



Solution Brief: VMware vCloud Director and Cisco Nexus 1000V

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Cisco and VMware: Virtualizing the Data Center	

## **Executive Summary**

Agility, flexibility, elasticity and reliability are requirements for the virtualized data center and for private and public clouds. To meet these requirements, organizations are implementing several delivery mechanisms: software as a service (SaaS), platform as a service (PaaS), infrastructure as a service (IaaS), and IT as a service (ITaaS). VMware vCloud Director<sup>™</sup> combined with VMware vSphere 4.1 provides the foundational Infrastructure As A Service (IaaS). The VMware vCloud Director with vSphere 4.1 provides a platform on which PaaS and SaaS offerings can be built.

VMware vCloud Director requires interoperability with the existing virtual infrastructure. The Cisco Nexus 1000V<sup>®</sup> switch, a distributed virtual switch, is one critical element of the existing infrastructure that is embedded in the VMware vSphere servers. This document describes the interoperability of VMware vCloud Director and the Cisco Nexus 1000V.

#### VMware vCloud Director

VMware vCloud Director enables IT organizations to deliver resources to internal users as virtual data centers (vDC). By logically pooling compute, storage, and networking capacity into these vDCs, IT organizations can manage resources more efficiently with complete abstraction between consumption and delivery of IT services. Instead of providing users or organizations with siloed physical infrastructures, IT teams can deliver isolated virtual datacenters that draw resources from a common physical infrastructure. By pooling these physical resources on the back end, hardware utilization and consolidation increases. This document highlights the integrations between VMware vCloud Director, vSphere 4.1 and the Cisco Nexus 1000V distributed virtual switch.

#### **Cisco Nexus 1000V**

The Cisco Nexus 1000V distributed virtual switch extends Cisco's extensive networking features and nondisruptive operational model into the vSphere networking environment. The Cisco Nexus 1000V, an IEEE 802.1Q standards based switch, provides rich NX-OS features such as advanced data center switching, monitoring, security and management functions to virtualized infrastructure. Additionally, it helps enable network administrators to implement consistent network policies across physical and virtual networks and use existing people and procedures, diagnostic and troubleshooting tools, events and statistics collection and analysis tools, etc. in the virtual infrastructure.

The tight integration between Cisco Nexus 1000V and VMware vSphere enables a nondisruptive operational model whereby the network and server teams can enhance collaboration while ensuring that each team meets its respective responsibilities. To enable this, the Cisco Nexus 1000V represents network policies using port-profiles, which are created by the networking team and programmatically published into vSphere's vCenter Server. Port-profiles are then applied to VMs by a server administrator upon VM instantiations. Port-profiles follow vMotion events, hence ensuring that networking policies remain in effect. In summary, the Cisco Nexus 1000V implemented on VMware vSphere provides transparency, visibility and security to allow an organization to control today's increasingly agile virtual network environment.

#### VMware vCloud Director and Cisco Nexus 1000V Design Principles

The Cisco Nexus 1000V interoperates with the VMware vCloud Director, thus extending the benefits of rich Cisco NX-OS features, feature consistency and Cisco's nondisruptive operational model to enterprise private clouds and service provider hosted public clouds managed by VMware vCloud Director.

As depicted in the architecture below, a provider cloud can be built on VMware vCloud Director to provide organizations their own vDC, networks and vApps, all while using the networking capabilities of the Nexus 1000V.



Figure 1. Assigning vApp and Organization networks with VMware vCloud Director and Cisco Nexus 1000V

Network Type	Label	Pool	Nexus 1000V Port-Profile
vApp Network	_	Red Orange	vApp_Red1 vApp_Orange1, vApp_Orange2
Organization Internal Network		Yellow-Green	Org_Yell-Green1
Organization Directly Connected External Network			Connected to Prov_Blue1
Organization Routed Network	=	Green Purple	Org_Green1, Org_Green2, Org_Green3 Org_Purple1, Org_Purple2
Provider External Network	_	Blue	Prov_Blue1

#### Solution

VMware vCloud Director provides three classes of networks:

- vApp Networks
- Organization Networks
- External Networks

All three classes of networks can be built using the Nexus 1000V.

In order to provide a complete Layer-2 networking experience in a cloud environment, VMware vCloud delivers connectivity - or isolation domains - as a pooled resource that can be provisioned automatically and consumed by organizations and users. This is accomplished with network pools, which are collections of undifferentiated, isolated, Layer-2 networks which can be used to create vApp and organization networks on-demand. There are three types of network pools from which Organization and vApp networks are created by VMware vCloud Director:

- vSphere Port-Group backed
- VLAN backed
- VCD Network Isolation backed (VCNI)



Figure 2. Nexus 1000V based implementation of VMware vCloud Director's networking

In common practice, vSphere Port-group backed and VLAN backed network pools will both provide for network isolation using VLANs: the IEEE 802.1Q standard frame format for network segmentation. Nexus 1000V fully supports VLAN based isolation using port-group backed network pools. Using Nexus 1000V's port-profile, VLANs are specified through port-groups which can be allocated and applied to all the three classes of networks (vApp, Organization and External networks). Deploying VLAN based network isolation has the advantage of utilizing existing features on physical networks such as quality of service, ACLs & security and visibility/monitoring features.

VMware vCloud Director Network Isolation (VCNI) is a VMware technology to provide isolated Layer-2 networks for multiple tenants of a cloud without consuming the VLAN address space. Nexus 1000V does not support VCNI at this time.

Both Cisco and VMware consider the Cisco Nexus 1000V an integral component of VMWare's vSphere and vCloud product lines and are committed to delivering interoperable solutions, including scalable network segmentation technologies.

### Conclusion

As networking requirements for cloud computing evolves so must the joint solutions provided by today's industry leading technology companies. Cisco and VMware continue to work together to drive: innovation, leadership and world class solutions that will power the next generation of cloud computing infrastructures of today and tomorrow.

For more information regarding the products and solutions above, visit

http://www.cisco.com/go/nexus1000V

http://www.vmware.com/products/vcloud

For more information, visit: www.vmware.com

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