# Cisco ACI Virtual Edge Installation

This chapter describes installation for Cisco ACI Virtual Edge, including prerequisites and installation methods.



# About Cisco ACI Virtual Edge Installation

Cisco ACI Virtual Edge installation consists of a series of tasks on the Cisco APIC, and VMware vCenter. You can then use one of three methods to deploy Cisco ACI Virtual Edge on ESXi hosts:

- Cisco ACI vCenter plug-in
- VMware PowerCLI (for Windows platforms)
- Python script

**Note** Do not use the vSphere (thick) Client to install Cisco ACI Virtual Edge or modify its vApp properties. Use only the Cisco ACI vCenter plug-in, the VMware Power CLI, or a Python script to install Cisco ACI Virtual Edge. Use only the vSphere Web Client to modify Cisco ACI Virtual Edge vApp properties.

**Note** When you deploy the Cisco ACI Virtual Edge VM on the ESXi hosts, OpFlex automatically comes online. Do not attach VMkernel ports to the Infra port group, as was done for OpFlex for Cisco AVS.

The following sections provide information about prerequisites and installation methods. For information about migrating from Cisco AVS to Cisco ACI Virtual Edge, see the chapter Migration from Cisco AVS to

Cisco ACI Virtual Edge in this guide. For information about migrating from VMware VDS to Cisco ACI Virtual Edge, see the chapter Migration from VMware VDS to Cisco ACI Virtual Edge in this guide.

**Note** Although you can install multiple Cisco ACI Virtual Edge VMs on the same host (one for each Cisco ACI Virtual Edge VMM domain), we recommend that you install only one Cisco ACI Virtual Edge VM per host.

# Cisco ACI Virtual Edge Installation Workflow

This section provides a high-level description of the tasks required to install the Cisco ACI Virtual Edge.

1. Fulfill all the prerequisites, which include tasks in the Cisco Application Policy Infrastructure Controller (APIC), and vCenter. See the section Prerequisites for Installing Cisco ACI Virtual Edge, on page 2.
2. Download the Cisco ACI Virtual Edge Open Virtualization Format (OVF) file from Cisco.com and then upload it to the vCenter content library. You can use the vCenter plug-in, the vCenter power CLI, or a Python script. See one of the following sections for instructions:
   - Upload the Cisco ACI Virtual Edge VM OVF File to the vCenter , on page 12
   - Install Cisco ACI Virtual Edge Cisco ACI Virtual Edge Using the VMware PowerCLI, on page 14
   - Install Cisco ACI Virtual Edge Using Python, on page 18
3. Deploy Cisco ACI Virtual Edge on the ESXi hosts. You can use one of four methods. See the following sections for instructions:
   - Deploy Cisco ACI Virtual Edge on the ESXi Hosts Using the Cisco ACI vCenter Plug-In, on page 12
   - Install Cisco ACI Virtual Edge Cisco ACI Virtual Edge Using the VMware PowerCLI, on page 14
   - Install Cisco ACI Virtual Edge Using Python, on page 18

**Note** We recommend that you deploy Cisco ACI Virtual Edge on a local datastore.

# Prerequisites for Installing Cisco ACI Virtual Edge

Perform the following tasks before you install Cisco ACI Virtual Edge:

- Make sure that Cisco APIC is set up correctly. See the *Cisco APIC Getting Started Guide* and *Cisco APIC Basic Configuration Guide*, on Cisco.com for instructions on how to configure Cisco APIC for the first time.
- Make sure that all switches are registered and that the Cisco ACI fabric is up-to-date. See *Cisco Application Centric Infrastructure Fundamentals* and the *Cisco APIC Getting Started Guide* on Cisco.com for instructions.

- Make sure that the ACI fabric is registered inside the vCenter plug-in. See "Connecting vCenter Plug-in to your ACI Fabric" in the chapter "Cisco ACI vCenter Plug-in" in the *Cisco ACI Virtualization Guide*.
- Create a new vCenter VMM domain and interface and switch profiles for Cisco ACI Virtual Edge.

  We recommend that you use the unified configuration wizard to perform these tasks. See the procedure Create vCenter Domain, Interface, and Switch Profiles Using the GUI, on page 5 in this guide. However, you may need to configure separate, more detailed policies. If so, see the appendix Alternate Procedures for Creating vCenter Domain, Interface, and Switch Profiles in this guide.
- In order to use the Cisco ACI Virtual Edge management tools (the ACI vCenter plug-in, the VMware PowerCLI, and Python scripts), we recommend that you use vCenter 6.0 Update 3 or later.
- Add one or more ESXi hosts and their PNICs to the new Cisco ACI Virtual Edge distributed virtual switch (DVS) in using vSphere Web Client on vCenter.
- If the host belongs to a Distributed Resource Scheduler (DRS) cluster that already has VMs running on Cisco ACI Virtual Edge put the host in maintenance mode before you add the Cisco ACI Virtual Edge DVS to it. Starting the installation with the host in maintenance mode prevents the DRS from migrating VMs to the other hosts before the Cisco ACI Virtual Edge VM is fully ready.
- If the host belongs to a DRS cluster, make sure that the Enhanced VMotion Compatibility (EVC) mode for the DRS cluster is set to Nehalem or higher.
- When connecting the Cisco ACI Virtual Edge using VXLAN encapsulation, set the maximum transmission unit (MTU) value equal to or greater than 1600 on all intermediate devices on the path between the Cisco ACI fabric and the Cisco ACI Virtual Edge. These include FI switches and UCS-B. However, to optimize performance, the MTU should be set to the maximum supported size that all intermediate devices on the path between the Cisco ACI fabric and the Cisco ACI Virtual Edge support.
- If you plan to install Cisco ACI Virtual Edge using the VMware PowerCLI, synchronize the clocks for the vCenter Server, any Active Directory domain controllers, and the host making single-sign-on connection requests. If the clocks are not synchronized, you may encounter problems when deploying Cisco ACI Virtual Edge using the VMware PowerCLI tool.

  For details, see the knowledge base article "Calling the SSOConnection SDK reports the exception: Client received SOAP Fault from server: The time now <timestamp> does not fall in the request lifetime interval extended with clock tolerance of 600000 ms (2125193)" on the VMware web site.

# Cisco APIC Settings Configuration

The following sections describe how to configure the Cisco ACI Virtual Edge and the VMware ESXi hypervisor with the Cisco APIC:

1. vCenter Domain, Interface, and Switch Profile Creation, on page 4
2. Interface and Switch Profile Guidelines and Prerequisites, on page 4
3. vCenter Domain Profile Guidelines and Prerequisites, on page 5
4. Create vCenter Domain, Interface, and Switch Profiles Using the GUI, on page 5

# vCenter Domain, Interface, and Switch Profile Creation

Before you can install the Cisco ACI Virtual Edge, you must create vCenter domain, interface, and switch profiles. We recommend that you perform these tasks in the united configuration wizard in the Cisco APIC. See the procedure Create vCenter Domain, Interface, and Switch Profiles Using the GUI, on page 5 in this guide.

Understand and follow the guidelines in this section before proceeding with the tasks.

### Alternate Procedures

If you want to configure a FEX profile or detailed interface, switch, or vCenter domain profiles, you can find instructions in Alternate Procedures for Creating vCenter Domain, Interface, and Switch Profiles in this guide.

### Firewall Considerations

If you use the recommended united configuration wizard, the Cisco APIC automatically creates a firewall policy, which can be modified later. If you instead use the alternate procedures to create interface, switch, or vCenter domain profiles, you will need to create a firewall policy manually. Follow the instructions in the Distributed Firewall section of the Cisco ACI Virtual Edge Configuration Guide.

# Interface and Switch Profile Guidelines and Prerequisites

Follow these guidelines and fulfill the prerequisites when creating interface and switch profiles for your Cisco ACI Virtual Edge.

### Guidelines for Creating Interface and Switch Profiles

The Cisco ACI Virtual Edge supports port channel (PC), virtual port channel (VPC), MAC Pinning, and FEX interface policies.

- If there is a Layer 2 network between the leaf switch and the Cisco ACI Virtual Edge vSphere host, configure the interface policy on the interfaces that are connected to the Layer 2 network.
- The number of links and leafs that you use determine whether you configure a PC or a VPC policy for the Cisco ACI Virtual Edge:
  - If you are using multiple links between one leaf and an ESXi host, you must configure a PC policy.
  - If you are using multiple links between multiple leafs and an ESXi host, you must configure a VPC policy.
- Follow these guidelines for choosing a LACP policy:
  - Choose LACP (Active or Passive) if the uplinks from the Cisco ACI Virtual Edge (vSphere host) are directly connected to the leaf switches and you want to use or turn on the LACP channeling protocol.
  - Choose Static Channel - Mode On if the uplinks form the Cisco ACI Virtual Edge are directly connected to the leaf switches but you do not want to use the LACP channeling protocol.
  - Choose MAC Pinning if the uplinks from the Cisco ACI Virtual Edge will not be channeled together and will operate as separate links.
- Follow these guidelines for choosing a vSwitch port group for the management interface:

Ensure that the vSwitch port group that you choose for the Cisco ACI Virtual Edge management interface can provide at least IPv4 addresses through DHCP or the vCenter IP pool. You can configure an additional IPv6 address for the vSwitch port group for the management interface; however, you cannot configure it only with an IPv6 address.

### Prerequisites for Creating Interface and Switch Profiles

Verify that the leaf switch interfaces are physically connected to the ESXi hypervisor. Or, if you are using a Layer 2 device, verify that the leaf is physically connected to the Layer 2 device.

## vCenter Domain Profile Guidelines and Prerequisites

You must create a new vCenter domain profile before you can install Cisco ACI Virtual Edge. You cannot convert an existing vCenter domain profile.

### Guidelines for Creating a VMware vCenter Domain Profile

You can create multiple data centers and DVS entries under a single domain. However, you can have only one Cisco ACI Virtual Edge assigned to each data center.

You can use IPv6 when creating a VMM domain if the vCenter and ESXi host management are IPv6-enabled.

### Prerequisites for Creating a VMware vCenter Domain Profile

Ensure that the multicast IP address pool has enough multicast IP addresses. You must accommodate the number of EPGs to be published to the VMware vCenter domain. You can add more IP addresses to a multicast address pool that is already associated with a VMware vCenter domain at any time.

Ensure that you have enough VLAN IDs. If you do not, ports on endpoint groups (EPGs) might report that no encapsulation is available.

vCenter must be installed, configured, and reachable through the in-band/out-of-band management network.

You must have the administrator/root credentials to the vCenter.

## Create vCenter Domain, Interface, and Switch Profiles Using the GUI

**Note** If you want to choose a delimiter for the VMware PortGroup name when you create a vCenter domain, you cannot do so in this procedure. This procedure uses a configuration wizard that enables you to configure a vCenter domain, interface, and switch profiles. Instead, you must create the vCenter domain separately; the delimiter option appears in the **Create vCenter Domain** dialog box. See the procedure Create a VMM Domain Profile for Cisco ACI Virtual Edge in this guide.

### Before you begin

Before you create a vCenter domain profile, you must establish connectivity to an external network using in-band management network on the Cisco APIC.

### Procedure

**Step 1** Log in to the Cisco APIC.

**Step 2** On the menu bar, click **Fabric** > **Access Policies**.

**Step 3** In the Policies **Navigation** pane, right-click **Switch Policies**, and then click **Configure Interfaces, PC, and VPC**.

**Step 4** In the **Configure Interfaces, PC, and VPC** dialog box, expand **Configured Switch Interfaces**, click the green + icon, and then perform the following steps:

a) In the **Select Switches to Configure Interfaces** area, make sure that the **Quick** radio button is selected.

b) From the **Switches** drop-down list, choose the appropriate leaf ID.

In the **Switch Profile Name** field, the switch profile name automatically appears.

c) Click the green + icon again.

The **Configure Interfaces, PC, and VPC** dialog box displays a wizard that enables you to configure vCenter domain, interface, and switch profiles.

**Step 5** In the wizard, perform the following actions:

a) In the **Interface Type** area, choose the appropriate radio button.

PC and VPC are the only valid options for Cisco ACI Virtual Edge deployment. See the section Interface and Switch Profile Guidelines and Prerequisites, on page 4 in this guide.

b) In the **Interfaces** field, enter the interface or interface range for your vSphere hosts.

Once you enter the interface or interface range, the wizard enters a name in the **Interface Selector Name** field.

c) In the **Interface Policy Group** area, choose the **Create One** radio button.

**Note** This procedure assumes that you are creating interface and switch policies and creating a vCenter domain rather than using existing ones. If you choose the **Choose One** radio button, you will not be able to create policies in the wizard.

d) From the **CDP Policy** or the **LLDP Policy** drop-down list, create a policy.

**Note** If you use a Cisco Unified Computing System (UCS) server, create two policies. Create one policy to enable a Cisco Discovery Protocol (CDP) policy and a second policy to disable Link Layer Discovery Protocol (LLDP).

**Note** CDP and LLDP policies are disabled by default. You can enable them in the configuration wizard. Enable CDP or LLDP policies in the **Interface Policy Group** area to enable them on Cisco ACI Virtual Edge and other switches in the fabric. If you want to enable CDP or LLDP only on Cisco ACI Virtual Edge, enable them in the **vSwitch Policy** area of the configuration wizard.

e) From the **Link Level Policy** drop-down list, choose a link level policy or create one.

The link level policy specifies the speed of the physical interface. If you do not choose a link level policy, the speed defaults to 10 Gbps.

f) In the **Port Channel Policy** drop-down list, choose **Create Port Channel Policy**.

g) In the **Create Port Channel Policy** dialog box, enter a name for the policy, choose a mode, and then click **Submit**.

Choose the same policy mode that is on the ESXi server. For example, if the server does not support LACP, you can choose **Static Channel - Mode On** or **MAC Pinning**. Other fields in the dialog box are optional.

h) In the **Attached Device Type** area, choose **AVE VLAN Hosts** or **AVE VXLAN Hosts**.

**Note** If the hypervisors are directly connected to leaf switches, you can use either VLAN or VXLAN. (Cisco UCS blade servers, where Fabric Interconnects are connected to the fabric, are considered to be directly connected.) However, if the hypervisors are not directly connected to leaf switches, you must use VXLAN. For more information, see the Cisco ACI Virtual Edge Overview section.

i) In the **Domain** area, make sure that the **Create One** radio button is chosen.

The **Create One** option is used when creating a new VMM domain for an interface or switch profile, as you do in this procedure. The **Choose One** button is used when creating an interface or switch profile for a new host that you want to make part of an existing VMM domain.

j) In the **Domain Name** field, enter the domain name.

**Note** When you create the VMM domain, you choose VLAN or VXLAN encapsulation, depending on the attached device type you chose in Step 5 h. However, you can configure a single VMM domain to use VLAN and VXLAN encapsulation. After you finish installing the Cisco ACI Virtual Edge, you can enable mixed encapsulation mode. See the section "Mixed-Mode Encapsulation Configuration" in the Cisco ACI Virtual Edge Configuration Guide.

k) Complete one of the following series of steps:

**Mandatory:** If you deploy Cisco ACI Virtual Edge in mixed-mode or VLAN mode, create two VLAN pools: one for primary encapsulation and one for private VLAN implementation. The role for the private VLAN pool must be internal. If you deploy Cisco ACI Virtual Edge in VXLAN mode, only a private VLAN pool is necessary.

| If in Step 5 h you chose... | Then... |
| --- | --- |
| **AVE VLAN Hosts** | **1.** In the **VLAN** area, make sure that the **Create One** radio button is chosen.<br>**2.** In the **VLAN Range** field, enter the VLAN range as appropriate.<br>**Note** Do not define a range that includes the reserved VLAN ID for the infrastructure network because that VLAN is for internal use.<br>The VLAN range is for external or on-the-wire encapsulations. It is used for allocating VLANs for each EPG assigned to the domain. The VLANs are used when packets are sent to or from leafs.<br>**3.** In the **Internal VLAN Range** field, enter a range.<br>The internal VLAN range is used for private VLAN allocations in the internal vSwitch by the Cisco ACI Virtual Edge. The VLANs are not seen outside the ESX host or on the wire.<br>**Note** If you use Cisco ACI Virtual Edge, and you deploy it in mixed-mode or VLAN mode, create two VLAN pools. Create one for primary encapsulation and one for private VLAN implementation. The role for the private VLAN pool must be internal. If you deploy Cisco ACI Virtual Edge in VXLAN mode, only a private VLAN pool is necessary. |

| If in Step 5 h you chose... | Then... |
|---|---|
| **AVE VXLAN Hosts** | **1.** In the **VLAN** area, make sure that the **Create One** radio button is chosen.<br>**2.** In the **Internal VLAN Range** field, enter a range.<br>**3.** In the **Fabric Multicast Address** field, enter a multicast address, such as 225.1.1.1.<br>**4.** In the **Pool of Multicast Address Ranges** field, create a new multicast pool or choose an existing one.<br>**Note** The multicast address configured in Step 3 must not overlap with the ranges configured in Step 4.<br>**5.** In the **Local Switching** area, choose **True** or **False**.<br>With local switching, traffic within an EPG does not go to the leaf. So if you choose local switching, you may not see some traffic counters. If you want to see all intra-EPG traffic, choose **False**. See the section About Cisco ACI Virtual Edge for additional information about Local Switching and No Local Switching modes. |

l) (Optional) From the **Security Domains** drop-down list, choose or create a security domain.

m) In the **vCenter Login Name** field, enter the vCenter Administrator/root username.

n) In the **Password** field, enter the vCenter Administrator/root password.

o) In the **Confirm Password** field, reenter the password.

**Step 6** Click the + icon to expand **vCenter**, and in the **Create vCenter Controller** dialog box, perform the following actions:

a) In the **Name** field, enter a name to refer to the vCenter domain.

The name does not need to be the same as the vCenter domain name; you can use the vCenter host name.

b) In the **Host Name (or IP Address)** field, enter the host name or IP address.

If you use the host name, you must already have configured a DNS policy on Cisco APIC. If you do not have a DNS policy configured, enter the IP address of the vCenter server.

c) From the **DVS Version** drop-down list, choose a DVS version.

The DVS version that you choose represents the minimum ESXi version of the host that can be added to the virtual switch. So if you choose DVS version 6.0, you can add or manage hosts of ESXI version 6.0 and later.

**Note** Cisco ACI Virtual Edge supports DVS and ESXi versions 6.0 and later.

d) In the **Datacenter** field, enter the data center name.

**Note** The name that you enter for **Datacenter** must match exactly the name in vCenter. The name is case-sensitive.

e) Click OK.

**Note** For the following three steps, if you do not specify port channel, vSwitch, or interface control policies, the same interface policy that you configured earlier in this procedure will take effect for the vSwitch.

f) From the **Port Channel Mode** drop-down list, choose a mode.

Choose **MAC Pinning** if you have a Unified Computing System (UCS) Fabric Interconnect (FI) between the top-of-rack switch and the Cisco ACI Virtual Edge.

g) In the **vSwitch Policy** area, choose a policy.

h) In the **Interface Controls** area, choose **BPDU Guard**, **BPDU Filter**, or both.

See the section "BPDU Features" in the Cisco ACI Virtual Edge Configuration Guide for information about BPDU Guard and BPDU Filter.

i) From the **Firewall** drop-down list, choose **Learning**, **Enabled** or **Disabled** mode.

Learning mode, the default, should be used only when upgrading to Cisco ACI Virtual Edge from a version of Cisco AVS that does not support Distributed Firewall. Otherwise, Distributed Firewall should be in Enabled mode. You can change the Distributed Firewall mode later. See the chapter "Distributed Firewall" in the Cisco ACI Virtual Edge Configuration Guide.

j) Disregard the NetFlow Exporter Policy option.

**Step 7** In the **Configure Interface, PC, And VPC** dialog box, click **Save**, click **Save** again, and then click **Submit**.

**Step 8** Verify the new domain and profiles, by performing the following actions:

a) On the menu bar, choose **Virtual Networking** > **Inventory**.

b) In the navigation pane, expand **VMM Domains** > **VMware** > ***Domain_name*** > **Controllers**, and then choose the vCenter.

In the work pane, under **Properties**, view the virtual machine manager (VMM) domain name to verify that the controller is online. In the work pane, the vCenter properties are displayed including the operational status. The displayed information confirms that connection from the Cisco APIC to the vCenter server is established, and the inventory is available.

# Add ESXi Hosts and PNICs to the Cisco ACI Virtual Edge DVS

Before you can install Cisco ACI Virtual Edge, you must add one or more ESXi hosts and their respective PNICs to the new Cisco ACI Virtual Edge DVS.

### Before you begin

- Create a VMM domain for Cisco ACI Virtual Edge. See the procedure Create a VMM Domain Profile for Cisco ACI Virtual Edge in this guide.
- Have at least one available PNIC on the host.

### Procedure

**Step 1** Log in to the VMware vCenter Web Client.

**Step 2** Go to **Networking**.

**Step 3** In the left navigation pane, expand the Cisco ACI Virtual Edge folder and the folder for the newly created Cisco ACI Virtual Edge VMM domain.

**Step 4** Right click the Cisco ACI Virtual Edge domain and choose **Add and Manage Hosts**.

**Step 5** In the **Add and Manage Hosts** dialog box, in the **Select task** pane, click the **Add hosts** radio button and then click **Next**.

**Step 6** In the **Select hosts** pane, click **New hosts**.

**Step 7** In the **Select new hosts** dialog box, choose all the hosts that you want to add to the Cisco ACI Virtual Edge DVS, and then click **OK**.

**Step 8** In the **Add and Manage Hosts** dialog box, click **Next**.

**Step 9** Check the **Manage physical adapters** check box and then click **Next**.

**Step 10** In the **Manage physical network adapters** pane, choose a PNIC, and click **Assign uplink**.

**Step 11** In the **Select an Uplink** dialog box, choose an uplink for the adapter, and then click OK.

**Step 12** Repeat Step 10 and Step 11 for each additional PNIC you want to add.

**Step 13** Click **Next**, click **Next** again, and then click **Finish**.

Each host that you chose in Step 6 appears in the Cisco ACI Virtual Edge domain work pane.

### What to do next

Upload the OVF file of the Cisco ACI Virtual Edge VM to the vCenter.

# Cisco ACI Virtual Edge Installation Using the vCenter

After you fulfill the installation prerequisites, you can use the vCenter to install Cisco ACI Virtual Edge. You use the Cisco ACI vCenter plug-in, which automates the process.

You first upload the Cisco ACI Virtual Edge VM Open Virtualization Format (OVF) file to the vCenter content library. You can then deploy Cisco ACI Virtual Edge on the ESXi hosts.

**Note** If you use a local datastore for content library storage, re-create the content library after you remove a host and then reattach it to vCenter. That is because the datastore ID changes after the host is reattached, breaking the association between the content library and the datastore.

**Note** After you deploy Cisco ACI Virtual Edge, do not remove it from the vCenter inventory and add it back. Doing so removes all the configurations you made during deployment. Deploy a new Cisco ACI Virtual Edge instead of adding an existing one back to the inventory.

# Upload the Cisco ACI Virtual Edge VM OVF File to the vCenter

You upload the Cisco ACI Virtual Edge VM OVF file to the vCenter before you deploy Cisco ACI Virtual Edge on the ESXi hosts.

### Before you begin

You must have done the following:

- Created a VMM domain for the Cisco ACI Virtual Edge on Cisco APIC.
- Added one or more ESXi hosts and PNICs to the new Cisco ACI Virtual Edge DVS in the vCenter.
- Downloaded the folder with the OVF file to your computer.
- Made sure that the OVF file is compatible with the version of Cisco APIC.
- Have already registered the Cisco ACI fabric inside the Cisco ACI vCenter plug-in.

### Procedure

**Step 1** Log in to the vSphere Web Client.

**Step 2** Choose **Content Libraries**.

You can use an existing content library or create one to receive the upload of the Cisco ACI Virtual Edge VM OVF. See VMware documentation for instructions.

**Step 3** Choose the library and then click **Import item**.

**Step 4** In the **Import library item** dialog box, click the **Browse** button.

**Step 5** In the pop-up dialog box, choose the OVF file and click **Open**.

Once the OVF file is uploaded to the content library, it appears in the work pane under the **Templates** tab.

### What to do next

Deploy Cisco ACI Virtual Edge on the ESXi hosts.

# Deploy Cisco ACI Virtual Edge on the ESXi Hosts Using the Cisco ACI vCenter Plug-In

After you upload the Cisco ACI Virtual Edge VM OVF file to VMware vCenter, you deploy Cisco ACI Virtual Edge on the ESXi hosts.

### Before you begin

You must have done the following:

- Created a VMM domain for the Cisco ACI Virtual Edge on Cisco APIC.
- Added one or more ESXi hosts and PNICs to the new Cisco ACI Virtual Edge DVS in vCenter.

- Uploaded the Cisco ACI Virtual Edge VM OVF file to vCenter.

**Note** If you use VMware vCenter 6.0 Web Client, the pop-up window for browsing to the OVF file may not appear. In that case, upload the OVF and virtual machine disk file (VMDK) to the HTTP server. Then use the OVF file URL from the server to download the OVF file to the content library.

### Procedure

**Step 1** Log in to the vSphere Web Client.

**Step 2** In the **Home** work pane, click the **Cisco ACI Fabric** icon.

**Step 3** In the **Cisco ACI Fabric** navigation pane, click **ACI Virtual Edge**.

**Step 4** In the **ACI Virtual Edge** work pane, if there are multiple virtual domains, choose the domain from the **Select an ACI Virtual Edge Domain** drop-down list; if there is only one virtual domain, skip to the next step.

**Step 5** Choose the host or hosts on which you want to deploy Cisco ACI Virtual Edge.

**Step 6** From the **ACI Virtual Edge version** drop-down list, choose the version to be deployed.

**Step 7** From the **Management PortGroup** drop-down list, choose the management port group.

**Step 8** From the **Datastore** drop-down list, choose **Custom**, click **Edit**.

**Step 9** In the **Custom AVE Datastore selection** dialog box, ensure that the **Use local datastore only** check box is checked, and then choose the local data store for each Cisco ACI Virtual Edge.

**Note** Cisco ACI Virtual Edge installation is supported only on local data stores in the current release. If you try to choose a remote host, you see a warning message. Installation on remote data stores (SAN) will be supported in a future release.

**Note** You may not see all types of local storage in vCenter. However, if you uncheck the **Use local datastore only** check box, vCenter shows all local data stores. For details, see the document "When installing ESX/ESXi 4.x or 5.x to a physical server, the local SAS drive appears as a remote storage (1027819)" on the VMware website for details.

**Step 10** In the **VM Admin Password** fields, enter a new password for the Cisco ACI Virtual Edge VMs.

**Step 11** Click **Install/Upgrade ACI Virtual Edge**.

**Step 12** In the **Install** dialog box, click **Yes**.

In the work pane, the installed hosts display OpFlex status, the Cisco ACI Virtual Edge VM, and management IP. It could take a little while for OpFlex to come up.

### What to do next

- Attach the correct EPGs to the VMM domain on the Cisco APIC controller or through vCenter using the Cisco ACI vCenter plug-in.
- Put the VMs into the correct port groups in vCenter.

# Cisco ACI Virtual Edge Installation Using the VMware PowerCLI

After you fulfill the preinstallation prerequisites, you can use the VMware PowerCLI to install Cisco ACI Virtual Edge.

You first download the .zip file containing the VMware PowerCLI file, import the Cisco ACI Virtual Edge module, then deploy the new Cisco ACI Virtual Edge VM from the vCenter content library.

## Install Cisco ACI Virtual Edge Cisco ACI Virtual Edge Using the VMware PowerCLI

If you have a Windows platform, you can use the VMware PowerCLI to install Cisco ACI Virtual Edge.

After you download the script module, you use the VMware PowerCLI to connect to vCenter, import the CiscoAVE module, and then deploy a new Cisco ACI Virtual Edge VM from the vCenter content library.

**Note** You can use 'Get-Help' on any command to get help for any of the parameters. For example: **Get-Help New-LocalContentLibrary**

**Procedure**

**Step 1**

**Step 2** Download the following .zip file from Cisco.com: `cisco-ave-tools-`*`version`*`.zip`.

The folder contains the following:

```
cisco-ave-tools-<version>

* powercli/

. CiscoAve.psm1
```

**Step 3** Import the CiscoAVE module.

**Example:**

```
C:\> Import-Module .\Users\user name\Desktop\CiscoAve.psm1
```

**Step 4** Connect to the vCenter.

You must connect to both the VIServer and the cisServer, as shown in the following example.

**Example:**

```
PowerCLI C:\> Connect-VIServer -Server vcenter_domain.com

PowerCLI C:\> Connect-cisServer -Server vcenter_domain.com
```

**Step 5** Create a new content library on vCenter.

**Example:**

```
PowerCLI C:\> New-LocalContentLibrary -Name content_library_Name -Datastore data_store_name
```

**Step 6** Upload the Cisco ACI Virtual Edge OVF file to content library.

**Example:**

```
PowerCLI C:\> New-AveContentLibraryItem -Name name_of_OVF_file -ContentLibrary
content_library_name -Ovf path on your machine to OVF file
```

**Step 7** (Optional) Remove an Item from the content library.

**Example:**

```
PowerCLI C:\> Remove-LocalContentLibraryItem -Name name_of_OVF_file -ContentLibrary
content_library_name
```

**Step 8** (Optional) Get the details of content library items.

**Example:**

```
PowerCLI C:\> Get-ContentLibraryItem -Name name_of_OVF_file
```

**Step 9** List the Cisco ACI Virtual Edge VMs already deployed on the hosts.

**Example:**

```
C:\> Get-AveVM
```

The console displays a message similar to the following:

```
Virtual Machine             Host            Domain      Management IP
cisco-ave_192.0.2.101_ave-vm-1    192.0.2.101     ave-vm-1    192.0.2.141
```

**Step 10** Deploy the Cisco ACI Virtual Edge VM from the vCenter content library using one of the following methods:

- Method 1—Use this method to deploy a new Cisco ACI Virtual Edge VM. This will statically assign an IP address to the Cisco ACI Virtual Edge management.
- Method 2—Use this method to deploy a new Cisco ACI Virtual Edge VM. This will require that the DHCP Server on management network to assign an IP address to the Cisco ACI Virtual Edge management.

| Option | Description |
|---|---|
| If you want to use... | Then... |
| Method 1 | Use the following command:<br>`PowerCLI C:\> New-AveVM -HostName host where you want to deploy Cisco ACI Virtual Edge -DomainName VM_domain_name -MgmtPortgroupName management_port_group_name -InfraVlan infraVLAN -OvfItem OVF_file_name -Datastore data_store_name -Ip Management IP address for Cisco ACI Virtual Edge -Netmask subnet_mask -Gateway gateway_ IP_address -Nameserver DNS_IP_address`<br>**Note** Choose a local data store for Cisco ACI Virtual Edge deployment. Installation of the Cisco ACI Virtual Edge VM on a remote host is not supported.<br>The following parameters are optional: (If you do not use them, the DHCP server on the management network must assign an IP address for Cisco ACI Virtual Edge management during deployment.)<br>• -iP<br>• -Netmask<br>• -Gateway |

| Option | Description |
|---|---|
| | • -Nameserver |
| Method 2 | Use the following command:<br>`PowerCLI C:\> New-AveVM -HostName host where you want to deploy Cisco ACI Virtual Edge -DomainName VM_domain_name -MgmtPortgroupName management_port_group_name -InfraVlan infraVLAN -OvfItem OVF_file_name -Datastore data_store_name`<br>**Note** Choose a local data store for Cisco ACIO Virtual Edge deployment. Installation of the Cisco ACI Virtual Edge VM on a remote host is not supported. |

Wait for the installation to complete before proceeding to the next step. Until the deployment is finished, a progress bar and a status message display on the console:

```
Deploying AVE VM on Host <hostname> for domain <domainname>
```

**Step 11** When you are prompted, enter the adminPassword, which is required to connect by SSH to the Cisco ACI Virtual Edge.

**Example:**

```
PowerCLI C:\> $password = Read-Host -AsSecureString
```

```
PowerCLI C:\> New-AveVM -HostName host where you want to deploy Cisco ACI Virtual Edge
-DomainName VM VM_domain_name -MgmtPortgroupNamemanagement_port_group_name -AdminPassword
$password -InfraVlan infraVLAN -OvfItem
OVF_file_name -Datastore data_store_name
```

**Step 12** Verify the installation by again listing the Cisco ACI Virtual Edge VMs deployed on the hosts.

**Example:**

```
C:\> Get-AveVM
```

The console displays a list similar to the following:

```
Virtual Machine       Host   Domain  Management IP
cisco-ave_192.0.2.101_ave-vm-2  192.0.2.103  ave-vm-2 192.0.2.143
cisco-ave_192.0.2.101_ave-vm-1  192.0.2.101  ave-vm-1 192.0.2.141
```

**Step 13** (Optional) Remove any unneeded Cisco ACI Virtual Edge VMs from vCenter.

**Example:**

```
C:\> Remove-AveVM -HostName 192.0.2.101 -DomainName ave-vm-1
```

**Example:**

Wait for the uninstallation to complete before proceeding to the next step. Until the uninstallation is finished, a progress bar and status message display on the console.

**Step 14** Verify the removal by again listing the Cisco ACI Virtual Edge VMs deployed on the hosts.

**Example:**

```
C:\> Get-AveVM
```

The console displays a list similar to the following:

```
Virtual Machine       Host   Domain  Management IP
cisco-ave_192.0.2.101_ave-vm-2  192.0.2.103  ave-vm-2 192.0.2.143
```

# Cisco ACI Virtual Edge Installation Using Python

After you fulfill the preinstallation prerequisites, you can use Python to install Cisco ACI Virtual Edge.

You first download the zip file containing the Python files, set up the environment to run Python, and then use Python commands to create a content library on vCenter, upload the Cisco ACI Virtual Edge VM OVF file to the vCenter content library, and then deploy the new VM from the content library.

## Set Up the Python Environment for Installing Cisco ACI Virtual Edge

Set up the Python environment so you can use Python to install Cisco ACI Virtual Edge.

### Before you begin

- Ensure that you have Python 2.7.13 or a later version.
- Ensure that you have VMware vCenter 6.0 GA U3 or later, which is required for Python installation for Cisco ACI Virtual Edge.
- We strongly recommend that you use a virtual environment for an easy and trouble-free installation process.

### Procedure

**Step 1** Download the following .zip file from Cisco.com: `cisco-ave-tools-`*`version`*`.zip`.

The folder contains the following:

```
cisco-ave-tools-<version>

* python/

. requirements.txt
. content-library.py
. get-avevm.py
. new-avevm.py
. remove-avevm.py
. utilities.py
```

**Step 2** Complete one of the following series of steps:

| Option | Description |
|---|---|
| If you... | Then... |
| Want to use a virtual environment | **Note** If you plan to use a proxy to access the Internet, make sure to configure the proxy as follows:<br>`export http_proxy=http://`*`your_proxy_ip`*`:`*`your_proxy_port`*<br>`export https_proxy=http://`*`your_proxy_ip`*`:`*`your_proxy_port`* |

| Option | Description |
|---|---|
| | 1. Enter the following command:<br>**# pip install virtualenv**<br>2. Enter the following command:<br>**# virtualenv venv**<br>3. Activate your virtual environment by entering one of the following commands:<br>• For MAC OS and Linux systems: **. venv/bin/activate**<br>• For Windows systems: **ven\Scripts\activate**<br><br>Install the Python package references by entering the following command:<br>**# pip install -r requirements.txt**<br>**Note** The file `requirements.txt` contains all the dependencies that the script relies on. This is a one-time task. If you have permission issues, use the following command: **# sudo -H pip install -r requirements.txt** |
| Do not want to use a virtual environment | Install the Python package references by entering the following command:<br>**# pip install -r requirements.txt**<br>**Note** The file `requirements.txt` contains all the dependencies that the script relies on. This is a one-time task. If you have permission issues, use the following command: **# sudo -H pip install -r requirements.txt** |

# Install Cisco ACI Virtual Edge Using Python

You run a series of Python scripts to perform several tasks. They include creating a new content library on vCenter, uploading the Cisco ACI Virtual Edge VM OVF file to the content library, and deploying a new Cisco ACI Virtual Edge VM from the content library.

**Note** You can enter **-h** on any script to get help for any of the parameters. Example:

```
# python new-avevm.py -h
```

### Before you begin

- Ensure that you have set up the Python environment. See the procedure Set Up the Python Environment for Installing Cisco ACI Virtual Edge, on page 17 in this guide.
- If you used a proxy to access the Internet when setting up the Python environment, unset it before running Python scripts:

```
unset http_proxy
unset https_proxy
```

### Procedure

**Step 1** Create a new content library on vCenter by running the following script:

```
# python content-library.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
 'vCenter password' Create --name content library name --datastore datastore name --datacenter
 datacenter name
```

**Step 2** Upload an OVF file to the content library by running the following script:

```
# python content-library.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
 'vCenter password' Upload --library content library name --item AVE OVF filename --path
path on your machine to OVF file
```

The upload from your machine to the content library may take some time to complete. Wait until the upload is complete before proceeding to the next step.

A message showing the upload status displays; wait until the upload is complete.

**Step 3** (Optional) Delete an item from the content library by running the following script:

```
# python content-library.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
 'vCenter password' Remove --library content library name --item item to be deleted
```

**Step 4** List all the Cisco ACI Virtual Edge VMs currently deployed by running the following script:

```
# python get-avevm.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
'vCenter password'
```

A list similar to the following example displays:

```
Virtual Machine             Host            Domain      Management IP
cisco-ave_192.0.2.101_ave-vm-1    192.0.2.101     ave-vm-1    192.0.2.141
```

**Step 5** Deploy a new Cisco ACI Virtual Edge VM from the content library by using one of the following methods:

- Method 1—Use this method to deploy a new Cisco ACI Virtual Edge VM. This will statically assign an IP address to the Cisco ACI Virtual Edge management.
- Method 2—Use this method to deploy a new Cisco ACI Virtual Edge VM. This will require that the DHCP server on management network to assign an IP address to the Cisco ACI Virtual Edge management.

| Option | Description |
|---|---|
| If you want to use... | Then... |
| Method 1 | Use the following command:<br>`# python new-avevm.py --vcHost vCenter host name --vcUser vCenter user name --vcPwd vCenter password --hostName host where you want to deploy Cisco ACI Virtual Edge --domainName VM domain name --mgmtPortgroupName name of management portgroup --infraVlan infraVLAN --ovfItem name of OVF file --datastore data store name --ip management IP address for Cisco ACI Virtual Edge --netmask subnet mask --gateway gateway IP address --nameserver DNS IP address`<br>**Note** Choose a local data store for Cisco ACI Virtual Edge deployment. Installation of the Cisco ACI Virtual Edge VM on a remote host is not supported. |

| Option | Description |
|---|---|
| | The following parameters are optional: (If you do not use them, the DHCP server on the management network must assign an IP address for Cisco ACI Virtual Edge management during deployment.)<br>• -ip<br>• -subnet<br>• -gateway<br>• -nameserver |
| Method 2 | Use the following command:<br>`# python new-avevm.py --vcHost vCenter host name --vcUser vCenter user name --vcPwd vCenter password --hostName host where you want to deploy Cisco ACI Virtual Edge --domainName VM domain name --mgmtPortgroupName name of management portgroup --infraVlan infraVLAN --ovfItem name of OVF file --datastore data store name`<br>**Note** Choose a local data store for Cisco ACI Virtual Edge deployment. Installation of the Cisco ACI Virtual Edge VM on a remote host is not supported. |

**Step 6** When you are prompted, enter the adminPassword, which is required to connect by SSH to the Cisco ACI Virtual Edge.

Alternatively, you can read the adminPassword into a variable and use it while deploying the Cisco ACI Virtual Edge VM:

```
# read -s pass

[type in adminPassword]

# python new-avevm.py --vcHost vCenter host name --vcUser vCenter user name --vcPwd
vCenter password --hostName host where you want to deploy Cisco ACI Virtual Edge --domainName
 VM domain name --mgmtPortgroupName name of management portgroup  --infraVlan infraVLAN
--ovfItem name of OVF file --adminPassword $pass --datastore data store name
```

**Step 7** Wait for installation to complete before proceeding to the next step.

The screen displays the installation status:

```
Connecting to vCenter...
Getting objects from inventory...
Initializing tags...
Checking for existing AVE VM...
Getting OVF From content library...
Mapping networks...
Deploying OVF (this might take several minutes)...
Configuring VM...
Powering On VM...

Deployment successful!
```

**Step 8** Verify the installation by again listing the Cisco ACI Virtual Edge VMs deployed by running the following script:

```
# python get-avevm.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
'vCenter password'
```

**Example:**

A list similar to the following displays:

```
Virtual Machine       Host   Domain  Management IP
cisco-ave_192.0.2.103_ave-vm-2  192.0.2.103  ave-vm-2 192.0.2.143
cisco-ave_192.0.2.101_ave-vm-1  192.0.2.101  ave-vm-1 192.0.2.141
```

**Step 9** (Optional) Remove any unneeded Cisco ACI Virtual Edge VM from vCenter by running the following script:

```
# python remove-avevm.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
'vCenter password' --hostName name of host where AVE VM resides --domainName name of VM
domain
```

The following message displays:

```
Connecting to vCenter...
Getting objects from inventory...
Initializing tags...
Getting the AVE SVM...
Removing Tags...
Deleting VM...

Removal successful!
```

**Step 10** Verify the removal by again listing the Cisco ACI Virtual Edge VMs deployed by running the following script:

```
# python get-avevm.py --vcHost vCenter host name --vcUser 'vCenter user name' --vcPwd
'vCenter password'
```

A list similar to the following displays:

```
Virtual Machine       Host   Domain  Management IP
cisco-ave_192.0.2.101_ave-vm-2  192.0.2.103  ave-vm-2 192.0.2.143
```

# Viewing Cisco ACI Virtual Edge Licenses Using the GUI

Beginning with Cisco APIC Release 3.2(1), you can view Cisco ACI Virtual Edge licenses in the Cisco ACI Fabric as part of the Smart Licensing feature.

You also can use NX-OS style CLI commands to view licensing information. For detailed information, see the knowledgebase article *Smart Licensing* on Cisco.com.

### Before you begin

You must register for Smart Licensing. See the knowledgebase article *Smart Licensing* on Cisco.com.

### Procedure

**Step 1** Log in to Cisco APIC.

**Step 2** Go to **System** > **Smart Licensing**.
The central pane, in the **Smart License Usage** area, displays a list of licenses, their number, and status. For the Cisco ACI Virtual Edge license, the **Count** column displays the number of Cisco ACI Virtual Edge

instances in the Cisco ACI Fabric. Only Cisco ACI Virtual Edge instances that are turned on and connected through OpFlex are counted.

The **Count** column displays the number of Cisco ACI Virtual Edge instances present in the VMware vCenter DVS that is managed by Cisco APIC. Even Cisco ACI Virtual Edge instances that are not powered on are counted for licensing.

**Note** Cisco ACI Virtual Edge license count may be incorrect while upgrade or downgrade is being performed.

# Post-Installation Configuration

After you install the Cisco ACI Virtual Edge, perform key configuration tasks:

- Deploy an application profile, which includes creating a tenant, application profile, EPGs, filters, and contracts, and assigning port groups to VMs. Then verify the application profile.

  See the Cisco APIC Basic Configuration Guide for instructions.

- If you want to use Distributed Firewall, Enable it after installation. See the chapter "Distributed Firewall" in the Cisco ACI Virtual Edge Configuration Guide for instructions.

- In order for Cisco ACI Virtual Edge to forward multi-destination traffic—especially when traffic goes through a blade switch—configure an IGMP querier under the infra BD subnet. This enables devices to build their Layer 2 multicast tree.

  See the section "Configuring IGMP Querier and Snooping" in the Cisco ACI Virtual Edge Configuration Guide for instructions.

You can find instructions for other configuration tasks—including microsegmentation, SPAN, intra-EPG isolation enforcement, mixed-mode encapsulation, and BPDU features—in the Cisco ACI Virtual Edge Configuration Guide.