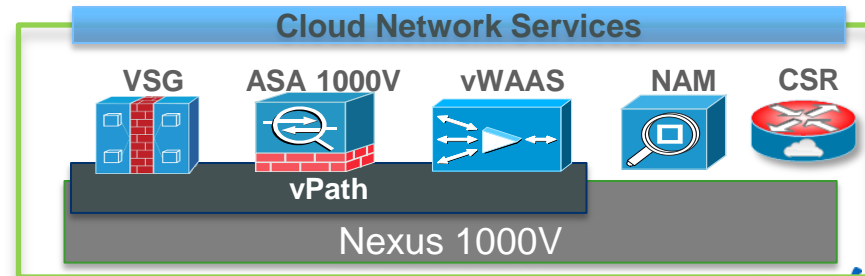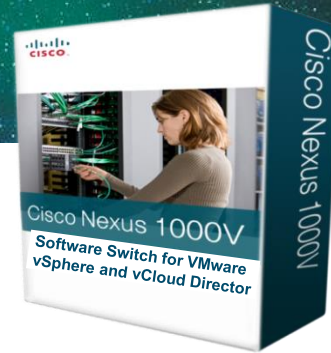TOMORROW starts here.

CISCO

Cisco live!

Inside the Nexus 1000v

BRKVIR-2012

Han Yang
TME Manager
Data Centre Group

Agenda

- Why Cisco Nexus 1000V
- Cisco's Virtual Networking Vision
- Cisco Nexus 1000V v 2.1+
  - Now It is Free!
  - Deploying N1k
  - Best Practice Updates
  - Upgrading N1k
  - vTracker
  - Resource availability
  - vCenter Plugin
  - VXLAN
  - Virtual Services with vPath
- Nexus 1000V for Microsoft Hyper-V
- Architectural Enhancements
- Q&A

Cisco Nexus 1000V
Software Switch for VMware vSphere and vCloud Director

VSM | VSG | NAM | DCNM | Partners

Nexus 1110-X

Cloud Network Services

VSG | ASA 1000V | vWAAS | NAM | CSR

vPath

Nexus 1000V

Cisco Public

What Happened to the Edge?

Unstable Cliffs
Keep Clear

Cisco Public

Losing the Edge…

VMs on Wrong VLANs!

Server Admin must handle network configuration

Server Admin

Host

Host

Host

Host

vSwitch

vSwitch

vSwitch

vSwitch

No Network Visibility or Control!

Unchaperoned VM-to-VM communication!

No Policy and VLAN control!
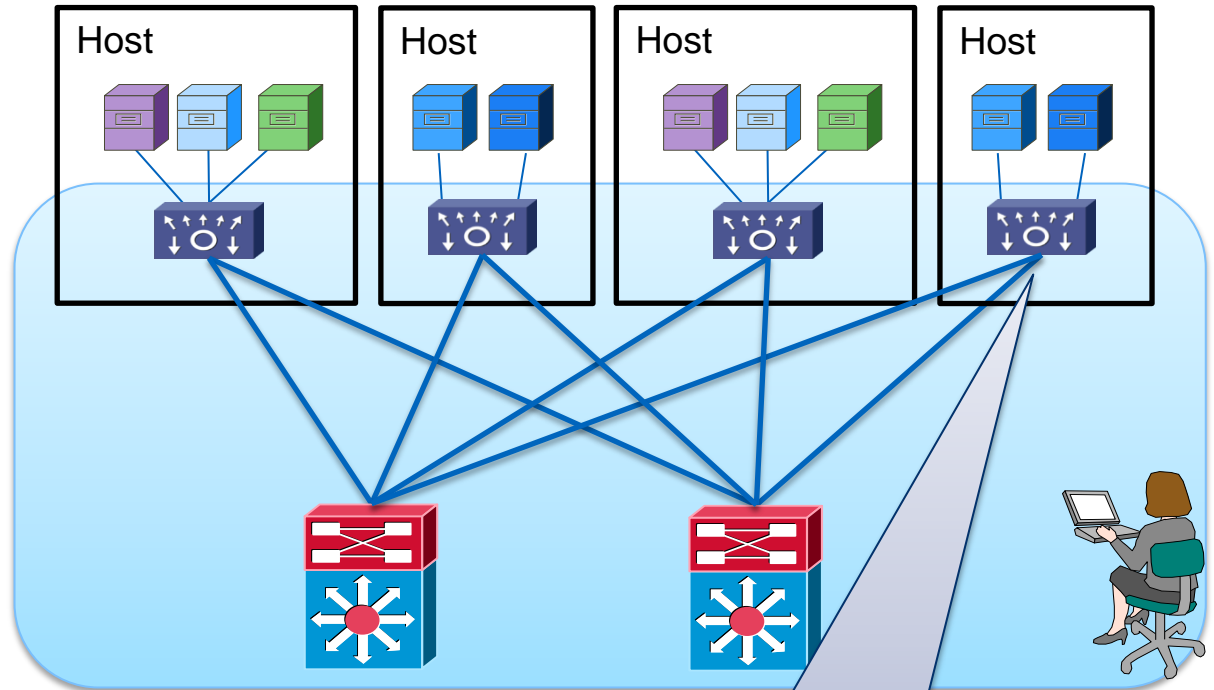
Network Admin
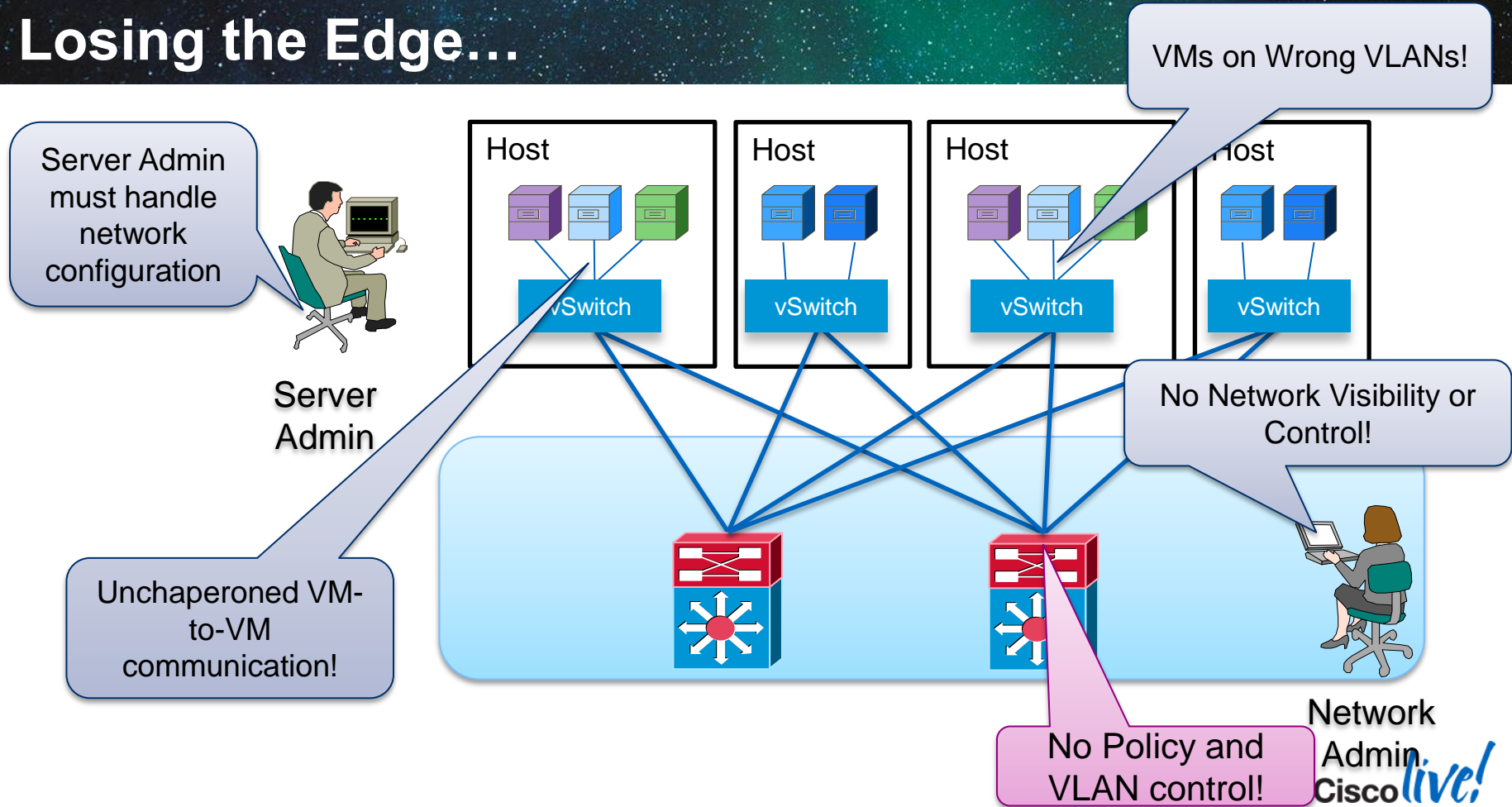
Cisco live!

And Finding it Back!

Server Admin freed from networking configuration

Server Admin

Host

Host

Host

Host
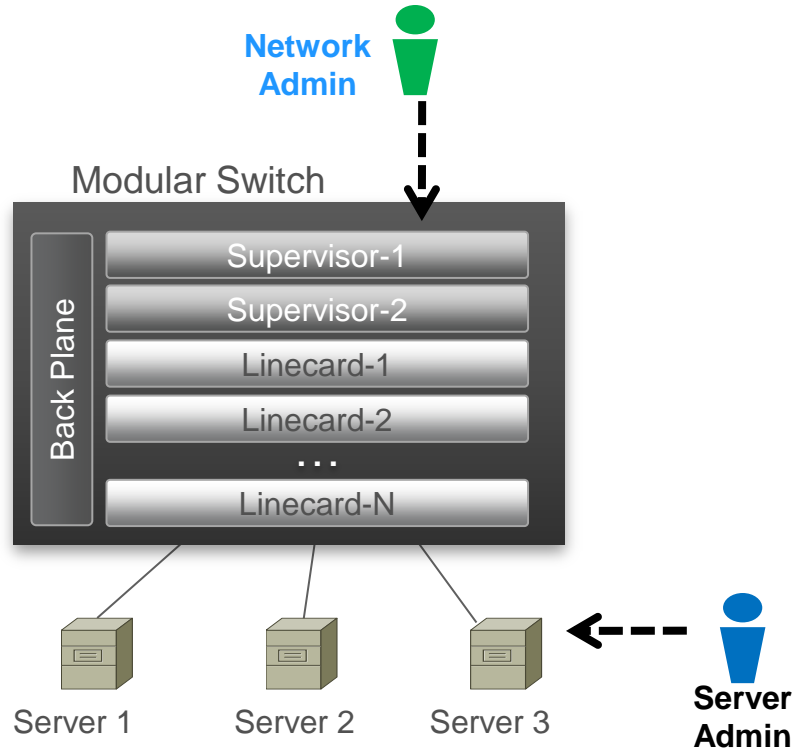
Distributed Switch managed by Network Admin

Network Admin

Cisco live!
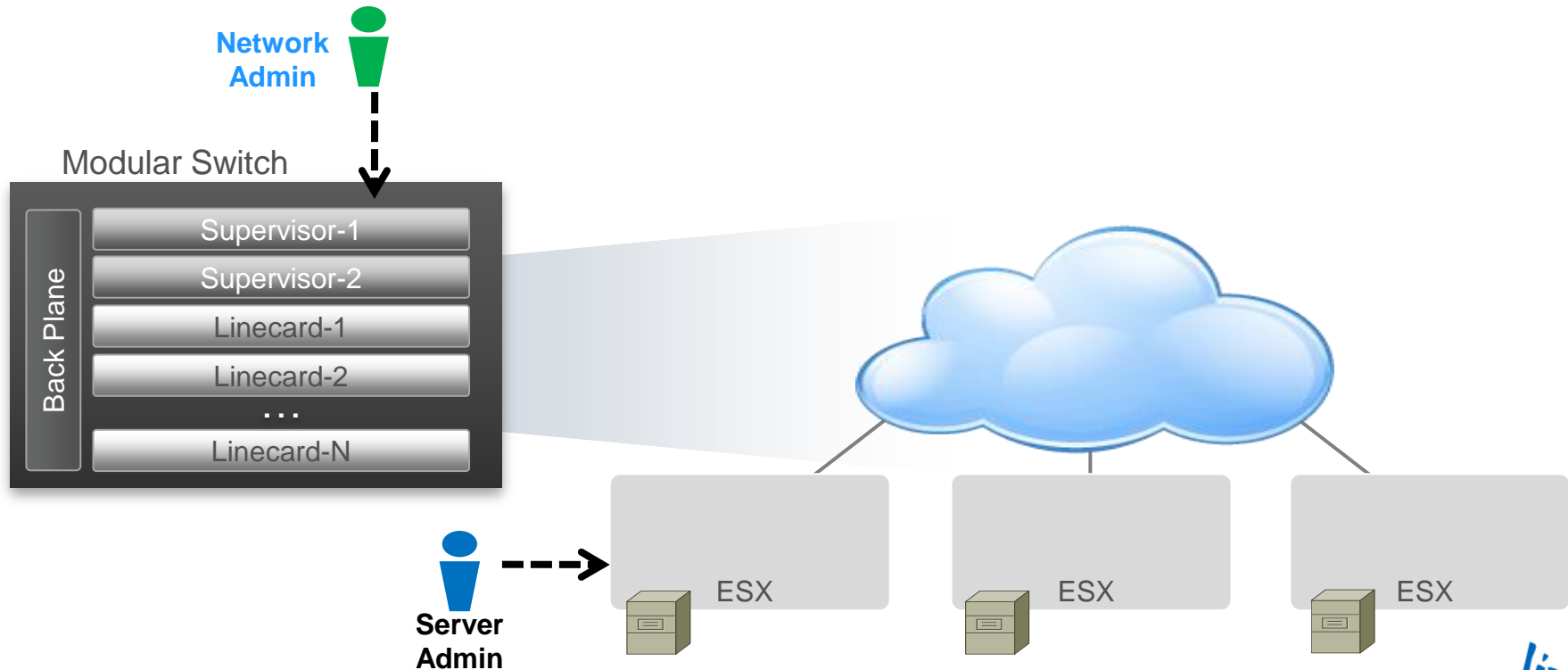
Nexus 1000V Architecture
Comparison to a Physical Switch

Network Admin

Modular Switch

Back Plane

Supervisor-1

Supervisor-2

Linecard-1

Linecard-2

…

Linecard-N

Server 1

Server 2

Server 3

Server Admin

Cisco Public

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Nexus 1000V Architecture
Moving to a Virtual Environment

Network Admin

Modular Switch

Back Plane

Supervisor-1
Supervisor-2
Linecard-1
Linecard-2
...
Linecard-N

ESX

ESX

ESX

Server Admin

Cisco Public

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Nexus 1000 Architecture
Supervisors: Virtual Supervisor Modules (VSMs)

Virtual Appliance

VSM1

VSM2

Network Admin

Modular Switch

Back Plane

Supervisor-1
Supervisor-2
Linecard-1
Linecard-2
…
Linecard-N

Hypervisor

Hypervisor

Hypervisor

VSM: Virtual Supervisor Module

Server Admin

Cisco live!
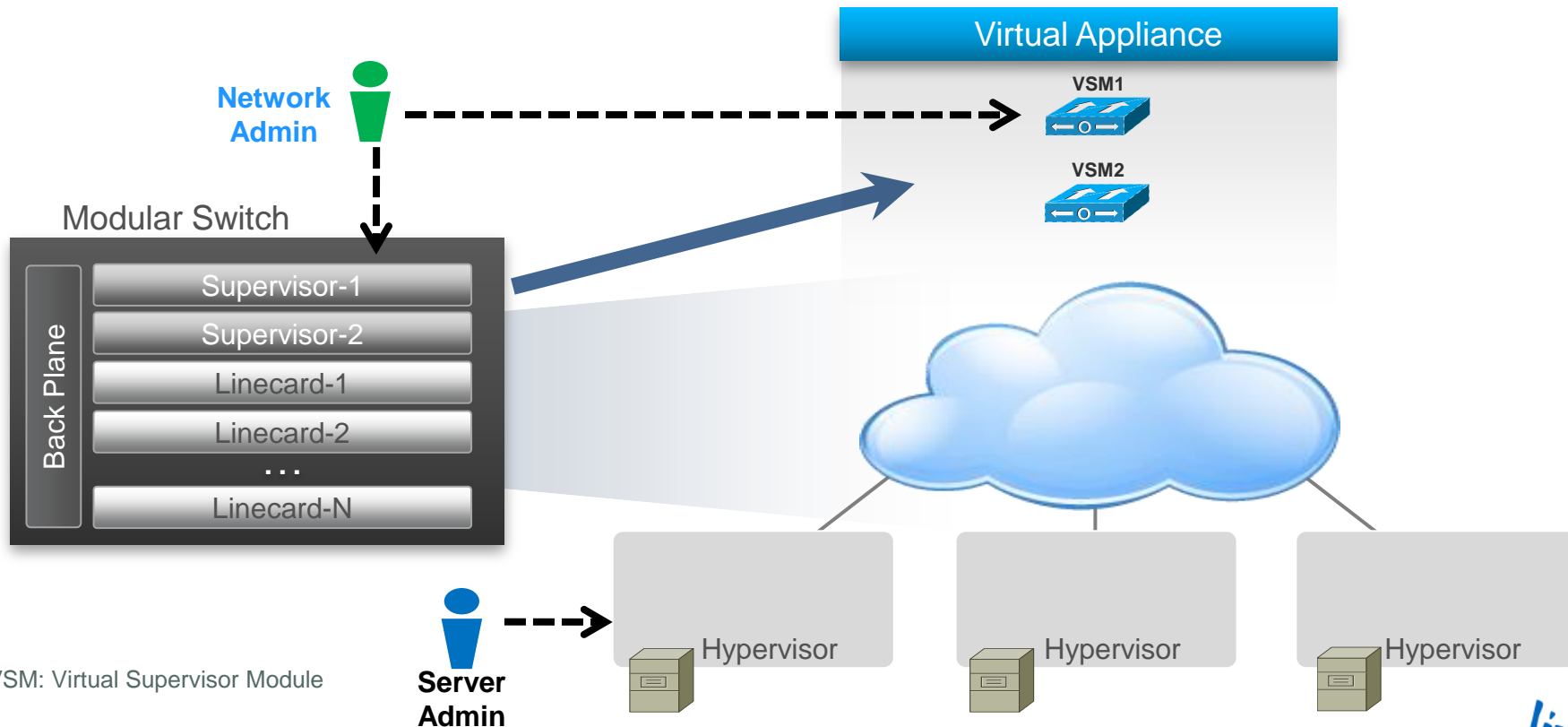
Nexus 1000 Architecture
Linecards: Virtual Ethernet Modules (VEMs)

Virtual Appliance

VSM1

VSM2

Network Admin

Modular Switch

Back Plane

Supervisor-1

Supervisor-2

Linecard-1

Linecard-2

…

Linecard-N

VEM-1

VEM-2

VEM-N

Hypervisor

Hypervisor

Hypervisor

Server Admin

VSM: Virtual Supervisor Module
VEM: Virtual Ethernet Module

Cisco*live!*
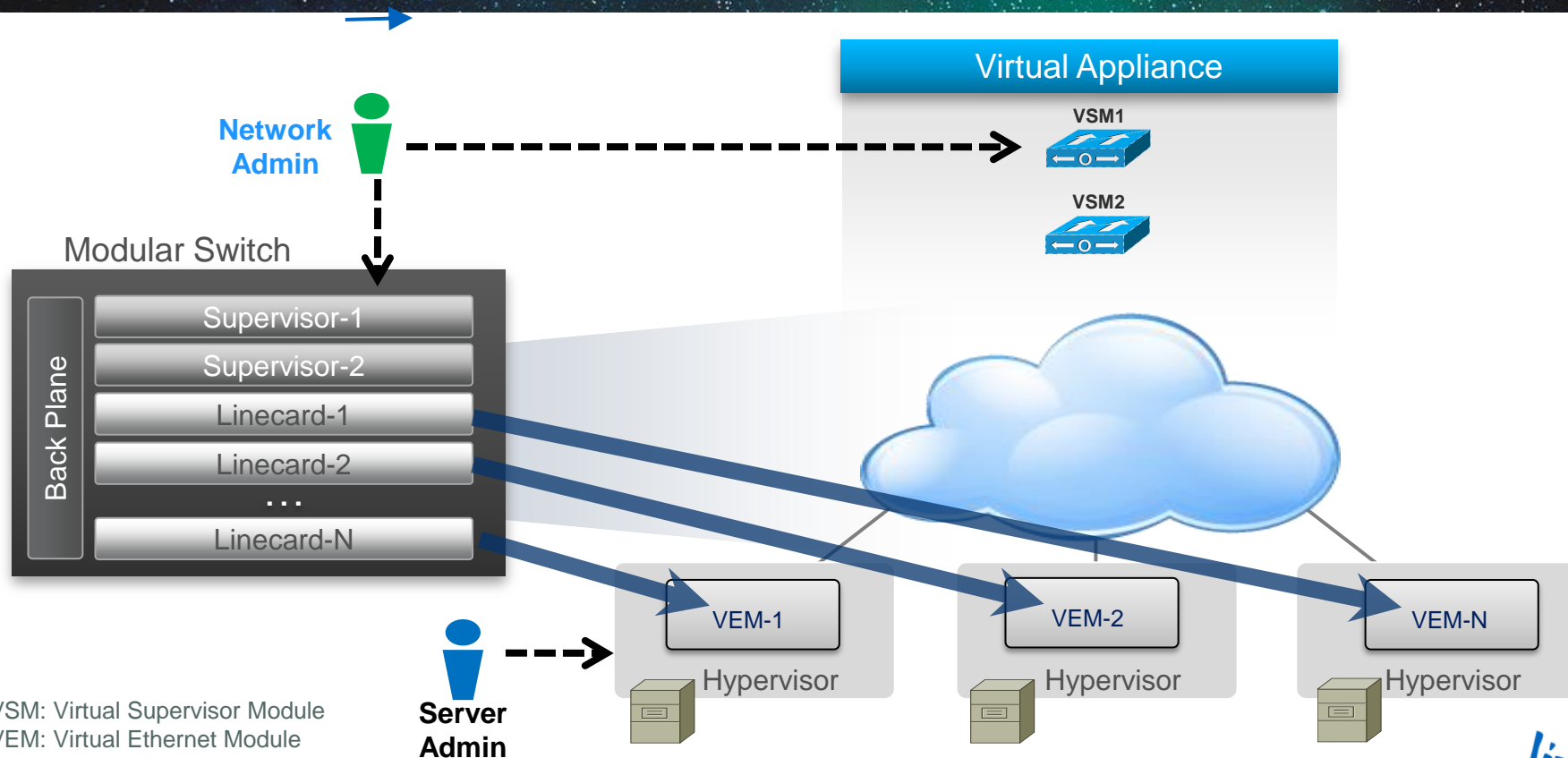
Cisco Nexus 1000V Overview

Architecture consistent with other modular switches

Virtual Appliance

VSM1

VSM2

Network Admin

Modular Switch

Back Plane

Supervisor-1
Supervisor-2
Linecard-1
Linecard-2
…
Linecard-N

VEM-1
Hypervisor

VEM-2
Hypervisor

VEM-N
Hypervisor

Server Admin

VSM: Virtual Supervisor Module
VEM: Virtual Ethernet Module

Cisco Public
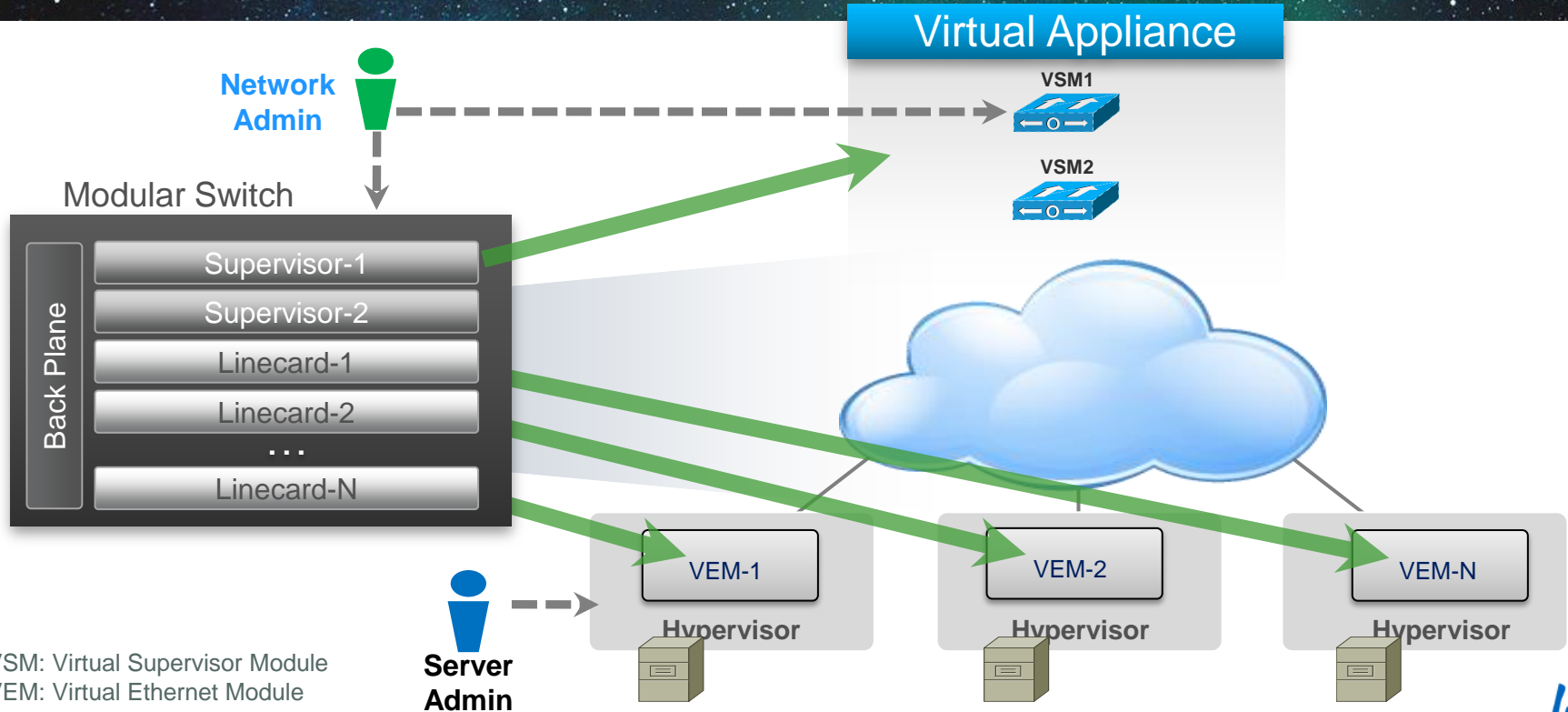
Cisco Nexus 1000V Overview

A Feature-rich Distributed Virtual Software Switch
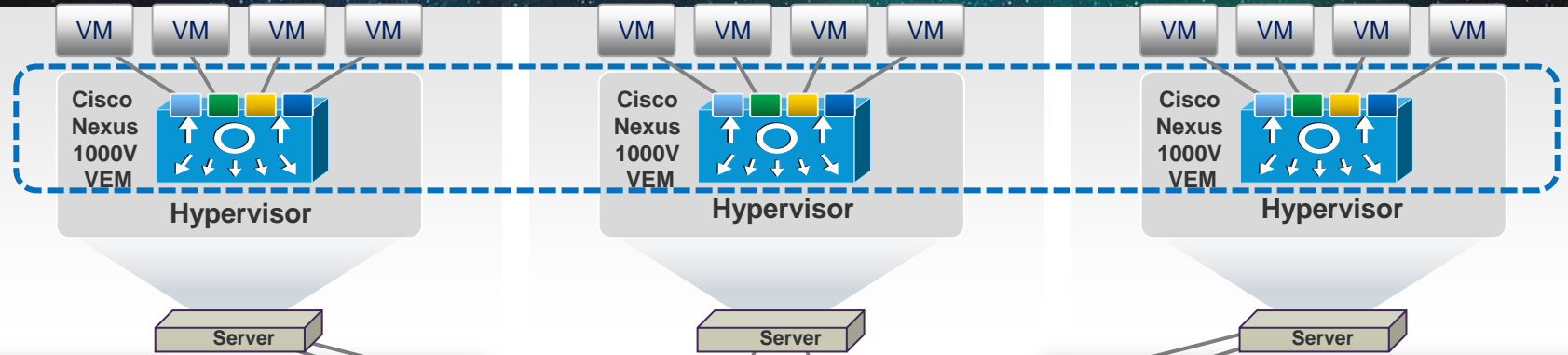
- Virtual or Physical appliance running Cisco NXOS (supports Hi-availability)
- Performs management, monitoring, and configuration
- Tight integration with virtual management platforms

- Enables advanced networking capability on the hypervisor
- Provides each virtual machine with dedicated "switch port"
- Collection of VEMs : 1 virtual network Distributed Switch

Cisco Nexus 1000V VSM

VM Management Station
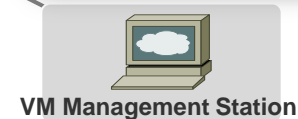
Cisco Nexus 1000V Overview
Consistent NX-OS Featureset for Virtual Networks

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

Security	
	• Policy Mobility, Private VLANs w/ local PVLAN Enforcement
	• Access Control Lists, Port Security, Cisco TrustSec Support
	• 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), vWAAS, ASA1000V]

Provisioning	
	• Port Profiles, Integration with vC, vCD, SCVMM*, BMC CLM
	• Optimised NIC Teaming with Virtual Port Channel – Host Mode

Visibility	
	• VM Migration Tracking, VC Plugin, NetFlow v.9 w/ NDE, CDP v.2
	• VM-Level Interface Statistics, vTracker
	• SPAN & ERSPAN (policy-based)

Management	
	• Virtual Centre VM Provisioning, vCenter Plugin, Cisco LMS, DCNM
	• Cisco CLI, Radius, TACACs, Syslog, SNMP (v.1, 2, 3)
	• Hitless upgrade, SW Installer

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Cisco Nexus 1000V Architecture

vPath and VXLAN

Virtual Appliance

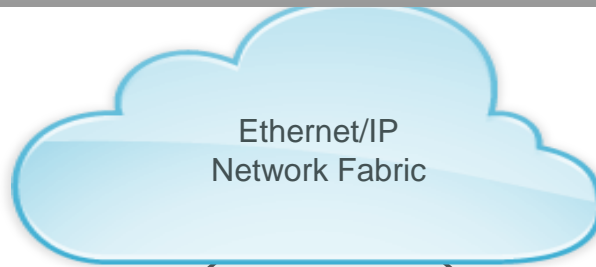| ASA 1000V	N1KV VSM	Cisco VSG	Cisco vWAAS	CSR1000V	Citrix VPX*	Imperva WAF*

Virtual Service Data Path (vPath)

Embedding intelligence for virtual services

- Service chaining (traffic steering)
- Fast-path offload
- VXLAN aware

Ethernet/IP Network Fabric

Nexus 1000V

| vPath | VXLAN |

Hypervisor ESX, Hyper-V

Nexus 1000V

| vPath | VXLAN |

Hypervisor KVM, Xen

Virtual Extensible LAN (VXLAN)

Scaling LAN segments DC-wide VM Mobility

- LAN segment across Layer 3
- Works with existing network infrastructure
- 16 million segments

Cisco Public

*To be released in CY13

Cisco Virtual Networking Vision

Nexus 1000V

Multi-Cloud

Multi-Services

Multi-Hypervisor

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Consistent Cloud Networking
Across Hypervisor and Orchestration Tools

	vmware®	**Microsoft**	**CITRIX® cloudstack**	**CISCO / openstack**
Cloud Portal and Orchestration	**vCloud Director/ Automation Centre**	**System Centre**	**Citrix CloudPlatform**	**CIAC/ OpenStack/ Partners**

L4-7 Virtual Network Infrastructure

Cloud Network Services

WAAS	ASA 1000V	VSG	NAM	NetScaler	Partners

vPath

L2-3 — **Nexus 1000V**

Hypervisor	vSphere	Hyper-V	XenServer	KVM
Computing Platform	**UCS**			
Physical Network	**Unified Fabric (Nexus 2000 – 7000)**			
Storage Platform	EMC²	NetApp™	HITACHI	

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Cisco Cloud Services

Hypervisor agnostic multi-service platform
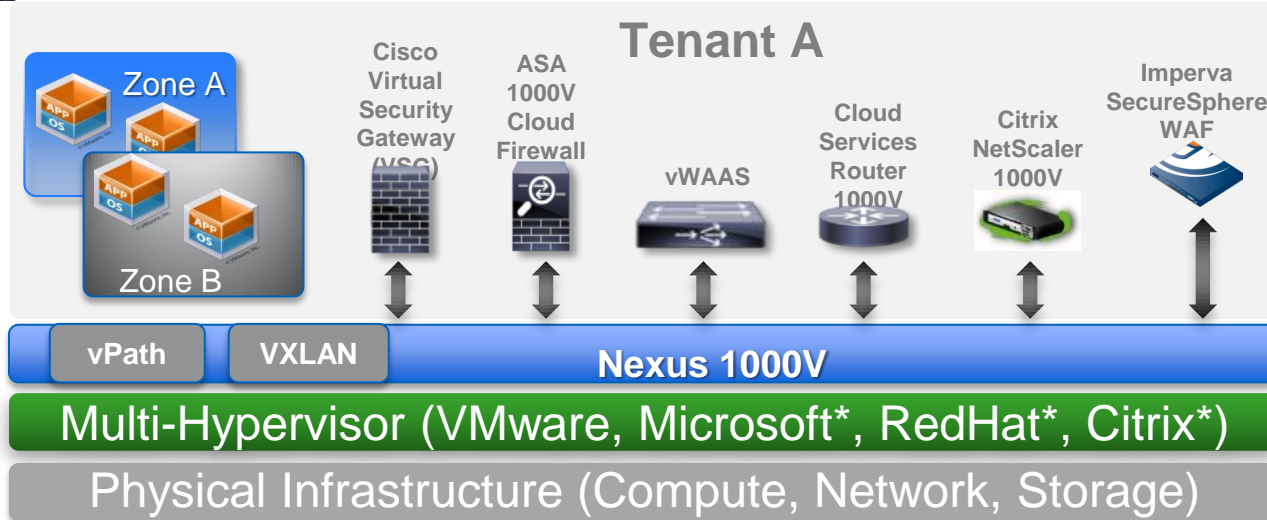
Tenant A

Zone A
Zone B

Cisco Virtual Security Gateway (VSG)

ASA 1000V Cloud Firewall

vWAAS

Cloud Services Router 1000V

Citrix NetScaler 1000V

Imperva SecureSphere WAF

vPath | VXLAN | **Nexus 1000V**

Multi-Hypervisor (VMware, Microsoft*, RedHat*, Citrix*)

Physical Infrastructure (Compute, Network, Storage)

Nexus 1000V	VSG	ASA 1000V	vWAAS	CSR 1000V (Cloud Router)	Ecosystem Services
• Distributed switch • NX-OS consistency	• VM-level controls • Zone-based FW	• Edge firewall, VPN • Protocol Inspection	• WAN optimisation • App, traffic	• WAN L3 gateway • Routing and VPN	• Citrix NetScaler 1000V • Imperva Web App. Firewall
9000+ Customers	**Shipping**	**Shipping**	**Shipping**	**Shipping**	

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Cisco's Vision for Hybrid Cloud

Private Cloud

Provider Cloud

Private Cloud

N1KV InterCloud

N1KV Switching
ASA Firewall
IOS Routing
Crypto Secure

Virtual Private Cloud

Tenant B
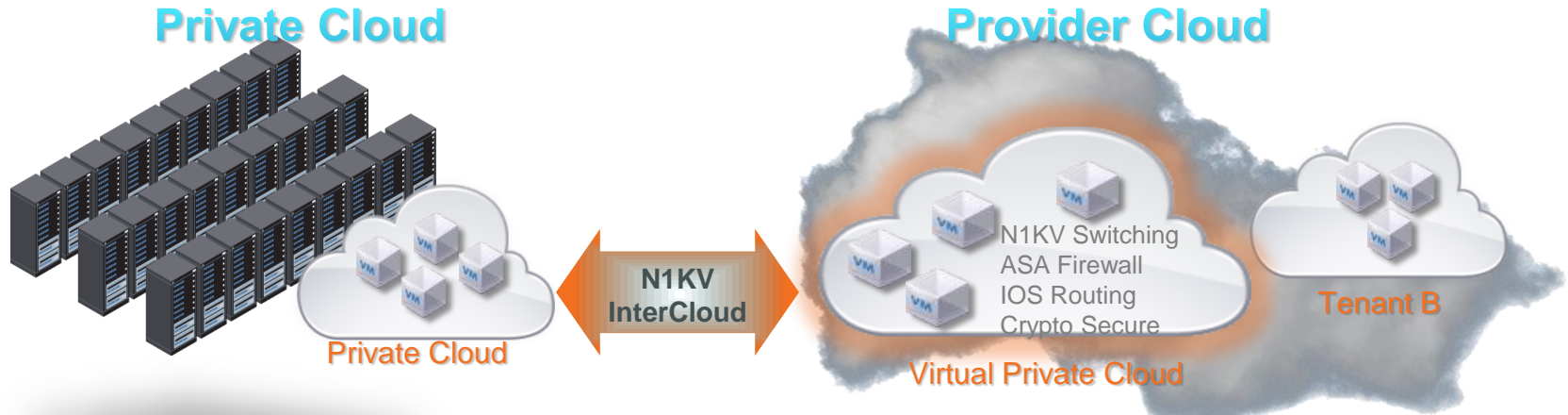
Secure Hybrid Cloud = Securely Extend Private Cloud into Provider Cloud

Use Cases	Workloads	Requirements
• Bursting	• Dev/QA	• Network consistency
• Disaster recovery/avoidance	• Intern/Partner VDI	• Security consistency
• Upgrade/migration	• Training Apps	• Policy consistency
	• Initially low-value workloads	

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Nexus 1000V is Free!

Now Cisco Nexus 1000V is Free

Flexible pricing model to meet customer needs

Nexus 1000V **Essential** Edition

The world's most advanced virtual switch

- Full Layer-2 Feature Set
- Security, QoS Policies
- VXLAN virtual overlays
- Full monitoring and management capabilities
- vPath enabled Virtual Services

Nexus 1000V **Advanced** Edition

Adds Cisco value-add features for DC and Cloud

- All Features of Essential Edition
- VSG firewall bundled (previously sold separately)
- VXLAN Gateway
- Support for Cisco TrustSec SGA
- Platform for other Cisco DC Extensions in the Future

**Start using the FREE Essential Edition today.
Download from http://cisco.com/go/1000v**

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Cisco Nexus 1000V Overview

Two Editions: Essential & Advanced

	Essential ($0)	Advanced ($1038/cpu)
VLANs, ACL, QoS	✓	✓
vPath	✓	✓
VXLAN	✓	✓
LACP	✓	✓
Multicast	✓	✓
Netflow, ERSPAN	✓	✓
Management	✓	✓
vTracker	✓	✓
vCenter Plugin	✓	✓
Virtual Security Gateway		✓
Cisco TrustSec SXP Support		✓
DHCP Snooping		✓
IP Source Guard		✓
Dynamic ARP Inspection		✓

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Cisco Nexus 1000V Essential Edition

It's Free: Start Using Today

1

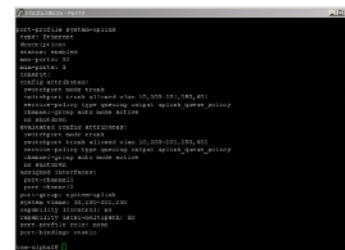Download Software
v2.1 from cisco.com*

2

Install Nexus 1000V
Using new Installer App**
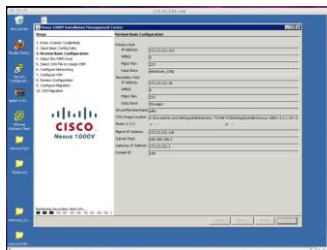
3

Create Port Profiles
& Start Using N1KV

Note: *CCO login required
         ** By default, the switch will be in Essential edition after installation

Cisco Public
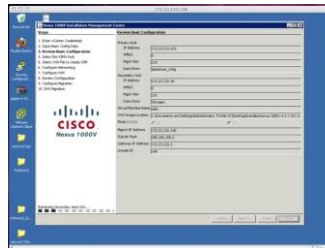
Cisco Nexus 1000V Advanced Edition

1

Download Software
v2.1 from cisco.com

2

Install Nexus 1000V
Using new Installer App

3

Change Switch mode
to **Advanced***
& Start Using N1KV

Command:
"svs switch edition advanced"

Note: * Ensure Nexus 1000V licenses are installed prior to enabling
Advanced edition

Cisco Public

Cisco Nexus 1000V Advanced Edition

1

Download Software
v2.1 from cisco.com

2

Install Nexus 1000V
Using new Installer App

3

Change Switch mode
to **Advanced***

Enabling Advanced Edition is as simple as running a command!

Duration: 60 days trial license
License Activation: Yes

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Existing Customers

Free Upgrade to Advanced Edition

N1KV Release 1.X

N1KV Release 2.1

N1KV licenses bought and deployed

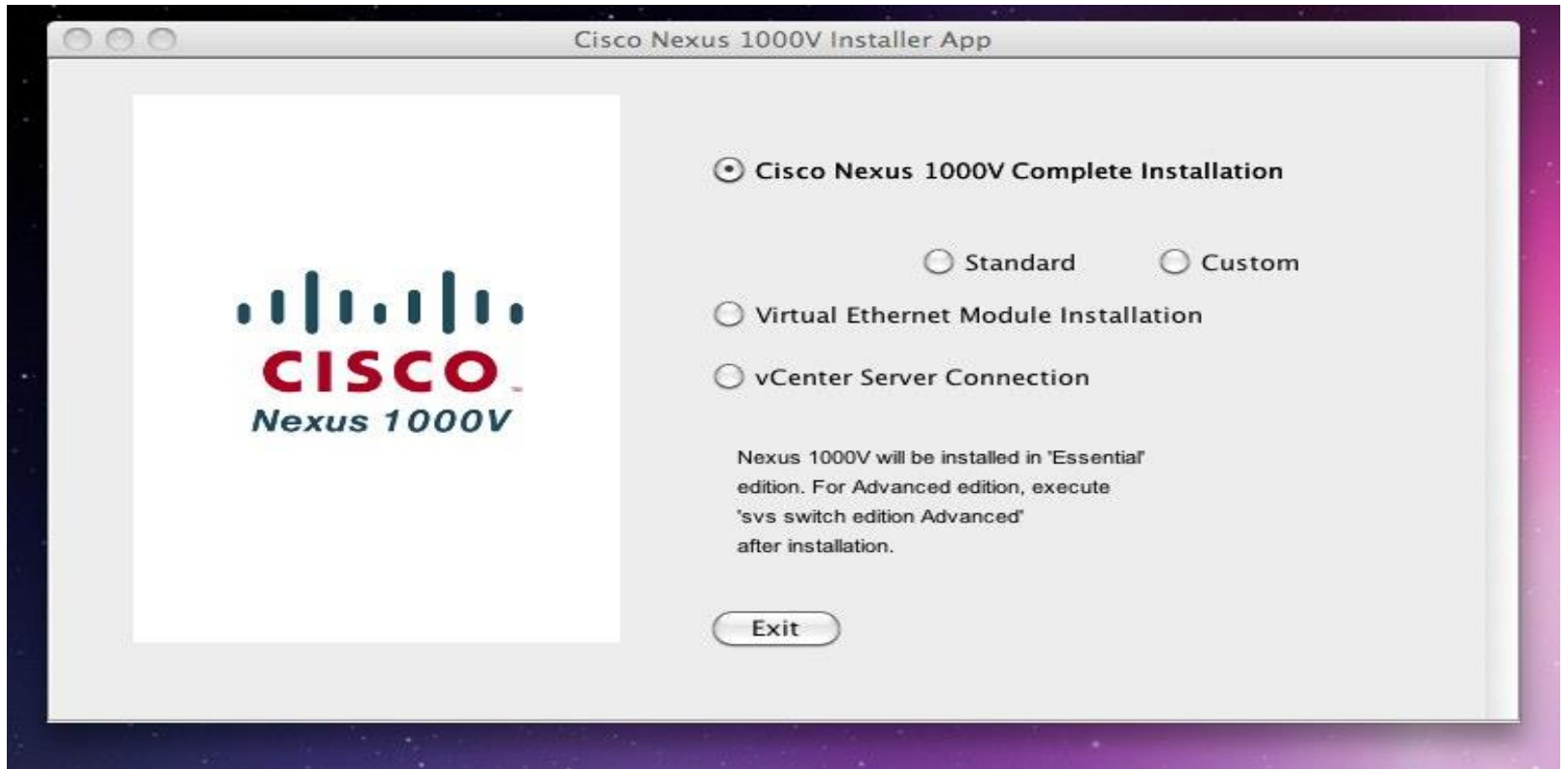Free upgrade to Release 2.1 Advanced

N1KV – Advanced Edition:
No Cost
use existing licenses

Seamless upgrade for Existing Customers to the Nexus 1000V Advanced Edition

Cisco Public

Deploying Nexus 1000V

Installer Application

Config File Feature (Screenshots)

Installation Steps (Screenshots)

Nexus 1000V Installation Management Center

Steps

1. Prerequisites
2. vCenter Server Credentials
3. Basic Configuration Data
4. **Basic Configuration Review**
5. Confirmation
6. Hosts Selection
7. Host Review

Install VEMs using VEM installer...

Basic Configuration Review

Installation Progress:

✓ Configuring Properties
✓ Configuring Network
  ✓ Control VLAN
  ✓ Management VLAN
✓ Setting Properties
✓ Checking VSM Status
  ✓ Configuring Virtual Device Specification
  ✓ Configuring Property Specification
  ✓ Powering On VSM
✓ Establishing SSH Connection (this might take a few minutes)
  ✓ Registering Extension with vCenter
  ✓ Creating SVS Connection
✓ Cleaning Up the Installation
  ✓ Removing OVF Properties
  ✓ Deleting Temporary Files
✓ Validating Install
✓ Installation Completed
  Add Host to Nexus 1000V DVS
  Creating Port Profiles
  Migrate Eligible Adapters
  Migration Completed

< Prev   Next >   Finish   Cancel

Add Sdditional Host (Screenshots)

Sources for VEM Images

- Terminology :
  - Online VIBs – used by VMware Update Manager (VUM)
  - Offline VIBs – used by N1k installer and for manual installs

- Cisco.com – N1k download page – All offline VEMs for a VSM, posted on release date

- VSM portal – Both offline and online VIBs for compatible vSphere versions released before N1k

- VMware online portal – used by VUM – All online VIBs

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vSphere and N1k Capability

- N1k will support 2 to 3 vSphere versions
- N1k is binary compatible with vSphere – will automatically support all patches and updates on a vSphere version !
- Refer to compatibility information in the release notes

VEM Installation

- Installer Application – uses vCenter API to install VEM on the host

- VUM – Automatically installs VEM when host is added to N1k DVS

- Manual install – more control over installs, needs scripting to scale

Deploying Large Numbers of Hosts

No Network Admin Actions Required!

- VUM for VEM installation

- Set up a host
  - Complete with port profiles!

- Create a host profile

- Add hosts using host profile

- Nexus 1000V is Added!

Profile Name: UCS Profile

Profile/Policy
- UCS Profile
  - Memory reservation configuration
  - Storage configuration
  - Networking configuration
    - vSwitch
    - Virtual machine port group
    - Host port group
    - Service console port group
    - DNS configuration
    - IP route configuration
    - Service Console IP route configuration
    - Physical NIC configuration
    - vNetwork Distributed Switch
    - Service console virtual NIC (vNetwork Distributed...
    - Host virtual NIC
  - Date and time co
  - Firewall configu
  - Security configu
  - Service configur
  - Advanced config
  - User configuratio
  - User group conf

- Physical NIC configuration
- vNetwork Distributed Switch
- Service console virtual NIC (vNetwork Distributed...
- Host virtual NIC

- Images from VMware vSphere

Cisco Public
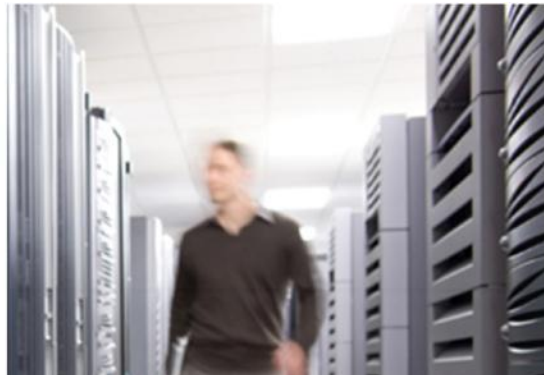
Best Practice Updates

LACP for "Clustered" Switches

Cisco vPC, VSS, VBS Stack

802.3ad LACP used by both sides to agree on how to load balance

Flow-based balancing allows more than one physical NIC to be used by a virtual NIC
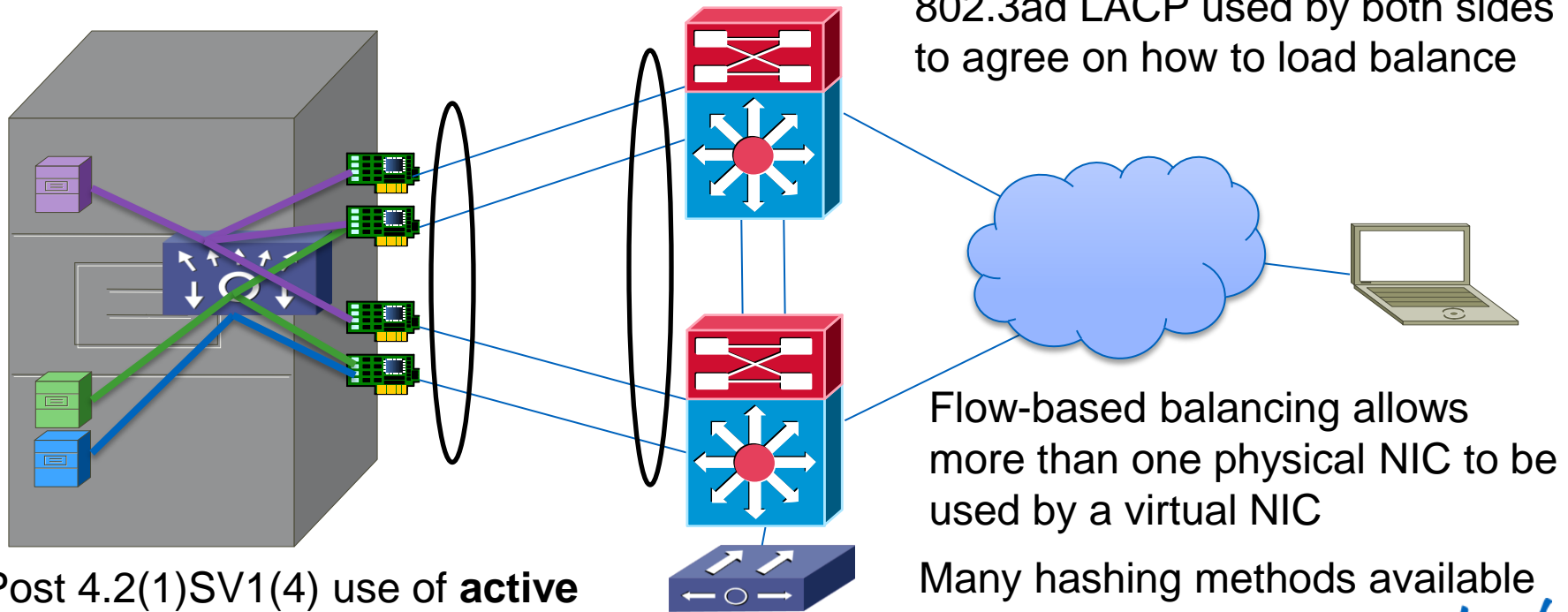
Post 4.2(1)SV1(4) use of **active** mode is preferred

Many hashing methods available

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MAC Pinning – Keeping it Simple

Simplest configuration; no upstream features required

All Pnics with the same port profile create a port channel

Each pnic is formed into its own subgroup

Each vnic is pinned to a particular pnic
vnics balanced across pnics

SubGroup   PortChannel
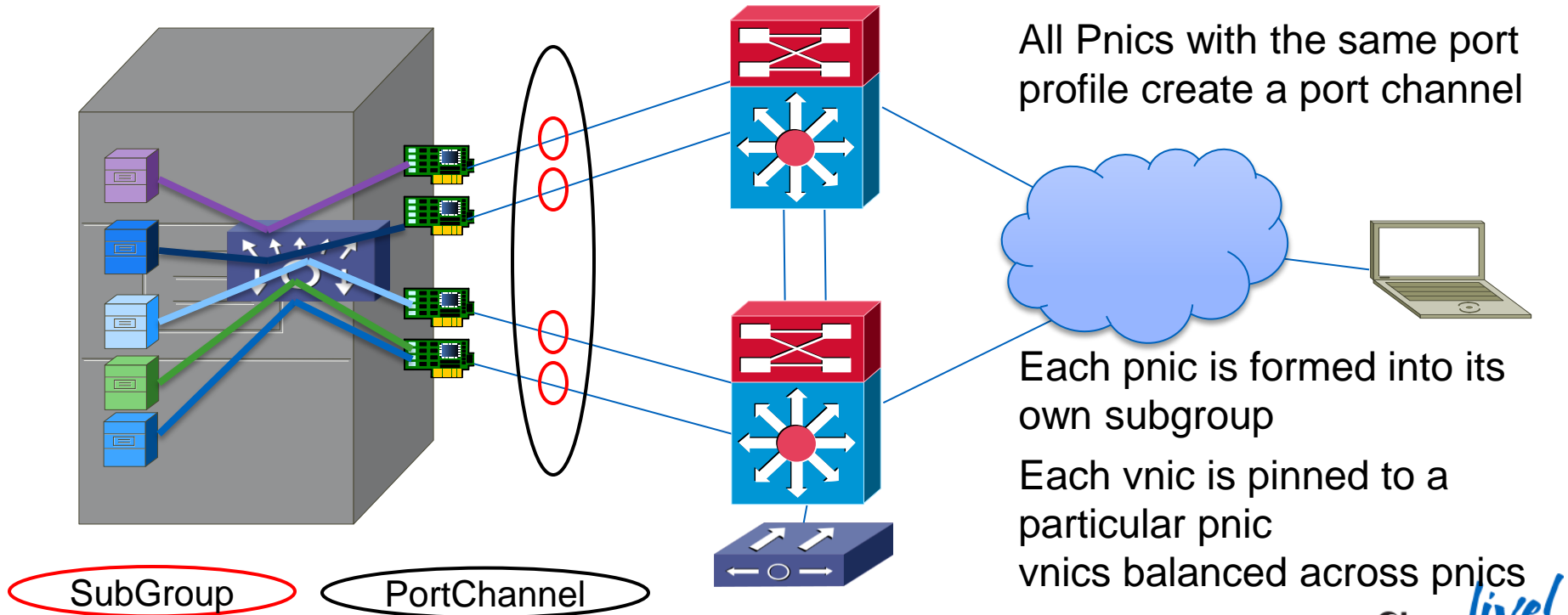
VSM Best Practices

- L3 control is recommended for new installations
  - No need to change a working L2 control setup

- Management, Control, and Packet can use same VLAN

- Do not use VLAN 1 for Control and Packet

- Primary and Standby VSM must be in the same L2 domain

- VSM VM can be backed up for recovery
  - Configuration backup must be done separately
  - "Configuring VSM Backup and Recovery" in System Management configuration guide

- If deploying VSM on remote storage, know the caveat
  - Storage failure will make N1k VSM non functional (NXOS mount partitions will go into read-only mode)

VSM and vMotion

- vMotion, DRS of VSM is supported
  - Define anti affinity rules for Primary and Secondary VSMs
- Aggressive DRS vMotion setting can cause VSM to drop packets. Can result in lose connectivity to VEM or switchover
- Using the **Nexus 1110** is a popular option that will avoid :
  - VSM storage concern
  - VSM DRS concern

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vMotion Inter Data Centre N1k Deployments

Data Centre 1

vCenter

VM VM VM

Nexus 1000V VEM

vSphere 4.1 Cluster

VSM Active

VM Datastore
for DC 1

Data Centre 2

VM VM VM VM

Nexus 1000V VEM

VSM Standby

DCI Latency
Max 10ms
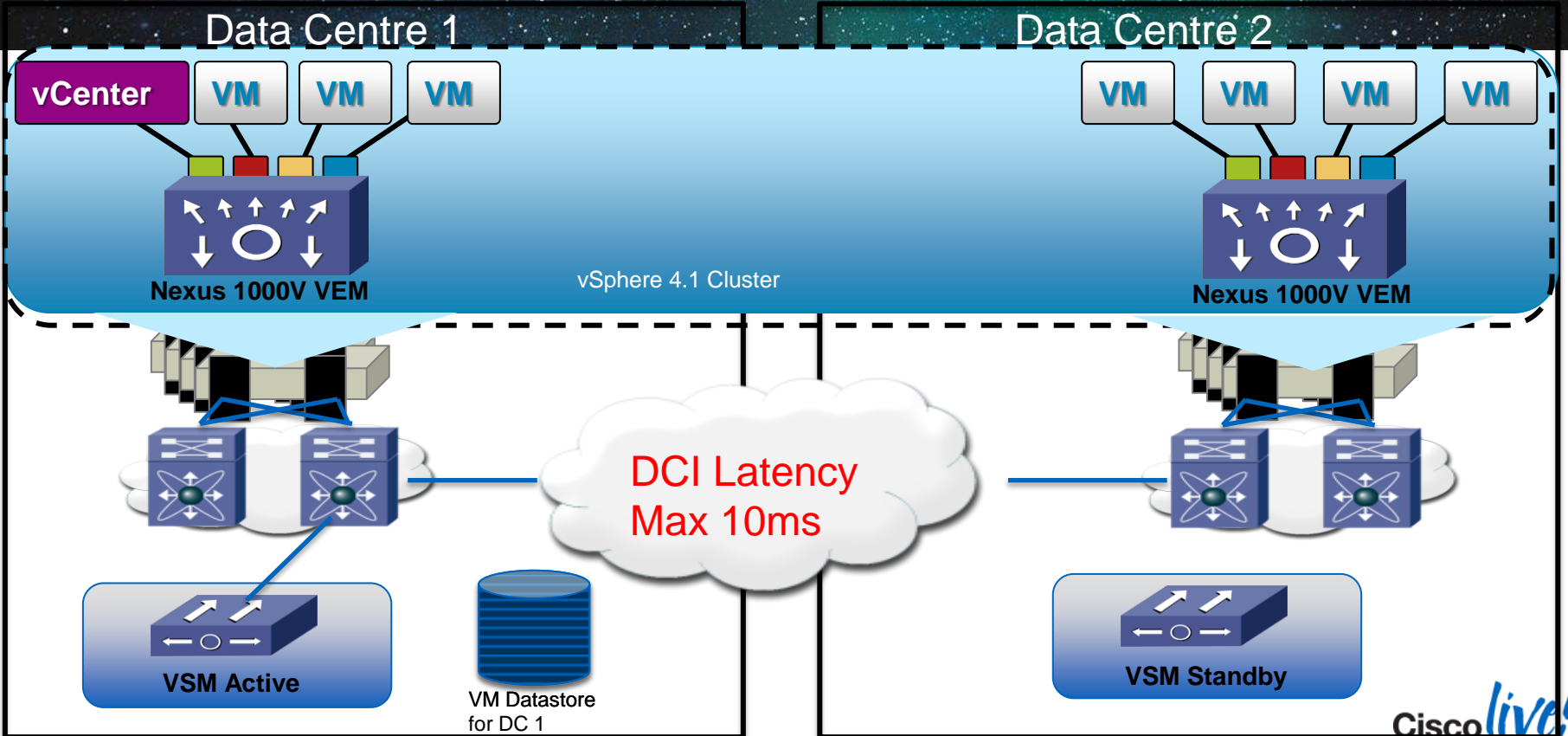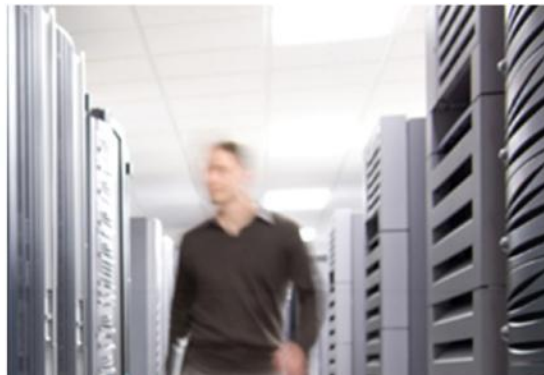
Upgrading the Nexus 1000V

Upgrading the Nexus 1000V Software

Keeping the Boundaries

3. Server admin upgrades VEMs

Server admin still owns the "hardware"
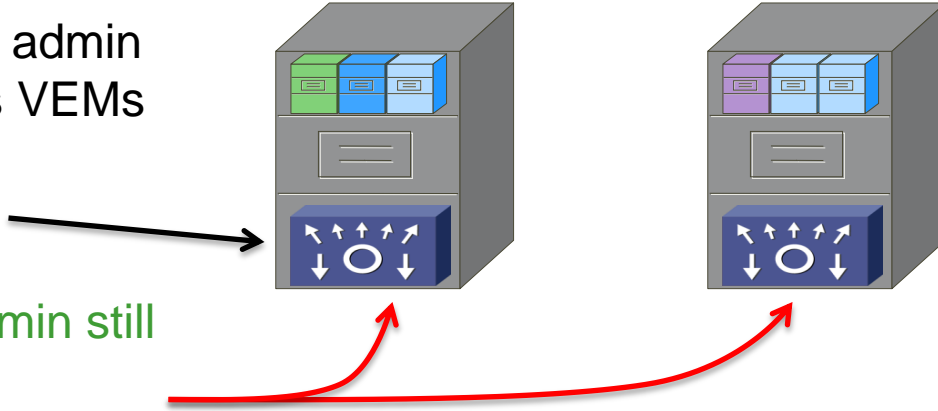
1. Network admin upgrades VSMs

2. VSM makes new VEM version available

vmware
vCenter Server

Cisco Public
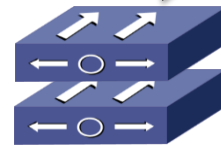
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Upgrading the Nexus 1000V Software

- VSM upgrade – Identical to other Nexus Products

- Upgraded VSM can work with previous version of VEM – So Server Admin schedule the upgrade as per is convenience (note Caveats later)

- VEM upgrade – should be handled (process and tools) as any other host upgrade (patches, updates)

- VEM upgrade options
  - VUM – caveat : currently automated but inflexible
  - Manual – flexible

- N1k upgrade utility for N1k upgrades with enhanced prechecks and error reporting coming – Stay tuned !

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Running Older VEMs with Upgrade VSM
Operations Allowed

- Add or remove ports (ETH and VETH).

- Shut or no-shut a port.

- Migrate ports to or from a vswitch.

- Change port modes (trunk or access) on ports.

- Add or remove port profiles.

- Modify port profiles to add or remove specific features such as VLANS, ACLs, QoS, or PortSec.

- Change port channel modes in uplink port profiles.

- Add or delete VLANs and VLAN ranges.

- Add or delete static MACs in VEMs.

- Note: Queuing configuration changes not supported on QoS.

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Simplified Upgrade Process

- Combined Upgrade: You can simultaneously upgrade the VEM and ESX versions
  - Requires vSphere version 5.0 Update 1 and above
    - Supported in Nexus 1000V version 4.2(1)SV1(5.2) and above
    - Can be done with VMware Update Manager or manually
- Upgrade few hosts or clusters incrementally when you upgrade Manually
  - Upgrade during normal working hours (no maintenance mode required) or short maintenance windows
  - Supported with combined upgrades of VEM and ESX, and also with manual upgrades of VEM alone

Cisco Public

vTracker : VM Visibility

What is vTracker?

- vTracker provides VM information through VSM
  - Works by pulling information from vCenter
- Following different views are available
  - Upstream
  - Vlan
  - Module Pnic
  - VM
  - VMotion

Upstream View
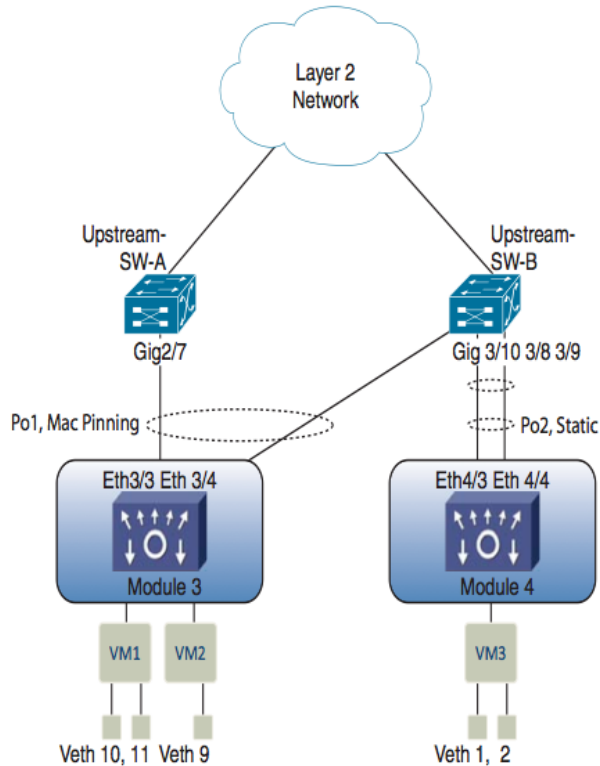
- Provides end-to-end network information from the physical switch to VM Veth ports

- Cisco Discovery Protocol (CDP) neighbour information must be enabled on network

Contd Upstream View…

```
VSM-N1k# show vtracker upstream-view

-------------------------------------------------------------------------
Device-Name          Device-Port  Server-Name      PC-Type    Veth-interfaces
Device-IP            Local-Port   Adapter Status    PO-Intf
-------------------------------------------------------------------------
Upstream-SW-A        Gig2/7       172.23.232.117   MacPinn    10-11
172.23.231.27        Eth3/3       vmnic2   up       Po1

Upstream-SW-B        Gig3/10      172.23.232.117   MacPinn    9
172.23.231.15        Eth3/4       vmnic3   up       Po1

                     Gig3/8       172.23.232.118   Default    1-2
                     Eth4/3       vmnic2   up       Po2

                     Gig3/9       172.23.232.118   Default    1-2
                     Eth4/4       vmnic3   up       Po2

-------------------------------------------------------------------------
VSM-N1k#
```

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Module PNic View

Provides hardware/firmware information on pnics
show vtracker module-view pnic [**module** *number*]

```
VSM-N1k# show vtracker module-view pnic

-------------------------------------------------------------------------------
Mod   EthIf     Adapter   Mac-Address     Driver    DriverVer        FwVer
                Description
-------------------------------------------------------------------------------
3     Eth3/8    vmnic7    0050.5652.f935  igb       2.1.11.1         1.4-3
                Intel Corporation 82576 Gigabit Network Connection

4     Eth4/3    vmnic2    0050.565e.df74  e1000     8.0.3.2-1vmw-NAPI  N/A
                Intel Corporation 82546GB Gigabit Ethernet Controller

4     Eth4/4    vmnic3    0050.565e.df75  e1000     8.0.3.2-1vmw-NAPI  N/A
                Intel Corporation 82546GB Gigabit Ethernet Controller

-------------------------------------------------------------------------------
VSM-N1k#
```

Vlan View

Provides information on all the VMs that are connected to a specific VLAN or a range of VLANs

show vtracker vlan-view [**vlan** *number/range*]

```
VSM-N1k# show vtracker vlan-view

* R = Regular Vlan,  P = Primary Vlan, C = Community Vlan
  I = Isolated Vlan, U = Invalid

-----------------------------------------------------------------------
VLAN    Type VethPort   VM Name               Adapter Name       Mod
-----------------------------------------------------------------------
1       R    -          -                     -                  -
233     R    -          -                     -                  -
335     R    -          -                     -                  -
336     R    -          -                     -                  -
337     R    -          -                     -                  -
338     R    -          -                     -                  -
339     R    Veth3      gentoo-2              Net Adapter 3      3
             Veth4      gentoo-2              Net Adapter 4      3
             Veth5      gentoo-2              Net Adapter 2      3
340     R    -          -                     -                  -
341     R    -          -                     -                  -
400     R    Veth1      Fedora-VM2            Net Adapter 1      5
401     R    Veth1      Fedora-VM2            Net Adapter 1      5
402     R    Veth1      Fedora-VM2            Net Adapter 1      5
403     R    -          -                     -                  -
404     P    Veth6      Fedora-VM1            Net Adapter 1      4
405     C    Veth2      Fedora-VM2            Net Adapter 3      5
406     I    Veth7      Fedora-VM1            Net Adapter 2      4
-----------------------------------------------------------------------
```

Cisco *live!*

VM VNic View

Provides information on vNICs

```
VSM-N1k# show vtracker vm-view vnic
* Network: For Access interface - Access vlan, Trunk interface - Native vlan,
           VXLAN interface - Segment Id.
-------------------------------------------------------------------------------
Mod VM-Name      VethPort     Drv Type   Mac-Addr        State Network Pinning
    HypvPort     Adapter      Mode       IP-Addr
-------------------------------------------------------------------------------
3   gentoo-2     Veth3        Vmxnet3    0050.56b5.37de  up    339     Eth3/8
    1025         Adapter 3    access     n/a

3   gentoo-2     Veth4        E1000      0050.56b5.37df  up    339     Eth3/8
    1026         Adapter 4    access     n/a

3   gentoo-2     Veth5        Vmxnet2    0050.56b5.37dd  up    339     Eth3/8
    1024         Adapter 2    access     n/a

4   Fedora-VM1   Veth7        E1000      0050.56bb.4fc1  up    406     Eth4/3
    4258         Adapter 2    pvlan      10.104.249.49

5   Fedora-VM2   Veth1        E1000      0050.56b5.098b  up    1       Po9
    100          Adapter 1    trunk      n/a

5   Fedora-VM2   Veth2        E1000      0050.56b5.098d  up    405     Po9
    3232         Adapter 3    pvlan      10.104.249.60

-------------------------------------------------------------------------------
VSM-N1k#
```

VM Info View

Provides information on all the VMs that run on each serve

```
VSM-N1k# show vtracker vm-view info module 4

Module 4:
    VM Name:                    Fedora-VM1
    Guest Os:                   Other Linux (32-bit)
    Power State:                Powered On
    VM Uuid:                    421871bd-425e-c484-d868-1f65f4f1bc50
    Virtual CPU Allocated:      1
    CPU Usage:                  1 %
    Memory Allocated:           256 MB
    Memory Usage:               1 %
    VM FT State:                Unknown
    Tools Running status:       Not Running
    Tools Version status:       not installed
    Data Store:                 NFS1_4
    VM Uptime:                  1 day 29 minutes 46 seconds

    VM Name:                    Fedora-VM2
    Guest Os:                   Other Linux (32-bit)
    Power State:                Powered On
    VM Uuid:                    4218ab37-d56d-63e4-3b00-77849401071e
    Virtual CPU Allocated:      1
    CPU Usage:                  1 %
    Memory Allocated:           256 MB
    Memory Usage:               1 %
    VM FT State:                Unknown
    Tools Running status:       Not Running
    Tools Version status:       not installed
    Data Store:                 NFS1_4
    VM Uptime:                  58 minutes 30 seconds
```

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VMotion View

```
show vtracker vmotion-view [now | last <1-100>]

VSM-N1k# show vtracker vmotion-view count 20
Note: Command execution is in progress..

Note: VM Migration events are shown only for VMs currently
      managed by Nexus 1000v.

* '-' = Module is offline or no longer attached to Nexus1000v DVS

----------------------------------------------------------------------------
VM-Name              Src Dst Start-Time              Completion-Time
                     Mod Mod
----------------------------------------------------------------------------
rk-ubt-1-0046        6   4   Mon Sep  3 10:42:27 2012 OnGoing

rk-ubt-1-0045        6   4   Mon Sep  3 10:42:27 2012 OnGoing

rk-ubt-1-0031        6   4   Mon Sep  3 10:42:27 2012 Mon Sep  3 10:44:10 2012

rk-ubt-1-0021        6   4   Mon Sep  3 10:42:27 2012 Mon Sep  3 10:43:42 2012

rk-ubt-1-0029        6   3   Thu Aug 16 14:25:26 2012 Thu Aug 16 14:27:55 2012

rk-ubt-1-0023        6   3   Thu Aug 16 14:25:26 2012 Thu Aug 16 14:27:50 2012

rk-ubt-1-0025        6   3   Thu Aug 16 14:25:26 2012 Thu Aug 16 14:26:13 2012

rk-ubt-1-0024        6   3   Thu Aug 16 14:25:26 2012 Thu Aug 16 14:26:12 2012

rk-ubt-1-0026        6   3   Thu Aug 16 14:25:26 2012 Thu Aug 16 14:26:09 2012

RHEL-Tool-VmServer   -   3   Wed Aug  8 12:57:48 2012 Wed Aug  8 12:58:37 2012

----------------------------------------------------------------------------
VSM-N1k#
```

Resource Availability

Resource Availability Overview

- Provides easy visibility for
  - Configuration limits on various "resources" on Nexus 1000V.
  - Resources could be vethernet ports, port channels, VLANs, etc.
  - Current usage of these resources
- Can be used to determine resource availability for whole DVS, per module or per resource.
- For whole DVS and module – similar to 'show tech' i.e. series of show commands executed one by one.
- For a specific resource – first prints DVS-wide limit and usage followed by per-module stats (if applicable)

Cisco Public

Supported Resources

```
switch#
switch# show resource-availability ?
  <CR>
  >                    Redirect it to a file
  >>                   Redirect it to a file in append mode
  acl                  Show resource information for Acl
  all                  Show resource information for all resources
  bridge-domain        Show resource information for bridge-domains
  ethports             Show resource information for ethernet ports
  hosts                Show resource information for hosts
  ip                   Show resource information for IP
  mac-address-table    Show resource information for mac address table
  module               Show resource information for a specific VEM
  monitor              Show resource information for ethernet span
  netflow              Show resource information for Netflow
  port-channel         Show resource information for port channels
  port-profile         Show resource information for port-profiles
  port-security        Show resource information for port security
  private-vlan         Show resource information for private vlan
  qos-queuing          Show resource information for QoS and Queuing
  vethports            Show resource information for vethernet ports
  vlan                 Show resource information for vlan
  |                    Pipe command output to filter

switch# show resource-availability
```

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Resource Availability – Example 1

```
switch# show resource-availability
`show resource-availability hosts`

Maximum number of hosts that can be added to DVS: 64
Number of hosts currently powered up: 1
Number of hosts currently absent: 0
Number of hosts that can be added further: 63

`show resource-availability port-channel dvs-only`

Maximum number of port channels per DVS: 256
Number of port channels currently created: 2
Number of port channels available: 254

`show resource-availability port-profile`

Maximum number of port-profiles per DVS        : 2048
Number of port-profiles in use                 : 15
Number of port-profiles available              : 2033

Maximum number of system port-profiles per DVS : 32
Number of system port-profiles in use          : 5
Number of system port-profiles available       : 27

`show resource-availability vethports dvs-only`

Maximum number of Veth ports per DVS: 2048
Number of Veth ports used: 0
Number of Veth ports available : 2048

`show resource-availability vlan`
```

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Resource Availability – Example 2

```
switch# show resource-availability module 3
`show resource-availability acl module 3`
Maximum number of ACL instances per host is      256
Instances created is       0
Instances available is     256

`show resource-availability ethports module 3`

Maximum number of Eth ports per module: 32
Number of Eth ports in module: 3
Number of Eth ports available for module: 29

`show resource-availability mac-address-table module 3`

Maximum MAC Addresses per module: 32000
------------------------------------------------------------------
Module   Used   Available
------------------------------------------------------------------
     3     22       31978

`show resource-availability port-channel module 3`

Maximum number of port channels per module: 8
Number of port channels in module: 2
Number of port channels available for module: 6

`show resource-availability qos-queuing module 3`
Maximum number of instances per host is     256
Instances created is       0
Instances available is     256

`show resource-availability vethports module 3`
```

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Resource Availability – Example 3

```
switch# show resource-availability ip igmp snooping ?
  <CR>
  >          Redirect it to a file
  >>         Redirect it to a file in append mode
  |          Pipe command output to filter

switch# show resource-availability ip igmp snooping
Max number of IGMP groups supported: 512
Number of IGMP groups in use: 0
Number of IGMP groups available: 512

switch#
switch# show resource-availability port-channel ?
  <CR>
  >          Redirect it to a file
  >>         Redirect it to a file in append mode
  module   Show VEM specific information
  |          Pipe command output to filter

switch# show resource-availability port-channel

Maximum number of port channels per DVS: 256
Number of port channels currently created: 2
Number of port channels available: 254

Maximum number of port channels per module: 8
-------------------------------------------------------------------
Module   Used   Available
-------------------------------------------------------------------
    3      2          6

Note: Modules not seen in above table are either not added to DVS or have all 8 port channels available

switch#
```

Cisco Public

vCenter Plugin

vCenter Plugin

- Provide visibility to Server Admin on networking

- VC Plugin UI uses REST API to get info from VSM

- Requirements :

  - N1k 4.2(1)SV1(2)

  - VMware vSphere web client 5.1 only

  - vCenter version can be 5.0 or 5.1

Dashboard View

| Issues | Tasks | Events | Health | Cisco Nexus 1000V |

Getting Started | **Dashboard** | Switch | Hosts/VEM | About

Cisco Nexus 1000V Summary

System

Switch Name	NX-OS Version	VSM IP	DC Name	Connectivity Mod	VC Connectivity	VSM HA
Cx-VSM-51-MNN-1	4.2(1)SV2(1.1) [build 4.2(1)SV2(1.0.194)]	10.78.0.121	DC-123	L2	Connected	true

Network Statistics

VNICs vs Max	Hosts vs Max	Port-Groups vs Max	Veths/Host Max	VLAN / VXLAN vs Max	
				Vlan	VxLan
1(2048)	1(64)	2049(2048)	1(216)	2023(2048)	N/A(N/A)

Licenses

Cisco Nexus 1000V Edition: Essential

License Type	Licenses Available	Licenses Used	Earliest Expiration	Status
NEXUS_VSG_SERVICES_PKG	512	0	24 Nov 2012	Unused
NEXUS_ASA1000V_SERVICES_PKG	16	0	24 Nov 2012	Unused
NEXUS1000V_LAN_SERVICES_PKG	512	0	24 Nov 2012	Unused

Cisco Public

Switch View

| Issues | Tasks | Events | Health | Cisco Nexus 1000V |

Getting Started | Dashboard | **Switch** | Hosts/VEM | About

Cisco Nexus 1000V Switch Level Details

Host/VEM | VM Info | Port Groups | vNICs | Uplinks

Host Name	NX-OS Version	Host IP	License	Host / Module	VMs / Host	VNICs / Host
10.78.0.125	4.2(1)SV2(1.1)	10.78.0.125	licensed	3	1	1

Logout

Hosts/VEM View

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Virtual Extensible Local Area Network (VXLAN)

Virtual Workload on Physical Data Centre

Elastic Virtual Workload

New Workload Exceeding Capacity

Mobility Across Layer 3?

Layer 2

Layer 2

On Physical Server & Network Infrastructure

How to Optimally Leverage Physical Infrastructure?

Layer 3
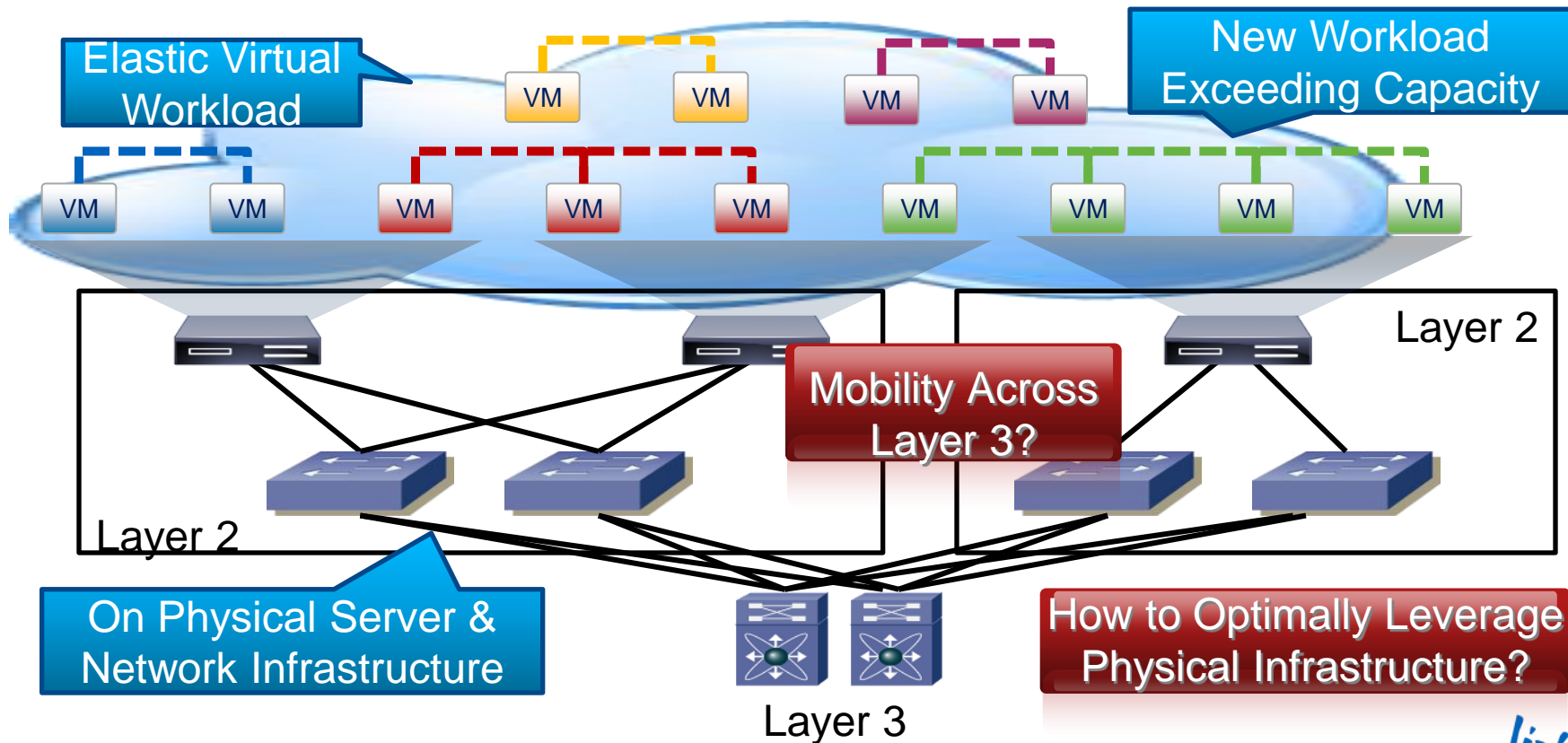
Scalable Pod Deployment with VXLAN within a Data Centre

Logical Network Spanning Across Layer 3

VM   VM   VM   VM VM VM   VM

Utilise All Links in Port Channel with UDP

Add More Pods to Scale

Cisco Public
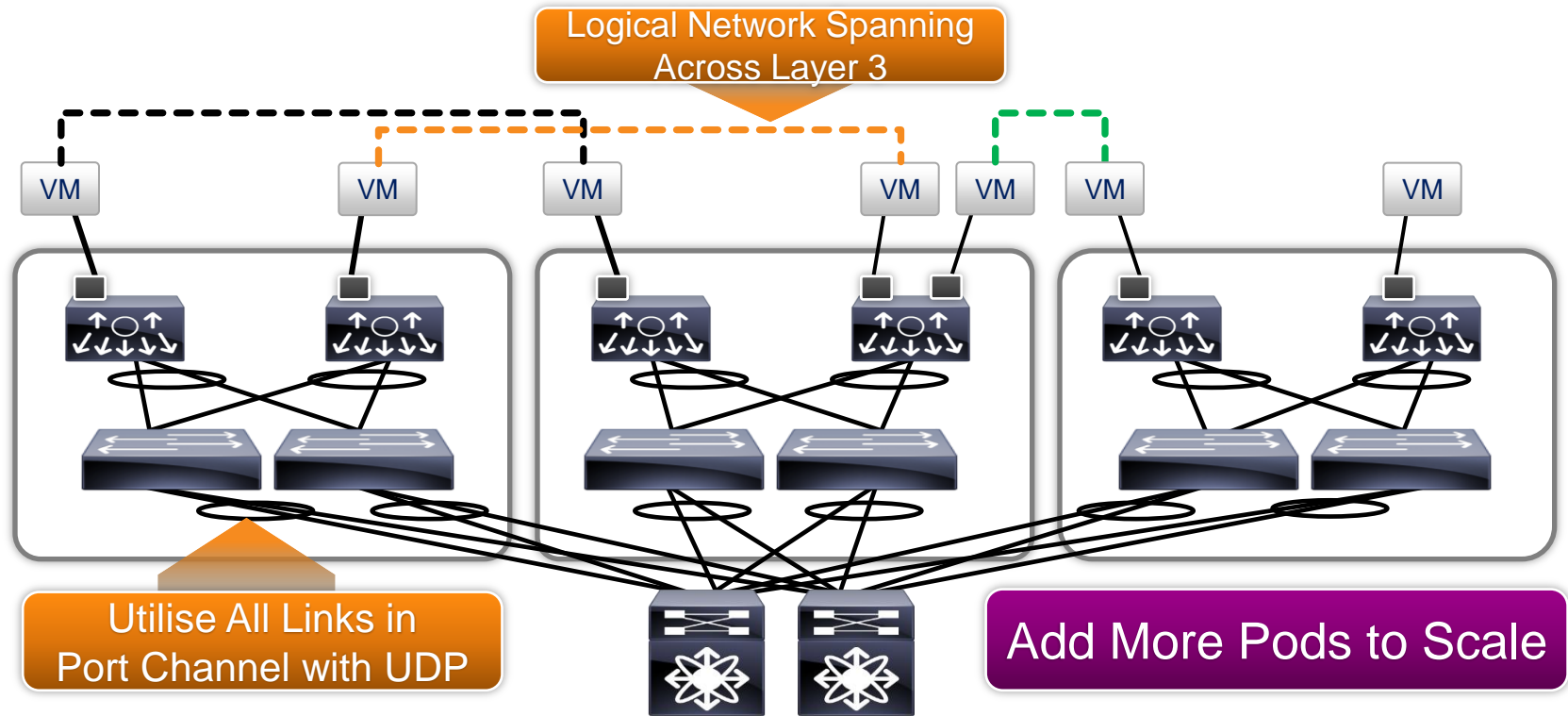
Virtual Extensible Local Area Network (VXLAN)

- Ethernet in IP overlay network
  - Entire L2 frame encapsulated in UDP
  - 50 bytes of overhead

- Include 24 bit VXLAN Identifier
  - 16 M logical networks
  - Mapped into local bridge domains

- VXLAN can cross Layer 3

- Tunnel between VEMs

- IP multicast used for L2 broadcast/multicast, unknown unicast

- Technology submitted to IETF for standardisation
  - With VMware, Citrix, Red Hat, and others
  - UDP Port 4789 assigned to VXLAN

Ethernet Frame

Outer MAC DA	Outer MAC SA	Outer 802.1Q	Outer IP DA	Outer IP SA	Outer UDP	VXLAN ID (24 bits)	Inner MAC DA	Inner MAC SA	Optional Inner 802.1Q	Original Ethernet Payload	CRC

VXLAN Encapsulation

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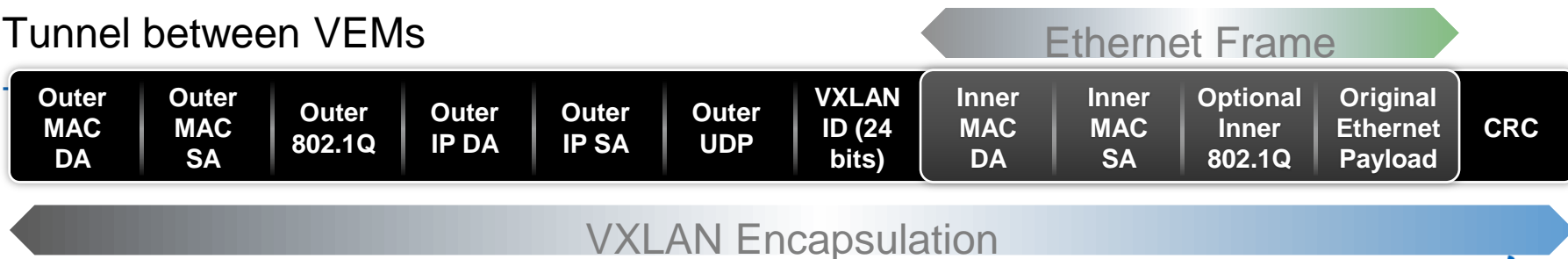
Nexus 1000V VEM VMKNICs = VTEPs

- Management VMKNIC
  - For VSM to VEM communication
- VXLAN VMKNIC(s)
  - For terminating VXLAN encapsulated traffic
  - VTEPs – VXLAN Tunnel endpoints
  - Connected to a "Transport VLAN" to carry VXLAN traffic

VM VM

Mgmt VMKNIC

VXLAN VMKNIC

Cisco Public
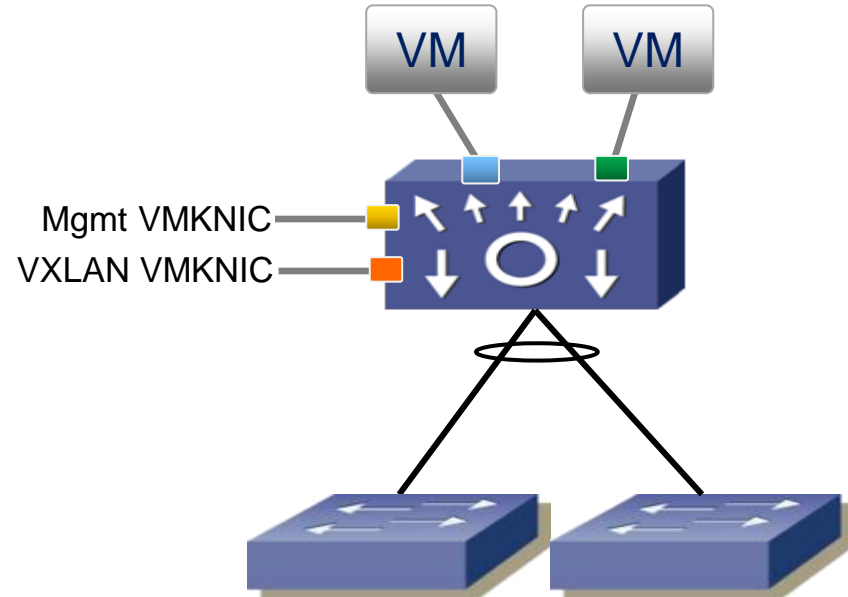
VXLAN Forwarding Basics

Forwarding mechanisms similar to Layer 2 bridge: Flood & Learn

VEM learns VM's Source (MAC, Host VXLAN IP) tuple

Broadcast, Multicast, and Unknown Unicast Traffic

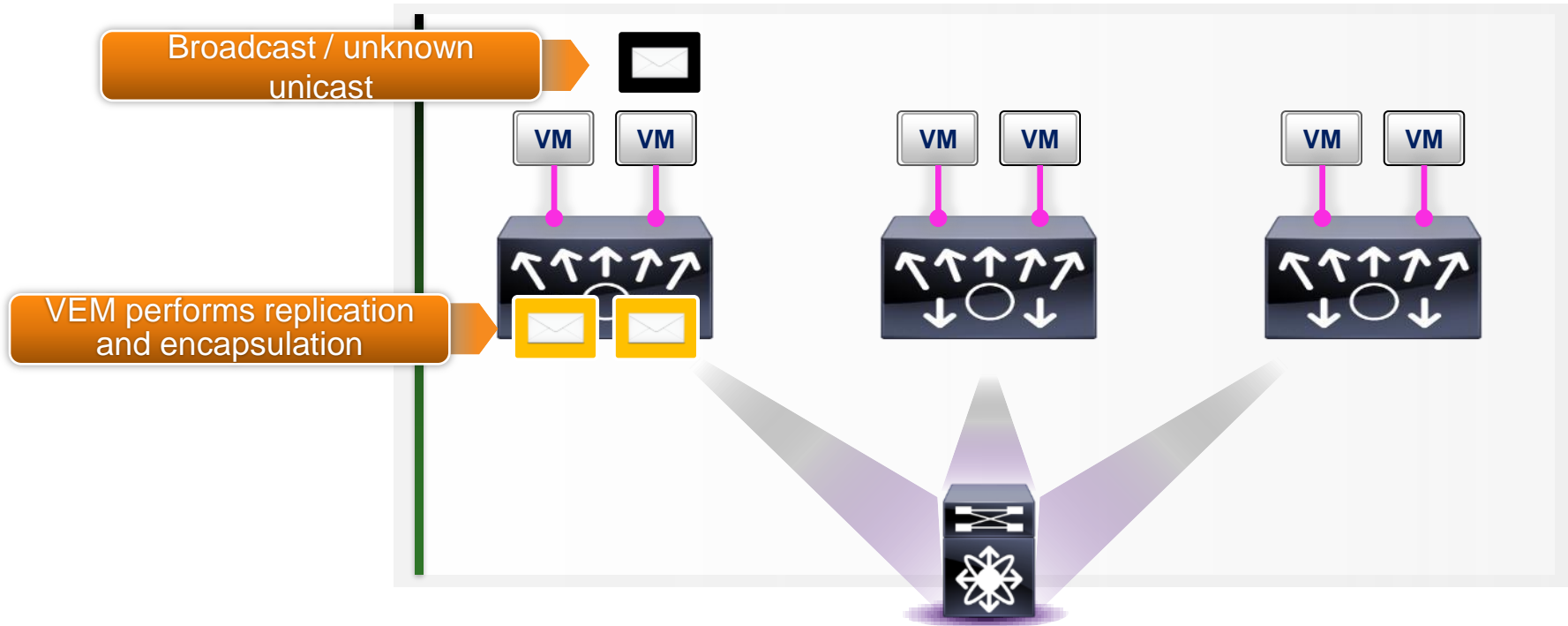VM broadcast & unknown unicast traffic are sent as multicast

Unicast Traffic

Unicast packets are encapsulated and sent directly (not via multicast) to destination host VXLAN IP (Destination VEM)

VM **VM** **VM** **VM**

VEM 1 **VEM 2**

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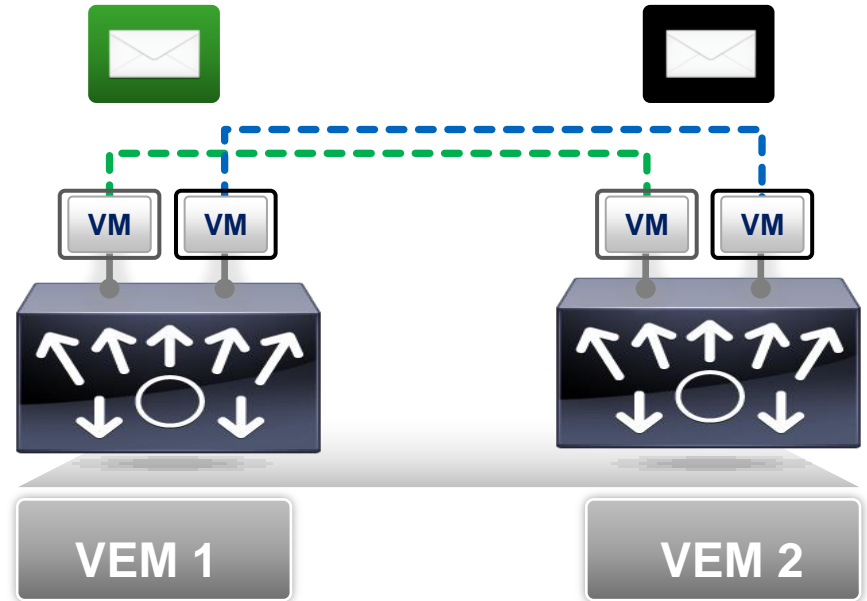
Broadcast and Unknown Unicast in Enhanced VXLAN

Broadcast / unknown unicast

VEM performs replication and encapsulation

VM   VM   VM   VM   VM   VM

No Multicast Needed

VXLAN MAC Distribution

VEM IP / MAC Table

VXLAN	IP/MAC
5000	[a.a.a]
	[b.b.b]
	[c.c.c]
	[d.d.d]

[a.a.a] VM [b.b.b] VM

[c.c.c] VM 3 [d.d.d] VM 4

Send unicast to MAC X

Malicious VM in VXLAN 5000

VM (M)

10.10.10.10

20.20.20.20

VEM IP / MAC Table

VXLAN	IP/MAC
5000	[a.a.a]
	[b.b.b]
	[c.c.c]

VSM distributes VXLAN / MAC

MAC X not found in table. **Packet Dropped.**

VSM learns VXLAN / MAC

VSM IP / MAC Table

VXLAN	IP/MAC
5000	[a.a.a]
	[b.b.b]
	[c.c.c]
	[d.d.d]

Nexus® 1000V VSM
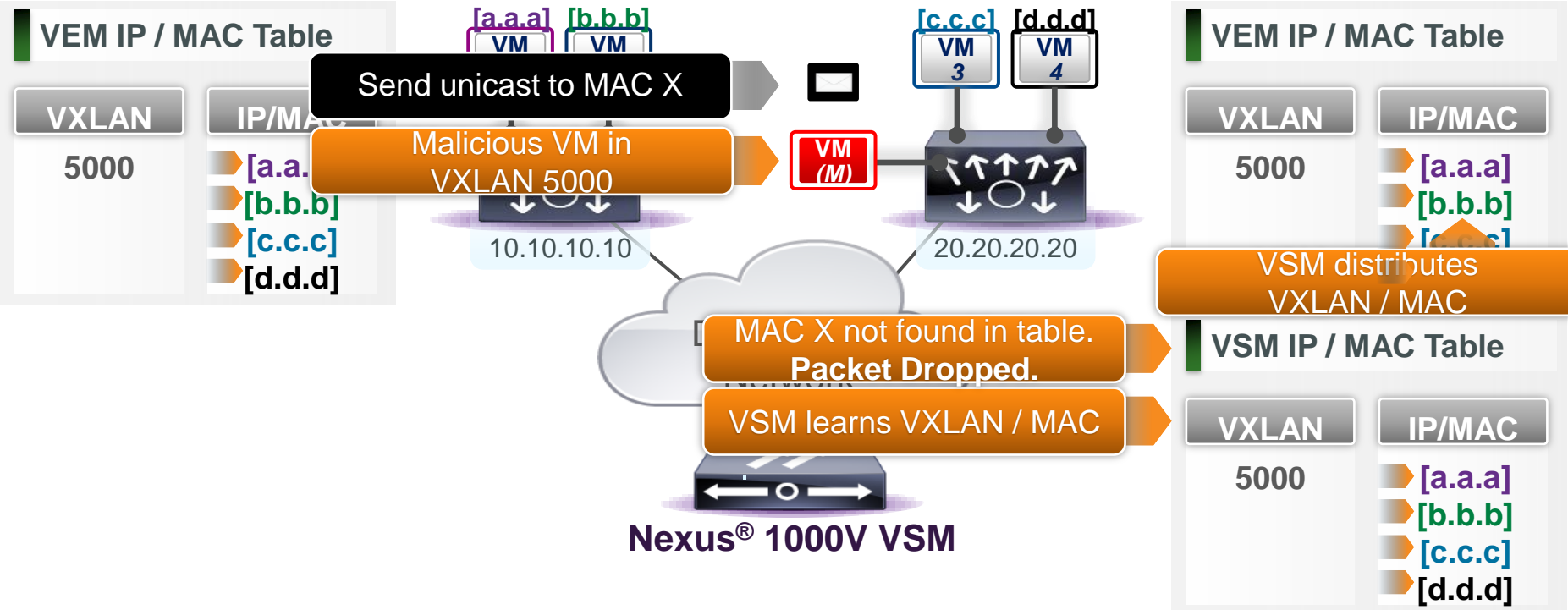
Unknown Unicast Flood Prevented

VXLAN ARP Termination

VEM IP / MAC Table

VXLAN	IP/MAC
5000	[192.1.1.1, a.a.a] [192.1.1.1, b.b.b] [192.1.1.1, c.c.c]

In this mode VEM learns VXLAN / IP / MAC

[192.1.1.1.a.a.a]

VM 3 ARP request for 192.1.1.1

[192.1.1.1.b.b.b] [192.1.1.1,c.c.c]

192.1. VEM ARP reply with
VXL   VM1's MAC a.a.a

10.10.10.10

20.20.20.20

Data Centre Network

VEM IP / MAC Table

VXLAN	IP/MAC
	[192.1.1.1, a.a.a] [192.1.1.1, b.b.b] [192.1.1.1, c.c.c]

VSM distributes VXLAN / MAC

VSM IP / MAC Table

VSM learns VXLAN / IP / MAC

VXLAN	IP/MAC
5000	[192.1.1.1, a.a.a] [192.1.1.1, b.b.b] [192.1.1.1, c.c.c]

Nexus® 1000V VSM

No ARP Broadcast

Enhanced VXLAN

VXLAN Mode

Packet	VXLAN (multicast mode)	Enhanced VXLAN (unicast mode)	Enhanced VXLAN MAC Distribution	Enhanced VXLAN ARP Termination
Broadcast / Multicast	Multicast Encapsulation	Replication plus Unicast Encap	Replication plus Unicast Encap	Replication plus Unicast Encap
Unknown Unicast	Multicast Encapsulation	Replication plus Unicast Encap	Drop	Drop
Known Unicast	Unicast Encapsulation	Unicast Encap	Unicast Encap	Unicast Encap
ARP	Multicast Encapsulation	Replication plus Unicast Encap	Replication plus Unicast Encap	VEM ARP Reply

Virtual Overlay Network

Physical Firewall

Gateway

Gateway

WAN

Gateway

Router

VM

Data Centre Network

Overlay ↔

Gateway

Bare Metal Servers

Overlay: Instant Provisioning

- Overlay needs gateway to access physical network
- Physical network to support overlay traffic pattern

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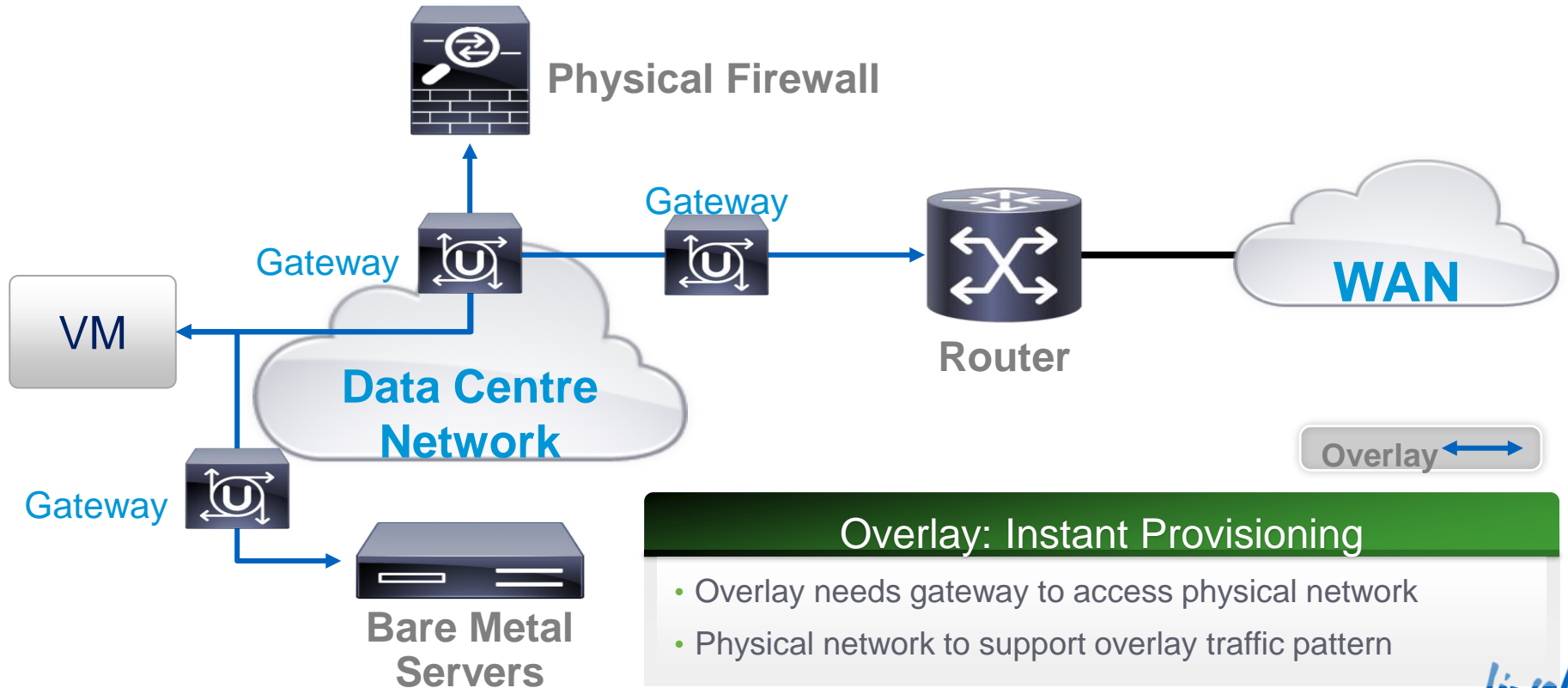
VXLAN to VLAN Gateway

Hosted on local hypervisor as virtual machine connected to Virtual Ethernet Module

Managed as a module from VSM

Active/Standby VXLAN Gateway

Integrated with OpenStack

Scale:
4 VXLAN Gateway per VSM | 2k Active VXLAN | 2k Active VLAN

VXLAN to VLAN Gateway

VXLAN to VLAN Gateway

VXLAN to VLAN Gateway

L2 Domain A

Web VM

L2 Domain B

VXLAN
VXLAN Gateway

Bare Metal DB Server

L2 Domain C

VXLAN
VXLAN Gateway

ASA 5500

LAYER 3

— VXLAN 5500
— VLAN 100
— VLAN 200

Cisco *live!*
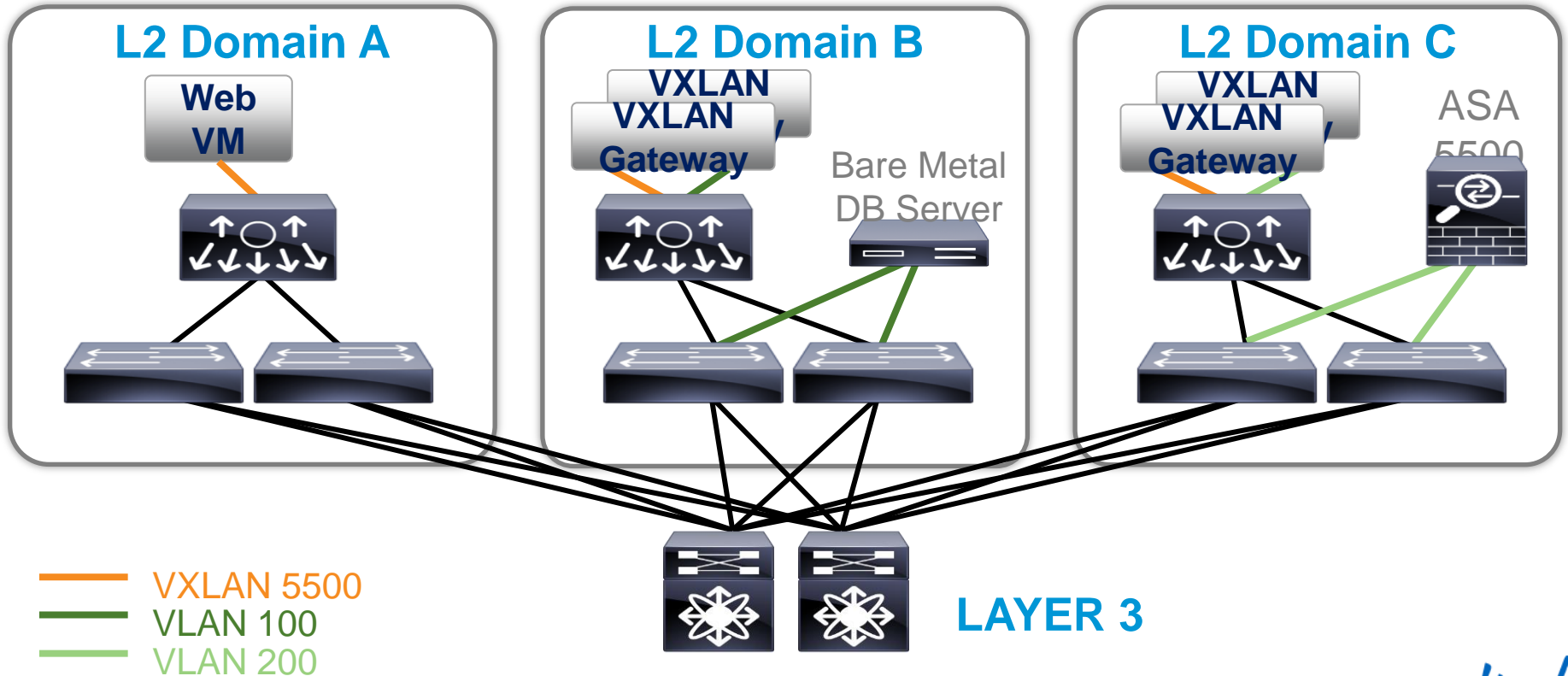
Virtualised Network with Cisco vPath

Deployment Options in Virtual/Cloud DC

1 Redirect VM traffic via VLANs to external (physical) firewall

| Web Server | App Server | Database Server |

Hypervisor

VLANs

Virtual Contexts

Traditional Service Nodes

2 Apply hypervisor-based virtual network services

| Web Server | App Server | Database Server |

Hypervisor

VSN

Virtual Service Nodes

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Why vPath?

Without vPath

VM	VM	VM
vSwitch		
VSN 1	VSN 2	

VM	VM	VM
vSwitch		
VSN 1	VSN 2	

VM	VM	VM
vSwitch		
VSN 1	VSN 2	

With vPath

VM	VM	VM
vPath		
Nexus 1000V		

VM	VM	VM
vPath		
Nexus 1000V		

VM	VM	VM
vPath		
Nexus 1000V		

VSN 1

VSN 2

	Without vPath	With vPath
Deployment	**Complex** Virtual Services Scope is Host-Local. One per Host.	**Simpler** Virtual services scope is network-wide. VSN shared among one or many Hosts.
Capacity Planning	**Difficult** App workloads share CPU resources with virtual services	**Easier** Virtual services can reside on dedicated servers. Can be hosted on Nexus 1010 appliance
Separation of Duties	**Server Admin is owner** Server/hypervisor maintenance need to be co-ordinated	**Network/Security Admin is owner** Virtual services can reside on dedicated servers.. Little co-ordination is needed
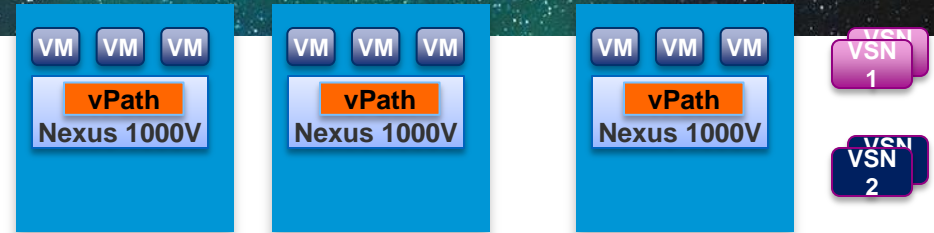
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vPath – Service Overlay Model
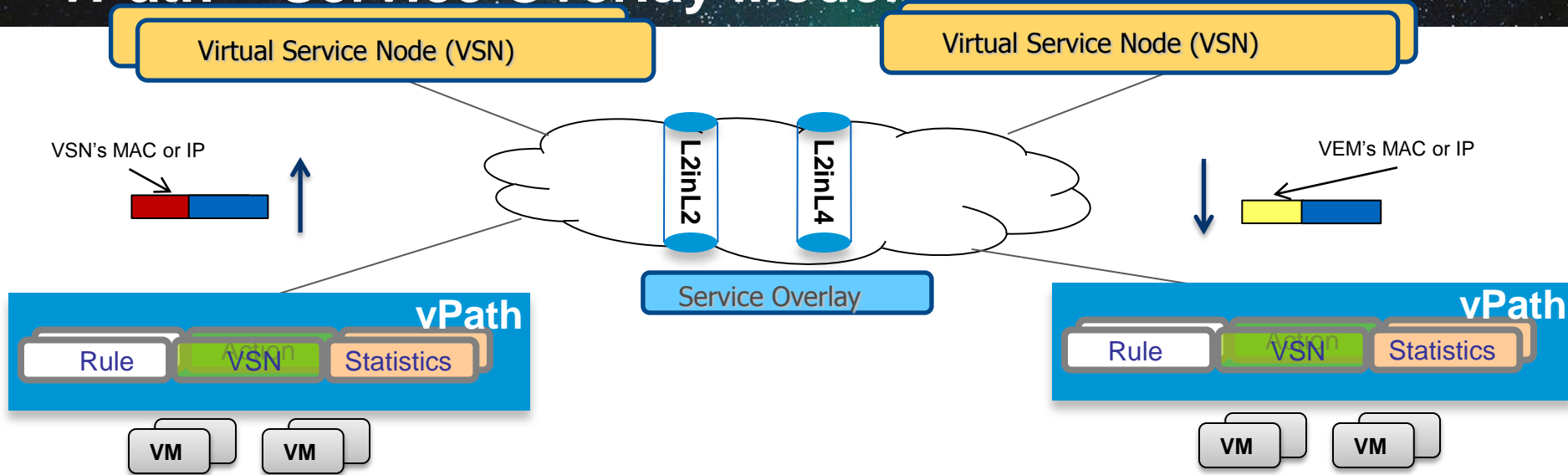
- L2 Mode – VSN is l2-adjacent to switch, uses Mac-in-Mac Encapsulation

- L3 Mode – VSN is L3 hop away from switch, uses Mac-in-UDP Encapsulation

- Overlay provides topology agnostic model – enables mobility of VSNs

VSG Packet Flow

Intelligent Traffic Steering

VM **VM** **VM** **VNMC**

VM **VM** **VM** **VM** **VM** **VM** **VM**

VM **VM** **VM** **VM** **VM** **VM** **VM** **VM** **VM**

④

Nexus 1000V
Distributed Virtual Switch

vPath

**Decision
Caching**

③

VSG

① **Initial Packet
Flow**

② **Flow Access
Control
(policy evaluation)**

Log/Audit

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Cisco live!
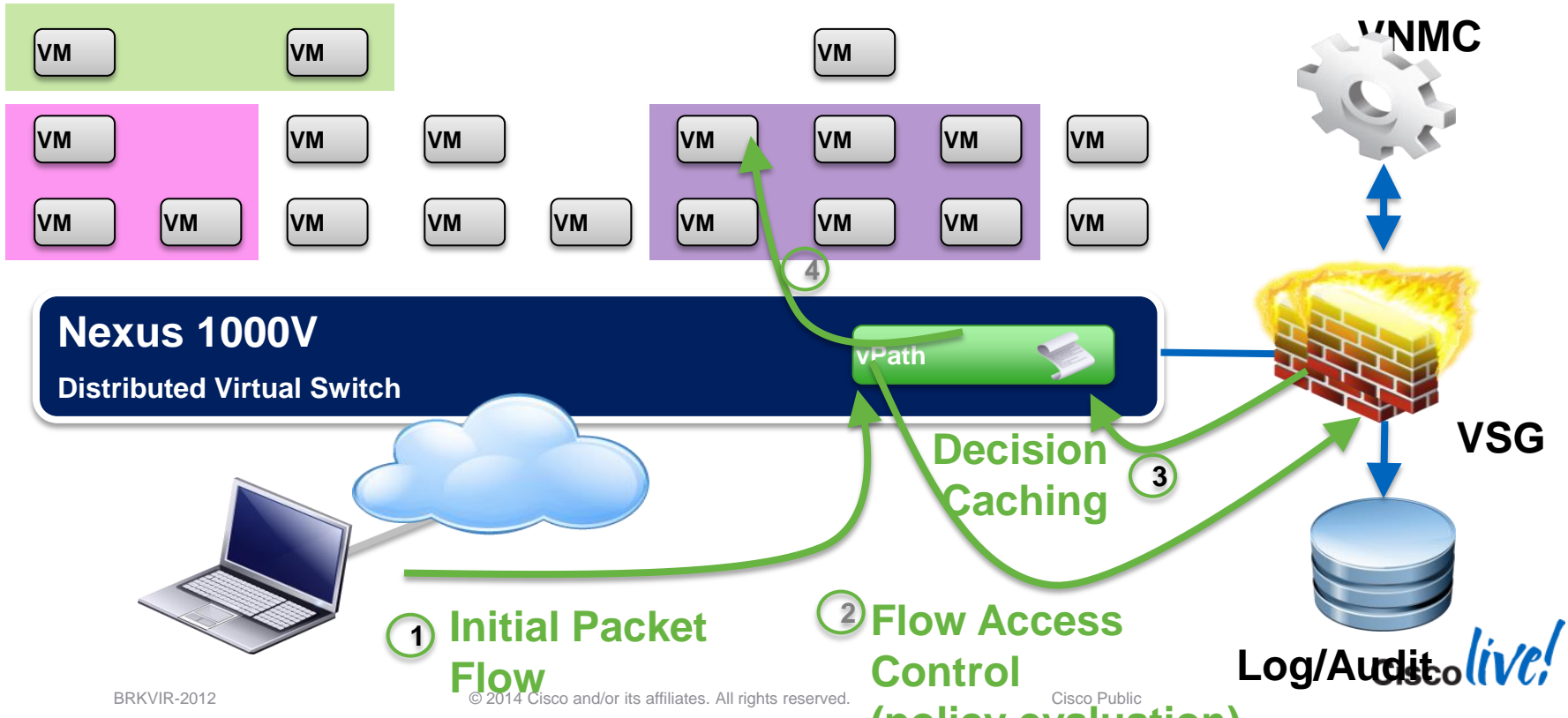
VSG Packet Flow
Performance Acceleration

VNMC

VM   **VM**   **VM**

VM   **VM**   **VM**   **VM**   **VM**   **VM**   **VM**

VM   **VM**   **VM**   **VM**   **VM**   **VM**   **VM**   **VM**   **VM**

Nexus 1000V

Distributed Virtual Switch

/Path

VSG

ACL offloaded to Nexus 1000V (policy enforcement)

Remaining packets from flow

Log/Audit
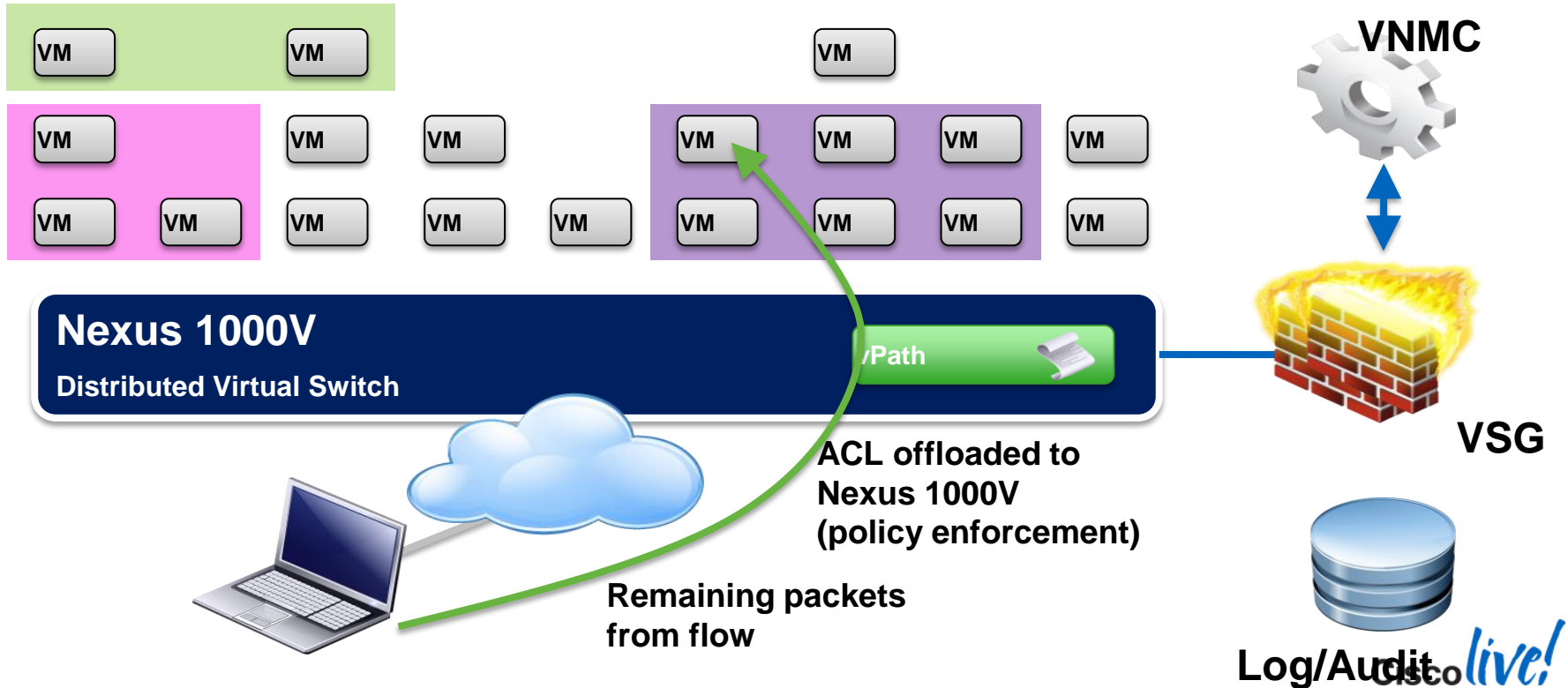
vPath – Service Chaining

- Service Path defines the service chain – an ordered list of service profiles (e.g. security profile, edge profile, slb profile etc.)

- Traffic Selector rules are used to configure Service Table in vPath

- An endpoint VM is associated with Service Path via Port-Profile Binding

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Cisco Cloud Network Services

- A complete Layer 4 through 7 virtual service portfolio
- Best-in-class service insertion technology with vPath
- Built for all major hypervisor platforms

vPath
Nexus 1000V

Any Hypervisor

VM VM VM

Cisco Cloud Network Services (CNS)

Citrix NetScaler 1000V	Prime virtual NAM	Imperva SecureSphere WAF	Virtual Security Gateway	ASA 1000V	Virtual WAAS	CloudServices Router 1000V
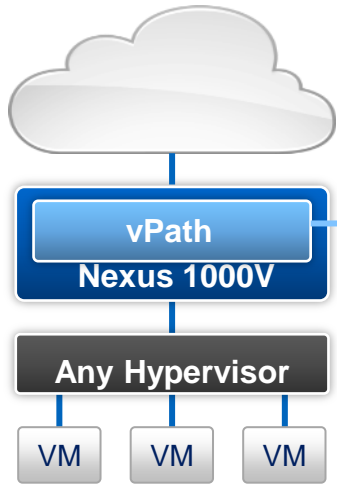
Nexus 1000V (Dist. Virtual Switch)	VSG (Zone-based FW)	ASA 1000V (Cloud FW)	vWAAS (WAN Optimisation)	CSR 1000V (Cloud Router)	vNAM (Network Analytics)	Partner Services
• Distributed switch • NX-OS consistency	• VM-level controls • Zone-based FW	• Edge firewall, VPN • Protocol Inspection	• WAN optimisation • Application traffic	• WAN L3 gateway • Routing and VPN	• App Visibility (L2-L7) • Overlay Intelligence (OTV, VXLAN, FP**)	• Citrix NetScaler 1000V virtual ADC • Imperva Web App. FW

Cisco Cloud Services Platform

- Dedicated Cloud Services appliance
- Flexible, on-demand allocation of resources
- Allows policy management by network teams
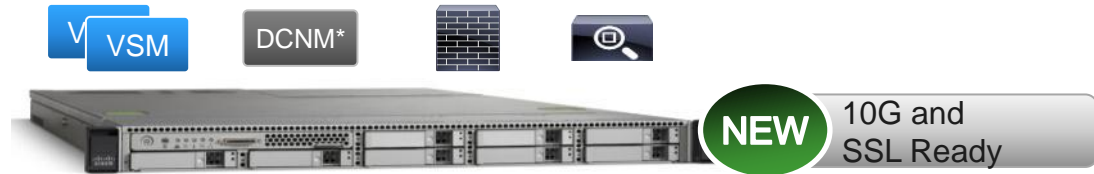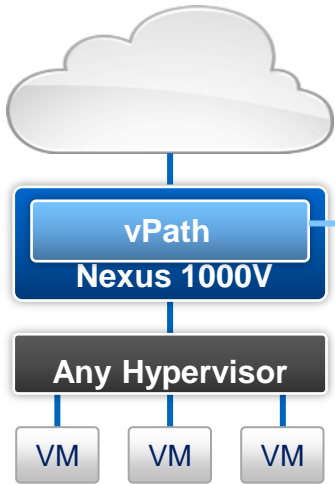
vPath
Nexus 1000V

Any Hypervisor

VM   VM   VM

Cisco Cloud Network Services (CNS)

| Citrix NetScaler 1000V | Prime virtual NAM | Imperva SecureSphere WAF | Virtual Security Gateway |

VSM   DCNM*

NEW   10G and SSL Ready

Nexus 1110 Cloud Services Platform

* 2H CY13

VSM = Virtual Supervisor Module
DCNM = Data Centre Mgt. Centre

Cisco live!

Citrix NetScaler 1000V in Cloud Services Portfolio

Citrix NetScaler 1000V
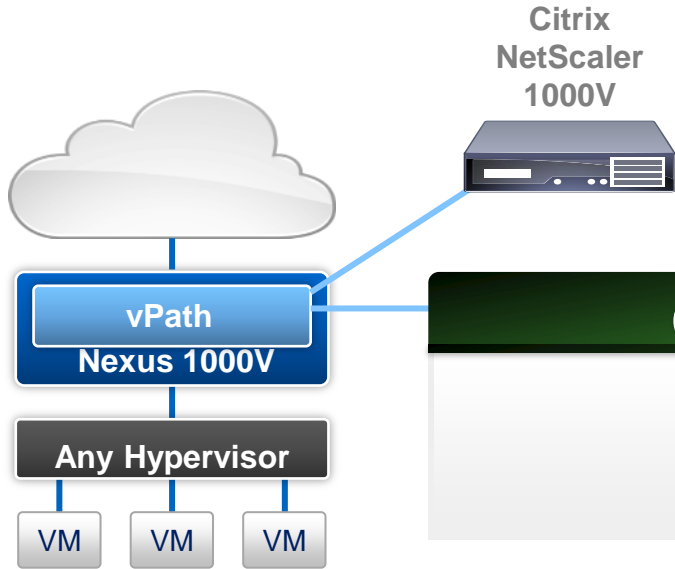
- Citrix Best-in-Class virtual application delivery controller (vADC)
- Sold and supported by Cisco (Q3)
- Integrated with Nexus 1100, vPath
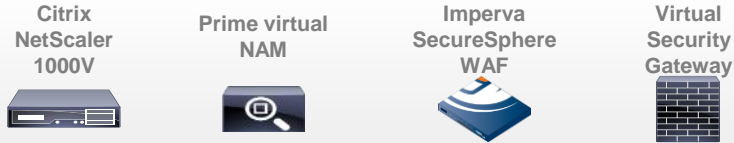
vPath
Nexus 1000V

Any Hypervisor

VM   VM   VM

Cisco Cloud Network Services (CNS)

| Citrix NetScaler 1000V | Prime virtual NAM | Imperva SecureSphere WAF | Virtual Security Gateway |

VSM   DCNM*

Nexus 1110 Cloud Services Platform

* 2H CY13

VSM = Virtual Supervisor Module
DCNM = Data Centre Mgt. Centre

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Application Intelligence Extended to the Cloud

Virtual Network Analysis Module (vNAM)—
Track Workload Performance and Resource Usage

AWARENESS
Improved Application Performance

ANALYTICS
Optimised Network Resources

PROGRAMMABILITY
Enhanced Operational Efficiency

INSTRUMENTATION FLEXIBILITY
Increased Agility

Virtualised/Cloud
Data Centre

Application
Services

Application
Services

Tenant-C

Tenant-B

Tenant-A

APP
OS

APP
OS

APP
OS

APP
OS

APP
OS

VSG

Virtual
NAM

Nexus 1000V
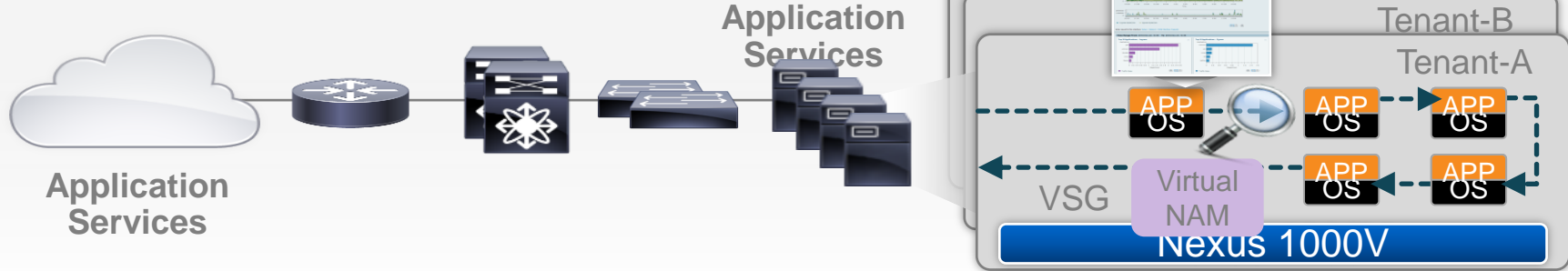
Maintain Consistency Across Physical and Virtual Environments

Imperva SecureSphere Web Application Firewall

Hacker and Bots

Internet

Firewall

SecureSphere WAF on Cisco Nexus 1110

Web Servers

HTTP

HTTPS

SQL Injection

Web Fraud
XSS
Site Scraping

iMPERVA®
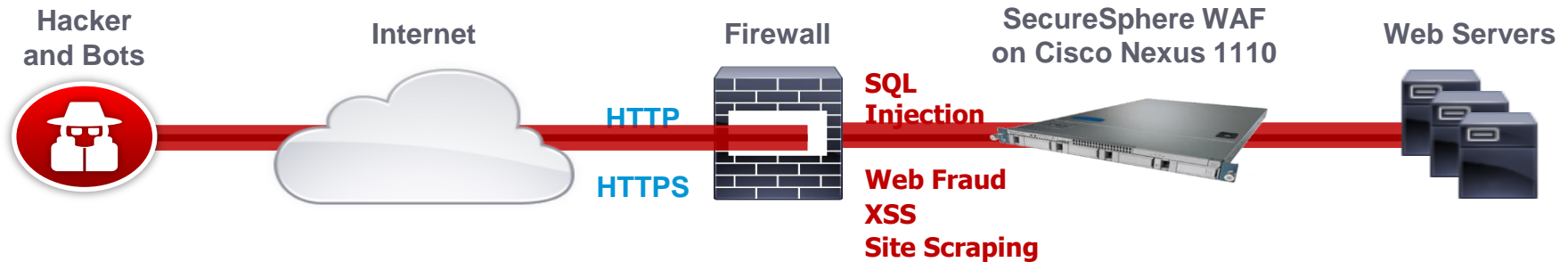
- Stops Web attacks that lead to compromise and downtime
- Easy to deploy and manage via N1110

Most Widely Deployed WAF in the World

Services Chaining with vPath

Intelligent Policy-based Traffic Steering Through Multiple Network Services

vPath 3.0

vPath	Non vPath	vPath	Non vPath
Virtualised Network Service	Virtualised Network Service	Physical Network Service	Physical Network Service

VM

vPath
Nexus 1000V

Any Hypervisor
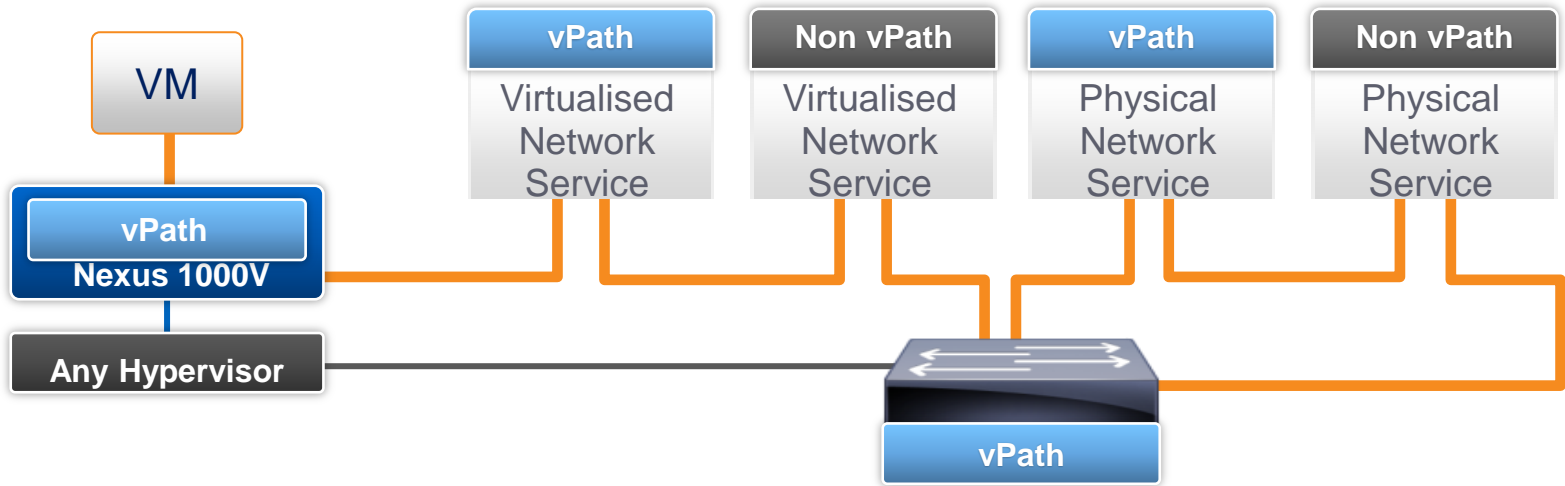
vPath

- Service chaining with vPath and non-vPath network services
- Virtual and physical network services
- Any network service can now be distributed, not just firewalls
- Submitted to IETF for standardisation*
- Supporting Multiple hypervisors

*http://tools.ietf.org/html/draft-quinn-nsh-00

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CSR 1000V:
Single-Tenant WAN Gateway in Shared Multi-tenant Clouds

Enterprise A

DC

Branch   ASR

ISR

Enterprise B

Branch

ISR

MPLS

Internet

Cloud Provider's Data Centre

Tenant A

CSR 1000V

APP OS | APP OS

APP OS

Tenant B

CSR 1000V

APP OS | APP OS

APP OS | APP OS

WAN Router   Switches   Servers

Physical Infrastructure   Virtual Infrastructure

Enterprise Use Cases

- Secure multipoint VPN Gateway
- L3 Extension
- VXLAN

Cloud Provider Use Cases

- Secure VPN Gateway
- MPLS Extension

Can be Deployed by Enterprises or Cloud Providers
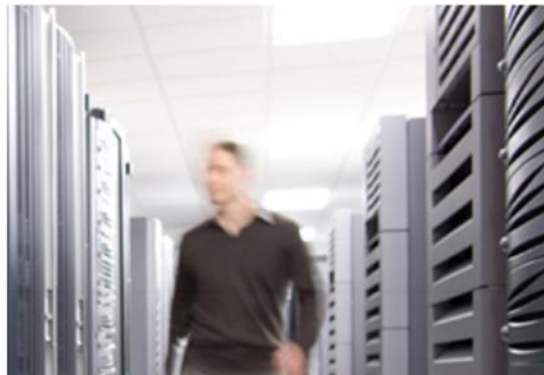
Cisco Nexus 1000V for Win8/Hyper-V

Cisco Nexus 1000V for Win8/Hyper-V
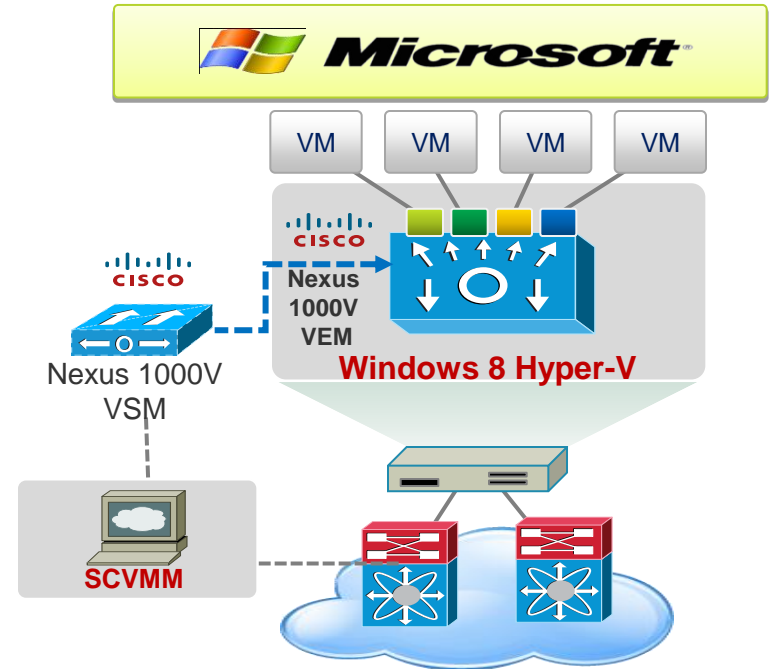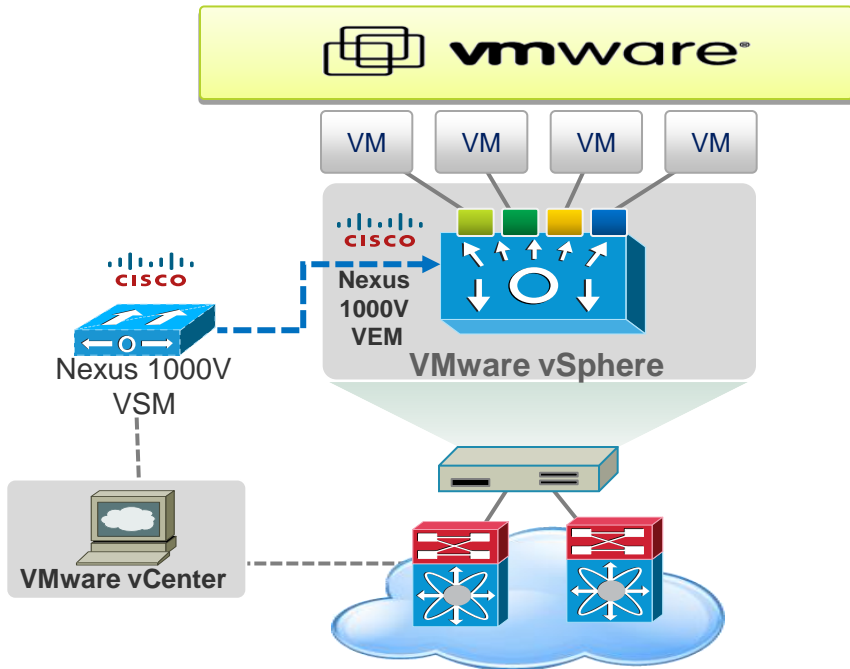
Consistent architecture, feature-set & network services ensures operational transparency across multiple hypervisors.

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Hyper-V: Comparison with ESX

Terminology

Microsoft Hyper-V	VMware ESX
Logical Switch	Virtual Distributed Switch (VDS)
Virtual Port Profiles + VM networks	Port Group
Host VNIC	vmknic
Host Group	Folder/Data Centre
Live Migration	vMotion
Dynamic Optimisation	Distributed Resource Scheduling (DRS)
Power Management	Distributed Power Mgmt (DPM)
SCVMM, Opalis	vCenter, vCloud Director
Hyper-V Replica	Site Recovery Manager
Virtual Hard Disk (VHDX)	Virtual Machine Disk (VMDK)

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Hyper-V Extensible Switch Architecture

Nexus

Hyper-V Host

Virtual NIC — Virtual NIC — Virtual NIC

Capture Extension

Filtering Extension

Forwarding Extension

Virtual Switch
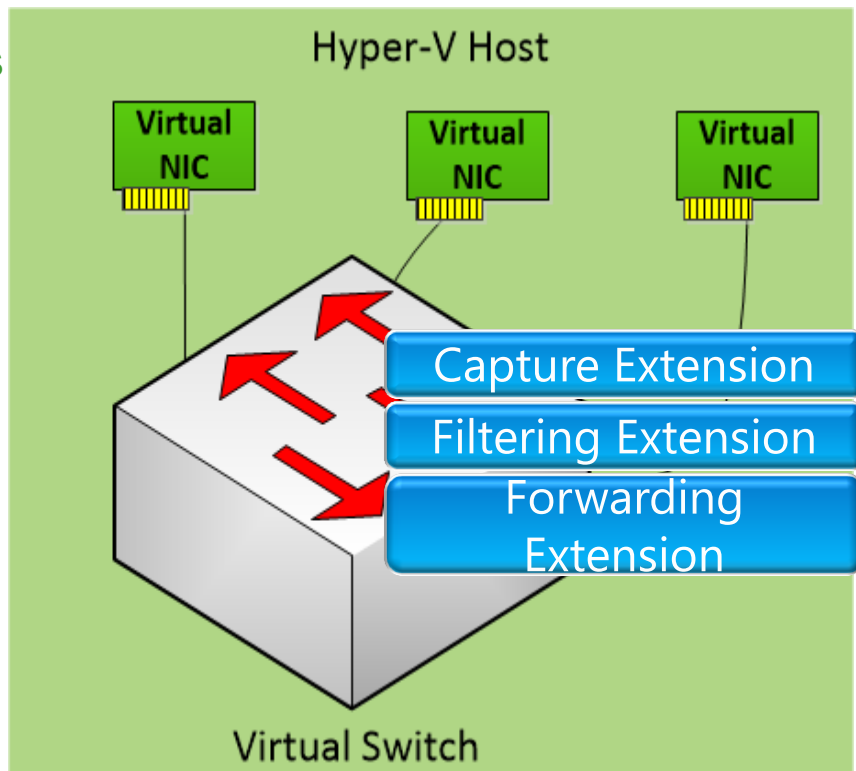
- Extensions process all network traffic, including VM-to-VM

- Forwarding Extensions can Capture and Filter Traffic as well

- Nexus 1000V will work with other 3rd party Capture and Filtering Extensions as well

- Live Migration and NIC Offloads continue to work even when the extensions are present

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What is SCVMM?

System Centre Virtual Machine Manager

- Manages Hyper-V Virtualisation environment

- Similar in function to VMware vCenter Server
  - But includes some functionality similar to VMware vCloud Director

- What SCVMM Manages
  - Hyper-V hosts
  - Virtual Machines
  - Logical Switches
  - Logical Networks and Network Sites
  - VM Networks and Subnets
  - IP Addressing
  - Port Profiles and Classifications

SCVMM Management of Switch Extensions
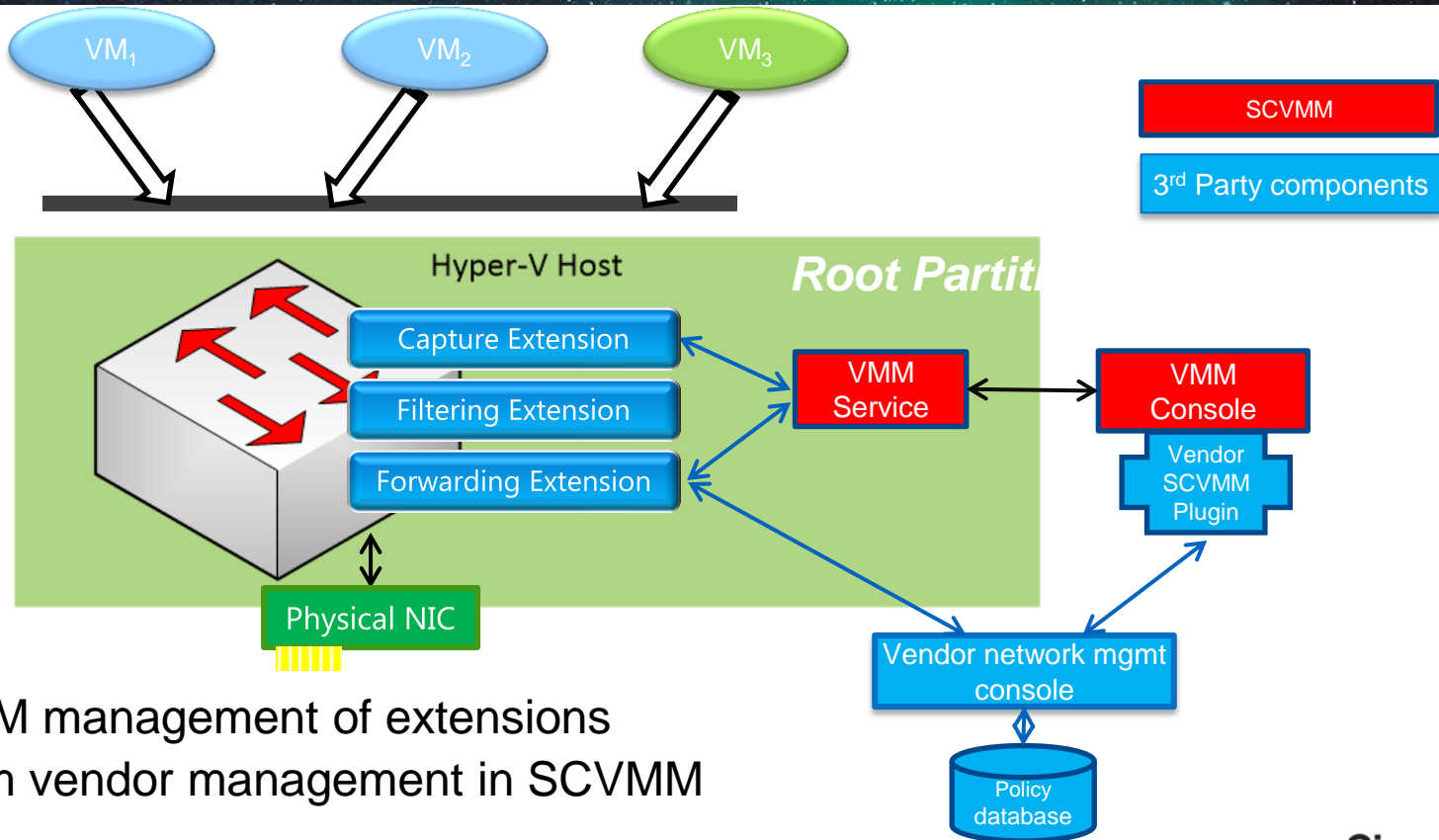
- SCVMM management of extensions
- Custom vendor management in SCVMM

Cisco Nexus 1000V for Hyper-V
Operational Model with SCMM

SCVMM manages the placement and live-migration of the VMs based on the constraints between VM networks and the network sites.

VM VM VM VM

CISCO
Nexus 1000V VEM
Win 8 Hyper-V

SCVMM

Server Admin

Adds hosts to N1KV Connects VMs (VNICs) to VM Networks

Configuration data and policies sent to N1KV VEM

Networks & policies synced to SCVMM

Server

CISCO
Nexus 1000V VSM

Create networks and policies (logical networks, network sites, VMnetworks)

Network Admin

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Port Profiles – Current Nexus 1000V

- Setting Port Policies Ahead of Time

```
# port-profile database
switchport mode access
switchport access vlan 10
no shut
```

```
# port-profile webserver
switchport mode access
switchport access vlan 243
acc
no
```

```
# port-profile webserver
switchport mode access
switchport access vlan 752
access list, etc. commands
no shut
```
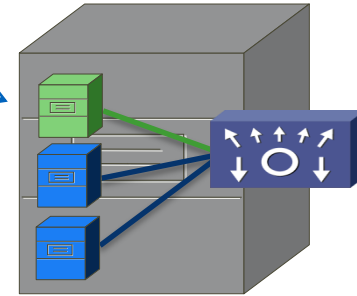
Port Profiles are "Live":

Network Admin can change them any time!

Network Segments and Port Profiles

- Networks and Profiles are Two Different Things
- Different ports need different protection on the same network

Clients   Guests   Servers

Port Profiles
- Guest access
- Intranet client
- Privileged intranet client
- Application server

Intranet

Network Segment

Cisco live!
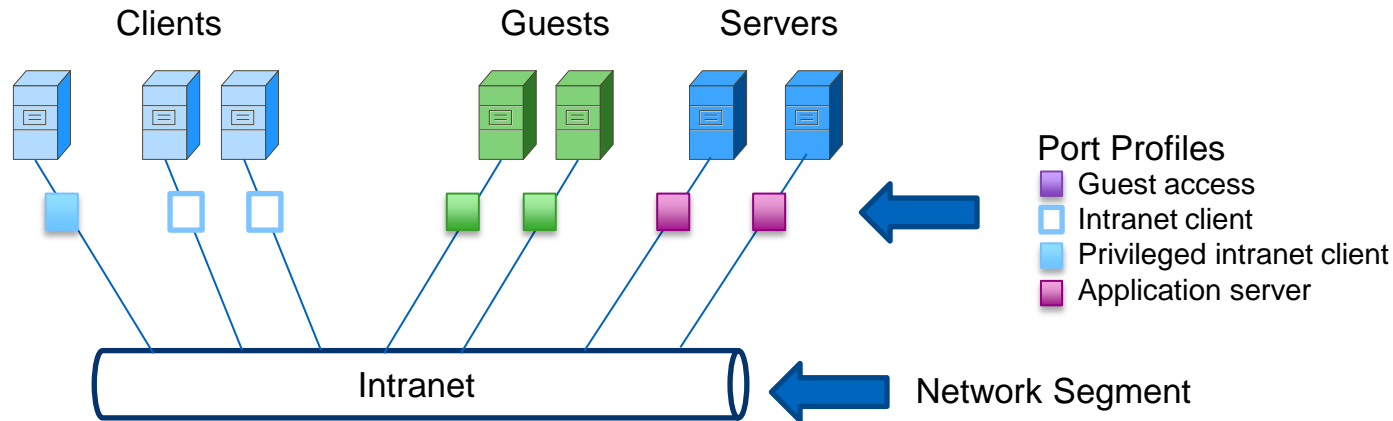
Network Segments and Port Profiles

Splitting the port profile into "Network Connectivity" and "Policy"

```
# port-profile database-client1
switchport mode access
switchport access vlan 10
ip port access-group dbclient in
no shut
state enabled
```

```
# port-profile database-client
ip port access-group dbclient in
no shut
state enabled
```

```
# port-profile database-server
ip port access-group dbserver in
no shut
state enabled
```

```
# port-profile database-server1
switchport mode access
switchport access vlan 10
ip port access-group dbserver in
no shut
state enabled
```

Network is separate:

```
# network-segment database1
switchport mode access
switchport access vlan 10
```

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Port Profiles, Network Segments and VMs

Clients

Servers

database1

```
# port-profile database-client
ip port access-group dbclient in
no shut
state enabled
```

```
# port-profile database-server
ip port access-group dbserver in
no shut
state enabled
```

```
# network-segment database1
switchport mode access
switchport access vlan 10
```

```
# port-profile database-admin
ip port access-group dbadmin in
no shut
state enabled
```

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Distributed NetFlow Export on N1KV

Nexus 1KV VSM

Nexus 1KV VEM

NetFlow Collector
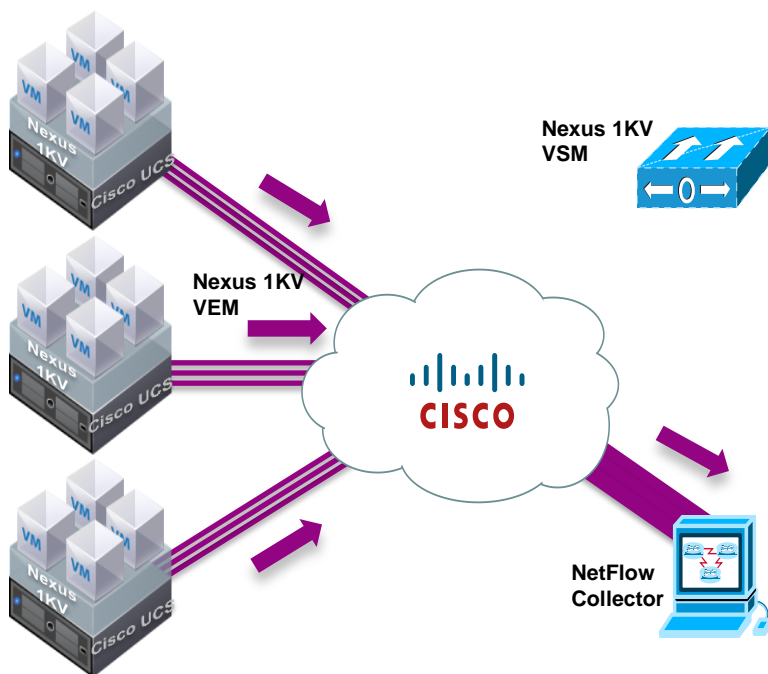
- VEMs directly export to Collectors

- Option 1: Spoofing VSM's address
  - Reverse forwarding checks need to be disabled on network

- Option 2: Use VEM mgmt address (not yet supported)
  - VEM exports "DVS ID" to enable collectors to identify all the data exported from a single switch

Using VM Networks and Port Profiles

How networks and port profiles are used

- Choose network
  - VM Network
  - VM Subnet is tied to the Network (1:1)

- Choose IP address type (DHCP or statically assigned)
  - Choose IP pool for static IPs

- Choose Port Profile Classification
  - Policy (QoS, Security, Monitoring)
  - A Classification refers to a Port Profile

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Nexus 1000V Architectural Enhancements

Architectural Issues

- VSM – VEM and VSM internal communication very chatty
  - Makes it sensitive to latency. Example : inter DC deployments
- VEM over dependency on VSM reduces resiliency
- VSM is required for vSphere HA, FT, vmotion to work
- Message handling overload on VSM at higher scale
  - Reduces response time of VSM
- VSM – VEM, VSM (active) – VSM (standby) heartbeat time of 6 seconds makes it sensitive to network failures, congestion

Current Architecture
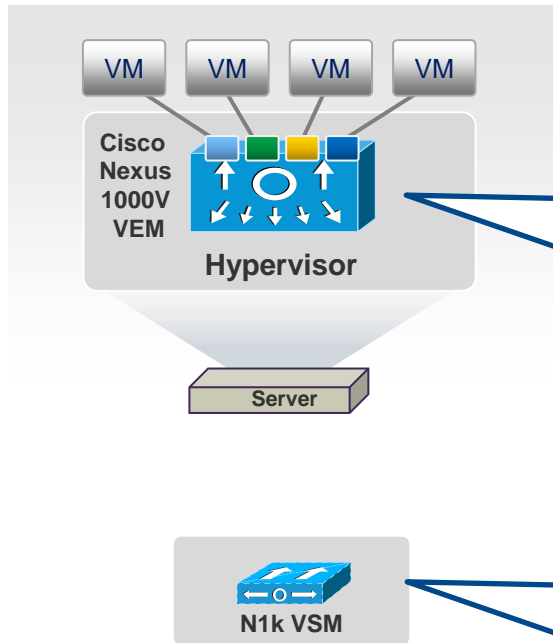
- VEM needs to talk to VSM to provision ports
- VSM has to orchestrate port bring up
- VSM has to download port profiles and network policies to VEM if the VEM does not have it

- VSM has to handle requests (port mgmt, etc) from all VEMs
- VSM has to remove the module/VEM on HeartBeat failure and reprogram when connectivity is established

Architecture for Scale and Resiliency

VM | VM | VM | VM

Cisco Nexus 1000V VEM

Hypervisor

More control plane functionality moving to VEM

Server

N1k VSM
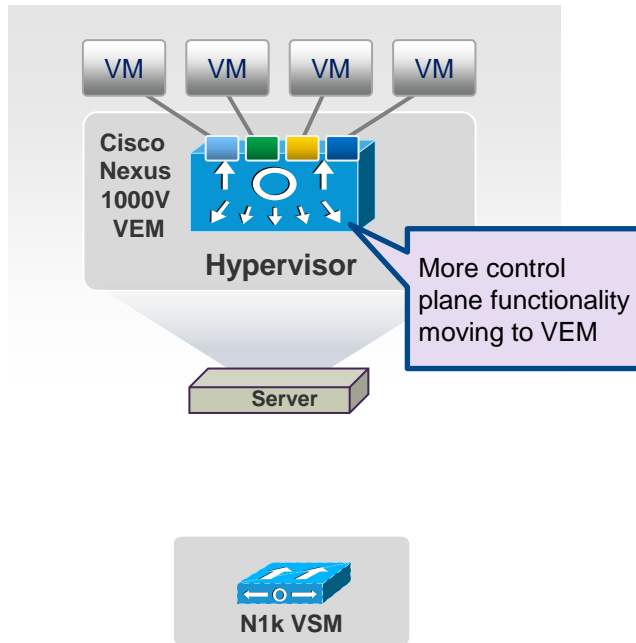
- Control plane functionality in VEM

- Reduces messages and allows significantly higher scale
  - VSM load, response time is reduced

- VSM distributes policies to VEM ahead of time

- VSM-VEM heartbeat loss will not cause VEM to go offline on VSM

- VSM-VSM HA heatbeat timeout will be increased

Fabric Integration

Dynamic Fabric Automation Management

Orchestration Stack

Compute and Storage Orchestration

Network and Services Orchestration

Cisco Prime DCNM

Virtual Machines

N1K

Auto-config Triggers

VDP

DHCP/ARP-ND

Data Packet Driven

Programmatic

Physical Machines

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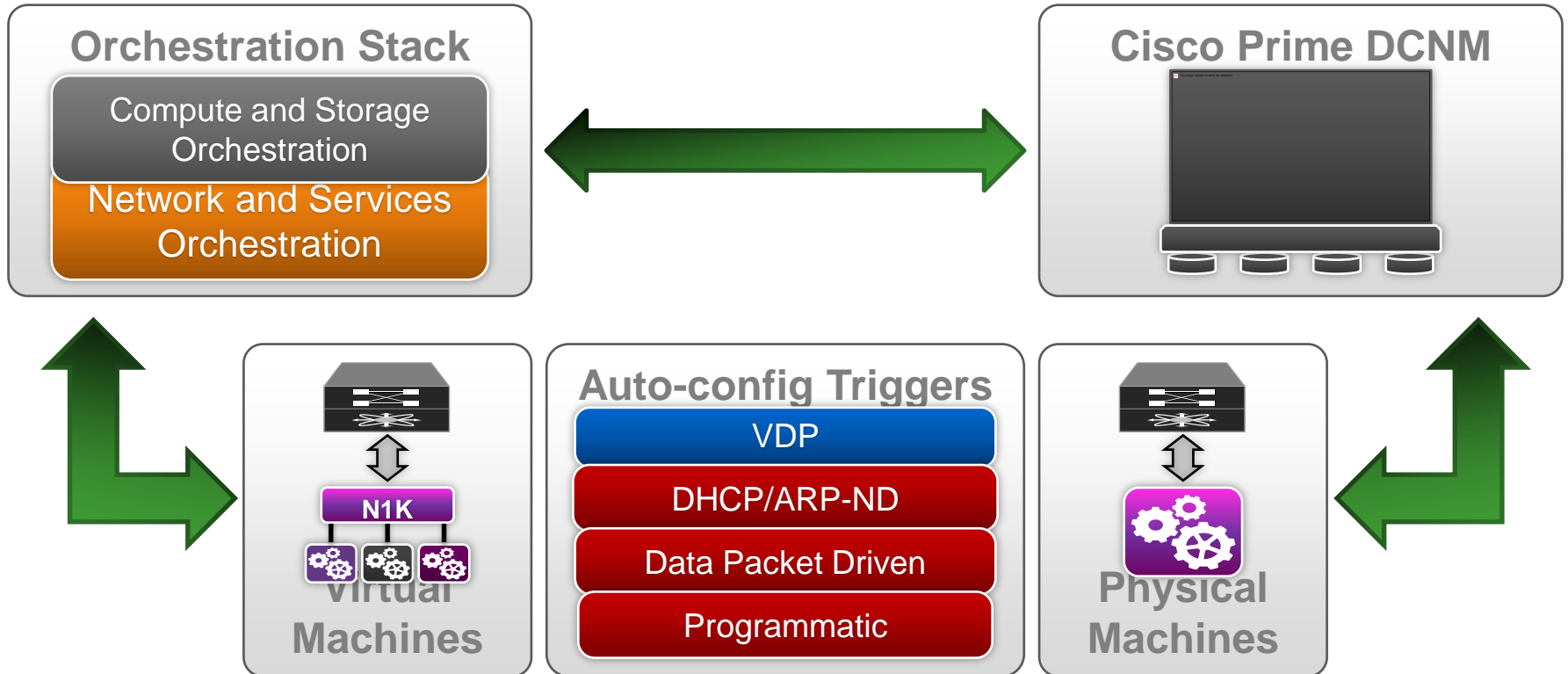
Introducing Nexus 1000V aci Fabric Mode
High performance ACI fabric integration

NETWORK VIRTUALISATION SUPPORT

APIC

Application Virtual Switch

N1k ACI — WEB APP — vmware HYPERVISOR

N1k ACI — WEB APP — Microsoft HYPERVISOR

N1k ACI — WEB APP — redhat HYPERVISOR

PURPOSE BUILT VIRTUAL MEMBER OF ACI	OPTIMAL TRAFFIC STEERING	INTEGRATED VISIBLITY THROUGH APIC (PHYSICAL AND VIRTUAL)	COMMON MANAGEMENT MODEL THROUGH APIC	MULTI-HYPERVISOR SUPPORT	OPEN APIS

Resources

- Reference Solutions
- Webinars
- Deployment Guides, White Papers, Cheat Sheets
- CloudLab – On-line lab for N1KV & VSG

Reference Solutions

With Nexus 1000V, Nexus 1010, VSG & vWAAS

- vBlock with Nexus 1000V; Vblock with VSG and vWAAS

- 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 DC-to-DC 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 Resources

- CCO Links
  - 1000V: www.cisco.com/go/1000v
  - 1010: www.cisco.com/go/1010
  - VSG: www.cisco.com/go/vsg
  - VNMC: www.cisco.com/go/vnmc
  - vWAAS: www.cisco.com/go/waas
  - NAM on 1010: www.cisco.com/go/nam
- 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

- Cheat Sheets
  - Nexus 1010 Configuration Cheat Sheet v.2.0
  - https://communities.cisco.com/docs/DOC-28188

  - Nexus 1000V with UCS Configuration Cheat Sheet v.1.1
  - https://communities.cisco.com/docs/DOC-28187

  - More on the way

- Deployment Guides
  - Nexus 1000V Deployment Guide
  - Nexus 1000V on UCS – Best Practices
  - Nexus 1010 Deployment Guide
  - VSG Deployment Guide

- My Cisco Community: www.cisco.com/go/1000vcommunity

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)

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Additional N1K Public Links

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

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Combined Upgrade References

- Cisco Nexus 1000V / VMware vSphere Combined Upgrade [Part 1 of 3]

- Cisco Nexus 1000V / VMware vSphere Combined Upgrade [Part 2 of 3]

- Cisco Nexus 1000V / VMware vSphere Combined Upgrade [Part 3 of 3]
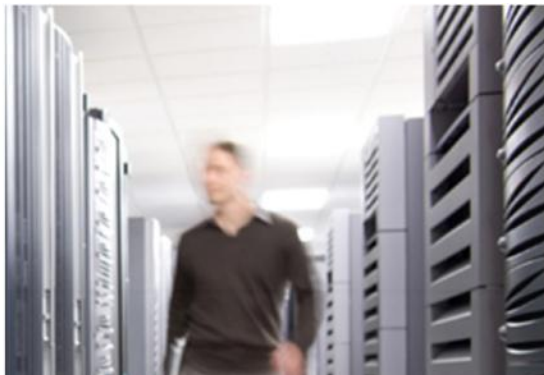
Q & A

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N1K Public Webcasts, Spring 2012

Webinar Link: www.cisco.com/go/1000vcommunity

Date	Technical Track Topics	Webinar	Preso
2/14/12	Virtual Security Gateway (VSG) v1.3	Play	PDF
2/22/12	Nexus 1000V v1.5 Technical Deep Dive	Play	PDF
2/29/12	Nexus 1010-X v1.4 Technical Deep Dive	Play	PDF
3/7/12	vWAAS and Nexus 1000V Technical Deep Dive	Play	PDF
3/14/12	FlexPod & Nexus 1000V/1010	Play	PDF
3/21/12	VMDC QoS for Hybrid Cloud-based Multimedia Services with the Nexus 1000V	Play	PDF
3/28/12	Vblock & Nexus 1000V / VSG / vWAAS	Play	PDF
4/4/12	vCloud Director, Nexus 1000V, and VXLAN Technical Deep Dive	Play	PDF
4/11/12	Cisco's CloudLab Deep Dive: Hands-on labs for N1KV, VSG & VXLAN	Play	PDF
4/18/12	NAM and DCNM on the Nexus 1010 and 1010-X	Play	PDF

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N1K Public Webcasts, Fall 2011

Webinar Link: www.cisco.com/go/1000vcommunity

Date	Technical Track Topics	Webinar	Preso
7/27	Long Distance vMotion with Nexus 1000V and VSG	Play	PDF
8/10	PCI Reference Architecture with Nexus 1000V and Virtual Security Gateway	Play	PDF
10/05	Nexus 1000V, VXLAN, and vCloud Director	Play	PDF
10/12	Virtualised Multi-Tenant Data Centre (VMDC)	Play	PDF
10/19	Nexus 1010 v1.3 - What's New?	Play	PDF
10/26	Virtualised Workload Mobility - Latest Design Guidance	Play	PDF
11/02	UCS and Nexus 1000V - Best Practices	Play	PDF
11/09	Virtual Security Gateway (VSG) What's new? What's coming?	Play	PDF

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N1K Public Webcasts – Spring 2011

Webinar Link: www.cisco.com/go/1000vcommunity

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

Date	Technical Track Topics	Webinar	Preso	Q&A
3/29	Nexus 1000V v1.4 Features & Install Overview (Installation Screencasts Link)	Play	PDF	PDF
4/12	Nexus 1010 Overview & Best Practices	Play	PDF	PDF
4/26	Virtual Security Gateway (VSG) Technical Overview	Play	PDF	PDF
5/10	Nexus 1000V Key Features Overview	Play	PDF	PDF
5/24	Nexus 1000V Troubleshooting	Play	PDF	PDF

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