



Journey to the Cloud with the Cisco Nexus 1000V

Sal Lopez – Technical Marketing Engineer
Jake Howering – Product Manager

Cisco Confidential



Nexus 1000V Public Webinar Series

Date	Business Sessions
22-Mar	Nexus 1000V Family Overview and Update
5-Apr	Virtual Network Services (vPath, NAM, vWAAS)
19-Apr	Virtual Security Gateway Introduction
3-May	Journey to the Cloud w/ N1KV: vCloud Director & Long Distance vMotion
17-May	Secure VDI with Nexus1000V & VSG

Date	Technical Sessions
29-Mar	Nexus 1000V New Features and Installation Overview
12-Apr	Nexus1010 Overview & Best Practices
26-Apr	Virtual Security Gateway Technical Overview
10-May	Nexus 1000V Key Features
24-May	Nexus 1000V Troubleshooting

Journey to the Cloud with Nexus 1000V

Today's Agenda

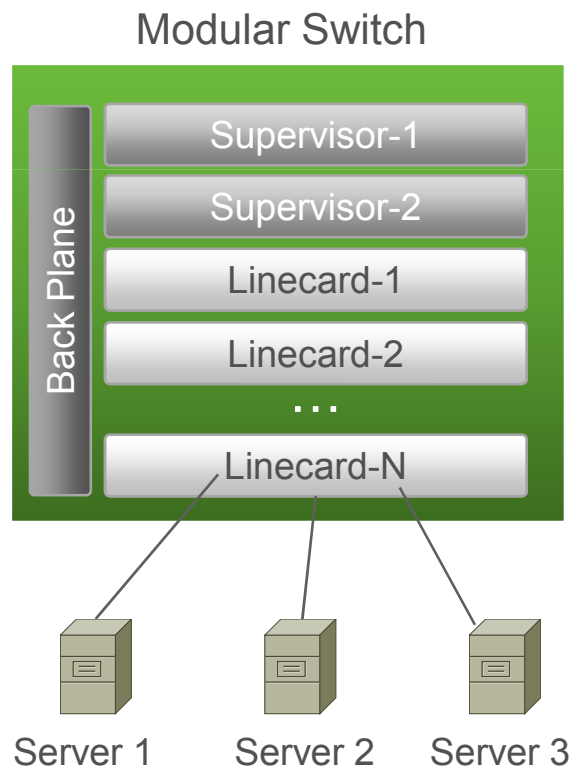
- Nexus 1000V Architecture – Joe Dillon
- vCloud Director Integration – Sal Lopez
- Virtualized Workload Mobility (vMotion) – Jake Howering
- Q &A

Nexus 1000V Architecture Overview



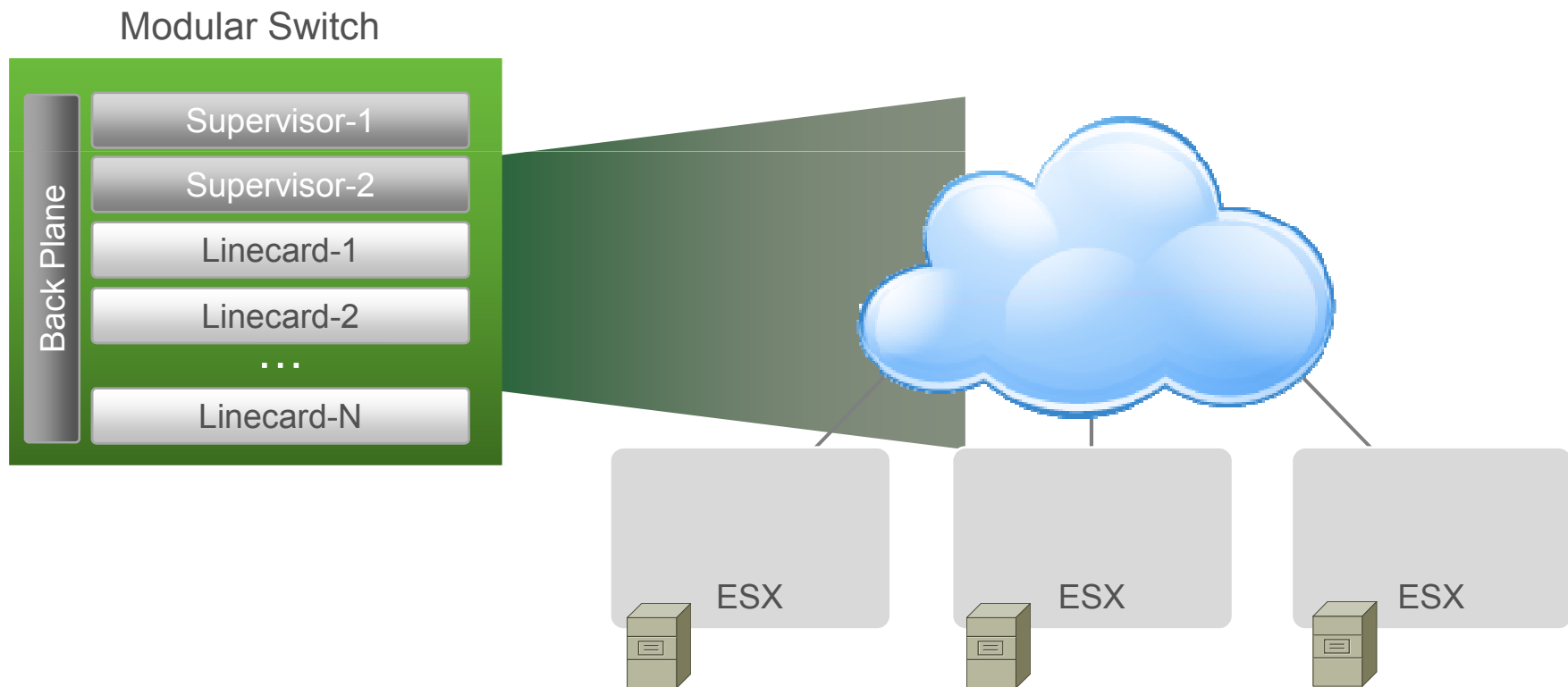
Nexus 1000V Architecture

Comparison to a Physical Switch



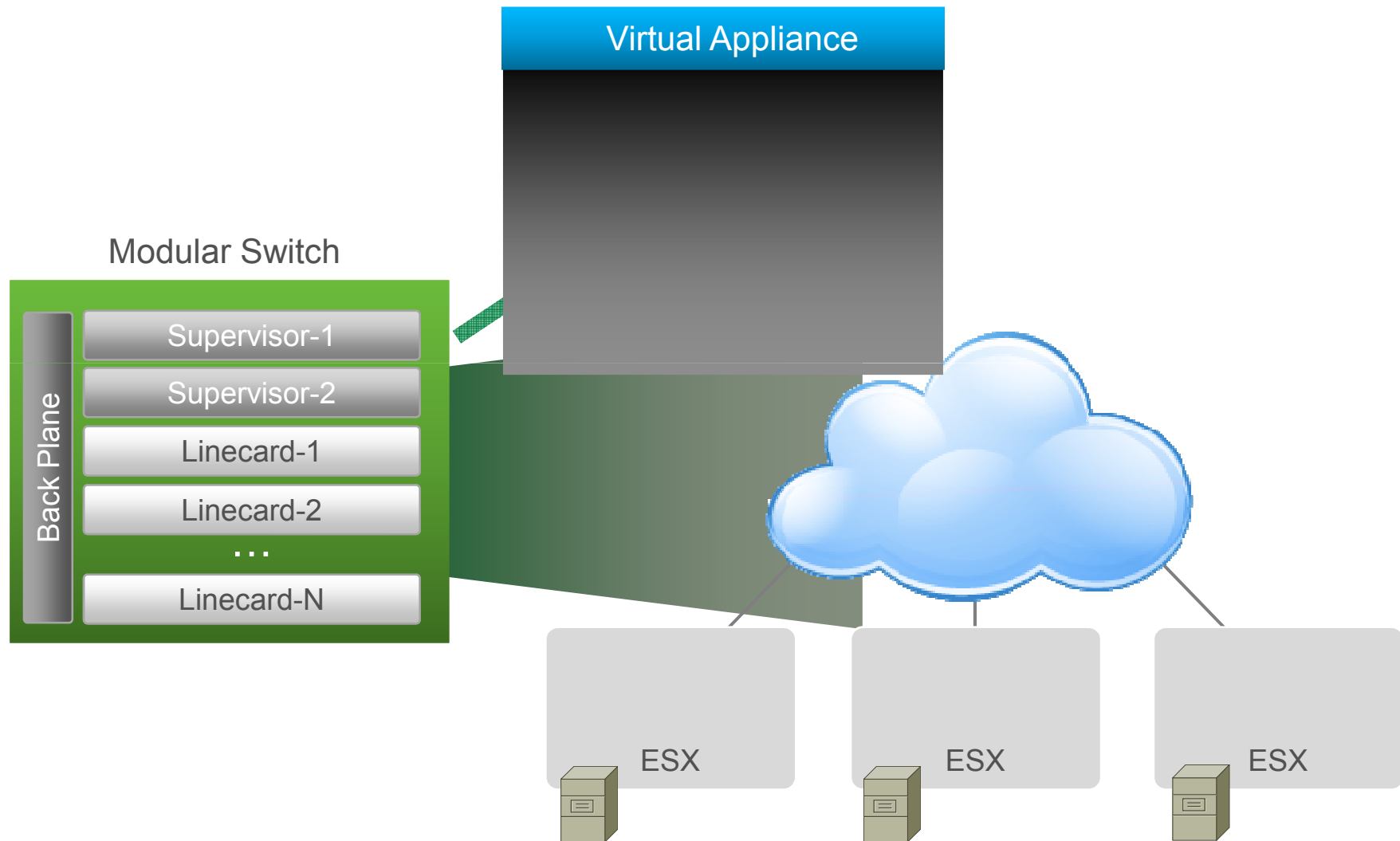
Nexus 1000V Architecture

Moving to a Virtual Environment



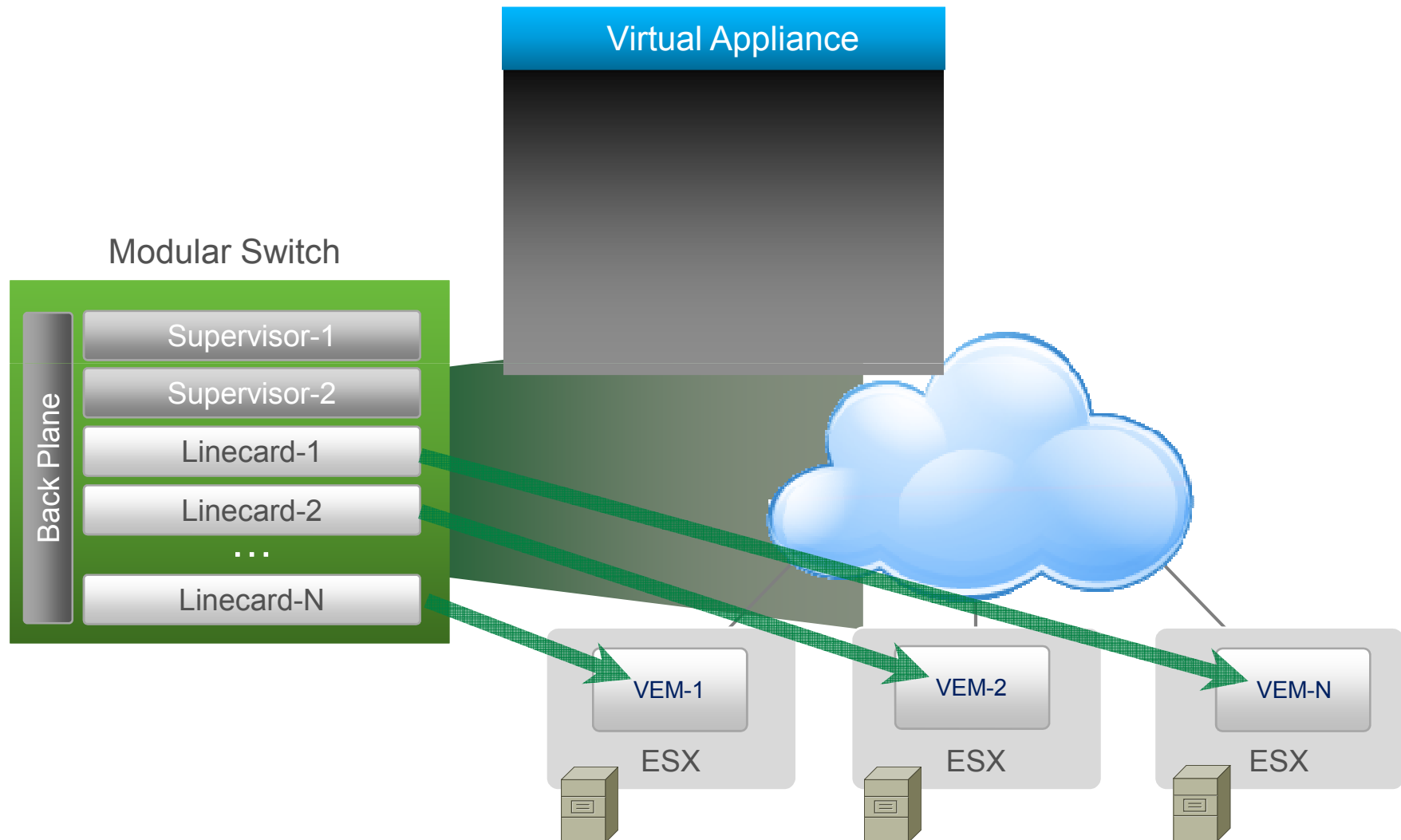
Nexus 1000V Architecture

Supervisors → Virtual Supervisor Modules (VSMs)



Nexus 1000V Architecture

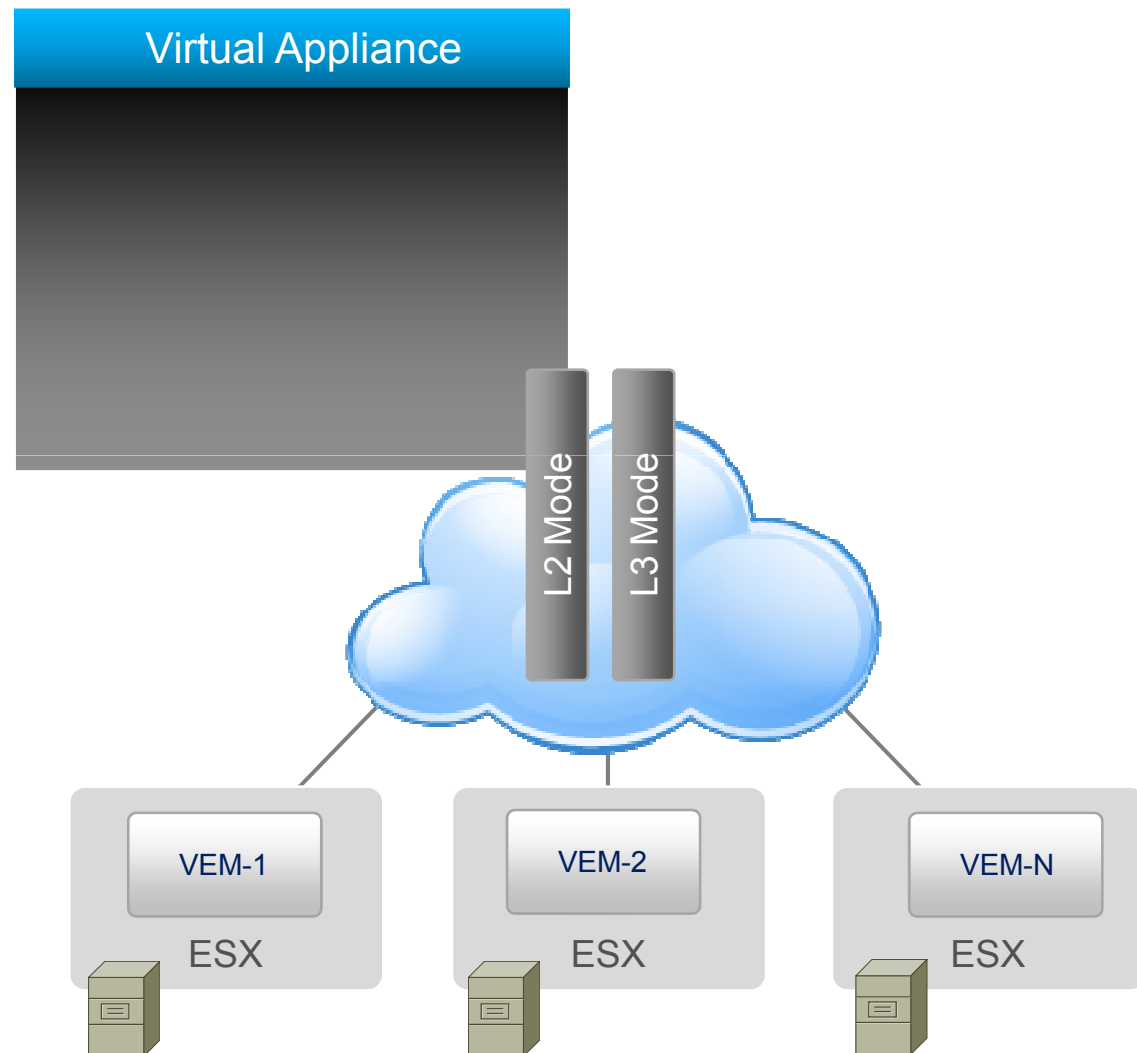
Linecards → Virtual Ethernet Modules (VEMs)



Nexus 1000V Architecture

VSM + VEMs = Nexus 1000V Virtual Chassis

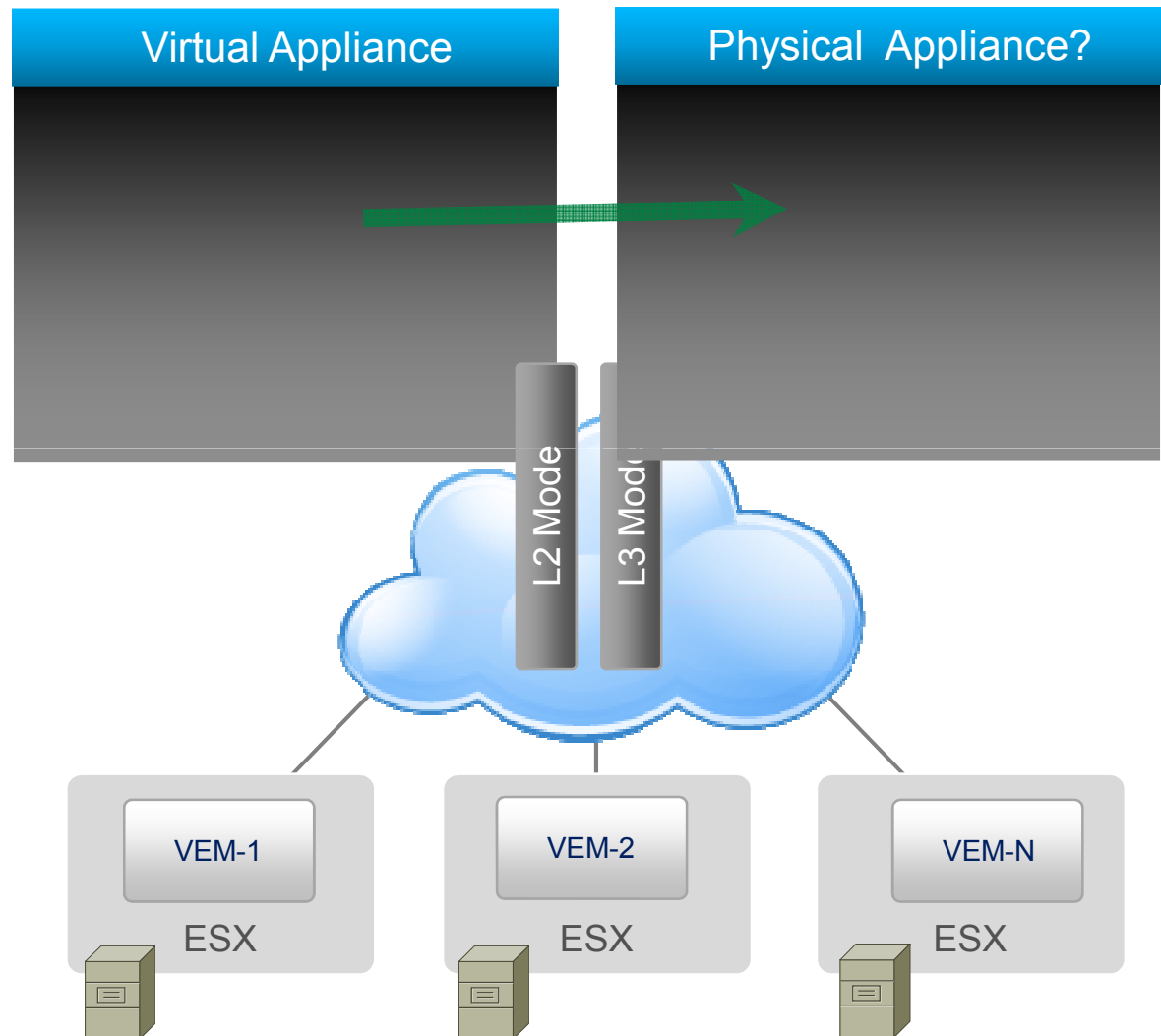
- 64 VEMs per 1000V (connected by L2 or L3)
- 200+ vEth ports per VEM
- 2K vEths per 1000V
- Multiple 1000Vs can be created per vCenter



VSM: Virtual Supervisor Module
VEM: Virtual Ethernet Module

Nexus 1000V Architecture

Customer Request: Host VSMs on a Physical Appliance



- 200+ vEth ports per VEM
- 64 VEMs per 1000V
- 2K vEths per 1000V
- Multiple 1000Vs can be created per vCenter

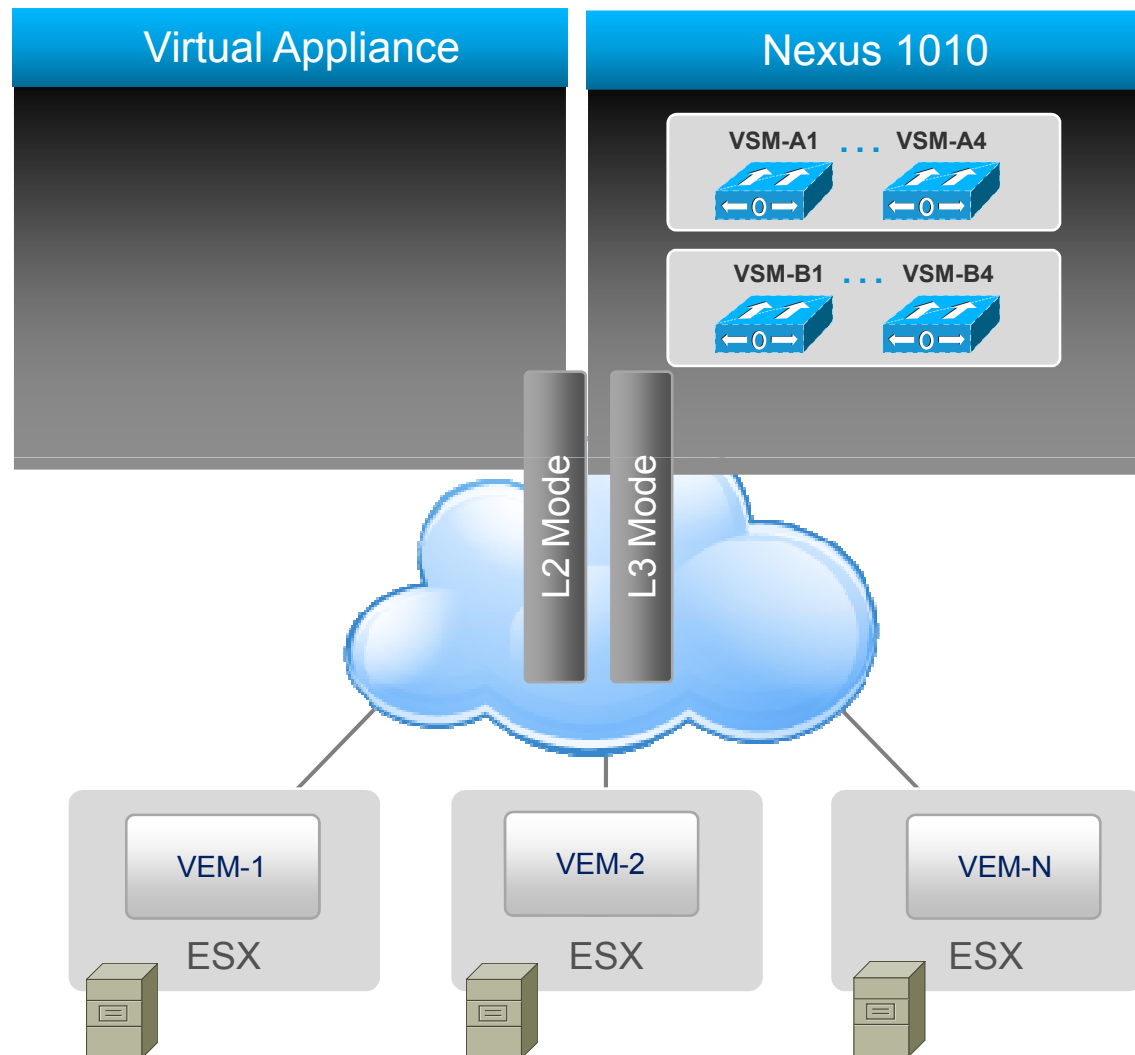
VSM: Virtual Supervisor Module

VEM: Virtual Ethernet Module

Nexus 1000V Architecture

VSMs hosted on a Physical Appliance: Nexus 1010

- Up to 4 VSMs per Nexus 1010
- Nexus 1010s deployed in redundant pair

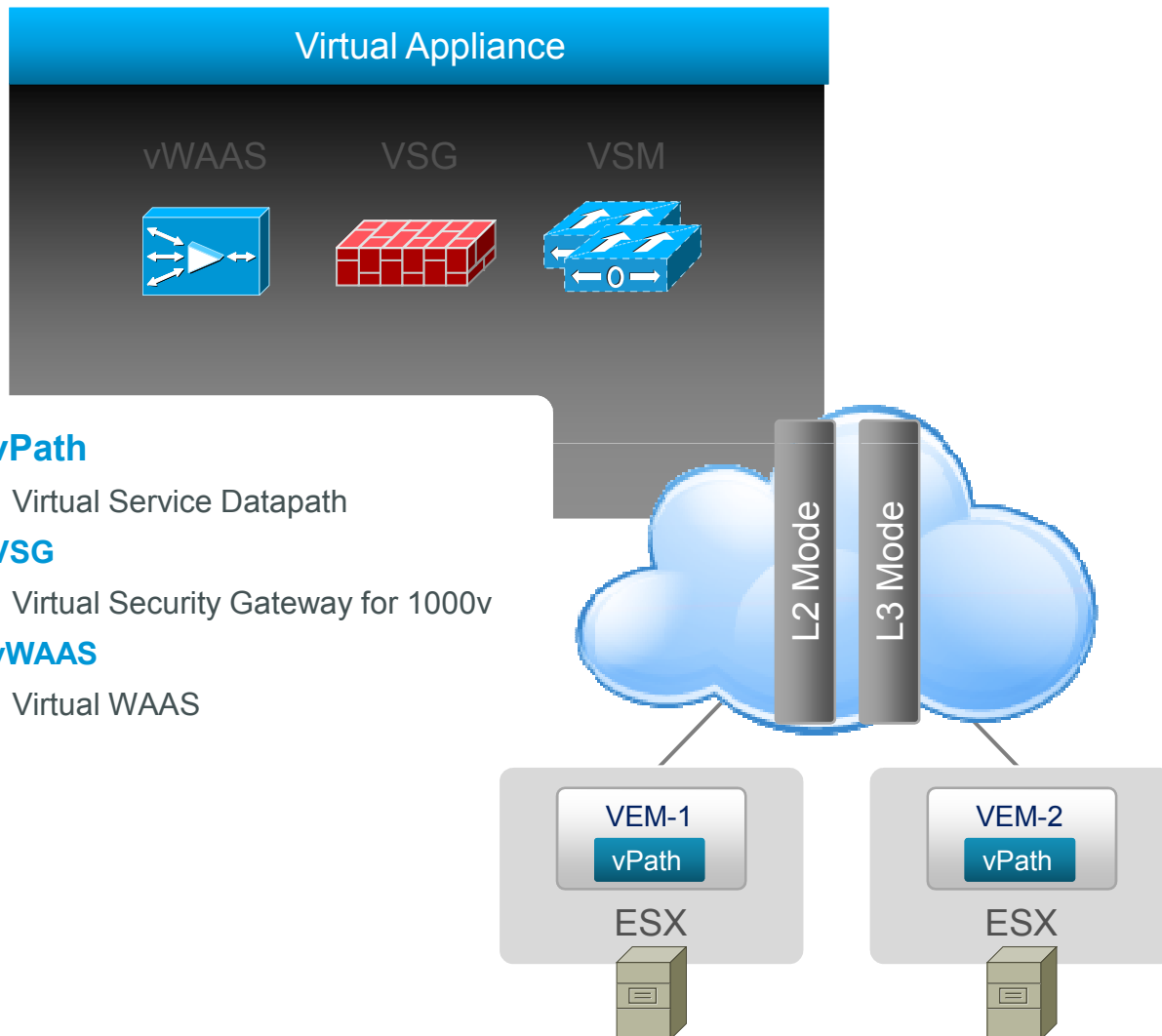


- 200+ vEth ports per VEM
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VSM: Virtual Supervisor Module
VEM: Virtual Ethernet Module

Embedding Intelligence for Virtual Services

vPath – Virtual Service Datapath



vPath

- Virtual Service Datapath

VSG

- Virtual Security Gateway for 1000v

vWAAS

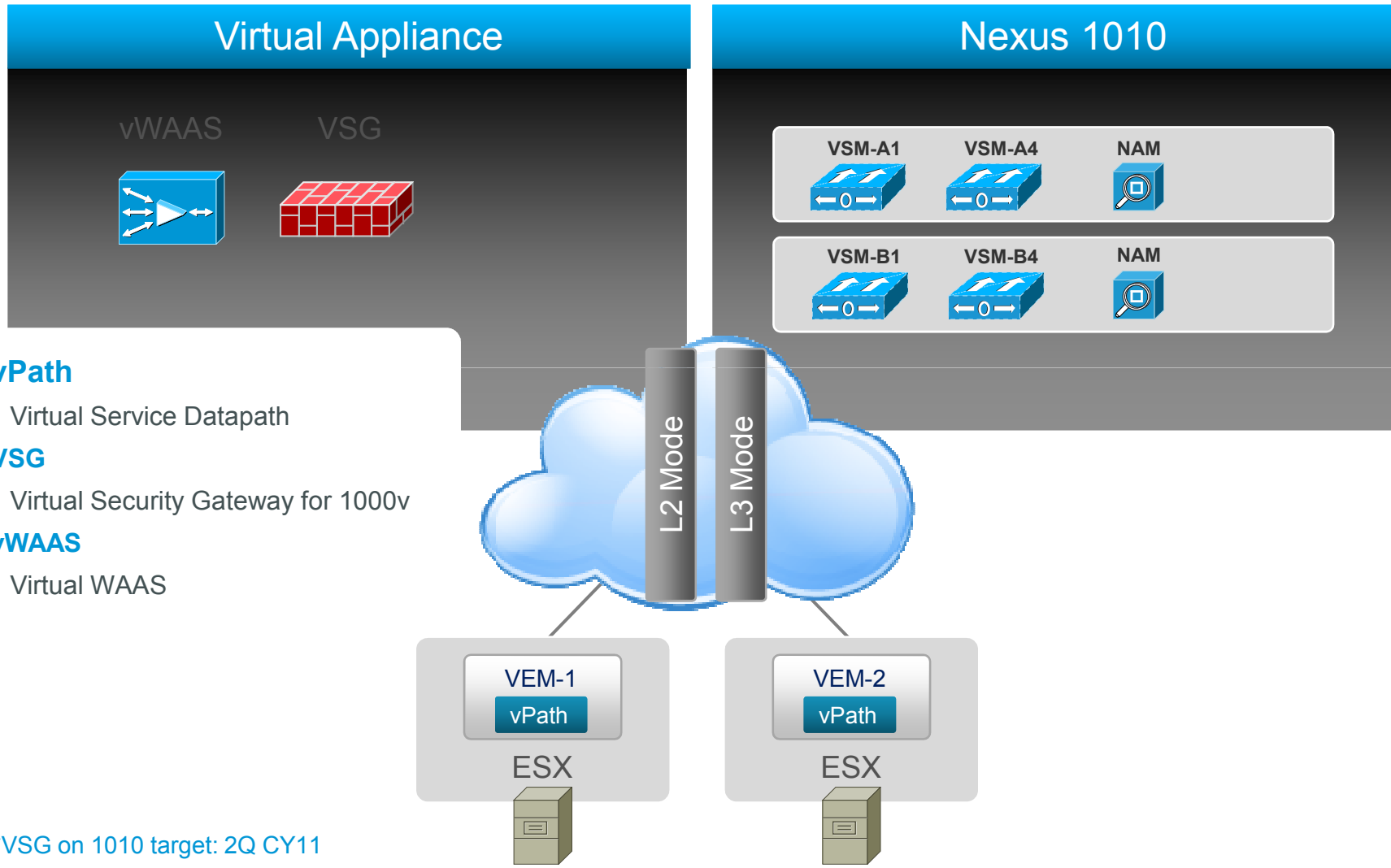
- Virtual WAAS

vPath

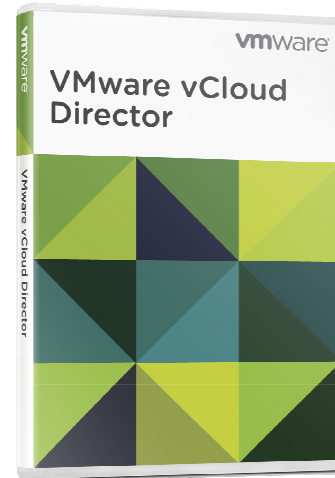
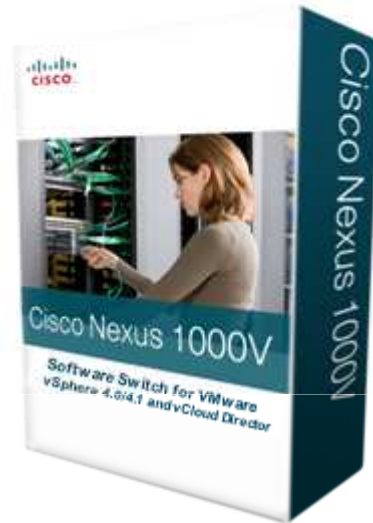
- Traffic Steering
- Fast -Path Offload

• **Nexus 1000V ver 1.4 & above**

Nexus 1010 – Hosting Platform for Services



*VSG on 1010 target: 2Q CY11

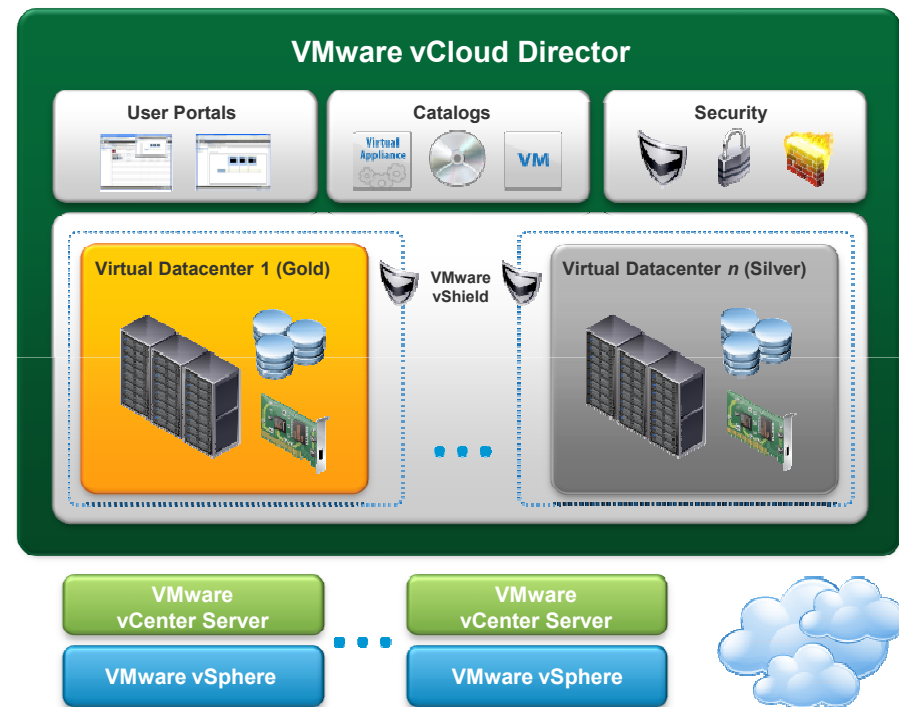


Cisco Nexus 1000V and VMware vCloud Director Interoperability

Sal Lopez
Technical Marketing Engineer
SAVBU

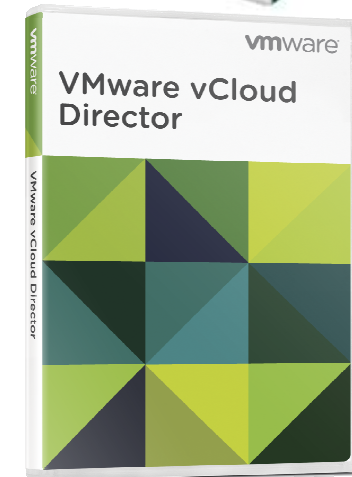
VMware vCloud Director

- Builds on vSphere
- Creates and Manages Virtual Data Centers
- Secures Clouds
- Provides self-service
- Isolates users into organizations
- Provides portability and programmability for control



Nexus 1000V & vCloud Director

- Nexus 1000V:
 - IEEE 802.1Q standard-based distributed virtual switch
 - Deployed with VMware vSphere 4.0 and 4.1
 - Deployable with VMware's Desktop and Cloud products
- When deployed with vCloud Director, Nexus 1000V continues to provide:
 - Rich NX-OS based networking features
 - Operational and feature consistency with Cisco Nexus 7K/5K/2K switches
 - Administrative segregation across server and network teams



vCloud Director – Nexus 1000V Interoperability

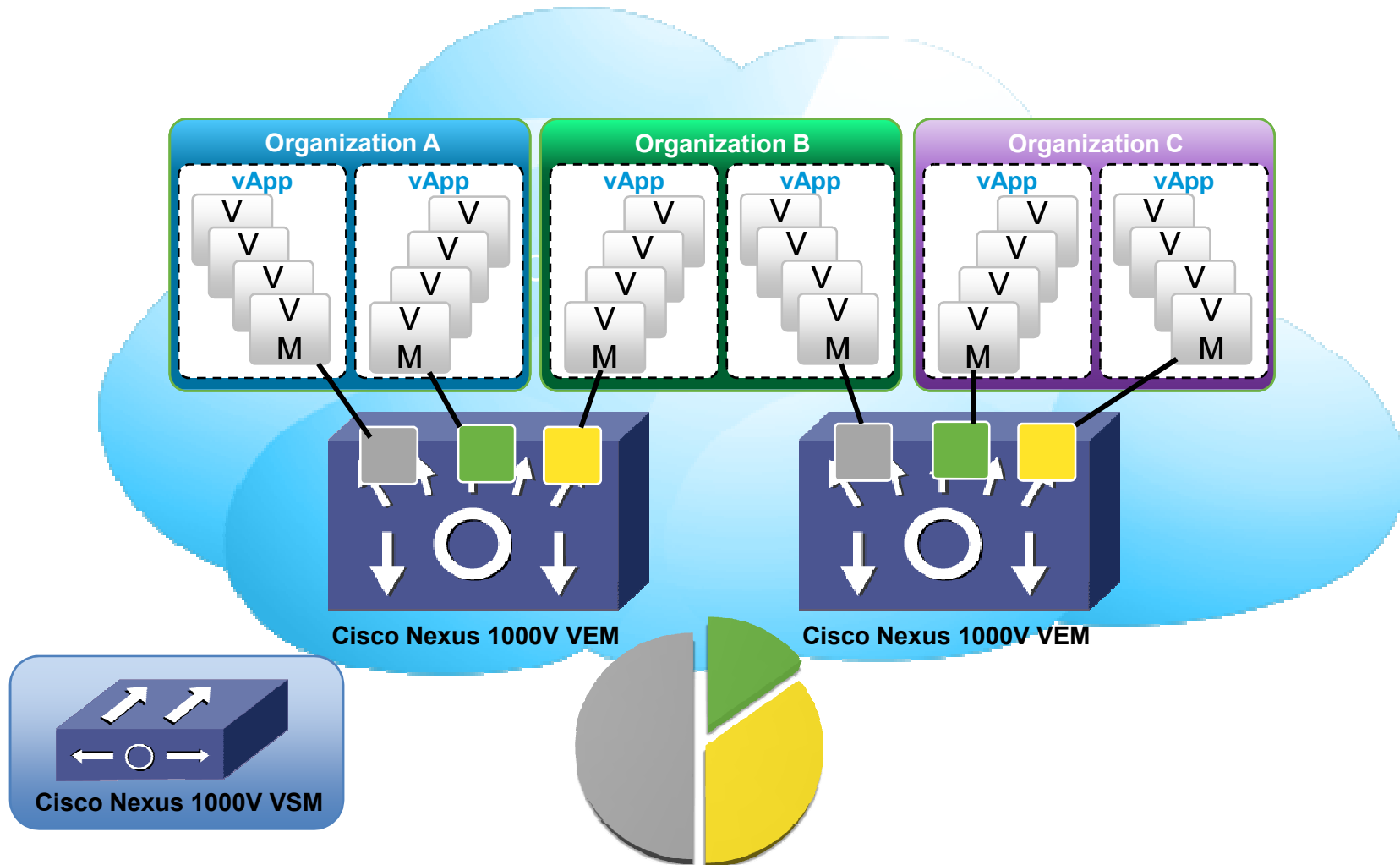
vCloud Director Functionality	Nexus 1000V Support
<p>vCloud Director has three layers of Networks:</p> <ul style="list-style-type: none">• Provider networks• Organization networks• vApp networks	<p>Nexus 1000V supports all three vCloud Director networks</p>
<p>vCloud Director leverages network pools to allow for self-service isolated network provisioning by end-users/tenants</p>	<p>Nexus 1000V supports L2/VLAN isolation through Portgroup-backed network pools</p>
	<p>Nexus 1000V does not support vCloud Network Isolation (VCNI), a VMware technology</p>
<p>vShield Edge for security functions</p>	<p>Nexus 1000V supports vShield Edge</p>

* Maintains IEEE 802.1Q frame format; physical network continues to provide ACL/security, monitoring, etc.

Joint Commitment

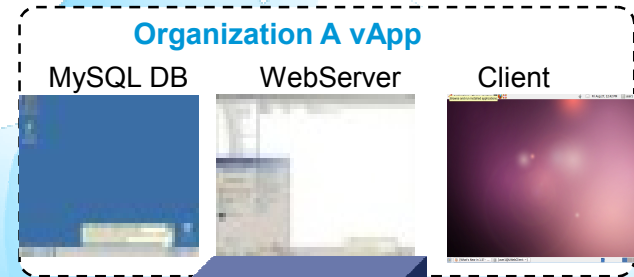
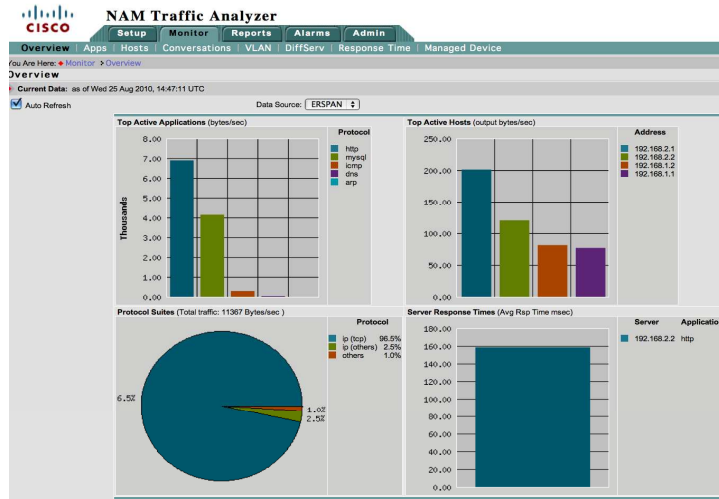
- Both Cisco and VMware consider Cisco Nexus 1000V an integral component of VMware's vSphere and vCloud product lines
- Cisco and VMware are working together on a jointly supportable network isolation solution
- Both companies are committed to delivering interoperable solutions for current and future versions of these products

QoS for vCloud using Nexus 1000V



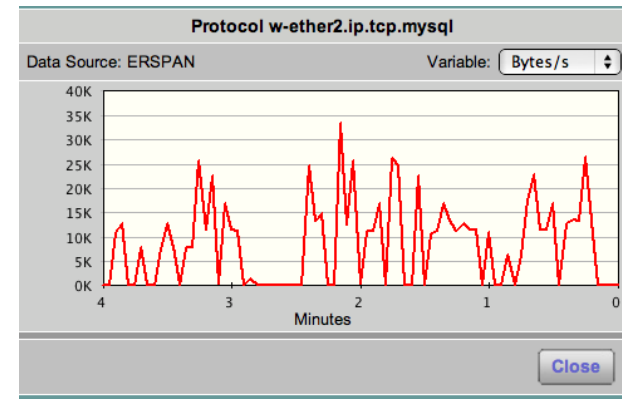
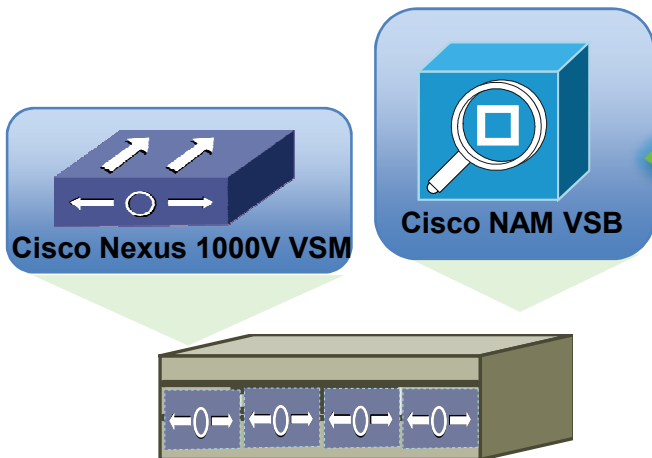
Traffic Classification, Bandwidth Reservation, Rate Limiting, QoS Statistics

Monitoring and Visibility of vApp



Cisco Nexus 1000V VEM

Port-Mirroring Across L3 Boundaries Using ERSPAN



Isolation Domains

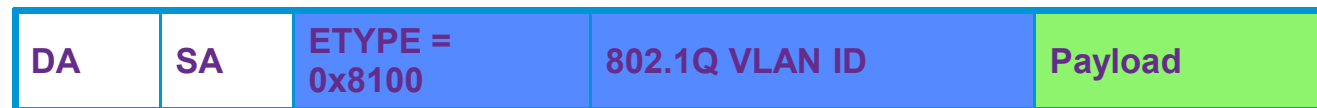
VMware vCloud Director provides 2 mechanisms for this

- VLAN based isolation

802.1Q Standards based with “port-group backed” or “VLAN backed” network pools

VLAN isolation has major benefits, as in physical networks like QoS, monitoring and security

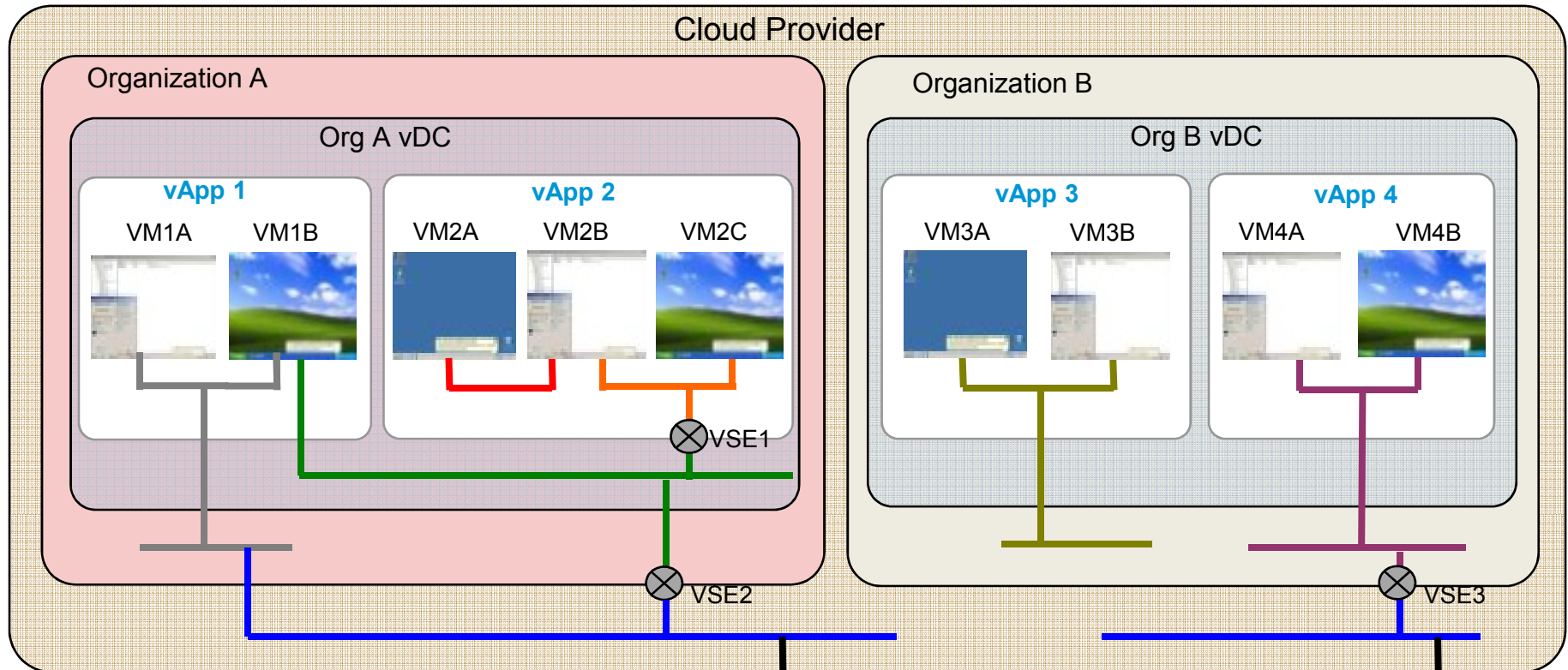
Nexus 1000V supports VLAN based isolation with “port-group backed” pools








- vCloud Director Network Isolation (VCNI)

VMware technology to be used with vSphere vDS

vCloud Director and Nexus 1000V Networking



Network Type	Label	Nexus 1000V Port-Profile
vApp Internal Network	 	N1KV_vApp_VLAN301 N1KV_vApp_VLAN300
Organization Directly Connected External Network		Connected to N1KV_Provider_Ext
Organization Routed Network		N1KV_Org_VLAN200, N1KV_Org_VLAN201
Provider External Network		N1KV_Provider_VLAN170

Port Binding Options on Nexus 1000V

vApps use vEthernet interfaces

- Static

Fixed DVPort ID throughout life of vNIC, even after VM reboot

Allocated from reserved port group pool

Port groups with Static binding have limited number of ports, defined by max-port

- Ephemeral

New DVPort ID each time vNIC is connected/disconnected and changes each time VM is rebooted

Not allocated by port group pool reservation

Usage based on max limit of DVS, not max-port setting

Recommended for dynamic/automated environments such as vCD

Configuration Guidelines

- VSM must be present on vCenter to be used with vCloud
- Predefine port-profiles prior to vCloud networks definition
- Allocate a range of VLAN IDs to use for vCloud deployment and associate each to a unique port-profile
- Use descriptive port-profile names that include type of network and/or customer information

VLAN ID

vApp, Organization or Provider part of name

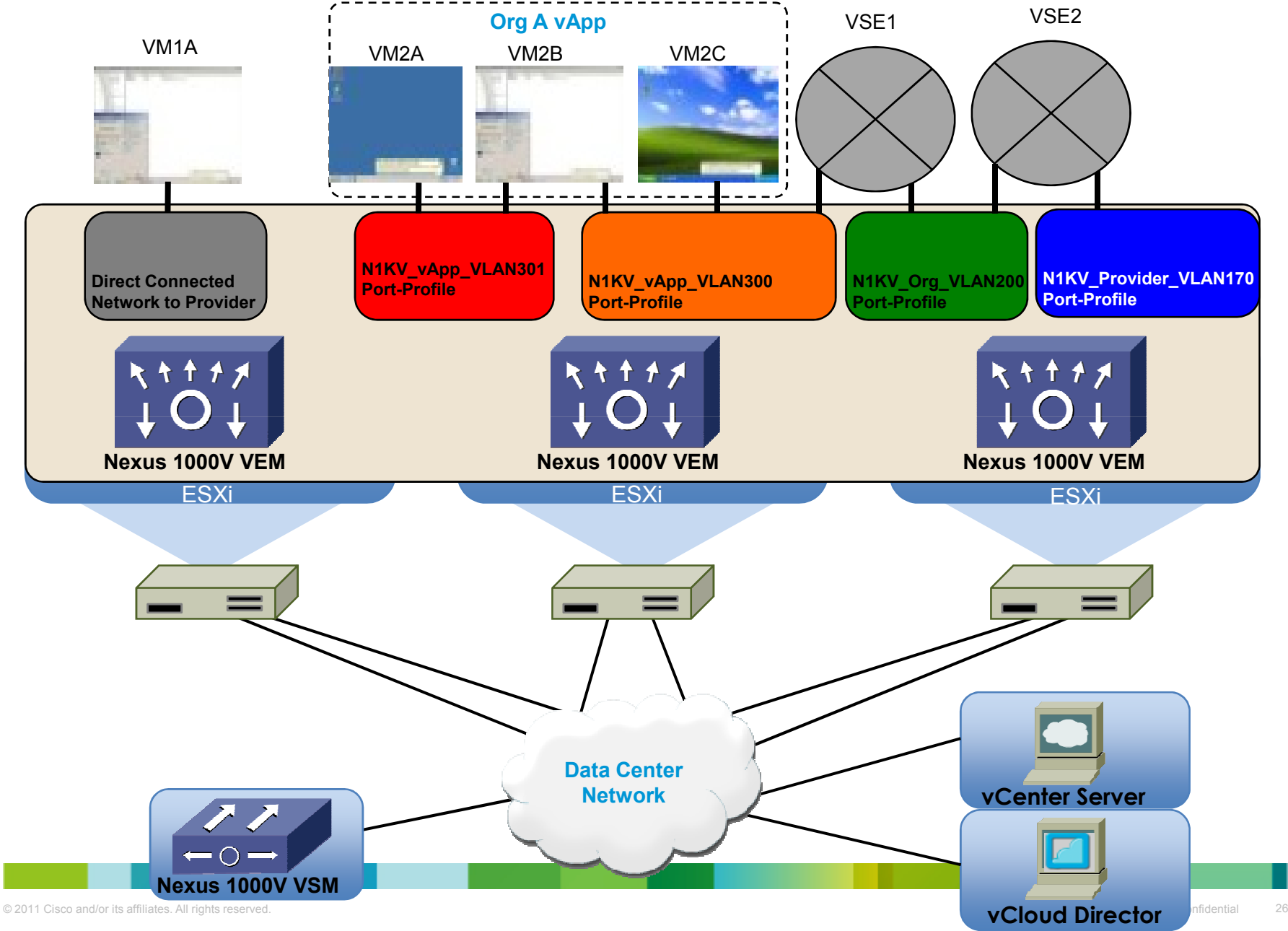
- Use these when creating port-group backed network pools from vCloud Director interface
- Will eventually be assigned to a VM by vCloud Director, so can use QoS and security within port-profile

Configuration Example

- Create an network pools to be used by an Organization
- Specifically to be used: External Organization Network and Organization Networks
- Use VLANs 170, 200 and 300
- vApps and networks similar to the following diagram



Nexus 1000V Port-Profiles for network pools



Configuration Example

- Define a range of VLANs and conventions

```
vlan 170
```

```
name Provider_Infra_VLAN170
```

```
vlan 200
```

```
name Org_VLAN200
```

```
vlan 300
```

```
name vApp_VLAN300
```

Descriptive Names



Nexus 1000V and vCloud Director Configuration

- Port-profile configuration on VSM

```
port-profile type vethernet N1KV_Provider_VLAN170
```

```
vmware port-group  
port-binding ephemeral  
switchport mode access  
switchport access vlan 170  
no shutdown  
state enabled
```

Descriptive Port-Profile name with VLAN ID

```
port-profile type vethernet N1KV_Org_VLAN200
```

```
vmware port-group  
port-binding ephemeral  
switchport mode access  
switchport access vlan 200  
no shutdown  
state enabled
```

Use of ephemeral port binding

```
port-profile type vethernet N1KV_vApp_VLAN300
```

```
vmware port-group  
service-policy input platinum_in_mark  
port-binding ephemeral  
switchport mode access  
switchport access vlan 300  
no shutdown  
state enabled
```

Provide QoS Policy for vApp

Nexus 1000V and vCloud Director Configuration

- Port-Group backed network pool configuration on vCloud Director interface

New External Network

Select vSphere Network

An external network uses a network in vSphere to connect to a network outside of your cloud. The network can be a public network such as the Internet, or even an external VPN network that connects to a given organization.

If you don't see the vCenter you need: [attach a different vCenter](#)

Select vCenter and vSphere Network:

vCenter Name	vSphere Network	VLAN	Datacenter
SL-TME-vCenter	N1KV_Provider_VLAN170	-1	SL-TME-DC-2
sfish-233-154.cisco.com			
sfish-233-105.cisco.com			
PrashvCenter			

Previously Defined Port-Profile

Nexus 1000V and vCloud Director Configuration

- Networks visible from the Provider and Organization Views

The screenshot shows the vCloud Director interface. The left sidebar contains a navigation tree with categories like 'Cloud Resources' and 'vSphere Resources'. The main area is titled 'Manage & Monitor' and 'Networks'. A table lists network configurations with columns for Name, Status, VLAN, IP Pool (Used/Total), vSphere Network, and vCenter. The first row, 'N1K_Provider_Ext', is highlighted with a blue border.

Name	Status	VLAN	IP Pool (Used/Total)	vSphere Network	vCenter	
N1K_Provider_Ext	✓	-1	10	0%	N1KV_Provider_VLAN170	SL-TME-vCenter

For more information

Nexus 1000V and vCloud Director Interoperability Technical White Paper

<https://communities.cisco.com/docs/DOC-21111>

Nexus 1000V Configuration Guides

www.cisco.com/go/nexus1000V

vCloud Director Administrator's Guide

www.vmware.com/products/vcloud







Virtualized Workload Mobility in Data Center Interconnect



Jake Howering, Product Manager
Cisco Systems Architecture and Strategy Unit (SASU)
May 2011

Virtualized Workload Mobility

A New Validated Design with the Nexus 1000v

Today's Topics

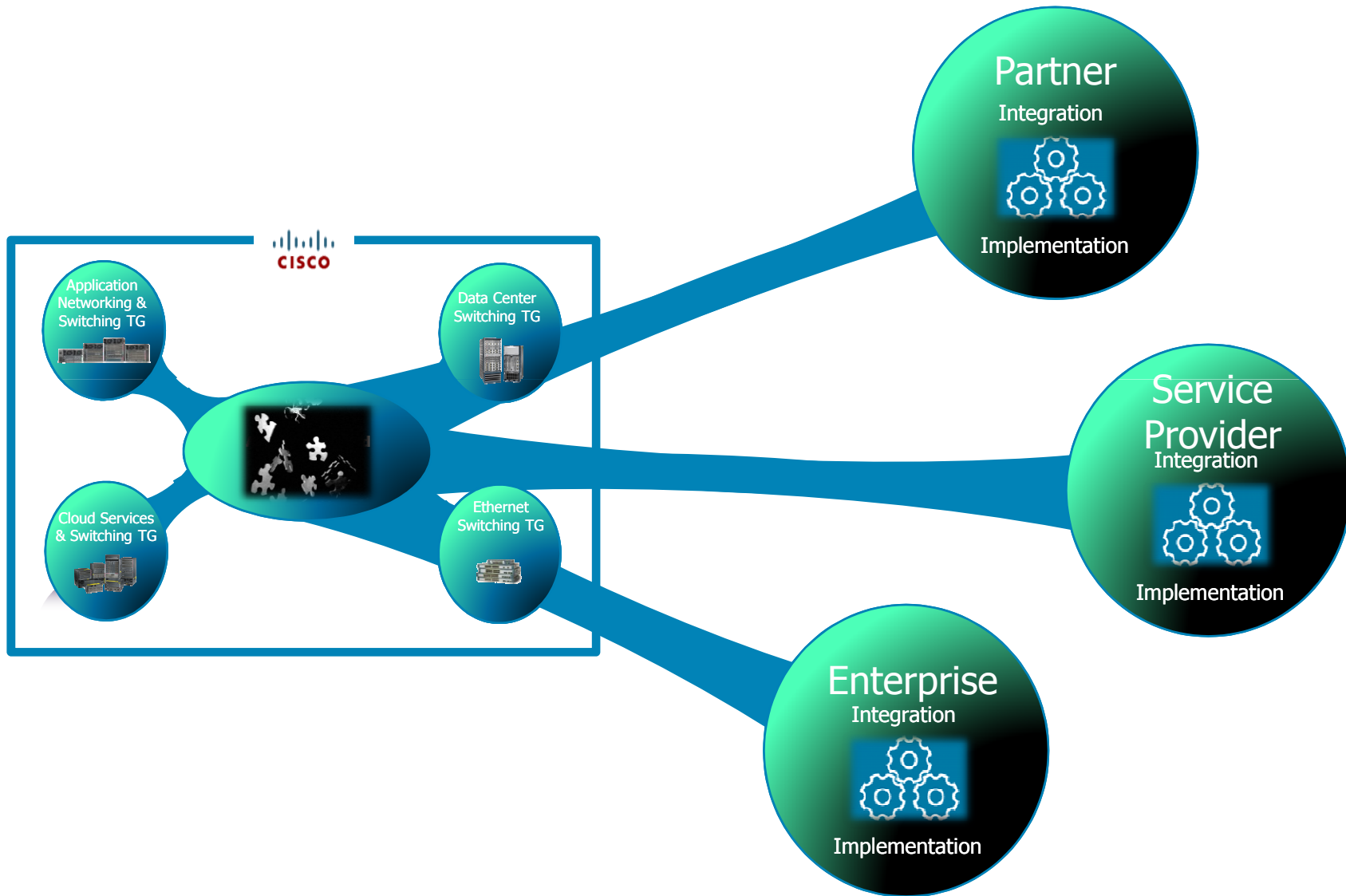
Systems Architecture and Strategy Unit

Data Center Interconnect

Virtualized Workload Mobility

Systems Architecture and Strategy Unit

Enabling execution...



Systems Architecture and Strategy Unit

Program overview...

Mission



Provide scalable flexible Data Center and Borderless solutions, which focus on **real-world challenges**, provide dramatic differentiation and result in significant reduction in implementation/integration.

Scope



Data Center Interconnect (DCI)

Cloud Computing

Data Center POD Interconnect

Borderless Network

Cisco Products & 3rd party products

Deliverables



Design and Implementation Guide (DIG)

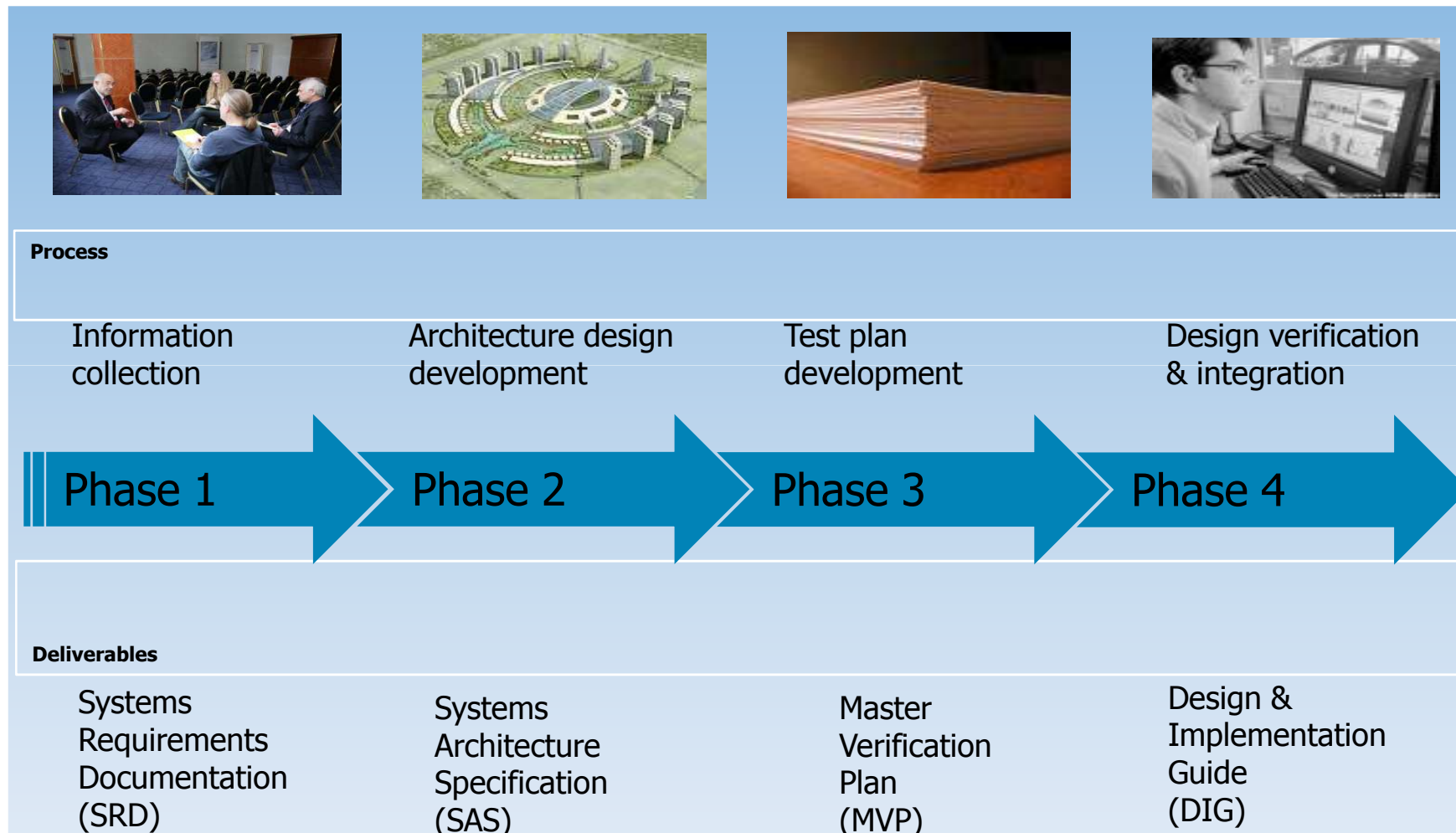
Master Verification Publication (MVP)

Transfer of Information (TOI)

Focused Launch and Marketing Campaign

Systems Architecture and Strategy Unit

Process and deliverables...



Data Center Virtualization

Driving Application Mobility and Resource Optimization

Server Virtualization

Consolidation of *physical* servers as virtual servers to reduce management, power and cooling, etc

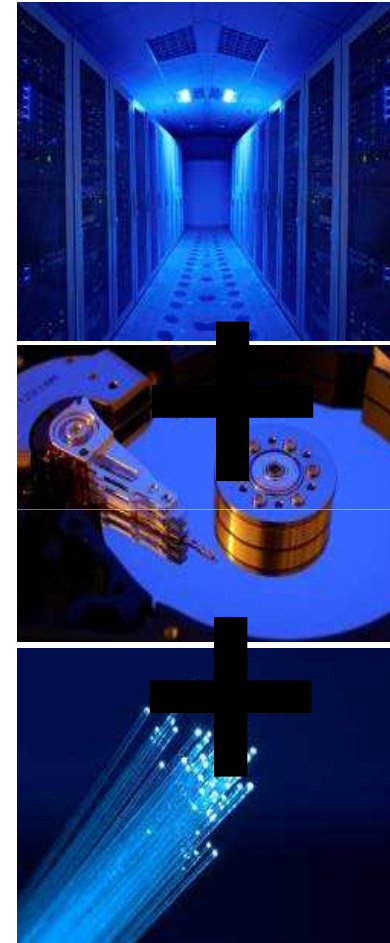
Hypervisors such as vSphere with VMware VMotion enable application mobility

Storage Virtualization

Consolidation of physical storage assets to logical storage assets

Network Virtualization

Creating pools of network ports that are isolated, but which reside on the same physical infrastructure

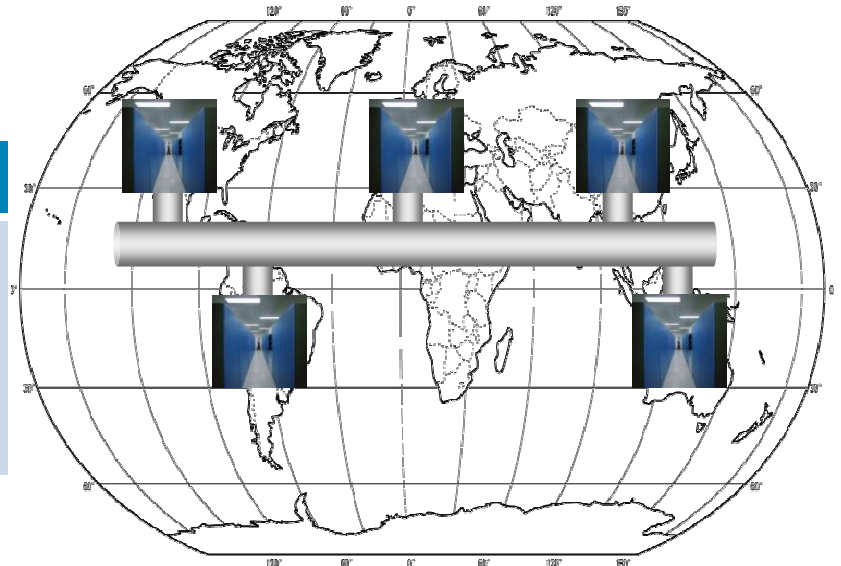


Data Center Interconnect for the Virtualized Data Center

Data Center Interconnect

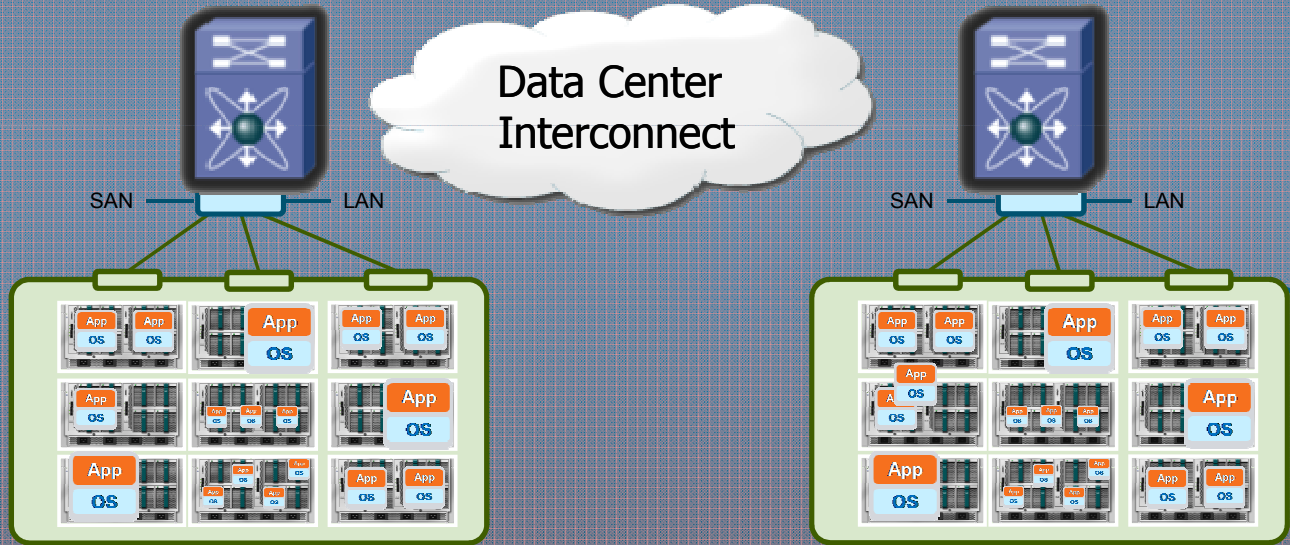
Many Good Reasons to have Multiple Data Center Locations

Business Driver	IT Solutions
<ul style="list-style-type: none">✓ Workload Mobility✓ Cost of Real Estate, Power, Cooling✓ Cloud Computing Business Models✓ Data Center Maintenance/migration/consolidation	<ul style="list-style-type: none">✓ Virtual Machine Mobility✓ Server Clustering

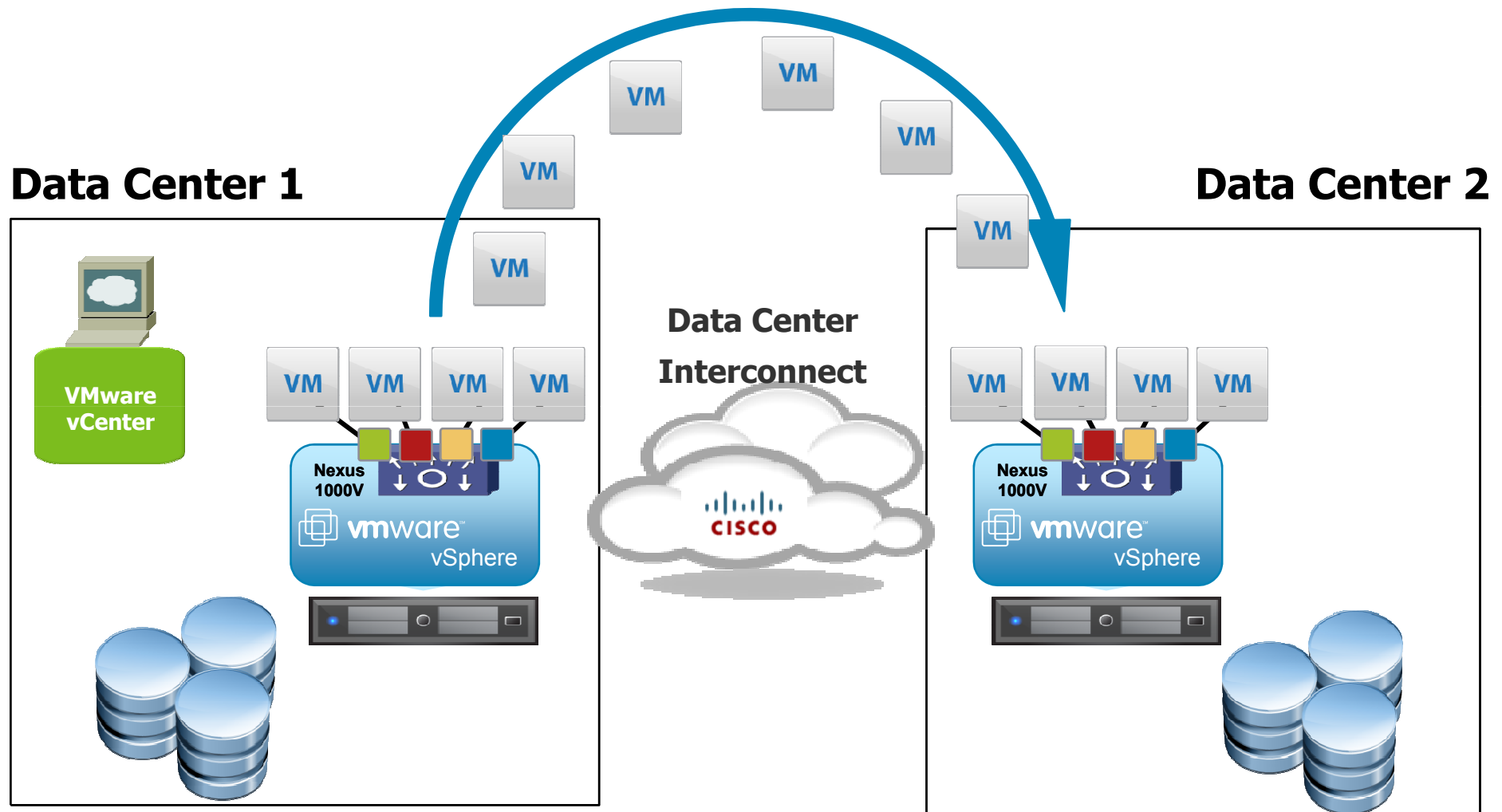


Virtualized Data Center

One Virtual Data Center, distributed locations







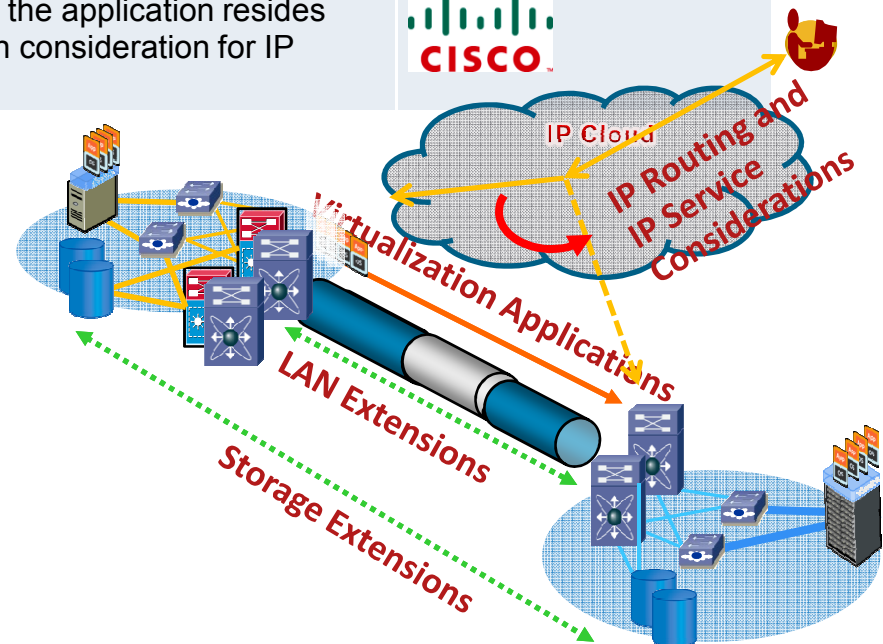
Virtual Machine Mobility Across Data Centers



Data Center Interconnect (DCI)

Components

DCI Components	Purpose	Ecosystem
Virtualization – Network and Server	<p>Server Virtualization is a baseline requirement, preparing virtual machines for application mobility</p> <p>Network Virtualization is a baseline requirement to enable virtual network connectivity</p>	
LAN Extensions	Extend same VLAN across Data Centers to enable Layer 2 connectivity between Virtual Machines	
Storage Extensions	Providing applications access to storage locally, as well as remotely with desirable storage attributes	
Routing Optimization	Routing users to the data center where the application resides while keeping symmetrical routing in consideration for IP services (e.g. Firewall)	



Virtualized Workload Mobility

DCI Phase 4 – Scheduled Release July 10, 2011

Virtualized Workload Mobility

Virtualized Workload Mobility enables:

Data Center
consolidation
and/or **expansion**
over distance

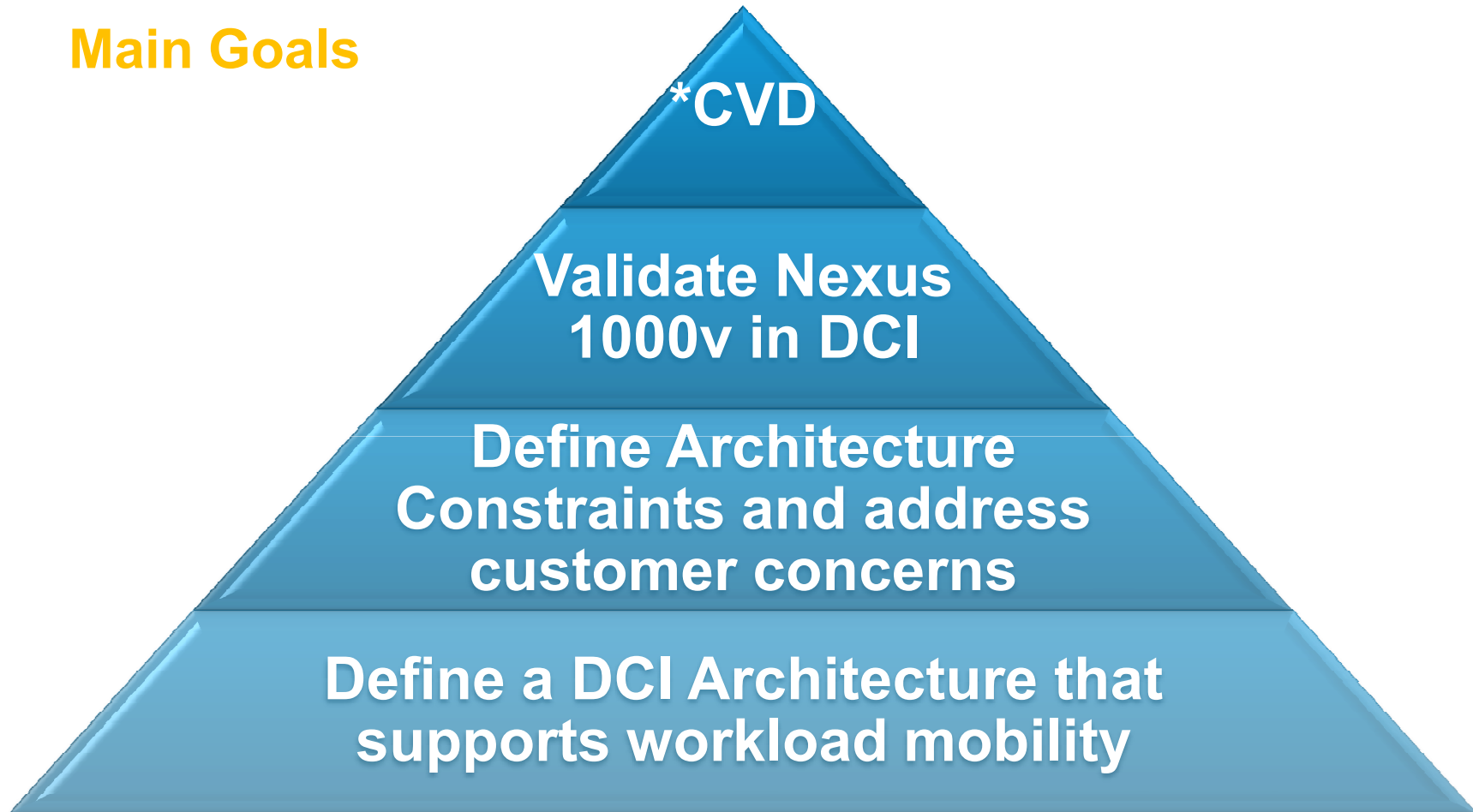
Virtualized Server
Resource
distribution over
distance

Disaster Planning
strategies, including
Disaster Avoidance
capabilities

Virtualized Workload Mobility

Virtualized Workload Mobility

Main Goals



*** Cisco Validated Design**

Virtualized Workload Mobility

DCI Phase 4 Solution Components

Virtualization

- Nexus 1000v
- VMware vSphere

LAN Extension

- Overlay Transport Virtualization
- Virtual Port Channels

Storage Extension

- Synchronous Replication with Fibre Channel
- Share Storage Model
- Netapp FlexCache
- EMC VPLEX

Routing Optimization

- Egress the Virtual Data Center - HSRP Localization
- Ingress the Virtual Data Center – ACE/GSS integration with vCenter

Virtualized Workload Mobility

Constraints and Concerns

Virtualized Workload Mobility

Constraints

Synchronous
Replication

VMware 5 ms
RTT

Fibre Channel
distance ~ 100
km

Theoretical:
2.5 ms one
way ~ 750 km

Optimize with
storage
extensions

Optics: 2.5 ms
one way ~ 500
km

Distance at 100 km

Concerns

Storage
System
Integration

Service
Performance

Which storage
model to
choose

Will Nexus
1000v port
profile migrate

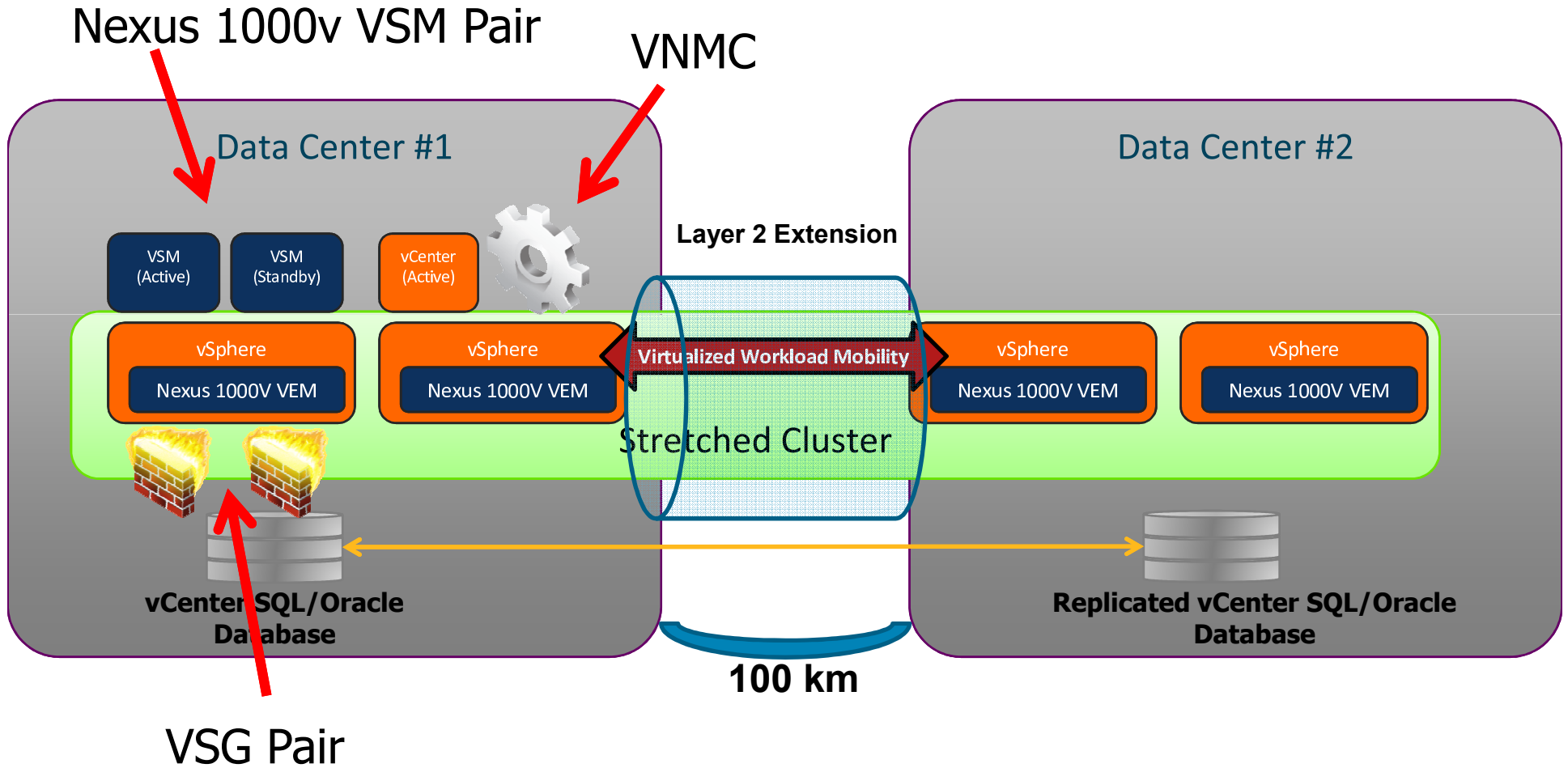
Which storage
products to
use

Will application
performance
degrade

Multiple Test Iterations

Nexus 1000v Deployment Model

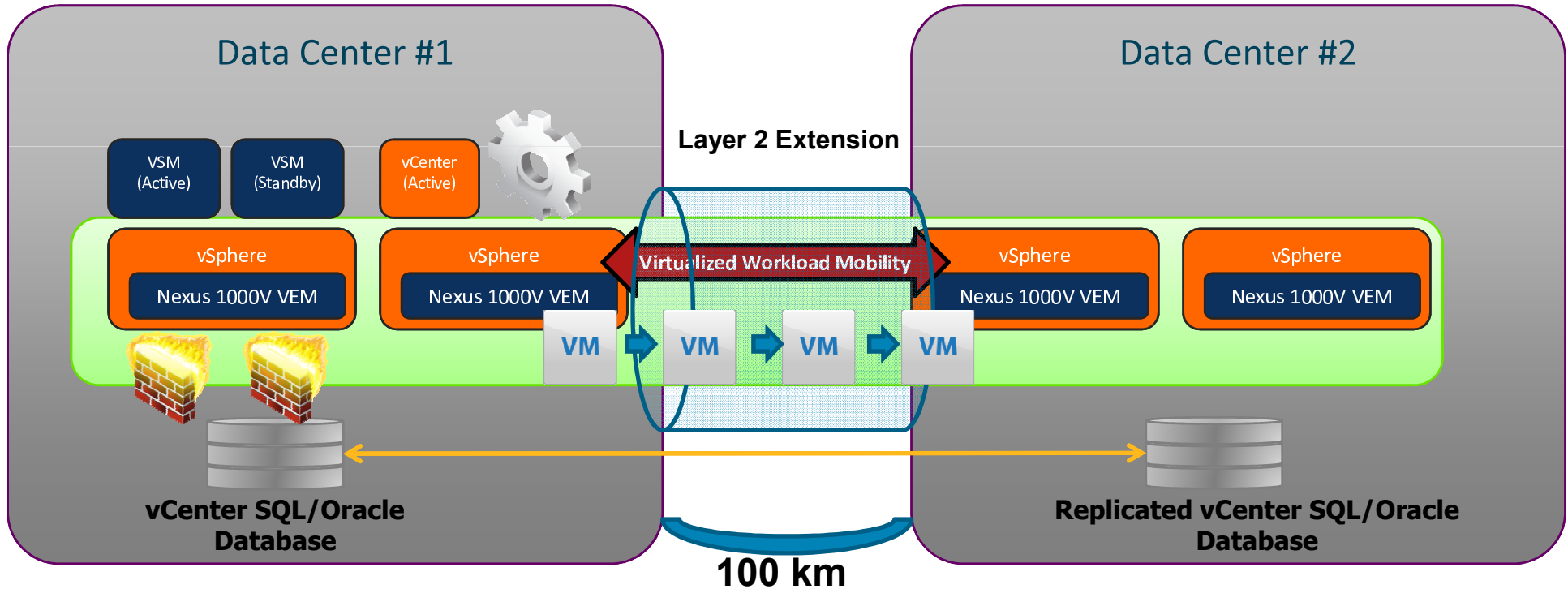
Stretching the Cluster to 100km apart



Nexus 1000v Port Profile Mobility

Port Profile Moves with the Virtual Machine

Port Profiles Migrate with VM, including:
QoS, Port Counters, Port Security

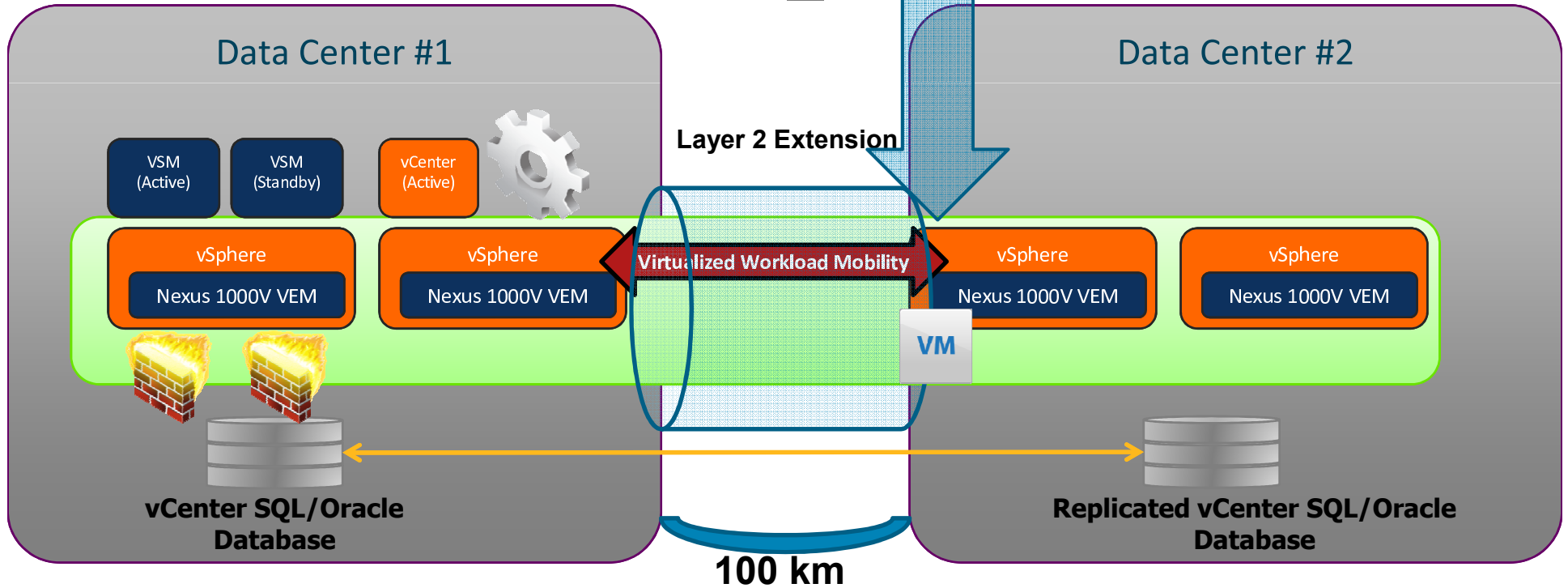


Nexus 1000v Mobility

Need to Redirect Traffic to new VM Location



Workflow Integration between vCenter and Cisco ACE/GSS triggers a DNS entry change, pointing to new Data Center



Data Center Interconnect – Release 4.0: Challenges -> Solution -> Benefit

Driver, Development, Benefit		
Solution Challenge	Solution Development	Customer Benefit
Virtual Networking over distance	N1KV Stretched Cluster over 1000 km	Consistent Port Policy deployment
VM Mobility test cases in a multi-vendor environment	VM Mobility test cases	Offer internal/external clients new services
Incomplete Storage story	Multiple storage models and partners	Better assess impact to applications and content
Set expectations with VM Mobility distances	Metro Distances – test cases @ 100 km	Understand distance constraints -> develop strategic solutions or alternatives
Optimize traffic flow post VM migration	Enable traffic redirection	Assess application performance and VM mobility strategies
Driver, Development, Benefit		

Virtualized Workload Mobility

DCI Phase 4 – Scheduled Release July 10, 2011

Schedule of Events

- Cisco Validated Design – Publically Released
- Live Demonstrations
- Featured Speaker at the Cisco Booth
- DCI Session





Sign up at: <http://tinyurl.com/1000v-webinar>

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Web Sites

- www.cisco.com/go/1000v
- www.cisco.com/go/nexus1010
- www.cisco.com/go/vsg
- www.cisco.com/go/vnmc
- www.cisco.com/go/1000vcommunity
(Preso and Q&A posted here)

Thank you.

