



# Preface

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The Cisco Virtualized Multi-tenant Data Center (VMDC) is a reference architecture for cloud ready infrastructure and is a design that is validated in a lab environment. This guide describes the design of the Cisco VMDC architecture and identifies environment-specific considerations to be addressed prior to deployment. It also discusses the problems solved by this architecture and describes the four pillars of a cloud-ready, multi-tenancy environment. This design guide focuses on infrastructure elements but does not address automation and orchestration considerations.

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## Purpose of This Document

This document identifies the design considerations and validation efforts required to design and deploy a cloud-ready infrastructure that serves as a foundation for either Infrastructure as a Service (IaaS) offerings or application environments deployed on a shared infrastructure.

## Audience

The target audience for this guide includes, but is not limited to, sales engineers, field consultants, professional services, IT managers, partner engineering, and customers who want to deploy a Cisco VMDC-based cloud ready infrastructure.

## Problem Identification

Today's traditional IT model suffers because resources are located in different, unrelated silos, which leads to low utilization, gross inefficiency, and an inability to respond quickly to changing business needs. Enterprise servers reside in one area of the data center and network switches and storage arrays

in another. In many cases, different business units own much of the same type of equipment, use it in much the same way, in the same data center row, and yet require separate physical systems to separate their processes and data from each other.

This separation is often ineffective, complicates the delivery of IT services, and sacrifices business activity alignment. As the IT landscape changes, cost reduction pressures, focus on time to market, and employee empowerment are compelling enterprises and IT providers to develop innovative strategies to address these challenges.

By deploying a Cisco VMDC infrastructure, each business unit can be a tenant and benefit from the transparency of the virtual environment that still "looks and feels" like the traditional physically separate topology.

From the tenant viewpoint, each system is separate with its own network and storage; however, the separation is not provided by a server rack, but by a Cisco VMDC environment. The servers, networks, and storage are securely separated and in some cases, more so than in a traditional environment.

## Solution Objectives

The Cisco VMDC architecture is a blueprint for organizations that either want to start moving toward or move all the way toward a cloud infrastructure. This design addresses the following key requirements:

- It creates a shared infrastructure that avoids parallel underutilized assets.
- It provides a transition from a single tenant model per dedicated infrastructure to a multi-tenant model using a shared infrastructure.
- Using a shared environment, it matches the isolation and security of a dedicated environment.
- It scales in overall infrastructure and in individual tenant segments.

The secure cloud architecture extends end-to-end control of the tenant environment, from compute platform through network connectivity, storage resources, and data management. This architecture enables Service Providers and Enterprises to securely offer their users unprecedented control over their entire application environment. Unique isolation technologies combined with extensive management flexibility deliver the cloud computing benefits that IT providers require to confidently provide high levels of security and service for multi-tenant customers and consolidated application environments.

## Change Summary

Cisco VMDC 2.1 is based on Cisco's general multi-tenancy architecture and improves the Cisco VMDC 2.0 Compact Pod design. The Cisco VMDC 2.0 Compact Pod validated design documents are located at the following URLs:

### **Cisco VMDC 2.0 Design Guide**

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/VMDC/2.0/design\\_guide/vmdcDesignGuideCompactPod20.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/VMDC/2.0/design_guide/vmdcDesignGuideCompactPod20.html)

### **Cisco VMDC 2.0 Deployment Guide**

[http://www.cisco.com/en/US/partner/docs/solutions/Enterprise/Data\\_Center/VMDC/2.0/implementation\\_guide/vmdcImplementationGuideCompactPod20.html](http://www.cisco.com/en/US/partner/docs/solutions/Enterprise/Data_Center/VMDC/2.0/implementation_guide/vmdcImplementationGuideCompactPod20.html)

Table ii-1 summarizes the high-level differences.

**Table ii-1**      **Summary of Changes between Cisco VMDC 2.1 and Cisco VMDC 2.0**

Requirement	Cisco VMDC 2.1	Cisco VMDC 2.0
End-to-End Network Architecture	Services on the stick design modification (Core/Aggregation handoff)	
Enterprise centric services integration	Services sandwich design (Aggregation/Sub-aggregation)	
Service Orchestration	Orchestration requirements addressed separately	Service Orchestration and network-compute-workload automation with BMC AO, BBSA, BBNA, UCSM, and VCenter
SLA Assurance	Enterprise multi-tenancy SLA with QoS and alignment with WAN/Campus QoS requirements	Preliminary QoS guidelines based on VM role
Applications	Functional multicast validation for end-to-end DC components covering clustering and VRF enabled multicast requirements	Multicast applications not validated
Products/Monitoring	Cisco Nexus 1010 integration and Cisco Network Analysis Module (NAM) capability validation	No major monitoring capability
Other Critical Features	Jumbo MTU support and jumbo frame validation	Jumbo frame support not validated

## Related Documentation

The Cisco VMDC design recommends that general Cisco data center design best practices be followed as the foundation for IaaS deployments. The following Cisco Validated Design (CVD) companion documents provide guidance on such a foundation:

### Data Center Design—IP Network Infrastructure

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/DC\\_3\\_0/DC-3\\_0\\_IPInfra.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/DC_3_0/DC-3_0_IPInfra.html)

### Data Center Service Patterns

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/DC\\_3\\_0/dc\\_serv\\_pat.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/DC_3_0/dc_serv_pat.html)

### Security and Virtualization in the Data Center

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/DC\\_3\\_0/dc\\_sec\\_design.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/DC_3_0/dc_sec_design.html)

### Designing Secure Multi-Tenancy into Virtualized Data Centers

[http://www.cisco.com/en/US/solutions/ns340/ns414/ns742/ns743/ns1050/landing\\_dcVDDC.html](http://www.cisco.com/en/US/solutions/ns340/ns414/ns742/ns743/ns1050/landing_dcVDDC.html)

### Enhanced Secure Multi-Tenancy Design Guide

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/Virtualization/secureldg\\_V2.html](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/Virtualization/secureldg_V2.html)

The following VMDC solution document provide additional details on the solution:

**Cisco VMDC 1.1 Design and Deployment Guide**

[http://www.cisco.com/en/US/docs/solutions/Enterprise/Data\\_Center/VMDC/vmdcDdg11.pdf](http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/VMDC/vmdcDdg11.pdf)

**Cisco VMDC Solution Overview**

[http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/solution\\_overview\\_c22-602978.html](http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/solution_overview_c22-602978.html)

**Cisco VMDC Solution White Paper**

[http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns836/white\\_paper\\_c11-604559.html](http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns836/white_paper_c11-604559.html)

## About Cisco Validated Designs

The Cisco Validated Design Program consists of systems and solutions designed, tested, and documented to facilitate faster, more reliable, and more predictable customer deployments. For more information visit [www.cisco.com/go/validateddesigns](http://www.cisco.com/go/validateddesigns).

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