

Why Your Network is Poised to Thwart Your IT Progress

Abner Germanow
Director, Enterprise Marketing
Juniper Networks



TIME FOR A NEW NETWORK

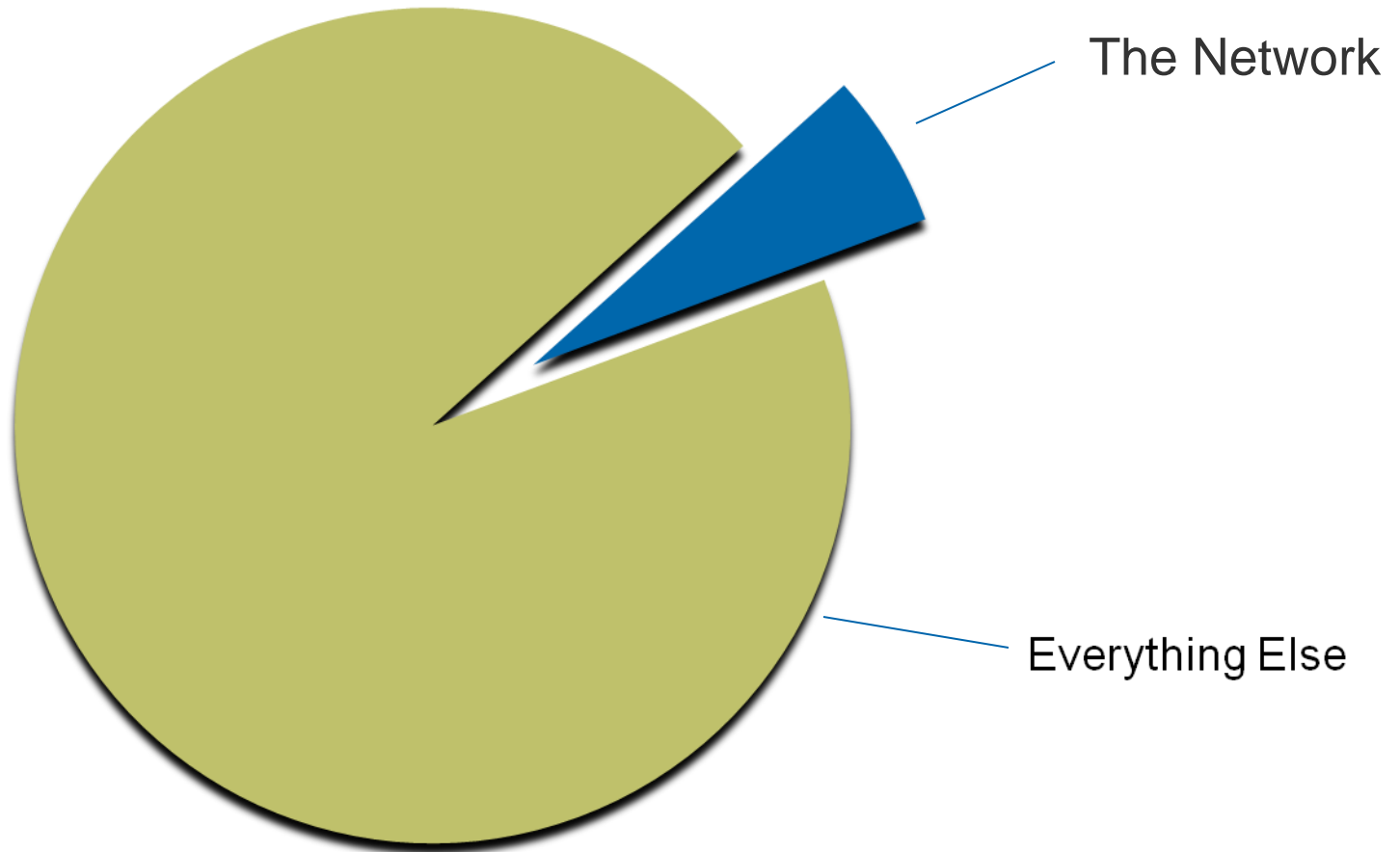
REINVENTING THE NETWORK

Abner Germanow

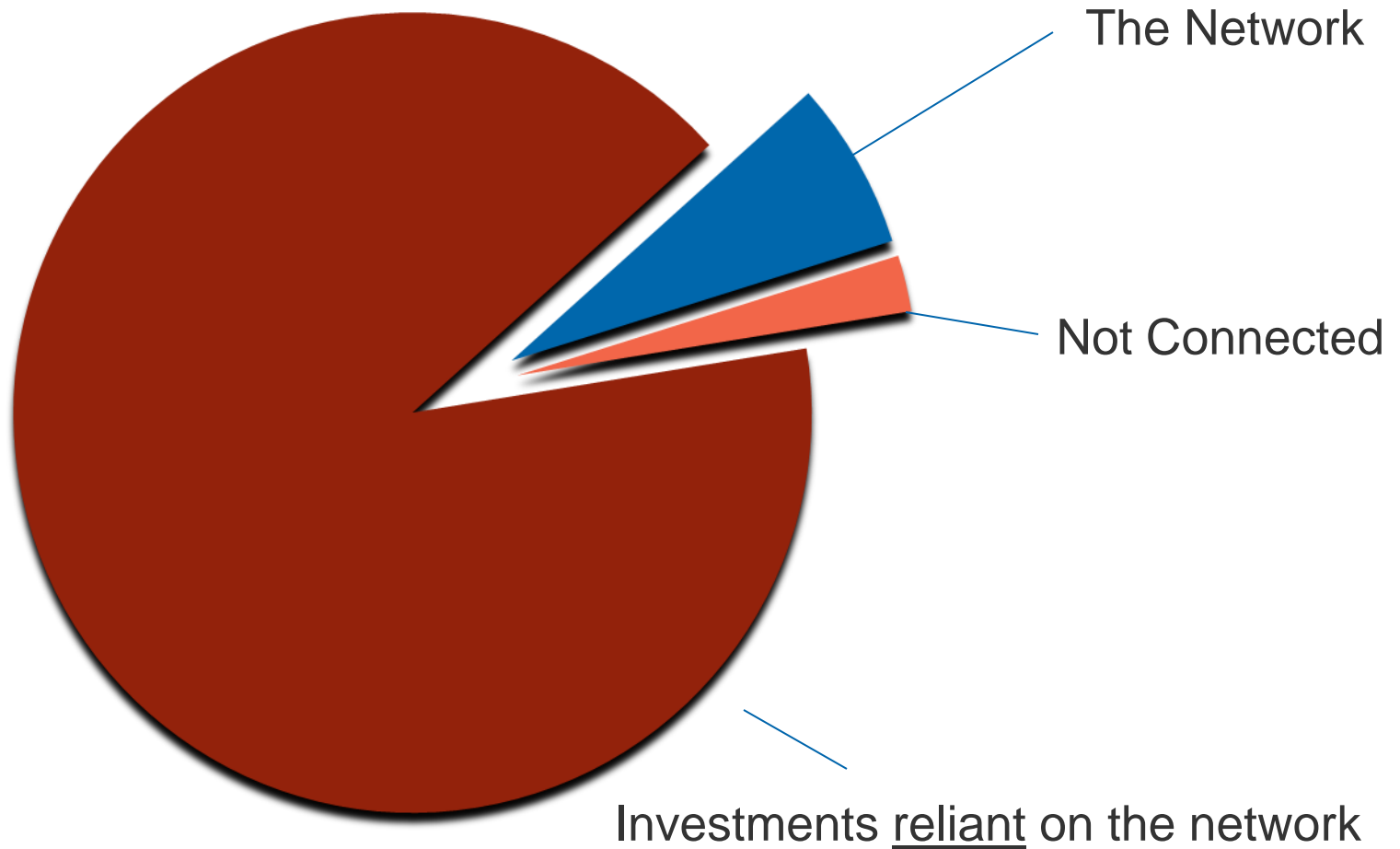
June 7, 2011



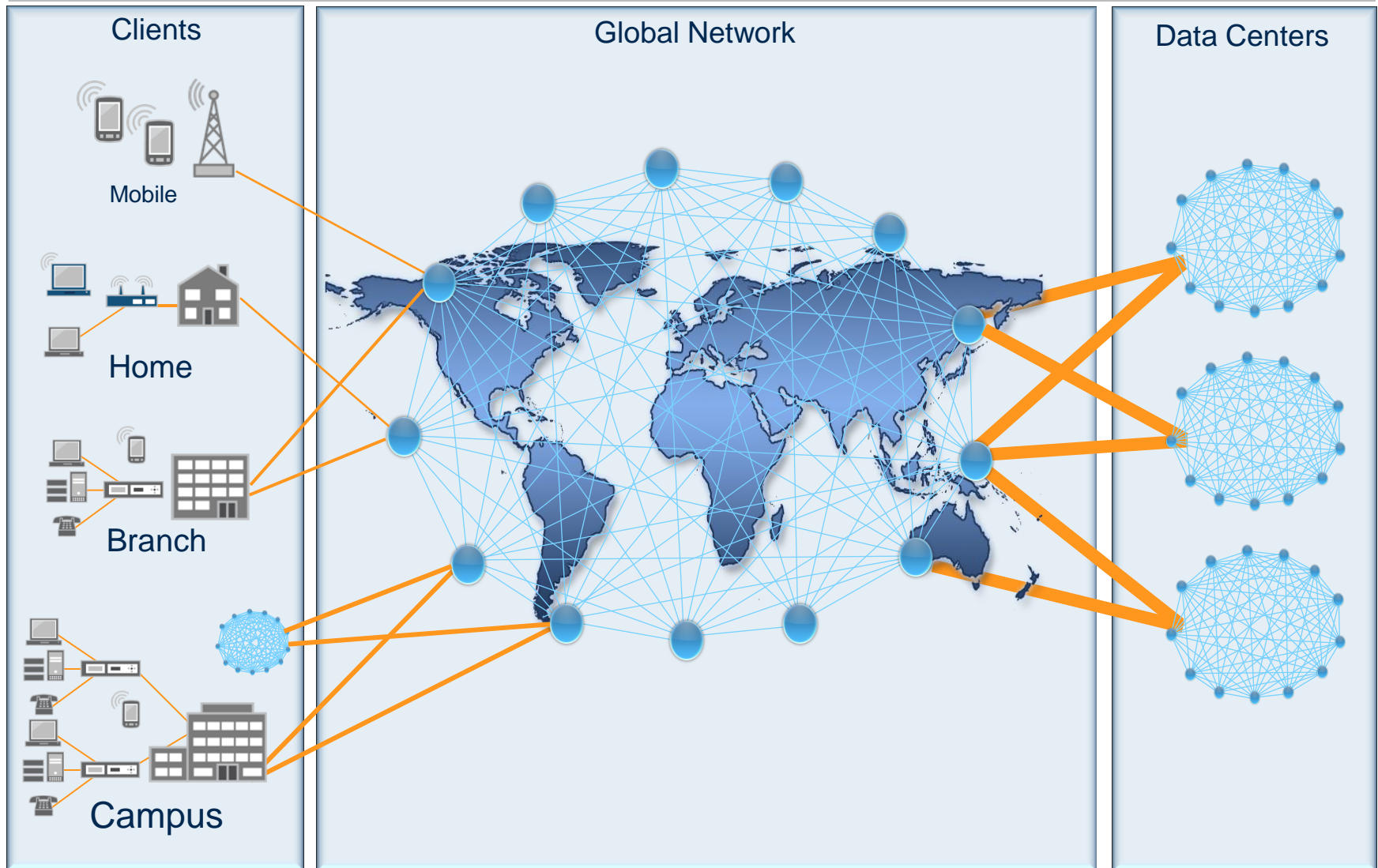
IT SPENDING



IMPACT OF THE NETWORK



The New Network: Goes Everywhere

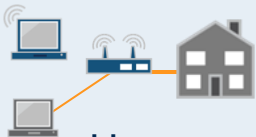


WHAT NEW EXPERIENCES DOES THE NETWORK NEED TO ENABLE?

Clients



Mobile



Home



Branch



Deliver Services

MOBILITY



APPLICATION AGILITY

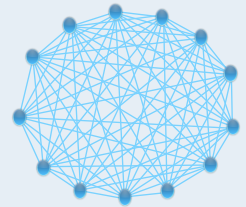
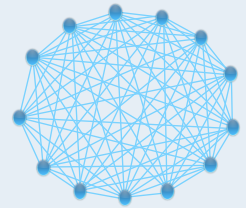
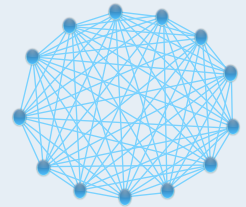


ECONOMICS & IT PRODUCTIVITY

Agility



Data Centers



Create Services

3 TOPICS TODAY

1

IT Changes Are Breaking the DC Network

2

Mobility Changes Everything

3

New network software is good for you

WHAT NEW EXPERIENCES DOES THE NETWORK NEED TO ENABLE?

MOBILITY



People and Application mobility drive efficiency & productivity

NEW APPLICATIONS



Any Application
One Agnostic Network
Private, Public, Hybrid

ECONOMICS & IT PRODUCTIVITY



Simple to provision,
manage and change

SOME CLOUD SUCCESS STORIES



“pulls meds out of the cloud”
– InformationWeek



“e4 Mars Rover Application hosted in the AWS cloud”
- Amazon Web Services Blog



“hundreds of millions of players are playing games
on Amazon’s servers, without even knowing it”
- venturebeat.com



“Everyone knows that SmugMug is a heavy user of S3”
-Opensource magazine

SOME ENTERPRISE WIDE SUCCESS STORIES

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Why?

SECURITY



Often Cited.

But not really
the problem
or the solution
by itself

Simplified NAS

The diagram illustrates the intricate electronic architecture of a Naval Air Station. Key functional areas and systems depicted include:

- Command and Control:** Systems like AFSS/PSS (Control), AFSS/PSS (Alphabet), and various command consoles.
- Communication:** NWS/NCAA, NWS/NCAA, and various communication links.
- Radar and Surveillance:** Visual NAVAR, Radar, and various surveillance facilities.
- ATC (Air Traffic Control):** ATC Tower, ATIS, and various ATC-related systems.
- Support Systems:** Various support systems, including power, data, and communication links.

The diagram is a complex network of interconnected systems, with numerous lines representing data and signal paths. A legend in the bottom right corner identifies symbols for ATC (Air Traffic Control) and NAS (Naval Air Station) facilities.

12

OF COURSE WHAT IT REALLY IT LOOKS LIKE IS THIS

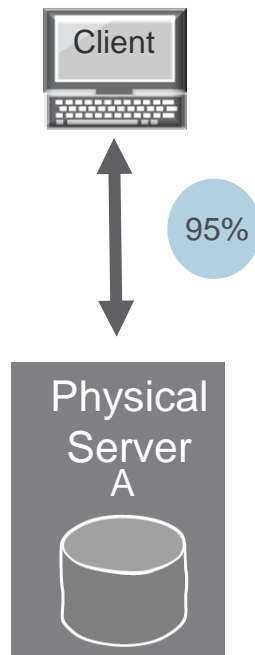


**Any successes tend to be “Pot Noodles”
Internally equally complex but well packaged**

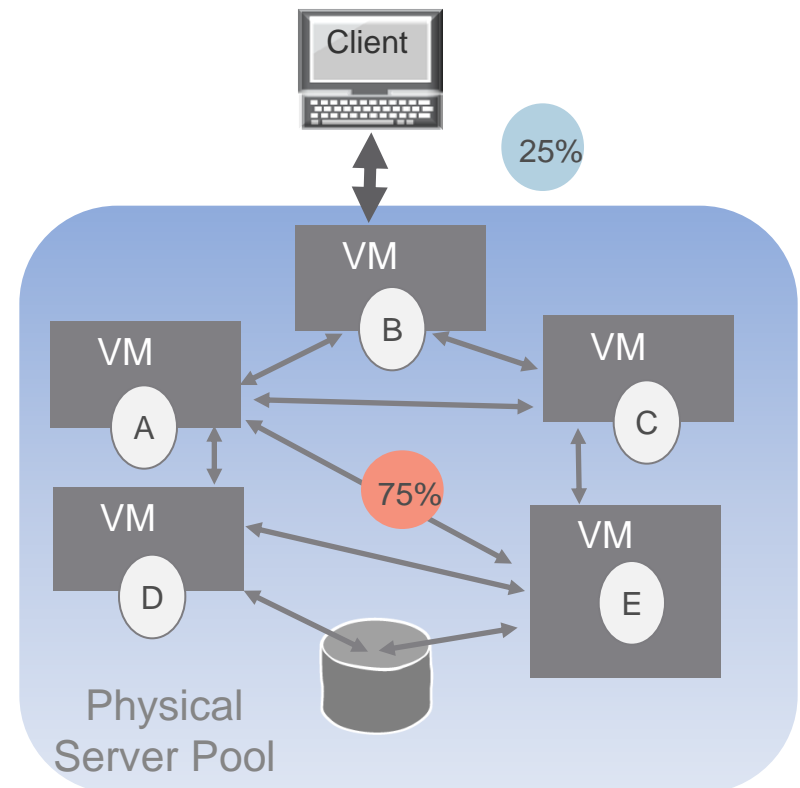
APPLICATION DATA FLOWS ARE CHANGING



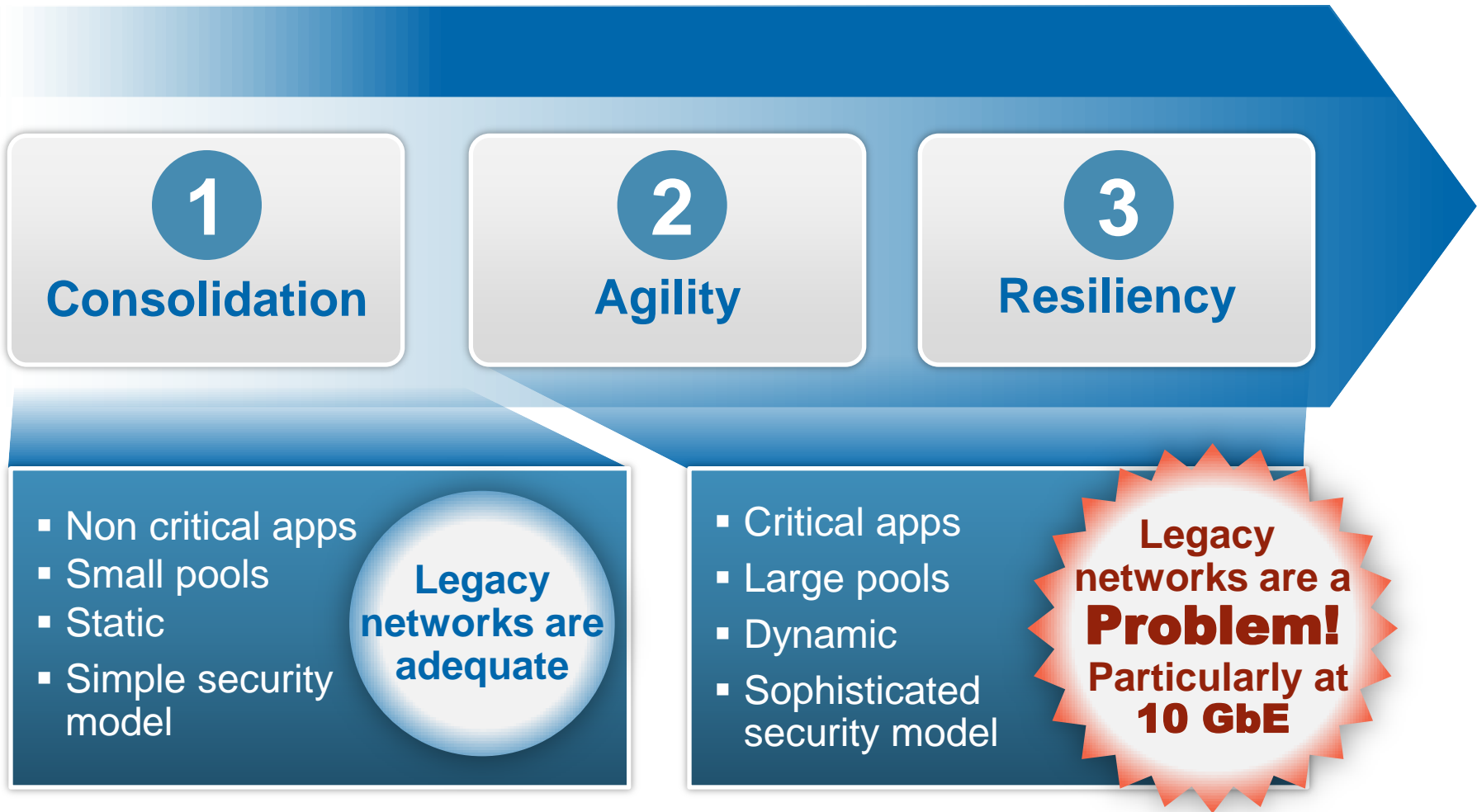
Client – Server Architecture



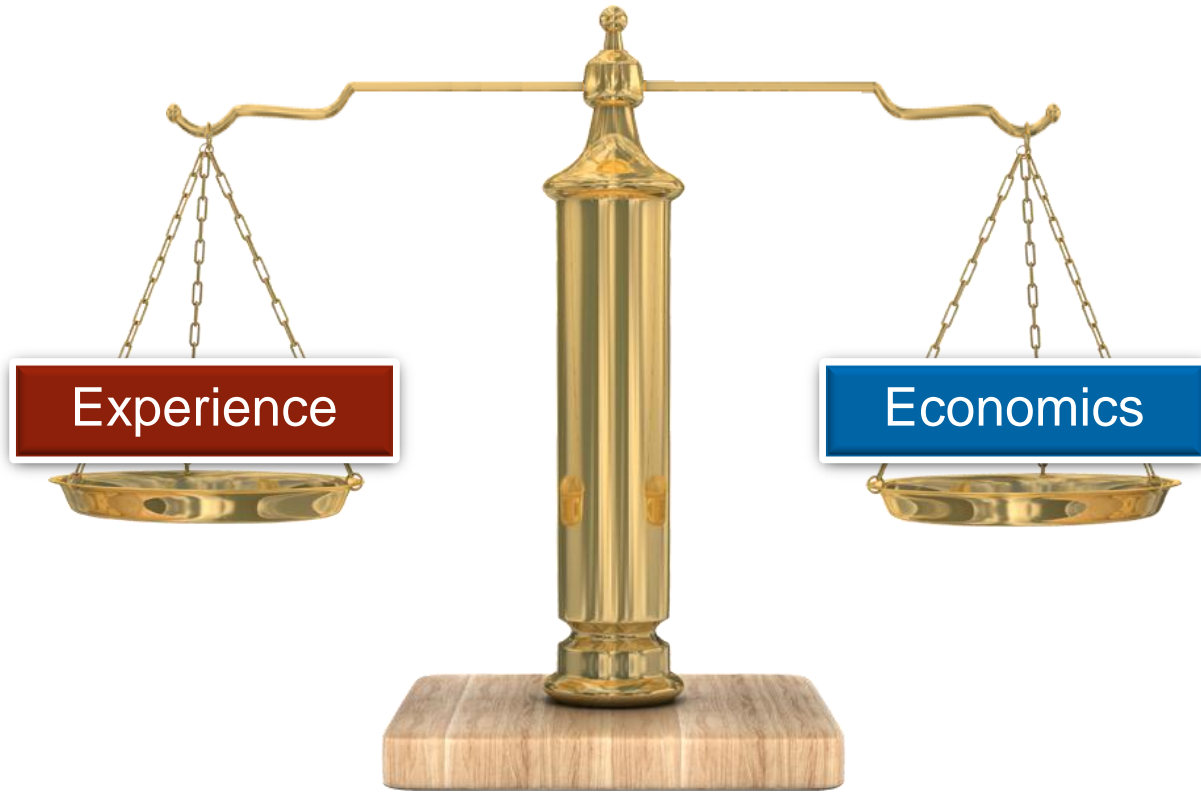
Today's Application Architecture



VIRTUALIZATION



IT Priorities



TWO PROBLEMS WITH THE LEGACY NETWORK

The Tyranny of Trees

Customer challenge

Maintaining application consistency in a dynamic environment

Experience

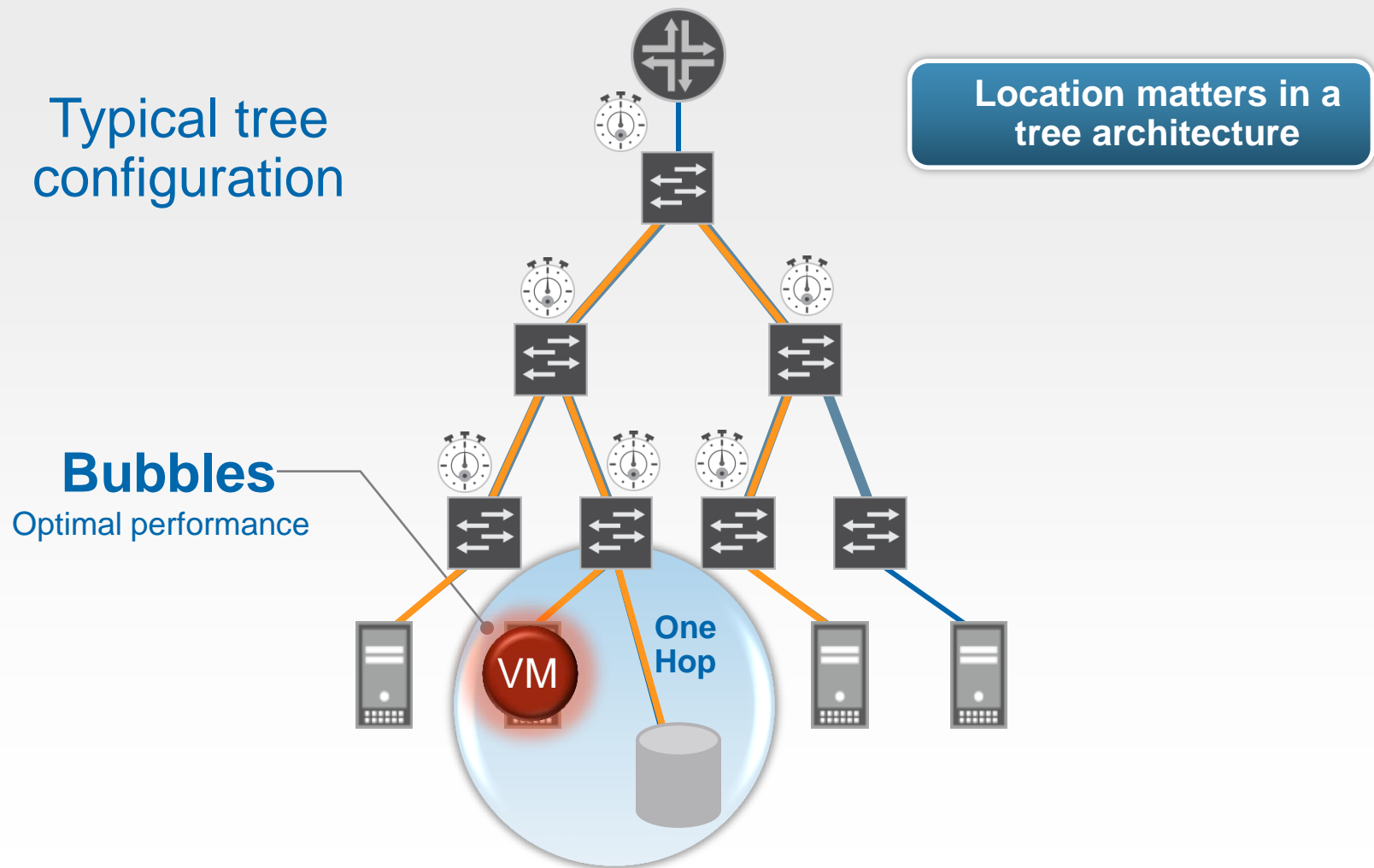
Overwhelming Complexity

Customer challenge

Multiple networks and each with geometrically increasing complexity

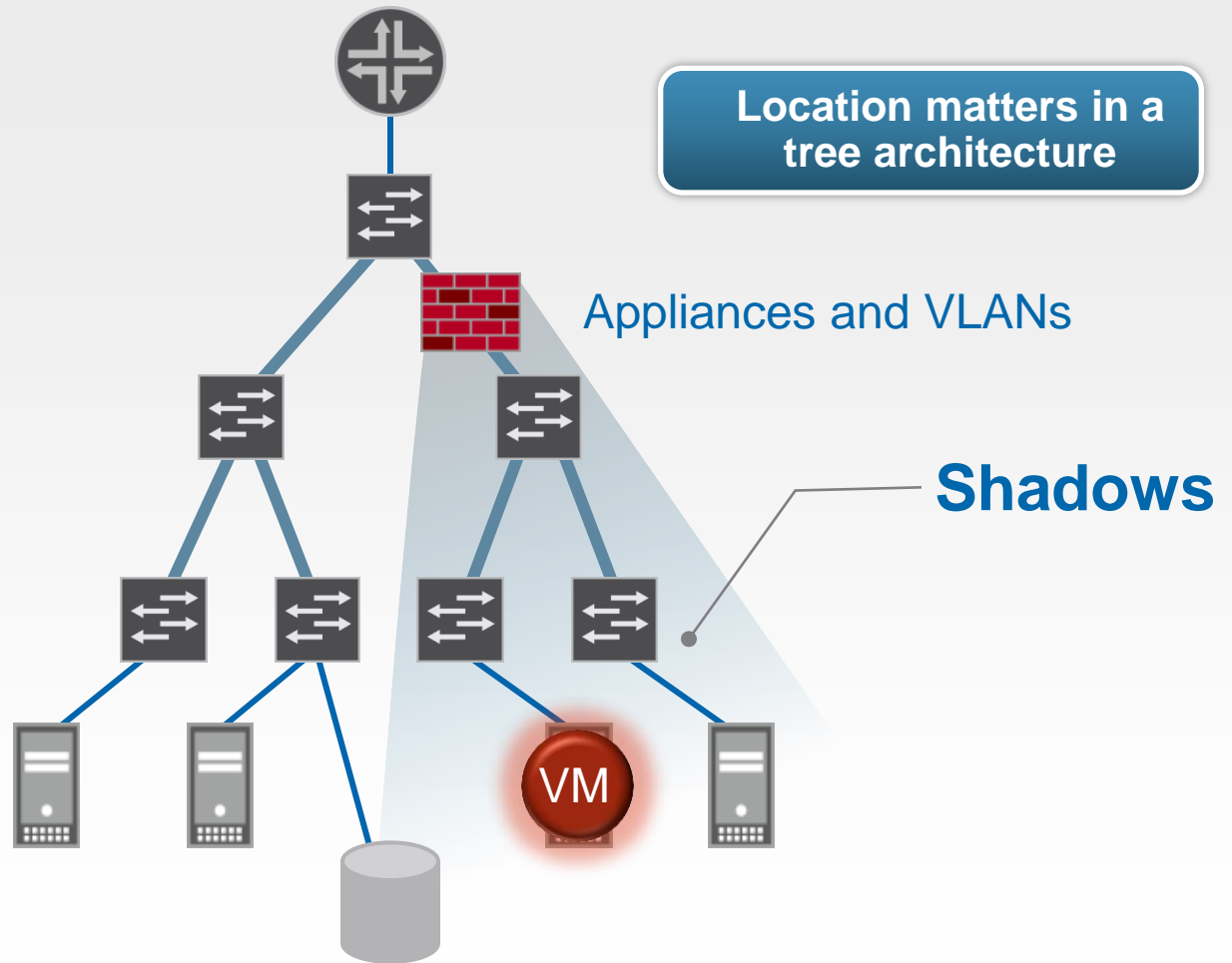
Economics

THE TYRANNY OF TREES

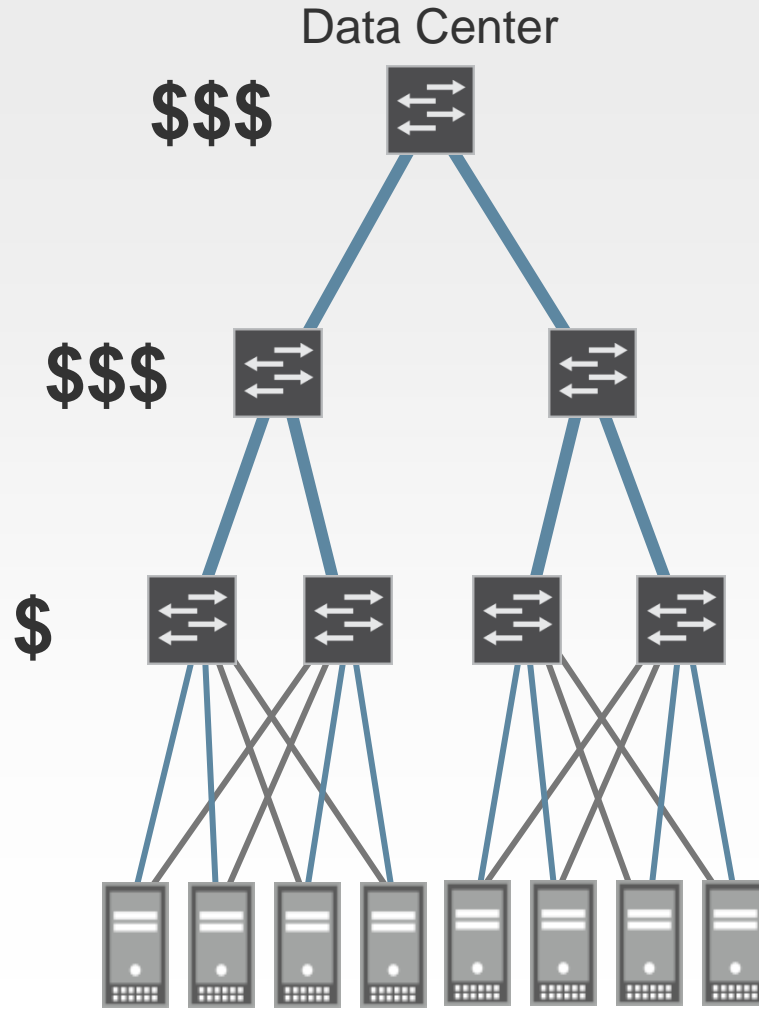


Shadows in the Branches

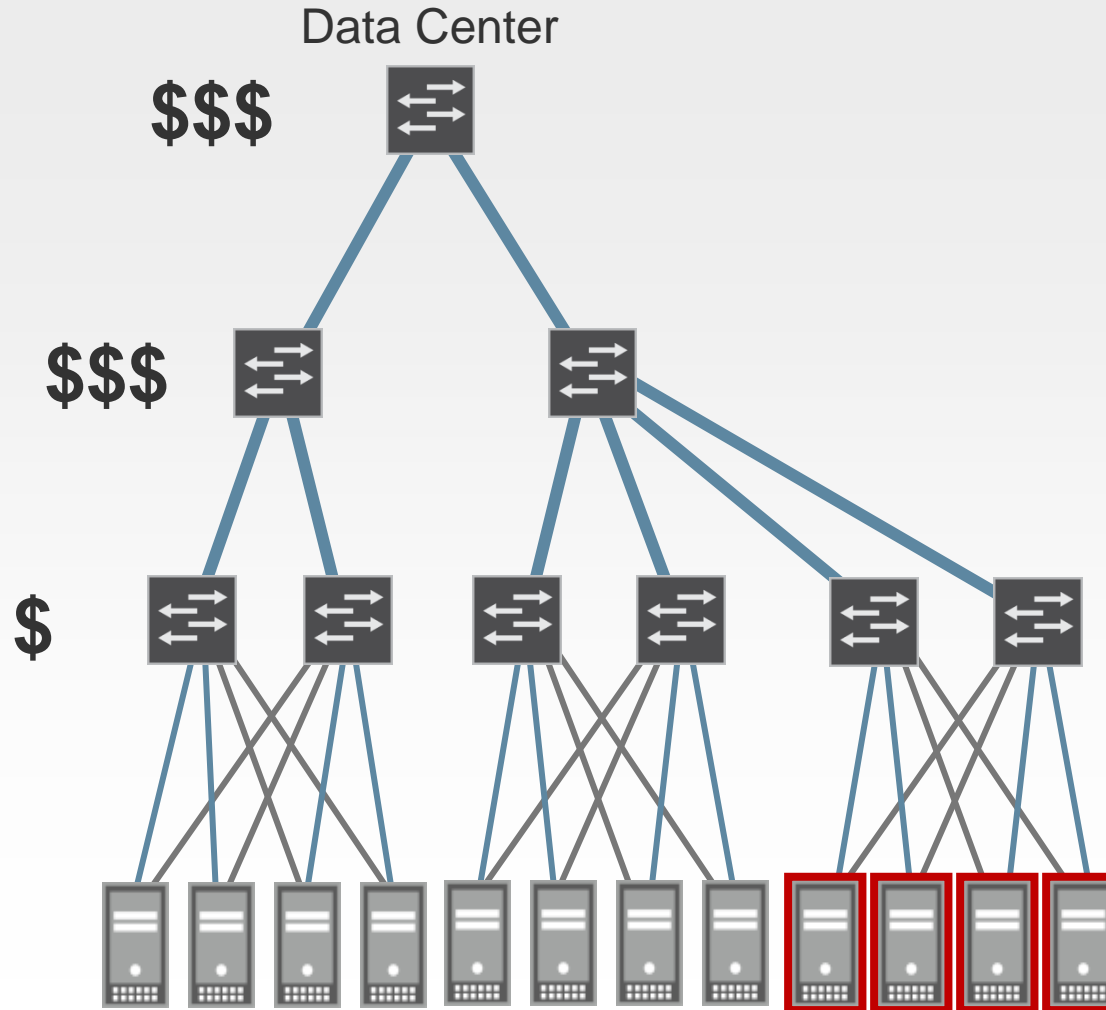
Typical tree configuration



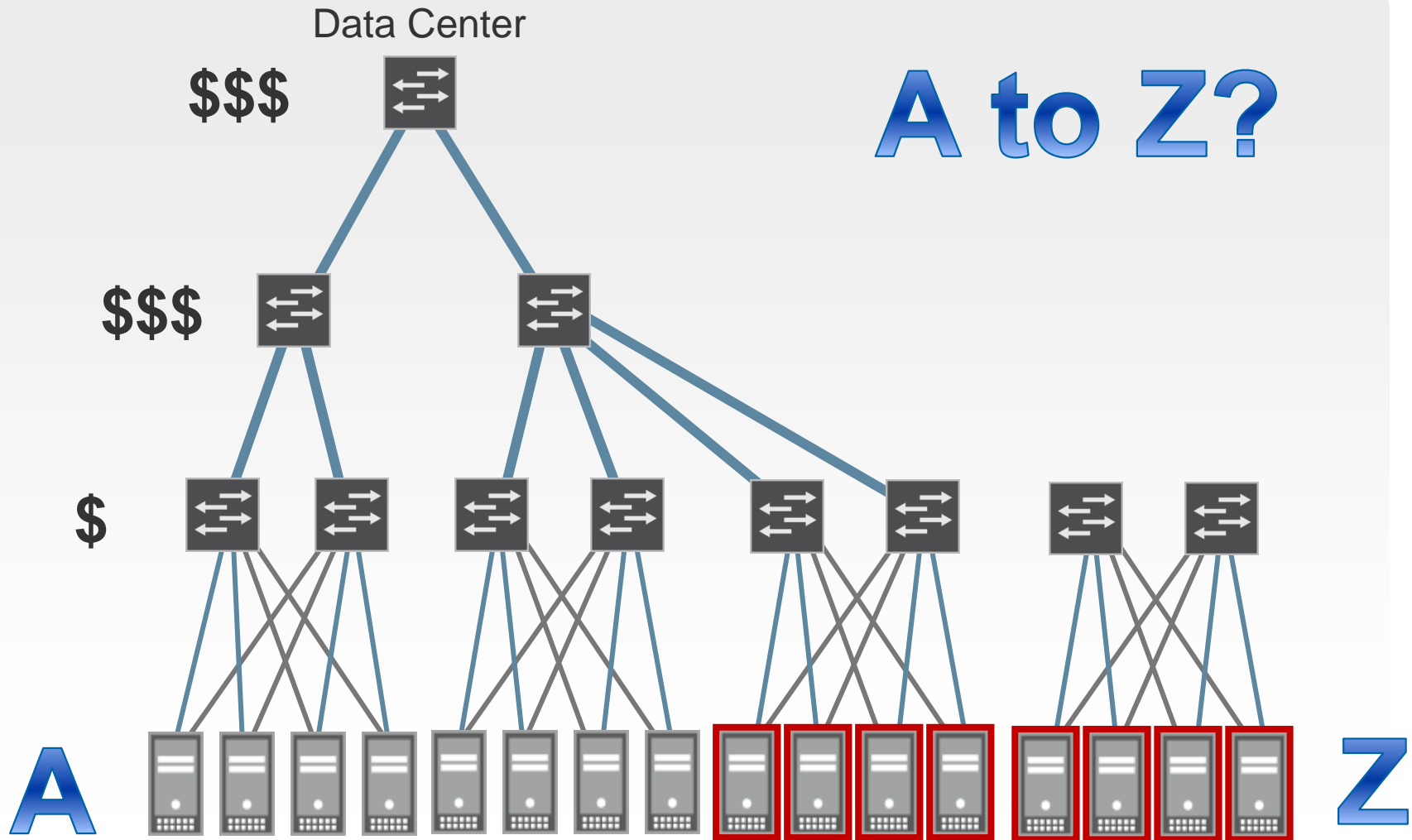
ECONOMIC REALITY CRIPPLES SERVER ROI



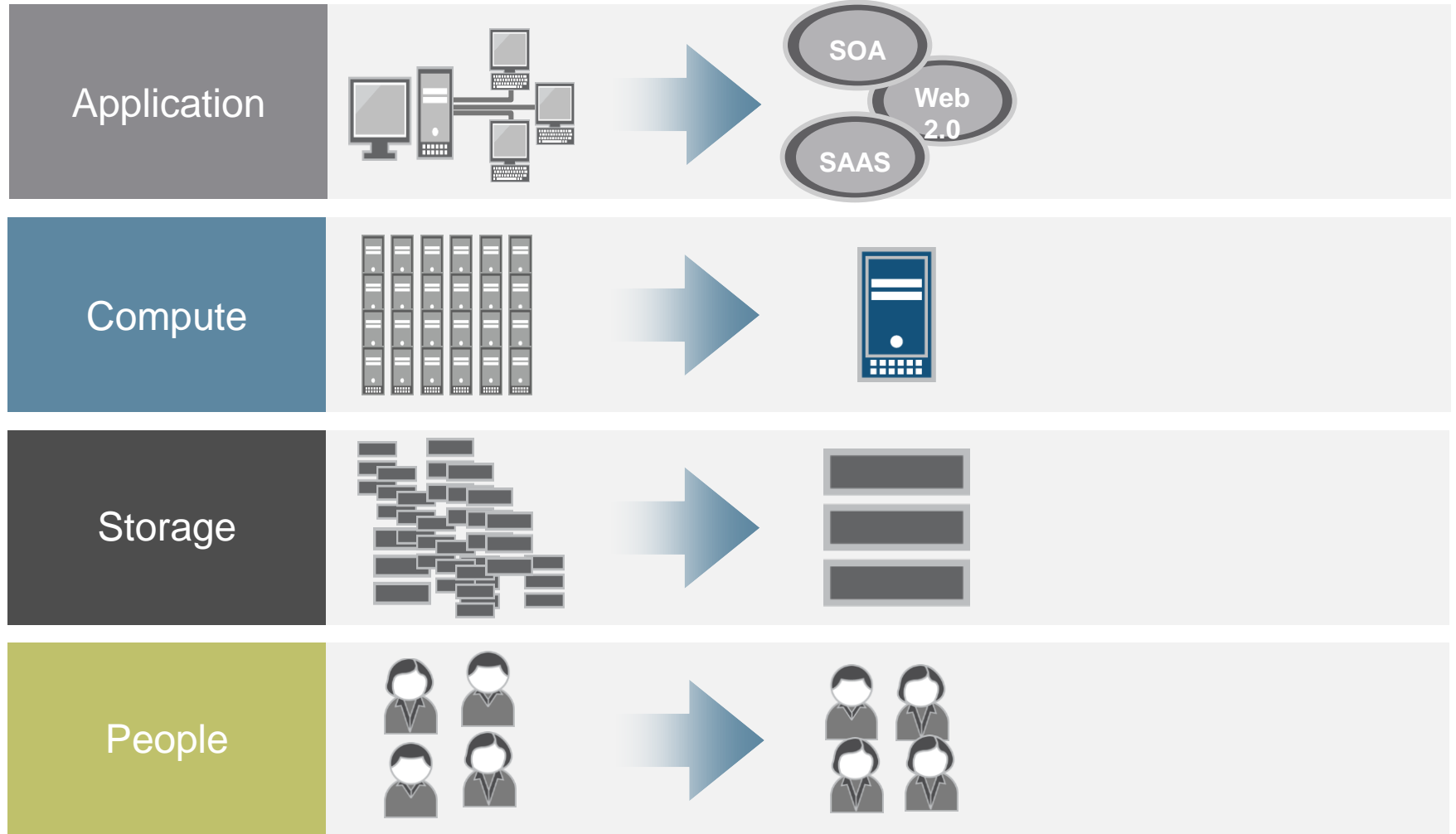
ECONOMIC REALITY CRIPPLES SERVER ROI



ECONOMIC REALITY CRIPPLES SERVER ROI



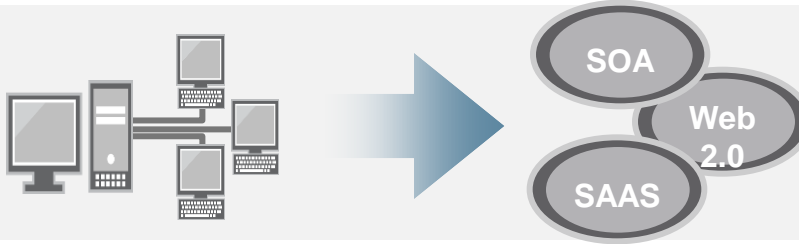
EVOLUTION IN THE DATACENTER



EVOLUTION IN THE DATACENTER

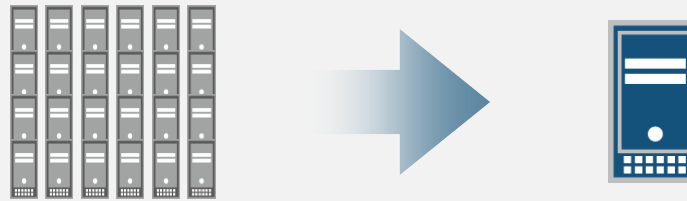
Legacy Network
Is In The Way

Application



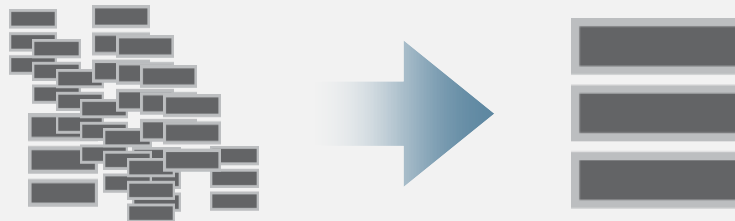
App Flexibility
Performance

Compute



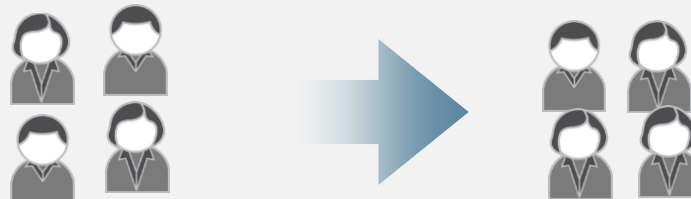
Inefficient
Security

Storage



Efficiency
Economics

People



Risk
Productivity

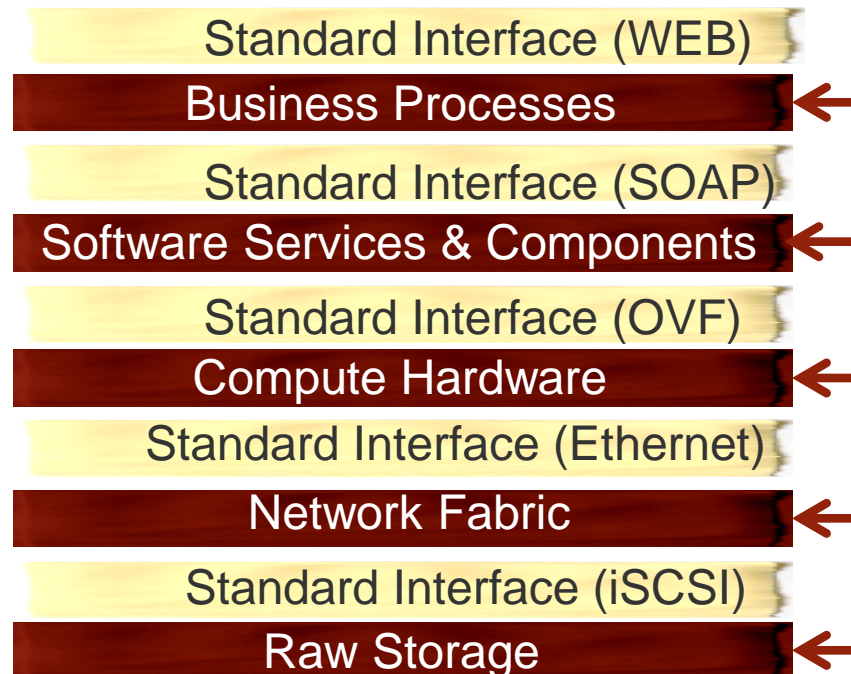
BOTTOM LINE

In a legacy datacenter network, where you put things matters.

The result? Brittle Complexity



LAYERS & SLICING



Secret Sauce

Much easier to slice and understand what is happening

WHAT I'LL COVER IN THE DC BREAKOUT

1

The ideal datacenter fabric and QFabric

2

Security in a virtual and physical world

3

Connecting datacenters, colos, and clouds

IF YOU ONLY ASK ONE QUESTION...

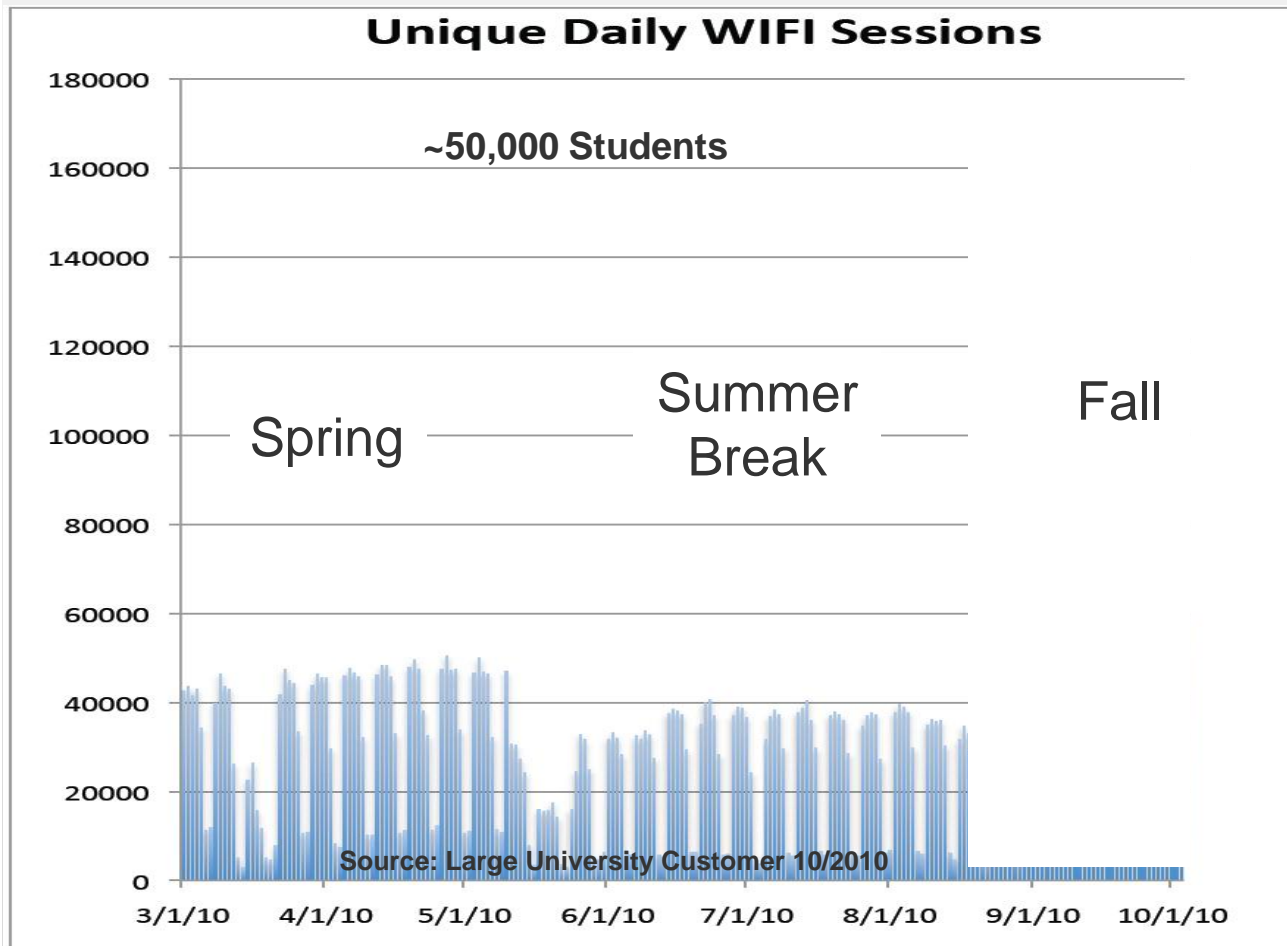
Where and how often
will you move virtual
machines?



**WHAT ELSE HAS
CHANGED?**

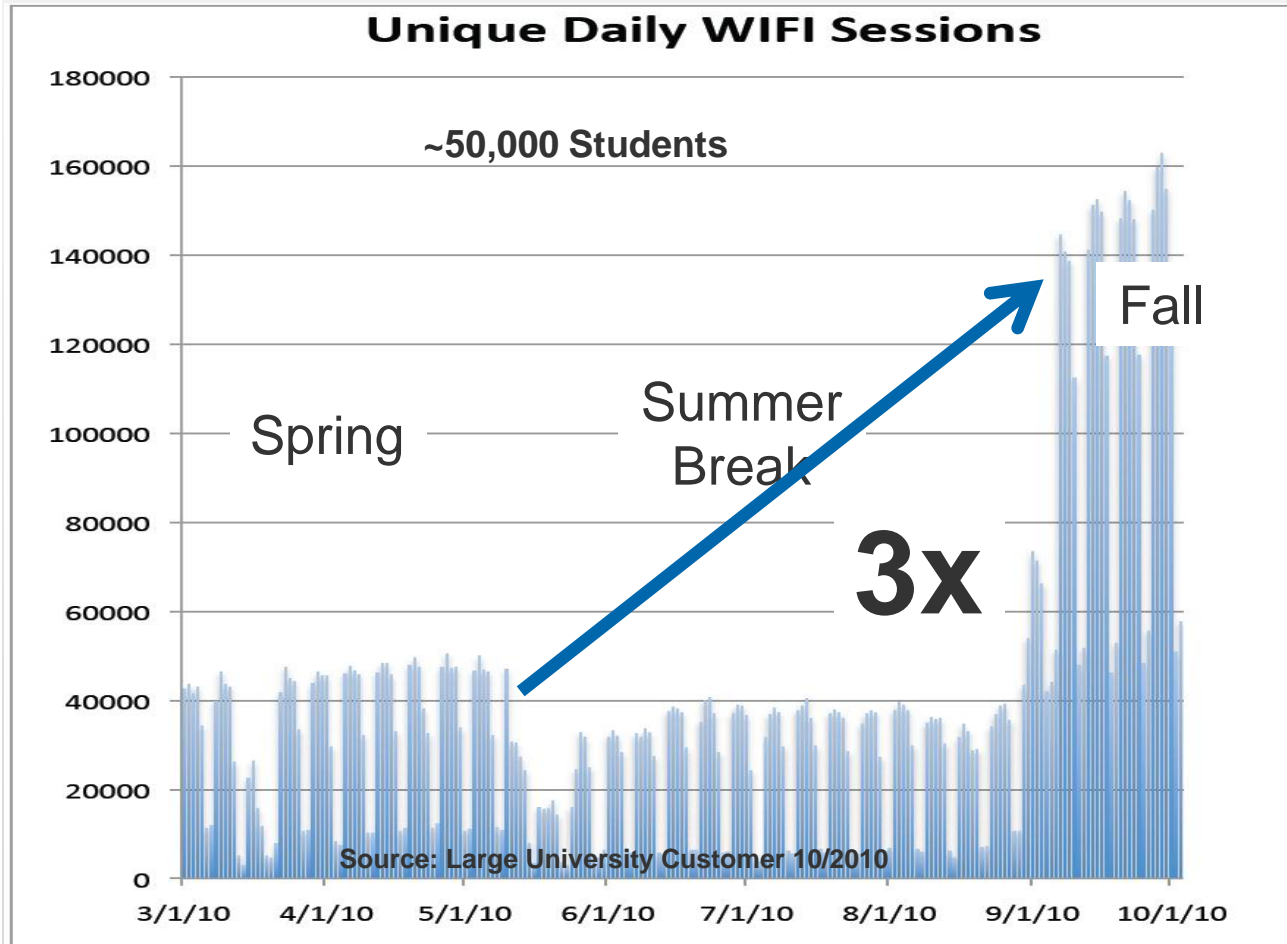
EXPLODING GROWTH IN MOBILE DEVICES OPTIONS AND MULTI DEVICE PER USER UTILIZATION

3X GROWTH IN SESSIONS
(Multiple Devices per Student)



EXPLODING GROWTH IN MOBILE DEVICES OPTIONS AND MULTI DEVICE PER USER UTILIZATION

3X GROWTH IN SESSIONS
(Multiple Devices per Student)



BIG QUESTIONS

For user networks you control:

Can WLAN be the primary access technology?

What can you do to the network to make it easier to manage and simple?

BIG QUESTIONS

For devices you can't stop

How do you enable secure mobile access from any device?

How do you manage mobile devices and security efficiently?

How do you manage multiple user types?

WHAT NEW EXPERIENCES DOES THE NETWORK NEED TO ENABLE?

MOBILITY



APPLICATION AGILITY



ECONOMICS & IT PRODUCTIVITY



WHAT NEW EXPERIENCES DOES THE NETWORK NEED TO ENABLE?

MOBILITY



Network access for wired, wireless and cellular on any and many devices

APPLICATION AGILITY



One Network, Any Application: Private, Public, Hybrid Datacenter

ECONOMICS & IT PRODUCTIVITY



Simple to provision, manage and update

HOW DOES THIS TRANSLATE TO JUNIPER?

MOBILITY



NEW APPLICATIONS



ECONOMICS & IT PRODUCTIVITY



Pulse, UAC, WLAN

Don't lock the app to the network. Enable Change

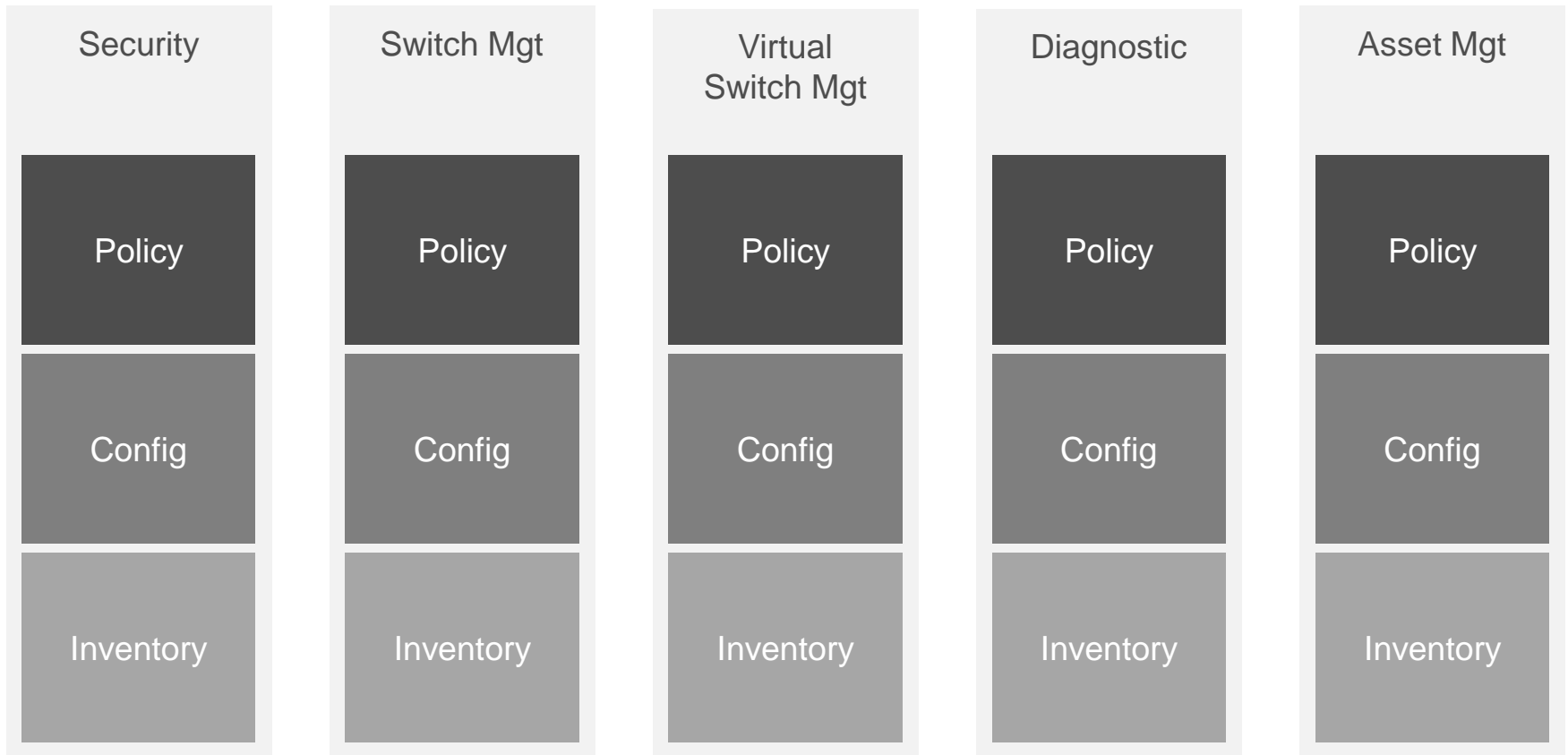
Service Now
JUNOS Rollback / Skills
Transferability
Safe to Migrate

**NETWORK
SOFTWARE
VS.**

**YOUR FISCAL AND
MENTAL HEALTH**

OLD NETWORK SOFTWARE STACKS

Legacy approach





**JUNIPER NETWORKS
ARE DIFFERENT.**

WHY?

NEW NETWORK SOFTWARE STACK

Tivoli. software

 **vmware**

Mashups

IBM

 **bmc**software



ca

Security

Switch Mgt

**Virtual
Switch Mgt**

Diagnostic

Asset Mgt

New Apps



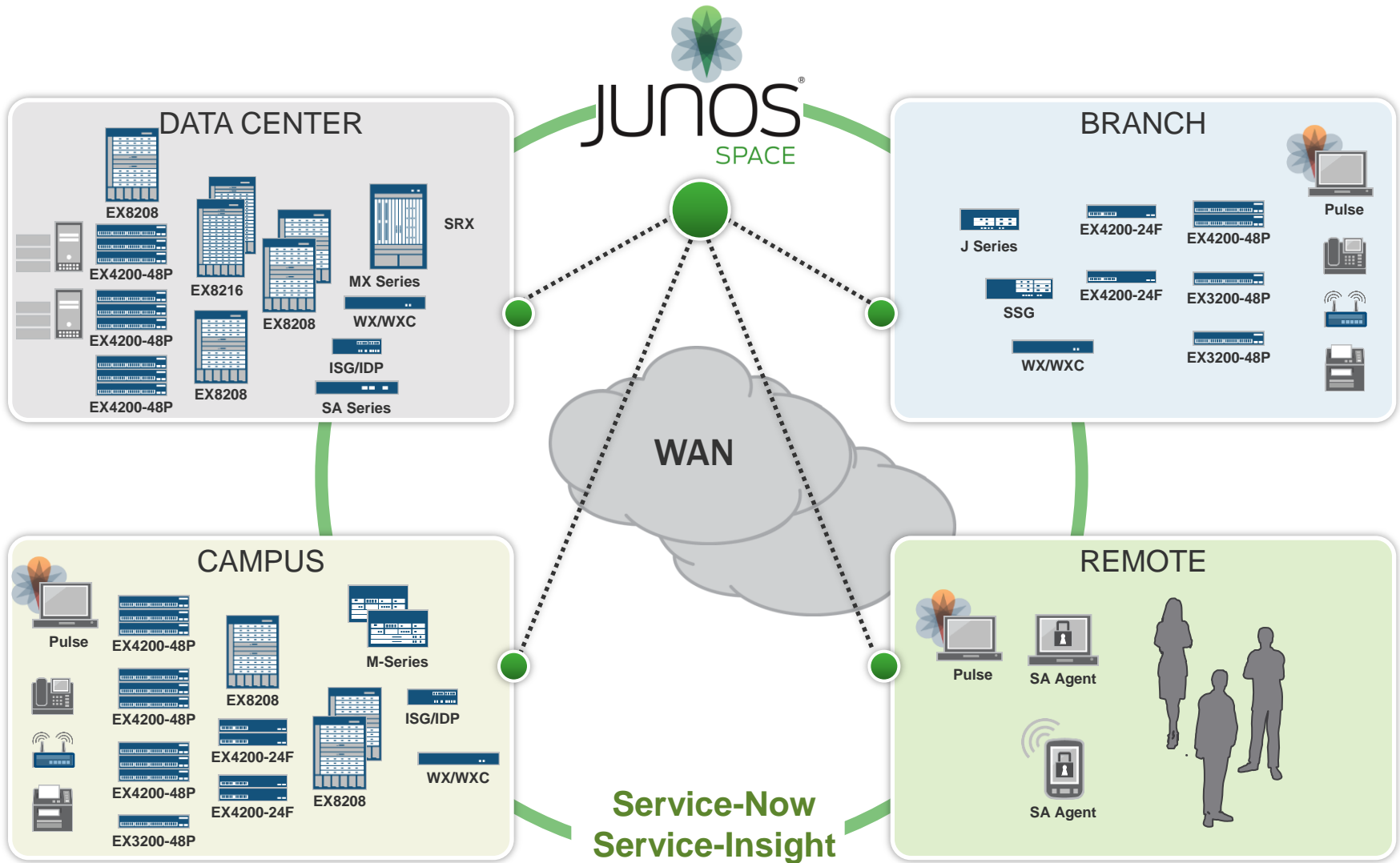
APIs + SDK



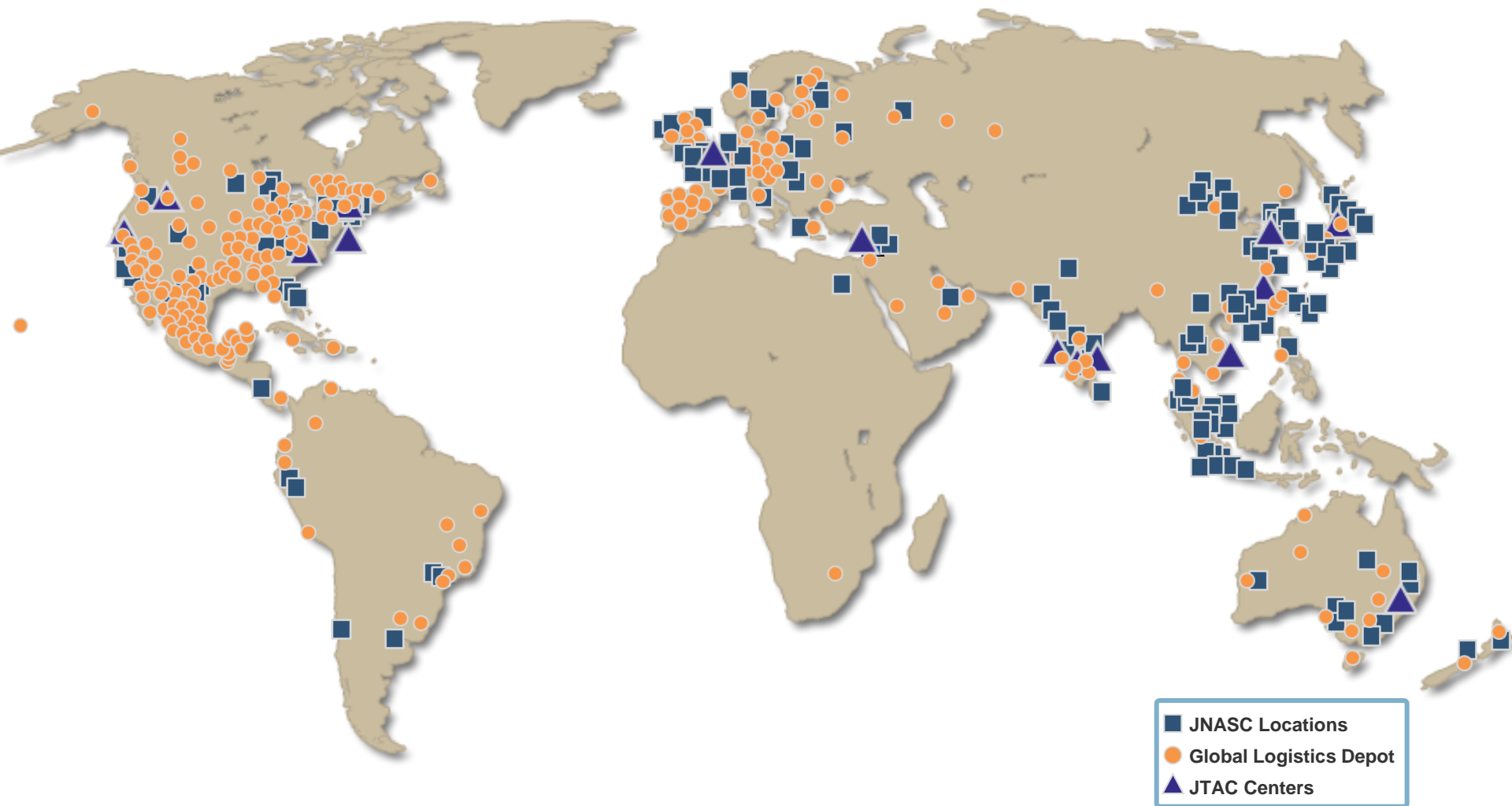
Network Devices



DOMAIN BREADTH



GEOGRAPHIC BREADTH



▪ 1000+ Support Personnel

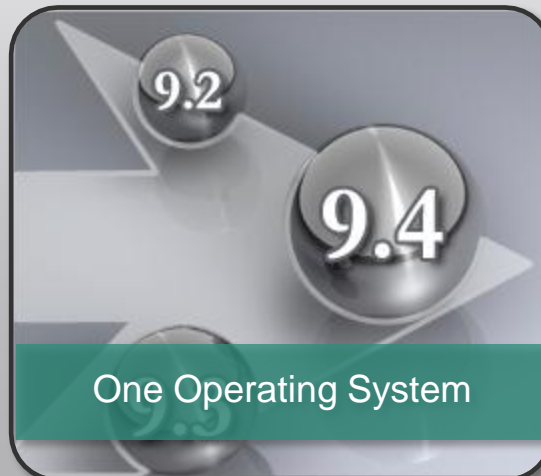
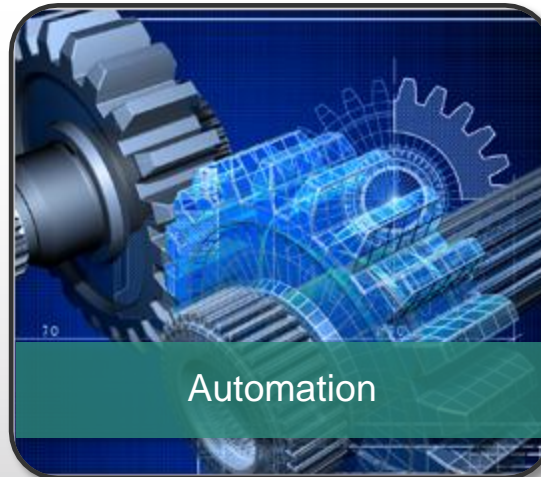
▪ 17 JTAC Centers WW

▪ 250+ Logistic Depot Locations

We solve
Networking
and Security
problems.
No distractions.
No other motives.



NEW NETWORK BUILDING BLOCKS



NEW NETWORK BUILDING BLOCKS

Fewer Boxes
Better Performance

Datacenter: -33%
Wiring Closet: -20%
10x WAN utilization w MPLS

Simplify Architecture

Reliability & Agility
Faster Support

Enforce consistency
Mean time to recover:
16 hrs to 5 hrs

Automation

Adopt a long-term
security architecture

A consistent platform
to efficiently deploy &
manage security

Services Consolidation

Juniper reduces risk across
the network

A growing set of security
services for datacenters,
campus, branch, & mobile

Security from App to User

Drive cost out with an OS
designed for change

Better interoperability
Skills flexibility
Roll-back safety

One Operating System

Best of breed innovation

65+ partners developing
device, client, & network-
wide applications

Open Development Platform

http://bloga.tw/Network_Change

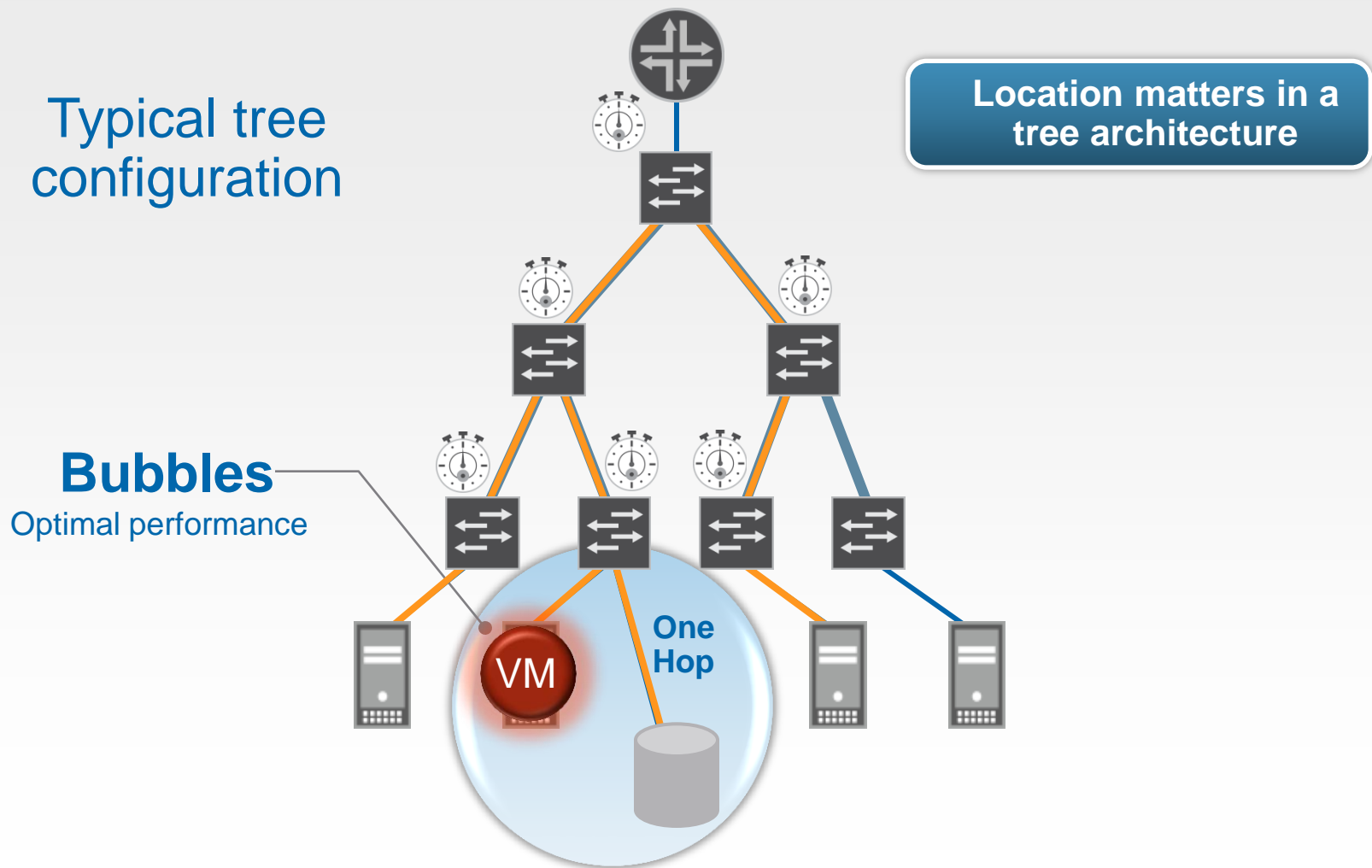
@abnerg

@junipernetworks

IT ROADSHOW: DATA CENTER BREAKOUT

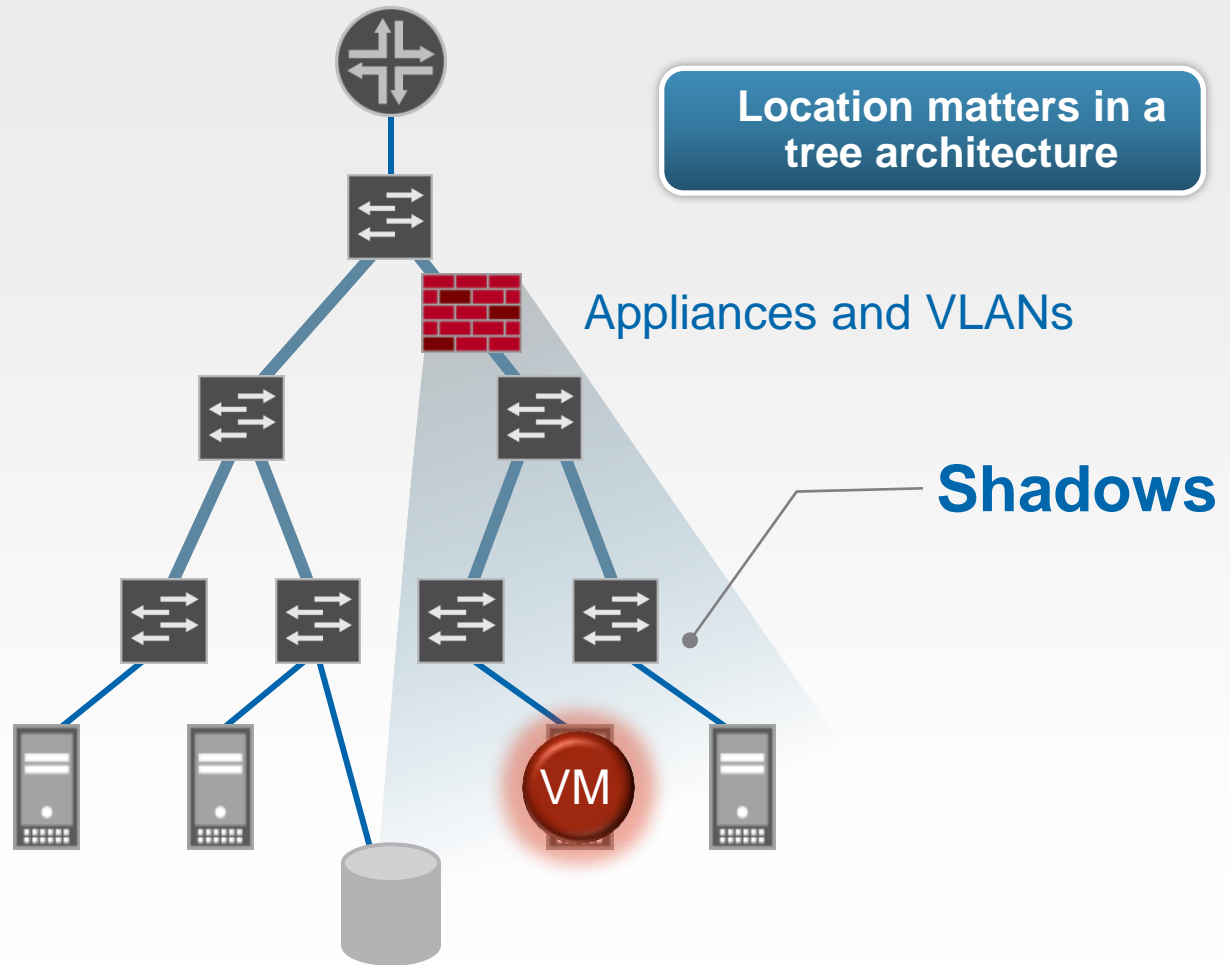


THE TYRANNY OF TREES



THE TYRANNY OF TREES

Typical tree configuration



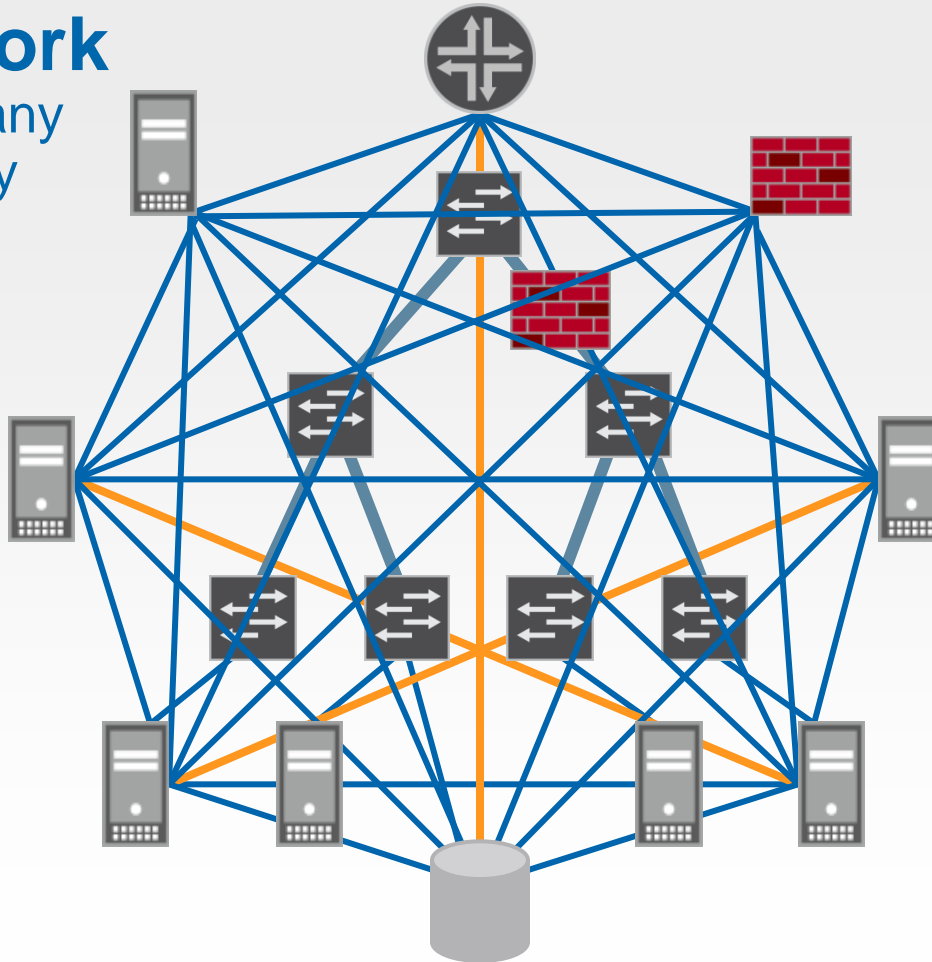


**WHAT DOES AN
IDEAL FABRIC LOOK
LIKE?**

TRANSFORM THE NETWORK

One Network

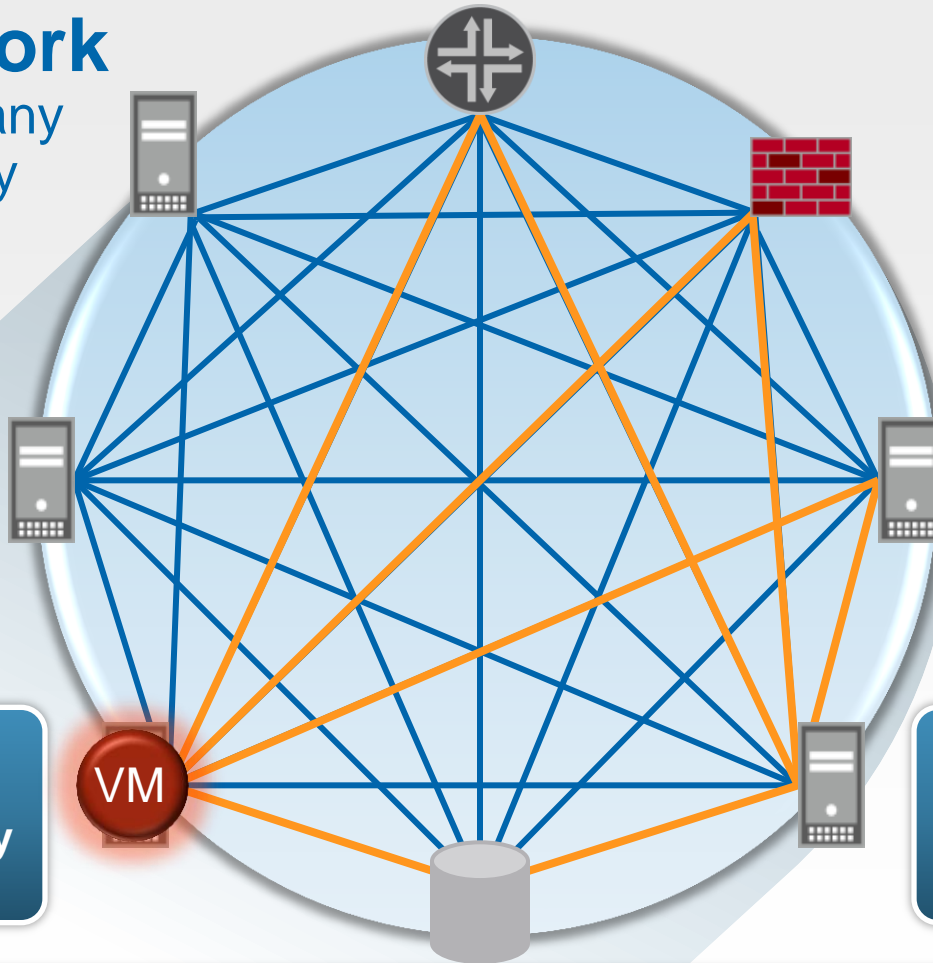
Flat, any-to-any
connectivity



TRANSFORM THE NETWORK

One Network

Flat, any-to-any
connectivity



Key resources
are one hop away

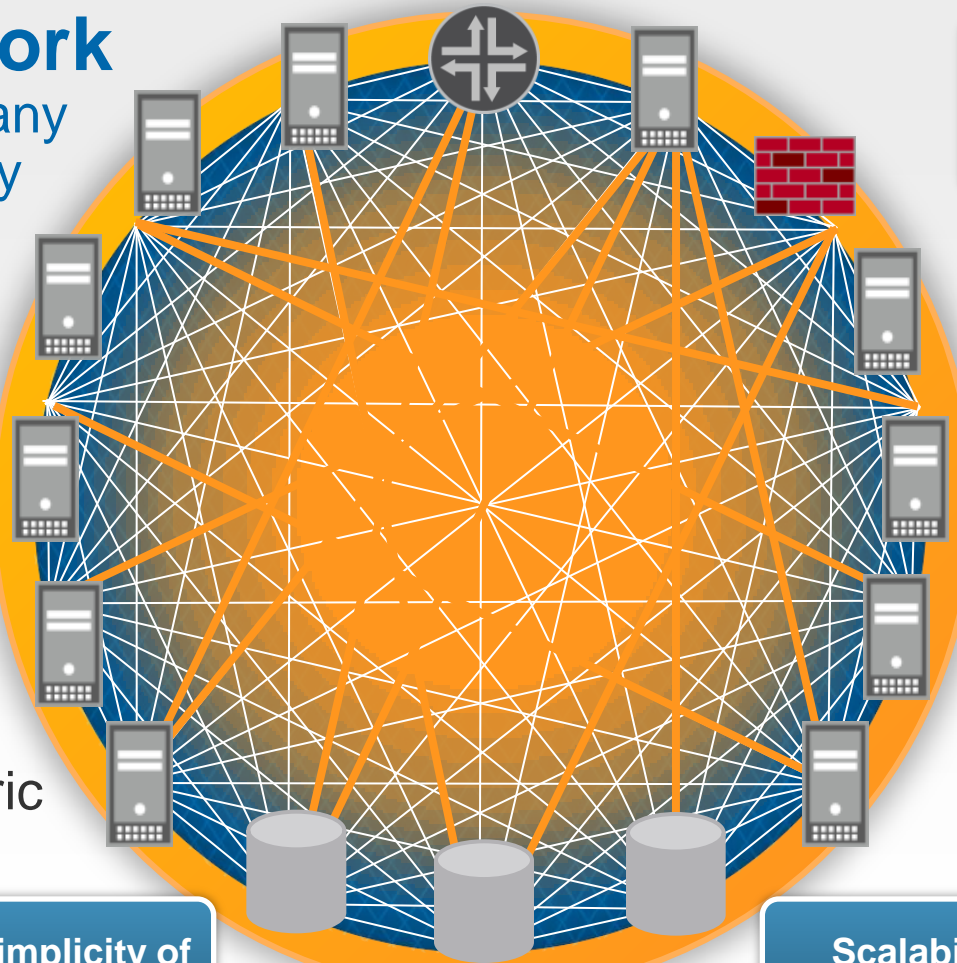
Key resources
are ALWAYS one
hop away

Locality should not matter in a virtualized data center

TRANSFORM THE NETWORK

One Network

Flat, any-to-any
connectivity



Single device
 $N=1$

Switch Fabric

Data Plane

- Flat
- Any-to-any

Control Plane

- Single device
- Shared state

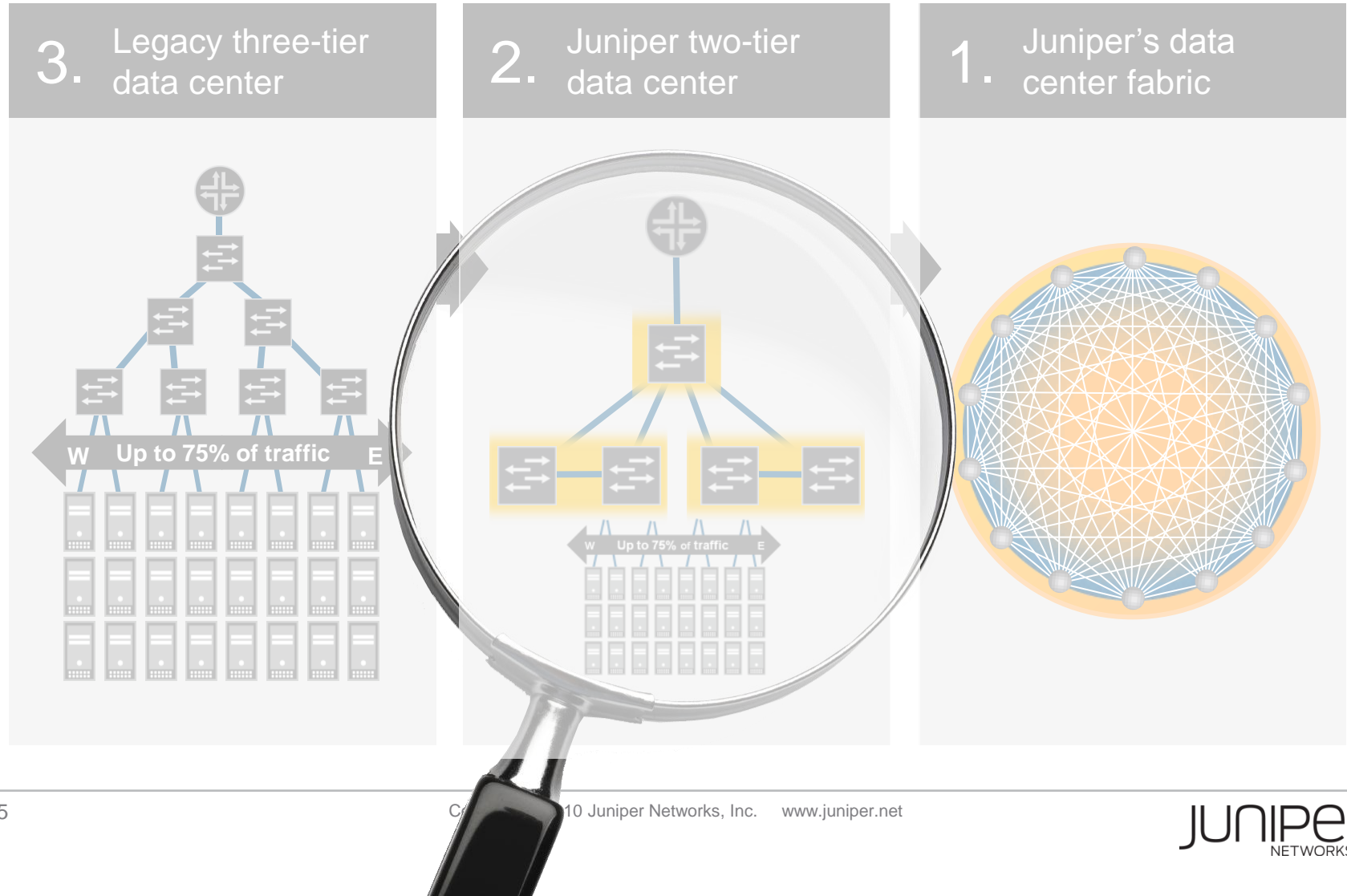
A Network Fabric
has the....

Performance and simplicity of
a single switch

And the...

Scalability and resilience
of a network

JUNIPER HAS THE ANSWER: 3-2-1



TRANSFORM THE NETWORK

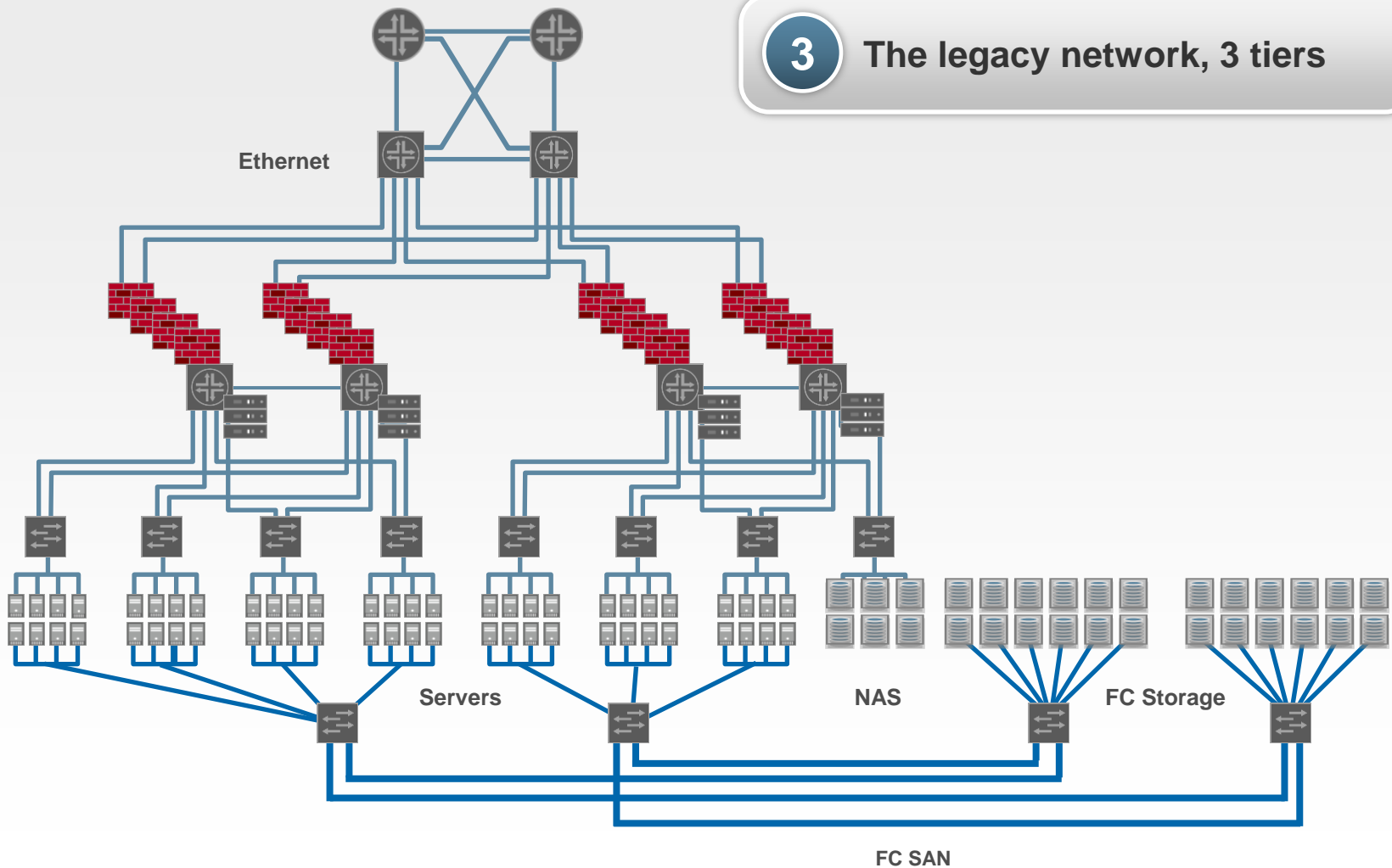
3

2

1

3

The legacy network, 3 tiers

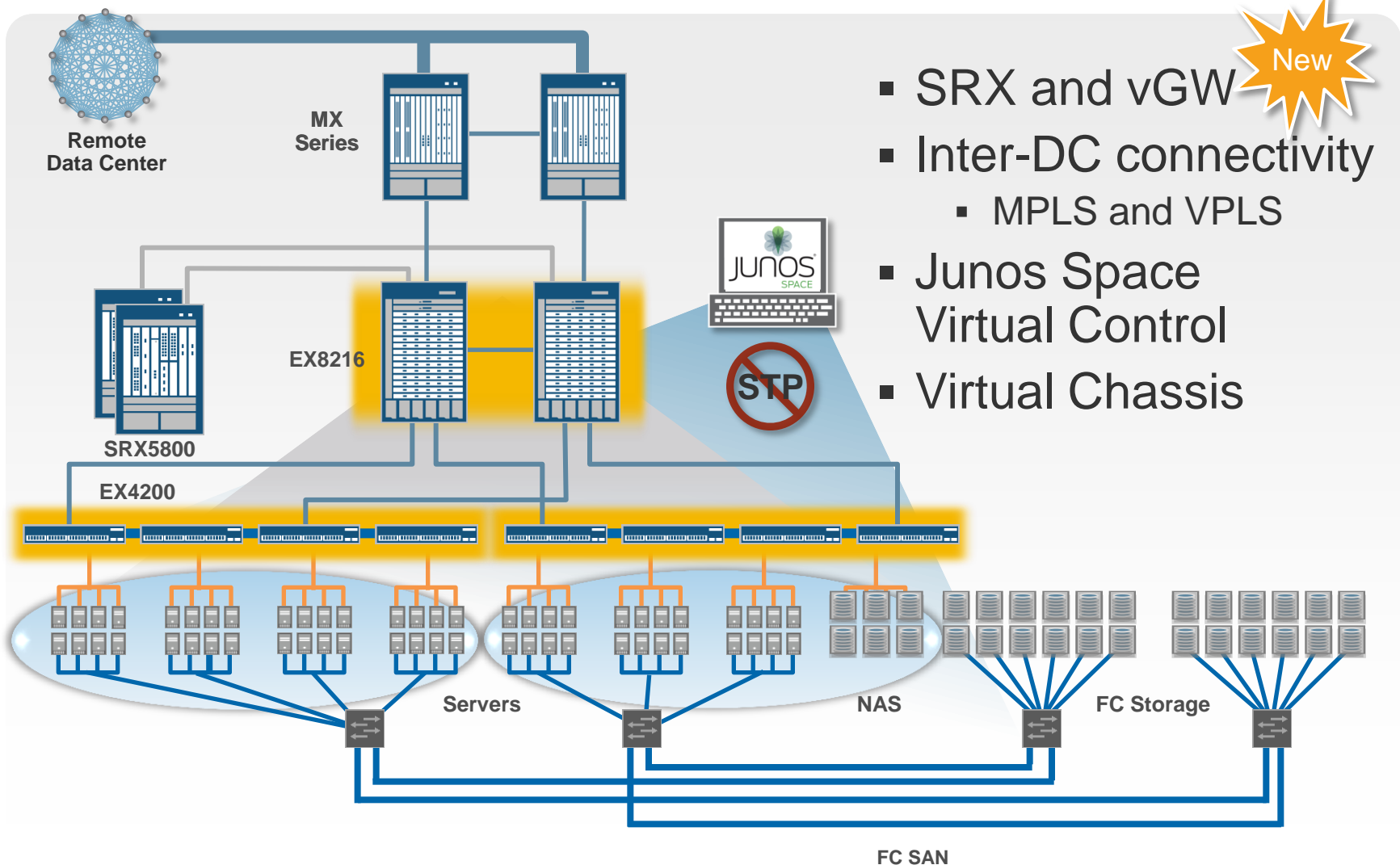


DELIVER TODAY – 2 TIERS

3

2

1

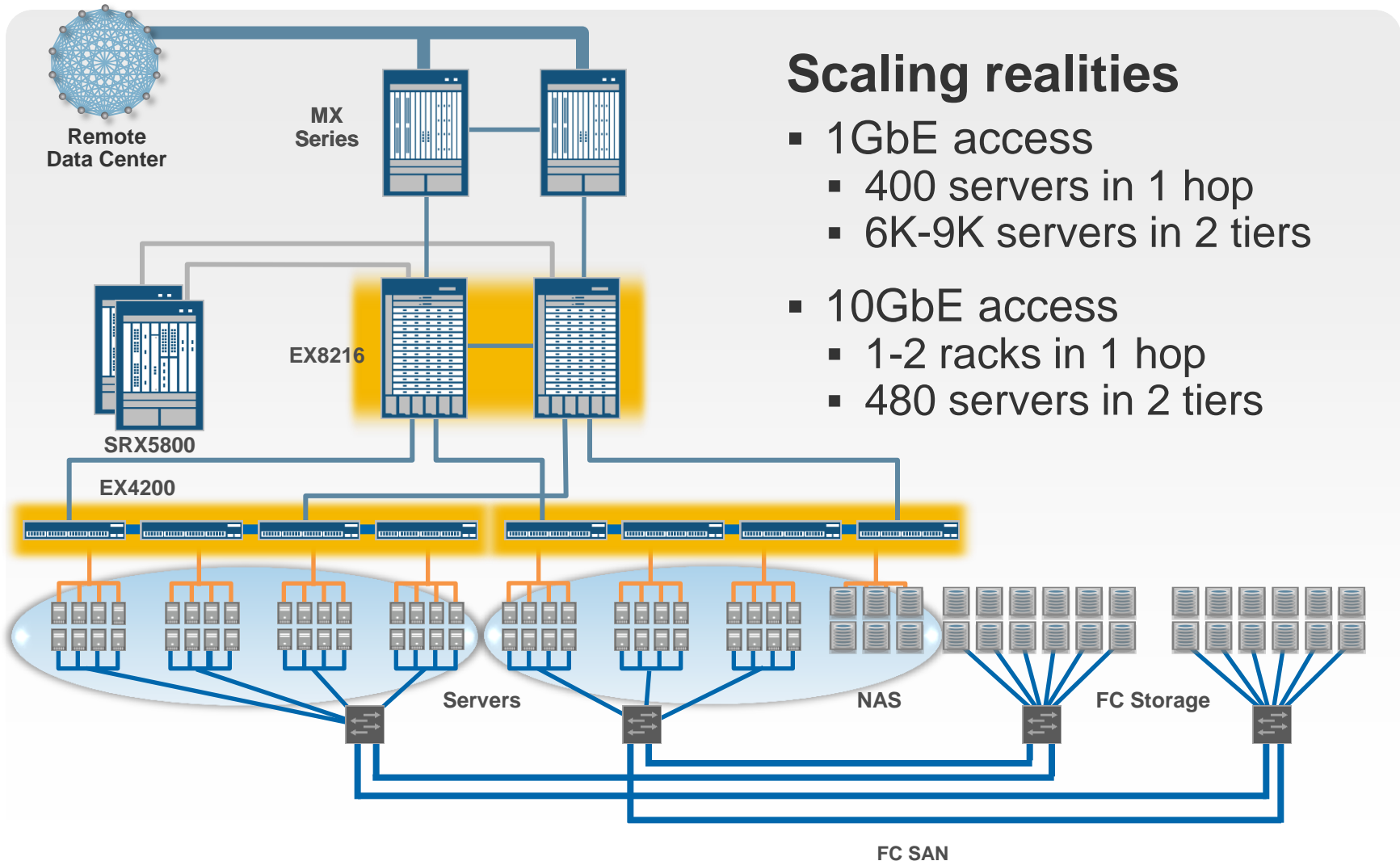


DELIVER TODAY – 2 TIERS

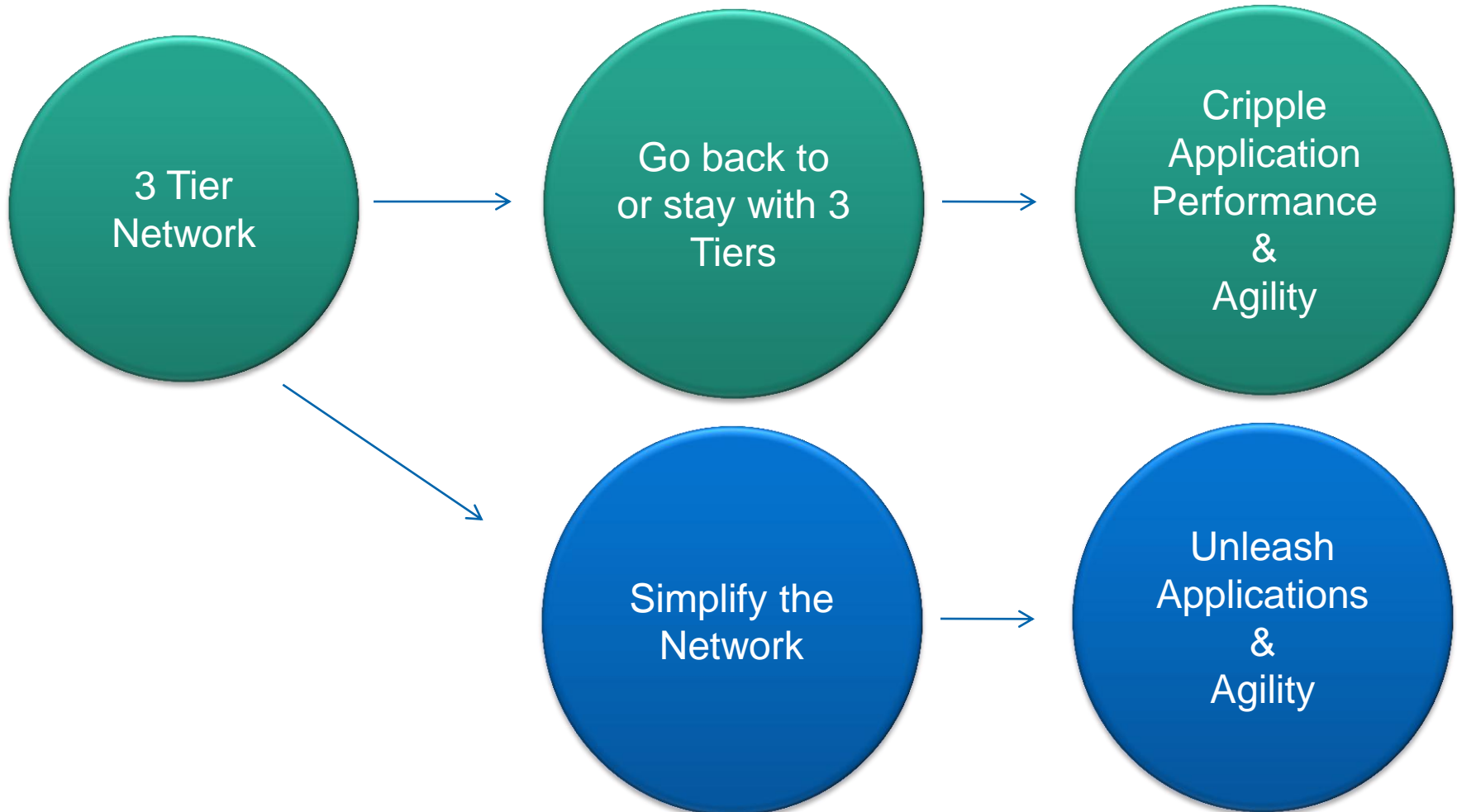
3

2

1

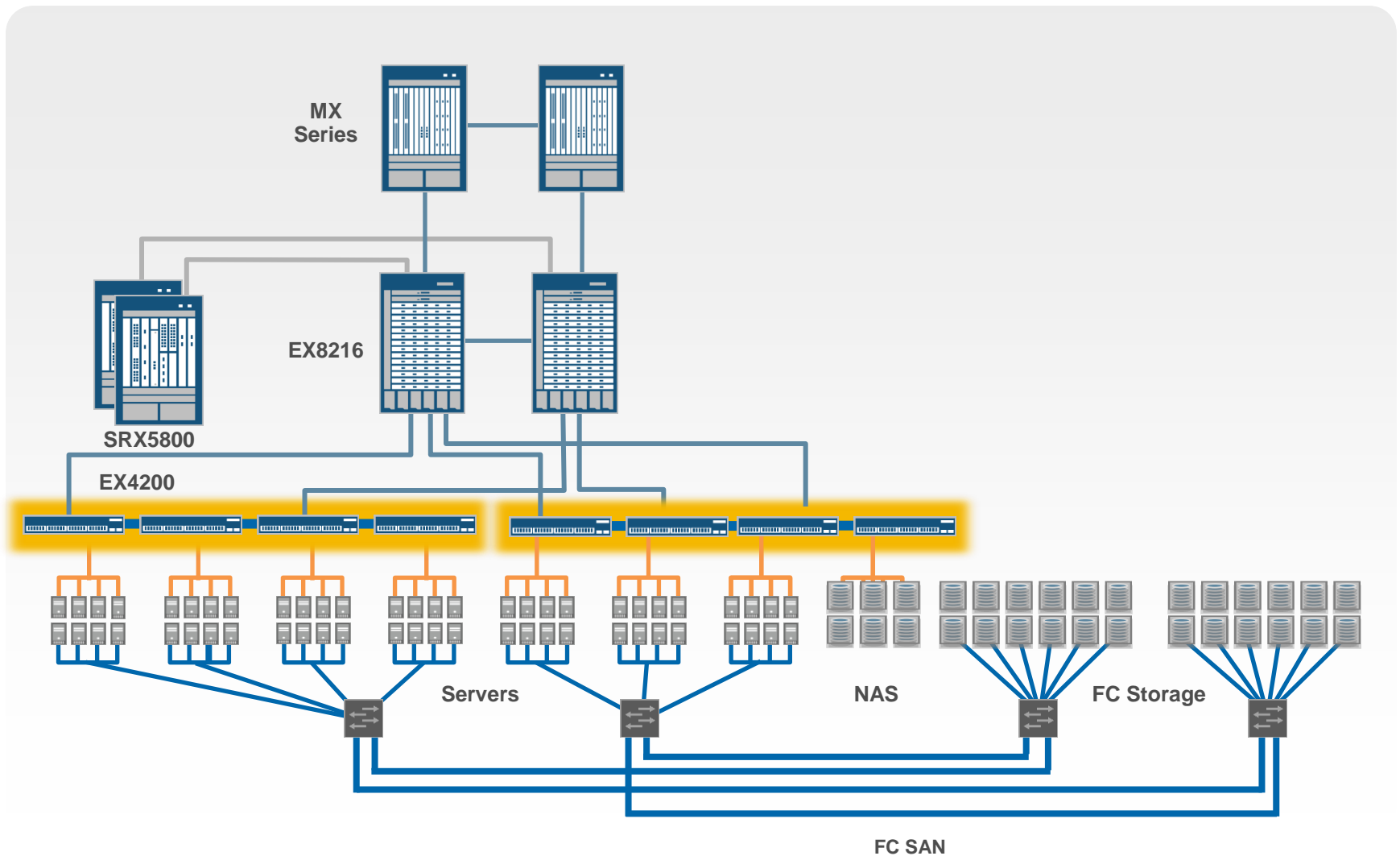


THE FORK IN THE ROAD – 10G & DISTRIBUTED APPS



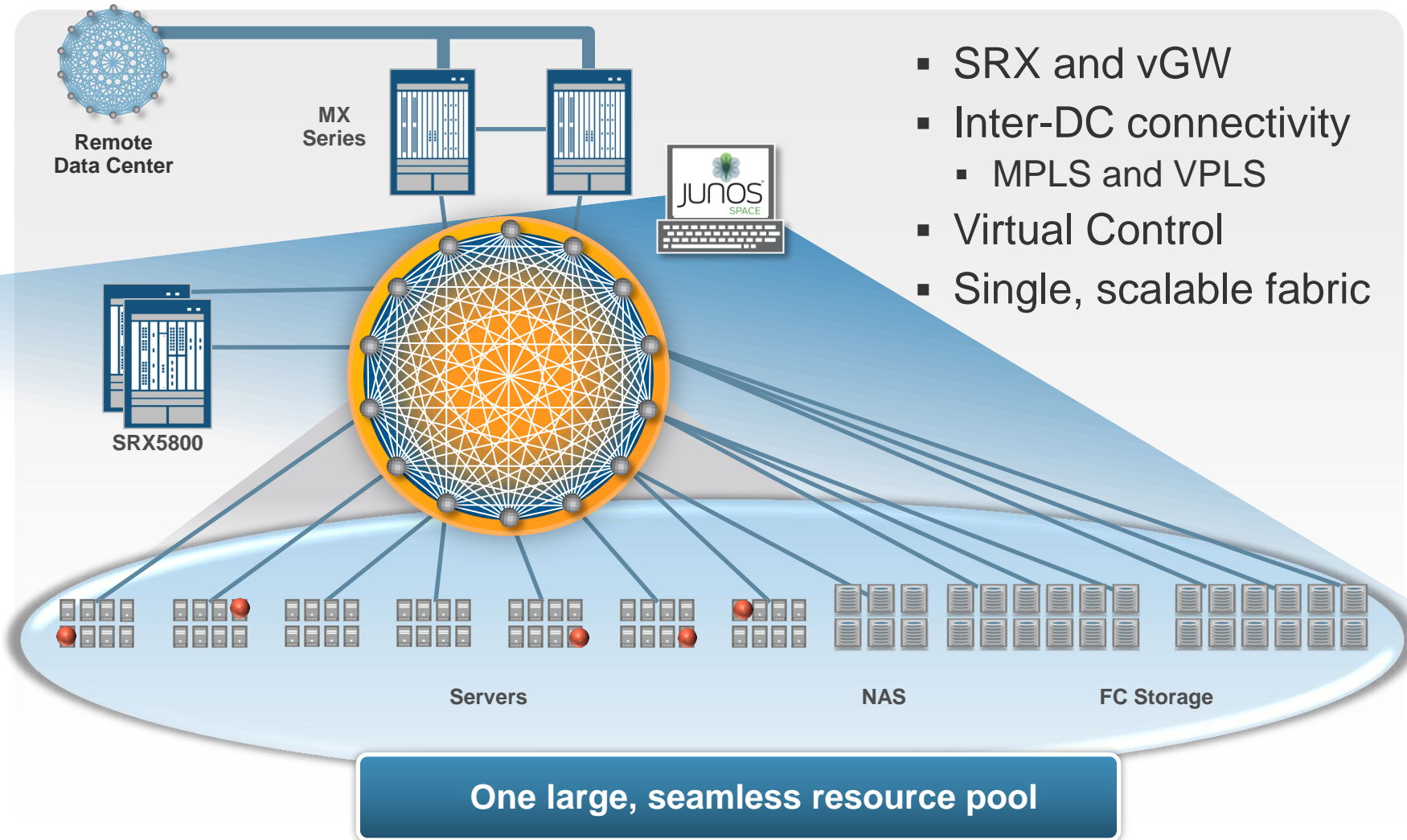
DELIVER SOON – 1 TIER

3 – 2 – 1



DELIVER SOON – 1 TIER

3 – 2 – 1



A decorative graphic in the top-left corner consisting of overlapping, semi-transparent geometric shapes, including a large circle and several triangles, creating a star-like or floral pattern in shades of blue and grey.

QFABRIC

3 years in development

1 million man hours

\$100s of millions invested

Over 125 patents pending



QFabric

A Revolutionary New Architecture

Design Goals

Flat, resilient fabric

Everything is one hop away

Scale without complexity

The ability to add capacity without adding operational complexity

N=1

QFabric

A Revolutionary New Architecture

3 Design Principles

Management Plane

N=1

Operational model of a single switch

Control Plane

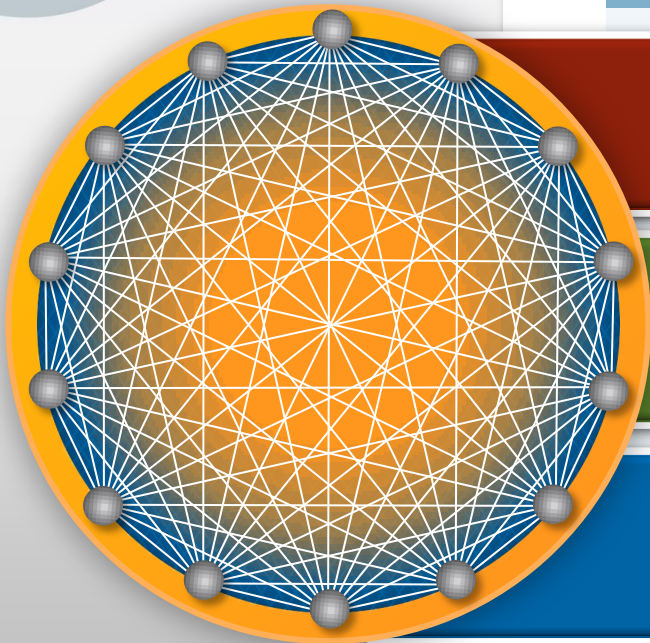
Federated Intelligence

Only way to scale with resilience

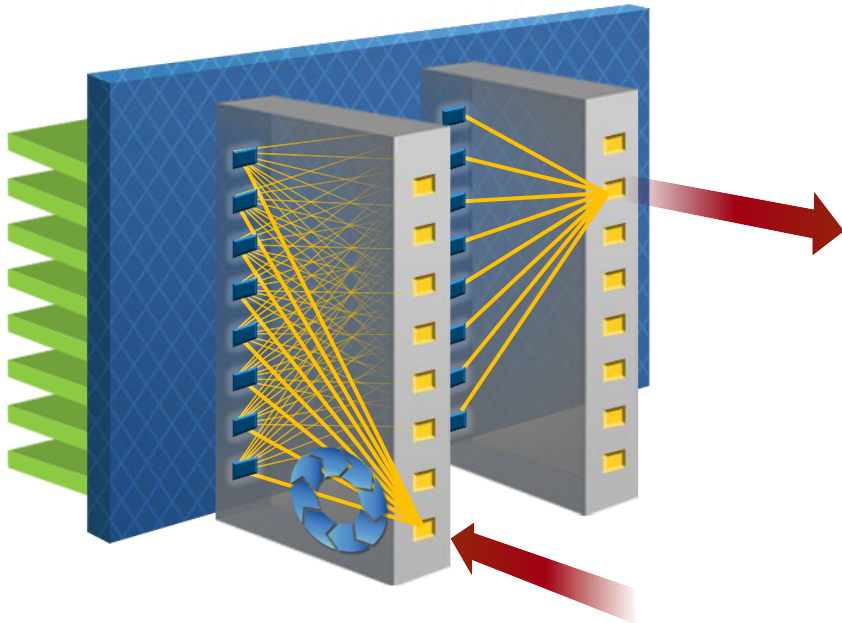
Data Plane

Rich edge, Simple core

Everything is one hop away



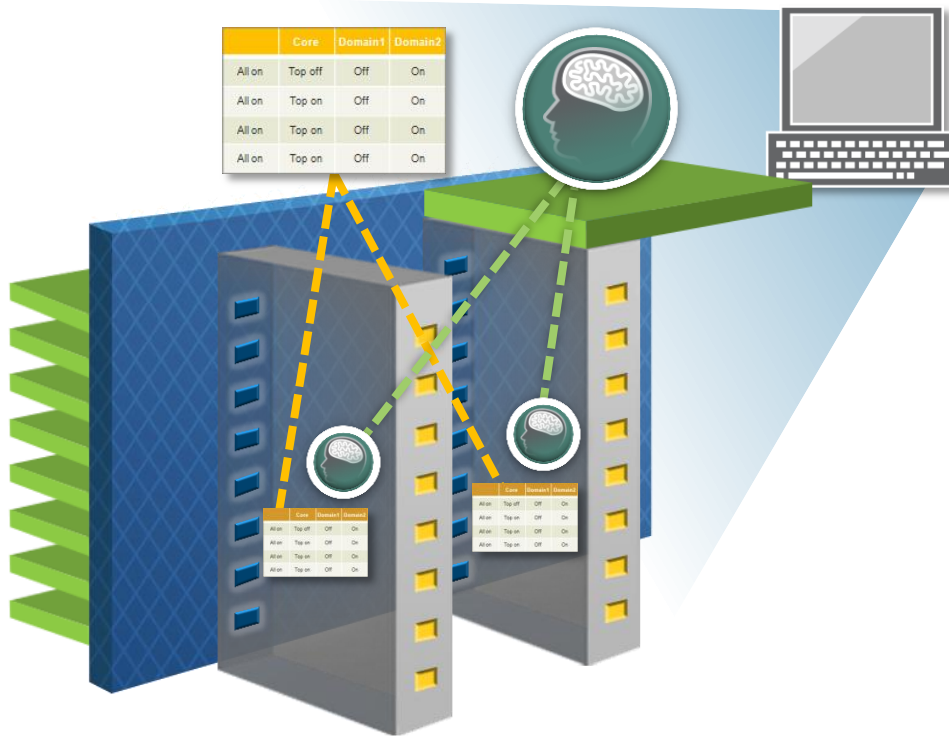
DATA PLANE IN A SINGLE SWITCH



Data Plane

1. All ports are directly connected to every other port
2. A single “full lookup” processes packets

CONTROL PLANE IN A SINGLE SWITCH



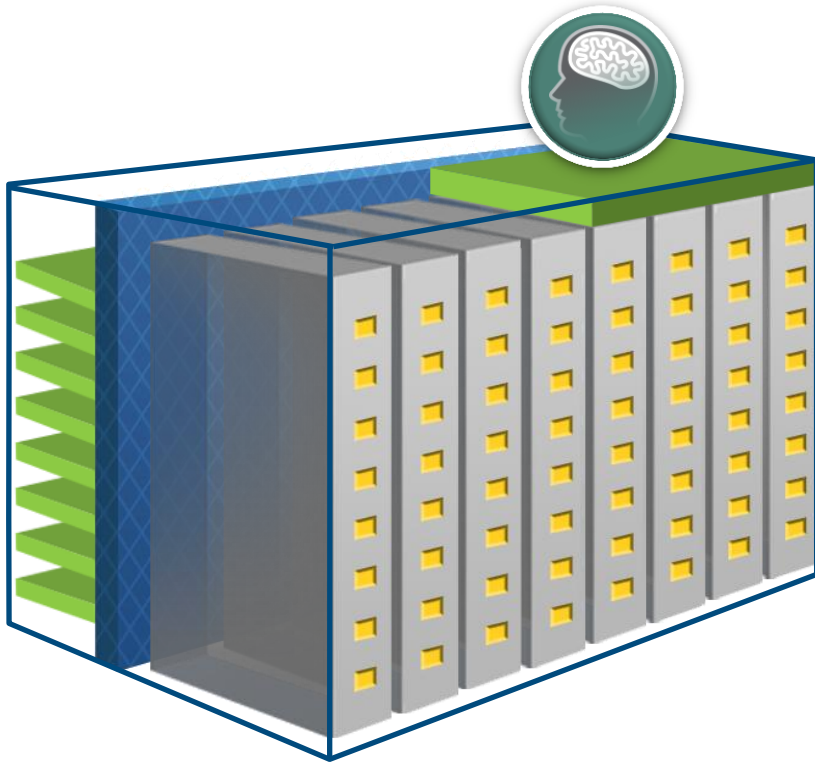
Control Plane

- Single consciousness
- Centralized shared table(s) have information about all ports

Management Plane

- All the ports are managed from a single point

SINGLE SWITCH DOES NOT SCALE



Ports can be added to a single switch fabric.

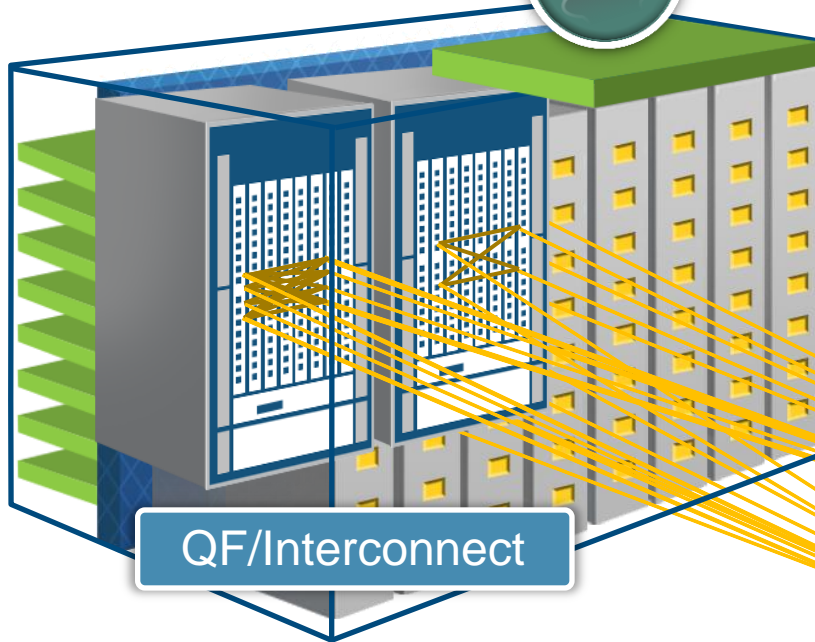
...but eventually it runs out of real estate.

After this, the network cannot be flat.

Choice: Sacrifice simplicity or.....
change the scaling model

SCALING THE DATA PLANE

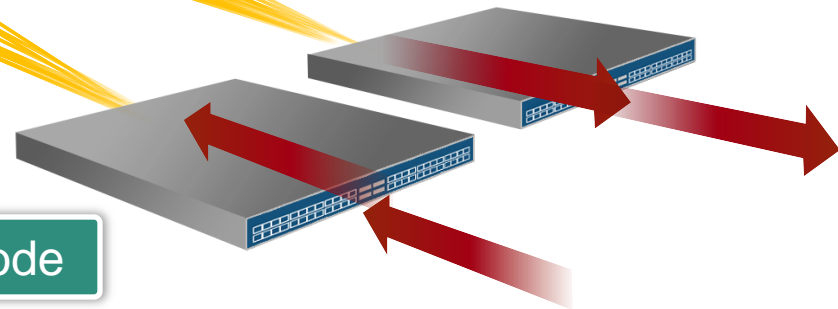
Data Plane



QF/Interconnect

So, we separate the line cards from the fabric.
And replace the copper traces with fiber links.
For redundancy add multiple devices.

QF/Node

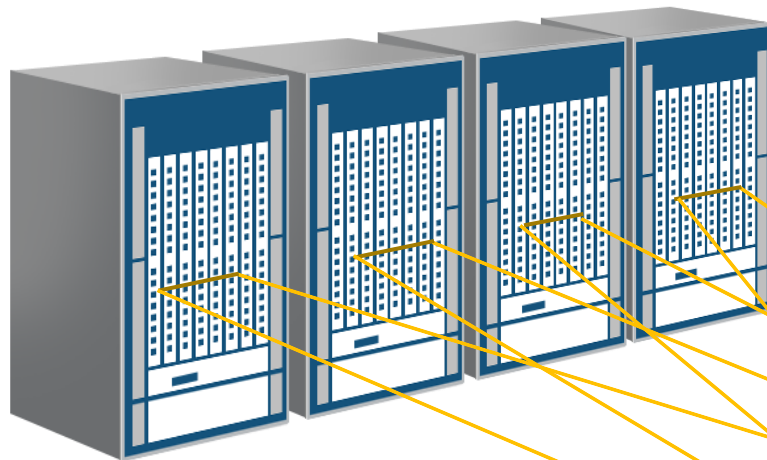


SCALING THE DATA PLANE

Data Plane



So, we separate the fabric from the I/O ports.
And replace the copper traces with fiber links.
For redundancy add multiple devices.
Enable large scale.

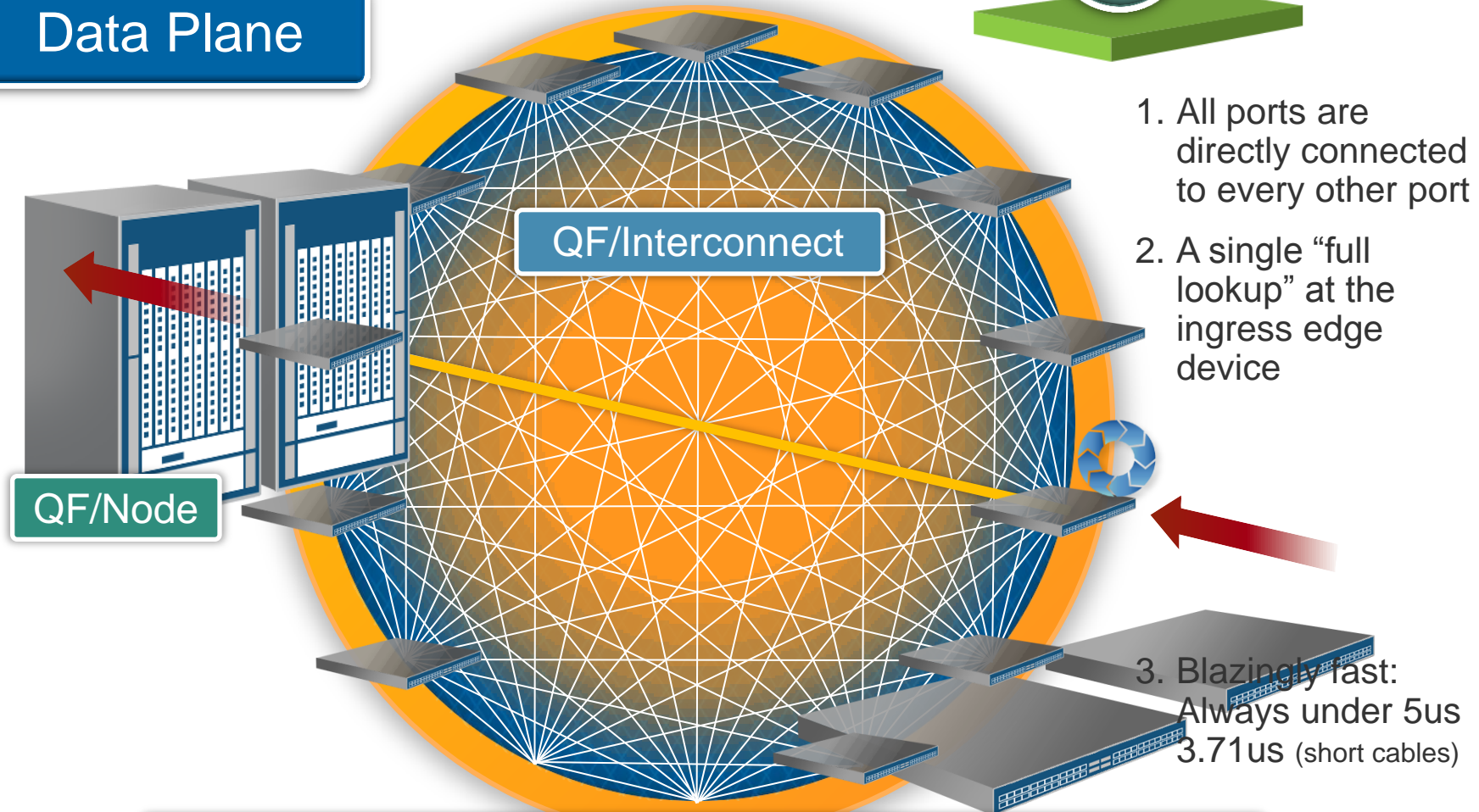


QF/Interconnect

QF/Node

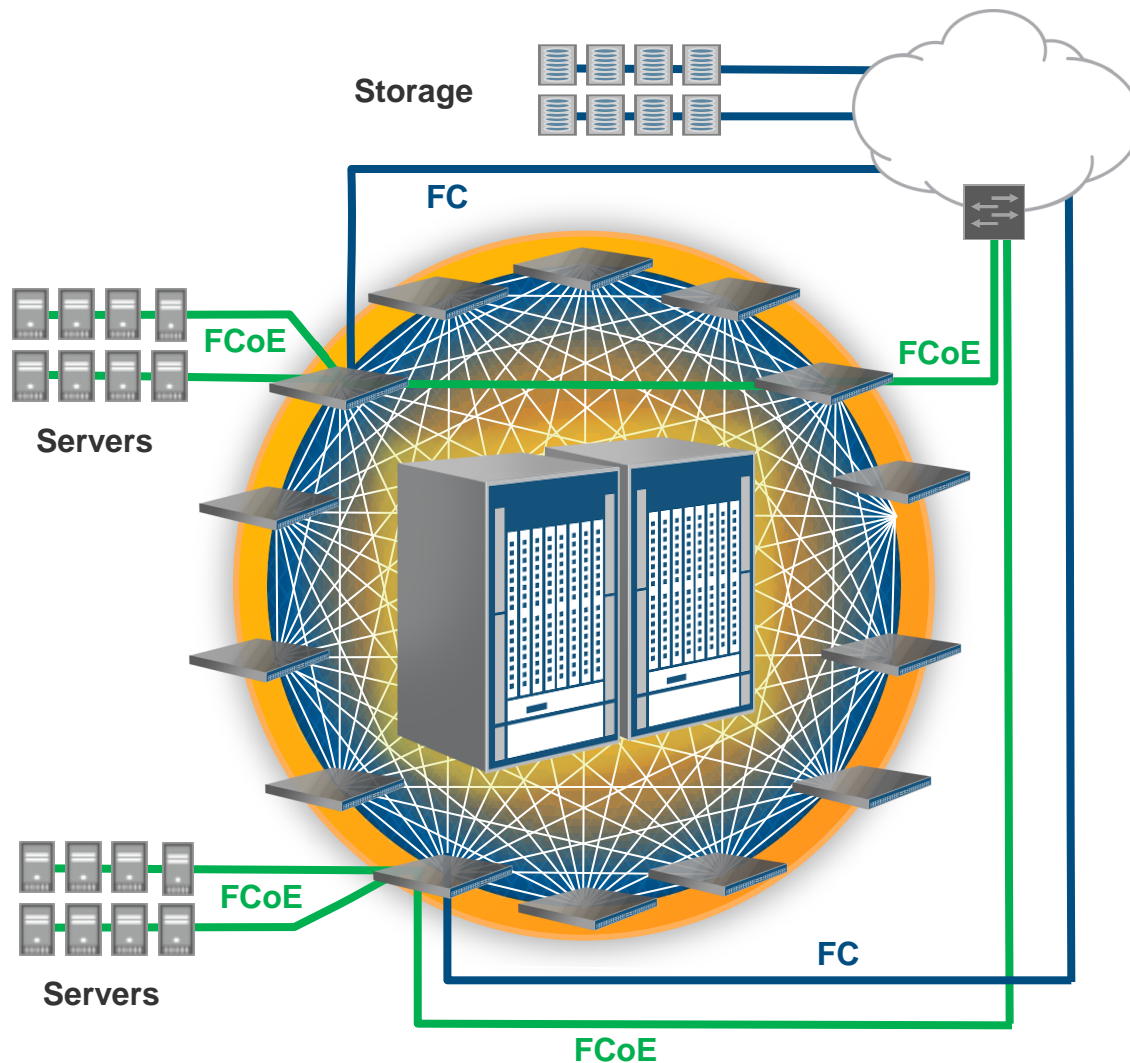
SCALING THE DATA PLANE

Data Plane



QFabric is faster than any Ethernet chassis switch ever built

QFABRIC CONVERGENCE



Convergence

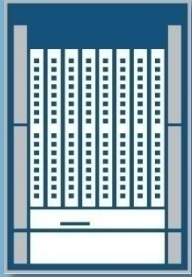
FCoE Transit Switch

- Converged Enhanced Ethernet – Standards based (CEE or DCB)
- Provides Perimeter protection with FIP Snooping.

FCoE-FC Gateway

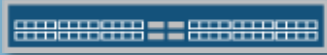
- Ethernet or Fibre channel gateway with FC ports at the edge
- Interoperates with existing SANs

QFABRIC HARDWARE



QF/Interconnect

Connects all the edge devices



QF/Node

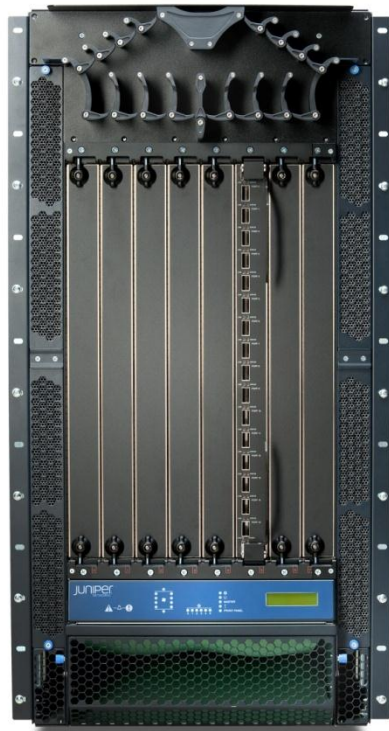
Media independent I/O ToR device.
Can be run in independent or fabric mode



QF/Director

2 RU high fixed configuration
X86 based system architecture

QFABRIC HARDWARE – INTERCONNECT



Front View



Rear View

QF/Interconnect

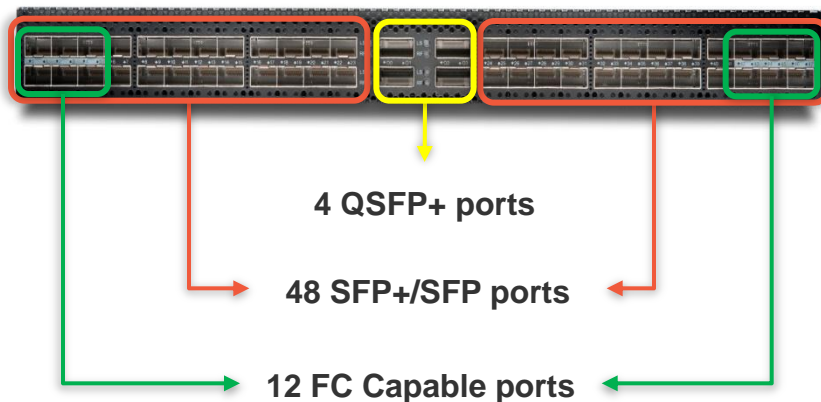
- 21 RU high 8 slot chassis
- 128 QSFP 40G ports – wire speed
- 8 fabric cards (10.24Tbps/chassis)
- Dual redundant control board
- Redundant AC power supply
- Front to back air flow

FABRIC HARDWARE – EDGE NODE

Front View



Rear View



QF/Node

- 1 RU high fixed configuration
- 48 SFP+/SFP ports
- 12 FC capable (2/4/8G) ports
- 4 * 40G fabric uplink ports (can also operate in 10G mode)
- Redundant AC power supply
- Front to back air flow

Will also operate as a
Stand Alone Switch
QFX3500

QFABRIC HARDWARE – DIRECTOR



QF/Director

- 2RU device
- Has GE ports to connect to edge and interconnect devices
- Based on x86 architecture

QFABRIC AT A GLANCE



Scalability
10's to 6000 ports



Runs Junos
Rich functionality



Performance
<5us, Low jitter



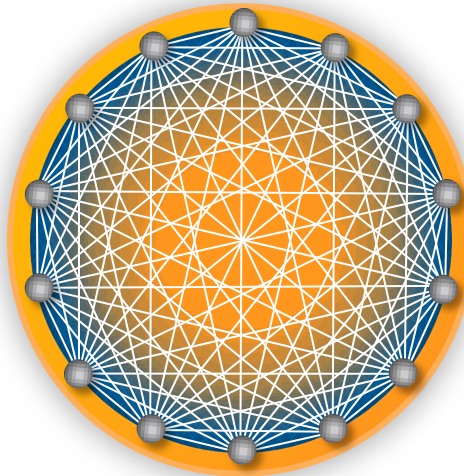
Lossless
DCB compliant



Simplicity
N=1



Storage
FCoE gateway
and transit



Designed for Modern DC
Virtualization and Convergence



**Seamless Layer 2
and Layer 3**
Flexible VLAN capability

QFABRIC



Performs

- Every application performs better



Scales

- Build large, efficient clouds



Simplifies

- Less hardware
- Operational simplicity of a switch
- Greater reliability



Lowers Cost

- Elegance of design delivers lower OPEX and CAPEX

QUESTIONS ABOUT QFABRIC



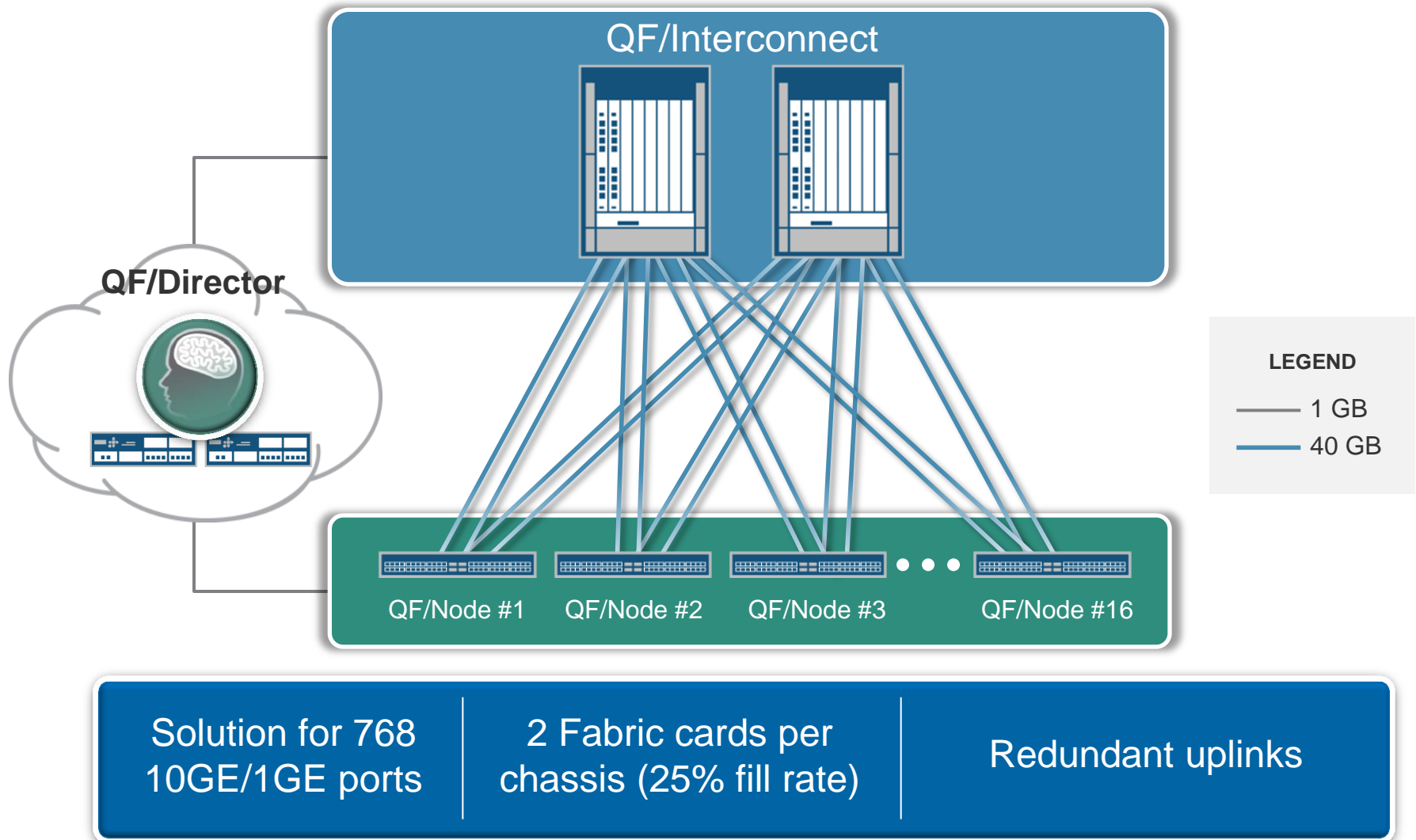
Deployment

Migration

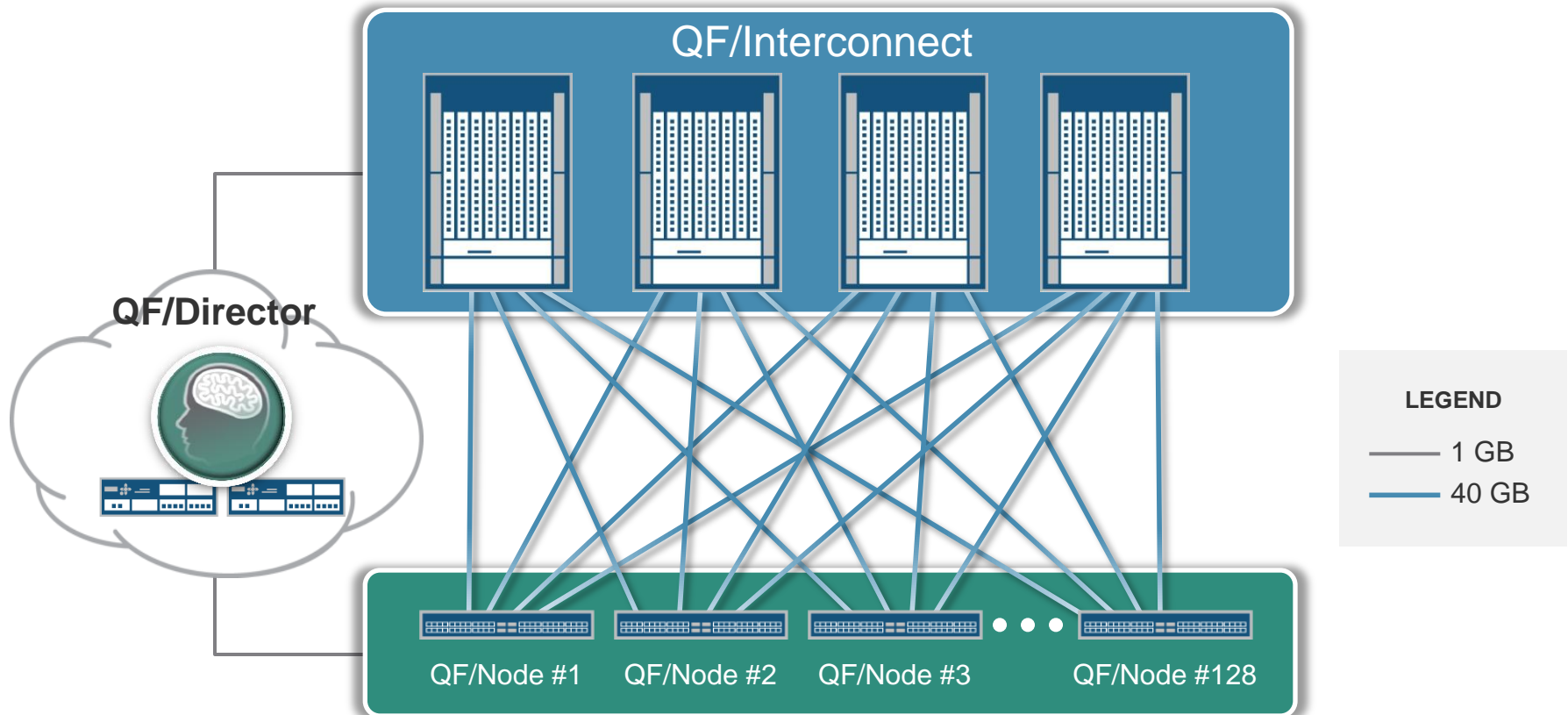
Competition

Timing and Direction

QFABRIC CONFIGURATION FOR SMALL DEPLOYMENT



QFABRIC CONFIGURATION FOR LARGE DEPLOYMENT

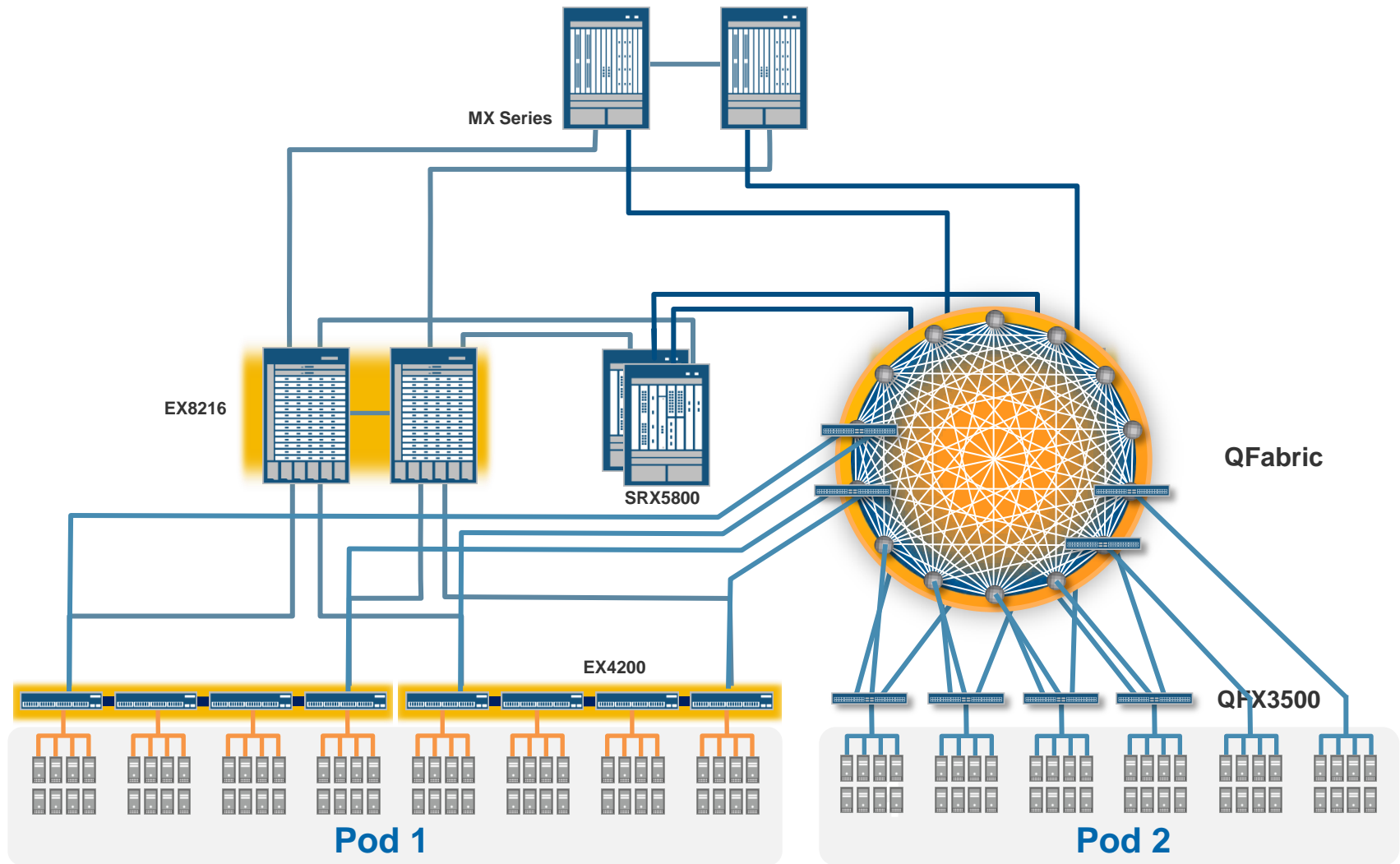


Solution for 6,000
10GE/1GE ports

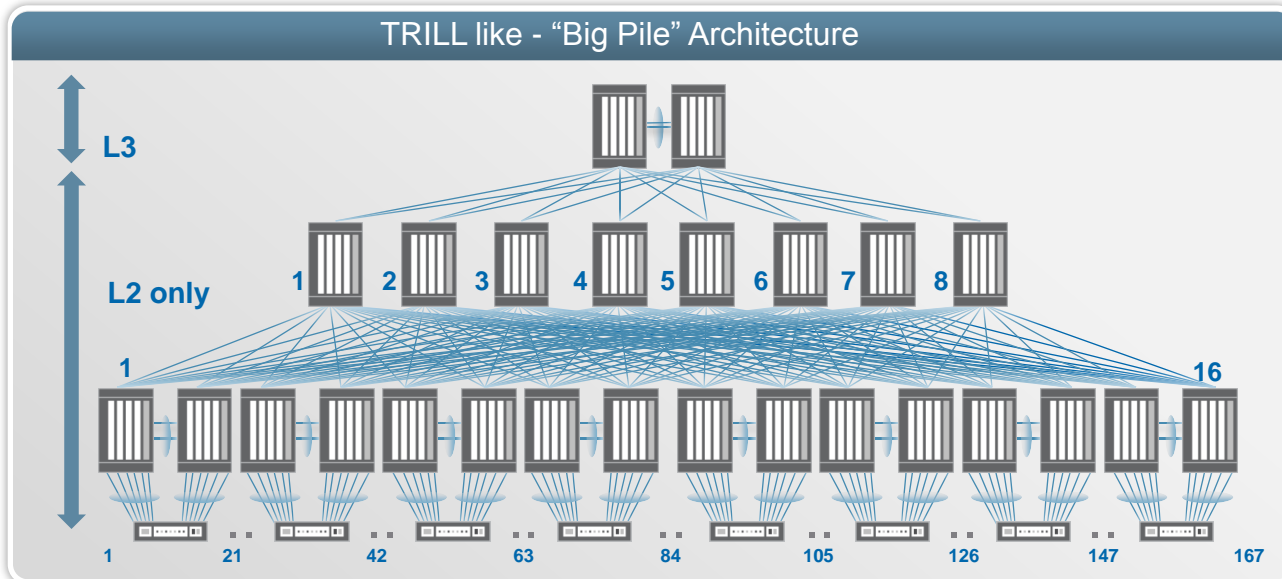
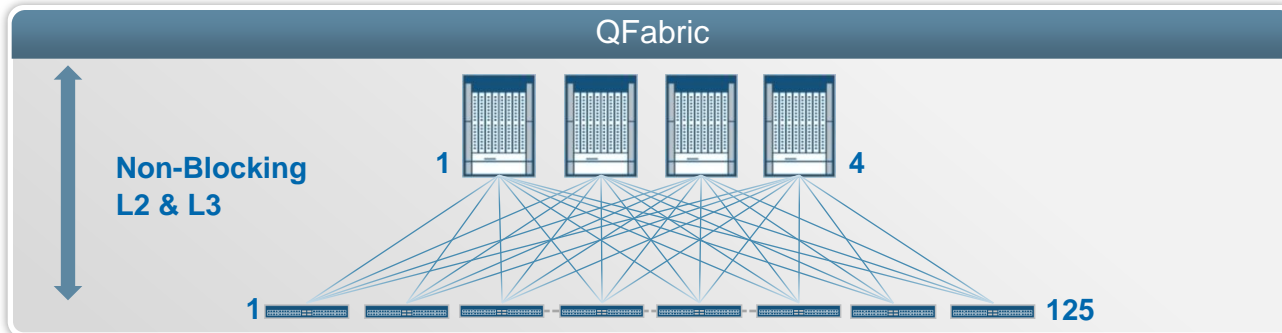
40 Gig uplink from each
Node to Interconnect

1GE connections to
the control cluster

MIGRATING TO QFABRIC



QFABRIC VS. COMPETITION – 6000 10 GbE PORTS



QFabric

- 1/3 fewer devices ↓
- 77% less power Savings: \$360K/Yr ↓
- 90% less floor space ↓
- 85% fewer links ↓
- 12-16x faster ↓
- Mgd. Devices 1 vs. 193 ↓
- L2 AND L3 ★

The QFabric is faster than any chassis switch ever built!

MULTIPLE PORT CONFIGURATION COMPARISONS

500 ports¹

- 1/6 fewer devices ↓
- 45% less power
Savings: \$28K/Yr ↓
- 50% less floor
space ↓
- 74% fewer links ↓
- 2-3x faster ↓
- Mgd. Devices
1 vs. 18 ↓



1000 ports²

- 1/5 fewer devices ↓
- 46% less power
Savings: \$33K/Yr ↓
- 50% less floor
space ↓
- 84% fewer links ↓
- 2-3x faster ↓
- Mgd. Devices
1 vs. 32 ↓
- L2 & L3* ★



3000 ports²

- 1/3 fewer devices ↓
- 73% less power
Savings: \$180K/Yr ↓
- 85% less floor
space ↓
- 85% fewer links ↓
- 12-16x faster ↓
- Mgd. Devices
1 vs. 98 ↓
- L2 & L3* ★



6000 ports²

- 1/3 fewer devices ↓
- 77% less power
Savings: \$360K/Yr ↓
- 90% less floor
space ↓
- 85% fewer links ↓
- 12-16x faster ↓
- Mgd. Devices
1 vs. 193 ↓
- L2 & L3* ★



TIMING AND DIRECTION

Timing

QFX3500 ships
in this quarter

QFabric is in
customer trials

QFabric ships
in Q3 2011

Future directions

Scale up – Mega-Fabrics
10s of 1000s of 10GbE ports,
100s of thousands of
Virtual Ports

Scale down – Micro-Fabrics
50-750 ports

40 GbE and 100 GbE
access speeds

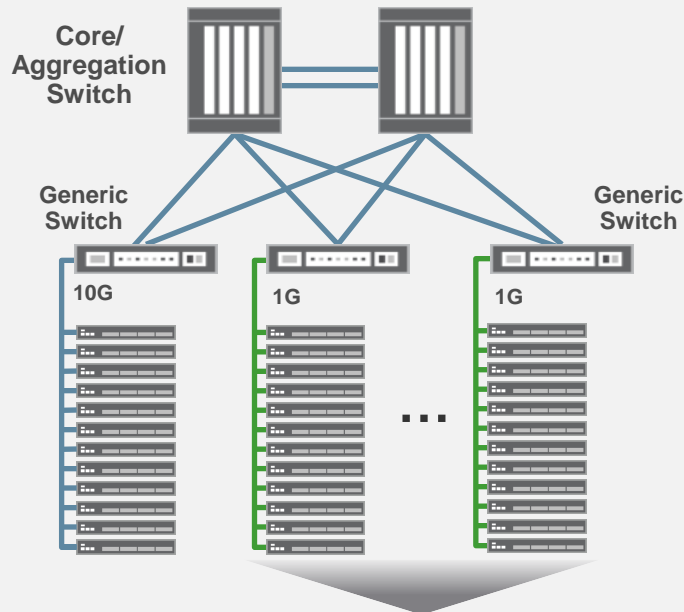
**Provide a fully blended
fabric with full fibre
channel services**

BACKUP



MIGRATION SCENARIO #1: HIGH PERFORMANCE ACCESS

Before (1GbE Access)

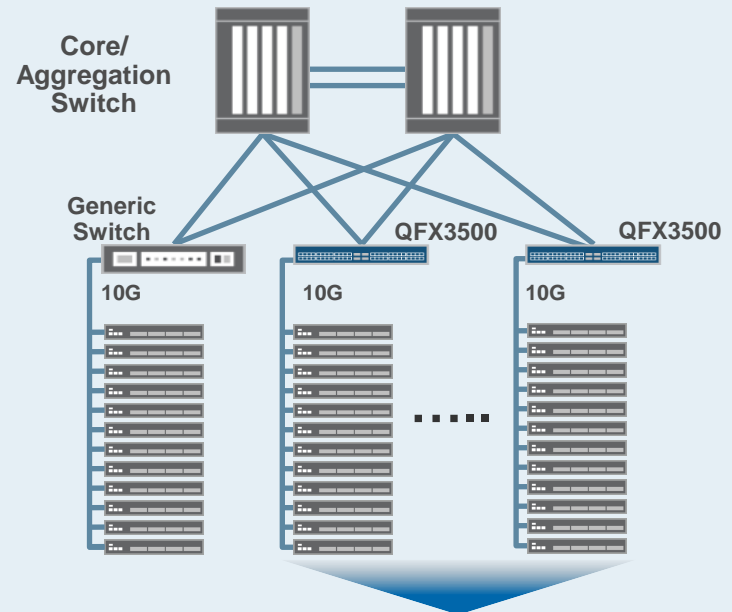


Limited performance

Challenges

Server virtualization increasing network utilization and requiring 10 GbE access connectivity.

After (10GbE Access)



High performance and low latency

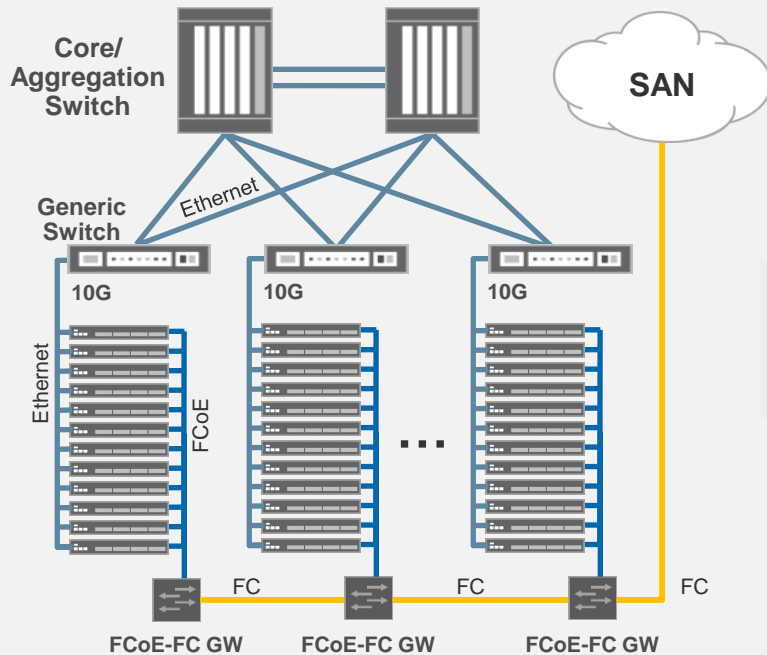
Solution

QFX3500 wire-speed 48x10G and 4x40G ports, with ultra low latency, low power consumption and compact design (1RU)

MIGRATION SCENARIO #2: CONVERGED ACCESS (10G)

Before

Non-Converged Access
(10G)

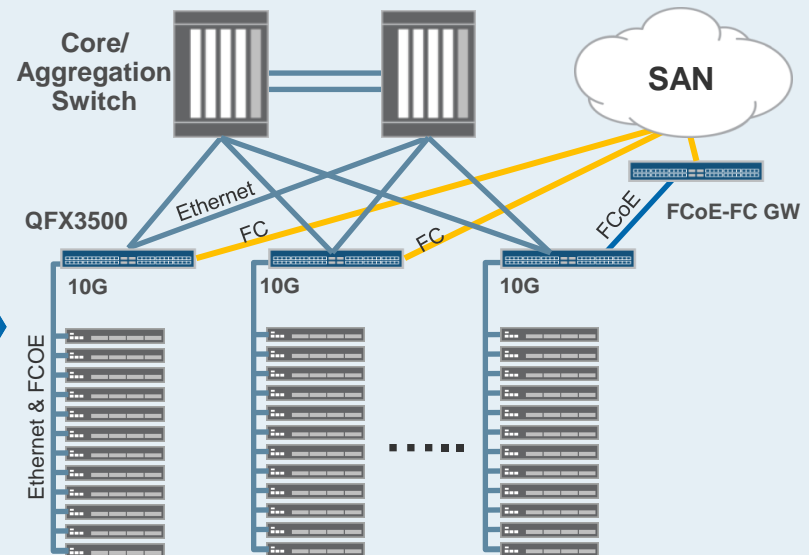


Challenges

Operational simplicity by preserving existing investments in SAN and LAN infrastructure and reduce management complexity.

After

Converged Access
(10G)

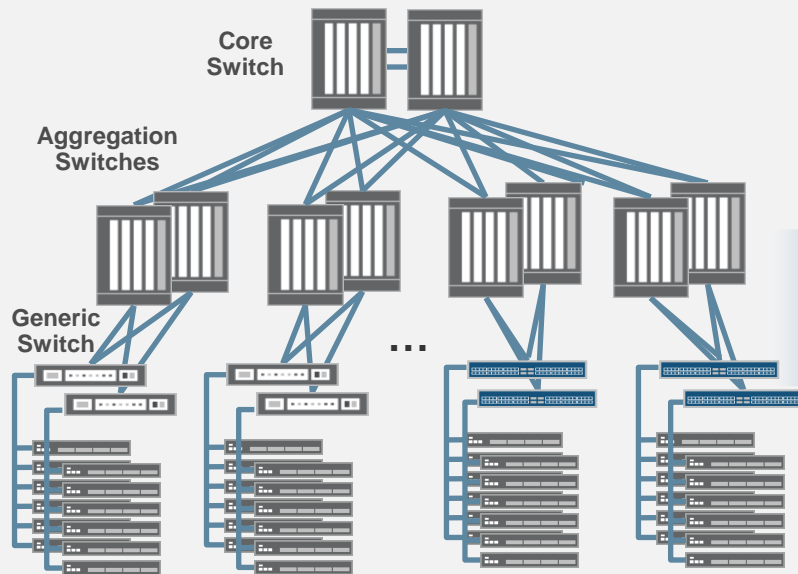


Solution

QFX3500 support standards-based FCoE and DCB features. QFX3500 is a ultra low-latency, lossless switch with 12 FC ports.

MIGRATION SCENARIO #3: CLOUD-READY

Before (Traditional)

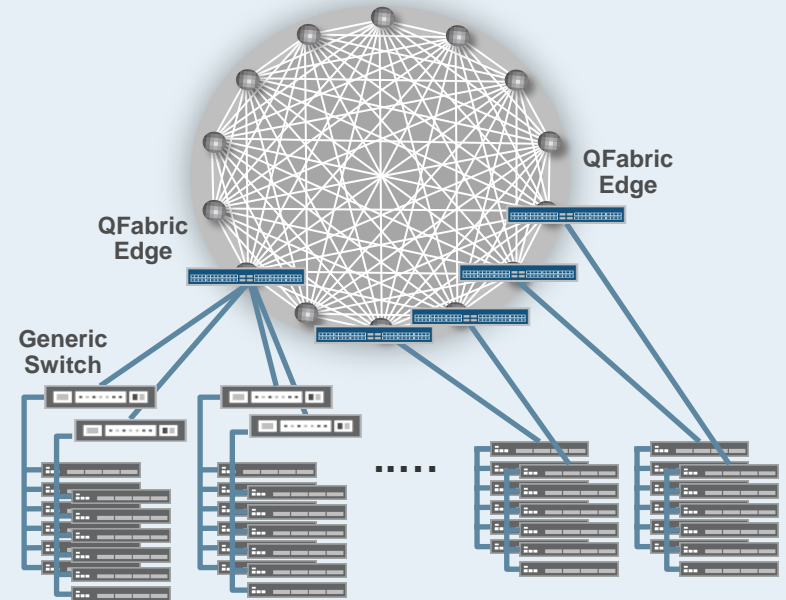


Limited Scale

Challenges

Traditional multi-tiered architectures are too complex and inflexible. Cost increase exponentially as network grows.

After (QFabric)



Exponential Scale

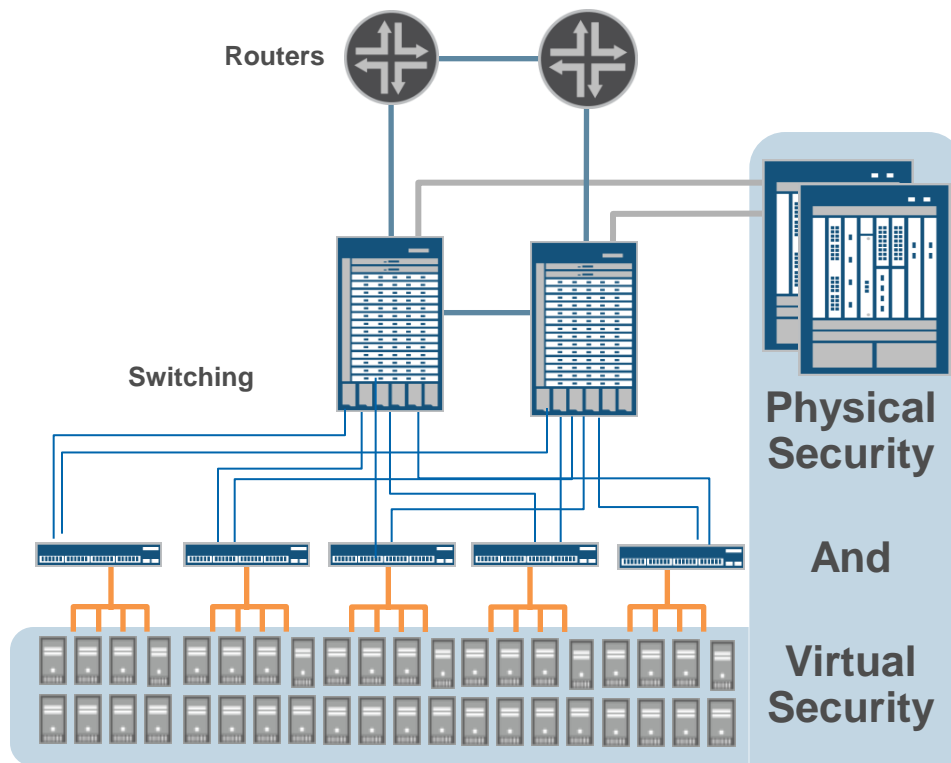
Solution

The QFabric architecture provides a quantum leap in performance, scale and simplicity. Scales from few hundred to thousands of ports.

SECURING THE VIRTUALIZED DATA CENTER



DATA CENTER SECURITY DYNAMICS



Changing Requirements

- Data center scale and virtualization driving enforcement and compliance requirements in both physical and virtual environments
- Physical security is not enough
 - enforcement flexibility needed
 - security services at any location on any flow
- Best in class approach
 - hardware efficiency for physical security
 - software efficiency for virtual security

SECURITY IMPLICATIONS OF VIRTUALIZATION: DYNAMIC VMS CREATE BLIND SPOTS AND INCREASE RISK

VMworld 2010 Survey Respondents

- 55% Move VMs multiple times per day
- 70% Consolidating mixed trust workloads
- Lack of clear responsibility for virtualization security

Inter VM traffic is handled by the vSwitch

- Flows between VMs on the same machine don't go through the physical security infrastructure

VMs change all the time

- At-a-click provisioning means new VMs sprawl in number and may proliferate risky configurations

VMs move

- VMs can migrate between trust zones automatically and security configuration is not tracked



VIRTUALIZED DATA CENTER SECURITY STRATEGY



Securing across Physical and Virtual

- New visibility into virtualization security blind spots
- Visibility and enforcement for any flow in the fabric



Adaptive security for dynamic changes

- Visibility and enforcement for new, changing and moving Virtual Machines
- Automated VM detection and intelligent enforcement



Part of the Data Center Fabric

- Maximize resource use by eliminating stranded security capacity
- Efficient delivery of security services at scale (no shadow problem)

BUILDING A DATA CENTER SECURITY SOLUTION

Management and Security Services



**Security
Design**



**Security Threat
Response Manager**



Physical



SRX Series

← Services →



Firewall



IPS



DoS Protection



AppSecure

Virtual



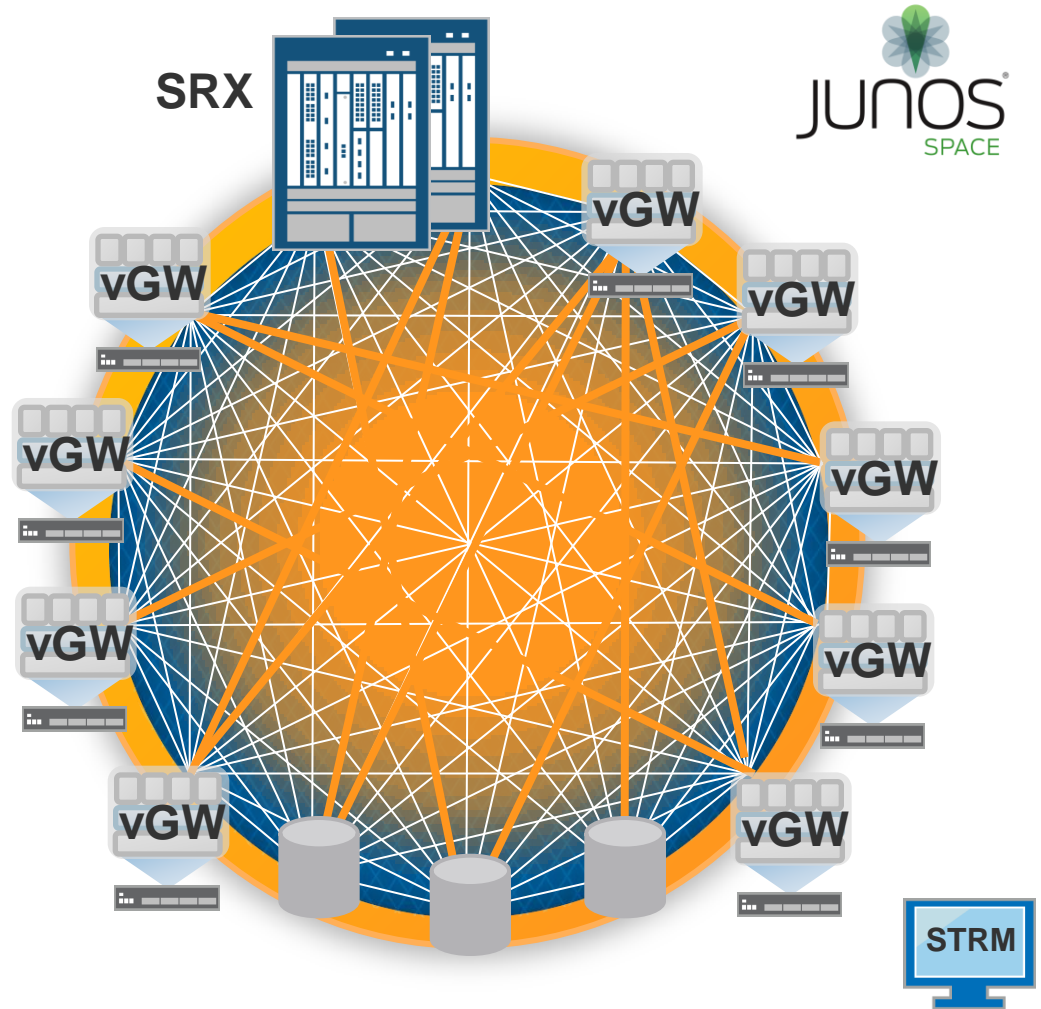
vGW Series

INTEGRATING SECURITY AS PART OF THE FABRIC WITH THE SRX & vGW SERIES

Only solution to integrate
physical and virtual network
security

First to visualize all traffic
flows in the data center

Allows 5x more secure VMs
per ESX host than
alternatives





everywhere

KEY QUESTIONS

1. How can maximize the lifetime of server & app investments?
2. What is the best way to move traffic around the datacenter?
3. What is the best way to connect datacenters, colo, & cloud?
4. How can you secure both physical and virtual traffic flows?
5. Can you do all of the above while simplifying the infrastructure and reducing spend?