Cisco DCNM Installation and Upgrade Guide for Classic LAN Deployment, Release 11.2(1)

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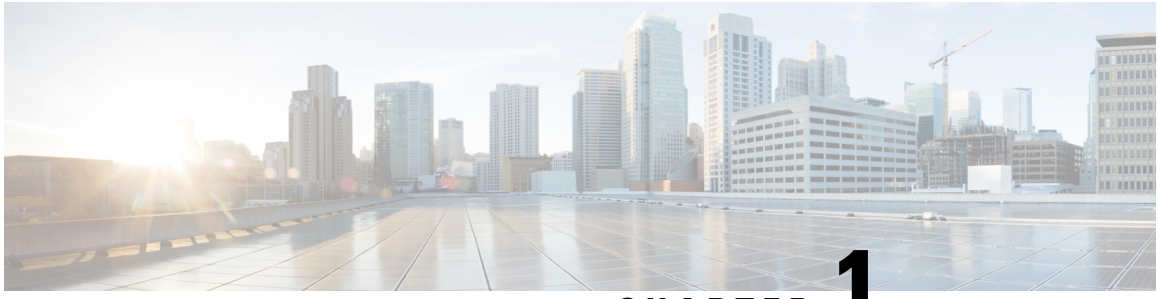


CHAPTER 1

Overview

Cisco Data Center Network Manager (DCNM) is a management system for Cisco NXOS-based programmable fabrics and Cisco NXOS-based storage fabrics. In addition to provisioning, monitoring, and troubleshooting the data center network infrastructure, the Cisco DCNM provides a comprehensive feature-set that meets the routing, switching, and storage administration needs of data centers. It streamlines the provisioning for the Programmable Fabric and monitors the SAN components.

Cisco DCNM provides a high level of visibility and control through a single web-based management console for Cisco Nexus Series Switches, Cisco MDS, and Cisco Unified Computing System (UCS) products. Cisco DCNM also includes Cisco DCNM-SAN client and Device Manager functionality.

This section contains the following sections:

Introduction

Cisco DCNM provides an alternative to the command-line interface (CLI) for switch configuration commands.

Cisco DCNM includes these management applications:

Cisco DCNM Web UI

Cisco DCNM Web UI allows operators to monitor and obtain reports for Cisco MDS and Nexus events, performance, and inventory from a remote location using a web browser. Licensing and discovery are part of the Cisco DCNM Web UI.

Performance Manager

Performance Manager presents detailed traffic analysis by capturing data with SNMP. This data is compiled into various graphs and charts that can be viewed on the Cisco DCNM Web UI. Performance Manager stores data into Elastic search time series database. API access to Elastic search isn't supported.

Installation Options

Cisco DCNM software images are packaged with the Cisco DCNM installer, signature certificate, and signature verification script. Unzip the desired Cisco DCNM installer image ZIP file to a directory. Verify the image signature by following the steps in the README file. The installer from this package installs the Cisco DCNM software.

DCNM Open Virtual Appliance (OVA) Installer

This installer is available as an Open Virtual Appliance file (.ova). The installer contains a pre-installed OS, DCNM, and other applications needed for programmable fabric.

DCNM ISO Virtual Appliance (ISO) Installer

This installer is available as an ISO image file (.iso). The installer is a bundle of OS, DCNM, and other applications needed for dynamic fabric automation.

Deployment Options

You can deploy the Cisco DCNM installer in one of the following modes:

Standalone Server

All types of installers are packaged along with PostgreSQL database. The default installation steps for the respective installers result in this mode of deployment.

High Availability for Virtual Appliances

You can deploy the DCNM Virtual appliances, both OVA and ISO, in High Availability mode to have resilience in case of application or OS failures.

System Requirements for Cisco DCNM

This section describes the various system requirements for proper functioning of your Cisco DCNM, Release 11.2(1).

Java Requirements

The Cisco DCNM Server is distributed with JRE 1.8.0_201 into the following directory:

```
DCNM_root_directory/java/jre1.8
```

Server Requirements

Cisco DCNM, Release 11.2(1), supports the Cisco DCNM Server on these 64-bit operating systems:

- **IP for Media, LAN Fabric, and Classic LAN Deployments:**
  - Open Virtual Appliance (OVA) with an integrated CentOS Linux release 7.6

- ISO Virtual Appliance (ISO) with an integrated CentOS Linux release 7.6

Cisco DCNM Release 11.2(1) supports the following databases:

- PostgreSQL 9.4.5

Note The ISO/OVA installation only supports the embedded PostgreSQL database.

Cisco DCNM Release 11.2(1) supports the ISO installation on a bare-metal server (no hypervisor) on the following server platforms:

Server	**Product ID (PID)**	**Recommended minimum memory, drive capacity, and CPU count** [1]
Cisco UCS C240M4	UCSC-C240-M4S	32G / 500G 16-vCPU Cores with Cisco hardware RAID Controller [UCSC-MRAID12G-1GB/2 GB] for the RAID operation (small)
Cisco UCS C240M4	UCSC-C240-M4L	32G / 500G 16-vCPU Cores with Cisco hardware RAID Controller [UCSC-MRAID12G- GB/2 GB] for the RAID operation (large)
Cisco UCS C240 M5S	UCSC-C240-M5SX	32G / 500G 16-vCPU Cores with Cisco hardware RAID Controller [UCSC-SAS-M5] for the RAID operation (small)
Cisco UCS C220 M5L	UCSC-C220-M5L	32G / 500G 16-vCPU Cores with Cisco hardware RAID Controller [UCSC-SAS-M5] for the RAID operation (small)

[1] Install the Cisco DCNM Compute node with 16vCPUs, 64G RAM, and 500GB hard disk. Ensure that you do not install the Compute node on 32G RAM server.

Note Cisco DCNM can work on an alternative computing hardware as well, despite Cisco is only testing on Cisco UCS.

Note Only Warm and Cold VMware snapshot is supported.

vCenter server is mandatory to deploy the Cisco DCNM OVA Installer.

Supported Hypervisors

Cisco DCNM Release 11.2(1) supports the running of the Cisco DCNM Server on the following hypervisors, for DCNM LAN Fabric and DCNM LAN Classic Deployments:

Table 1: Cisco DCNM Redhat KVM Support for DCNM LAN Fabric and DCNM LAN Classic Deployments

Installation Mode	Hypervisor
DCNM LAN Fabric	Red Hat Enterprise Linux 7.6 with KVM
DCNM Classic LAN	Red Hat Enterprise Linux 7.4

Table 2: VMware Snapshot Support for DCNM LAN Fabric and DCNM LAN Classic Deployments

VMware vSphere Hypervisor (ESXi)	6.0	6.5	6.7	6.7 update 1
VMware vCenter Server	6.0	6.5	6.7	6.7 update 1

Server Resource Requirements

Deployment	Deployment Type	Small (Lab or POC)	Large (Production)	Compute
LAN Fabric Classic LAN	• OVA • ISO	CPU: 8 vCPUs RAM: 24 GB DISK: 500 GB	CPU: 16 vCPUs RAM: 32 GB DISK: 500 GB	CPU: 16 vCPUs RAM: 64 GB DISK: 500 GB

Supported Web Browsers

Cisco DCNM supports the following web browsers:

- Google Chrome Version 74.0.3729.13
- Mozilla Firefox Version 66.0.4 (32/64 bit)
- Microsoft Internet Explorer Version 11.706 update version 11.0.120

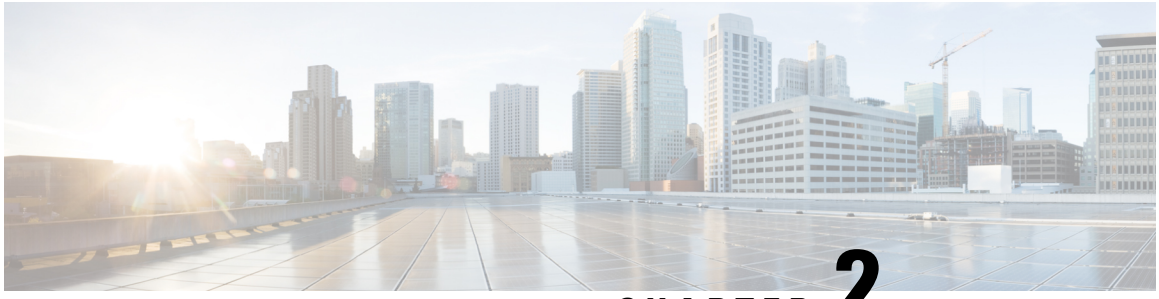
Other Supported Software

The following table lists the other software that is supported by Cisco DCNM, Release 11.2(1).

Table 3: Other Supported Software

Component	Features
Security	• ACS versions 4.0, 5.1, 5.5, and 5.8. • Telnet Disabled: SSH Version 1, SSH Version 2, Global Enforce SNMP Privacy Encryption. • Web Client Encryption: HTTPS with TLS 1, 1.1 and 1.2
OVA/ISO Installers	CentOS 7.6/Linux Kernel 3.10.x

Also, Cisco DCNM supports call-home events, fabric change events, and events that are forwarded by traps and email.



CHAPTER 2

Guidelines and Limitations

Guidelines and Limitations

The guidelines and limitations for installing and upgrading Cisco DCNM Release 11.2(1) are as follows:

General Guidelines and Limitations

- Adhere to the following password requirements. If you do not comply with the requirements, the DCNM application might not function properly:
  - It must be at least 8 characters long and contain at least one alphabet and one numeral.
  - It can contain a combination of alphabets, numerals, and special characters.
  - Do not use any of these special characters in the DCNM password: <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*
  - From Cisco DCNM Release 11.0(1), the characters that are allowed in the Administrative password is restricted for OVA and ISO installations. Therefore while upgrading, the old password used in DCNM 11.0(1) or 11.1(1) is not valid. However, different passwords are allowed during Upgrade.

    The new Administrative password that is entered is used in the following scenarios.

    —accessing the DCNM appliance via its console.

    —accessing the appliance via SSH

    —for applications running on the appliance, e.g. Postgres DBMS

    However, after the upgrade, since Postgres DBMS is restored from the backup that is taken on DCNM 10.4(2), you must logon to the Cisco DCNM Web UI using the password used on DCNM Release 10.4(2) appliance.
- Do not interrupt the boot process (such as pressing the Ctrl+ALT + DELETE keys) when installing DCNM. If you interrupt, you must restart the installation process.
- Ensure that you configure the timezone after installation or upgrade, before performing any other operations on the Cisco DCNM Appliance. Use the NTP server for configuring timezones.

Fresh Installation

- For Virtual Appliances (OVA/ISO), the installer installs the Operating system and Cisco DCNM components.
- The DCNM OVA cannot be deployed by connecting the vSphere client directly to the ESXi server.

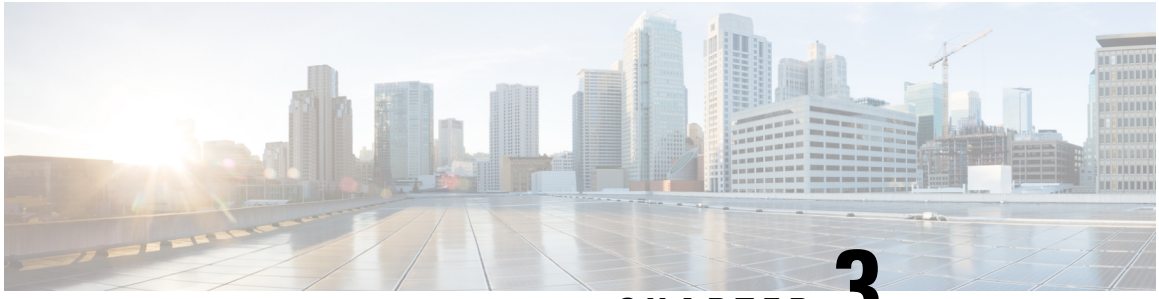
Upgrade

- Ensure that you do not perform inline upgrade from an SSH session. The session may timeout and result in an incomplete upgrade.
- Disable Telemetry in the earlier release before you upgrade to Cisco DCNM Release 11.2(1).
- Disable Telemetry before you deploy Compute Nodes. You can enable Telemetry after deploying compute nodes.

  For DCNM in Native HA mode, Telemetry is supported with 3 compute nodes only.
- If you need to run Network Insights applications, you must install 3 compute nodes.
- ElasticSearch was used to store the Performance monitoring stats, End point locator (EPL) data. If the compute cluster was deployed in the Cisco DCNM Release 11.1(1), and you must retain the ElasticSearch data intact, ensure that you take a backup of the compute nodes. You can restore the nodes after you upgrade. To backup, a compute node, you need to execute the backup script on each of the compute node separately. After you deploy the new compute, you can restore the backup on that compute node.
- Disable Telemetry before modifying Interface settings. You can enable Telemetry after modifying the settings.
- During a backup and restore process, the compute nodes are also included in the backup. After you deploy the new compute, you can restore the backup on the compute node.

  If there was no backup, disconnect the 3 compute nodes, and erase the data on all the compute nodes. On the Cisco DCNM Web Client UI, navigate to **Application > Compute**. Select the + icon to join the compute nodes.
- To erase data on the compute node, logon to the compute node through an SSH session and erase the data using the **rm -rf /var/afw/vols/data** command.

  Note You must run the above command separately on all compute nodes to erase data.



CHAPTER 3

Prerequisites

This chapter provides release-specific prerequisites information for your deployment of *Cisco Data Center Network Manager*.

Prerequisites for DCNM Open Virtual Appliance

Before you install the Cisco DCNM Open Virtual Appliance, you will need to meet following software and database requirements:

- VMware vCenter Server that is running on a Windows server (or alternatively, running as a virtual appliance).
- VMware ESXi host imported into vCenter.
- Three port groups on the ESXi host─DCNM Management Network, Enhanced Fabric Management Network, and InBand interface for EPL and Telemetry features.
- Determine the number of switches in your Cisco Programmable Fabric that will be managed by the Cisco DCNM Open Virtual Appliance.
- Ensure that no anti-virus software (such as McAfee) is running on the host where the VMware vCenter web client is launched for the DCNM OVA installation. If the anti-virus software is running, the DCNM installation might fail.
- The DCNM Open Virtual Appliance is compatible to be deployed in ESXi host as well. For deploying in the ESXi host, VMware vSphere Client application is mandatory.

Note For more information about the CPU and memory requirements, see the *Server Resource Requirements* section of the Cisco DCNM Release Notes, Release 11.2(1).

Prerequisites for DCNM ISO Virtual Appliance

Ensure that you do not add an additional Active or Standby node to an existing Active-Standby Native HA DCNM Appliance. The installation fails.

You have to set up the host or the hypervisor before you install the Cisco DCNM ISO Virtual Appliance. Based on the requirement, set up the setup Host machine or Hypervisor based on CPU and Memory requirement.

Note For more information about the CPU and memory requirements, see the *Server Resource Requirements* section of the Cisco DCNM Release Notes, Release 11.2(1).

You can set up one of the following hosts to install the DCNM ISO Virtual Appliance.

VMware ESXi

The host machine is installed with ESXi and two port groups are created—one for EFM network and the other for DCNM Management network. Enhanced Fabric In-Band network is optional.

Kernel-based Virtual Machine (KVM)

The host machine is installed with Red Hat Enterprise Linux (RHEL) 5.x or 6.x or 7.x, with KVM libraries and Graphical User Interface (GUI) access. The GUI allows you to access the Virtual Machine Manager, to deploy and manage the Cisco DCNM Virtual Appliances. Two networks are created—EFM network and DCNM Management network. Typically, the DCNM management network is bridged to gain access from other subnets. Refer the KVM documentation on how to create different types of networks.

Note KVM on other platforms like CentOS or Ubuntu will not be supported as it increases the compatibility matrix.

Prerequisites for Cisco DCNM Virtual Appliance HA

This section contains the following topics that describe the prerequisites for obtaining a high-availability (HA) environment.

Deploying Cisco DCNM Virtual Appliances in HA mode

You must deploy two standalone Virtual Appliance (OVA and ISO). When you deploy both Virtual Appliances, you must meet the following criteria:

- The eth0 of the active OVA must be in the same subnet as eth0 of the standby Virtual Appliance. The eth1 of the active Virtual Appliance must be in the same subnet as eth1 of the standby OVA. The eth2 of the active virtual appliance must be in the same subnet as the eth2 of the standby appliance.
- Both Virtual Appliances must be deployed with the same administrative password. This process ensures that both Virtual Appliances are duplicates of each other.

- If you try to add an additional Active or Standby node to an existing Active-Standby Native HA DCNM Appliance, the installation fails.

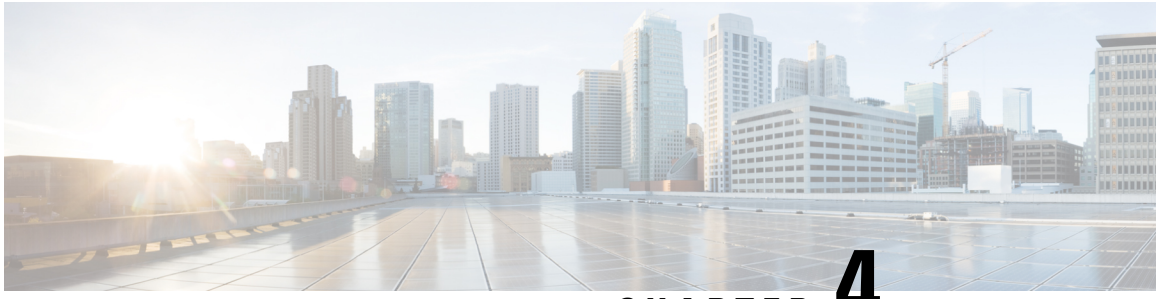
Availability of Virtual IP Addresses

Two free IP addresses are needed to set up the server eth0 and eth1 interfaces. However, eth2 IP address is optional. The first IP address will be used in the management access network; it should be in the same subnet as the management access (eth0) interface of the OVAs. The second IP address should be in the same subnet as enhanced fabric management (eth1) interfaces (switch/POAP management network).

If you choose to configure inband management (eth2) for the DCNM Server, you must reserve another IP Address. For Native HA setup, the eth2 interface on Primary and Secondary servers must be in same subnet.

Installing an NTP Server

For most of the HA functionality to work, you must synchronize the time on both OVAs by using an NTP server. The installation would typically be in the management access network (eth0) interfaces.



CHAPTER 4

Installing the Cisco DCNM

This chapter contains the following sections:

Installing DCNM on Open Virtual Appliance

This chapter contains the following sections:

Downloading the Open Virtual Appliance File

The first step to install the Open Virtual Appliance is to download the `dcnm.ova` file. Point to that `dcnm.ova` file on your computer when deploying the OVF template.

Note If you plan to use HA application functions, you must deploy the `dcnm.ova` file twice.

Procedure

Step 1 Go to the following site: http://software.cisco.com/download/ .

Step 2 In the Select a Product search box, enter **Cisco Data Center Network Manager**.

Click **Search** icon.

Step 3 Click **Data Center Network Manager** from the search results.

A list of the latest release software for Cisco DCNM available for download is displayed.

Step 4 In the Latest Releases list, choose Release 11.2(1).

Step 5 Locate the DCNM Open Virtual Appliance Installer and click the **Download** icon.

Step 6 Save the `dcnm.ova` file to your directory that is easy to find when you start to deploy the OVF template.

Deploying the Open Virtual Appliance as an OVF Template

After you download the Open Virtual Appliance file, you must deploy the OVF template from the vSphere Client application or the vCenter Server.

Note Deploy two OVAs for the HA setup.

Procedure

Step 1 Open the vCenter Server application and connect to the vCenter Server with your vCenter user credentials.

Note ESXi host must be added to the vCenter Server application.

Depending on the version of the VMware vsphere web HTML5 interface may not work properly when deploying Huge or Compute OVA, as it does not allow users to specify extra disk size. Therefore, we recommend that you use Flex interface for deploying VMs.

If you're deploying OVF template using the ESXi 6.7, the installation fails if you use Internet Explorer browser with HTML5. Ensure that you one of the following options to successfully deploy OVF template with ESXi and 6.7:

- Mozilla Firefox browser, with HTML 5 support

  Use flex interface if HTML 5 is not supported
- Mozilla Firefox browser, with flex\flash support
- Google Chrome browser, with HTML 5 support

  Use flex interface if HTML 5 is not supported

Step 2 Navigate to **Home > Inventory > Hosts and Clusters** and choose the host on which the OVF template is deployed.

Step 3 On the correct Host, right-click and select **Deploy OVF Template**.

You can also choose **Actions > Deploy OVF Template.**

Deploy OVF Template Wizard opens.

Step 4 On the Select template screen, navigate to the location where you have downloaded the OVA image.

You can choose the OVA file by one of the following methods:

- Select the **URL** radio button. Enter the path of the location of the image file.
- Select **Local File** radio button. Click **Browse**. Navigate to the directory where the image is stored. Click **OK**.

Click **Next**.

Step 5 Verify the OVA template details and click **Next**.

Step 6 On the End User License Agreement screen, read the license agreement.

Click **Accept** and click **Next**.

Step 7 On the Select name and location screen, enter the following information:

- In the Name field, enter an appropriate name for the OVF.

  Note Ensure that the VM name is unique within the Inventory.

- In the Browse tab, select **Datacenter** as the deployment location under the appropriate ESXi host.

Click **Next**.

Step 8 On the Select configuration screen, select the configuration from the drop-down list.

- Choose **Small** (Lab or POC) to configure the virtual machine with 8 vCPUs, 24GB RAM.

  Choose Small for proof-of-concept and other small-scale environments with fewer than 50 switches that are not expected to grow with time.

- Choose **Large** (Production) to configure the virtual machine with 16 vCPUs, 32GB RAM.

  We recommend that you use a Large deployment configuration when you are managing more than 50 devices to leverage better RAM, heap memory, and CPUs. For setups that could grow, choose Large.

- Choose **Compute** to configure the virtual machine with 16 vCPUs, 64GB RAM.

  You must have DCNM deployed in Compute mode to use applications in your deployment.

Click **Next**.

Step 9 On the Select a resource screen, select the host on which you want to deploy the OVA template.

Click **Next**.

Step 10 On the Select storage screen, based on the Datastore and Available space choose the disk format and the destination storage for the virtual machine file.

a) Select the virtual disk format from the drop-down list.

The available disk formats are:

Note Choose one of the thick provision types if you have enough storage capacity as required by the virtual appliance and want to set a specific allocation of space for the virtual disks.

- **Thick Provision Lazy Zeroed**: The space that is required for the virtual disk is allocated when the virtual disk is created. The data that remains on the physical device is not erased when the virtual disk is created but is zeroed out on demand later on first write from the virtual disk.
- **Thin Provision**: The disk space available is less than 100 GB. The initial disk consumption is 3GB and increases as the size of the database increases with the number of devices being managed.
- **Thick Provision Eager Zeroed**: The space that is required for the virtual disk is allocated when the virtual disk is created. Unlike the Lazy Zeroed option, the data that remains on the physical device is erased when the virtual disk is created.

  Note With 500G, the DCNM installation will appear to be stuck with option Thick Provision Eager Zeroed. However, it takes longer time to complete.

b) Select the VM storage policy from the drop-down list.

By default, no policy is selected.

c) Check the **Show datastores from Storage DRS clusters** to view the clusters datastores.
d) Select the destination storage for the virtual machine, available in the datastore.

Click **Next**.

Step 11 On the Select Networks screen, map the networks that are used in the OVF template to networks in your inventory.

- **dcnm-mgmt network**

  This network provides connectivity (SSH, SCP, HTTP, HTTPS) to the Cisco DCNM Open Virtual Appliance. Associate this network with the portgroup that corresponds to the subnet that is associated with the DCNM Management network.

- **enhanced-fabric-mgmt**

  This network provides enhanced fabric management of Nexus switches. You must associate this network with the port group that corresponds to management network of leaf and spine switches.

- **enhanced-fabric-inband**

  This network provides in-band connection to the fabric. You must associate this network with port group that corresponds to a fabric in-band connection.

  Note If you do not configure enhanced-fabric-inband network, Endpoint Locator and Telemetry features are not operational.

  However, you can configure the network after installation, if required. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

From the Destination Network drop-down list, choose to associate the network mapping with the port group that corresponds to the subnet that is associated with the corresponding network.

If you are deploying more than one DCNM Open Virtual Appliance for HA functionality, you must meet the following criteria:

- Both OVAs must have their management access (eth0), enhanced fabric management (eth1) and inband management (eth2) interfaces in the same subnet.
- Each OVA must have their eth0-eth1 and eth2 interfaces in different subnets.
- Both OVAs must be deployed with the same administrative password. This is to ensure that both OVAs are duplicates of each other for application access. Do not use the following characters in your password: <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Click **Next**.

Step 12 On the Customize template screen, enter the Management Properties information.

Enter the **IP Address** (for the outside management address for DCNM), **Subnet Mask**, and **Default Gateway**.

Note During Native HA installation and upgrade, ensure that you provide appropriate Management Properties for both Active and Standby appliances.

Click **Next**.

Step 13 On the Ready to Complete screen, review the deployment settings.

Click **Back** to go to the previous screens and modify the configuration.

Click **Finish** to deploy the OVF template.

You can see the deployment status in the Recent Tasks area on the vSphere Client.

Note If this deployment is a part of the upgrade process, do not Power on the VM. Edit and provide the 11.0(1) or 11.1(1) MAC address and power on the VM.

Step 14 After the installation is complete, right click on the installed VM and select **Power > Power On**.

Note Before you power on the VM, ensure that you have reserved appropriate resources for the VM, such as CPU and memory, based on the chosen deployment configuration.

You can see the status in the Recent Tasks area.

Step 15 Navigate to the Summary tab and click **Settings** icon and select **Launch Web Console**.

A message indicating that the DCNM appliance is configuring appears on the screen.

```
*************************************************************
Please point your web browser to
https://<IP-address>:<port-number>
to complete the application
*************************************************************
```

Copy and paste the URL to the browser to complete the installation, using the Web Installer.

What to do next

The DCNM installer creates a _deviceImage-0.iso in the DCNM VM folder and mounts the ISO permanently to the VM. If this ISO is removed or the CD/DVD is disconnected, the VM will not boot. The VM will enter Emergency Mode and prompt you with the message:Give root password for maintenance. If the VM is down, CD/DVD drive can be disconnected. However, after you power it up again, the VM will enter Emergency Mode and provide a prompt.

You can choose to install DCNM in Standalone mode or Native HA mode. For more information, see Installing the Cisco DCNM OVA in Standalone Mode, on page 17 or Installing the Cisco DCNM OVA in Native HA mode, on page 20.

Installing the Cisco DCNM OVA in Standalone Mode

Paste the URL displayed on the Console tab and hit Enter key. A welcome message appears.

To complete the installation of Cisco DCNM from the web installer, perform the following procedure.

Procedure

Step 1 On the Welcome to Cisco DCNM screen, click **Get Started**.

Step 2 On the Cisco DCNM Installer screen, select **Fresh Installation – Standalone** radio button.

Click **Continue**.

Step 3 On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Adhere to the following password requirements. If you do not comply with the requirements, the DCNM application may not function properly.

- It must be at least eight characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Do not use any of these special characters in the DCNM password for all platforms:

  <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Select the **Show passwords in clear text** checkbox to view the password you have typed.

Click **Next**.

Step 4 In the Install Mode tab, from the drop-down list, choose **Classic LAN** installation mode for the OVA DCNM Appliance.

Click **Next**.

Step 5 On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

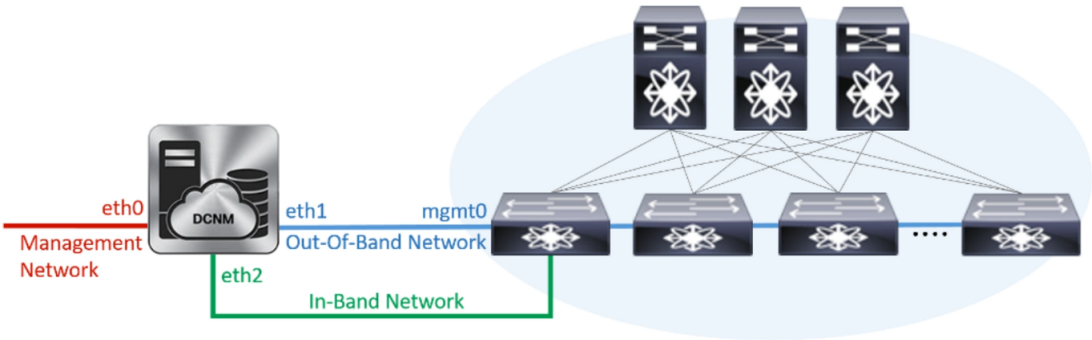
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

Step 6 On the Network Settings tab, configure the network parameters.

Figure 1: Cisco DCNM Management Network Interfaces



a) In the Management Network area, verify if the auto-populated IP Address and Default Gateway address are correct. Modify, if necessary.

Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

(Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

b) In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

Out-of-band management provides a connection to the device management ports (Typically mgmt0).

Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

c) In the In-Band Network area, enter the IP Address and gateway IP Address for the in-band network.

The In-Band Network provides reachability to the devices via the front-panel ports.

Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

Note To modify the already configured in-band network (eth2 interface), execute the **ifconfig eth2 0.0.0.0** command and run the **appmgr setup inband** command again. Refer to Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104 to run the **appmgr setup inband** command.

d) In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

All the applications use the IP Address from this subnet.

Click **Next**.

Step 7 On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM Installation for the chosen deployment mode.

A progress bar appears showing the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A success message appears with the URL to access DCNM Web UI.

```
*************************************************************
Your Cisco Data Center Network Manager software has been installed.
DCNM Web UI is available at
https://<<IP Address>>:2443
You will be redirected there in 60 seconds.
Thank you
*************************************************************
```

Note If the Cisco DCNM is running behind a firewall, ensure that you open the port 2443 to launch Cisco DCNM Web UI.

Note If you try to access the DCNM Web UI using the Management IP address while the installation is still in progress, an error message appears on the console.

```
**************************************
*Preparing Appliance*

**************************************
```

What to do next

Log on to the DCNM Web UI with appropriate credentials.

Click the **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

If you have configured inband management (eth2) IP addresses for device management, login to standalone server and configure the inband network reachability from eth2 of the server to the switches by using the following commands:

```
dcnm# appmgr setup inband-route --subnet switches-fabric-links-IP-subnet/mask
dcnm# appmgr setup inband-route --subnet switch-loopback-IP-subnet>/mask
```

For example: If you have four switches with all fabric links connected through 10.0.0.x/30 subnet, and if all switches are configured with the loopback interface for inband reachability in subnet 40.1.1.0/24, use the following commands:

```
dcnm# appmgr setup inband-route --subnet 10.0.0.0/24
dcnm# appmgr setup inband-route --subnet 40.1.1.0/24
```

Installing the Cisco DCNM OVA in Native HA mode

The native HA is supported on DCNM appliances with ISO or OVA installation only.

By default, an embedded PostgreSQL database engine with the Cisco DCNM. The native HA feature allows two Cisco DCNM appliances to run as active and standby applications, with their embedded databases synchronized in real time. Therefore, when the active DCNM is not functioning, the standby DCNM takes over with the same database data and resume the operation.

Perform the following task to set up Native HA for DCNM.

Procedure

Step 1 Deploy two DCNM Virtual Appliances (either OVA or ISO).

For example, let us indicate them as **dcnm1** and **dcnm2**.

Step 2 Configure **dcnm1** as the Primary node. Paste the URL displayed on the Console tab of **dcnm1** and press **Enter** key.

A welcome message appears.

a) On the Welcome to Cisco DCNM screen, click **Get Started**.
b) On the Cisco DCNM Installer screen, select **Fresh Installation - HA Primary** radio button, to install **dcnm1** as Primary node.

Click **Continue**.

c) On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Adhere to the following password requirements. If you do not comply with the requirements, the DCNM application may not function properly.

- It must be at least eight characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Do not use any of these special characters in the DCNM password for Linux, Windows, OVA, and ISO platforms:

  <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Select the **Show passwords in clear text** checkbox to view the password you have typed.

Click **Next**.

d) In the Install Mode tab, from the drop-down list, choose **Classic LAN** installation mode for the DCNM Appliance.

Click **Next**.

e) On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

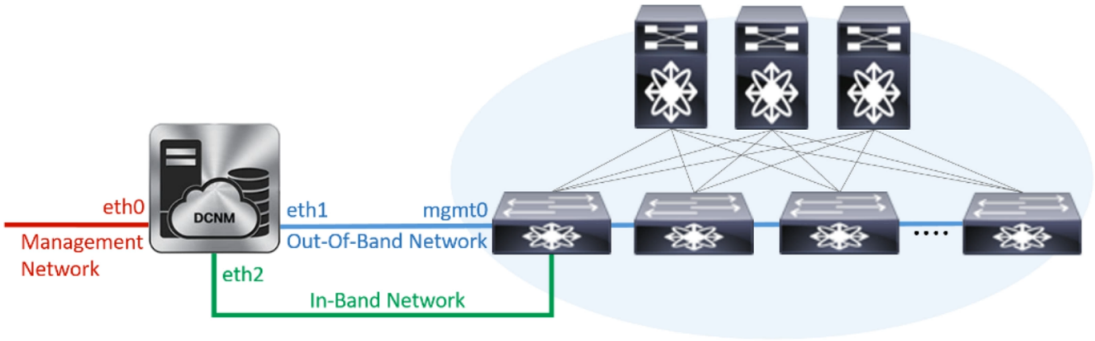
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

f) On the Network Settings tab, configure the network parameters.

Figure 2: Cisco DCNM Management Network Interfaces



- In the Management Network area, verify is the auto-populated IP Address and Default gateway address are correct. Modify, if necessary.

  Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

  (Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

- In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

  Out-of-band management provides a connection to the device management ports (Typically mgmt0).

  Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

- In the In-Band Network area, enter the VIP Address and gateway IP Address for the in-band network. The In-Band Network provides reachability to the devices via the front-panel ports.

  Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

  However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

  Note To modify the already configured in-band network (eth2 interface), execute the **ifconfig eth2 0.0.0.0** command and run the **appmgr setup inband** command again. Refer to Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104 to run the **appmgr setup inband** command

- In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

  All the applications use the IP Address from this subnet.

  Note Ensure that you configure the same IP subnet on both the Primary HA and the Secondary HA node.

Click **Next**.

g) On the HA Settings tab, a confirmation message appears.

```
You are installing the primary DCNM HA node.
Please note that HA setup information will need to
be provided when the secondary DCNM HA node is
installed.
```

Click **Next**.

h) On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM Installation for the chosen deployment mode.

A progress bar appears to show the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A warning message appears stating that the setup is not complete until you install the Secondary node.

```
WARNING: DCNM HA SETUP IS NOT COMPLETE!
Your Cisco Data Center Network Manager software has been installed on
this HA primary node.
However, the system will be ready to be used only after installation
of the secondary node has been completed.
Thank you.
```

Step 3 Configure **dcnm2** as the Secondary node. Paste the URL displayed on the Console tab of **dcnm2** and hit Enter.

A welcome message appears.

a) On the Welcome to Cisco DCNM screen, click **Get Started**.

b) On the Cisco DCNM Installer screen, select **Fresh Installation - HA Secondary** radio button, to install **dcnm2** as Secondary node.

Click **Continue**.

c) On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Note The password for the secondary node must be the same as the Administrative password for primary, as entered in Step 2.c, on page 21.

Click **Next**.

d) In the Install Mode tab, from the drop-down list, choose the same installation mode that you selected for the Primary node.

Note The HA installation fails if you do not choose the same installation mode as Primary node.

Click **Next**.

e) On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

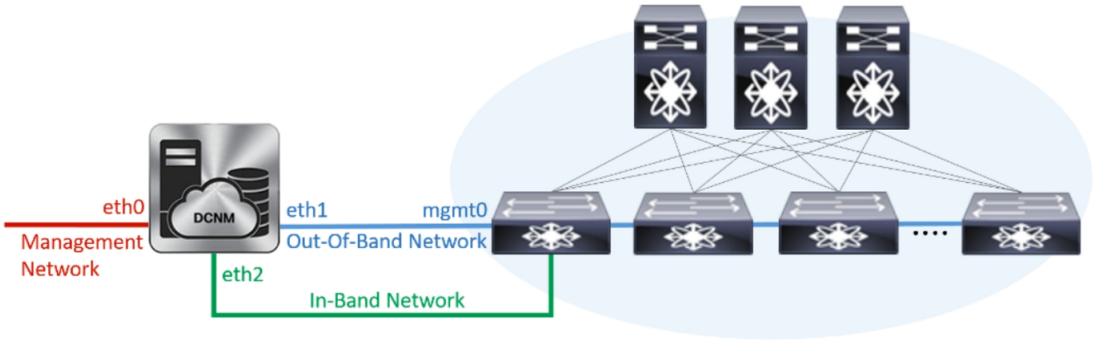
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

f) On the Network Settings tab, configure the network parameters.

Figure 3: Cisco DCNM Management Network Interfaces



- In the Management Network area, verify is the auto-populated IP Address and Default gateway address are correct. Modify, if necessary.

  Note Ensure that the IP Address belongs to the same Management Network as configured on the Primary node for HA setup to complete successfully.

  Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

  (Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

- In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

  Out-of-band management provides a connection to the device management ports (Typically mgmt0).

  Note Ensure that the IP Address, IP address gateway, and the IPv6 address belong to the same Out-of-Band Network as configured on the Primary node for HA setup to complete successfully.

  Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

  You can also configure an IPv6 address for out-of-band management network.

- In the In-Band Network area, enter the IP Address and gateway IP Address for the in-band network. The In-Band Network provides reachability to the devices via the front-panel ports.

  Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

  However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

- In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

  All the applications use the IP Address from this subnet.

  Note Ensure that you configure the same IP subnet on both the Primary HA and the Secondary HA node.

Click **Next**.

g) On the HA Settings tab, configure the system settings..

- In the Management IP Address of primary DCNM node field, enter the appropriate IP Address to access the DCNM UI.
- In the VIP Fully qualified Host Name field, enter hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- Enter the Management Network VIP address, VIPv6 address, and OOB Network VIP address appropriately.

  Note If you have configured the Management network using IPv6 address, ensure that you configure the Management Network VIPv6 Address.
- Enter OOB Network VIPv6 Address to configure IPv6 address for VIP.
- In the In-Band Network area, enter the VIP Address for the in-band network.

  This is the VIP address for the In-Band network. This field is mandatory if you have provided an IP address for In-Band network in the Network Settings tab.
- Enter the HA ping IP address if necessary.

  HA_PING_ADDRESS, must be different from the DCNM Active and Standby addresses.

  You must configure the HA ping IP Address to avoid the Split Brain scenario. This address must belong to Enhanced Fabric management network.

Click **Next**.

h) On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM OVA Installation for the chosen deployment mode.

A progress bar appears to show the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A success message appears with the URL to access DCNM Web UI.

```
*************************************************************
Your Cisco Data Center Network Manager software has been installed.
DCNM Web UI is available at
https://<<IP Address>>:2443
You will be redirected there in 60 seconds.
Thank you
*************************************************************
```

Note If the Cisco DCNM is running behind a firewall, ensure that you open the port 2443 to launch Cisco DCNM Web UI.

What to do next

Log on to the DCNM Web UI with appropriate credentials.

Click the **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

If you have configured inband management (eth2) IP addresses for device management, login to standalone server and configure the inband network reachability from eth2 of the server to the switches by using the following commands:

```
dcnm# appmgr setup inband-route --subnet switches-fabric-links-IP-subnet/mask
dcnm# appmgr setup inband-route --subnet switch-loopback-IP-subnet>/mask
```

For example: If you have four switches with all fabric links connected through 10.0.0.x/30 subnet, and if all switches are configured with the loopback interface for inband reachability in subnet 40.1.1.0/24, use the following commands:

```
dcnm# appmgr setup inband-route --subnet 10.0.0.0/24
dcnm# appmgr setup inband-route --subnet 40.1.1.0/24
```

Installing DCNM on ISO Virtual Appliance

This chapter contains the following sections:

Downloading the ISO Virtual Appliance File

The first step to installing the ISO Virtual Appliance is to download the `dcnm.iso` file. You must point to that dcnm.iso file on your computer when preparing the server for installing DCNM.

Note If you plan to use HA application functions, you must deploy the `dcnm.iso` file twice.

Procedure

Step 1 Go to the following site: http://software.cisco.com/download/ .

Step 2 In the Select a Product search box, enter Cisco Data Center Network Manager.

Click on Search icon.

Step 3 Click on **Data Center Network Manager** from the search results.

A list of the latest release software for Cisco DCNM available for download is displayed.

Step 4 In the Latest Releases list, choose Release 11.2(1).

Step 5 Locate the DCNM ISO Virtual Appliance Installer and click the **Download** icon.

Step 6 Locate the DCNM VM templates at DCNM Virtual Appliance definition files for VMWare (.ovf) and KVM (domain XMLs) environment and click **Download**.

Step 7 Save the `dcnm.iso` file to your directory that will be easy to find when you being the installation.

What to do next

You can choose to install DCNM On KVM or Baremetal servers. Refer to Installing the DCNM ISO Virtual Appliance on KVM, on page 30 or Installing the DCNM ISO Virtual Appliance on UCS (Bare Metal), on page 27 for more information.

Installing the DCNM ISO Virtual Appliance on UCS (Bare Metal)

Perform the following tasks to install the DCNM ISO virtual appliance on UCS.

Procedure

Step 1 Launch Cisco Integrated Management Controller (CIMC).

Step 2 Click the **Launch KVM** button.

You can either launch Java-based KVM or HTML-based KVM.

Step 3 Click the URL displayed on the window to continue loading the KVM client application.

Step 4 On the Menu bar, click **Virtual Media > Activate Virtual Devices**.

Step 5 Click **Virtual Media** and choose one of the following mediums to browse and upload DCNM ISO images from the following:

- Map CD/DVD
- Map Removable Disk
- Map Floppy Disk

Navigate to the location where the ISO image is located and load the ISO image.

Step 6 Select **Power > Reset System (warm boot)** and Ok to continue and restart the UCS box.

Step 7 Press **F6** interrupt the reboot process when the server starts to select a boot device. The boot selection menu appears.

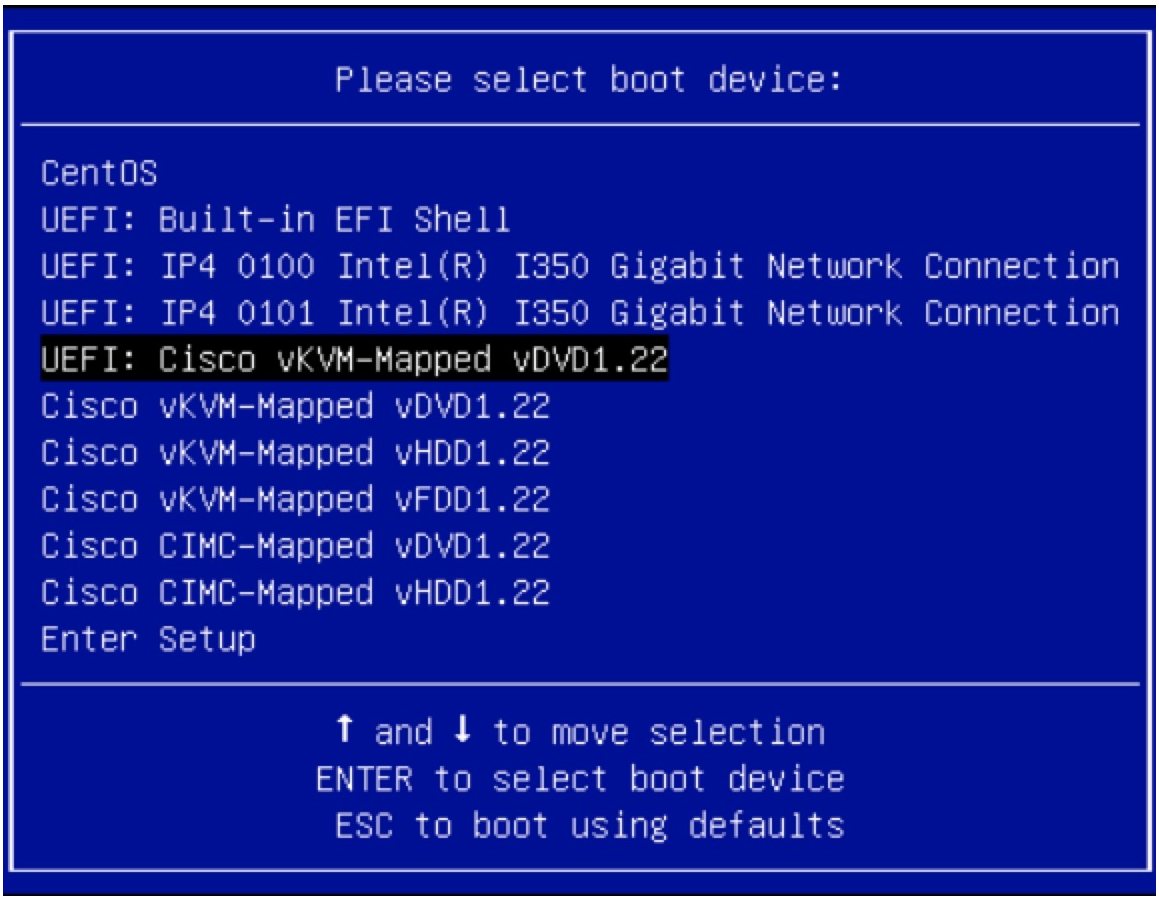
For more information about using the UCS KVM Console window, see the Cisco UCS Server Configuration Utility, Release 3.1 User Guide at the following URL:

https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/sw/ucsscu/user/guide/31/UCS_SCU/booting.html#wp1078073

Step 8 Use the arrow keys to select Cisco Virtual CD/DVD and press **Enter**. The server boots with the DCNM ISO image from the mapped location.

Note The following image highlights UEFI installation. However, you can also choose **Cisco vKVM-Mapped vDVD1.22** for BIOS installation. ISO can be booted in both modes, BIOS, and UEFI.

UEFI is mandatory for a system with minimum of 2TB disks.



For Cisco UCS with the disk size of 2TB or higher and with 4K sector size drivers, the UEFI boot option is required. For more information, see UEFI Boot Mode.

Step 9 Select **Install Cisco Data Center Network Manager** using the up or down arrow keys. Press **Enter**.

The option shown in the following image appears when the ISO image is booted with UEFI.

```
Boot existing Cisco Data Center Network Manager
Install Cisco Data Center Network Manager
Rescue Cisco Data Center Network Manager

Use the ▲ and ▼ keys to change the selection.
Press 'e' to edit the selected item, or 'c' for a command prompt.
```

Step 10 On the Cisco Management Network Management screen, select the interface for the networks. The list of available interfaces is displayed on the screen.

Choose the Management Interface (eth0) and Out-of-Band interface (eth1) from the Network Interface List. You can also configure the in-band interface (eth2) if necessary.

```
*************************************
 Cisco Data Center Network Management
*************************************

Network Interface List
------------------------------------------------------
1) 0b:00.0 Cisco Systems Inc VIC Ethernet NIC (rev a2)
   Address: 70:69:5a:f9:5e:19    Link:UP
2) 0c:00.0 Cisco Systems Inc VIC Ethernet NIC (rev a2)
   Address: 70:69:5a:f9:5e:1a    Link:DOWN
3) 01:00.0 Intel Corporation I350 Gigabit Network Connection (rev 01)
   Address: 00:be:75:49:c2:86    Link:UP
4) 01:00.1 Intel Corporation I350 Gigabit Network Connection (rev 01)
   Address: 00:be:75:49:c2:87    Link:UP

Please select the interfaces to use from the list above:
Management Interface (eth0) : 3
Out-Of-Band Interface (eth1) : 4

Configure In-Band Interface (eth2)? [y/n]: y
In-Band Interface (eth2) : 1
```

Note If you do not configure In-Band interface, Endpoint Locator and Telemetry features are not operational.

However, you can configure the network after installation, if required. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

Step 11 Review the selected interfaces. Press **y** to confirm and continue with the installation.

Step 12 Configure the Management Network for Cisco DCNM. Enter the IP address, Subnet Mask, and Gateway. Press **y** to continue with the installation.

After the installation is complete, the system reboots and a message indicating that the DCNM appliance is configuring appears on the screen.

```
*************************************************************
Please point your web browser to
http://<IP-address>:<port-number>
to complete the application
*************************************************************
```

Copy and paste the URL to the browser to complete the installation using the Web Installer.

What to do next

You can choose to install DCNM in Standalone mode or Native HA mode. Refer to Installing Cisco DCNM ISO in Standalone Mode, on page 32 or Installing the Cisco DCNM ISO in Native HA mode, on page 34 for more information.

Installing the DCNM ISO Virtual Appliance on KVM

Perform the following tasks to install the ISO virtual appliance on KVM.

Procedure

Step 1 Unzip and extract **dcnm-va-ovf-kvm-files.11.2.1.zip** and locate the **dcnm-kvm-vm.xml** file.

Step 2 Upload this file on the RHEL server that is running KVM to the same location as the ISO.

Step 3 Connect to the RHEL server running KVM via SCP File transfer terminal.

Step 4 Upload the **dcnm-va.11.2.1.iso** and **dcnm-kvm-vm.xml** to the RHEL server.

Step 5 Close the file transfer session.

Step 6 Connect to the RHEL server running KVM via SSH terminal.

Step 7 Navigate to the location where both the ISO and domain XMLs is downloaded.

Step 8 Create the VM (or Domains, as they are known in the KVM terminology) using the **virsh** command.

need info on dcnm-kvm-vm-huge.xml

```
sudo virsh define [{dcnm-kvm-vm-huge.xml|dcnm-kvm-vm-compute.xml|
dcnm-kvm-vm-large.xml|dcnm-kvm-vm-small.xml}]
```

Step 9 Enable a VNC server and open the required firewall ports.

Step 10 Close the SSH session.

Step 11 Connect to the RHEL server running KVM via a VNC terminal.

Step 12 Navigate to **Applications > System Tools > Virtual Machine Manager (VMM)**.

A VM is created in the Virtual Machine Manager.

Step 13 From Virtual Machine Manager, edit the VM by selecting the VM in the listing. Click **Edit > Virtual Machine Details > Show virtual hardware details**.

Step 14 In the Virtual Hardware Details, navigate to **Add Hardware > Storage**.

Step 15 Create a hard disk with Device type withe the following specifications:

- device type: IDE disk
- cache-mode: default
- storage format: raw

We recommend that you use storage size of 500GB.

Step 16 Select IDE CDROM on the edit window of the Virtual Machine and click **Connect**.

Step 17 Navigate to dcnm-va.iso and click **OK**.

Step 18 Select both the NICs and assign appropriate networks that are created.

Step 19 Power on the Virtual Machine.

Note Before you power on the VM, ensure that you have reserved appropriate resources for the VM, such as CPU and memory, based on the chosen deployment configuration.

The operating system is installed.

Step 20 On the Cisco Management Network Management screen, select the interface for the networks. The list of available interfaces is displayed on the screen.

Choose the Management Interface (eth0) and Out-of-Band interface (eth1) from the Network Interface List. You can also configure in-band interface (eth2) if necessary.

Note If you do not configure in-band interface (eth2), Endpoint Locator and Telemetry features are not operational.

However, you can configure the network after installation, if required. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

Step 21 Press **y** to confirm and continue with the installation.

Step 22 Configure the Management Network. Enter the IP address, Subnet Mask, and Gateway. Press **y** to continue with the installation.

After the installation is complete, the system reboots and a message indicating that the DCNM appliance is configuring appears on the screen.

```
************************************************************
Please point your web browser to
http://<IP-address>:<port-number>
to complete the application
************************************************************
```

Copy and paste the URL to the browser to complete the installation using the Web Installer.

What to do next

You can choose to install DCNM in Standalone mode or Native HA mode. Refer to Installing Cisco DCNM ISO in Standalone Mode, on page 32 or Installing the Cisco DCNM ISO in Native HA mode, on page 34 for more information.

Installing Cisco DCNM ISO in Standalone Mode

Paste the URL displayed on the Console tab and hit Enter key. A welcome message appears.

To complete the installation of Cisco DCNM from the web installer, perform the following procedure.

Procedure

Step 1 On the Welcome to Cisco DCNM screen, click **Get Started**.

Step 2 On the Cisco DCNM Installer screen, select **Fresh Installation – Standalone** radio button.

Click **Continue**.

Step 3 On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Adhere to the following password requirements. If you do not comply with the requirements, the DCNM application may not function properly.

- It must be at least eight characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Do not use any of these special characters in the DCNM password for all platforms:

  <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Select the **Show passwords in clear text** checkbox to view the password you have typed.

Click **Next**.

Step 4 In the Install Mode tab, from the drop-down list, choose **Classic LAN** installation mode for the OVA DCNM Appliance.

Click **Next**.

Step 5 On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

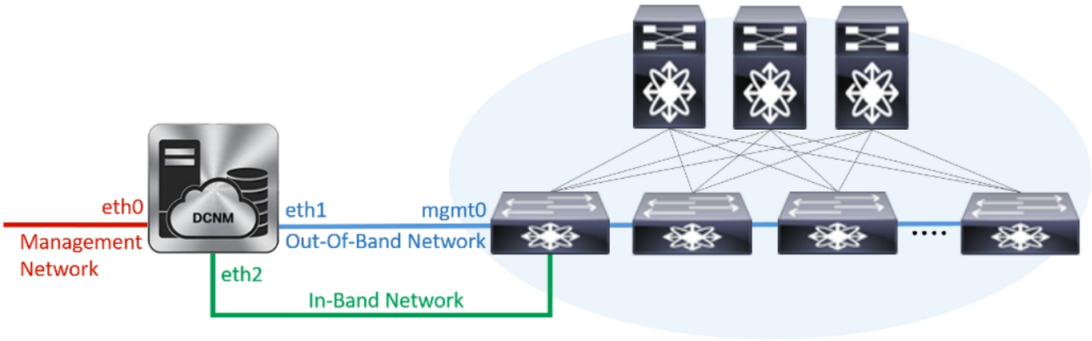
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

Step 6 On the Network Settings tab, configure the network parameters.

Figure 4: Cisco DCNM Management Network Interfaces



a) In the Management Network area, verify if the auto-populated IP Address and Default Gateway address are correct. Modify, if necessary.

Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

(Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

b) In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

Out-of-band management provides a connection to the device management ports (Typically mgmt0).

Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

c) In the In-Band Network area, enter the IP Address and gateway IP Address for the in-band network.

The In-Band Network provides reachability to the devices via the front-panel ports.

Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

Note To modify the already configured in-band network (eth2 interface), execute the **ifconfig eth2 0.0.0.0** command and run the **appmgr setup inband** command again. Refer to Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104 to run the **appmgr setup inband** command.

d) In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

All the applications use the IP Address from this subnet.

Click **Next**.

Step 7 On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM Installation for the chosen deployment mode.

A progress bar appears showing the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A success message appears with the URL to access DCNM Web UI.

```
**************************************************************
Your Cisco Data Center Network Manager software has been installed.
DCNM Web UI is available at
https://<<IP Address>>:2443
You will be redirected there in 60 seconds.
Thank you
**************************************************************
```

Note If the Cisco DCNM is running behind a firewall, ensure that you open the port 2443 to launch Cisco DCNM Web UI.

Note If you try to access the DCNM Web UI using the Management IP address while the installation is still in progress, an error message appears on the console.

```
**************************************
*Preparing Appliance*

**************************************
```

What to do next

Log on to the DCNM Web UI with appropriate credentials.

Click the **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

If you have configured inband management (eth2) IP addresses for device management, login to standalone server and configure the inband network reachability from eth2 of the server to the switches by using the following commands:

```
dcnm# appmgr setup inband-route --subnet switches-fabric-links-IP-subnet/mask
dcnm# appmgr setup inband-route --subnet switch-loopback-IP-subnet>/mask
```

For example: If you have four switches with all fabric links connected through 10.0.0.x/30 subnet, and if all switches are configured with the loopback interface for inband reachability in subnet 40.1.1.0/24, use the following commands:

```
dcnm# appmgr setup inband-route --subnet 10.0.0.0/24
dcnm# appmgr setup inband-route --subnet 40.1.1.0/24
```

Installing the Cisco DCNM ISO in Native HA mode

The native HA is supported on DCNM appliances with ISO or OVA installation only.

By default, an embedded PostgreSQL database engine with the Cisco DCNM. The native HA feature allows two Cisco DCNM appliances to run as active and standby applications, with their embedded databases synchronized in real time. Therefore, when the active DCNM is not functioning, the standby DCNM takes over with the same database data and resume the operation.

Perform the following task to set up Native HA for DCNM.

Procedure

Step 1 Deploy two DCNM Virtual Appliances (either OVA or ISO).

For example, let us indicate them as **dcnm1** and **dcnm2**.

Step 2 Configure **dcnm1** as the Primary node. Paste the URL displayed on the Console tab of **dcnm1** and press **Enter** key.

A welcome message appears.

a) On the Welcome to Cisco DCNM screen, click **Get Started**.

b) On the Cisco DCNM Installer screen, select **Fresh Installation - HA Primary** radio button, to install **dcnm1** as Primary node.

Click **Continue**.

c) On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Adhere to the following password requirements. If you do not comply with the requirements, the DCNM application may not function properly.

- It must be at least eight characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Do not use any of these special characters in the DCNM password for Linux, Windows, OVA, and ISO platforms:

  <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Select the **Show passwords in clear text** checkbox to view the password you have typed.

Click **Next**.

d) In the Install Mode tab, from the drop-down list, choose **Classic LAN** installation mode for the DCNM Appliance.

Click **Next**.

e) On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

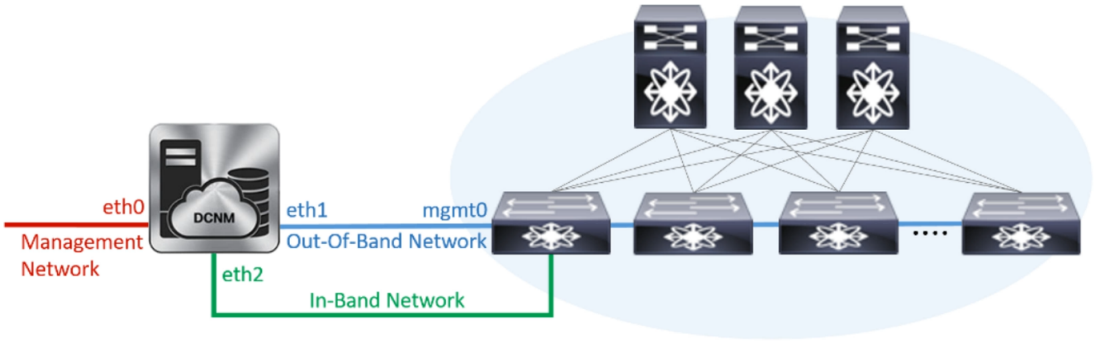
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

f) On the Network Settings tab, configure the network parameters.

Figure 5: Cisco DCNM Management Network Interfaces



- In the Management Network area, verify is the auto-populated IP Address and Default gateway address are correct. Modify, if necessary.

  Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

  (Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

- In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

  Out-of-band management provides a connection to the device management ports (Typically mgmt0).

  Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

- In the In-Band Network area, enter the VIP Address and gateway IP Address for the in-band network. The In-Band Network provides reachability to the devices via the front-panel ports.

  Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

  However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

  Note To modify the already configured in-band network (eth2 interface), execute the **ifconfig eth2 0.0.0.0** command and run the **appmgr setup inband** command again. Refer to Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104 to run the **appmgr setup inband** command

- In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

  All the applications use the IP Address from this subnet.

  Note Ensure that you configure the same IP subnet on both the Primary HA and the Secondary HA node.

Click **Next**.

g) On the HA Settings tab, a confirmation message appears.

```
You are installing the primary DCNM HA node.
Please note that HA setup information will need to
be provided when the secondary DCNM HA node is
installed.
```

Click **Next**.

h) On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM Installation for the chosen deployment mode.

A progress bar appears to show the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A warning message appears stating that the setup is not complete until you install the Secondary node.

```
WARNING: DCNM HA SETUP IS NOT COMPLETE!
Your Cisco Data Center Network Manager software has been installed on
this HA primary node.
However, the system will be ready to be used only after installation
of the secondary node has been completed.
Thank you.
```

Step 3 Configure **dcnm2** as the Secondary node. Paste the URL displayed on the Console tab of **dcnm2** and hit Enter.

A welcome message appears.

a) On the Welcome to Cisco DCNM screen, click **Get Started**.

b) On the Cisco DCNM Installer screen, select **Fresh Installation - HA Secondary** radio button, to install **dcnm2** as Secondary node.

Click **Continue**.

c) On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Note The password for the secondary node must be the same as the Administrative password for primary, as entered in Step 2.c, on page 35.

Click **Next**.

d) In the Install Mode tab, from the drop-down list, choose the same installation mode that you selected for the Primary node.

Note The HA installation fails if you do not choose the same installation mode as Primary node.

Click **Next**.

e) On the System Settings, configure the settings for the DCNM Appliance.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.

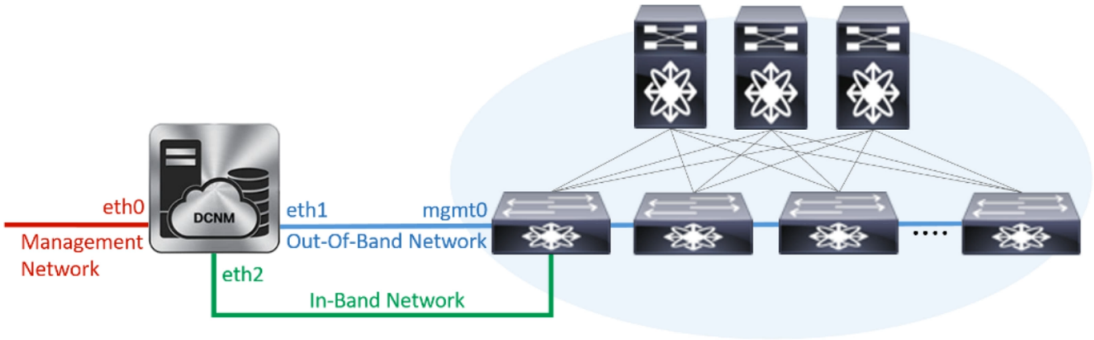
  Beginning with Release 11.2(1), you can also configure the DNS server using an IPv6 address.
- In the NTP Server field, enter the IP address of the NTP server.

  The value must be an IP or IPv6 address or RFC 1123 compliant name.

Click **Next**.

f) On the Network Settings tab, configure the network parameters.

Figure 6: Cisco DCNM Management Network Interfaces



- In the Management Network area, verify is the auto-populated IP Address and Default gateway address are correct. Modify, if necessary.

  Note Ensure that the IP Address belongs to the same Management Network as configured on the Primary node for HA setup to complete successfully.

  Note Beginning with Cisco DCNM Release 11.2(1), you can also use an IPv6 address for the Management Network.

  (Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

- In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the network with an IPv6 Address.

  Out-of-band management provides a connection to the device management ports (Typically mgmt0).

  Note Ensure that the IP Address, IP address gateway, and the IPv6 address belong to the same Out-of-Band Network as configured on the Primary node for HA setup to complete successfully.

  Note If the out-of-band network is not configured, you cannot configure Cisco DCNM in Cluster mode.

  You can also configure an IPv6 address for out-of-band management network.

- In the In-Band Network area, enter the IP Address and gateway IP Address for the in-band network. The In-Band Network provides reachability to the devices via the front-panel ports.

  Note If you do not configure in-band network, Endpoint Locator and Telemetry features are not operational.

  However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

- In the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

All the applications use the IP Address from this subnet.

Note Ensure that you configure the same IP subnet on both the Primary HA and the Secondary HA node.

Click **Next**.

g) On the HA Settings tab, configure the system settings..

- In the Management IP Address of primary DCNM node field, enter the appropriate IP Address to access the DCNM UI.
- In the VIP Fully qualified Host Name field, enter hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- Enter the Management Network VIP address, VIPv6 address, and OOB Network VIP address appropriately.

  Note If you have configured the Management network using IPv6 address, ensure that you configure the Management Network VIPv6 Address.
- Enter OOB Network VIPv6 Address to configure IPv6 address for VIP.
- In the In-Band Network area, enter the VIP Address for the in-band network.

  This is the VIP address for the In-Band network. This field is mandatory if you have provided an IP address for In-Band network in the Network Settings tab.
- Enter the HA ping IP address if necessary.

  HA_PING_ADDRESS, must be different from the DCNM Active and Standby addresses.

  You must configure the HA ping IP Address to avoid the Split Brain scenario. This address must belong to Enhanced Fabric management network.

Click **Next**.

h) On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM OVA Installation for the chosen deployment mode.

A progress bar appears to show the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A success message appears with the URL to access DCNM Web UI.

```
************************************************************
Your Cisco Data Center Network Manager software has been installed.
DCNM Web UI is available at
https://<<IP Address>>:2443
You will be redirected there in 60 seconds.
Thank you
************************************************************
```

Note If the Cisco DCNM is running behind a firewall, ensure that you open the port 2443 to launch Cisco DCNM Web UI.

What to do next

Log on to the DCNM Web UI with appropriate credentials.

Click the **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

If you have configured inband management (eth2) IP addresses for device management, login to standalone server and configure the inband network reachability from eth2 of the server to the switches by using the following commands:

```
dcnm# appmgr setup inband-route --subnet switches-fabric-links-IP-subnet/mask
dcnm# appmgr setup inband-route --subnet switch-loopback-IP-subnet>/mask
```

For example: If you have four switches with all fabric links connected through 10.0.0.x/30 subnet, and if all switches are configured with the loopback interface for inband reachability in subnet 40.1.1.0/24, use the following commands:

```
dcnm# appmgr setup inband-route --subnet 10.0.0.0/24
dcnm# appmgr setup inband-route --subnet 40.1.1.0/24
```

Installing Cisco DCNM Compute Node

Paste the URL displayed on the Console tab and hit Enter key. A welcome message appears.

Note Compute nodes allows users to scale DCNM, as application load can be shared across all the compute nodes, instead of the usual 1 or 2 (if you have HA) nodes.

Note If **Enable Clustered Mode** was selected during DCNM installation, applications such as, Config Compliance, EPL, NIA, and NIR won't work until you install the compute nodes.

To complete the installation of Cisco DCNM Compute Node from the web installer, perform the following procedure.

Before you begin

Ensure that you have 16 vCPUs, 64GB RAM, and 500GB hard disc to install compute node.

Procedure

Step 1 On the Welcome to Cisco DCNM screen, click **Get Started**.

Step 2 On the Cisco DCNM Installer screen, select the **Fresh Installation – Standalone** radio button.

Click **Continue**.

Step 3 On the Administration tab, enter the password that is used to connect to all the applications in the Cisco DCNM Open Virtual Appliance.

Adhere to the following password requirements. If you don't comply with the requirements, the DCNM application may not function properly.

- It must be at least eight characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Don't use any of these special characters in the DCNM password for all platforms:

  <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Select the **Show passwords in clear text** checkbox to view the password you have typed.

Click **Next**.

Step 4 In the Install Mode tab, from the drop-down list, choose **Compute** to deploy a DCNM Compute node.

Click **Next**.

Step 5 On the System Settings, configure the settings for the DCNM Compute node.

- In the Fully Qualified Hostname field, enter the hostname that is a fully qualified domain name (FQDN) as per RFC1123, section 2.1.
- In the DNS Server Address field, enter the DNS IP address.
- In the NTP Server field, enter the IP address of the NTP server.

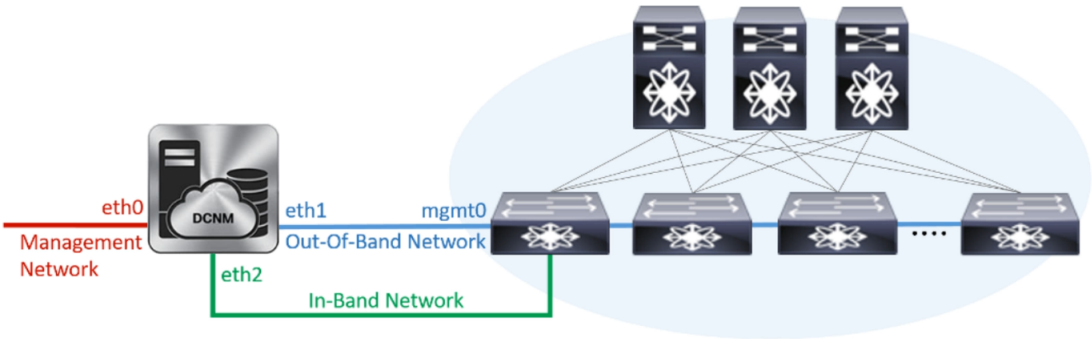
  The value must be an IP address or RFC 1123 compliant name.
- In the DCNM Server IP address field, enter the IP address that is assigned to the DCNM Server on the Management Network.

  Note If you are installing Compute node on a Cisco DCNM Native HA setup, enter the VIP address.

Click **Next**.

Step 6 On the Network Settings tab, configure the network parameters.

Figure 7: Cisco DCNM Management Network Interfaces



a) In the Management Network area, verify is the autopopulated IP Address and Default gateway address are correct. Modify, if necessary.

   (Optionally) Enter a valid IPv6 address along with the prefix to configure the Management address and the Management Network Default IPv6 Gateway.

b) In the Out-of-Band Network area, enter the IP address, gateway IP Address, and DNS server address. If DCNM is on the IPv6 network, configure the IP Address.

Out-of-band management provides a connection to the device management ports (Typically mgmt0).

c) (Optional) In the In-Band Network area, enter the IP Address and gateway IP Address for the in-band network.

The In-Band Network provides reachability to the devices via the front-panel ports.

Note If you don't configure in-band network, Endpoint Locator and Telemetry features aren't operational.

However, you can configure the in-band network after installation, if necessary. For more information, see Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation, on page 104.

Click **Next**.

Step 7 In the Applications tab, in the Internal Application Services Network area, enter the IP subnet to access the applications that run internally to DCNM.

All the applications use the IP Address from this subnet.

Note You must configure the same subnet across all nodes of the cluster.

Click **Next**.

Step 8 On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** to complete the Cisco DCNM Installation for the chosen deployment mode.

A progress bar appears to show the completed percentage, description of the operation, and the elapsed time during the installation. After the progress bar shows 100%, click **Continue**.

A success message appears with the URL to access DCNM Compute Node.

```
*************************************************************
Your Cisco DCNM Compute Node has been installed.
Click on the following link to go to DCNM GUI's Application page:
DCNM GUI's Applications
You will be redirected there in 60 seconds.
Thank you
*************************************************************
```

Step 9 Logon to the compute node via SSH, using **sysadmin@**<*dcnm-compute-eth0-ip-address*>.

Step 10 Run the **sudo reboot** command to ensure that this compute node joins the Cluster in a fully initialized state.

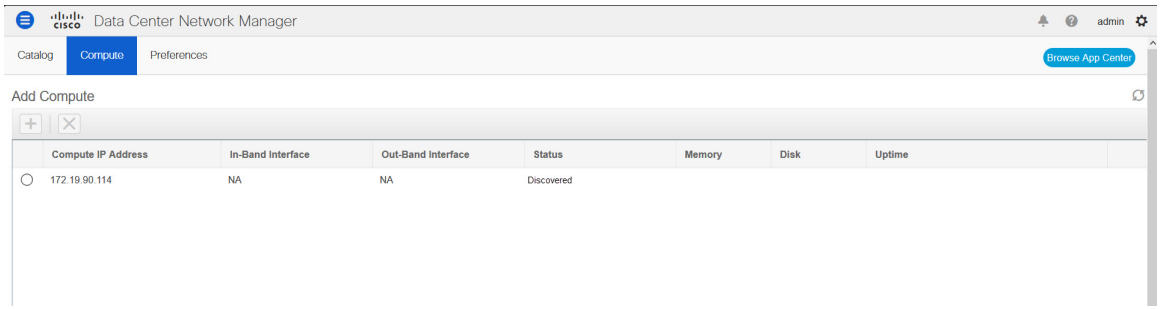
```
dcnm-compute# sudo reboot
```

After reboot, verify if you can SSH into the compute node using **sysadmin@**<*dcnm-compute-eth0-ip-address*>.

What to do next

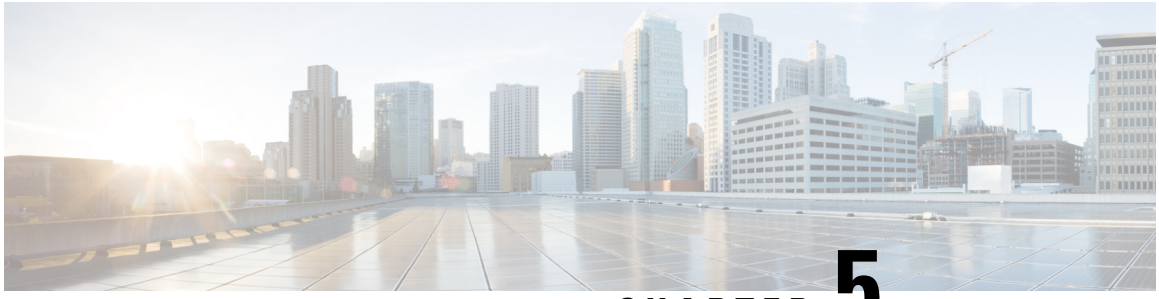
Log on to the DCNM Web UI with appropriate credentials.

The **Applications** tab displays all the services running on the DCNM deployment that you have installed. Click **Compute** tab to view the new Compute in Discovered state on the Cisco DCNM Web UI.



Refer to the *Applications* chapter in your deployment-specific *Cisco DCNM Configuration Guide* for more information.

To set up compute cluster and to deploy applications, refer to the *Deploying Applications in Clustered Mode* in your Cisco DCNM Configuration Guide for your deployment.



CHAPTER 5

Upgrading the Cisco DCNM

Before Cisco DCNM Release 11.0(1), DCNM OVA, and ISO supported SAN functionality. From Cisco DCNM 11.0(1), OVA, and ISO does not ship with SAN support.

You can upgrade to the Cisco DCNM Release 11.2(1) from DCNM Release 11.0(1) and 11.1(1) only. For instructions, refer to *Cisco DCNM Installation Guides*.

The following table summarizes the type of upgrade that you must follow to upgrade to Release 11.2(1).

Table 4: Type of Upgrade

Current Release Number	Upgrade type to upgrade to Release 11.2(1)
11.1(1)	Inline Upgrade
11.0(1)	Inline Upgrade
10.4(2)	**1.** Upgrade to 11.0(1) or 11.1(1) using the DCNMUpgradeTool. **2.** Inline Upgrade from 11.0(1) or 11.1(1) to 11.2(1)

- Upgrading the Cisco DCNM, on page 45
- Upgrading ISO or OVA through Inline Upgrade, on page 45

Upgrading the Cisco DCNM

Before Cisco DCNM Release 11.0(1), DCNM OVA, and ISO supported SAN functionality. From Cisco DCNM Release 11.3(1), you can install Cisco DCNM for SAN Deployment on both OVA and ISO virtual appliances. However, there is not upgrade path for SAN OVA\ISO.

From Release 11.3(1), Cisco DCNM OVA and ISO is supported for SAN functionality.

The following table summarizes the type of upgrade that you must follow to upgrade to Release 11.3(1).

Upgrading ISO or OVA through Inline Upgrade

Inline upgrade allows you to upgrade DCNM by imposing the new DCNM version to the existing DCNM. After the inline upgrade, ensure that you clear your browser cache before launching the DCNM application.

When you install Cisco DCNM, a self-signed certificate is installed, by default. However, after upgrading to the latest Cisco DCNM Release, you must restore the certificates.

Note Restoring certificates is a disruptive mechanism; it requires you to stop and restart applications. Restore the certificates only when the upgraded system is stable, that is, you must be able to login to Cisco DCNM Web UI.

To restore certificates after upgrade, see Restoring the certificates after an upgrade, on page 77.

This section contains the procedure to upgrade the DCNM using the Inline Upgrade method.

Inline Upgrade for DCNM Virtual Appliance in Standalone Mode

You can upgrade from Release 11.0(1) or Release 11.1(1) to Release 11.2(1) using the inline upgrade. Inline upgrade allows you to upgrade DCNM by imposing the new DCNM version to the existing DCNM. After the inline upgrade, ensure that you clear your browser cache before launching the DCNM application.

Perform the following task to upgrade the DCNM virtual appliance in standalone mode.

Before you begin

If the Cisco DCNM setup is in clustered mode, ensure that you perform the following:

- Stop the Network Insights - Resources (NIR) 2.x application. On the Cisco DCNM Web UI, choose **Applications > Catalog**. On the NIR app, click **Stop** icon to stop the application. Click **Delete** to remove the application from the Catalog.
- Stop all the applications running on the Cisco DCNM Compute nodes using the **appmgr stop afw** command.

```
dcnm-compute# appmgr stop afw
```

Procedure

Step 1 Log on to the Cisco DCNM appliance console.

- For OVA Installation: On the OVF template deployed for the host, right click and select **Settings > Launch Web Console**.
- For ISO Installation: Select the KVM console or UCS (Bare Metal) console.

Caution Do not perform an Inline Upgrade from an SSH Session. The session may timeout and result in an incomplete upgrade.

OR

Run the following command to create a screen session.

```
dcnm# screen
```

This creates a session which allows you to execute the commands. The commands continue to run even when the window is not visible or if you get disconnected.

Step 2 Take a backup of the application data using the **appmgr backup** command.

```
dcnm# appmgr backup
```

Copy the backup file to a safe location outside the DCNM server.

Step 3 Unzip the `dcnm-va.11.2.1.iso.zip` file and upload the `DCNM 11.2(1) ISO` file to the `/root/` folder in the DCNM setup that you want to upgrade.

Step 4 Create folder that is named **iso** using the **mkdir /mnt/iso** command.

```
dcnm# mkdir /mnt/iso
```

Step 5 Mount the DCNM 11.2(1) ISO file on the standalone setup in the /mnt/iso folder.

mount -o loop *<DCNM 11.2(1) image>* **/mnt/iso**

```
dcnm# mount -o loop dcnm-va.11.2.1.iso /mnt/iso
```

Step 6 Navigate to **/mnt/iso/packaged-files/scripts/** and run the **./inline-upgrade.sh** script.

```
dcnm# cd /mnt/iso/packaged-files/scripts/
dcnm# ./inline-upgrade.sh
```

Note If some services are still running, you will receive a prompt that the services will be stopped. When prompted, press y and continue.

```
Do you want to do the inline upgrade to 11.2(1)?
The DCNM and Elasticsearch will go down (if it is running) and come up after the upgrade
[y/n] n ? y
```

Note When upgrading to Cisco DCNM Release 11.2, the OS kernel is upgraded. At the end of the inline upgrade, the Cisco DCNM appliance reboots.

Step 7 Provide the new sysadmin user password at the prompt:

```
Enter the password for the new sysadmin user: <<sysadmin_password>>
Enter it again for verification: <<sysadmin_password>>
```

After the upgrade is complete, the appliance reboots.

Step 8 Ensure that the DCNM application is functional, by using the **appmgr status all** command.

```
dcnm# appmgr status all
```

Step 9 To verify that you have successfully installed the Cisco DCNM Release 11.2(1), use the **appmgr show version** command.

```
dcnm# appmgr show version

Cisco Data Center Network Manager
Version: 11.3(1)
Install mode: LAN Fabric
Standalone node. HA not enabled.
```

What to do next

Logon to the DCNM Web UI with appropriate credentials.

Click **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

To gracefully onboard Cisco DCNM Release 11.0(1) or Release 11.1(1) managed VXLAN BGP EVPN fabric(s) comprising Cisco Nexus 9000 switches post upgrade to Cisco DCNM Release 11.2(1), see Post DCNM 11.2(1) Upgrade for VXLAN BGP EVPN, External, and MSD Fabrics.

Inline Upgrade for DCNM Virtual Appliance in Native HA Mode

You can upgrade from Release 11.0(1) or Release 11.1(1) to Release 11.2(1) using the inline upgrade.

Inline upgrade allows you to upgrade DCNM by imposing the new DCNM version to the existing DCNM. After the inline upgrade, ensure that you clear your browser cache before launching the DCNM application.

Perform the following task to upgrade the DCNM virtual appliance in Native HA mode.

Before you begin

- Ensure that both the Cisco DCNM 11.0(1) or Cisco DCNM 11.1(1) Active and Standby peers are up and running.
- Check and ensure that the Active and Standby servers are operational, using the **appmgr show ha-role** command.

  Example:

  On the Active node:

  ```
  dcnm1# appmgr show ha-role
  Native HA enabled.
  Deployed role: Active
  Current role: Active
  ```

  On the Standby node:

  ```
  dcnm2# appmgr show ha-role
  Native HA enabled.
  Deployed role: Standby
  Current role: Standby
  ```

- If the Cisco DCNM setup is in clustered mode, ensure that you perform the following:

  Note Inline upgrade of Cisco DCNM in Clustered mode is supported from Release 11.2(1). Release 11.1(1) doesn't support inline upgrade for DCNM in clustered mode.

  - Stop the Network Insights - Resources (NIR) 2.x application. On the Cisco DCNM Web UI, choose **Applications > Catalog**. On the NIR app, click **Stop** icon to stop the application. Click **Delete** to remove the application from the Catalog.
  - Stop all the applications running on the Cisco DCNM Compute nodes using the **appmgr stop afw** command.

    ```
    dcnm-compute# appmgr stop afw
    ```

Procedure

Step 1 Unzip the `dcnm-va.11.2.1.iso.zip` file and upload the `DCNM 11.2(1) ISO` file to the `/root/` folder in both Active and Standby node of the DCNM setup that you want to upgrade.

Note For example, let us indicate Active and Standby appliances as **dcnm1** and **dcnm2** respectively.

Step 2 Log on to the Cisco DCNM appliance console.

- For OVA Installation: On the OVF template that is deployed for the host, right click and select **Settings > Launch Web Console**.
- For ISO Installation: Select the KVM console or UCS (Bare Metal) console.

Caution Do not perform an Inline Upgrade from an SSH Session. The session may timeout and result in an incomplete upgrade.

OR

Run the following command to create a screen session.

```
dcnm1# screen
dcnm2# screen
```

This creates a session which allows you to execute the commands. The commands continue to run even when the window is not visible or if you get disconnected.

Step 3 Take a backup of the application data using the **appmgr backup** command on both Active and Standby appliances.

```
dcnm1# appmgr backup
dcnm2# appmgr backup
```

Copy the backup file to a safe location outside the DCNM server.

Step 4 On the Active node, perform the inline upgrade.

a) Create a folder named **iso** using the **mkdir /mnt/iso** command.

```
dcnm1# mkdir /mnt/iso
```

b) Mount the DCNM 11.2(1) ISO file on the Active node in the `/mnt/iso` folder.

```
dcnm1# mount -o loop dcnm-va.11.2.1.iso /mnt/iso
```

c) (Optional) Stop the HA applications on the Standby appliance using the **appmgr stop ha-apps** command.

```
dcnm2# appmgr stop ha-apps
```

d) Navigate to **/mnt/iso/packaged-files/scripts/** location and run the **./inline-upgrade.sh** script.

```
dcnm1# cd /mnt/iso/packaged-files/scripts/
dcnm1# ./inline-upgrade.sh
```

Note If some services are still running, you will receive a prompt that the services will be stopped. When prompted, press **y** to continue.

```
Do you want to do the inline upgrade to 11.2(1)?
The DCNM and Elasticsearch will go down (if it is running) and
come up after the upgrade [y/n] n ? y
```

e) Provide the new sysadmin user password at the prompt:

```
Enter the password for the new sysadmin user: <<sysadmin_password>>
Enter it again for verification: <<sysadmin_password>>
```

After the upgrade is complete, the appliance reboots.

f) Ensure the DCNM application is functional, by using the **appmgr status all** command.

```
dcnm1# appmgr status all
```

Note Ensure that all the services are up and running on the Cisco DCNM Active node before proceeding to upgrade Standby node.

g) Verify the role of the Active node, by using **appmgr show ha-role** command. Current role must show as Active.

```
dcnm1# appmgr show ha-role

Native HA enabled.
Deployed role: Active
Current role: Active
```

Warning We recommend that you do not continue to upgrade the Standby node, unless the Active node Current role is Active.

Step 5 On the Standby node, perform the inline upgrade.

a) Create folder named **iso** using the **mkdir /mnt/iso** command.

```
dcnm2# mkdir /mnt/iso
```

b) Mount the DCNM 11.2(1) ISO file on the Standby node in the `/mnt/iso` folder.

```
dcnm2#

dcnm2# mount -o loop dcnm-va.11.2.1.iso /mnt/iso
```

c) Navigate to **/mnt/iso/packaged-files/scripts/** location and run the **./inline-upgrade.sh** script.

```
dcnm2# cd /mnt/iso/packaged-files/scripts/
dcnm2# ./inline-upgrade.sh --standby
```

Note If some services are still running, you will receive a prompt that the services will be stopped. When prompted, press y and continue.

```
Do you want to do the inline upgrade to 11.2(1)?
The DCNM and Elasticsearch will go down (if it is running) and
come up after the upgrade [y/n] n ? y

dcnm2# Do you want to continue and perform the inline upgrade to 11.3(1)? [y/n]: y
```

d) Provide the new sysadmin user password at the prompt:

```
Enter the password for the new sysadmin user: <<sysadmin_password>>
Enter it again for verification: <<sysadmin_password>>
```

After the upgrade is complete, the appliance reboots.

After the upgrade is complete, the appliance reboots. Verify the role of the appliance, using the following command:

```
dcnm2# appmgr show ha-role
Native HA enabled.
```

```
Deployed role: Standby
Current role: Standby
```

What to do next

Log on to the DCNM Web UI with appropriate credentials.

Click **Settings** icon and choose **About DCNM**. You can view and verify the Installation type that you have deployed.

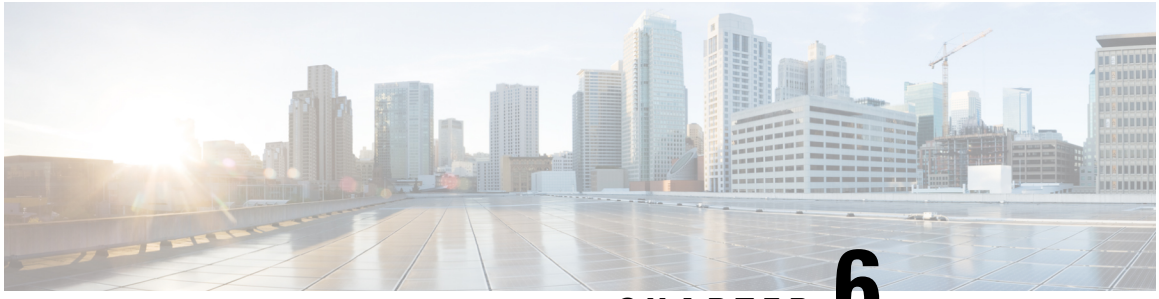
Verify the role of both the appliances using the **appmgr show ha-role**

```
dcnm1# appmgr show ha-role
Native HA enabled.
Deployed role: Active
Current role: Active
```

```
dcnm2# appmgr show ha-role
Native HA enabled.
Deployed role: Standby
Current role: Standby
```

Verify the status of all applications using the **appmgr status all** command.

To gracefully onboard Cisco DCNM Release 11.0(1) or Release 11.1(1) managed VXLAN BGP EVPN fabric(s) comprising Cisco Nexus 9000 switches post upgrade to Cisco DCNM Release 11.2(1), see Post DCNM 11.2(1) Upgrade for VXLAN BGP EVPN, External, and MSD Fabrics.



CHAPTER 6

Deployment Best Practices

Best Practices for Deploying Cisco DCNM and Computes

This chapter describes the document best practices to deploy Cisco DCNM OVA and ISO in clustered and unclustered modes. The following sections explain the recommended design for configurations of IP addresses and relevant IP pools during the Cisco DCNM installation.

The Cisco DCNM OVA or the ISO installation consists of 3 network interfaces:

- dcnm-mgmt network (eth0) interface

  This network provides connectivity (SSH, SCP, HTTP, HTTPS) to the Cisco DCNM.

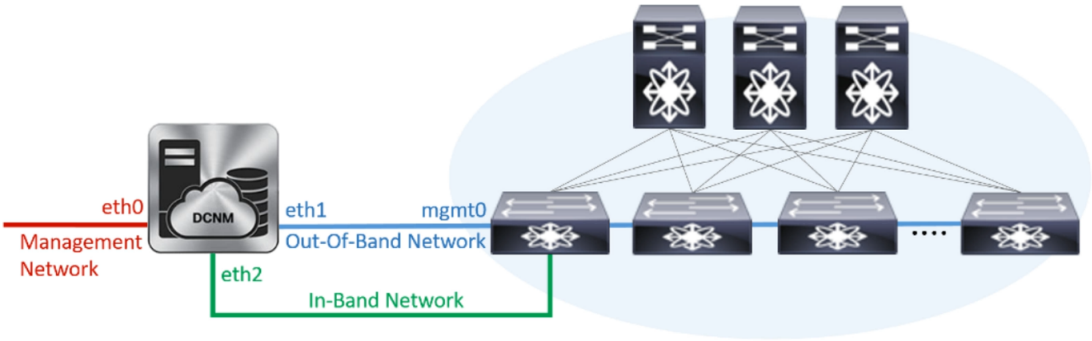
- enhanced-fabric-mgmt (eth1) interface

  This network provides enhanced fabric management of Cisco Nexus switches through the out-of-band or mgmt0 interface.

- enhanced-fabric-inband (eth2) interface

  This network provides in-band connection to the fabric through the front-panel ports. This network interface is used for applications such as Endpoint Locator (EPL) and Network Insights Resources (NIR).

The following figure shows the network diagram for the Cisco DCNM management interfaces.



Guidelines to Use the Best Practices

The following are the guidelines to remember while you use the best practices for deploying DCNM and Computes.

- The IP addresses specified in this document are sample addresses. Ensure that your setup reflects the IP addresses used in the production network.
- Ensure that the eth2 interface subnet is different from the subnet that is associated with the eth0 interface and the eth1 interface.
- Cisco DCNM Native HA consists of two Cisco DCNM appliances, that run as Active and Standby applications. The embedded databases of both Active and Standby appliances are synchronized in real time. The eth0, eth1, and eth2 interfaces of the Cisco DCNM and Compute nodes, in a clustered mode, must be Layer-2 adjacent.
- For information about Cluster Mode in your Cisco DCNM Deployment, refer to Applications chapter in the *Cisco DCNM Configuration Guide* for your deployment type.

Deployments for Redundancy in Cisco DCNM

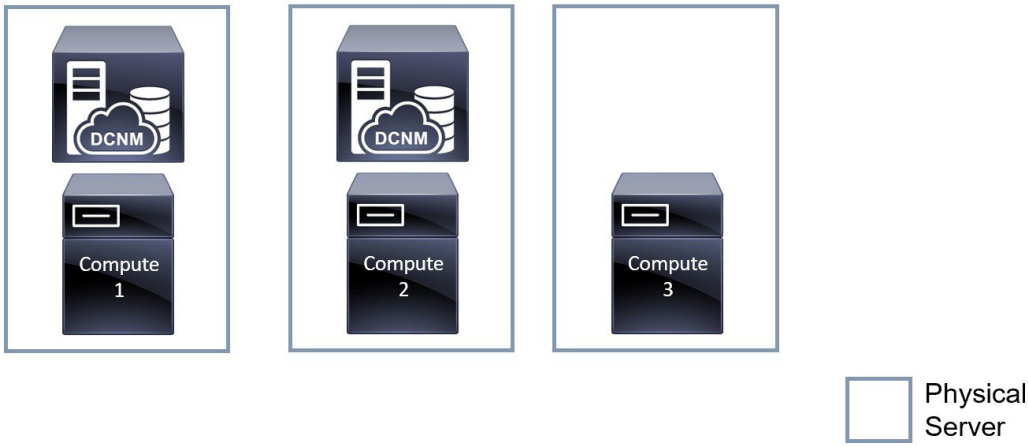
This section describes the recommended deployments for redundancy of DCNM operations. As a general assumption, the DCNM and the compute nodes are installed as Virtual Machines. During Cisco DCNM ISO installation on Virtual Appliance on UCS (Bare Metal), all DCNMs and computes have their own individual servers.

Deployment 1: Minimum Redundancy Configuration

The recommended configuration for minimum redundancy in a Cisco DCNM Cluster mode installation is as follows:

- DCNM Active Node and Compute Node 1 in Server 1
- DCNM Standby Node and Compute Node 2 in Server 2
- Compute Node 3 in Server 3
- Compute VMs deployed on an exclusive disk
- No oversubscription of memory or CPU of the physical servers

Figure 8: Cisco DCNM Cluster Mode: Physical Server to VM Mapping

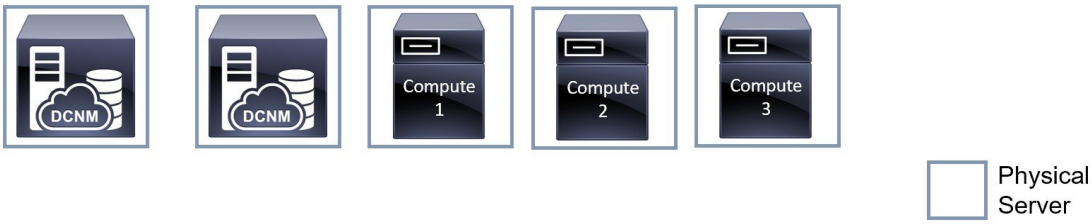


Deployment 2: Maximum Redundancy Configuration

The recommended configuration for maximum redundancy in a DCNM Cluster mode installation is as follows:

- DCNM Active Node(Active) in Server 1
- DCNM Standby Node in Server 2
- Compute Node 1 in Server 3
- Compute Node 2 in Server 4
- Compute Node 3 in Server 5

Figure 9: Cisco DCNM Cluster Mode: Physical Server to VM Mapping



IP Address Configurations in Cisco DCNM

This section describes the best practices and recommended deployments for IP address configurations of all interfaces of the Cisco DCNM and Compute nodes.

Scenario 1: All 3 Ethernet Interfaces are in Different Subnets

In this scenario, consider all three Ethernet interfaces of DCNM on different subnets.

For example:

- eth0 – 172.28.8.0/24
- eth1 – 10.0.8.0/24
- eth2 – 192.168.8.0/24

The possible deployments are as follows:

- Cisco DCNM Unclustered mode, on page 56
- Cisco DCNM Clustered Mode, on page 57

Cisco DCNM Unclustered mode

Figure 10: Cisco DCNM Standalone Deployment without Compute Cluster

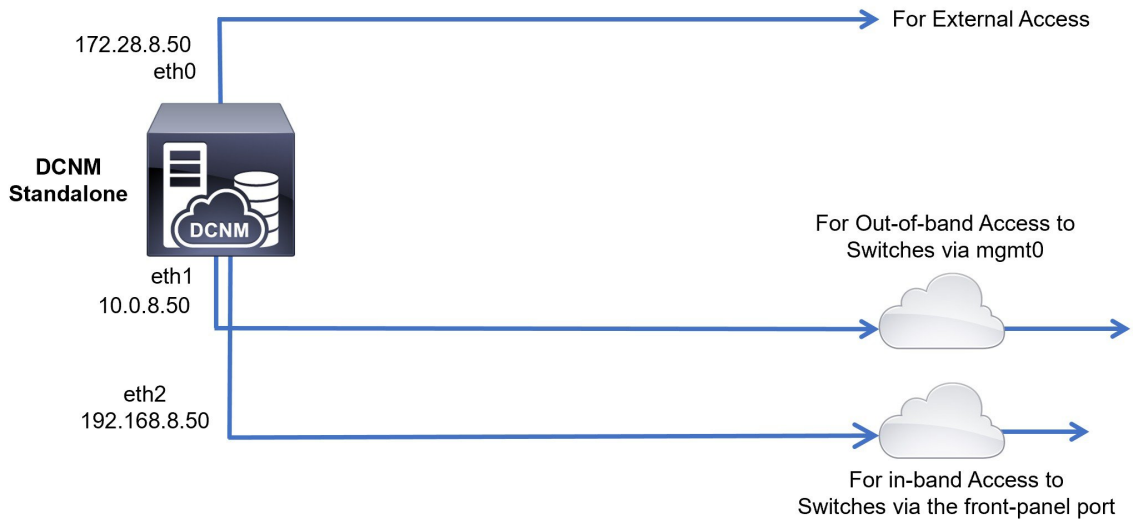
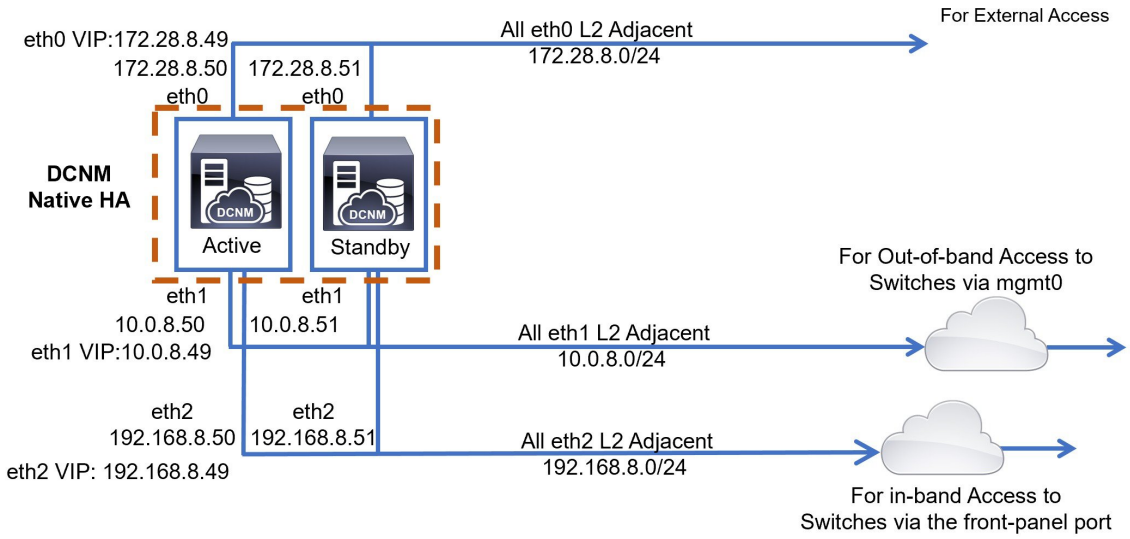


Figure 11: Cisco DCNM HA Deployment without Compute Cluster



Cisco DCNM Clustered Mode

Figure 12: Cisco DCNM Standalone Deployment with Compute Cluster

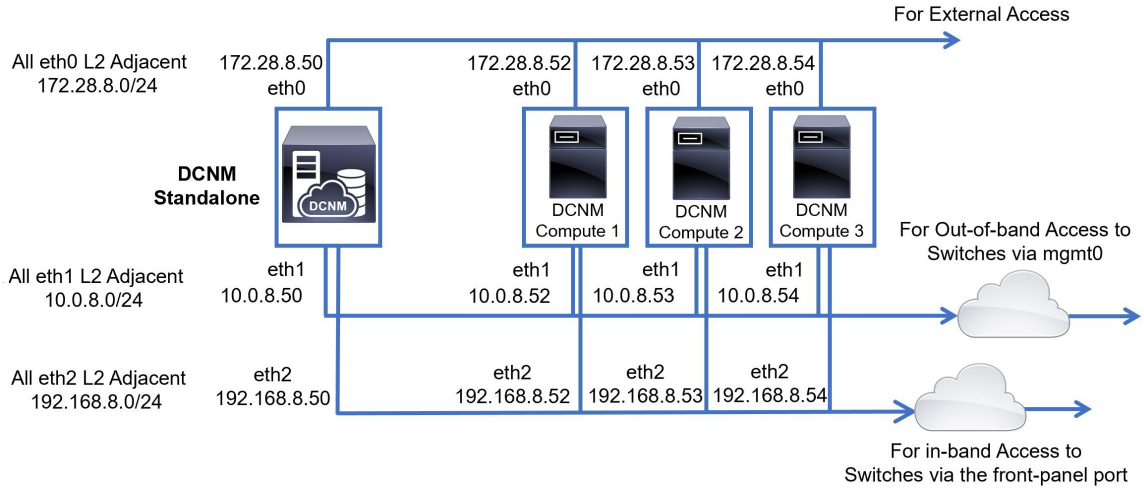
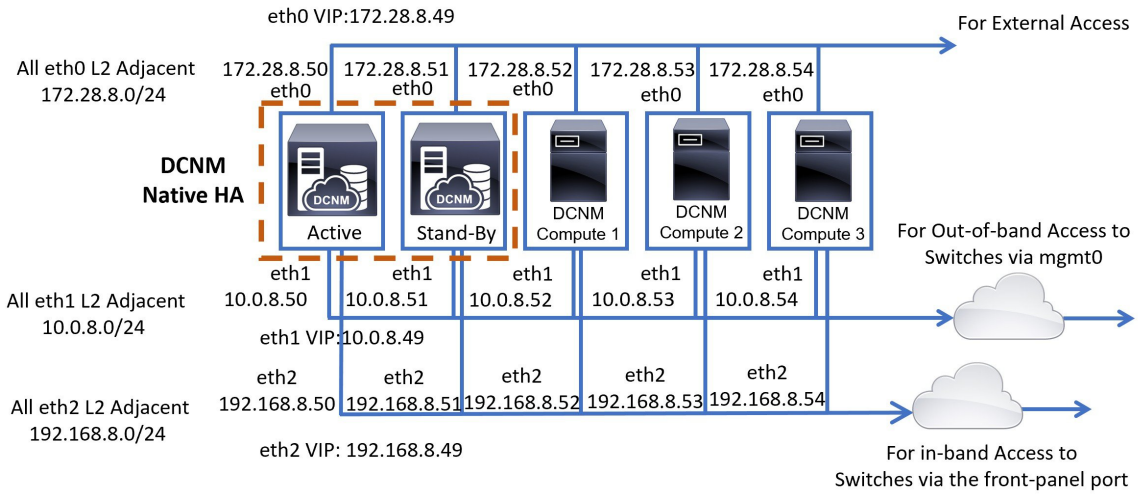


Figure 13: Cisco DCNM HA Deployment with Compute Cluster



Scenario 2: eth2 Interface in Different Subnet

In this scenario, consider that the eth0 and eth1 interfaces are in the same subnet, and eth2 interfaces of DCNMs and Computes are in a different subnet.

For example:

- eth0 – 172.28.8.0/24
- eth1 – 172.28.8.0/24
- eth2 – 192.168.8.0/24

The possible deployments are as follows:

- Cisco DCNM Unclustered Mode, on page 59
- Cisco DCNM Clustered Mode, on page 60

Cisco DCNM Unclustered Mode

Figure 14: Cisco DCNM Standalone deployment (No HA) without Compute Cluster

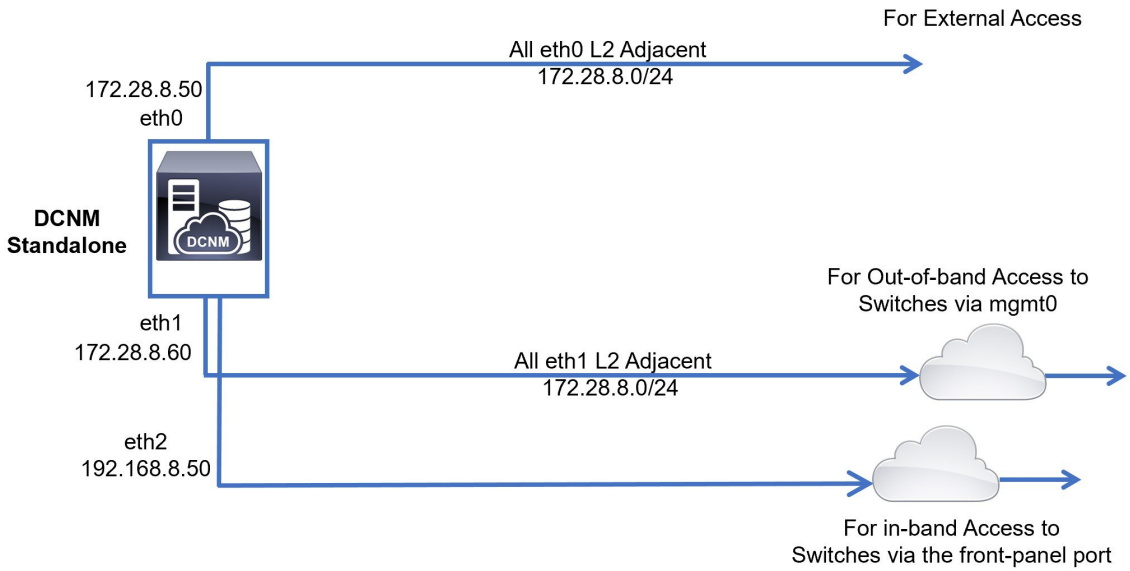
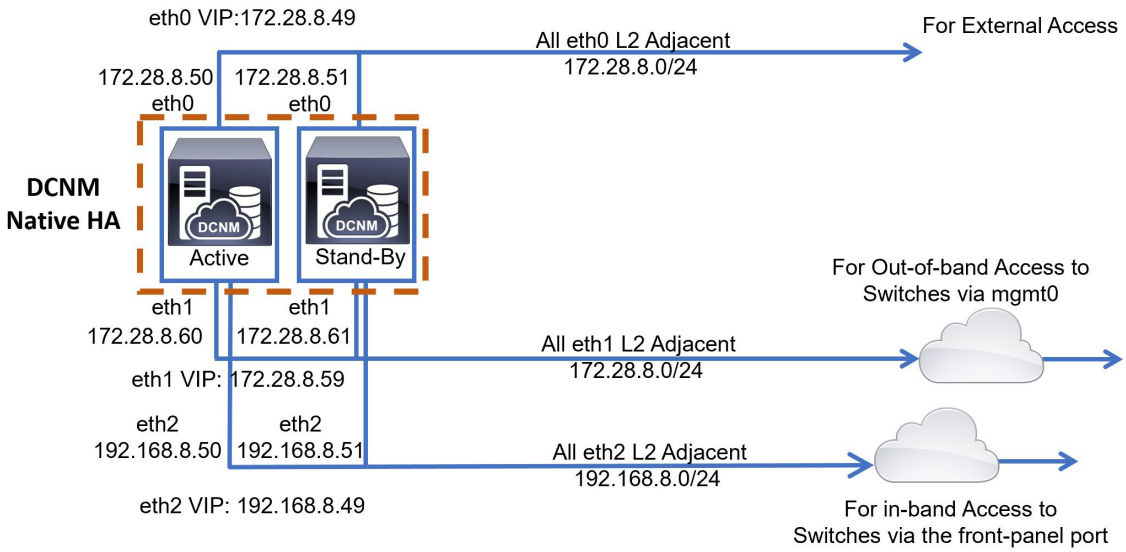


Figure 15: Cisco DCNM Native HA deployment without Compute Cluster



Cisco DCNM Clustered Mode

Figure 16: Cisco DCNM Standalone Deployment with Compute Cluster

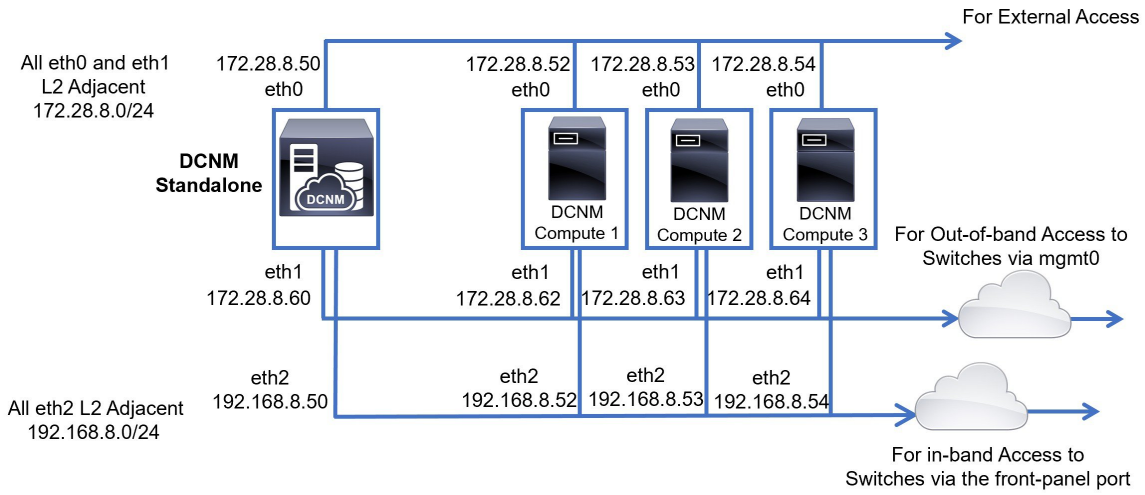
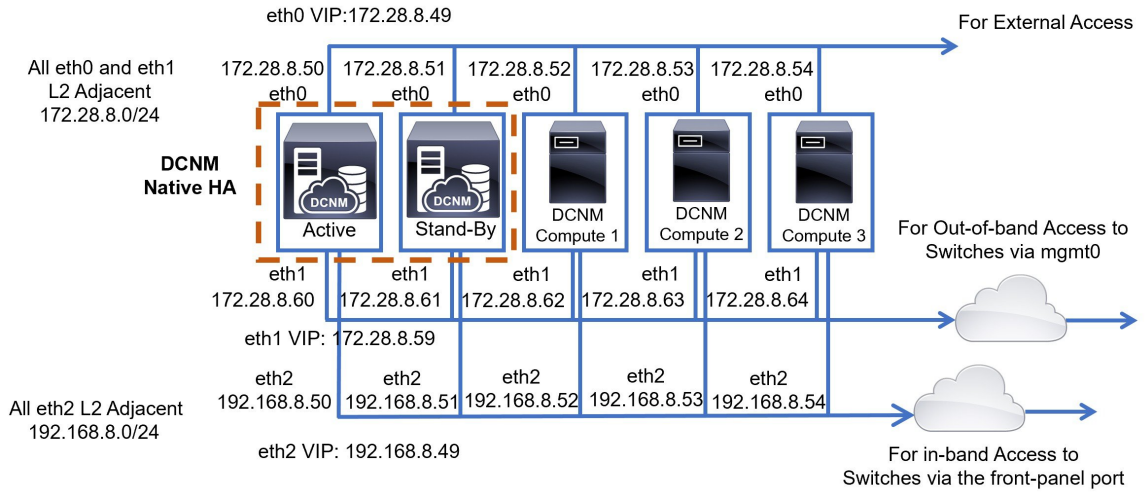


Figure 17: Cisco DCNM Native HA Deployment with Compute Cluster



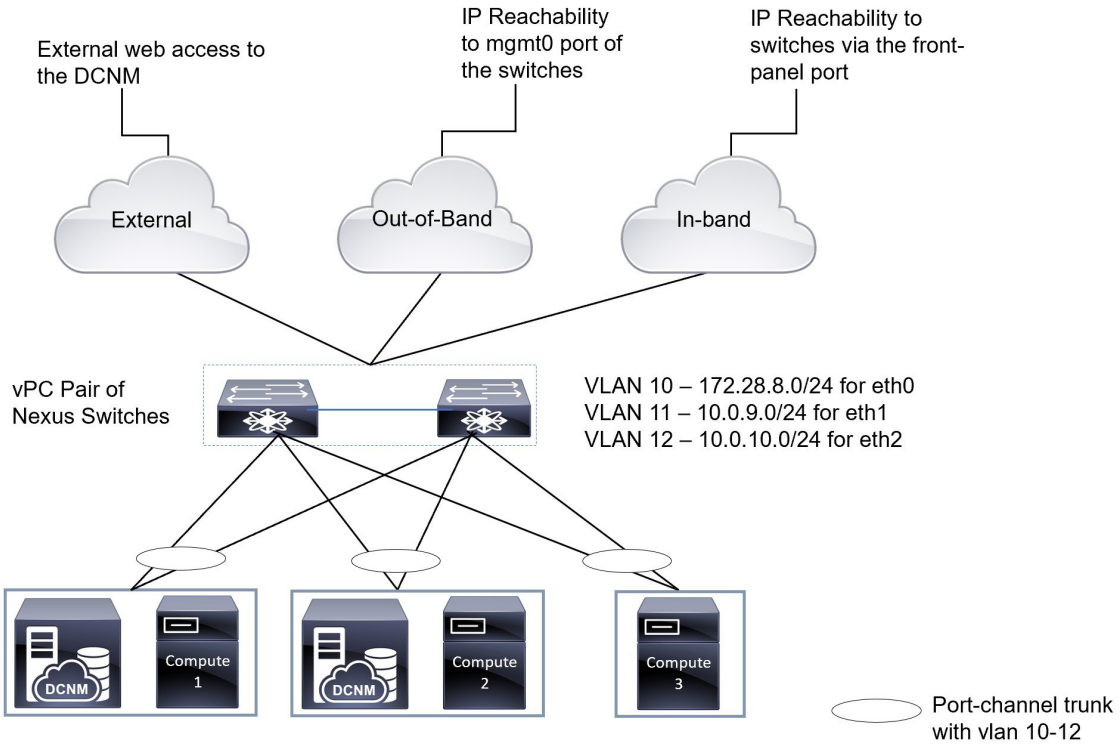
Physical Connectivity of Cisco DCNM and Compute Nodes

This section describes the physical connectivity of the Cisco DCNM and Compute nodes in both Virtual Machines and Bare Metal installations.

Virtual Machines

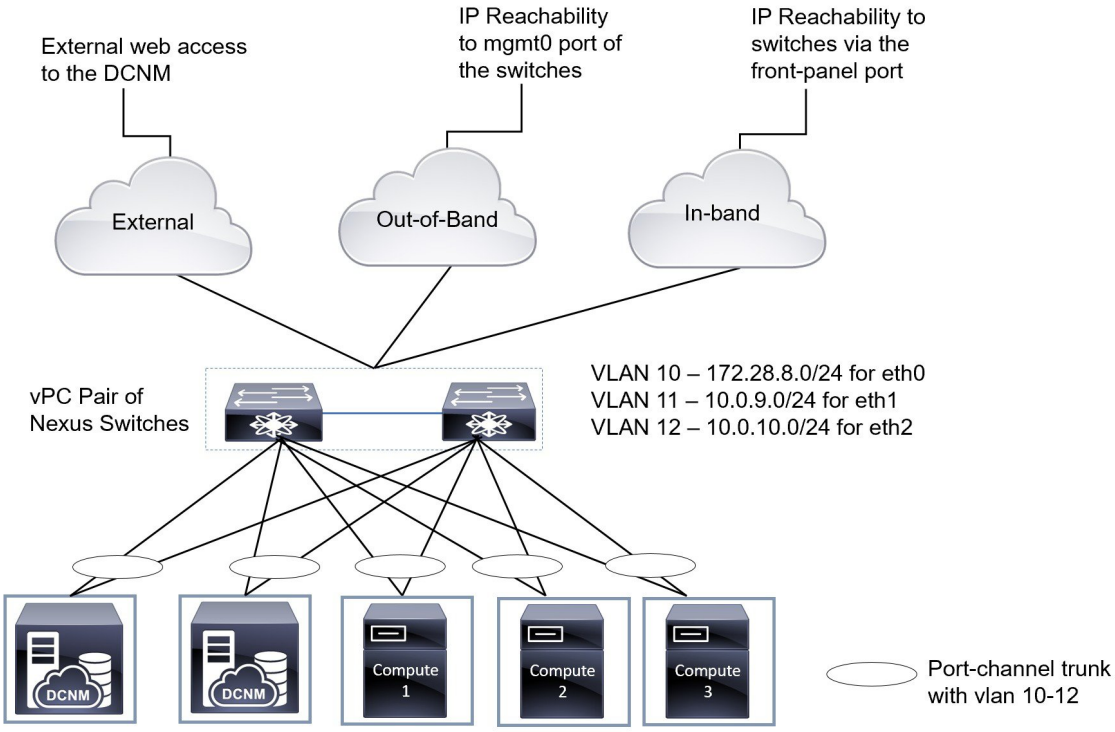
The following image shows the physical connectivity of DCNM and compute nodes supported in a 3 server redundancy configuration. The physical servers must be connected to a vPC pair of switches via port-channels. This provides adequate fault-tolerance, if a single link fails or a single switch fails. The vPC pair of switches is considered as the infra vPC pair that provides management connectivity to the physical servers.

Figure 18: Cisco DCNM VM Physical Connectivity with 3 servers



The following image shows the physical connectivity of Cisco DCNM and Compute nodes supported in an VM installation in a 5 server redundancy configuration.

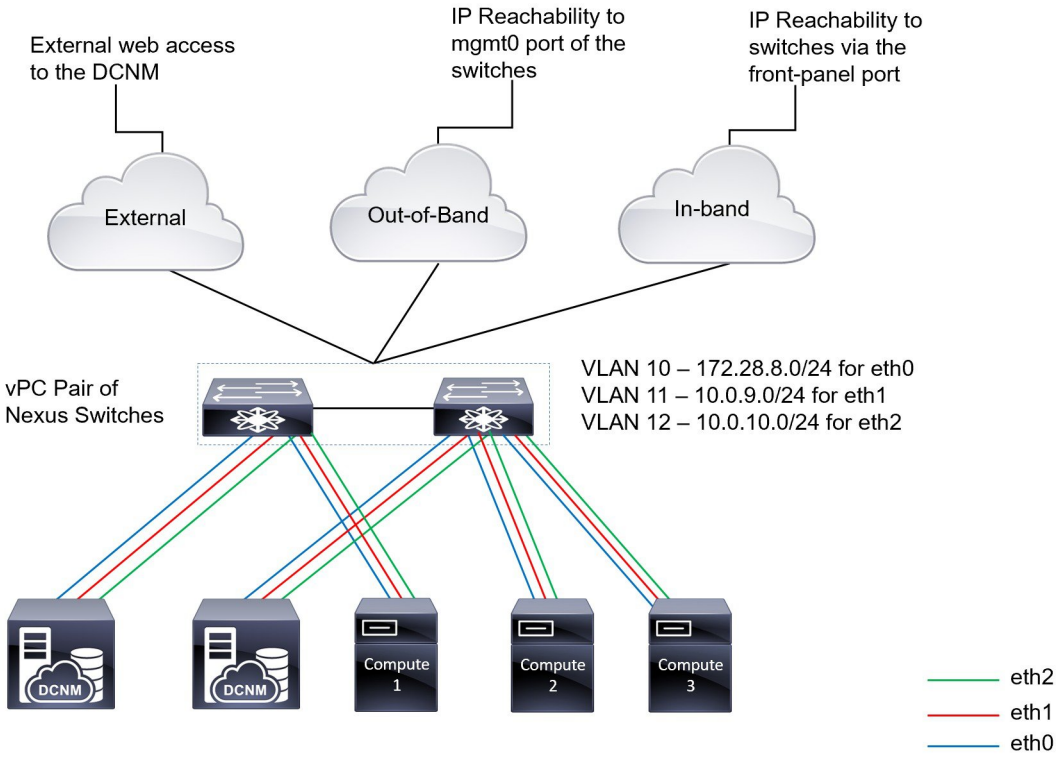
Figure 19: Cisco DCNM VM Physical Connectivity with 5 servers

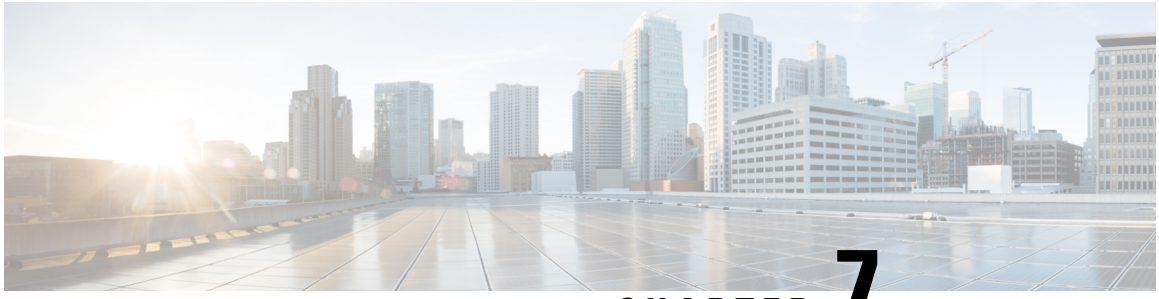


Bare Metal Installation

For installing Cisco DCNM on Bare Metal, 5 servers are required. The following image shows the physical connectivity of Cisco DCNM and Compute nodes. Note that, there are 3 physical interfaces on each server that map to the eth0, eth1, and eth2 interfaces, respectively. If the physical server consists of a managed network adapter such as the Cisco UCS VIC 1455 Virtual Interface Card, you can have a port-channel connectivity from the servers to the switches, similar to the Virtual Machines.

Figure 20: Cisco DCNM and Compute Bare Metal Physical Connectivity





CHAPTER 7

Disaster Recovery (Backup and Restore)

This chapter contains the following sections:

Backup and Restore Cisco DCNM and Application Data on Standalone DCNM setup

You can take a backup of Cisco DCNM application data for analytics and troubleshooting.

Perform the following task to take a backup of Cisco DCNM and Application data.

Procedure

Step 1 Logon to the Cisco DCNM appliance using SSH.

Step 2 Take a backup of the application data using the **appmgr backup** command.

```
dcnm# appmgr backup
```

Copy the backup file to a safe location and shut down the DCNM Appliance.

Step 3 Right click on the installed VM and select **Power > Power Off**.

Step 4 Deploy the new DCNM appliance.

Step 5 After the VM is powered on, click on **Console** tab.

A message indicating that the DCNM appliance is configuring appears on the screen.

Copy and paste the URL to the browser to continue with restore process.

Step 6 On the DCNM Web Installer UI, click **Get Started**.

Step 7 On the Cisco DCNM Installer screen, select **Fresh Installation with backup file for restore** radio button.

Select the backup file that was generated in Step Step 2, on page 65.

Continue to deploy the DCNM.

Step 8 On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** complete Cisco DCNM Virtual Appliance Installation for the chosen deployment mode.

A progress bar appears showing the completed percentage, description of the operation, and the elapsed time during the installation.

After the progress bar shows 100%, click **Continue**.

Step 9 After the data is restored, check the status using the **appmr status all** command.

Backup and Restore Cisco DCNM and Application Data on Native HA setup

Perform the following task to take perform backup and restore of data in a Native HA setup.

Before you begin

Ensure that the Active node is operating and functional.

Procedure

Step 1 Check if the Active node is operational. Otherwise, trigger a failover.

Step 2 Logon to the Cisco DCNM appliance using SSH.

Step 3 Take a backup of the application data using the **appmgr backup** command on both Active and Standby appliances.

```
dcnm1# appmgr backup
dcnm2 appmgr backup
```

Copy the backup file of both active and standby appliances to a safe location and shut down the DCNM Appliance.

Step 4 Right click on the installed VM and select **Power > Power Off**.

Step 5 Deploy the new DCNM appliance in Native HA mode.

Step 6 For both the Active and Standby appliances, after the VM is powered on, click on **Console** tab.

A message indicating that the DCNM appliance is configuring appears on the screen.

Copy and paste the URL to the browser to continue with restore process.

Step 7 On the DCNM Web Installer UI, click **Get Started**.

Step 8 On the Cisco DCNM Installer screen, select **Fresh Installation with backup file for restore** radio button.

Select the backup file that was generated in Step Step 3, on page 66.

The values for parameters are read from the backup file, and auto-populated. Modify the values, if required.

Continue to deploy the DCNM.

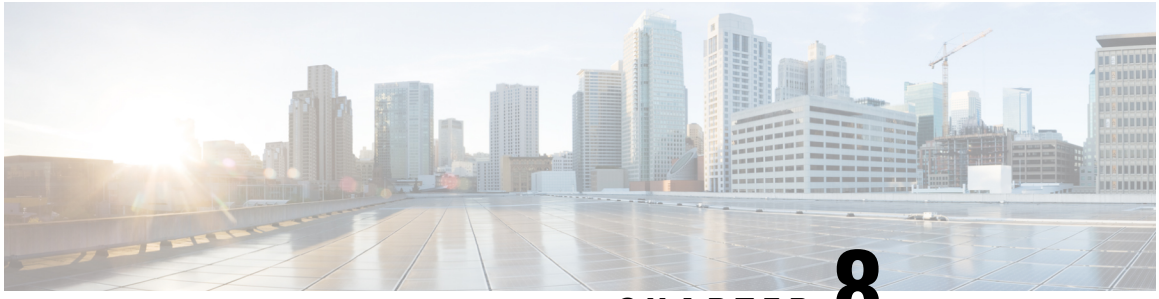
Step 9 On the Summary tab, review the configuration details.

Click **Previous** to go to the previous tabs and modify the configuration. Click **Start Installation** complete Cisco DCNM Virtual Appliance Installation for the chosen deployment mode.

A progress bar appears showing the completed percentage, description of the operation, and the elapsed time during the installation.

After the progress bar shows 100%, click **Continue**.

Step 10 After the data is restored, check the status using the **appmr status all** command.



CHAPTER 8

Certificates

Collecting PM Data

To setup a shared rrd path to collect PM data, perform these steps:

Procedure

Step 1 Locate the **server.properties** file under **C:\Program Files\Cisco Systems\dcm\fm\conf**.

Step 2 Add the **pm.rrdpath** property file information to the server.properties file. For example, add the server location that needs to be accessible from the DCNM server.

Step 3 Save the server.properties file.

Step 4 Restart the Cisco DCNM-SAN server.

What to do next

Once PM server is ready, the new shared location will be used by the PM server to save .rrd files. PM will create a new directory called db under pm. Ensure you do not open or change these .rrd files as PM server is actively writing into the .rrd files.

Certificate Management

From Release 11.2(1), Cisco DCNM allows new methods and new CLIs for installing, restoring after upgrade, and verifying certificates on the system. You can export certificates from the Active node to the Standby node, to ensure that both peers on the Native HA setup have the same certificates.

In a Cisco DCNM Native HA setup, after you install a CA certificate on the Active node and start the services, the certificates are automatically synchronized with the Standby node. If you need the same internal certificate on both Active and Standby nodes, you must export the certificate from the Active node to the Standby node. This ensures that both the peers on the Cisco Native HA setup have the same certificates.

Note The CLIs are available through SSH console, and only a **root** user can accomplish these tasks.

Cisco DCNM stores two certificates:

- Self-signed certificate, for internal communication between the Cisco DCNM Server and various applications
- CA (Certificate Authority) Signed certificate, for communicating with the external world, such as Web UI.

Note Until you install a CA Signed certificate, Cisco DCNM retains a self-signed certificate for the communicating with the external network.

Best practices for Certificate Management

The following are the guidelines and best practices for Certificate Management in Cisco DCNM.

- Cisco DCNM provides CLI based utilities to display, install, restore, and export or import of certificates. These CLIs are available through SSH console, and only a **root** user can accomplish these tasks.
- When you install Cisco DCNM, a self-signed certificate is installed, by default. This certificate is used to communicate with the external world. After Cisco DCNM installation, you must install a CA-Signed certificate on the system.
- On Cisco DCNM Native HA setup, we recommend that you install a CA-Signed certificate on the DCNM Active Node. The CA-Signed certificate will synchronize with the Standby node automatically. However, if you want to keep the same internal and CA-Signed certificate on both Active node and Standby node, you must export the certificates from Active node and import it to the Standby node. Both the Active node and Standby node will have the same set of certificates.

  Note Compute nodes in a cluster deployment do not require any action, as the compute nodes use internally managed certificates.

- Generate a CSR on Cisco DCNM with a CN (common name). Provide a VIP FQDN (Virtual IP Address FQDN) as CN to install a CA Signed certificate. The FQDN is the fully qualified domain name for the management subnet VIP (VIP of eth0) interface that is used to access Cisco DCNM Web UI.
- If the CA Signed certificate was installed prior to upgrading the Cisco DCNM, then you must restore the CA Signed certificate after you upgrade the Cisco DCNM.

  Note You need not take a backup of certificates when you perform inline upgrade or backup and restore.

Display Installed Certificates

You can view the details of the installed certificate by using the following command:

appmgr afw show-cert-details

In the following sample output for the **appmgr afw show-cert-details** command, **CERTIFICATE 1** represents the certificate offered to the external network and to the Web browsers. **CEERTIFICATE 2** represents the internally used certificate.

```
dcnm# appmgr afw show-cert-details

****CERTIFICATE 1****
[Certificate available to web gateway. This certificate is offered to webclients]:
--------------Web gateway certificate---------------------------------------
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 4202 (0x106a)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: C=IN, ST=KA, L=BGL, O=xyz, OU=ABC, CN=<FQDN/IP>
        Validity
            Not Before: Jun  4 13:55:25 2019 GMT
            Not After : Jun  3 13:55:25 2020 GMT
        Subject: C=IN, ST=KA9, L=BGL9, O=XYZ123, OU=ABC123, CN=<FQDN/IP>
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                Modulus:
                    00:bb:52:1e:7f:24:d7:2e:24:62:5a:83:cc:e4:88:
--------------Certificate output is truncated to first 15 lines--------------

****CERTIFICATE 2****
[Certificate available in keystore(jks). CA signed certificate is installed here till DCNM
 version 11.1.x]
If you have upgraded from DCNM version 11.1.x to later version please see installation guide
 to restore
CA signed certificate to upgraded version.
--------------Keystore certificate------------------------------------------
alias = sme, storepass = fmserver_1_2_3
Alias name: sme
Creation date: Oct 14, 2018
Entry type: PrivateKeyEntry
Certificate chain length: 2
Certificate[1]:
Owner: CN=localhost, OU=Data Center, O=Cisco Systems Inc, L=San Jose, ST=CA, C=US
Issuer: CN=dcnmca, OU=Data Center, O=Cisco Systems Inc, L=San Jose, ST=CA, C=US
Serial number: 62044620
Valid from: Sun Oct 14 20:39:39 PDT 2018 until: Fri Oct 13 20:39:39 PDT 2023
Certificate fingerprints:
         MD5:  E5:F8:AD:17:4D:43:2A:C9:EE:35:5F:BE:D8:22:7D:9C
         SHA1: 38:66:F1:CD:10:61:27:E7:43:85:10:41:3D:A3:4B:5C:C9:CC:17:5E
         SHA256:
E0:87:D8:34:71:18:FE:8C:AB:18:0B:D7:85:B1:91:A8:4B:75:A3:91:BA:90:83:46:72:87:FE:FE:FE:04:F0:E1
Signature algorithm name: SHA256withRSA
Subject Public Key Algorithm: 2048-bit RSA key
--------------Certificate output is truncated to first 15 lines--------------
dcnm#
```

The Web UI refers to the **CERTIFICATE 1** after installation. If **CERTIFICATE 1** is not available, you must stop and restart all applications, using the following commands:

Note Ensure that you follow the same sequence of commands on the Cisco DCNM to troubleshoot this scenario.

On the Cisco DCNM Standalone appliance, run the following commands to stop and start all Cisco DCNM applications to troubleshoot **CERTIFICATE 1**:

```
dcnm# appmgr stop all /* stop all the applications running on Cisco DCNM */
dcnm# appmgr start all /* start all the applications running on Cisco DCNM */
```

On the Cisco DCNM Native HA appliance, run the following commands to stop and start all Cisco DCNM applications to troubleshoot CERTIFICATE 1:

For example, let us indicate the Active node as **dcnm1**, and Standby node **dcnm2**.

Stop the applications running on the both the nodes.

```
dcnm2# appmgr stop all /* stop all the applications running on Cisco DCNM Standby Node */
dcnm1# appmgr stop all /* stop all the applications running on Cisco DCNM Active Node */
```

Start the applications on both nodes.

```
dcnm1# appmgr start all /* start all the applications running on Cisco DCNM Active Node*/
dcnm2# appmgr start all /* start all the applications running on Cisco DCNM Standby Node*/
```

Note Ensure that you clear the browser cache before you launch the Cisco DCNM Web UI, using the Management IP Address.

The **CERTIFICATE 1** is displayed in the Security settings on the browser.

Installing a CA Signed Certificate

We recommend that you install a CA Signed certificate as a standard security practice. The CA Signed certificates are recognized, and verified by the browser. You can also verify the CA Signed certificate manually.

Note The Certificate Authority can be an Enterprise Signing Authority, also.

Installing a CA Signed Certificate on Cisco DCNM Standalone Setup

To install a CA Signed certificate on the Cisco DCNM, perform the following steps.

Procedure

Step 1 Logon to the DCNM server via SSH terminal.

Step 2 Generate a CSR on the Cisco DCNM server using the **appmgr afw gen-csr** command:

Note CSR is unique to a Cisco DCNM, and only a corresponding CSR signed certificate must be installed on a given Cisco DCNM.

```
dcnm# appmgr afw gen-csr
Generating CSR....
..
...
-----
Country Name (2 letter code) [XX]:US
State or Province Name (full name) []:CA
Locality Name (eg, city) [Default City]:San Jose
Organization Name (eg, company) [Default Company Ltd]:Cisco
Organizational Unit Name (eg, section) []:DCBG
Common Name (eg, your name or your server's hostname) []:dcnmhost.cisco.com
Email Address []:dcnm@cisco.com

Please enter the following 'extra' attributes to be sent with your certificate request
A challenge password []: /* This field is not mandatory */
An optional company name []: /* This field is not mandatory */
...
```

A CSR file `dcnmweb.csr` is created in the `/var/tmp/` directory.

```
********** CA certificate installation not completed yet. Please do followings. **********
CSR is generated and placed at /var/tmp/dcnmweb.csr.
Please download or copy the content to your certificate signing server.
```

Step 3 Send this CSR to your Certificate signing server.

Note The CA Signing server is local to your organization.

Step 4 Get the certificate signed by your Certificate Authority.

Step 5 Copy the new CA Signed certificate to Cisco DCNM server.

Ensure that the certificate is located at `/var/tmp` directory on the Cisco DCNM Server.

Step 6 Install the CA Signed certificate on the Cisco DCNM by using the following commands:

Note We recommend that you run the following commands in the same sequence as shown below.

```
dcnm# appmgr stop all /* Stop all applications running on Cisco DCNM
dcnm# appmgr afw install-CA-signed-cert <CA-signed certificate directory>
/* CA-signed certificate with full or relative path */
Making the signed certificate available to web gateway....

CA signed certificate CA-signed-cert.pem is installed. Please start all applications as
followings:
On standalone setup execute: 'appmgr start all'
```

Step 7 Restart all applications with the new certificate on Cisco DCNM using the **appmgr start all** command.

```
dcnm# appmgr start all
```

Step 8 Verify the newly installed CA Signed certificate using the **appmgr afw show-cert-details** command.

The system is now armed with the CA Signed certificate, which is verified at the browser.

Note CSR is unique to a Cisco DCNM, and only a corresponding CSR signed certificate must be installed on a given Cisco DCNM.

Installing a CA Signed Certificate on Cisco DCNM Native HA setup

To install a CA Signed certificate on the Cisco DCNM, perform the following steps.

Note We recommend that you run the following commands in the same sequence as shown below.

Procedure

Step 1 On the Active node, logon to the DCNM server via SSH terminal.

Note For example, let us indicate the Cisco DCNM Active and Standby appliances as **dcnm1** and **dcnm2** respectively.

Step 2 Generate a CSR on the Cisco DCNM server using the **appmgr afw gen-csr** command:

Note CSR is unique to a Cisco DCNM, and only a corresponding CSR signed certificate must be installed on a given Cisco DCNM.

```
dcnm1# appmgr afw gen-csr
Generating CSR....
..
...
-----
Country Name (2 letter code) [XX]:US
State or Province Name (full name) []:CA
Locality Name (eg, city) [Default City]:San Jose
Organization Name (eg, company) [Default Company Ltd]:Cisco
Organizational Unit Name (eg, section) []:DCBG
Common Name (eg, your name or your server's hostname) []:dcnmhost.cisco.com
/* Provide a VIP FQDN name of the eth0 interface*/
Email Address []:dcnm@cisco.com

Please enter the following 'extra' attributes to be sent with your certificate request
A challenge password []: /* This field is not mandatory */
An optional company name []: /* This field is not mandatory */
...
```

Note For generating CSR on the Active node, we recommend that you provide a VIP FQDN name of eth0 interface, when for prompted for Common Name.

This FQDN must be the web server address that you enter on the browser to launch the Cisco DCNM Web UI.

A CSR file `dcnmweb.csr` is created in the `/var/tmp/` directory.

```
********** CA certificate installation not completed yet. Please do followings. **********
CSR is generated and placed at /var/tmp/dcnmweb.csr.
Please download or copy the content to your certificate signing server.
```

Step 3 Send this CSR to your Certificate signing server.

Note The CA Signing server is local to your organization.

The CA Signing server can be the CA certificate signing authority in your organizations, or your local CA to your organization.

Step 4 Get the certificate signed by your Certificate Authority.

Step 5 Copy the new CA Signed certificate to Cisco DCNM server.

Ensure that the certificate is located at `/var/tmp` directory on the Cisco DCNM Server.

Step 6 On the Standby node, logon to the DCNM server via SSH terminal.

Step 7 Stop all the applications on the Standby node using the **appmgr stop all** command.

```
dcnm2# appmgr stop all /* Stop all applications running on Cisco DCNM Standby Node
dcnm2#
```

Step 8 On the Active node, stop all the applications by using the **appmgr stop all** command.

```
dcnm1# appmgr stop all /* Stop all applications running on Cisco DCNM Active Node
dcnm2#
```

Step 9 On the Active node, install the CA Signed certificate on the Cisco DCNM by using the **appmgr afw install-CA-signed-cert** command.

```
dcnm1# appmgr afw install-CA-signed-cert <CA-signed certificate directory>
/* CA-signed certificate with full or relative path */
Making the signed certificate available to web gateway....

CA signed certificate CA-signed-cert.pem is installed. Please start all applications as
followings:
On standalone setup execute: 'appmgr start all'
```

Step 10 On the Active node, restart all applications with the new certificate on Cisco DCNM using the **appmgr start all** command.

```
dcnm1# appmgr start all  /* Start all applications running on Cisco DCNM Active Node
```

Ensure that all services on Cisco DCNM Active node is operational before you proceed further.

Note Logon to the Cisco DCNM Web UI and check if the Certificate details are correct.

Step 11 On the Standby node, restart all applications with the new certificate on Cisco DCNM using the **appmgr start all** command.

```
dcnm2# appmgr start all  /* Start all applications running on Cisco DCNM Standby Node
```

This will ensure that the Standby node makes a fresh peer relationship with the Active Node. Therefore, the newly installed CA Signed certificate on the Active node will be synchronized on the Standby node.

Step 12 Verify the newly installed CA Signed certificate using the **appmgr afw show-cert-details** command, on both Active and Standby nodes.

The system is now armed with the CA Signed certificate, which is verified at the browser.

Note If the Certificates information is not displayed, we recommend that you wait for a few minutes. The Secondary node takes a while to synchronize with the Active node.

If you want to retain the same internal and CA Signed certificate on both peers on a Native HA setup, first install the certificates on the Active node. After installing certificates on the Active node, export the certificates from Active node and import the same certificates to the Standby node.

Exporting certificate from Active Node to Standby Node

The following procedure applies to the Cisco DCNM Native HA setup only. The CA Signed certificate installed on the Active node is always synced to the Standby node. However, the internal certificate differs on both Active and Standby nodes. If you want to keep the same set of certificates on both peers, you must perform the procedure described in this section.

Note You may choose not to export any certificates, because the internal certificates are internal to the system. These certificates can differ on Active and Standby nodes without having any functional impact.

To export the CA Signed certificate from Active node and import the certificate to the Standby node, perform the following procedure.

Procedure

Step 1 On the Active node, logon to the DCNM server via SSH terminal.

Step 2 Create a certificate bundle, by using the **appmgr afw export-import-cert-ha-peer export** command.

```
dcnm1# appmgr afw export-import-cert-ha-peer export
```

Step 3 Copy the certificate bundle to the Standby node.

Note Ensure that you copy the certificate on the Standby node to the location as specified on the SSH terminal.

Step 4 On the Standby node, stop all the applications by using the **appmgr stop all** command.

```
dcnm2# appmgr stop all /* Stop all applications running on Cisco DCNM Standby Node
dcnm2#
```

Step 5 Import the certificates to the Standby node by using the **appmgr afw export-import-cert-ha-peer import** command.

The certificates bundle is imported and installed on the Standby node.

Step 6

Step 7 On the Standby node, restart all applications with the new certificate on Cisco DCNM using the **appmgr start all** command.

```
dcnm2# appmgr start all  /* Start all applications running on Cisco DCNM Standby Node
```

This ensures that the new imported certificate are effective when applications are started on the Standby node.

Step 8 On the Standby node, verify the newly imported CA Signed certificate using the **appmgr afw show-cert-details** command.

The system is now armed with same certificates on both Active and Standby nodes.

Restoring the certificates after an upgrade

This mechanism applies to Cisco DCNM Upgrade procedure using the inline upgrade process only. This procedure is not required for the backup and restore of data on the same version of the Cisco DCNM appliance.

Note that certificate restore is a disruptive mechanism; it requires you to stop and restart applications. Restore must performed only when the upgraded system is stable, that is, you must be able to login to Cisco DCNM Web UI. On a Cisco DCNM Native HA setup, both the Active and Standby nodes must have established peer relationship.

After upgrading the Cisco DCNM, you must always verify the certificate before restoring to check if **CERTIFICATE 1** is the CA signed certificate. You must restore the certificates, if otherwise.

Verify the certificates using the **appmgr afw show-cert-details** as shown in the sample output below.

```
dcnm# appmgr afw show-cert-details
****CERTIFICATE 1****
[Certificate available to web gateway. This certificate is offered to webclients]:
--------------Web gateway certificate--------------------------------
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1575924977762797464 (0x15decf6aec378798)
    Signature Algorithm: sha256WithRSAEncryption
       Issuer: C=US, ST=CA, L=San Jose, O=Enterprise CA inc, OU=Data Center, CN=dcnm1.ca.com

        Validity
            Not Before: Dec  9 20:56:17 2019 GMT
            Not After : Dec  9 20:56:17 2024 GMT
        Subject: C=US, ST=CA, L=San Jose, O= Enterprise CA inc, OU=Data Center,
CN=dcnm1.ca.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                Modulus:
                    00:cf:6e:cd:c6:a9:30:08:df:92:98:38:49:9c:2a:
--------------Certificate output is truncated to first 15 lines--------------

****CERTIFICATE 2****
[Certificate available in keystore(jks). CA signed certificate is installed here till DCNM
 version 11.1.x]
If you have upgraded from DCNM version 11.1.x to later version please see installation guide
 to restore
CA signed certificate to upgraded version.
--------------Keystore certificate-------------------------------------------
Alias name: sme
Creation date: Oct 14, 2018
Entry type: PrivateKeyEntry
Certificate chain length: 2
Certificate[1]:
Owner: CN=localhost, OU=Data Center, O=Cisco Systems Inc, L=San Jose, ST=CA, C=US
Issuer: CN=dcnmca, OU=Data Center, O=Cisco Systems Inc, L=San Jose, ST=CA, C=US
Serial number: 62044620
Valid from: Sun Oct 14 20:39:39 PDT 2018 until: Fri Oct 13 20:39:39 PDT 2023
Certificate fingerprints:
  SHA1: 38:66:F1:CD:10:61:27:E7:43:85:10:41:3D:A3:4B:5C:C9:CC:17:5E
  SHA256:
E0:87:D8:34:71:18:FE:8C:AB:18:0B:D7:85:B1:91:A8:4B:75:A3:91:BA:90:83:46:72:87:FE:FE:FE:04:F0:E1
Signature algorithm name: SHA256withRSA
Subject Public Key Algorithm: 2048-bit RSA key
Version: 3
--------------Certificate output is truncated to first 15 lines------
dcnm#
```

Restoring Certificates on Cisco DCNM Standalone setup after Upgrade

To restore the certificates after you upgrade the Cisco DCNM Standalone deployment to Release 11.2(1), perform the following:

Procedure

Step 1 **Note** When you upgrade to Release 11.2(1), a backup of the CA Signed certificate is created.

After you have successfully upgraded the Cisco DCNM Standalone appliance, logon to the DCNM server via SSH.

Step 2 Stop all the applications using the following command:

appmgr stop all

Step 3 Restore the certificate by using the following command:

appmgr afw restore-CA-signed-cert

Step 4 Enter **yes** to confirm to restore the previously installed certificate.

Step 5 Start all the applications using the following command:

appmgr start all

Step 6 Verify the newly installed CA Signed certificate using the **appmgr afw show-cert-details** command.

The system is now armed with the CA Signed certificate, which is verified at the browser.

Restoring Certificates on Cisco DCNM Native HA setup after Upgrade

In a Cisco DCNM Native HA setup, the certificate is installed on both the Active and Standby nodes. You must restore the certificate only on the Active node. The certificate will synchronize with the Standby node automatically.

To restore the certificates after you upgrade the Cisco DCNM Standalone deployment to Release 11.2(1), perform the following:

Procedure

Step 1 Logon to the Cisco DCNM server via SSH.

Note For example, let us indicate Active and Standby appliances as **dcnm1** and **dcnm2** respectively.

Step 2 On the Standby node, stop all the applications using the **appmgr stop all** command.

```
dcnm2# appmgr stop all /* Stop all applications running on Cisco DCNM Standby Node
```

Step 3 On the Active node, stop all the applications using the **appmgr stop all** command.

```
dcnm1# appmgr stop all /* Stop all applications running on Cisco DCNM Active Node
```

Step 4 Restore the certificate on the Active node by using the **appmgr afw restore-CA-signed-cert** command.

```
dcnm1# appmgr afw restore-CA-signed-cert
```

Step 5 Enter **yes** to confirm to restore the previously installed certificate.

Step 6 On the Active node, start all the applications using the **appmgr start all** command.

```
dcnm1# appmgr start all /* Start all applications running on Cisco DCNM Active Node
```

Ensure that all services on Cisco DCNM Active node is operational before you proceed further.

Note Logon to the Cisco DCNM Web UI and check if the Certificate details are correct.

Step 7 On the Standby node, start all the applications using the **appmgr start all** command.

```
dcnm2# appmgr start all  /* Start all applications running on Cisco DCNM Standby Node
```

Wait for some time, while the Standby node synchronizes with the Active node.

Step 8 Verify the newly installed CA Signed certificate using the **appmgr afw show-cert-details** command, on both Active and Standby nodes.

The system is now armed with the CA Signed certificate, which is verified at the browser.

Verifying the installed certificate

While the installed certificate can be verified using the **appmgr afw show-cert-details** command, the web browser verifies if the certificate is effective or not. Cisco DCNM supports all standard browsers (Chrome, IE, Safari, Firefox). However, each browser display the certificate information differently.

We recommend that you refer to the browser specific information on that browser provider website.

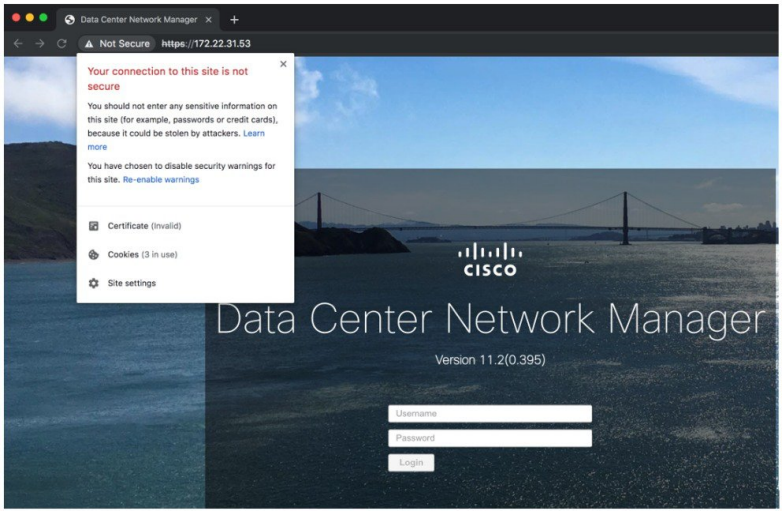
The following snippet is a sample from the Chrome Browser, Version 74.0.3729.169, to verify the certificate.

1. Enter URL **https://<dcnm-ip-address>** or **https://<FQDN>** in the address bar on the browser.

   Press the **Return** key.

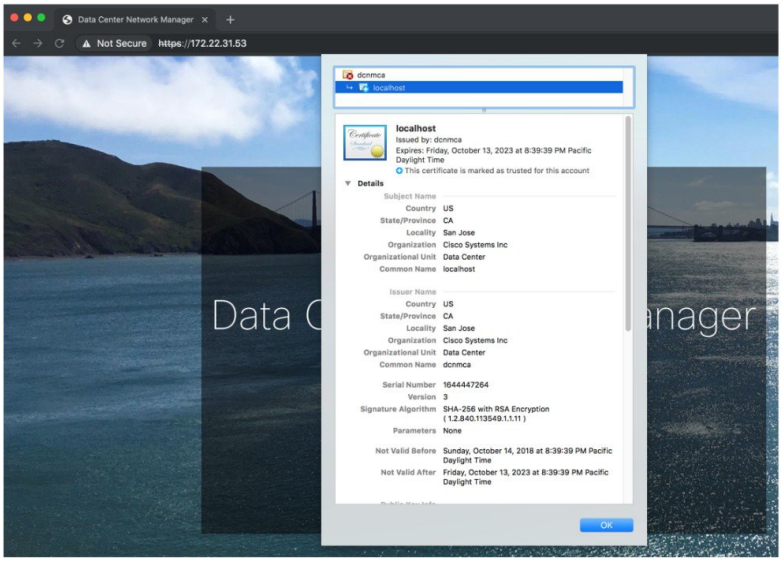
2. Based on the type of certificate, the icon on the left of the URL field shows a lock icon [ ] or an alert icon [ ].

   Click on the icon.

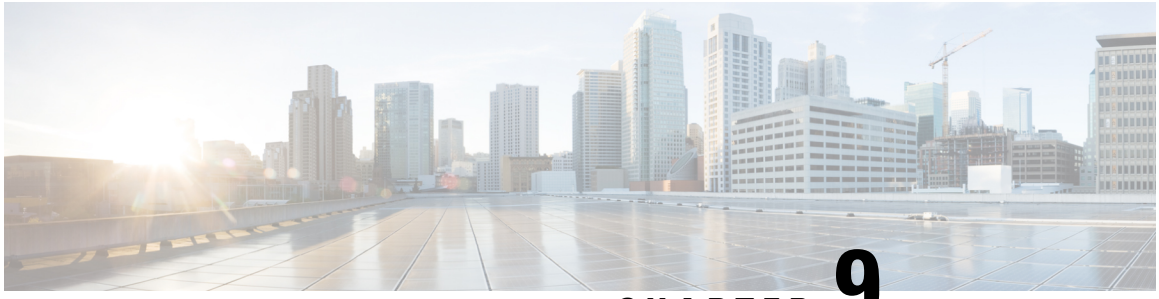


3. On the card, click **Certificate** field.

   The information in the certificate is displayed.



The information that is displayed must match with the details as displayed on CERTIFICATE 1 when you view the certificate details using the **appmgr afw show-cert-details**.



CHAPTER 9

Running Cisco DCNM Behind a Firewall

This chapter provides information about running Cisco DCNM behind a firewall.

Running Cisco DCNM Behind a Firewall

Generally, an Enterprise (external world) and Data center is separated by a firewall, i.e., DCNM is configured behind a firewall. The Cisco DCNM Web Client and SSH connectivity must pass-through that firewall. Also, a firewall can be placed between the DCNM Server and DCNM-managed devices.

All Cisco DCNM Native HA nodes must be on the same side of the firewall. The internal DCNM Native HA ports are not listed, as it is not recommended to configure a firewall in between the Native HA nodes.

Note When you add or discover LAN devices in DCNM, ICMP echo packets are sent as part of the discovery process. If you have a firewall that blocks ICMP messages, the discovery process fails. You can skip sending the ICMP echo packets by setting the **cdp.discoverPingDisable** server property to **true**. For more information about how to set a server property, Cisco DCNM Web UI **Administration > DCNM Server > Server Properties**.

Any standard port where the Ingress traffic enters from clients cannot be modified unless you disable the local firewall.

The following table lists all ports that are used for communication between Cisco DCNM Web Client, SSH Client, and Cisco DCNM Server.

Port Number	Protocol	Service Name	Direction of Communication	Remarks
22	TCP	SSH	Client to DCNM Server	SSH access to external world is optional.
443	TCP	HTTPS	Client to DCNM Server	This is needed to reach DCNM Web Server.

The following table lists all ports that are used for communication between Cisco DCNM Server and other services.

Note The services can be hosted on either side of the firewall.

Port Number	Protocol	Service Name	Direction of Communication	Remarks
49	TCP/UDP	TACACS+	DCNM Server to DNS Server	ACS Server can be either side of the firewall.
53	TCP/UDP	DNS	DCNM Server to DNS Server	DNS Server can be either side of the firewall.
123	UDP	NTP	DCNM Server to NTP Server	NTP Server can be either side of the firewall.
5000	TCP	Docker Registry	Incoming to DCNM Server	Docker Registry Service on DCNM Server listening to requests from DCNM compute nodes.
5432	TCP	Postgres	DCNM Server to Postgres DB Server	Default installation of DCNM does not need this port. This is needed only when Postgres is installed external to the DCNM host machine.

The following table lists all ports that are used for communication between DCNM Server and managed devices:

Port Number	Protocol	Service Name	Direction of Communication	Remarks
22	TCP	SSH	Both Direction	DCNM Server to Device – To manage devices. Device to DCNM Server – SCP (POAP).

Port Number	Protocol	Service Name	Direction of Communication	Remarks
67	UDP	DHCP	Device to DCNM Server	
69	TCP	TFTP	Device to DCNM Server	Required for POAP
161	TCP/UDP	SNMP	Server to DCNM Device	DCNM configured via `server.properties` to use TCP uses TCP port 161, instead of UDP port 161.
514	UDP	Syslog	Device to DCNM Server	
2162	UDP	SNMP_TRAP	Device to DCNM Server	
33000-33499	TCP	gRPC	Device to DCNM Server	LAN Telemetry Streaming

CHAPTER 10

Secure Client Communications for Cisco DCNM Servers

This section describes how to configure HTTPS on Cisco Data Center Network Manager Servers.

Note You must enable SSL/HTTPS on the Cisco DCNM before you add a CA signed SSL certificate. Therefore, perform the procedure in the below mentioned order.

This section includes the following topics:

Enabling SSL/HTTPS on Cisco DCNM in HA Environment on Virtual Appliance

To enable SSL/HTTPS on a Virtual Appliance for Cisco DCNM in HA mode, perform the following:

Procedure

Step 1 Configure the primary server with a self signed SSL certificate.

Note In a CA signed certificate, each server has their own certificate generated. Ensure that the certificate is signed by the signing certificate chain which is common for both the servers.

Step 2 On the secondary server, locate the keystore.

Step 3 Rename the keystore located at

`<DCNM_install_root>/dcm/wildfly-10.1.0.Final/standalone/configuration/fmserver.jks`

to

`<DCNM_install_root>/dcm/wildfly-10.1.0.Final/standalone/configuration/fmserver.jks.old`

Step 4 Copy the file `fmserver.jks` generated in primary server to secondary server into folders

```
<dcnm-home> /dcm/wildfly-10.1.0.Final/standalone/configuration/
<dcnm-home>/dcm/fm/conf/cert/
```

What to do next

If you have created a self-signed certificate or imported an SSL certificate to the keystore, you must copy the new fmserver.jks located at `/usr/local/cisco/dcm/wildfly-10.1.0.Final/standalone/configuration` to `/etc/elasticsearch`. If you do not copy the fmserver.jks file to the elasticsearch directory, you will not be able to get the Alarms and Policies. As the elasticsearch database will be stabilizing, you cannot configure any Alarm Policy on the Cisco DCNM **Web UI Monitor > Alarms > Alarm Policies**.

CHAPTER 11

Managing Applications in a High-Availability Environment

This chapter describes how to configure a high-availability (HA) environment in your Cisco DCNM Open Virtual Appliance deployment for your Cisco Programmable Fabric solution. It also includes details about the HA functionality for each of the applications bundled within the Cisco DCNM Open Virtual Appliance.

Note Ensure that the NTP server is synchronized between active and standby peers is essential for proper HA functioning in DCNM

This chapter contains the following sections:

Information About Application Level HA in the Cisco DCNM Open Virtual Appliance

To achieve HA for applications that are run on the Cisco DCNM Open Virtual Appliance, you can run two virtual appliances. You can run one in Active mode and the other in Standby mode.

Note This document refers to these appliances as OVA-A and OVA-B, respectively.

In this scenario:

1. All applications run on both appliances.

   The application data is either constantly synchronized or applications share a common database as applicable.

2. Only one of the applications running on the two appliances serves the client requests. Initially this would be the applications running on OVA-A. The application continues to do so until one of the following happens:

- The application on OVA-A crashes.
- The operating system on OVA-A crashes.
- OVA-A is powered off for some reason.

3. At this point, the application running on the other appliance (OVA-B) takes over.

   For DHCP, when the first node fails, the second node starts serving the IP addresses.

4. The existing connections to OVA-A are dropped and the new connections are routed to OVA-B.

   This scenario demonstrates why one of the nodes (OVA-A) is initially referred to as the Active node and OVA-B is referred as the Standby node.

Automatic Failover

The application-level and virtual machine (VM)-level and switchover process is as follows.

- If any of the applications managed by the load-balancing software (DCNM/AMQP) goes down on OVA-A, the Active node that handles the client requests detects the failure and redirects subsequent requests to the Standby node (OVA-B). This process provides an application-level switchover.
- If the Active node (OVA-A) fails or is powered-off for some reason, the Standby node (OVA-B) detects the failure and enables the VIP address for Cisco DCNM/AMQP on OVA-B. It also sends a gratuitous ARP to the local switch to indicate the new MAC address that is associated with the IP address. For applications not using VIP, the DHCPD running on OVA-B detects the failure of DHCPD on OVA-A and activates itself; whereas LDAP running on OVA-B continues running as LDAP is deployed Active-Active. Consequently, a VM-level failover is accomplished for all four applications (DCNM/AMQP/DHCP/LDAP).

Manually Triggered Failovers

An application-level failover can also be triggered manually. For instance, you might want to run AMQP on OVA-B and the rest of the applications on OVA-A. In that case, you can log in to the SSH terminal of OVA-A and stop AMQP by using the **appmgr stop amqp** command.

This failover triggers the same process that is described in the Automatic Failover, on page 88; subsequent requests to the AMQP Virtual IP address are redirected to OVA-B.

Native HA Failover and Troubleshooting

When Cisco DCNM is deployed in Native HA mode, we recommend that you do not restart applications using the **appmgr restart all** or **appmgr restart ha-apps**.

Due to the nature of Native HA, the role of the host might alternate from Active to Standby or from Standby to Active.

The following sections provide information on troubleshooting in different use cases.

Native HA Failover from Active Host to Standby Host

Perform the following steps when the Native HA failover occurs from Active to Standby host:

1. Log on to DCNM Web UI, and navigate to **Administrator > Native HA**.
2. Verify the status of HA. If the DCNM HA status is not in **OK** mode, you cannot perform Failover operation.

   Click **Failover**. The Cisco DCNM server will shutdown and the DCNM Standby appliance will be operational.
3. Refresh the Cisco DCNM Web UI.

   After the DCNM server is operational, you can log on to the DCNM Web UI.

Note We recommend that you do not run **appmgr stop all** or **appmgr stop ha-apps** commands on the Active host to trigger failover. If Cisco DCNM HA status is not in **OK** mode, a failover may cause loss of data, as the Standby DCNM appliance is not synchronized with the Active appliance before failover.

Issue with DCNM Application Framework

If DCNM Web UI is not accessible, and a failover operation is necessary, execute one of the following commands under Linux console:

appmgr failover—This command triggers the HA heartbeat failover.

Or

reboot -h now—This command triggers the Linux host to reboot, which causes a failover.

However, we recommend that you use DCNM Web UI to perform failover, as all other methods carry a risk of data loss when both HA peers are not in sync.

Stop and Restart DCNM

To completely stop DCNM and restart it, perform the following:

1. On the Standby appliance, stop all the applications by using the **appmgr stop all** command.
2. Check if all the applications have stopped, using the **appmgr status all** command.
3. On the Active appliance, stop all the applications using the **appmgr stop all** command.
4. Verify if all the applications are stopped using the **appmgr status all** command.
5. On the deployed Active host, start all the applications using the **appmgr start all** command.

   Verify if all the applications are running. Log on to the DCNM Web UI to check if it is operational.
6. On the deployed Standby host, start all the applications using the **appmgr start all** command.

   On the Web UI, navigate to **Administration > Native HA** and ensure that the HA status displays **OK**.

Restart Standby Host

Perform this procedure to restart only the Standby host:

1. On the Standby host, stop all the applications using the **appmgr stop all** command.
2. Verify if all the applications have stopped using the **appmgr status all** command.
3. Start all the applications using the **appmgr start all**.

   On the Web UI, navigate to **Administration > Native HA** and ensure that the HA status displays **OK**.

Application High Availability Details

This section describes all of the Cisco Programmable Fabric HA applications.

Cisco DCNM Open Virtual Appliance has two interfaces: one that connects to the Open Virtual Appliance management network and one that connects to the enhanced Programmable Fabric network. Virtual IP addresses are defined for both interfaces.

- From the Open Virtual Appliance management network, the DCNM-REST API, DCNM interface, and AMQP are accessed through the VIP address
- From the enhanced fabric management network, LDAP and DHCP are accessed directly.

Only three Virtual IPs are defined:

- DCNM REST API (on dcnm management network)
- DCNM REST API (on enhanced fabric management network
- AMQP (on dcnm management network)

Note Although DCNM Open Virtual Appliance in HA sets up a VIP, the VIP is intended to be used for the access of DCNM, REST API. For GUI access, we still recommend that you use the individual IP addresses of the DCNM HA peers and use the same to launch DCNM SAN Java clients, etc.

See the following table for a complete list of Programmable Fabric applications and their corresponding HA mechanisms.

Programmable Fabric Application	HA Mechanism	Use of Virtual IPs	Comments
Data Center Network Manager	DCNM Clustering/Federation	Yes	Two VIPs defined, one on each network
RabbitMQ	RabbitMQ Mirrored Queues	Yes	One VIP defined on theOVA management network
Repositories	—	—	External repositories have to be used

Data Center Network Management

The data center network management function is provided by the Cisco Data Center Network Manager (DCNM) server. Cisco DCNM provides the setup, visualization, management, and monitoring of the data center infrastructure. Cisco DCNM can be accessed from your browser at http://[host/ip].

Note For more information about Cisco DCNM, see http://cisco.com/go/dcnm .

HA Implementation

Cisco DCNMs that run on both OVAs are configured in clustering and federated modes for HA. Cisco DCNM federation is the HA mechanism for SAN devices. Groups of SAN devices can be managed by each node in the DCNM federated setup. All the devices can be managed using a single client interface.

You can enable automatic failover in the Cisco DCNM UI by choosing: **Admin > Federation**. If you enable an automatic failover and the Cisco DCNM that is running on OVA-A fails, the automatic failover moves only the fabrics and shallow-discovered LANs that are managed by OVA-A to OVA-B automatically.

DCNM Virtual IP Usage

An Open Virtual Appliance HA setup has two VIP addresses (one for each network) for the Cisco DCNM at the default HTTP port. These VIPs can be used for accessing the DCNM RESTful services on the Open Virtual Appliance management network and the enhanced fabric management network. For example, external systems such as Cisco UCS Director can point to the VIP in the Open Virtual Appliance management network and the request gets directed to the active Cisco DCNM. Similarly, the switches in an enhanced fabric management network access the VIP address on the enhanced fabric management network during the POAP process.

You can still directly connect to Cisco DCNM real IP addresses and use them as you would in a DCNM in a cluster/federated set up.

Note Cisco recommends that you must use VIP addresses only for accessing DCNM REST API. To access the Cisco DCNM Web or SAN client, you must connect using the IP address of the server.

Licenses

For Cisco DCNM, we recommend that you have licenses on the first instance and a spare matching license on the second instance.

Application Failovers

Enable an automatic failover option in the Cisco DCNM UI when an Open Virtual Appliance HA pair is set up by choosing: **Administration > DCNM Server > Native HA**. This process ensures that if the DCNM that is running on OVA-A fails, all the fabrics and shallow-discovered LANs managed by DCNM-A are managed by DCNM-B automatically after a given time interval (usually about 5 minutes after the failure of DCNM on OVA-A).

The Cisco DCNM VIP address still resides on OVA-A. The Representational State Transfer Web Services (REST) calls initially hit the VIP addresses on OVA-A and get redirected to the Cisco DCNM that is running on OVA-B.

Application Failbacks

When the Cisco DCNM on OVA-A comes up, the VIP address automatically redirects the REST requests to DCNM-A.

Virtual-IP Failovers

The VIP address that is configured for Cisco DCNM REST API on OVA-A can fail due to two reasons:

- The load-balancing software running on OVA-A fails.
- OVA-A fails.

The VIP address of Cisco DCNM automatically migrates to OVA-B. The only difference is which DCNM will be used after the failover.

- If a load-balancing software failure occurs, the VIP address on OVA-B directs the requests to DCNM-A.
- If an OVA-A failure occurs, the VIP address on OVA-B directs the requests to DCNM-B.

The automatic failover ensures that the ownership of all of the fabrics and shallow-discovered LANs managed by DCNM-A automatically change to DCNM-B.

Virtual-IP Failbacks

When OVA-A is brought up and Cisco DCNM is running, the VIP addresses keep running on the Standby node. The failback of Virtual IP addresses from OVA-B to OVA-A occurs only in the following sequence.

1. OVA-A comes up.
2. Cisco DCNM runs on OVA-A.
3. OVA-B goes down or the load-balancing software fails on OVA-B.

RabbitMQ

RabbitMQ is the message broker that provides the Advanced Messaging Queuing Protocol (AMQP).

Note You need to stop and restart AMQP on both DCNM's server in HA within 30 seconds, otherwise AMQP may not start.For more information about RabbitMQ, go to https://www.rabbitmq.com/documentation.html.

HA Implementation

Enabling the HA on the Open Virtual Appliance creates a VIP address in the Open Virtual Appliance management network. Orchestration systems such as vCloud Director, set their AMQP broker to the VIP address.

Enabling the HA on the Open Virtual Appliance also configures the RabbitMQ broker that runs on each node to be a duplicate of the broker that is running on the other node. Both OVAs act as “disk nodes” of a RabbitMQ cluster, which means that all the persistent messages stored in durable queues are replicated. The RabbitMQ policy ensures that all the queues are automatically replicated to all the nodes.

Application Failovers

If RabbitMQ-A fails, the VIP address on OVA-A redirects the subsequent AMQP requests to RabbitMQ-B.

Application Failbacks

When RabbitMQ-A comes up, the VIP address automatically starts directing the AMQP requests to RabbitMQ-A.

Virtual-IP Failovers

The VIP address configured for the AMQP broker on OVA-A can fail due to two reasons:

- The load-balancing software running on OVA-A fails.
- OVA-A fails.

In both cases, the VIP address of the AMQP automatically migrates to OVA-B. The only difference is which AMQP broker will be used after the failover.

- In a load-balancing software failure, the VIP address on OVA-B directs the requests to RabbitMQ-A.
- In an OVA-A failure, the VIP address on OVA-B directs the requests to RabbitMQ-B.

Virtual-IP Failbacks

When OVA-A is brought up and AMQP-A is running, the VIP addresses keep running on the OVA-B (directing the requests to AMQP-A). The failback of the RabbitMQ VIP from OVA-B to OVA-A occurs only in the following sequence.

1. OVA-A comes up.
2. RabbitMQ runs on OVA-A.
3. OVA-B goes down or the load-balancing software fails on OVA-B.

Repositories

All repositories must be remote.

CHAPTER 12

Managing Utility Services After DCNM Deployment

This chapter describes how to verify and manage all of the utility services that provide DC3 (Programmable Fabric) central point of management functions after the DCNM is deployed.

Table 5: Cisco DCNM Utility Services

Category	Application	Username	Password	Protocol Implemented
Network Management	Data Center Network Manager	admin	User choice [2]	Network Management

[2] User choice refers to the administration password entered by the user during the deployment.

This chapter contains the following sections:

Editing Network Properties Post DCNM Installation

The Cisco DCNM OVA or the ISO installation consists of 3 network interfaces:

- dcnm-mgmt network (eth0) interface

  This network provides connectivity (SSH, SCP, HTTP, HTTPS) to the Cisco DCNM Open Virtual Appliance. Associate this network with the port group that corresponds to the subnet that is associated with the DCNM Management network.

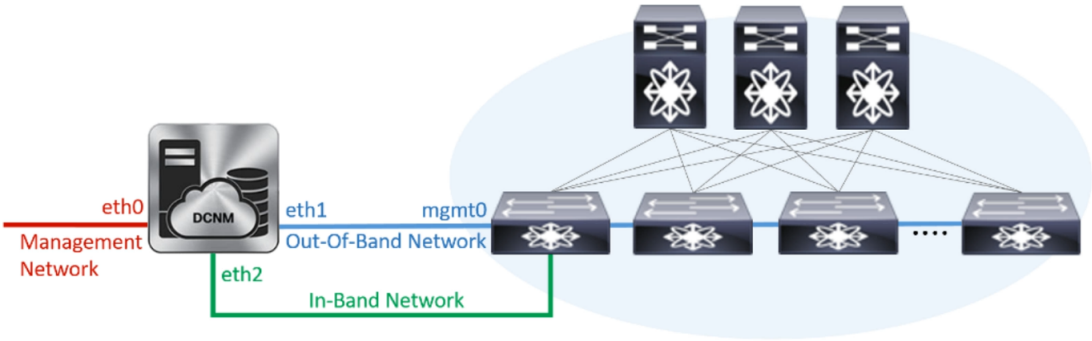
- enhanced-fabric-mgmt (eth1) interface

  This network provides enhanced fabric management of Nexus switches. Associate this network with the port group that corresponds to management network of leaf and spine switches.

- enhanced-fabric-inband (eth2) interface

  This network provides in-band connection to fabric. Associate this network with the port group that corresponds to a fabric in-band connection.

The following figure shows the network diagram for the Cisco DCNM Management interfaces.



During Cisco DCNM installation for your deployment type, you can configure these interfaces. However, from Cisco DCNM Release 11.2(1), you can edit and modify the network settings post installation.

You can modify the parameters as explained in the following sections:

Modifying Network Interfaces (eth0 and eth1) Post DCNM Installation

Along with the eth0 and eth1 IP address (IPv4 and\or IPv6), you can also modify the DNS and the NTP server configuration using the **appmgr update network-properties** command.

For step-by-step instructions on how to modify the network parameters using the **appmgr update network-properties** commands, see the following sections.

- Modifying Network Properties on DCNM in Standalone Mode, on page 96

  Sample Command Output for Modifying Network Parameters in the Cisco DCNM Standalone Setup, on page 97

- Modifying Network Properties on DCNM in Native HA Mode, on page 98

  Sample Command Output for Modifying Network Parameters in the Cisco DCNM Native HA Setup, on page 99

Modifying Network Properties on DCNM in Standalone Mode

The following sample shows the output for the **appmgr update network-properties** command for a Cisco DCNM Standalone Appliance.

Note Execute the following commands on the DCNM Appliance console to avoid a premature session timeout.

1. Initiate a session on the console, using the following command:

   appmgr update network-properties session start

2. Update the Network Properties using the following command:

   appmgr update network-properties set ipv4 {eth0|eth1}*<ipv4-address> <network-mask> <gateway>*

Enter the new IPv4 address for the Management (eth0) interface, along with the subnet mask and gateway IP addresses.

3. View and verify the changes by using the following command:

   appmgr update network-properties session show {config | changes | diffs}

4. After you validate the changes, apply the configuration using the following command:

   appmgr update network-properties session apply

   Wait for a few minutes before you can logon to the Cisco DCNM Web UI using the eth0 Management Network IP address.

Sample Command Output for Modifying Network Parameters in the Cisco DCNM Standalone Setup

The following sample example shows how to modify the network parameters post installation for a Cisco DCNM Standalone setup.

```
dcnm# appmgr update network-properties session start

dcnm# appmgr update network-properties set ipv4 eth0 172.28.10.244 255.255.255.0 172.28.10.1
dcnm# appmgr update network-properties set ipv4 eth1 100.0.0.244 255.0.0.0
****************************************************************
 WARNING: fabric/poap configuration may need to be changed
 manually after changes are applied.
****************************************************************

dcnm# appmgr update network-properties session show changes
eth0 IPv4 addr  172.28.10.246/255.255.255.0  ->  172.28.10.244/255.255.255.0
eth1 IPv4 addr  1.0.0.246/255.0.0.0          ->  100.0.0.244/255.0.0.0

dcnm# appmgr update network-properties session apply
*******************************************************************
                            WARNING

Applications of both nodes of the DCNM HA system need to be stopped
for the changes to be applied properly.

            PLEASE STOP ALL APPLICATIONS MANUALLY
*******************************************************************

Have applications been stopped? [y/n]: y
Applying changes
DELETE 1
Node left the swarm.
Server configuration file loaded: /usr/local/cisco/dcm/fm//conf/server.properties
log4j:WARN No appenders could be found for logger (fms.db).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
UPDATE 1
UPDATE 1
DELETE 1
server signaled
INFO      : [ipv6_wait_tentative] Waiting for interface eth0 IPv6 address(es) to leave the
 'tentative' state
INFO      : [ipv6_wait_tentative] Waiting for interface eth0 IPv6 address(es) to leave the
 'tentative' state
*******************************************************************
Please run 'appmgr start afw; appmgr start all' to restart your nodes.
*******************************************************************
```

```
dcnm# appmgr start afw; appmgr start all
Started AFW Server Processes
Started AFW Agent Processes
Started AFW Server Processes
Started AFW Agent Processes
Started applications managed by heartbeat..
Check the status using 'appmgr status all'
Starting High-Availability services: INFO:  Resource is stopped
Done.

Warning: PID file not written; -detached was passed.
AMQP User Check
Started AFW Server Processes
Started AFW Agent Processes
dcnm#
```

Modifying Network Properties on DCNM in Native HA Mode

The following sample shows output to modify the network parameters using the **appmgr update network-properties** command for a Cisco DCNM Native HA Appliance.

Note

- Execute the following commands on the DCNM Active and Standby node console to avoid premature session timeout.
- Ensure that you execute the commands in the same order as mentioned in the following steps.

1. Stop the DCNM Applications on the Standby node by using the following command:

   appmgr stop all

   Wait until all the applications stop on the Standby node before you go proceed.

2. Stop the DCNM Applications on the Active node by using the following command:

   appmgr stop all

3. Initiate a session on the Cisco DCNM console of both the Active and Standby nodes by using the following command:

   appmgr update network-properties session start

4. On the Active node, modify the network interface parameters by using the following commands:

   a. Configure the IP address for eth0 and eth1 address by using the following command:

      appmgr update network-properties set ipv4 {eth0|eth1}*<ipv4-address> <network-mask> <gateway>*

      Enter the new IPv4 or IPv6 address for the eth1 interface, along with the subnet mask and gateway IP addresses.

   b. Configure the VIP IP address by using the following command:

      appmgr update network-properties set ipv4 {vip0|vip1}*<ipv4-address> <network-mask>*

      Enter the vip0 address for eth0 interface. Enter the vip1 address for eth1 interface.

   c. Configure the peer IP address by using the following command:

appmgr update network-properties set ipv4 {peer0|peer1}<*ipv4-address*>

Enter the eth0 address of the Standby node as peer0 address for Active node. Enter the eth1 address of the Standby node as peer1 address for Active node.

d. View and validate the changes that you have made to the network parameters by using the following command:

appmgr update network-properties session show {*config* | *changes* | *diffs*}

View the changes that you have configured by using the following command:

5. On the Standby node, modify the network interface parameters using the commands described in Step 4.
6. After you validate the changes, apply the configuration on the Active node by using the following command:

   appmgr update network-properties session apply

   Wait until the prompt returns, to confirm that the network parameters are updated.
7. After you validate the changes, apply the configuration on the Standby node by using the following command:

   appmgr update network-properties session apply
8. Start all the applications on the Active node by using the following command:

   appmgr start all

Note Wait until all the applications are running successfully on the Active node, before proceeding to the next step.

9. Start all the applications on the Standby node by using the following command:

   appmgr start all
10. Establish peer trust key on the Active node by using the following command:

    appmgr update ssh-peer-trust
11. Establish peer trust key on the Standby node by using the following command:

    appmgr update ssh-peer-trust

Sample Command Output for Modifying Network Parameters in the Cisco DCNM Native HA Setup

The following sample example shows how to modify the network parameters post installation for a Cisco DCNM Native HA setup.

Note For example, let us indicate Active and Standby appliances as **dcnm1** and **dcnm2** respectively.

```
[root@dcnm2]# appmgr stop all
Stopping AFW Applications...
Stopping AFW Server Processes
Stopping AFW Agent Processes
```

```
Stopped Application Framework...
Stopping High-Availability services: Done.

Stopping and halting node rabbit@dcnm2 ...
Note: Forwarding request to 'systemctl enable rabbitmq-server.service'.
Stopping AFW Applications...
Stopping AFW Server Processes
Stopping AFW Agent Processes
Stopped Application Framework...
[root@dcnm2]#

[root@dcnm1]# appmgr stop all
Stopping AFW Applications...
Stopping AFW Server Processes
Stopping AFW Agent Processes
Stopped Application Framework...
Stopping High-Availability services: Done.

Stopping and halting node rabbit@dcnm1 ...
Note: Forwarding request to 'systemctl enable rabbitmq-server.service'.
Stopping AFW Applications...
Stopping AFW Server Processes
Stopping AFW Agent Processes
Stopped Application Framework...
[root@dcnm1]#

[root@dcnm1]# appmgr update network-properties session start
[root@dcnm2]# appmgr update network-properties session start

[root@dcnm1]# appmgr update network-properties set ipv4 eth0 172.28.10.244 255.255.255.0
172.28.10.1
[root@dcnm1]# appmgr update network-properties set ipv4 eth1 100.0.0.244 255.0.0.0
*****************************************************************
 WARNING: fabric/poap configuration may need to be changed
 manually after changes are applied.
*****************************************************************
[root@dcnm1]# appmgr update network-properties set ipv4 vip0 172.28.10.238 255.255.255.0
[root@dcnm1]# appmgr update network-properties set ipv4 vip1 100.0.0.238 255.0.0.0
[root@dcnm1]# appmgr update network-properties set ipv4 peer0 172.28.10.245
[root@dcnm1]# appmgr update network-properties set ipv4 peer1 100.0.0.245
[root@dcnm1]# appmgr update network-properties session show changes

[root@dcnm2]# appmgr update network-properties set ipv4 eth0 172.28.10.245 255.255.255.0
172.28.10.1
[root@dcnm2]# appmgr update network-properties set ipv4 eth1 100.0.0.245 255.0.0.0
*****************************************************************
 WARNING: fabric/poap configuration may need to be changed
 manually after changes are applied.
*****************************************************************
[root@dcnm2]# appmgr update network-properties set ipv4 vip0 172.28.10.238 255.255.255.0
[root@dcnm2]# appmgr update network-properties set ipv4 vip1 100.0.0.238 255.0.0.0
[root@dcnm2]# appmgr update network-properties set ipv4 peer0 172.28.10.244
[root@dcnm2]# appmgr update network-properties set ipv4 peer1 100.0.0.244
[root@dcnm2]# appmgr update network-properties session show changes

[root@dcnm1]# appmgr update network-properties session show changes
eth0 IPv4 addr  172.28.10.246/255.255.255.0  ->  172.28.10.244/255.255.255.0
eth1 IPv4 addr  1.0.0.246/255.0.0.0          ->  100.0.0.244/255.0.0.0
eth0 VIP        172.28.10.248/24             ->  172.28.10.238/24
eth1 VIP        1.0.0.248/8                  ->  100.0.0.238/8
Peer eth0 IP    172.28.10.247                ->  172.28.10.245
Peer eth1 IP    1.0.0.245                    ->  100.0.0.245
```

```
[root@dcnm1]# appmgr update network-properties session show config
======= Current configuration ======
NTP Server      1.ntp.esl.cisco.com
eth0 IPv4 addr  172.28.10.246/255.255.255.0
eth0 IPv4 GW    172.28.10.1
eth0 DNS        171.70.168.183
eth0 IPv6 addr  2001:420:284:2004:4:112:210:20/112
eth0 IPv6 GW    2001:420:284:2004:4:112:210:1
eth1 IPv4 addr  1.0.0.246/255.0.0.0
eth1 IPv4 GW
eth1 DNS        1.0.0.246
eth1 IPv6 addr
eth2 IPv4 addr  /
eth2 IPv4 GW
Peer eth0 IP    172.28.10.247
Peer eth1 IP    1.0.0.247
Peer eth2 IP
eth0 VIP        172.28.10.248/24
eth1 VIP        1.0.0.248/8
eth2 VIP        /
eth0 VIPv6      /
eth1 VIPv6      /

====== Session configuration ======
NTP Server      1.ntp.esl.cisco.com
eth0 IPv4 addr  172.28.10.244/255.255.255.0
eth0 IPv4 GW    172.28.10.1
eth0 DNS        171.70.168.183
eth0 IPv6 addr  2001:420:284:2004:4:112:210:20/112
eth0 IPv6 GW    2001:420:284:2004:4:112:210:1
eth1 IPv4 addr  100.0.0.244/255.0.0.0
eth1 IPv4 GW
eth1 DNS        1.0.0.246
eth1 IPv6 addr
eth2 IPv4 addr  /
eth2 IPv4 GW
Peer eth0 IP    172.28.10.245
Peer eth1 IP    100.0.0.245
Peer eth2 IP
eth0 VIP        172.28.10.238/24
eth1 VIP        100.0.0.238/8
eth2 VIP        /
eth0 VIPv6      /
eth1 VIPv6      /
[root@dcnm1]#

[root@dcnm2]# appmgr update network-properties session show config
======= Current configuration ======
NTP Server      1.ntp.esl.cisco.com
eth0 IPv4 addr  172.28.10.247/255.255.255.0
eth0 IPv4 GW    172.28.10.1
eth0 DNS        171.70.168.183
eth0 IPv6 addr
eth0 IPv6 GW
eth1 IPv4 addr  1.0.0.247/255.0.0.0
eth1 IPv4 GW
eth1 DNS        1.0.0.247
eth1 IPv6 addr
eth2 IPv4 addr  /
eth2 IPv4 GW
Peer eth0 IP    172.28.10.246
Peer eth1 IP    1.0.0.246
Peer eth2 IP
eth0 VIP        172.28.10.248/24
```

```
eth1 VIP        1.0.0.248/8
eth2 VIP        /
eth0 VIPv6      /
eth1 VIPv6      /

====== Session configuration ======
NTP Server      1.ntp.esl.cisco.com
eth0 IPv4 addr  172.28.10.245/255.255.255.0
eth0 IPv4 GW    172.28.10.1
eth0 DNS        171.70.168.183
eth0 IPv6 addr
eth0 IPv6 GW
eth1 IPv4 addr  100.0.0.245/255.0.0.0
eth1 IPv4 GW
eth1 DNS        1.0.0.247
eth1 IPv6 addr
eth2 IPv4 addr  /
eth2 IPv4 GW
Peer eth0 IP    172.28.10.244
Peer eth1 IP    100.0.0.244
Peer eth2 IP
eth0 VIP        172.28.10.238/24
eth1 VIP        100.0.0.238/8
eth2 VIP        /
eth0 VIPv6      /
eth1 VIPv6      /
[root@dcnm2]#

[root@dcnm1]# appmgr update network-properties session apply
*********************************************************************
                          WARNING

Applications of both nodes of the DCNM HA system need to be stopped
for the changes to be applied properly.

            PLEASE STOP ALL APPLICATIONS MANUALLY
*********************************************************************

Have applications been stopped? [y/n]: y
Applying changes
DELETE 1
Node left the swarm.
Server configuration file loaded: /usr/local/cisco/dcm/fm//conf/server.properties
log4j:WARN No appenders could be found for logger (fms.db).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
UPDATE 1
UPDATE 1
DELETE 1
server signaled
INFO      : [ipv6_wait_tentative] Waiting for interface eth0 IPv6 address(es) to leave the
 'tentative' state
INFO      : [ipv6_wait_tentative] Waiting for interface eth0 IPv6 address(es) to leave the
 'tentative' state
*********************************************************************
Please run 'appmgr start afw; appmgr start all' to restart your nodes.
*********************************************************************
*********************************************************************
Please run 'appmgr update ssh-peer-trust' on the peer node.
*********************************************************************
[root@dcnm1]#

[root@dcnm2]# appmgr update network-properties session apply
*********************************************************************
```

```
                              WARNING

Applications of both nodes of the DCNM HA system need to be stopped
for the changes to be applied properly.

            PLEASE STOP ALL APPLICATIONS MANUALLY
*********************************************************************

Have applications been stopped? [y/n]: y
Applying changes
DELETE 1
Node left the swarm.
Server configuration file loaded: /usr/local/cisco/dcm/fm//conf/server.properties
log4j:WARN No appenders could be found for logger (fms.db).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
UPDATE 1
UPDATE 1
DELETE 1
afwnetplugin:0.1
server signaled
*********************************************************************
Please run 'appmgr start afw; appmgr start all' to restart your nodes.
*********************************************************************
*********************************************************************
Please run 'appmgr update ssh-peer-trust' on the peer node.
*********************************************************************
[root@dcnm2]#

[root@dcnm1]# appmgr start afw; appmgr start all
Started AFW Server Processes
Started AFW Agent Processes
Started AFW Server Processes
Started AFW Agent Processes
Started applications managed by heartbeat..
Check the status using 'appmgr status all'
Starting High-Availability services: INFO:  Resource is stopped
Done.

Warning: PID file not written; -detached was passed.
AMQP User Check
Started AFW Server Processes
Started AFW Agent Processes
[root@dcnm1]#

Wait until dcnm1 becomes active again.

[root@dcnm2]# appmgr start afw; appmgr start all
Started AFW Server Processes
Started AFW Agent Processes
Started AFW Server Processes
Started AFW Agent Processes
Started applications managed by heartbeat..
Check the status using 'appmgr status all'
Starting High-Availability services: INFO:  Resource is stopped
Done.

Warning: PID file not written; -detached was passed.
AMQP User Check
Started AFW Server Processes
Started AFW Agent Processes
[root@dcnm2]#

[root@dcnm1]# appmgr update ssh-peer-trust
```

```
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no' '172.28.10.245'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no' '100.0.0.245'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1
Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no'
'dcnm-247.cisco.com'"
and check to make sure that only the key(s) you wanted were added.
[root@dcnm1]#

[root@dcnm2]# appmgr update ssh-peer-trust
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no' '172.28.10.244'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no' '100.0.0.244'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -o 'StrictHostKeyChecking=no'
'dcnm-246.cisco.com'"
and check to make sure that only the key(s) you wanted were added.
[root@dcnm2]#
```

Configuring Enhanced-Fabric-Inband Interface (eth2) Post DCNM Installation

During the DCNM installation, you can configure the In-Band Management interface. You must associate this network with the port group that corresponds to a fabric in-band connection. The In-Band Network provides reachability to the devices via the front-panel ports.

Note If you need to modify the already configured in-band network (eth2 interface), execute the **ifconfig eth2 0.0.0.0** command and run the **appmgr setup inband** command again.

Note You cannot use Endpoint Locator and Telemetry features if the eth2 interface is not configured.

To configure the eth2 interface for the in-band management network, use the **appmgr setup inband** command.

The following example shows a sample output for the **appmgr setup inband** command for a Cisco DCNM Standalone Appliance.

```
[root@dcnm]# appmgr setup inband
Configuring Interface for InBand Connectivity...
```

```
Please enter the information as prompted:
InBand Physical IP [e.g. 2.2.2.69]: 2.0.0.250
InBand Network Mask [e.g. 255.255.255.0]: 255.0.0.0
InBand Gateway [e.g. 2.2.2.1]: 2.0.0.1
Validating Inputs ...

You have entered these values..
PIP=2.0.0.250
NETMASK=255.0.0.0
GATEWAY=2.0.0.1

Press 'y' to continue configuration, 'n' to discontinue [y] y
{"ResponseType":0,"Response":"Refreshed"}
{"ResponseType":0,"Response":{"AfwServerEnabled":true,"AfwServerReady":true,"InbandSubnet":"2.0.0.0/8",
"InbandGateway":"2.0.0.1","OutbandSubnet":"0.0.0.0/8","OutbandGateway":"0.0.0.0","UnclusteredMode":true}}

Done.
[root@dcnm]#
```

The following example shows a sample output for the **appmgr setup inband** command for a Cisco DCNM Native HA Appliance.

On Cisco DCNM Primary appliance:

```
[root@dcnm-primary]# appmgr setup inband
Configuring Interface for InBand Connectivity...
Please enter the information as prompted:
InBand Physical IP [e.g. 2.2.2.69]: 2.0.0.244
InBand Network Mask [e.g. 255.255.255.0]: 255.0.0.0
InBand Gateway [e.g. 2.2.2.1]: 2.0.0.1
InBand Virtual IP for HA setup [e.g. 2.2.2.60]: 2.0.0.243
InBand Virtual Network Mask [mandatory for HA setup] [e.g. 255.255.255.0]: 255.0.0.0
Peer Inband IP [mandatory for HA setup] [e.g. 2.2.2.59]: 2.0.0.244
Validating Inputs ...

You have entered these values..
PIP=2.0.0.244
NETMASK=255.0.0.0
GATEWAY=2.0.0.1
VIP=2.0.0.243
VIP_NETMASK=255.0.0.0
PEER_ETH2=2.0.0.244

Press 'y' to continue configuration, 'n' to discontinue [y] y

Done.
[root@dcnm-primary]#
```

On Cisco DCNM Secondary appliance:

```
[root@dcnm-secondary]# appmgr setup inband
Configuring Interface for InBand Connectivity...
Please enter the information as prompted:
InBand Physical IP [e.g. 2.2.2.69]: 2.0.0.245
InBand Network Mask [e.g. 255.255.255.0]: 255.0.0.0
InBand Gateway [e.g. 2.2.2.1]: 2.0.0.1
InBand Virtual IP for HA setup [e.g. 2.2.2.60]: 2.0.0.243
InBand Virtual Network Mask [mandatory for HA setup] [e.g. 255.255.255.0]: 255.0.0.0
Peer Inband IP [mandatory for HA setup] [e.g. 2.2.2.59]: 2.0.0.244
Validating Inputs ...

You have entered these values..
PIP=2.0.0.245
```

```
NETMASK=255.0.0.0
GATEWAY=2.0.0.1
VIP=2.0.0.243
VIP_NETMASK=255.0.0.0
PEER_ETH2=2.0.0.244

Press 'y' to continue configuration, 'n' to discontinue [y] y
HA Role is Active {"ResponseType":0,"Response":"Refreshed"}
Done.

[root@dcnm-secondary]#
```

Changing the DCNM Server Password Post DCNM Installation

The password to access Cisco DCNM Web UI is configured while installing the Cisco DCNM for your deployment type. However, you can modify this password post installation also, if required.

To change the password post installation, perform the following steps:

Procedure

Step 1 Stop the applications using the **appmgr stop all** command.

Wait until all the applications stop running.

Step 2 Change the password for the management interface by using the **appmgr change_pwd ssh {root|poap}**[*password*] command.

Ensure that the new password adheres to the following password requirements. If you do not comply with the requirements, the DCNM application might not function properly:

- It must be at least 8 characters long and contain at least one alphabet and one numeral.
- It can contain a combination of alphabets, numerals, and special characters.
- Do not use any of these special characters in the DCNM password: <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

Step 3 Start the application using the **appmgr start all** command.

Utility Services Details

This section describes the details of all the utility services within the functions they provide in Cisco DCNM. The functions are as follows:

Network Management

The data center network management function is provided by the Cisco Data Center Network Manager (DCNM) server. Cisco DCNM provides the setup, visualization, management, and monitoring of the data

center infrastructure. Cisco DCNM can be accessed from your browser: `http://<<hostname/IP address>>`.

Note For more information about Cisco DCNM, see http://cisco.com/go/dcnm.

Orchestration

RabbitMQ

Rabbit MQ is the message broker that provides the Advanced Messaging Queuing Protocol (AMQP). The RabbitMQ message broker sends events from the vCloud Director/vShield Manager to the Python script for parsing. You can configure this protocol by using certain CLI commands from the Secure Shell (SSH) console of the firmware.

Note You need to stop and restart AMQP on both DCNM's server in HA within 30 seconds, otherwise AMQP may not start. For more information about RabbitMQ, go to https://www.rabbitmq.com/documentation.html.

Device Power On Auto Provisioning

Power On Auto Provisioning (POAP) occurs when a switch boots without any startup configuration. It is accomplished by two components that were installed:

- DHCP Server

  The DHCP server parcels out IP addresses to switches in the fabric and points to the location of the POAP database, which provides the Python script and associates the devices with images and configurations.

  During the Cisco DCNM installation, you define the IP Address for the inside fabric management address or OOB management network and the subnets associated with the Cisco Programmable Fabric management.

  Note You should always configure DHCP through Cisco DCNM web UI by choosing: **Configure > POAP > DHCP Scopes**. Editing the `/etc/dhcp/dhcp.conf` file from an SSH terminal might lead to unexpected behavior.

- Repositories

  The TFTP server hosts boot scripts that are used for POAP.

  The SCP server downloads the database files, configuration files, and the software images.

Managing Applications and Utility Services

You can manage the applications and utility services for Cisco Programmable Fabric in the Cisco DCNM through commands in an SSH terminal.

Enter the **appmgr** command from the SSH terminal by using the following credentials:

- Username: **root**
- Password: **Administrative password provided during deployment**

Note For your reference, context sensitive help is available for the **appmgr** command. Use the **appmgr** command to display help.

Use the **appmgr tech_support** command to produce a dump of the log files. You can then provide this information to the TAC team for troubleshooting and analysis of your setup.

Note This section does not describe commands for Network Services using Cisco Prime Network Services Controller.

This section includes the following:

Verifying the Application and Utility Services Status after Deployment

After you deploy the OVA/ISO file, you can determine the status of various applications and utility services that were deployed in the file. You can use the **appmgr status** command in an SSH session to perform this procedure.

Note Context-sensitive help is available for the **appmgr status** command. Use the **appmgr status ?** command to display help.

Procedure

Step 1 Open up an SSH session:

a) Enter the **ssh root DCNM network IP address** command.

b) Enter the administrative password to login.

Step 2 Check the status by using the following command:

appmgr status all

Example:

```
DCNM Status
 PID  USER      PR   NI VIRT RES  SHR  S  %CPU %MEM  TIME+   COMMAND
 ===  =====    ===   == ==== ===  ===  =  ==== ===== ======  =======
```

```
 1891 root 20 02635m 815m  15m S  0.0 21.3    1:32.09  java

LDAP Status
 PID  USER      PR   NI VIRT RES  SHR  S  %CPU %MEM  TIME+   COMMAND
 ===  =====    ===   == ==== ===  ===  =  ==== ===== ======  =======
 1470 ldap      20   0  692m  12m 4508 S  0.0  0.3   0:00.02 slapd

AMQP Status
 PID  USER      PR   NI VIRT RES  SHR  S  %CPU %MEM  TIME+   COMMAND
 ===  =====    ===   == ==== ===  ===  =  ==== ===== ======  =======
1504 root      20   0 52068  772  268 S  0.0  0.0   0:00.00 rabbitmq

TFTP Status
 PID  USER      PR   NI VIRT RES  SHR  S  %CPU %MEM  TIME+   COMMAND
 ===  =====    ===   == ==== ===  ===  =  ==== ===== ======  =======
 1493 root      20   0 22088 1012  780 S  0.0  0.0   0:00.00 xinetd

DHCP Status
 PID  USER      PR   NI VIRT RES  SHR  S  %CPU %MEM  TIME+   COMMAND
 ===  =====    ===   == ==== ===  ===  =  ==== ===== ======  =======
 1668 dhcpd 20   0 46356 3724 408 S  0.0  0.0   0:05.23 dhcp
```

Stopping, Starting, and Resetting Utility Services

Use the following CLI commands for stopping, starting, and resetting utility services:

- To stop an application, use the **appmgr stop** command.

```
dcnm# appmgr stop dhcp
Shutting down dhcpd:     [  OK  ]
```

- To start an application, use the **appmgr start** command.

```
dcnm# appmgr start amqp
Starting vsftpd for amqp:     [  OK  ]
```

- To restart an application use the **appmgr restart** command.

```
# appmgr restart tftp
Restarting TFTP...
Stopping xinetd:     [  OK  ]
Starting xinetd:     [  OK  ]
```

Note From Cisco DCNM Release 7.1.x, when you stop an application by using the **appmgr stop** *app_name* command, the application will not start during successive reboots.

For example, if DHCP is stopped by using the **appmgr stop dhcp** command, and the OS is rebooted, the DHCP application will still be down after the OS is up and running.

To start again, use the command **appmgr start dhcp**. The DHCP application will be started after reboots also. This is to ensure that when an environment uses an application that is not packaged as part of the virtual appliance (like CPNR instead of DHCP), the application locally packaged with the virtual appliance will not interfere with its function after any OS reboots.

Note When a DCNM appliance (ISO/OVA) is deployed, the Cisco SMIS component will not get started by default. However, this component can be managed using the appmgr CLI: **appmgr start/stop dcnm-smis**

appmgr start/stop dcnm will start or stop only the DCNM web component.

Updating the SFTP Server Address for IPv6

After deploying the DCNM OVA/ISO successfully with EFM IPv4 and IPv6, by default the SFTP address is pointed to IPv4 only. You need to change the IPv6 address manually in the following two places:

- In the DCNM Web Client, choose **Administration > Server Properties** and then update the below fields to IPv6 and click the **Apply Changes** button.

```
#_____________________________________________________________________
# GENERAL>xFTP CREDENTIAL
#
# xFTP server's ip address for copying switch files:
server.FileServerAddress
```

- Log in to the DCNM through ssh and update the SFTP address with IPv6 manually in the server.properties file (/usr/local/cisco/dcm/fm/conf/server.properties).

```
# xFTP server's ip address for copying switch files:
server.FileServerAddress=2001:420:5446:2006::224:19
```