Installing in VMware ESXi Environment

VMware ESXi, a hypervisor that allows the basic creation and management of virtual machines, is one of the hypervisors supported by Cisco Catalyst 8000V. This hypervisor runs on an x86 hardware containing virtualization extension, and you can use the same hypervisor to run several VMs simultaneously.

This chapter contains information about how to deploy Cisco Catalyst 8000V in ESXi, and the requirements for a successful deployment. Before you read the requirements and the deployment procedures, see the following information that tells you the various deplopyment methods for the ESXi hypervisor:

Deploying the OVA template on the VM

Deploying using the OVA file: In this method, you must download the .ova file from Software Download page, and use this file for the deployment. Further, you can use the following two methods to deploy the OVA file:

- **Deploying using the vSphere client**: In this procedure, you need a VMware vSphere Client or a vSphere Web Client to deploy the *.ova installation file. The VMware vSphere Web Client is a web application that runs on a x86 hardware containing virtualization extension and accesses the VMware vCenter Server. You can use VMware vSphere Web Client software to create, configure, and manage VMs on the vCenter Server and to start or stop a Cisco Catalyst 8000V instance.

  Note   This is the recommended method of deployment for Cisco Catalyst 8000V.

- **Deploying using the Common Ovf Tool (COT)**: COT is a tool that allows you to edit virtual appliances such as Cisco Catalyst 8000V. You can also use this tool to deploy the .ova file to the ESXi server and provision the VM.

To learn more about VMware vSphere products, see VMware product documentation .

Manually deploying the .iso file

The third deployment option for the ESXi hypervisor is the manual creation of the VM and installation of Cisco Catalyst 8000V by using the .iso file. Download the .iso file from the Cisco Software Download page and use this file for the installation. In this method, you install the .iso file on the VMware ESXi host and manually create the VM using the vSphere GUI. This option is advisable only if you want to modify the OVA. However, note that this option is the least recommended since manual deployments invite opportunities to stray from supported configurations.

Important Create the VM using ESXi 6.5 or later. Ensure that you use VM version 13 or greater. To choose the EFI firmware mode, navigate through **VM Options** > **Boot Options** > **Firmware** > **EFI**. The firmware mode is required to enable the secure boot functionality. For more information, see the *VNF Secure Boot* chapter in this guide.

VMware Requirements

The following table specifies the supported VMware tools by Cisco Catalyst 8000V using Cisco IOS XE 17.4 and later releases:

Cisco IOS XE Release	vSphere Web Client	vCenter Server
Cisco IOS XE 17.4.x releases	The 6.7 and 6.5 versions of the VMware vSphere Web Client are supported.	VMware ESXi 6.7 and ESXi 6.5

These versions have been fully tested and meet performance benchmarks.

VMware vCenter - installation tool.

VMware vSwitch - standard or distributed vSwitches are supported.

Hard Drive - only a single hard disk drive is supported. Multiple hard disk drives on a VM are not supported.

Virtual Disk - both 16GB and 8 GB virtual disks are supported.

vCPUs - the following vCPU configurations are supported:

- 1 vCPU: requires minimum 4 GB RAM allocation
- 2 vCPUs: requires minimum 4 GB RAM allocation
- 4 vCPUs: requires minimum 4 GB RAM allocation
- 8 vCPUs: requires minimum 4 GB RAM allocation

Note The required vCPU configuration depends on the throughput license and technology package installed. For more information, see the data sheet for your release.

ESXi hypervisor - The minimum requirement is ESXi 6.5 Update 2 or ESXi 6.7 Update 3.

Virtual CPU core - one virtual CPU core is required. This needs a 64-bit processor with Virtualization Technology (VT) enabled in the BIOS setup of the host machine.

Virtual hard disk space - minimum size of 8 GB.

Virtual Network Interface Cards (vNICs) - A maximum of 8 vNICs is supported; VMXNET3, iXGBeVF, and i40eVF.

A default video, SCSI controller set is required, and an installed virtual CD/DVD drive.

Note

Familiarize yourself about the secure boot configuration before you proceed with the installation. To see information about secure boot, see the *VNF Secure Boot* chapter in this guide.

Do not use a standalone vSphere client to manage the ESXi server. Starting ESXi 6.0, it is no longer possible to directly deploy Cisco Catalyst 8000V in ESXi in the case of an ova deployment. You must have a vMware vCenter server and a vSphere client to deploy a .ova file.

Supported VMware Features and Operations

VMware supports various features and operations that allow you to manage your virtual applications and perform operations such as cloning, migration, shutdown and resume.

Some of these operations cause the runtime state of the VM to be saved and then restored upon restarting. If the runtime state includes traffic-related state, then on resumption or replaying the runtime state, additional errors, statistics, or messages are displayed on the user console. If the saved state is just configuration driven, you can use these features and operations without a problem.

The *Supported VMware Features and Operations: Storage Options (for Both vCenter Server and vSphere Client)* table lists the VMware features and operations that are supported on Cisco Catalyst 8000V. For more information about VMware features and operations, see the VMware Documentation .

The following VMware features and operations are not supported in all versions of Cisco Catalyst 8000V, but can still be used or performed on non-supported versions at the risk of encountering dropped packets, dropped connections, and other error statistics:

- Distributed Resource Scheduling (DRS)
- Fault Tolerance
- Resume
- Snapshot
- Suspend

General Features (vCenter Server)

Table 1: Supported VMware Features and Operations: General Features (for vCenter Server Only)

Supported Entities	Description
Cloning	Enables cloning a virtual machine or template, or cloning a virtual machine to a template.

Supported Entities	Description
Migrating	The entire state of the virtual machine as well as its configuration file, if necessary, is moved to the new host even while the data storage remains in the same location on shared storage.
vMotion	Enables moving the VM from one physical server to another while the VM remains active.
Template	Uses templates to create new virtual machines by cloning the template as a virtual machine.

Operations (for vCenter Server and vSphere Web Client)

Table 2: Supported VMware Features and Operations: Operations (for vCenter Server and vSphere Client)

Supported Entities	Description
Power On	Powers on the virtual machine and boots the guest operating system if the guest operating system is installed.
Power Off	Stops the virtual machine until it is powered back. The power off option performs a "hard" power off, which is analogous to pulling the power cable on a physical machine and always works.
Shut Down	Shut Down, or "soft" power off, leverages VMware Tools to perform a graceful shutdown of a guest operating system. In certain situations, such as when VMware Tools is not installed or the guest operating system is hung, shut down might not succeed and using the Power off option is necessary.
Suspend	Suspends the virtual machine.
Reset/Restart	Stops the virtual machine and restarts (reboots) it.
OVF Creation	An OVF package consisting of several files in a directory captures the state of a virtual machine including disk files that are stored in a compressed format. You can export an OVF package to your local computer.
OVA Creation	You can create a single OVA package file from the OVF package/template. The OVA can then be distributed more easily; for example, it may be downloaded from a website or moved via a USB key.

Table 3: Supported VMware Features and Operations: Networking Features

Supported Entities	Description
Custom MAC address	From both vCenter Server and vSphere Client. Allows you to set up the MAC address manually for a virtual network adapter.
Distributed VSwitch	From vCenter Server only. A vSphere distributed switch on a vCenter Server data center can handle networking traffic for all associated hosts on the data center.
Distributed Resources Scheduler	Provides automatic load balancing across hosts.
NIC Load Balancing	From both vCenter Server and vSphere Client. Load balancing and failover policies allow you to determine how network traffic is distributed between adapters and how to reroute traffic if an adapter fails.

Supported Entities	Description
NIC Teaming	From both vCenter Server and vSphere Client. Allows you to set up an environment where each virtual switch connects to two uplink adapters that form a NIC team. The NIC teams can then either share the load of traffic between physical and virtual networks among some or all of its members, or provide passive failover in the event of a hardware failure or a network outage. **Note** NIC Teaming can cause a large number of ARP packets to flood the Cisco Catalyst 8000V and overload the CPU. To avoid this situation, reduce the number of ARP packets and implement NIC Teaming as Active-Standby rather than Active-Active.
vSwitch	From both vCenter Server and vSphere Client. A vSwitch is a virtualized version of a Layer 2 physical switch. A vSwitch can route traffic internally between virtual machines and link to external networks. You can use vSwitches to combine the bandwidth of multiple network adapters and balance communications traffic among them. You can also configure a vSwitch to handle a physical NIC fail-over.

High Availability

Note Cisco IOS-based High Availability is not supported by the Cisco Catalyst 8000V instance. High Availability is supported on the VM host only.

Table 4: Supported VMware Features and Operations: High Availability

Supported Entities	Description
VM-Level High Availability	To monitor operating system failures, VM-Level High Availability monitors heartbeat information in the VMware High Availability cluster. Failures are detected when no heartbeat is received from a given virtual machine within a user-specified time interval. VM-Level High Availability is enabled by creating a resource pool of VMs using VMware vCenter Server.
Host-Level High Availability	To monitor physical servers, an agent on each server maintains a heartbeat with the other servers in the resource pool such that a loss of heartbeat automatically initiates the restart of all affected virtual machines on other servers in the resource pool. Host-Level High Availability is enabled by creating a resource pool of servers or hosts, and enabling high availability in vSphere.
Fault Tolerance	Using high availability, fault tolerance is enabled on the ESXi host. When you enable fault tolerance on the VM running the Cisco Catalyst 8000V instance, a secondary VM on another host in the cluster is created. If the primary host goes down, then the VM on the secondary host will take over as the primary VM for the Cisco Catalyst 8000V.

Storage Options (for vCenter Server and vSphere Web Client)

Table 5: Supported VMware Features and Operations: Storage Options (for Both vCenter Server and vSphere Client)

Supported Entities	Description
Storage Options (for both vCenter Server and vSphere Client)	
Local Storage	Local storage is in the internal hard disks located inside your ESXi host. Local storage devices do not support sharing across multiple hosts. A datastore on a local storage device can be accessed by only one host.
External Storage Target	You can deploy the Cisco Catalyst 8000V instance on external storage. That is, a Storage Area Network (SAN).
Mount or Pass Through of USB Storage	You can connect USB sticks to the Cisco Catalyst 8000V instance and use them as storage devices. In ESXi, you need to add a USB controller and then assign the disk devices to the Cisco Catalyst 8000V instance. • Cisco Catalyst 8000V supports USB disk hot-plug. • You can use only two USB disk hot-plug devices at a time. • USB hub is not supported.

Deploying the OVA to the VM using vSphere

The Cisco Catalyst 8000V OVA file package allows you to deploy the Cisco Catalyst 8000V to the VM. The OVA package includes an OVF file that contains a default VM configuration based on the Cisco IOS XE release and the supported hypervisor.

Restrictions and Requirements

The following restrictions apply when deploying the OVA package to the VM:

If the virtual CPU configuration is changed, you must reboot the Cisco Catalyst 8000V instance. Changing the RAM allocation does not require you to reboot the Cisco Catalyst 8000V instance.

The OVA package provides an option to select the virtual CPU configuration.

When you deploy the OVA, the VM requires two virtual CD/DVD drives, one for the OVF environment file and one for the .iso file.

Deploying the OVA to the VM

Perform the following steps in VMware vSphere Client:

Step 1   Log in to the VMware vSphere Client.

Step 2   From the vSphere Client Menu Bar, choose **File** > **Deploy OVF Template**.

Step 3   In the OVA Wizard, point the source to the Cisco Catalyst 8000V OVA to be deployed. Click **Next**.

The system displays the OVF Template Details with the information about the OVA. Click **Next**.

Step 4   Under **Name and Inventory Location**, specify the name for the VM and click **Next**.

Step 5   Under **Deployment Configuration**, select the desired hardware configuration profile from the drop-down menu and click **Next**.

Step 6   Under **Storage**, select the Datastore to use for the VM. Click **Next**.

Step 7   Under **Disk Format**, select the disk format option:

- Thick Provision Lazy Zeroed

- Thick Provision Eager Zeroed

Note   The Thin Provision option is not supported. The Thick Provision Eager Zeroed option takes longer to install but provides better performance.

Click **Next**.

Step 8   Under **Network Mapping**, allocate one or more virtual network interface card (vNIC) on the destination network using the drop-down list.

Select the network mappings for the 3 default vNICs created during the OVA deployment. You can choose which vNIC will map to the router's management interface when setting the bootstrap properties.

Note   After you make any change to the bootstrap properties, the system assumes that you are starting with a fresh VM. So, when the VM restarts, all the pre-existing networking configuration is removed.

Step 9   Select the vNIC to connect at **Power On**. Click **Next**.

When the Cisco Catalyst 8000V installation using the OVA is complete, two additional vNICS are allocated. Cisco Catalyst 8000V supports up to ten vNICs. You must manually create additional vNICs on the VM.

Step 10   Configure the properties for the VM.

Note   After you make any change to the bootstrap properties the system assumes that you are starting with a fresh VM. So when the VM restarts, all pre-existing networking configuration is removed.

Note   The bootstrap properties are optional when creating the VM. You can set these properties to easily provision the VM before starting it up.

Table 6: OVA Bootstrap Properties

Property	Description
Bootstrap Properties	
Console	Configures the console mode. Possible values: virtual, serial
Login Username	Sets the login username for the router.

Property	Description
Login Password	Sets the login password for the router.
Management Interface	Designates the management interface for the Cisco Catalyst 8000V instance. The format must be GigabitEthernetx or GigabitEthernetx.xxx. **Note** The GigabitEthernet0 interface is no longer supported.
Management vLAN	Configures the dot1Q VLAN interface. Requires the management interface to be configured using the GigabitEthernetx.xxx format.
Management Interface IPv4 Address/Mask	Configures the IPv4 address and subnet mask for the management interface.
Management IPv4 Default Gateway	Configures the IPv4 management default gateway address. If using DHCP, enter "dhcp" in the field.
Management IPv4 Gateway	Configures the IPv4 management default gateway address. If using DHCP, enter "dhcp" in the field.
Management IPv4 Network	Configures the IPv4 Network (such as "192.168.2.0/24" or "192.168.2.0 255.255.255.0") that the management gateway should route to. If a default route (0.0.0.0/0) is desired, this may be left blank.
PNSC IPv4 Address	Configures the IP address of the Cisco Prime Network Services Controller. This setting is used if you plan to remotely manage the Cisco Catalyst 8000V instance using the Cisco Prime Network Services Controller.
Router name	Configures the hostname of the router.
Resource Template	Configures the Resource Template. Possible values: default, service_plane_medium, service_plane_heavy
Features	
Enable SCP Server	Enables the IOS SCP feature.
Enable SSH Login and Disable Telnet Login	Enables remote login using SSH and disables remote login via Telnet. Requires that the login username and password are set.
Additional Configuration Properties	
Enable Password	Configures the password for privileged (enable) access.
Domain Name	Configures the network domain name.
License Boot Level	Configures the license technology level that is available when the Cisco Catalyst 8000V instance boots.

After you configure the router properties, click **Next**. The system displays the Ready to Complete screen with the settings to be used when the OVA is deployed.

You can also configure advanced properties after the router boots.

Step 11   Select **Power On After Depolyment** to automatically power on the VM.

Step 12   Click **Finish** to deploy the OVA.

The OVA deploys the .iso file, and if you select the **Power on after deployment** setting, the VM is automatically powered on. Once the VM is powered on, the Cisco Catalyst 8000V device begins the installation and boot process. If a bootstrap configuration file was included in the OVA, the router configuration is automatically enabled.

For more information, see *Booting the Cisco Catalyst 8000V and Accessing the Console*.

Deploying the OVA to the VM Using COT

The Cisco Catalyst 8000V OVA file package allows you to deploy the Cisco Catalyst 8000V to the VM. The OVA package includes an OVF file that contains a default VM configuration based on the Cisco IOS XE release and the supported hypervisor. You can deploy the OVA using VMware vSphere or COT or the Common OVF Tool. This section describes how to deploy using the COT.

The Common OVF Tool (COT) included in the Cisco Catalyst 8000V software package is a Linux-based application that enables you to create attributes for one or more VMs and quickly deploy VMs with the Cisco Catalyst 8000V software pre-installed. This tool can speed the process of deploying Cisco Catalyst 8000V on multiple VMs.

COT provides a simple command-line interface to enter the VM attributes into the .ova file. You can run COT either in a LINUX shell or on Mac OS X. However, ensure that VMware ovftools are installed.

Danger   The Common OVF Tool (COT) is provided without official Cisco support. Use it at your own risk.

Downloading COT

Download and install the COT libraries and script according to the instructions provided in the http://cot.readthedocs.io/en/latest/installation.html GitHub site.

Editing the Basic Properties of Cisco Catalyst 8000V using COT

Before you deploy Cisco Catalyst 8000V using COT, you can edit the basic or custom properties of the Cisco Catalyst 8000V VM in the OVA package using COT.

To edit the basic properties of the OVA, use the **cot edit-properties** command.

cot edit-properties

-p *key1=value1*, **--properties** *key1=value1*

This command sets properties using key value pairs. For Example, **-p "login-username=cisco"** sets the login username using a key value pair.

-o *output*

Specifies the name or the path to a new OVA package, if you are creating a new OVA instead of updating the existing OVA.

For more information on the **cot edit-properties** command, see:
http://cot.readthedocs.io/en/latest/usage_edit_properties.html

Editing the Basic Properties of Cisco Catalyst 8000V using COT [Sample]

```
cot edit-properties c8000v-universalk9.ova
-p "login-username=cisco"

-p "login-password=cisco"
-o c8000v-universalk9-customized.ova
\# save modifications to a new OVA
cot info c8000v-universalk9-customized.ova
  # verify the new values of properties in the OVA
(...)
Properties:
  <config-version>                                "1.0"
  Router Name                                     ""
  Login Username                                  "cisco"
  Login Password                                  "cisco"
  Management Interface                            "GigabitEthernet1"
  Management VLAN                                 ""
  Management Interface IPv4 Address/Mask          ""
```

The following table specifies the **cot edit-properties** command and arguments used in the above example.

Script Step	Description
`cot edit propertie s c8000v-universalk9.ova`	Edits the basic environment properties of the OVA file.
`-p "login-username=cisco"`	Sets the bootstrap login username.
`-p "login-password=cisco"`	Sets the bootstrap login password.
`-o "c8000v-universalk9-customized.ova"`	Saves a modified OVA, which contains configuration commands from the text file.

Editing the Custom Properties

You can add custom properties to your Cisco Catalyst 8000V instance based on the Cisco IOS XE CLI commands using the vSphere GUI. You can add these properties either before or after you boot the Cisco Catalyst 8000V instance. If you set these custom properties after you boot the Cisco Catalyst 8000V instance, you must reload the router or power-cycle the VM for the properties settings to take effect.

To edit the vApp options to add the custom Cisco Catalyst 8000V properties, do the following:

Step 1   In the vSphere GUI, select the **Options** tab.

Step 2   Select **vApp Options** > **Advanced**.

Step 3   In the Advanced Property Configuration screen, click the **Properties** button.

Step 4   Click **New** to add a property.

Step 5 In the Edit Property Settings screen, enter the information to create the new custom property based on a Cisco IOS XE CLI command:

Note Before adding a custom property, make sure that the Cisco IOS XE command upon which it is based is supported for your Cisco Catalyst 8000V version.

a) (Optional) Enter the label. This is a descriptive string for the property.

b) Enter the class ID as "com.cisco.c8000v".

c) Assign the property an ID of "ios-config-xxxx" where xxxx is a sequence number from 0001 to 9999 that determines the order in which the custom properties are applied.

d) (Optional) Enter a description for the property.

e) Enter the property type as "string". This is the only type supported.

f) Enter the default value as the Cisco IOS XE CLI command the custom property is based on.

Step 6 Click **OK**.

Step 7 In the Advanced Property Configuration screen, click **OK**.

Step 8 Reboot the Cisco Catalyst 8000V instance.

You must reboot the router for the new or edited properties to take effect.

cot edit-properties

Use the **cot edit-properties** command to pre-apply a small number of configuration commands to the OVA.

To use more commands, use the **cot inject-config** command.

For more information about the **cot edit-properties** command, see http://cot.readthedocs.io/en/latest/usage_edit_properties.html .

Synopsis and Description

cot edit-properties *ova-filename*

-o *output*

Specifies the name or path to a new OVA package, if you are creating a new OVA instead of updating the existing OVA.

-c *config-file*

Specifies the name of a text file containing IOS XE commands to be added to the OVA.

Example

In this example, a previously created text file, iosxe_config.txt, containing IOS XE config commands is added to the OVA using the **cot edit-properties** command. Finally, the **cot info** command is used to show the modified OVA.

```
$ cat iosxe_config.txt

interface GigabitEthernet1
no shutdown
ip address 192.168.100.10 255.255.255.0
!
```

```
ip route 0.0.0.0 0.0.0.0 GigabitEthernet1 192.168.100.1
$ cot edit-properties c8000v-universalk9.ova \
    -o c8000v-universalk9-customized.ova \
    -c iosxe_config.txt
$ cot info c8000v-universalk9-customized.ova

...


Properties:
  <config-version>              "1.0"
  Router Name                   ""

...


  Intercloud Tunnel Interface Gateway IPv4 Address   ""
  <ios-config-0001>             "interface GigabitEthernet1"
  <ios-config-0002>             "no shutdown"
  <ios-config-0003>             "ip address 192.168.100.10 255.255.255.0"
  <ios-config-0004>             "ip route 0.0.0.0 0.0.0.0 GigabitEthernet1 192.168.100.1"
```

The following table specifies the **cot edit properties** command and arguments used in the example.

Script Step	Description
`cot edit properties c8000v-universalk9.ova`	Edits the custom environment properties of the OVA file.
`-o "c8000v-universalk9-customized.ova"`	New OVA, containing configuration commands from the text file.
`-c iosxe_config.txt`	The text file that contains IOS XE configuration commands. Each line of configuration in this file results in an entry such as com.cisco.productname.ios-config-xxxx in the XML of the OVF.

cot inject-config

Use the **cot inject-config** command if you have a large set of configuration commands to pre-apply to the OVA. For example, if you want to add a complete running configuration. This is efficient in terms of file size and loading time as this command uses plain text for the configuration commands (instead of XML). For further details about the **cot inject-config** command, see
http://cot.readthedocs.io/en/latest/usage_inject_config.html

Synopsis and Description

cot inject-config ova-filename

-o *output*

Specifies the name or path to a new OVA package if you are creating a new OVA instead of updating the existing OVA.

-c *config-file*

Specifies the name of a text file, such as iosxe_config.txt to be embedded in the OVA.

Example

In this example, the **cot inject-config** command adds Cisco IOS XE commands in text file iosxe_config.txt to the OVA.

```
$ cat iosxe_config.txt
interface GigabitEthernet1
no shutdown
ip address 192.168.100.10 255.255.255.0
!
ip route 0.0.0.0 0.0.0.0 GigabitEthernet1 192.168.100.1
$ cot inject-config c8000v-universalk9.ova \

 -o c8000v-universalk9-customized.ova \
      -c iosxe_config.txt
$ cot info c8000v-universalk9-customized.ova
```

<.. other output snipped for brevity ..>

```
Files and Disks:                       File Size  Capacity Device
                                       --------- --------- --------------------
  c8000v_harddisk.vmdk                 71.50 kB   8.00 GB harddisk @ SCSI 0:0
  bdeo.sh                              52.42 kB
  README-OVF.txt                        8.53 kB
  README-BDEO.txt                       6.75 kB
  cot.tgz                             116.78 kB
  c8000v-universalk9.iso              484.80 MB          cdrom @ IDE 1:0
  config.iso                          350.00 kB          cdrom @ IDE 1:1
```

The following table specifies the **cot inject-config** command and arguments used in the example.

Script Step	Description
`cot inject-config c8000v-universalk9.ova`	Edits the custom environment properties of the OVA file.
`-o "c8000v-universalk9-customized.ova"`	The name of the new or the modified OVA, containing the config commands from the text file.
`-c iosxe_config.txt`	The name of the text file that contains the IOS XE configuration commands.

Deploying the Cisco Catalyst 8000V VM using COT

To deploy the Cisco Catalyst 8000V VM, use the **cot deploy ... esxi** command as shown in the following step. Note that the following description provides general guidance. The exact steps that you need to perform may vary depending on the characteristics of your VMware environment and setup.

Run the **cot deploy ... esxi** command to deploy the Cisco Catalyst 8000V. The script options are described at: http://cot.readthedocs.io/en/latest/usage_deploy_esxi.html

Note   The default values may vary depending on the Cisco Catalyst 8000V version.

Example

The table below shows an example **cot deploy** command, and its arguments, that is used to deploy a Cisco Catalyst 8000V VM in a vCenter environment.

Script Step	Description
`cot deploy`	
`-s '10.122.197.5/UCS/host/10.122.197.38'`	vCenter server 10.122.197.5, target host UCS/host/10.122.197.38
`-u administrator -p password`	Credentials for the ESXi server. If unspecified, COT will use your userid and prompt for a password.
`-n XE3.13`	Name of the newly created Cisco Catalyst 8000V VM.
`-c 1CPU-4GB`	OVF hardware config profile. If this is not specified, COT displays a list of available profiles and prompts you to select one.
`-N "GigabitEthernet1=VM Network"` `-N "GigabitEthernet2=VM Network"` `-N "GigabitEthernet3=VM Network"`	Mapping each NIC in the Cisco Catalyst 8000V OVA to a vSwitch on the server.
`esxi`	Target hypervisor (currently always ESXi)
`~/Downloads/c8000v-universalk9.ova`	OVA to deploy
`-ds=datastore38a`	Any ESXi-specific parameters - here, the datastore to use for disk storage.

Manually Creating the VM Using the .iso File

Perform the following steps to install the .iso file on the VMware ESXi host and manually and create the VM using the vSphere GUI. While this procedure provides general guidance for how to deploy Cisco Catalyst 8000V, the exact steps that you need to perform may vary depending on the characteristics of your VMware environment and setup. The instructions in this procedure are based on VMware ESXi 5.0.

Step 1 Download the C8000V_esxi.iso file from the Cisco Catalyst 8000V software installation image package and copy it onto the VM Datastore.

Step 2 In the VSphere client, select **Create a New Virtual Machine** option.

Step 3 Under **Configuration**, select the option to create a Custom configuration, and click **Next**.

Step 4 Under **Name and Location**, specify the name for the VM and click **Next**.

Step 5 Under **Storage**, select the datastore to use for the VM. Click **Next**.

Step 6   From the **Virtual Machine Version** field, select **Virtual Machine Version 15** or a higher version that is availble. Click **Next**.

> **Note**   Cisco Catalyst 8000V is not compatible with ESXi Server versions prior to 6.5 Update 2.

Step 7   Under **Guest Operating System**, select **Linux** and the **Other 3.x Linux (64-bit)** setting from the drop-down menu. Click **Next**.

Step 8   Under **CPUs**, select the following settings:

- Number of virtual sockets (virtual CPUs)

- Number of cores per socket

The number of cores per socket should always be set to 1, regardless of the number of virtual sockets selected. For example, a Cisco Catalyst 8000V with a 4 vCPU configuration should be configured as 4 sockets and 1 core per socket.

Click **Next**.

Step 9   Under **Memory**, configure the supported memory size for your **Cisco Catalyst 8000V** release. Click **Next**.

Step 10   Under **Network**, allocate at least three virtual network interface cards (vNICs).

a)   Select the number of vNICs that you want to connect from the drop-down menu.

> **Note**   The VMware ESXi 5.0 interface only allows the creation of 4 vNICS during the initial VM creation. You can add more vNICs after the VM is created and you boot the Cisco Catalyst 8000V the first time.

b)   Add the vNICs.

Select a different network for each vNIC.

Select the adapter type from the drop-down menu. See the requirements sections in this guide for the supported adapter type in your release.

c)   Select all the vNICs to connect at power-on.

d)   Click **Next**.

> **Note**   You can add vNICs into the VM using vSphere while the Cisco Catalyst 8000V is running. For more information about adding vNICS to an existing VM, see the vSphere documentation.

Step 11   Under **SCSI Controller**, select **VMware Paravirtual**. Click **Next**.

Step 12   Under **Select a Disk**, click **Create a New Virtual Disk**.

Step 13   From the **Create a Disk** field, configure the following:

a)   **Capacity: Disk Size**: See the requirements sections in this guide for the virtual hard disk size required in your release.

b)   **Disk Provisioning**: select one of the following: Thick Provision Lazy Zeroed or Thick Provision Eager Zeroed.

> **Note**   The Thin Provision option is not supported. The **Thick Provision Eager Zeroed** option takes longer to install but provides better performance.

c)   **Location**: Store with the Virtual Machine

Click **Next**.

Step 14   From the **Advanced Options** field, select **SCSI (0:0)** for the virtual device node.

Step 15   On the Ready to Complete screen, click the **Edit the Virtual Machine** settings before completion. Select the **Continue** checkbox.

Step 16   In the **Hardware** tab, click **New CD/DVD Drive**.

a) Select the **Device Type** that the VM will boot from:

Select the **Datastore ISO file** option to boot from the .iso file. Browse to the location of the .iso file on the datastore set in step 1.

b) In the **Device Status** field, select the **Connect at Power On** checkbox.

c) Select the **Virtual Device Node CD/DVD** drive on the host that the VM will boot from.

Step 17 In the **Resources** tab, click the **CPU** setting:

Set the **Resource Allocation** setting to **Unlimited**.

Step 18 Click **OK**.

Step 19 Click **Finish**.

The VM is now configured for the Cisco Catalyst 8000V and is ready to boot. The Cisco Catalyst 8000V is booted when the VM is powered on. See the *Booting the Cisco Catalyst 8000V and Accessing the Console* section.

Note To configure the day0 settings of a manually installed Cisco Catalyst 8000V, attach a second CD/DVD drive pointing to an ISO that contains the said bootstrap configuration. For further details on the supported bootstrap ISO contents, see the *Configuring Day0 Settings* chapter in this guide.

Note To access and configure the Cisco Catalyst 8000V from the serial port on the ESXi host instead of the virtual VGA console, provision the VM to use this setting before powering on the VM and booting the router.

Increasing the Performance on VMware ESXi Configurations

You can improve the performance of Cisco Catalyst 8000V running on ESXi environment by modifying the settings on the host and the virtual machine.

• Enable the hypervisor performance settings.

• Limit the overhead of vSwitch by enabling SR-IOV on the supported Physical NICs.

• Configure the vCPUs of the VM to run on the same NUMA node as Physical NICs.

• Set the **VM Latency Sensitivity** to **High**.

For more information about the VMware best practices for versions 6.7 and 6.5, see https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/techpaper/performance/Perf_Best_Practices_vSphere65.pdf and https://www.vmware.com/techpapers/2019/vsphere-esxi-vcenter-server-67U2-performance-best-practices.html.

Modifications to the Host Configuration

To improve the performance of the VMware ESXi configuration, perform the following modifications in the host configuration:

• Select the **High Performance** option under **Power Management**.

• Disable **Hyperthreading**.

• Enable SR-IOV for the supported physical adapters.

Modifications to the Virtual Machine Configuration

To improve the performance of the VMware ESXi configuration, perform the following modifications in the host configuration:

- Ensure that the ESXi version is compatible with your Cisco Catalyst 8000V version.

- Set the Virtual Hardware: CPU reservation setting to Maximum.

- Reserve all the guest memory in Virtual Hardware: Memory.

- Select **VMware Paravirtual** from **Virtual Hardware: SCSI Controller**.

- From the **Virtual Hardware: Network Adapter: Adapter Type** option, select SR-IOV for the supported NICs

- Set the **General Guest OS Version** > **VM Options** option to **Other 3.x or later Linux (64-bit)**.

- Set the **VM Options** option under **Advanced Latency Sensitivity** to High.

- Under **VM Options** > **Advanced Edit Configuration**, add "numa.nodeAffinity" to the same NUMA node as the SRIOV NIC.