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NETWORK EVOLUTION IN A VIRTUALISED WORLD

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Major Trends

TRAFFIC GROWTH

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Major Trends

TRAFFIC GROWTH VIRTUALIZATION

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Major Trends

TRAFFIC GROWTH VIRTUALIZATION SIMPLIFICATION

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Major Trends

TRAFFIC GROWTH VIRTUALIZATION SIMPLIFICATION BORDERLESS COMPUTING

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Fundamental Shifts in Communication…

Global Collaboration

Rich Media Communication

Convergence

Broadband Access Anywhere

Ethernet Everywhere

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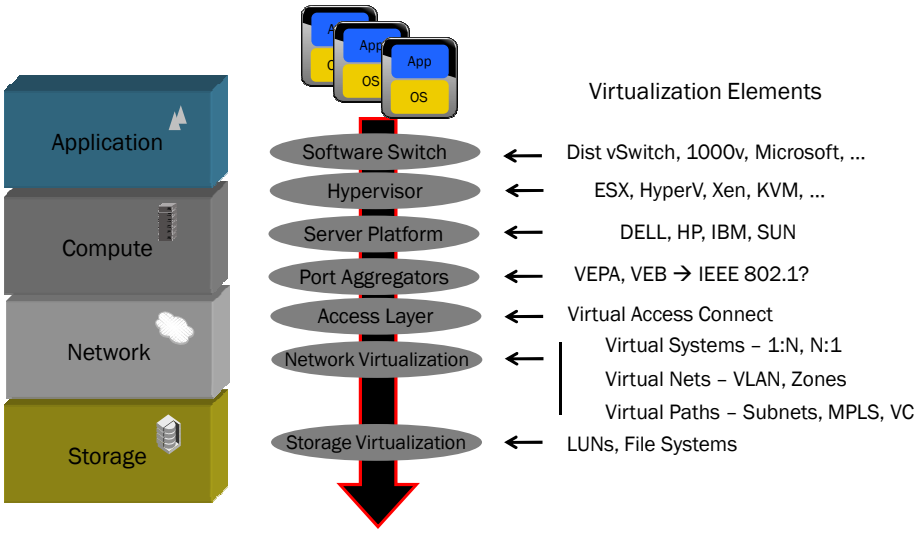
Dynamic Infrastructure Enabled by Virtualization



Strategy: Open integration with Best-in-Class IT

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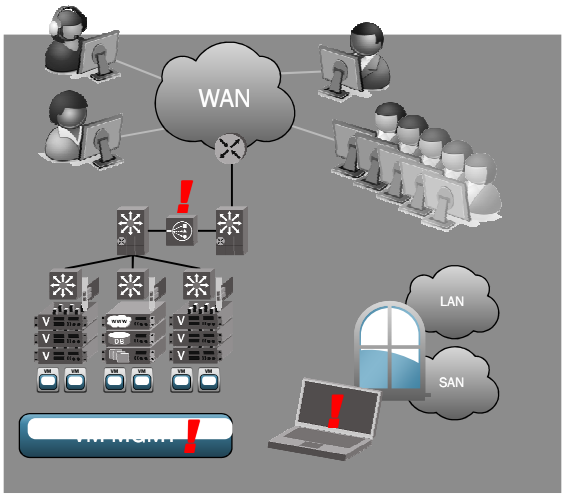
Brocade Ecosystem Advantage

Integrated Solutions for Server Virtualization



vmware

Application Resource Broker (ARB) Monitoring, Analysis and Provisioning Engine

ARB monitors response time and number of client connections to application servers

ARB plug-in for VMware vCenter (tab in vSphere client) monitors CPU utilization

ARB intelligently recommends and automates provisioning and de-provisioning of application resources (VMs)

Avoids costly over-provisioning and broken SLAs

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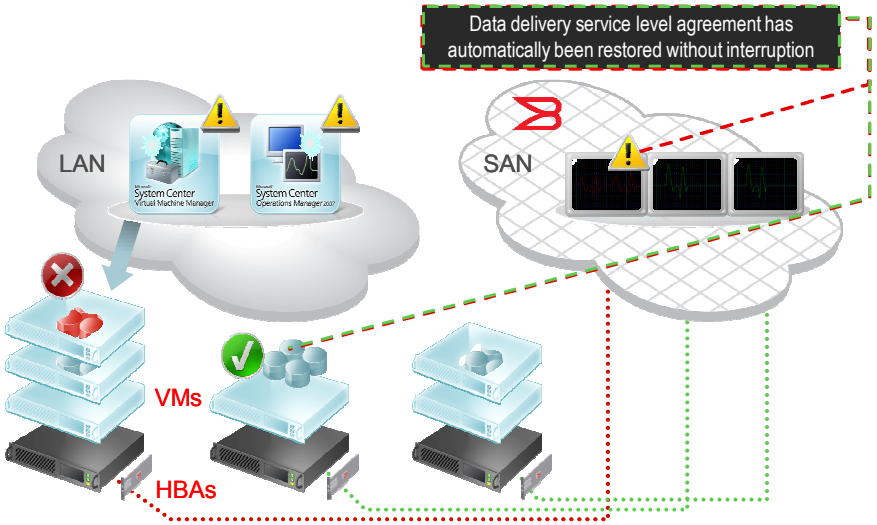
Brocade Management Pack for SCVMM

Scenario: I/O utilization exceeds threshold



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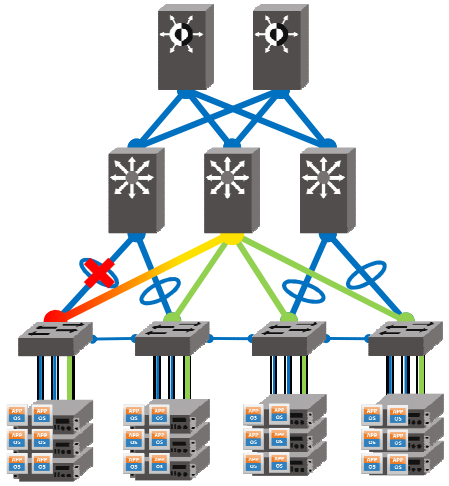
Scaling Virtual Server Environments

Challenges Today



- Layer 2: only 1 active path
  - STP disables other paths
  - Not "virtualization optimized"
- Add Virtual Machines
  - Add additional GbE connections
  - Move to 10 GbE for simplicity and more performance
  - Uplinks are stressed; need more connections in LAG
- Increase utilization using MSTP (spanning tree per VLAN)
  - Increases complexity
  - Creates multiple single-path networks; limits sphere of mobility
- Link failure
  - STP reconvergence – network is down
  - Broadcast storms stress network
- Layer 3 as an alternative
  - Greater complexity; higher cost
  - VM mobility limited to rack

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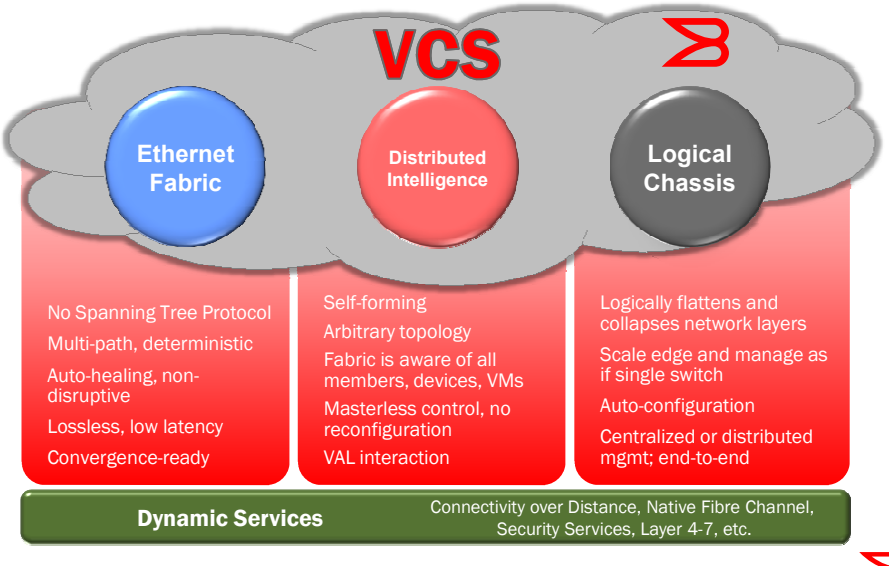
Virtual Cluster Switching (VCS)



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Virtual Cluster Switching (VCS)

Optimize the Network for Server Virtualization

VCS

Revolutionizes Layer 2 Connectivity

Increases scalability of virtual server environments and sphere of mobility

Maximizes network performance—reduces network complexity

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Virtual Cluster Switching (VCS)

Optimize the Network for Server Virtualization

ETHERNET FABRIC

No Spanning Tree Protocol

Multi-path, deterministic

Auto-healing, non-disruptive

Lossless, low latency

Convergence-ready

DISTRIBUTED INTELLIGENCE

Self-forming

Arbitrary topology

Network aware of all members, devices, VMs

Masterless control, no reconfiguration

VAL interaction

LOGICAL CHASSIS

Logically flattens and collapses network layers

Scale edge and manage as if single switch

Auto-configuration

Centralized or distributed management; end-to-end

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Virtual Access Layer (VAL)

Maximize Application Performance

VAL

Virtually extends network connectivity to VMs (I/O virtualization)

Optimizes application service levels and scalability

Enables seamless application mobility

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Virtual Access Layer (VAL)

Maximize Application Performance

APPLICATION AWARE

End-to-end application QoS

VM visibility in the network

Virtual network services and policies per VM

SERVICE LEVEL OPTIMIZATION

VM performance assurance under load

Hardware offload of virtual switching (VEPA, VEB)

Direct IO support

Service level mgmt across physical/virtual Networks

APPLICATION MOBILITY

Automated migration of port profiles

VM persistent network policies

Non-disruptive to applications and end users

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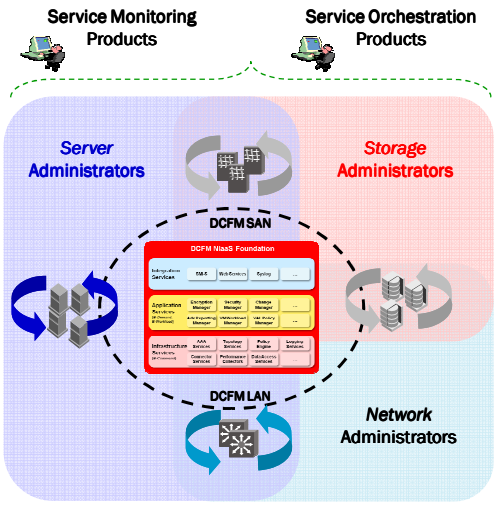
Brocade Manageability Vision

DCFM NIaaS foundation services for federated management



DCFM NIaaS foundation:

- Unifies management for data and storage networking
- Enables uniform policy enforcement across all networking layers (server, access, aggregation, core)
- Forms the basis for integration with key partner products
- Provides network lifecycle management services for virtual and physical servers
- Provides the foundation for future cloud offerings
- Differentiates Brocade's approach vs. our key competitors

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VCS Use Cases

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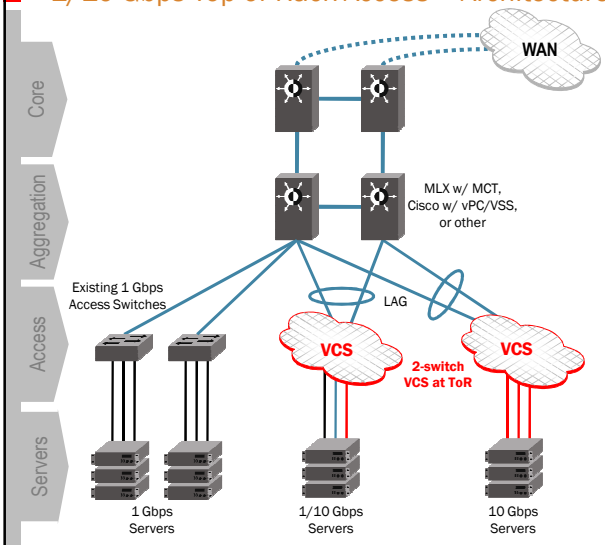
VCS Use Case #1

1/10 Gbps Top-of-Rack Access – Architecture



- Preserves existing architecture
  - Leverages existing core/agg
  - Co-exists with existing ToR switches
- Supports 1 and 10 Gbps server connectivity
- Active-active network
  - Load splits across connections
- No single point failure
  - Self healing
- Fast link reconvergence
  - < 250 milliseconds
- High-density access with flexible subscription ratios
  - Supports up to 36 servers per rack with 4:1 subscription

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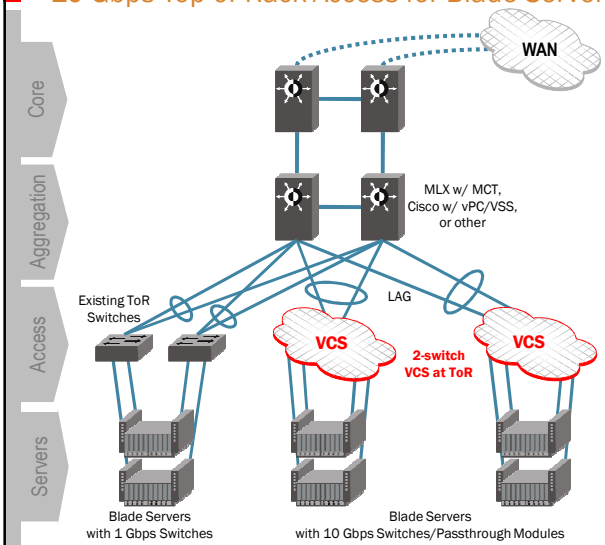
VCS Use Case #2

10 Gbps Top-of-Rack Access for Blade Servers – Architecture



- Preserves existing architecture
  - Leverages existing core/agg
  - Co-exists with existing ToR switches
- Provides low-cost, first stage aggregation
  - High density blade servers without stress on existing aggregation
  - Reduces cabling out of rack
- Active-active network
  - Load splits across connections
- No single point failure
  - Self healing
- Fast link reconvergence
  - < 250 milliseconds
- High-density ToR aggregation with flexible subscription ratios
  - Supports up to 4 blade chassis per rack with 2:1 subscription

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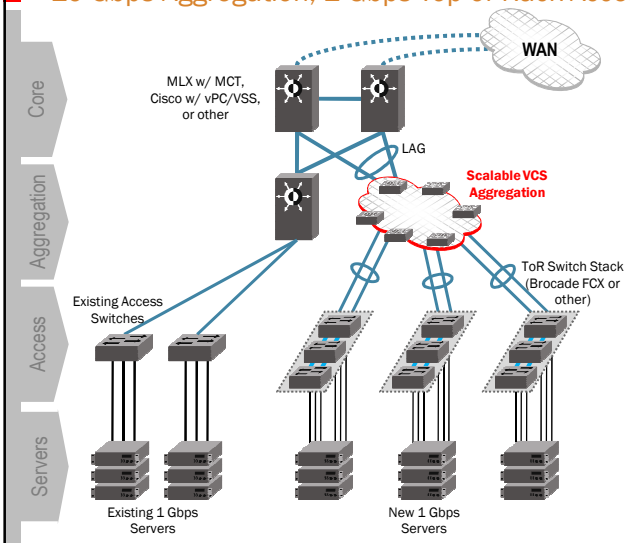
VCS Use Case #3

10 Gbps Aggregation; 1 Gbps Top-of-Rack Access – Architecture



- Low cost, highly flexible logical chassis at aggregation layer
  - Building block scalability
  - Per port price similar to a ToR switch
  - Availability, reliability, manageability of a chassis
  - Flexible subscription ratios
- Ideal aggregator for 1 Gbps ToR switches
  - Supports 1080 servers in 30 racks with 5:1 subscription, assuming 4 NICs per server
- Optimized multi-path network
  - No single point failure
  - STP not necessary

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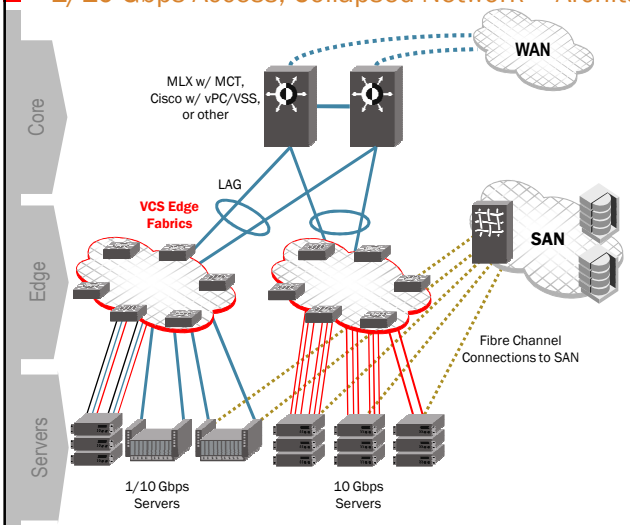
VCS Use Case #4

1/10 Gbps Access; Collapsed Network – Architecture



- Flatter, simpler network design
  - Logical two-tier architecture
  - Ethernet fabrics at the edge
- Greater layer 2 scalability/flexibility
  - Increased sphere of VM mobility
  - Seamless network expansion
- Optimized multi-path network
  - All paths are active
  - No single point failure
  - STP not necessary

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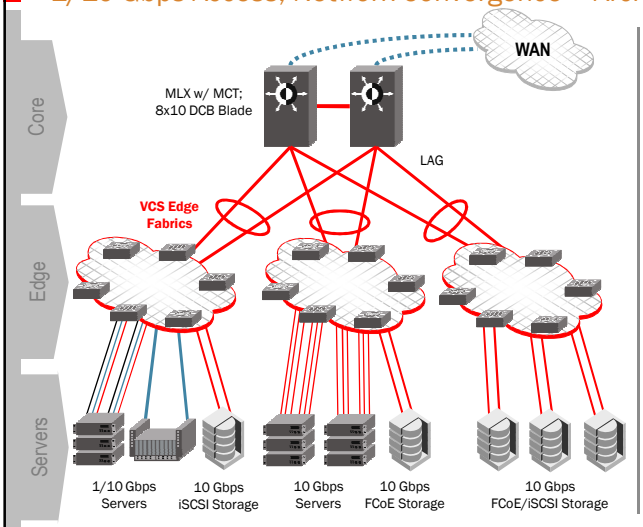
VCS Use Case #5

1/10 Gbps Access; Network Convergence – Architecture



- Flatter, simpler network design
  - Logical two-tier architecture
  - VCS fabrics at the edge
- Greater layer 2 scalability/flexibility
  - Increased sphere of VM mobility
  - Seamless network expansion
- Optimized multi-path network
  - All paths are active
  - No single point failure
  - STP not necessary
- Convergence ready
  - End-to-end enhanced Ethernet (DCB)
  - Multi-hop FCoE support
  - Lossless iSCSI

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BROCADE ONE™

A Unified Network Strategy and Architecture

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Thank You

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