CHAPTER 1

Overview

Revised: October 18, 2011

This chapter introduces the implementation of the Cisco VMDC 2.1 solution. For detailed design considerations relating to this architecture, refer to the *Cisco Virtualized Multi-Tenant Data Center, Version 2.1, Design Guide*.

Scope

The Cisco VMDC solution validation focused on the following features and technologies:

Table 1-1 Features and Technologies Validated

Features	Technologies
Data Center functionality validation	Feature integration and testing, including Jumbo Frames, Multicast, and QoS for all datacenter network layers from aggregation to virtual access; ESX/VM provisioning, boot up. and maintenance, as well as basic SAN/NAS storage design verification
Data Center Services functionality validation	Validation of Service offerings with Datacenter Services Node (firewall and load balancing)
Reliability validation	Validation of redundancy designs (with Baseline Steady State traffic) - Routing, vPC/MEC, ECMP, VSS, HSRP, Active-Active service modules
Scalability verification	Multi-dimensional scalability (VLAN, MAC, HSRP, routes, contexts, VM) within scope of architecture
Automation validation	Validation of Service Orchestration, portal, service catalog validation with element manager integration for compute and network

What's Changed?

This section identifies the Cisco VMDC 2.1 design and testbed changes relative to VMDC 2.0.

Design Changes

- A new flexible tenancy model. The network tenancy definition and scope is not limited to application service availability. As a result, the tenant container is no longer characterized or referenced as Gold, Silver, or Bronze.

- Single aggregation VDC representing a single L2/L3 boundary for all compute/storage flows.
- DSN connected via L3 Port-Channel (MEC) with all routed services.

Additional Technology Validation

- Jumbo MTU validation.
- Multicast validation for PIM and IGMP.

Additional Product Validation

- Nexus 1010 Virtual Service Appliance
- Cisco NAM Virtual Service Blade capability validation.

Hardware and Software Components

Table 1-2 Hardware and Software Components

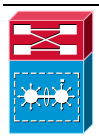
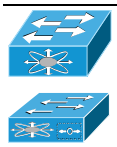
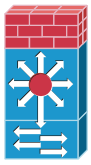
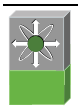
Icon	Platform	Hardware Used	Software Used	Role in Solution
Core Layer and Aggregation Layer				
	Cisco Nexus	7010	5.2.1	Aggregation Layer Switch
Access Layer				
 (VSM)	Cisco Nexus	5020	5.0.3(N1)	Layer 2 Access Switch
	Cisco Nexus	1010	4.2.1.SP1.2	Virtual Service Appliance
	Cisco Nexus	1000V	4.2(1)SV1(4)	Distributed Virtual Access Switch
Services Layer				
	Data Center Services Node) on Cisco Catalyst 6500	6509-E chassis SUP720-10G Supervisor Module	12.2(33)SXI5	Multi-Layer Switch Virtual Switching System (VSS)
	Cisco Catalyst	Firewall Services (FWSM) Module	4.1(4)	Service layer firewall services for Gold and Silver service tiers

Table 1-2 Hardware and Software Components (continued)

	Cisco Catalyst	Application Control Engine (ACE) module	A4(2.1)	Service layer load balancing for service tiers
Storage Layer				
Network Attached Storage				
 	NetApp Filer	FAS6080	ONTAP 7.3.3	Network Attached Storage
Storage Area Network				
	Cisco MDS	MDS-9513 (15 RU)	NX-OS 5.0(1a)	FC Director Switch (13 slots)
 	EMC	Symmetrix V-Max Storage Array	Engenuity 5874.210.168	block I/O storage for ESXI boot LUNs and datastores
Compute Layer				
10-Gbps Cisco Unified Computing System (UCS)				
	Cisco UCS	6140-XP	UCS Software Bundle 1.4(1m)	Fabric Interconnect Switch (20 base ports + 2 expansion slots)
 	Cisco UCS	UCS-5108	UCS Software Bundle 1.4(1m)	Blade Server Chassis
n/a	Cisco UCS	B200-M1	ESXi 4.0.0, 261974 UCS Software Bundle 1.4(1m)	½ width blade server Virtual Machine Host
n/a	Cisco UCS	M81KR Virtual Interface Card	UCS Software Bundle 1.4(1m)	Virtual Mezzanine CNA (B200-M1 only)

Tenant Scalability Validation

The Cisco VMDC 2.1 infrastructure was validated and operationally compared at two different tenant scale points: 8 tenants and 32 tenants. Table 1-3 lists some of the main focus variables that were validated as part of the Cisco VMDC 2.1 architecture testing.

Table 1-3 Unicast Scale Validation in Cisco VMDC 2.1

Device	Feature	Detail	8 Tenant	32 Tenant
Nexus 7010	VRF	Each tenant requires 2 VRFs	16	64
	VLAN	VLANs per tenant VRF	48	192
	MAC	Total MAC addresses	4,000	13,000
	RIB	Routes in unprotected zone	328	1312
		Routes in protected zone	160	640
	OSPF	AFI	16	64
		Neighbor adjacencies in unprotected zone	32	128
		Neighbor adjacencies in protected zone	16	64
Catalyst 6509	VRFs	Each tenant requires 2 VRFs	16	64
	VLAN	2 ACE VLANs / 2 FWSM VLANs	32	128
	RIB	Routes in unprotected zone	208	832
		Routes in protected zone	104	416
	OSPF	Processes	16	64
		Neighbor adjacencies	32	128
ACE	Context	2 ACE contexts per Tenant	16	64
	VIPs	4 VIPs per context (8 Tenant)	32	—
		2 VIPs per context (32 Tenant)	—	64
FWSM	Context	1 FW context per tenant	8	32
Nexus 5020	VLANs	3 Server VLANs per VRF	48	192
		Management VLANs	8	8
		NFS vFiler VLANs	8	32
	MAC	Total MAC addresses	4,000	13,000
Nexus 61xx	VLANs	3 Server VLANs per VRF	48	192
		Management	8	8
		NFS vFiler VLANs	8	32
	MAC	Total MAC addresses	4,000	~13,000
Nexus 1000v	VLANs	3 Server VLANs per VRF	48	192
		Management	8	8
		NFS vFiler VLANs	8	32
	MAC	Total MAC addresses	4,000	~13,000
UCS	VM	Test VMs	32	128
		VMs per blade server ratio	4:1	4:1

In addition, an 8 tenant multicast implementation was added to the validation which brought the following multicast scale parameters into the architecture.

Table 1-4 Multicast Scale Validation in Cisco VMDC 2.1

Device	Feature	Detail	8 Tenant
Nexus 7010	Multicast	PIM adjacencies unprotected zone only	48
		Total mroutes unprotected zone only	128
		Total number of (*,G) routes unprotected zone only	64
		Total number of (S,G) routes unprotected zone only	64