Configuring Cisco Cloud APIC Components

About Configuring the Cisco Cloud APIC

You create the Cisco Cloud APIC components using either the Cisco Cloud APIC GUI or the REST API. This section explains how to create configuration, application management, operations, and administrative components.

Note

- For information about configuring a load balancer and service graph, see Deploying Layer 4 to Layer 7 Services.
- For information about the GUI, such as navigation and a list of configurable components, see About the Cisco Cloud APIC GUI.

Configuring the Cisco Cloud APIC Using the GUI

Creating a Tenant Using the Cisco Cloud APIC GUI

This section explains how to create a tenant using the Cisco Cloud APIC GUI.

Before you begin

- You can create a tenant that is managed by the Cisco Cloud APIC or a tenant that is unmanaged. To establish a managed tenant, you must first obtain the Azure subscription ID from the Azure portal. You enter the subscription ID in the appropriate field of the Cisco Cloud APIC when creating the tenant. Before you can use the managed tenant, you must explicitly grant the Cisco Cloud APIC permission to manage the subscription. The steps for doing so are displayed in the Cisco Cloud APIC GUI during tenant creation. The steps for the infra tenant, however, are displayed in the infra tenant details view:

  1. Click the **Navigation** menu > **Application Management** subtab.

2. Double-click the infra tenant.
3. Click **View Azure Role Assignment Command**. The steps for granting the Cisco Cloud APIC permission to manage the subscription are displayed.

Note For information about obtaining the Azure subscription ID, see the Microsoft Azure documentation.

- Creating an unmanaged tenant requires obtaining a directory (Azure Tenant) ID, an Azure enterprise application ID, and a client secret from the enterprise application. For more information, see the Microsoft Azure documentation.

Note Cloud APIC does not disturb Azure resources created by other applications or users. It only manages the Azure resources created by itself.

- The required steps to explicitly grant the Cisco Cloud APIC permission to manage a given subscription are located in the Cisco Cloud APIC GUI. When creating a tenant, the steps are displayed after entering the client secret.
- Cloud APIC enforces ownership checks to prevent deployment of policies in the same tenant-region combination done either intentionally or by mistake. For example, assume that Cloud APIC is deployed in Azure subscription IA1 in region R1. Now you want to deploy a tenant TA1 in region R2. This tenant deployment i.e. account-region combination TA1-R2 is now owned by IA1-R1. If another Cloud APIC attempts to manage the same tenant-region combination later (say Capic2 in Azure subscription IA2 deployed in region R3), this will not be allowed because the current owner for the deployment TA1-R2 is IA1-R1. In other words, only one account in one region can be managed by one Cloud APIC. Example below shows some valid and wrong deployment combinations.

```
Capic1:
IA1-R1: TA1-R1 - ok
        TA1-R2 - ok

Capic2:
IA1-R2: TA1-R1 - not allowed
        TA1-R3 - ok

Capic3:
IA2-R1: TA1-R1 - not allowed
        TA1-R4 - ok
        TA2-R4 - ok
```

- Ownership enforcement is done using Azure Resource Groups. When a new tenant in subscription TA1 in region R2 is managed by Cloud APIC, a Resource Group CAPIC_TA1_R2 (e.g. CAPIC_123456789012__eastus2) is created in the subscription. This Resource Group has a resource tag AciOwnerTag with value IA1_R1_TA1_R2, assuming it was managed by Cloud APIC in subscription IA1 and deployed in region R1. If the AciOwnerTag mismatch happens, tenant-region management is aborted.

  Here is a summary of AciOwnerTag mismatch cases:

  - Initially Cloud APIC is installed in a subscription, and then taken down and Cloud APIC is installed in a different subscription. All existing tenant-region deployment will fail.

- Another Cloud APIC is managing the same tenant-region.

In ownership mismatch cases, **retry** (to setup tenant-region again) is not currently supported. As a workaround, if you are certain that no other Cloud APIC is managing the same tenant-region combination, logon to the tenant's Azure subscription and manually remove the affected Resource Group (for example: CAPIC_123456789012__eastus2). Next, reload Cloud APIC or delete and add the tenant again.

- Prior to release 5.2(1), support varied for the method that could be used to access Azure resources, depending on the type of tenant:
  - **Infra tenants**: Prior to release 5.2(1), support is only available for managed identity when dealing with authorization or credentials.
  - **User tenants**: Support is available for both managed identity and unmanaged identity/service principal when dealing with authorization or credentials.

  Beginning with release 5.2(1), for both the infra tenants and the user tenants, support is now available for both managed identity and unmanaged identity/service principal when dealing with authorization or credentials.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Tenant**. The **Create Tenant** dialog box appears.

Step 4 Choose the appropriate options and enter the appropriate values in each field as listed in the following *Create Tenant Dialog Box Fields* table then continue.

Table 1: Create Tenant Dialog Box Fields

Properties	Description
Name	Enter the name of the tenant.
Description	Enter a description of the tenant.
Settings	
Add Security Domain	To add a security domain for the tenant: **a.** Click **Add Security Domain**. The **Select Security Domains** dialog appears with a list of security domains in the left pane. **b.** Click to choose a security domain. **c.** Click **Select** to add the security domain to the tenant.
Azure Subscription	

Properties	Description
Mode	Choose an account type: • **Create Own**—Choose this option to create a new tenant. • **Select Shared**—Choose this option to inherit the managed or unmanaged settings from an existing tenant.
Azure Subscription ID	Enter the Azure subscription ID.
Access Type	Choose an access type: • **Service Principal** or **Unmanaged Identity**—Choose this option if the tenant subscription is not managed by the Cisco Cloud APIC. • **Managed Identity**—Choose this option if the tenant subscription is managed by the Cisco Cloud APIC. **Note** Prior to release 5.2(1), you could only assign **Managed Identity** to the infra tenant. For release 5.2(1) and later, you can now assign either **Service Principal** or **Managed Identity** to the infra tenant. For more information, see Understanding Tenants, Identities, and Subscriptions.
Application ID	**Note** This field is only valid for the **Service Principal** or **Unmanaged Identity** access type. Enter the application ID. **Note** For information about obtaining the application ID, see the Azure documentation or support.

Properties	Description
Client Secret	**Note** This field is only valid for the **Service Principal** or **Unmanaged Identity** access type. Enter the client secret. **Note** • For information about creating a client secret, see the Azure documentation or support. • You must explicitly grant Cloud APIC permission to manage a given subscription. Go to the Azure portal and follow these steps: **a.** Open the Cloud Shell **b.** Choose 'Bash' **c.** Copy and paste the command displayed in the Cisco Cloud APIC GUI.
Active Directory ID	**Note** This field is only valid for the **Service Principal** or **Unmanaged Identity** access type. Enter the active directory ID. **Note** For information about obtaining the active directory ID, see the Azure documentation or support.
Add Security Domain	To add a security domain for the account: **a.** Click **Add Security Domain**. The **Select Security Domains** dialog appears with a list of security domains in the left pane. **b.** Click to choose a security domain. **c.** Click **Select** to add the security domain to the tenant.

Step 5 Click **Save** when finished.

Creating an Application Profile Using the Cisco Cloud APIC GUI

This section explains how to create an application profile using the Cisco Cloud APIC GUI.

Before you begin

Create a tenant.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Application Profile**. The **Create Application Profile** dialog box appears.

Step 4 Enter a name in the **Name** field.

Step 5 Choose a tenant:

a) Click **Select Tenant**.

The **Select Tenant** dialog box appears.

b) From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**.

You return to the **Create Application Profile** dialog box.

Step 6 Enter a description in the **Description** field.

Step 7 Click **Save** when finished.

Creating a VRF Using the Cisco Cloud APIC GUI

This section explains how to create a VRF using the Cisco Cloud APIC GUI.

Before you begin

Create a tenant.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create VRF**. The **Create VRF** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create VRF Dialog Box Fields* table then continue.

Table 2: Create VRF Dialog Box Fields

Properties	Description
General	
Name	Enter a name for the VRF in the **Name** field. All VRFs are assigned a *vrfEncoded* value. If the Tenant and VRF name combination has more than 32 characters, then, a VRF name (which also contains the tenant name) is identified in the cloud router using the *vrfEncoded* value. To see the *vrfEncoded* value, navigate to **Application Management** > **VRFs** subtab. Click a VRF on the right hand pane and look for *Encoded VRF Name in Cloud Router*.

Properties	Description
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create VRF** dialog box.
Description	Enter a description of the VRF.

Step 5 When finished, click **Save**.

Creating an External Network Using the Cisco Cloud APIC GUI

This procedure describes how to create an external network. You can have a single external network that can connect to multiple routers on the on-premises site, or you can have multiple external networks with multiple VRFs that you can use to connect to CCRs.

Before you begin

You must have a hub network created before you can create an external network.

Step 1 In the left navigation bar, navigate to **Application Management** > **External Networks**.
The configured external networks are displayed.

Step 2 Click **Actions**, then choose **Create External Network**.
The **Create External Network** window appears.

Step 3 Enter the appropriate values in each field as listed in the following *Create External Network Dialog Box Fields* table then continue.

Table 3: Create External Network Dialog Box Fields

Properties	Description
General	
Name	Enter the name for the external network.

Properties	Description
VRF	This external VRF will be used for external connectivity with external non-ACI devices. You can create multiple external VRFs for this purpose. This VRF will be identified as an external VRF if the VRF has all three of the following characteristics: • Configured under the infra tenant • Associated with an external network • Not associated with a cloud context profile Any VRF that is associated with an external network becomes an external VRF. The external VRF is not allowed to be associated with a cloud context profile or subnet. To choose an external VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog, click to choose a VRF in the left column. You can also create a VRF using the **+ Create VRF** option. **c.** Click **Select**. You return to the **Create External Network** dialog box.
Host Router Name	This field is not editable. The default host router is automatically selected.
Settings	
Regions	To choose a region: **a.** Click **Add Regions**. The **Select Regions** dialog box appears. The regions that you selected as part of the First Time Setup are displayed here. **b.** From the **Select Regions** dialog, click to choose a region in the left column then click **Select**. You return to the **Create External Network** dialog box.

Properties	Description
VPN Networks	

Properties	Description
	The VPN networks entries are used for external connectivity. All configured VPN networks will be applied to all the selected regions. To add a VPN network: **a.** Click **Add VPN Network**. The **Add VPN Network** dialog box appears. **b.** In the **Name** field, enter a name for the VPN network. **c.** Click **+ Add IPSec Peer**. A tunnel is created for each IPSec peer entry. **d.** Enter values for the following fields for the IPSec tunnel that you want to add: • **Public IP of IPSec Tunnel Peer** • **Pre-Shared Key** • **IKE Version**: Select **ikev1** or **ikev2** for IPSec tunnel connectivity • **BGP Peer ASN** • **Subnet Pool Name**: Click **Select Subnet Pool Name**. The **Select Subnet Pool Name** dialog box appears. Select one of the available subnet pools that are listed, then click **Select**. **Note** Additional IPsec tunnel subnet pools can be added in the **External Networks** page, or through the Cloud APIC First Time Set Up, if necessary. For more information on adding additional subnet pools through the Cloud APIC First Time Set Up, see the chapter "Configuring Cisco Cloud APIC Using the Setup Wizard" in the *Cisco Cloud APIC for Azure Installation Guide*, Release 25.0(1)-25.0(4) and later. The subnet pool size should be large enough to accommodate the number of IPsec tunnels that will get created. • **IPsec Tunnel Source Interfaces**: Using the entries in this field, the Cisco Cloud APIC creates one IPsec tunnel from each selected source interface to the destination IP address. **Note** **ikev2** is the default option in this field. The IPsec tunnel source interfaces feature is supported only with the IKEv2 configuration. **gig3** is selected by default. Choose one or more from the following interfaces: • **gig2**: The GigabitEthernet2 interface • **gig3**: The GigabitEthernet3 interface • **gig4**: The GigabitEthernet4 interface **Note** After you have configured the IPsec tunnel source interfaces in this external network, you can then configure IPsec tunnel source interfaces in additional networks where tunnels to the same destination can be formed, as described in Routing Policies: Release 25.0(2).

Properties	Description
	e. Click the checkmark to add this IPSec tunnel. Click **+ Add IPSec Tunnel** if you want to add another IPSec tunnel. **f.** Click **Add** in the **Add VPN Network** dialog box. You return to the **Create External Network** dialog box.

Step 4 When you have finished creating the external network, click **Save**.
After you click **Save** in the **Create External Network** window, cloud routers are then configured in AWS.

Configuring the Global Inter-VRF Route Leak Policy

The global inter-VRF route leak policy feature is introduced in release 25.0(2).

Before you begin

Review the information provided in Route Leaking Between Internal VRFs before making any changes in the **Contract Based Routing** area in the **Cloud APIC Setup** window.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Configuration**.

A list of options appear in the **Intent** menu.

Step 3 From the **Configuration** list in the **Intent** menu, click **Cloud APIC Setup**.
The **Set up - Overview** dialog box appears.

Step 4 In the **Contract Based Routing** area, note the current setting for the **Contract Based Routing** field.

The **Contract Based Routing** setting reflects the current internal VRF route leak policy, which is a global policy under the infra tenant where a Boolean flag is used to indicate whether contracts can drive routes in the absence of route maps:

- **Off**: Default setting. Indicates that routes are not leaked based on contracts, and are leaked based on route maps instead.
- **On**: Indicates that routes are leaked based on contracts in the absence of route maps. When enabled, contracts drive routing when route maps are not configured. When route maps exist, route maps always drives routing.

Step 5 Determine if you want to change the current setting for the **Contract Based Routing** field.

Follow these procedures if you toggle from one setting to another:

- **Toggling from On setting to Off (disabling contract-based routing)**: In this situation, the assumption is that you have contract-based routing configured currently and you want to toggle over to route map-based routing. This can be disruptive if the route map-based routing is not configured before you toggle from contract-based routing to map-based routing.

  Before toggling from the **On** setting to the **Off** setting in this situation, make the following changes:

  a. Between all pairs of VRFs that have existing contracts, enable route maps-based route leaking.

Follow the procedures provided in Configuring Inter-VRF Route Leaking Using the Cisco Cloud APIC GUI, on page 12.

b. Disable the contract-based route policy in the global policy.

Toggle the switch in the **Contract Based Routing** field from the **On** setting to the **Off** setting to toggle from contract-based routing to route map-based routing.

c. Change the routing to reflect any granularity that is required based on the new route map-based routing that you enabled.

- **Toggling from Off setting to On (enabling contract-based routing)**: In this situation, the assumption is that you have map-based routing configured currently and you want to toggle over to contract-based routing. This is not a disruptive operation, but rather is an additive operation, since both contracts and route maps can be enabled between a pair of VRFs. In that situation, route maps take precedence over contracts when enabling routing. With map-based routing enabled, adding contract-based routing should be non-disruptive.

  For that reason, you do not have to make any changes before toggling from the **Off** setting to the **On** setting in this situation. However, if you do not want to have both contracts and route maps enabled between a pair of VRFs, and you want to move completely to contract-based routing, you should completely set up contracts between the VRFs and delete the route maps between the VRFs before toggling to the **On** setting in the **Contract Based Routing** field.

Step 6 If you want to change the current setting for the **Contract Based Routing** area, toggle the setting based on the type of routing that you want.

Step 7 Click **Done** when you have finished the **Cloud APIC Setup** configurations.

Configuring Leak Routes Using the Cisco Cloud APIC GUI

The procedures for configuring leak routes using the Cisco Cloud APIC GUI will vary slightly, depending on the release:

- For releases prior to 25.0(2), you can configure an independent routing policy to specify which routes to leak between internal and external VRFs when you are setting up routing between an ACI cloud site and an external destination using the external connectivity feature. See Configuring Inter-VRF Route Leaking Using the Cisco Cloud APIC GUI, on page 12 for those procedures.
- For releases 25.0(2) and later, support is available for route maps-based route leaking between a pair of internal VRFs. See Configuring Leak Routes for Internal VRFs Using the Cisco Cloud APIC GUI, on page 15 for those procedures.

Configuring Inter-VRF Route Leaking Using the Cisco Cloud APIC GUI

Configuring leak routes is part of the release 25.0(1) update where routing and security policies are configured separately. Using inter-VRF routing, you can configure an independent routing policy to specify which routes to leak between internal and external VRFs when you are setting up routing between an ACI cloud site and an external destination using the external connectivity feature. See Understanding Supported Routing and Security Policies for more information.

The external destination must be configured manually using the Enabling Connectivity From the Azure Site to External Devices, on page 17 procedures. The external destination could be another cloud site, an ACI on-premises site or a branch office.

Note

- Use these procedures to configure routing policies independent of security policies only between internal and external VRFs.
- Do not use these procedures to configure routing between a pair of internal VRFs; use contracts as you normally would prior to release 25.0(1) in that case.

Step 1 In the left navigation bar, navigate to **Application Management** > **VRFs**.
The configured VRFs are displayed.

Step 2 Click the **Leak Routes** tab.
Any already-configured leak routes are displayed.

Step 3 Click **Actions**, then choose **Create Leak Route**.
The **Create Leak Route** window appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Leak Routes Dialog Box Fields* table then continue.

Table 4: Create Leak Routes Dialog Box Fields

Properties	Description
Source VRF	To choose a source VRF: **a.** Click **Select a Source VRF**. The **Select a VRF** dialog box appears. **b.** From the **Select a VRF** dialog, click to choose a VRF in the left column to use for the source VRF. Note that the source VRF can be an internal or an external VRF. **c.** Click **Select** to select this source VRF. You return to the **Create Leak Route** dialog box.
Destination VRF	To choose a destination VRF: **a.** Click **Select a Destination VRF**. The **Select a VRF** dialog box appears. **b.** From the **Select a VRF** dialog, click to choose a VRF in the left column to use for the destination VRF. Note that the destination VRF cannot be an internal VRF if the source VRF is also internal VRF. **c.** Click **Select** to select this destination VRF. You return to the **Create Leak Route** dialog box.

Properties	Description
Type	Choose the type of leaked route that you want to configure: • **Leak All**: Select to configure all routes to leak from the source VRF to the destination VRF. The entry `0.0.0.0/0` is entered automatically in the subnet IP area by default in this case. • **Subnet IP**: Select to configure a specific subnet IP address as the route to leak from the source VRF to the destination VRF. The **Subnet IP** box appears. In the **Subnet IP** box, enter a subnet IP address as the route to leak between VRFs.

Step 5 When finished, click **Save**.
The **Success** window appears.

Step 6 Determine if you want to configure additional inter-VRF route leaking.

- If you want to add another route to leak between a pair of VRFs, click the **Add Another Leak Route** option in the **Success** window.

  You are returned to the **Add Leak Route** window. Repeat Step 4, on page 13 through Step 5, on page 14 to configure another route to leak between a pair of VRFs.

- If you want to add a reverse route, where:
  - The destination VRF from the previous configuration now becomes the source VRF, and
  - The source VRF from the previous configuration now becomes the destination VRF

  Then click the **Add Reverse Leak Route** option in the **Success** window.

  You are returned to the **Add Leak Route** window. Repeat Step 4, on page 13 through Step 5, on page 14 to configure another route, but this time:
  - In the **Source VRF** field, select the VRF that you had selected as a destination VRF in the previous configuration.
  - In the **Destination VRF** field, select the VRF that you had selected as a source VRF in the previous configuration.

Step 7 When you have finished configuring leak routes, click **Done**.

The **Leak Routes** tab in the main **VRFs** page is displayed again, with the newly configured leak route displayed.

Step 8 To get more information on a source or destination VRF, or to make changes to a configured leak route, double-click the VRF in the **Leak Routes** tab in the main **VRFs** page.
The **Overview** page for that VRF is displayed.

Step 9 Click the **Application Management** tab at the top of the VRF page, then click the **Leak Routes** tab in the left nav bar.
The leak routes associated with this particular VRF are displayed.

Step 10 Configure additional leak routes associated with this VRF, if necessary.

- To add a leak route from this VRF, click **Actions**, then choose **Add Leak Route from <VRF_name>**.

  The **Add Leak Route** window appears. Enter the necessary information as you did previously using the information in Step 4, on page 13. Note that the entry in the **Source VRF** is pre-selected and cannot be changed in this situation.

- To add a leak route to this VRF, click **Actions**, then choose **Add Leak Route to <VRF_name>**.

  The **Add Leak Route** window appears. Enter the necessary information as you did previously using the information in Step 4, on page 13. Note that the entry in the **Destination VRF** is pre-selected and cannot be changed in this situation.

What to do next

You have now configured the routing policy. Since the routing and security policies are separate, you now need to configure the security policy separately:

- Creating an External EPG Using the Cisco Cloud APIC GUI, on page 26: Use these procedures to create an external EPG.
- Creating a Contract Using the Cisco Cloud APIC GUI, on page 44: Use these procedures to create a contract between the external EPG and the cloud EPG.

Configuring Leak Routes for Internal VRFs Using the Cisco Cloud APIC GUI

Beginning with release 25.0(2), support is available for route maps-based route leaking between a pair of internal VRFs, as described in Route Leaking Between Internal VRFs. This feature is an extension of the routing and security split update provided in release 25.0(1), where routing and security policies are configured separately.

Step 1 In the left navigation bar, navigate to **Application Management** > **VRFs**.
The configured VRFs are displayed.

Step 2 Click the **Leak Routes** tab.
Any already-configured leak routes are displayed.

Step 3 Click **Actions**, then choose **Create Leak Route**.
The **Create Leak Route** window appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Leak Routes Dialog Box Fields* table then continue.

Table 5: Create Leak Routes Dialog Box Fields

Properties	Description
Source VRF	To choose a source VRF: **a.** Click **Select a Source VRF**. The **Select a VRF** dialog box appears. **b.** From the **Select a VRF** dialog, click to choose a VRF in the left column to use for the source VRF. Because this procedure is for route maps-based route leaking between a pair of internal VRFs, choose an internal VRF for the source VRF. **c.** Click **Select** to select this source VRF. You return to the **Create Leak Route** dialog box.

Properties	Description
Destination VRF	To choose a destination VRF: **a.** Click **Select a Destination VRF**. The **Select a VRF** dialog box appears. **b.** From the **Select a VRF** dialog, click to choose a VRF in the left column to use for the destination VRF. Because this procedure is for route maps-based route leaking between a pair of internal VRFs, choose an internal VRF for the destination VRF. **c.** Click **Select** to select this destination VRF. You return to the **Create Leak Route** dialog box.
Type	Choose the type of leaked route that you want to configure: • **Leak All**: Select to configure all routes to leak from the source VRF to the destination VRF. The entry `0.0.0.0/0` is entered automatically in the subnet IP area by default in this case. • **Subnet IP**: Select to configure a specific subnet IP address as the route to leak from the source VRF to the destination VRF. The **Subnet IP** box appears. In the **Subnet IP** box, enter a subnet IP address as the route to leak between VRFs.

Step 5 When finished, click **Save**.
The **Success** window appears.

Step 6 Determine if you want to configure additional inter-VRF route leaking.

- If you want to add another route to leak between a pair of VRFs, click the **Add Another Leak Route** option in the **Success** window.

  You are returned to the **Add Leak Route** window. Repeat Step 4, on page 15 through Step 5, on page 16 to configure another route to leak between a pair of VRFs.

- If you want to add a reverse route, where:
  - The destination VRF from the previous configuration now becomes the source VRF, and
  - The source VRF from the previous configuration now becomes the destination VRF

  Then click the **Add Reverse Leak Route** option in the **Success** window.

  You are returned to the **Add Leak Route** window. Repeat Step 4, on page 15 through Step 5, on page 16 to configure another route, but this time:
  - In the **Source VRF** field, select the VRF that you had selected as a destination VRF in the previous configuration.
  - In the **Destination VRF** field, select the VRF that you had selected as a source VRF in the previous configuration.

Step 7 When you have finished configuring leak routes, click **Done**.

The **Leak Routes** tab in the main **VRFs** page is displayed again, with the newly configured leak route displayed.

Step 8 To get more information on a source or destination VRF, or to make changes to a configured leak route, double-click the VRF in the **Leak Routes** tab in the main **VRFs** page.
The **Overview** page for that VRF is displayed.

Step 9 Click the **Application Management** tab at the top of the VRF page, then click the **Leak Routes** tab in the left nav bar.
The leak routes associated with this particular VRF are displayed.

Step 10 Configure additional leak routes associated with this VRF, if necessary.

- To add a leak route from this VRF, click **Actions**, then choose **Add Leak Route from <VRF_name>**.

  The **Add Leak Route** window appears. Enter the necessary information as you did previously using the information in Step 4, on page 15. Note that the entry in the **Source VRF** is pre-selected and cannot be changed in this situation.

- To add a leak route to this VRF, click **Actions**, then choose **Add Leak Route to <VRF_name>**.

  The **Add Leak Route** window appears. Enter the necessary information as you did previously using the information in Step 4, on page 15. Note that the entry in the **Destination VRF** is pre-selected and cannot be changed in this situation.

Enabling Connectivity From the Azure Site to External Devices

Follow these procedures to manually enable IPv4 connectivity from the infra VNet CCRs to any external device with IPSec/BGP.

Downloading the External Device Configuration Files

Step 1 In the Cisco Cloud APIC GUI, click on **Dashboard**.
The **Dashboard** view for the Cisco Cloud APIC appears.

Step 2 Navigate to **Infrastructure** > **External Connectivity**.
The **External Connectivity** window appears.

Step 3 Click **Actions** > **Download External Device Configuration Files**.
The **Download External Device Configuration Files** pop-up appears.

Step 4 Select the external device configuration files to download and click **Download**.
This action downloads a zip file that contains configuration information that you will use to manually configure the external device for IPv4 connectivity to the CCRs.

Enabling Connectivity From the Azure Site to the External Devices

Step 1 Gather the necessary information that you will need to manually enable IPv4 connectivity from the infra VNet CCRs to any external device without EVPN.

Step 2 Log into the external device.

Step 3 Enter the configuration information to connect an external networking device.

If you downloaded the external device configuration files using the instructions in Downloading the External Device Configuration Files, on page 17, locate the configuration information for the first tunnel and enter that configuration information.

Following is an example of what the external device configuration file might look like for the first tunnel:

```
! The following file contains configuration recommendation to connect an external networking device
 with the cloud ACI Fabric
! The configurations here are provided for an IOS-XE based device. The user is expected to understand
 the configs and make any necessary amends before using them
! on the external device. Cisco does not assume any responsibility for the correctness of the config.

! Tunnel to 128.107.72.122 1.100 [ikev2] for
hctunnIf.acct-[infra]/region-[westus]/context-[overlay-1]-addr-[10.115.9.128/25]/csr-[ct_routerp_westus_0:0]/tunn-34
! USER-DEFINED: please define gig-gateway: GIG-GATEWAY
! USER-DEFINED: please define GigabitEthernet2 if required
! USER-DEFINED: please define tunnel-id: 100 if required
! USER-DEFINED: please define vrf-name: infra:externalvrf1 if required
! USER-DEFINED: please define gig3-public-ip: 13.88.168.176 if 0.0.0.0 ip still not provided by AWS.
! Device:            128.107.72.122
! Tunnel ID:         100
! Tunnel counter:    1
! Tunnel address:    5.16.1.9
! Tunnel Dn:
acct-[infra]/region-[westus]/context-[overlay-1]-addr-[10.115.9.128/25]/csr-[ct_routerp_westus_0:0]/tunn-34
! VRF name:          infra:externalvrf1
! ikev:              ikev2
! Bgp Peer addr:     5.16.1.10
! Bgp Peer asn:      65015
! Gig3 Public ip:    13.88.168.176
! PreShared key:     device1azure
! ikev profile name: ikev2-100

vrf definition infra:externalvrf1
    rd 1:1

    address-family ipv4
        route-target export 64550:1
        route-target import 64550:1
    exit-address-family
exit

crypto ikev2 proposal ikev2-infra:externalvrf1
    encryption aes-cbc-256 aes-cbc-192 aes-cbc-128
    integrity sha512 sha384 sha256 sha1
    group 24 21 20 19 16 15 14 2
exit

crypto ikev2 policy ikev2-infra:externalvrf1
    proposal ikev2-infra:externalvrf1
exit

crypto ikev2 keyring keyring-ikev2-100
    peer peer-ikev2-keyring
        address 13.88.168.176
        pre-shared-key device1azure
    exit
exit

crypto ikev2 profile ikev2-100
    match address local interface GigabitEthernet2
    match identity remote address 13.88.168.176 255.255.255.255
    identity local address 128.107.72.122
```

```
    authentication remote pre-share
    authentication local pre-share
    keyring local keyring-ikev2-100
    lifetime 3600
    dpd 10 5 on-demand
exit

crypto ipsec transform-set ikev2-100 esp-gcm 256
    mode tunnel
exit

crypto ipsec profile ikev2-100
    set transform-set ikev2-100
    set pfs group14
    set ikev2-profile ikev2-100
exit

interface Tunnel100
    vrf forwarding infra:externalvrf1
    ip address 5.16.1.10 255.255.255.252
    ip mtu 1400
    ip tcp adjust-mss 1400
    tunnel source GigabitEthernet2
    tunnel mode ipsec ipv4
    tunnel destination 13.88.168.176
    tunnel protection ipsec profile ikev2-100
exit

ip route 13.88.168.176 255.255.255.255 GigabitEthernet2 GIG-GATEWAY

router bgp 65015

address-family ipv4 vrf infra:externalvrf1
    redistribute connected
    maximum-paths eibgp 32

    neighbor 5.16.1.9 remote-as 65008
    neighbor 5.16.1.9 ebgp-multihop 255
    neighbor 5.16.1.9 activate
    neighbor 5.16.1.9 send-community both

    distance bgp 20 200 20
exit-address-family
```

The following figures provide more information on what each set of fields is used for in the external device configuration file:

- The fields shown in the following figure are used to configure these areas:
    - VRF definition
    - IPSec global configurations

```
vrf definition Ext-V1
rd 1:10
!
address-family ipv4
  route-target export 64550:10
  route-target import 64550:10
!
crypto isakmp policy 10
encryption aes
authentication pre-share
group 2
lifetime 28800
!
crypto isakmp keepalive 10 10 periodic
crypto isakmp aggressive-mode disable
!
```

VRF Definition

IPSec Global Configurations

- The fields shown in the following figure are used to configure these areas:
  - IPSec and ikev1 per tunnel configurations
  - BGP configurations for the VRF neighbor

```
!
crypto keyring Ext-V1-1000-ike
  pre-shared-key address <50.18.55.126>[cAPIC CSR Gig3 public IP] key <abcdefg12345>
!
crypto isakmp profile Ext-V1-1000-ike
   keyring Ext-V1-1000-ike
   match identity address <50.18.55.126>[cAPIC CSR1 gig3 Public IP] 255.255.255.255
!
crypto ipsec transform-set Ext-V1-1000-ike esp-aes esp-sha-hmac
mode tunnel
!
crypto ipsec profile Ext-V1-1000-ike
set security-association lifetime kilobytes disable
set security-association replay window-size 512
set transform-set Ext-V1-1000-ike
set pfs group14
!
interface Tunnel1000
vrf forwarding Ext-V1
ip address 50.50.0.2[cAPIC CSR BGP Peer Addr] 255.255.255.252
ip mtu 1400
ip tcp adjust-mss 1400
tunnel source GigabitEthernet2
tunnel mode ipsec ipv4
tunnel destination <50.18.55.126>[cAPIC CSR1 gig3 Public IP]
tunnel protection ipsec profile Ext-V1-1000-ike
!
router bgp 64550
!
address-family ipv4 vrf Ext-V1
  redistribute connected
  neighbor <50.50.0.1>[cAPIC CSR1 Tunnel Inner IP Addr] remote-as 1234
  neighbor 50.50.0.1 ebgp-multihop 255
  neighbor 50.50.0.1 activate
  neighbor 50.50.0.1 send-community both
  neighbor <50.50.0.5>[cAPIC CSR1 Tunnel Inner IP Addr] remote-as 1234
  neighbor 50.50.0.5 ebgp-multihop 255
  neighbor 50.50.0.5 activate
  neighbor 50.50.0.5 send-community both
  distance bgp 20 200 20
!
ip route 50.18.55.126[cAPIC CSR1 gig3 Public IP] 255.255.255.255 GigabitEthernet2 10.10.0.103
```

IPSec and Ikev1
Per Tunnel Configurations

BGP Configurations for VRF Neighbor

- The fields shown in the following figure are used to configure these areas:
  - Ikev2 global configurations
  - IPSec and ikev2 per tunnel configurations

```
crypto ikev2 proposal ikev2-1
 encryption aes-cbc-256 aes-cbc-192 aes-cbc-128
 integrity sha512 sha384 sha256 sha1
 group 24 21 20 19 16 15 14 2
!
crypto ikev2 policy ikev2-1
 proposal ikev2-1
!
crypto ikev2 keyring keyring-ikev2-2000
 peer peer-ikev2-keyring
  address 35.81.94.248 [cAPIC CSR1 gig3 Public IP]
  pre-shared-key abcdefg12345
!
crypto ikev2 profile ikev2-2000
 match address local interface GigabitEthernet3
 match identity remote address 35.81.94.248[cAPIC CSR1 gig3 Public IP] 255.255.255.255
 identity local address 52.53.49.193 [Local Device tunnel source interface Public IP (Gig3 public IP)]
 authentication remote pre-share
 authentication local pre-share
 keyring local keyring-ikev2-2000
 lifetime 3600
 dpd 10 5 on-demand
!
crypto ipsec transform-set ikev2-2000 esp-gcm 256
 mode tunnel
!
crypto ipsec profile ikev2-2000
 set transform-set ikev2-2000
 set pfs group14
 set ikev2-profile ikev2-2000
!
interface Tunnel2000
 vrf forwarding Ext-V1
 ip address 50.50.0.14 [cAPIC CSR1 BGP Peer Addr] 255.255.255.252
 ip mtu 1400
 ip tcp adjust-mss 1400
 tunnel source GigabitEthernet3
 tunnel mode ipsec ipv4
 tunnel destination 35.81.94.248[cAPIC CSR1 gig3 Public IP]
 tunnel protection ipsec profile ikev2-2000
```

Ikev2 Global Configurations

IPSec and Ikev2
Per Tunnel Configurations

Step 4 Repeat the previous step to configure additional tunnels.

Creating an EPG Using the Cisco Cloud APIC GUI

Use the procedures in this section to create an application EPG, an external EPG, or a service EPG. The available configuration options vary, depending on which type of EPG you are creating.

Creating an Application EPG Using the Cisco Cloud APIC GUI

This section explains how to create an application EPG using the Cisco Cloud APIC GUI. Each service needs at least one consumer EPG and one provider EPG.

Note You can create cloud EPGs and cloud external EPGs in the infra tenant, where all the cloud EPGs and cloud external EPGs will be associated with the secondary VRF in the infra tenant. A cloud EPG in the secondary VRF can communicate with other cloud EPGs and cloud external EPGs in the secondary VRF, and can also communicate with cloud EPGS in other user tenant VRFs. We recommend that you do not use existing "cloud-infra" application profiles, and instead create a new application profile in the infra tenant and associate that new application profile to the cloud EPGs and cloud external EPGs in the secondary VRF.

Before you begin

Create an application profile and a VRF.

Step 1 Click the **Intent** icon.

The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create EPG**.

The **Create EPG** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create EPG Dialog Box Fields* table then continue.

Table 6: Create EPG Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the EPG.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column. Beginning with Release 5.0(2), you can select the infra tenant and can create cloud EPGs and cloud external EPGs in the infra tenant, as described earlier in this section. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Application Profile	To choose an application profile: **a.** Click **Select Application Profile**. The **Select Application Profile** dialog box appears. **b.** From the **Select Application Profile** dialog, click to choose an application profile in the left column. **Note** If you are creating an EPG in the infra tenant, we recommend that you do not choose the `cloud-infra` application profile because that application profile is used by EPGs in the overlay-1 VRF. Select a different application profile or click **Create Application Profile** to create a new one. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Description	Enter a description of the EPG.
Settings	
Type	Because this will be an application EPG, choose **Application** as the EPG type.

Properties	Description
VRF	To choose a VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog, click to choose a VRF in the left column. If you are creating an EPG in the infra tenant, select the secondary VRF in this step. A cloud EPG in the secondary VRF can communicate with other cloud EPGs and cloud external EPGs in the secondary VRF, and can also communicate with cloud EPGs in other user tenant VRFs. **c.** Click **Select**. You return to the **Create EPG** dialog box.

Properties	Description
Endpoint Selectors	

Properties	Description
	Note See Configuring Virtual Machines in Azure, on page 58 for instructions on configuring virtual machines in Azure as part of the endpoint selector configuration process. To add an endpoint selector: **a.** Click **Add Endpoint Selector** to open the **Add Endpoint Selector** dialog. **b.** In the **Add Endpoint Selector** dialog, enter a name in the **Name** field. **c.** Click **Selector Expression**. The **Key**, **Operator**, and **Value** fields are enabled. **d.** Click the **Key** drop-down list to choose a key. The options are: • Choose **IP** if you want to use an IP address or subnet for the endpoint selector. **Note** IPv6 is not supported for Cisco Cloud APIC in Azure. You must use a valid IPv4 address for this field. • Choose **Region** if you want to use the Azure region for the endpoint selector. • Choose **Custom** if you want to create a custom key for the endpoint selector. **Note** When choosing the **Custom** option, the drop-down list becomes a text box. You need to enter a name for the key in the spaces after **custom:** (for example, **custom: Location**). **e.** Click the **Operator** drop-down list to choose an operator. The options are: • **equals**: Used when you have a single value in the Value field. • **not equals**: Used when you have a single value in the Value field. • **in**: Used when you have multiple comma-separated values in the Value field. • **not in**: Used when you have multiple comma-separated values in the Value field. • **has key**: Used if the expression contains only a key. • **does not have key**: Used if the expression contains only a key. **f.** Enter a value in the **Value** field then click the check mark to validate the entries. The value you enter depends on the choices you made for the **Key** and **Operator** fields. For example, if the **Key** field is set to **IP** and the **Operator** field is set to **equals**, the **Value** field must be an IP address or subnet. However, if the **Operator** field is set to **has key**, the **Value** field is disabled. **g.** When finished, click the check mark to validate the selector expression. **h.** Determine if you want to create additional endpoint selector expressions to the endpoint selector. If you create more than one expression under a single endpoint selector, a logical AND exists between those expressions. For example, assume you created two sets of expressions under a single endpoint selector: • Endpoint selector 1, expression 1: • **Key:** Region

Properties	Description
	• **Operator:** equals • **Value:** westus • Endpoint selector 1, expression 2: • **Key:** IP • **Operator:** equals • **Value:** 192.0.2.1/24 In this case, if *both* of these expressions are true (if the region is westus AND if the IP address belongs to subnet 192.0.2.1/24), then that endpoint is assigned to the Cloud EPG. **i.** Click the check mark after every additional expression that you want to create under this endpoint selector then click **Add** when finished. If you create more than one endpoint selector under an EPG, a logical OR exists between those endpoint selectors. For example, assume you had created endpoint selector 1 as described in the previous step, and then you created a second endpoint selector as described below: • Endpoint selector 2, expression 1: • **Key:** Region • **Operator:** in • **Value:** eastus, centralus In this case: • If the region is westus AND the IP address belongs to the 192.0.2.1/24 subnet (endpoint selector 1 expressions) OR • If the region is either eastus or centralus (endpoint selector 2 expression) Then that end point is assigned to the Cloud EPG.

Step 5 Click **Save** when finished.

Creating an External EPG Using the Cisco Cloud APIC GUI

This section explains how to create an external EPG using the Cisco Cloud APIC GUI. Each service needs at least one consumer EPG and one provider EPG.

Note You can create cloud EPGs and cloud external EPGs in the infra tenant, where all the cloud EPGs and cloud external EPGs will be associated with the secondary VRF in the infra tenant. A cloud EPG in the secondary VRF can communicate with other cloud EPGs and cloud external EPGs in the secondary VRF, and can also communicate with cloud EPGS in other user tenant VRFs. We recommend that you do not use existing "cloud-infra" application profiles, and instead create a new application profile in the infra tenant and associate that new application profile to the cloud EPGs and cloud external EPGs in the secondary VRF.

Before you begin

Create an application profile and a VRF.

Step 1 Click the **Intent** icon.

The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create EPG**.

The **Create EPG** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create EPG Dialog Box Fields* table then continue.

Table 7: Create EPG Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the EPG.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column. Beginning with Release 5.0(2), you can select the infra tenant and can create cloud EPGs and cloud external EPGs in the infra tenant, as described earlier in this section. **c.** Click **Select**. You return to the **Create EPG** dialog box.

Properties	Description
Application Profile	To choose an application profile: **a.** Click **Select Application Profile**. The **Select Application Profile** dialog box appears. **b.** From the **Select Application Profile** dialog, click to choose an application profile in the left column. **Note** If you are creating an EPG in the infra tenant, we recommend that you do not choose the `cloud-infra` application profile because that application profile is used by EPGs in the overlay-1 VRF. Select a different application profile or click **Create Application Profile** to create a new one. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Description	Enter a description of the EPG.
Settings	
Type	Because this will be an external EPG, choose **External** as the EPG type.
VRF	To choose a VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog, click to choose a VRF in the left column. If you are creating an EPG in the infra tenant, select the secondary VRF in this step. A cloud EPG in the secondary VRF can communicate with other cloud EPGs and cloud external EPGs in the secondary VRF, and can also communicate with cloud EPGs in other user tenant VRFs. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Route Reachability	Choose the type of route reachability for the external EPG. The options are: • **Internet** • **External-Site**

Properties	Description
Endpoint Selectors	**Note** See Configuring Virtual Machines in Azure, on page 58 for instructions on configuring virtual machines in Azure as part of the endpoint selector configuration process. To add an endpoint selector: **a.** Click **Add Endpoint Selector** to add an endpoint selector. **b.** Enter a name in the **Name** field. **c.** Enter a subnet in the **Subnet**. **Note** IPv6 is not supported for Cisco Cloud APIC in Azure. You must use a valid IPv4 address for this field. **d.** When finished, click the check mark to validate the endpoint selector. **e.** Determine if you want to create additional endpoint selectors. If you create more than one endpoint selector under an EPG, a logical OR exists between those endpoint selectors. For example, assume you created two endpoint selectors: • Endpoint selector 1: • **Name:** EP_Sel_1 • **Subnet:** 192.1.1.1/24 • Endpoint selector 2: • **Name:** EP_Sel_2 • **Subnet:** 192.2.2.2/24 In this case: • If the IP address belongs to the 192.1.1.1/24 subnet (endpoint selector 1) OR • If the IP address belongs to the 192.2.2.2/24 subnet (endpoint selector 2) Then that end point is assigned to the Cloud EPG.

Step 5 Click **Save** when finished.

Creating a Service EPG

Use the procedures in the following sections to create a service EPG.

Tasks To Perform Prior to Configuring Service EPGs

Before you can configure a service EPG, there are certain tasks that you might have to perform beforehand. If you are using subnets or private link labels with your service EPG, you must first configure the subnets and/or private link label outside of the service EPG.

Step 1 Create a VRF, if necessary.

a) Click the **Intent** icon. The **Intent** menu appears.
b) Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

c) From the **Application Management** list in the **Intent** menu, click **Create VRF**. The **Create VRF** dialog box appears.
d) Make the following selections:

- **Name**: Enter the name for the VRF.
- **Tenant**: Select a tenant.

e) Click **Save**.

Step 2 Configure a cloud context profile.

a) Click the **Intent** icon. The **Intent** menu appears.
b) Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

c) From the **Application Management** list in the **Intent** menu, click **Create Cloud Context Profile**. The **Create Cloud Context Profile** dialog box appears.

Step 3 Enter the appropriate values in each field as listed in the following *Cloud Context Profile Dialog Box Fields* table then continue.

Table 8: Create Cloud Context Profile Dialog Box Fields

Properties	Description
Name	Enter the name of the cloud context profile.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.
Description	Enter a description of the cloud context profile.
Settings	
Region	To choose a region: **a.** Click **Select Region**. The **Select Region** dialog box appears. **b.** From the **Select Region** dialog, click to choose a region in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.

Properties	Description
VRF	To choose a VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog box, click to choose a VRF in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.

Properties	Description
Add CIDR	**Note** You cannot add, delete, or edit a CIDR when VNet peering is enabled. You must disable VNet peering before adding, deleting or editing a CIDR. To disable VNet peering: • For the infra tenant, disable the **Hub Network Peering** option in the cloud context profile • For a user (non-infra) tenant, disable the **VNet Peering** option in the cloud context profile Enable VNet peering again after you have made the changes to the CIDR configuration. The following features are supported, depending on the release: • You can add additional secondary CIDRs and subnets for infra VNets (`cloudCtxProfiles` created by the cloud template). You cannot add primary CIDRs or modify the existing CIDRs created by the cloud template. After subnets are created under the user-created CIDRs, the subnets will be implicitly mapped to the secondary VRF. • You can add also additional secondary CIDRs and subnets for VNets other than the infra VNet. See Support for Multiple VRFs Under Single VNet for more information. To add a CIDR: **a.** Click **Add CIDR**. The **Add CIDR** dialog box appears. **b.** Enter the address in the **CIDR Block Range** field. **c.** Click to check (enabled) or uncheck (disabled) the **Primary** check box. If you are adding additional secondary CIDRs and subnets for VNets, leave the **Primary** box unchecked. **d.** Click **Add Subnet** and enter the following information: • In the **Address** field, enter the subnet address. • In the **Name** field, enter the name for this subnet. • In the **Private Link Label** field, choose **Create New** and enter a unique name for the private link label to associate with this subnet. **e.** In the **VRF** field, make a selection, if necessary. • If you checked the box next to the **Primary** field, this CIDR is automatically associated with the primary VRF. • If you did not check the box next to the **Primary** field, you can associate this CIDR with a secondary VRF. Click the **X** next to the VRF, then click on **Select VRF** to select the secondary VRF to associate with this CIDR. **f.** When finished, click **Add**.
VNet Gateway Router	Click to check (enable) or uncheck (disable) in the **VNet Gateway Router** check box.

Properties	Description
VNet Peering	Click to check (enable) or uncheck (disable) the Azure VNet peering feature. For more information on the VNet peering feature, see the *Configuring VNet Peering for Cloud APIC for Azure* document in the Cisco Cloud APIC documentation page.

Step 4 Click **Save**.

Creating a Service EPG Using the Cisco Cloud APIC GUI

This section explains how to create a service EPG using the Cisco Cloud APIC GUI. Each service needs at least one consumer EPG and one provider EPG.

Before you begin

- Review the information in Cloud Service Endpoint Groups.
- Verify that you have the **NSG-per-subnet** configuration enabled.

  You must have the **NSG-per-subnet** configuration enabled if you are configuring cloud service EPGs. See Security Groups for more information.
- Create an application profile and a VRF.

Step 1 Click the **Intent** icon.

The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create EPG**.

The **Create EPG** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create EPG Dialog Box Fields* table then continue.

Table 9: Create EPG Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the EPG.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column. **c.** Click **Select**. You return to the **Create EPG** dialog box.

Properties	Description
Application Profile	To choose an application profile: **a.** Click **Select Application Profile**. The **Select Application Profile** dialog box appears. **b.** From the **Select Application Profile** dialog, click to choose an application profile in the left column. **Note** If you are creating a service EPG in the infra tenant, we recommend that you do not choose the `cloud-infra` application profile because that application profile is used by EPGs in the overlay-1 VRF. Select a different application profile or click **Create Application Profile** to create a new one. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Description	Enter a description of the EPG.
Settings	
Type	Because this will be a service EPG, choose **Service** as the EPG type.
VRF	To choose a VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog, click to choose a VRF in the left column. **c.** Click **Select**. You return to the **Create EPG** dialog box.
Deployment Type	Choose the EPG deployment type. Services are differentiated based on their deployment mode: • **Cloud Native**: A Cloud Native service deployed in the provider network • **Cloud Native Managed**: A Cloud Native service deployed in your network • **Third-Party**: A third-party service from the market place

Properties	Description

Access Type	Choose the EPG deployment access type. The access type indicates how the other services or VMs will connect to the service.
	The choices vary, depending on the selection you made in the **Deployment Type** field:
	• **Cloud Native** deployment type:
	  • **Public**: Access the public IP of the service.
	  • **Private**: Use private links and private endpoints to access the service.
	• **Cloud Native Managed** deployment type:
	  • **Private**: Choose this type if the service deployed in the managed subnet has only private IP addresses.
	  • **Public and Private**: Use public and private endpoints to access the service. This is used for services that also expose public IP addresses when deployed in Cisco Cloud APIC-managed subnets.
	• **Third-Party** deployment type: **Private** is the only option available to you as an access type. This means that you will use only private endpoints to the service, if the service offers it.

Properties	Description
Service Type	Choose the Azure service type. Certain service types are only supported with certain specific deployment types. See Cloud Service Endpoint Groups for more information on the service types that are supported with specific deployment types. The options are: • **Azure Storage Blob** (see Azure Storage) • **Azure SQL** • **Azure Cosmos DB** • **Azure Databricks** (see Azure Databricks Services) • **Azure Storage** (see Azure Storage) • **Azure Storage File** (see Azure Storage) • **Azure Storage Queue** (see Azure Storage) • **Azure Storage Table** (see Azure Storage) • **Azure Kubernetes Services (AKS)** (see Azure Kubernetes Services) • **Azure Active Directory Domain Services** (see Azure Active Directory Domain Services) • **Azure Container Registry** • **Azure ApiManagement Services** (see Azure ApiManagement Services) • **Azure Key Vault** • **Redis Cache** (see Azure Redis Cache) • **Custom Service** (used if you choose **Third-Party** as the **Deployment Type**)

Step 5 Enter the necessary information in the **Endpoint Selector** area, depending on the selection you made in the **Deployment Type** field:

- If you chose **Cloud Native** as the deployment type, go to Configuring Cloud Native as the Deployment Type, on page 36.
- If you chose **Cloud Native Managed** as the deployment type, go to Configuring Cloud Native Managed as the Deployment Type, on page 39.
- If you chose **Third-Party** as the deployment type, go to Configuring Third-Party as the Deployment Type, on page 41.

Configuring Cloud Native as the Deployment Type

Use the procedures in this section to configure **Cloud Native** as the deployment type for the service EPG.

Before you begin

Review the information provided in Cloud Native to understand tasks that you might have to perform prior to using these instructions.

Step 1 Verify that you have completed the steps in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33 before beginning these procedures.

These procedures are a continuation of the procedures provided in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33, where you would have set a service type, such as `Azure SQL`, before configuring the deployment type in these procedures.

Step 2 If you selected **Private** as the access type, the **Select Private Link Label** option becomes available.

A private link label is used to associate the subnets to the service EPGs.

Step 3 Click **Select Private Link Label**.

The **Select Private Link Label** window appears.

Step 4 Search for the appropriate private link label.

Search for the private link label that you created using the procedures provided in Tasks To Perform Prior to Configuring Service EPGs, on page 30.

Step 5 In the **Select Private Link Label** window, select the appropriate private link label.

You are returned to the **Create EPG** window.

Next, add an endpoint selector in the **Endpoint Selectors** field.

Step 6 Click **Add Endpoint Selector**.

The **Add Endpoint Selector** window appears.

Step 7 In the **Add Endpoint Selector** window, enter a name in the **Name** field.

Step 8 Click the **Key** drop-down list to choose a key.

The options are:

- Choose **Custom** if you want to create a custom endpoint selector.
- Choose **Region** if you want to use the Azure region for the endpoint selector.
- Choose **Name** if you want to use the service resource's name for the endpoint selector.

  For example, to select an SQL server with the name `ProdSqlServer`, you would choose **Name** in the **Key** field, and you would enter `ProdSqlServer` in the **Value** field later in these procedures.
- Choose **Resource ID** if you want to use the cloud provider's ID for the endpoint selector.

  For example, to select an SQL server using the cloud provider's resource ID, you would choose **Resouce ID** in the **Key** field, and you would enter the value of the selector, such as `/subscriptions/{subscription-id}/resourceGroups/{resourceGroupName}/providers/Microsoft.Sql/servers/ProdSqlServer`, in the **Value** field later in these procedures.

Step 9 Click the **Operator** drop-down list to choose an operator.

The options are:

- **equals**: Used when you have a single value in the Value field.
- **not equals**: Used when you have a single value in the Value field.
- **in**: Used when you have multiple comma-separated values in the Value field.
- **not in**: Used when you have multiple comma-separated values in the Value field.
- **has key**: Used if the expression contains only a key.
- **does not have key**: Used if the expression contains only a key.

Step 10 Enter a value in the **Value** field then click the check mark to validate the entries.

The value you enter depends on the choices you made for the **Key** and **Operator** fields.

For example, if the **Key** field is set to **IP** and the **Operator** field is set to **equals**, the **Value** field must be an IP address or subnet. However, if the **Operator** field is set to **has key**, the **Value** field is disabled.

Step 11 When finished, click the check mark to validate the selector expression.

Step 12 Determine if you want to create additional endpoint selector expressions for the endpoint selector.

If you create more than one expression under a single endpoint selector, a logical AND exists between those expressions.

For example, assume you created two sets of expressions under a single endpoint selector:

- Endpoint selector 1, expression 1:
  - **Key:** Region
  - **Operator:** equals
  - **Value:** `westus`
- Endpoint selector 1, expression 2:
  - **Key:** Name
  - **Operator:** equals
  - **Value:** `ProdSqlServer`

In this case, if *both* of these expressions are true (if the region is `westus` AND if the name attached to the resource is `ProdSqlServer`), then that endpoint is assigned to the service EPG.

Step 13 Click the check mark after every additional expression that you want to create under this endpoint selector, then click **Add** when finished.

You are returned to the **Create EPG** screen, with the new endpoint selector and the configured expressions shown.

Step 14 If you want to create additional endpoint selectors, click **Add Endpoint Selector** again and repeat these steps to create additional endpoint selectors.

If you create more than one endpoint selector under an EPG, a logical OR exists between those endpoint selectors. For example, assume you had created endpoint selector 1 as described in the previous step, and then you created a second endpoint selector as described below:

- Endpoint selector 2, expression 1:
  - **Key:** Region

- **Operator:** in
- **Value:** `eastus`, `centralus`

In this case:

- If the region is `westus` AND the name attached to the resource is `ProdSqlServer` (endpoint selector 1 expressions)

  OR

- If the region is either `eastus` or `centralus` (endpoint selector 2 expression)

Then that end point is assigned to the service EPG.

Step 15 Click **Save** when finished.

Configuring Cloud Native Managed as the Deployment Type

Use the procedures in this section to configure **Cloud Native Managed** as the deployment type for the service EPG.

Before you begin

Review the information provided in Cloud Native Managed to understand tasks that you might have to perform prior to using these instructions.

Step 1 Verify that you have completed the steps in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33 before beginning these procedures.

These procedures are a continuation of the procedures provided in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33, where you would have set a service type, such as `Azure ApiManagement Services`, before configuring the deployment type in these procedures.

Step 2 Click **Add Endpoint Selector**.

The **Add Endpoint Selector** window appears.

Step 3 In the **Add Endpoint Selector** window, enter a name in the **Name** field.

Step 4 Click the **Key** drop-down list to choose a key.

At this time, **IP** is the only option available as a key for this access type.

Note IPv6 is not supported for Cisco Cloud APIC in Azure. You must use a valid IPv4 address for this field.

Step 5 Click the **Operator** drop-down list to choose an operator.

The options are:

- **equals**: Used when you have a single value in the Value field.
- **not equals**: Used when you have a single value in the Value field.
- **in**: Used when you have multiple comma-separated values in the Value field.
- **not in**: Used when you have multiple comma-separated values in the Value field.

- **has key**: Used if the expression contains only a key.
- **does not have key**: Used if the expression contains only a key.

Step 6 Enter the appropriate IP address or a subnet in the **Value** field then click the check mark to validate the entries.

Enter the IP address or subnet that you created using the procedures provided in Tasks To Perform Prior to Configuring Service EPGs, on page 30.

Step 7 When finished, click the check mark to validate the selector expression.

Step 8 Determine if you want to create additional endpoint selector expressions to the endpoint selector.

If you create more than one expression under a single endpoint selector, a logical AND exists between those expressions.

For example, assume you created two sets of expressions under a single endpoint selector:

- Endpoint selector 1, expression 1:
  - **Key:** IP
  - **Operator:** equals
  - **Value:** 192.1.1.1/24
- Endpoint selector 1, expression 2:
  - **Key:** IP
  - **Operator:** not equals
  - **Value:** 192.1.1.2

In this case, if *both* of these expressions are true (if the IP address belongs to subnet 192.1.1.1/24 AND the IP address is not 192.1.1.2), then that endpoint is assigned to the service EPG.

Step 9 Click the check mark after every additional expression that you want to create under this endpoint selector, then click **Add** when finished.

You are returned to the **Create EPG** screen, with the new endpoint selector and the configured expressions shown.

Step 10 If you want to create additional endpoint selectors, click **Add Endpoint Selector** again and repeat these steps to create additional endpoint selectors.

If you create more than one endpoint selector under an EPG, a logical OR exists between those endpoint selectors. For example, assume you had created endpoint selector 1 as described in the previous step, and then you created a second endpoint selector as described below:

- Endpoint selector 2, expression 1:
  - **Key:** IP
  - **Operator:** equals
  - **Value:** 192.2.2.2/24

In this case:

- If the IP address belongs to subnet 192.1.1.1/24 AND the IP address is not 192.1.1.2 (endpoint selector 1 expressions)

OR

- If the IP address belongs to subnet 192.2.2.2/24

Then that end point is assigned to the service EPG.

Step 11 Click **Save** when finished.

Configuring Third-Party as the Deployment Type

Use the procedures in this section to configure **Third-Party** as the deployment type for the service EPG.

Note You must choose **Custom** as the **Service Type** if you choose **Third-Party** as the **Deployment Type**.

Step 1 Verify that you have completed the steps in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33 before beginning these procedures.

These procedures are a continuation of the procedures provided in Creating a Service EPG Using the Cisco Cloud APIC GUI, on page 33, where you would have set the service type as `Custom Service` before configuring the deployment type in these procedures.

Step 2 Make the necessary selections for the access type for the **Third-Party** deployment type.

Private is the only option available to you as an access type. This means that you will use only private endpoints to the service, if the service offers it.

The **Select Private Link Label** option becomes available with this access type. A private link label is used to associate the subnets to the service EPGs.

Step 3 Search for the appropriate private link label.

Search for the private link label that you created using the procedures provided in Tasks To Perform Prior to Configuring Service EPGs, on page 30.

Step 4 In the **Select Private Link Label** window, select the appropriate private link label.

You are returned to the **Create EPG** window.

Next, add an endpoint selector in the **Endpoint Selectors** field.

Step 5 Click **Add Endpoint Selector**.

The **Add Endpoint Selector** window appears.

Step 6 In the **Add Endpoint Selector** window, enter a name in the **Name** field.

Step 7 Click the **Key** drop-down list to choose a key.

At this time, **URL** is the only option available as a key for this access type, where you will use the alias or fully qualified domain name (FQDN) that identifies the service for the endpoint selector.

Step 8 Click the **Operator** drop-down list to choose an operator.

The options are:

- **equals**: Used when you have a single value in the Value field.
- **not equals**: Used when you have a single value in the Value field.
- **in**: Used when you have multiple comma-separated values in the Value field.
- **not in**: Used when you have multiple comma-separated values in the Value field.
- **has key**: Used if the expression contains only a key.
- **does not have key**: Used if the expression contains only a key.

Step 9 Enter a valid URL in the **Value** field then click the check mark to validate the entries.

Step 10 When finished, click the check mark to validate the selector expression, then click **Add**.

You are returned to the **Create EPG** screen, with the new endpoint selector and the configured expression shown.

Step 11 If you want to create additional endpoint selectors, click **Add Endpoint Selector** again and repeat these steps to create additional endpoint selectors.

If you create more than one endpoint selector under an EPG, a logical OR exists between those endpoint selectors.

For example, assume you created two endpoint selectors as described below:

- Endpoint selector 1:
  - **Key:** URL
  - **Operator:** equals
  - **Value:** `www.acme1.com`
- Endpoint selector 2:
  - **Key:** URL
  - **Operator:** equals
  - **Value:** `www.acme2.com`

In this case:

- If the URL is `www.acme1.com`

  OR

- If the URL is `www.acme2.com`

Then that end point is assigned to the service EPG.

Step 12 Click **Save** when finished.

Creating a Filter Using the Cisco Cloud APIC GUI

This section explains how to create a filter using the Cisco Cloud APIC GUI.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Filter**. The **Create Filter** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Filter Dialog Box Fields* table then continue.

Table 10: Create Filter Dialog Box Fields

Properties	Description
Name	Enter a name for the filter in the **Name** field.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create Filter** dialog box.
Description	Enter a description of the filter.

Properties	Description
Add Filter	To add a filter: **a.** Click **Add Filter Entry**. The **Add Filter Entry** dialog box appears. **b.** Enter a name for the filter entry in the **Name** field. **c.** Click the **Ethernet Type** drop-down list to choose an ethernet type. The options are: • **IP** • **Unspecified** **Note** When **Unspecified** is chosen, any traffic type is alloed, including IP, and the remaining fields are disabled. **d.** Click the **IP Protocol** drop-down menu to choose a protocol. The options are: • **tcp** • **udp** • **Unspecified** **Note** The remaining fields are enabled only when **tcp** or **udp** is chosen. **e.** Enter the appropriate port range information in the **Destination Port** fields. **f.** When finished entering filter entry information, click **Add**. You return to the **Create Filter** dialog box where you can repeat the steps to add another filter entry.

Step 5 When finished, click **Save**.

Creating a Contract Using the Cisco Cloud APIC GUI

This section explains how to create a contract using the Cisco Cloud APIC GUI.

Before you begin

Create filters.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Contract**. The **Create Contract** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Contract Dialog Box Fields* table then continue.

Table 11: Create Contract Dialog Box Fields

Properties	Description
Name	Enter the name of the contract.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column. **Note** Beginning in Release 5.0(2), you can create contracts in the infra tenant. You can also export contracts from and import contracts to the infra tenant for shared services use cases. **c.** Click **Select**. You return to the **Create Contract** dialog box.
Description	Enter a description of the contract.
Settings	
Scope	The scope limits the contract to any endpoint groups within the same application profile, within the same VRF instance, throughout the fabric (globally), or within the same tenant. **Note** Shared services enables communication between EPGs in different tenants and between EPGs in different VRFs. To enable EPGs in one tenant to communicate with EPGs in another tenant, choose **Global** scope. To enable an EPG in one VRF to communicate with another EPG in a different VRF, choose **Global** or **Tenant** scope. For more information about shared services, see Shared Services. Click the drop-down arrow to choose from the following scope options: • **Application Profile** • **VRF** • **Global** • **Tenant**

Properties	Description
Add Filter	To choose a filter: **a.** Click **Add Filter**. The filter row appears with a **Select Filter** option. **b.** Click **Select Filter**. The **Select Filter** dialog box appears. **c.** From the **Select Filter** dialog, click to choose a filter in the left column then click **Select**. You return to the **Create Contract** dialog box.

Step 5 Click **Save** when finished.

Creating an Inter-Tenant Contract Using the Cisco Cloud APIC GUI

This section explains how to create an inter-tenant contract using the Cisco Cloud APIC GUI. See Shared Services for more information on situations where you might want to create an inter-tenant contract.

Before you begin

Create filters.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Contract**. The **Create Contract** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Contract Dialog Box Fields* table then continue.

Table 12: Create Contract Dialog Box Fields

Properties	Description
Name	Enter the name of the contract.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column. **Note** Beginning in Release 5.0(2), you can create contracts in the infra tenant. You can also export contracts from and import contracts to the infra tenant for shared services use cases. **c.** Click **Select**. You return to the **Create Contract** dialog box.
Description	Enter a description of the contract.

Properties	Description
Settings	
Scope	The scope limits the contract to any endpoint groups within the same application profile, within the same VRF instance, throughout the fabric (globally), or within the same tenant. For inter-tenant communication, you will first create a contract with the **Global** scope in one of the tenants (for example, **tenant1**). This tenant's EPG will always be the provider of this contract. This contract will then be exported to the other tenant (for example, **tenant2**). For the other tenant that imports this contract, its EPG will be the consumer of the imported contract. If you want tenant2's EPG to be the provider and tenant1's EPG to be the consumer, then create a contract in **tenant2** and then export it to **tenant1**.
Add Filter	To choose a filter: **a.** Click **Add Filter**. The filter row appears with a **Select Filter** option. **b.** Click **Select Filter**. The **Select Filter** dialog box appears. **c.** From the **Select Filter** dialog, click to choose a filter in the left column then click **Select**. You return to the **Create Contract** dialog box.

Step 5 Click **Save** when finished.

Step 6 Export the contract that you just created to another tenant.

For example, assume the following:

- The contract that you created in the procedure above is named **contract1** in tenant **tenant1**.
- The contract that you want to export is named **exported_contract1** and you are exporting it to tenant **tenant2**.

a) Navigate to the Contracts page (**Application Management** > **Contracts**).

The configured contracts are listed.

b) Select the contract that you just created.

For example, scroll through the list until you see the contract **contract1** and click the box next to it to select it.

c) Go to **Actions** > **Export Contract**.

The **Export Contract** window appears.

d) Click **Select Tenant**.

The **Select Tenant** window appears.

e) Select the tenant that you want to export the contract to, then click **Save**.

For example, **tenant2**. You are returned to the **Export Contract** window.

f) In the **Name** field, enter a name for the exported contract.

For example, **exported_contract1**.

g) In the **Description** field, enter a description for the exported contract, if necessary.

h) Click **Save**.

The list of contracts appears again.

Step 7 Configure the first tenant's EPG as the provider EPG, with the original contract, as the first part of the EPG communication configuration.

a) Click the **Intent** button, then choose **EPG Communication**.

The **EPG Communication** window appears.

b) Click **Let's Get Started**.

c) In the **Contract** area, click **Select Contract**.

The **Select Contract** window appears.

d) Locate and select the contract that you created at the beginning of these procedures.

In this example, you would locate and select **contract1**.

e) Click **Select**.

The **EPG Communication** window appears.

f) In the **Provider EPGs** area, click **Add Provider EPGs**.

The **Select Provider EPGs** window appears.

g) Leave the **Keep selected items** box checked, then select the first tenant's (**tenant1**) EPG.

h) Click **Select**.

The **EPG Communication** window appears.

i) Click **Save**.

Step 8 Configure the second tenant's EPG as the consumer EPG, with the exported contract, as the second part of the EPG communication configuration.

a) Click the **Intent** button, then choose **EPG Communication**.

The **EPG Communication** window appears.

b) Click **Let's Get Started**.

c) In the **Contract** area, click **Select Contract**.

The **Select Contract** window appears.

d) Locate and select the contract that you created at the beginning of these procedures.

In this example, you would locate and select **exported_contract1**.

e) Click **Select**.

The **EPG Communication** window appears.

f) In the **Consumer EPGs** area, click **Add Consumer EPGs**.

The **Select Consumer EPGs** window appears.

g) Leave the **Keep selected items** box checked, then select the second tenant's (**tenant2**) EPG.

h) Click **Select**.

The **EPG Communication** window appears.

i) Click **Save**.

Configuring Network Security Groups Using the Cloud APIC GUI

As described in Security Groups, the way the network security groups are configured differ, depending on the release:

- For releases prior to Release 5.1(2), there is a one-to-one mapping between NSGs in Azure and EPGs on Cisco Cloud APIC (these configurations are also referred to as **NSG-per-EPG** configurations throughout this document).
- Beginning with Release 5.1(2), in addition to the existing NSG-per-EPG configurations available previously, NSGs in Azure can also have a one-to-one mapping with subnets rather than EPGs on Cisco Cloud APIC (these configurations are also referred to as **NSG-per-subnet** configurations throughout this document).

Note You can have either the newer **NSG-per-subnet** configuration *or* the older **NSG-per-EPG** configuration in your Cisco Cloud APIC. You cannot have both configurations in the same Cisco Cloud APIC system.

These procedures describe how to select either the newer **NSG-per-subnet** configuration or the older **NSG-per-EPG** configuration for your Cisco Cloud APIC for Release 5.1(2) or later.

Before you begin

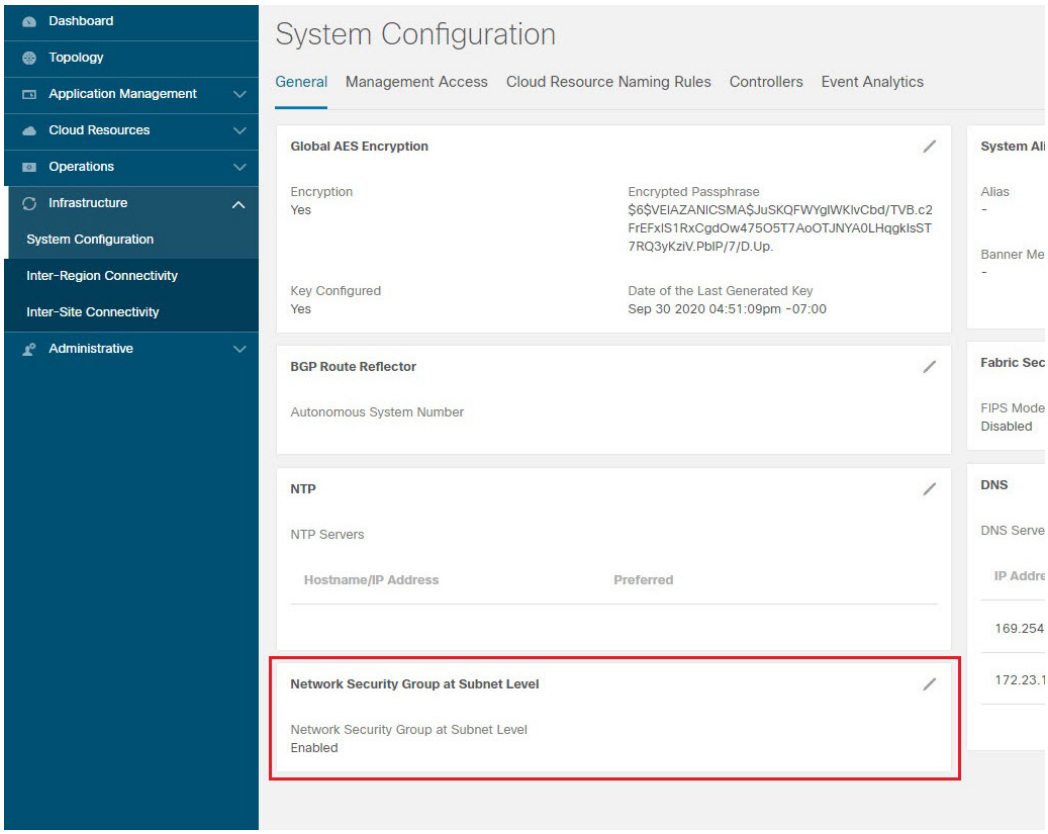
Review the information provided in Security Groups to better understand how security groups are configured, depending on the release, and to understand the guidelines and limitations for security groups.

Step 1 Log in to the Cloud APIC, if you are not logged in already.

Step 2 In the left navigation bar, navigate to **Infrastructure** > **System Configuration**.

The **General** tab is displayed by default.

Step 3 In the **General** area in the **System Configuration** window, locate the **Network Security Group at Subnet Level** field.



Step 4 Determine the current setting for the **Network Security Group at Subnet Level** field.

- If you see **Enabled** as the value in this field, that means that you have the newer **NSG-per-subnet** configuration for your Cisco Cloud APIC.
- If you see **Disabled** as the value in this field, that means that you have the older **NSG-per-EPG** configuration for your Cisco Cloud APIC.

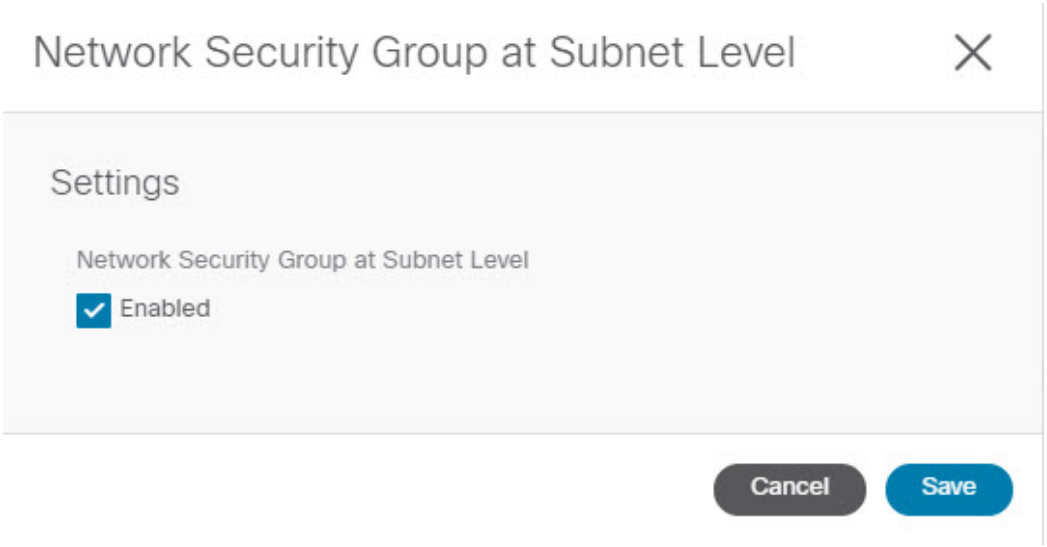
Step 5 Determine if you want to change the setting for the **Network Security Group at Subnet Level** field or leave it as-is.

Desired Configuration	Existing Configuration	Action
If you want to have the newer **NSG-per-subnet** configuration for your Cisco Cloud APIC, and:	You see **Enabled** as the value in the **Network Security Group at Subnet Level** field, then:	Your Cisco Cloud APIC is already set up with the **NSG-per-subnet** configuration that you want. You do not have to make any changes.
	You see **Disabled** as the value in the **Network Security Group at Subnet Level** field, then:	You will have to change the setting in the **Network Security Group at Subnet Level** field. Go to Step 6, on page 51.

Desired Configuration	Existing Configuration	Action
If you want to have the older **NSG-per-EPG** configuration for your Cisco Cloud APIC, and:	You see **Enabled** as the value in the **Network Security Group at Subnet Level** field, then:	You will have to change the setting in the **Network Security Group at Subnet Level** field. Go to Step 6, on page 51.
	You see **Disabled** as the value in the **Network Security Group at Subnet Level** field, then:	Your Cisco Cloud APIC is already set up with the **NSG-per-EPG** configuration that you want. You do not have to make any changes.

Step 6 If you have to change the setting in the **Network Security Group at Subnet Level** field, click the pencil icon in the upper right corner of the field.

The **Settings** window for **Network Security Group at Subnet Level** appears.



Step 7 Make the necessary changes in this window.

Note Changing the network security group setting will result in traffic loss. If you have to change the network security group setting, we recommend that you make the change during a maintenance window.

- If you want to have the newer **NSG-per-subnet** configuration for your Cisco Cloud APIC and you do not see a check in the box next to the **Enabled** field in this window, then click the box to add the check mark. This allows you to enable the newer **NSG-per-subnet** configuration for your Cisco Cloud APIC.
- If you want to have the older **NSG-per-EPG** configuration for your Cisco Cloud APIC and you see a check in the box next to the **Enabled** field in this window, then click the box to remove the check mark. This allows you to disable the newer **NSG-per-subnet** configuration, and to enable the older **NSG-per-EPG** configuration, for your Cisco Cloud APIC.

  Note the following:

  - Changing the setting from the newer **NSG-per-subnet** to the older **NSG-per-EPG** configuration is not recommended. Disabling the **NSG-per-subnet** setting means losing support for service EPG configurations and will result in traffic loss.

- If you have a service EPG or a private link label configured, you will not be able to disable the **NSG-per-subnet** configuration. You must disable the configured service EPG and/or a private link label before you can disable the **NSG-per-subnet** configuration.
  - To disable a configured service EPG:
    a. Navigate to **Application Management** > **EPGs**.
    b. Locate the EPGs with **Service** shown in the **Type** column.
    c. Select the service EPG that you want to delete, then click **Actions** > **Delete EPG**.
  - To disable a configured private link label:
    a. Navigate to **Application Management** > **Cloud Context Profiles**.
    b. Locate the necessary cloud context profile and click on that profile.

       A panel showing details for this cloud context profile slides in from the right side of the window.
    c. Click the Details icon ( ).

       Another window appears that provides more detailed information for this cloud context profile. In the **CIDRs** area, you should see the text **Private Link Labels** in the **Subnets** column.
    d. Click the pencil icon in the upper right corner of the window.

       The **Edit Cloud Context Profile** window appears.
    e. In the **Settings** area, locate the **CIDRs** area again and click the pencil icon in that row.

       The **Edit CIDR** window appears.
    f. In the **Subnets** area, locate the row with an entry in the **Private Link Label** column and click on the pencil icon for that subnet row.

       The entries on this subnet row become editable.
    g. Click the **X** next to the entry in the **Private Link Label** column for that subnet row.

       This removes the private link label.

Step 8 Click **Save** after you have made the necessary changes in the **Network Security Group at Subnet Level** window.

The **General** area in the **System Configuration** window appears again, and the setting in the **Network Security Group at Subnet Level** field reflects the change that you made in the previous step.

Viewing Security Group Details

Step 1 Log into your Cisco Cloud APIC GUI, if you aren't logged in already.

Step 2 Navigate to **Cloud Resources** > **Security Groups**.

The **Security Groups** window appears.

Step 3 Click on the **Network Security Groups** (NSG) tab or the **Application Security Groups** ASG tab, depending on which type of security group that you want to get details on.

The following information is provided in each tab:

- **Network Security Groups** tab:
  - **Name**: The name of the network security group.
  - **Cloud Provider ID**: The cloud provider ID that is associated with the network security group.

    Note that the value provided in the **Name** and the **Cloud Provider ID** fields will show whether the NSGs are configured with the newer NSG-per-subnet configuration (shown as **subnet-** in the **Cloud Provider ID** column) or with the older NSG-per-EPG configuration (shown as **epg-** in the **Cloud Provider ID** column). See Security Groups for more information on the different types of NSG configurations available, depending on the software release.
  - **EPGs**: The EPG that is associated with the network security group, if you have the older NSG-per-EPG configuration.
  - **Virtual Machines**: The virtual machine that is associated with the network security group.
  - **Endpoints**: The endpoints that are associated with the network security group.
  - **Subnets**: The subnets that are associated with the network security group, if you have the newer NSG-per-subnet configuration.
- **Application Security Groups** tab:
  - **Health**: The health status for the application security group.
  - **Name**: The name of the application security group.
  - **Cloud Provider ID**: The cloud provider ID that is associated with the application security group.
  - **EPGs**: The EPG that is associated with the application security group.
  - **Virtual Machines**: The virtual machine that is associated with the application security group.
  - **Endpoints**: The endpoints that are associated with the application security group.

Step 4 Click on the value in any of the columns to get more detailed information.

For example, clicking on a value in the **Name** column in the **Network Security Groups** tab will being up more detailed information about that particular network security group.

In this window, clicking on the Details icon ( ) brings up another window that provides more detailed information for this security group, such as cloud resources information, including ingress and egress rules.

Specifying Consumer and Provider EPGs Using the Cisco Cloud APIC

This section explains how to specify an EPG as a consumer or a provider.

Before you begin

- You have configured a contract.
- You have configured an EPG.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Configuration**.

A list of **Configuration** options appears in the **Intent** menu.

Step 3 From the **Configuration** list in the **Intent** menu, click **EPG Communication**. The **EPG Communication** dialog box appears with the **Consumer EPGs**, **Contract**, and **Provider EPGs** information.

Step 4 To choose a contract:

a) Click **Select Contract**. The **Select Contract** dialog appears.

b) In the pane on the left side of the **Select Contract** dialog, click to choose a contract then click **Select**. The **Select Contract** dialog box closes.

Step 5 To add a consumer EPG:

a) Click **Add Consumer EPGs**. The **Select Consumer EPGs** dialog appears.

Note EPGs within the tenant (where the contract is created) are displayed.

b) In the pane on the left side of the **Select Consumer EPGs** dialog, click to place a check in a check box to choose an EPG.

Step 6 To add a provider EPG:

a) Click **Add Provider EPGs**. The **Select Provider EPGs** dialog appears.

Note EPGs within the tenant (where the contract is created) are displayed.

b) In the pane on the left side of the **Select Provider EPGs** dialog, click to place a check in a check box to choose a provider EPG.

Note If the chosen contract is an Imported Contract, the provider EPG selection is disabled.

c) When finished, click **Select**. The **Select Provider EPGs** dialog box closes, and you return to the **EPG Communication Configuration** window.

d) Click **Save**.

Creating a Cloud Context Profile Using the Cisco Cloud APIC GUI

This section explains how to create a cloud context profile using the Cisco Cloud APIC GUI.

Before you begin

Create a VRF.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Application Management**.

A list of **Application Management** options appear in the **Intent** menu.

Step 3 From the **Application Management** list in the **Intent** menu, click **Create Cloud Context Profile**. The **Create Cloud Context Profile** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Cloud Context Profile Dialog Box Fields* table then continue.

Table 13: Create Cloud Context Profile Dialog Box Fields

Properties	Description
Name	Enter the name of the cloud context profile.
Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.
Description	Enter a description of the cloud context profile.
Settings	
Region	To choose a region: **a.** Click **Select Region**. The **Select Region** dialog box appears. **b.** From the **Select Region** dialog, click to choose a region in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.
VRF	To choose a VRF: **a.** Click **Select VRF**. The **Select VRF** dialog box appears. **b.** From the **Select VRF** dialog box, click to choose a VRF in the left column then click **Select**. You return to the **Create Cloud Context Profile** dialog box.

Properties	Description
Add CIDR	

Properties	Description
	Note The following subnet is reserved and should not be used in this **Add CIDR** field: 192.168.100.0/24 (reserved by the CCR for the bridge domain interface) **Note** You cannot add, delete, or edit a CIDR when VNet peering is enabled. You must disable VNet peering before adding, deleting or editing a CIDR. To disable VNet peering: • For the infra tenant, disable the **Hub Network Peering** option in the cloud context profile • For a user (non-infra) tenant, disable the **VNet Peering** option in the cloud context profile Enable VNet peering again after you have made the changes to the CIDR configuration. The following features are supported, depending on the release: • You can add additional secondary CIDRs and subnets for infra VNets (`cloudCtxProfiles` created by the cloud template). You cannot add primary CIDRs or modify the existing CIDRs created by the cloud template. After subnets are created under the user-created CIDRs, the subnets will be implicitly mapped to the secondary VRF. • You can add also additional secondary CIDRs and subnets for VNets other than the infra VNet. See Support for Multiple VRFs Under Single VNet for more information. To add a CIDR: **a.** Click **Add CIDR**. The **Add CIDR** dialog box appears. **b.** Enter the address in the **CIDR Block Range** field. **c.** Click to check (enabled) or uncheck (disabled) the **Primary** check box. If you are adding additional secondary CIDRs and subnets for VNets, leave the **Primary** box unchecked. **d.** Click **Add Subnet** and enter the following information: • In the **Address** field, enter the subnet address. • In the **Name** field, enter the name for this subnet. • In the **Private Link Label** field, choose one of the following: • **Select Existing**: Click **Select Private Link Label**, then choose an existing private link label to associate with this subnet. • **Create New**: Enter a unique name for the private link label to associate with this subnet. **e.** In the **VRF** field, make a selection, if necessary.

Properties	Description
	• If you checked the box next to the **Primary** field, this CIDR is automatically associated with the primary VRF. • If you did not check the box next to the **Primary** field, you can associate this CIDR with a secondary VRF. Click the **X** next to the VRF, then click on **Select VRF** to select the secondary VRF to associate with this CIDR. **f.** When finished, click **Add**.
VNet Gateway Router	Click to check (enable) or uncheck (disable) in the **VNet Gateway Router** check box.
VNet Peering	Click to check (enable) or uncheck (disable) the Azure VNet peering feature. For more information on the VNet peering feature, see the *Configuring VNet Peering for Cloud APIC for Azure* document in the Cisco Cloud APIC documentation page.

Step 5 Click **Save** when finished.

Configuring Virtual Machines in Azure

When you configure endpoint selectors for Cisco Cloud APIC, you will also need to configure the virtual machines that you will need in Azure that will correspond with the endpoint selectors that you configure for Cisco Cloud APIC.

This topic provides the requirements for configuring the virtual machines in Azure. You can use these requirements to configure the virtual machines in Azure either before you configure the endpoint selectors for Cisco Cloud APIC or afterward. For example, you might go to your account in Azure and create a custom tag or label in Azure first, then create an endpoint selector using a custom tag or label in Cisco Cloud APIC afterward. Or you might create an endpoint selector using a custom tag or label in Cisco Cloud APIC first, then go to your account in Azure and create a custom tag or label in Azure afterward.

Before you begin

You must configure a cloud context profile as part of the Azure virtual machine configuration process. When you configure a cloud context profile, the configurations, such as the VRF and region settings, are pushed out to Azure afterward.

Step 1 Review your cloud context profile configuration to get the following information:

- VRF name
- Subnet information
- Subscription Id
- The resource group that corresponds to where the cloud context profile is deployed.

Note In addition to the information above, if you are using tag-based EPGs, you also need to know the tag names. The tag names are not available in the cloud context profile configuration.

To obtain the cloud context profile configuration information:

a) From the **Navigation** menu, choose the **Application Management** tab.

When the **Application Management** tab expands, a list of subtab options appear.

b) Choose the **Cloud Context Profiles** subtab option.

A list of the cloud context profiles that you have created for your Cisco Cloud APIC are displayed.

c) Select the cloud context profile that you will use as part of this Azure virtual machine configuration process.

Various configuration parameters are displayed for this cloud context profile, such as the region, VRF, IP address and subnets. Use the information displayed in this window when you configure the Azure virtual machine.

Step 2 Log in to the Azure portal account for the Cisco Cloud APIC user tenant and begin creating an Azure VM using the information you gathered from the cloud context profile configuration.

Note For information about how to create the VM in the Azure portal, see the Microsoft Azure documentation.

Creating a Backup Configuration Using the Cisco Cloud APIC GUI

This section explains how to create a backup configuration.

Before you begin

Create a remote location and a scheduler, if needed.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Operations**.

A list of **Operations** options appear in the **Intent** menu.

Step 3 From the **Operations** list in the **Intent** menu, click **Create Backup Configuration**. The **Create Backup Configuration** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Backup Configuration Dialog Box Fields* table then continue.

Table 14: Create Backup Configuration Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the backup configuration.
Description	Enter a description of the backup configuration.
Settings	

Properties	Description
Backup Destination	Choose a backup destination. • **Local** • **Remote**

Properties	Description
Backup Object	

Properties	Description
	Choose the root hierarchical content to consider for the backup • **Policy Universe** • **Selector Object**—When chosen, this option adds the **Object Type** drop-down list and **Object DN** field. **a.** From the **Object Type** drop-down list, choose from the following options: • **Tenant**—When chosen the **Select Tenant** option appears. • **Application Profile**—When chosen the **Select Application Profile** option appears. • **EPG**—When chosen the **Select EPG** option appears. • **Contract**—When chosen the **Select Contract** option appears. • **Filter**—When chosen the **Select Filter** option appears. • **VRF**—When chosen the **Select VRF**option appears. • **Device**—When chosen the **Select fvcloudLBCtx**option appears. • **Service Graph**—When chosen the **Select Service Graph** option appears. • **Cloud Context Profile**—When chosen the **Select Cloud Context Profile** option appears. **b.** Click the **Select <object_name>**. The **Select <object_name>** dialog appears. **c.** From the **Select <object_name>** dialog, click to choose from the options in the left column then click **Select**. You return to the **Create Backup Configuration** dialog box. **Note** The **Object DN** field is automatically populated with the DN of the object it will use as root of the object tree to backup • **Enter DN**—When chosen, this option displays the **Object DN** field. **a.** From the **Object DN** field, enter the DN of a

Properties	Description
	specific object to use as the root of the object tree to backup.
Scheduler	**a.** Click **Select Scheduler** to open the **Select Scheduler** dialog and choose a scheduler from the left-side column. **b.** Click the **Select** button at the bottom-right corner when finished.
Trigger Backup After Creation	Choose one of the following: • **Yes**—(Default) Trigger a backup after creating the backup configuration. • **No**—Do not trigger a backup after creating the backup configuration.

Step 5 Click **Save** when finished.

Creating a Tech Support Policy Using the Cisco Cloud APIC GUI

This section explains how to create a tech support policy.

Before you begin

When creating a tech support policy for a remote location, you must first create the remote location.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Operations**.

A list of **Operations** options appear in the **Intent** menu.

Step 3 From the **Operations** list in the **Intent** menu, click **Create Tech Support**. The **Create Tech Support** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Tech Support Dialog Box Fields* table then continue.

Table 15: Create Tech Support Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the tech support policy.
Description	Enter a description of the tech support.
Settings	

Properties	Description
Export Destination	Choose an export destination. • **Controller** • **Remote Location**—When chosen the **Select Remote Location** option appears. **a.** Click **Select Remote Location**. The **Select Remote Location** dialog box appears. **b.** From the **Select Remote Location** dialog, click to choose a remote location in the left column then click **Select**. You return to the **Create Tech Suport** dialog box.
Include Pre-Upgrade Logs	Click to place a check in the **Enabled** check box if you want to include pre-upgrade logs in the tech support policy.
Trigger After Creation	Click to place a check in the **Enabled** (the default) check box if you want to create the tech support policy after the policy creation. To disable, click the check box to uncheck.

Step 5 Click **Save** when finished.

Creating a Scheduler Using the Cisco Cloud APIC GUI

This section explains how to create a scheduler, which would be in User Laptop Browser local time and will be converted to the Cisco Cloud APIC default UTC time.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Operations**.

A list of **Operations** options appear in the **Intent** menu.

Step 3 From the **Operations** list in the **Intent** menu, click **Create Scheduler**. The **Create Scheduler** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Scheduler Dialog Box Fields* table then continue.

Table 16: Create Scheduler Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the trigger scheduler policy.
Description	Enter a description of the trigger scheduler.
Settings	

Properties	Description
Recurring Windows	Click **Add Recurring Window**. The **Add Recurring Window** dialog appears. **a.** From the **Schedule** drop-down list, choose from the following. • **every-day** • **Monday** • **Tuesday** • **Wednesday** • **Thursday** • **Friday** • **Saturday** • **Sunday** • **odd-day** • **even-day** **b.** From the **Start Time** field, enter a time. **c.** From the **Maximum Concurrent Tasks** field, enter a number or leave the field empty to specify unlimited. **d.** From the **Maximum Running Time**, click to choose **Unlimited** or **Custom**. **e.** Click **Add** when finished.
Add One Time Window	Click **Add One Time Window**. The **Add One Time Window** dialog appears. **a.** From the **Start Time** field, enter a date and time. **b.** From the **Maximum Concurrent Tasks** field, enter a number or leave the field blank to specify unlimited. **c.** From the **Maximum Running Time**, click to choose **Unlimited** or **Custom**. **d.** Click **Add** when finished.

Step 5 Click **Save** when finished.

Creating a Remote Location Using the Cisco Cloud APIC GUI

This section explains how to create a remote location using the Cisco Cloud APIC.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Operations**.

A list of **Operations** options appear in the **Intent** menu.

Step 3 From the **Operations** list in the **Intent** menu, click **Create Remote Location**. The **Create Remote Location** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Remote Location Dialog Box Fields* table then continue.

Table 17: Create Remote Location Dialog Box Fields

Properties	Description
General	
Name	Enter the name of the remote location policy.
Description	Enter a description of the remote location policy.
Settings	
Hostname/IP Address	Enter the hostname or IP address of the remote location
Protocol	Choose a protocol: • **FTP** • **SFTP** • **SCP**
Path	Enter the path for the remote location.
Port	Enter the port for the remote location.
Username	Enter a username for the remote location.
Authentication Type	When using SFTP or SCP, choose the authentication type: • **Password** • **SSH Key**
SSH Key Content	Enter the SSH key content.
SSH Key Passphrase	SSH key passphrase.
Password	Enter a password for accessing the remote location.
Confirm Password	Reenter the password for accessing the remote location.

Step 5 Click **Save** when finished.

Creating a Login Domain Using the Cisco Cloud APIC GUI

This section explains how to create a login domain using the Cisco Cloud APIC GUI.

Before you begin

Create a provider before creating a non-local domain.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appear in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Create Login Domain**. The **Create Login Domain** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Login Domain Dialog Box Fields* table then continue.

Table 18: Create Login Domain Dialog Box Fields

Properties	Description
Name	Enter the name of the login domain.
Description	Enter a description of the login domain.
Realm	Choose a realm: • **Local** • **LDAP**—Requires adding providers and choosing an authenication type. • **RADIUS**—Requires adding providers. • **TACACS+**—Requires adding providers. • **SAML**—Requires adding providers.
Providers	To add a provider: **a.** Click **Add Providers**. The **Select Providers** dialog appears with a list of providers in the left pane. **b.** Click to choose a provider. **c.** Click **Select** to add the provider.
Advanced Settings	Displays the **Authentication Type** and **LDAP Group Map Rules** fields.

Properties	Description
Authentication Type	When LDAP is chosen for realm option, choose one of the following authentication types: • **Cisco AV Pairs**—(Default) • **LDAP Group Map Rules**—Requires adding LDAP group map rules.
LDAP Group Map Rules	To add an LDAP group map rule: **a.** Click **Add LDAP Group Map Rule**. The **Add LDAP Group Map Rule** dialog appears with a list of providers in the left pane. **b.** Enter a name for the rule in the **Name** field. **c.** Enter a description for the rule in the **Description** field. **d.** Enter a group DN for the rule in the **Group DN** field. **e.** Add security domains: **1.** Click **Add Security Domain**. The **Add Security Domain** dialog box appears. **2.** Click **Select Security Domain**. The **Select Security Domain** dialog box appears with a list of security domains in the left pane. **3.** Click to choose a security domain. **4.** Click **Select** to add the security domain. You return to the **Add Security Domain** dialog box. **5.** Add a user role: **a.** From the **Add Security Domain** dialog box, click **Select Role**. The **Select Role** dialog box appears with a list of roles in the left pane. **b.** Click to choose a role. **c.** Click **Select** to add the role. You retun to the **Add Security Domain** dialog box. **d.** From the **Add Security Domain** dialog box, click the **Privilege Type** drop-down list and choose **Read Privilege** or **Write Privilege**. **e.** Click the check mark on the right side of the **Privilege Type** drop-down list to confirm. **f.** Click **Add** when finished. You return to the **Add LDAP Group Map Rule** dialog box where you can add another security domain.

Step 5 Click **Save** when finished.

Creating a Security Domain Using the Cisco Cloud APIC GUI

A security domain restricts the tenant to the security domains that you add. If you do not add a security domain, all security domains will have access to this tenant. This section explains how to create a security domain using the GUI.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appear in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Security** > **Security Domains** > **Create Security Domain**. The **Create Security Domain** dialog box appears.

Step 4 In the **Name** field, enter the name of the security domain.

Step 5 In the **Description** field, enter a description of the security domain.

Step 6 Set the **Restricted Domain** control to **Yes** or **No**.

If the security domain is configured as a restricted domain (**Yes**), users who are assigned to this domain will not be able to see policies, profiles, or users configured in other security domains.

Step 7 Click **Save** when finished.

Creating a Role Using the Cisco Cloud APIC GUI

This section explains how to create a role using the Cisco Cloud APIC GUI.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appear in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Create Role**. The **Create Role** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Role Dialog Box Fields* table then continue.

Table 19: Create Role Dialog Box Fields

Properties	Description
General	
Name	Enter a name for the role in the **Name** field.
Description	Enter a description of the role.
Settings	

Properties	Description
Privilege	

Properties	Description
	Click to place a check mark in the check boxes of the privileges you want to assign the user. The privileges are: • **aaa**—Used for configuring authentication, authorization, accouting and import/export policies. • **access-connectivity-l1**Used for Layer 1 configuration under infra. Example: selectors and port Layer 1 policy configurations. • **access-connectivity-l2**—Used for Layer 2 configuration under infra. Example: Encap configurations on selectors, and attachable entity. • **access-connectivity-l3**—Used for Layer 3 configuration under infra and static route configurations under a tenant's L3Out. • **access-connectivity-mgmt**—Used for management infra policies. • **access-connectivity-util**—Used for tenant ERSPAN policies. • **access-equipment**—Used for access port configuration. • **access-protocol-l1**—Used for Layer 1 protocol configurations under infra. • **access-protocol-l2**—Used for Layer 2 protocol configurations under infra. • **access-protocol-l3**—Used for Layer 3 protocol configurations under infra. • **access-protocol-mgmt**—Used for fabric-wide policies for NTP, SNMP, DNS, and image management. • **access-protocol-ops**—Used for operations-related access policies such as cluster policy and firmware policies. • **access-protocol-util**—Used for tenant ERSPAN policies. • **access-qos**—Used for changing CoPP and QoS-related policies. • **admin**—Complete access to everything (combine ALL roles) • **fabric-connectivity-l1**—Used for Layer 1 configuration under the fabric. Example: selectors and port Layer 1 policy and VNET protection.

Properties	Description
	• **fabric-connectivity-l2**—Used in firmware and deployment policies for raising warnings for estimating policy deployment impact. • **fabric-connectivity-l3**—Used for Layer 3 configuration under the fabric. Example: Fabric IPv4 and MAC protection groups. • **fabric-connectivity-mgmt**—Used for atomic counter and diagnostic policies on leaf switches and spine switches. • **fabric-connectivity-util**—Used for atomic counter, diagnostic, and image management policies on leaf switches and spine switches. • **fabric-equipment**—Used for atomic counter, diagnostic, and image management policies on leaf switches and spine switches. • **fabric-protocol-l1**—Used for Layer 1 protocol configurations under the fabric. • **fabric-protocol-l2**—Used for Layer 2 protocol configurations under the fabric. • **fabric-protocol-l3**—Used for Layer 3 protocol configurations under the fabric. • **fabric-protocol-mgmt**—Used for fabric-wide policies for NTP, SNMP, DNS, and image management. • **fabric-protocol-ops**—Used for ERSPAN and health score policies. • **fabric-protocol-util**—Used for firmware management traceroute and endpoint tracking policies. • **none**—No privilege. • **nw-svc-device**—Used for managing Layer 4 to Layer 7 service devices. • **nw-svc-devshare**—Used for managing shared Layer 4 to Layer 7 service devices. • **nw-svc-params**—Used for managing Layer 4 to Layer 7 service policies. • **nw-svc-policy**—Used for managing Layer 4 to Layer 7 network service orchestration.

Properties	Description
	• **ops**—Used for operational policies including monitoring and troubleshooting policies such as atomic counter, SPAN, TSW, tech support, traceroute, analytics, and core policies. • **tenant-connectivity-l1**—Used for Layer 1 connectivity changes, including bridge domains and subnets. • **tenant-connectivity-l2**—Used for Layer 2 connectivity changes, including bridge domains and subnets. • **tenant-connectivity-l3**—Used for Layer 3 connectivity changes, including VRFs. • **tenant-connectivity-mgmt**—Used for tenant in-band and out-of-band management connectivity configurations and for debugging/monitoring policies such as atomic counters and health score. • **tenant-connectivity-util**—Used for atomic counter, diagnostic, and image management policies on leaf switches and spine switches. • **tenant-epg**—Used for managing tenant configurations such as deleting/creating endpoint groups, VRFs, and bridge domains. • **tenant-ext-connectivity-l2**—Used for managing tenant L2Out configurations. • **tenant-ext-connectivity-l3**—Used for managing tenant L3Out configurations. • **tenant-ext-connectivity-mgmt**—Used as write access for firmware policies. • **tenant-ext-connectivity-util**—Used for debugging/monitoring/observer policies such as traceroute, ping, oam, and eptrk. • **tenant-ext-protocol-l1**—Used for managing tenant external Layer 1 protocols. Generally only used for write access for firmware policies. • **tenant-ext-protocol-l2**—Used for managing tenant external Layer 2 protocols. Generally only used for write access for firmware policies. • **tenant-ext-protocol-l3**—Used for managing tenant external Layer 3 protocols such as BGP, OSPF, PIM, and IGMP. • **tenant-ext-protocol-mgmt**—Used as write access for firmware policies.

Properties	Description
	• **tenant-ext-protocol-util**—Used for debugging/monitoring/observer policies such as traceroute, ping, oam, and eptrk. • **tenant-network-profile**—Used for managing tenant configurations, such as deleting and creating network profiles, and deleting and creating endpoint groups. • **tenant-protocol-l1**—Used for managing configurations for Layer 1 protocols under a tenant. • **tenant-protocol-l2**—Used for managing configurations for Layer 2 protocols under a tenant. • **tenant-protocol-l3**—Used for managing configurations for Layer 3 protocols under a tenant. • **tenant-protocol-mgmt**—Only used as write access for firmware policies. • **tenant-protocol-ops**—Used for tenant traceroute policies. • **tenant-protocol-util**—Used for debugging/monitoring/observer policies such as traceroute, ping, oam, and eptrk. • **tenant-qos**—Only used as Write access for firmware policies. • **tenant-security**—Used for Contract related configurations for a tenant. • **vmm-connectivity**—Used to read all the objects in APIC's VMM inventory required for VM connectivity. • **vmm-ep**—Used to read VM and Hypervisor endpoints in the APIC's VMM inventory. • **vmm-policy**—Used for managing policies for VM networking. • **vmm-protocol-ops**—Not used by VMM policies. • **vmm-security**—Used for Contract related configurations for a tenant.

Step 5 Click **Save** when finished.

Creating a Certificate Authority Using the Cisco Cloud APIC GUI

This section explains how to create a certificate authority using the GUI.

Before you begin

- Have the certificate chain.
- If the certificate authority is for a tenant, create the tenant.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appears in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Create Certificate Authority**. The **Create Certificate Authority** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Certificate Authority Dialog Box Fields* table then continue.

Table 20: Create Certificate Authority Dialog Box Fields

Properties	Description
Name	Enter the name of the certificate authority.
Description	Enter a description of the certificate authority.
Used for	Choose from the following options: • **Tenant**—Choose if the certificate authority is for a specific tenant. When chosen, the **Select Tenant** option appears in the GUI. • **System**—Choose if the certificate authority is for the system.
Select Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create Certificate Authority** dialog box.
Certificate Chain	Enter the certificate chain in the **Certificate Chain** text box. **Note** Add the certificates for a chain in the following order: **a.** CA **b.** Sub-CA **c.** Subsub-CA **d.** Server

Step 5 Click **Save** when finished.

Creating a Key Ring Using the Cisco Cloud APIC GUI

This section explains how to create a key ring using the Cisco Cloud APIC GUI.

Before you begin

- Create a certificate authority.
- Have a certificate.
- If the key ring is for a specific tenant, create the tenant.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appear in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Create Key Ring**. The **Create Key Ring** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Key Ring Dialog Box Fields* table then continue.

Table 21: Create Key Ring Dialog Box Fields

Properties	Description
Name	Enter the name of the key ring.
Description	Enter a description of the key ring.
Used for	• **System**—The key ring is for the system. • **Tenant**—The key ring is for a specific tenant. Displays a **Tenant** field for specifying the tenant.
Select Tenant	To choose a tenant: **a.** Click **Select Tenant**. The **Select Tenant** dialog box appears. **b.** From the **Select Tenant** dialog, click to choose a tenant in the left column then click **Select**. You return to the **Create Key Ring** dialog box.
Settings	

Properties	Description
Certificate Authority	To choose a certificate authority: **a.** Click **Select Certificate Authority**. The **Select Certificate Authority** dialog appears. **b.** Click to choose a certificate authority in the column on the left. **c.** Click **Select**. You return to the **Create Key Ring** dialog box.
Private Key	Choose one of the following: • **Generate New Key**—Generates a new key. • **Import Existing Key**—Displays the **Private Key** text box and enables you to use an existing key.
Private Key	Enter an existing key in the **Private Key** text box (for the **Import Existing Key** option).
Modulus	Click the **Modulus** drop-down list to choose from the following: • **MOD 512** • **MOD 1024** • **MOD 1536** • **MOD 2048**—(Default)
Certificate	Enter the certificate information in the **Certificate** text box.

Step 5 Click **Save** when finished.

Creating a Local User Using the Cisco Cloud APIC GUI

This section explains how to create a local user using the Cisco Cloud APIC GUI.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Administrative**.

A list of **Administrative** options appear in the **Intent** menu.

Step 3 From the **Administrative** list in the **Intent** menu, click **Create Local User**. The **Create Local User** dialog box appears.

Step 4 Enter the appropriate values in each field as listed in the following *Create Local User Dialog Box Fields* table then continue.

Table 22: Create Local User Dialog Box Fields

Properties	Description
Name	Enter the username of the local user.
Password	Enter the password for the local user.
Confirm Password	Reenter the password for the local user.
Description	Enter a description of the local user.
Settings	
Account Status	To choose the account status: • **Active**—Activates the local user account. • **Inactive**—Deactivates the local user account.
First Name	Enter the first name of the local user.
Last Name	Enter the last name of the local user.
Email Address	Enter the email address of the local user.
Phone Number	Enter the phone number of the local user.

Properties	Description
Security Domains	To add a security domain: **a.** Click **Add Security Domain**. The **Add Security Domain** dialog box appears. **b.** Click **Select Security Domain**. The **Select Security Domain** dialog box appears with a list of security domains in the left pane. **c.** Click to choose a security domain. **d.** Click **Select** to add the security domain. You return to the **Add Security Domain** dialog box. **e.** Add a user role: **1.** From the **Add Security Domain** dialog box, click **Select Role**. The **Select Role** dialog box appears with a list of roles in the left pane. **2.** Click to choose a role. **3.** Click **Select** to add the the role. You retun to the **Add Security Domain** dialog box. **4.** From the **Add Security Domain** dialog box, click the **Privilege Type** drop-down list and choose **Read Privilege** or **Write Privilege**. **5.** Click the check mark on the right side of the **Privilege Type** drop-down list to confirm. **6.** Click **Add** when finished. You return to the **Create Local User** dialog box where you can add another security domain.

Step 5 Click **Advanced Settings** and enter the appropriate values in each field as listed in the following *Create Local User Dialog Box Fields: Advanced Settings* table then continue.

Table 23: Create Local User Dialog Box Fields: Advanced Settings

Property	Description
Account Expires	If you choose **Yes**, the account is set to expire at the time that you choose.
Password Update Required	If you choose **Yes**, the user must change the password upon the next login.
OTP	Put a check in the box to enable the one-time password feature for the user.

Property	Description
User Certificates	To add a user certificate: **a.** Click **Add X509 Certificate**. The **Add X509 Certificate** dialog box appears. **b.** Enter a name in the **Name** field. **c.** Enter the X509 certificate in the **User X509 Certificate** text box. **d.** Click **Add**. The **X509 certificate in the User X509 Certificate** dialog box closes. You return to the **Local User** dialog box.
SSH Keys	To add a an SSH key: **a.** Click **Add SSH Key**. The **Add SSH Key** dialog box appears. **b.** Enter a name in the **Name** field. **c.** Enter the SSH key in the **Key** text box. **d.** Click **Add**. The **Add SSH Key** dialog box closes. You return to the **Local User** dialog box.

Step 6 Click **Save** when finished.

Managing Regions (Configuring a Cloud Template) Using the Cisco Cloud APIC GUI

Regions are configured during the first-time setup. When configured, you specify the regions that are managed by Cisco Cloud APIC and the region's inter-site and inter-region connectivity. This section explains how to manage regions with the cloud template using the Cisco Cloud APIC GUI after the initial installation.

For more information about cloud templates, see About the Cloud Template.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Configuration**.

A list of options appear in the **Intent** menu.

Step 3 From the **Configuration** list in the **Intent** menu, click **cAPIC Setup**.
The **Set up - Overview** dialog box appears with options for **DNS and NTP Servers**, **Region Management**, and **Smart Licensing**.

Step 4 For **Region Management**, click **Edit Configuration**.
The **Setup - Region Management** dialog box appears. and the first step in the **Setup - Region Management** series of steps appears, **Regions to Manage**, with a list of managed regions.

Step 5 If you want inter-site connectivity, click to place a check mark in the **Enabled** box in the **Inter-Site Connectivity** area. The **Inter-Site Connectivity** step is added in the **Setup - Region Management** steps at the top of the page.

Step 6 To choose a region that you want to be managed by the Cisco Cloud APIC, click to place a check mark in check box of that region.

Step 7 To deploy cloud routers locally to this region, click to place a check mark in the **Cloud Routers** check box for that region.

Step 8 To configure the fabric infra connectivity for the cloud site, click **Next**.
The next step in the **Setup - Region Management** series of steps appears, **General Connectivity**.

Step 9 To add a subnet pool for the CCRs, click **Add Subnet Pool for Cloud Router** and enter the subnet in the text box.

Note The /24 subnet provided during the Cloud APIC deployment would be sufficient for up to two cloud sites. If you need to manage more than two cloud sites, you need to add more subnets.

Step 10 Enter a value in the **BGP Autonomous System Number for CCRs** field.

The BGP ASN can be in the range of 1 - 65534.

Step 11 In the **Assign Public IP to CCR Interface** field, determine if you want to have a public or a private IP address assigned to the CCR interface.

Note that CCRs require a public IP address for intersite communication.

- To have a public IP address assigned to the CCR interface, leave the check in the **Enabled** check box. By default, the **Enabled** check box is checked.
- To have a private IP address assigned to the CCR interface, uncheck the **Enabled** check box. A private IP address is used for connectivity in this case.

Note Changing a CCR address from a public IP address to a private IP address (or vice-versa) is a disruptive operation and can result in traffic loss.

Beginning with release 5.1(2), both the public and private IP addresses assigned to a CCR are displayed with the other details of the router in the Cloud Resources area. If a public IP is not assigned to a CCR, only the private IP is displayed.

Step 12 To chose the number of routers per region, click the **Number of Routers Per Region** drop-down list and click **2**, **3**, **4**, **6**, or **8**.

Step 13 Enter a username in the **Username** text box.

Note Do not use admin as a username for the CCR when connecting to an Azure cloud site.

Step 14 Enter a password in the **Password** and **Confirm Password** text boxes.

Step 15 To choose the throughput value, click the **Throughput of the routers** drop-down list.

Note
- Cloud routers should be undeployed from all regions before changing the throughput or login credentials.
- Beginning with release 25.0(3), Cisco Cloud APIC moves from the Cisco Cloud Services Router 1000v to the Cisco Catalyst 8000V. For information on the throughput values for the Cisco Catalyst 8000V, see About the Cisco Catalyst 8000V.

Step 16 Enter the necessary information in the **TCP MSS** field, if applicable.

Beginning with Release 4.2(4q), the **TCP MSS** option is available to configure the TCP maximum segment size (MSS). This value will be applied to all cloud router tunnel interfaces, including VPN tunnels towards the cloud and external

tunnels towards the on-premises site or other cloud sites. For VPN tunnels towards the cloud, if the cloud provider's MSS value is less than the value that you enter in this field, then the lower value is used; otherwise, the value that you enter in this field is used.

The MSS value affects only TCP traffic, and has no impact on other types of traffic, such as ping traffic.

Step 17 (Optional) To specify the license token, enter the product instance registration token in the **License Token** text box.

Note
- Beginning with release 25.0(3), Cisco Cloud APIC moves from the Cisco Cloud Services Router 1000v to the Cisco Catalyst 8000V. For licensing information for the Cisco Catalyst 8000V, see About the Cisco Catalyst 8000V.
- If no token is entered, the CCR will be in EVAL mode.
- If you assigned private IP addresses to the CCRs in Step 11, on page 81, the only supported option is **Direct connect to Cisco Smart Software Manager (CSSM)** when registering smart licensing for CCRs with private IP addresses (available by navigating to **Administrative** > **Smart Licensing**). You must provide reachability to the CSSM through express route in this case.

Step 18 Click **Next**.

- If you placed a check mark in the **Enabled** box in the **Inter-Site Connectivity** area earlier in these procedures, **Inter-Site Connectivity** appears as the next step in the **Setup - Region Management** series of steps. Go to Step 19, on page 82.
- If you did not place a check mark in the **Enabled** box in the **Inter-Site Connectivity** area earlier in these procedures, **Cloud Resource Naming Rules** appears as the next step in the **Setup - Region Management** series of steps. Go to Step 23, on page 82.

Step 19 To enter a peer public IP address of the IPsec Tunnel peer on-premises in the text box, click **Add Public IP of IPSec Tunnel Peer**.

Step 20 Enter the OSPF area ID in the **OSPF Area Id** text box.

Step 21 To add an external subnet pool, click **Add External Subnet** and enter a subnet pool in the text box.

Step 22 When you have configured all the connectivity options, click **Next** at the bottom of the page.

The **Cloud Resource Naming Rules** page appears.

Step 23 In the **Cloud Resource Naming Rules** page, configure the cloud resource naming rules, if necessary.

The cloud resource naming rules are described in detail in the Cloud Resources Naming, on page 83 section. If you don't need to make any changes to the naming rules, you can skip this page.

Step 24 Click **Save and Continue** when finished.

Configuring Smart Licensing

This task demonstrates how to set up smart licensing in the Cisco Cloud APIC.

Before you begin

You need the product instance registration token.

Step 1 Click the **Intent** icon. The **Intent** menu appears.

Step 2 Click the drop-down arrow below the **Intent** search box and choose **Configuration**.

A list of options appear in the **Intent** menu.

Step 3 From the **Configuration** list in the **Intent** menu, click **Set Up cAPIC**. The **Set up - Overview** dialog box appears with options for **DNS Servers**, **Region Management**, and **Smart Licensing**.

Step 4 To register the Cloud APIC to Cisco's unified license management system: From **Smart Licensing**, click **Register**. The **Smart Licensing** dialog appears.

Step 5 Choose a transport setting:

- **Direct to connect to Cisco Smart Software Manager (CSSM)**
- **Transport Gateway/Smart Software Manager Satellite**
- **HTTP/HTTPS Proxy**

Note An IP address is alo required when choosing **HTTP/HTTPS Proxy**.

Step 6 Enter the product instance registration token in the provided text box.

Step 7 Click **Register** when finished.

Cloud Resources Naming

Prior to Cloud APIC Release 5.0(2), the cloud resources created by the Cloud APIC in Azure were assigned names that were derived from the names of the ACI objects:

- Resource groups were created based on the Tenant, VRF, and region. For example, `CAPIC_<tenant>_<vrf>_<region>`.
- VNET names matched the name of the Cloud APIC VRF.
- Subnet names were derived from the CIDR address space. For example, `subnet-10.10.10.0_24` for the `10.10.10.0/24` cloud subnet.
- The cloud application name was derived from the EPG name and the application profile name. For example, `<epg-name>_cloudapp_<app-profile-name>`

This approach is not ideal for deployments with strict cloud resource naming conventions and it does not follow the Azure best practices for naming and tagging of cloud resources.

Starting with Cloud APIC Release 5.0(2), you can create a global naming policy on the Cloud APIC, which allows you to define a custom cloud resources naming convention for all objects deployed from the Cloud APIC into the Azure cloud. You can define custom naming rules for all cloud resources during the first time setup wizard of the Cloud APIC, with the exception of the **Resource group** name used for the Cloud APIC ARM template deployment. The resource group name for the template is defined when you first deploy it and cannot be changed after. In addition to the global policy, you can also explicitly define the names of the cloud resources created from each Cloud APIC object using the REST API.

Starting with Cloud APIC Release 5.1(2), for Layer 4 to Layer 7 service deployments, you can provide custom names to cloud resources, such as, Network Load Balancers, Application Load Balancers and Device Application Security Groups.

Note Keep in mind that even with custom naming policy, once a cloud resource is created, you will not be able to modify the name. If you want to change the name of an existing cloud resource, you would need to delete all configured cloud resources and recreate them. Cloud resources to be deleted include secondary CIDR and subnets, CCRs deployed by Cloud APIC and therefore IPSec tunnels from the CCRs to every remote site.

Variables Available for Naming Rules

When creating your cloud resources naming policy, you can use the following variables to dynamically define the name of the cloud resource based on the Cisco Cloud APIC objects:

- `${tenant}` – the resource will include the name of the Tenant
- `${ctx}` – the resource will include the name of the VRF
- `${ctxprofile}` – the resources will include the cloud context profile, which is a VRF deployed in a given cloud region
- `${subnet}` – the resource will include the string `subnet` followed by the subnet IP address
- `${app}` – the resource will include the name of the application profile.
- `${epg}` – the resource will include the name of the EPG.
- `${contract}` – the resource will include the name of the contract
- `${region}` – the resource will include the name of the cloud region
- `${priority}` – the resource will include the name of the network security group (NSG) rule priority. This number is allocated automatically to ensure that each NSG rule name is unique
- `${serviceType}` – the resource will include an abbreviation of the service Type (only valid for private endpoint resources)
- `${resourceName}` – the resource will include the name of the target resource (only valid for private endpoint resources)
- `${device}` – the resource will include the name of the Layer 4 to Layer 7 device.
- `${interface}` – the resource will include the name of the Layer 4 to Layer 7 device interface.
- `${deviceInterfaceDn}` – the resource will include the DN of the Layer to Layer 7 device interface.

For private endpoints, the combination of the `${app}-${svcepg}-${subnet}-${serviceType}-${resourceName}` makes the private endpoint name unique. Removing any of these variables might form a name of a private endpoint that already exists. This would result in a fault raised by the Cisco Cloud APIC. Also, the max length requirements vary from Azure service to service.

When you define a global naming policy using one or more of the above variables, Cisco Cloud APIC validates the string to ensure that all mandatory variables are present and no invalid string is specified.

There is a maximum name length limit in Azure. If the length of the name exceeds the length supported by the cloud provider, it rejects the config and Cisco Cloud APIC raises a fault that the resource creation failed. You can then check the fault for details and correct the naming rules. The maximum length limits at the time of Cisco Cloud APIC, Release 5.0(2) are listed below, for the latest up-to-date information and any changes to the length limit, consult the Azure documentation.

The following table provides a summary of which cloud resources support each of the naming variables above. Cells denoted with an asterisk (*) indicate variables that are mandatory for that type of cloud resource. Cells denoted with a plus sign (+) indicate that at least one of these variables is mandatory for that type of cloud resource; for example, for VNET resources you can provide `${ctx}`, or `${ctxprofile}`, or both.

Table 24: Supported Variables for Cloud Resources

Azure Resource	`${tenant}`	`${ctx}`	`${ctxprofile}`	`${subnet}`	`${app}`	`${epg}`	`${contract}`	`${region}`	`${priority}`
Resource Group Max Length: 90	Yes*	Yes*						Yes*	
Virtual Network (VNET) Max Length: 64	Yes	Yes+	Yes+					Yes	
Subnet Max Length: 80	Yes	Yes	Yes	Yes*				Yes	
Application Security Group (ASG) Max Length: 80	Yes				Yes*	Yes*		Yes	
Network Security Group (NSG) Max Length: 80	Yes				Yes*	Yes*		Yes	

Azure Resource	${tenant}	${ctx}	${ctxprofile}	${subnet}	${app}	${epg}	${contract}	${region}	${priority}
Network Security Group Rule Max Length: 80	Yes						Yes		Yes* (auto)

Table 25: Supported Variables for Cloud Resources (Layer 4 to Layer 7 device services)

Azure Resource	${tenant}	${region}	${ctxprofile}	${device}	${interface}	${deviceInterfaceDN}
Internal Network Load Balancer Max Length: 80	Yes	Yes	Yes	Yes*		
Internet-facing Network Load Balancer Max Length: 80	Yes	Yes	Yes	Yes*		
Internal Application Load Balancer Max Length: 80	Yes	Yes	Yes	Yes*		
Internet-facing Application Load Balancer Max Length: 80	Yes	Yes	Yes	Yes*		
Device ASG Max Length: 80	Yes	Yes		Yes*	Yes*	Yes*

Naming Rules Guidelines and Limitations

When configuring custom rules for naming cloud resources, the following restrictions apply:

- You define global naming policy during the Cloud APIC's first time setup using two sets of naming rules:
  - **Hub Resource Naming Rules** define names for the Hub Resource Group, Hub VNET, overlay-1 CIDR, secondary CIDR subnet in the Infra Tenant, as well as the subnet prefixes for subnets that are created automatically by the system in the Infra tenant.
  - **Cloud Resource Naming Rules** define the names of the Network Security Group (NSG), Application Security Group (ASG), Network Load Balancer, Application Load Balancer, Device Application Security Group, and subnets you create in the Infra Tenant, as well as the names of all resources

(Resource Groups, Virtual Networks, Subnets, NSG, ASG, Network Load Balancer, Application Load Balancer) in user Tenants.

After you define the naming rules, you will be required to review and confirm them. Keep in mind that you must confirm the naming rules before any cloud resources are deployed.

- Once a cloud resource is created, its name cannot be changed and the naming policy cannot be updated in the GUI. If you upgrade your Cloud APIC to Release 5.0(2) with some resources already deployed in Azure, you will also not be able to change the global custom naming rules.

  If you want to change the names of the existing cloud resources or the policy, you would need to delete the deployed resources before being able to update the global naming policy in the GUI.

  In these cases you can use the REST API to explicitly assign custom names to any new resources you create.

- When updating cloud resources naming via REST API, we recommend you do not import configuration at the same time.

  We recommend you define any naming rules first. Then any tenant configuration.

  We recommend that you do not change the naming policy after the tenant configuration is deployed.

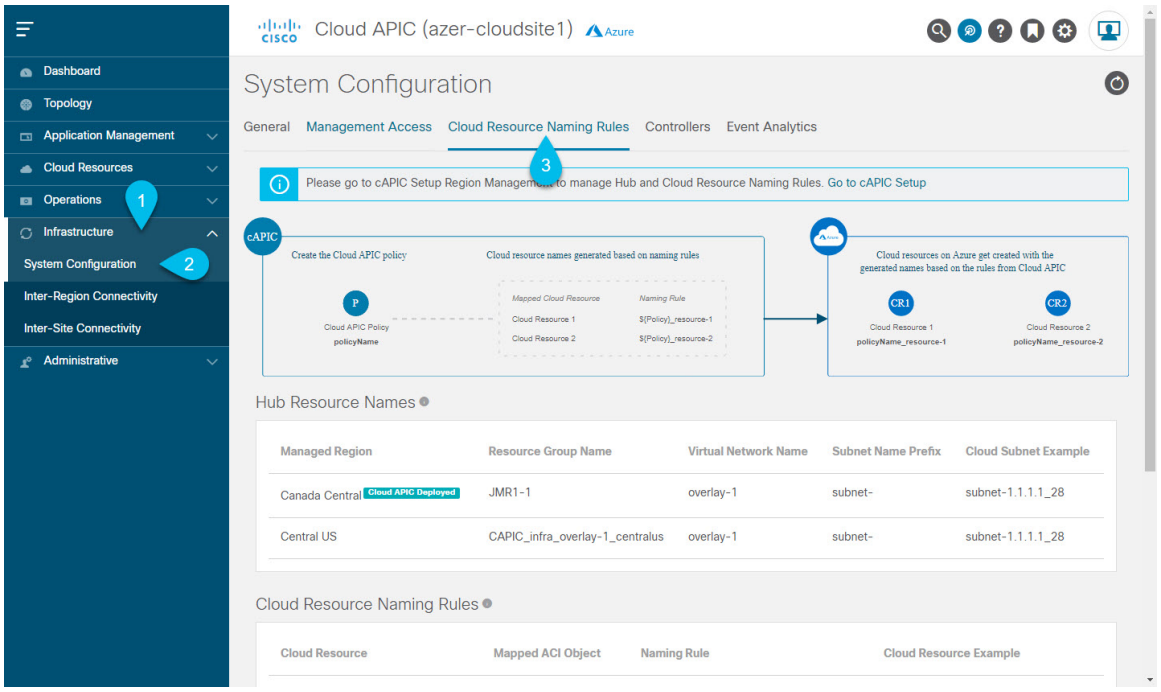
Viewing Cloud Resource Naming Rules

You initially define the cloud resource naming rules in the Region Management part of the first time setup wizard when you deploy your Cloud APIC, which is described in the *Cisco Cloud APIC Installation Guide*. After the initial setup, you can view the rules you configured in the **System Configuration** screen of your Cloud APIC GUI as described in this section.

Note that the information in this screen is presented in read-only view and if you want to change the rules any time after the original deployment, you will need to re-run the first time setup wizard .

Step 1 Log in to your Cloud APIC GUI.

Step 2 Navigate to the **Cloud Resource Naming Rules** screen.



a) In the **Navigation** sidebar, expand the **Infrastructure** category.
b) From the **Infrastructure** category, select **System Configuration**.
c) In the **System Configuration** screen, select the **Cloud Resource Naming Rules** tab.

   In the **Cloud Resource Naming Rules** tab, you can see a summary of the currently configured rules for the names of resources that you deploy in the cloud site from your Cloud APIC.

   If you did not configure custom naming rules before, the default rules are listed here, which use the Cloud APIC object names for cloud resources.

   If you have not accepted the naming rules you have defined during the first time setup, a warning banner will be displayed across the top of the screen.

   Note Keep in mind that you must confirm the naming rules before any cloud resources are deployed.

Configuring Cisco Cloud APIC Using the REST API

Creating a Tenant Using the REST API

There are two types of subscriptions: own and shared. Each subscription type has a primary tenant. You choose the own subscription when creating a new managed or unmanaged tenant. You choose the shared subscription when creating a tenant that inherits the managed or unmanaged settings of an existing primary tenant. This section demonstrates how to create a managed and unmanaged tenant with the own type of subscription and how to create a shared subscription.

This section demonstrates how to create a tenant using the REST API using sample POST requests from the body of Postman.

Step 1 Create an own subscription.

a) To create an unmanaged tenant using a client secret:

```
POST https://<cloud-apic-ip-address>/api/mo/uni.xml

<fvTenant name="{{primary-tenant-name}}">
    <cloudAccount id="{{user-tenant-subscription-id}}" vendor="azure" accessType="credentials"
status="">
       <cloudRsCredentials tDn="uni/tn-{{primary-tenant-name }}/credentials-{{ primary-tenant-name
 }}"/>
    </cloudAccount>
    <cloudCredentials name="{{ primary-tenant-name }}" keyId="{{application_key_id}}"
key="{{client_secret_key}}">
        <cloudRsAD tDn="uni/tn-{{ primary-tenant-name }}/ad-{{active_directory_id}}"/>
    </cloudCredentials>
    <cloudAD name="{{active_directory_name}}" id="{{active_directory_id}}" />
    <fvRsCloudAccount tDn="uni/tn-{{ primary-tenant-name }}/act-[{{ user-tenant-subscription-id
}}]-vendor-azure" status=""/>
</fvTenant>
```

b) To create a managed tenant:

```
POST https://<cloud-apic-ip-address>/api/mo/uni.xml

<fvTenant name="{{ primary-tenant-name }}">
    <cloudAccount id="{{ user-tenant-subscription-id }}" vendor="azure" accessType="managed"
status="" />
    <fvRsCloudAccount tDn="uni/tn-{{ primary-tenant-name }}/act-[{{ user-tenant-subscription-id
}}]-vendor-azure" status=""/>
</fvTenant>
```

Step 2 Create a shared subscription:

```
POST https://<cloud-apic-ip-address>/api/mo/uni.xml

<fvTenant name="{{ primary-tenant-name }}">
    <fvRsCloudAccount tDn="uni/tn-{{ primary-tenant-name }}/act-[{{ user-tenant-subscription-id
}}]-vendor-azure" status=""/>
</fvTenant>
```

Creating a Contract Using the REST API

This example demonstrates how to create a contract for the Cisco Cloud APIC using the REST API.

Before you begin

Create filters.

To create a contract:

Example:

```
<polUni>
  <fvTenant name="t2" status="">
    <vzFilter descr="" name="http-family-destination" ownerKey="" ownerTag="">
      <vzEntry name="http" prot="tcp" etherT="ip" dFromPort="http" dToPort="http"/>
      <vzEntry name="https" prot="tcp" etherT="ip" dFromPort="https" dToPort="https"/>
    </vzFilter>
    <vzBrCP name="httpFamily">
      <vzSubj name="default" revFltPorts="yes" targetDscp="unspecified">
        <vzRsSubjFiltAtt action="permit" directives="" tnVzFilterName="http-family-destination"/>
      </vzSubj>
    </vzBrCP>
  </fvTenant>
</polUni>
```

Creating a Cloud Context Profile Using the REST API

This section demonstrates how to create a cloud context profile.

Before you begin

Create a VRF.

Step 1 To create a basic cloud context profile:

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="tn15">
    <cloudCtxProfile name="cProfilewestus151">
        <cloudRsCtxProfileToRegion tDn="uni/clouddomp/provp-azure/region-westus"/>
      <cloudRsToCtx tnFvCtxName="ctx151"/>
    <cloudCidr addr="15.151.0.0/16" primary="true" status="">
          <cloudSubnet ip="15.151.1.0/24" name="GatewaySubnet" usage="gateway">
              <cloudRsZoneAttach tDn="uni/clouddomp/provp-azure/region-westus/zone-default"/>
        </cloudSubnet>
        <cloudSubnet ip="15.151.2.0/24" name="albsubnet" >
            <cloudRsZoneAttach tDn="uni/clouddomp/provp-azure/region-westus/zone-default"/>
        </cloudSubnet>
          <cloudSubnet ip="15.151.3.0/24" name="subnet" usage="">
              <cloudRsZoneAttach tDn="uni/clouddomp/provp-azure/region-westus/zone-default"/>
        </cloudSubnet>
    </cloudCidr>
    </cloudCtxProfile>
  </fvTenant>
</polUni>
```

Step 2 To create a cloud context profile where you are adding a secondary VRF, CIDR, and subnet for a VNet:

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="tenant1" status="">
        <fvCtx name="VRF1" />
```

```
        <fvCtx name="VRF2″ />
        <cloudCtxProfile name="vpc1" status="">
            <cloudRsCtxProfileToRegion tDn="uni/clouddomp/provp-azure/region-centralus" status=""/>
            <cloudRsToCtx tnFvCtxName="VRF1" />
            <cloudRsCtxProfileToGatewayRouterP tDn="uni/tn-infra/gwrouterp-default" status=""/>
            <cloudCidr name="cidr1" addr="192.0.2.0/16" primary="yes" status="">
                <cloudSubnet ip="192.0.3.0/24" usage="gateway" status="">
                    <cloudRsZoneAttach status=""
tDn="uni/clouddomp/provp-azure/region-centralus/zone-default"/>
                </cloudSubnet>
            </cloudCidr>
            <cloudCidr name="cidr1" addr="193.0.2.0/16" primary="no" status="">
                <cloudSubnet ip="193.0.3.0/24" usage="" status="">
                    <cloudRsSubnetToCtx tnFvCtxName="VRF2"/>
                    <cloudRsZoneAttach status=""
tDn="uni/clouddomp/provp-azure/region-centralus/zone-default"/>
                </cloudSubnet>
            </cloudCidr>
        </cloudCtxProfile>
    </fvTenant>
</polUni>
```

Managing a Cloud Region Using the REST API

This section demonstrates how to manage a cloud region using the REST API.

To create a cloud region:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
  <cloudDomP name="default">
       <cloudProvP vendor="azure">
          <cloudRegion adminSt="managed" name="eastus"><cloudZone name="default"/></cloudRegion>
          <cloudRegion adminSt="managed" name="eastus2"><cloudZone name="default"/></cloudRegion>
          <cloudRegion adminSt="managed" name="westus"><cloudZone name="default"/></cloudRegion>
        </cloudProvP>
    </cloudDomP>
</polUni>
```

Creating a Filter Using the REST API

This section demonstrates how to create a filter using the REST API.

To create a filter:

```
https://<IP_Address>/api/node/mo/.xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
```

```
    <fvTenant name="t15">
    <vzFilter name="rule1">
      <vzEntry etherT="ip" dToPort="22" prot="tcp" dFromPort="22" name="ssh"/>
      <vzEntry etherT="ip" prot="unspecified" name="any"/>
    </vzFilter>
    <vzFilter name="rule2">
      <vzEntry etherT="ip" dToPort="http" prot="tcp" dFromPort="http" name="http"/>
    </vzFilter>
    <vzFilter name="rule3">
      <vzEntry etherT="ip" dToPort="22" prot="tcp" dFromPort="22" name="ssh"/>
    </vzFilter>
    <vzFilter name='all_rule'>
        <vzEntry etherT="ip" prot="unspecified" name="any"/>
  </vzFilter>

    <vzBrCP name="c1">
        <vzSubj name="c1">
            <vzRsSubjFiltAtt tnVzFilterName="rule2"/>
            <vzRsSubjGraphAtt tnVnsAbsGraphName="c13_g1"/>
            <vzRsSubjFiltAtt tnVzFilterName="rule3"/>
            <vzRsSubjFiltAtt tnVzFilterName="all_rule"/>
      </vzSubj>
    </vzBrCP>

  </fvTenant>
</polUni>
```

Creating an Application Profile Using the REST API

This section demonstrates how to create an application profile using the REST API.

Before you begin

Create a tenant.

To create an application profile:

```
https://<IP_Address>/api/node/mo/.xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="tn15">
        <fvRsCloudAccount tDn="uni/tn-infra/act-[<subscription id>]-vendor-azure" />


        <fvCtx name="ctx151"/>

        <cloudVpnGwPol name="VgwPol1"/>
        <cloudApp name="a1">

    </cloudApp>

  </fvTenant>
</polUni>
```

Configuring Network Security Groups Using the REST API

This example demonstrates how set the newer **NSG-per-subnet** configuration for your Cisco Cloud APIC using the REST API.

Before you begin

Review the information provided in Security Groups.

To set the NSG-per-subnet configuration for your Cisco Cloud APIC:

Example:

```
<polUni>
    <cloudDomP status="">
        <cloudProvP vendor="azure">
            <cloudProvResPolCont><cloudProvSGForSubnetP enableSGForSubnet="true"
status=""/></cloudProvResPolCont>
        </cloudProvP>
    </cloudDomP>
</polUni>
```

Creating an EPG Using the REST API

Use the procedures in this section to create an application EPG, an external EPG, or a service EPG using the REST API.

Creating a Cloud EPG Using the REST API

This example demonstrates how to create a cloud EPG using the REST API.

Before you begin

Create an application profile and a VRF.

To create a cloud EPG:

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="tn15">
        <fvRsCloudAccount tDn="uni/tn-infra/act-[<subscription id>]-vendor-azure" />


        <fvCtx name="ctx151"/>

        <cloudVpnGwPol name="VgwPol1"/>
        <cloudApp name="a1">
```

```
        <cloudEPg name="epg1">
            <cloudRsCloudEPgCtx tnFvCtxName="ctx151"/>
            <cloudEPSelector matchExpression="custom:tag1=='value1'" name="selector-1"/>
        </cloudEPg>


    </cloudApp>

  </fvTenant>
</polUni>
```

Creating an External Cloud EPG Using the REST API

This example demonstrates how to create an external cloud EPG using the REST API.

Before you begin

Create an application profile and a VRF.

Step 1 To create an external cloud EPG:

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="tn15">
        <fvRsCloudAccount tDn="uni/tn-infra/act-[<subscription id>]-vendor-azure" />
        <fvCtx name="ctx151"/>
        <cloudVpnGwPol name="VgwPol1"/>
        <cloudApp name="a1">
        <cloudExtEPg routeReachability="internet" name="extEpg-1">
            <fvRsCons tnVzBrCPName="extEpg-1"/>
            <cloudRsCloudEPgCtx tnFvCtxName="ctx151"/>
            <cloudExtEPSelector name="extSelector1" subnet="0.0.0.0/0"/>
       </cloudExtEPg>
    </cloudApp>
  </fvTenant>
</polUni>
```

Step 2 To create an external cloud EPG with type **site-external**:

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
    <fvTenant name="infra">
        <cloudApp name="a1">
        <cloudExtEPg routeReachability="site-ext" name="extEpg-1">
            <fvRsCons tnVzBrCPName="extEpg-1"/>
            <cloudRsCloudEPgCtx tnFvCtxName="overlay-2"/>
            <cloudExtEPSelector name="extSelector1" subnet="10.100.0.0/16"/>
       </cloudExtEPg>
    </cloudApp>
```

```
  </fvTenant>
</polUni>
```

Creating a Service EPG Using the REST API

This example demonstrates how to create a service EPG using the REST API.

Before you begin

- Review the information in Cloud Service Endpoint Groups.
- Create an application profile and a VRF.

Step 1 To create a service EPG with a deployment type of Cloud Native:

Example:

```
<cloudSvcEPg name="Storage" type="Azure-Storage" accessType="Private" deploymentType="CloudNative">
    <cloudPrivateLinkLabel name="ProductionSubnets"/>
    <cloudRsCloudEPgCtx tnFvCtxName="HUB-SERVICES-VRF"/>
    <cloudSvcEPSelector matchExpression="ResourceName=='StorageAcct1'" name="selector-1"/>
    <cloudSvcEPSelector matchExpression="custom:Tag=='ProdStorage'" name="selector-2"/>
</cloudSvcEPg>
```

Step 2 To create a service EPG with a deployment type of Cloud Native Managed:

Example:

```
<cloudSvcEPg name="APIM" type="Azure-ApiManagement" accessType="Private"
deploymentType="CloudNativeManaged" status="">
    <cloudRsCloudEPgCtx tnFvCtxName="infra-SvcCtx" />
    <fvRsCons tnVzBrCPName="infra-APIM-Mock"/>
    <fvRsProv tnVzBrCPName="infra-managedAPIM" status=""/>
    <cloudSvcEPSelector matchExpression="IP=='10.21.52.0/28'" name="sel1" status=""/>
</cloudSvcEPg>
```

Step 3 To create a service EPG with a deployment type of Third-Party:

Example:

```
<cloudSvcEPg name="SaaS-Hub" type="Custom"  accessType="Private" deploymentType="Third-party" status="">

    <cloudRsCloudEPgCtx tnFvCtxName="infra-SvcCtx" status=""/>
    <cloudSvcEPSelector
matchExpression="URL=='saassvcepg.286b0377-a9b7-40d7-a94f-67abe03ce5f4.centralus.azure.privatelinkservice'"
 name="s1" status=""/>
    <cloudPrivateLinkLabel name="saas-hub" status=""/>
    <fvRsProv tnVzBrCPName="SaaS-Hub" status=""/>
</cloudSvcEPg>
```

Creating a Cloud Template Using the REST API

This section demonstrates how to create a cloud template using the REST API. For more information about cloud templates, see About the Cloud Template.

The REST API will change depending on the type of Licensing model selected. The license type of the Cisco Catalyst 8000V is captured by the property `routerThroughput` in the `cloudtemplateProfile` managed object .

If the `routerThroughput` value belongs to **T0/T1/T2/T3** then **BYOL** Cisco Catalyst 8000V is deployed on Cisco Cloud APIC. If `routerThroughput` value is **PAYG** then **PAYG** Cisco Catalyst 8000V is deployed on Cisco Cloud APIC.

Before you begin

Step 1 To create a cloud template post to deploy a **BYOL** Cisco Catalyst 8000V:

```
<polUni>
  <fvTenant name="infra">
    <cloudtemplateInfraNetwork name="default" numRemoteSiteSubnetPool="2" numRoutersPerRegion="2"
status="" vrfName="overlay-1">
         <cloudtemplateProfile name="default" routerPassword="cisco123" routerUsername="cisco"
routerThroughput="250M" routerLicenseToken="thisismycsrtoken" />
              </cloudtemplateProfile>
      <cloudtemplateExtSubnetPool subnetpool="10.20.0.0/16"/>

      <cloudtemplateIntNetwork name="default">
        <cloudRegionName provider="azure" region="westus"/>
        <cloudRegionName provider="azure" region="westus2"/>
      </cloudtemplateIntNetwork>

      <cloudtemplateExtNetwork name="default">
        <cloudRegionName provider="azure" region="westus2"/>

        <cloudtemplateVpnNetwork name="default">

          <cloudtemplateIpSecTunnel peeraddr="23.2.1.1/32" />
          <cloudtemplateIpSecTunnel peeraddr="23.0.1.1/32" />
          <cloudtemplateIpSecTunnel peeraddr="23.1.1.1/32" />

          <cloudtemplateOspf area="0.0.0.1"/>

        </cloudtemplateVpnNetwork>

      </cloudtemplateExtNetwork>
</cloudtemplateInfraNetwork>
  </fvTenant>
</polUni>
```

Step 2 To create a cloud template post to deploy a **PAYG** Cisco Catalyst 8000V:

```
<polUni>
  <fvTenant name="infra">
    <cloudtemplateInfraNetwork name="default" numRemoteSiteSubnetPool="2" numRoutersPerRegion="2"
status="" vrfName="overlay-1">
         <cloudtemplateProfile name="default" routerPassword="cisco123" routerUsername="cisco"
routerThroughput="PAYG" vmType="DS2V2" />
              </cloudtemplateProfile>
cloudtemplateProfile name="default" routerPassword="cisco123" routerUsername="cisco"
routerThroughput="250M" routerLicenseToken="thisismycsrtoken" />
```

```
        </cloudtemplateProfile>
      <cloudtemplateExtSubnetPool subnetpool="10.20.0.0/16"/>

      <cloudtemplateIntNetwork name="default">
        <cloudRegionName provider="azure" region="westus"/>
        <cloudRegionName provider="azure" region="westus2"/>
      </cloudtemplateIntNetwork>

      <cloudtemplateExtNetwork name="default">
        <cloudRegionName provider="azure" region="westus2"/>

        <cloudtemplateVpnNetwork name="default">

          <cloudtemplateIpSecTunnel peeraddr="23.2.1.1/32" />
          <cloudtemplateIpSecTunnel peeraddr="23.0.1.1/32" />
          <cloudtemplateIpSecTunnel peeraddr="23.1.1.1/32" />

          <cloudtemplateOspf area="0.0.0.1"/>

        </cloudtemplateVpnNetwork>

      </cloudtemplateExtNetwork>
</cloudtemplateInfraNetwork>
  </fvTenant>
</polUni>
```

On selecting PAYG throughput, the user must also select the **vmName** from a list of vmNames which is created by Cloud APIC and represented by the managed object `VmType`.

The following table lists the vmNamesTypes that are indicated by the property `vmType` in the `cloudtemplateProfile`.

VmName on Azure	Memory	vCPUs	NetworkBw
DS2V2	7GiB	2	Up to 1.5 Gigabit
DS3V2	14GiB	4	Up to 3 Gigabit
DS4V2	28GiB	8	Up to 6 Gigabit
F16SV2	32GiB	16	Up to 12.5 Gigabit
F32SV2	64GiB	32	Up to 16 Gigabit

Configuring VRF Leak Routes Using the REST API

Before you begin

Review the information provided in Route Leaking Between Internal VRFs and Global Inter-VRF Route Leak Policy before proceeding with the instructions in this section.

Step 1 Enter a post similar to the following to enable or disable contract-based routing.

```
<fvTenant name="infra">
```

```
    <cloudVrfRouteLeakPol name="default" allowContractBasedRouting=”true”/>
</fvTenant>
```

Where the `allowContractBasedRouting` field has either of the following settings:

- **true**: Indicates that routes are leaked based on contracts in the absence of route maps. When enabled, contracts drive routing when route maps are not configured. When route maps exist, route maps always drives routing.
- **false**: Default setting. Indicates that routes are not leaked based on contracts, and are leaked based on route maps instead.

Step 2 Enter a post similar to the following to use the `leakInternalPrefix` field to configure route leaking for all cloud CIDRs associated with the VRFs.

```
<fvTenant name=”t1”>
  <fvCtx name="v1">
    <leakRoutes>
      <leakInternalPrefix ip="0.0.0.0/0" le="32">
        <leakTo tenantName="t2" ctxName="v2" scope="public"/>
      </leakInternalPrefix>
    </leakRoutes>
  </fvCtx>
</fvTenant>

<fvTenant name=”t2”>
  <fvCtx name="v2">
    <leakRoutes>
      <leakInternalPrefix ip="0.0.0.0/0" le="32">
        <leakTo tenantName="t1" ctxName="v1" scope="public"/>
      </leakInternalPrefix>
    </leakRoutes>
  </fvCtx>
</fvTenant>
```

Step 3 Enter a post similar to the following to use the `leakInternalSubnet` field to leak specific routes between a pair of VRFs.

```
<fvTenant name=”anyTenant" status="">
    <fvCtx name="VRF1" >
        <leakRoutes status="">
            <leakInternalSubnet ip="110.110.1.0/24" >
                <leakTo ctxName=”VRF2" scope="public" tenantName=" anyTenant " />
            </leakInternalSubnet>
        </leakRoutes>
    </fvCtx>
    <fvCtx name="VRF2" status="" >
        <leakRoutes status="">
            <leakInternalSubnet ip="110.110.2.0/24" >
                <leakTo ctxName=”VRF1" scope="public" tenantName=" anyTenant " />
            </leakInternalSubnet>
        </leakRoutes>
    </fvCtx>
</fvTenant>
```

Configuring the Source Interface Selection for Tunnels Using the REST API

Before you begin

Review the information provided in Source Interface Selection for Tunnels before proceeding with these instructions.

Enter a post similar to the following to configure the source interface selection for tunnels.

```
<cloudtemplateInfraNetwork name="default" vrfName="overlay-1">
  <cloudtemplateProfile name="defaultxyz" routerUsername="james" routerPassword="bond@@7" />

  <cloudtemplateIpSecTunnelSubnetPool subnetpool="10.20.0.0/16" poolname="pool1" />

  <cloudtemplateIntNetwork name="default">
    <cloudRegionName provider="aws" region="us-west-1"/>
    <cloudRegionName provider="aws" region="us-west-2"/>
  </cloudtemplateIntNetwork>

  <cloudtemplateExtNetwork name="something" vrfName="xyz" >
    <cloudRegionName provider="aws" region="us-west-2"/>
    <cloudtemplateVpnNetwork name="default">
      <cloudtemplateIpSecTunnel peeraddr="23.2.1.1/32" poolname="" presharedkey="abcd"
ikeVersion="v1|v2">
          <cloudtemplateIpSecTunnelSourceInterface sourceInterfaceId="2" />
      </cloudtemplateIpSecTunnel>
    </cloudtemplateVpnNetwork>
  </cloudtemplateExtNetwork>
</cloudtemplateInfraNetwork>
```

Defining Global Cloud Resource Naming Rules or Overriding Specific Object's Name

This section provides an example REST API POST you can use to configure a global policy for naming your cloud resources or override a specific cloud resource's name.

Note To ensure that any custom naming conventions can be supported, cloud resource names can be defined on a per-object basis. These explicit name overrides are not available in the Cloud APIC GUI and can be done using REST API only. We recommend using the global cloud resource naming policy to define the names. Explicit name overrides shouldf be used only when naming requirements cannot be met using the global naming policy.

Step 1 To create Hub Resource Naming Rules:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
  <fvTenant name="infra">
```

```
    <cloudtemplateInfraNetwork name="default" numRemoteSiteSubnetPool="2"
    numRoutersPerRegion="2" status="" vrfName="overlay-1">
      <cloudtemplateIntNetwork name="default">
        <cloudRegionName provider="azure" region="west's" status="">
          <cloudtemplateRegionNameCustomization ctxProfileName="infra-vnet"
          resourceGroupName="infra-rh" subnetNamePrefix="snet-" />
        </cloudRegionName>
      </cloudtemplateIntNetwork>
    </cloudtemplateInfraNetwork>
  </fvTenant>
</polUni>
```

Step 2 To create Cloud Resource Naming Rules:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<polUni>
  <cloudDomP name="default">
    <cloudNaming
    azResourceGroup="${tenant}-network-${ctx}-${region}-rg"
    azVirtualNetwork="${tenant}-${ctxprofile}-vnet"
    azSubnet="${tenant}-${ctxprofile}-snet-${subnet}"
    azNetworkSecurityGroup="${app}-${epg}-nsg"
    azApplicationSecurityGroup="${app}-${epg}-asg"
    azNetworkSecurityGroupRule="${contract}--${priority}"
    internetApplicationBalancer="agw-e-${device}"
    internalApplicationBalancer="agw-i-${device}"
    internetNetworkBalancer="lbe-${device}"
    internalNetworkBalancer="lbi-${device}"
    l4L7DeviceApplicationSecurityGroup="${deviceInterfaceDn}"
   reviewed="yes" />
  </cloudDomP>
</polUni>
```

Step 3 To override an Azure cloud resource name corresponding to a specific Cloud APIC object:

You can use the same variables (for example, `${tenant}`) when specifying the custom name using the API.

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
<fvTenant name="ExampleCorp" status="">
  <fvRsCloudAccount status="" tDn="uni/tn-infra/act-[<infra-subscription>]-vendor-azure"/>
  <fvCtx name="VRF1"/>
  <cloudApp name="App1">
    <cloudEPg name="Db" azNetworkSecurityGroup="db-nsg" azApplicationSecurityGroup="db-asg-${region}">

      <cloudRsCloudEPgCtx tnFvCtxName="VRF1"/>
      <cloudEPSelector matchExpression="custom:EPG=='db'" name="100"/>
    </cloudEPg>
  </cloudApp>
  <cloudCtxProfile name="c02" azResourceGroup="custom-tc-rg1" azVirtualNetwork="vnet1">
    <cloudRsCtxProfileToRegion tDn="uni/clouddomp/provp-azure/region-westus"/>
    <cloudRsToCtx tnFvCtxName="VRF1"/>
    <cloudCidr addr="10.20.20.0/24" name="cidr1" primary="yes" status="">
      <cloudSubnet ip="10.20.20.0/24" name="subnet1" azSubnet="s1" status="">
        <cloudRsZoneAttach status="" tDn="uni/clouddomp/provp-azure/region-westus/zone-default"/>
      </cloudSubnet>
    </cloudCidr>
  </cloudCtxProfile>
</fvTenant>
```

Step 4 To override a Layer 4 to Layer 7 Azure cloud resource name corresponding to a specific Cloud APIC object:

You can use the same variables (for example, `${tenant}`) when specifying the custom name using the API.

Override policy for load balancer:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
 <fvTenant>
 <cloudLB name="ALB" type="application" scheme="internet" size="small" instanceCount="2" status=""
nativeLBName=”ALB” >
                <cloudRsLDevToCloudSubnet
tDn="uni/tn-{{tenantName}}/ctxprofile-c1/cidr-[31.10.0.0/16]/subnet-[31.10.80.0/24]" status="" />
        </cloudLB>
 </fvTenant>
```

Override policy for device ASG:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/node/mo/uni/.xml -->
 <fvTenant>
 <cloudLDev name="{{FWName}}" status="" l4L7DeviceApplicationSecurityGroup="Group1" >
            <cloudRsLDevToCtx tDn="uni/tn-{{tenantName}}/ctx-VRF1" status=""/>
            </cloudLIf>
        </cloudLDev>
 <fvTenant>
```