



## UCS and Nexus 1000V Best Practices



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Server Access Virtualization Technology Group (SAVTG)

# Nexus 1000V Fall Webinar Series

([www.cisco.com/go/1000vcommunity](http://www.cisco.com/go/1000vcommunity))

Date	Technical Track Topic	Webinar	Preso	Q&A
10/05	Nexus 1000V, VXLAN, and vCloud Director	<a href="#">Play</a>	PDF	PDF
10/12	Virtualized Multi-Tenant Data Center (VMDC)	<a href="#">Play</a>	PDF	
10/19	Nexus 1010 v1.3 - What's New?	<a href="#">Play</a>	PDF	
10/26	Virtualized Workload Mobility - Latest Design Guidance	<a href="#">Play</a>	PDF	
11/02	UCS and Nexus 1000V - Best Practices	<a href="#">Register</a>		
11/09	Virtual Security Gateway (VSG) v1.2 - What's New?	<a href="#">Register</a>		

# Reference Solutions

Solution	Nexus 1000V	Nexus 1010	Virtual Security Gateway
vBlock	✓		
FlexPOD	✓	✓	
Virtual Desktop	✓	Implicit Support	✓
Virtualized Multi-tenant DC (VMDC)	✓	Implicit support	Target Nov '11
Long-distance vMotion (Virtualized Workload Mobility)	✓	Implicit support	✓
PCI 2.0	✓	Implicit support	✓

# Agenda

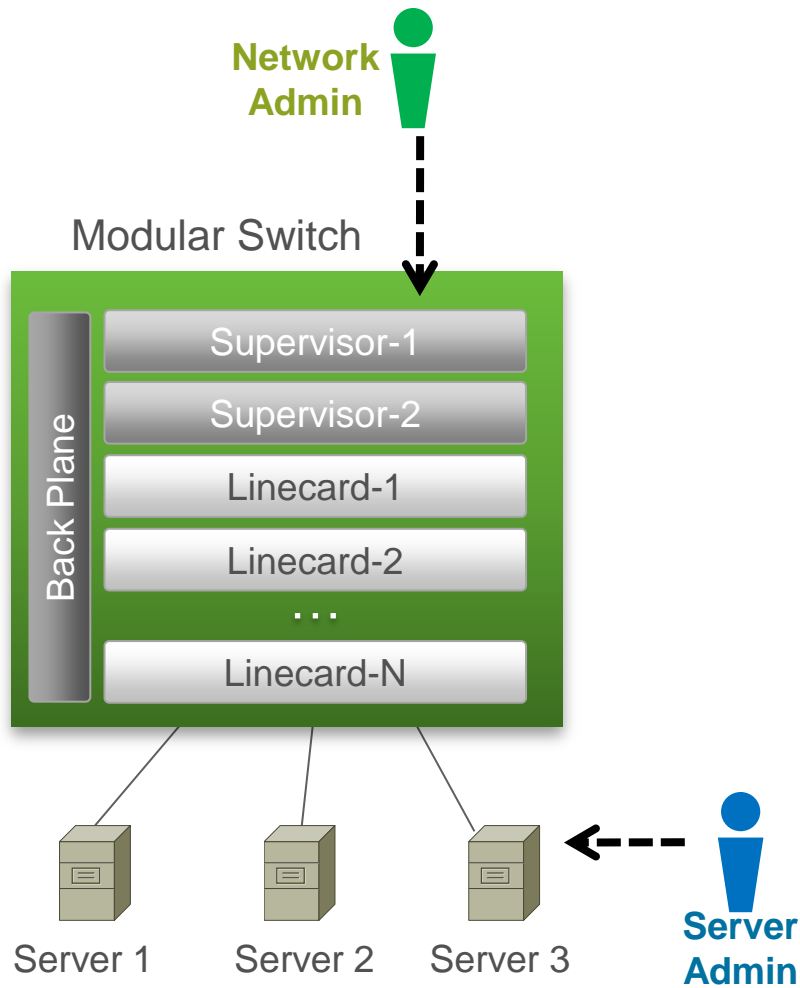
- Nexus 1000V Architecture
- Virtual Networking on UCS
  - Nexus 1000V
  - Virtual Machine Fabric Extender (VM-FEX)
- Nexus 1000V on UCS best practices
- Nexus 1000V networking best practices
- Resources
- Q&A as we go...



# 1000V Architecture

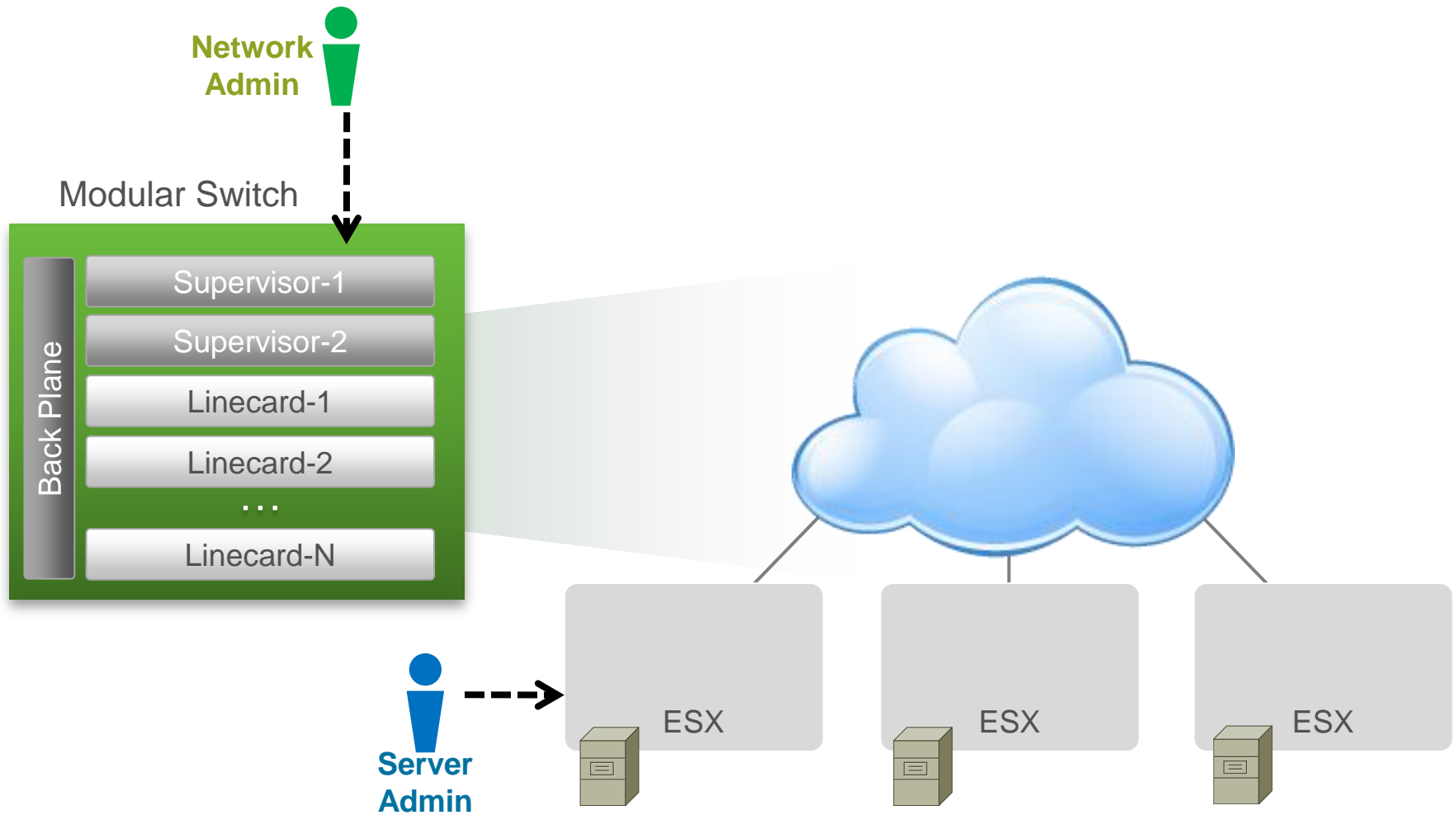
# Nexus 1000V Architecture

## Comparison to a Physical Switch



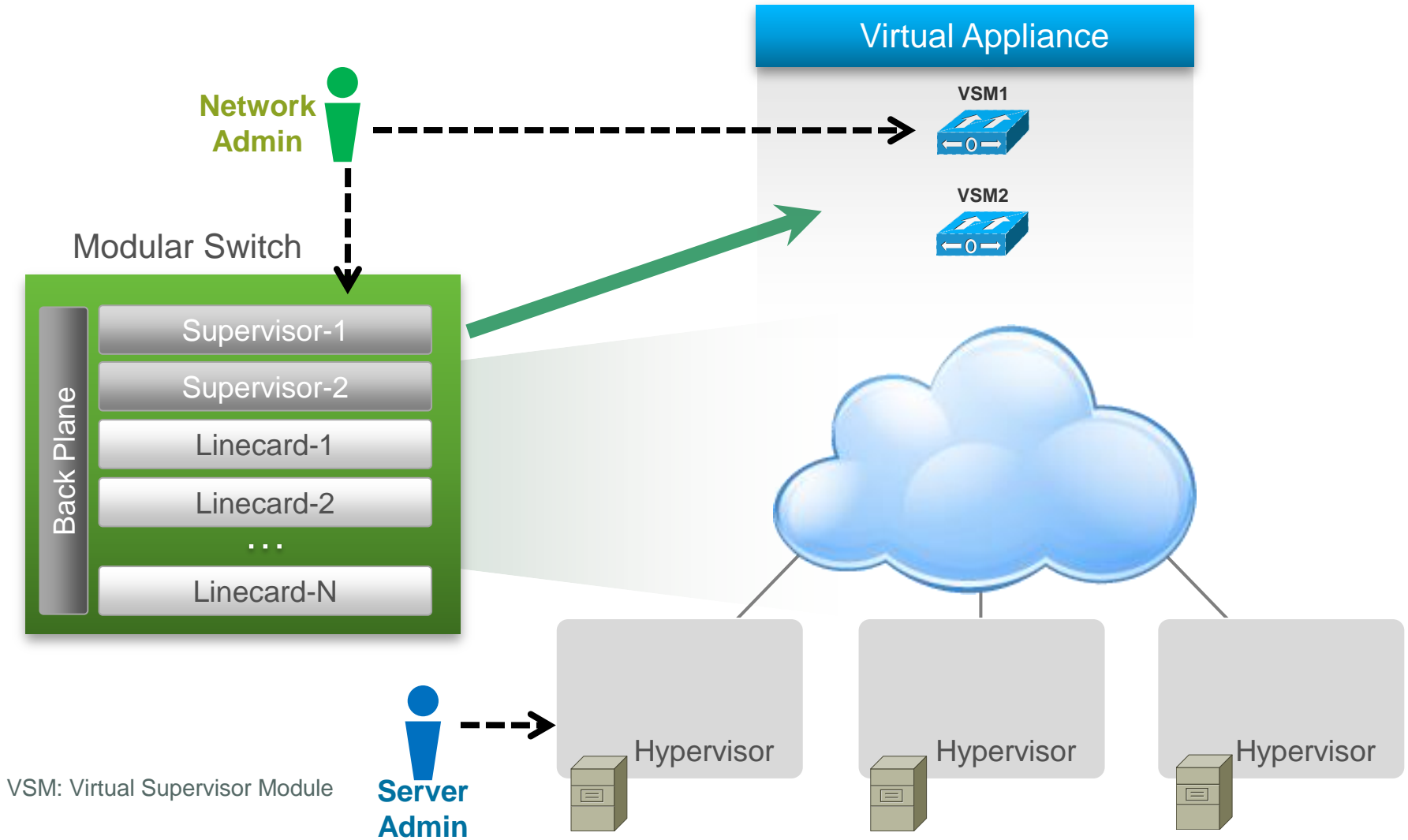
# Nexus 1000V Architecture

## Moving to a Virtual Environment



# Nexus 1000 Architecture

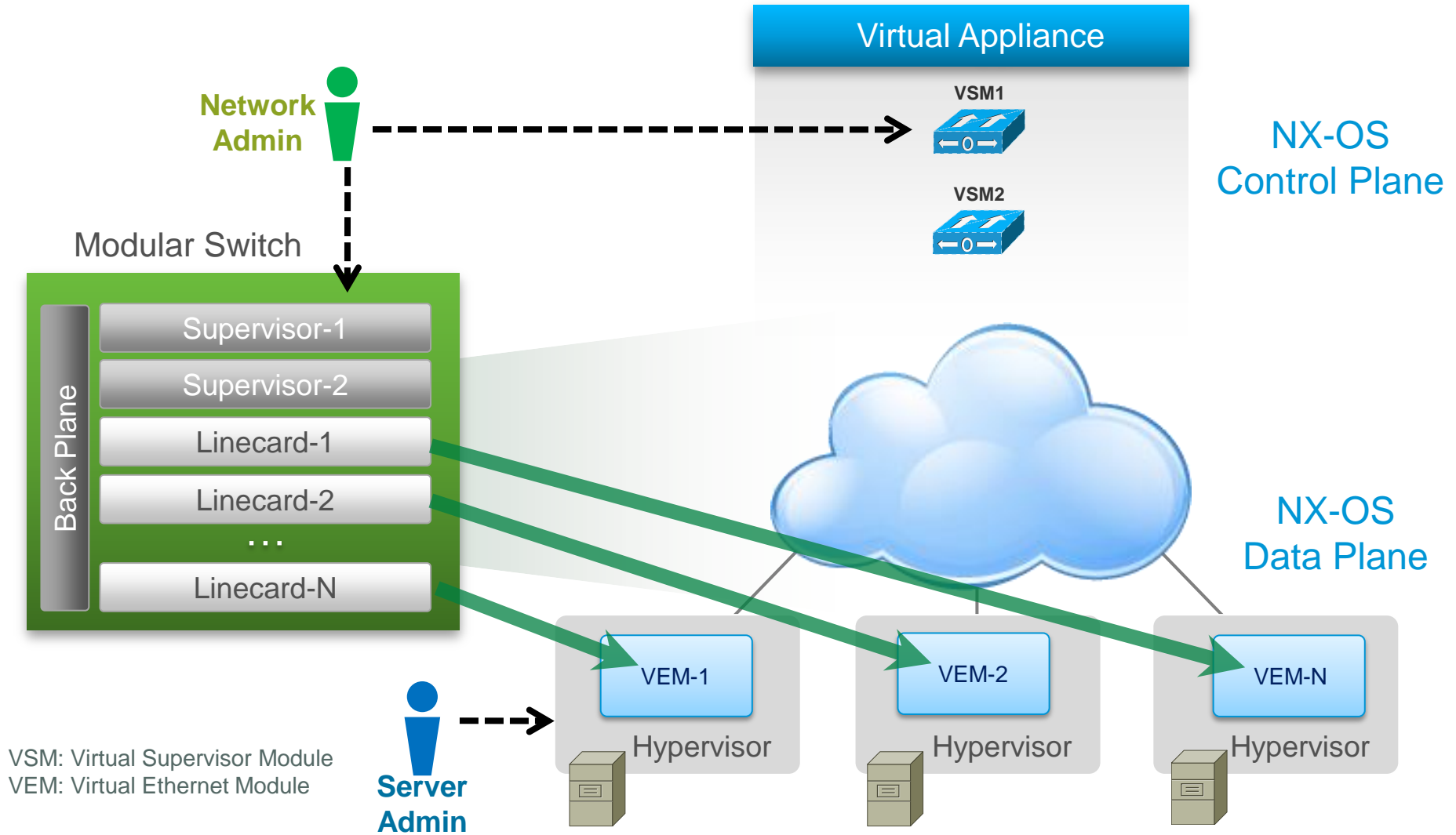
Supervisors → Virtual Supervisor Modules (VSMs)





# Nexus 1000 Architecture

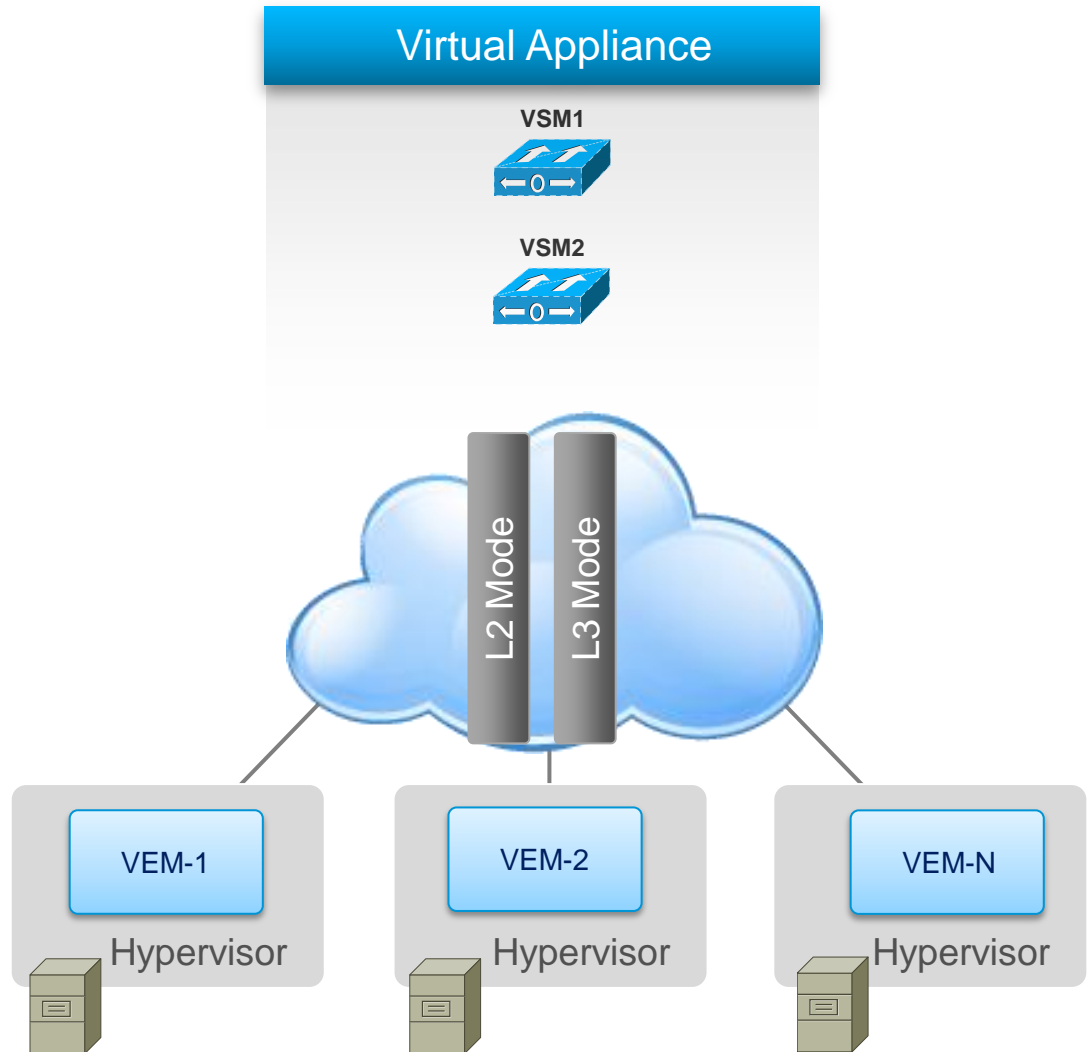
Linecards → Virtual Ethernet Modules (VEMs)



# Nexus 1000 Architecture

VSM + VEMs = Nexus 1000 Virtual Chassis

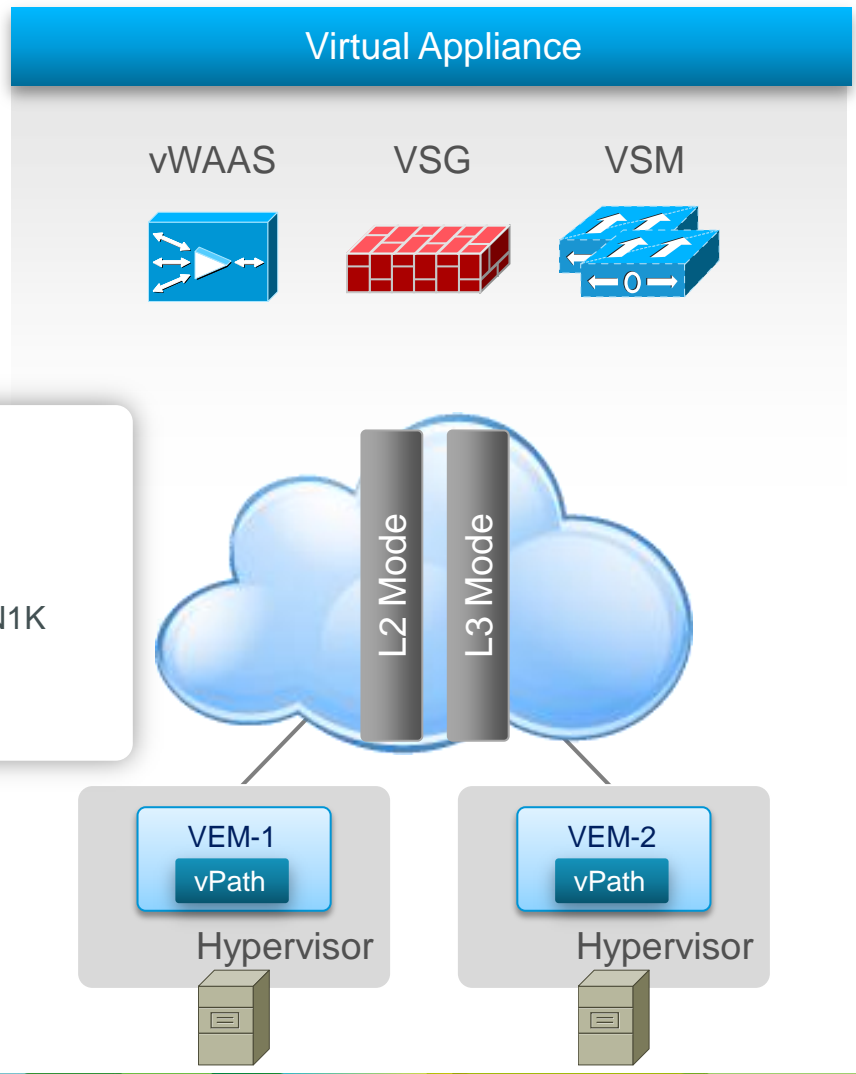
- 200+ vEth ports per VEM
- 2K vEths per N1K
- 64 VEMs per N1K (connected by L2 or L3)
- Multiple N1Ks can be created (under single hypervisor management center)



VSM: Virtual Supervisor Module  
VEM: Virtual Ethernet Module

# Embedding Intelligence for Virtual Services

## vPath – Virtual Service Datapath

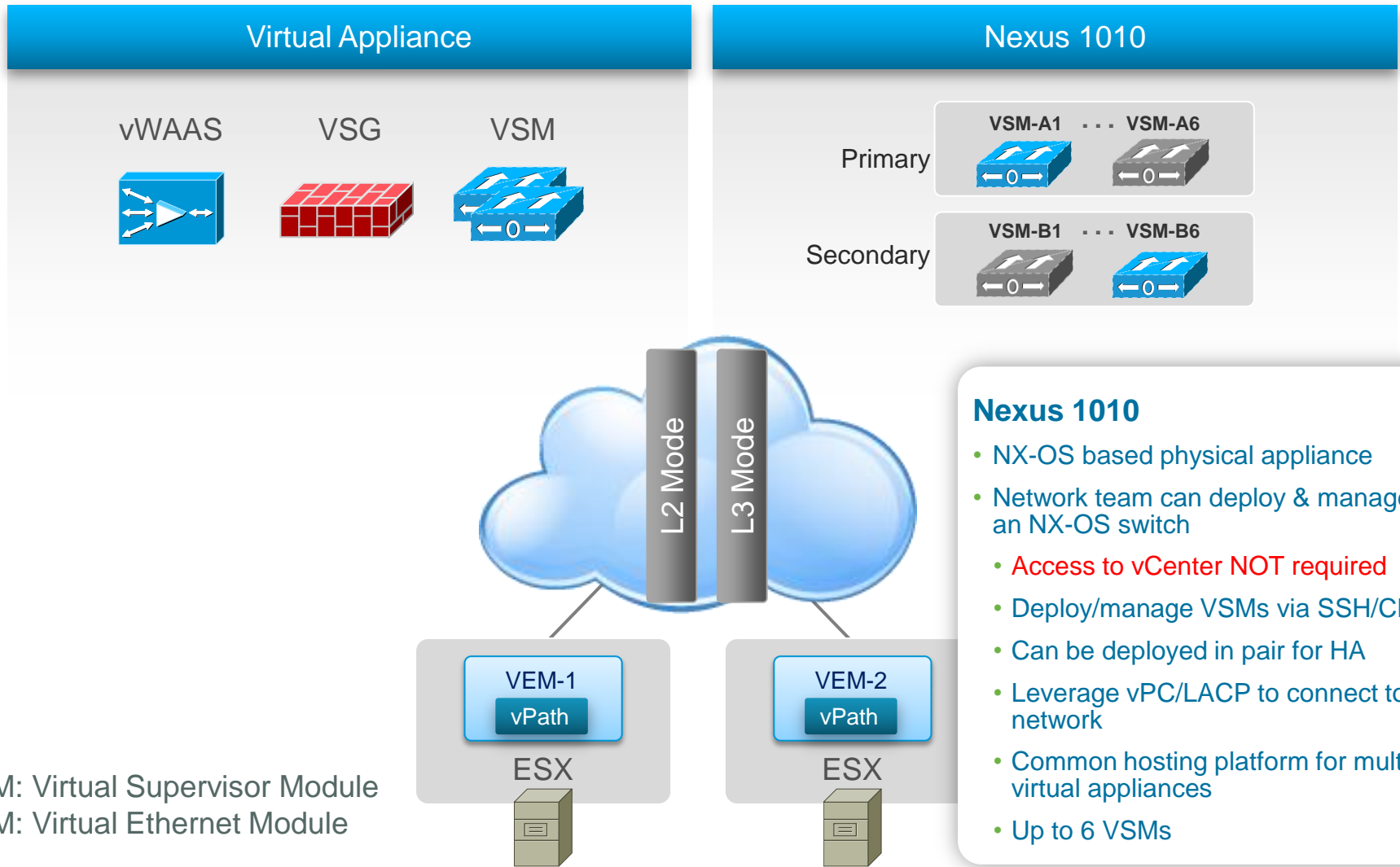


- vPath**
  - Virtual Service Datapath
- VSG**
  - Virtual Security Gateway for N1K
- vWAAS**
  - Virtual WAAS

### vPath

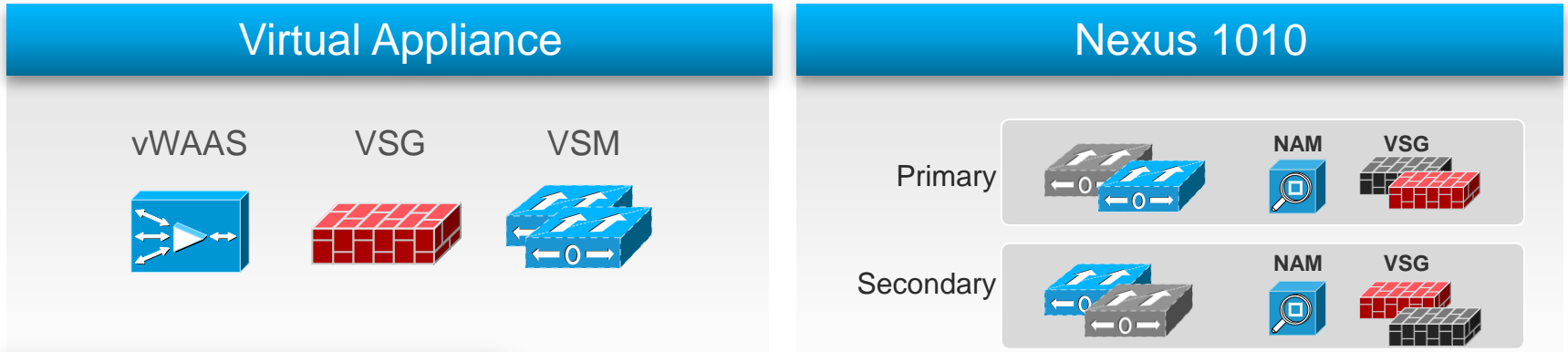
- Service Binding (Traffic Steering)
- Fast-Path Offload

# Nexus 1010 – Hosting Platform for VSM

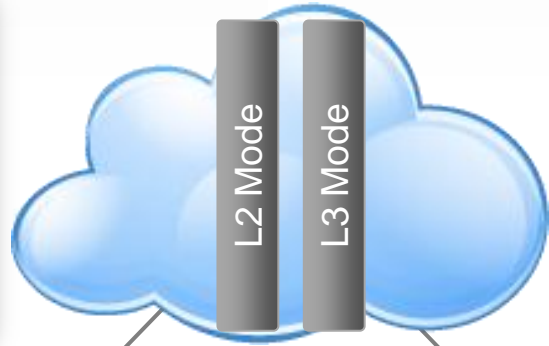


VSM: Virtual Supervisor Module  
VEM: Virtual Ethernet Module

# Nexus 1010 – Hosting Platform for Services



**VSM:** Virtual Supervisor Module  
**VEM:** Virtual Ethernet Module (N1KV)  
**vPath:** Virtual Service Datapath  
**VSG:** Virtual Security Gateway  
**vWAAS:** Virtual WAAS



**Network Analysis Module (NAM)**

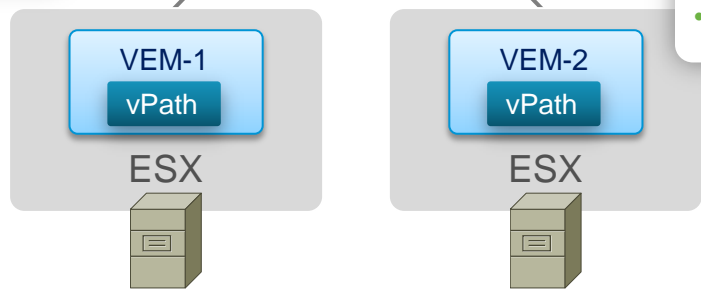
- Available today

**Virtual Security Gateway**

- Available today

**Data Center Network Mgr (DCNM)**

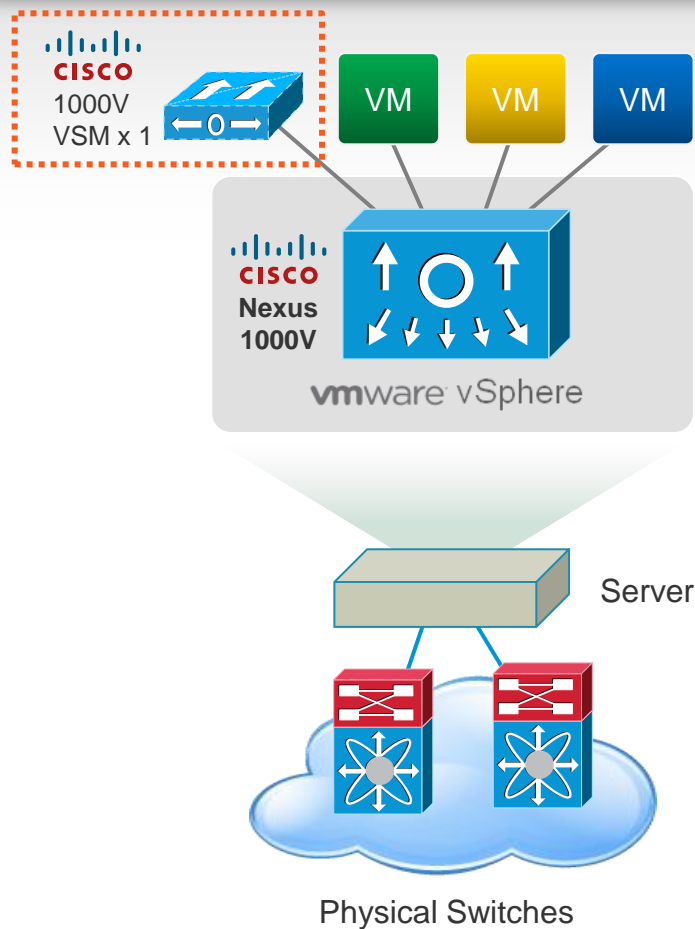
- Target Availability – Dec '11



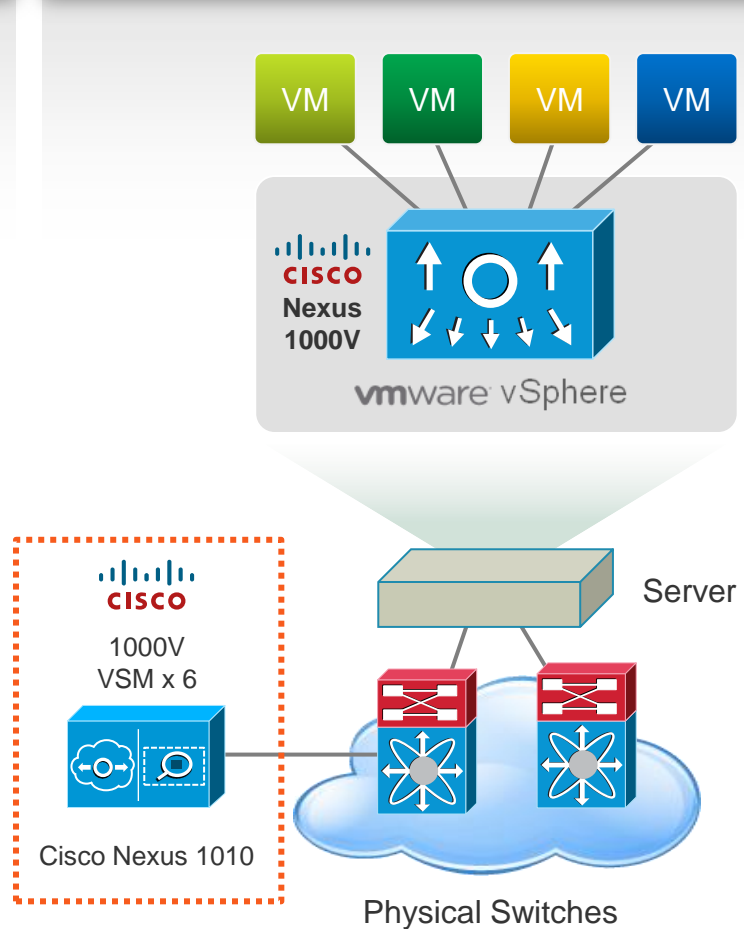
VSM: Virtual Supervisor Module  
 VEM: Virtual Ethernet Module

# Architectural Comparison

## VSM on Virtual Machine



## VSM on Nexus 1010



# Cisco Nexus 1000V

## Increased Operational Efficiency

### Cisco Virtual Machine Networking

#### Policy-Based VM Connectivity

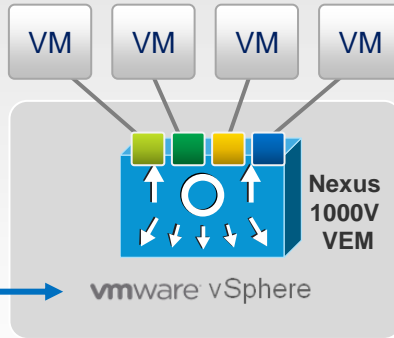
##### VI Admin Benefits

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

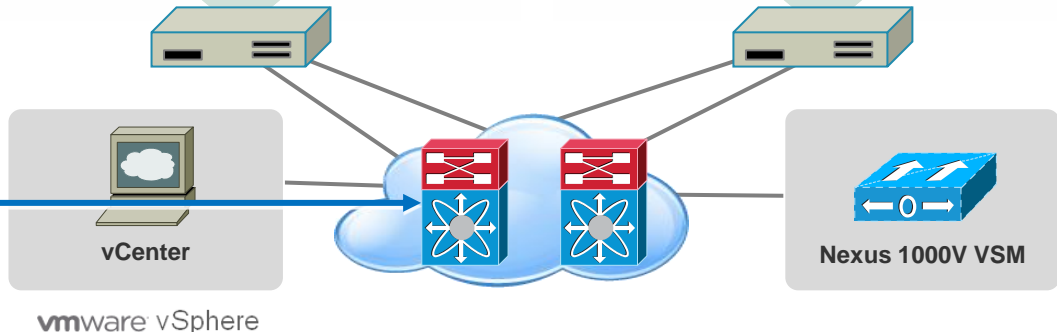
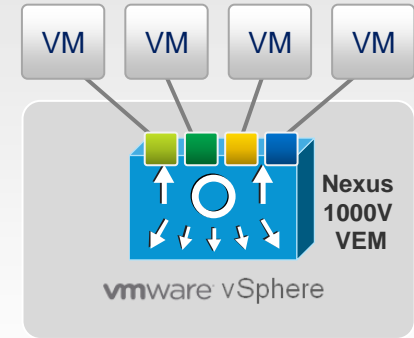
##### Network Admin Benefits

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

#### Mobility of Network and Security Properties



#### Non-Disruptive Operational Model



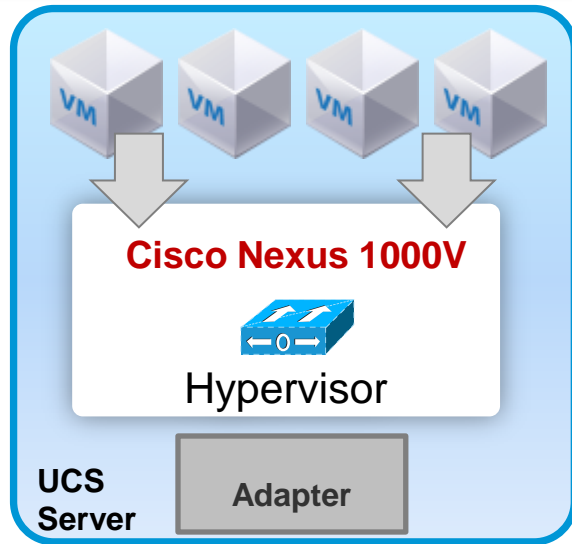
# Virtual Networking on UCS

Nexus 1000V  
VM-FEX



# Cisco Virtual Networking Solutions on UCS

**Nexus 1000V (Hypervisor Switch)**  
*Brings virtual network to the hypervisor*

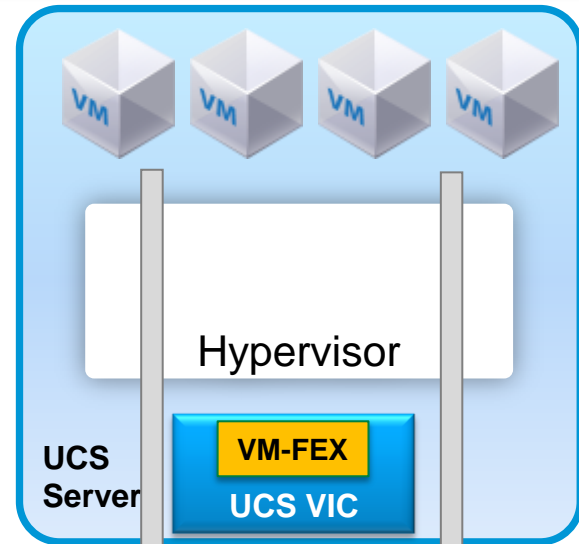


UCS  
Fabric Inter-connect



Richer Features, Higher Feature Velocity  
Higher Port Density per Host

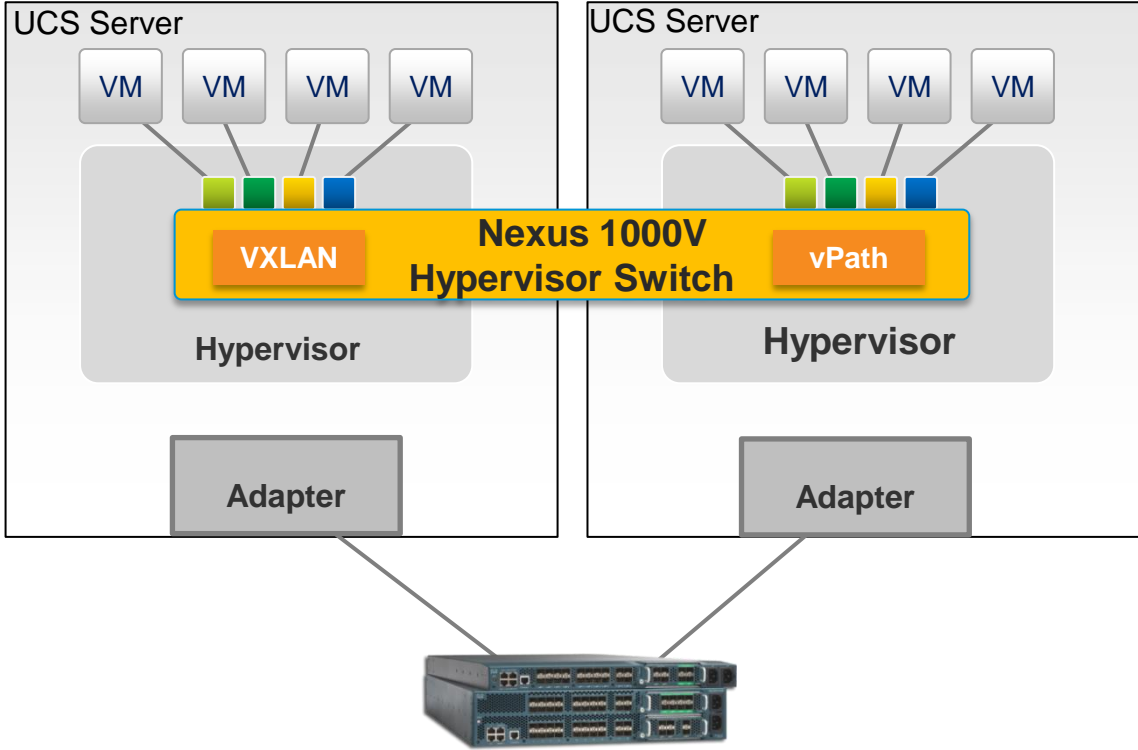
**UCS VM-FEX**  
*Brings VM awareness to physical network*



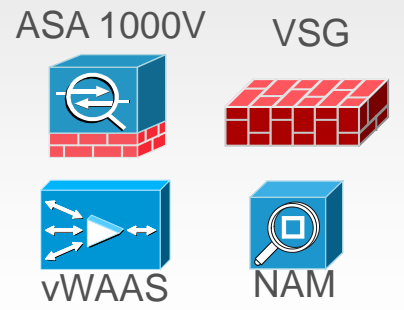
UCS  
Fabric Inter-connect

Higher Performance (10G to VM)  
Single Pt of Mgmt (via UCSM)

# Nexus 1000V Overview



## Networking Services



VSG: Virtual Security Gateway  
ASA: Adaptive Security Appliance  
WAAS: Wide Area Acceleration Service  
NAM: Network Analysis Module

### Customer Benefits:

- Operational consistency across physical and virtual networks
- Network team manages physical and virtual networks
- Integrated advanced Cisco NX-OS networking features
- Support existing Cisco virtual network services

More info on N1KV: [Cisco.com](http://Cisco.com), [Community Site](#), [Nexus 1000V on UCS – Best Practices](#)

# Advanced Features of the Nexus 1000V

## Switching

- L2 Switching, 802.1Q Tagging, VLAN Segmentation, Rate Limiting (TX)
- IGMP Snooping, QoS Marking (COS & DSCP), Class-based WFQ

## Security

- Policy Mobility, Private VLANs w/ local PVLAN Enforcement
- Access Control Lists (L2–4 w/ Redirect), Port Security
- Dynamic ARP inspection, IP Source Guard, DHCP Snooping

## Network Services

- Virtual Services Datapath (vPath) support for traffic steering & fast-path off-load [leveraged by Virtual Security Gateway (VSG) and vWAAS]

## Provisioning

- Automated vSwitch Config, Port Profiles, Virtual Center Integration
- Optimized NIC Teaming with Virtual Port Channel – Host Mode

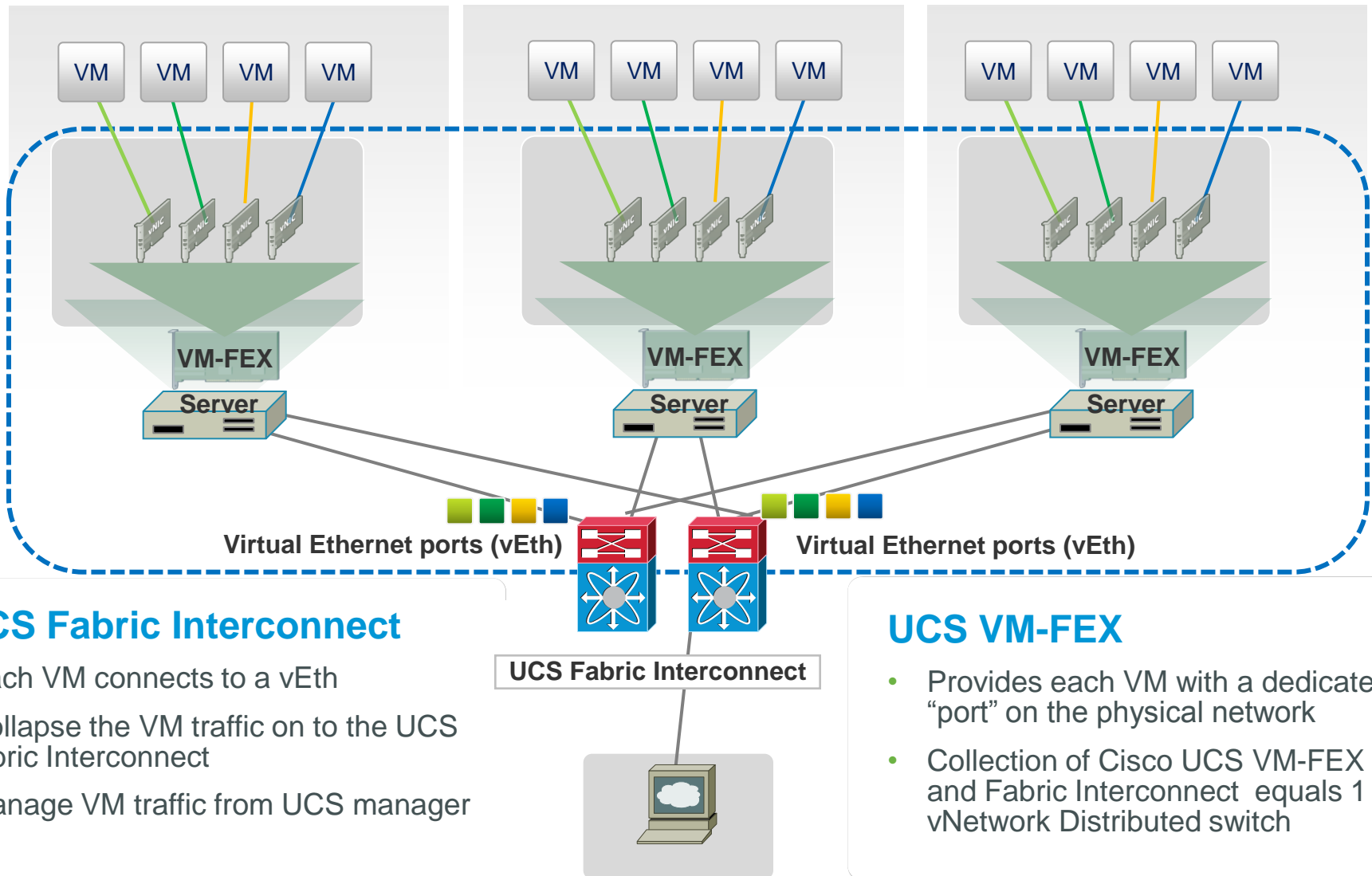
## Visibility

- VMotion Tracking, NetFlow v.9 w/ NDE, CDP v.2
- VM-Level Interface Statistics
- SPAN & ERSPAN (policy-based)

## Management

- Virtual Center VM Provisioning, Cisco Network Provisioning, CiscoWorks
- Cisco CLI, Radius, TACACs, Syslog, SNMP (v.1, 2, 3)
- Hitless upgrade, SW Installer

# VM-FEX Overview



# Nexus 1000V on UCS Best Practices

# Modular Building Blocks

## UCS Manager

Embedded– manages entire system



## UCS Fabric Interconnect

20 Port 10Gb FCoE  
40 Port 10Gb FCoE



## UCS Fabric Extender

Remote line card



## UCS Blade Server Chassis

Flexible bay configurations



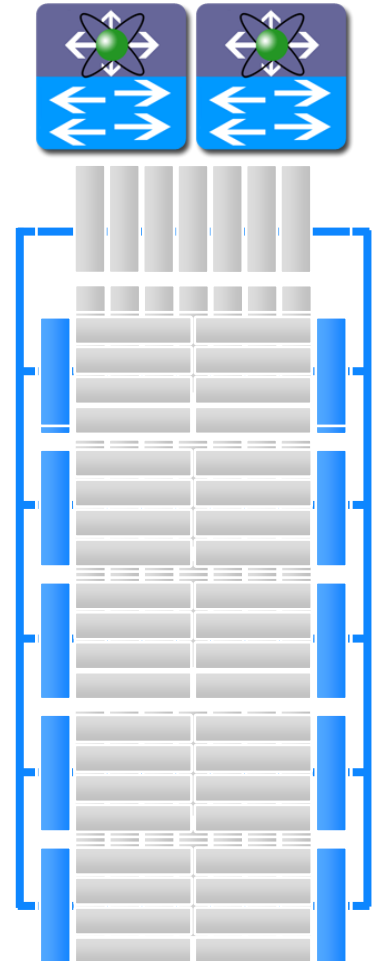
## UCS Compute Options

Industry-standard architecture



## UCS Virtual Adapters

Choice of multiple adapters



# UCS 6100 Ethernet Switching Modes

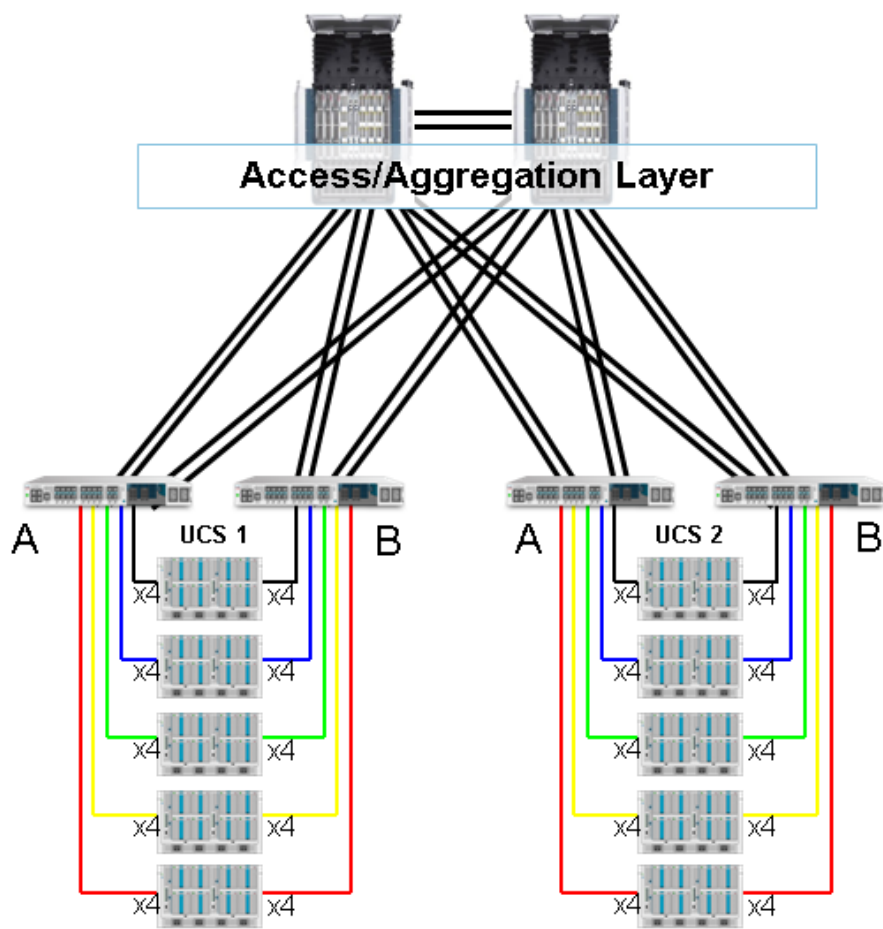
## End Host Mode (EHM)

- The external LAN sees the UCS 6100 as an end-host with multiple adapters. No Spanning Tree protocol on uplink ports.
- Active/Active use of uplinks by pinning.
- More Scalable than switch mode (Control plan is not stressed)

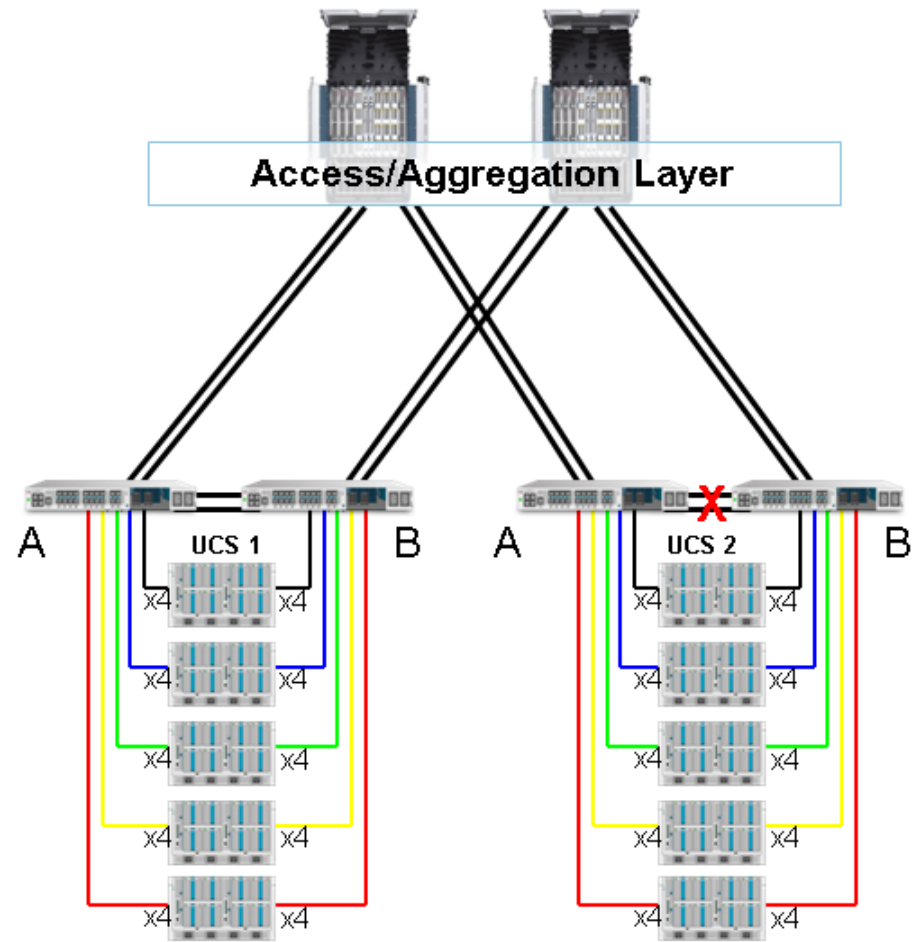
## Switch Mode

- The UCS 6100 acts like a traditional Ethernet switch with support for Spanning Tree protocol on the uplink ports.
- Links usage as per Spanning tree.
- MAC learning on both uplink and server interface

## End Host Mode



## Switch Mode



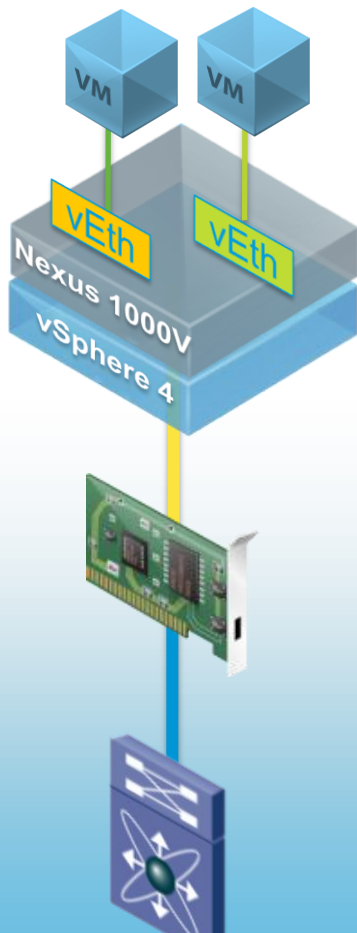
Implementation with Nexus 1000V



# Deployment Options for Virtualized Environments

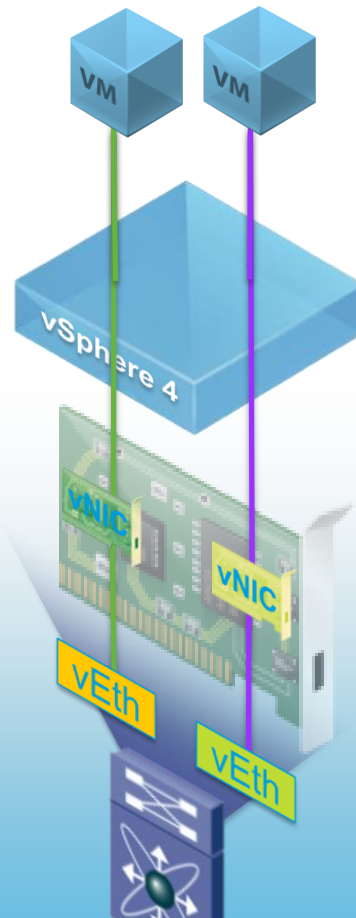
Three Options Available

## Nexus 1000V - Software



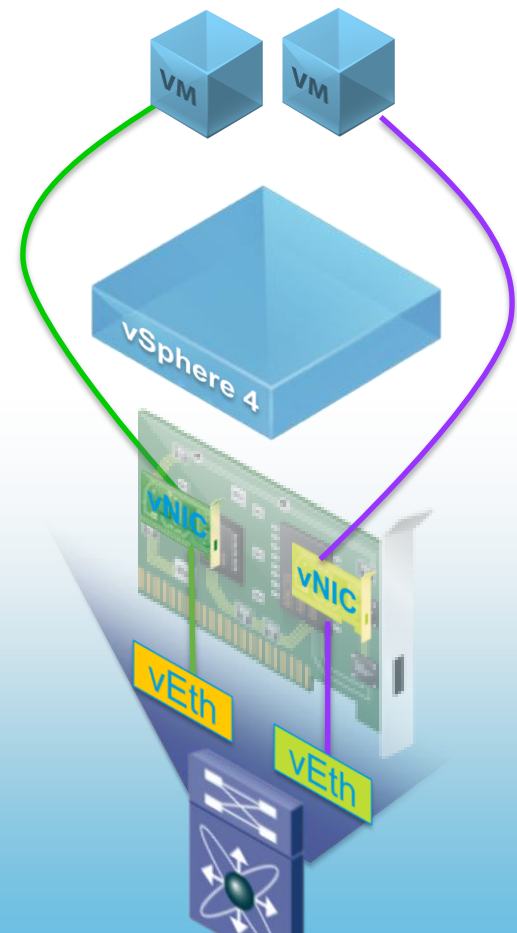
Nexus 1000V hypervisor switch uplinks connect to Cisco virtual interfaces (VIFs)

## VM-FEX



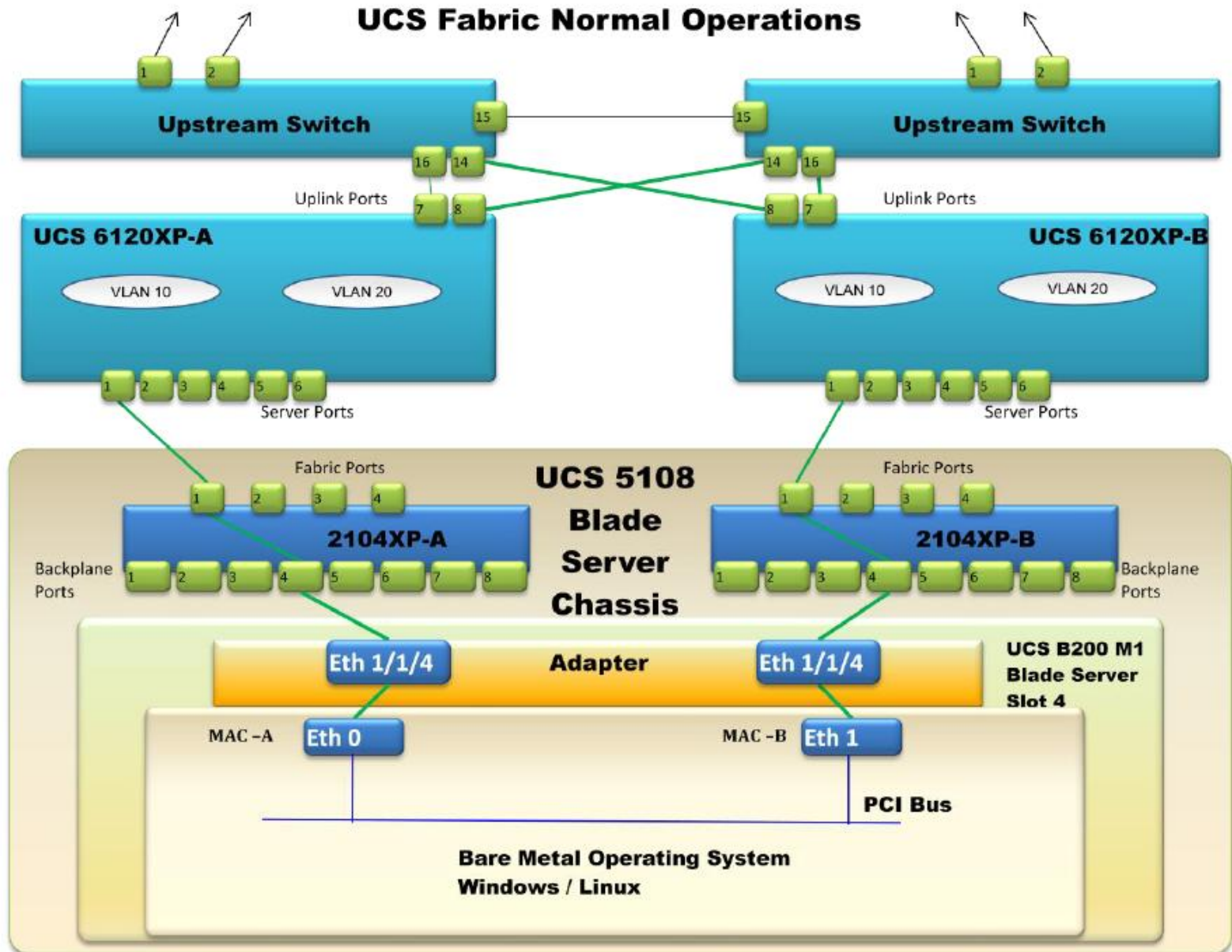
Each VM connects to a Cisco virtual interface (VIF) and does a pass through of the hypervisor switch

## VM-FEX with hypervisor bypass

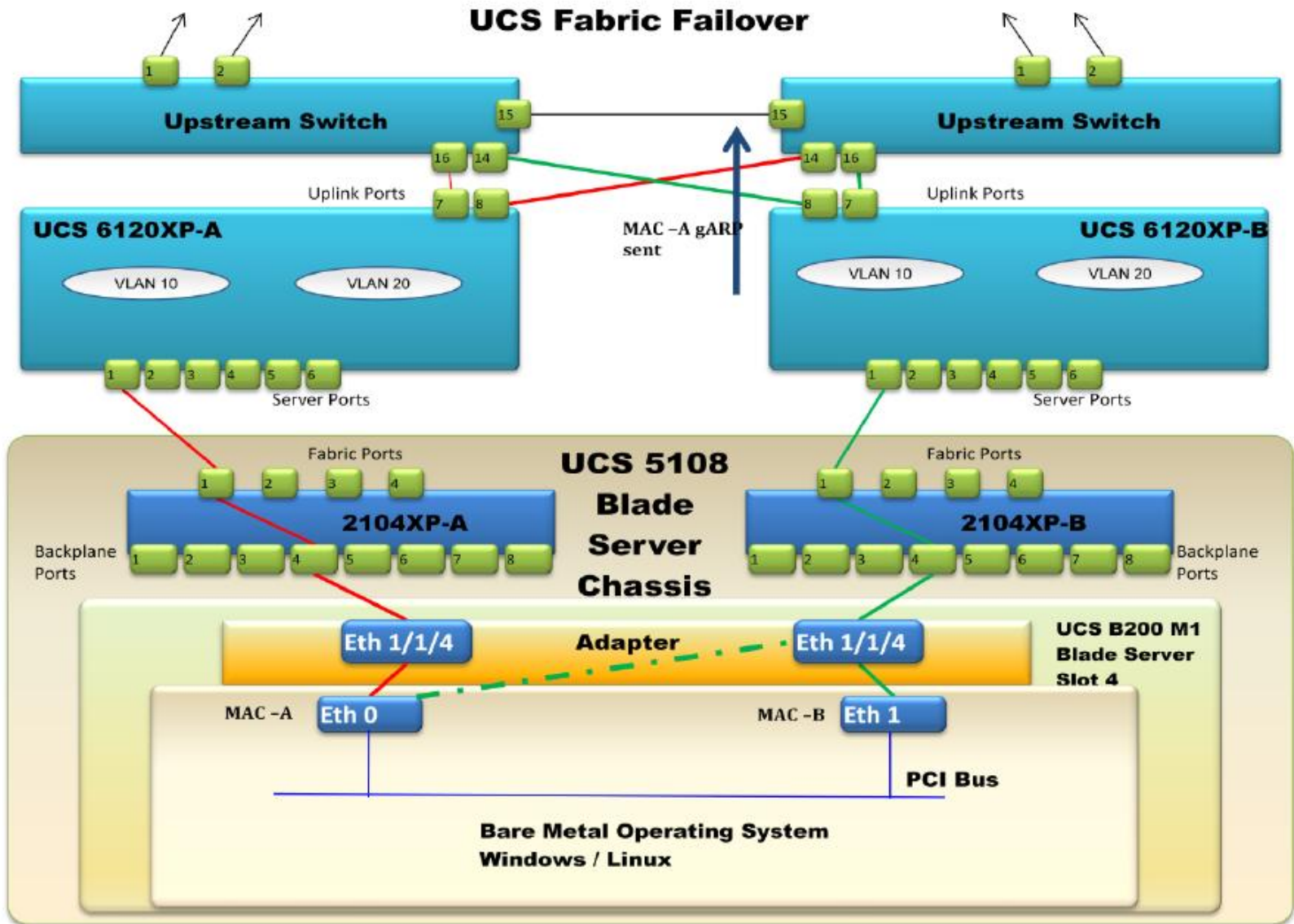


Each VM bypasses the hypervisor completely and connects to a Cisco virtual interface (VIF)

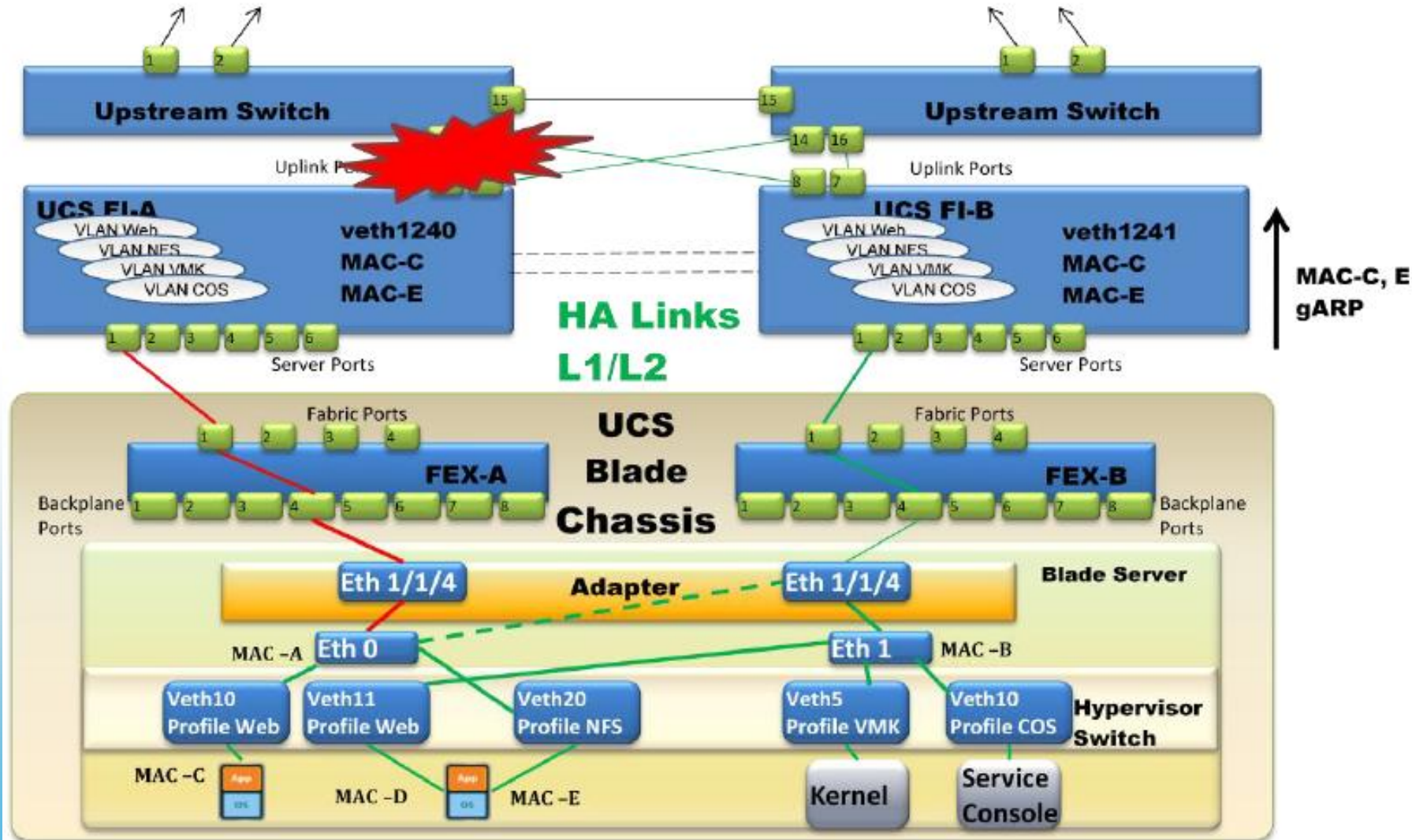
# UCS Fabric Failover – Bare Metal



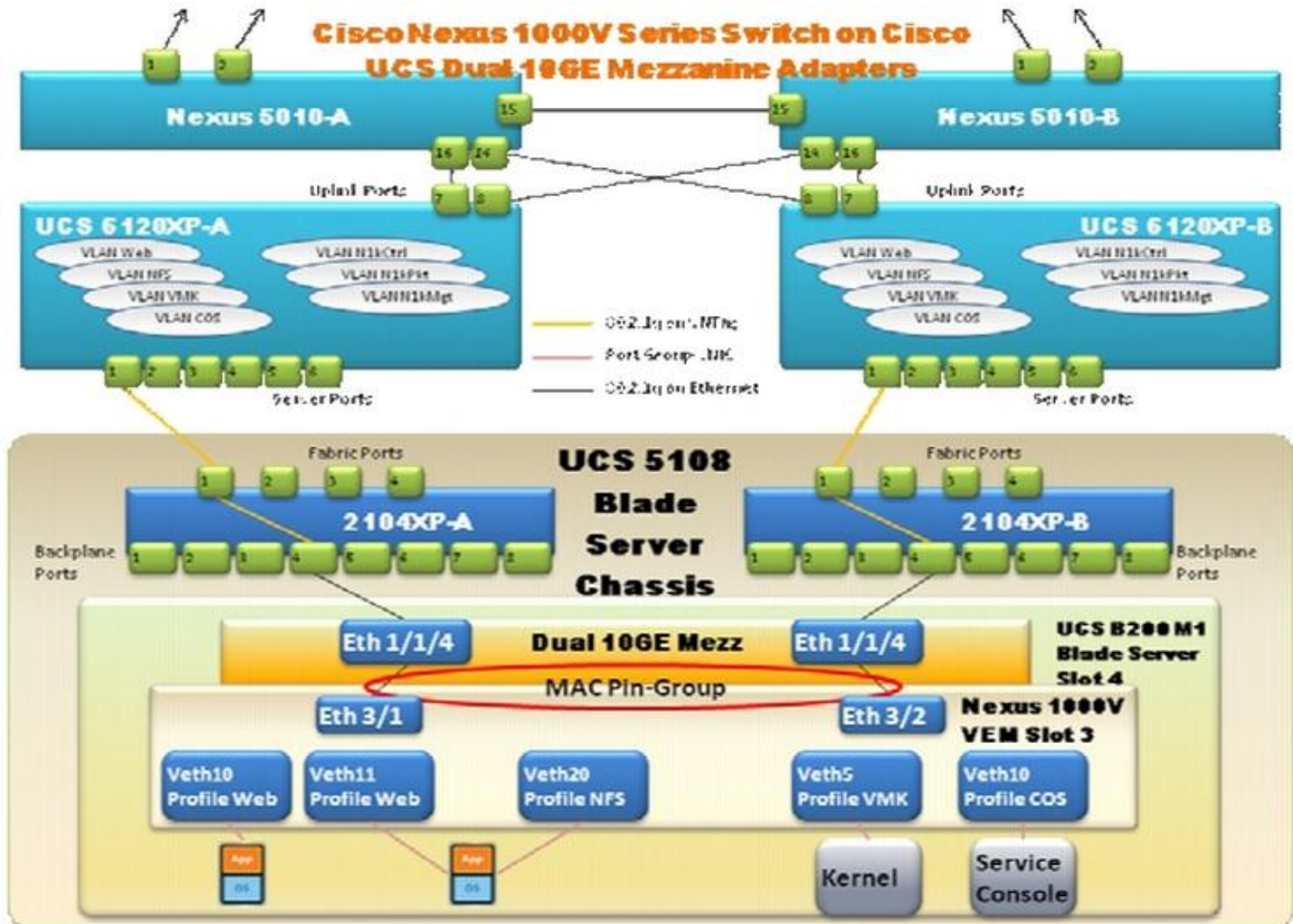
# UCS Fabric Failover – Bare Metal



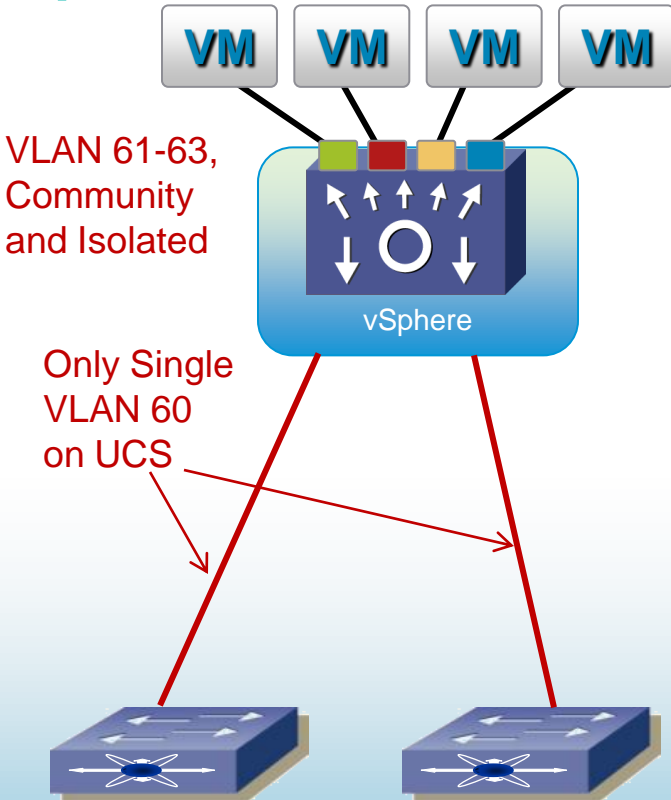
# UCS Fabric Failover – Nexus 1000v



# UCS Fabric Failover – Nexus 1000v



# PVLAN or MAC ACL for VLAN preservation



## PVLAN

```
port-profile type ethernet oplin-uplink-PVLAN
vmware port-group
switchport mode private-vlan trunk promiscuous
switchport private-vlan mapping trunk 60 61-63
switchport private-vlan trunk allowed vlan 1-6,60-63
channel-group auto mode on mac-pinning
no shutdown
system vlan 2-5
state enabled
```

## MAC ACL

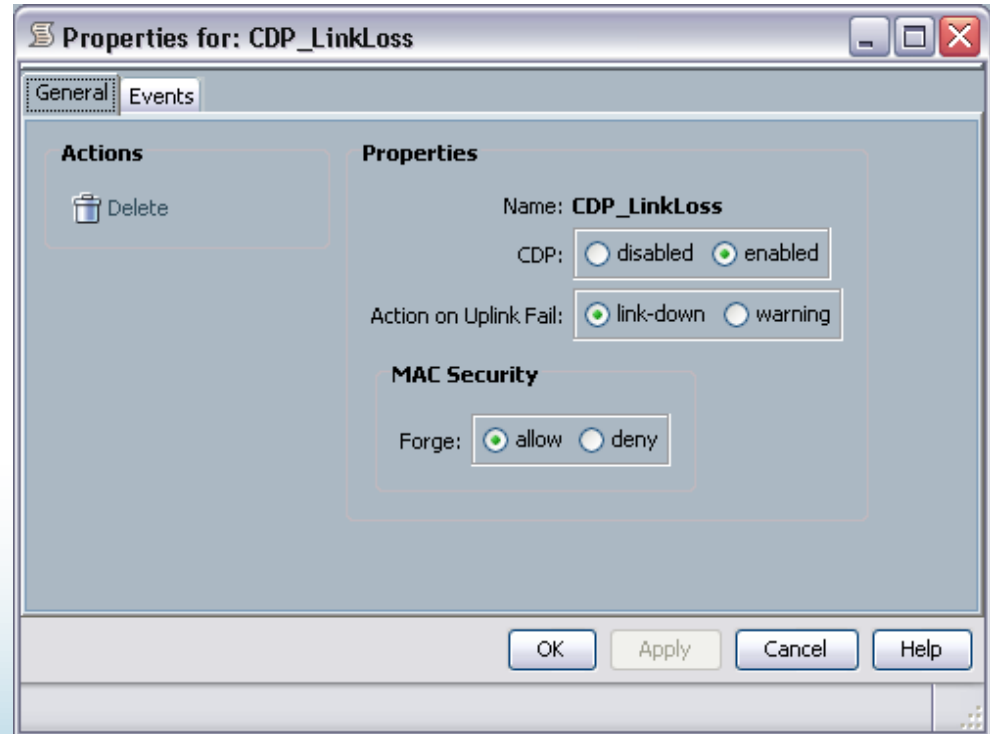
```
port-profile type vethernet access6
mac port access-group JustExternalHost in

mac access-list JustExternalHost
10 permit any 0022.1991.7e08 0000.0000.0000
20 deny any any
```

- VM's cannot talk to each other unless in a Community
- All VM's talk to Promiscuous devices (default gateways)
- Only Primary VLAN needed on UCS

# Enabling Cisco Discovery Protocol (CDP)

- Administrator configures a policy for enabling or disabling CDP in Network Control Policies
- CDP information will then pass to vNIC's created within a service profile using this policy



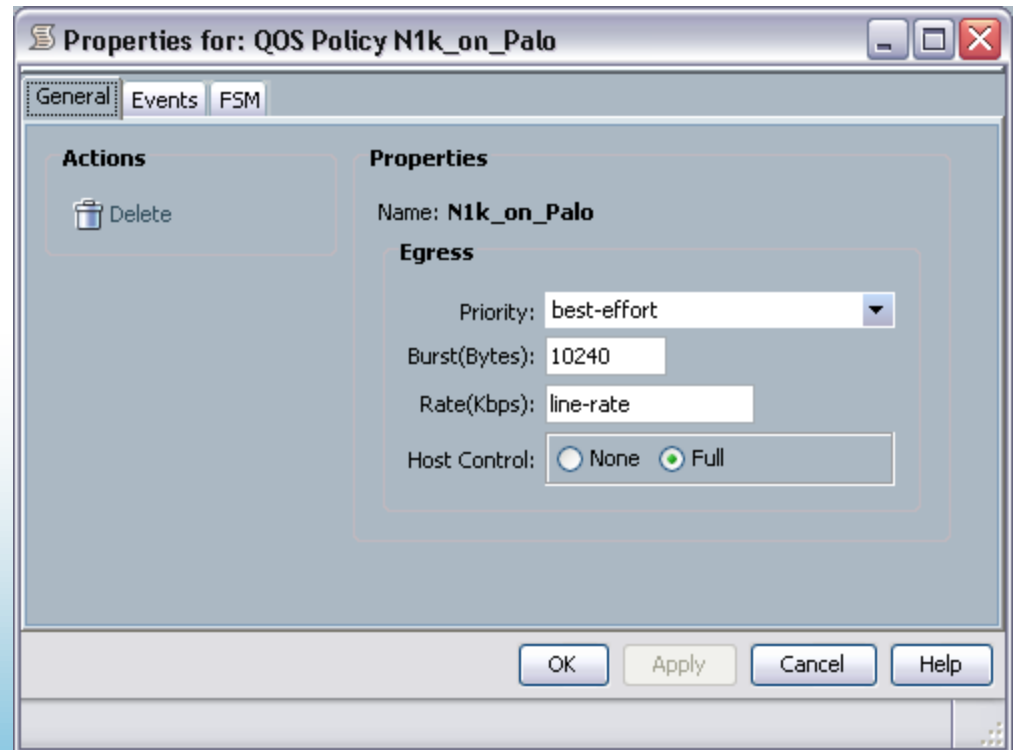
N1KV-VSM# **show cdp neighbors**

Device-ID	Local Intrfce	Hldtme	Capability	Platform	Port ID
TME-FI-A(SSI13180GSC)	Eth3/1	161	S I s	N10-S6100	Vethernet995
TME-FI-B(SSI130609WC)	Eth3/2	155	S I s	N10-S6100	Vethernet996
TME-FI-A(SSI13180GSC)	Eth4/1	126	S I s	N10-S6100	Vethernet1019
TME-FI-B(SSI130609WC)	Eth4/2	134	S I s	N10-S6100	Vethernet1020

# Nexus 1000V QoS on UCS VIC

- QoS Policy

- Host Control None: Manually assign the Class of Service bucket to assign this traffic to
- Host Control Full: Trust the Class of Service request from the server (Nexus 1000V use cases, Multimedia, etc.)
- Assign a maximum rate that can be sent from this interface to fabric
- Allow a burst data amount to pass
- Recommendation is to set Full Host Control on Nexus 1000V use cases





# Nexus 1000V on UCS Key Takeaways

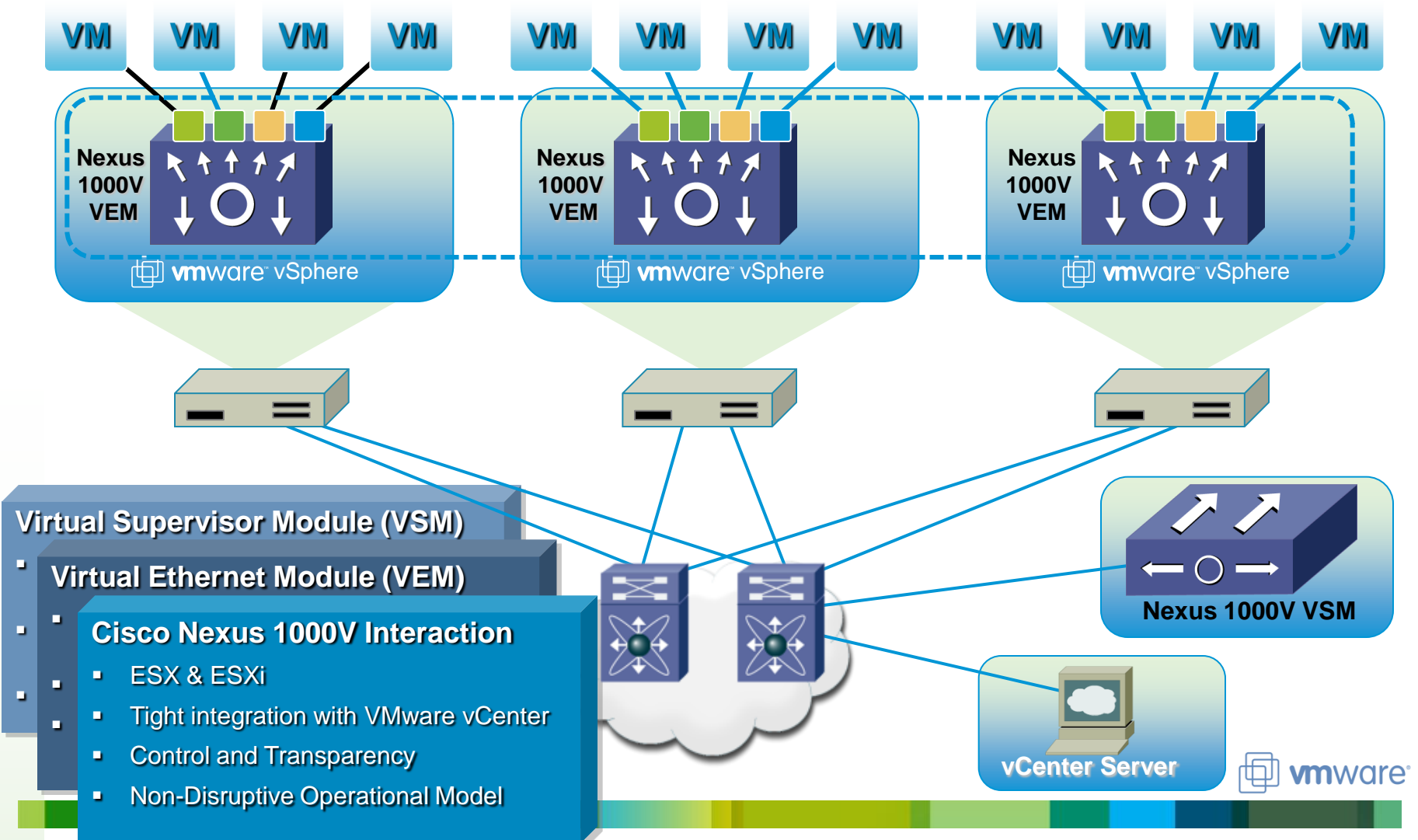
- End Host Mode configuration is recommended on UCS Fabric Interconnect for Nexus 1000v
- UCS fabric failover is recommended to disable and configure MAC pin group on VEM for HA
- Private VLAN is recommended for VM traffic isolation and VLAN preservation on UCS
- CDP is recommended to turn on enable the communication between Nexus 1000v and FI
- Adapter QoS policy is recommended to set to “Host Control Full” which the Nexus 1000v marking will be honored throughout the UCS



# Nexus 1000V Networking Best Practices



# Cisco Nexus 1000V Architecture



## Virtual Supervisor Module (VSM)

### Virtual Ethernet Module (VEM)

### Cisco Nexus 1000V Interaction

- ESX & ESXi
- Tight integration with VMware vCenter
- Control and Transparency
- Non-Disruptive Operational Model

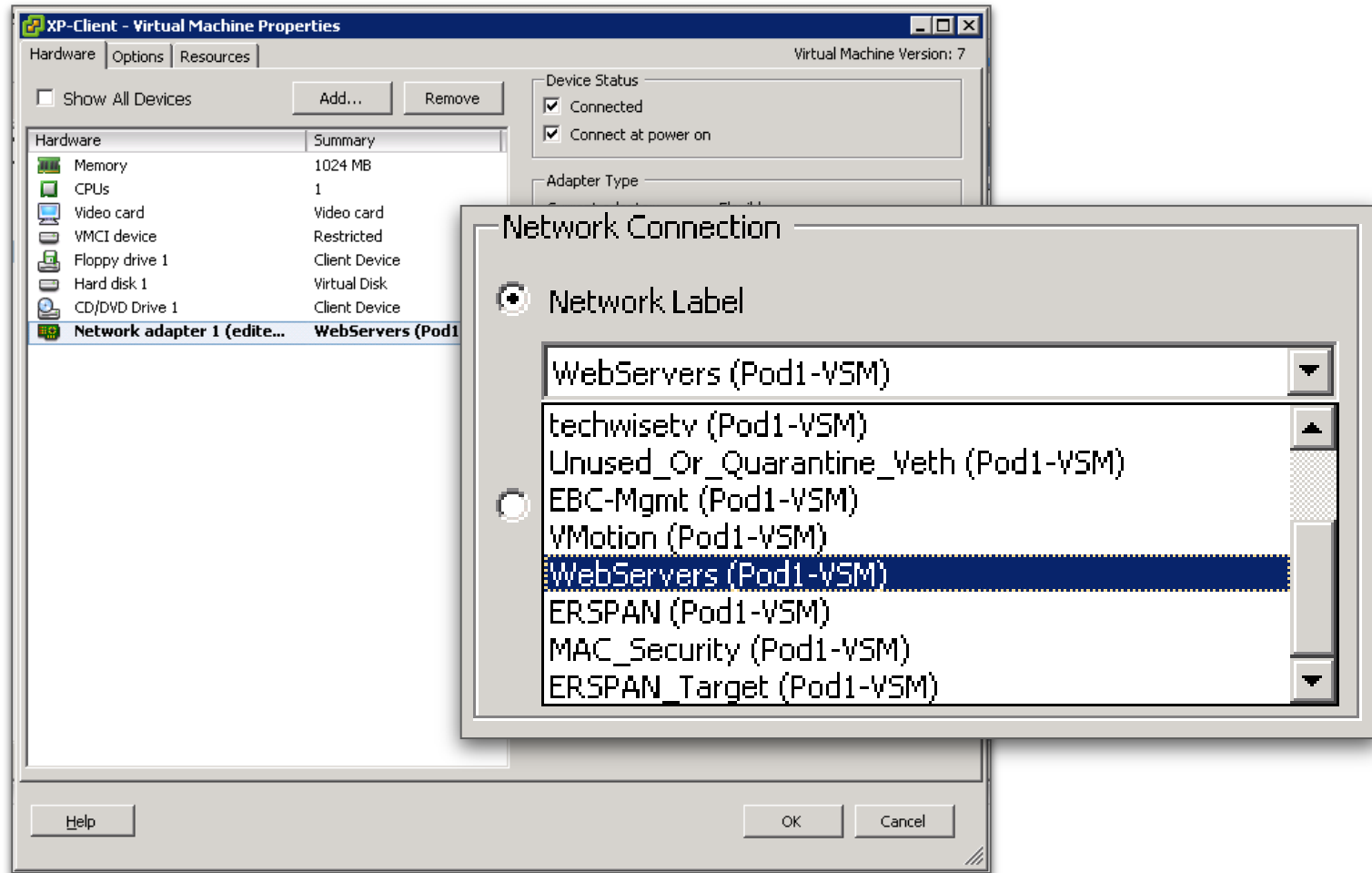
# Port Profile Configuration

```
n1000v# show port-profile name WebServers
port-profile WebServers
  description:
  type: vethernet
  status: enabled
  capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group: WebServers
  max ports: 32
  inherit:
  config attributes:
    switchport mode access
    switchport access vlan 100
    no shutdown
  evaluated config attributes:
    switchport mode access
    switchport access vlan 100
    no shutdown
  assigned interfaces:
    Vethernet9
```

## Support Commands include:

- ✓ Port management
- ✓ VLAN
- ✓ PVLAN
- ✓ Port-channel
- ✓ ACL
- ✓ NetFlow
- ✓ Port Security
- ✓ QoS
- ✓ Port-Mirroring (ERSPAN)

# VM Network Connectivity – Port Groups



# Cisco Nexus 1000V

## Switch Interface Types

```
Nexus1000V# show interface brief
```

Port	VRF	Status	IP Address	Speed	MTU
mgmt0	--	up	10.2.11.5	1000	1500

used for out-of-band management

Numbering based on Module #

Ethernet Interface	VLAN	Type	Mode	Status	Reason	Speed	Port Ch #
Eth3/4	1	eth	trunk	up	none	1000 (D)	1
Eth4/4	1	eth	trunk	up	none	1000 (D)	2

Physical NICs on ESX hosts

Port-Channeling of the Physical NICs out of the ESX hosts

Port-channel Interface	VLAN	Type	Mode	Status	Reason	Speed	Protocol
Po1	1	eth	trunk	up	none	a-1000 (D)	none
Po2	1	eth	trunk	up	none	a-1000 (D)	none

Interface	VLAN	Type	Mode	Status	Reason	MTU
Veth1	11	virt	access	up	none	1500
Veth2	11	virt	access	up	none	1500

Virtual interfaces corresponding to each VM attached

Port	VRF	Status	IP Address	Speed
ctrl0	--	up	--	1000

```
Nexus1000V#
```

# Nexus 1000V Configuration over VIC

```
port-profile type ethernet palo-n1k-aipc-no-ha-uplink
```

```
vmware port-group  
switchport mode trunk  
switchport trunk allowed vlan 4-5
```

```
channel-group auto mode on mac-pinning
```

```
no shutdown  
system vlan 4-5  
state enabled
```

VPC Host Mode

```
port-profile type ethernet palo-vm-data6-no-ha-uplink
```

```
vmware port-group  
switchport mode trunk  
switchport trunk allowed vlan 1,6
```

```
channel-group auto mode on mac-pinning
```

```
no shutdown  
state enabled
```

```
port-profile type ethernet palo-vmk-sc-no-ha-uplink
```

```
vmware port-group  
switchport mode trunk  
switchport trunk allowed vlan 2-3
```

```
channel-group auto mode on mac-pinning
```

```
no shutdown  
system vlan 2-3  
state enabled
```

# VMware Display of Nexus 1000V on UCS

- Uplink Port Profiles shown on Right
- Recommended MAC pinning and traffic segmentation with failover
  - VM production traffic on VMNIC0
  - Management traffic on VMNIC1

The screenshot shows the VMware vCenter interface for a Nexus 1000V virtual switch. The title bar reads "Nexus1000V-VSM-A". The interface is divided into two main panels: a left panel for network components and a right panel for uplink port profiles.

**Left Panel Components:**

- access6:** Virtual Machines (0)
- Default\_177:** Virtual Machines (2)
  - Clone30 on 8-10-09 of Win...
  - Clone12 on 8-10-09 of Win...
- N1k\_Control:** Virtual Machines (2)
  - Clone30 on 8-10-09 of Nex...
  - Clone12 on 8-10-09 of Nex...
- N1k\_Packet:** Virtual Machines (2)
  - Clone30 on 8-10-09 of Nex...
  - Clone12 on 8-10-09 of Nex...
- Unused\_Or\_Quarantine\_V...:** Virtual Machines (0)
- VMKernelNet:** VMKernel Ports (2)
  - vmk0 : 10.1.3.12
  - vmk0 : 10.1.3.30Virtual Machines (0)
- VMServiceConsole:** Service Console Ports (2)
  - vswif0 : 10.1.1.12
  - vswif0 : 10.1.1.30Virtual Machines (4)

**Right Panel Uplink Port Profiles:**

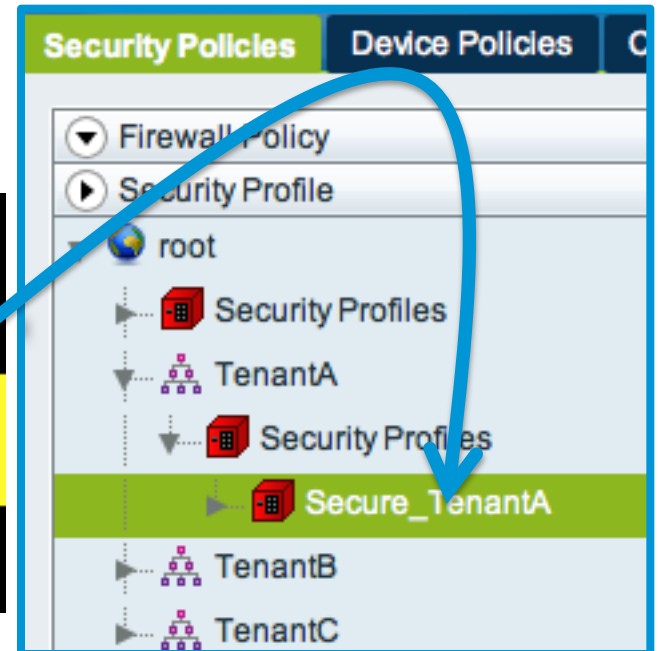
- oplin-uplink:**
  - Uplink0 (1 NIC Adapter) vmnic0 10.1.1.12
  - Uplink1 (1 NIC Adapter) vmnic1 10.1.1.12
- palo-vm-data6-no-ha-uplink:**
- menlo-ha-n1k-vmk-sc-uplink:**
  - Uplink1 (1 NIC Adapter) vmnic1 10.1.1.30
- palo-vm-data6-uplink:**
- palo-n1k-aipc-no-ha-uplink:**
- Unused\_Or\_Quarantine\_Uplink:**
- menlo-no-ha-uplink:**
- palo-vmk-sc-no-ha-uplink:**
- palo-vmk-sc-ha-uplink:**
- menlo-ha-vm-data6-uplink:**
  - Uplink0 (1 NIC Adapter) vmnic0 10.1.1.30
- palo-n1k-aipc-ha-uplink:**



# Enabling vPath in Nexus 1000V

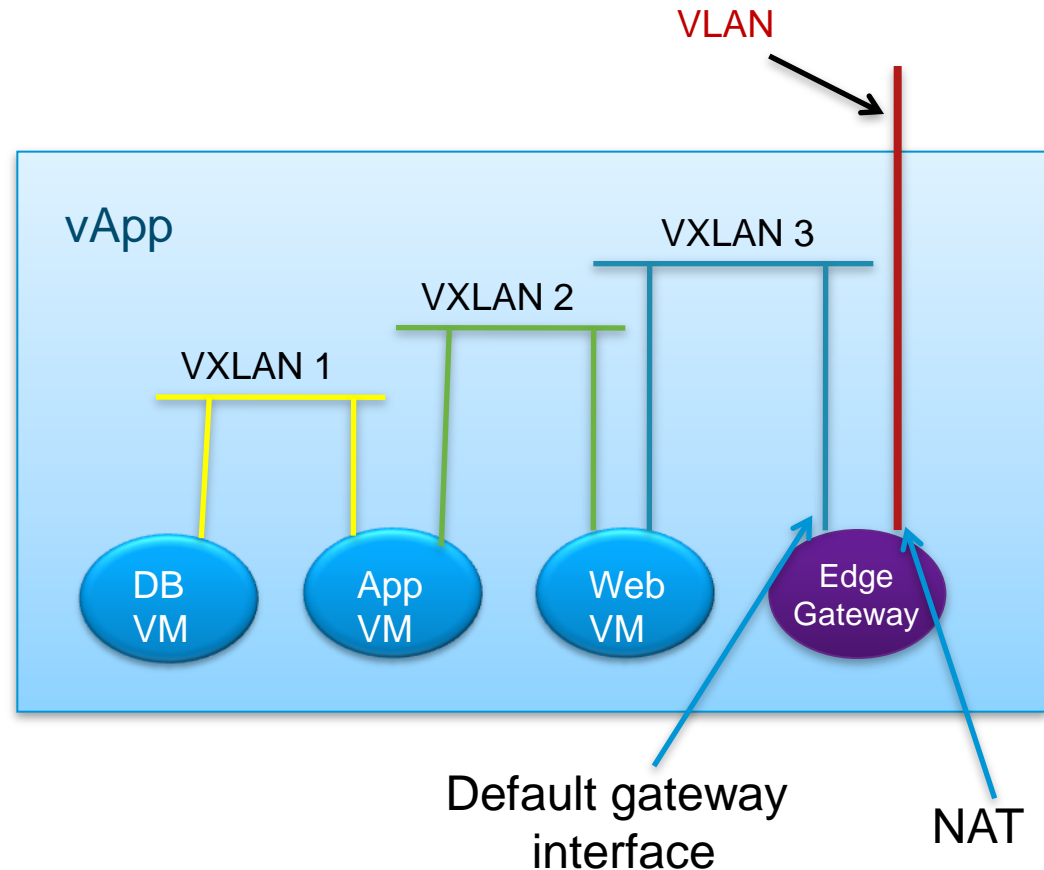
- vPath let you enable virtual network services, e.g. VSG, vWaaS

```
port-profile type vethernet TenantA
  vmware port-group
  switchport access vlan 10
  switchport mode access
  org root/TenantA
  vn-service ip-address 192.168.173.42 vlan 20 security-profile Secure_TenantA
  state enabled
```



# VXLAN on 1000V- Preserving VLANs for UCS (Future)

- Will be Available with 1.5 release of Nexus 1000V
- You can preserve VLANs on UCS by leveraging VXLAN in Nexus 1000V
- VXLAN is only known to 1000V today





# Resources

# On Cisco.com: 1000V / 1010 / VSG

- CCO Links

1000V: [www.cisco.com/go/1000v](http://www.cisco.com/go/1000v)

1010: [www.cisco.com/go/1010](http://www.cisco.com/go/1010)

VSG: [www.cisco.com/go/vsg](http://www.cisco.com/go/vsg)

VNMC: [www.cisco.com/go/vnmc](http://www.cisco.com/go/vnmc)

vWAAS: [www.cisco.com/go/waas](http://www.cisco.com/go/waas)

NAM on 1010: <http://www.cisco.com/en/US/products/ps10846/index.html> (or [www.cisco.com/go/nam](http://www.cisco.com/go/nam))

- My Cisco Community: [www.cisco.com/go/1000vcommunity](http://www.cisco.com/go/1000vcommunity)

- Deployment Guides

[Nexus 1000V Deployment Guide](#)

[Nexus 1000V on UCS – Best Practices](#)

[Nexus 1010 Deployment Guide](#)

[VSG Deployment Guide](#)

- White papers:

[Nexus 1000V and vCloud Director](#)

[N1K on UCS Best Practices](#)

[Nexus 1000V QoS White paper \(draft\)](#)

[VSG and vCloud Director \(draft\)](#)

[vWAAS Technical Overview, vWAAS for Cloud-ready WAN Optimization](#)

# Cisco Validated Designs

## *With Nexus 1000V, Nexus 1010 and VSG*

- [vBlock with Nexus 1000V](#)
- [FlexPOD with Nexus 1000V and Nexus 1010](#)
- [Virtual Multi-tenant Data Center with Nexus 1000V](#)
- Virtual Desktop
  - [1000V and VMware View](#)
  - [1000V and Citrix XenDesktop](#)
  - [1000V and VSG in VXI Reference Architecture](#)
- Virtual Workload Mobility (aka Long-distance vMotion)
  - [Cisco, VMware and EMC \(with 1000V and VSG\)](#)
  - [Cisco, VMware and NetApp \(with 1000V and VSG\)](#)
- [PCI 2.0 with Nexus 1000V and VSG](#)

# N1K Public Webcasts

Date	Business Track Topics	Webinar	Preso	Q&A
3/22	Nexus 1000V/1010 Overview and Update	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4/05	Virtual Network Services: Virtual Service Datapath (vPath), Network Analysis Module (NAM), Virtual Application Acceleration (vWAAS)	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4/19	Virtual Security Gateway (VSG) Overview  (Installation Videos: <a href="#">Link</a> )	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5/03	Journey to the Cloud w/ N1KV: vCloud Director & Long Distance vMotion	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5/17	Secure Virtual Desktop with Nexus 1000V & VSG	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>

Date	Technical Track Topics	Webinar	Preso	Q&A
3/29	Nexus 1000V v1.4 Features & Install Overview  (Installation Screencasts <a href="#">Link</a> )	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4/12	Nexus 1010 Overview & Best Practices	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4/26	Virtual Security Gateway (VSG) Technical Overview	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5/10	Nexus 1000V Key Features Overview	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5/24	Nexus 1000V Troubleshooting	<a href="#">Play</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
7/27	Long Distance vMotion with Nexus 1000V and VSG	<a href="#">Play</a>	<a href="#">PDF</a>	
8/10	PCI Reference Architecture with Nexus 1000V and Virtual Security Gateway	<a href="#">Play</a>	<a href="#">PDF</a>	

Webinar Link: [www.cisco.com/go/1000vcommunity](http://www.cisco.com/go/1000vcommunity)

# Additional Links

- N1K Download and 60-day Eval: [www.cisco.com/go/1000vdownload](http://www.cisco.com/go/1000vdownload)
- N1K Product Page: [www.cisco.com/go/1000v](http://www.cisco.com/go/1000v)
- N1K Community: [www.cisco.com/go/1000vcommunity](http://www.cisco.com/go/1000vcommunity)
- N1K Twitter [www.twitter.com/official\\_1000V](http://www.twitter.com/official_1000V)
- N1K Webinars: [www.tinyurl.com/1000v-webinar](http://www.tinyurl.com/1000v-webinar)
- N1K Case Studies: [www.tinyurl.com/n1k-casestudy](http://www.tinyurl.com/n1k-casestudy)
- N1K Whitepapers [www.tinyurl.com/n1k-whitepaper](http://www.tinyurl.com/n1k-whitepaper)
- N1K Deployment Guide: [www.tinyurl.com/N1k-Deploy-Guide](http://www.tinyurl.com/N1k-Deploy-Guide)
- VXI Reference Implementation: [www.tinyurl.com/vxiconfigguide](http://www.tinyurl.com/vxiconfigguide)
- N1K on UCS Best Practices: [www.tinyurl.com/N1k-On-UCS-Deploy-Guide](http://www.tinyurl.com/N1k-On-UCS-Deploy-Guide)

# Cisco Cloud Lab

## Hands On Training & Demos

- Hands on labs available for Nexus 1000V and VSG in Cloud Lab
- <https://cloudlab.cisco.com>
- Open to all Cisco employees
- Customers/Partners require sponsorship from account team for access via CCO LoginID
- Extended duration lab licenses for 1000V and VSG are available upon request



### Welcome to Cisco CloudLab

Please select one of the available labs, by clicking on its name. Hover over the lab name content.

#### Available labs:

- Cisco Nexus 1000V - Basic Introduction (N1K-000111)
- Cisco Nexus 1000V - Installation (N1K-000211)
- Cisco Nexus 1000V - Upgrade to 1.4 (N1K-000310)
- Cisco Virtual Security Gateway (VSG) - Introduction (VSG-000110)
- Cisco Nexus 7000 - Introduction to NX-OS (N7K-000110)
- Cisco Overlay Transport Virtualization (OTV) (N7K-000210)
- Demo: Cisco Nexus 1000V (Pre-Configured) (N1K-100111)
- Demo: Cisco Virtual Security Gateway (VSG)(Pre-Configured) (VSG-100110)



Thank you.

