



Infrastructure Consolidation

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Datacraft Asia

Gartner

“Virtualization is the ***highest-impact*** issue changing ***infrastructure*** and ***operations*** through ***2012.***”

March 2008

The IT Dilemma

 Datacraft



I am supposed to still do the same job, but with less budget and headcount?!?

Recent CIO Surveys Agree: Virtualization is the Top CIO Priority in a Tough Economic Environment



IT Hardware

CIO Survey: outlook for flat '09 IT budgets

Industry Overview

Equity | United States | IT Hardware
28 October 2008



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Research Analyst
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CIO survey indicates flat

According to our 3Q08 CIO survey budgets to be flat YoY (+0.5%) interviews were conducted the expectations were lowered the remained in positive territory progress, and plan to spend virtualization, and infrastr

Indications for p

Since the beginning which was surpris global financial cri of CIOs surveyer believe that a n quarter budg

Software

Software/ as CIOs well as of CIO effici prio ran d

Virtualization adoption increasing

93% of the CIO respondents said they are now using virtualization technology in their x86 server environments, up from 91% surveyed in 2Q08 and 83% in 1Q08. In our opinion, the current environment has moved virtualization toward the top of the priority list for CIOs, and only 29% of x86 servers are currently virtualized. However, the number of virtualized servers is expected to nearly double in the next two years to 59%. Our survey shows that 57% of CIOs are using blade servers. We believe that HP is well positioned in the blade server market (~50% share), as evidenced by the recent share gains driven by HP's c-Class blades.

“The current environment has moved virtualization toward the top of the priority list for CIOs.”

November 2, 2008

US Technology Strategy



Independent Insight: IT Spending Survey

November 2, 2008

“Total cost of ownership (TCO) reductions will be a key driver of the acceleration in server virtualization deployments as CIOs are forced to cut capital spending and reign in management, administrative and power/ cooling costs.”

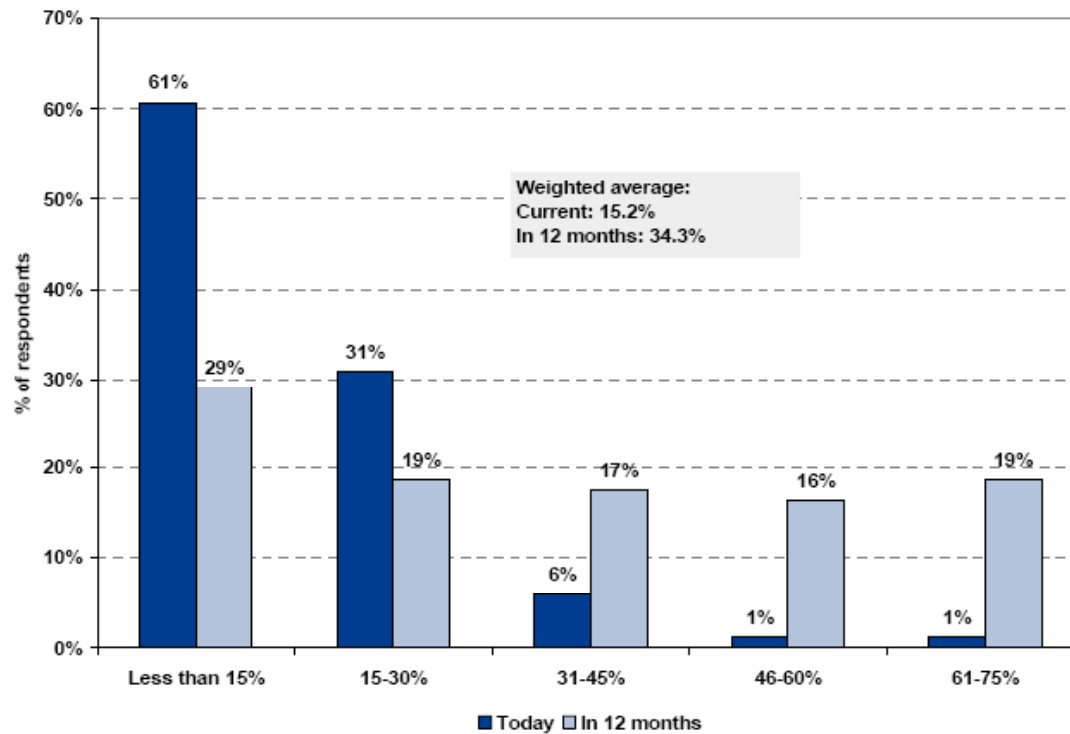
...the 15% that servers up from just 10 last year, suggesting a much more aggressive penetration of virtualization compared to what we have seen to date. Our sense is that total cost of ownership (TCO) reductions will be a key driver of the acceleration in server virtualization deployments as CIOs are forced to cut capital spending and reign in management, administrative, and power/cooling costs. In our VMware initiation (“Still the aggressor, but slowing growth & valuation a drag”, published August 11, 2008), our base-case analysis showed a 30% reduction in TCO, while a higher compression ratio of physical to virtual servers would allow the savings to increase to 45%-50%. Avoidance of PC server purchases is the largest source of savings, followed by reduced management and support costs which more than offset the incremental investment in the server virtualization software/support itself and storage.

Source: Merrill Lynch CIO Survey, Oct 28th, 2008

Source: Goldman Sachs IT Spending Survey, Nov 2nd, 2008

Customers Are Still Moving Ahead with Virtualization in 2009

Exhibit 21: What percentage of your PC servers use server virtualization software today? What percentage of your PC servers will use server virtualization software 12 months from now?

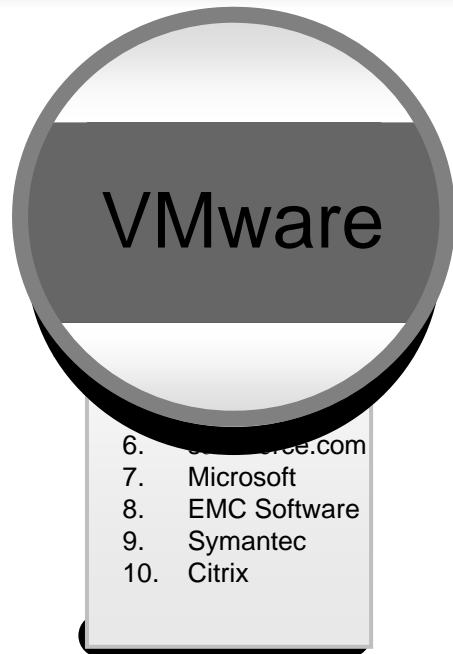


CIOs expect to double the percentage of servers virtualized in 2009

Source: Goldman Sachs IT Spending Survey, Nov 2008

VMware Continues to be the #1 Software Investment for CIOs in a Tough Economy

Datacraft



#1

12 Quarters



Source: Goldman Sachs IT Spending Survey, Nov 2009

Top 3 Reasons Why VMware is the Right IT Investment in a Tough Economic Environment

Datacraft

1 Reduce Physical Infrastructure Cost

2 Reduce Datacenter Operating Cost
(e.g. Power & Cooling)

3 Increase Productivity, Operational
Flexibility and Responsiveness

Reduce Server Spend Through Consolidation

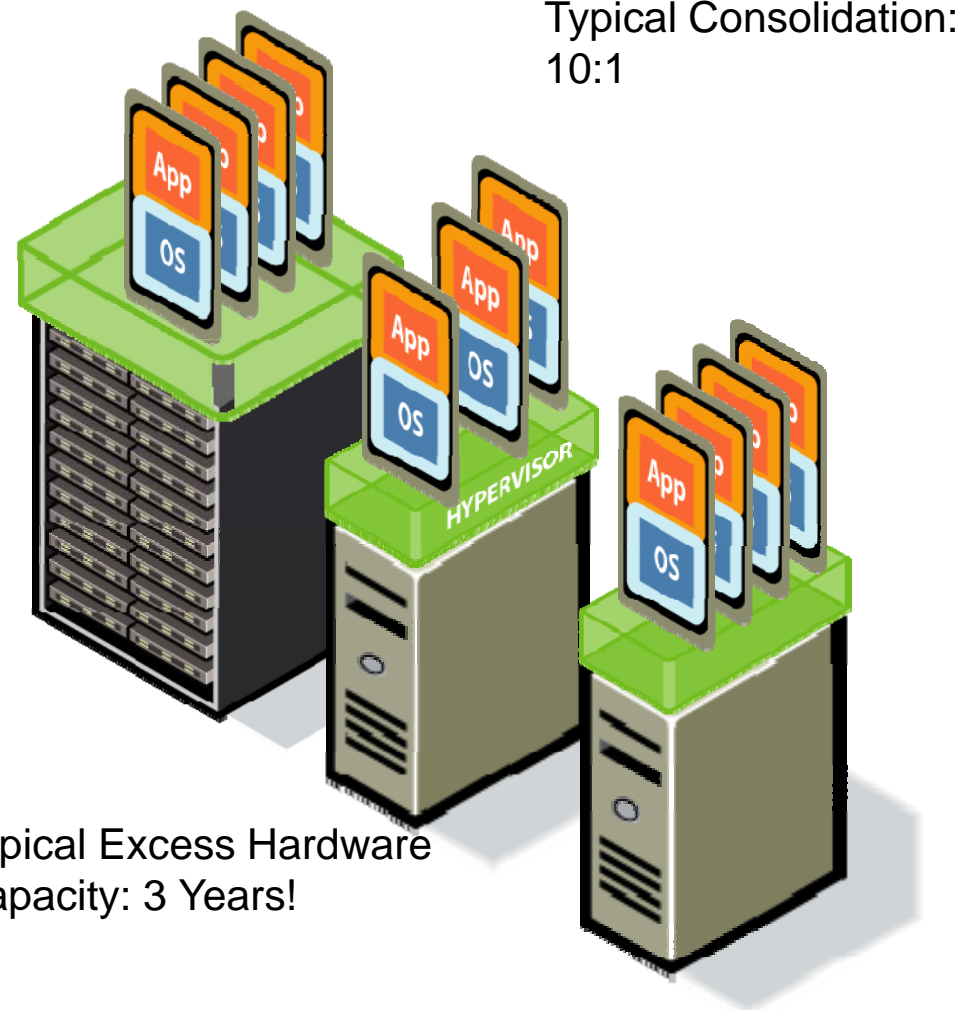
Datacraft

VMware...

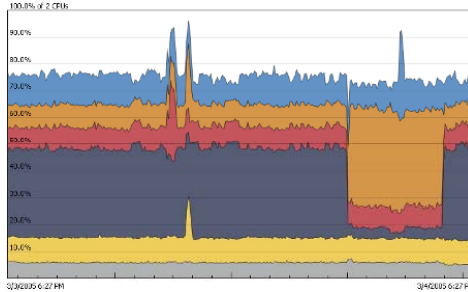
- Decouples software from hardware
- Encapsulates Operating Systems and applications into "Virtual Machines"



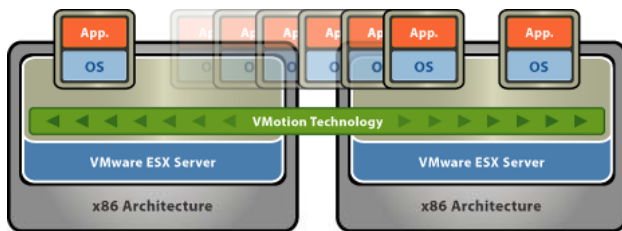
A Server or Desktop
Virtual Machine



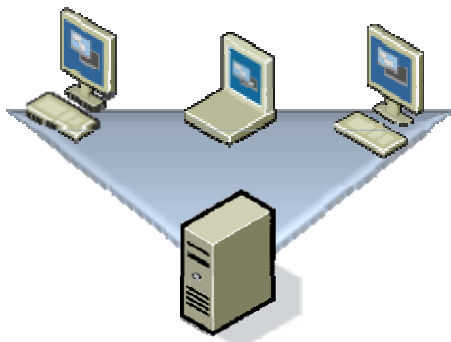
Reduce Energy Consumption



- > Highest consolidation rates on most secure and reliable virtualization platform
- > Safely improve utilization rates
- > 80% energy reduction



- > Dynamic server and storage migration
- > Power off unneeded servers in real-time
- > Migrate storage dynamically
- > 25% energy reduction



- > Host desktop PCs in the datacenter
- > Use thin clients, double refresh cycle
- > Reduce storage for similar desktop images
- > 70% energy reduction

Total Savings per Workload



VMware consolidates servers, storage and networking infrastructure to safely achieve higher utilization

	BEFORE	AFTER	SAVINGS	
1 Physical Infrastructure	Servers	1000	80	\$5,816
	Network Switches	84	10	\$296
2 Operating Cost	Power (kWh)	407	52	\$759
	Cooling (kWh)	509	64	\$949
	Real Estate (Sq ft)	2053	257	\$431
	Savings per Workload (Over 3 years)			\$8,251*

- Actual customer savings per application; represents typical savings
- Includes estimated cost of VMware licenses, Support and Subscription

Decreasing Operating Costs

3

Productivity, Flexibility
& Responsiveness

30–75

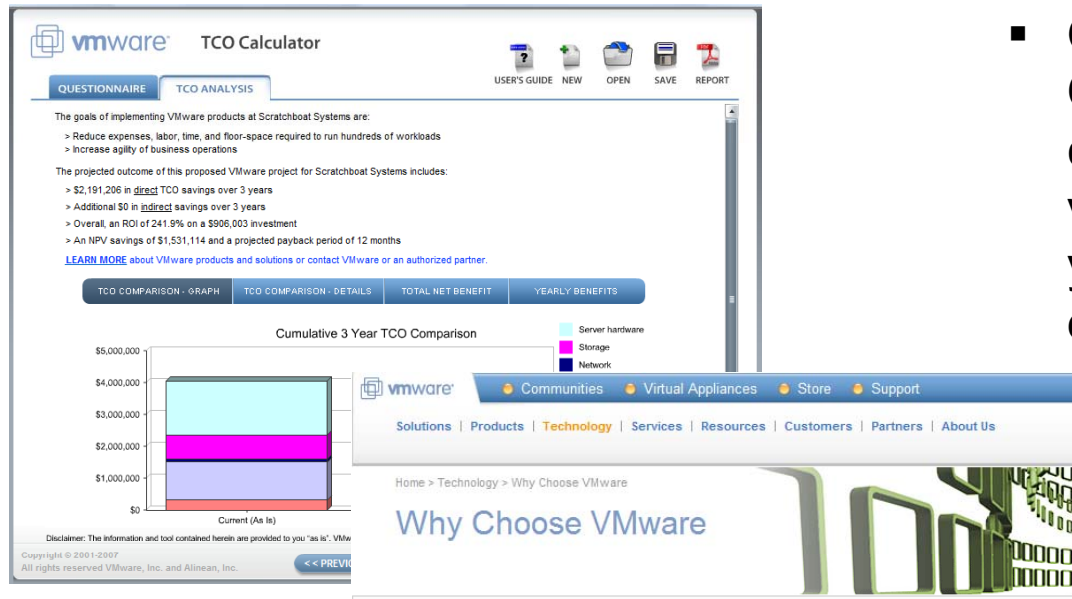
90–225

Workloads per Admin

- Do more work with the same number of people = operating cost savings
- Drivers of productivity improvements:
 - Instant provisioning
 - Dynamic patching
 - Zero downtime maintenance
 - Built-in high availability
 - Automated disaster recovery

Source: IDC and VMware TAM program

Available Resources



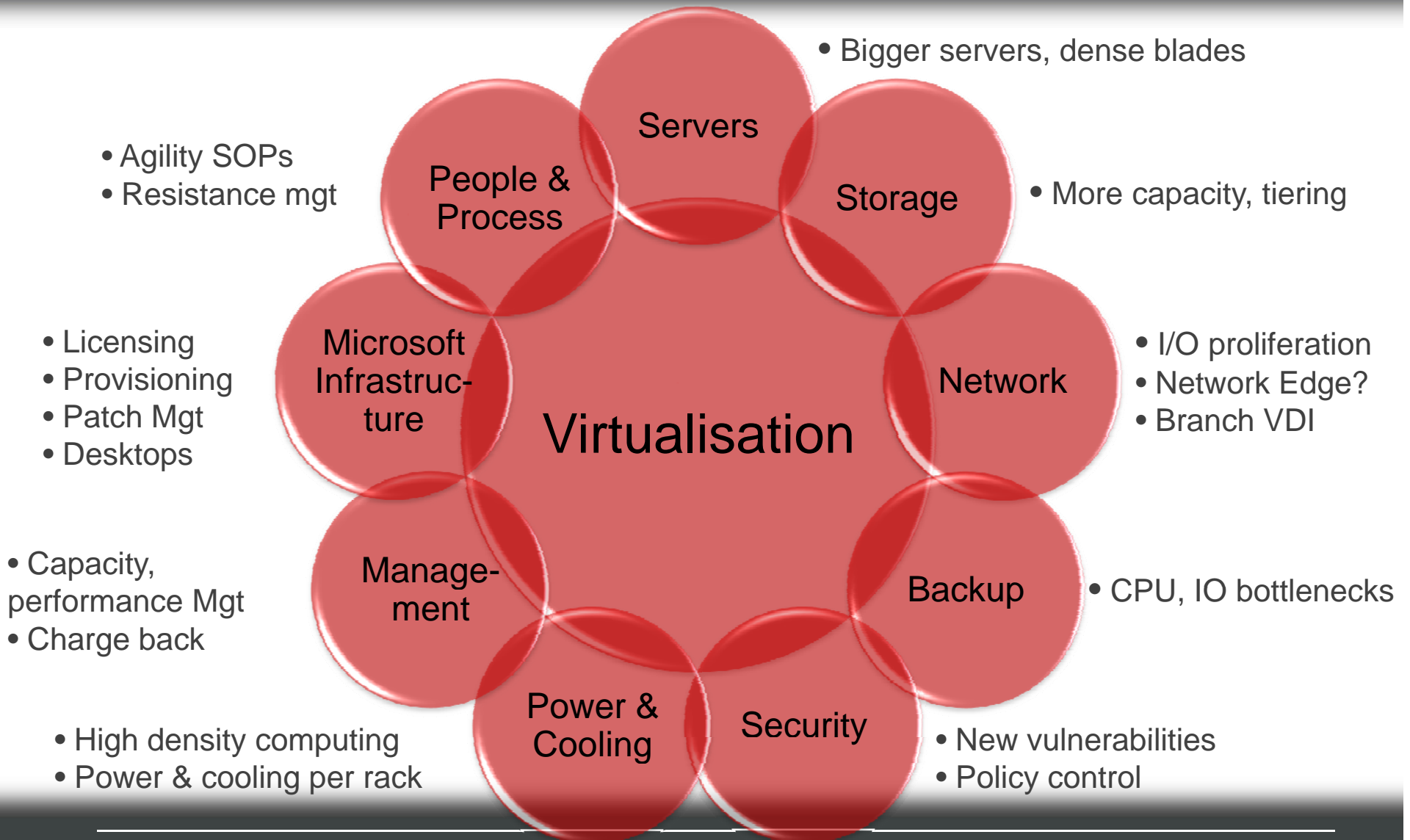
- **Online ROI/ TCO Calculator:** Robust and customizable analysis of virtualization's impact on your IT budget and datacenter costs

▪ www.vmware.com/calculator

6 reasons to choose VMware

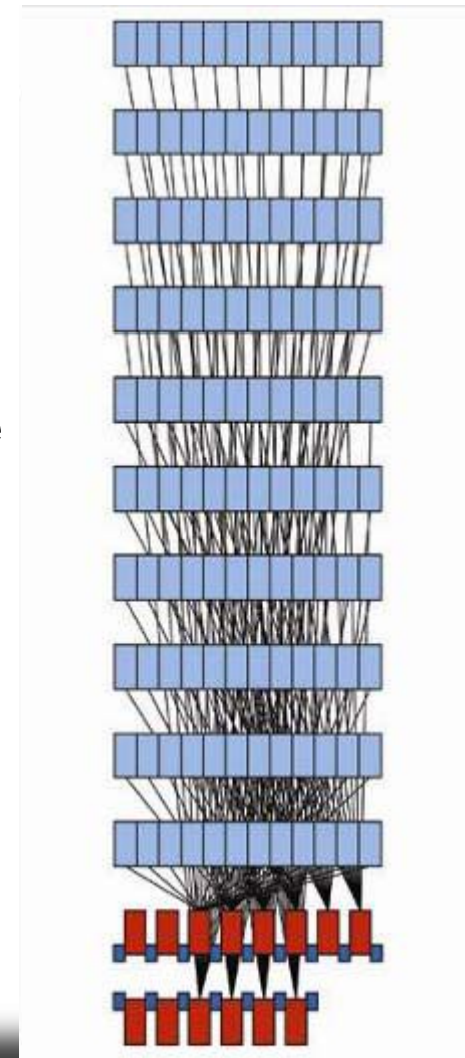
- ▶ **Built on Reliable Foundation**
 - Comparing Hypervisors
 - Why Architecture Matters
 - Achieve Scalable Performance
 - Why File Systems Matter
 - Ecosystem of Security Solutions
 - Industry Recognition
- ▶ **Complete Virtualization Management**
 - Centrally Manage Virtual Machines
 - Quickly Add New Server Resources
 - Manage Entire Software Lifecycle
 - Automate Disaster Recovery
 - Automate Patching
 - Use Existing Systems Management
- ▶ **Shared IT Services Platform**
 - Transparent Agility
 - Shared Pools of Resources
 - Elastic Pool of Resources
 - Intelligently Save Power
 - Flexible, Uniform High Availability
- ▶ **Integrate with Your Infrastructure**
 - Broad Hardware Support
 - Largest Guest OS Support
 - Broad Application Support
 - VMware Partner Support Programs
- ▶ **Low Total Cost of Ownership**
 - Debunking the Myth
 - Maximize Virtual Machine Density
 - Save on Operational Costs
- ▶ **Customer-proven Solution**
 - Large Companies Trust VMware
 - Small and Medium Businesses Trust VMware

Virtualisation Touches Everything



Legacy Collapsed Backbone Cabling Designs

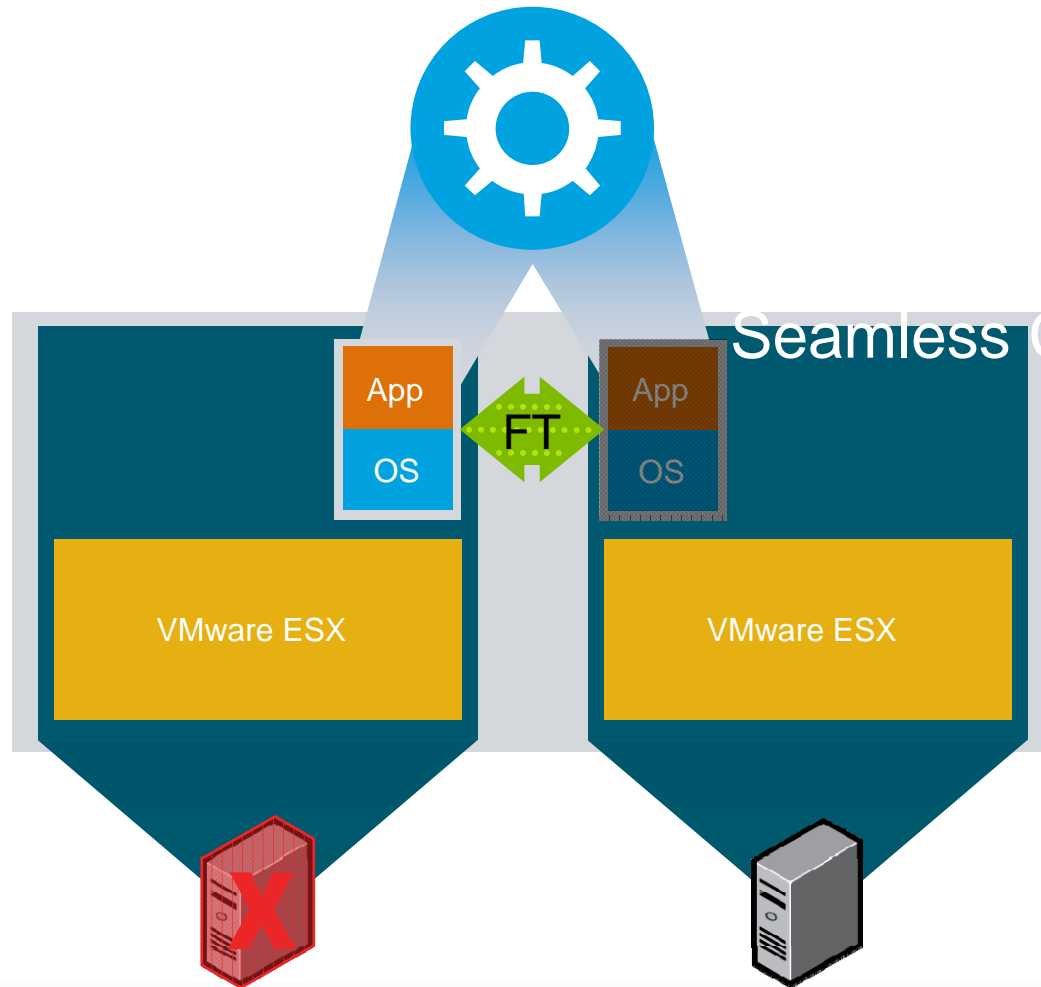
- More servers = more switch ports = more cabling
- Most DC's are wired this way
- Legacy Data Centre cabling issues
 - Cabling decision to enable 10GE is expensive i.e. Cat 7
 - Bad for the physical element of a network
 - Scales poorly
 - Prone to cable overlap
 - Affects facility environmentals



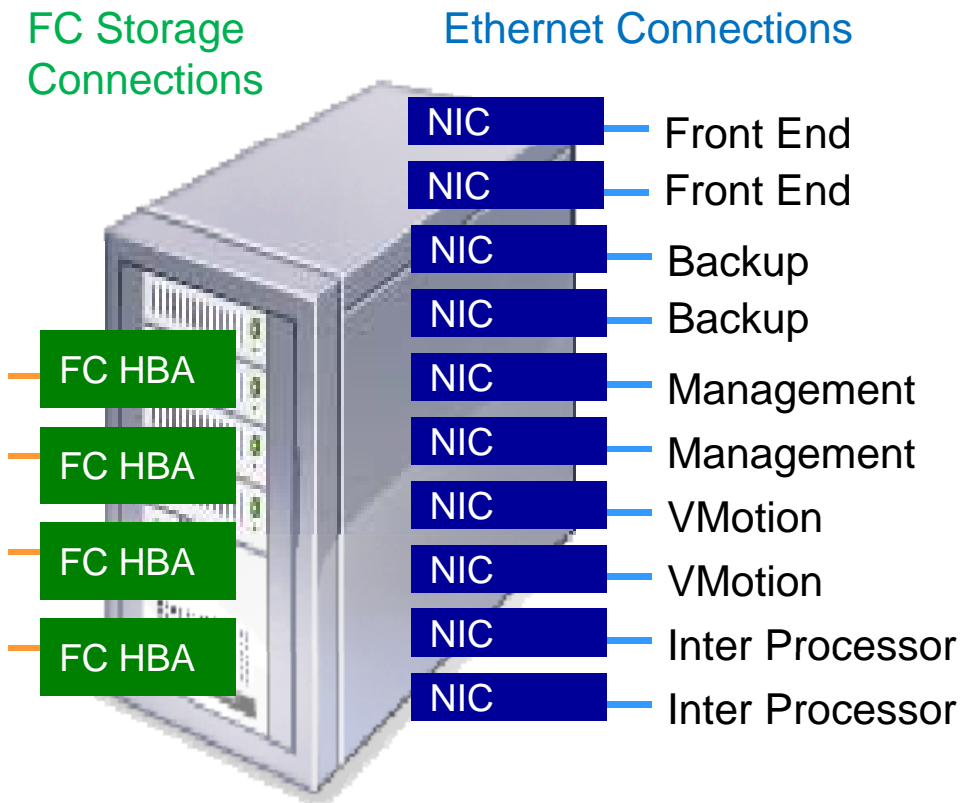
VMware's Advanced Features: Driving Bandwidth & More Connections per Server



VMware Fault Tolerance



I/O Proliferation with VMware

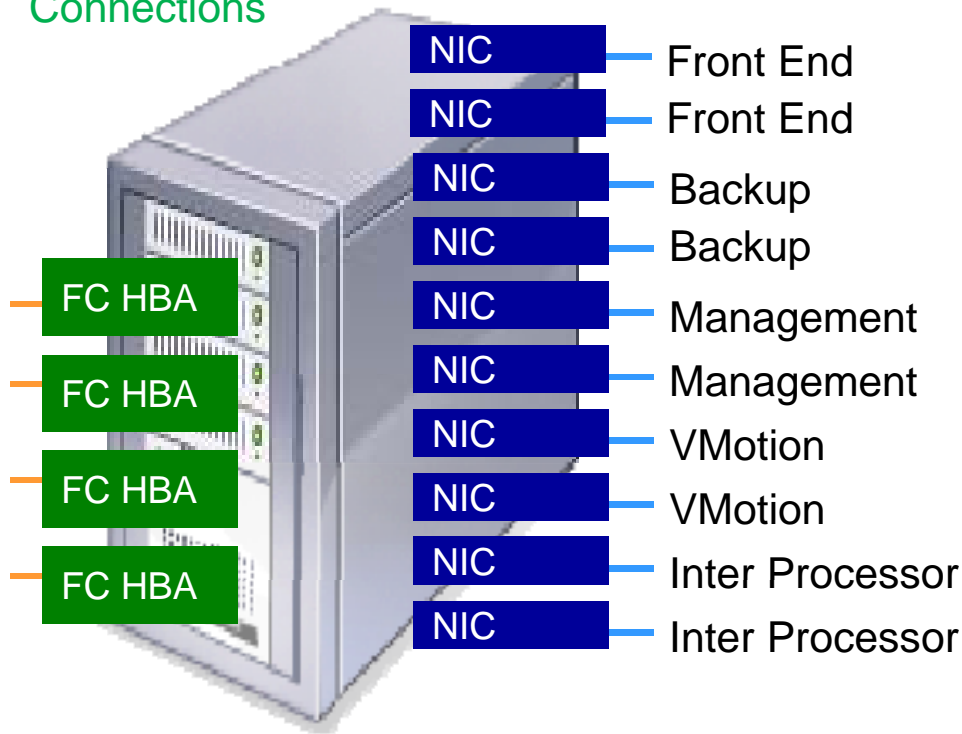


Real world example

- 100:10 Server consolidation
- x10 connections per server
- = 100 network ports for VMware
- + 100 existing server's ports
 - (both old and new servers need to be connected for P2V)
- = 200 network ports required
- Double existing!

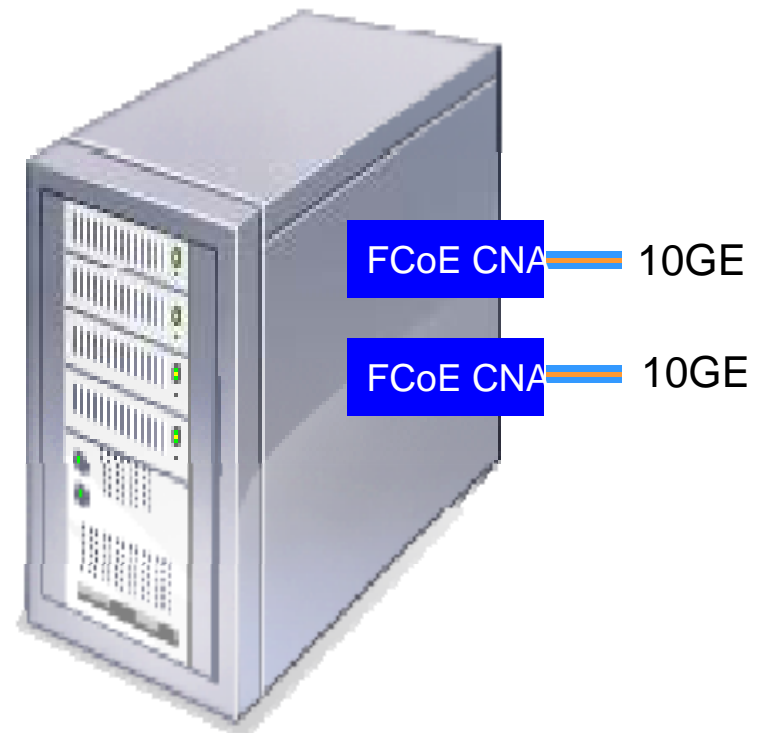
I/O Consolidation with FCoE

FC Storage Connections



Ethernet Connections

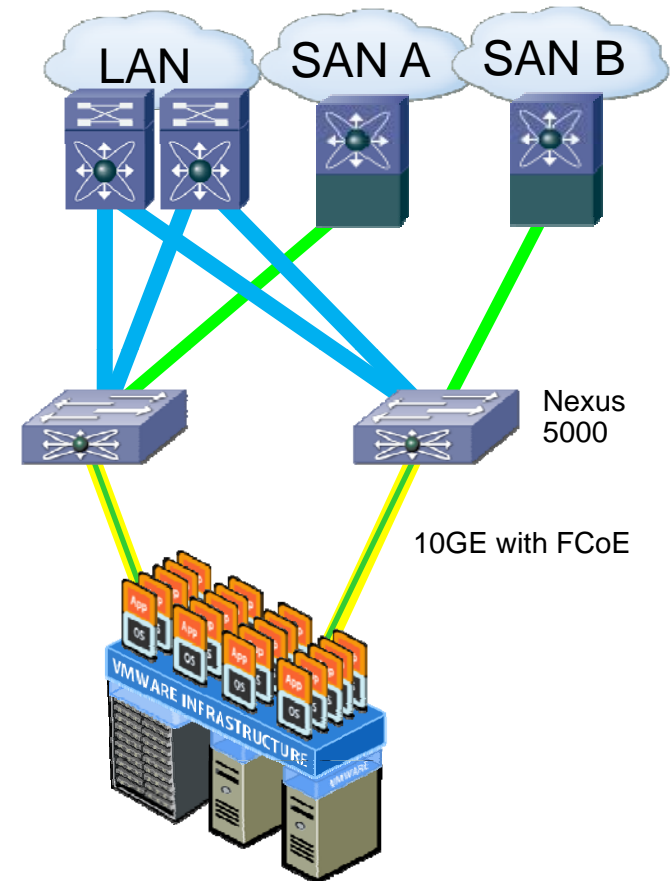
Network & storage port consolidation



Port and Cabling Consolidation with FCoE

Datacraft

- What does it take to converge Storage and the Network?
 - A better Ethernet: DCE
 - Loss less, with guaranteed QoS
 - No gateways
- What is available?
 - Standardization INCITS T11 *Now*
 - Cisco Nexus 5020 switch
 - Converged Network Adapters *Now*
 - Emulex, Qlogic
 - VMware ESX 3.5-U2 *Now*
 - on the I/O HCL
 - EMC certification *Now*





Cisco Nexus 5000 Unified Fabric TCO Calculator

Assumptions

Number of servers:

Traditional network server connections to LAN:

Traditional network server connections to SAN:

Span of analysis (years):

The following information can be customized if you click through the levels by clicking on the + button.

Unconsolidated LAN

Unconsolidated SAN

Consolidated Network

Service

Cabling

Power

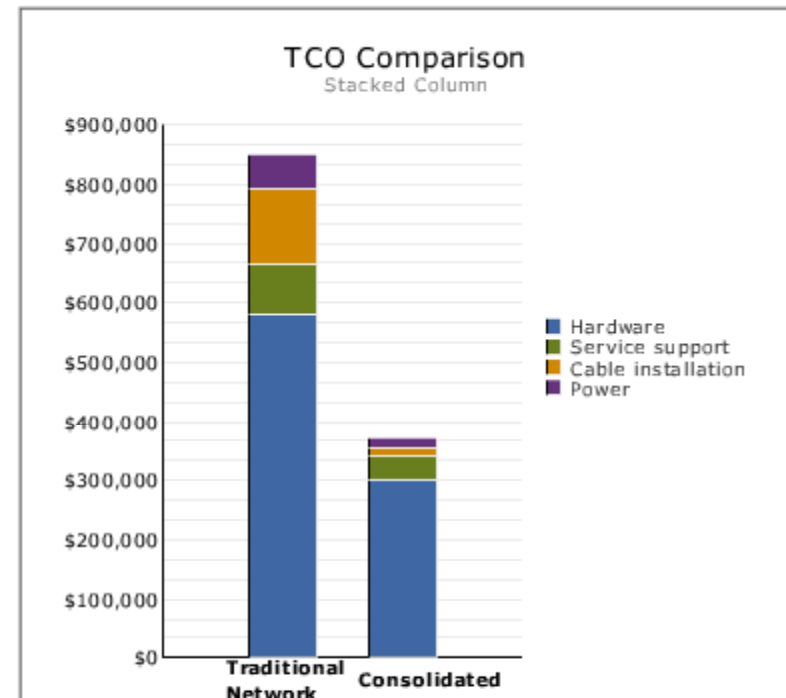
Cisco Nexus 5000 Unified Fabric TCO Calculator Scope and Assumptions

Model Scope:

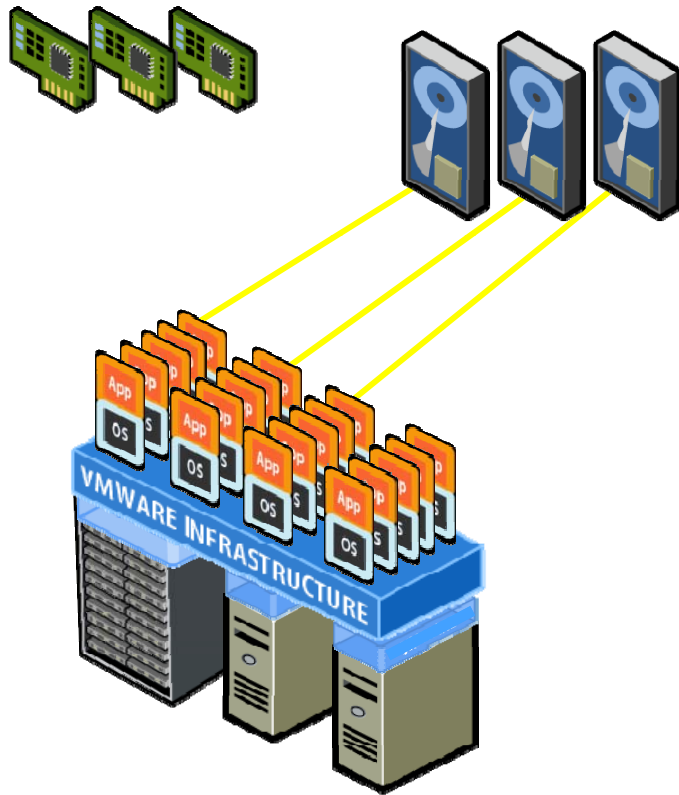
The model compares a Unified Fabric implementation where LAN and SAN I/O are combined over 10GbE to traditional, unconsolidated I/O technology based on separate LAN and SAN technologies. The objective is to economically quantify the comparative value of these approaches to constructing data center networks. Due to the newness of Unified Fabric technology there are many benefit areas that cannot be quantified as yet but are expected to show significant

[Detailed assumptions](#) [For more info read this TCO White Paper](#)

Cost	Traditional Network	Consolidated	Difference
Hardware	\$581,880	\$302,310	
Service support	\$83,568	\$39,808	
Cable installation	\$128,000	\$13,000	
Power	\$55,525	\$15,453	
Total Cost	\$848,973	\$370,571	56%
Inter-rack cables	640	40	94%
Power utilized (kw-hr)	265,113	75,599	71%

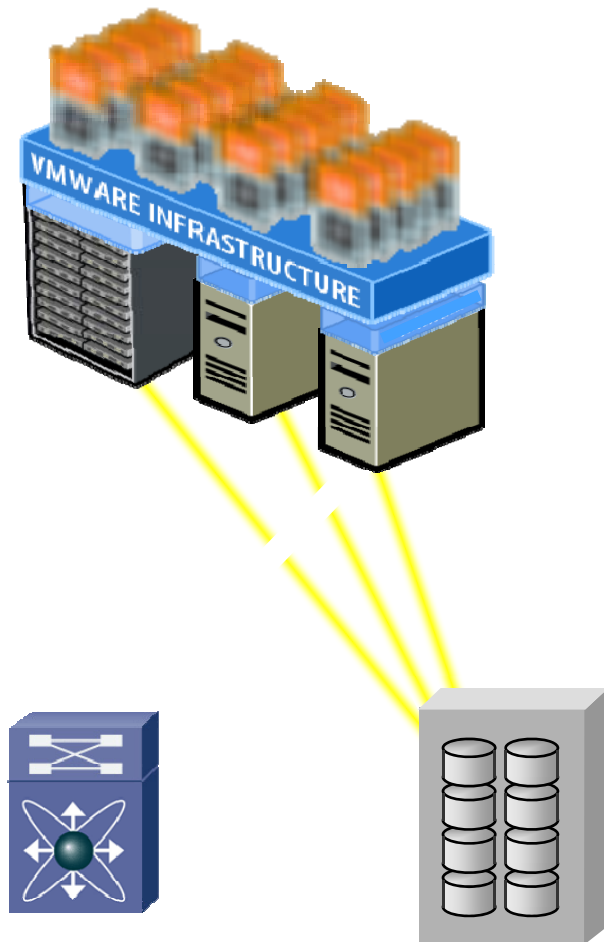


Transparency in the Eye of the Beholder



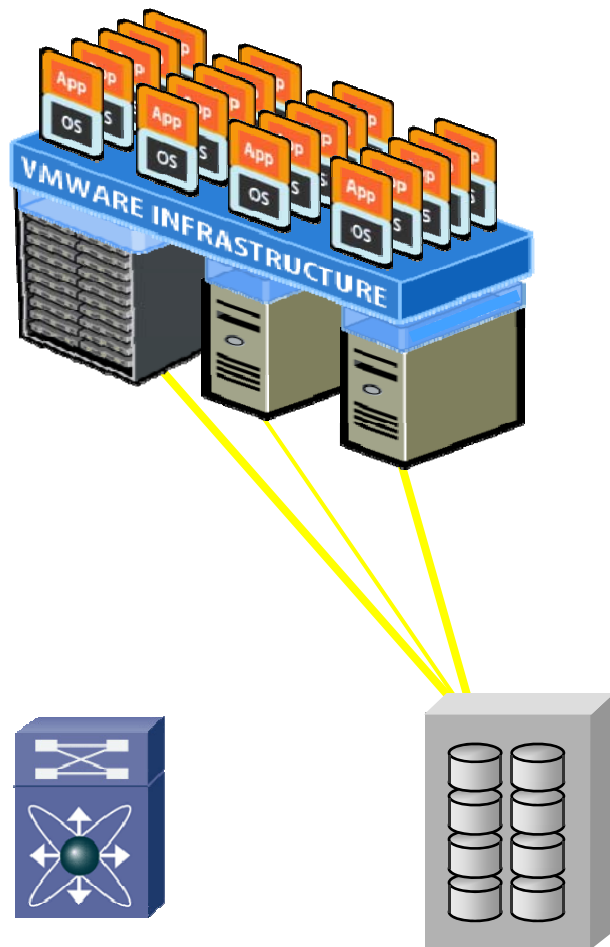
With virtualization,
VMs have a
transparent view of
their resources...

Transparency in the Eye of the Beholder



...but its difficult to **correlate** network and storage back to virtual machines

Transparency in the Eye of the Beholder



Scaling globally depends on maintaining transparency while also providing operational consistency

Networking Challenges



Security & Policy Enforcement

Applied at physical server—not the individual VM

Impossible to enforce policy for VMs in motion



Operations & Management

Lack of VM visibility, accountability, and consistency

Inefficient management model and inability to effectively troubleshoot



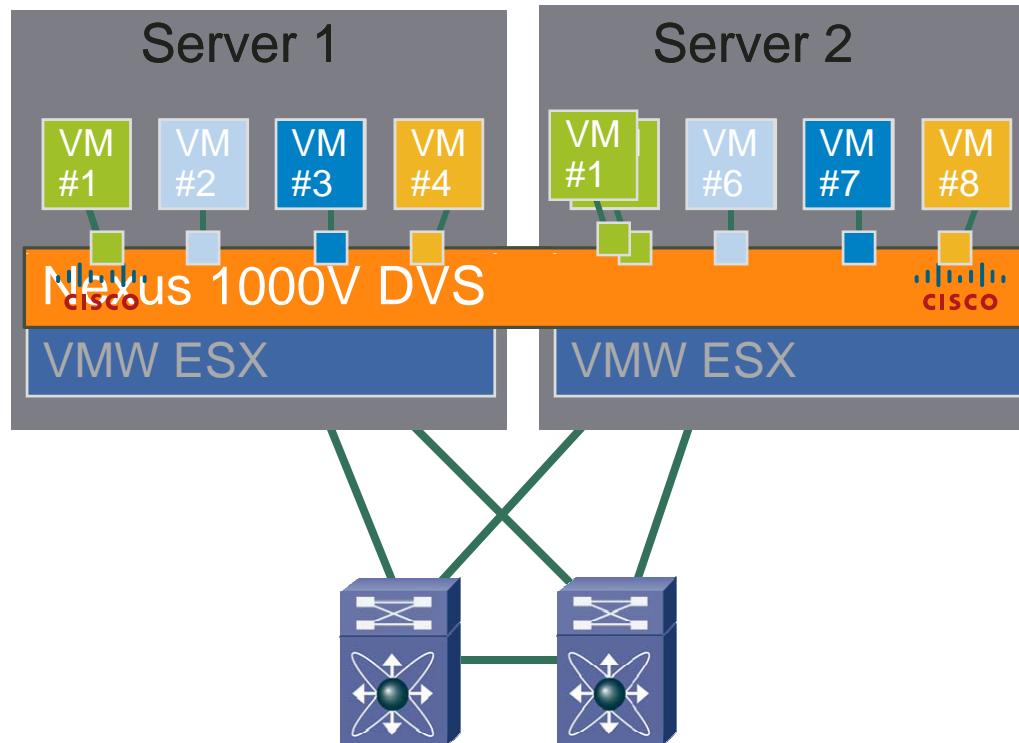
Organizational Structure

Muddled ownership as server admin must configure virtual network

Organizational redundancy creates compliance challenges

Cisco Nexus 1000V

The industries First Distributed Virtual Switch 

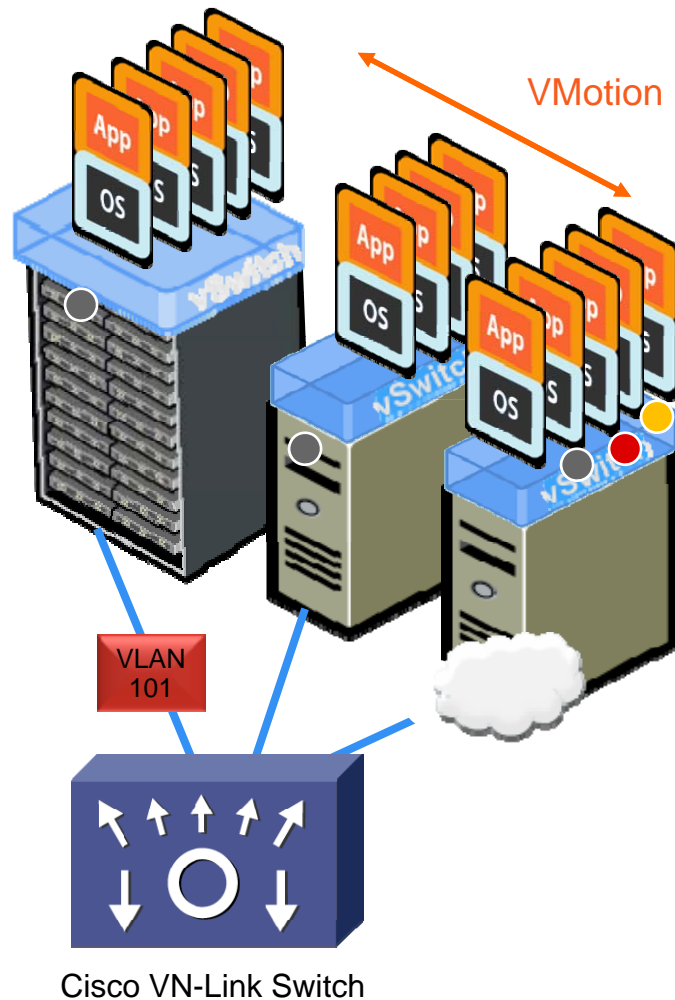


Policy-Based
VM Connectivity

Mobility of Network
and Security Properties

Non-Disruptive
Operational Model

VN-Link Brings VM Level Granularity



Problems:

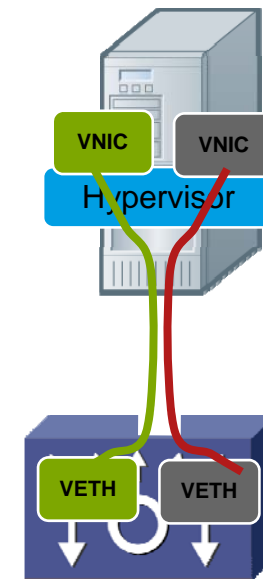
- VMotion may move VMs across physical ports—policy must follow
- Impossible to view or apply policy to locally switched traffic
- Cannot correlate traffic on physical links—from multiple VMs

VN-Link:

- Extends network to the VM
- Consistent services
- Coordinated, coherent management

Cisco Virtual Network Link – VN-Link

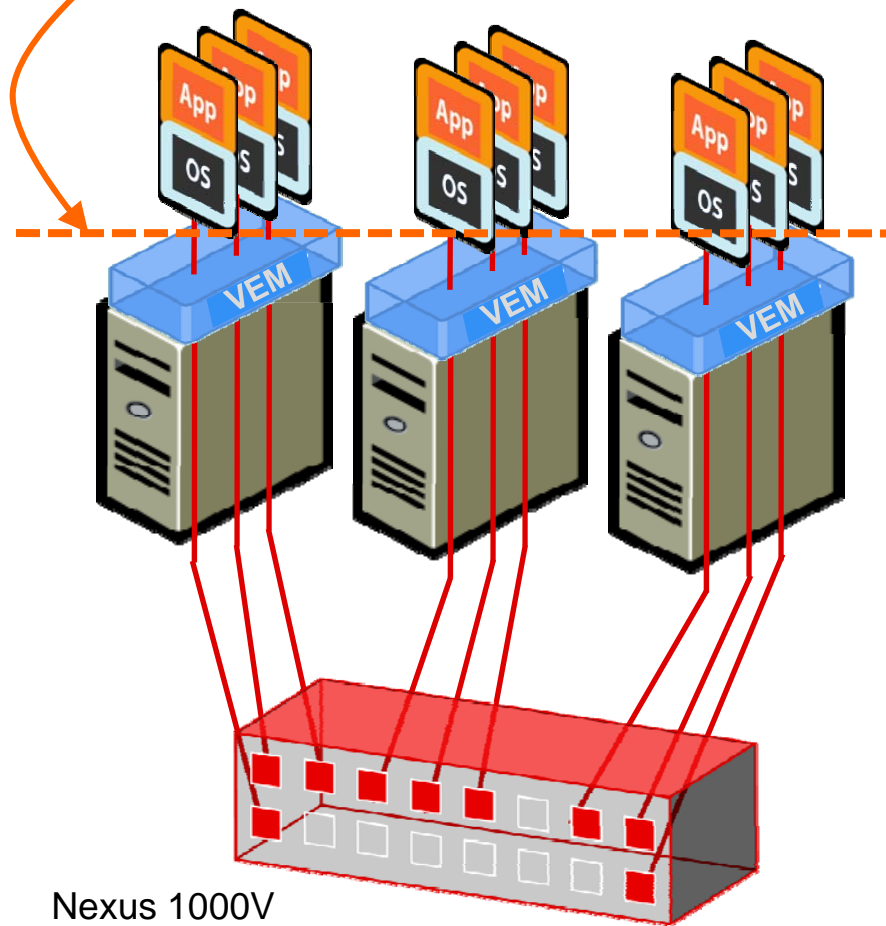
- Virtual Network Link (VN-Link) is about:
 - VM-level network granularity
 - Mobility of network and security properties (follow the VM)
 - Policy-based configuration of VM interfaces (Port Profiles)
 - Non-disruptive operational model
- VN-Link refers to a literal link between a VM VNIC & a Cisco VN-Link Switch
- VN-Link with Nexus 1000V
 - Replaces Hypervisor switch with Cisco modular switch (software)



Cisco VN-Link Switch

VN-Link View of the Access Layer

Boundary of network visibility



Nexus 1000V
Distributed Virtual Switch

- Nexus 1000V and VN-Link provide visibility to the individual VMs
- Policy can be configured per-VM
- Policy is mobile within the ESX cluster

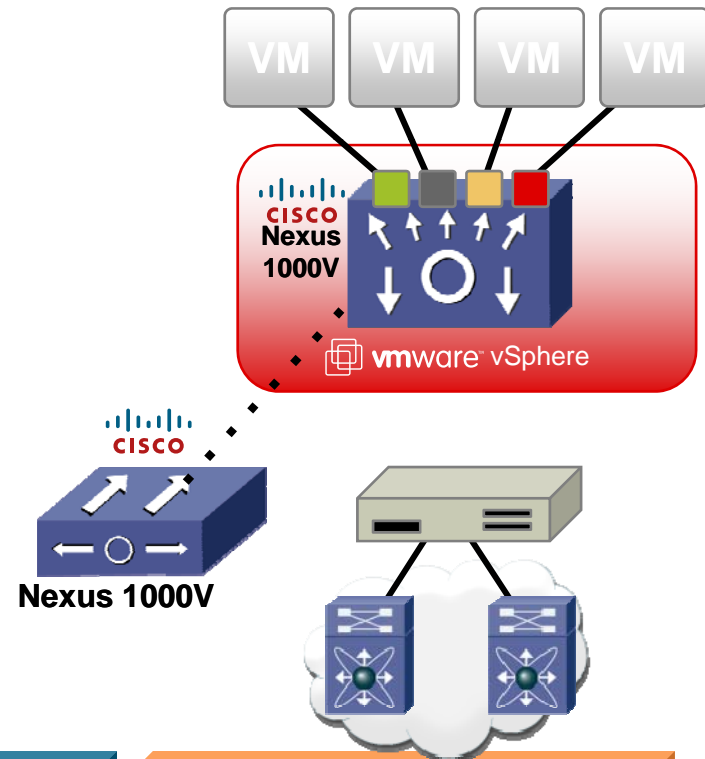
VN-Link With the Cisco Nexus 1000V

Cisco Nexus 1000V

Software Based

- Industry's first 3rd-party vNetwork Distributed Switch for VMware vSphere
- Built on Cisco NX-OS
- Compatible with all switching platforms
- Maintain vCenter provisioning model unmodified for server administration; allow network administration of virtual network via familiar Cisco NX-OS CLI

BEST OF
vmworld 2008



Policy-Based
VM Connectivity

Mobility of Network &
Security Properties

Non-Disruptive
Operational Model

Faster VM Deployment

Cisco VN-Link: Virtual Network Link

Policy-Based
VM Connectivity

Mobility of Network &
Security Properties

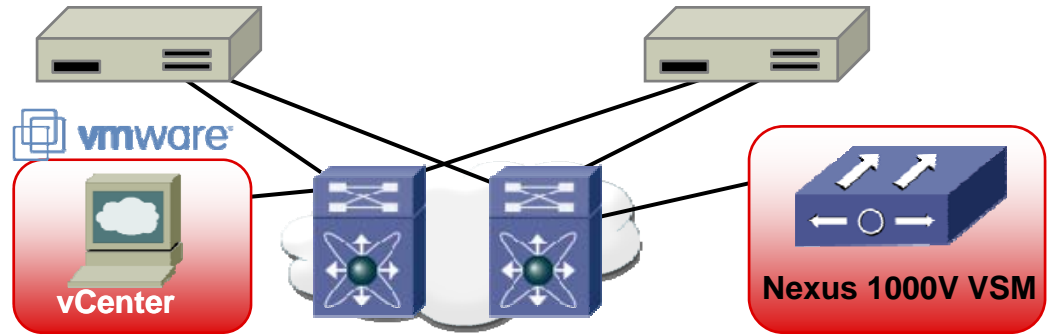
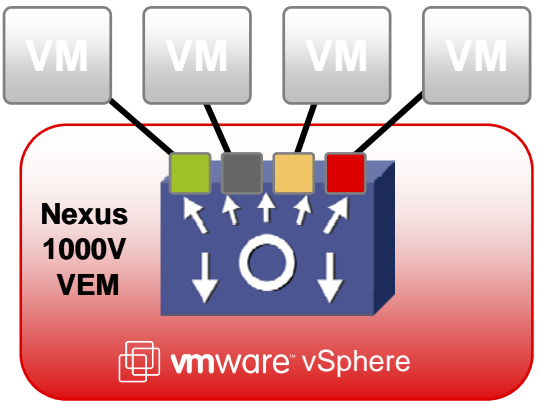
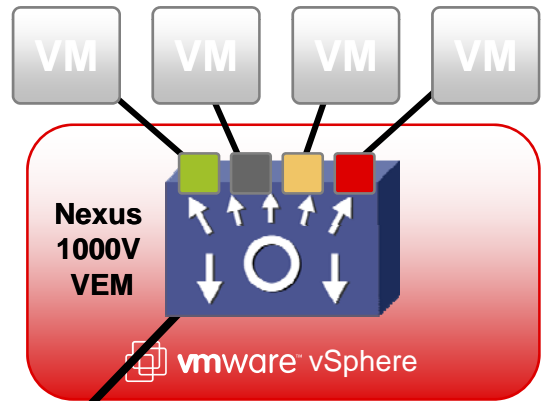
Non-Disruptive
Operational Model

Defined Policies

WEB Apps	
HR	
DB	
DMZ	

VM Connection Policy

- Defined in the network
- Applied in Virtual Center
- Linked to VM UUID



Richer Network Services

Cisco VN-Link: Virtual Network Link

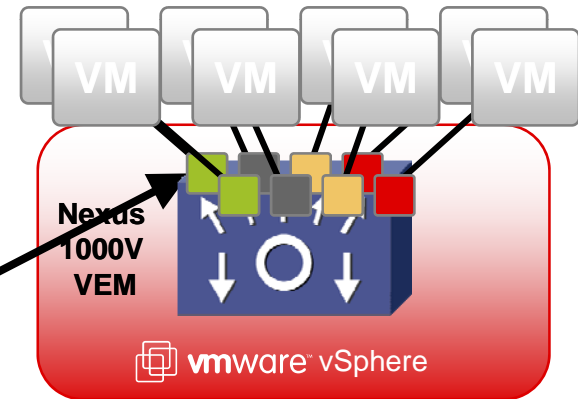
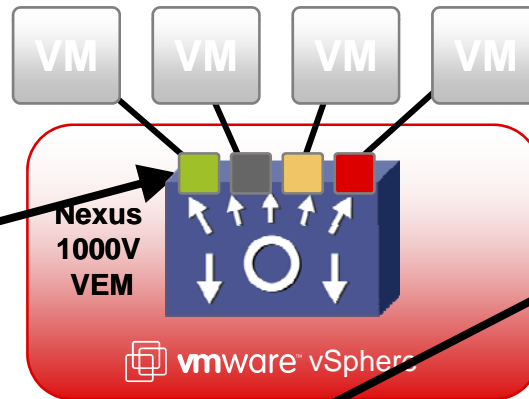
Policy-Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model

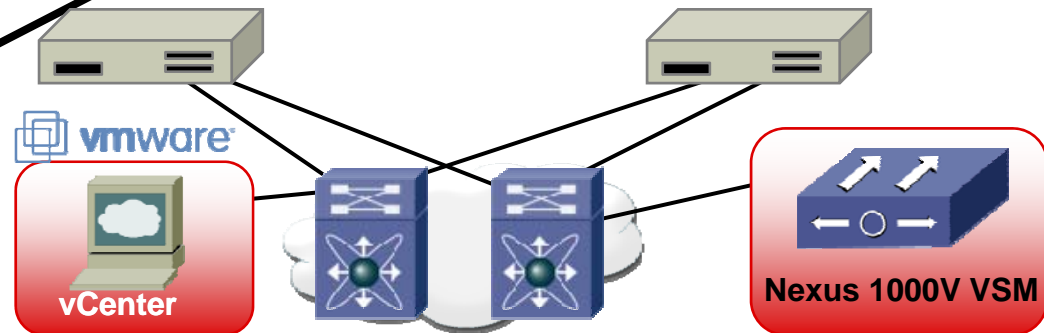
VMs Need to Move

- VMotion
- DRS
- SW Upgrade/Patch
- Hardware Failure



VN-Link Property Mobility

- VMotion for the network
- Ensures VM security
- Maintains connection state



Increased Operational Efficiency

Cisco VN-Link: Virtual Network Link

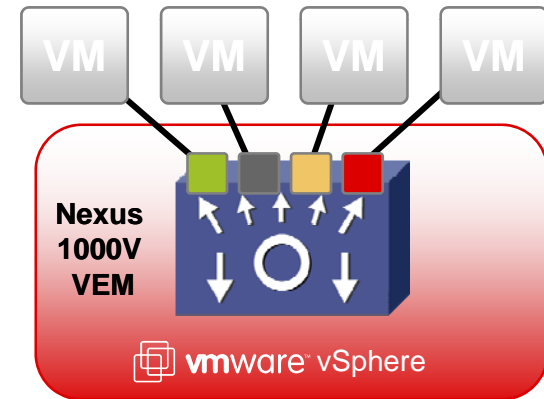
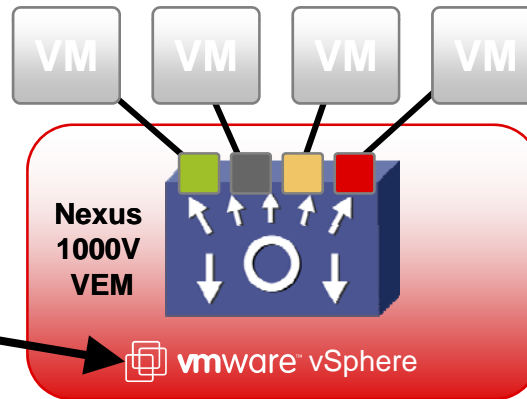
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Mobility of Network & Security Properties

Non-Disruptive Operational Model

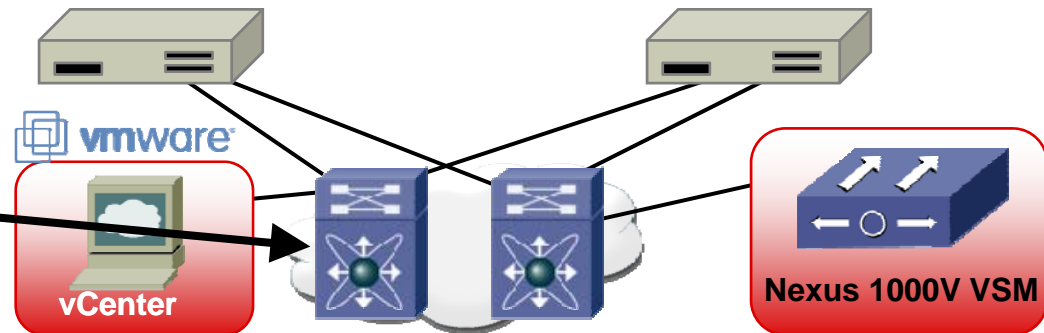
VI Admin Benefits

- Maintains existing VM mgmt
- Reduces deployment time
- Improves scalability
- Reduces operational workload
- Enables VM-level visibility

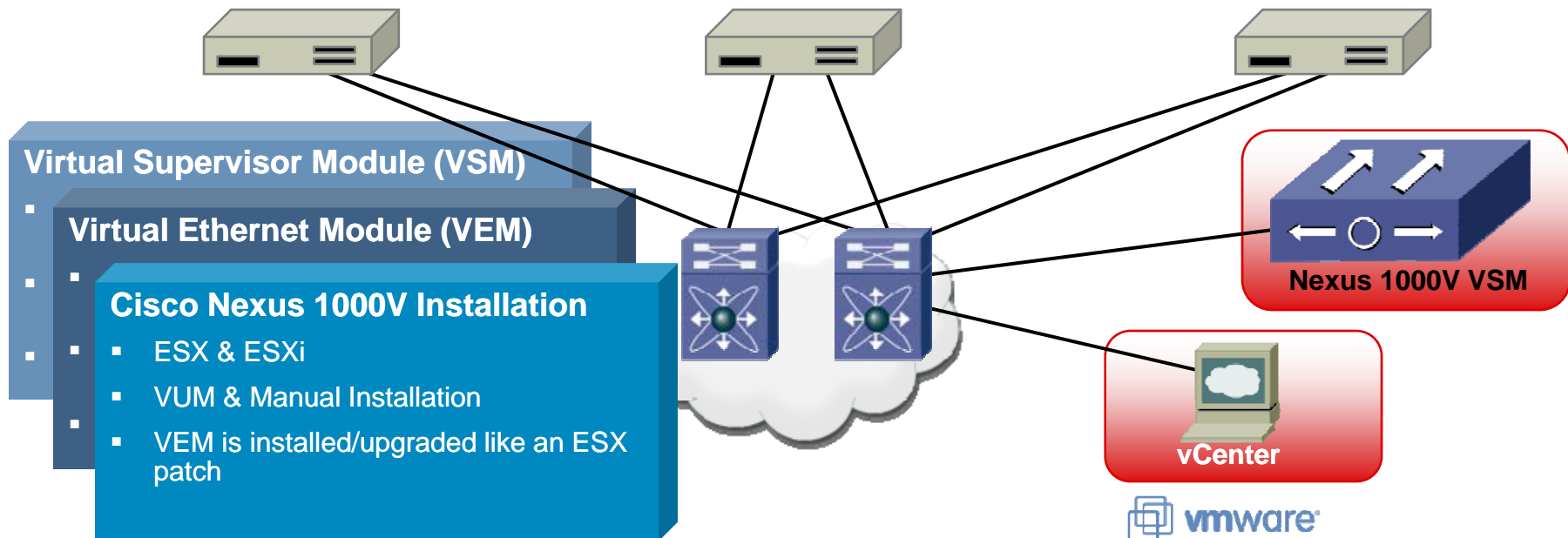
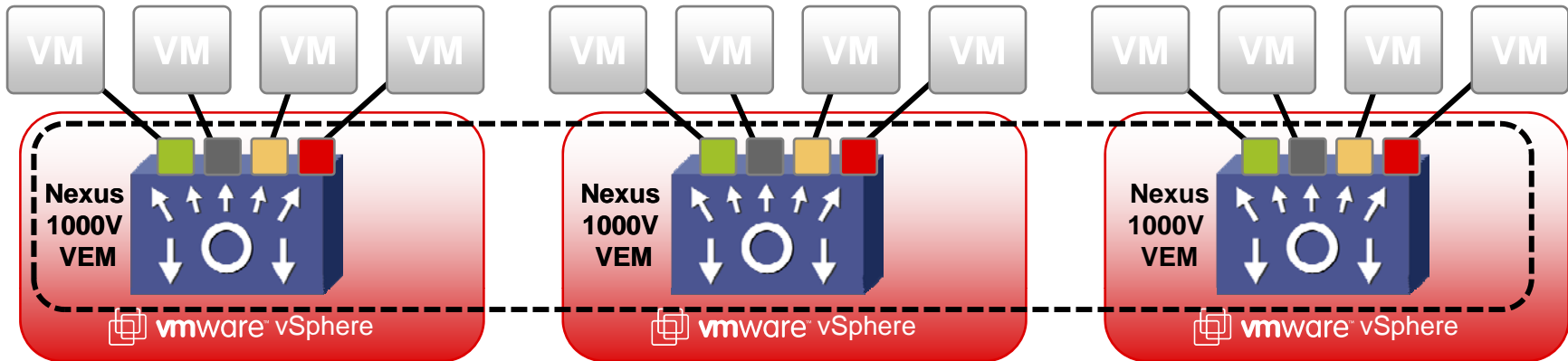


Network Admin Benefits

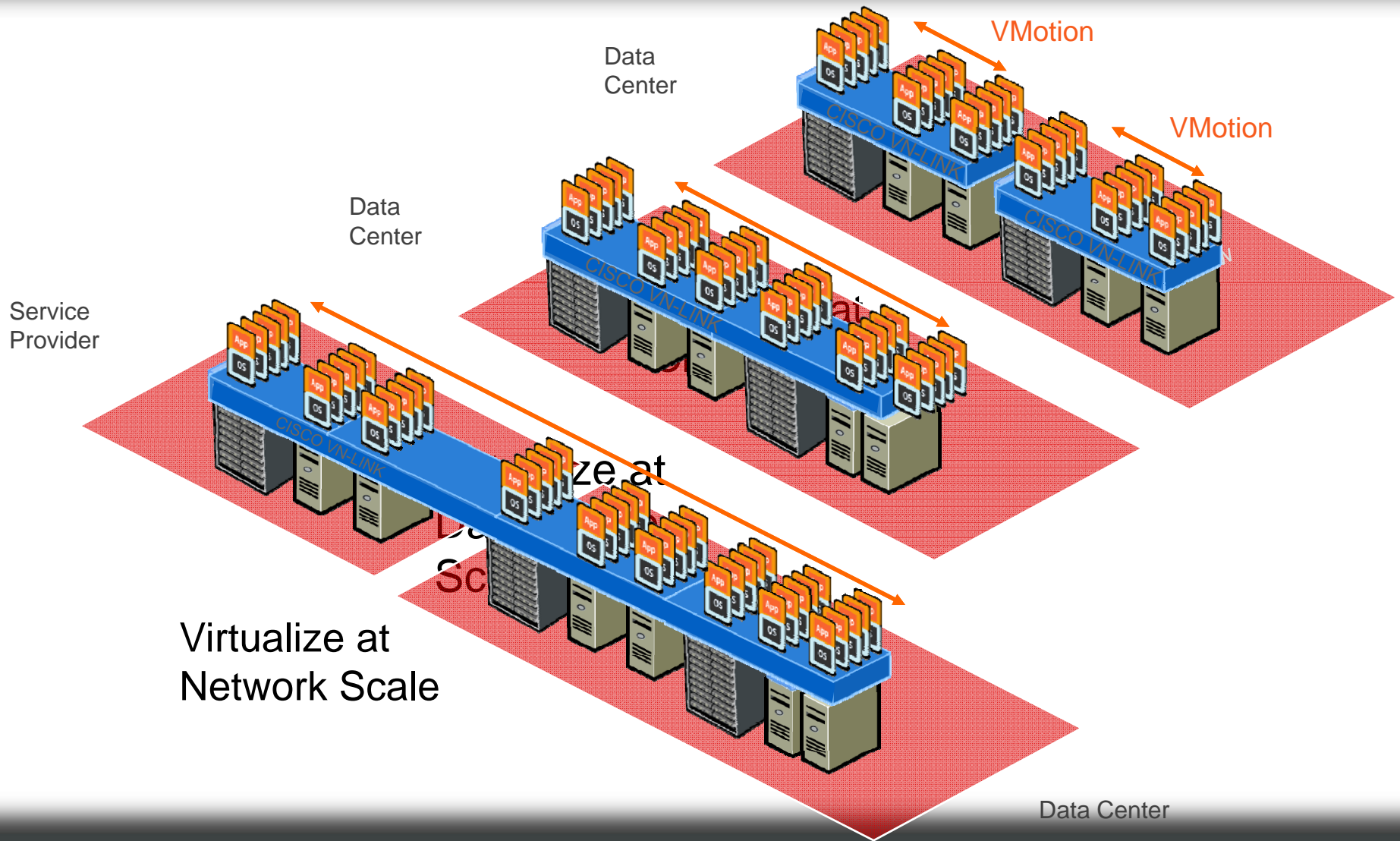
- Unifies network mgmt and ops
- Improves operational security
- Enhances VM network features
- Ensures policy persistence
- Enables VM-level visibility



Cisco Nexus 1000V Architecture



Network Scale Virtualization



Nexus 1000V Deployment Options

All types of servers

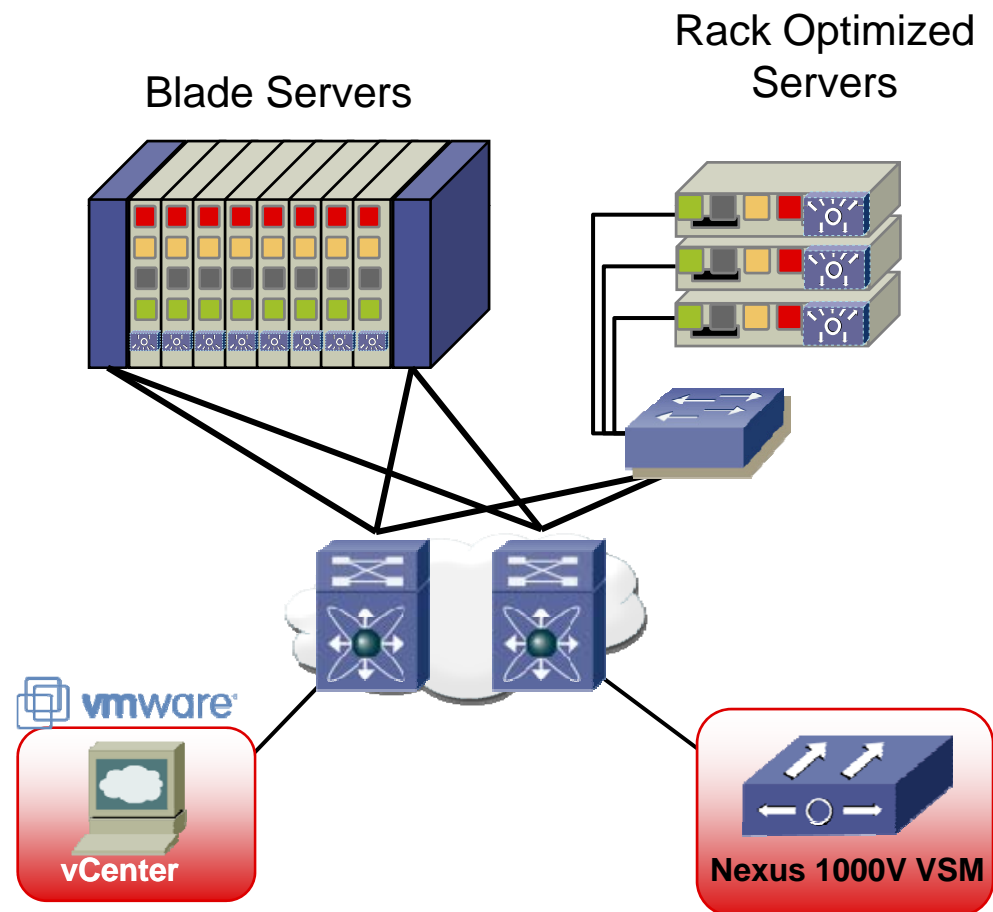
1G & 10G NICs

Any type of physical switch
(Cisco & other vendors)

Requires External
Management Appliance
(VSM) which can be a
virtual or physical appliance

Requires VMware vSphere
4.0 Enterprise Plus License

Network stats, interface
state, flow stats maintained
in VEM, exposed through
VSM



Accelerate Server Virtualization



Enable, Simplify, Scale



Security & Policy Enforcement

Enable VM-level security and policy

Scale the use of VMotion and DRS



Operations & Management

Simplify management and troubleshooting with VM-level visibility

Scale with automated server & network provisioning



Organizational Structure

Enable flexible collaboration with individual team autonomy

Simplify and maintain existing VM mgmt model