Installing in an NFVIS Environment

Cisco Enterprise Network Function Virtualization Infrastructure Software (Cisco Enterprise NFVIS) is a Linux-based infrastructure software designed to help service providers and enterprises dynamically deploy virtualized network functions such as a virtual router, firewall, and WAN acceleration on a supported Cisco device.

The Cisco Enterprise NFVIS solution helps you convert your critical network functions into software, making it possible to deploy network services in minutes across dispersed locations. This solution provides a fully integrated platform that can run on top of a diverse network of both virtual and physical devices.

This chapter specifies how you can upgrade from Cisco Integrated Services Virtual Router (ISRv) to Cisco Catalyst 8000V. If your hardware is running on Cisco NFVIS, and you want to deploy this setup on a Cisco Catalyst 8000V, perform the procedures as mentioned in the *Installing the VM on NFVIS* section.

Note   From the Cisco IOS XE 17.4.x release onwards, Cisco Catalyst 8000V replaces ISRv.

Cisco Catalyst 8000V requires NFVIS version 4.4 or later for deployments.

Supported Hardware Platforms running NFVIS

- Cisco 5400 Series Enterprise Network Compute System (ENCS)

- Cloud Services Platform 5000 Series (CSP)

- Cisco 8200 UCPE Series

Supported NIMS

- NIM-4G-LTE-VZ

- NIM-4G-LTE-ST

- NIM-4G-LTE-NA

- NIM-4G-LTE-GA

- NIM-4G-LTE-LA

- NIM-LTEA-EA

- NIM-LTEA-LA

- NIM-1MFT-T1/E1

- NIM-2MFT-T1/E1

- NIM-4MFT-T1/E1

- NIM-8MFT-T1/E1

- NIM-1CE1T1-PRI

- NIM-2CE1T1-PRI

- NIM-8CE1T1-PRI

- NIM-16A

- NIM-24A

- NIM-VA-B

- NIM-VAB-A

- NIM-VAB-M

- NIM-4SHDSL-EA

- NIM-1GE-CU-SFP

- NIM-2GE-CU-SFP

- NIM-ES2-8-P

- NIM-ES2-8 NIM-ES2-4

Supported NICs

Hardware	VNIC
ENCS	virtio, igbvf and i40evf
UCPE	virtio, igbvf and ixgbevf
CSP	- virtio, igbvf - Supported from Cisco IOS XE 17.4.1 - i40evf - Supported from Cisco IOS XE 17.4.1 to 17.8.x - ConnectX-5VF and iavf - Supported from Cisco IOS XE 17.9.1 - Ixgbe - Supported from Cisco IOS XE 17.10.1

Supported Profiles

- Mini – 1vCPU

- Small – 2vCPU

- Medium – 4vCPU

- Large - 4vCPU

Note   Cisco Catalyst 8000V works as a low latency VM and performs as expected with dedicated vCPU cores.

Install the VM in NFVIS

From the Cisco IOS XE 17.4.1 release, you can either freshly install a Cisco Catalyst 8000V VM in NFVIS, or you can upgrade from an Cisco ISRv to Cisco Catalyst 8000V. The following are the key tasks that you must perform for the installation or the upgrade:

- **Register a VM image**: To register a VM image, you must first copy or download the VM image to the NFVIS server or host the image on a HTTP or HTTPs server. After you download the file, register the image using the registration API. This API allows you to specify the file path to the location (on an HTTP or HTTPs server) where the tar.gz file is hosted. Registering the image is a one-time activity. After you register an image on the HTTP or HTTPs server, and the registration is in the active state, you can perform multiple VM deployments using the registered image.

- **Create a custom profile**: After registering a VM image, you can optionally create a custom profile for the VM image. This is especially beneficial if the profiles defined in the image file do not match your requirements. Custom profiles allow you to provide specific profiling details for a VM image such as the virtual CPU on which the VM will run, the amount of virtual memory the VM will consume. Depending on the topology that you require, you can create additional networks and bridges to attach the VM during deployment.

- **Deploy the VM**: Deploy the VM by using the deployment API. This API allows you to provide values to the parameters that are passed to the system during deployment. Depending on the VM that you are deploying, some parameters are mandatory and others are optional. For more details on the APIs, see the VM Lifecycle Management APIs .

- **Manage and monitor the VM**: You can monitor a VM using APIs and commands that enable you to get the VM status and debug logs. Using the VM management APIs, you can start, stop, or reboot a VM, and view the statistics for a VM, such as CPU usage. You can also change or update a VM profile. You can change a VM profile to one of the existing profiles in the image file. Alternatively, you can create a new custom profile for the VM. The vNICs on a VM can also be added or updated.

Install the VM in NFVIS (Release 4.5.1 and Later)

Install Cisco Catalyst 8000V in NFVIS Environment

If you want to install Cisco Catalyst 8000V on NFVIS version 4.5.1 or later, follow the procedures that follow this section.

To install Cisco Catalyst 8000V on earlier releases of NFVIS, see .

Upload the Image on NFVIS

Step 1 Log in to the NFVIS Portal.

Step 2 Choose **Configuration** > **Virtual Machine** > **Images** > **Image Repository**.

Step 3 Upload the installation file by doing one of the following:

- Choose **Local** > **Select File**, and from your device, locate and select the installation file.

- Choose **Remote**.

Step 4 If you chose Remote, provide the following details:

a) **Image Name**: Specify the name of the image file in this field.
b) **Protocol**: Choose the protocol from this drop-down list.
c) **IP Address**: Specify the IP address for the remote location in this field.
d) **Port**: Specify the port for the remote location in this field.
e) **Image File Path**: Specify the file path to the image file in this field.

Create a Network

Step 1 In the NFVIS Portal, choose **Configuration** > **Virtual Machine** > **Networking** > **Networks**.

Step 2 To create a new network, click the + icon.

Step 3 In the **Add Network** area, enter the following details:

a) **Network**: Choose the network from this drop-down list.
b) **Mode**: Enter the mode in which the VNF will boot.
c) **VLAN**: Choose the VLAN for the VM.
d) **VLAN-Range**: Enter the range of VLAN for your VM.
e) **Native VLAN**: Choose the native VLAN for your VM from this field.
f) **Bridge**: The Layer 2 domain between virtual network interface controllers (vNICs) of VMs. Choose either the **Existing** or the **Create New** radio button.
g) **Interface**: Choose the interface from this field for your VM.

> **Note** Single Root Input/Output Virtualization (SR-IOV) is not supported in this installation.

Step 4   Click **Submit**.

Create a VM Package

Step 1   In the NFVIS portal, choose **Configuration** > **Virtual Machine** > **Images** > **Image Packaging**.

Step 2   To create a VM package, click the + icon.

Step 3   In the **Image Packaging** area, enter the following details:

    a) **Name**: The name associated with the VM packaging.

    b) **Version**: The version of the package.

    c) **VM Type**: The type of the VM for which you're creating the package.

    d) **Dedicate Cores (Optimize)**: The dedicated core a container requires. By default, the value is **False**.

    e) **Serial Console**: The field to either enable or disable access through the serial console. By default, the value is **Disable**.

    f) **SRIOV Driver**: The SRIOV supported by the VM interfaces.

    g) **Local**: The option you must use if the image you want to bundle is available in the intdatastore.

    h) **Upload Raw Images**: The option to upload an image to be packaged from your local machine.

    i) **Raw Disk File Bus**: Choose the root disk image bus from this drop-down list.

    j) **Thick Disk Provisioning**: Choose true from the drop-down list to enable thick provisioning. By default, the value is false.

Step 4   To upload the bootstrap file, do one of the following:

- Choose **Local** and choose the **Add Local File** option to add a locally available bootstrap file.

- Choose the **Upload Bootstrap Files** option to browse to the bootstrap configuration file from your computer.

- Choose the track state of the VM from the **Monitored** drop-down field. By default, the value is **False**.

Step 5   Click **Submit** to generate the VM Package.

Deploy the VM

Step 1   In the NFVIS Portal, choose **Configuration** > **Deploy**.

Step 2   In the **VM Deployment** window, choose the **Router** icon.

Step 3   Click on the VM. Four drag handlers appears around the VM. Drag from one of those handlers to any of the networks and provide the details.

Step 4   In the **VM Details** area, enter the following details:

    a) **VM Name**: Specify the name for your VM.

    b) **Image**: Choose the appropriate value from the drop-down list.

    c) **Profile**: Choose a profile from the drop-down list. The default profile is used when no profile is specified during deployment.

    d) **Group Name**: Choose a group if you want this VM to be associated with a specific group.

    e) **VNC Password**: Enter the VNC password in this field.

f) **Controller**: Choose **non-vManage** to deploy in autonomous mode and choose **vManage** to deploy the VM in controller mode.

g) **Tech Package**: Choose the desired tech package from the drop-down field. The available options are network essentials, network advantage, and network premier.

h) **NGIO**: The Next Generation Input/Output (NGIO) option that decides the NIM enablement capability available for the VM. Choose **ENABLE** from the NGIO drop-down list to enable NGIO.

i) **SSH Username**: The username to remotely log in to the Cisco Catalyst 8000V VM.

j) **SSH Password**: The SSH password to access the VM.

k) **Port Number**: The port number that is required for the SSH connectivity to the VM.

l) **External Port Number**: The external port number that is required for the SSH connectivity to the VM.

Step 5 Click **Deploy**.

Install the VM in NFVIS (Release 4.5.0 and Earlier)

Deploy the Virtual Machine on NFVIS

Step 1 From the NFVIS Portal select **VM Lifecycle** > **Deploy**.

Step 2 From the VM Deployment window, drag and drop the Router icon to the pane below and map to the desired networks as required.

Step 3 In the VM Details section, enter the **VM Name**.

Step 4 From the **Image** drop-down field, select the appropriate value.

Step 5 From the **Mode** drop-down field, select the **non-vManage** option.

Step 6 From the **Profile** drop-down field, select the profile name.

Step 7 From the **Tech Package** drop-down field, select the desired tech package.

Step 8 If a specific network function physical hardware is installed, you can pass it through into the VM by selecting **ENABLE** from the **NIM** drop-down field.

Step 9 Select the **ENABLE** option from the **Crypto Offload** drop-down field to offload the crypto processing to a hardware chip.

Step 10 Enter the username and password for the ssh login for Cisco Catalyst 8000V.

Step 11 Optionally, add other VM details like **VNC Password**, **Port Number**, **External Port**, **Source Bridge**, **Deployment Disk**, and **Management IP**.

Step 12 Select the **Add Bootstrap Config** option to provide the bootstrap configuration file before deploying the VM. Ensure that you use the filename `iosxe_config.txt` for the bootstrap configuration file.
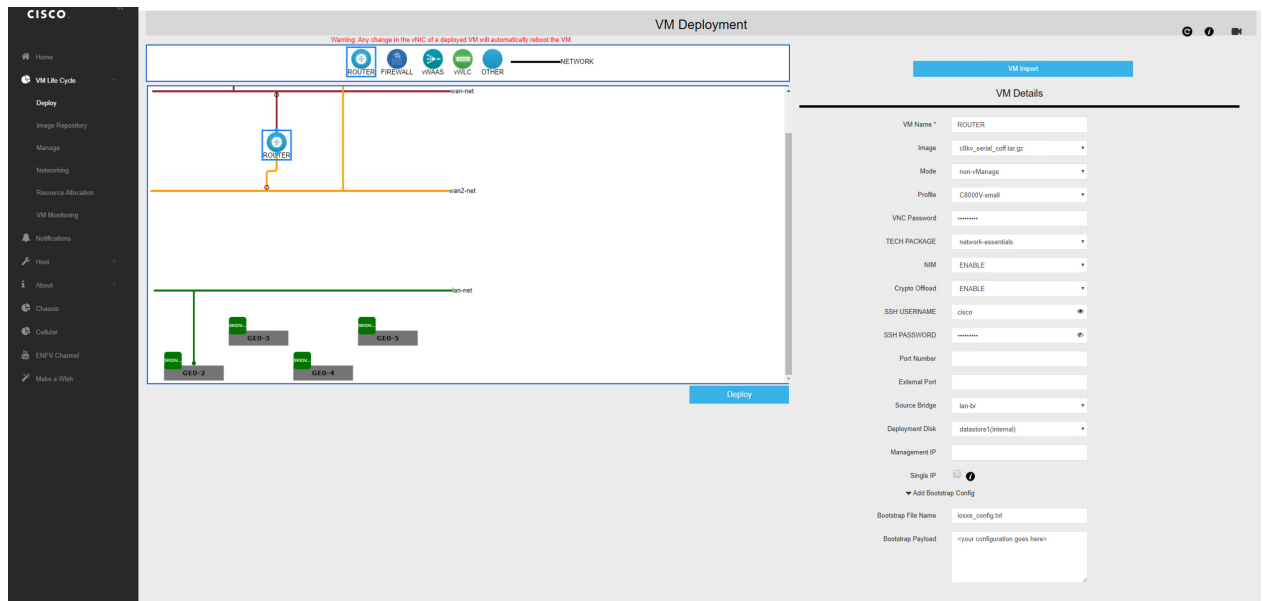
Note   Gigabit Ethernet 1 interface is reserved for management communications with NFVIS host.

Step 13   Click **Deploy**.

What to do next

After deploying the VM instance, check the Instance details through the **Manage** tab. This tab lists the summary of the VM instances.

To access the console, click the Console symbol next to the VM. You can also connect to the **serial console** of the VM using the following NFVIS command:

```
vmConsole <ROUTER-NAME>
```

Download the Cisco Catalyst 8000V Image for NFVIS

Step 1   Go to https://software.cisco.com/download/home

Step 2   In the Search bar at the bottom of the page, search Cisco Catalyst 8000V.

Step 3   Select the **Software Type** from the list. For example, IOS XE Software.

Step 4   From the list of files, download the latest Cisco Catalyst 8000V image file with the tar.gz extension.

Note   To deploy a Cisco Catalyst 8000V image in NFVIS, the image must be packaged with the image properties file.

Upload the Image on NFVIS

Step 1   Log in to the NFVIS Portal.

Step 2   Select **VM Lifecycle** > **Image Repository**.

Step 3   Click the **Image Registration** tab, and click the upload arrow next to the **Images** option.

Step 4   From the **Drop Files or Click** option on the top of the page, select the appropriate file.

Step 5   Click **Start** to upload the image.

After the image is uploaded, NFVIS creates the respective profiles and registers the image. You can find your file listed under the **Images** section on the same page.

Create a VM Package Using the Web Interface

Step 1   From the NFVIS Web Portal, select **Image Repository** > **Image Packaging**. Click the **Create** icon.

Step 2   Click **VM Packages**.

Step 3   Enter the details in **Image Packaging** tab. Select **Yes** from the **Dedicated Code** drop-down list.

Step 4   Click **Submit**. The bootstrap files are uploaded.

After the image is created, you have to register the image so that the profiles are populated in NFVIS.

Step 5   Select the image that you created and click **Register**.

Create a Network

Step 1   From the NFVIS Portal, select **VM Lifecycle** > **Networking**. The system displays the **Networks & Bridges** page.

Step 2   Click the **Create** icon next to Networks & Bridges.

Step 3   Enter the appropriate values for the **Network**, **Mode**, **VLAN**, **Bridge**, and **Interface** fields.

Single Root Input/Output Virtualization (SRIOV) is not supported.

Step 4   Click **Submit**. The network is now created.

Monitor the Virtual Machine

This procedure specifies the steps to monitor the VM and provides operational information such as resource allocation, VM statistics, and so on.

Step 1   To view the VM Resource Allocation follow these steps:

a)   From the NFVIS Portal select **VM Life Cycle** > **Resource Allocation**. The system displays the VM CPU Allocation tab which displays the overall CPU allocation.

b)   Click **VM Memory Allocation** to view the overall memory allocations.

c)   Click **VM Disk Allocation** to view the overall disk allocations.

Step 2   To view the VM Stastics, perform the following steps:

a)   From the NFVIS Portal select **VM Life Cycle** > **Resource Allocation**.

The system displays the VM CPU Utilization tab which displays the overall CPU utilization per VM.

b)   Click **Memory Allocation** to view the memory utilization per VM.

c) Click **VNC Utilization** tab to view the VNIC utilization per VM.

d) Click the **Disk Utilization** tab to view the disk utilization per VM.

The first interface on Cisco Catalyst 8000V is always reserved for Cisco NFVIS management network (generally Gigabit Ethernet 1). Cisco NFVIS assigns the IP address to this interface and it periodically monitors the VM by using ICMP pings via the interface.

Warning   Shutting down the interface or changing the IP address might result in the recovery and reload of the NFVIS VM.

Upgrade and Downgrade Between Cisco ISRV and Cisco Catalyst 8000V

From the Cisco IOS XE 17.4.x release onwards, Cisco Catalyst 8000V replaces Cisco Integrated Services Virtual Router (ISRV). As a user, you have the option of upgrading your existing ISRv routers into Cisco Catalyst 8000V. To know how to upgrade to the latest release of Cisco Catalyst 8000V, see Upgrading the Cisco IOS XE Software.

Note

- You cannot downgrade from Cisco Catalyst 8000V to Cisco ISRV.

- To upgrade from Cisco ISRV to Cisco Catalyst 8000V, the minimum version of Cisco ISRV supported are 16.12.4, 17.2.3, 17.3.2 . You cannot upgrade to Cisco Catalyst 8000V if you are using a Cisco ISRV device running on any other version than the ones mentioned above.

- When you upgrade from Cisco IOS XE 17.1.x or an earlier release to Cisco IOS XE 17.4.x, the **install add file bootflash:c8000v-universalk9.XXX.bin activate commit** command is not supported. To upgrade the Cisco ISRV to Cisco Catalyst 8000V, copy the `c8000v-universalk9.XXX.bin` file to `bootflash:`, under the Configuration folder. Then, use the **write memory** command to copy the configuration and start the upgrade process.

- If you are an existing Cisco CSR1000V user running Cisco IOS XE 16.12.3 release or earlier, and want to upgrade to Cisco Catalyst 8000V, you cannot upgrade by using the Web UI. You must first upgrade to Cisco CSR1000V releases 16.12.4, 17.2.3, or 17.3.2 before you upgrade to Cisco Catalyst 8000V.

- All licensing information is retained after you upgrade to Cisco Catalyst 8000V.

Supported Upgrade Paths

Autonomous Mode

- 16.12.x > 17.4 C8000V

- 17.2.x > 17.4 C8000V

- 17.3.x > 17.4 C8000V

Controller Mode

- 16.12.2 ISRV > 16.12.4 ISRV > 17.4 C8000V

- 16.12.3 ISRV > 16.12.4 ISRV > 17.4 C8000V

- 16.12.4 ISRV > 17.4 C8000V

- 17.1.1 ISRV > 17.3.x ISRV > 17.4 C8000V

- 17.2.1 ISRV > 17.2.2 ISRV > 17.4 C8000V

- 17.2.2 ISRV > 17.4 C8000V

- 17.3.x ISRV > 17.4 C8000V

Note   When you upgrade Cisco ISRV to Cisco Catalyst 8000V in the controller mode, first upgrade Cisco IOS XE to 17.3.1 and later releases or 16.12.4 and later releases.