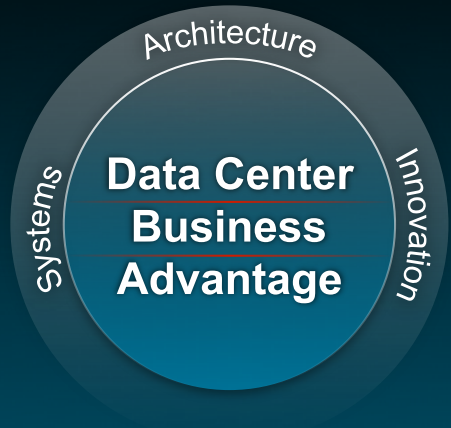
UNIFIED NETWORK SERVICES (UNS)

Prashant Gandhi
Product Management
Server Access and Virtualization BU

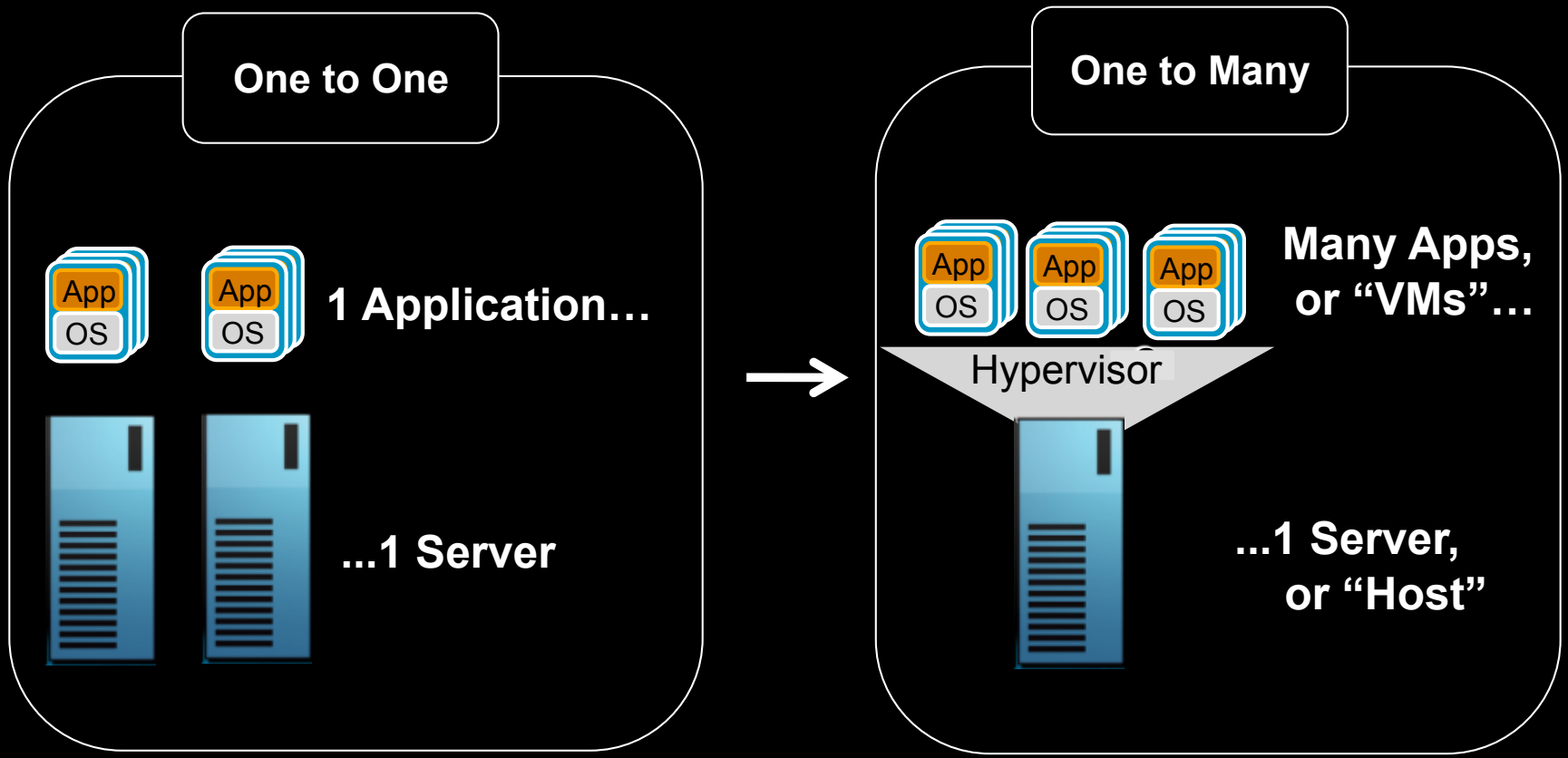


Agenda

- Virtualization & Data Center
  - Virtualization Trends
  - Virtualization Case Study
- Virtual Machine Switching
- Unified Network Services (UNS)
  - Cisco VSG (Virtual Service Gateway)
  - Cisco vWAAS (Virtual WAAS)

Present Day Virtualization

Virtualizing Consolidated Data Centers



Traditional Model:

- Low CPU Utilization
- Heating/Cooling Challenges

Virtualized Model:

- Agile, Policy Driven, Multi-Tenant
- Forecasted to be 50% of all workloads in 2012
- Environment demands 10GbE and a new architectural framework

More Servers are Virtualized

Journey to 100% Virtualization

Recent Forbes Insights survey: 235 CIOs and IT executives:

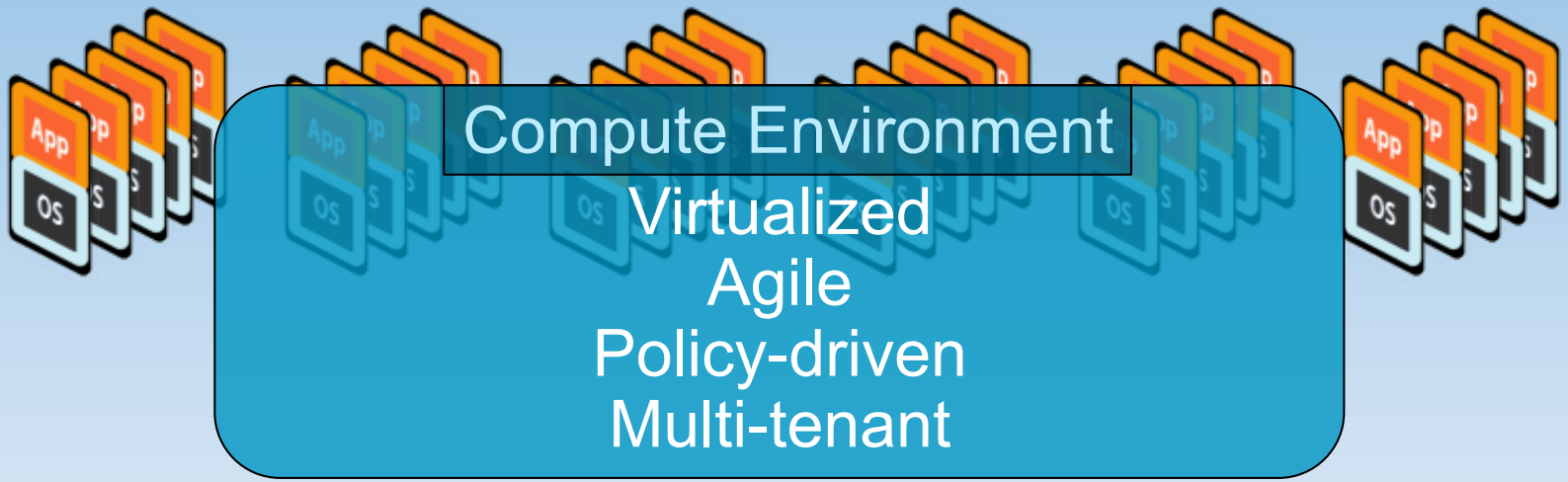
- **48%** have virtualized at least a quarter of their organization's servers in order to reduce infrastructure costs and deliver applications more rapidly
- **43%** of the survey respondents identified security as their top concern about adopting virtualization as the foundation for cloud computing

Ref: Session SE8195, VMWorld 2010

Virtual Switching

Establishing A Platform for Virtual Network Services

Cisco's Virtual Networking Vision
Accelerate Data Center Virtualization



Virtual Network Link (VN-Link)

Extend networking to virtualized environments

- Hypervisor Switch (SW): **Nexus 1000V**
  - Standards based, Feature rich
- External Switch (HW): **UCS 6100/N5K + VIC** (Pre-standard, IEEE 802.1 Qbh)

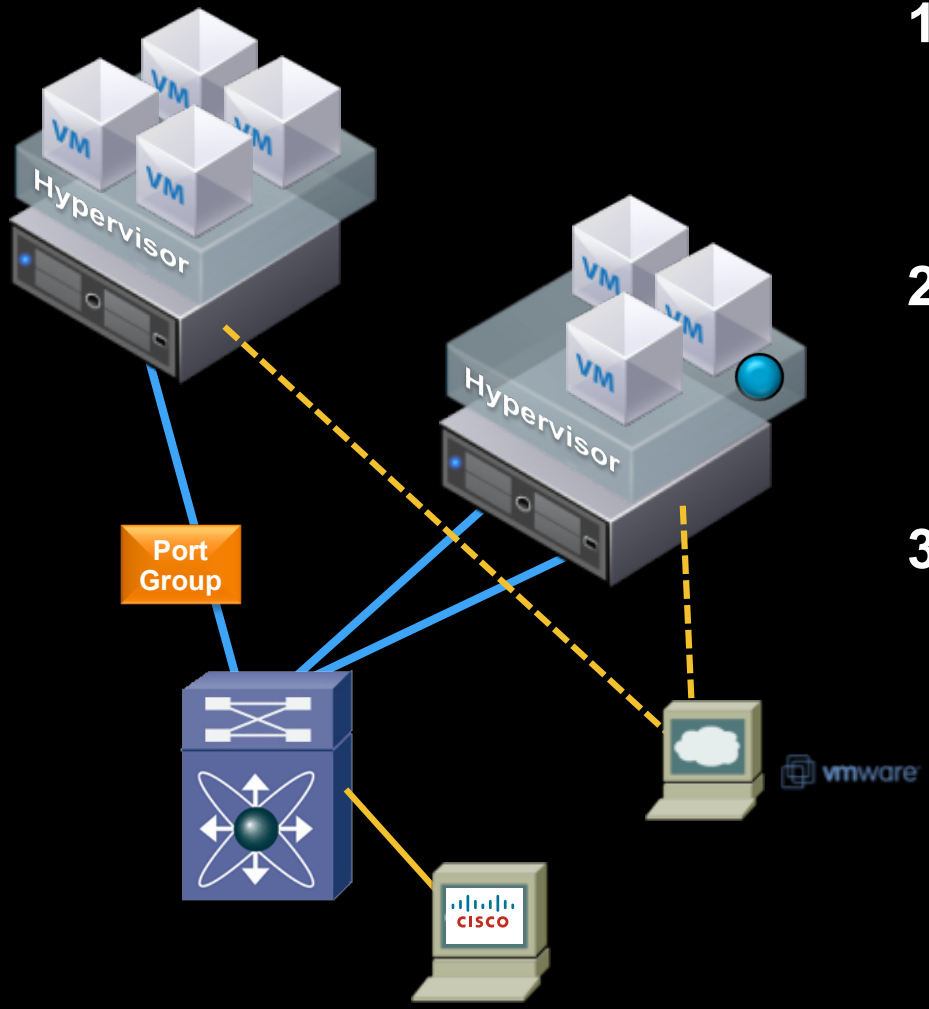
Virtual Network Services

Extend network services to virtualized environments

- Virtual Security Gateway for Nexus 1000V
- Virtual WAAS
- NAM virtual service blade on Nexus 1010

Virtual Network Management (UCSM, VNMC)
Policy-driven, Programmatic, Multi-device, Multi-tenant

Server Virtualization Issues

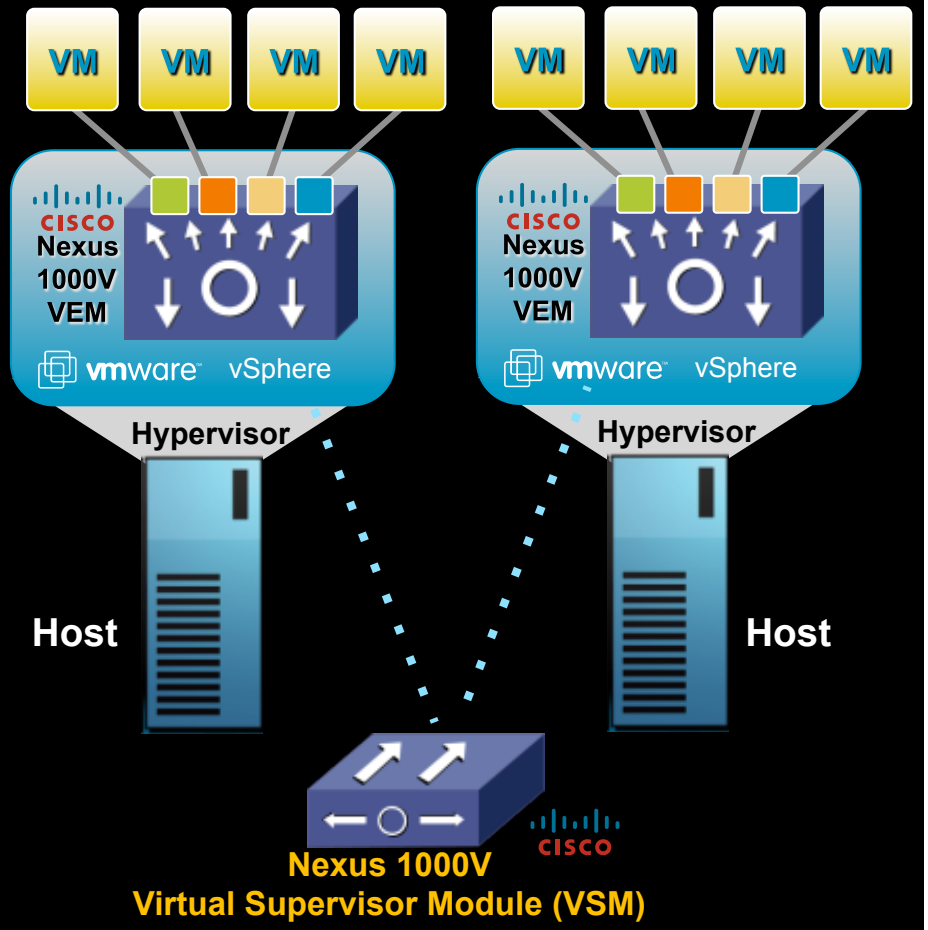


1. vMotion moves VMs across physical ports—the network policy must follow
2. Impossible to view or apply network policy to locally switched traffic
3. Need shared nomenclature for security policies between network and server admin

Cisco Nexus 1000V
Distributed Virtual Switch for VMware vSphere

BEST OF vmworld 2008

- Industry's most advanced virtual switch for VMware vSphere
- Standards based – interoperates with all IEEE 802.1Q switching platforms
- Built on Cisco NX-OS
  - Feature and operational consistency across physical and virtual networks
  - Provides advanced switching features
- Non-disruptive provisioning model
  - Network team manages virtual network
  - No change for server administration



Policy-Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model

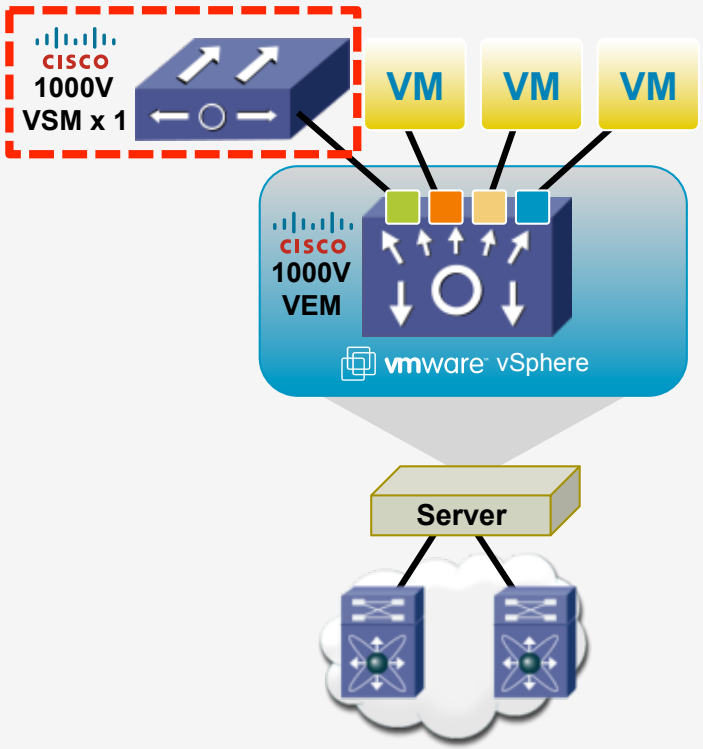
Features of the Nexus 1000V

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
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 ▪ Policy-based SPAN & ERSPAN*
Management	▪ Virtual Center VM Provisioning, Cisco Network Provisioning, CiscoWorks ▪ Cisco CLI, Radius, TACACs, Syslog, SNMP (v.1, 2, 3) ▪ Hitless upgrade*

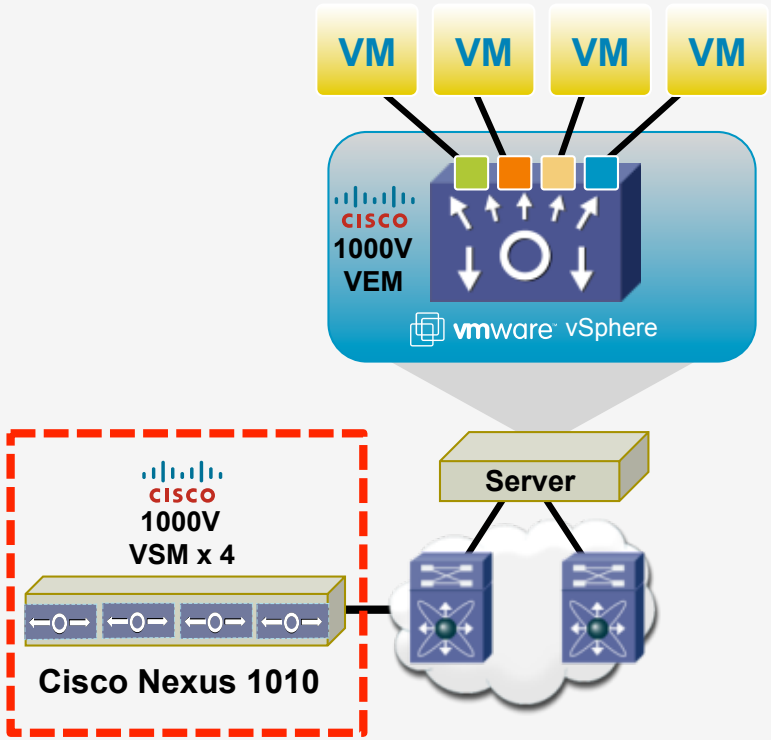
*In 1.4 Release, 4Q CY2010

Nexus 1010: VSM on an Appliance

VSM on Virtual Machine

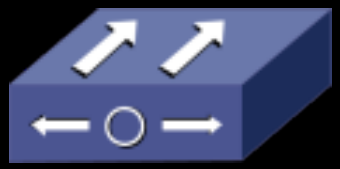


VSM on Nexus 1010



Feature Comparison

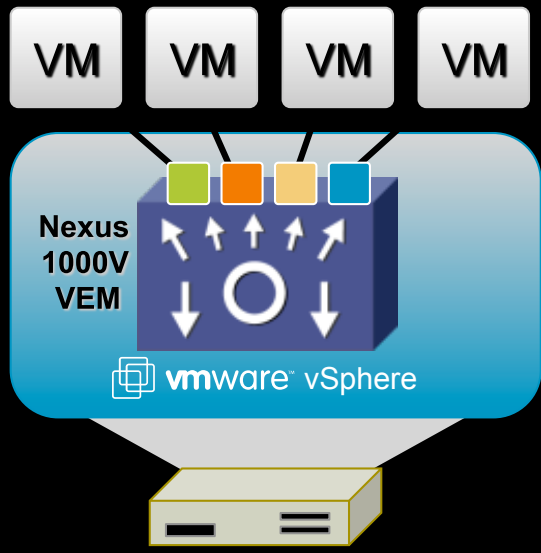
	Network Team manages the switch hardware
	Installation like a standard Cisco switch
NX-OS high availability of VSM	NX-OS high availability of VSM
VEM running on vSphere 4 Enterprise Plus	VEM running on vSphere 4 Enterprise Plus
Nexus 1000V features and scalability	Nexus 1000V features and scalability



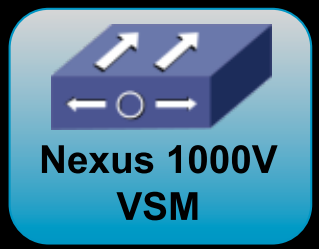
VSM Virtual Appliance

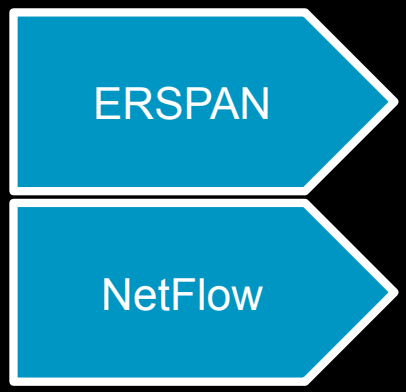
VSM hosted on Nexus 1010

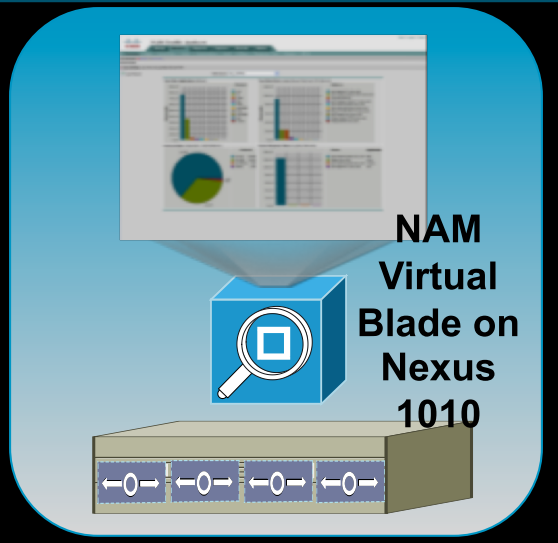
NAM Virtual Blade on Nexus 1010



- Application Performance Monitoring
- Traffic Analysis and Reporting
  - Applications, Host, Conversations, VLAN, QoS, etc.
- View VM-level Interface Statistics
- Packet Capture and Decodes
- Historical Reporting and Trending







Promotions

Nexus 1000V: $695/CPU List

Free 60-day Eval (www.cisco.com/go/1000veval)

1000V + vSphere bundle: $795/CPU

Nexus 1000V and vSphere Ent → EntPlus Upgrade for extra $100

UCS bundle (till 12/31/2010):

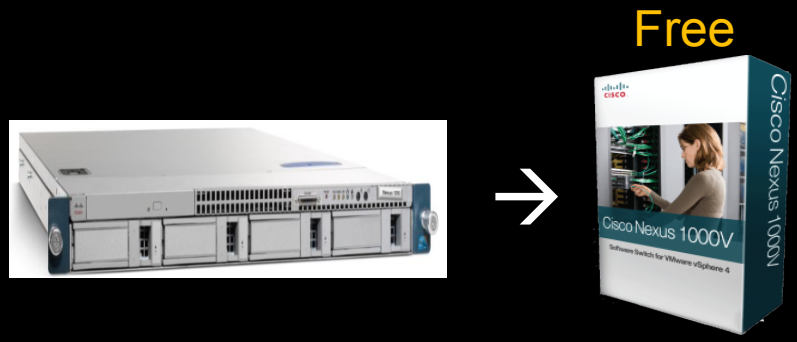
- UCS B/C + vSphere Ent Plus
- Get Free Nexus 1000V

Nexus 1010: $24,995 List

NAM Virtual Blade: $4000 List

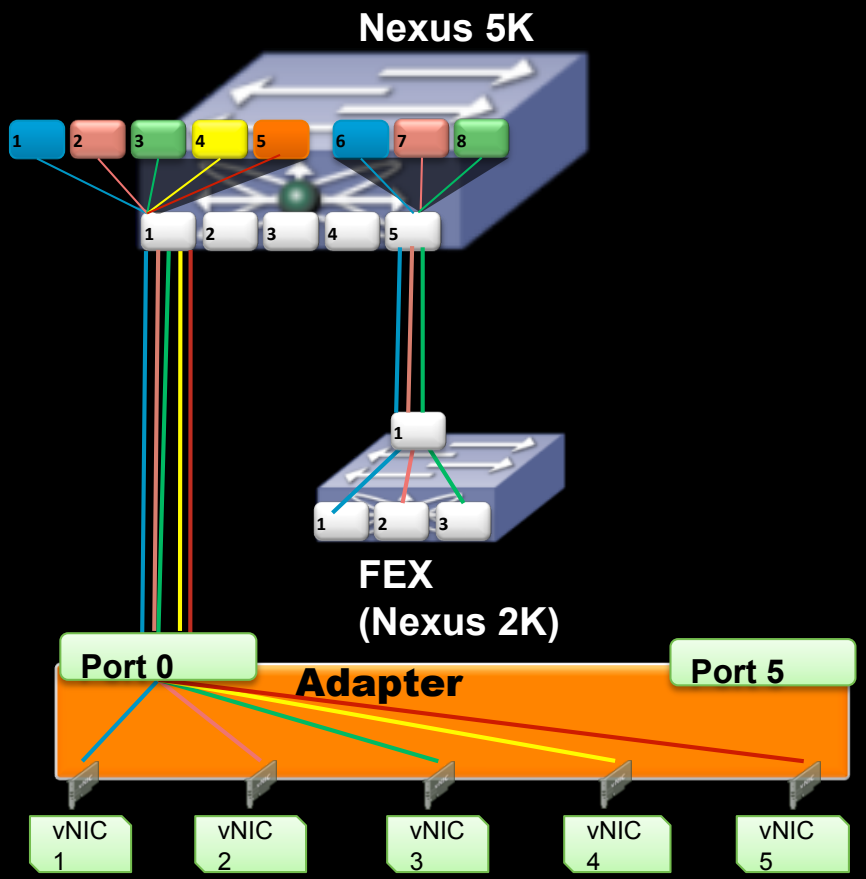
1010 + 1000V bundle (till 12/31/10)

Free 32 Nexus 1000V licenses (List: $21K+)



Network Interface Virtualization (NIV)*

Why virtualized adapters?



Any network interface can be virtualized (FEX, adapter)

Enables external switch to forward frames that "belong" to the same physical port by using VN-Tag

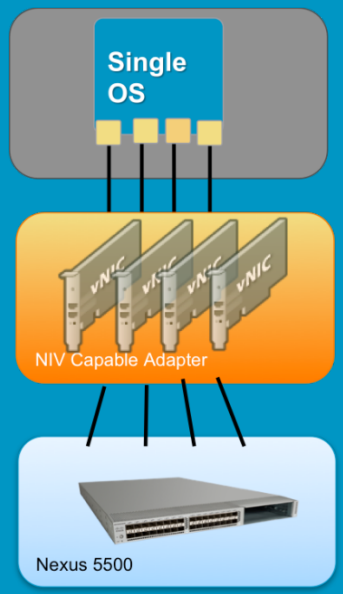
Under standardization - 802.1Qbh

Expanding the Adapter Ecosystem with VN-Tag

CISCO BROADCOM. EMULEX QLOGIC

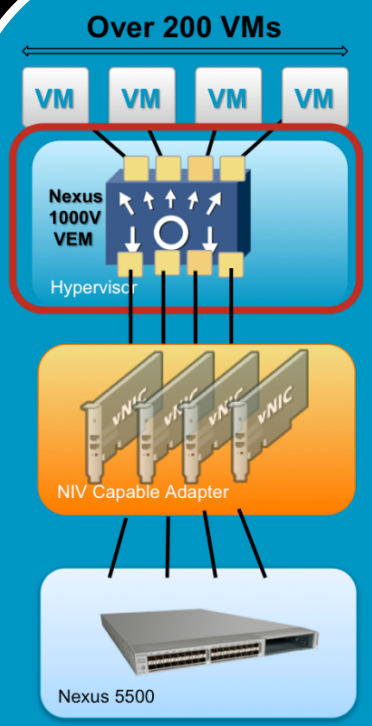
** NIV & VN-Tag is also implemented on UCS 6100 Fabric Interconnect and Cisco Virtual Interface Card (VIC)*

NIV Use Cases

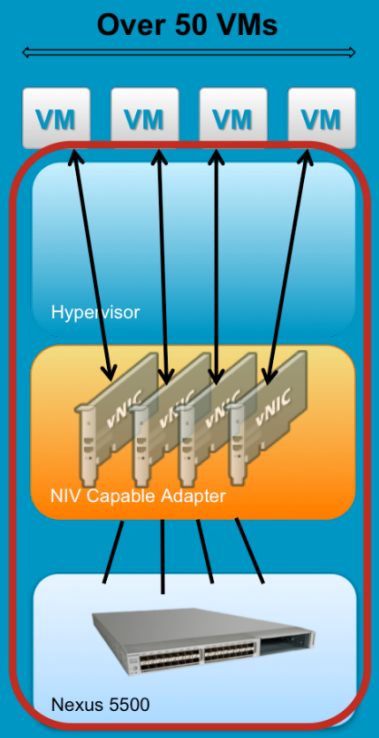


NIV Standalone

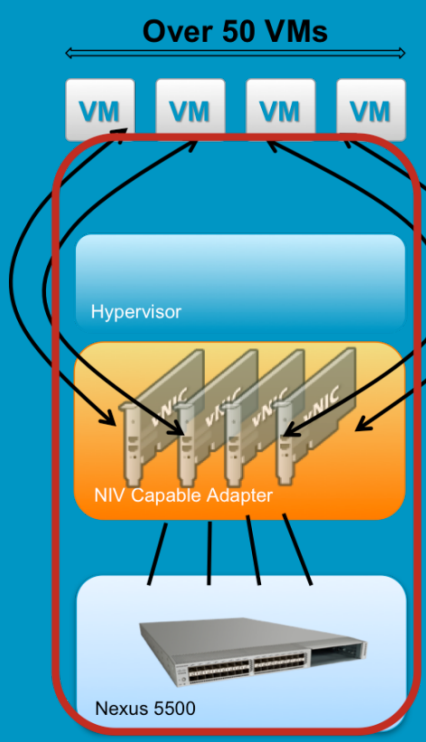
Non-Virtualized Applications



NIV with VN-Link in SW (Nexus 1000V)



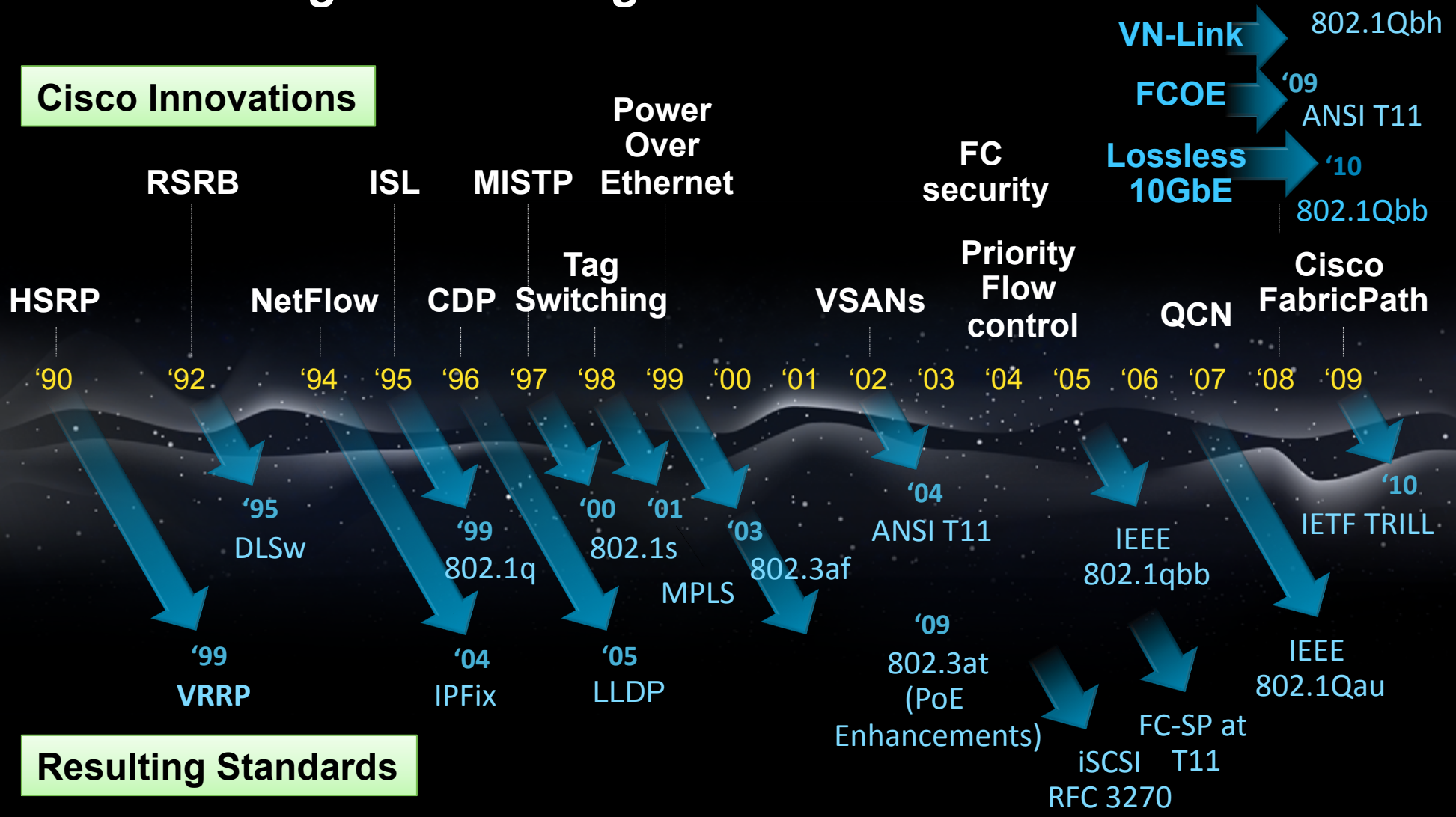
NIV with VN-Link in HW



NIV with VN-Link in HW & VMDirectPath

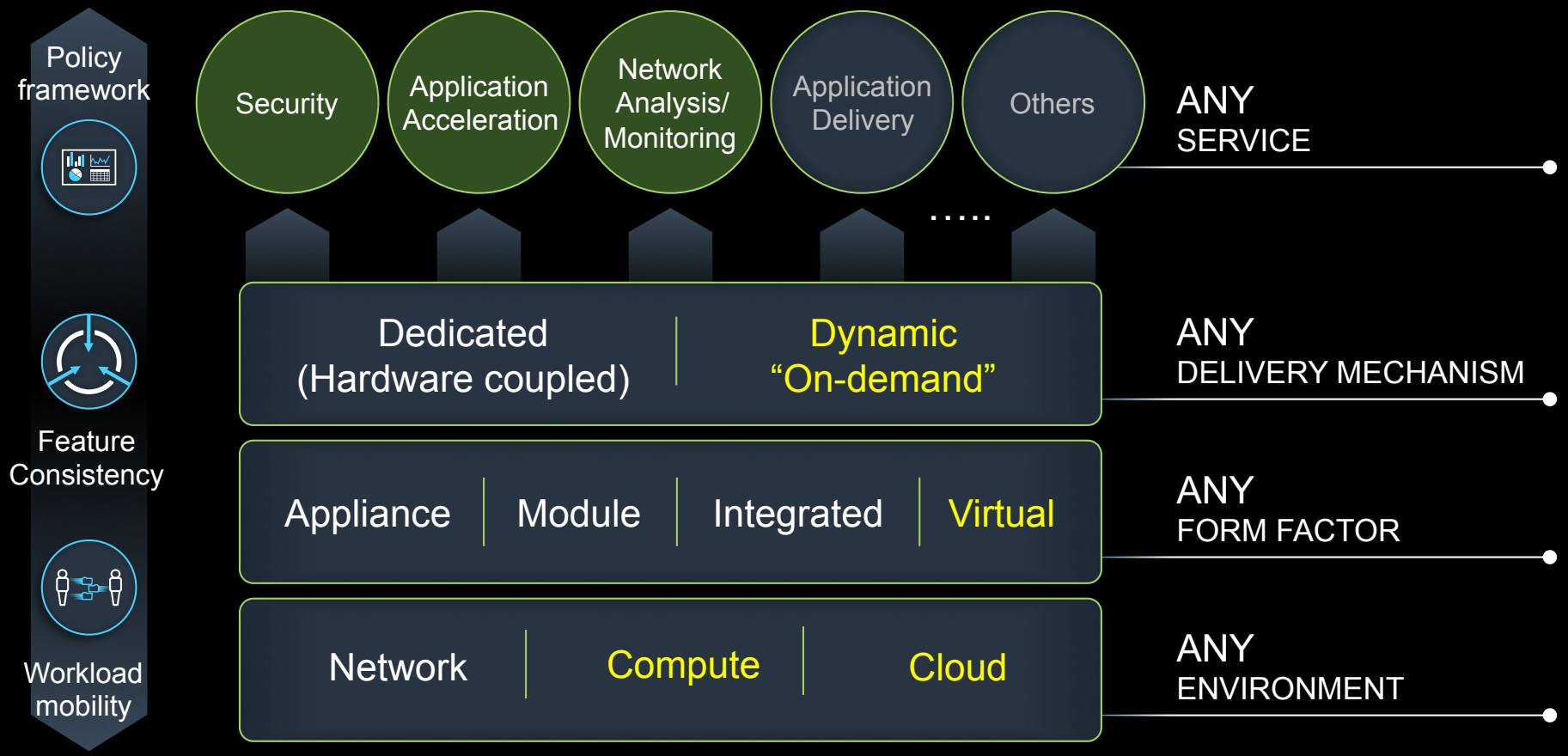
Virtualized Applications

Cisco's Commitment to Standards
Switching and Routing



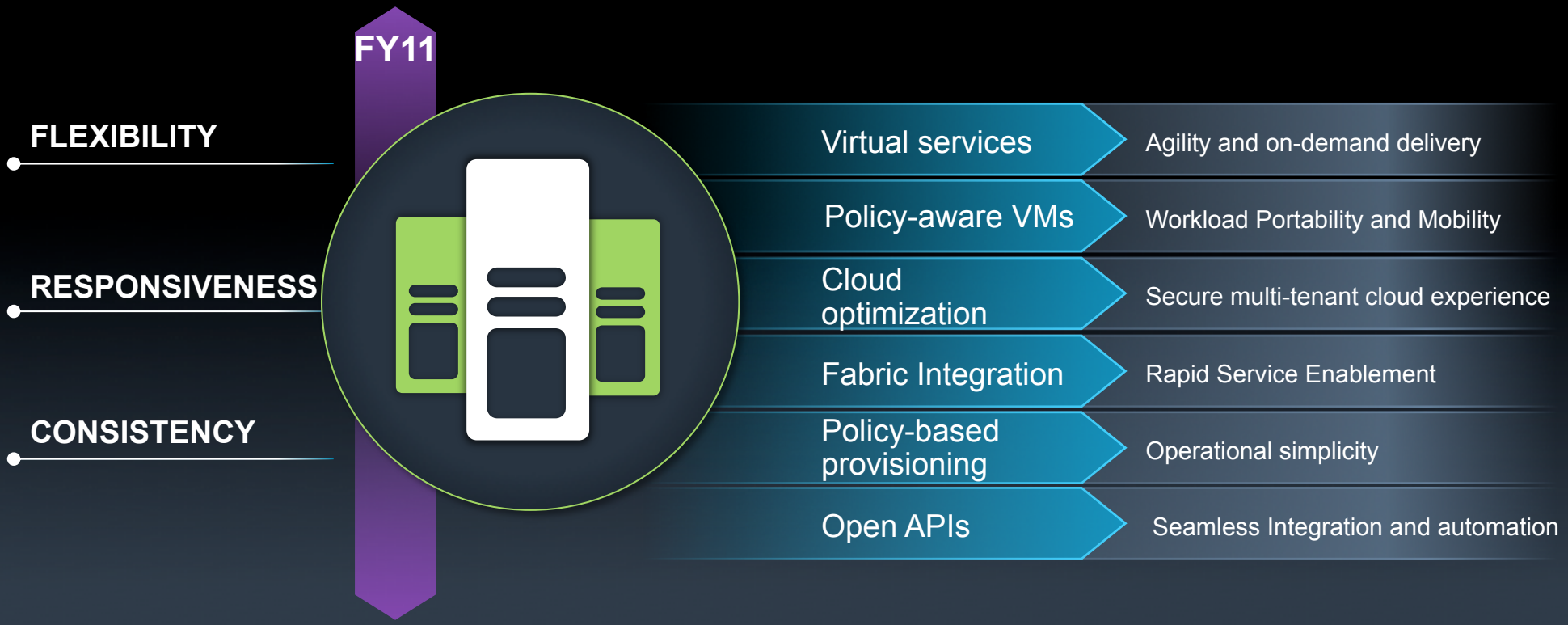
Unified Network Services – Overview

Cisco Unified Network Services Vision



Flexibility and Choice For Any Deployment Model

UNS Architectural Innovations and Benefits



UNS Product Innovations

Virtual Security Gateway (VSG)

On Nexus 1000V

Virtual Network Management Center (VNMC)

Virtual WAAS

ESX ESXi Hypervisor w/ Nexus 1000V

UCS /x86 Servers

vPath

Nexus 1000V

vPath: Fabric Intelligence for Virtual services

Traffic interception/redirection, Fast-path off-load

Customer Endorsements

"To optimize and scale cloud services, we need network services to be virtualized, including security and application optimization. We're excited to see Cisco taking a leadership role in delivering Unified Network Services, with Cisco Virtual Security Gateway and virtual WAAS for the Nexus 1000V, as part of its broader architectural vision for the data center.

"Alphawest continues to work closely with Cisco to develop a strong value proposition for its Australian customers that enable innovative Get Cloud Ready solutions. Our aim is to offer a range of sustainable, scalable and efficient data centre services that help to better manage infrastructure and data centre technologies. Key to this strategy is a network architecture that enables a policy-based, on-demand and elastically scalable service deployment model for cloud services. We are pleased that Cisco is making this possible by delivering virtual WAAS (vWAAS) and Virtual Security Gateway (VSG), integrated with the Nexus 1000V, as part of its Unified Network Services vision for the data center."

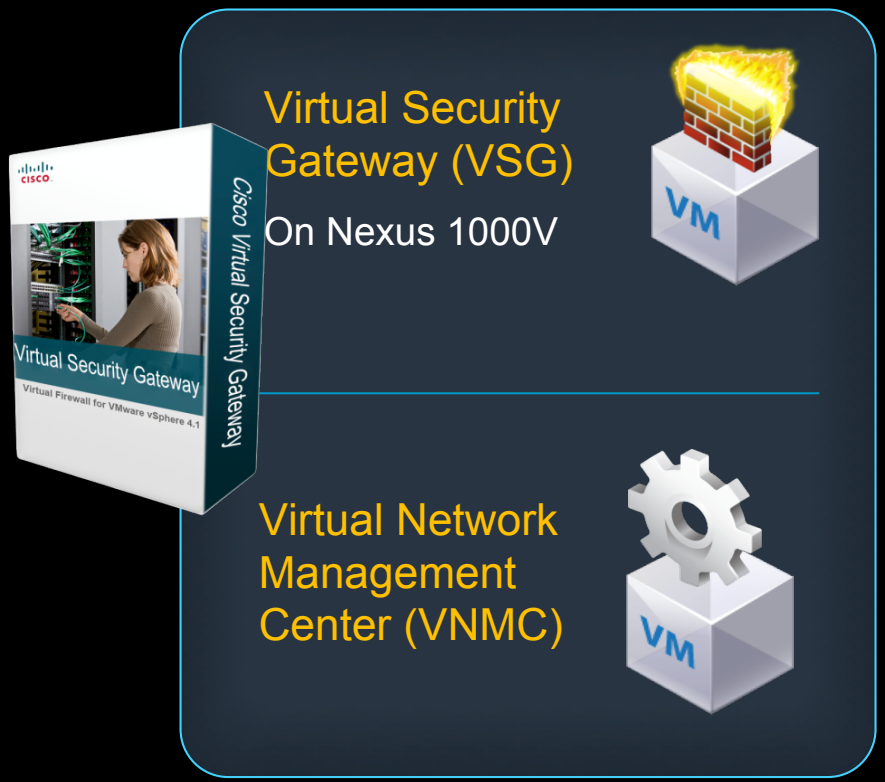
Cisco VSG

(Virtual Security Gateway)

Virtual Security Gateway on
Nexus 1000V with vPath

Introducing: Cisco Virtual Security Gateway

Securing Virtualized Data Center and Cloud Environments



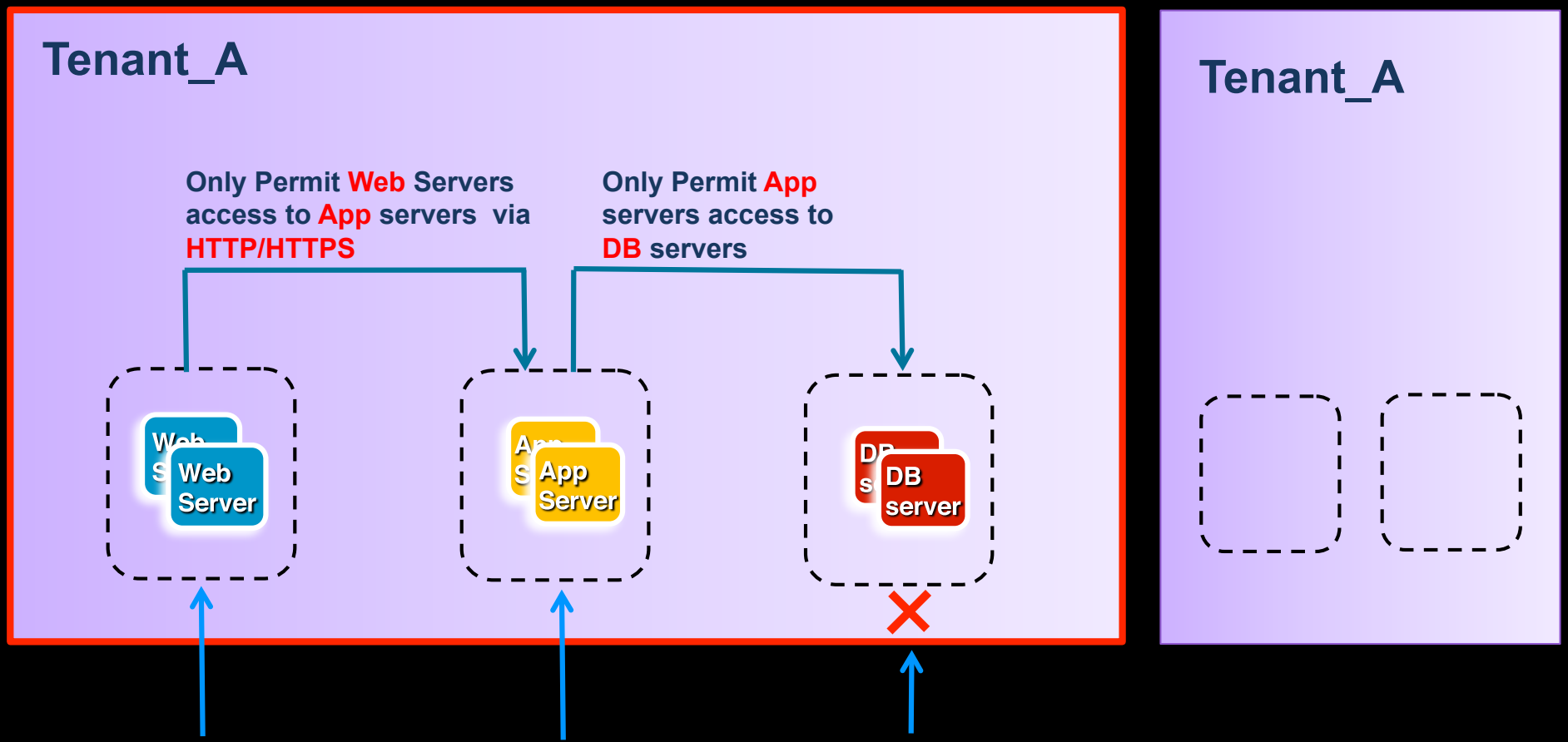
FEATURES

- Secure segmentation with zone-based firewall
- VM-level granularity with context-aware rules
- Virtual Network Management Center: Policy-based centralized management

BUSINESS BENEFITS

- Operational simplicity
- Deployment flexibility
- Consistent security policy compliance and auditing

Example Use Case: 3-tier Server Zones



Virtual Security Gateway - Capabilities

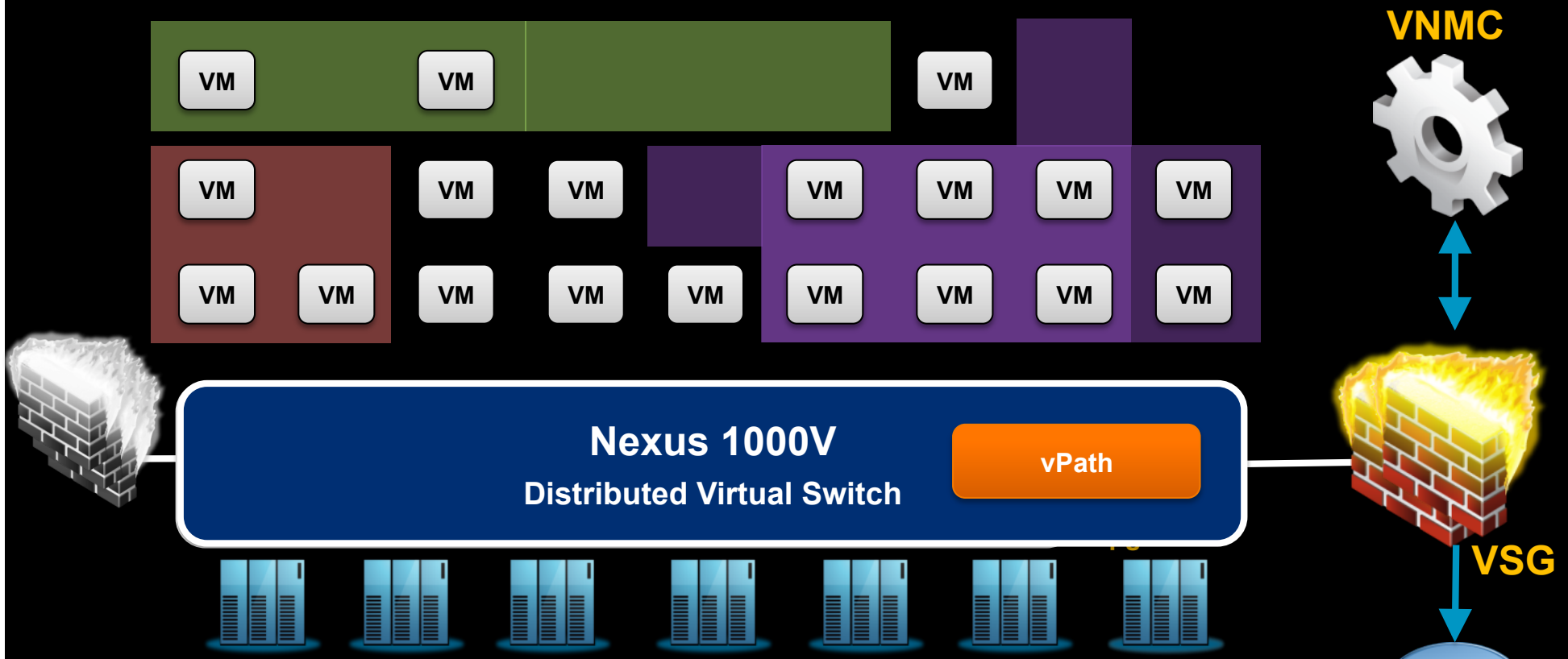
Virtual Security Gateway (VSG)

Context aware Security	VM context aware rules
Zone based Controls	Establish zones of trust
Dynamic, Agile	Policies follow vMotion
Best-in-class Architecture	Efficient, Fast, Scale-out SW

Virtual Network Management Center (VNMC)

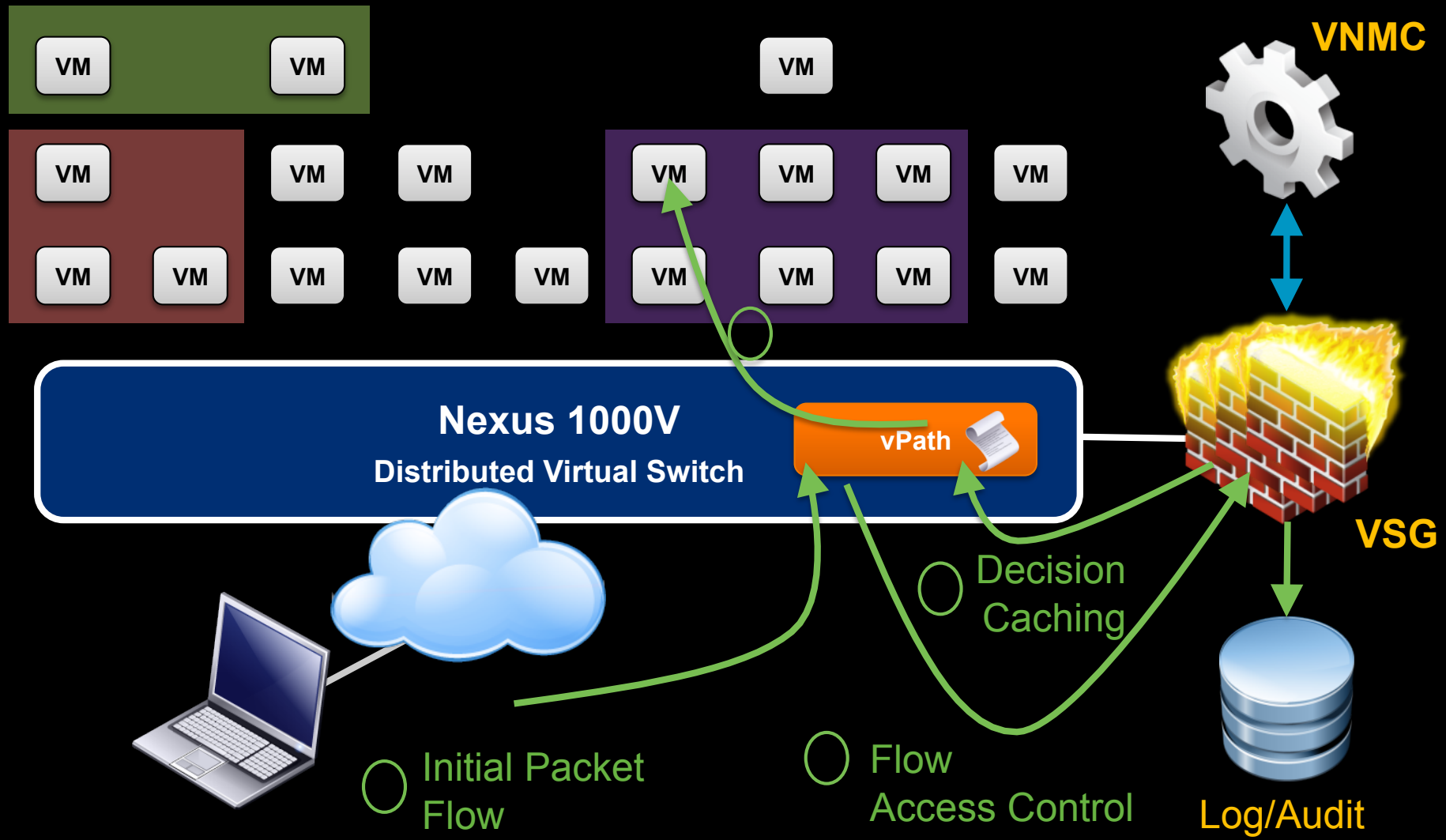
Non-Disruptive Operations	Security team manages security
Policy Based Administration	Central mgmt, scalable deployment, multi-tenancy
Designed for Automation	XML API, security profiles

Virtual Security Gateway
Deployment Scenarios

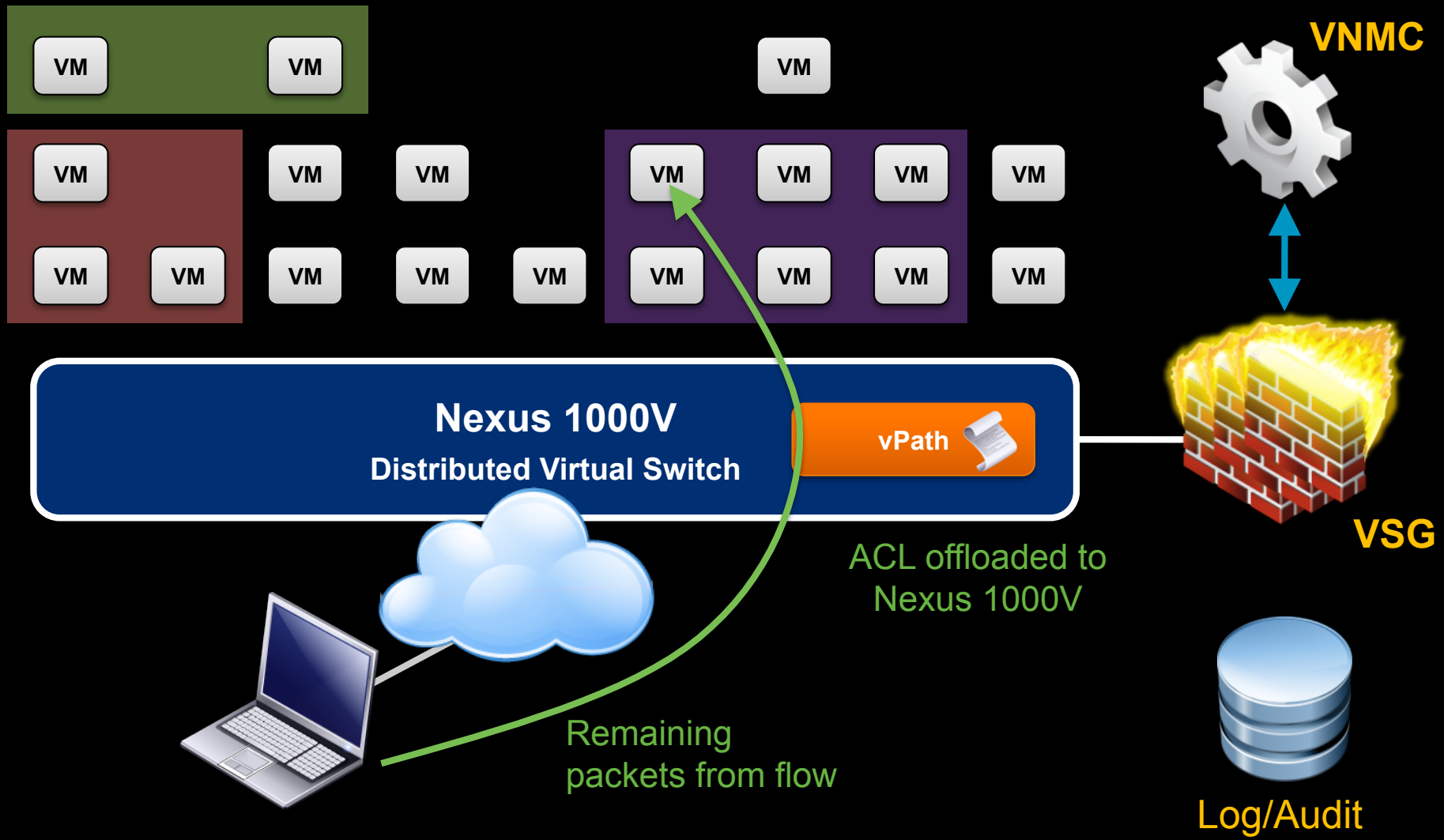


Secure Segmentation (VLAN agnostic)	Efficient Deployment (secure multiple hosts)	Dynamic/Mobility Aware (policies follow vMotion)
Transparent Insertion (topology agnostic)	High Availability	Operationally Simple (easy to upgrade HW)

Virtual Security Gateway
Intelligent Traffic Steering with vPath

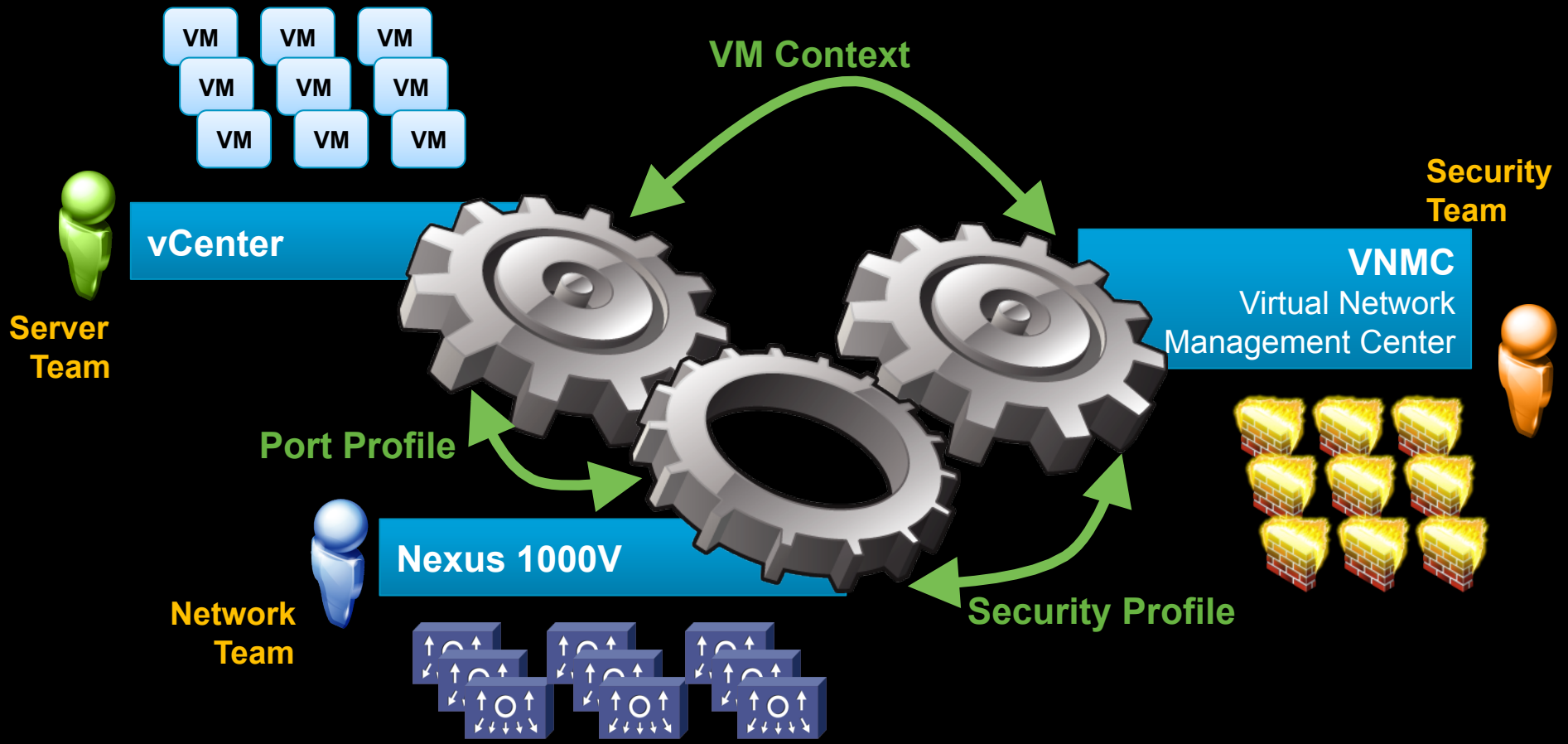


Virtual Security Gateway
Performance Acceleration with vPath

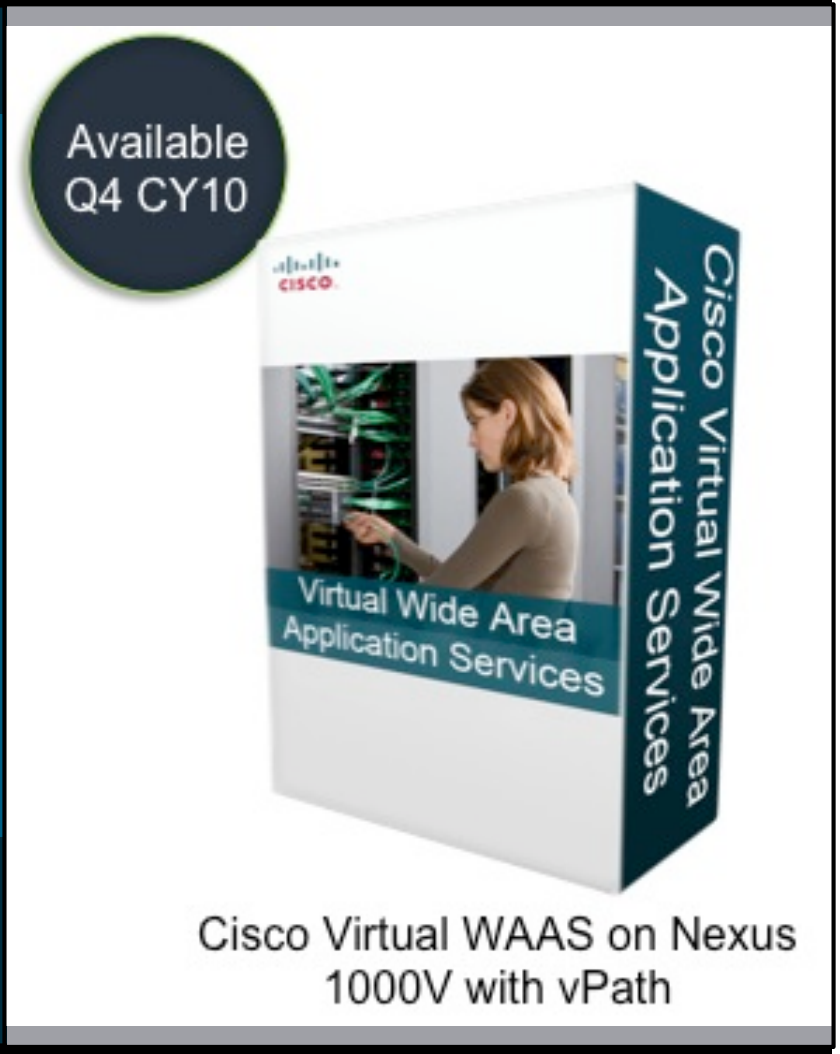


Virtual Network Management Center (VNMC)

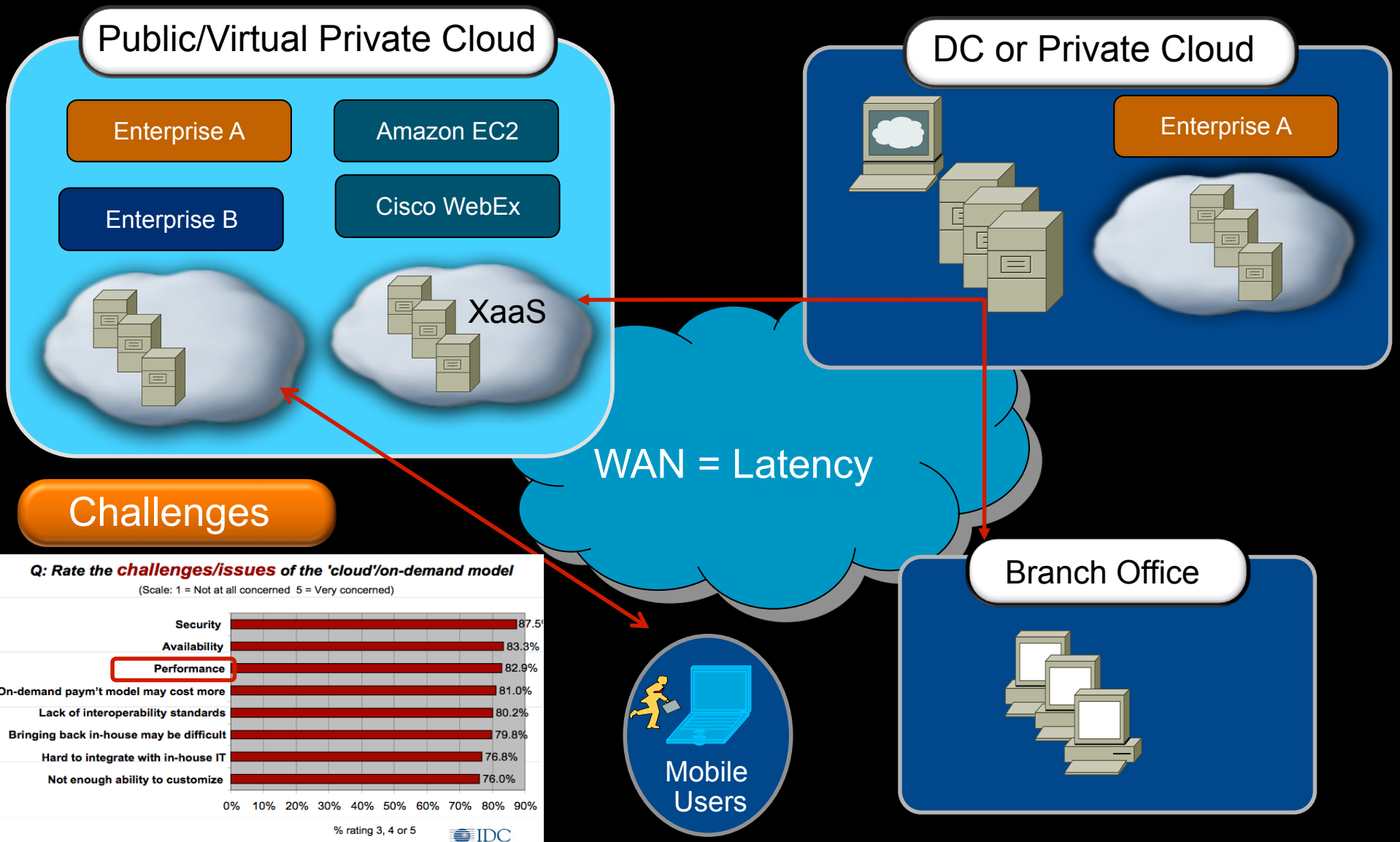
Seamless Policy-Based Management



Cisco vWAAS
(Virtual WAAS)



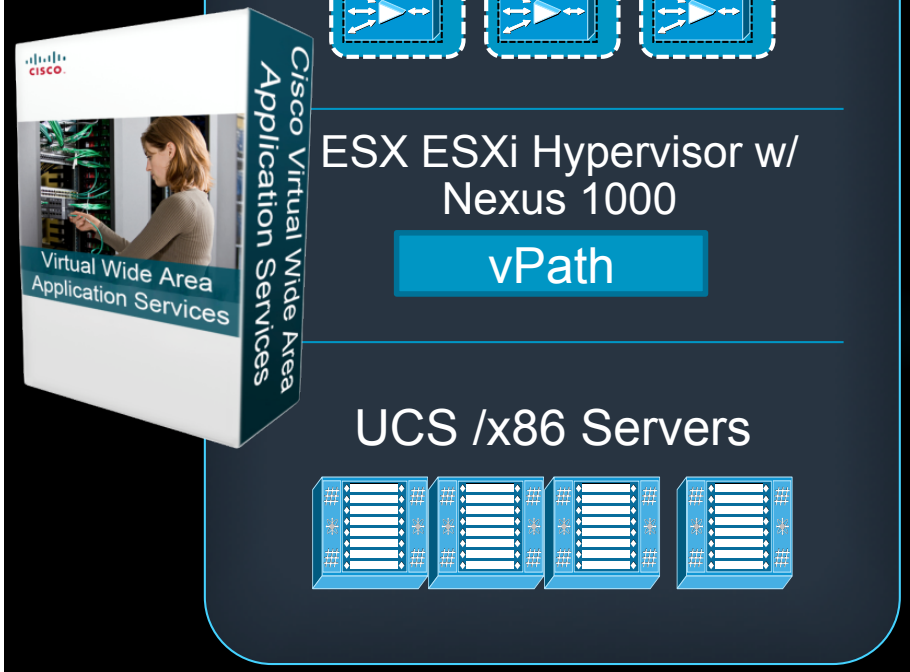
Application Performance is a Top 3 Concern For Cloud Adoption



Introducing: Cisco Virtual WAAS

Cloud-ready WAN Optimization

Available Q4 CY10



Virtual WAAS
on Nexus 1000V with vPath

FEATURES

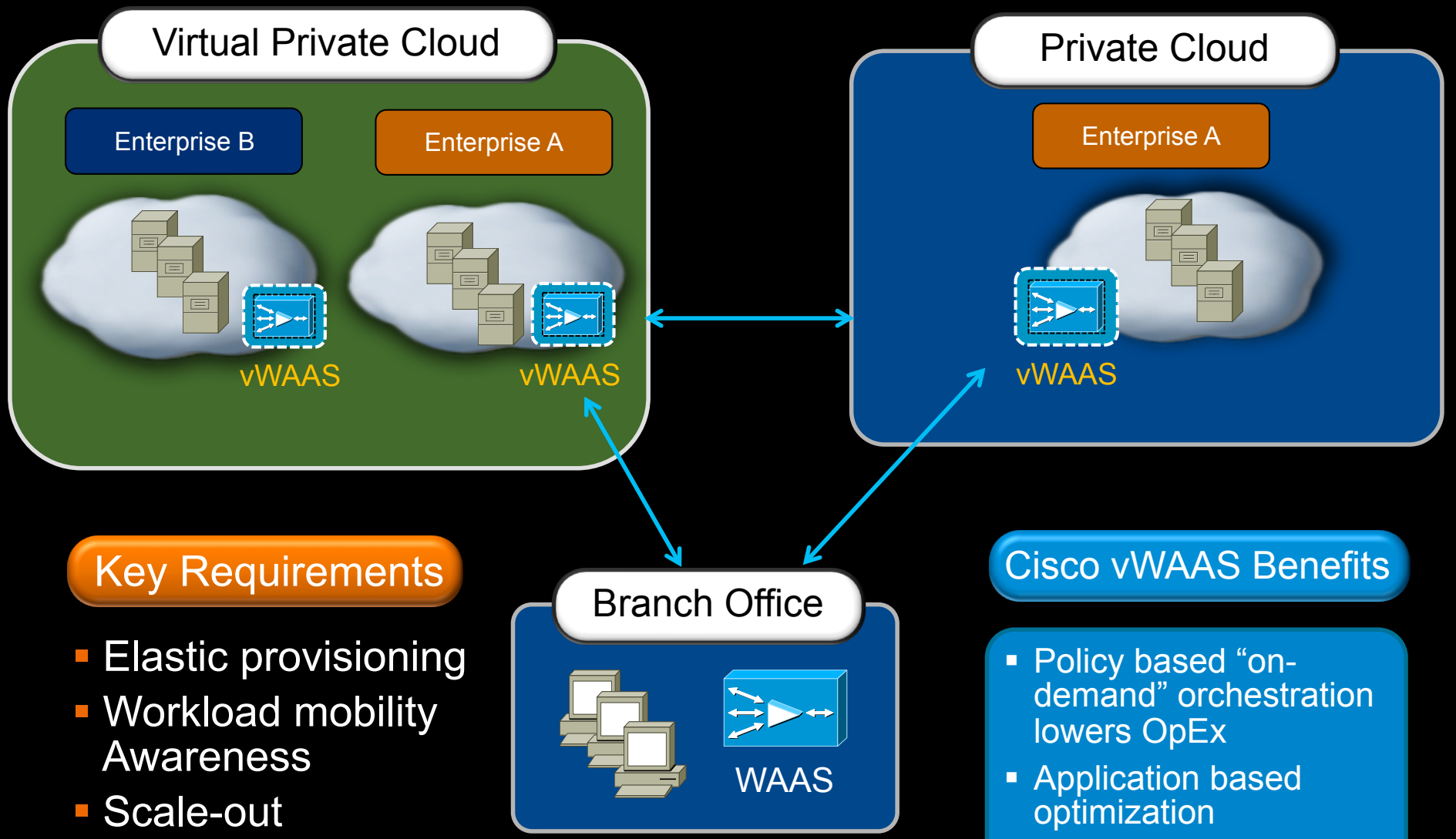
- Allows Agile, Elastic, & Multi Tenant Deployment
- Supports DRE Cache in SAN
- Policy-based Provisioning w/ Nexus 1000V
- Extends WAAS Solution Portfolio

BUSINESS BENEFITS

- Business Agility with on-demand orchestration
- Lower operational cost, reduced migration risk
- Fault-tolerance with VM mobility awareness

Cisco vWAAS Accelerates Cloud Deployment

Accelerate cloud-bursting, workload mobility, virtualized deployment



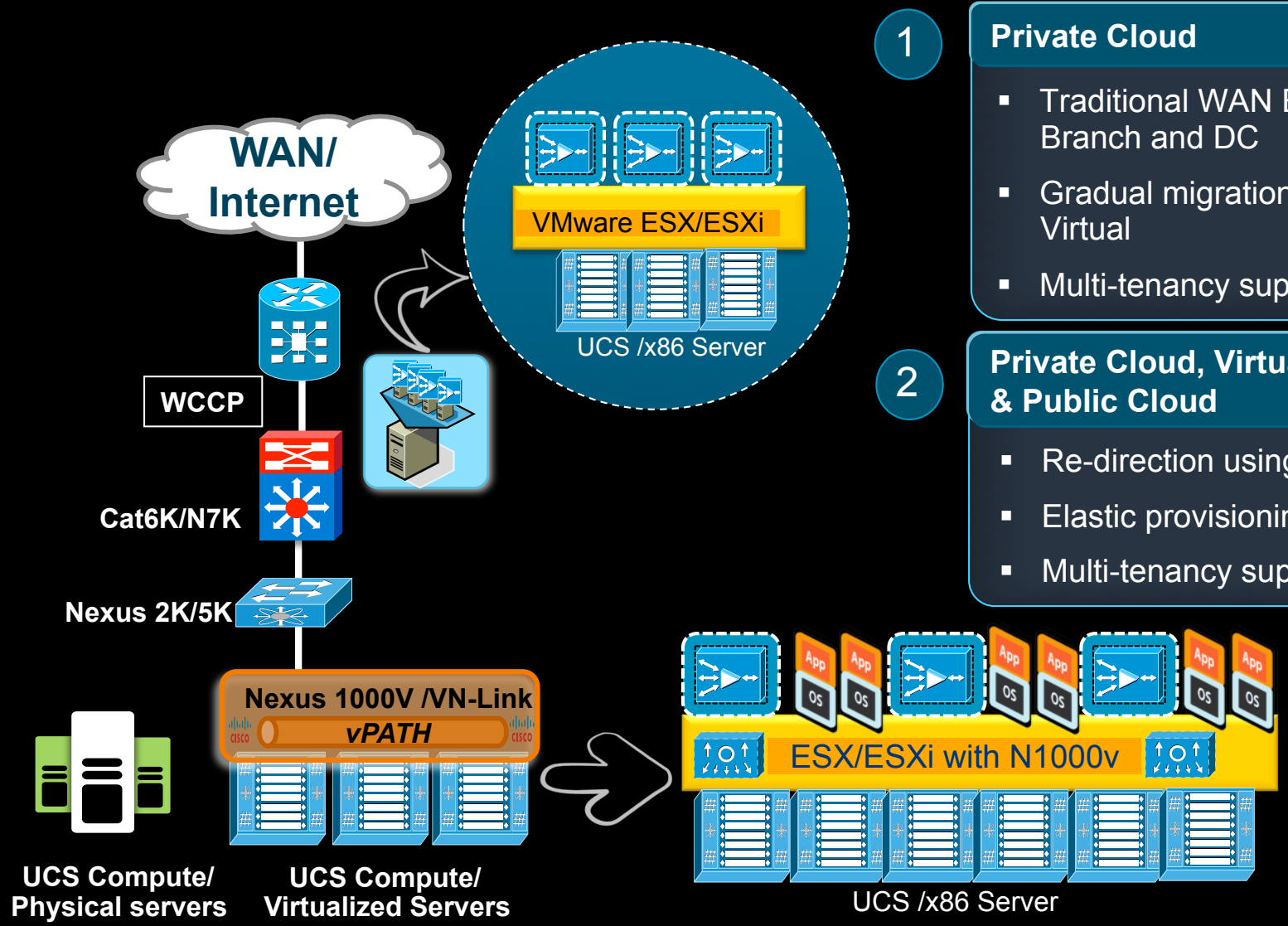
Key Requirements

- Elastic provisioning
- Workload mobility Awareness
- Scale-out
- Multi-tenancy

Cisco vWAAS Benefits

- Policy based “on-demand” orchestration lowers OpEx
- Application based optimization
- Elastic, Multi-tenancy

Cisco vWAAS Provides Flexible Cloud Deployment Options



1

Private Cloud

- Traditional WAN Edge Deployment at Branch and DC
- Gradual migration from Physical to Virtual
- Multi-tenancy support

2

Private Cloud, Virtual Private Cloud, & Public Cloud

- Re-direction using vPath @VM level
- Elastic provisioning
- Multi-tenancy support

Elastic vWAAS Deployment

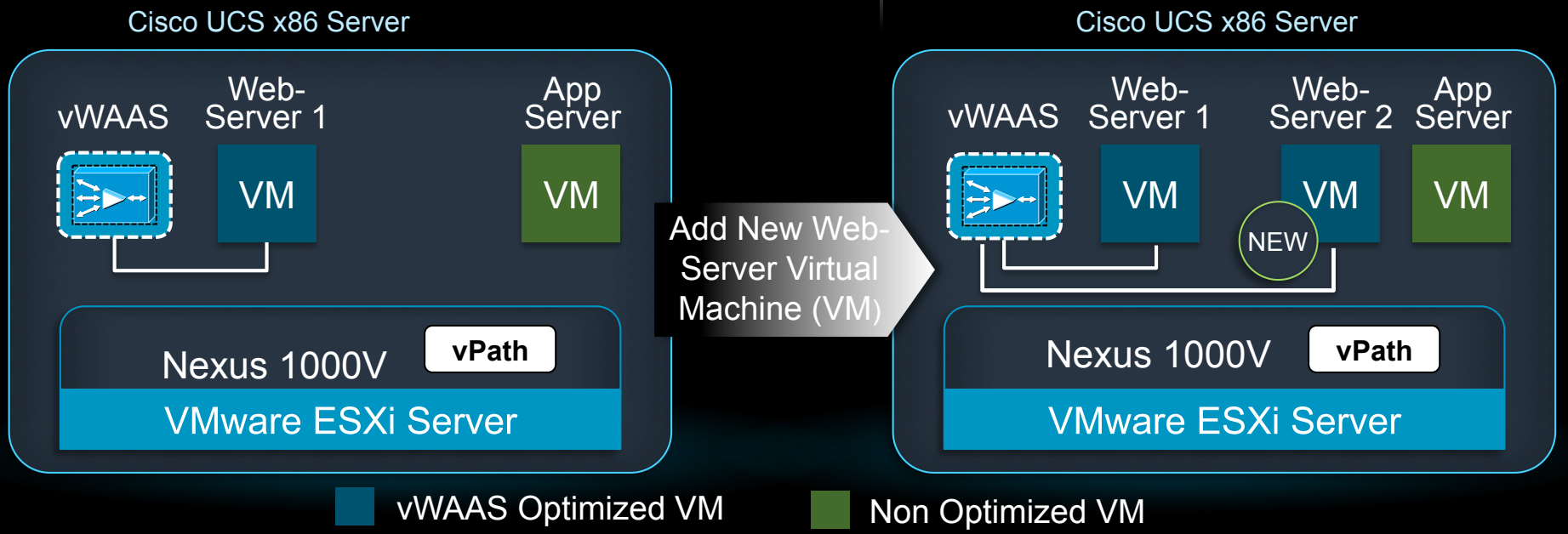
On-demand orchestration with Nexus 1000V

Scenario

1. Provide application-specific optimization as an on-demand service in the cloud without network disruption
2. Scale-out Virtual Web Server farm by provisioning additional VMs while applying WAN optimization

Solution

1. vWAAS services associated with 'Web server' VMs using Nexus 1000V policies.
2. Automatic application of vWAAS service when a new VM is provisioned



Nexus 1000V vPath: Fabric Intelligence for Virtual WAAS

VM Mobility Traffic interception/redirection Fast-path off-load


CISCO

Case Study – Denton County, Texas, USA

Presented at VMWorld 2010, San Francisco, September 2010

Denton County: Before & After Virtualization

Physical	Virtual
125 Physical Servers	9 Physical Virtualization Hosts
325 tons of annual CO_2 emissions	38 tons of annual CO_2 emissions
NO server clustering	HA for all servers
Limited Network Capacity	10 GB DCE Network (eventually)
Limited Data Protection	Backups @ VM & File Levels DR foundation for all servers

Ref: Session v17737, VMWorld 2010

5-Year Savings for 96 Servers

	Unit Cost	Physical	Virtual	Savings
Servers (Existing)	$10,000	$1,200,000	$136,170	$1,063,830
New Servers (5/yr)	$10,000	$250,000	-	$250,000
Power/Cooling Servers	$75	$432,000	$27,000	$405,000
Power/Cool New Servers	$75	$ 56,250	-	$ 56,250
Maintenance	-	-	$32,648	<$32,648>
Windows Srvr (74 Std)	$ 789	$ 125,183	-	$125,183
Windows Srvr (10 Ent)	$ 2,559	$ 54,850	$75,000	<$20,150>
SQL Srvr (16 Std)	$ 6,285	$ 215,493	-	$215,493
SQL Srvr (0 Ent-8 CPU)	$23,910	-	$159,400	<$159,400>
Total		$2,360,633	$430,218	$1,930,415

Ref: Session v17737, VMWorld 2010

Customer: Denton County, Ohio, USA

INX

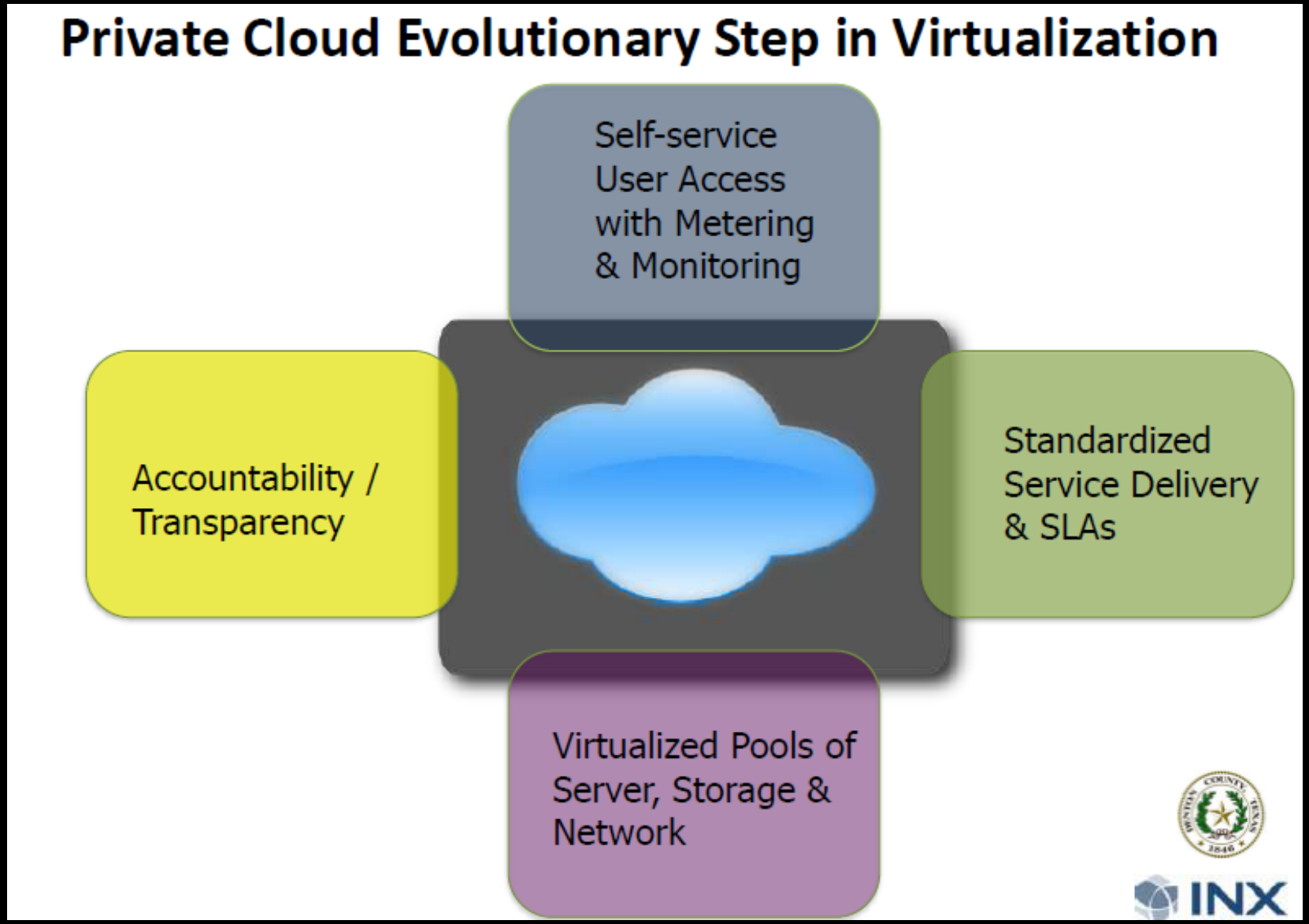
Virtualization Investment

Unit	Cost
Virtualization & virtual switch licenses	$ 55,000
Storage	$ 42,000
9 Dell R710 Hosts w/96 GB RAM	$ 137,000
Services/Training	$ 33,000
Total	$267,000

Versus savings of $1,930,000
ROI=580% over 5 years. 8.8 month payback

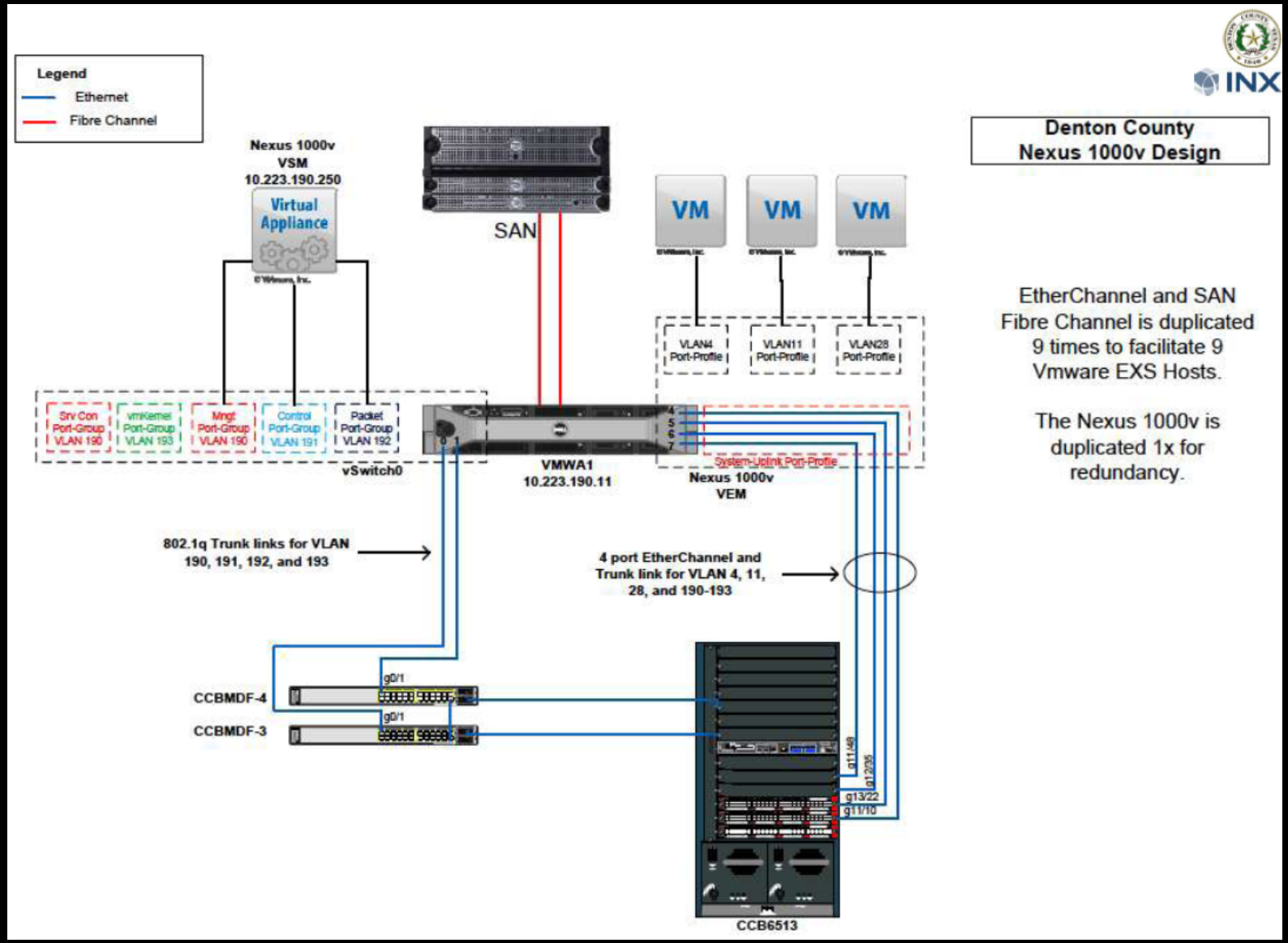
Ref: Session v17737, VMWorld 2010

Getting Ready for Private Cloud



Ref: Session v17737, VMWorld 2010

Example Design: Denton County



Ref: Session v17737, VMWorld 2010

Denton County, Texas

"As a Cisco shop, we wanted the ability to manage both the virtual and physical networks with the same Cisco interface with which we are familiar. The Cisco Nexus 1000V virtual switch, in conjunction with vSphere, provides that capability while also reducing the amount of time required to manage the virtual switches."

Kevin Carr, Director of IS for Denton County

Ref: Session v17737, VMWorld 2010