Deploying the Cloud APIC in Azure

Subscribing to the CCR

The procedures for subscribing to the CCR vary depending on the release of the Cisco Cloud APIC software:

- For releases up to 25.0(3), Cisco Cloud APIC uses the **CSR 1000v** as the cloud services router, so refer to the procedures in Subscribing to the Cisco Cloud Services Router 1000V, on page 1.
- For release 25.0(3) and later, Cisco Cloud APIC uses the **CCR 8000v** as the cloud services router, so refer to the procedures in Subscribing to the Cisco Cloud Router 8000V, on page 3.

Subscribing to the Cisco Cloud Services Router 1000V

You must subscribe to the Cisco Cloud Services Router (CSR) 1000V - Bring Your Own License (BYOL) for Maximum Performance. To subscribe through the Microsoft Azure Marketplace:

Step 1 In the Azure Marketplace search text field, type *Cisco Cloud Services Router (CSR) 1000V* and select the option that appears.

The **Cisco Cloud Services Router (CSR) 1000V** option appears as a search suggestion.

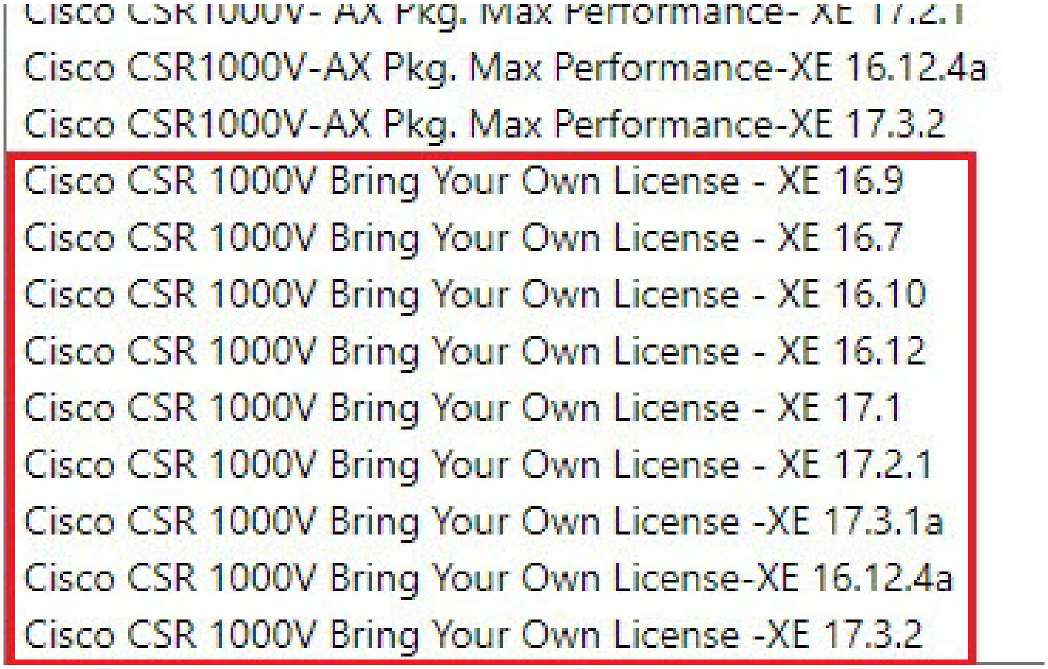
Step 2 Click the **Cisco Cloud Services Router (CSR) 1000V** option.

You should be redirected to the **Cisco Cloud Services Router (CSR) 1000V** page in the Microsoft Azure Marketplace.

Step 3 Locate the **Select a software plan** drop-down menu.

If you do not see the **Select a software plan** drop-down menu in the main page, you might have to click the **Plans + Pricing** tab, if that option is available, to access the **Select a software plan** drop-down menu.

Step 4 In the **Select a software plan** drop-down menu, locate the area that lists the **Cisco CSR 1000V Bring Your Own License** options.



Cisco CSR1000V- AX Pkg. Max Performance- XE 17.2.1

Cisco CSR1000V-AX Pkg. Max Performance-XE 16.12.4a

Cisco CSR1000V-AX Pkg. Max Performance-XE 17.3.2

Cisco CSR 1000V Bring Your Own License - XE 16.9

Cisco CSR 1000V Bring Your Own License - XE 16.7

Cisco CSR 1000V Bring Your Own License - XE 16.10

Cisco CSR 1000V Bring Your Own License - XE 16.12

Cisco CSR 1000V Bring Your Own License - XE 17.1

Cisco CSR 1000V Bring Your Own License - XE 17.2.1

Cisco CSR 1000V Bring Your Own License -XE 17.3.1a

Cisco CSR 1000V Bring Your Own License-XE 16.12.4a

Cisco CSR 1000V Bring Your Own License -XE 17.3.2

Step 5 Select the appropriate option, depending on the Cisco Cloud APIC software release:

For Cloud APIC Release	Select this specific option
Release 4.2x	Cisco CSR 1000V Bring Your Own License - XE **16.12**
Release 5.0(1)	Cisco CSR 1000V Bring Your Own License - XE **16.12**
Release 5.0(2)	Cisco CSR 1000V Bring Your Own License - XE **17.1**
• Release 5.1(2) • Release 5.2(1) • Release 25.0(1) • Release 25.0(2)	Cisco CSR 1000V Bring Your Own License - XE **17.3.1(a)**

Step 6 Locate the **Want to deploy programmability?** field and click **Get Started**.

Step 7 In the **Configure Programmability Deployment** page, scroll down to your subscription and, in the Status column, change the status from **Disable** to **Enable** for your subscription.

Step 8 Click **Save**.

What to do next

Go to Registering the Necessary Resource Providers, on page 3.

Subscribing to the Cisco Cloud Router 8000V

You must subscribe to the Cisco Cloud Router (CCR) 8000V - Bring Your Own License (BYOL) for Maximum Performance. To subscribe through the Microsoft Azure Marketplace:

Step 1 In the Azure Marketplace search text field, type *Cisco Catalyst 8000V Edge Software* and select the option that appears.

The **Cisco Catalyst 8000V Edge Software** option appears as a search suggestion.

Step 2 Click the **Cisco Catalyst 8000V Edge Software** option.

You should be redirected to the **Cisco Catalyst 8000V Edge Software** page in the Microsoft Azure Marketplace.

Step 3 Locate the **Select a software plan** drop-down menu.

If you do not see the **Select a software plan** drop-down menu in the main page, you might have to click the **Plans + Pricing** tab, if that option is available, to access the **Select a software plan** drop-down menu.

Step 4 In the **Select a software plan** drop-down menu, select the appropriate option, depending on the Cisco Cloud APIC software release:

For Cloud APIC Release	Select this specific option
• 25.0(3) • 25.0(4)	Cisco Catalyst 8000V Edge Software-BYOL-**17.07.01a**

Step 5 Locate the **Want to deploy programmability?** field and click **Get Started**.

Step 6 In the **Configure Programmability Deployment** page, scroll down to your subscription and, in the Status column, change the status from **Disable** to **Enable** for your subscription.

Step 7 Click **Save**.

What to do next

Go to Registering the Necessary Resource Providers, on page 3.

Registering the Necessary Resource Providers

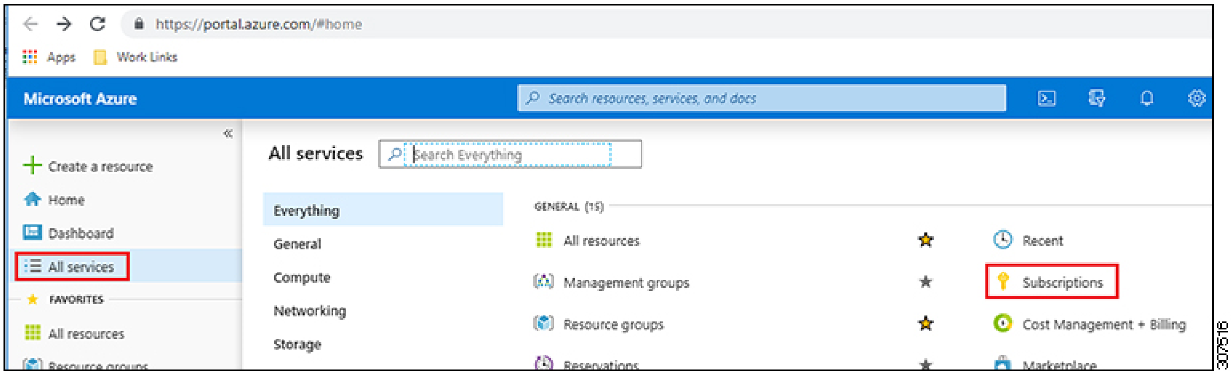
For every subscription that you use with the Cloud APIC, including for tenants that have subscriptions that you might add later, you must register the following resource providers:

- `microsoft.insights`
- `Microsoft.EventHub`
- `Microsoft.Logic`
- `Microsoft.ServiceBus`

These procedures describe how to register these necessary resource providers for a subscription.

Step 1 Access the area in Azure where you can view the resource providers:

a) From the main Azure management portal page, click the **All services** link in the left nav bar, then click the **Subscriptions** link.

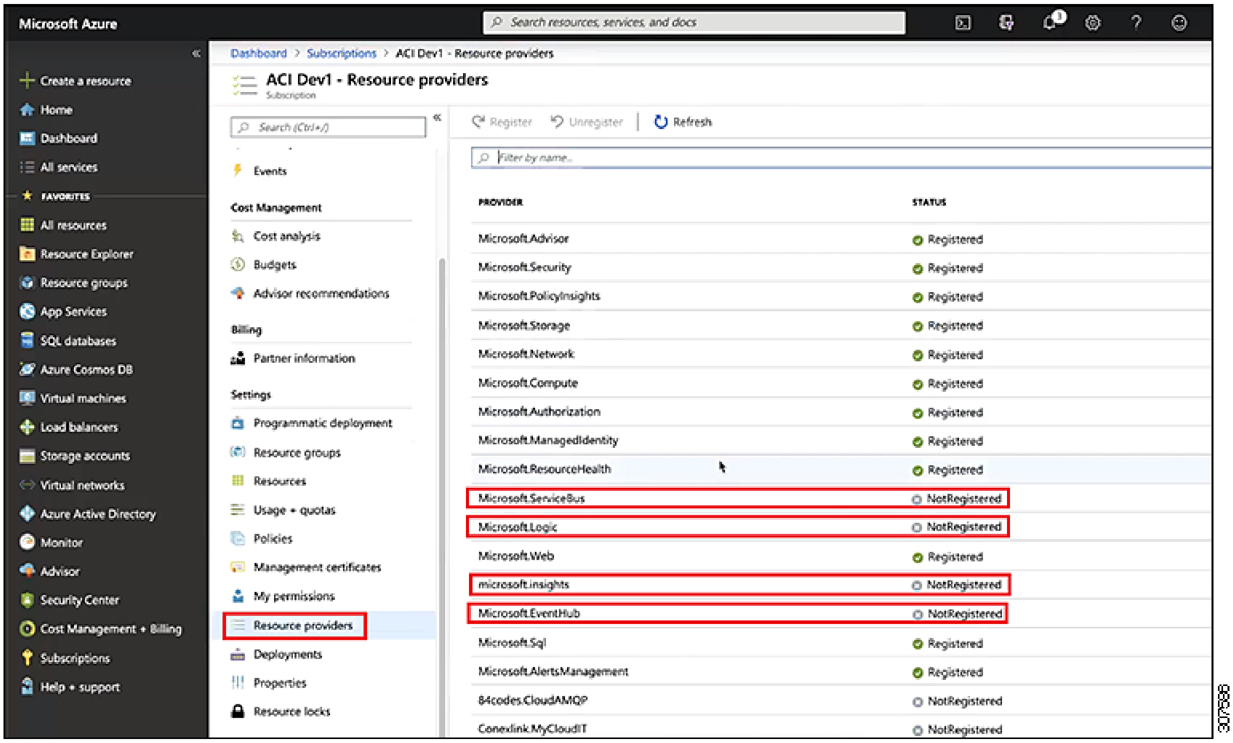


b) In the **Subscriptions** page in the Azure management portal, click the subscription account for your Microsoft account.

The overview information for that subscription is displayed.

c) From the overview page for that subscription, locate the **Resource providers** link in the left nav bar and click that link.

The Resource Providers page for that subscription is displayed.



PROVIDER	STATUS
Microsoft.Advisor	Registered
Microsoft.Security	Registered
Microsoft.PolicyInsights	Registered
Microsoft.Storage	Registered
Microsoft.Network	Registered
Microsoft.Compute	Registered
Microsoft.Authorization	Registered
Microsoft.ManagedIdentity	Registered
Microsoft.ResourceHealth	Registered
Microsoft.ServiceBus	NotRegistered
Microsoft.Logic	NotRegistered
Microsoft.Web	Registered
microsoft.insights	NotRegistered
Microsoft.EventHub	NotRegistered
Microsoft.Sql	Registered
Microsoft.AlertsManagement	Registered
84codes.CloudAMQP	NotRegistered
Conexlink.MyCloudIT	NotRegistered

Step 2 Locate the following four resource providers in the list of providers, as shown in the preceding screenshot:

- `microsoft.insights`

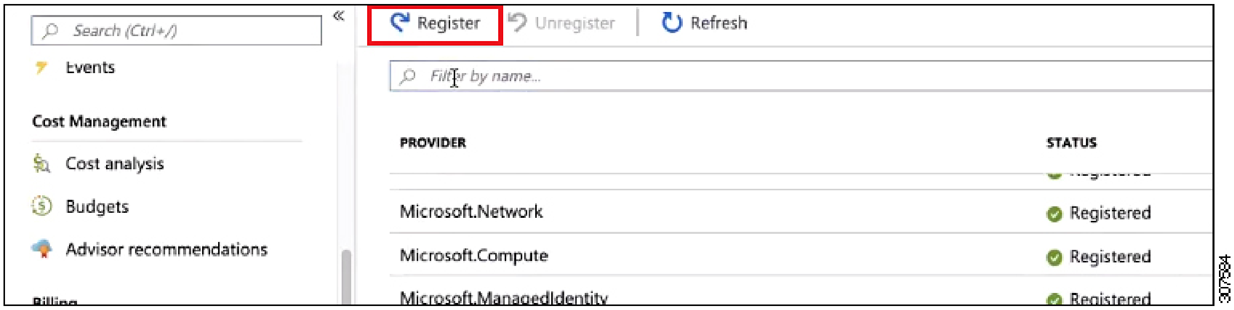
- `Microsoft.EventHub`
- `Microsoft.Logic`
- `Microsoft.ServiceBus`

Step 3 Determine if all four of the resource providers are in the `Registered` or `NotRegistered` state.

- If all four of the resource providers are shown as `Registered` in the Status column, then you do not have to do anything further to register these resource providers for this subscription.
- For every resource provider that is shown as `NotRegistered` in the Status column:

  a. Click on that specific resource provider that is shown as `NotRegistered`.

  b. Click on Register at the top of the screen to register that resource provider.



PROVIDER	STATUS
Microsoft.Network	Registered
Microsoft.Compute	Registered
Microsoft.ManagedIdentity	Registered

  The Status will change from `NotRegistered` to `Registering`, then to `Registered` when the registration process is completed.

  c. Repeat these steps for every resource provider that is shown as `NotRegistered` until all four resource providers are shown as `Registered`.

Creating an Application in Azure

Follow these instructions to create an application in Azure, if necessary. You will need these procedures if you are creating a new subscription for the tenant and you are selecting **Unmanaged Identity** to manage the cloud resources through a specific application.

Note An application in Azure is also referred to as a Service Principal.

Step 1 Log into your Azure account for the Cloud APIC infra tenant and go to the Azure management portal, if you are not there already:

https://portal.azure.com/#home

Step 2 From the main Azure management portal page, click the **Azure Active Directory** link in the left nav bar, then click the **App registrations** link.

Step 3 In the **App registrations** page, click **+ New registration**.

Step 4 Enter the necessary information in the **Register an application** page:

- **Name**
- **Supported Account Types**: Select the first option (Accounts in this organizational directory only)
- (Optional) **Redirect URI**

Then click **Register**.

The overview page for this application appears.

Step 5 Click **Certificates & secrets** in the left nav bar, then enter the necessary information in the **Add a client secret** area and click **Add**.

This generates the necessary information that you will need for the **Application Secret** field later on in these procedures.

Step 6 Open a text file and copy-and-paste the necessary information into the text file:

- **Client Secret**: Copy the text in the **Value** field in the **Client Secrets** area in the **Clients & Secrets** page.
- **Application ID**: Navigate to **Home** > **App registrations** > **<application-name>**, then, in the **Overview** page, copy the text from **Application (client) ID** field.
- **Azure Active Directory ID**: Navigate to **Home** > **App registrations** > **<application-name>**, then, in the **Overview** page, copy the text from **Directory (tenant) ID** field.

Step 7 Save the text file and note its location.

You will refer to this information when you are going through the procedures in Configuring a Tenant later on in this document.

Generating an SSH Key Pair for Azure

As part of the Cloud APIC setup process, you will be asked to provide the Admin Public Key (the SSH public key) in the Azure Resource Manager (ARM) template for your Cloud APIC. The following sections provide instructions for generating the SSH public and private key pair in Windows or Linux systems.

Generating an SSH Key Pair in Windows

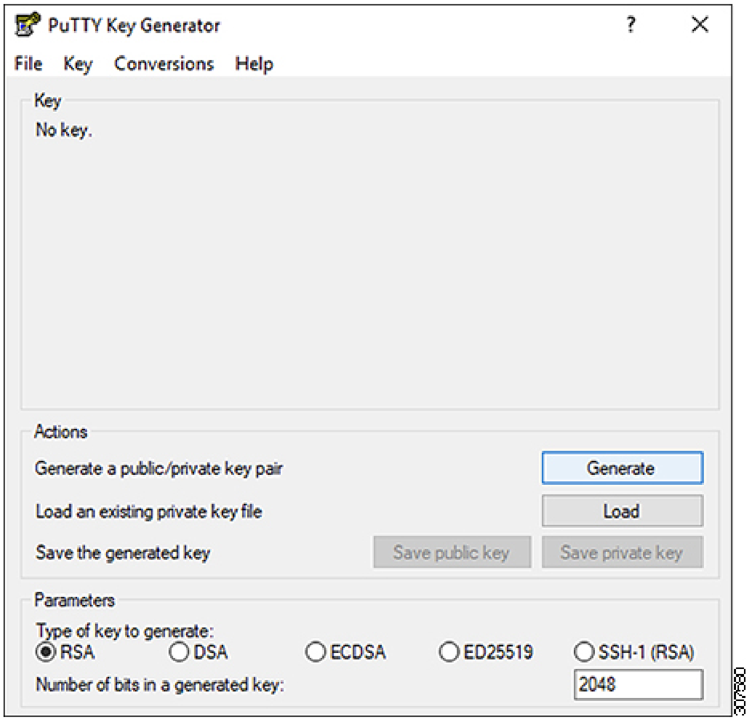
These procedures describe how to generate an SSH public and private key pair in Windows. For instructions on generate an SSH public and private key pair in Linux, see Generating an SSH Key Pair in Linux or MacOS, on page 9.

Step 1 Download and install the PuTTY Key Generator (puttygen):

https://www.puttygen.com/download-putty

Step 2 Run the PuTTY Key Generator by navigating to **Windows** > **Start Menu** > **All Programs** > **PuTTY** > **PuTTYgen**.

You will see a window for the PuTTY Key Generator on your screen.



No key.

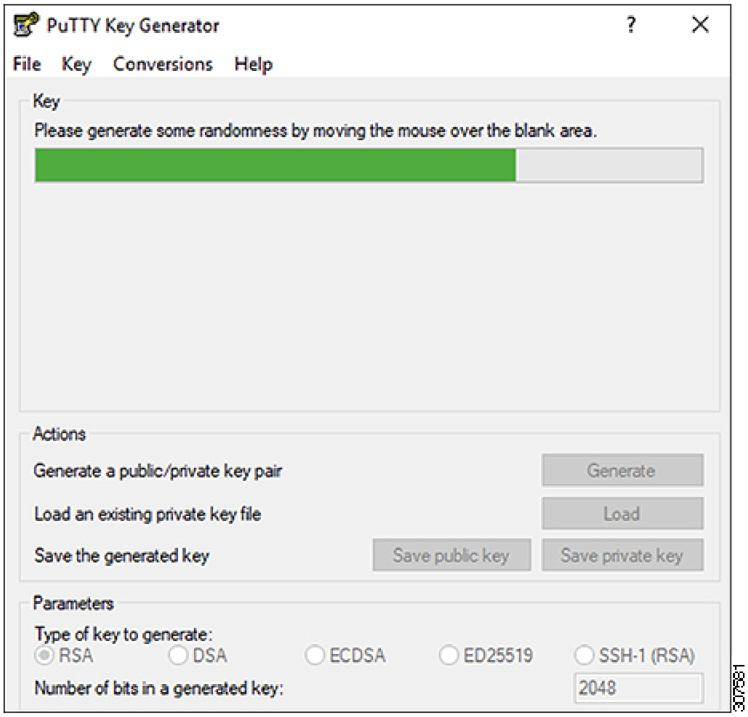
Type of key to generate:
● RSA ○ DSA ○ ECDSA ○ ED25519 ○ SSH-1 (RSA)

Number of bits in a generated key: 2048

Step 3 Click **Generate**.

A screen appears, asking you to move the mouse over the blank area to generate a public key.

Step 4 Move your cursor around the blank area to generate random characters for a public key.



Please generate some randomness by moving the mouse over the blank area.

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
● RSA ○ DSA ○ ECDSA ○ ED25519 ○ SSH-1 (RSA)

Number of bits in a generated key: 2048

Step 5 Save the public key.

a) Navigate to a folder on your laptop where you want to save the public key file and create a text file for this public key.

b) Copy the information in the PuTTY Key Generator.

Copy the public key information in the window, with these inclusions and exclusions:

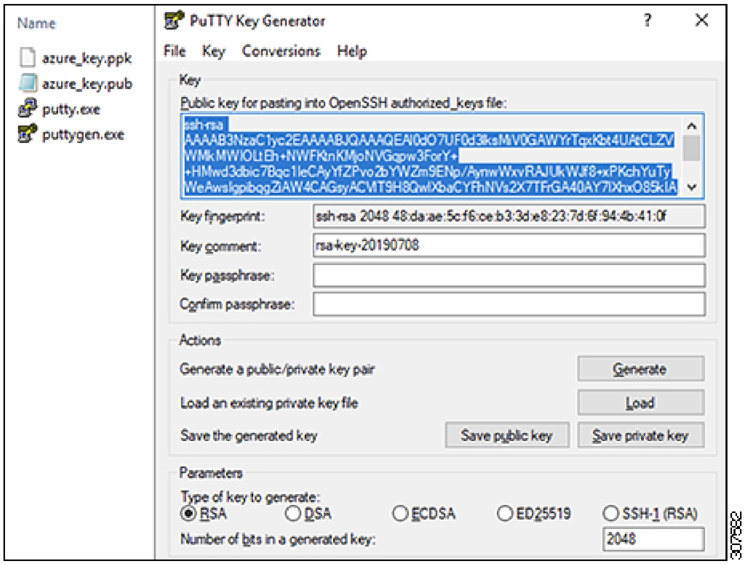
- Including the **ssh-rsa** text at the beginning of the public key.
- Excluding the following text string at the end:

```
== rsa-key-<date-stamp>
```

Truncate the key so that it does not include the == **rsa-key-<date-stamp>** text string at the end.

Note In the next set of procedures, you will paste the public key information into the Azure ARM template. If the form does not accept the key in this format, add == back to the end of the key, as this format is required in some regions.

If the key is not in the correct format, the Cloud APIC will not complete its installation.



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAABJQAAAQEAl0dO7UF0d3ksMiV0GAWYrTqxKbt4UAtCLZV
WMkMWIOLtEh+NWFKtnKMjoNVGqpw3ForY+
+HMwd3dbic7Bqc1leCAyYfZPvo2bYWZm9ENp/AynwWxvRAJUkWJf8+xPKchYuTy
WeAwslgpibqgZiAW4CAGsyACVlT9H8QwlXbaCYFhNVs2X7TFrGA40AY7lXhxO85kIA
```

Key fingerprint: ssh-rsa 2048 48:da:ae:5c:f6:ce:b3:3d:e8:23:7d:6f:94:4b:41:0f

Key comment: rsa-key-20190708

Key passphrase:

Confirm passphrase:

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
● RSA ○ DSA ○ ECDSA ○ ED25519 ○ SSH-1 (RSA)

Number of bits in a generated key: 2048

c) Paste the information in the public key text file that you created in 5.a, on page 8 and save the file, giving it a unique file name.

This public key text file will now contain a key that is on a single line of text. You will need the information in this public key text file in the next set of procedures.

Note Do not save the public key using the **Save public key** option in the PuTTY Key Generator. Doing so saves the key in a format that has multiple lines of text, which is not compatible with the Cloud APIC deployment process.

Step 6 Save the private key.

a) Click **Save private key**.

A screen appears, asking if you want to save the file without a passphrase. Click **Yes** on this screen.

b) Navigate to a folder on your laptop and save the private key file, giving it a unique file name.

Note The private key file is not used in the installation process. However, you might need it for other reasons, such as logging into your Cloud APIC through SSH, as described in Logging Into Cloud APIC Through SSH.

What to do next

Follow the instructions in Deploying the Cloud APIC in Azure, on page 11 to continue the Azure configuration process, which includes pasting the public key information into the Azure ARM template.

Generating an SSH Key Pair in Linux or MacOS

These procedures describe how to generate an SSH public and private key pair in Linux or MacOS. For instructions on generate an SSH public and private key pair in Windows, see Generating an SSH Key Pair in Windows, on page 6.

Step 1 On your Linux virtual machine or Mac, create a public and private key pair using ssh-keygen, directing the output to a file.

```
# ssh-keygen -f filename
```

For example:

```
# ssh-keygen -f azure_key
```

Output similar to the following appears. Press the Enter key without entering any text when you are asked to enter a passphrase (leave the field empty so that there is no passphrase).

```
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in azure_key.
Your public key has been saved in azure_key.pub.
The key fingerprint is:
SHA256:gTsQIIAadjgNsgcguifIloh4XGpVWMdcXVV6U0dyBNs
...
```

Step 2 Locate the public and private key files that you saved.

```
# ls
```

Two files should be displayed, where:

- The file with the .pub suffix contains the public key information
- The file with the same name, but with no suffix, contains the private key information

For example, if you directed the output to a file named `azure_key`, you should see the following output:

```
# ls
azure_key
azure_key.pub
```

In this case:

- The `azure_key.pub` file contains the public key information
- The `azure_key` file contains the private key information

Step 3 Open the public key file and copy the public key information from that file, without the `username@hostname` information at the end.

Note The private key file is not used in the installation process. However, you might need it for other reasons, such as logging into your Cloud APIC through SSH, as described in Logging Into Cloud APIC Through SSH.

What to do next

Follow the instructions in Deploying the Cloud APIC in Azure, on page 11 to continue the Azure configuration process, which includes pasting the public key information from the public key file into the Azure ARM template.

Deploying the Cloud APIC in Azure

Before you begin

- Verify that you have met the requirements outlined in Requirements for Extending the Cisco ACI Fabric to the Public Cloud before proceeding with the tasks in this section. For example, verify that you have the correct number of elastic IP addresses and that you have checked the limits that are allowed to deploy the instances.

Step 1 Log into your Azure account for the Cloud APIC infra tenant and go to the Azure management portal, if you are not there already:

https://portal.azure.com/#home

Step 2 From the main Azure management portal page, in the search text field, type *Cisco Cloud APIC*.

Step 3 In the **Cisco Cloud APIC** page, in the **Select a plan** field, select the appropriate release and click **Create**.

The **Basics** page for the **Cisco Cloud APIC** screen appears.

Step 4 Complete the necessary fields in the **Basics** page:

- **Subscription**: Select the Cloud APIC infra subscription account from the drop-down list.
- **Resource group**: Choose an existing resource group from the drop-down list or click **Create new** to enter a name for a new resource group.

  A resource group is a container that holds related resources for an Azure solution.

  You can define custom naming rules for most cloud resources created by the Cloud APIC, with the exception of the resource group for the Cloud APIC itself. Ensure that the resource group name you select here is correct.
- **Region**: Select the location from the drop-down list where you want to deploy the virtual machine for the Cloud APIC.
- **Virtual Machine name**: Enter a virtual machine name. This entry will be the name for the virtual machine for this Cloud APIC. The virtual machine name must be only alphanumeric characters, but can be separated by dashes (for example, `CloudAPIC`).
- **Password**: Enter an admin password. This entry is the password that you will use to log into the Cloud APIC after you have enabled SSH access.

  The password must have the following characteristics:

  - Must be between 12 and 72 characters in length
  - Must have three of the following:
    - 1 lower case letter
    - 1 upper case letter
    - 1 number
    - 1 of the following acceptable special characters:

      @$!%*#?&

- **Confirm Password**: Enter the admin password again.
- **SSH Public Key**: Paste the public key information that you copied at the end of one of these procedures:
    - Generating an SSH Key Pair in Windows, on page 6
    - Generating an SSH Key Pair in Linux or MacOS, on page 9

  You will use this SSH key pair to log into the Cloud APIC. Note that the **ssh-rsa** string should remain at the beginning of the public key string that you paste into this field.

  Note If you generated an SSH key pair in Windows, the key in the PuTTY Key Generator ends with == **rsa-key-<date-stamp>**. Truncate the key so that it does not include **== rsa-key-<date-stamp>**. If the form does not accept the key in this format, add == back to the end of the key, as this format is required in some regions.

  If the key is not in the correct format, the Cloud APIC will not complete its installation.

Step 5 When you have finished completing the fields in this page, click **Next: ACI Settings**.

The **ACI Settings** page for the **Cisco Cloud APIC** screen appears.

Step 6 Complete the necessary fields in the **ACI Settings** page:

- **ACI Fabric Name**: Leave the default value as-is or enter a fabric name. This entry will be the name for this Cloud APIC. The fabric name must be only alphanumeric characters, but can be separated by dashes (for example, `ACI-Cloud-Fabric`).
- **Virtual machine size**: The virtual machine size is automatically set to the default deployment size of Standard_D8s_v3. You cannot change the default virtual machine size setting.
- **Image Version**: Choose the appropriate release in this field.
- **Infra Subnet**: The infra pool for your Cloud APIC. This field is automatically populated with a default value of 10.10.0.0/24. Change the value in this field if the default value overlaps with your infra pool from your on-premises fabric. This entry must be a /24 subnet.

  Note We recommend that you do not use any subnet from 172.17.0.0/16 (for example, 172.17.10.0/24) as the infra subnet, as this might cause a conflict with the Docker bridge IP subnet, as described in Resolving Subnet Conflict Issue With Infra Subnet, on page 15.

- **Public IP Address**: Set the public IP address to **static**.

  a. In the **Public IP Address** field, click **Create New**.

  Note To assign a private IP address for Cloud APIC, select **none** from the drop-down list.

  The **Create public IP address** field appears on the right side of the page.

  b. In the **SKU** area, choose either the **Basic** or the **Standard** SKU.

  For more information on the differences between the Basic and the Standard SKU, see the *Public IP Addresses in Azure* document in the Microsoft documentation site.

  c. In the **Assignment** area, choose **Static**.

  Do not leave the setting as Dynamic in the **Assignment** area.

  d. Click **OK** in the **Create public IP address** area.

- **DNS Prefix for the public IP Address**: The Cloud APIC DNS name prefix. When the Cloud APIC is deployed, you can access the Cloud APIC using the DNS name.

  Note Due to an Azure restriction, you cannot use periods (.) in the Cloud APIC DNS name prefix that you enter in this field.

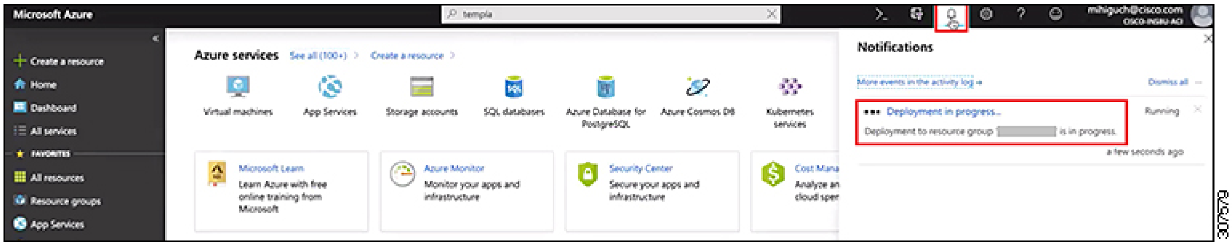
- **External Subnets**: Enter the IP addresses and subnets of the external networks that you will allow to connect to Cloud APIC (for example, 192.0.2.0/24). Only the IP addresses from this subnet are allowed to connect to Cloud APIC. Entering a value of `0.0.0.0/0` means that anyone is allowed to connect to Cloud APIC.
- **Virtual Network Name**: Leave the default entry for the virtual network name as-is or change the entry in this field, if desired.
- **Management NSG Name**: Leave the default entry for the management network security group name as-is or change the entry in this field, if desired.
- **Management ASG Name**: Leave the default entry for the management application security group name as-is or change the entry in this field, if desired.
- **Subnet Prefix**: Leave the default entry for the subnet prefix as-is or change the entry in this field, if desired.

Step 7 When you have finished completing the fields in this page, click **Next: Review + create**.

The **Review + create** page for the **Cisco Cloud APIC** screen appears.

Step 8 Review the information in the **Review + create** page, then click **Create**.

The system now uses the information that you provided in the template to create the Cloud APIC VM instance. This process takes 5-10 minutes to complete. Click the Notifications icon (the bell-shaped icon) to check the status of the deployment of your Cloud APIC.



••• Deployment in progress...

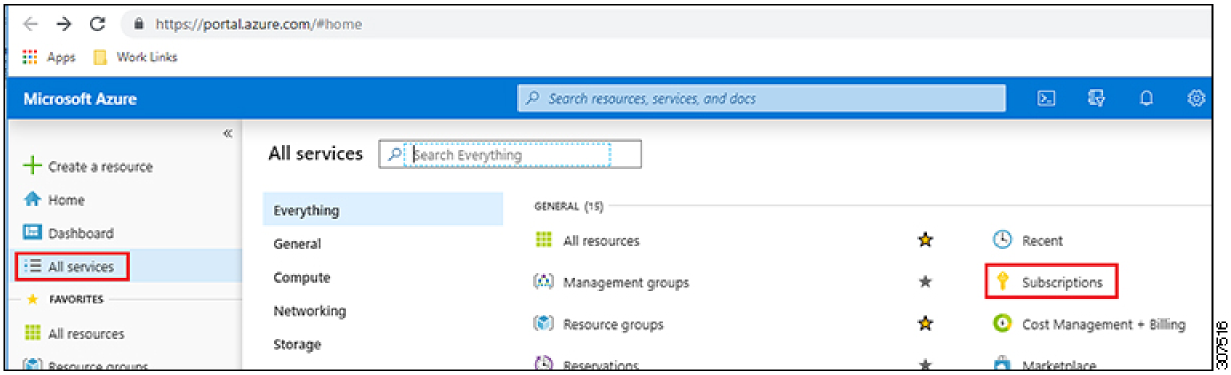
Deployment to resource group [redacted] is in progress.

Running

a few seconds ago

Step 9 When the deployment is complete, add a **User Access Administrator** role assignment.

a) From the main Azure management portal page, click the **All services** link in the left nav bar, then click the **Subscriptions** link.



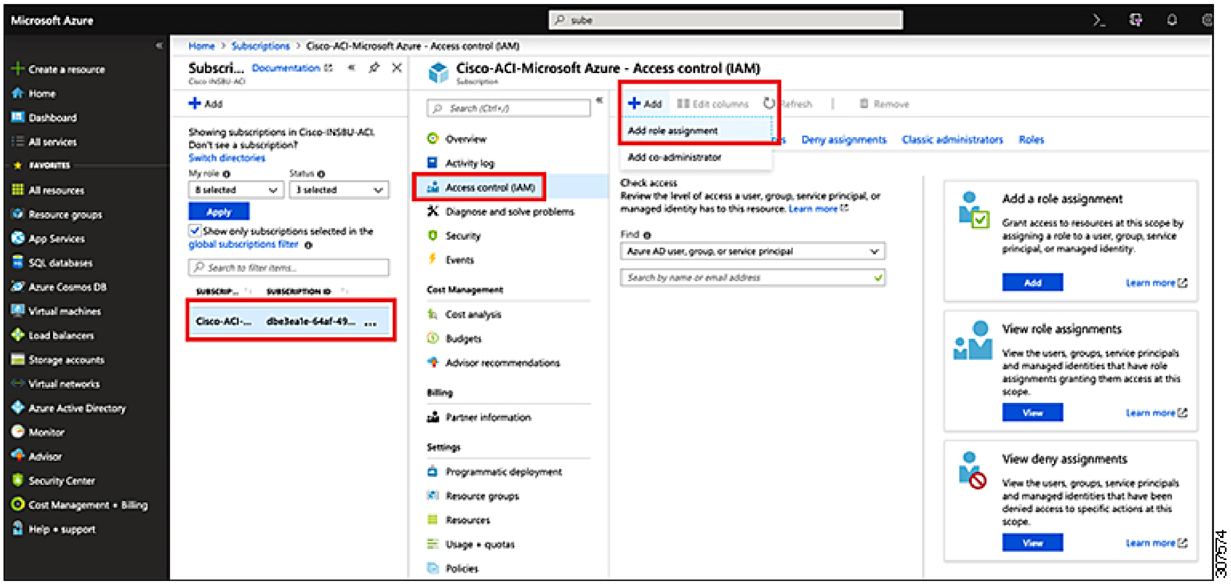
b) In the **Subscriptions** page in the Azure management portal, click the subscription account to which Cloud APIC was deployed.

The overview information for that subscription is displayed.

c) From the overview page for that subscription, locate the **Access control (IAM)** link in the left nav bar and click that link.

The Access Control page for that subscription is displayed.

d) Click **+ Add**, then select **Add role assignment** from the drop-down menu.



Showing subscriptions in Cisco-INSBU-ACI. Don't see a subscription?

☑ Show only subscriptions selected in the global subscriptions filter

Review the level of access a user, group, service principal, or managed identity has to this resource. Learn more

Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.

View the users, groups, service principals and managed identities that have role assignments granting them access at this scope.

View the users, groups, service principals and managed identities that have been denied access to specific actions at this scope.

e) In the **Add role assignment** page, make the following selections:

- In the **Role** field, select **User Access Administrator** from the drop-down menu.
- In the **Assign access to** field, select **Virtual Machine**.
- In the **Subscription** field, select the subscription where the Cloud APIC is deployed.
- Select the Cloud APIC virtual machine.

f) Click **Save** at the bottom of the screen.

What to do next

Go to Adding a Role Assignment, on page 17 to determine if you need to add a role assignment for a managed identity or unmanaged identity for the access type.

Resolving Subnet Conflict Issue With Infra Subnet

In some situations, you might encounter an issue with a subnet conflict with your Cloud APIC. This issue might occur when the following conditions are met:

- Your Cloud APIC is running on release 25.0(2)
- The infra subnet for your Cloud APIC is configured within the 172.17.0.0/16 CIDR (for example, if you entered `172.17.10.0/24` in the **Infra Subnet** field as part of the procedures in Deploying the Cloud APIC in Azure, on page 11)
- There is something else configured that overlaps with the 172.17.0.0/16 CIDR that you are using for the infra subnet for your Cloud APIC (for example, if the Docker bridge IP subnet is configured with `172.17.0.0/16`, which is the default subnet in Cloud APIC).

In this situation, your Cloud APIC might not be able to reach the CCR private IP address due to this subnet conflict and the Cloud APIC will raise an SSH connectivity fault for the affected CCR.

You could determine if there might be a possible conflict by logging in as root into the Cloud APIC and entering the `route -n` command:

```
[root@ACI-Cloud-Fabric-1 ~]# route -n
```

Assume that you see output similar to the following:

```
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         172.17.0.17     0.0.0.0         UG    16     0        0 oobmgmt
169.254.169.0   0.0.0.0         255.255.255.0   U     0      0        0 bond0
169.254.254.0   0.0.0.0         255.255.255.0   U     0      0        0 lxcbr0
172.17.0.0      0.0.0.0         255.255.0.0     U     0      0        0 docker0
172.17.0.12     0.0.0.0         255.255.255.252 U     0      0        0 bond0
172.17.0.16     0.0.0.0         255.255.255.240 U     0      0        0 oobmgmt
```

In this example output, the highlighted text shows that a Docker bridge is configured with `172.17.0.0/16`.

Because this overlaps with the 172.17.0.0/16 CIDR that you used for the infra subnet for your Cloud APIC, you might see an issue where you lose connectivity to the CCR, where you are not able to SSH into the CCR, and you see a Host Unreachable message when you try to ping the CCR (such as in the following example, where 172.17.0.84 is the private IP address of the CCR):

```
[root@ACI-Cloud-Fabric-1 ~]# ping 172.17.0.84
PING 172.17.0.84 (172.17.0.84) 56(84) bytes of data.
From 172.17.0.1 icmp_seq=1 Destination Host Unreachable
From 172.17.0.1 icmp_seq=2 Destination Host Unreachable
From 172.17.0.1 icmp_seq=3 Destination Host Unreachable
From 172.17.0.1 icmp_seq=5 Destination Host Unreachable
From 172.17.0.1 icmp_seq=6 Destination Host Unreachable
```

```
^C
--- 172.17.0.84 ping statistics ---
9 packets transmitted, 0 received, +5 errors, 100% packet loss, time 8225ms
pipe 4
[root@ACI-Cloud-Fabric-1 ~]#
```

To resolve the conflict in this situation, enter a REST API post similar to the following to change the IP address for the other area that is causing the conflict:

```
https://{{apic}}/api/plgnhandler/mo/.xml
<apPluginPolContr>
    <apContainerPol containerBip="<new-IP-address>" />
</apPluginPolContr>
```

For example, to move the Docker bridge IP address out from under the 172.17.0.0/16 CIDR, which was shown in the example scenario above, you might enter a REST API post such as the following:

```
https://{{apic}}/api/plgnhandler/mo/.xml
<apPluginPolContr>
    <apContainerPol containerBip="172.19.0.1/16" />
</apPluginPolContr>
```

where `172.19.0.1/16` is the new subnet for the Docker bridge. This moves the Docker bridge IP address under the 172.19.0.0/16 CIDR, where there is no longer a conflict with the infra subnet for your Cloud APIC that is configured within the 172.17.0.0/16 CIDR.

You can use the same commands as before to verify that there is no longer a conflict:

```
[root@ACI-Cloud-Fabric-1 ~]# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         172.17.0.17     0.0.0.0         UG    16     0        0 oobmgmt
169.254.169.0   0.0.0.0         255.255.255.0   U     0      0        0 bond0
169.254.254.0   0.0.0.0         255.255.255.0   U     0      0        0 lxcbr0
172.17.0.12     0.0.0.0         255.255.255.252 U     0      0        0 bond0
172.17.0.16     0.0.0.0         255.255.255.240 U     0      0        0 oobmgmt
172.19.0.0      0.0.0.0         255.255.0.0     U     0      0        0 docker0
```

In this example output, the highlighted text shows that a Docker bridge is configured with the IP address `172.19.0.0`. Because there is no overlap with the 172.17.0.0/16 CIDR that you are using for the infra subnet for your Cloud APIC, there is no issue with connectivity with the CCR:

```
[root@ACI-Cloud-Fabric-1 ~]# ping 172.17.0.84
PING 172.17.0.84 (172.17.0.84) 56(84) bytes of data.
64 bytes from 172.17.0.84: icmp_seq=1 ttl=255 time=1.15 ms
64 bytes from 172.17.0.84: icmp_seq=2 ttl=255 time=1.01 ms
64 bytes from 172.17.0.84: icmp_seq=3 ttl=255 time=1.03 ms
64 bytes from 172.17.0.84: icmp_seq=4 ttl=255 time=1.03 ms
64 bytes from 172.17.0.84: icmp_seq=5 ttl=255 time=1.09 ms
64 bytes from 172.17.0.84: icmp_seq=6 ttl=255 time=1.06 ms
64 bytes from 172.17.0.84: icmp_seq=7 ttl=255 time=1.03 ms
64 bytes from 172.17.0.84: icmp_seq=8 ttl=255 time=1.05 ms
^C
--- 172.17.0.84 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7005ms
rtt min/avg/max/mdev = 1.014/1.061/1.153/0.046 ms
[root@ACI-Cloud-Fabric-1 ~]#
```

Adding a Role Assignment

The type of role assignment that you add depends on whether you have a managed identity or unmanaged identity for the access type:

- If you have a **managed** identity for the access type, then you must add a role assignment for the user tenant. Go to Adding a Role Assignment for a Virtual Machine, on page 17.

  Note that this access type would apply if you make either of the following selections when you are entering information in the **Associate Account** page in the Configuring a Tenant procedures later in this manual:

  - You choose **Mode: Create Own** and you selected **Managed Identity** in the **Associate Account** page, or
  - You choose **Mode: Select Shared** and you are sharing with the infra tenant

- If you have an **unmanaged** identity (service principal) for the access type, then the cloud resources will be managed through a specific application. Go to Adding a Role Assignment for an App, on page 19.

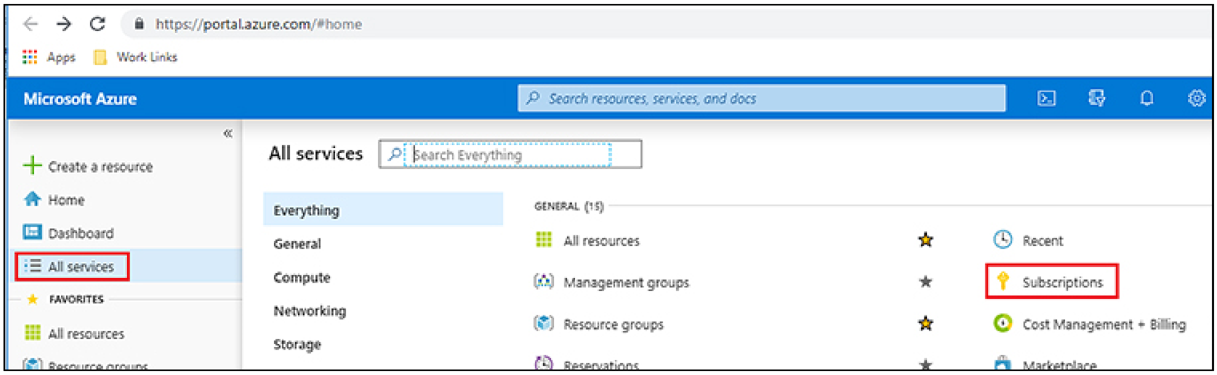
  Note that this access type would apply if you select **Unmanaged Identity** (service principal) in the **Associate Account** page in the Configuring a Tenant procedures later in this manual.

Adding a Role Assignment for a Virtual Machine

Follow the procedures in this section if you have a **managed** identity for the access type, where you must add a role assignment for the user tenant. See Understanding Tenants, Identities, and Subscriptions for more information about the relationship between Azure subscription types and Cloud APIC tenants.

Note If you have an **unmanaged** identity for the access type, where the cloud resources will be managed through a specific application, follow the procedures in Adding a Role Assignment for an App, on page 19 instead.

Step 1 From the main Azure management portal page, click the **All services** link in the left nav bar, then click the **Subscriptions** link.



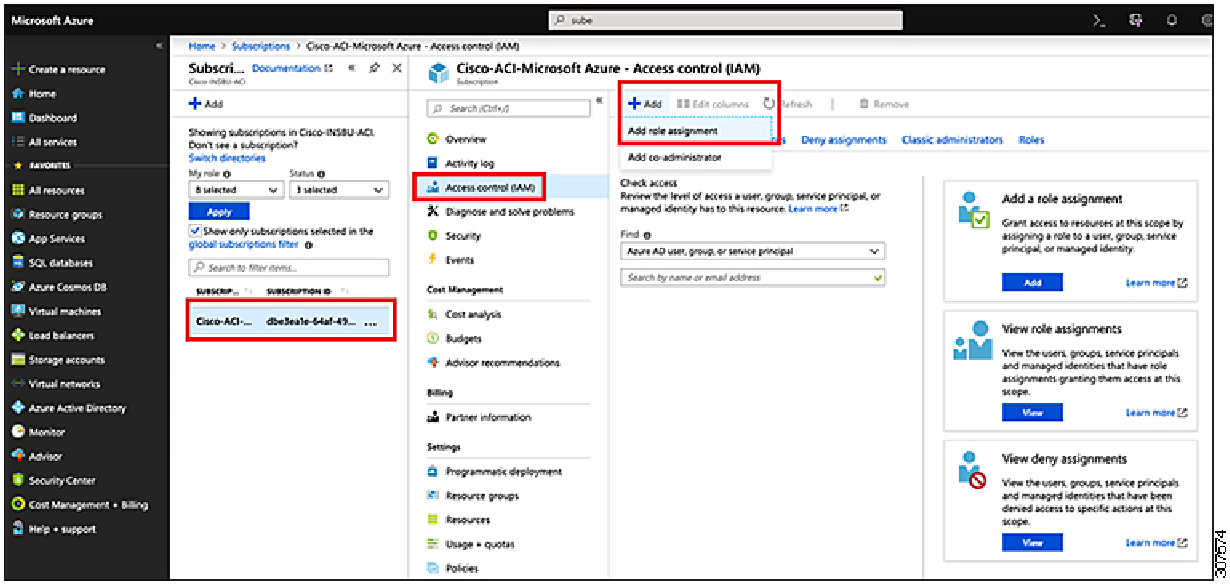
Step 2 In the **Subscriptions** page in the Azure management portal, click the subscription account to which Cloud APIC was deployed.

The overview information for that subscription is displayed.

Step 3 From the overview page for that subscription, locate the **Access control (IAM)** link in the left nav bar and click that link.

The Access Control page for that subscription is displayed.

Step 4 Click **+ Add**, then select **Add role assignment** from the drop-down menu.



Showing subscriptions in Cisco-INSBU-ACI.
Don't see a subscription?
Switch directories

My role: 8 selected
Status: 3 selected
Apply
☑ Show only subscriptions selected in the global subscriptions filter
Search to filter items...

SUBSCRIP...	SUBSCRIPTION ID
Cisco-ACI-...	dbe3ea1e-64af-49... ...

Check access
Review the level of access a user, group, service principal, or managed identity has to this resource. Learn more

Find: Azure AD user, group, or service principal
Search by name or email address

Add a role assignment
Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.

View role assignments
View the users, groups, service principals and managed identities that have role assignments granting them access at this scope.

View deny assignments
View the users, groups, service principals and managed identities that have been denied access to specific actions at this scope.

Step 5 Add a **Contributor** role assignment.

a) In the **Add role assignment** page, make the following selections:

- In the **Role** field, select **Contributor** from the drop-down menu.
- In the **Assign access to** field, select **Virtual Machine**.
- In the **Subscription** field, select the subscription where the Cloud APIC is deployed.
- Select the Cloud APIC virtual machine.

b) Click **Save** at the bottom of the screen.

Step 6 Add a **User Access Administrator** role assignment.

a) In the **Add role assignment** page, make the following selections:

- In the **Role** field, select **User Access Administrator** from the drop-down menu.
- In the **Assign access to** field, select **Virtual Machine**.
- In the **Subscription** field, select the subscription where the Cloud APIC is deployed.
- Select the Cloud APIC virtual machine.

b) Click **Save** at the bottom of the screen.

Note If you are sharing a subscription for the user tenant, it could take up to 30 minutes for a new IAM role assignment to take effect in Azure. Wait for at least 30 minutes before proceeding to the next section.

What to do next

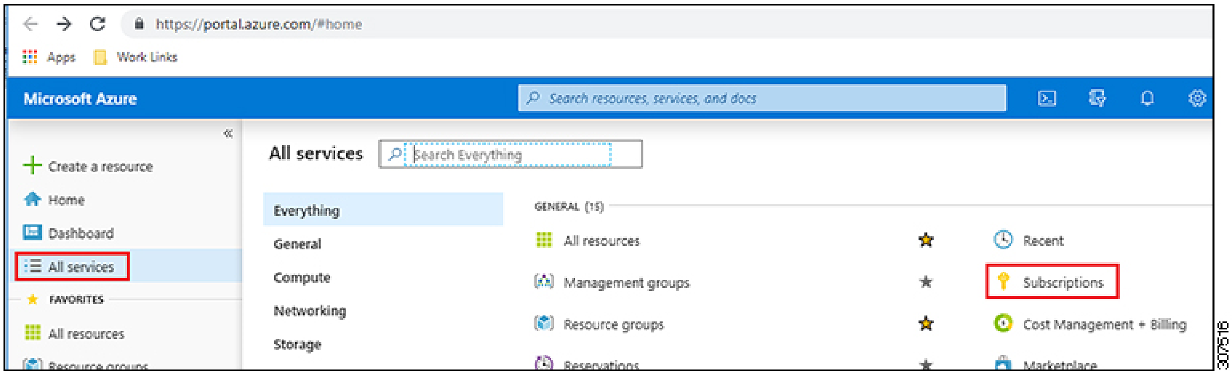
Go to Configuring Cisco Cloud APIC Using the Setup Wizard to continue setting up the Cloud APIC.

Adding a Role Assignment for an App

Follow the procedures in this section if you have an **unmanaged** identity for the access type, where the cloud resources will be managed through a specific application. See Understanding Tenants, Identities, and Subscriptions for more information about the relationship between Azure subscription types and Cloud APIC tenants.

Note If you have a **managed** identity for the access type, where you must add a role assignment for the user tenant, follow the procedures in Adding a Role Assignment for a Virtual Machine, on page 17 instead.

Step 1 From the main Azure management portal page, click the **All services** link in the left nav bar, then click the **Subscriptions** link.



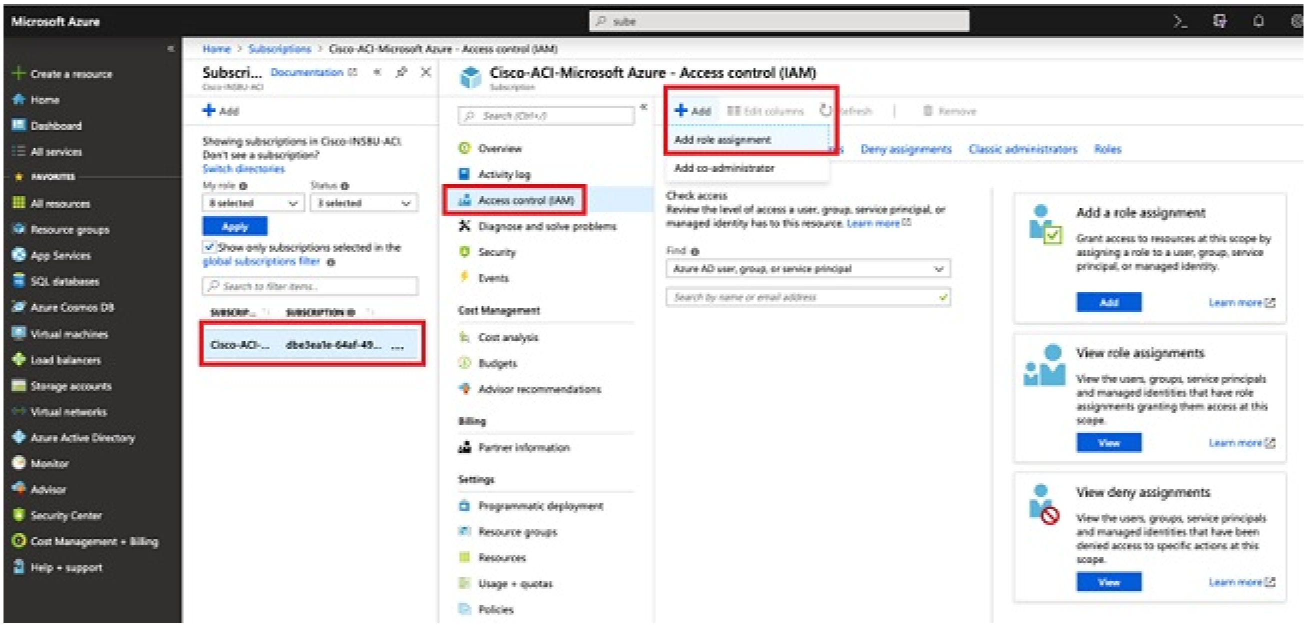
Step 2 In the **Subscriptions** page in the Azure management portal, click the subscription account to which Cloud APIC was deployed.

The overview information for that subscription is displayed.

Step 3 From the overview page for that subscription, locate the **Access control (IAM)** link in the left nav bar and click that link.

The Access Control page for that subscription is displayed.

Step 4 Click **+ Add**, then select **Add role assignment** from the drop-down menu.



Showing subscriptions in Cisco-INSBU-ACI. Don't see a subscription?

☑ Show only subscriptions selected in the global subscriptions filter

Review the level of access a user, group, service principal, or managed identity has to this resource. Learn more

Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.

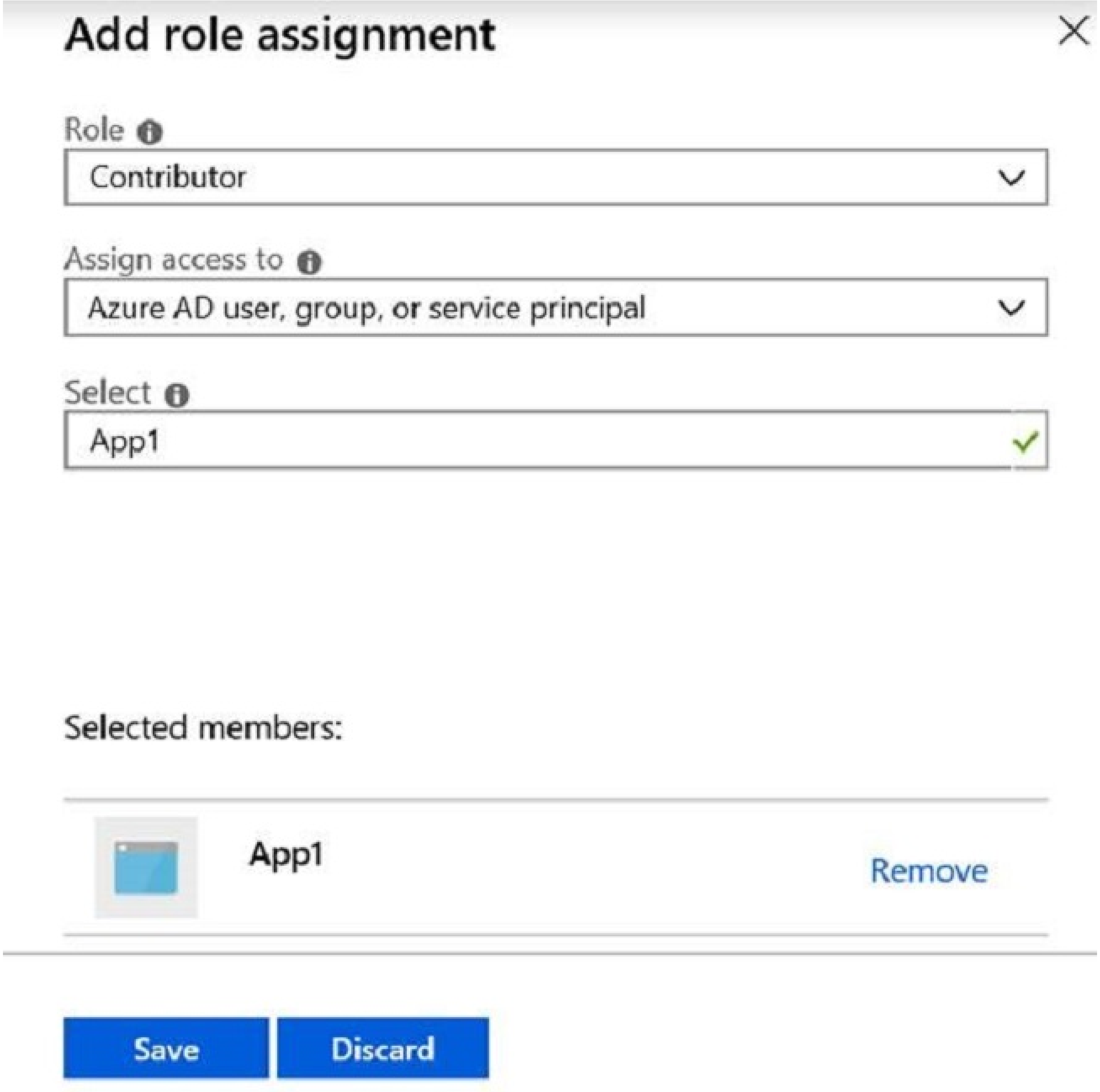
View the users, groups, service principals and managed identities that have role assignments granting them access at this scope.

View the users, groups, service principals and managed identities that have been denied access to specific actions at this scope.

Step 5 Add a **Contributor** role assignment.

a) In the **Add role assignment** page, make the following selections:

- In the **Role** field, select **Contributor** from the drop-down menu.
- In the **Assign access to** field, select **Azure AD user, group, or service principal**.
- In the **Select** field, select the credentials that are associated with the Azure application.



Add role assignment

Role: Contributor

Assign access to: Azure AD user, group, or service principal

Select: App1

Selected members:

App1

b) Click **Save** at the bottom of the screen.

Step 6 Add a **User Access Administrator** role assignment.

a) In the **Add role assignment** page, make the following selections:

- In the **Role** field, select **User Access Administrator** from the drop-down menu.
- In the **Assign access to** field, select **Azure AD user, group, or service principal**.
- In the **Select** field, select the credentials that are associated with the Azure application.

b) Click **Save** at the bottom of the screen.

Note It could take up to 30 minutes for a new IAM role assignment to take effect in Azure. Wait for at least 30 minutes before proceeding to the next chapter. If you attempt to configure the Cloud APIC using the setup wizard before the IAM role assignment takes effect in Azure, then the CCR deployment will fail.

What to do next

Go to Configuring Cisco Cloud APIC Using the Setup Wizard to continue setting up the Cloud APIC.