Deploying the Cloud APIC in Azure

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, select the **Cisco CSR 1000V Bring Your Own License - XE 16.12** option.

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 2.

Registering the Necessary Resource Providers

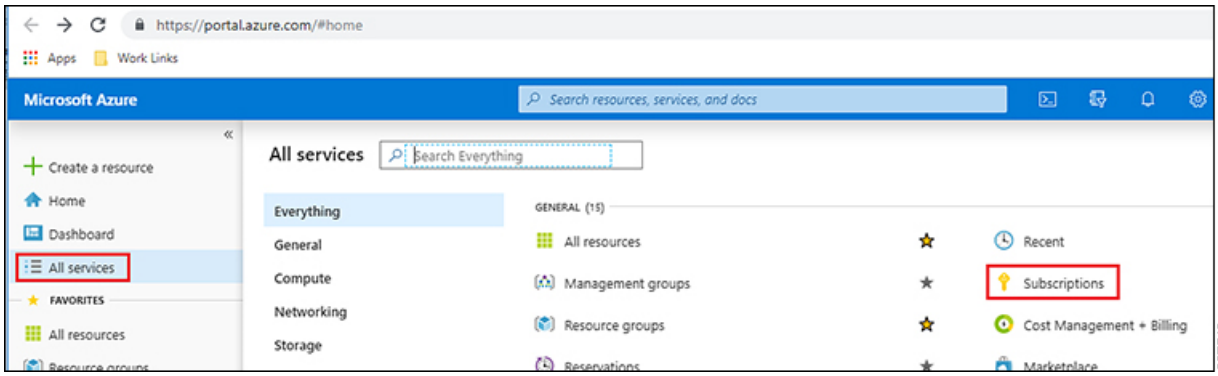
For every subscription that you use with the Cloud APIC, including for tenants that have subscriptions that you might add later, you must register the following resource providers:

- `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.

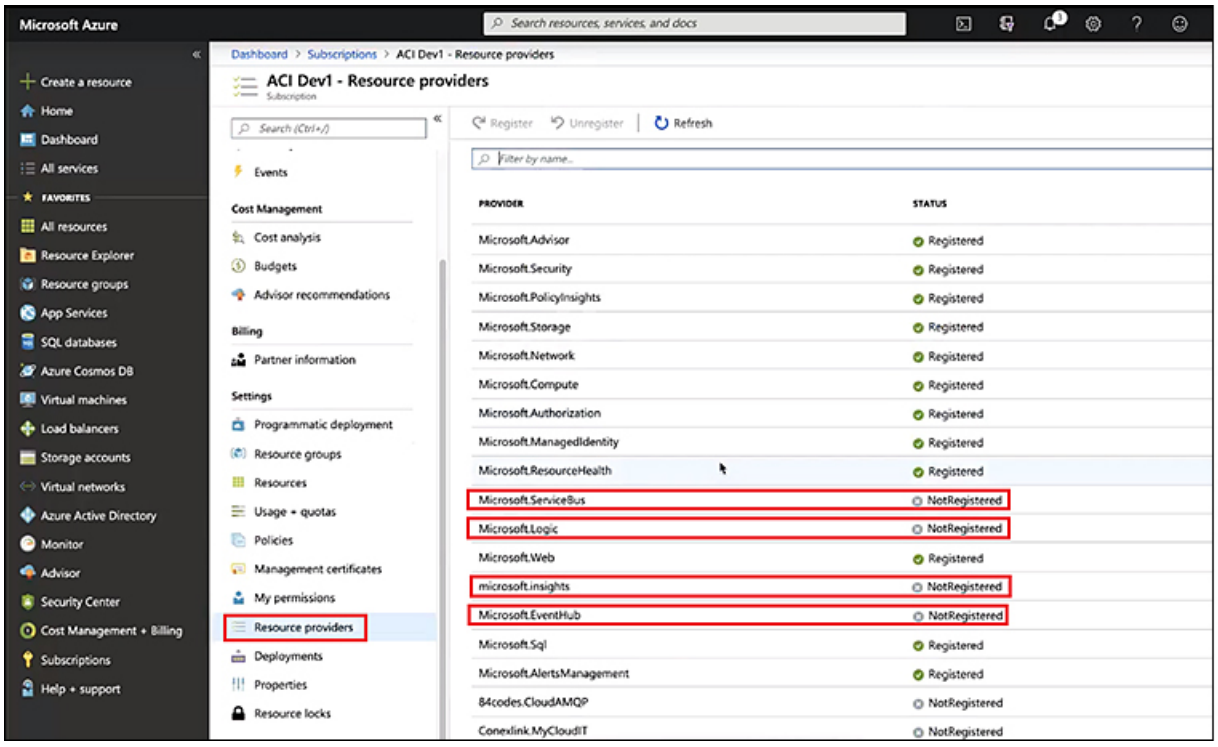


b) In the **Subscriptions** page in the Azure management portal, click the subscription account for your Microsoft account.

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.

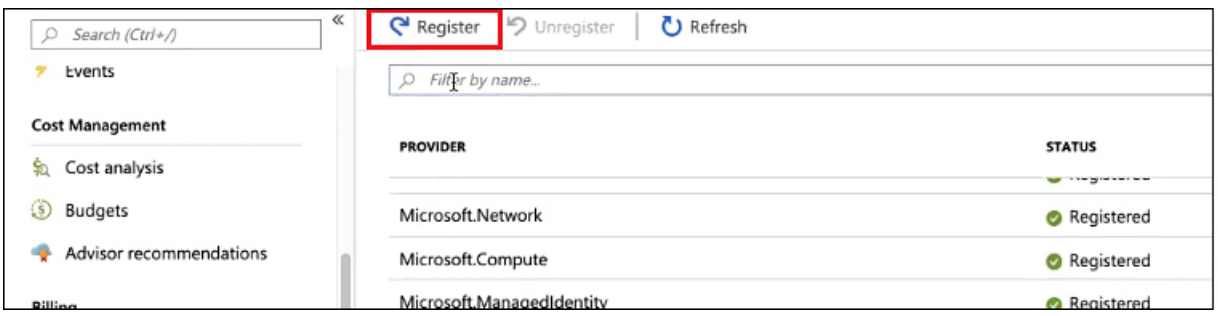


Step 2 Locate the following four resource providers in the list of providers, as shown in the preceding screenshot:

- `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.



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 Principle.

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

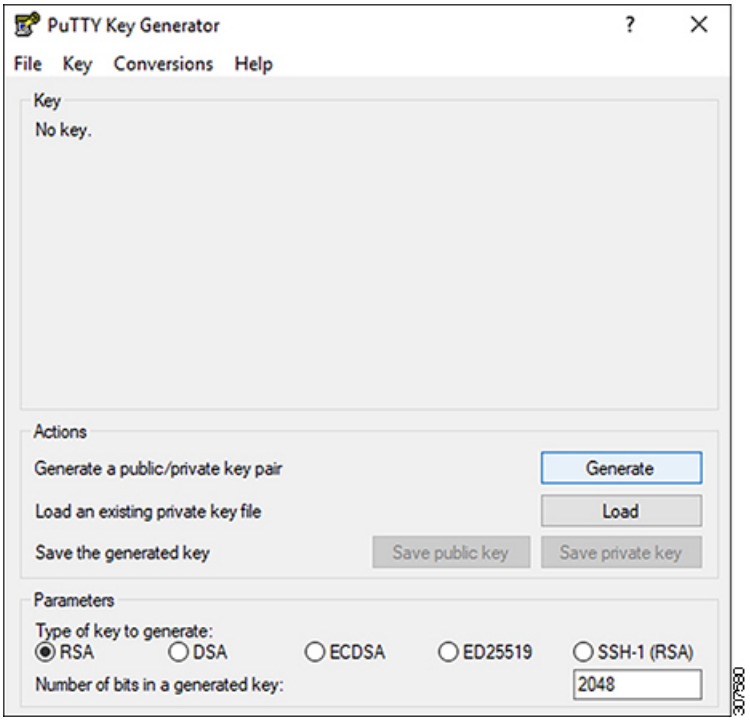
These procedures describe how to generate an SSH public and private key pair in Windows. For instructions on generate an SSH public and private key pair in Linux, see Generating an SSH Key Pair in Linux or MacOS, on page 7.

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**.

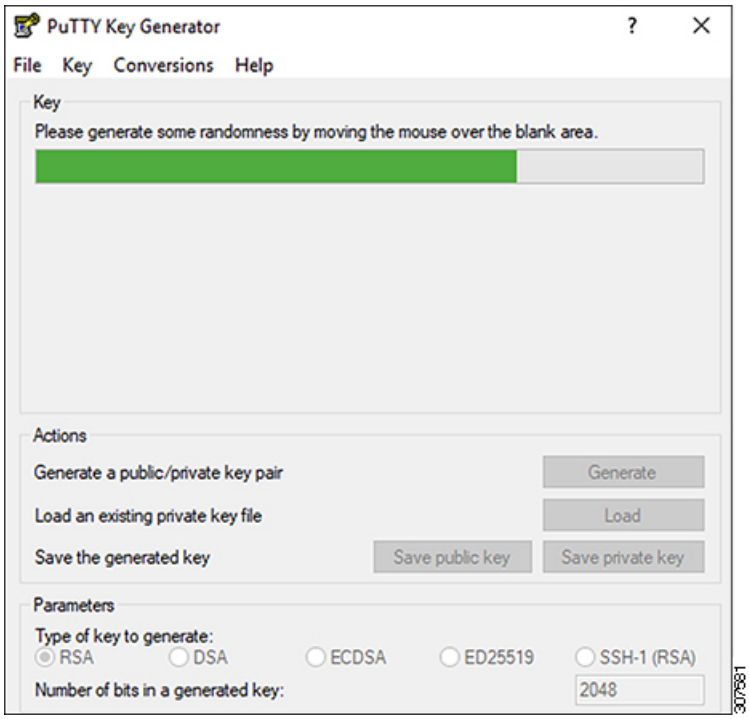
You will see a window for the PuTTY Key Generator on your screen.



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.



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:

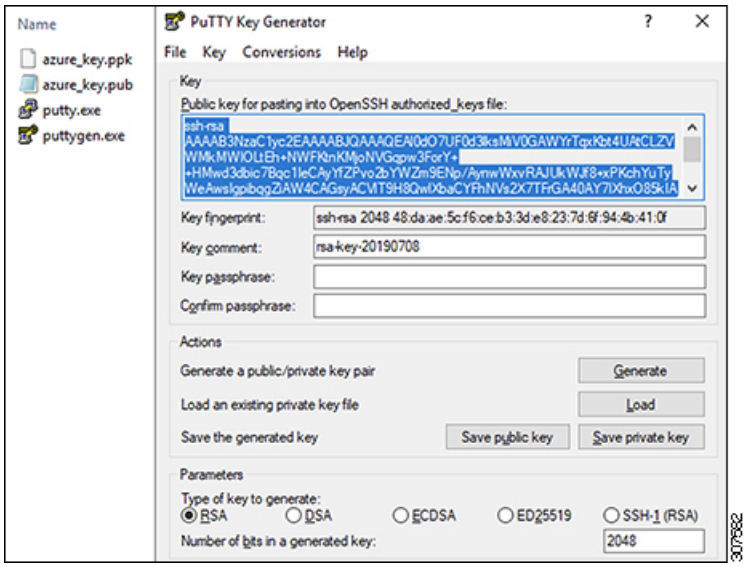
- Including the **ssh-rsa** text at the beginning of the public key.
- Excluding the following text string at the end:

```
== 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.



c) Paste the information in the public key text file that you created in 5.a, on page 6 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 9 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 5.

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 9 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, 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.

  Starting with Release 5.0(2), 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 be between 12 and 72 characters in length and have three of the following: 1 lower case, 1 upper case, 1 number, and 1 special character.
- **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 5
  - Generating an SSH Key Pair in Linux or MacOS, on page 7

  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:

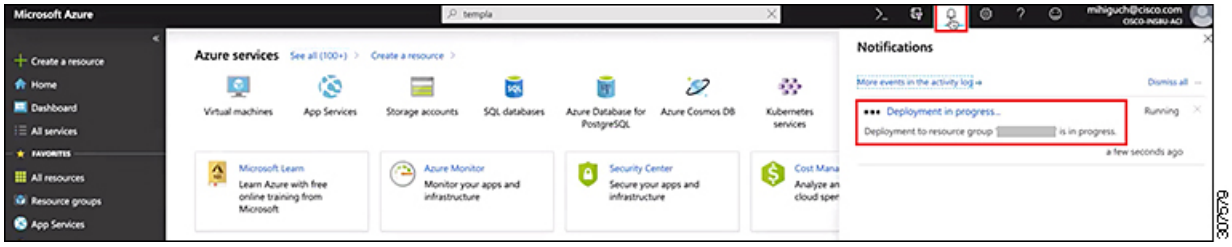
- **ACI Fabric Name**: Leave the default value as-is or enter a fabric name. This entry will be the name for this Cloud APIC. The fabric name must be only alphanumeric characters, but can be separated by dashes (for example, `ACI-Cloud-Fabric`).
- **Virtual machine size**: The virtual machine size is automatically set to the default deployment size of Standard_D8s_v3. You cannot change the default virtual machine size setting.
- **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.
- **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.
- **Public IP Address for the VM**: As part of the configuration process, a public IP address can be set up automatically. However, if you have an IP address that you would like to use as the public IP address for the VM, enter it here and it will be used instead of the automatically-generated IP address.
- **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.

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**.

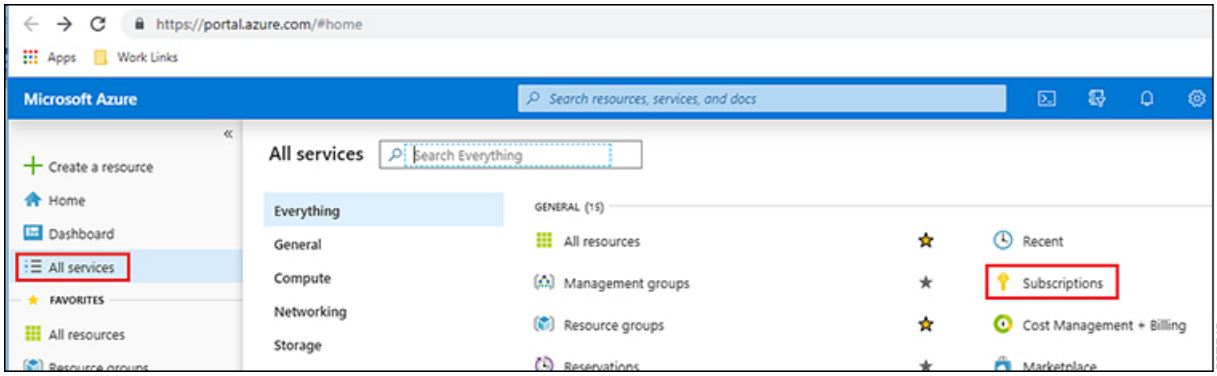
The system now uses the information that you provided in the template to create the Cloud APIC VM instance. This process takes 5-10 minutes to complete. Click the Notifications icon (the bell-shaped icon) to check the status of the deployment of your Cloud APIC.



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

Deploying the Cloud APIC in Azure

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



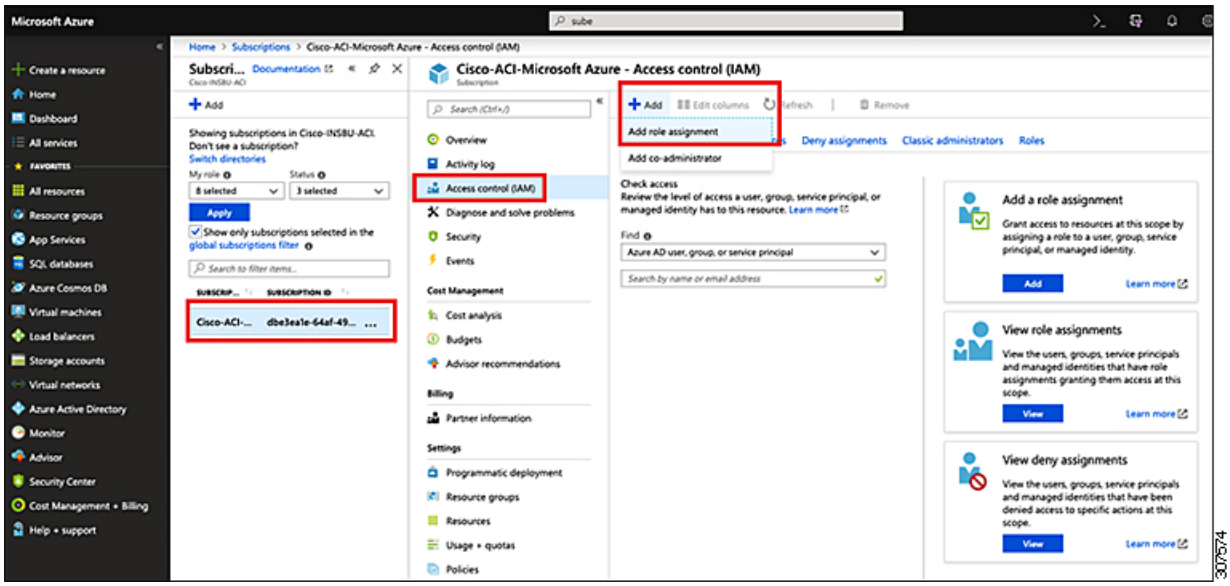
b) In the **Subscriptions** page in the Azure management portal, click the subscription account to which Cloud APIC was deployed.

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.



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