



# Cisco Nexus 1000V for Microsoft Hyper-V

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# Agenda

- Cisco Virtual Networking Vision
- Cisco Nexus 1000V (N1KV) Overview
- WS2012 & SC2012 SP1 Networking
- Cisco N1KV Integration with SC2012 SP1
- Cisco Virtual Security Gateway

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# Fast Changing DC environments

Require platform-agnostic design & future-proof architectures



- New hypervisors & cloud stacks
- New virtualization use-cases

- Any hypervisor & any cloud
- Flexible, scalable services

*Reduce Risk  
Reduce Time to deploy  
Protect Investments*

*Evolutionary approach  
Proven architectures  
Consistency*

# Build once, Run Anywhere

Consistency → Reduced Risk & Investment Protection

Intra-tenant Security



Inter-tenant Security



Application Acceleration



Routing & Gateways



Load balancer



Web-app Firewall



## Consistent Nexus Experience



PHYSICAL



VIRTUAL



CLOUD

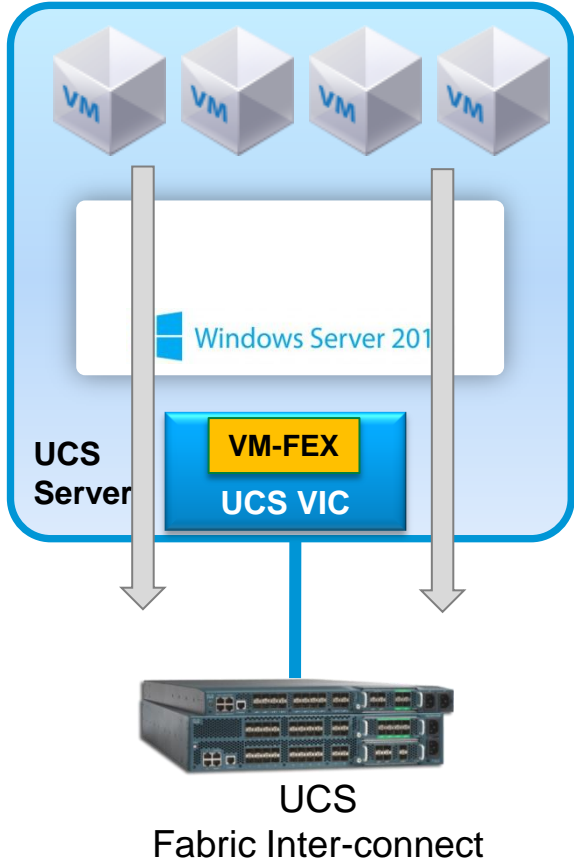
# Cisco Virtual Networking for Hyper-V

## Cisco Nexus 1000V and UCS VM-FEX

Bring network to the hypervisor  
(Cisco Nexus 1000V Switch)



Bring VM awareness to physical network  
(Cisco UCS VM-FEX)



# Cisco Delivers Optimum IT Infrastructure For Your Microsoft Windows Server 2012 Environment



## Compute

- Cisco Unified Computing (UCS)



## Networking

- Cisco Nexus 1000V
- Cisco UCS VM-FEX



## Manageability

- Cisco UCS Manager
- Cisco UCS PowerTool

Certified for top-tier Microsoft applications and workloads



Microsoft Exchange Server



 Windows Server

Microsoft System Center

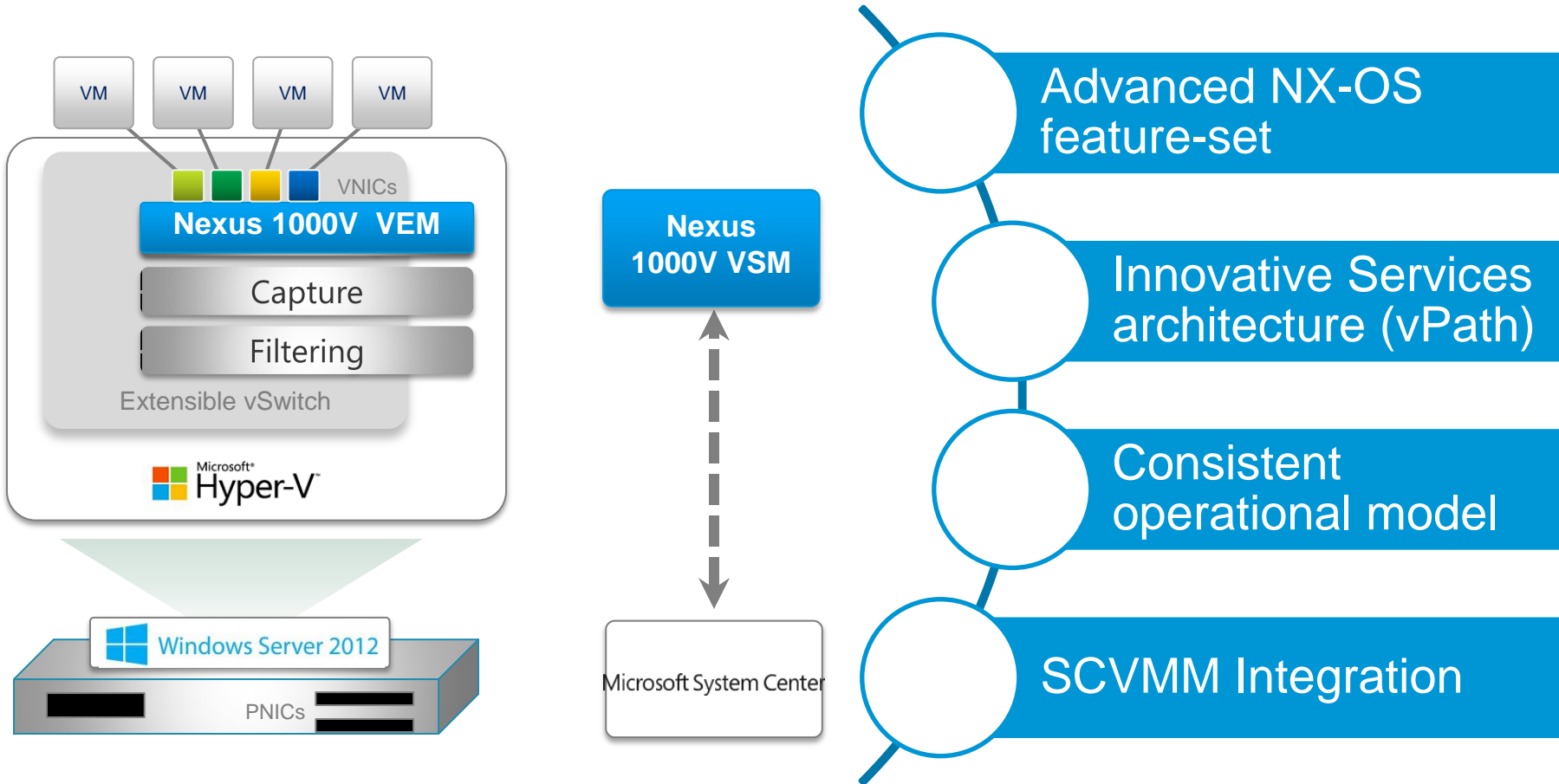


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# Cisco Nexus 1000V

## Award Winning Networking Platform for Hyper-V



# Cisco Nexus 1000V & Windows Server Hyper-V partnership drives Private Cloud adoption

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Networking Nuggets and Security Snippets

Jon Oltsik

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## Microsoft Hyper-V and Cisco Nexus 1000V: A Proverbial Win-Win

Partnership helps meet user requirements while opening market opportunities

By [oltsik](#) on Thu, 09/22/11 - 11:55am.

Check out the official announcement:

[http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns955/ns963/solution\\_overview\\_c22-687087.html](http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns955/ns963/solution_overview_c22-687087.html)

Its fair to say allot of people simply haven't considered Hyper-V due to the lack of Nk1V support so it will be interesting if this any impact on VMware's dominance.



## What the Cisco Nexus 1000V means to Hyper-V virtual networking

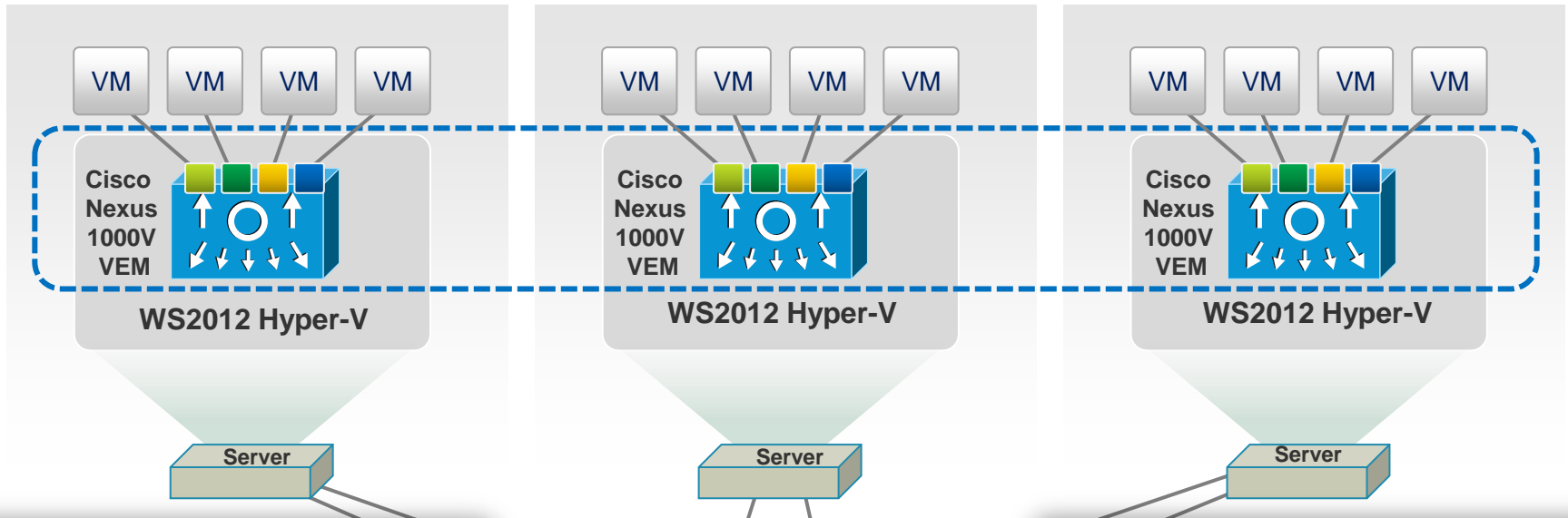
Mike Laverick



- **Well-tested networking platform**
- **Reduces technical & operational complexity**
- **Physical & Virtual Consistency helps reduce the risk**

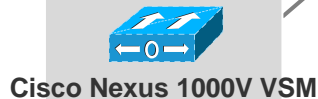
# Cisco Nexus 1000V Architecture

## A simple Deployment Scenario



### Virtual Supervisor Module (VSM)

- Virtual or Physical appliance running Cisco NXOS (supports Hi-availability)
- Performs management, monitoring, and configuration
- Tight integration with management platforms



### Virtual Ethernet Module (VEM)

- 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 Features

## Switching

- L2 Switching, 802.1Q Tagging, Rate Limiting (TX)
- IGMP Snooping, QoS Marking (COS & DSCP)

## 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 other services]

## Provisioning

- Full integration with System Center – VM Manager (SCVMM)
- Faster network policy provisioning through port profiles

## Visibility

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

## Management

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

# Port Profiles: Faster VM Deployment

## Cisco Virtual Networking

### Policy-Based VM Connectivity

#### Port Profiles

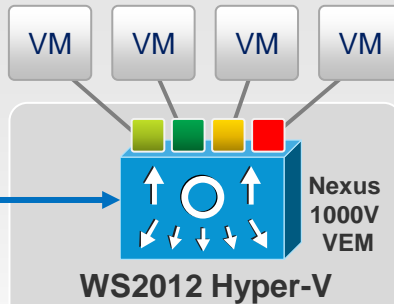
#### Defined Policies

|          |   |
|----------|---|
| WEB Apps |  |
| HR       |  |
| DB       |  |
| DMZ      |  |

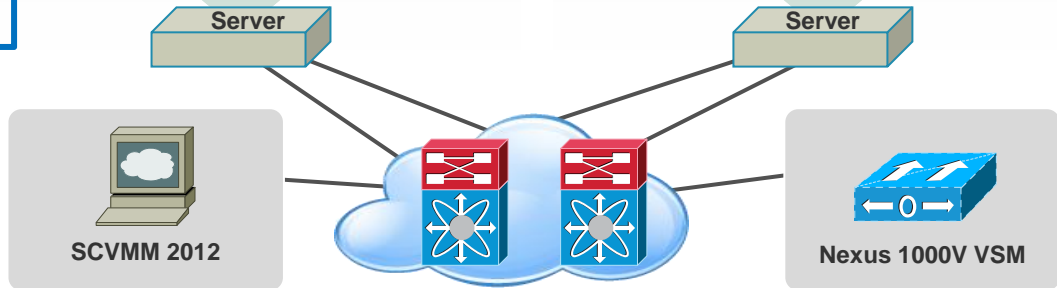
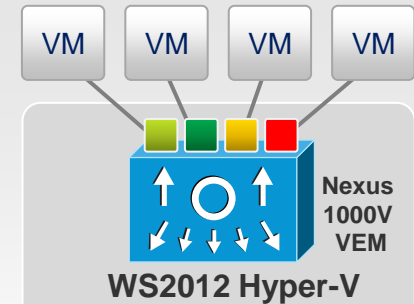
#### VM Connection Policy

- Defined in the network
- Applied in SCVMM

### Mobility of Network and Security Properties



### Non-Disruptive Operational Model



# Port Profiles: Policy Mobility

## Cisco Virtual Networking

### Policy-Based VM Connectivity

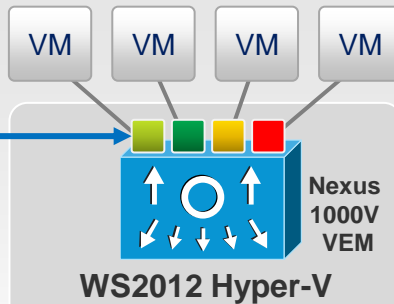
#### VMs Need to Move

- VM Migration
- Resource Scheduling
- SW upgrade/patch
- Hardware failure

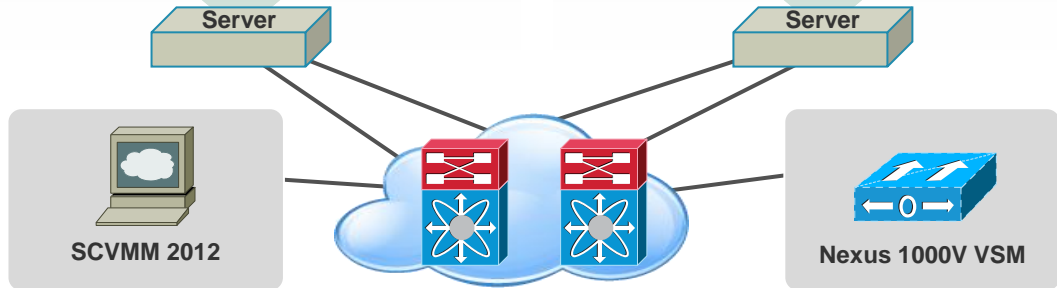
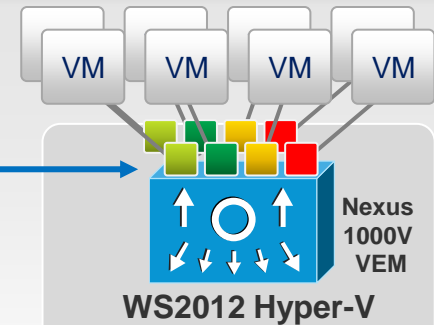
#### VM Networking Mobility

- Live Migration
- Ensures VM security
- Maintains connection state

### Mobility of Network and Security Properties



### Non-Disruptive Operational Model



# Cisco Nexus 1000V Pricing

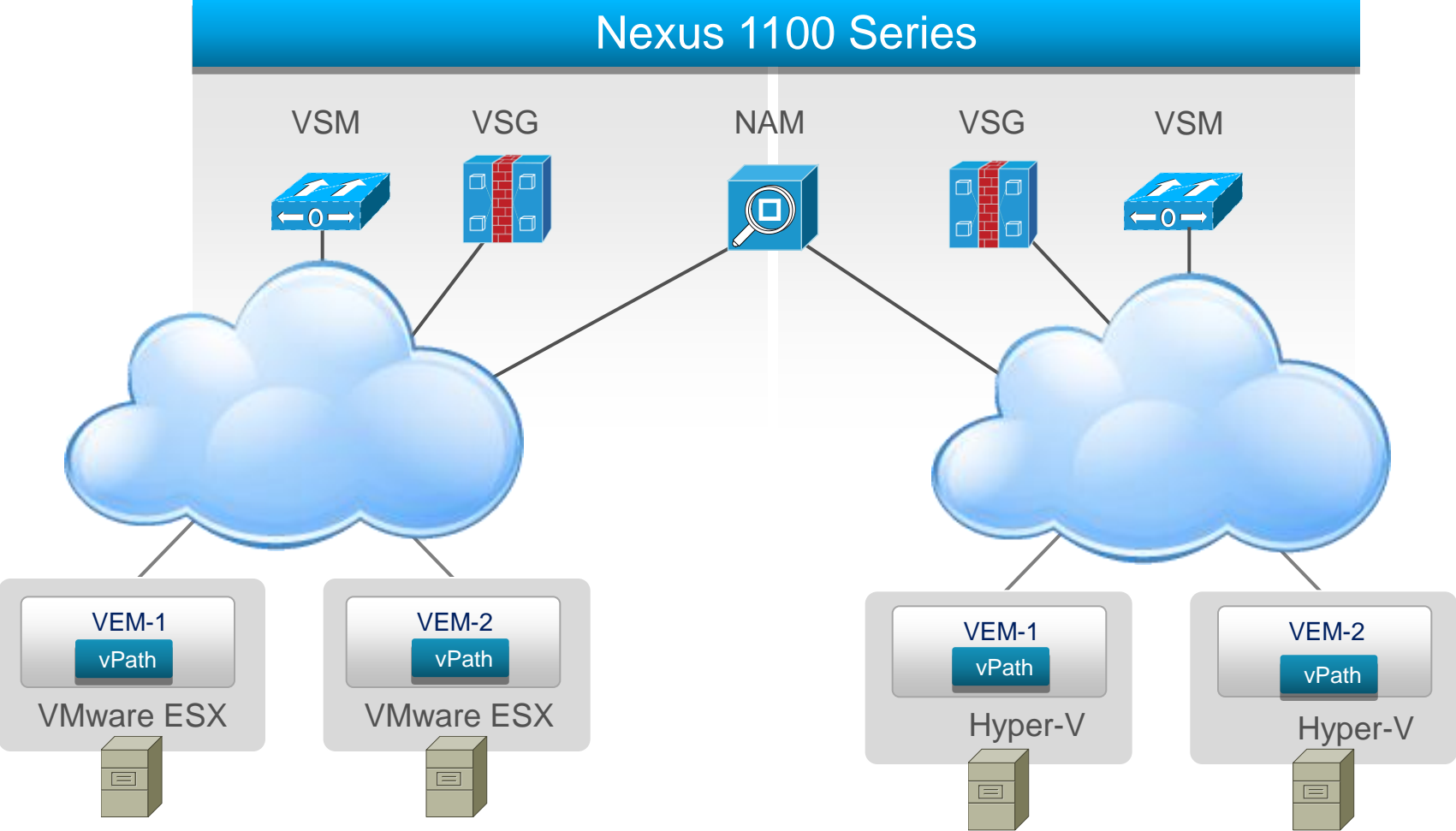
## Tiered Licensing – Essential & Advanced Editions

|                            | Essential (\$0) | Advanced (\$695/cpu) |
|----------------------------|-----------------|----------------------|
| VLANs, ACL, QoS            | ✓               | ✓                    |
| vPath                      | ✓               | ✓                    |
| LACP                       | ✓               | ✓                    |
| Multicast                  | ✓               | ✓                    |
| Netflow, SPAN, ERSPAN      | ✓               | ✓                    |
| Management (SNMP etc.)     | ✓               | ✓                    |
| SCVMM Integration          | ✓               | ✓                    |
| DHCP Snooping              |                 | ✓                    |
| IP Source Guard            |                 | ✓                    |
| Dynamic ARP Inspection     |                 | ✓                    |
| Virtual Security Gateway** |                 | ✓                    |



# Cisco Nexus 1100 Series

## Consistent architecture across hypervisors



Existing Nexus 1010 will support multi-hypervisor environments

# Frequently Asked Questions

- Does Nexus 1000V work with all versions of Hyper-V?  
N1KV requires Windows Server 2012 and System Center Virtual Machine Manager 2012 SP1.
- Is Cisco Virtual Security Gateway (VSG) available for Hyper-V?  
Yes. VSG comes bundled with the advanced edition of N1KV.
- Can the same Nexus 1000V manage both ESX & Hyper-V?  
No. Separate N1KV switches should be deployed for different hypervisor environments.

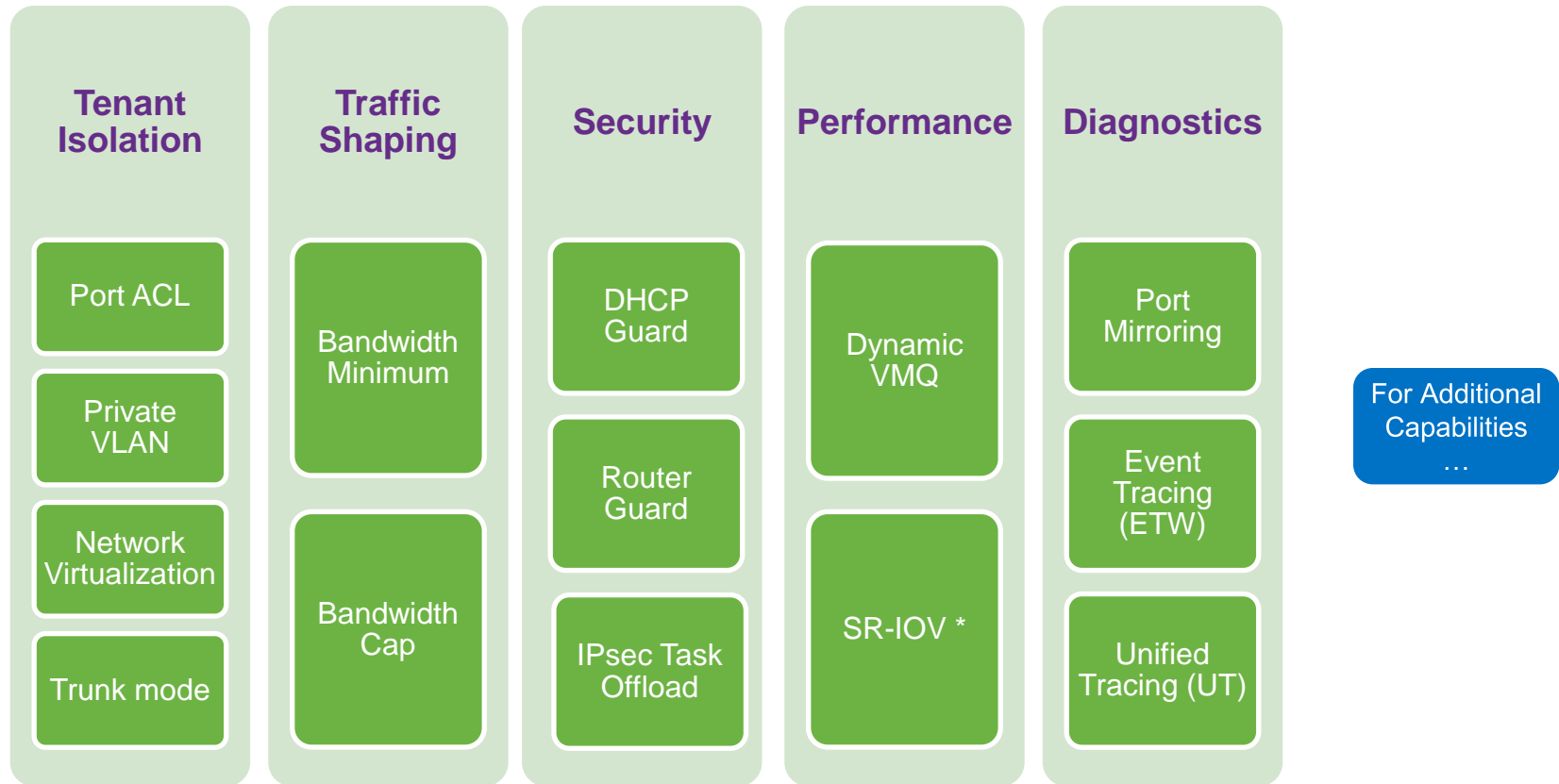
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# Microsoft SCVMM Networking Concepts

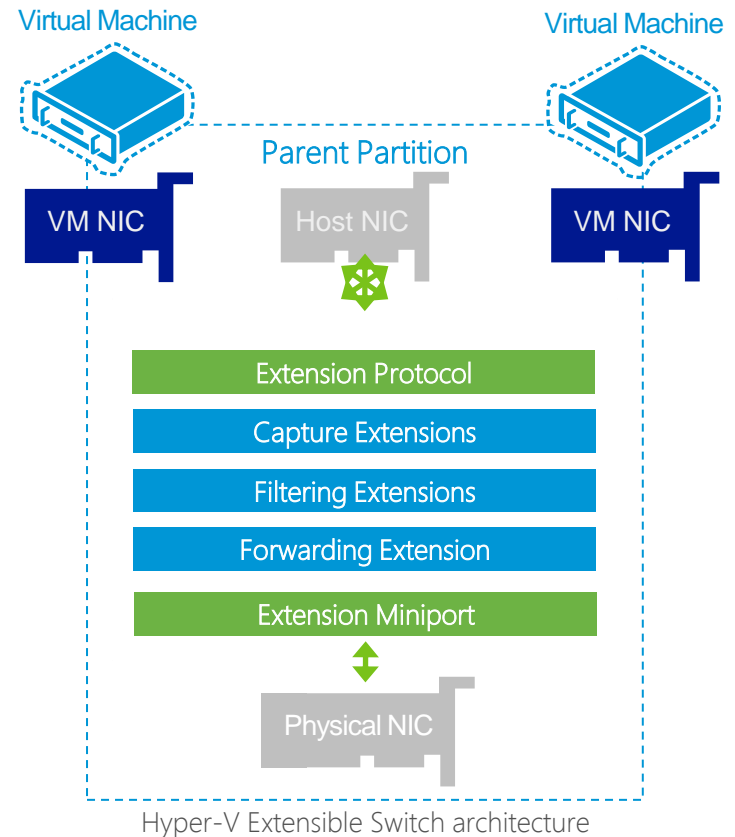
- Switch Extensibility
- Logical Networks
- Network Sites
- VM Networks
- IP-Pools
- Port Profiles
- Port Classification
- Logical Switch

# Windows Server 2012 Switch Features



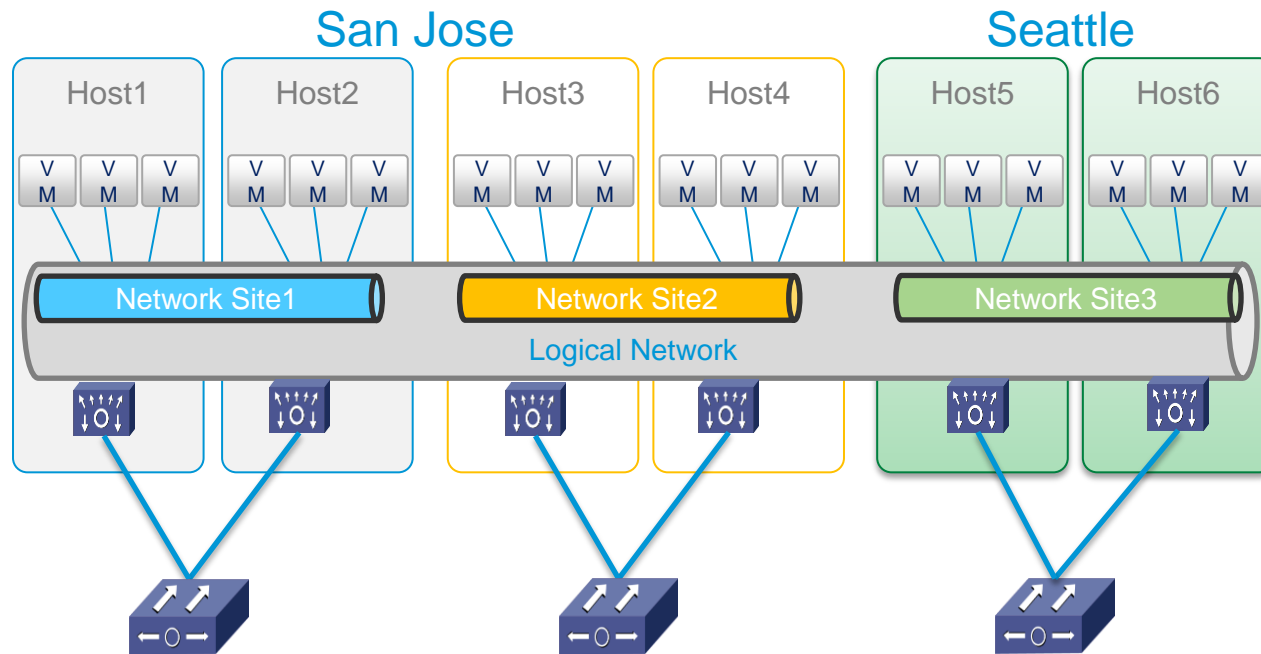
# Hyper-V Extensible Switch

- Extends virtual switch functionality by adding switch extensions
- Provides open platform supporting third-party plug-ins to add functionality
- Lets customers manage virtual network the same way they would manage a physical network
- Helps monitor the security of virtual machine to virtual machine traffic
- Provides unified management and enforcement of plug-ins with Virtual Machine Manager across entire datacenter
- Includes NDIS filter drivers, WFP callout drivers, Ingress filtering, Destination lookup and forwarding and Egress filtering extensions
- Extensions from Cisco N1KV, 5Nine, NEC, inMon



# Microsoft SCVMM Networking Concepts

## Logical Networks & Network Sites



Logical Network represents a network with a certain type of connectivity characteristics (for eg. DMZ network, intranet, isolation)

An instantiation of a Logical network on a set of host-groups (for eg. hosts in a POD) is called a network-site

# Microsoft SCVMM Networking Concepts

## VMs are bound to VM Networks

The screenshot displays the 'Logical Network Information for Virtual Machines (3)' interface in Microsoft SCVMM. The table below shows the configuration for three VMs, with their vNICs and associated logical and VM networks highlighted by red boxes.

| Name          | Type | Logical Network | VM network            | Resource |
|---------------|------|-----------------|-----------------------|----------|
| CONTRACTOR-VM | VM   |                 |                       |          |
| CONTRACTOR-VM | vNIC | Intranet        | INTRANET_POD1_SUBNET1 |          |
| EMPLOYEE-VM   | VM   |                 |                       |          |
| EMPLOYEE-VM   | vNIC | Intranet        | INTRANET_POD2_SUBNET3 |          |
| SERVER        | VM   |                 |                       |          |
| SERVER        | vNIC | DMZ             | DMZ_POD1_SUBNET1      |          |

Below the table, the configuration for the selected 'CONTRACTOR-VM' is shown:

- Logical network: Intranet
- VM network: INTRANET\_POD1\_SUBNET1

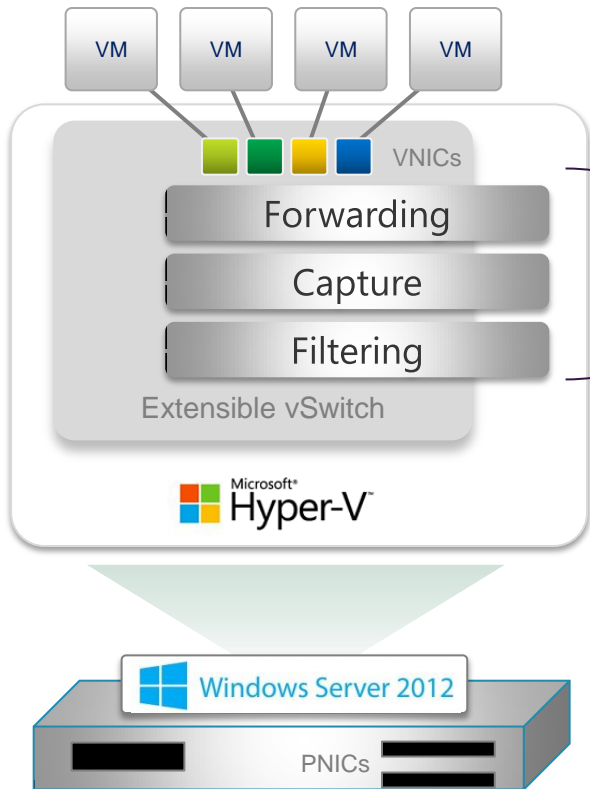
A context menu is visible over the 'VM Networks' folder in the left-hand navigation pane, showing options: 'Create VM Network' and 'Create IP Pool'.

VM Networks can be backed by either VLANs or other overlay networks (e.g. NVGRE segments). The first release of the Cisco Nexus 1000V Switch only supports VLAN-backed VM-networks.

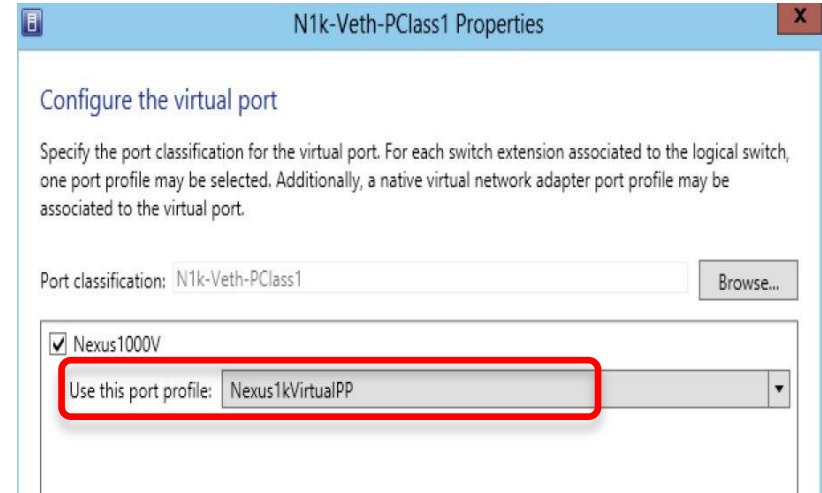


# Microsoft SCVMM Networking Concepts

## Port profile and classifications



Bundling of profiles from each extension is the port-classification




|                                  |  |
|----------------------------------|--|
| Medium bandwidth                 | Port classification to be used for virtual machines that require medium b  |
| Host Cluster Workload            | Port classification for host cluster workloads.                            |
| Low bandwidth                    | Port classification to be used for virtual machines that require low bandw |
| High bandwidth                   | Port classification to be used for virtual machines that require low bandw |
| n1k_class                        |  |
| cluster-acl-154                  |  |
| cluster-acl-153                  |  |
| Port_Classification_VSM-inst-app |  |
| Port_Classification_VSM-virt-1   |  |
| Port_Classification_vsm-test     |  |
| Port_Classification_vsm-nest     |  |
| iSCSI workload                   | Port classification for host iSCSI workloads.                              |
| unicast-nlb                      |  |

# Microsoft SCVMM Networking Concepts

## Associating VM VNICs to VM Networks & Port-classifications

- Choose network
  - VM Network
  - VM Subnet is tied to the Network (1:1)
- Choose IP address type
  - Can be dynamic (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



Network Adapter 1

Not connected

Connected to a VM network:

VM network: DMZ\_POD1\_SUBNET1

VM subnet: DMZ\_POD1\_SUBNET1

Dynamic IP

Static IP (from a static IP Pool)

**MAC Address**

Dynamic

Static: 00:15:5D:AD:AC:00

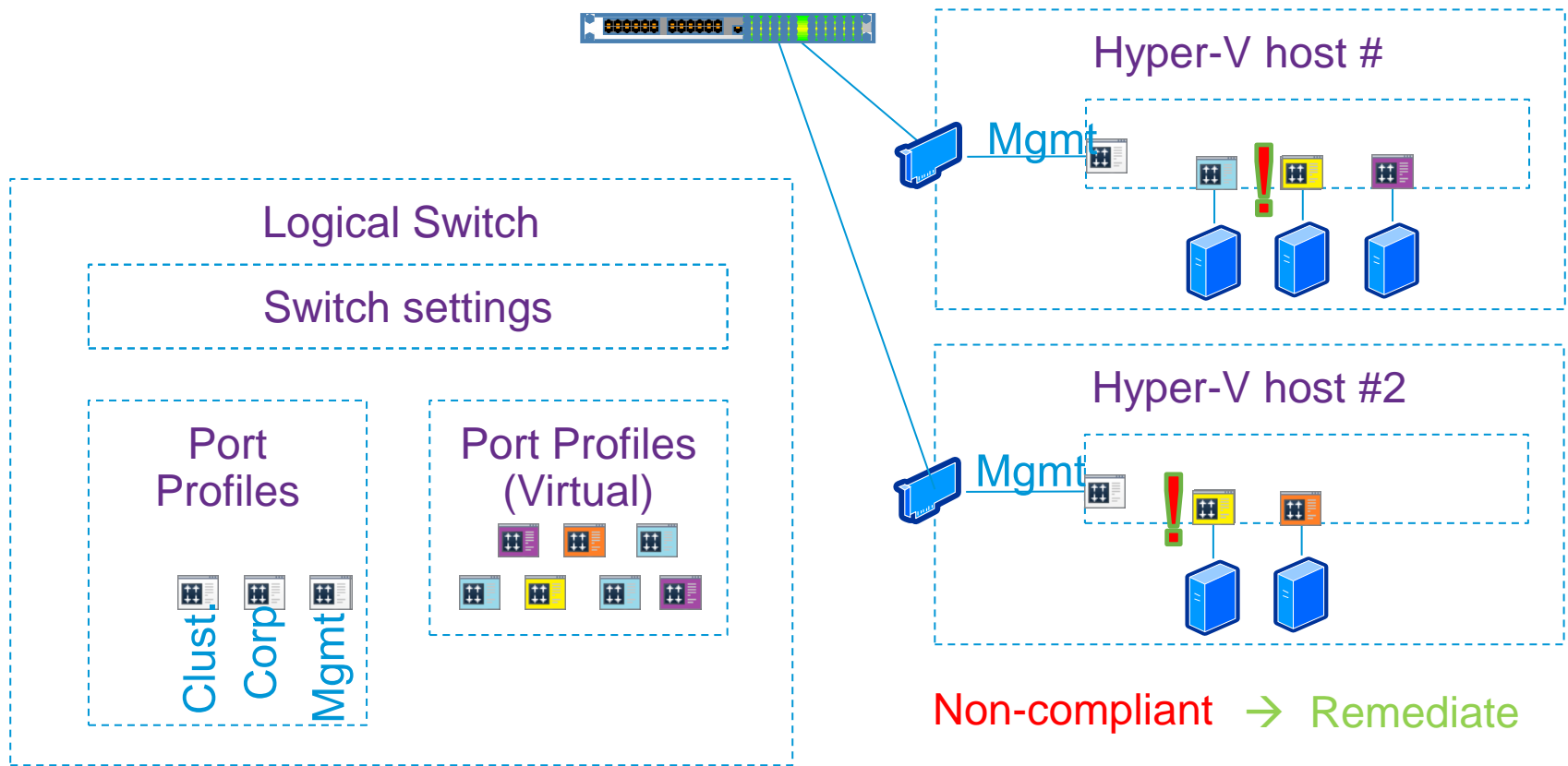
**Switch Port**

Logical switch

Logical switch: Nexus 1000V Switch

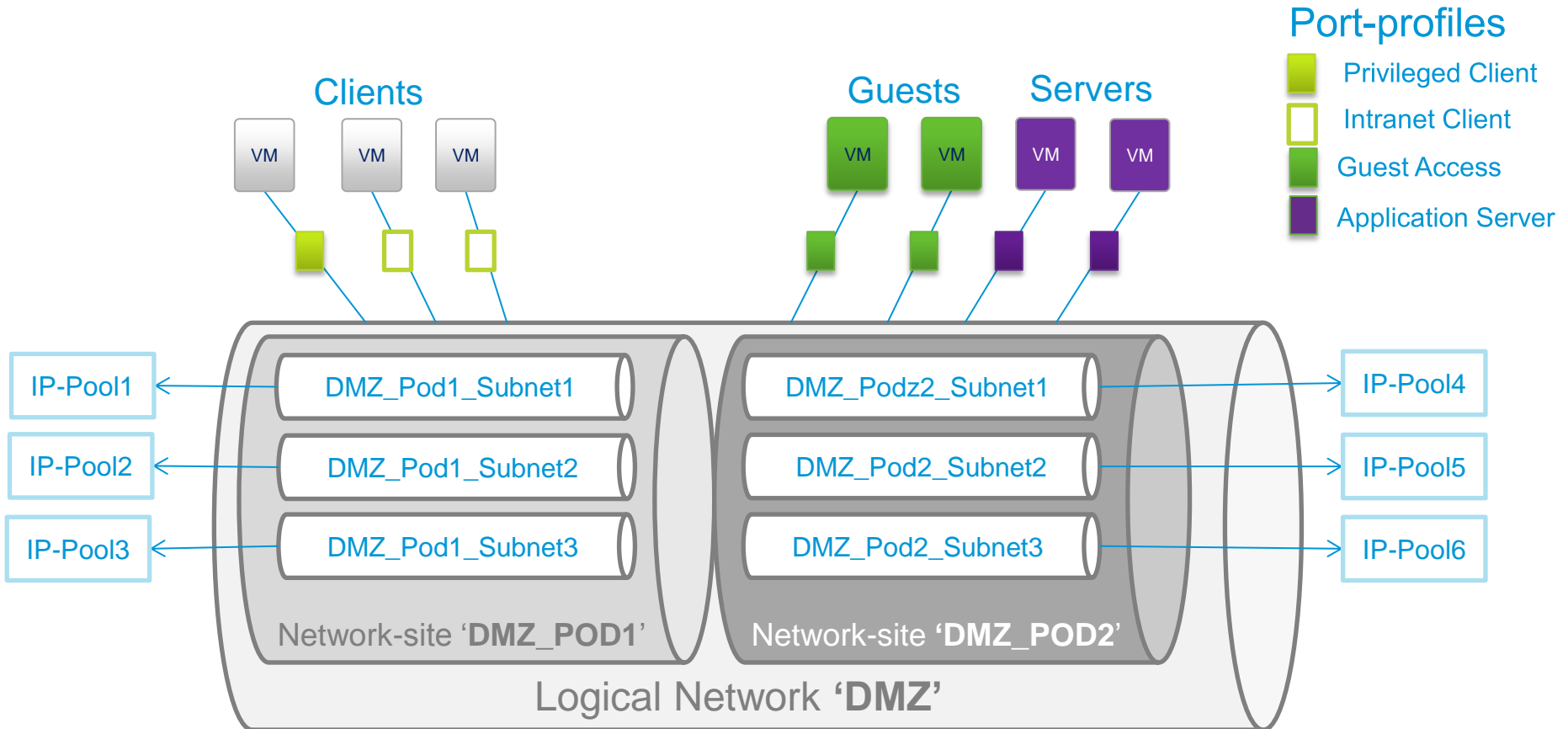
Classification: DMZ\_WebServer

# How the logical switch works



# Microsoft SCVMM Networking Concepts

## Putting everything together



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- Cisco Virtual Networking Vision
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- WS2012 & SC2012 SP1 Networking
- **Cisco N1KV Integration with SC2012 SP1**
- Cisco Virtual Security Gateway

# Cisco Nexus 1000V Terminology

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## SCVMM Terminology

## Cisco Nexus 1000V Terminology

Logical Networks

Logical Networks

Network Sites

Network Segment Pools

VM Network Definitions

Network Segments

IP-Pools

IP-Pools & IP-Pool Templates

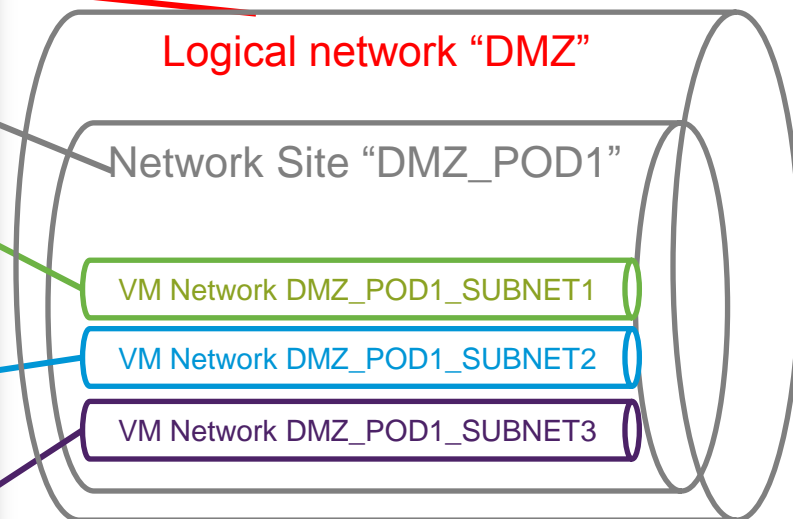
Port-Classifications

Port-profiles

# Cisco Nexus 1000V for Hyper-V

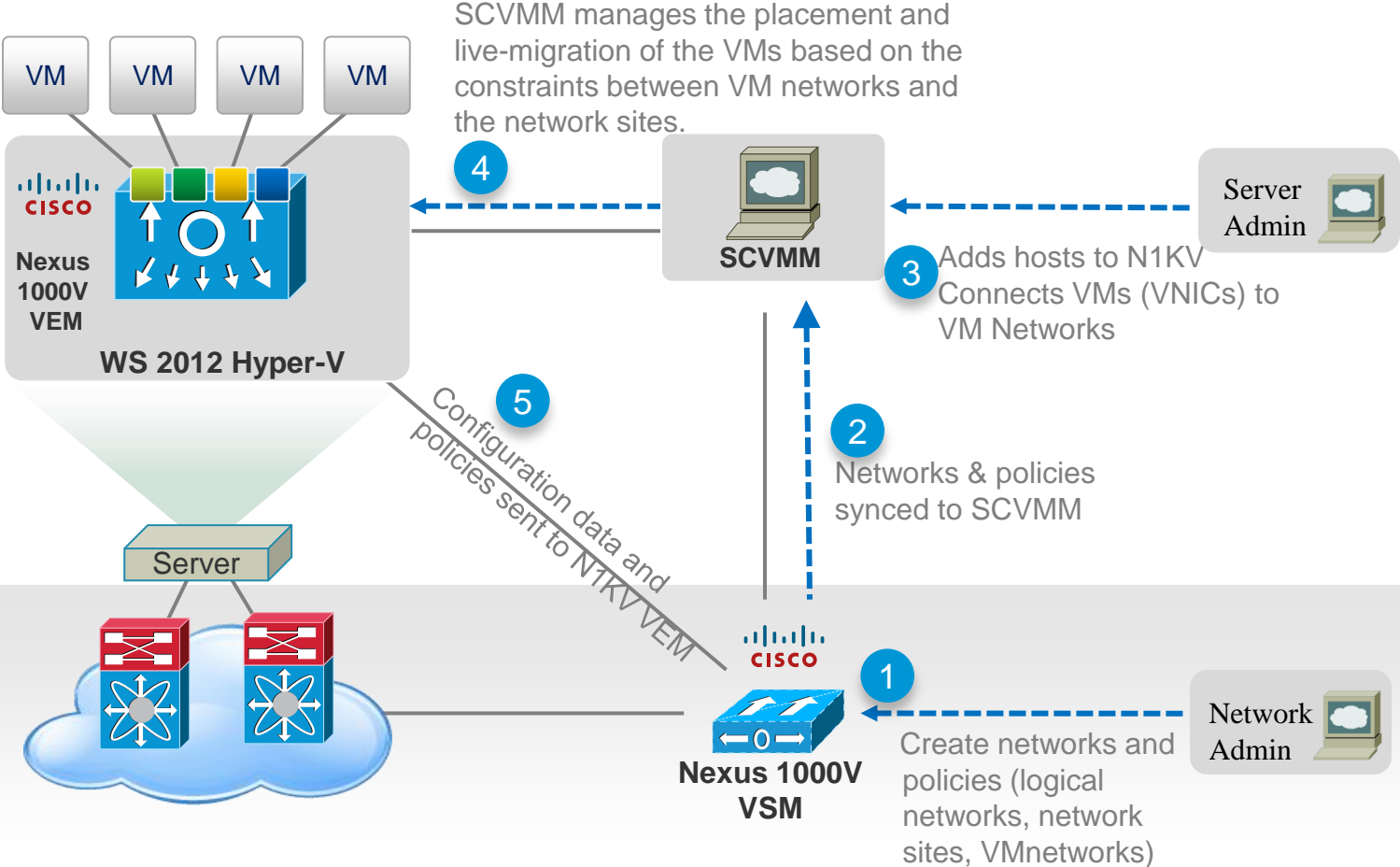
## Defining “Network sites” and “VM Networks”

```
nsm logical-network DMZ  
  
# nsm network-segment-pool DMZ_POD1  
# member-of logical network DMZ  
  
# nsm network-segment DMZ_POD1_SUBNET1  
member-of network segment pool DMZ_POD1  
switchport mode access  
switchport access vlan 20  
ip-pool import template DMZ_POD1_Pool1  
  
# nsm network-segment DMZ_POD1_SUBNET2  
member-of network segment pool DMZ_POD1  
switchport mode access  
switchport access vlan 21  
ip-pool import template DMZ_POD1_Pool2  
  
# network-segment DMZ_POD1_SUBNET3  
member-of network segment pool DMZ_POD1  
switchport mode access  
switchport access vlan 22  
ip-pool import template DMZ_POD1_Pool2
```



# Cisco Nexus 1000V for Hyper-V

## Operational Model with SCVMM







# N1KV/SCVMM Integration Demo

# Cisco Nexus 1000V REST API Support

URI: `http://<VSM-IP-address>/api/<object-locator>`

## CRUD Operations through VSM RESTful APIs

|                   |             |
|-------------------|-------------|
| Create an object* | HTTP POST   |
| Read an object    | HTTP GET    |
| Update an object  | HTTP POST   |
| Delete an object  | HTTP DELETE |

\*Objects can be VM networks, Port-profiles, IP-Pools etc.  
Write/Update Operations are only supported on limited set of objects



# Cisco Nexus 1000V for Hyper-V

## Accessing N1KV with Powershell 3.0

### Basic Parameters Required for API Calls

```
$User = "admin"
$Password = ConvertTo-SecureString -String
"Secret123" -AsPlainText -Force
$VSMIPAddress = "10.105.228.108"
$URI = "http://" + $VSMIPAddress + "/api/"

$Credentials = New-Object -TypeName
System.Management.Automation.PSCredential -
ArgumentList $User, $Password
```

### CREATE Object

```
#Create IP-Pool on Nexus 1000V - HTTP POST
$IPPURI=$URI + "hyper-v/ip-address-pool"
$IPPArg = '{"name":"pool1",
"addressRangeStart":"192.168.0.2",
"addressRangeEnd":"192.168.0.16"}\`

ConvertFrom-Json -InputObject $IPPArg
Invoke-RestMethod -Uri $IPPURI -Credential
$Credential -Method Post -Body $IPPArg
```

### UPDATE Object

```
#Update IP-Pool Information - HTTP POST
$IPPURI=$URI + "hyper-v/ip-address-pool/pool1"
$IPPArg = '{
"addressRangeStart":"192.168.0.5",
"addressRangeEnd":"192.168.0.20"}\`

ConvertFrom-Json -InputObject $IPPArg
Invoke-RestMethod -Uri $IPPURI -Credential
$Credential -Method Post -Body $IPPArg
```

### READ Object

```
#Read VSEM Information - HTTP GET
$VersionURI = $URI + "/api/hyper-v/vsem-
system-info"

Invoke-RestMethod -Uri $VersionURI -
Credential $Credential -Method Get -Outfile
testout.xml
```

### DELETE Object

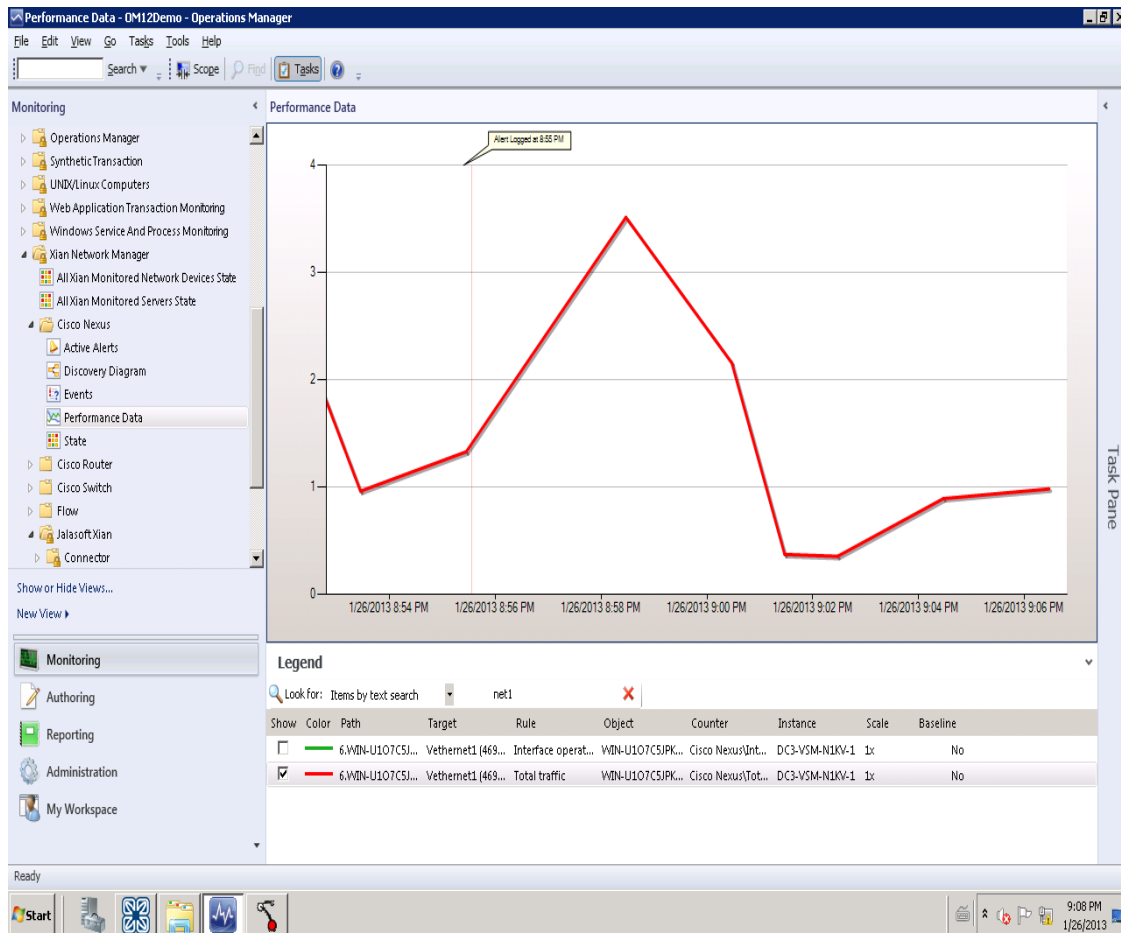
```
#$VMNURI = $URI + "hyper-v/vm-network-definition/vmn4"
$VMNArg = '{"name":"VMN4"}\`
ConvertFrom-Json -InputObject $VMNArg
Invoke-RestMethod -Uri $VMNURI -Credential $Credential
-Method Delete -Body $VMNArg
```



# N1KV PowerShell Demo

# Cisco Nexus 1000V for Hyper-V SCOM Plugin from Jalasoft

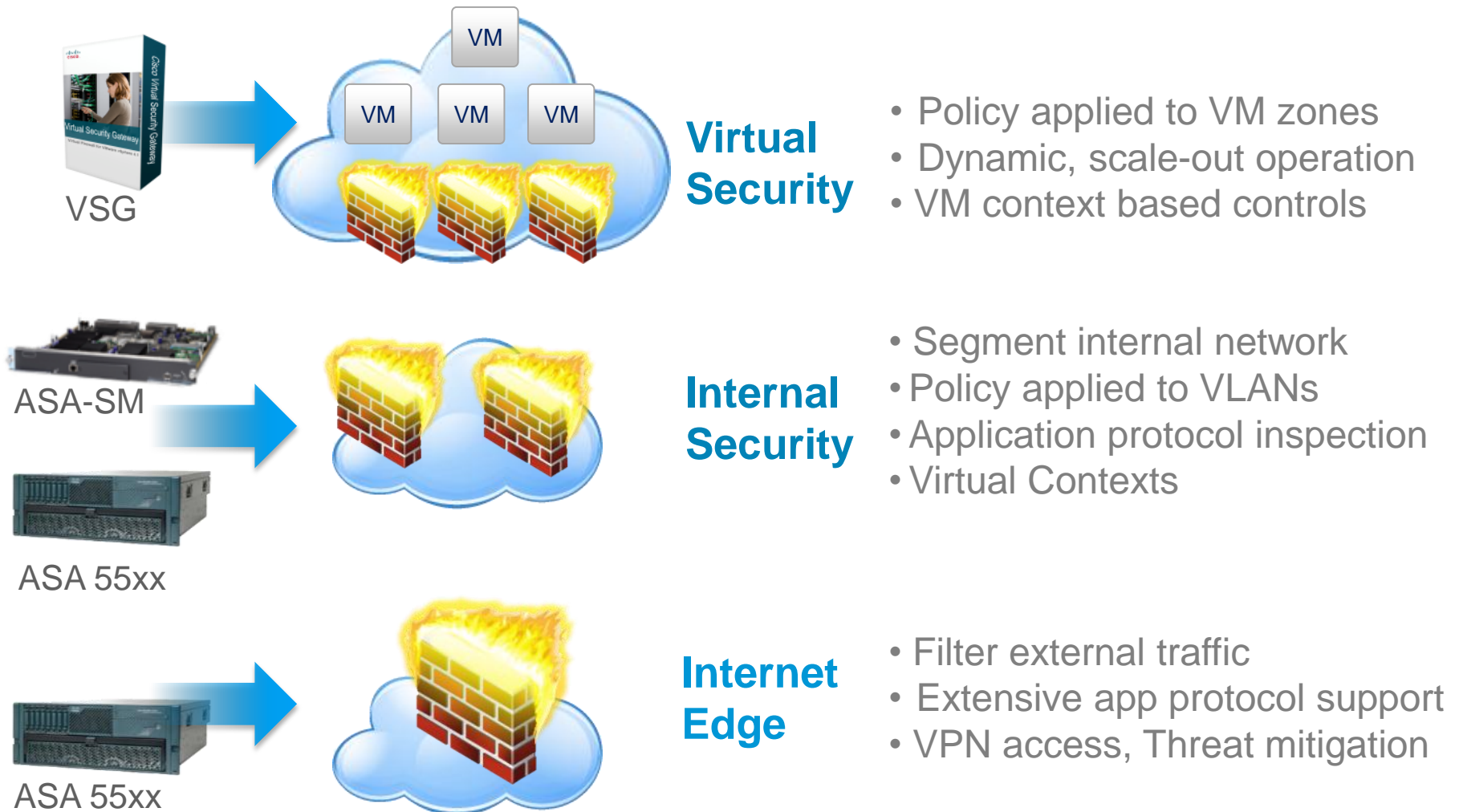
- Xian SCOM Plugin for Nexus 1000V
- Monitors various metrics:
  - Availability (ICMP and SNMP)
  - TCP Connections
  - Uptime
  - Traffic, total, error etc.
  - Bandwidth



# Agenda

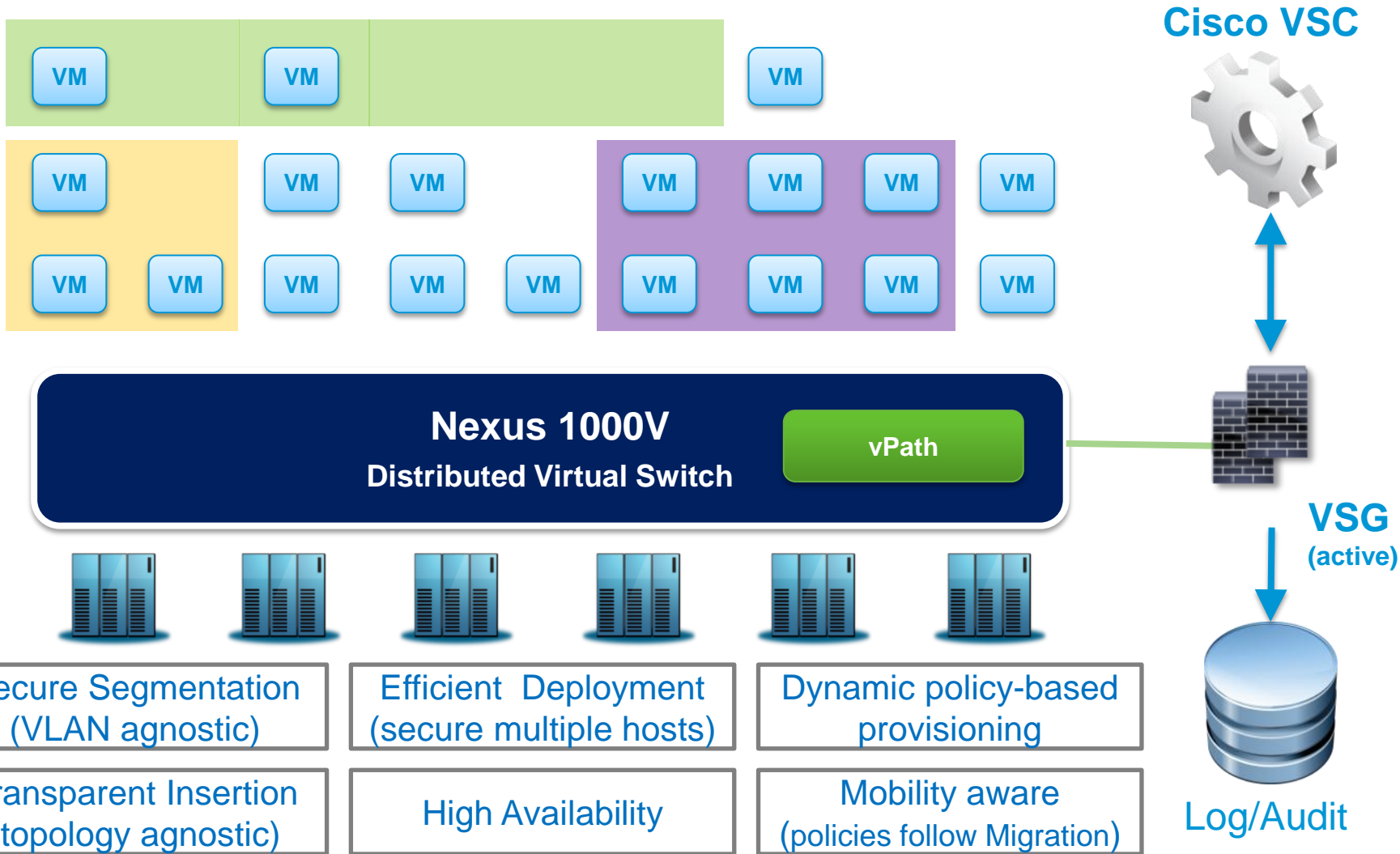
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# Defense in Depth Security Model



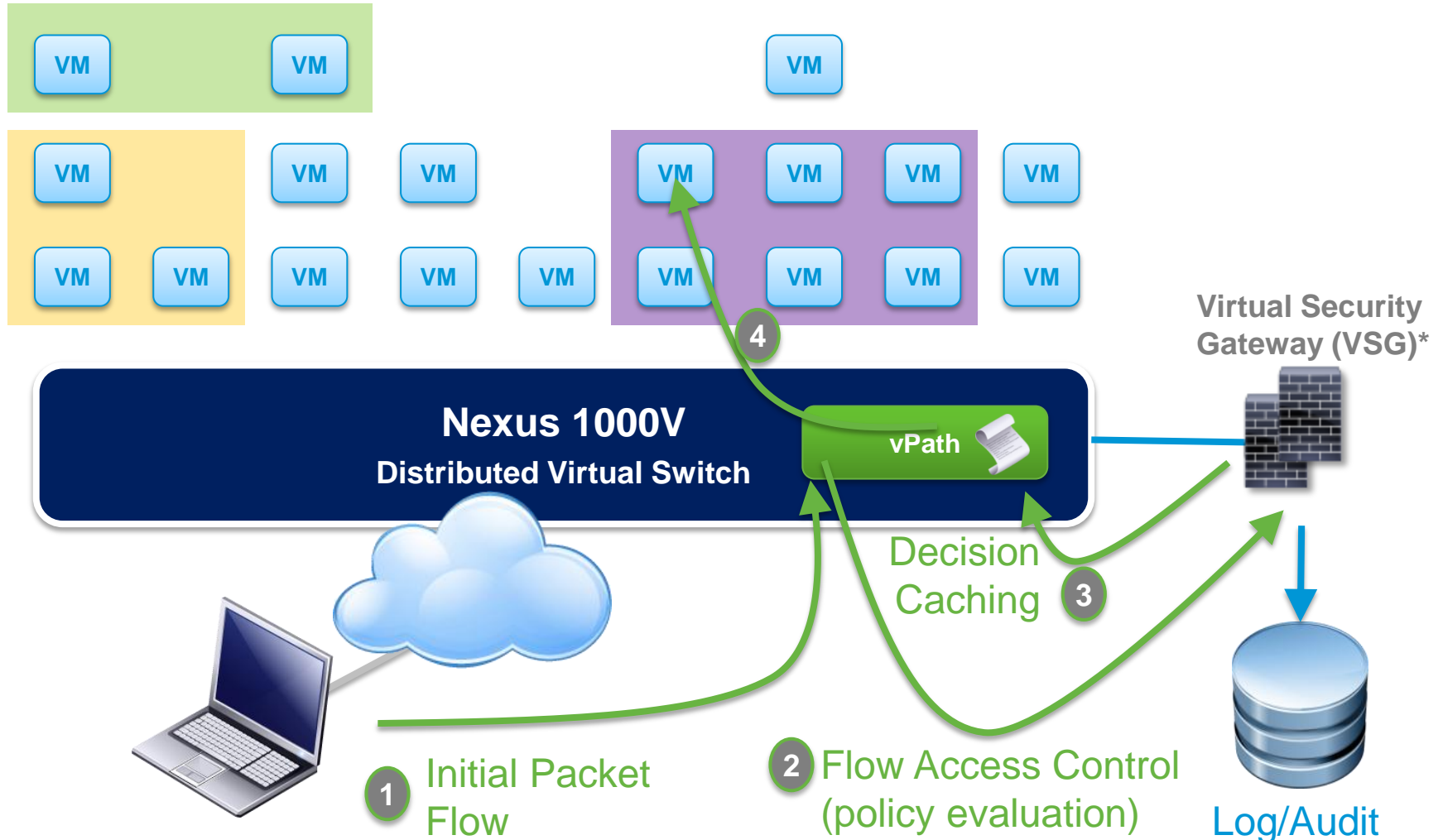
# Cisco Virtual Security Gateway (VSG)

## Context-based, Multi-tenant, Workload Segmentation

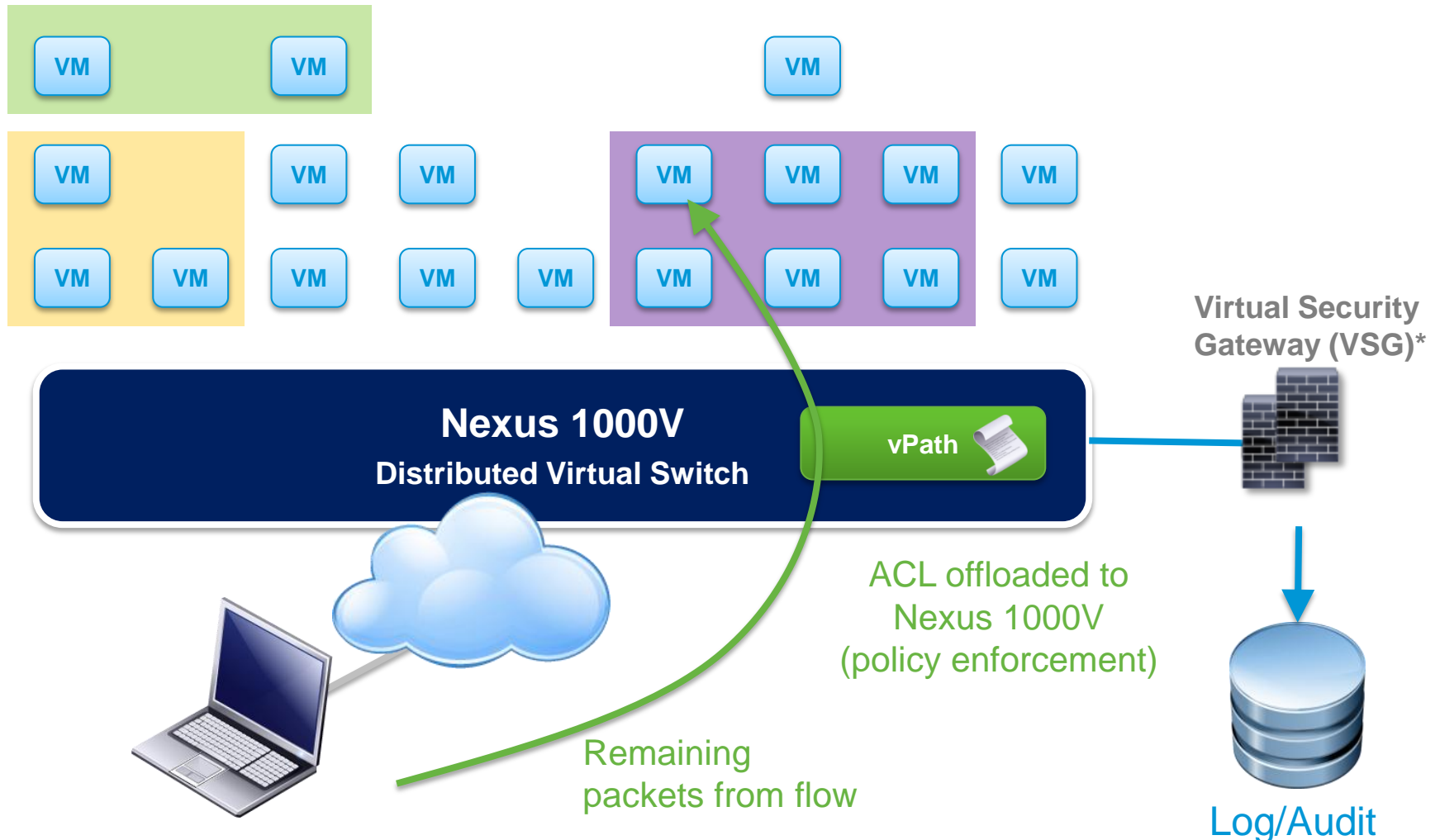




# Cisco Virtual Security Gateway Intelligent Traffic Steering with vPath



# Virtual Security Gateway Performance Acceleration with vPath



# Summary



# Cisco Nexus 1000V: Customer Benefits

## Consistent Networking Features

- NX-OS feature across multiple hypervisors & across physical
- Advanced NX-OS switching features, including security, visibility, QoS, segmentation, port channel, ...

## Consistent Operational Model

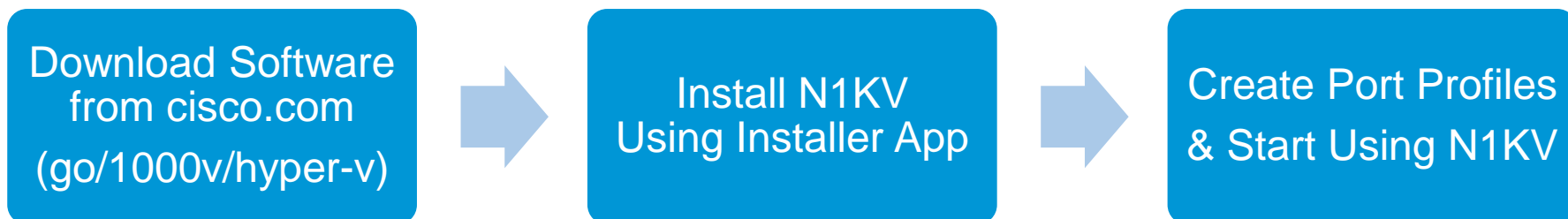
- NX-OS CLI across multiple hypervisors & across physical
- Separation of duties between network & server admins
- Dynamic provisioning and VM mobility awareness
- Leverage existing monitoring and management tools

## Consistent Network Services

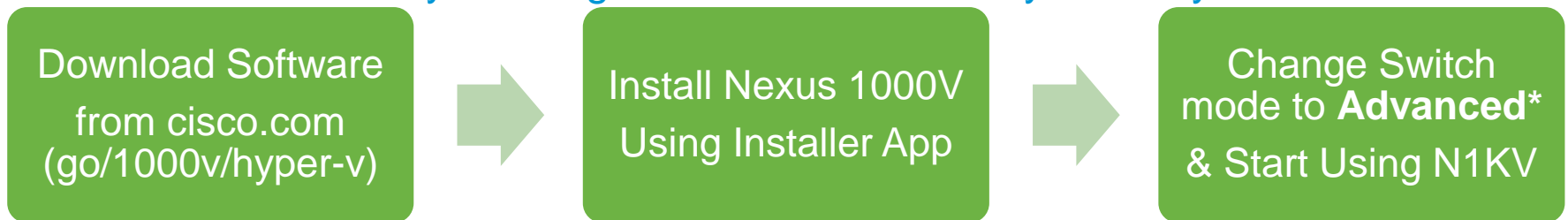
- Leverage existing virtual services  
Virtual Security Gateway, Virtual WAAS, Virtual ASA, NAM on Nexus 1010
- Services can be hosted on Nexus 1010

# Start using Cisco Nexus 1000V today

Essential Edition – No licensing or procurement needed



Advanced Edition – you can get a free trial for 60 days when you use essential



# Additional Resources

## Cisco

- Cisco Nexus 1000V for Hyper-V: <http://www.cisco.com/go/1000v/hyper-v>
- Cisco Virtual Security Gateway: <http://www.cisco.com/go/vsg>
- Cisco Nexus 1000V Portfolio: <http://www.cisco.com/go/1000v>
- N1KV Powershell Cmdlets: <http://developer.cisco.com/web/n1k/hyperv>
- Cisco-Microsoft Partnership: <http://www.cisco.com/go/microsoft>

## Microsoft

- Evaluate Windows Server: [www.microsoft.com/WindowsServer](http://www.microsoft.com/WindowsServer)
- Evaluate System Center: [www.microsoft.com/SystemCenter](http://www.microsoft.com/SystemCenter)
- Follow the VMM Blog: <http://blogs.technet.com/b/scvmm/>
- TechEd Sessions: <http://aka.ms/Ci8e86>

Thank you.

