Cisco Dynamic Fabric Automation Solution Guide

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Preface

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Audience

This publication is for network administrators who configure and maintain Cisco Nexus devices.

Document Organization

This document is organized into the following chapters:

Chapter	Description
"Information About Cisco DFA"	Provides an overview of Cisco Dynamic Fabric Automation (DFA) and descriptions of the Cisco DFA building blocks.
"Deploying Cisco DFA"	Provides information about how to prepare for and deploy Cisco DFA, including compatibility and licensing information.
"Configuration Examples for Cisco DFA"	Provides examples of basic Cisco DCNM templates for configuring spine and leaf devices.

Document Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
Italic	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x | y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x | y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
`variable`	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
`screen font`	Terminal sessions and information the switch displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation for Cisco DFA

The Cisco Dynamic Fabric Automation documentation is at the following URL: http://www.cisco.com/en/US/solutions/ns340/ns517/ns224/ns945/dynamic_fabric_automation.html#~Products .

The Cisco Nexus 6000 Series documentation is at the following URL: http://www.cisco.com/en/us/products/ps9402/tsd_products_support_series_home.html.

The Cisco Nexus 7000 Series documentation is at the following URL: http://www.cisco.com/en/US/products/ps12806/tsd_products_support_series_home.html.

The Cisco Nexus 1000V Switch for VMware vSphere documentation is at the following URL: http://www.cisco.com/en/US/products/ps9902/tsd_products_support_series_home.html. The documentation therein includes the following guides for Cisco DFA. Additional information pertaining to troubleshooting can be located in the Cisco Nexus 1000V documentation for Cisco NX-OS Release 4.2(1)SV2(2.2).

- *Cisco Nexus 1000V DFA Configuration Guide, Release 4.2(1)SV2(2.2)*
- *Cisco Nexus 1000V VDP Configuration Guide, Release 4.2(1)SV2(2.2)*

The Cisco Prime Data Center Network Manager (DCNM) documentation is at the following URL: http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html. The Cisco Prime DCNM documentation for Cisco DFA includes but is not limited to the following guides:

- *Cisco DCNM 7.0 OVA Installation Guide.*
- *Cisco DCNM 7.0 Fundamentals Guide*
- *Cisco DCNM DFA REST 7.0 API Guide*

The Cisco Prime Network Services Controller (NSC) documentation is at the following URL: http://www.cisco.com/en/US/products/ps13213/tsd_products_support_series_home.html.

The OpenStack for Cisco DFA install documentation includes the following guide and documents:

- *Open Source Used In OpenStack for Cisco DFA 1.0* at the following URL: http://preview.cisco.com/en/US/docs/switches/datacenter/dfa/openstack/opensource/OpenStack_for_Cisco_DFA_1.0_Open_Source_Documentation.pdf
- *OpenStack for Cisco DFA Install Guide Using Cisco OpenStack Installer* at the following URL: http://www.cisco.com/en/US/docs/switches/datacenter/dfa/openstack/install/guide/os-dfa-coi.pdf
- *OpenStack for Cisco DFA Install Guide for Using Pre-built OpenStack for Cisco DFA Images* at the following URL: http://www.cisco.com/en/US/docs/switches/datacenter/dfa/openstack/install/guide/preblt-image.pdf

- *Quick Guide to Clonezilla* at the following URL: http://www.cisco.com/en/US/docs/switches/datacenter/dfa/openstack/install/guide/clonezilla-image-restore.pdf

Documentation Feedback

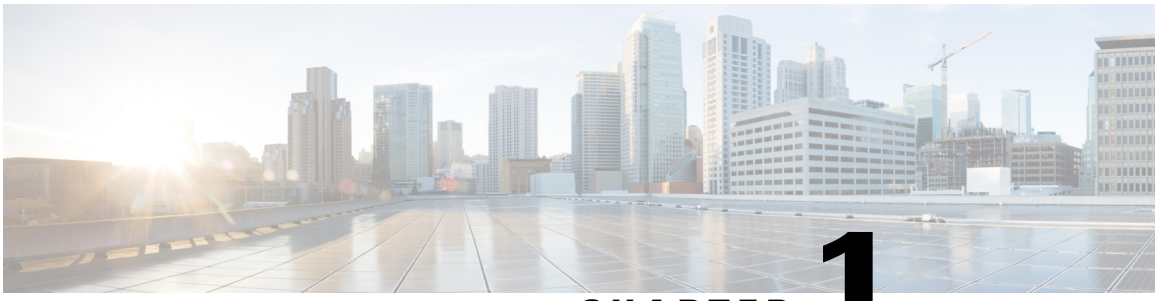
To provide technical feedback on this document, or to report an error or omission, please send your comments to one of the following:

We appreciate your feedback.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*, at: http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation, as an RSS feed and deliver content directly to your desktop using a reader application. The RSS feeds are a free service.



CHAPTER 1

Information About Cisco DFA

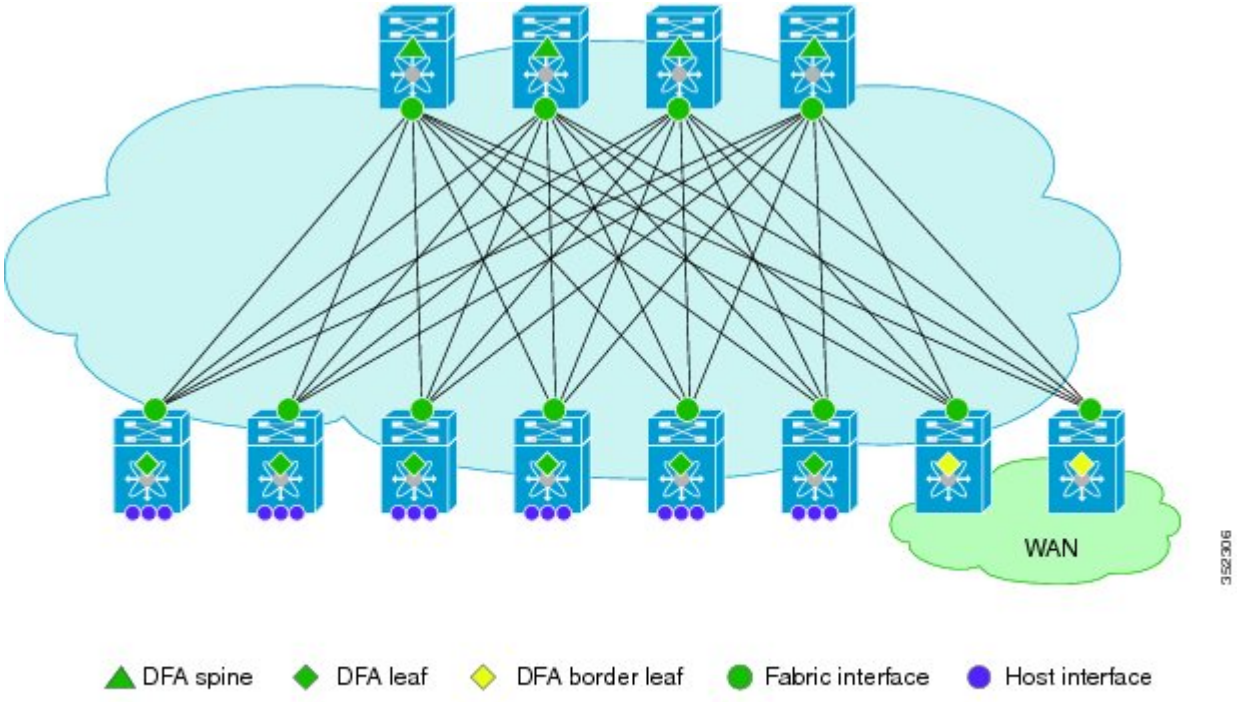
This chapter includes the following sections:

- Terminology, page 2
- Cisco Dynamic Fabric Automation Overview, page 3
- Fabric Management, page 3
- Optimized Networking, page 4
- Cisco DFA Services Support, page 5
- OpenStack for Cisco DFA, page 7

Terminology

The following figure illustrates the terms in a Cisco Dynamic Fabric Automation (DFA) deplyment. You should understand these terms and definitions before deploying Cisco Dynamic Fabric Automation (DFA).

Figure 1: Terms Used in a Cisco DFA Deployment



- Cisco DFA fabric--Multistage, switching network in which every connected device is reachable through the same number of hops. The Cisco DFA fabric enables the use of a Scale-Out model for optimized growth.
- Cisco DFA switch--A leaf, border leaf, or spine device.
- Leaf--Switches with ports that are connected to Ethernet devices such as servers (host interfaces) and ports (fabric interfaces) that are connected to the Cisco DFA fabric. Leaf switches forward traffic based on enhanced control-plane functionality of Cisco DFA optimized networking, which requires segment-id based forwarding.
- Border leaf--Switches that primarily connect external network devices or services, such as fire walls and router ports, to a Cisco DFA fabric. Border leaf switches are similar to leaf switches and can perform segment-id based forwarding.
- Spine-- Switches through which all leaf and border leaf switches are connected to each other and to which no end nodes are connected. Spine switches forward traffic based on Cisco DFA optimized networking with enhanced or traditional forwarding.

- Host interface--Leaf-to-server interfaces that receive traffic for connected VLANs to be extended across the Cisco DFA fabric.
- Fabric interface--Ports through which Cisco DFA switches are connected to one another.

Cisco Dynamic Fabric Automation Overview

Cisco Dynamic Fabric Automation (DFA) optimizes data centers through superior integration. The Cisco DFA architecture eliminates the need for overlay networks that can hinder traffic visibility and optimization and reduce scalability when physical server and virtual machine environments are integrated. This simpler, more homogeneous architecture enables zero-touch provisioning and greater orchestration, while delivering more predictable performance and latency for large cloud networks. The following building blocks are the foundation of Cisco DFA:

- Fabric Management--Simplifies workload visibility, optimizes troubleshooting, and automates fabric component configuration.
- Workload Automation--Integrates with automation and orchestration tools through northbound application programming interfaces (APIs) and also provides control for provisioning fabric components by automatically applying templates that leverage southbound APIs and/or standard-based protocols. These automation mechanisms are also extensible to network services.
- Optimized Networking--Uses a simple distributed gateway mechanism to support any subnet, anywhere, concurrently. Existing redundancy models are also utilized to provide N+ redundancy across the entire fabric.
- Virtual Fabrics--Extends the boundaries of segmented environments to different routing and switching instances by using logical fabric isolation and segmentation within the fabric. All of these technologies can be combined to support hosting, cloud, and/or multi-tenancy environments.

Fabric Management

The fabric management network in Cisco Dynamic Fabric Automation (DFA) represents a dedicated out-of-band network that is responsible for bootstrapping and managing the individual networking devices, such as spines, leafs, border leafs, that are controlled by fabric management. The fabric management network is responsible for transporting the protocols required for the different fabric management functions.

Table 1: Functions and Protocols Across the Fabric Management Network

Function	Protocol
Power On Auto provisioning (POAP) for automatically configuring network devices	• Dynamic Host Configuration Protocol (DHCP) • Trivial File Transfer Protocol (TFTP) • Serial Control Protocol (SCP)
Fabric discovery	Simple Network Management Protocol (SNMP)

Function	Protocol
User-to-machine and machine-to-machine communication	Extensible Messaging and Presence Protocol (XMPP)
Automated network provisioning	Lightweight Directory Access Protocol (LDAP)

The management network, also known as the management access, is the Network Administrator-facing interface for accessing fabric management. The management network represents the portion of your network from which a Network Administrator can connect to an Element Manager or a network management station (NMS) and to switches and routers.

The Cisco Data Center Network Manager (DCNM) is a turn-key management system for fabric management, visibility, and an extensible set of functions to more efficiently control the data center fabric. Cisco DCNM combines ease of deployment and use with standards-based control protocols components to provide an extensive level of customization and integration with an operations support system (OSS) network.

Cisco Prime Data Center Network Manager

An Open Virtual Appliance (OVA) is a prebuilt software solution that comprises one or more virtual machines (VMs) that are packaged, maintained, updated, and managed as a single unit. The Cisco DCNM OVA includes application functionality that is necessary for Cisco Dynamic Fabric Automation (DFA). The Cisco Prime data Center Network manager (DCNM) as an OVA can be deployed on a VMWare Vsphere infrastructure.

The Cisco Prime Data Center Network Manager (DCNM) provides the following functionality:

- Device auto configuration is the process of bringing up the Cisco DFA fabric by applying preset configuration templates to any device joining the fabric. Auto configuration installs an image or applies the basic configuration.
- Cable-plan consistency checks the physical connectivity of the fabric against a documented cable plan for compliance. The lack of compliance prevents specific links from being active, protecting the fabric from unwanted errors.
- Common point-of-fabric access allows Administrators to interact with the fabric as a single entity (system) to simplify queries and to eliminate switch-by-switch troubleshooting efforts.
- Automated network provisioning provides a new layer of automation integration in which the Data Center fabric-switching infrastructure is automatically provisioned for the physical or virtual workload being instantiated.
- Network, virtual fabric, and host visibility is provided by the management GUI and displays a single set of active network elements belonging to an organization in the fabric.

The Cisco DFA DCNM access network is the network administrator-facing interface for accessing fabric management and for connecting northbound application program interfaces (APIs) to orchestrators.

Optimized Networking

Optimized networking in Cisco Dynamic Fabric Automation (DFA) uses a simple distributed gateway mechanism to support any subnet, anywhere, concurrently.

Frame Encapsulation

Optimized networking in a Cisco Dynamic Fabric Automation (DFA) deployment uses Cisco FabricPath Frame Encapsulation (FE) for efficient forwarding based on a Shortest Path First (SPF) algorithm for unicast and multicast IP Traffic. Host route distribution across the fabric is accomplished using a scalable multi-protocol Border Gateway Protocol (MP-BGP) control plane.

The Cisco DFA enhanced forwarding improves Cisco FabricPath FE by optimizing the conversational learning from Layer 2 to the Layer 3. In addition to the enhanced control and data plane for unicast and multicast forwarding, Cisco DFA reduces the Layer 2 failure domain by having the Layer2/Layer 3 demarcation on the host-connected leaf switch, terminating the host-originated discovery protocols at this layer.

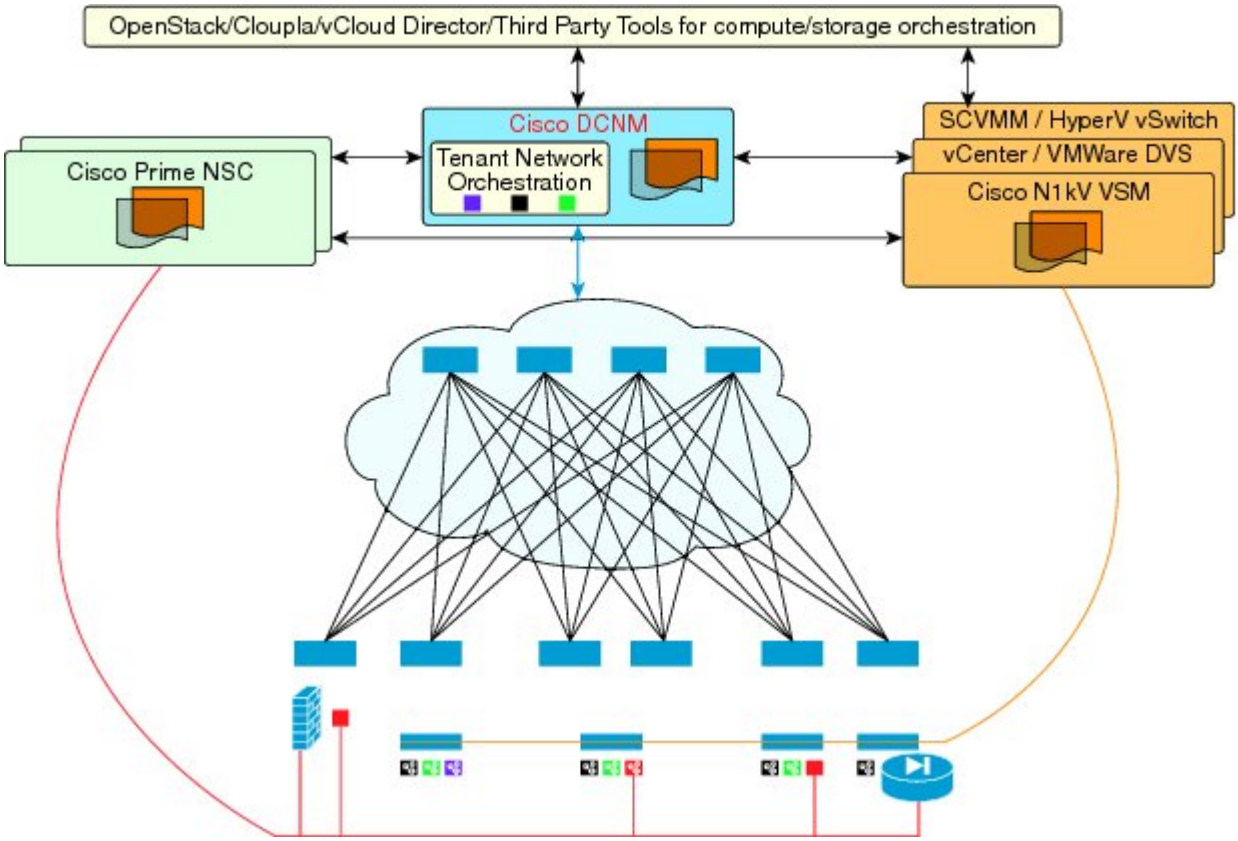
A distributed anycast gateway on all of the Cisco DFA leaf switches for a VLAN improves resilience and enables the fabric to scale to more hosts by keeping a short path for intra and inter VLAN forwarding. Cisco DFA leaf switches that operate as border leaf switches interconnect the Cisco DFA fabric to external networks. Cisco DFA border leaf switches peer with external standard unicast and multicast routing protocols.

Cisco DFA Services Support

Services such as a firewall, load balancer, and virtual private networks (VPNs) are deployed at the aggregation layer in the traditional data center. In a Cisco Dynamic Fabric Automation (DFA) deployment, services nodes

are deployed at regular leaf switches for both east-west and north-south traffic. Services can be physical or virtual services nodes.

Figure 2: Cisco DFA with Services



The Cisco Prime Network Services Controller (NSC) is the services orchestrator for Cisco DFA. The NSC Adapter in the Cisco Data Center Network Manager (DCNM) Open Virtual Appliance (OVA) performs the following functions:

- Provides connectivity between the Cisco Prime DCNM and the Cisco Prime NSC services orchestrator
- Automatically populates the Cisco Prime NSC with the organizations, partitions, and networks that are created in Cisco Prime DCNM
- Populates Cisco Prime DCNM with the services that are stitched through Cisco Prime NSC
- Allows the use of multiple Cisco Prime NSC instances to match the Cisco Prime DCNM scale

In Cisco DFA, configuration profile templates and instantiating the profiles on a leaf switch provides network automation. The templates are extended to support services in Cisco DFA. The profile templates are packaged in Cisco Prime DCNM for the services orchestrator. The table below includes a list of profile templates that are available for Cisco DFA services. It is important that you select the correct profile to orchestrate and automate services in the Cisco DFA fabric.

Table 2: Cisco Templates for Services Support

Service	Network	Routing	Service Profile
Edge Firewall	Host Network	N/A	defaultNetworkIpv4EfEdgeServiceProfile
	Edge Firewall	Static	defaultNetworkIpv4TfEdgeServiceProfile
		Dynamic	serviceNetworkIpv4TfDynamicRoutingProfile
	Tenant External Service Network	Static	defaultExternalNetworkIpv4TfProfile
		Dynamic	externalNetworkIpv4TfDynamicRoutingProfile
Service Node as Router/Default Gateway	Host Network	N/A	defaultNetworkL2Profile

For NSC Adapter installation information, see the *Cisco DCNM 7.0 OVA Installation Guide*.

OpenStack for Cisco DFA

OpenStack creates a human- and machine-accessible service for managing the entire life cycle of the infrastructure and applications within OpenStack clouds. The technology consists of a series of interrelated projects that control pools of processing, storage, and networking resources throughout a data center that can be managed or provisioned through a web-based dashboard, command line tools, or a RESTful application programming interface (API).

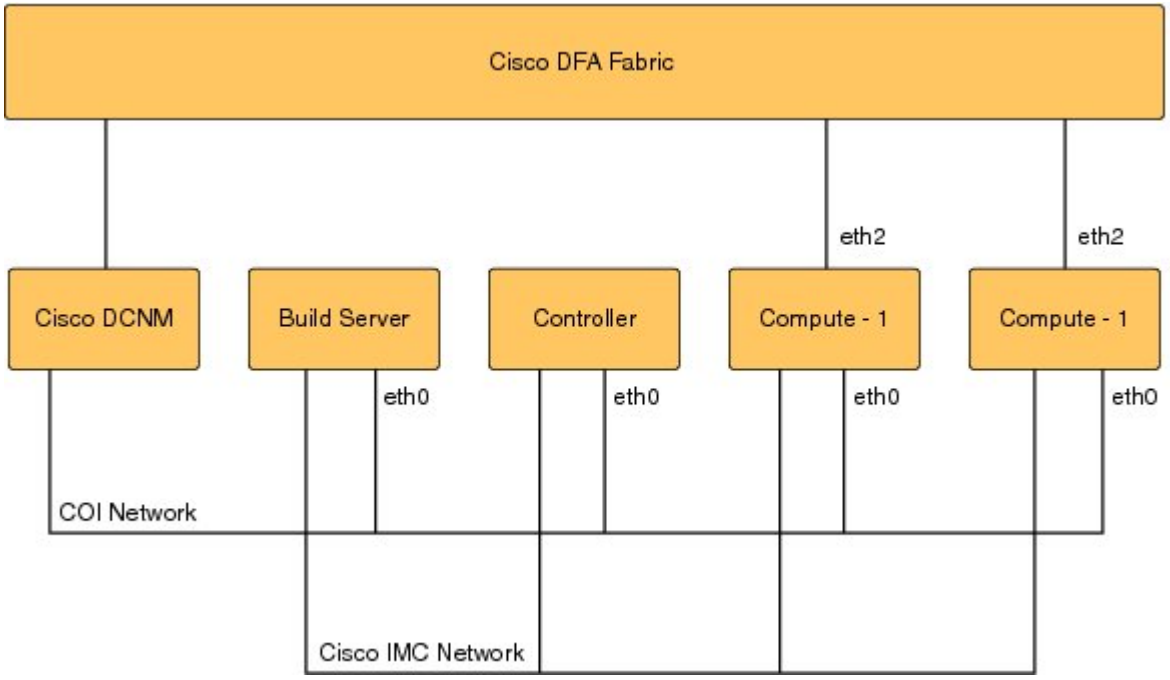
The OpenStack for Cisco DFA software is included in the Cisco OpenStack Installer with its Grizzly-based release for this initial Cisco Dynamic Fabric Automation (DFA) release. OpenStack for Cisco DFA provides orchestration of the cloud that is enabled by Cisco DFA.

A minimum of three Cisco UCS C-series servers, each with a minimum 500.1GB hard disk space, are required for using the pre-installed OpenStack for Cisco DFA. The initial release (1.0) of OpenStack for Cisco DFA is supported only through the web-based dashboard. The role and responsibilities for each Cisco UCS server is described in the following list:

- Build server--One server is a dedicated puppet build server.
- Controller--One server is a dedicated OpenStack controller for performing orchestration.
- Compute--One or more servers provide the hypervisor function for virtual machines (VMs); VMs run in the computes. You can have as many computes as is required and each compute can host multiple VMs.

The following figure illustrates a sample topology for OpenStack for Cisco DFA.

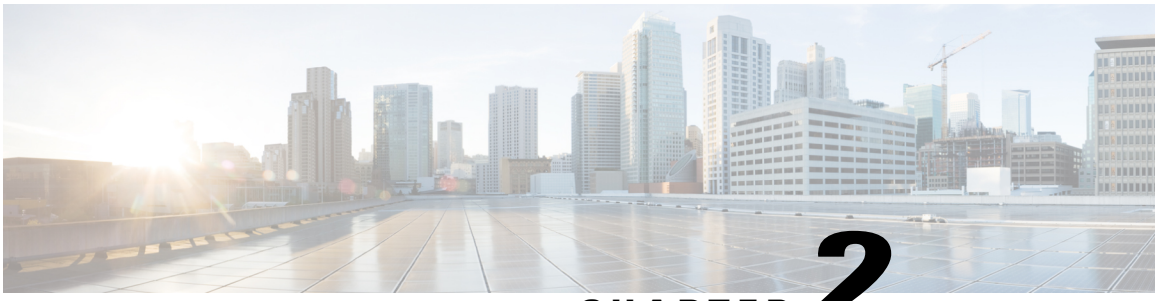
Figure 3: OpenStack for Cisco DFA Topology



Each of the Cisco UCS servers in your implementation must be connected to each other and the Cisco Prime Data Center Network Manager (DCNM) must be connected to the control node. In the sample topology illustrated in the preceding figure, the build server, the controller and the computes are all connected through eth0 on the Cisco OpenStack Installer network (COI in the figure).

All of the Cisco UCS servers in your implementation must be configured with the Cisco Integrated Management Controller (IMC), also called CIMC. All of the Cisco IMC ports on the build server, controller, and computes must be connected to the Cisco IMC network. The Cisco IMC network performs the management functions against each Cisco UCS server.

For information about Open Source used in OpenStack for Cisco DFA 1.0, see the *Open Source used in OpenStack for Cisco DFA 1.0* document.



CHAPTER 2

Deploying Cisco DFA

This section describes how to deploy Cisco Dynamic Fabric Automation (DFA).

This section includes the following topics:

- Platform Requirements, page 9
- Licensing Requirements for Cisco DFA, page 10
- Guidelines and Limitations for Cisco DFA, page 11
- How to Cable the Network Fabric and Servers for Cisco DFA, page 13
- Deploying Cisco DFA, page 16

Platform Requirements

Table 3: Cisco Dynamic Fabric Automation Platform Support

Product	Function					Software Release (and later releases)
	Spine	Leaf	Border-Leaf	RR[3]	Other	
Cisco Nexus 6001 Series switch	Yes	Yes	Yes	Yes		Cisco NX-OS Release 7.0(0)N1(1)
Cisco Nexus 6004 Series switch	Yes	Yes	Yes	Yes		Cisco NX-OS Release 7.0(0)N1(1)
Cisco Nexus 7000 Series switch	--	--	Yes[1]	--		Cisco NX-OS Release 6.2(2)
Cisco Nexus 7700 Series switch	--	--	Yes[1]	--		Cisco NX-OS Release 6.2(2)

Product	Function					Software Release (and later releases)
	Spine	Leaf	Border-Leaf	RR[3]	Other	
Cisco Nexus 1000V switch for VMware vSphere 5.1 and 5.5	--	--	--	--	Virtual switch with VDP signaling	Cisco NX-OS Release 4.2(1)SV2(2.2)
Cisco Prime Data Center Network Manager (DCNM)	--	--	--	--	Fabric management	Cisco Prime Data Center Network Manager Release 7.0
Cisco Prime Network Services Controller (NSC)	--	--	--	--	Services support	Release 3.2
OpenStack for Cisco DFA	--	--	--	--	Openstack Controller	OpenStack for Cisco DFA 1.0

Note

1 With Cisco Nexus 7000 F2, F2E, and F3 Series modules.

2 With Cisco Nexus 7000 F3 Series module.

3 Cisco DFA requires a minimum of one multiprotocol BGP route-reflector (RR). As an integrated function of Cisco DFA, Nexus 6000 Series devices with Cisco NX-OS Release 7.0(0)N1(1) and later releases can support this function.

Licensing Requirements for Cisco DFA

Review the other hardware and software components of your existing fabric with respect to the Cisco Dynamic Fabric Automation (DFA) release requirements and compatibility constraints. Because Cisco DFA implements an architectural solution with a switch topology different from what you have previously used, devices may be required to perform different roles when used in a Cisco DFA implementation, and may be subject to new licensing requirements. For information, see the "Platform Requirements" section of this guide.

Product	License Requirement
Cisco Nexus 6000 Series switch	• Cisco DFA requires the FabricPath Services package (ENHANCED_LAYER2_PKG) license. • For Cisco Nexus 6000 Series as a Cisco DFA spine node, the Enterprise Services Package (LAN_ENTERPRISE_SERVICES_PKG) is required. • For Cisco Nexus 7000 Series as a Cisco DFA leaf node, the Layer 3 Base Services Package (LAN_BASE_SERVICES_PKG) is required. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the *Cisco NX-OS Licensing Guide*.
Cisco Nexus 7000 Series switch	• Cisco DFA requires the FabricPath Services package (ENHANCED_LAYER2_PKG) license. • For Cisco Nexus 7000 Series as a Cisco DFA spine node, the Enterprise Services Package (LAN_ENTERPRISE_SERVICES_PKG) is required. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the *Cisco NX-OS Licensing Guide*.
Cisco Prime Data Center Network Manager (DCNM)	**Note** The switch feature licenses must be installed before you install the Cisco Prime DCNM license. Cisco DFA features and capabilities are covered by the Cisco DCNM Base license. The basic unlicensed version of Cisco DCNM-SAN Server is included in the software download. To get licensed features, such as Performance Manager, remote client support, and continuously monitored fabrics, you must buy and install the Cisco DCNM-SAN Server package. For information, see the *Cisco DCNM Installation and Licensing Guide, Release 7.x*.

Guidelines and Limitations for Cisco DFA

Cisco Dynamic Fabric Automation (DFA) has the following guidelines and limitations:

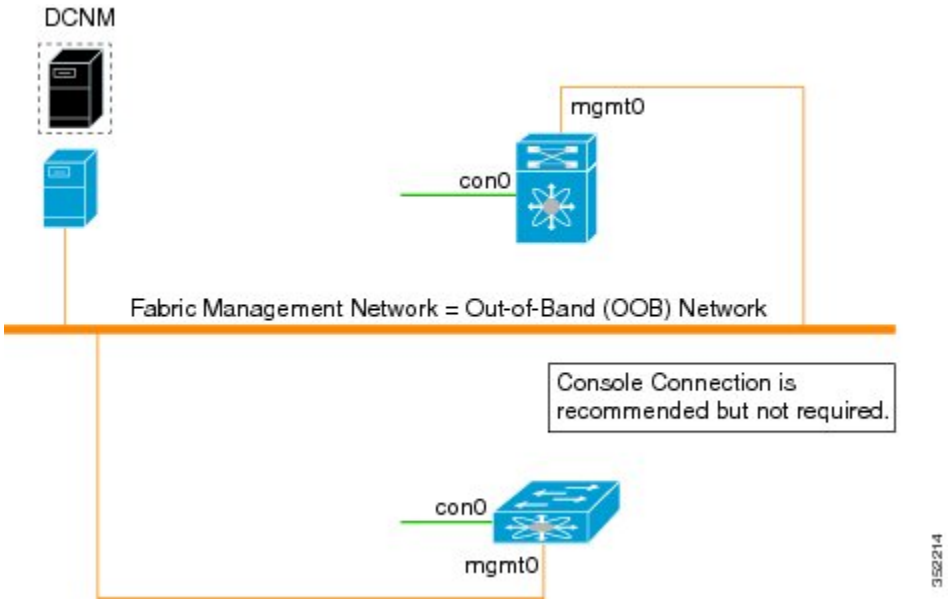
- The fabric management network can support only one Dynamic Host Configuration Protocol (DHCP) server. You can use either the DHCP server in Cisco Prime Data Center Network Manager (DCNM) or another designated DHCP server, but not both.
- To ensure that Cisco DFA device auto configuration does not interfere with other DHCP servers on your network, we recommended that you use a dedicated VLAN and subnet for the fabric management network. Cisco Prime DCNM and the Ethernet out-of-band ports of the Cisco DFA switches (mgmt0) reside in the fabric management network. You have the option to interconnect the fabric management network with your existing out-of-band management network.
- The management connectivity for Cisco DFA must come through the Cisco NX-OS device management interface (mgmt0).
- The management port on any Cisco DFA switch must be connected to the same management subnet that includes the Cisco Prime DCNM user interface.
- Every Cisco DFA switch to be managed by fabric management must be connected to the fabric management network via the Ethernet out-of-band network.
- A console connection for fabric management is recommended but not required for Cisco DFA.
- If Cisco Prime DCNM is your repository server, you must upload the Cisco NX-OS kickstart and system-image images to Cisco Prime DCNM using the Serial Copy Protocol (SCP) or Secure File Transfer Protocol (SFTP).

How to Cable the Network Fabric and Servers for Cisco DFA

Fabric Management Network and Console

Every Cisco DFA switch that is to be managed by Cisco Dynamic Fabric Automation (DFA) fabric management must connect to the fabric management network through the Ethernet out-of-band port (mgmt0).

Figure 4: Cabling the Fabric Management Network

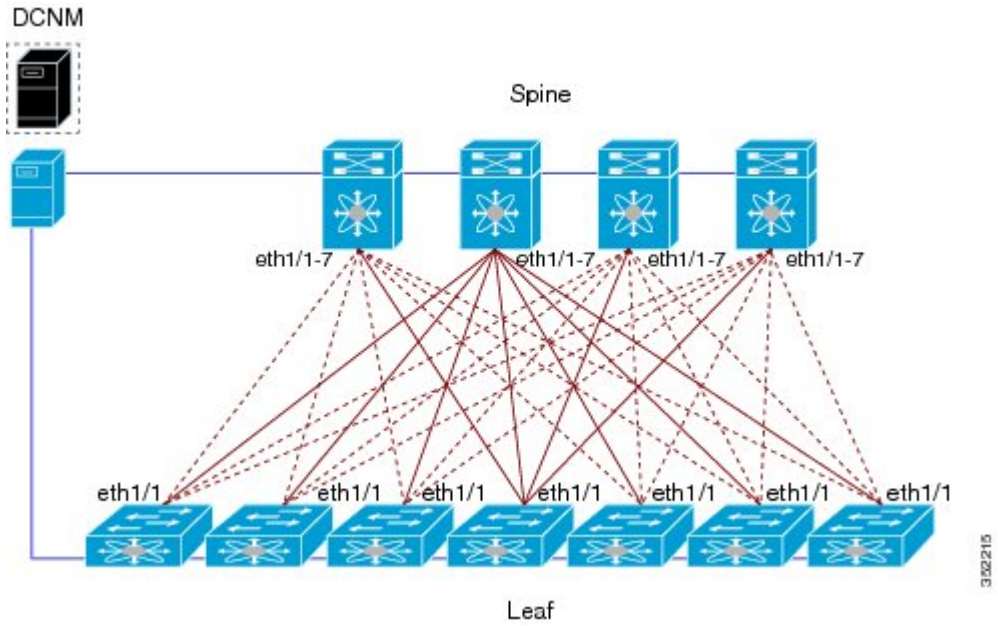


Fabric Connectivity

The fabric interfaces of the Cisco Dynamic fabric Automation (DFA) fabric connect the Cisco DFA switches to one another. Fabric interfaces are configured with Cisco FabricPath Frame Encapsulation (FE) for efficient

forwarding based on a Shortest Path First (SPF) algorithm. You do not configure VLAN trunking or pruning for the transported VLANs on Cisco DFA fabric interfaces .

Figure 5: Cabling the Cisco DFA Network Fabric and Servers

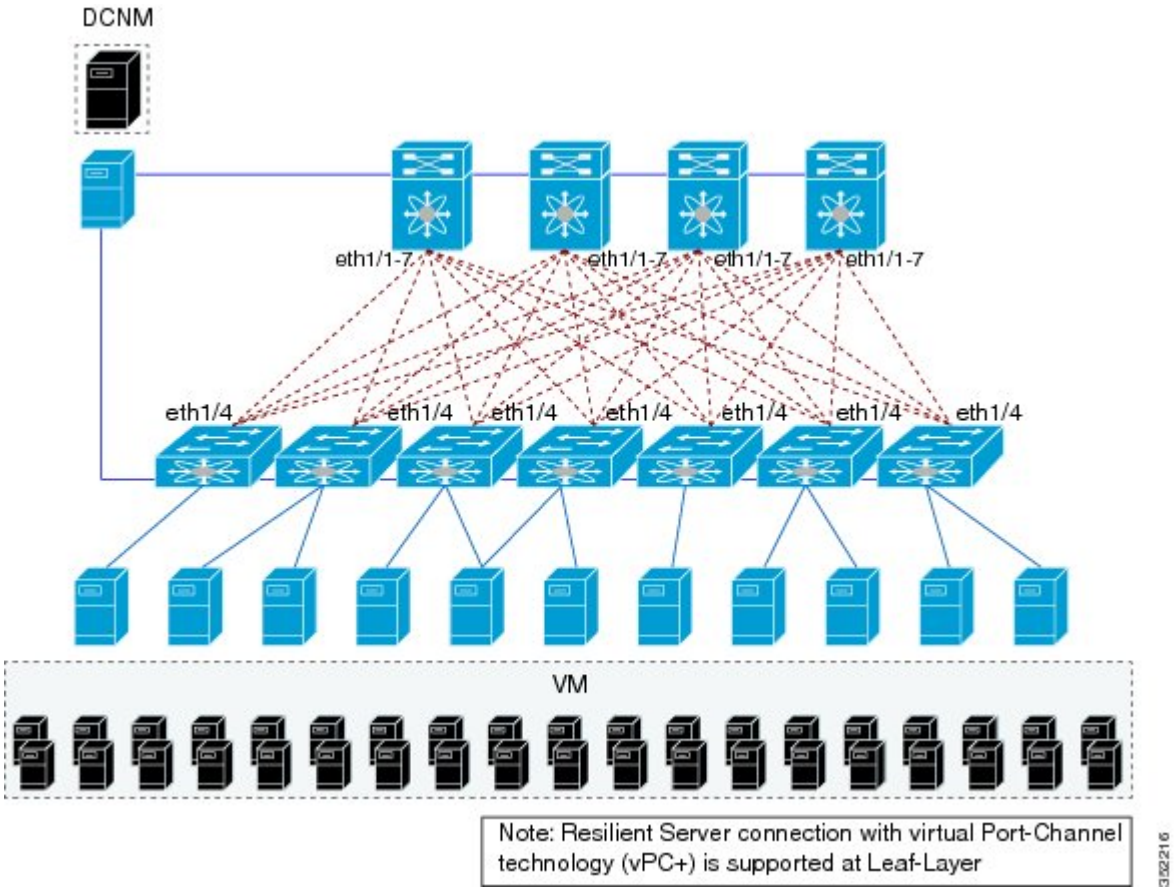


Server Connectivity

To transport data traffic across the Cisco Dynamic Fabric Automation (DFA) Fabric, the leaf switch must receive the traffic for connected VLANs that are to be extended across the fabric. The leaf-to-server interfaces are called host interfaces.

Note Always connect servers to Cisco DFA leaf or border leaf switches. You must not connect servers to Cisco DFA spine switches.

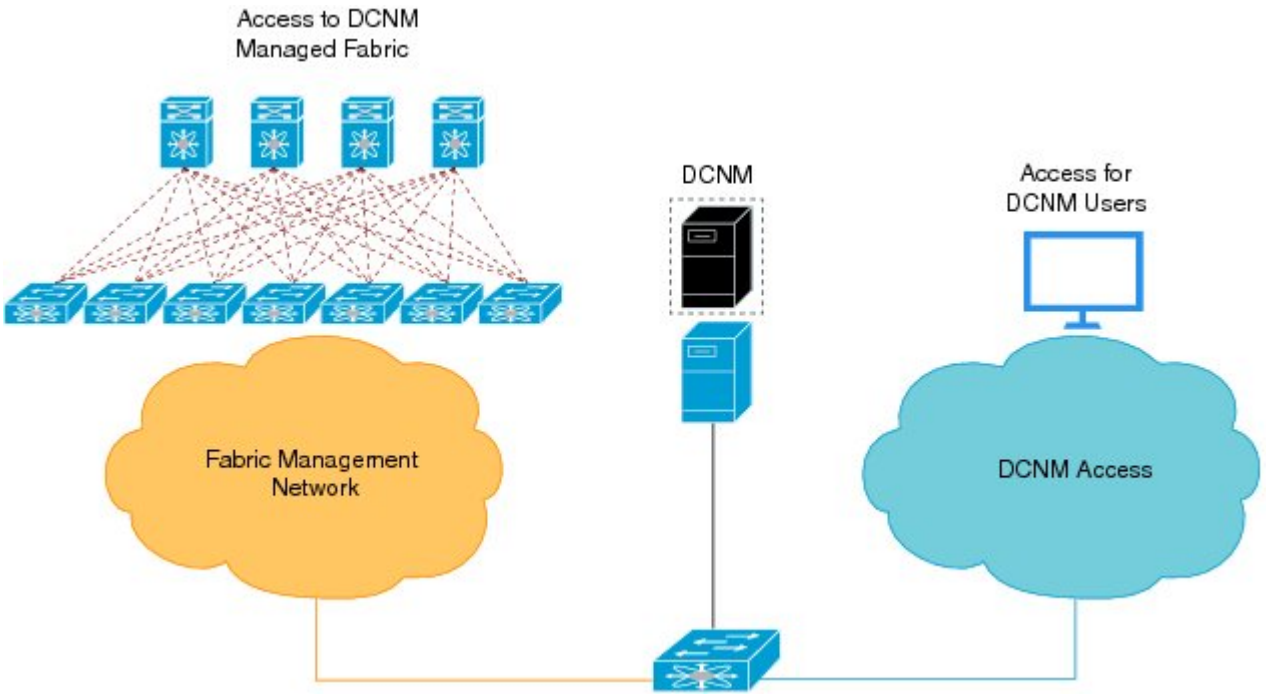
Figure 6: How to Cable Server Connectivity



Fabric Management

The Cisco Prime Data Center Network Manager (DCNM) is the central point of management for Cisco DFA.

Figure 7: Preparing to Deploy Cisco Prime DCNM



Deploying Cisco DFA

Note If this is not a new Cisco DFA deployment, see the *Cisco Dynamic Fabric Automation Migration Guide* for migrating your existing fabric to a Cisco DFA deployment.

1. Ensure that you have the appropriate Cisco Nexus devices with the minimum required Cisco NX-OS software releases to support Cisco Dynamic Fabric Automation DFA). See the "Platform requirements" section of this guide.
2. Install the Data Center devices. For information, see the appropriate install guides for your Cisco Nexus devices.
3. Install and configure the Cisco Nexus 1000V switch for VMware vSphere for Cisco DFA. For information, see the *Cisco Nexus 1000V Installation and Upgrade Guide* and the*Cisco Nexus 1000V DFA Configuration Guide*.

Note To deploy Cisco Prime DCNM, two port groups or port profiles are required on the virtual switch.

4 Create a cabling plan and cable your Cisco Nexus devices for Cisco DFA. For information, see the "How to Cable the Network Fabric and Servers for Cisco DFA" section.

5 Install the Cisco Prime Data Center Network Manager (DCNM) Open Virtual Appliance (OVA) to manage all the applications for the central point of management. For information, see the *Cisco DCNM 7.0 OVA Installation Guide*.

6 Start the Prime NSM adapter in the Cisco Prime DCNM OVA and configure Services support for Cisco DFA. For information, see the "Network Services" section of the *Cisco DCNM 7.0 OVA Installation Guide*.

7 (Optional) Use one of the following options to install OpenStack for Cisco DFA:

   a Install the Cisco OpenStack Installer to install the OpenStack for Cisco DFA orchestrator. For information, see the *OpenStack for Cisco DFA Install Guide Using Cisco OpenStack Installer*.

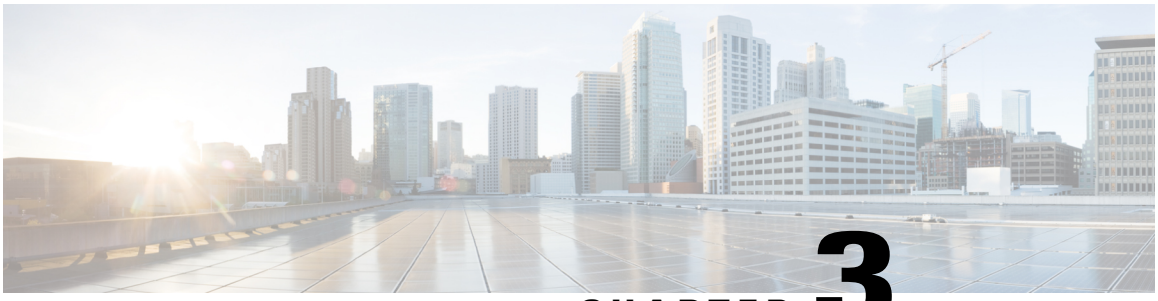
Note

- Before installing the Cisco OpenStack installer, the Cisco DFA fabric, switches, and Cisco Prime DCNM OVA must be already installed.
- To support OpenStack for Cisco DFA, Cisco Prime DCNM must be accessible via the OpenStack controller and the Cisco DFA fabric.

   b Use the pre-built OpenStack for Cisco DFA images to install the OpenStack for Cisco DFA orchestrator. For information, see the following guides:

      - *OpenStack for Cisco DFA Install Guide for Using Pre-built OpenStack for Cisco DFA Images*
      - *Quick Guide to Clonezilla*

Deploying Cisco DFA



CHAPTER 3

Configuration Examples for Cisco DFA

Examples of the Cisco DCNM templates with default configurations for the spine, leaf and border leaf switches in a Cisco DFA deployment are in the *Cisco DCNM DFA REST 7.0 API Guide*.