

JUNIPER EX SERIES SWITCHES

STALLION AUTUMN SEMINAR 11.11.2010



AGENDA

The New Network

Operational Simplicity with Junos Software

- Junos Software

Juniper EX Series product line overview

- EX switch models
- Virtual Chassis technology

Operational Simplicity

- Unified Network Management



SETTING THE AGENDA FOR THE NEXT DECADE

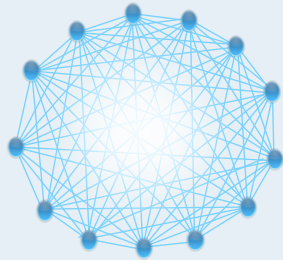
A wide-angle photograph of a city street lined with tall, modern skyscrapers. The street is paved and has a central green space with small trees. A large, bright yellow square is superimposed in the center of the image, containing the text "THE NEW NETWORK IS HERE" in white, bold, sans-serif capital letters.

THE
NEW
NETWORK
IS HERE

Juniper Networks is transforming the
experience and economics of networking

NEED FOR NEW NETWORK EQUATION

NETWORK INNOVATION  ECOSYSTEM INNOVATION  NEW NETWORK



**HIGH PERFORMANCE
NETWORKING IS THE FOUNDATION**



FAST



SECURE



SCALABLE



RELIABLE



SIMPLE



**PARTNER SOLUTIONS EXTEND
THE POSSIBILITIES**



PROFITABLE



VERSATILE



DYNAMIC



OPEN



**ACCELERATED INNOVATION
AND COMPETITION DRIVES ...**



NEW, BETTER EXPERIENCES



NEW FLEXIBILITY & AGILITY



NEW CUSTOMER SOLUTIONS



NEW REVENUE SOURCES

JUNIPER PRODUCT PORTFOLIO



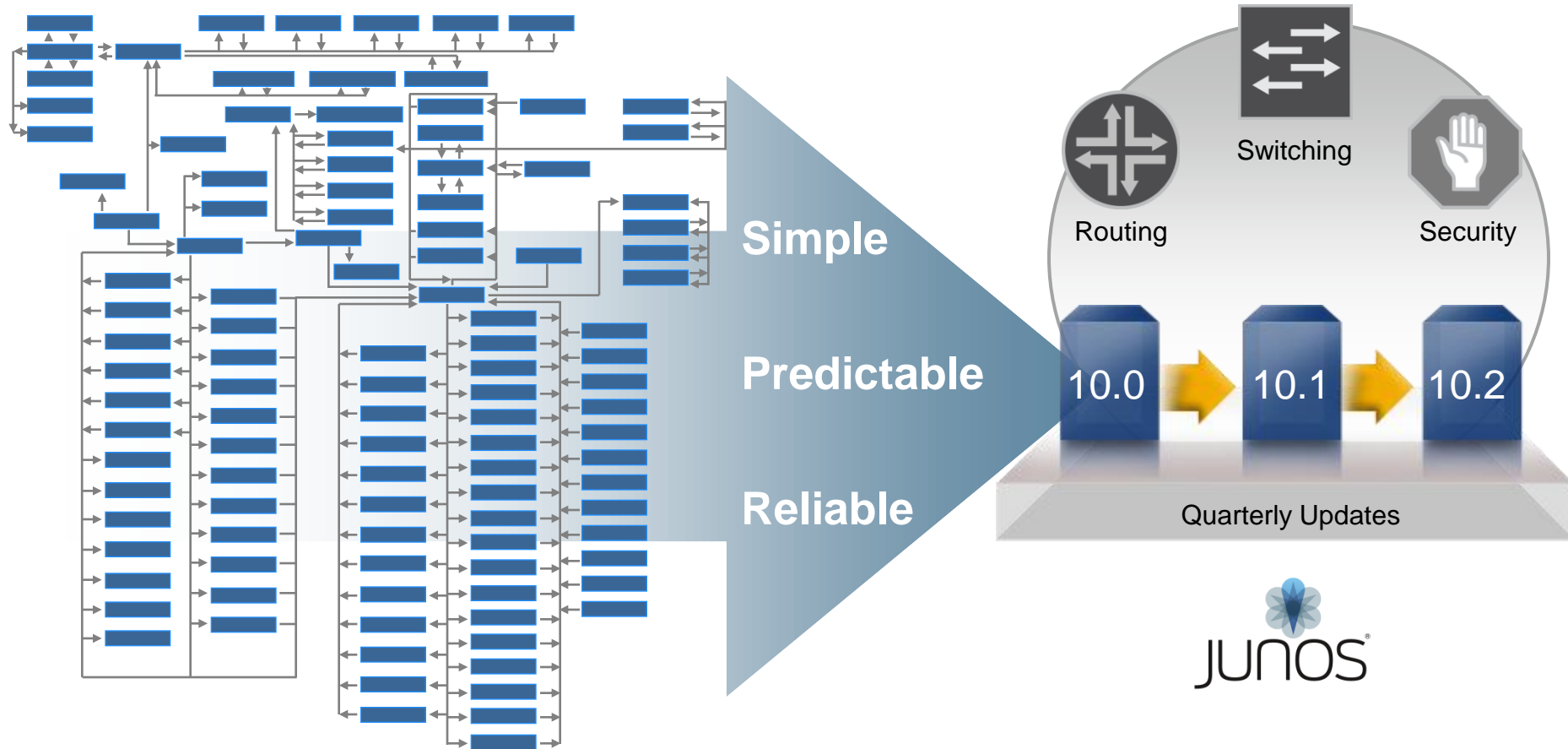


<http://junos.juniper.net/>

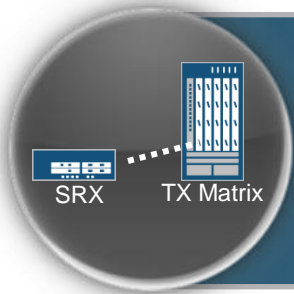
OPERATIONAL SIMPLICITY
JUNOS SOFTWARE

INNOVATE RATHER THAN OPERATE YOUR NETWORK

Ten years on-time, stable release delivery



WHAT MAKES JUNOS BETTER?



One OS

- Single source code base
- Consistent implementation of features



One Release

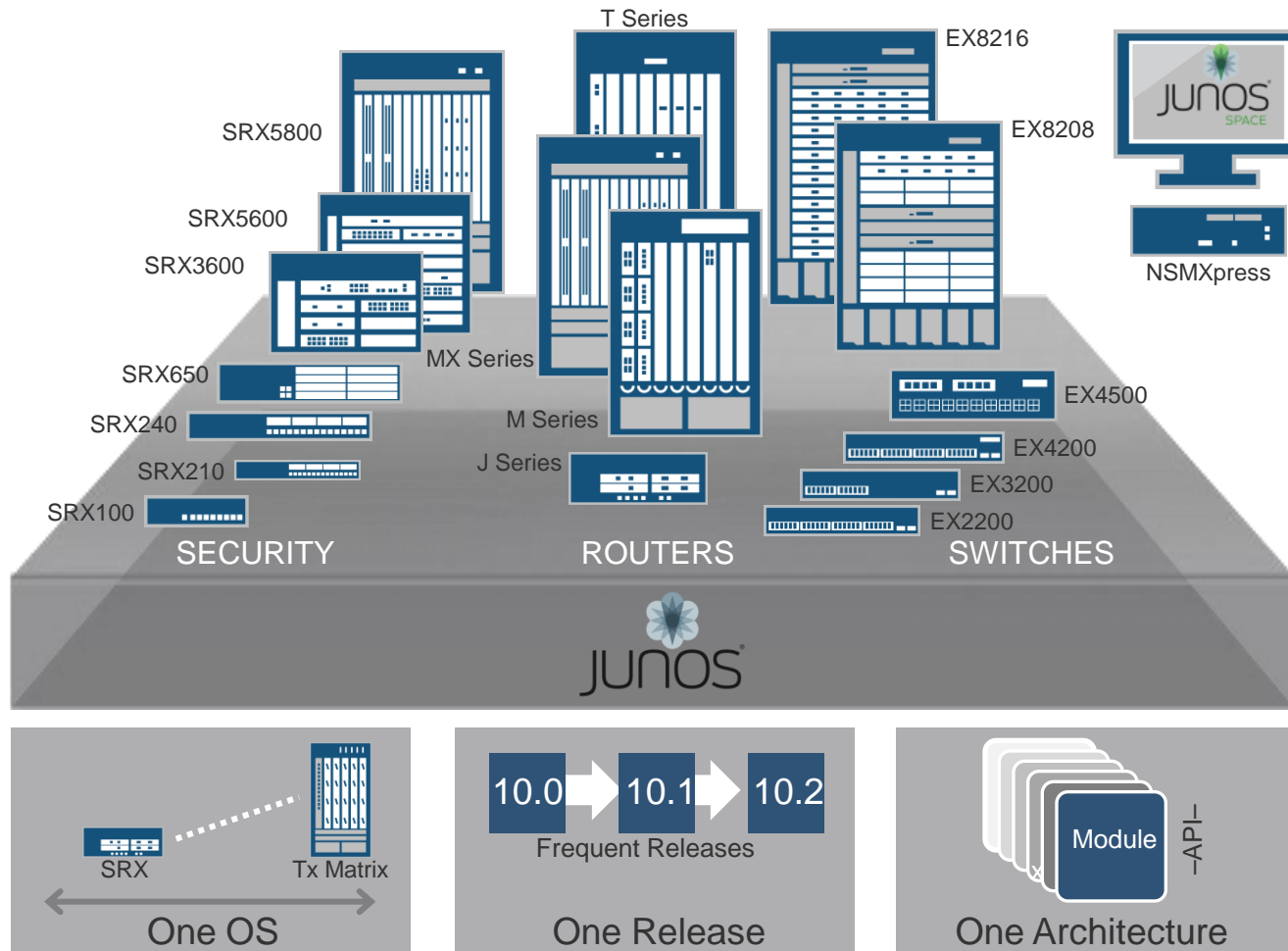
- Single software release track of feature supersets
- Stable, predictable development of new features



One Architecture

- Modular software with resource separation
- Highly available, secure and scalable software

JUNOS OPERATING SYSTEM



REDUCE COMPLEXITY, ACHIEVE EXCELLENCE, DELIVER DYNAMIC SERVICES

Reduce Risks

- Continuous systems availability
 - Improve network availability and delivery of applications and services

Network Availability Metric	Average Decrease*
Frequency of Unplanned Events	↓ 24%
Duration of Unplanned Events	↓ 30%

Decrease Cost & Complexity

- Automated operations efficiency
 - Streamline operations, enhance efficiency, and lower TCO

Network Efficiency Metric	Average Time Saved*
Troubleshooting	↓ 54%
Monitoring	↓ 24%

Increase Speed of Change

- Open innovation flexibility
 - Provide the flexibility to meet changing business requirements

Network Flexibility Metric	Average Time Saved*
Upgrading	↓ 23%
Adding Infrastructure	↓ 29%



EX SERIES PRODUCT LINE OVERVIEW

BUILD HIGH-PERFORMANCE NETWORKS WITH EX SERIES ETHERNET SWITCHES



Carrier-class Reliability

Integrated Security

Operational Simplicity



EX4500



EX8208



EX8216



EX2200



EX3200



EX4200

EX2200 LINE OF ETHERNET SWITCHES

Designed for branch and low-density wiring closets

Fixed configuration

- 24 or 48 ports
- PoE model options
- 4 SFP uplinks

Fixed power supply and fans

Junos operating system

- L2 and RIP in base license

Consistent management

- NSM or Junos Space
- UAC integration

High-performance

- Wire-rate, non-blocking
- 104Gbps capacity



# Ports	Port Type	PoE Ports	Fixed Uplinks	Max Power Consumption (PoE Power)
24	10/100/1000B-T	0	4 SFP	100 (0) W
24	10/100/1000B-T	24	4 SFP	550 (405) W
48	10/100/1000B-T	0	4 SFP	100 (0) W
48	10/100/1000B-T	48	4SFP	550 (405) W

EX3200 LINE OF ETHERNET SWITCHES

Standalone configuration

- 24 or 48 ports, PoE model options

Flexible uplink modules

- 4-port GbE (SFP)
- 2-port 10GbE (XFP)
- Dual-mode 4-port GbE/2-port 10GbE (SFP+)



Modular power and cooling

- Field-replaceable AC, DC PSU
- Field replaceable fan tray

Junos operating system

- RIP, full OSPF and IP multicast in base license

Consistent management

- NSM or Junos Space
- UAC integration

High-performance

- Wire-rate, non-blocking

# Ports	Port Type	PoE Ports	Max Power Consumption (incl. PoE)
24	10/100/1000B-T	8	112 (320) W
24	10/100/1000B-T	24	138 (600) W
48	10/100/1000B-T	8	167 (320) W
48	10/100/1000B-T	48	207 (930) W

EX4200 LINE OF ETHERNET SWITCHES WITH VIRTUAL CHASSIS TECHNOLOGY

Virtual Chassis technology

- 128 Gbps virtual backplane
- Manage up to 10 as a single device
- Extend over 10GbE or GbE uplinks
- Master and backup route engines

Flexible uplink modules

- 4-port GbE (SFP)
- 2-port 10GbE (XFP)
- Dual-mode 4-port GbE/ 2-port 10GbE (SFP+)

Fully redundant power and cooling

- Dual, hot-swappable AC, DC PSU
- Fan FRU, multiple blowers

Junos operating system

- RIP, full OSPF and IP multicast in base license

Consistent management

- NSM or Junos Space
- UAC integration

High-performance

- Wire-rate, non-blocking
- Local switching



# Ports	Port Type	PoE Ports	Max Power Consumption (incl. PoE)
24	10/100/1000B-T	8	129 (320) W
24	10/100/1000B-T	24	160 (600) W
24	100B-FX/1000B-X	N/A	108 (N/A) W
48	10/100/1000B-T	8	181 (320) W
48	10/100/1000B-T	48	224 (930) W

EX4500 LINE OF ETHERNET SWITCHES

10GbE Ethernet switch

- 2RU, 40x 1/10GbE SFP/SFP+
- Two uplink modules (4 x SFP+/each)

Data center-optimized

- Reversible airflow (2 SKUs - front-to-back; back-to-front)
- Versatile mounting options
- Twinax/DAC support for ToR server access

10GbE aggregation switch

- Building/campus distribution and core

Virtual Chassis enabled[Ⓢ]

- 128G Virtual Chassis compatible with EX4200[Ⓢ]
- High-speed optical Virtual Chassis[Ⓢ]

Wire-rate performance on all ports

Redundant power & fans

Junos operating system

- RIP, full OSPF and IP multicast in base license

Consistent management

- NSM or Junos Space
- UAC integration



Model	# Ports	Port Type	Uplinks	Air Flow
EX4500-40F-FB	40	1/10GbE	8xSFP+	Front-to-back
EX4500-40F-BF	40	1/10GbE	8xSFP+	Back-to-front

EX8200 LINE OF MODULAR ETHERNET SWITCHES

High-performance chassis platforms

- EX8208 – Eight line cards, 960 Mpps
- EX8216 – Sixteen line cards 1.92 Bpps
- 100 GbE ready
- Fully redundant routing engines with N+1 redundant switch fabrics
- Up to 256 wire-speed, non-blocking 10GbE ports in a rack
- 320 Gbps capacity per line card

Virtual Chassis technology ☎

- Two-member Virtual Chassis ☎
- External Routing Engine (XRE) required

Fully redundant power and cooling

- Redundant, load-sharing PSUs (AC, DC)
- Hot-swap fan tray with redundant fans

Proven Juniper technology

- Switch fabrics, control plane
- Packet Forwarding Engine (PFE)
- Junos operating system



Module Description	Max Ports	Interface
48-port 10/100/1000B-T	384 or 768	RJ-45
48-port 100B-FX/1000B-X	384 or 768	SFP
8-port 10GbE	64 or 128	SFP+
40-port GbE/10GbE	320 or 640	SFP/SFP+

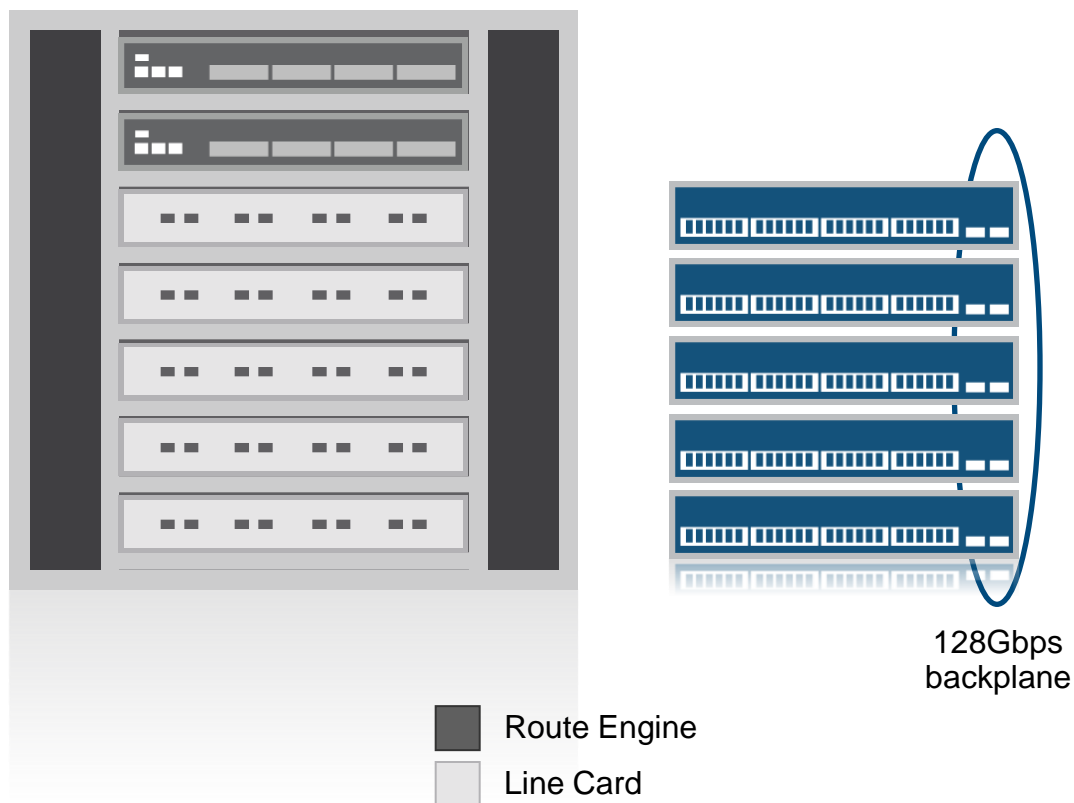


VIRTUAL CHASSIS TECHNOLOGY

MODULAR CHASSIS AND VIRTUAL CHASSIS TECHNOLOGY

Benefits of a Modular Chassis

- ✓High availability
 - Redundant RE
 - Redundant switch fabric
 - Redundant power
 - Redundant cooling
- ✓Easy to manage
 - Single image
 - Single configuration file
 - One management IP address
- ✓Performance and scale
 - Modular configuration
 - High-capacity backplane
- ✓Additionally, Virtual Chassis offers:
 - Physical placement flexibility
 - Pay-as-you-grow expansion
 - Lower power consumption
 - Decreased heat generation
 - Less consumed space



EX4200 AND EX4500[⌚] DELIVERS CHASSIS-CLASS FUNCTIONALITY



Master RE + line card

Backup RE + line card

Line cards...

Mix & match
EX4200 models
and EX4500[⌚]

- ✓ Consumes less power
- ✓ Saves rack space
- ✓ One Junos image
- ✓ One configuration file
- ✓ One management IP address

EX4200 DELIVERS CHASSIS-CLASS PERFORMANCE



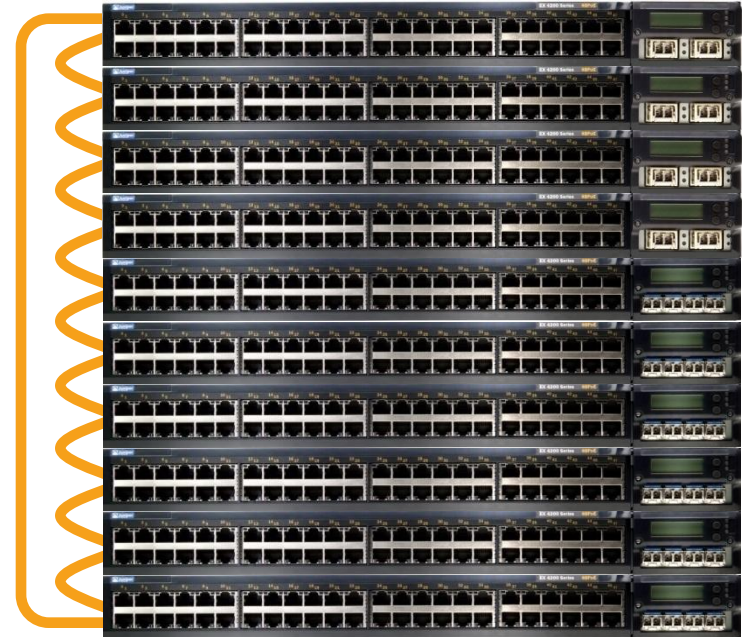
(48) 10/100/1000 + (2) 10GbE



64Gbps per Virtual Chassis port



64Gbps per Virtual Chassis port

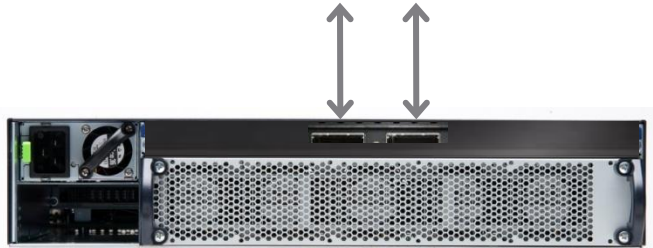


- Wire-rate performance
- Capacity: 136 Gbps
- Throughput: 101 Mpps

- 480 GbE ports
- 20 10GbE ports
- Backplane: 128 Gbps
- Capacity: 1.36 Tbps
- Throughput: 1010 Mpps

EX4200 & EX4500[Ⓢ] VIRTUAL CHASSIS

64Gbps per Virtual Chassis port



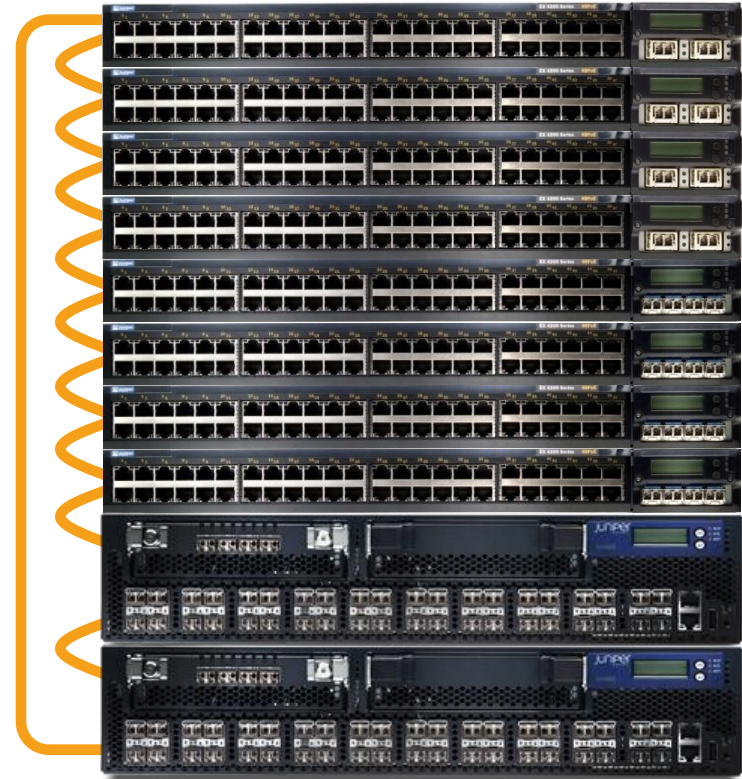
EX4500

64 Gbps per Virtual Chassis port

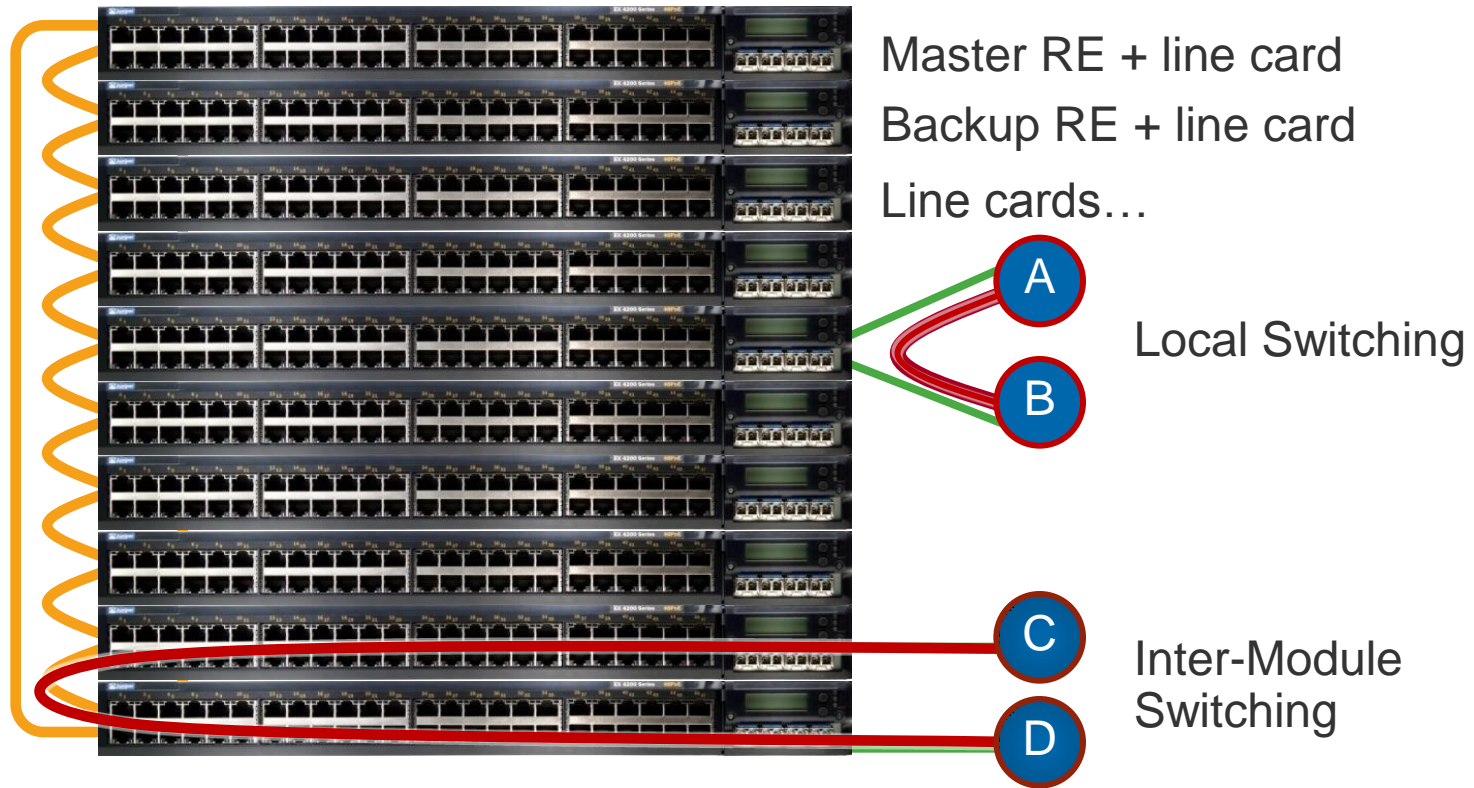


EX4200

- EX4200 and EX4500 Virtual Chassis[Ⓢ]
- Up to 10 EX4200s, two EX4500s[Ⓢ], or eight EX4200s / two EX4500s combined[Ⓢ]
- Up to 480 GbE ports
- Up to 112 10GbE ports[Ⓢ]
- Backplane: 128 Gbps

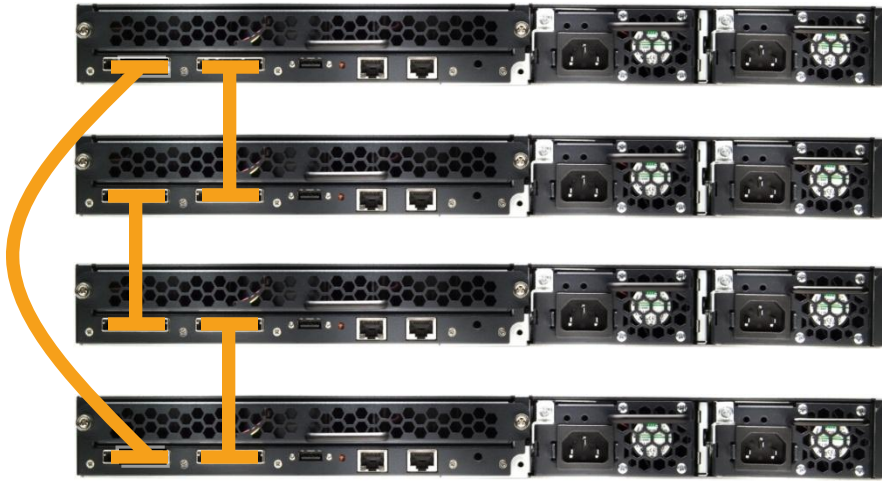


EX4200 DELIVERS WIRE-RATE PERFORMANCE WITH DISTRIBUTED SWITCHING



EX4200 VIRTUAL CHASSIS CABLING

Option 1: Daisy Chain Ring Wiring Closets



Longest Virtual Chassis cable spans entire Virtual Chassis; max height or width is 5 meters

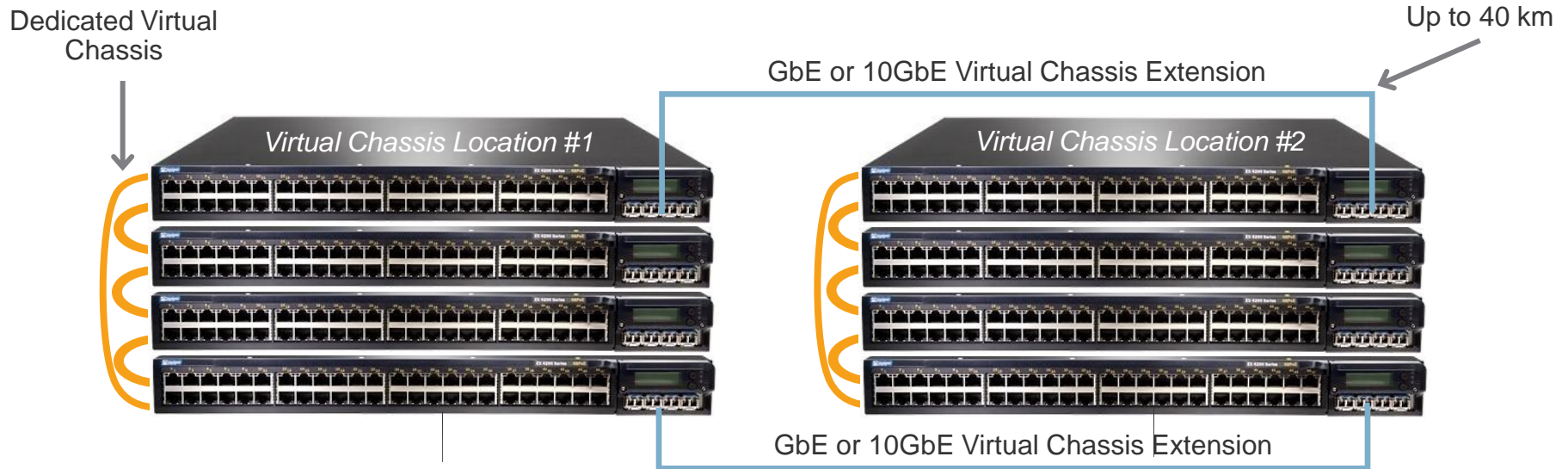
Option 2: Braided Ring Data Center Top of Rack, Wiring Closets



Longest Virtual Chassis cable spans just three switches; max height or width is 25 meters

EX4200 VIRTUAL CHASSIS CABLING

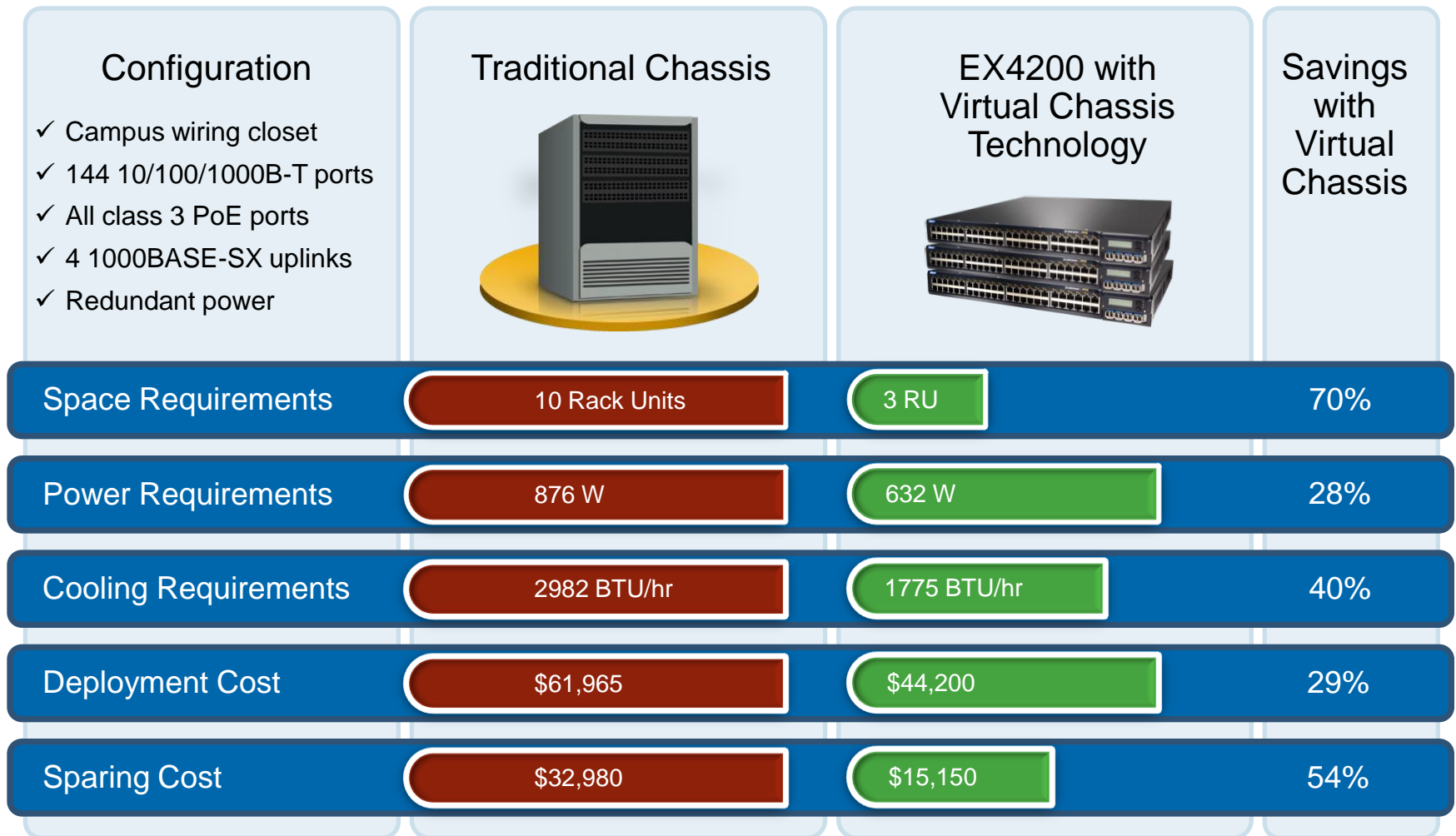
Option 3: Extended Virtual Chassis Across wiring closets, data center racks or rows



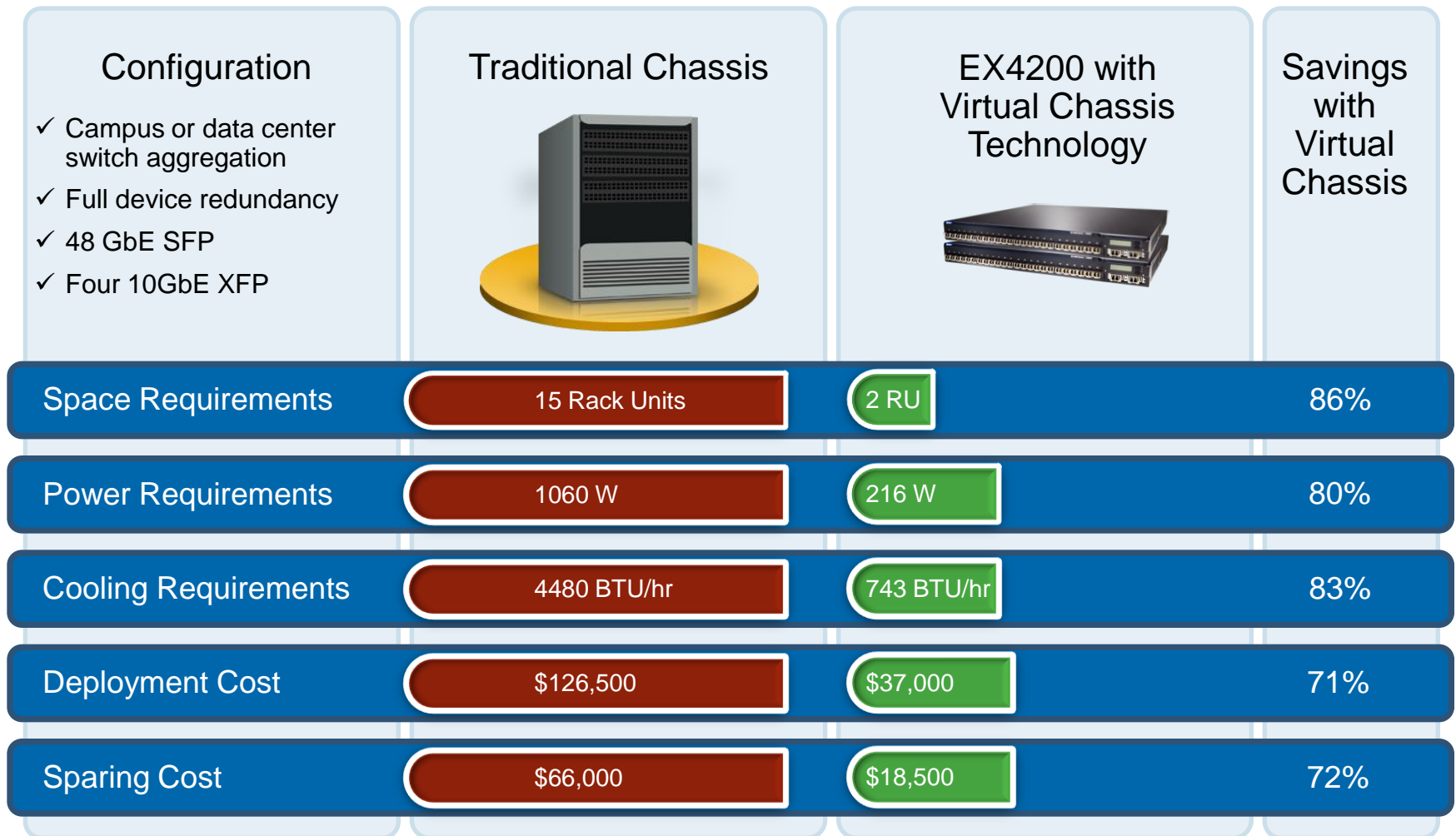
Extend height and/or width of Virtual Chassis by GbE or 10GbE uplinks

- Up to distance of optics (40km)
- Maximum circumference of 100km

VIRTUAL CHASSIS TECHNOLOGY COST BENEFITS



VIRTUAL CHASSIS TECHNOLOGY COST BENEFITS



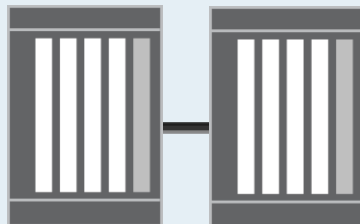
EX4500 VIRTUAL CHASSIS 10GbE AGGREGATION

COST BENEFITS

Configuration

- ✓ Campus or data center 10GbE aggregation or core
- ✓ Full device redundancy
- ✓ 96 10GbE SFP+
- ✓ Wire-speed performance, all ports

Traditional Chassis





EX4500 with Virtual Chassis Technology



Savings with Virtual Chassis

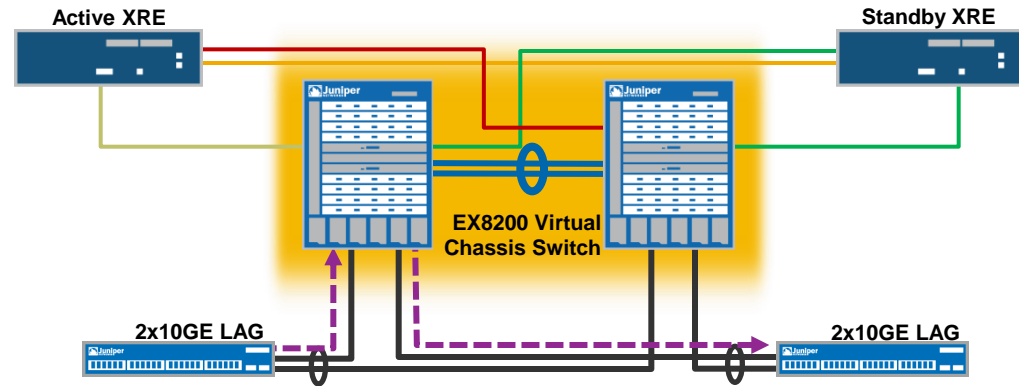
Space Requirements	30 Rack Units	4 RU	87%
Power Requirements	6,328 W	800 W	87%
Cooling Requirements	22,336 BTU/hr	2,728 BTU/hr	88%
Deployment Cost	\$577,000	\$83,000	86%
Sparing Cost	\$78,500	\$37,500	52%

VIRTUAL CHASSIS TECHNOLOGY COMPARISON WITH STACKABLES

	 Virtual Chassis	 Typical Stackable
Superior backplane capacity	128Gbps	10-80Gbps
Configuration Flexibility	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chassis extension via 10GbE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Modular uplinks	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chassis Like HA	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dedicated Master & Standby Routing Engines	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Graceful Routing Engine Switchover (GRES)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Non-stop routing (NSR)/ISSU [Ⓢ]	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Redundant & hot-swappable internal PSUs	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field-serviceable fan tray w/ redundant fans	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Operational Simplicity	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Licensing per RE, not per switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Uses chassis module configuration & numbering / LCD	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	\$\$\$	\$\$\$

EX8200 VIRTUAL CHASSIS TECHNOLOGY

- Extends Virtual Chassis technology to the core[®]
- Simplifies the architecture
 - Eliminates Spanning Tree and VRRP
 - Reduces the number of logical devices
- Enables large core and access
 - Two-member Virtual Chassis
 - Over 1200 10GbE ports per logical device
 - Over 1400 GbE per logical device
 - Extend the Virtual Chassis to 40km
- Most available single control plane implementation
 - No single point of failure
 - Control plane offload to external route engine



XRE200

OPERATIONAL SIMPLICITY
UNIFIED NETWORK MANAGEMENT



UNIFIED MANAGEMENT FOR EX SERIES SWITCHES

Device Management



Junos CLI

- Telnet, SSH
- Junoscript: Automated Configuration, Operations

J-Web

- Quick Setup with Templates
- Dashboard View
- Performance Monitoring



Network & Security Management



Juniper NSM and Junos Space

- Discovery & Configuration
- Policy Management
- Inventory Management
- Log Management



Juniper STRM

- Threat Detection
- Event Log Management
- Compliance & IT Efficiency

Third-party NMS



Telnet
SSH
XML

HTTP
HTTPS
XML

NetConf
DMI
Syslog
Sflow

SNMP
Syslog



Juniper EX Series
Open, standards-based
management



SIMPLIFY OPERATIONS WITH THE J-WEB MANAGEMENT USER INTERFACE

Easy initial setup

- Enables fast deployment with minimum configuration steps

Dashboard with Chassis View

- Dynamic status update of system and ports

Feature configuration

- Templates: Ports, VLAN, 802.1X, Security and QoS
- Networking: VLAN, PoE, LLDP, Link Aggregation, Chassis, Port Mirroring
- Security: 802.1X, ACL

Performance monitoring

- Real-time monitoring graphs
- System, ports, VLAN, PoE, chassis
- 802.1X, Port Security

Troubleshooting & maintenance

- Firmware & configuration upgrade / rollback
- Basic troubleshooting tasks



NETWORK MANAGEMENT

NSM AND NSMXPRESS™

Device management

- Device topology discovery, tracking
- Role-based administration
- Tracking end-hosts, free ports
- URL link to J-Web

Configuration management

- Role-based port templates
- Configuration version management

Inventory management

- Hardware & software inventory
- Viewing device licenses

Monitoring & troubleshooting

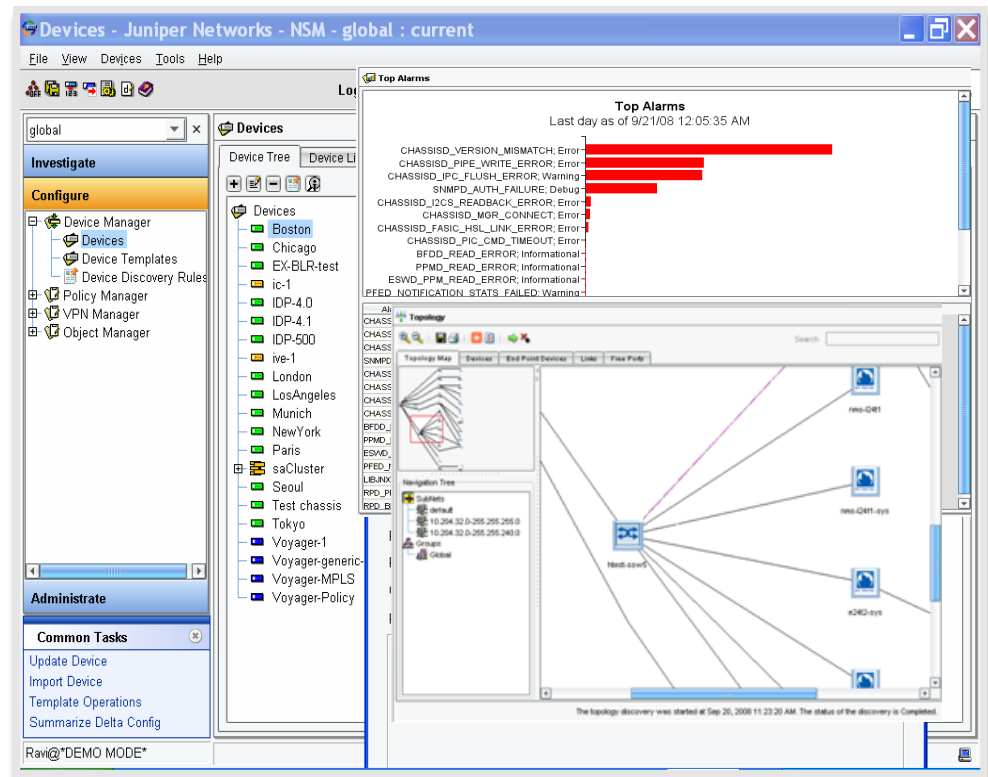
- Log filtering & reporting
- Status monitoring

Centralized change management

- Configuration version management
- Software version tracking & updates

Ease of deployment

- Appliance-based form factor



JUNOS SPACE ORCHESTRATES THE NEW NETWORK

The New Network With Junos Space



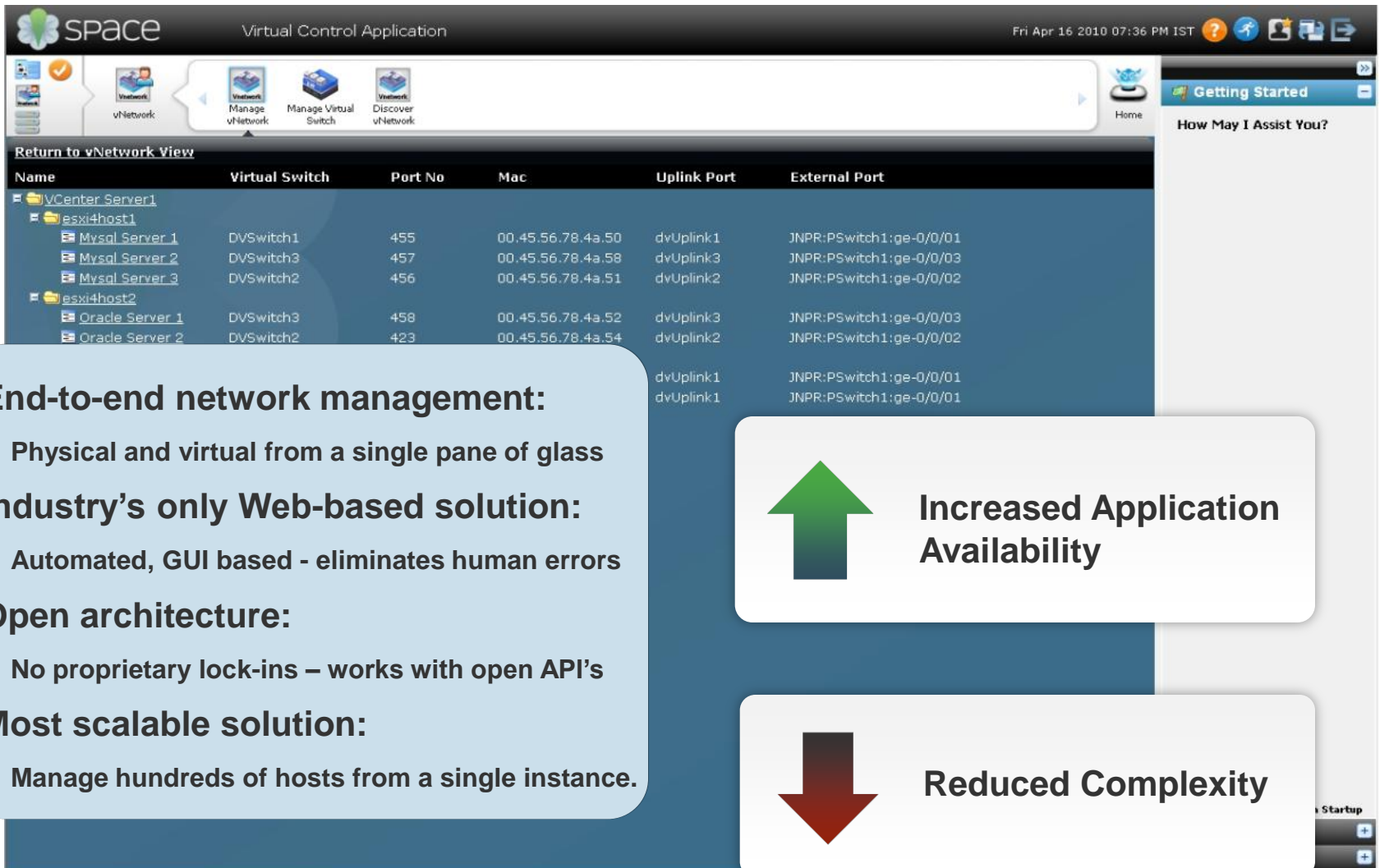
Characteristics:

- Common, cross-device platform for automation of virtual and physical networks
- Plug & play application environment
- User-centric, task-oriented interface
- Correlated network, security, app and user intelligence

Consequences:

- Improved top and bottom line benefits
 - Rapid scaling of application infrastructure
 - Reduced opex
- Optimal security, scale and resource efficiency

SIMPLIFIED MANAGEMENT OF VIRTUAL AND PHYSICAL NETWORKS



The screenshot displays the Juniper Space Virtual Control Application interface. The top navigation bar includes the 'space' logo, the title 'Virtual Control Application', and the date/time 'Fri Apr 16 2010 07:36 PM IST'. Below the navigation bar, there are icons for 'vNetwork', 'Manage vNetwork', 'Manage Virtual Switch', and 'Discover vNetwork'. The main content area shows a table of network configurations under the heading 'Return to vNetwork View'.

Name	Virtual Switch	Port No	Mac	Uplink Port	External Port
VCenter Server1					
esxi4host1					
Mysql Server 1	DVSwitch1	455	00.45.56.78.4a.50	dvUplink1	JNPR:PSwitch1:ge-0/0/01
Mysql Server 2	DVSwitch3	457	00.45.56.78.4a.58	dvUplink3	JNPR:PSwitch1:ge-0/0/03
Mysql Server 3	DVSwitch2	456	00.45.56.78.4a.51	dvUplink2	JNPR:PSwitch1:ge-0/0/02
esxi4host2					
Oracle Server 1	DVSwitch3	458	00.45.56.78.4a.52	dvUplink3	JNPR:PSwitch1:ge-0/0/03
Oracle Server 2	DVSwitch2	423	00.45.56.78.4a.54	dvUplink2	JNPR:PSwitch1:ge-0/0/02
				dvUplink1	JNPR:PSwitch1:ge-0/0/01
				dvUplink1	JNPR:PSwitch1:ge-0/0/01

On the right side of the interface, there is a 'Getting Started' section with the text 'How May I Assist You?' and a 'Startup' section with a '+ Start' button.

End-to-end network management:

- Physical and virtual from a single pane of glass

Industry's only Web-based solution:

- Automated, GUI based - eliminates human errors

Open architecture:

- No proprietary lock-ins – works with open API's

Most scalable solution:

- Manage hundreds of hosts from a single instance.

Increased Application Availability

Reduced Complexity

SECURITY THREAT RESPONSE MANAGER (STRM)

Juniper STRM Appliance



Key Features

Threat Detection

Detect Day 0 threats; detect right threats at the right time

Log Management

Log management and generic reporting engine

Compliance

Policy safety net & audits













Application Visibility

Application flow identification & consumption per application



THIRD PARTY NETWORK MANAGEMENT

Integration through standards-based Junos APIs: NetConf, SNMP v1/v2/v3, Telnet, SSHv3, HTTP/HTTPS

Vendor	Product	Description	Junos Release
	Tivoli NetCool OmniBus v7.2	Centralized fault management, and trap and alarm correlation and device monitoring	9.2
	Tivoli IP Network Manager v3.7	iP based layer 3 network visualization and topology based event correlation	9.0
	OpenView NNM v7.5	Device discovery, collection of traps and alarms, and device health monitoring	9.2R2.1 5
	OpsWare Network Automation	Centralized configuration & change management	9.x
	VistaInsight v3.0	Centralized performance management	9.0
	Smarts v7.03	Centralized fault management including discovery, alarm correlation	9.2R3
	Spectrum v8.1	Centralized fault management including discovery, and trap and alarm correlation and device monitoring	9.2R3
	eHealth v6.0	Centralized performance management	9.2
	NetworkAuthority Automation	Policy based configuration & change	9.2R3
	Orion Network Performance Monitor	Comprehensive fault and network performance management platform	9.0
	R-Series NCCM	Network Configuration and Change Management	9.2
	Comptel / Axiom Service Activation	Service Activation and provisioning	9.2R3



everywhere