

Brocade Ethernet Fabrics

Brocade

9 June 2015

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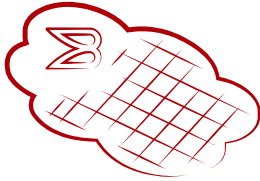
 [@Brocade](https://twitter.com/Brocade)



On-Demand Data Center Network Technologies

Strategic focus areas

**FIBRE CHANNEL
FABRICS**



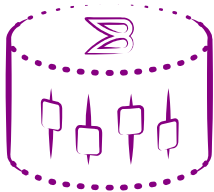
ETHERNET FABRICS



CORE ROUTING



SDN



NFV



**CLOUD
ORCHESTRATION**



Ethernet Fabrics



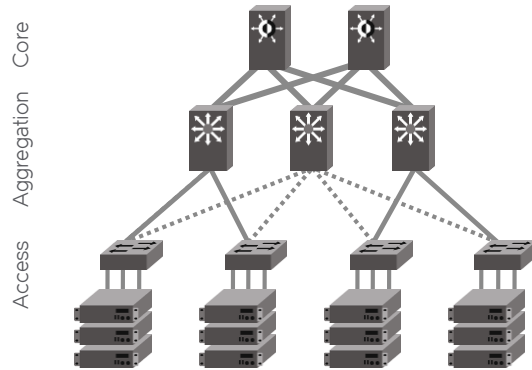
What Is an Ethernet Fabric?

- Optimized for server and network virtualization
- More efficient, higher throughput, lower latency
- Scale-out vs. scale-up to increase flexibility and protect investment
- Automated deployment and ongoing administration



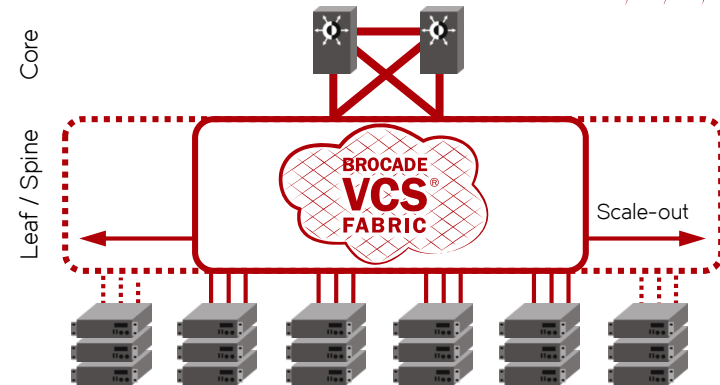
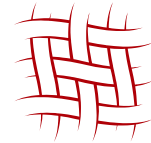
Ethernet Fabrics vs. Legacy Networks

CLASSIC HIERARCHICAL ARCHITECTURE



- Rigid architecture, north-south optimized
- Inefficient link utilization
- Individually managed switches
- VM-ignorant
- No network virtualization

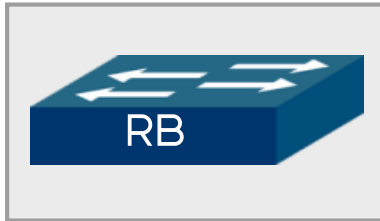
ETHERNET FABRIC ARCHITECTURE



- Flat topology, east-west optimized
- All links active, L1/2/3 multipathing
- Fabric managed as one logical switch
- VM-aware
- Native and overlay network virtualization

TRILL – Transparent Interconnect of Lots of Links

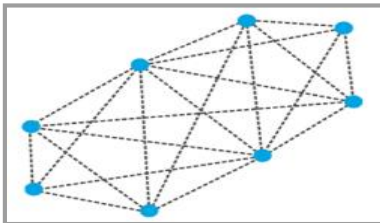
Overview



Devices are Routing Bridges (RBridges or Rbridges)



Data Plane is TRILL protocol

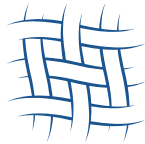


Control Plane is a L2 link state routing protocol
(FSPF+OSFP-like)

Brocade VCS™ Fabric Technology

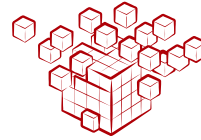
Pillars of innovation

ETHERNET FABRIC



No Spanning Tree Protocol
All paths active
Auto, non-disruptive healing
Ideal for storage

DISTRIBUTED INTELLIGENCE



Fabric aware of all switches, devices, VMs
Flexible topology
Masterless control, no reconfiguration
VM mobility (AMPP)

LOGICAL CHASSIS



Logically flatten and collapse network layers
Auto-forming and configuring - like adding a blades to a chassis
Manage fabric as a single switch
Virtual LAG (vLAG)



DYNAMIC SERVICES

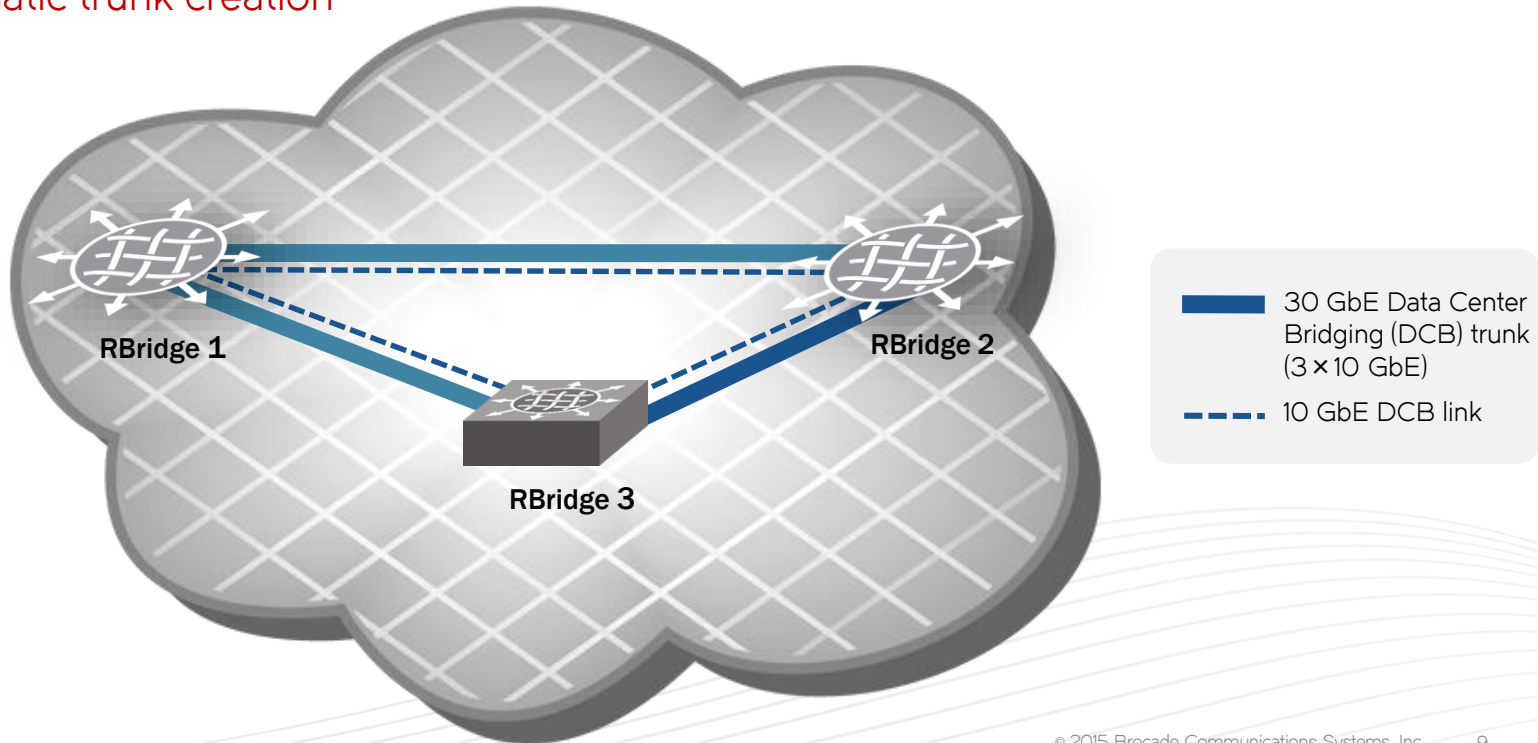


Connectivity over Distance, Native Fibre Channel, Layer 3, FCoE and IP Storage



Brocade VCS Fabrics Are Self-Forming

- Automatic fabric creation and expansion (two steps, 1 to 2 minutes)
- Automatic trunk creation



VCS DIFFERENTIATOR :

AUTOMATED

EFFICIENT

BUILT FOR CLOUD

Automated

Automated

Configuring LAG (for 2 members)

Execute the following commands on one switch:

- `configure terminal`
- `interface port-channel 1`
- `switchport`
- `switchport mode trunk`
- `switchport trunk allowed vlan all`
- `qos flowcontrol tx on rx on`
- `mtu 9208`
- `no shutdown`
- `interface tengigabitethernet 1/0/5`
- `channel-group 1 mode active type standard`
- `no shutdown`
- `interface tengigabitethernet 1/0/6`
- `channel-group 1 mode active type standard`
- `no shutdown`
- `exit`

Repeat same commands on other end switch.

Total commands: 30

Configuring ISL Trunking (for up to 8 members)

Absolutely no configuration required.

Total commands: 0

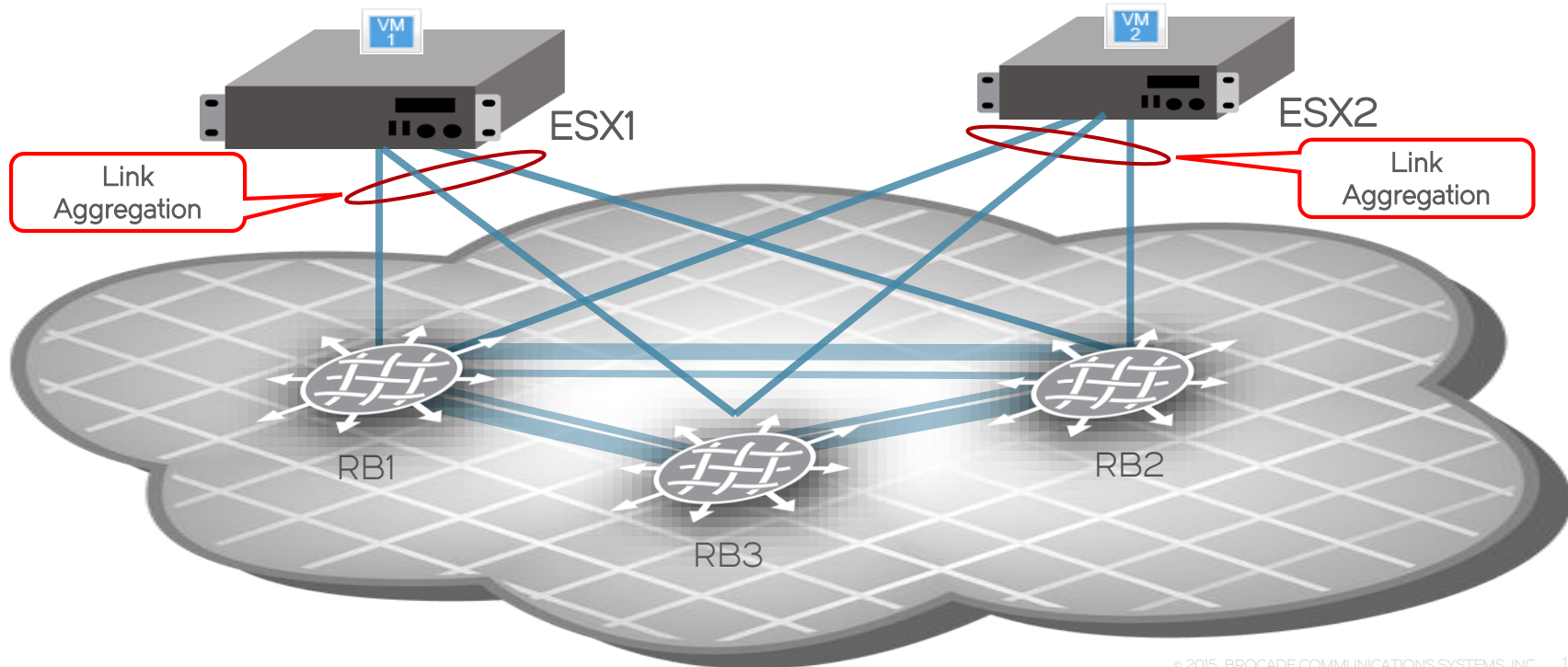
(10GbE)

10GbE DCB LINK



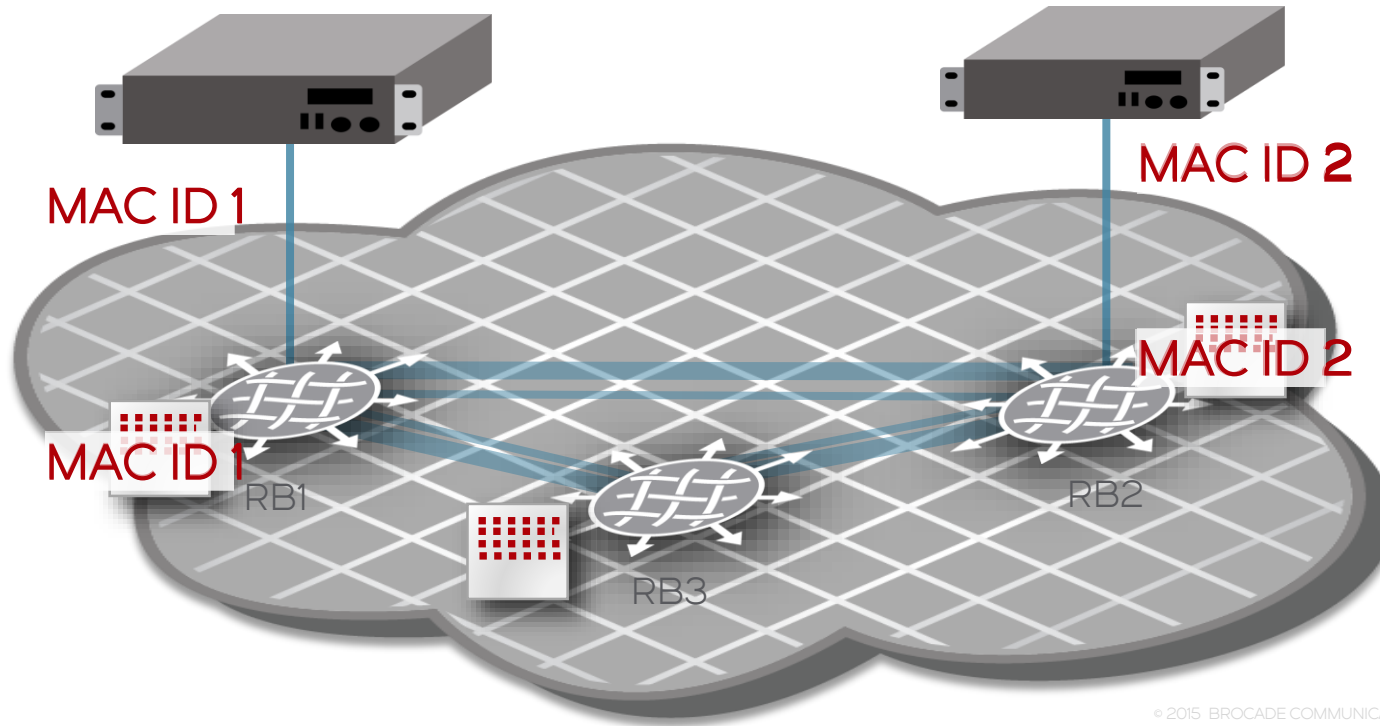
VCS DIFFERENTIATOR:

VLAG - LAG TO DIFFERENT PHYSICAL VDX SWITCHES



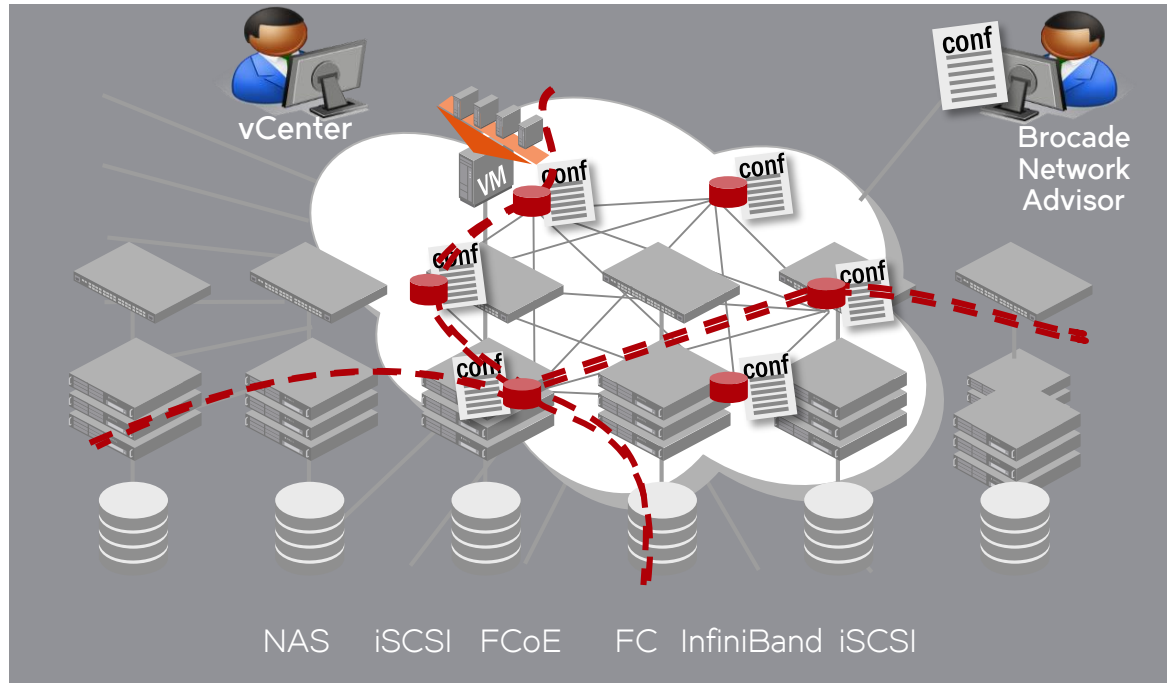
VCS DIFFERENTIATOR:

DISTRIBUTED INFORMATION TO ENABLE VM MOBILITY



VCS DIFFERENTIATOR :

VM-AWARE NETWORK AUTOMATION

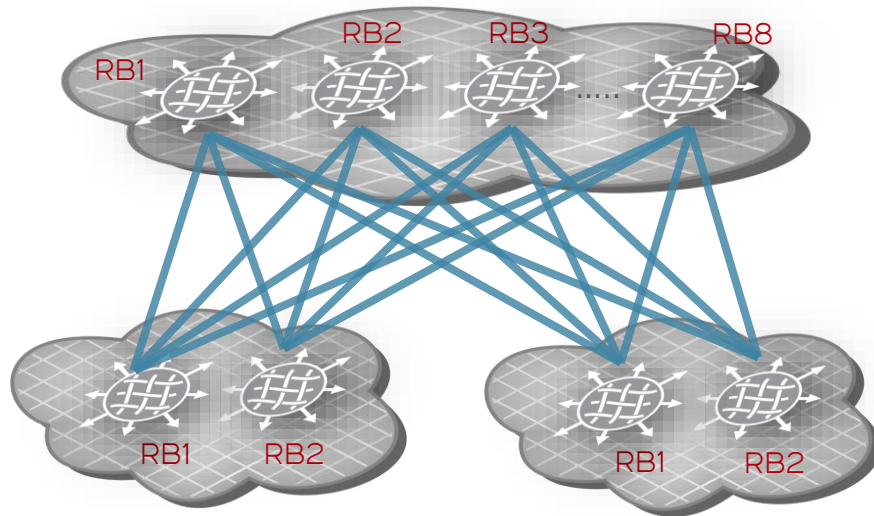


- No need for manual configuration of MAC addresses and port profiles; less error-prone
- Minimizes procedural delays between the server and network IT teams
- Eases integration of multiple Brocade VCS fabrics with VMware
- Protects against VM/MAC spoofing via secure vCenter communication

VCS DIFFERENTIATOR :

VLAG ACROSS 8 NODES

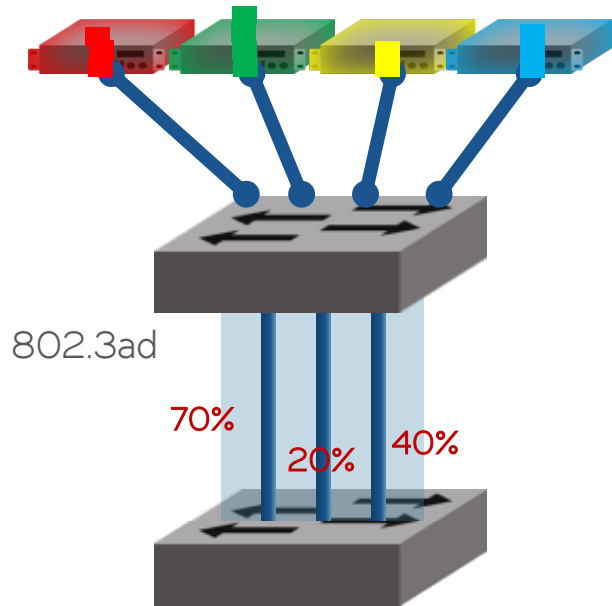
Industry
first



- Scale out leaf and spine
vLAG limit = 8 nodes
- Benefit
 - Stitch multiple fabrics together
 - Accommodate 4x more VMs
 - Larger domain for vm mobility
 - Flexible oversubscription ratios from as low as 1:1 to 1:N

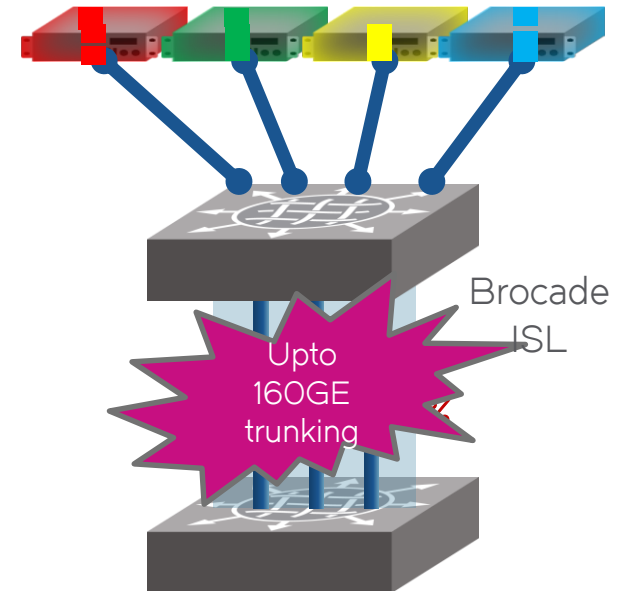
VCS DIFFERENTIATOR :

INCREASE LINK EFFICIENCY WITH BROCADE TRUNKING



Traditional algorithms cause imbalances

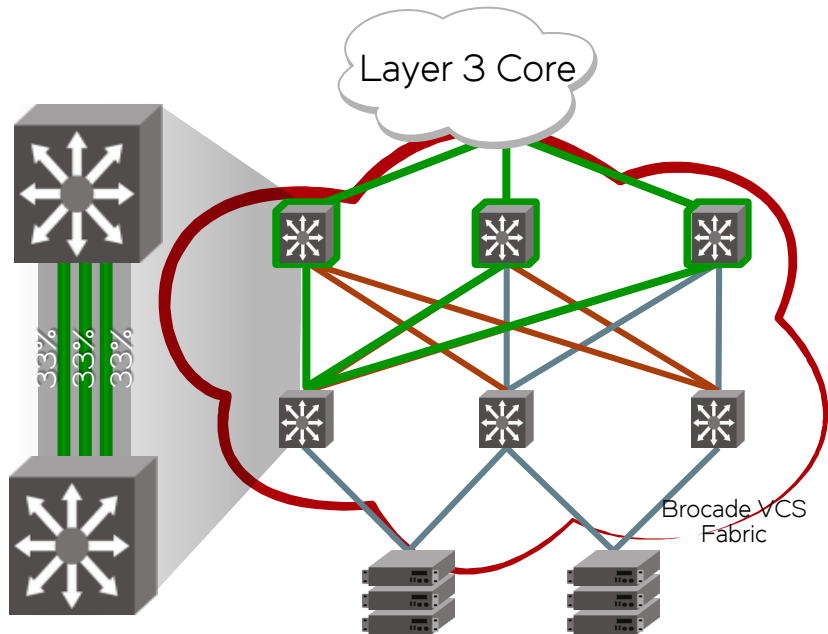
- High link utilization and ease-of-use
 - All 10GE ports are not alike
- Frame-level, hardware-based trunking at Layer 1
 - Near 100% link utilization versus 802.3ad LAG groups ~50-60% link utilization
 - Single flows can be split across all links
 - Frames are distributed across links in the trunk
 - Built into Brocade fabric switching ASIC



Brocade Trunking increase link efficiency

Brocade VCS Multi-pathing at Multiple Layers

Dramatic increase in network utilization and reliability

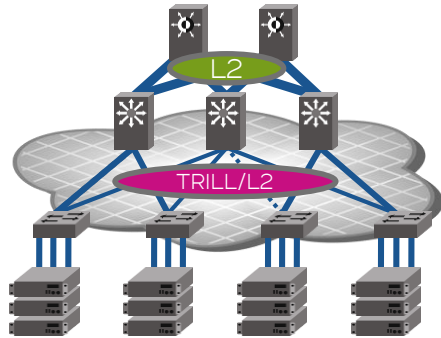


FEATURE	BENEFIT
L1: Trunking with frame striping	Near-perfect load balancing across all links in a trunk group
L2: Equal Cost Multi-Pathing (ECMP)	All links utilized with flow-based load balancing
L3: Fabric load balancing across multiple L3 gateways	Improved scalability and resiliency

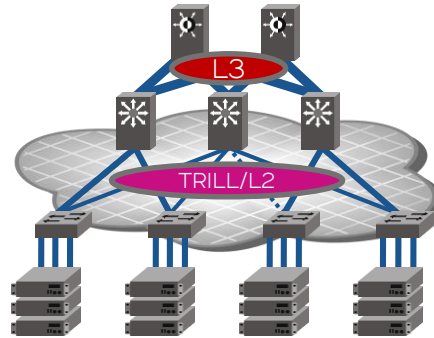
VCS DIFFERENTIATOR:

SUPPORTS L2 AND L3 FABRICS, SDN AND ALSO CLASSIC MODELS

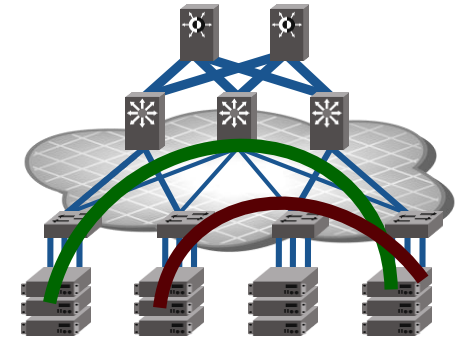
DIFFERENTIATOR



TRILL + L2

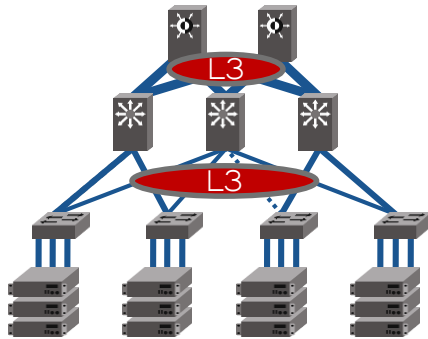


TRILL + L3

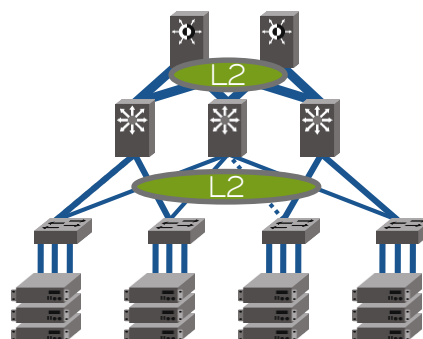


TRILL + Overlays

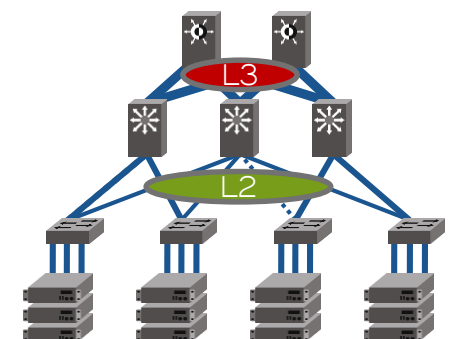
CLASSIC



Classic L3



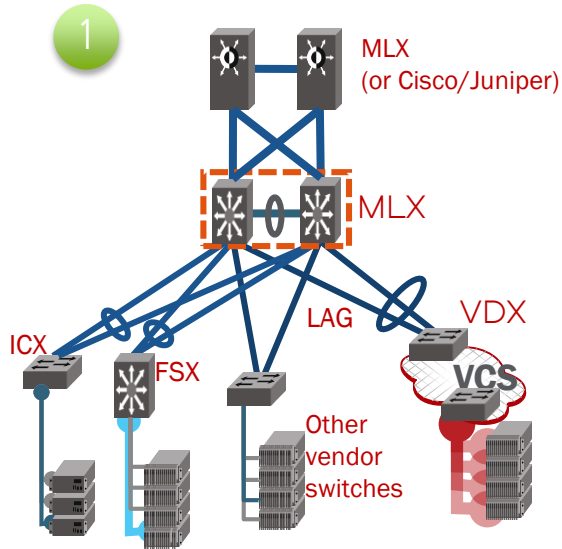
Classic L2



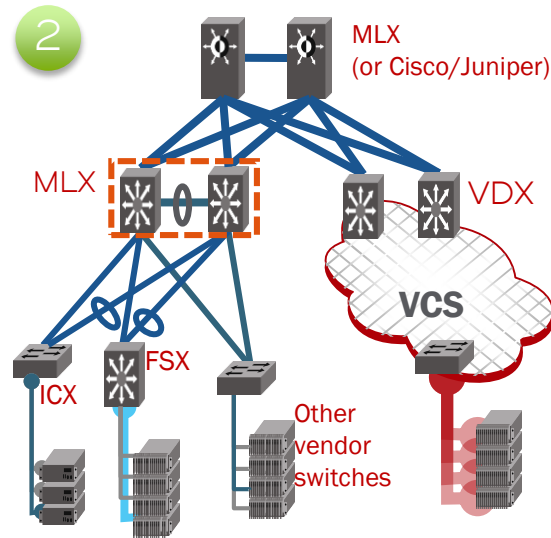
L2 + L3

VCS - Evolutionary architecture:

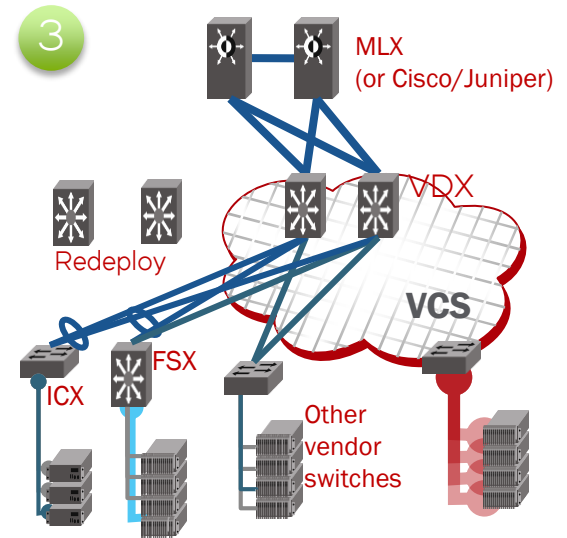
CLASSIC TO FABRIC TRANSITION



- Intro VCS in a POD
- Flat layer 2
- Co-exist with legacy access switches



- Scale Out VCS
- Co-exist with legacy access/aggregation

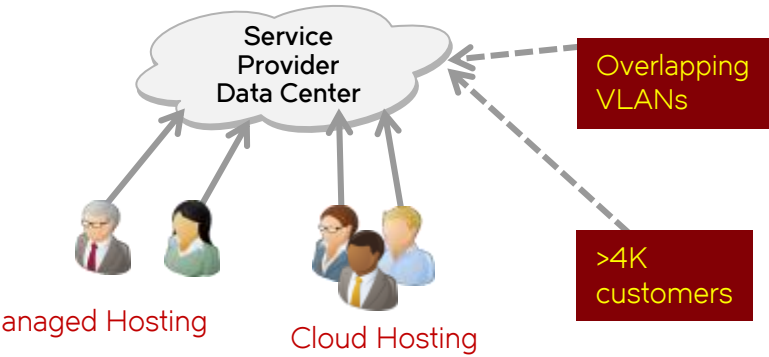
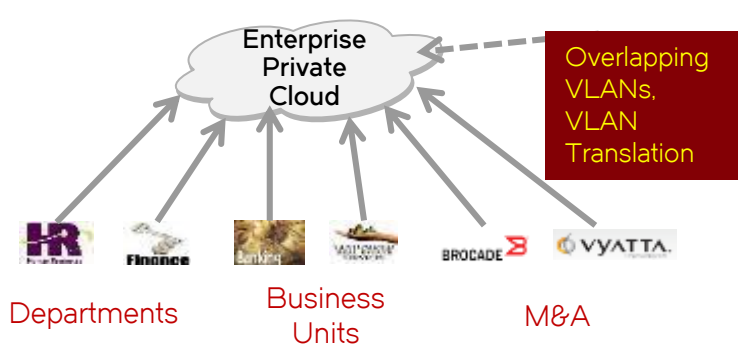


- Fully deployed fabric
- Core-Edge Solution
- Legacy network support

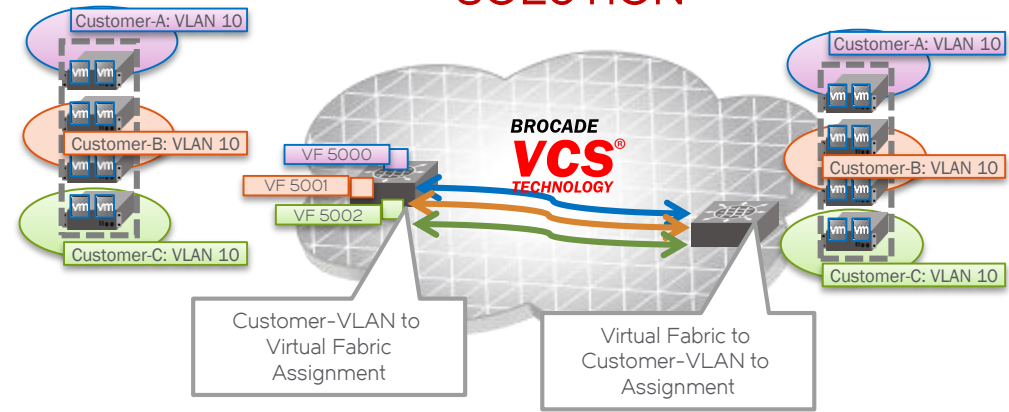
Challenge 1: Multi-tenancy

Solution: Virtual Fabric

CHALLENGE



SOLUTION



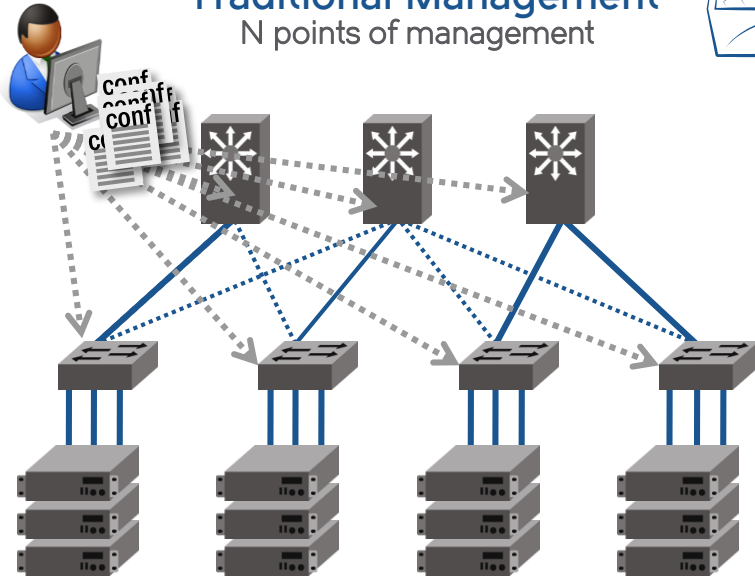
- Virtual Fabric is a native Ethernet Fabric based Multi-Tenancy solution
- It is based on standards based TRILL Fine-grained Labels. RFC # 6325
- Virtual Fabric provides support for overlapping vlans, vlan scale and transparent vlan services.

Challenge 2 : Operational Complexity

Solution : Logical Chassis Management

Traditional Management

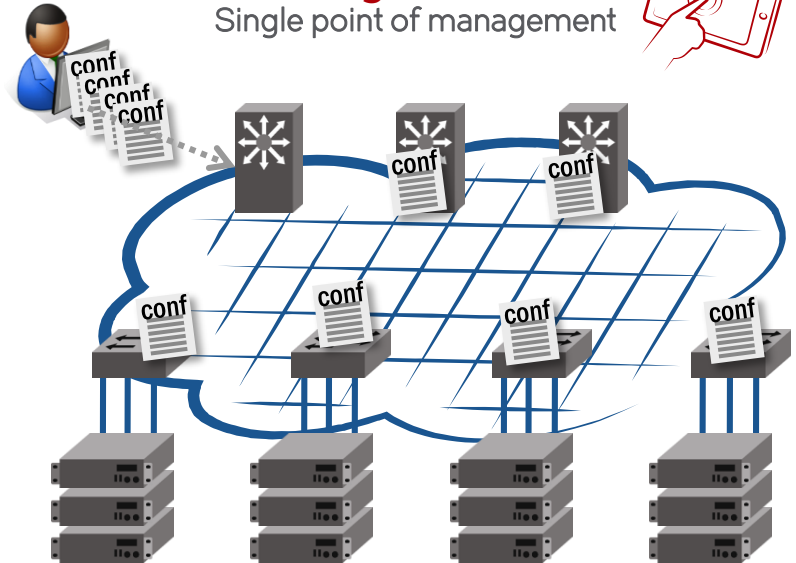
N points of management



ADMINISTRATIVE COST & COMPLEXITY
INCREASES WITH DATA CENTER SCALE

VCS Logical Chassis

Single point of management



ADMINISTRATIVE COST REMAINS RELATIVELY
FLAT WITH DATA CENTER SCALE

Challenge 3: Resiliency

Solution : Multi-layer Fabric HA & ISSU

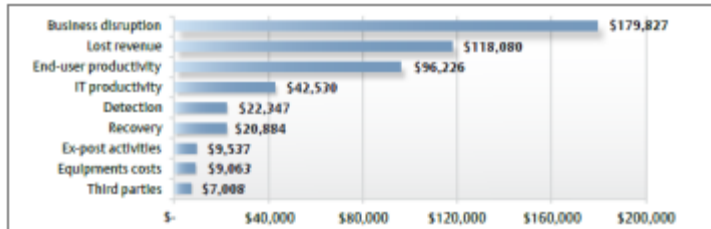
CHALLENGE



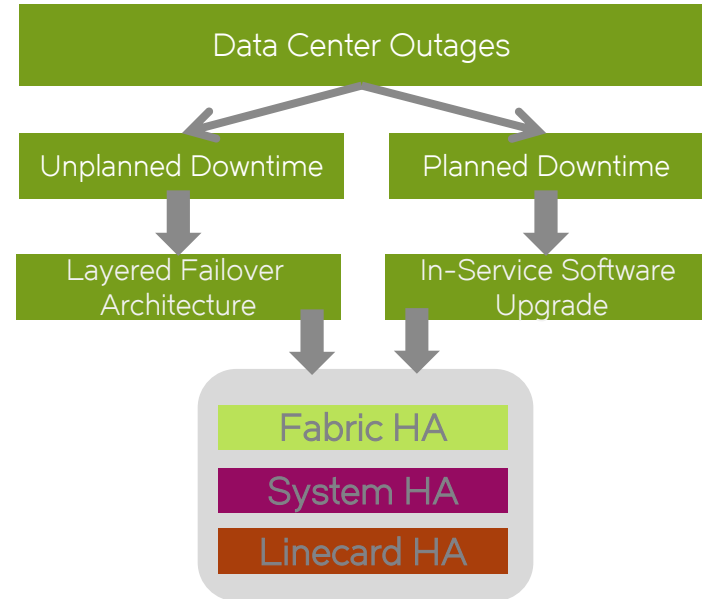
With an Incident length of **90 minutes**, the average cost of a single downtime event was approx. **\$505,500**



The Average cost of Data Center downtime is approximately **\$5,600 per minute***



SOLUTION

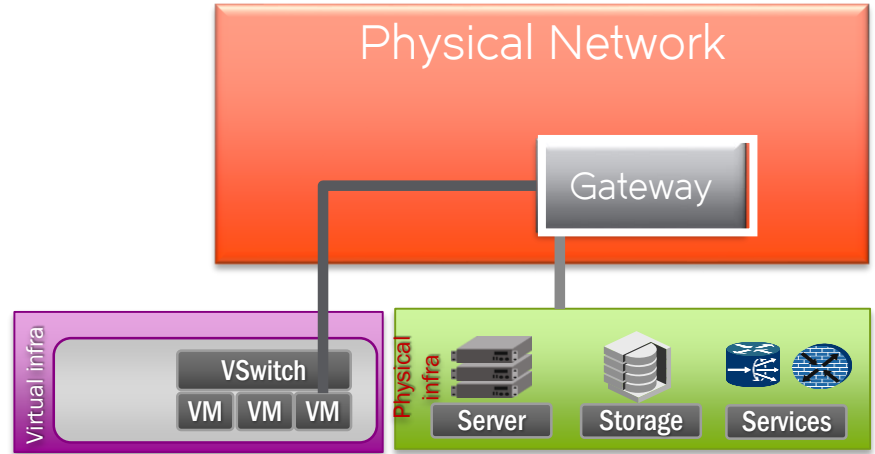


BENEFIT - Minimize risk of Network Downtime by implementing a self healing/intelligent network infrastructure.

Challenge 4: Complexity of Network Virtualization

Not every DC asset understands VXLAN

- Some applications running on physical servers like Oracle DB etc.
- Storage is still physical and non-VxLAN aware
- Existing appliances like firewalls and server load-balancers.
- Access to existing L3 networks via existing routers.



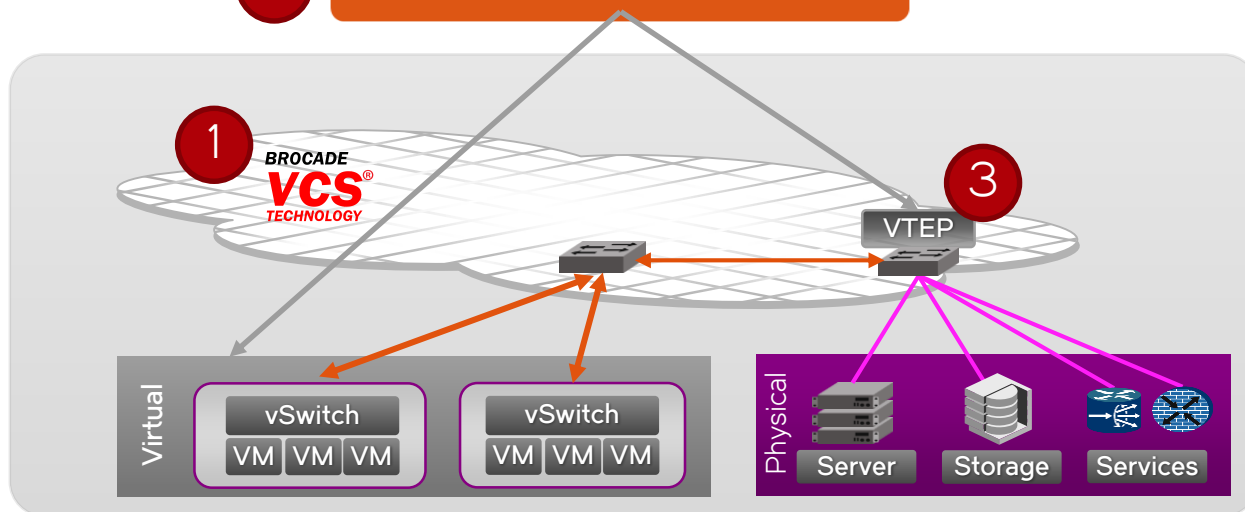
A VXLAN Gateway bridges virtual and physical assets

Network Virtualization with Brocade VCS & VMware NSX

vmware® vCloud

openstack™

2 VMware NSX Controller



1

Brocade VCS Fabric:
Automated, resilient physical foundation

2

VMware NSX:
Network virtualization overlay and controller

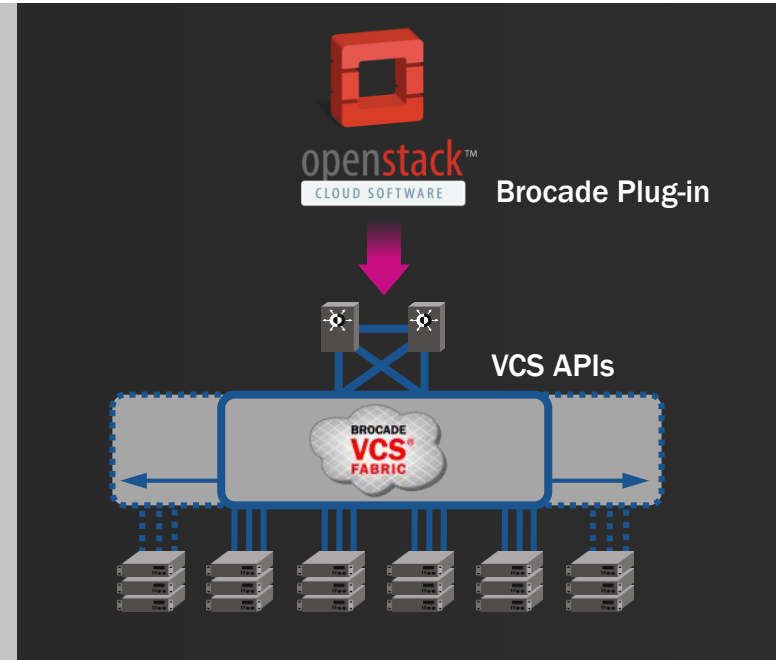
3

Brocade VCS Gateway for VMware NSX: Bridges virtual and physical infrastructure

VDX and Openstack

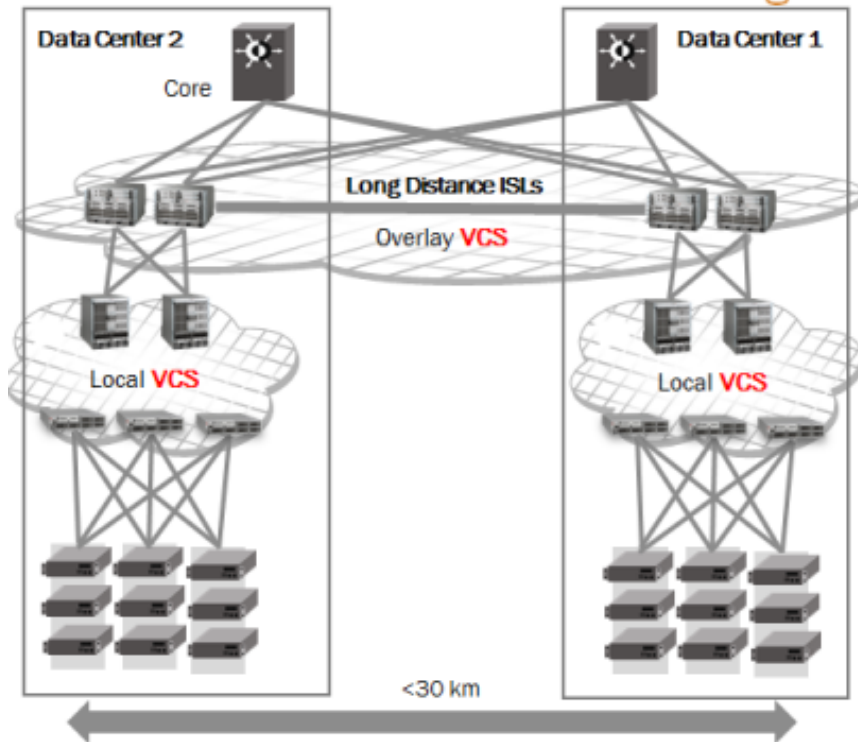
Self service, on demand fabric provisioning

- Brocade VCS fabric automation and OpenStack orchestration dramatically decrease time-to-deploy network capacity
- Brocade VCS plug-in contributed to OpenStack “Grizzly” release
- Brocade leading industry efforts to champion OpenStack support of Fibre Channel SANs
- Partnering with Red Hat and Piston Cloud for commercial versions of OpenStack that include Brocade VCS and FC fabrics



Challenge 5: Metro VCS

Stretching VCS fabric over metro distance



Brocade Multi-Fabric VCS Design

POD Design for Increased Scale - Multi-Fabric VCS deployment with vLAG connectivity between fabrics. Each Data Center can scale independently

Active - Active L3 Gateways - Support up to 4 VRRP-E Gateways in the Overlay VCS cloud.

Distribution of L2 Applications - Shared VLANs over the Overlay VCS

Localized VLANs - Certain VLANs remain native to the respective Datacenter with the Local VCS Fabric

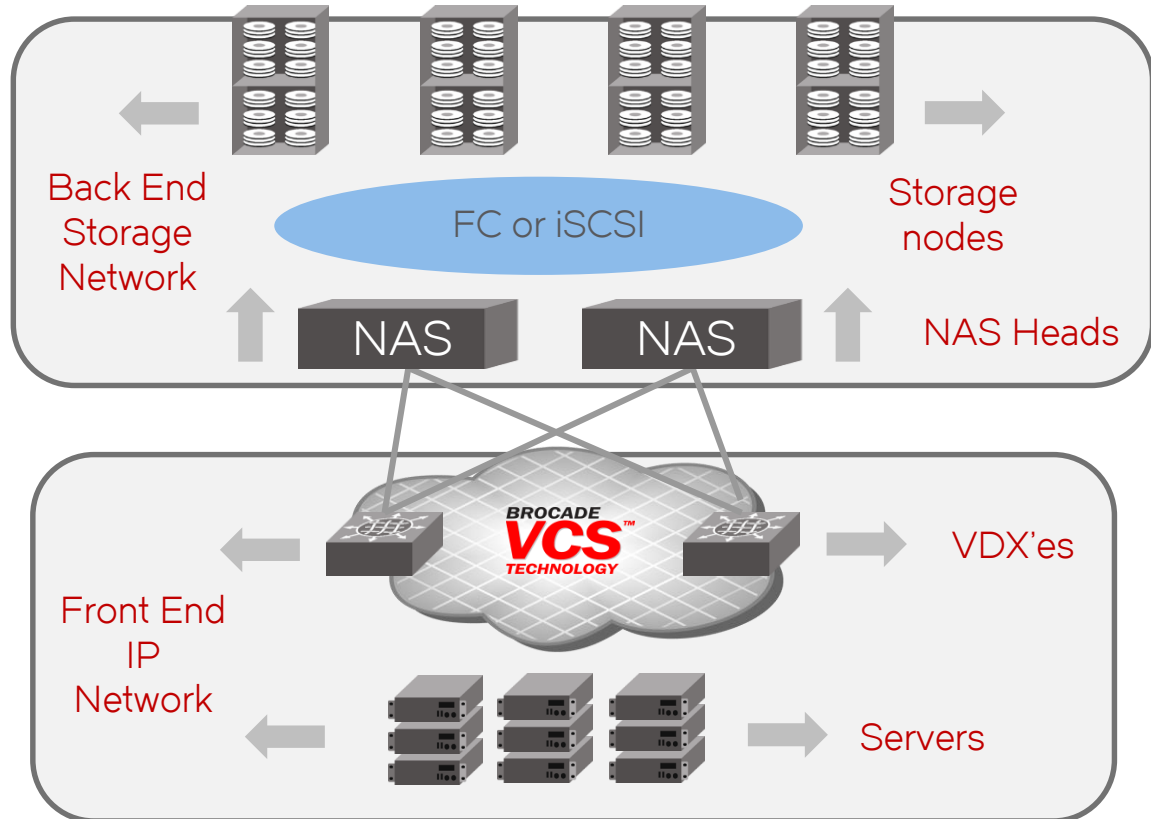
Seamless Transition of Services - Overlay VCS to accommodate Services (IDS, SLB & Firewalls)

Optimize Network Utilization - Contain L2 BUM traffic within Local VCS Clusters

Challenge 6: IP Storage Connectivity

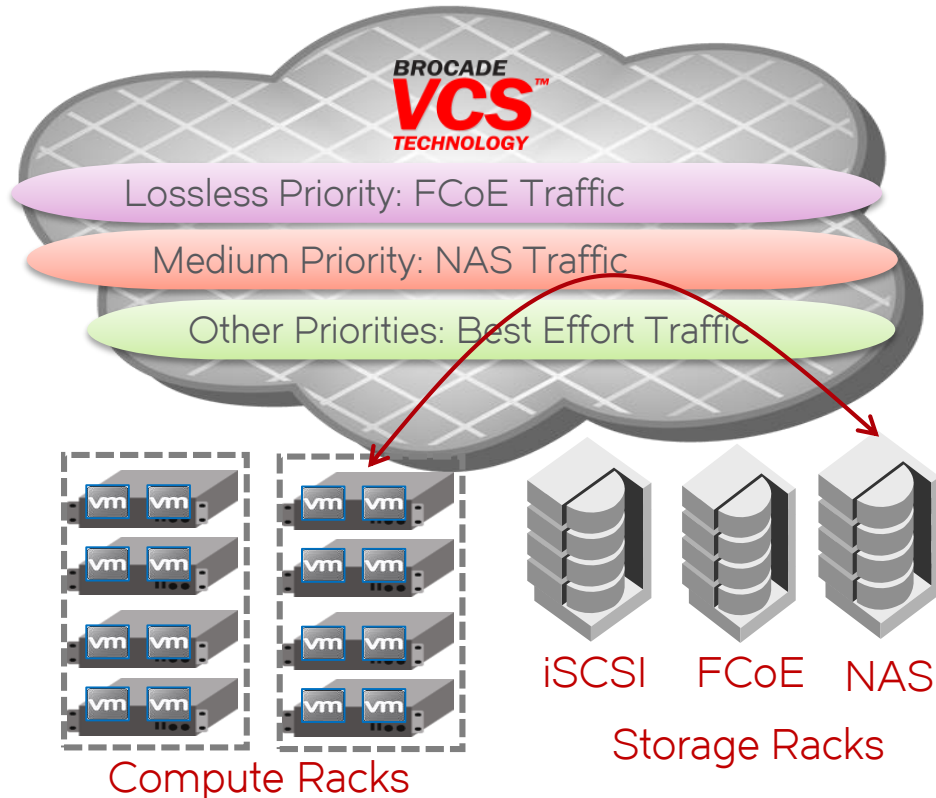
Solution : Auto NAS Traffic Prioritization

- **Dual NAS Head Architecture** File access to the NAS head, optional block access to the storage nodes.
- **Scale-Up or Out** Scale up the storage by adding storage nodes behind the NAS heads, typically limited to a pair of NAS heads. Or deploy a scale-out architecture such as EMC Isilon.
- **Network Requirements** Ideally highly automated, efficient and simple to deploy. In converged front-end network environments, important to have protection of NAS traffic. Predictable, reliable network transport, no hot spots.



What is Auto NAS

NAS Traffic Prioritization



- Fabric is designed for versatile storage technology: NAS, iSCSI, Object, FCoE
- Multipathing, Low Latency, Lossless, Highly Resilient Architecture enables Scale Out Storage
- All the nodes in the fabric will auto prioritize NAS Storage traffic over other traffic types (NFS, SMB/CIFS)
- Ability to monitor IP Storage traffic through ACL Counters

Summary of VCS Fabric Value Propositions

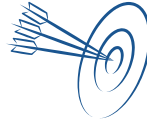
AUTOMATED



- Zero touch provisioning
- Zero-touch VM discovery, configuration, and mobility
- Self-forming trunks
- Manage many switches as single logical device

50% lower opex

EFFICIENT



- All links fully active, none on standby
- Multi-pathing at all layers of the network: L1/L2/L3
- Most efficient platform for IP storage

2x greater
network utilization

AGILE



- Network virtualization with VCS Virtual Fabrics or VMware NSX
- Scale-out non-disruptively
- Orchestration thru OpenStack

Quicker to deploy

Brocade VDX Fixed Switch Family

VCS fabric-enabled switches



Brocade VDX 6740T-1G Switch

- 1RU form factor & Single ASIC design/ISSU
- 48 × 1000BASE-T ports
- Low latency— 3μs (All packet sizes)
- Industry's 1st 1GbE to 10GbE S/W upgradable switch
- SDN Ready (Open Flow 1.3 support)
- VXLAN & VTEP support
- VCS Virtual Fabric Support
- Ports on Demand (POD)



Brocade VDX 6740/6740T Switches

- 1RU form factor & Single ASIC design/ISSU
- 48 × 1/10GbE SFP+ OR 48 × 1/10GBASE-T and 4 × 40GbE QSFP ports
- 32 Flexports (FC/Ethernet)
- SDN-ready (Open Flow 1.3 support)
- VXLAN & VTEP support
- VCS Virtual Fabric Support
- Low latency—Fiber (850ns) / Copper (3us)
- Ports on Demand (POD)



Brocade VDX 6940-36Q Switch

- 1RU form factor & Single ASIC design/ISSU
- 36 × 40GbE QSFP ports
- 32 Flexports (FC/Ethernet)
- SDN-ready (Open Flow 1.3 support)
- VXLAN & VTEP support
- VCS Virtual Fabric Support
- Low latency—650ns
- Ports on Demand (POD)



Brocade VDX 8770 Modular Switch

- 4 and 8RU form factors with ISSU
- Ultra-high availability
- 384 × 1/10GbE SFP+ ports
- 384 × 10GBASE-T ports
- 216 × 40GbE QSFP ports (576 × 10GbE w/ breakout)
- 48 x 100GbE CFP2 ports with Ports on Demand (POD)
- SDN-ready (Open Flow 1.3 support)
- VCS Virtual Fabric Support
- Low latency—3.5μs

Leadership through innovation

- Empowering the On-Demand Data Center
- Leadership and rapid innovation in Fabrics, IP routing, SDN and NFV
- Delivering the world's most automated, efficient and agile networks

Thank you!

