



# Data Center Transformation



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# Agenda

- Data Center Trends and Challenges
- Technology Enablers for Data Center Transformation
  - Unified Fabric
  - Nexus Data Centre Switches
  - Unified Computing
- Summary
- Q&A

# Data Centers Are Under Increasing Pressure



Collaboration



Empowered User



SLA Metrics

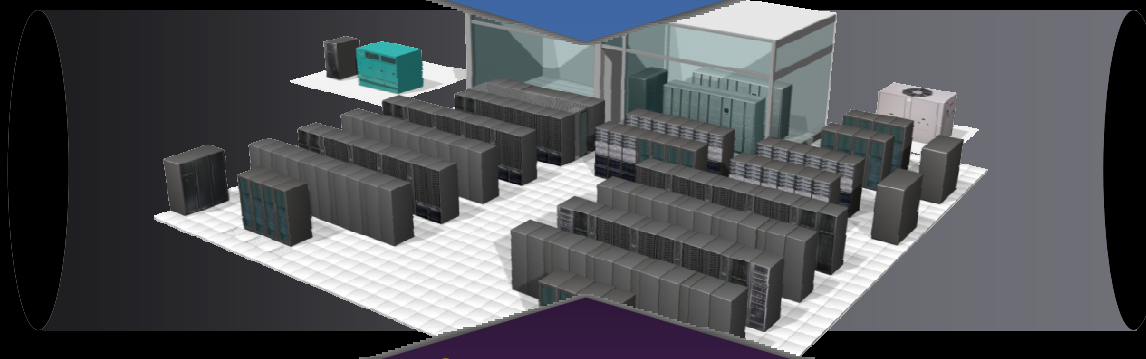


Global Availability



Reg. Compliance

New Business Pressures



Operational Limitations

Power & Cooling



Asset Utilization



Provisioning



Security Threats



Bus. Continuance



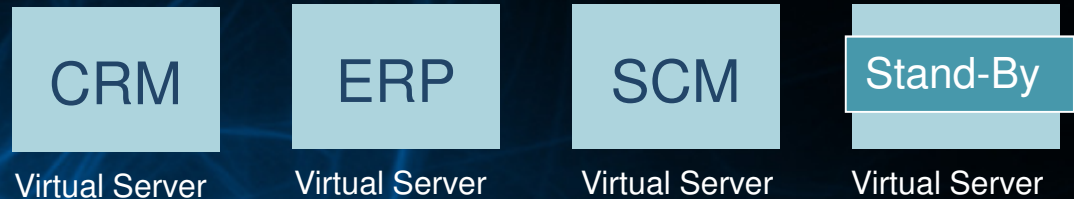
# The Transformation



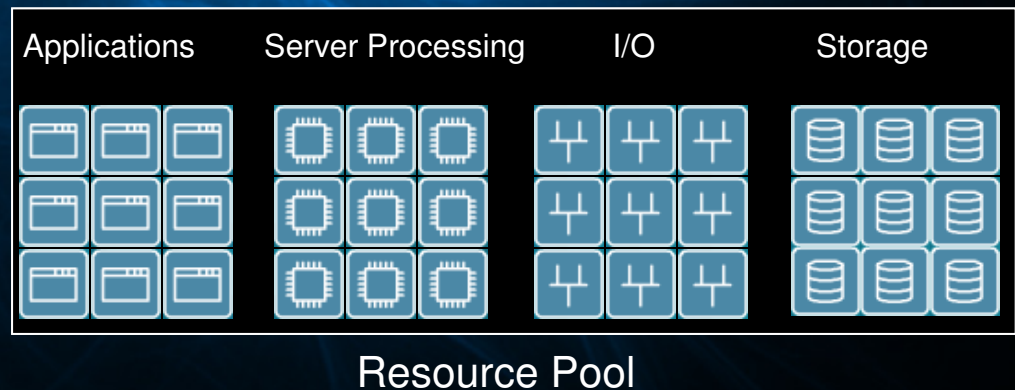
# The Virtualized Data Center Foundation

- Massive proliferation of server resources

- Orchestrate pools of compute, storage and I/O
- Based on application, process, or business objectives

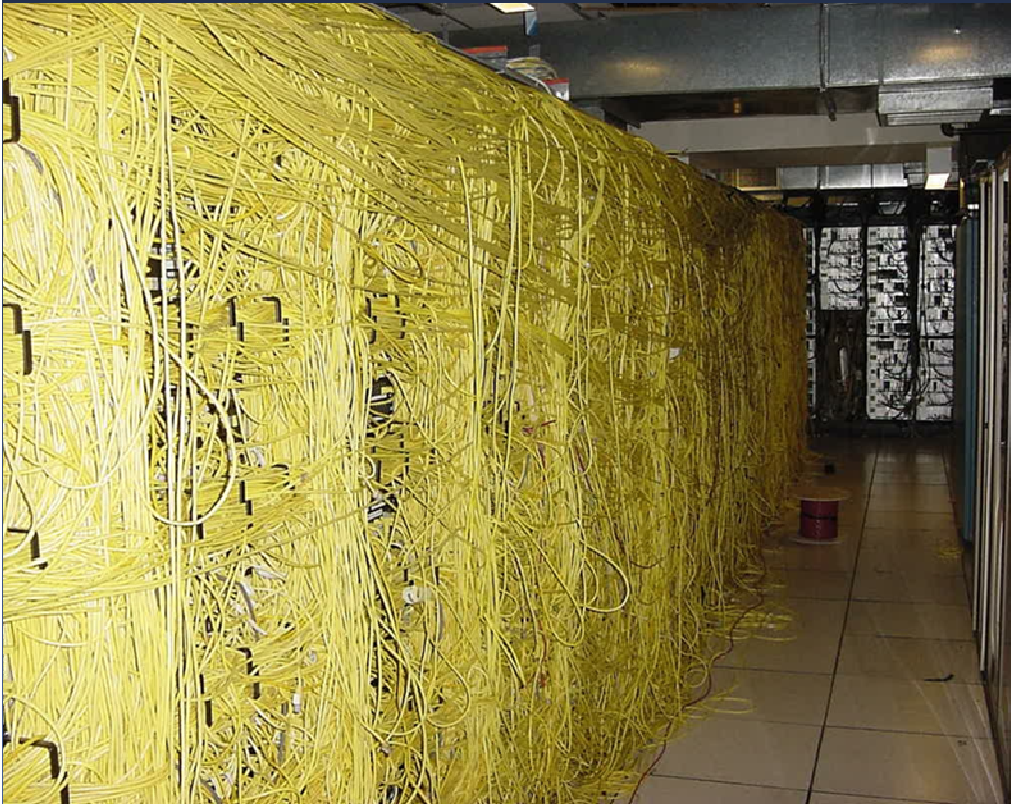


**Data Center Network Fabric**  
**Resilient, Scalable, Real Time**



# Example: Unifying the Data Center Fabric

## Many networks, One Infrastructure



Complexity,  
Cost, Power



Increased Efficiency,  
Simpler Operations

# Cisco Unified Fabric: An Innovative Architecture to Simplify Data Center Transformation

Standards



## Performance

High Performance Switching

## Scalability

Data Center Bridging (DCB) + TRILL

## Consolidation

Fibre Channel over Ethernet (FCoE)

## Virtualization

VM-Optimized Services



Cost-Effective, 10 Gigabit Ethernet Connectivity  
**Foundation**



# Why Unified Fabric at Server Access Layer 1 GbE to 10 GbE to Unified Fabric/FCoE

## Consolidation of Access Infrastructure

- Adapters, Switches, Cables

## TCO Reduction

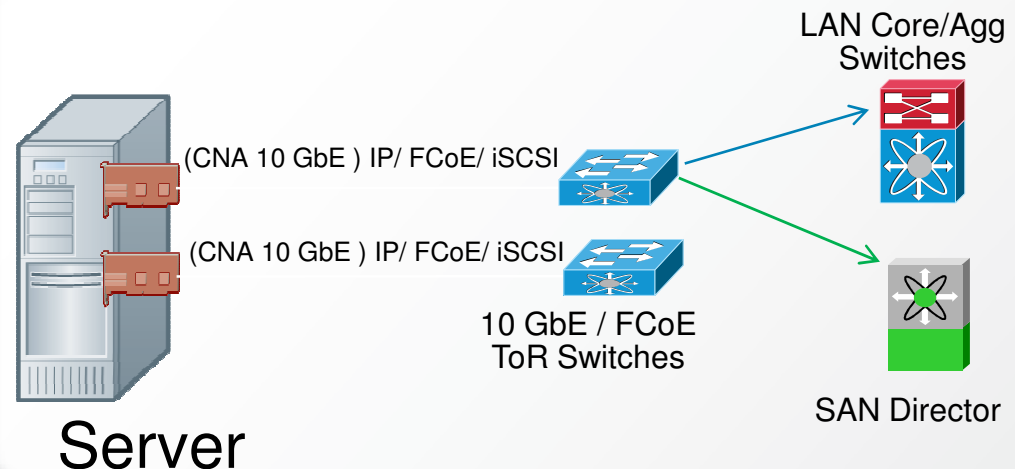
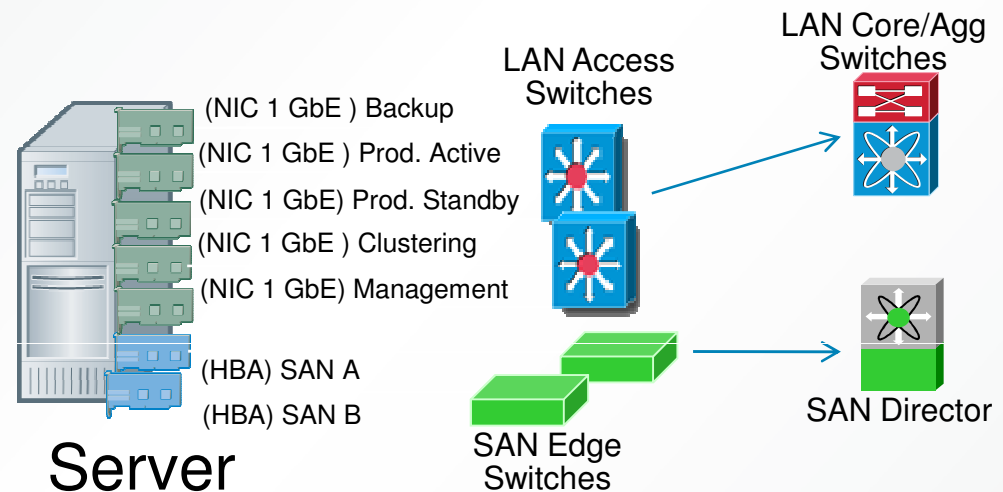
- Equipment costs
- Operational Costs

## Enhances Virtualization

- Uniform adaptors
- Wire once & Walk away
- Optimized for virtual machine environments

## Least Disruption & investment protection

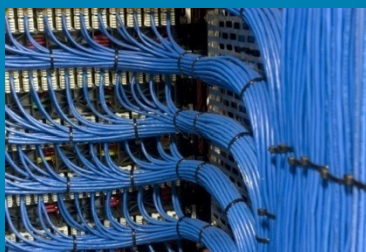
- Protects LAN & SAN upstream infrastructure
- Leverage existing storage tools



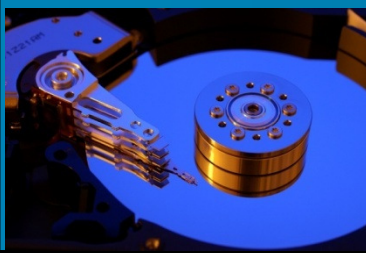
# Key Benefits of Unified Fabric



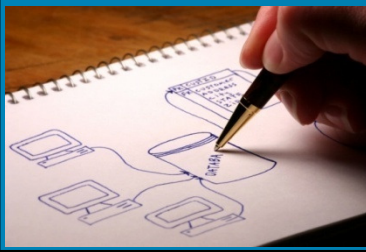
**Reduce overall DC power consumption by up to 8%.  
Extend the lifecycle of current data center.**



**Wire hosts once to connect to any network - SAN,  
LAN, HPC. Faster rollout of new apps and services.**



**Every host will be able to mount any storage target.  
Drive storage consolidation and improve utilization.**

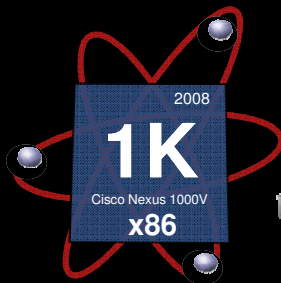


**Rack, Row, and X-Data Center VM portability become  
possible.**

# The News: Cisco Nexus Family

- Complete data center class switching portfolio
- Consistent data center NX-OS across all platforms
- Infrastructure scalability, transport flexibility and operational manageability

Nexus 1000V  
Virtual Switch



Nexus 2000  
1GbE Fabric  
Extender



520G  
Nexus 5010



1Tb/s  
Nexus 5020



Nexus 7010



Nexus 7018



NX-OS Data Center Operating System

Data Center Network Manager

# High Availability - Independently Verified Zero Packet Loss

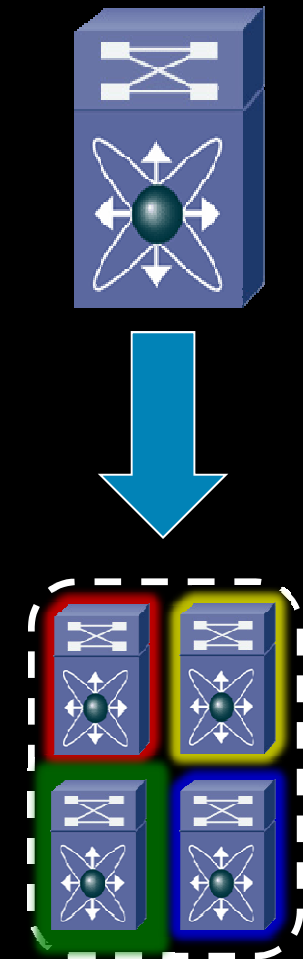
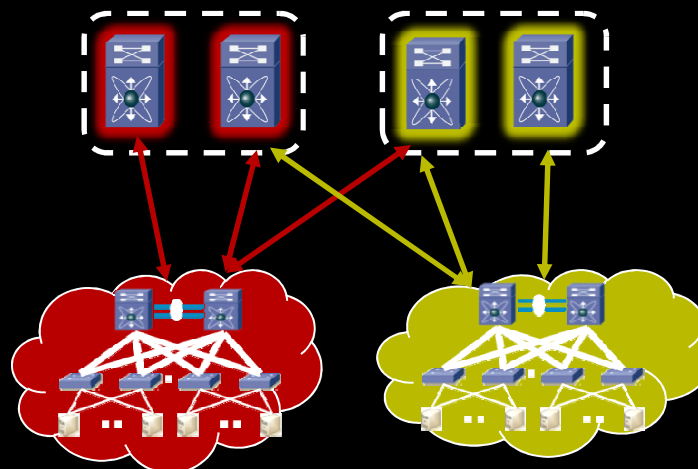
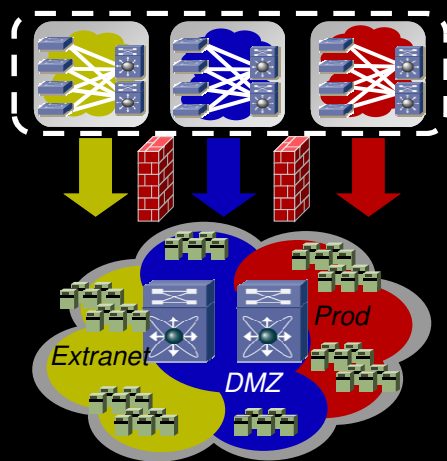


- Zero Packet Loss when Upgrading and Downgrading the software image - ISSU
- Zero Packet Loss when removing Fabric Cards

**Test Conditions:** Nexus 7000 I/O modules load balance all of the traffic across all 5 Fabric Cards. The test was performed with 51,200 OSPF routes, 256 OSPF neighbors (one on each 10GbE port), every packet going through a security ACL of 7000 lines, every packet being rewritten using a 500 line QOS ACL, each line cards was doing 48 Mpps lookup, and Cisco Netflow to track up to 512,000 flows .

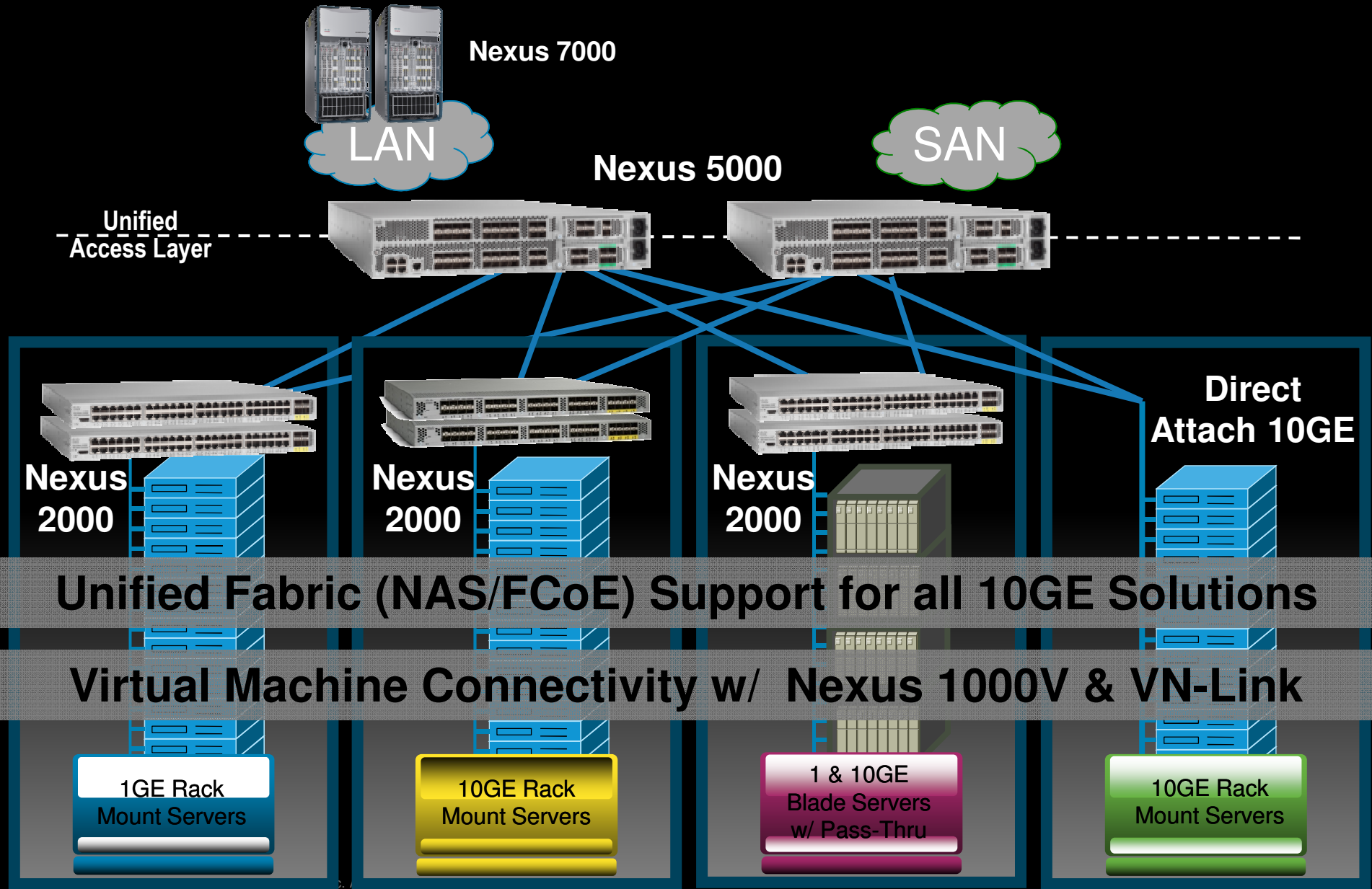
# Virtual Switches

- One physical switch can act as multiple virtual switches
  - Reduces the number of physical switches in the network, lowers capex and power
- Applications Include separating Networks, Isolating Security Domains using the same physical switch



- Note: Should not be used for dual homing high availability. Physical redundancy is more robust

# Nexus Data Center Access Topology



# Cisco Nexus 1000 Virtual Switch



# Networking Challenges to Scaling VM Deployments



## Security and Policy Enforcement

server—poor granularity

Security and policy doesn't follow VM



## Operation and Management

connection visibility

Inability to troubleshoot and audit



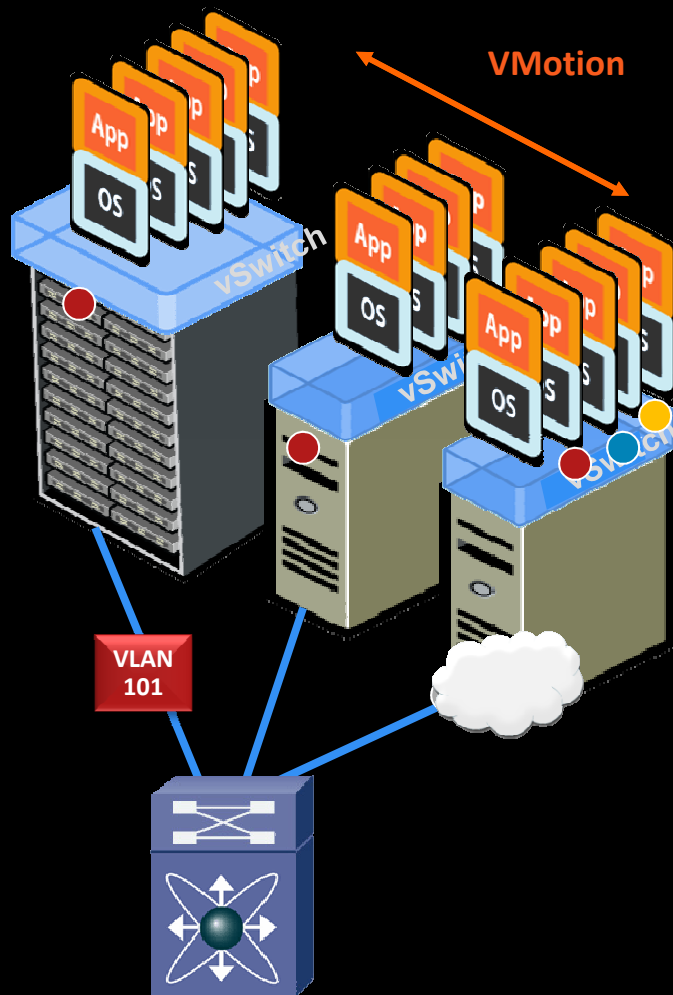
## Organizational Structure

between roles

Creates loss of productivity & compliance challenges

# Virtual Machine Granularity

## Introducing VN-Link



### 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 Nexus 1000V

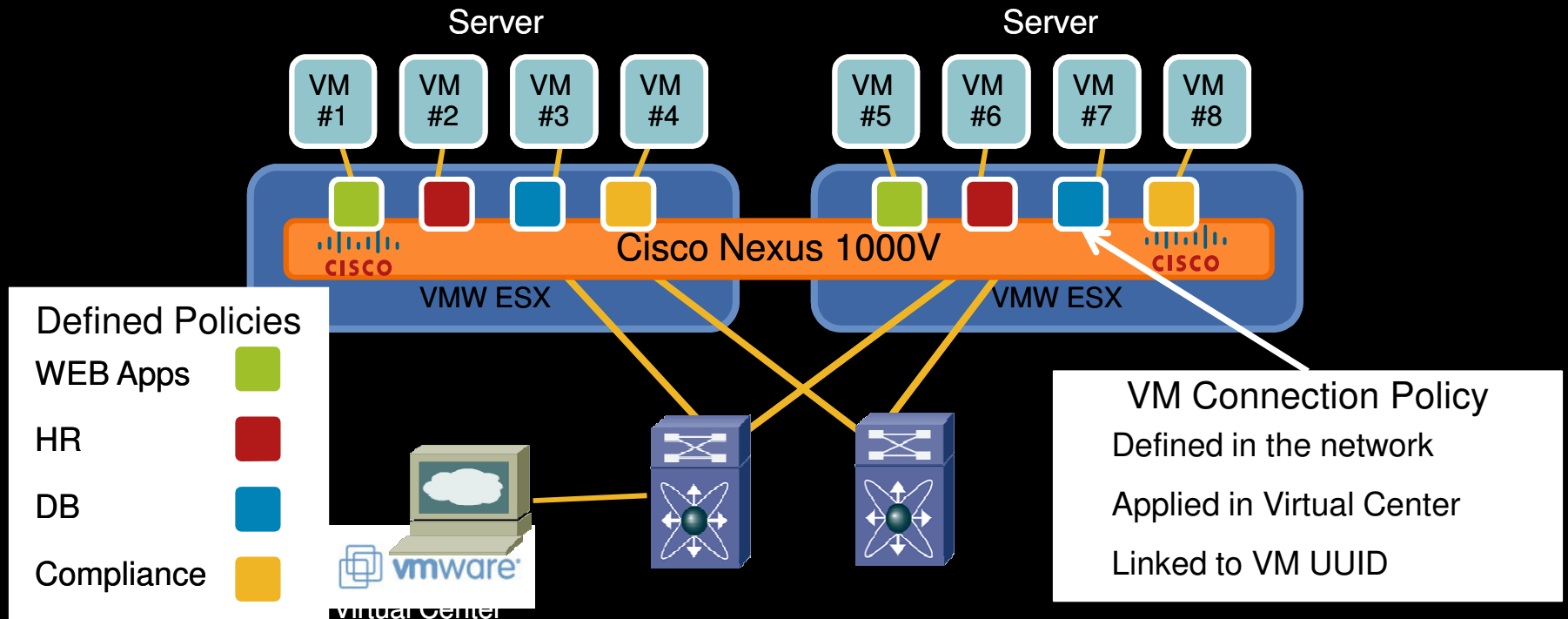
*Faster VM Deployment*

## VN-Link: Virtualizing the Network Domain

Policy Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model



# Cisco Nexus 1000V

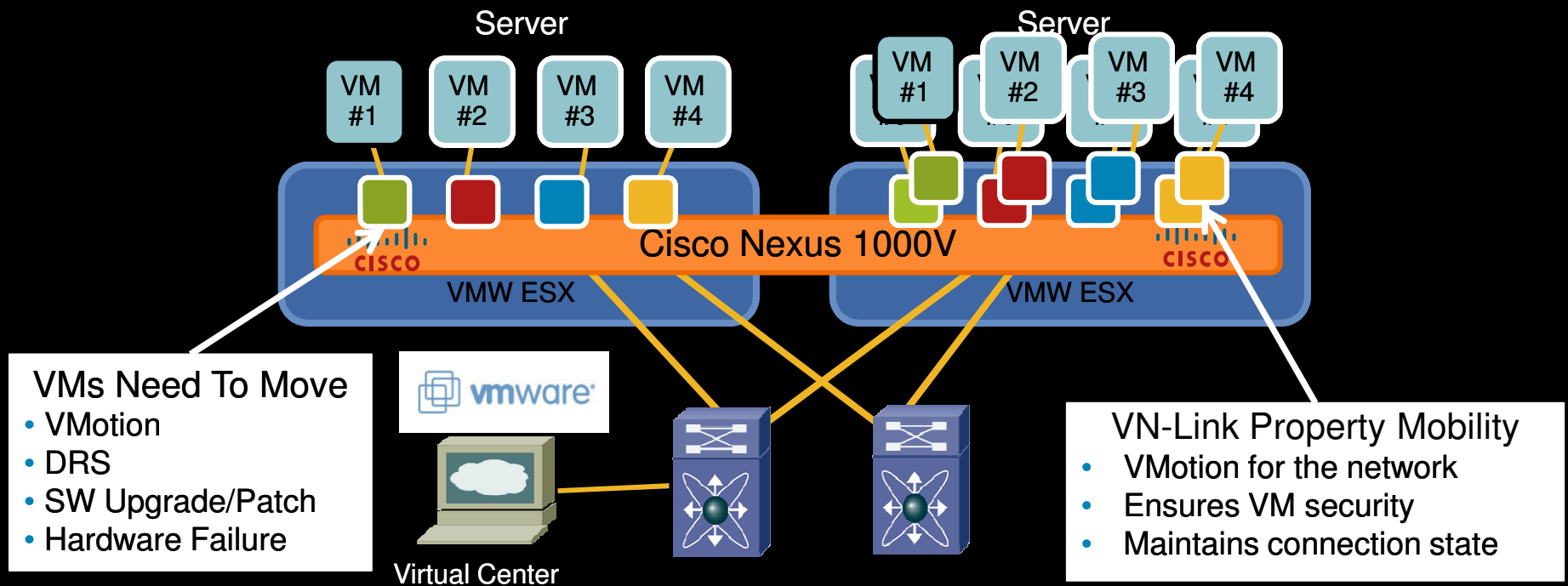
## Richer Network Services

### VN-Link: Virtualizing the Network Domain

Policy Based VM Connectivity

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Non-Disruptive Operational Model



# Cisco Nexus 1000V

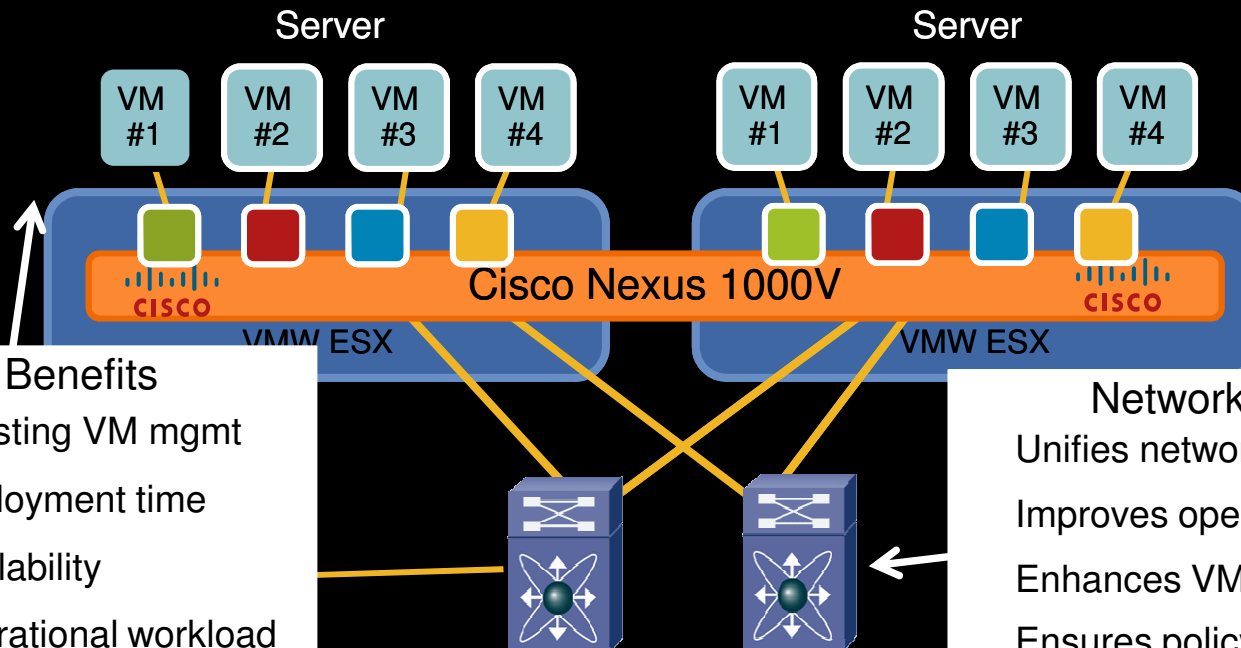
*Increase Operational Efficiency*

## VN-Link: Virtualizing the Network Domain

Policy Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model



### Server Benefits

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

### Network Benefits

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

# Key Features of the Nexus 1000V

## Switching

- L2 Switching, 802.1Q Tagging, VLAN Segmentation, Rate Limiting (TX)
- IGMP Snooping, QoS Marking/Queuing,

## Security

- Policy Mobility, PVLAN, ACL(L2-4), Port Security, IP Redirect
- Cisco TrustSec – Authentication, Admission, Access Control

## Provisioning

- Automated vSwitch config, Port Profiles, Virtual Center Integration
- Optimized NIC Teaming (LACP to 1 or more upstream device)

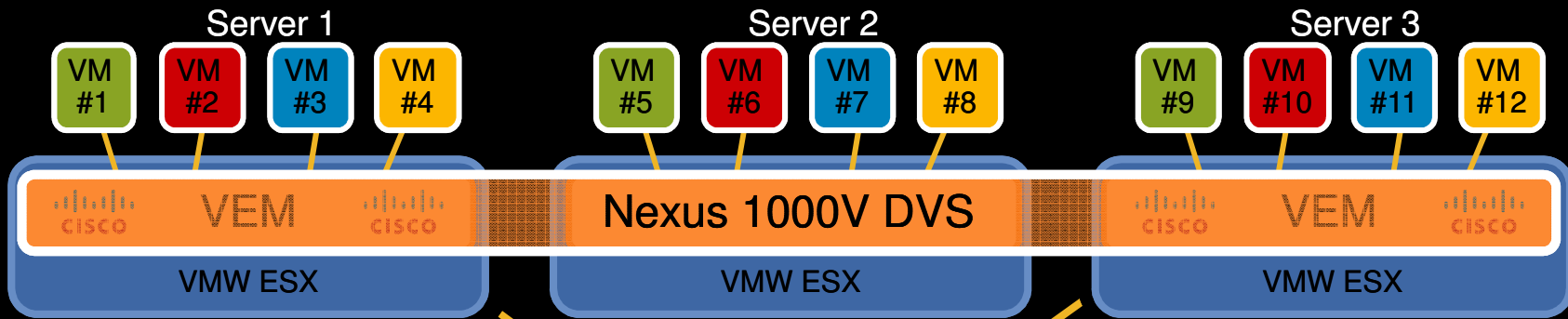
## Visibility

- Historical VMotion tracking, ERSPAN, Netflow v.9 w/ NDE, CDP v.2
- VM-Level Interface Statistics, Wireshark

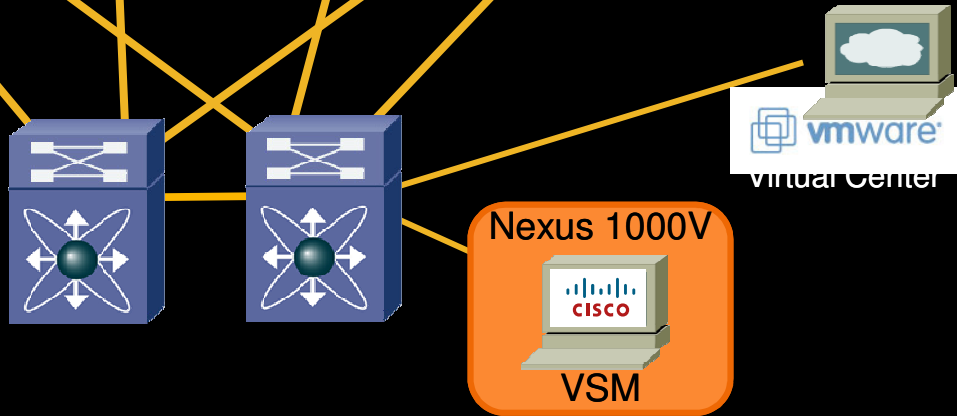
## Management

- Virtual Center VM Provisioning, Cisco Network Provisioning
- Cisco CLI, XMP API, SNMP (Read/Write)

# Cisco Nexus 1000V Architecture



Virtual Supervisor Module (VSM)  
 Virtual Ethernet Module (VEM)  
 Cisco Nexus 1000V Enables:  
 Policy Based VM Connectivity  
 Mobility of Network & Security Properties  
 Non-Disruptive Operational Model



**Slide 21**

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**PF3**

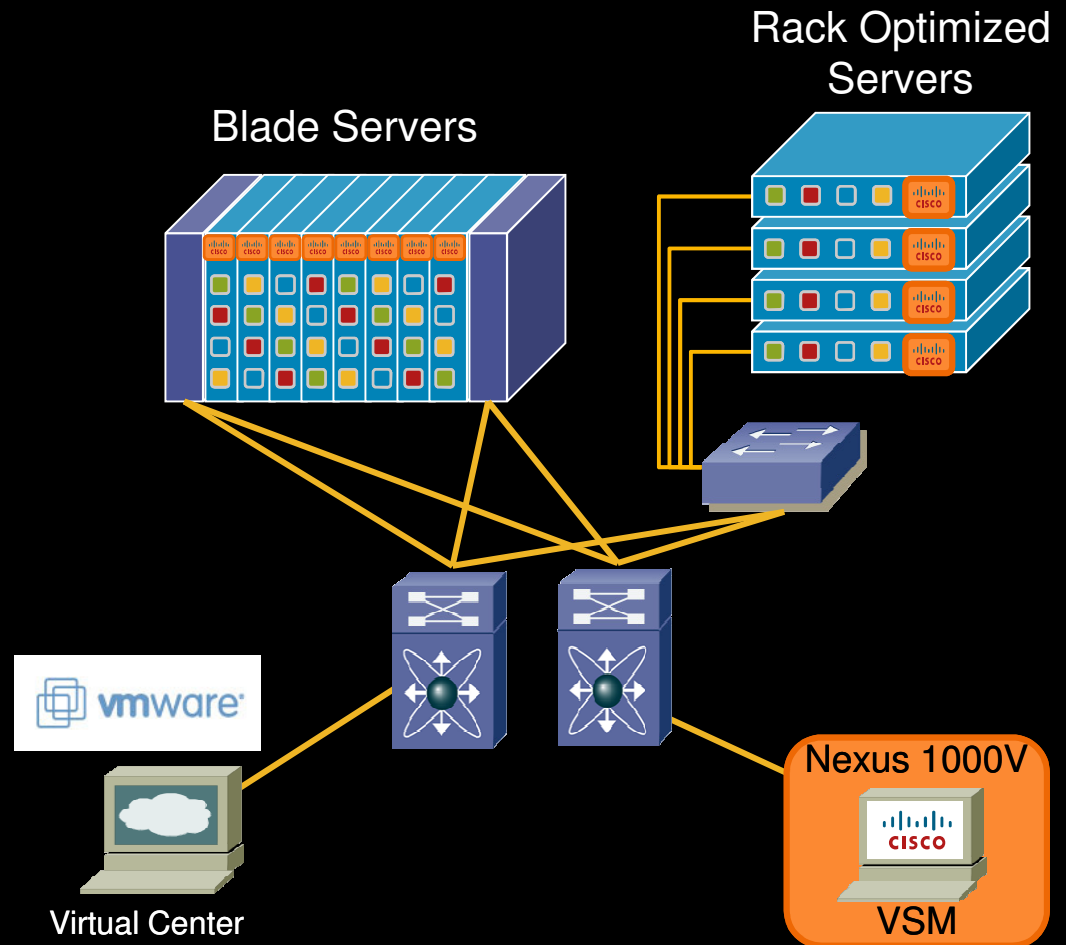
**Animate to show vmotion as last step**

Paul Fazzone, 22/8/2008

# Nexus 1000V Deployment Scenarios

*Pick your flavor*

1. Works with all types of servers (rack optimized, blade servers, etc)
2. Works with any type of upstream switch (Blade, Top or Rack, Modular)
3. Works at any speed (1G or 10G)
4. Nexus 1000V VSM can be deployed as a VM or a physical appliance



# Accelerate Server Virtualization

## Enable, Simplify, Scale



Security and Policy Enforcement



Operation and Management



Organizational Structure

### Enable

security and policy

**Scale** the use of VMotion and DRS

### Simplify

management and troubleshooting with VM-level visibility

**Scale** with automated server & network provisioning

### Enable

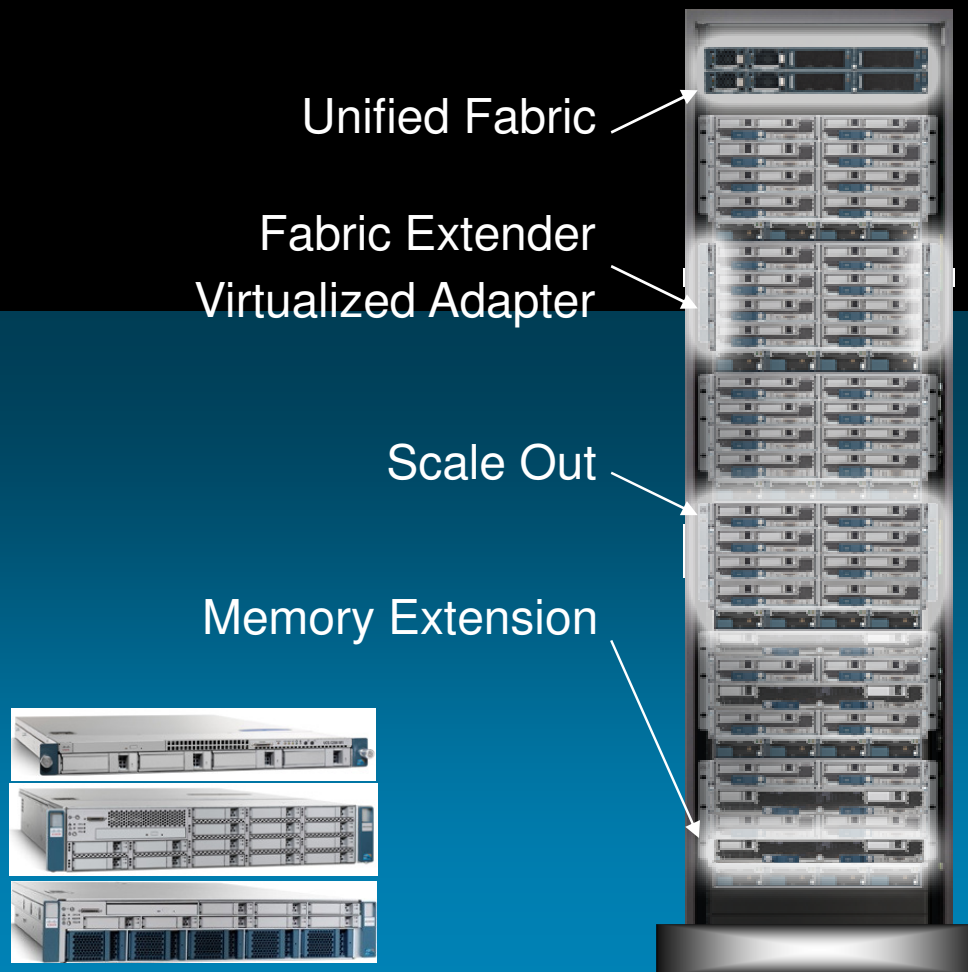
collaboration with individual team autonomy

**Simplify** and maintain existing VM mgmt model



# Cisco Unified Computing System

Designed to dramatically reduce datacenter total cost of ownership while simultaneously increasing IT agility and responsiveness.



## Virtualization Optimization

- Fine-grained control, portability, and visibility of network, compute, and storage attributes
- More than double the memory capacity of competing systems

## Industry Standard Servers

- Intel Xeon processor 5500 series
- 150% generational performance increase
- Intelligent platform for performance and energy efficiency

## Unified Fabric

- Wire once, low latency FC and Ethernet
- Virtualization aware
- Less than half the normal amount of adapters, switches, cables

## Automated Provisioning

- Embedded single point of management and provisioning
- Visibility and control across datacenter organizations
- Infrastructure policy management and compliance

# UCS builds on Nexus technologies

## Unified Computing System

- Platform for stateless computing and virtualization
- Multi-rack architecture, Form factor independent
- Enterprise-class x86, Standards-based



### Nexus 2000 Fabric Extender

#### Fabric Extender

- Simplifies Data Center architecture & operations
- Combines benefits of ToR and EoR
- Cost-effective highly-scalable 1/10GE
- Integrated management domain with N5000



### Nexus 1000V

#### VN-Link

- Virtualization aware access layer
- Compatible with switching platforms
- Combine VM and physical network operations
- Standards-based



### Nexus 5000

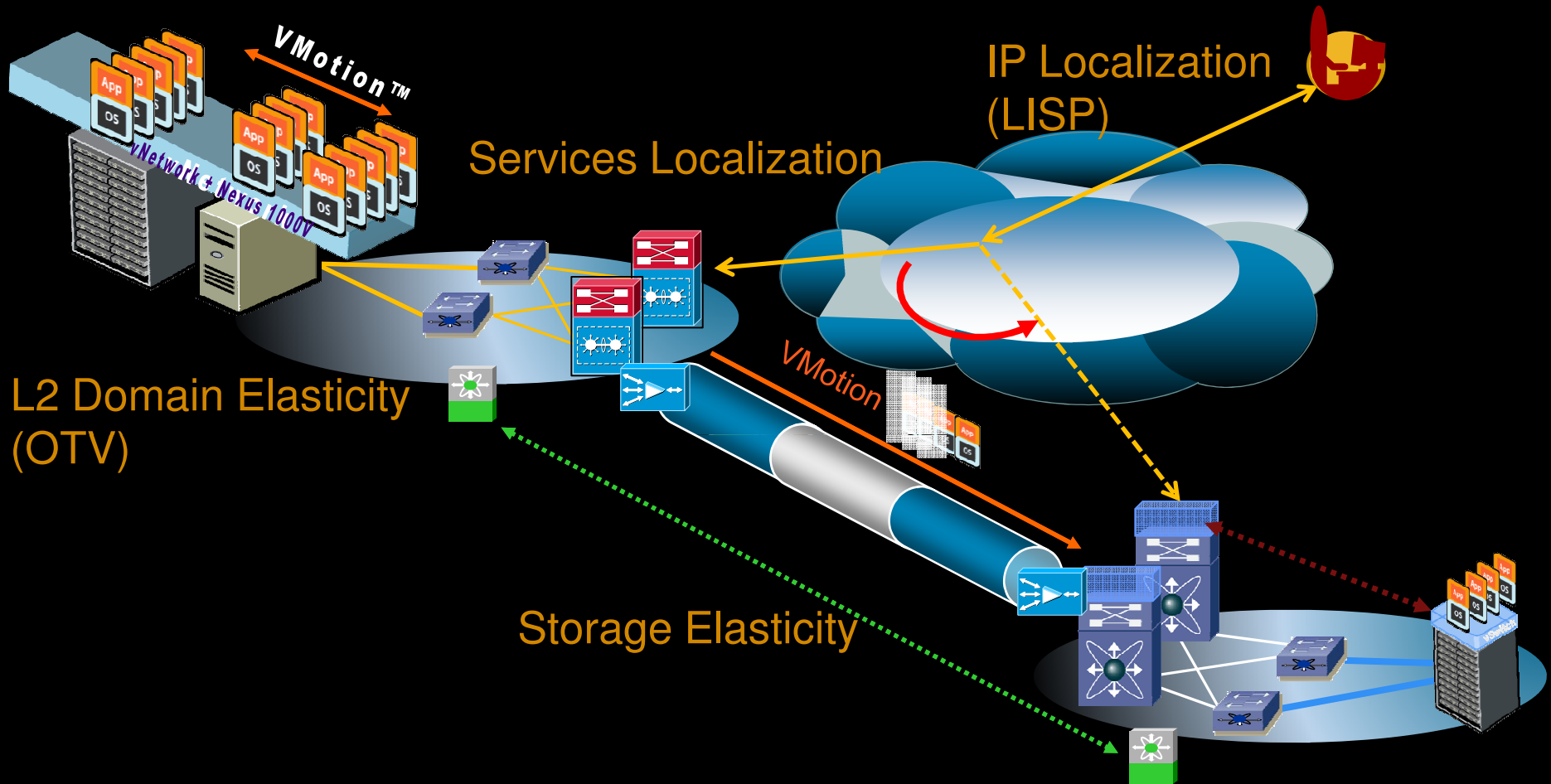
#### 10G FCoE Unified Fabric

- Enterprise-class top-of-rack switch
- Designed for server connectivity
- Lossless Low latency
- I/O Consolidation around Ethernet, Standards-based

# Summary



# DC Innovations for Cloud & Virtualization



Compute resources are part of the cloud, location is transparent to the user

# Data Center Evolution Path

