



## **Infrastructure as a Service (CVD)**

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## About this Guide

### Audience

The audience for this document includes network design engineers, network operations personnel, and security operations personnel who don't have physical appliances for Cisco Catalyst Center, Cisco Identity Services Engine (ISE), and others. These network specialists are already DNA-entitled and wish to manage their networks using a Catalyst Center Virtual Appliance (VA) and Cisco ISE running on Cloud for Authentication and Authorization.

### Purpose

This guide helps you design, deploy, and operate the following Cisco products as Infrastructure as a Service (IaaS) in a single Amazon Web Services (AWS) Virtual Private Cloud (VPC):

- Catalyst Center VA
- Cisco ISE
- Cisco Catalyst 9800-CL Wireless Controller

The guide discusses the interworkings of these Cisco products when deployed together in the following deployment models:

- A single AWS VPC connecting to on-premises network devices using an AWS Virtual Private Gateway (VGW)
- Different AWS VPCs connecting on-premises network devices using an AWS Transit Gateway (TGW)

The guide also provides the following information:

- Requirements to deploy these enterprise products successfully in AWS.
- Procedures that detail how to deploy and configure these products using a Quick Start workflow.
- Post-deployment tasks that should be carried out before these products are ready to use.

### Organization

This document organization follows the implementation flow:



As such, it contains these four main sections:

- **Define the Solution:** Presents a high-level overview of the Catalyst Center VA, Cisco ISE, and Catalyst 9800-CL Wireless Controller as IaaS.
- **Design the Solution and Review Prerequisites:** Discusses the prerequisites for this deployment. Topics include supported scale, latency recommendations, and bandwidth requirements, known limitations of the individual products, guidelines for integrating Cisco ISE with Catalyst Center on AWS, High Availability support in AWS, and security considerations.
- **Deploy the Solution:** Provides deployment procedures and post-deployment best practices for:
  - Catalyst Center VA using Cisco Global Launchpad (an automated Cisco utility used to deploy AWS infrastructure and Catalyst Center on AWS), AWS CloudFormation, or AWS Marketplace
  - Cisco ISE
  - Catalyst 9800-CL Wireless Controller
- **Operate the Solution:** Shows some of the capabilities of Amazon CloudWatch that can be used to monitor and troubleshoot the Catalyst Center VA, Cisco ISE, and Cisco Catalyst 9800-CL Wireless Controller deployment.

## Define the Solution

### Catalyst Center on AWS Overview



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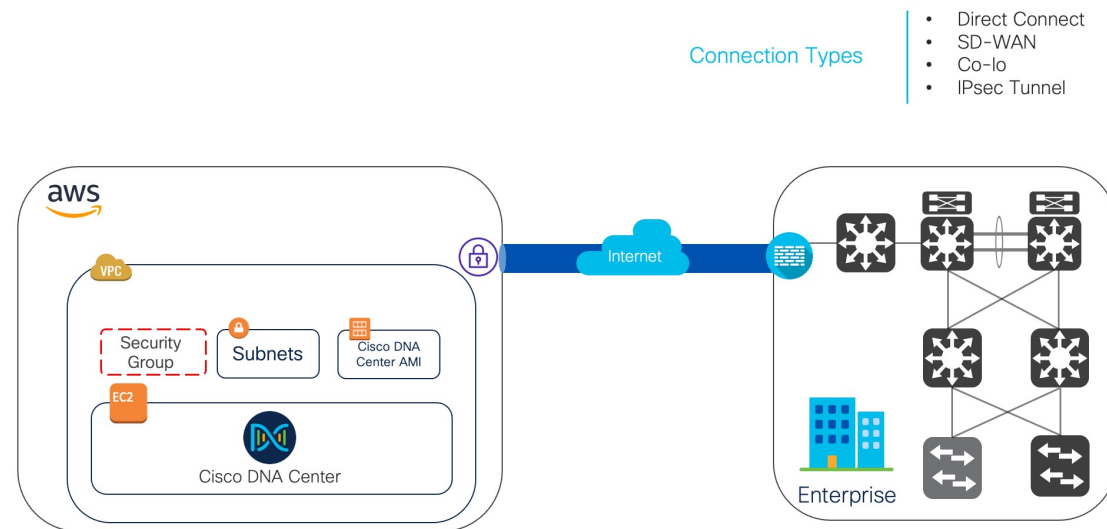
**Note**

Cisco DNA Center has been rebranded as Catalyst Center, and Cisco DNA Center VA Launchpad has been rebranded as Cisco Global Launchpad. During the rebranding process, you will see the former and rebranded names used in different collaterals. However, Cisco DNA Center and Catalyst Center refer to the same product, and Cisco DNA Center VA Launchpad and Cisco Global Launchpad refer to the same product.

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Catalyst Center offers centralized, intuitive management that makes it fast and easy to design, provision, and apply policies across your network environment. The Catalyst Center user interface provides end-to-end network visibility and uses network insights to optimize network performance and deliver the best user and application experience.

Catalyst Center on Amazon Web Services (AWS) provides the full functionality that a Catalyst Center appliance deployment offers. Catalyst Center on AWS runs in your AWS cloud environment and manages your network from the cloud.



## Cisco ISE on AWS

Extend the Cisco ISE policies in your home network to new remote deployments securely through Amazon Web Services (AWS).

You can configure and launch Cisco ISE in AWS through AWS CloudFormation Templates (CFTs) or Amazon Machine Images (AMIs). We recommend that you use CFTs through one of the ways in the following list. To launch Cisco ISE on AWS, perform one of the following procedures:

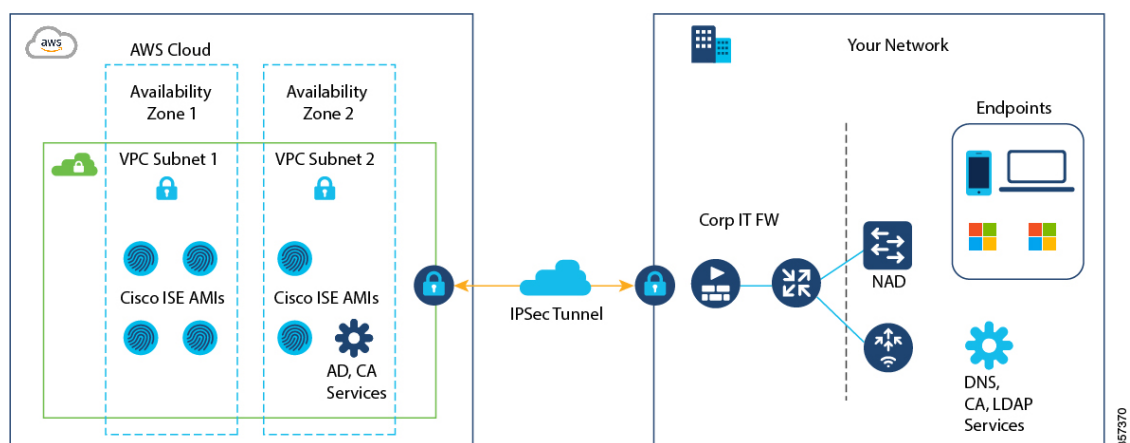
- [Launch a Cisco ISE CloudFormation Template Through AWS Marketplace, on page 80](#)
- [Launch Cisco ISE with CloudFormation Template, on page 85](#)
- [Launch a Cisco ISE AMI](#)

CFTs are AWS solutions that allow you to easily create and manage cloud deployments. Extend your network into the cloud by creating a virtual private cloud in AWS and configure a virtual private gateway to enable communication with your organization's network over an IPsec tunnel.

The following illustration is only an example. You can place common services such as Certificate Authority (CA), Active Directory (AD), Domain Name System (DNS) servers, and Lightweight Directory Access Protocol (LDAP) on premises or in AWS, based on the requirements of your organization.



**Figure 1: An Example of a Deployment Connected to AWS Cloud**



For information about using CFTs in AWS, see the [AWS CloudFormation User Guide](#).

The following table contains details of the Cisco ISE instances that are currently available. You must purchase a Cisco ISE VM license to use any of the following instances. See [Amazon EC2 On-Demand Pricing](#) for information on EC2 instance pricing for your specific requirements.

**Table 1: Cisco ISE Instances**

Cisco ISE Instance Type	C Cores	P U	RAM (in GB)
t3.xlarge		4	16
This instance supports the Cisco ISE evaluation use case and is supported in Cisco ISE Release 3.1 Patch 1 and later. 100 concurrent active endpoints are supported.			
m5.2xlarge		8	32
c5.4xlarge		16	32
m5.4xlarge		16	64
c5.9xlarge		36	72
m5.8xlarge		32	128
m5.16xlarge		64	256

Compute-optimized instances such as c5.4xlarge and c5.9xlarge are intended for compute-intensive tasks or applications and are best suited for Policy Service Node (PSN) use.

General purpose instances such as m5.4xlarge are intended for data processing tasks and database operations and are best suited for use as Policy Administration Node (PAN) or Monitoring and Troubleshooting (MnT) nodes, or both.

If you use a general purpose instance as a PSN, the performance numbers are lower than the performance of a compute-optimized instance as a PSN.

For information on the scale and performance data for AWS instance types, see the [Performance and Scalability Guide for Cisco Identity Services Engine](#).

You can leverage the AWS S3 storage service to easily store backup and restore files, monitoring and troubleshooting reports, and more. See [Configure A Cisco ISE Release 3.1 Repository With AWS S3](#).

In addition to the procedures explained above, you can also use the following Cisco developed solutions to install and automatically create multinode Cisco ISE deployments on AWS:

- [Cisco ISE AWS Partner Solution](#) for small deployments.
- [Cisco Developed Terraform Script](#) for deployments of any size.

## Cisco Catalyst 9800-CL Wireless Controller Hosted on AWS

This section describes the wireless controller hosted on AWS deployment, which uses a cloud-based Cisco Catalyst 9800-CL Wireless Controller hosted on AWS. For more information, see [Deployment guide for Cisco Catalyst 9800 Wireless Controller for Cloud \(C9800-CL\) on Amazon Web Services \(AWS\)](#).

Launching a Catalyst 9800-CL Wireless Controller Amazon Machine Image (AMI) occurs directly from AWS Marketplace. The Catalyst 9800-CL Wireless Controller is deployed on an Amazon EC2 in an AWS Virtual Private Cloud (VPC).

Cisco supports the following instance type for the first release of the Cisco Catalyst 9800-CL Wireless Controller in the cloud:

C5.xlarge: 4 vCPUs, 8 GB RAM, 8GB Disk with 1 vNIC.

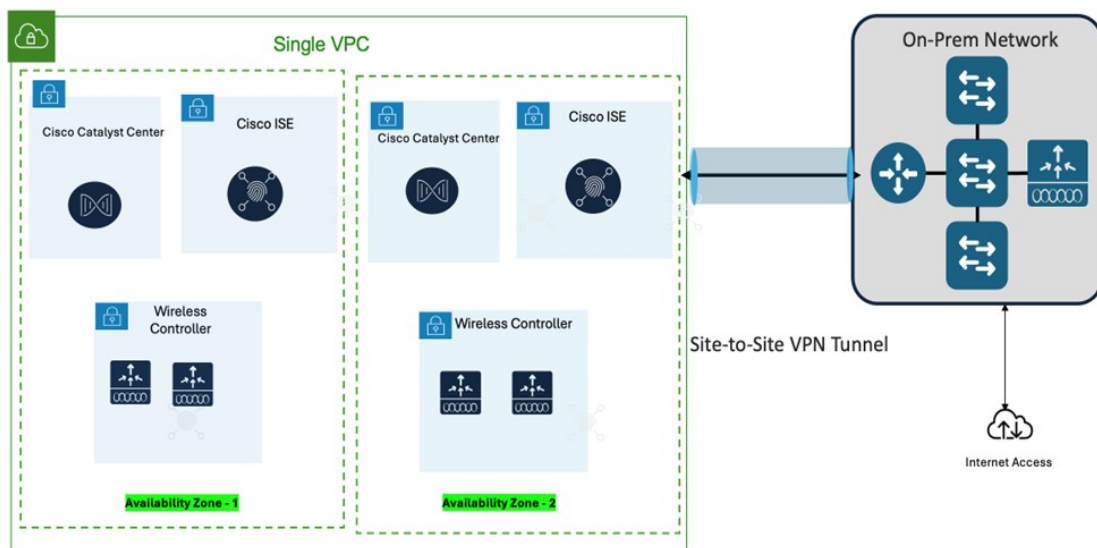
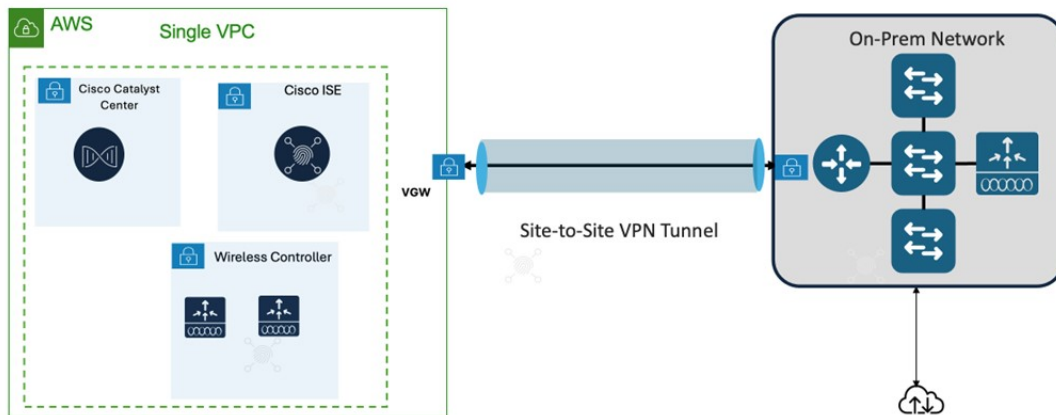
The allocated resources will allow the instance to scale to 1000 APs and 10,000 clients.

## Design the Solution and Review Prerequisites

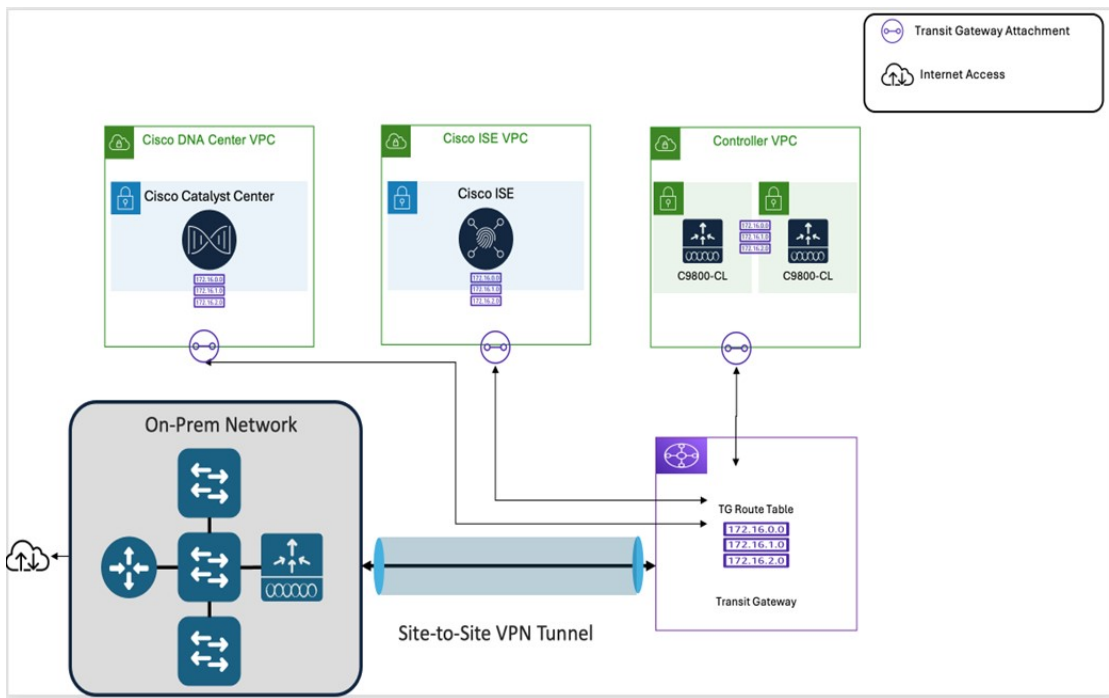
### Topology

Catalyst Center VAs, Cisco ISE, and Catalyst 9800-CL Wireless Controllers that are located in an AWS Public Cloud can be deployed in different topologies:

- Single VPC deployment for Catalyst Center VA, Cisco ISE, and Catalyst 9800-CL Wireless Controller instances:
  - Single VPC, same Availability Zone - Same Subnet
  - Single VPC, different Availability Zone – different subnets per AZ



- Individual VPC deployment for Catalyst Center VA, Cisco ISE, Catalyst 9800-CL Wireless Controller instances:
  - Same Availability Zone for all individual VPCs
  - Different Availability Zone for individual VPCs



## Prerequisites for Catalyst Center VA

### Prerequisites for Automated Deployment

Before you can begin to deploy Catalyst Center on AWS using Cisco Global Launchpad, make sure that the following requirements are met:

- Install Docker Community Edition (CE) on your platform.

Cisco Global Launchpad supports Docker CE on Mac, Windows, and Linux platforms. See the documentation on the [Docker](#) website for the specific procedure for your platform.

- Regardless of how you access Cisco Global Launchpad, your Catalyst Center VA must meet the following minimum resource requirements:

- **Catalyst Center Instance:**

- r5a.8xlarge



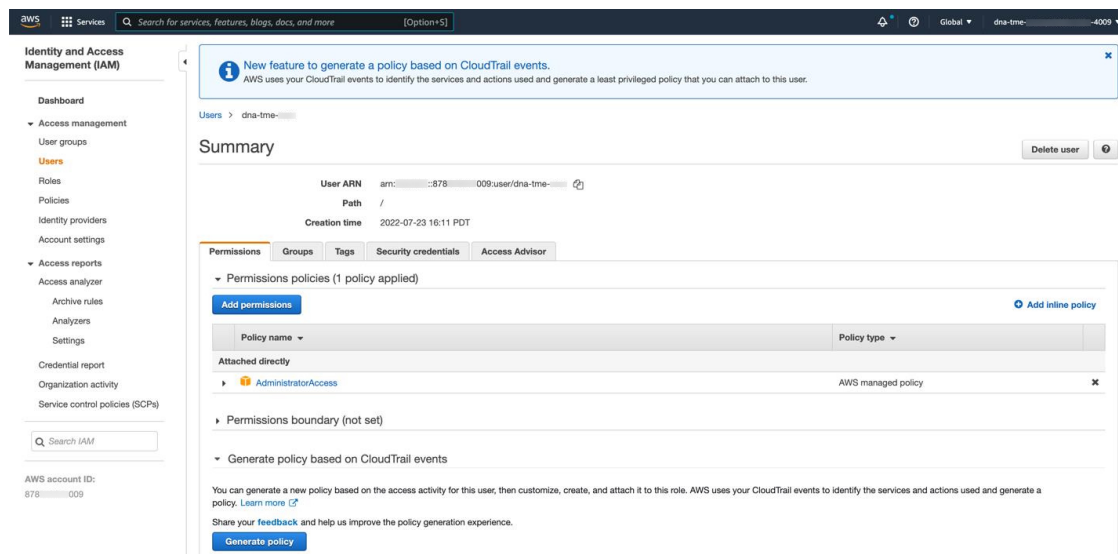
#### Important

Catalyst Center supports only the r5a.8xlarge instance size. Any changes to this configuration aren't supported. Additionally, the r5a.8xlarge instance size isn't supported in specific availability zones. To view the list of unsupported availability zones, see the [Release Notes for Cisco Global Launchpad](#).

- 32 vCPUs
- 256-GB RAM
- 4-TB storage (EBS-gp3)
- 2500 disk input/output operations per second (IOPS)

- 180-MBps disk bandwidth
- **Backup Instance:** T3.micro, 2 vCPUs, 500-GB storage, and 1-GB RAM
- You have valid credentials to access your AWS account.
- Your AWS account is a subaccount (a child account) to maintain resource independence and isolation. With a subaccount, this ensures that the Catalyst Center deployment doesn't impact your existing resources.
- **Important:** Your AWS account is subscribed to [Cisco Catalyst Center Virtual Appliance - Bring Your Own License \(BYOL\)](#) in AWS Marketplace.
- If you're an admin user, you must have administrator access permission for your AWS account. (In AWS, the policy name is displayed as **AdministratorAccess**.)

The administrator access policy must be attached to your AWS account directly and not to a group. The application doesn't enumerate through a group policy. So, if you are added to a group with the administrator access permission, you will not be able to create the required infrastructure.



- If you're a subuser, your administrator must add you to the CiscoDNACenter user group.

When an admin user logs in to Cisco Global Launchpad for the first time, the CiscoDNACenter user group is created on their AWS account with all the required policies attached. The admin user can add subusers to this group to allow them to log in to Cisco Global Launchpad.

The following policies are attached to the CiscoDNACenter user group:

- AmazonDynamoDBFullAccess
- IAMReadOnlyAccess
- AmazonEC2FullAccess
- AWSCloudFormationFullAccess
- AWSLambda\_FullAccess
- CloudWatchFullAccess

- ServiceQuotasFullAccess
- AmazonEventBridgeFullAccess
- service-role/AWS\_ConfigRole
- AmazonS3FullAccess
- ClientVPNServiceRolePolicy (Version: 2012-10-17)

This policy allows the following rules:

- ec2:CreateNetworkInterface
  - ec2:CreateNetworkInterfacePermission
  - ec2:DescribeSecurityGroups
  - ec2:DescribeVpcs
  - ec2:DescribeSubnets
  - ec2:DescribeInternetGateways
  - ec2:ModifyNetworkInterfaceAttribute
  - ec2>DeleteNetworkInterface
  - ec2:DescribeAccountAttributes
  - ds:AuthorizeApplication
  - ds:DescribeDirectories
  - ds:GetDirectoryLimits
  - ds:UnauthorizeApplication
  - logs:DescribeLogStreams
  - logs>CreateLogStream
  - logs:PutLogEvents
  - logs:DescribeLogGroups
  - acm:GetCertificate
  - acm:DescribeCertificate
  - iam:GetSAMLProvider
  - lambda:GetFunctionConfiguration
- ConfigPermission (Version: 2012-10-17, Sid: VisualEditor0)

This policy allows the following rules:

- config:Get
- config:\*
- config:\*ConfigurationRecorder

- config:Describe\*
  - config:Deliver\*
  - config:List\*
  - config:Select\*
  - tag:GetResources
  - tag:GetTagKeys
  - cloudtrail:DescribeTrails
  - cloudtrail:GetTrailStatus
  - cloudtrail:LookupEvents
  - config:PutConfigRule
  - config>DeleteConfigRule
  - config>DeleteEvaluationResults
- PassRole (Version: 2012-10-17, Sid: VisualEditor0)

This policy allows the following rules:

- iam:GetRole
- iam:PassRole

## Prerequisites for Manual Deployment Using AWS CloudFormation

Before you can begin to deploy Catalyst Center on AWS, make sure that the following network, AWS, and Catalyst Center requirements have been met:

### Network Environment

You must have the following information about your network environment on hand:

- Enterprise DNS server IP address
- (Optional) HTTPS Network Proxy details

### AWS Environment

You must meet the following AWS environment requirements:

- You have valid credentials to access your AWS account.

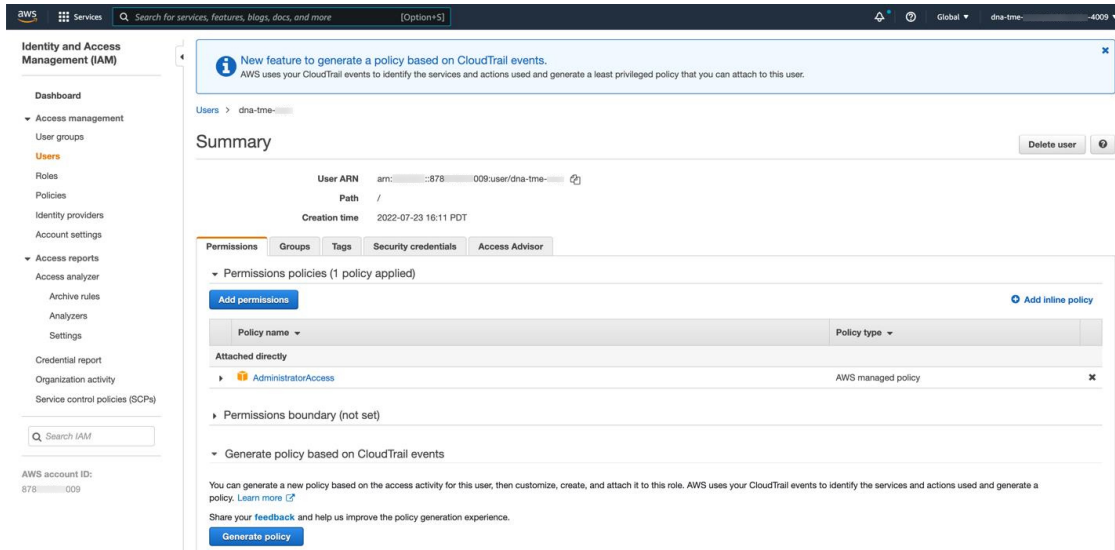


#### Note

We recommend that your AWS account be a subaccount (a child account) to maintain resource independence and isolation. A subaccount ensures that the Catalyst Center deployment does not impact your existing resources.



- **Important:** Your AWS account is subscribed to [Catalyst Center Virtual Appliance - Bring Your Own License \(BYOL\)](#) in AWS Marketplace.
- You must have administrator access permission for your AWS account. (In AWS, the policy name is displayed as **AdministratorAccess**.)



- The following resources and services must be set up in AWS:
  - **VPC:** The recommended CIDR range is /25. In IPv4 CIDR notation, the last octet (the fourth octet) of the IP address can only have the values 0 or 128. For example: x.x.x.0 or x.x.x.128.
  - **Subnets:** The recommended subnet range is /28 and should not overlap with your corporate subnet.
  - **Route Tables:** Make sure that your VPC subnet is allowed to communicate with your Enterprise network via your VPN GW or TGW.
  - **Security Groups:** For communication between your Catalyst Center VA on AWS and the devices in your Enterprise network, the AWS security group that you attach to your Catalyst Center VA on AWS must allow the following ports:
    - TCP 22, 80, 443, 9991, 25103, 32626
    - UDP 123, 162, 514, 6007, 21730

The following table lists information about the ports that Catalyst Center uses, the services communicating over these ports, the appliance's purpose in using them, and the recommended action.

Port	Service Name	Purpose	Recommended Action
—	ICMP	Devices use ICMP messages to communicate network connectivity issues.	Enable ICMP.

Port	Service Name	Purpose	Recommended Action
TCP 22, 80, 443	HTTPS, SFTP, HTTP	<p>Software image download from Catalyst Center through HTTPS:443, SFTP:22, HTTP:80.</p> <p>Certificate download from Catalyst Center through HTTPS:443, HTTP:80 (Cisco 9800 Wireless Controller, PnP), Sensor/Telemetry.</p> <p><b>Note</b> Block port 80 if you don't use Plug and Play (PnP), Software Image Management (SWIM), Embedded Event Management (EEM), device enrollment, or Cisco 9800 Wireless Controller.</p>	<p>Ensure that firewall rules limit the source IP of the hosts or network devices allowed to access Catalyst Center on these ports.</p> <p><b>Note</b> We do not recommend the use of HTTP 80. Use HTTPS 443 wherever possible.</p>
UDP 123	NTP	Devices use NTP for time synchronization.	Port must be open to allow devices to synchronize the time.
UDP 162	SNMP	Catalyst Center receives SNMP network telemetry from devices.	Port must be open for data analytics based on SNMP.
UDP 514	Syslog	Catalyst Center receives syslog messages from devices.	Port must be open for data analytics based on syslog.
UDP 6007	NetFlow	Catalyst Center receives NetFlow network telemetry from devices.	Port must be open for data analytics based on NetFlow.
TCP 9991	Wide Area Bonjour Service	Catalyst Center receives multicast Domain Name System (mDNS) traffic from the Service Discovery Gateway (SDG) agents using the Bonjour Control Protocol.	Port must be open on Catalyst Center if the Bonjour application is installed.
UDP 21730	Application Visibility Service	Application Visibility Service CBAR device communication.	Port must be open when CBAR is enabled on a network device.
TCP 25103	Cisco 9800 Wireless Controller and Cisco Catalyst 9000 switches with streaming telemetry enabled	Used for telemetry.	Port must be open for telemetry connections between Catalyst Center and Catalyst 9000 devices.
TCP 32626	Intelligent Capture (gRPC) collector	Used for receiving traffic statistics and packet - capture data used by the Assurance Intelligent Capture (gRPC) feature.	Port must be open if you are using the Assurance Intelligent Capture (gRPC) feature.

- **VPN Gateway (VPN GW) or Transit Gateway (TGW):** You must have an existing connection to your Enterprise network, which is your Customer Gateway (CGW).

For your existing connection from the CGW to AWS, make sure that the correct ports are open for traffic flow to and from the Catalyst Center VA, whether you open them using the firewall settings or a proxy gateway. For more information about the well-known network service ports that the appliance uses, see "Required Network Ports" in the "Plan the Deployment" chapter of the [Cisco Catalyst Center Appliance Installation Guide](#).

- **Site-to-Site VPN Connection:** You can use TGW Attachments and TGW Route Tables.
- Your AWS environment must be configured with supported regions described in AWS supported regions.
- If you want to enable multiple IAM users with the ability to configure Catalyst Center using the same environment setup, you need to create a group with the following policies and then add the required users to that group:
  - IAMReadOnlyAccess
  - AmazonEC2FullAccess
  - AWSCloudFormationFullAccess
- You have the following AWS information on hand:
  - Subnet ID
  - Security Group ID
  - Keypair ID
  - Environment name
  - CIDR reservation

## Catalyst Center Environment

You must meet the following requirements for your Catalyst Center environment:

- You have access to the Catalyst Center GUI.
- You have the following Catalyst Center information on hand:
  - Default gateway setting
  - CLI password
  - FQDN for the Catalyst Center VA IP address

## Prerequisites for Manual Deployment Using AWS Marketplace

Before you can begin to deploy Catalyst Center on AWS, make sure that the following network, AWS, and Catalyst Center requirements have been met:

### Network Environment

You must have the following information about your network environment on hand:

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- (Optional) HTTPS Network Proxy details

## AWS Environment

You must meet the following AWS environment requirements:

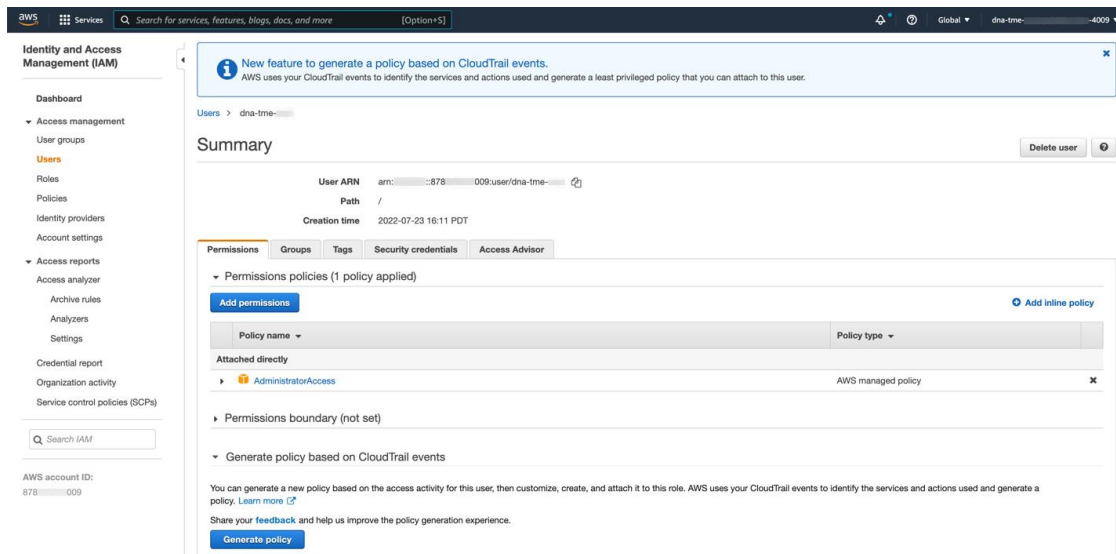
- You have valid credentials to access your AWS account.



### Note

We recommend that your AWS account be a subaccount (a child account) to maintain resource independence and isolation. A subaccount ensures that the Catalyst Center deployment does not impact your existing resources.

- **Important:** Your AWS account is subscribed to [Catalyst Center Virtual Appliance - Bring Your Own License \(BYOL\)](#) in AWS Marketplace.
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- The following resources and services must be set up in AWS:
  - **VPC:** The recommended CIDR range is /25. In IPv4 CIDR notation, the last octet (the fourth octet) of the IP address can only have the values 0 or 128. For example: x.x.x.0 or x.x.x.128.
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  - **Route Tables:** Make sure that your VPC subnet is allowed to communicate with your Enterprise network via your VPN GW or TGW.
  - **Security Groups:** For communication between the Catalyst Center on AWS and the devices in your Enterprise network, the AWS security group that you attach to the Catalyst Center on AWS must allow the following ports:
    - TCP 22, 80, 443, 9991, 25103, 32626
    - UDP 123, 162, 514, 6007, 21730

You must also configure the inbound and outbound ports. To configure inbound ports, refer to the following figure:

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
–	sgr-0e376bfc6025cbb5	IPv4	Custom TCP	TCP	9991	0.0.0.0/0	–
–	sgr-07df898f6cde9989	IPv4	Custom UDP	UDP	123	0.0.0.0/0	–
–	sgr-041d3c3f9c91252e	IPv4	Custom TCP	TCP	32626	0.0.0.0/0	–
–	sgr-0e96b4f0494db5d...	IPv4	Custom UDP	UDP	514	0.0.0.0/0	–
–	sgr-0fffea3f3af8cb906	IPv4	SSH	TCP	22	0.0.0.0/0	–
–	sgr-05cbe732bb2feeca8	IPv4	Custom TCP	TCP	25103	0.0.0.0/0	–
–	sgr-022947011fc90efe8	IPv4	DNS (TCP)	TCP	53	0.0.0.0/0	–
–	sgr-0f9cda6c3ba5d14d2	IPv4	Custom TCP	TCP	9005	0.0.0.0/0	–
–	sgr-003b55bec96e963b	IPv4	Custom TCP	TCP	873	0.0.0.0/0	–
–	sgr-0b08c864158f7d30c	IPv4	All UDP	UDP	0 - 65535	10.20.0.6/32	–
–	sgr-073f4611f0a79c314	IPv4	Custom UDP	UDP	111	0.0.0.0/0	–
–	sgr-0f203799c72b67633	IPv4	HTTP	TCP	80	0.0.0.0/0	–
–	sgr-04e9f75bd519069b	IPv4	Custom UDP	UDP	21730	0.0.0.0/0	–
–	sgr-0220a155852517...	IPv4	Custom TCP	TCP	9004	0.0.0.0/0	–
–	sgr-0cfdcd269abfdac24	IPv4	Custom TCP	TCP	123	0.0.0.0/0	–
–	sgr-06732d9b1e871a...	IPv4	DNS (UDP)	UDP	53	0.0.0.0/0	–
–	sgr-00cd51d8b186c67...	IPv4	Custom UDP	UDP	6007	0.0.0.0/0	–
–	sgr-01fb034d0ef851d51	IPv4	Custom UDP	UDP	2049	0.0.0.0/0	–
–	sgr-0aa297c247f44a7f8	IPv4	All ICMP - IPv4	ICMP	All	0.0.0.0/0	–
–	sgr-0af560ae3f24475b9	IPv4	All TCP	TCP	0 - 65535	10.20.0.6/32	–
–	sgr-0fe800a3da1aeff06	IPv4	Custom UDP	UDP	162	0.0.0.0/0	–
–	sgr-01f4b472ae59bb2...	IPv4	Custom TCP	TCP	2222	0.0.0.0/0	–
–	sgr-075db358356c3acc8	IPv4	NFS	TCP	2049	0.0.0.0/0	–
–	sgr-05379ca08ae870b1	IPv4	Custom TCP	TCP	111	0.0.0.0/0	–
–	sgr-069b3ea740cab18...	IPv4	HTTPS	TCP	443	0.0.0.0/0	–

To configure outbound ports, refer to the following figure:

Name	Security group rule...	IP version	Type	Protocol	Port range	Destination	Description
–	sgr-076363ab3019b8...	IPv4	All UDP	UDP	0 - 65535	10.20.0.6/32	–
–	sgr-022ea397d141005f7	IPv4	Custom UDP	UDP	1645	0.0.0.0/0	–
–	sgr-00b4c14b3e480f183	IPv4	All ICMP - IPv4	ICMP	All	0.0.0.0/0	–
–	sgr-029b2fd82cdf0edf1	IPv4	Custom TCP	TCP	49	0.0.0.0/0	–
–	sgr-04c6a1cf3cb3b5c7f	IPv4	All TCP	TCP	0 - 65535	10.20.0.6/32	–
–	sgr-01376d8fa27c78c1d	IPv4	Custom UDP	UDP	2049	0.0.0.0/0	–
–	sgr-0e1c02df65c1784fe	IPv4	Custom UDP	UDP	1812	0.0.0.0/0	–
–	sgr-08dbd82344e593...	IPv4	DNS (UDP)	UDP	53	0.0.0.0/0	–
–	sgr-03231c35500065e...	IPv4	Custom TCP	TCP	9060	0.0.0.0/0	–
–	sgr-092317fd1ff7a0b6e	IPv4	Custom TCP	TCP	123	0.0.0.0/0	–
–	sgr-0c0ca4c8c4fd5a368	IPv4	Custom TCP	TCP	23	0.0.0.0/0	–
–	sgr-08b929b66a33f29...	IPv4	Custom UDP	UDP	111	0.0.0.0/0	–
–	sgr-01f3fc40b3e8f06dd	IPv4	Custom TCP	TCP	111	0.0.0.0/0	–
–	sgr-0ae0f6f61929dbc54	IPv4	Custom TCP	TCP	8910	0.0.0.0/0	–
–	sgr-065fa8cb830de082e	IPv4	Custom TCP	TCP	830	0.0.0.0/0	–
–	sgr-0f529ea0425020db7	IPv4	HTTP	TCP	80	0.0.0.0/0	–
–	sgr-0264702bd385b5...	IPv4	Custom UDP	UDP	123	0.0.0.0/0	–
–	sgr-01ef7a675025aa9c	IPv4	Custom TCP	TCP	5222	0.0.0.0/0	–
–	sgr-0793f014435e6d7...	IPv4	Custom UDP	UDP	161	0.0.0.0/0	–
–	sgr-0c5b0d61fe044b92f	IPv4	Custom TCP	TCP	9991	0.0.0.0/0	–
–	sgr-0043a759b7dfdabf7	IPv4	Custom TCP	TCP	873	0.0.0.0/0	–
–	sgr-037a5a1eb51cb99da	IPv4	SSH	TCP	22	0.0.0.0/0	–
–	sgr-08a1c29aaa4e48d7f	IPv4	HTTPS	TCP	443	0.0.0.0/0	–
–	sgr-01a7332765efae645	IPv4	DNS (TCP)	TCP	53	0.0.0.0/0	–
–	sgr-09f0dd53d819618...	IPv4	NFS	TCP	2049	0.0.0.0/0	–

The following table lists information about the ports that Catalyst Center uses, the services communicating over these ports, the appliance's purpose in using them, and the recommended action.

Port	Service Name	Purpose	Recommended Action
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TCP 22, 80, 443	HTTPS, SFTP, HTTP	<p>Software image download from Catalyst Center through HTTPS:443, SFTP:22, HTTP:80.</p> <p>Certificate download from Catalyst Center through HTTPS:443, HTTP:80 (Cisco 9800 Wireless Controller, PnP), Sensor/Telemetry.</p> <p><b>Note</b> Block port 80 if you don't use Plug and Play (PnP), Software Image Management (SWIM), Embedded Event Management (EEM), device enrollment, or Cisco 9800 Wireless Controller.</p>	<p>Ensure that firewall rules limit the source IP of the hosts or network devices allowed to access Catalyst Center on these ports.</p> <p><b>Note</b> We do not recommend the use of HTTP 80. Use HTTPS 443 wherever possible.</p>
UDP 123	NTP	Devices use NTP for time synchronization.	Port must be open to allow devices to synchronize the time.
UDP 162	SNMP	Catalyst Center receives SNMP network telemetry from devices.	Port must be open for data analytics based on SNMP.
UDP 514	Syslog	Catalyst Center receives syslog messages from devices.	Port must be open for data analytics based on syslog.
UDP 6007	NetFlow	Catalyst Center receives NetFlow network telemetry from devices.	Port must be open for data analytics based on NetFlow.
TCP 9991	Wide Area Bonjour Service	Catalyst Center receives multicast Domain Name System (mDNS) traffic from the Service Discovery Gateway (SDG) agents using the Bonjour Control Protocol.	Port must be open on Catalyst Center if the Bonjour application is installed.
UDP 21730	Application Visibility Service	Application Visibility Service CBAR device communication.	Port must be open when CBAR is enabled on a network device.
TCP 25103	Cisco 9800 Wireless Controller and Cisco Catalyst 9000 switches with streaming telemetry enabled	Used for telemetry.	Port must be open for telemetry connections between Catalyst Center and Catalyst 9000 devices.
TCP 32626	Intelligent Capture (gRPC) collector	Used for receiving traffic statistics and packet - capture data used by the Assurance Intelligent Capture (gRPC) feature.	Port must be open if you are using the Assurance Intelligent Capture (gRPC) feature.

- **VPN Gateway (VPN GW) or Transit Gateway (TGW):** You must have an existing connection to your Enterprise network, which is your Customer Gateway (CGW).

For your existing connection from the CGW to AWS, make sure that the correct ports are open for traffic flow to and from your Catalyst Center VA, whether you open them using the firewall settings or a proxy gateway. For more information about the well-known network service ports that the appliance uses, see "Required Network Ports" in the "Plan the Deployment" chapter of the [Cisco Catalyst Center Appliance Installation Guide](#).

- **Site-to-Site VPN Connection:** You can use TGW Attachments and TGW Route Tables.
- Your AWS environment must be configured with one of the following regions:
  - ap-northeast-1 (Tokyo)
  - ap-northeast-2 (Seoul)
  - ap-south-1 (Mumbai)
  - ap-southeast-1 (Singapore)
  - ap-southeast-2 (Sydney)
  - ca-central-1 (Canada)
  - eu-central-1 (Frankfurt)
  - eu-south-1 (Milan)
  - eu-west-1 (Ireland)
  - eu-west-2 (London)
  - eu-west-3 (Paris)
  - us-east-1 (Virginia)
  - us-east-2 (Ohio)
  - us-west-1 (N. California)
  - us-west-2 (Oregon)
- If you want to enable multiple IAM users with the ability to configure Catalyst Center using the same environment setup, you need to create a group with the following policies and then add the required users to that group:
  - IAMReadOnlyAccess
  - AmazonEC2FullAccess
  - AWSCloudFormationFullAccess
- You have the following AWS information on hand:
  - Subnet ID
  - Security Group ID
  - Keypair ID
  - Environment name



- CIDR reservation

## Catalyst Center Environment

You must meet the following requirements for your Catalyst Center environment:

- You have access to the Catalyst Center GUI.
- You have the following Catalyst Center information on hand:
  - NTP setting
  - Default gateway setting
  - CLI password
  - UI username and password
  - Static IP
  - FQDN for the Catalyst Center IP address

## Verify the Catalyst Center VA TAR File

Before deploying the Catalyst Center VA, we strongly recommend that you verify that the TAR file you downloaded is a genuine Cisco TAR file.

### Before you begin

Ensure that you've downloaded Catalyst Center VA TAR file from the [Cisco Software Download](#) site.

### Procedure

- 
- Step 1** Download the Cisco public key (cisco\_image\_verification\_key.pub) for signature verification from the location specified by Cisco.
- Step 2** Download the secure hash algorithm (SHA512) checksum file for the TAR file from the location specified by Cisco.
- Step 3** Obtain the TAR file's signature file (.sig) from Cisco support through email or by download from the secure Cisco website (if available).
- Step 4** (Optional) Perform an SHA verification to determine whether the TAR file is corrupted due to a partial download.
- Depending on your operating system, enter one of the following commands:
- On a Linux system: **sha512sum** <tar-file-filename>
  - On a Mac system: **shasum -a 512** <tar-file-filename>

Microsoft Windows does not include a built-in checksum utility, but you can use the certutil tool:

```
certutil -hashfile <filename> sha256
```

For example:

```
certutil -hashfile D:\Customers\Launchpad-desktop-server-1.x.0.tar.gz sha256
```

On Windows, you can also use [Windows PowerShell](#) to generate the digest. For example:

```
PS C:\Users\Administrator> Get-FileHash -Path D:\Customers\Launchpad-desktop-server-1.x.0.tar.gz

Algorithm Hash Path
SHA256 <string> D:\Customers\Launchpad-desktop-server-1.x.0.tar.gz
```

Compare the command output to the SHA512 checksum file that you downloaded. If the command output does not match, download the TAR file again and run the appropriate command a second time. If the output still does not match, contact Cisco support.

**Step 5** Verify that the TAR file is genuine and from Cisco by verifying its signature:

**openssl dgst -sha512 -verify cisco\_image\_verification\_key.pub -signature** <signature-filename> <tar-file-filename>

**Note**

This command works in both Mac and Linux environments. For Windows, you must download and install OpenSSL (available on the [OpenSSL Downloads](#) site) if you have not already done so.

If the TAR file is genuine, running this command displays a `Verified OK` message. If this message fails to appear, do not install the TAR file and contact Cisco support.

## Prerequisites for Cisco ISE on AWS

- The following table contains details of the Cisco ISE instances that are currently available. You must purchase a Cisco ISE VM license to use any of the following instances. See [Amazon EC2 On-Demand Pricing](#) for information on EC2 instance pricing for your specific requirements.

**Table 2: Cisco ISE Instances**

Cisco ISE Instance Type	C P U Cores	RAM (in GB)
t3.xlarge This instance supports the Cisco ISE evaluation use case and is supported in Cisco ISE Release 3.1 Patch 1 and later releases. 100 concurrent active endpoints are supported.	4	16
m5.2xlarge	8	32
c5.4xlarge	16	32
m5.4xlarge	16	64
c5.9xlarge	36	72
m5.8xlarge	32	128
m5.16xlarge	64	256

- Compute-optimized instances such as c5.4xlarge and c5.9xlarge are intended for compute-intensive tasks or applications and are best suited for Policy Service Node (PSN) use.
- General purpose instances such as m5.4xlarge are intended for data processing tasks and database operations and are best suited for use as Policy Administration Node (PAN) or Monitoring and Troubleshooting (MnT) nodes, or both.

- If you use a general purpose instance as a PSN, the performance numbers are lower than the performance of a compute-optimized instance as a PSN.
- For information on the scale and performance data for AWS instance types, see the [Performance and Scalability Guide for Cisco Identity Services Engine](#).
- You can leverage the Amazon S3 storage service to easily store backup and restore files, monitoring and troubleshooting reports, and more. See [Configure A Cisco ISE Release 3.1 Repository With AWS S3](#).
- Users need to be familiar with AWS solutions such as Amazon EC2 instances and Amazon Elastic Block Storage (EBS) volumes, and concepts such as Regions, Availability Zones, Security Groups, Virtual Private Cloud (VPC), and so on. See the [AWS documentation](#) for information on these solutions.
- Must also be familiar with managing AWS service quotas.
- Configure VPC in AWS. See [VPC with public and private subnets and AWS Site-to-Site VPN access](#).
- To create encrypted EBS volumes, your AWS Identity and Access Management (IAM) policy must allow access to Key Management Service (KMS) resources. See [Policies and permissions in IAM](#).
- Create security groups, subnets, and key pairs in AWS before you configure a Cisco ISE instance.
- When you create a security group for Cisco ISE, you must create rules for all the ports and protocols for the Cisco ISE services you want to use. See Chapter "Cisco ISE Ports Reference" in the [Cisco ISE Installation Guide](#) for your release.
- The IP address that you enter in the Management Network field in the Cisco ISE CloudFormation template must not be an IP address that exists as a network interface object in AWS.
- You can configure a static IP as a private IP in your deployment. However, the static IP must be configured with a DNS-resolvable hostname.

## Prerequisites for Catalyst 9800-CL Wireless Controller on AWS

- Create a managed VPN connection from the corporate network to the VPC.
- Create a VPC with the desired subnet for the wireless management interface on the Catalyst 9800-CL Wireless Controller.
- You do not have to configure the AWS CloudFormation template because the template is automatically integrated in the launching procedure. If desired, you can download and view the AWS CloudFormation template file from AWS Marketplace for the product.
- Obtain the Amazon Machine Image ID (AMI-ID) for the desired Catalyst 9800-CL Wireless Controller software release. The AMI is available in AWS Marketplace.
- As an option, you can restrict AP access to your instance for security reasons. For example, you can allow CAPWAP from a single, specific IP range so that only those APs are able to register to the controller. Here is the list of protocols you might need to enable inbound and outbound:

Port	Protocol
UDP 5246/5247/5248	CAPWAP
TCP 22	SSH, SCP
TCP 21	FTP
ICMP	Ping

Port	Protocol
UDP 161, 162	SNMP/SNMP traps
TCP 443/80	HTTPS/HTTP
TCP/UDP 49	TACACS+
UDP 53	DNS Server
UDP 1812/1645/1813/1646	Radius
UDP 123	NTP Server
UDP 514	Syslog

## Known Limitations

### Known Limitations of Using Catalyst Center on AWS

- Catalyst Center on AWS supports only the r5a.8xlarge instance size. Any changes to this configuration aren't supported.
- Catalyst Center on AWS doesn't support the Federal Information Processing Standards (FIPS).
- Catalyst Center on AWS doesn't support IPv6.
- Catalyst Center on AWS doesn't support disaster recovery. Therefore, we recommend that you don't install the optional Disaster Recovery (DR) package.

### Known Limitations of Using Cisco ISE on AWS

The following are the known limitations with using Cisco ISE in AWS:

- You cannot take an Amazon EBS snapshot of a Cisco ISE instance and then create another EBS volume with the snapshot.
- The Amazon VPC supports only Layer 3 features. Cisco ISE nodes on AWS instances do not support Cisco ISE functions that depend on Layer 1 and Layer 2 capabilities. For example, working with DHCP SPAN profiler probes and CDP protocols that use the Cisco ISE CLI is currently not supported.
- NIC bonding is not supported.
- Dual NIC is supported with only two NICs—Gigabit Ethernet 0 and Gigabit Ethernet 1. To configure a secondary NIC in your Cisco ISE instance, you must first create a network interface object in AWS, power off your Cisco ISE instance, and then attach this network interface object to Cisco ISE. After you install and launch Cisco ISE on AWS, use the Cisco ISE CLI to manually configure the IP address of the network interface object as the secondary NIC.
- Cisco ISE upgrade workflow is not available in Cisco ISE on AWS. Only fresh installs are supported. However, you can carry out backup and restore of configuration data. When you restore the data in a Cisco ISE AWS instance, the data is upgraded to the Cisco ISE Release 3.1 version. For information on upgrading hybrid Cisco ISE deployments, see [Upgrade Guidelines for Hybrid Deployments](#).
- SSH access to Cisco ISE CLI using password-based authentication is not supported in AWS. You can only access the Cisco ISE CLI through a key pair, and this key pair must be stored securely.

If you use a private key (or PEM) file and you lose the file, you will not be able to access the Cisco ISE CLI.

Any integration that uses a password-based authentication method to access Cisco ISE CLI is not supported, for example, Cisco DNA Center Release 2.1.2 and earlier.

- You might receive an `Insufficient Virtual Machine Resources` alarm when Cisco ISE is in idle state. You can ignore this alarm because the CPU frequency is maintained lower than the required baseline frequency (2 GHz) for effective power conservation.
- In the software version Cisco ISE 3.1, when you run the **show inventory** command through a Cisco ISE instance that is launched through AWS, the output for the command does not display the instance type of the Cisco ISE on AWS in the output. This issue does not occur with software versions Cisco ISE 3.1 Patch 1 and later releases.
- You cannot configure an IPv6 server as an NTP server when launching Cisco ISE through AWS.
- An initial administrator user account name, `admin`, is generated by default. This user account name is used for both SSH and GUI access to Cisco ISE after the installation process is complete.
- You cannot resize an EC2 instance.
- You cannot convert the Cisco ISE Disk EBS Volume as an AMI and then relaunch another EC2 instance with this AMI.
- You cannot change the IP address or the default gateway of an instance after it has been created successfully.
- You can integrate the external identity sources that are located on the premises. However, because of latency, when on-premises identity sources are used, Cisco ISE performance is not at par with Cisco ISE performance when AWS-hosted identity sources or the Cisco ISE internal user database is used.
- The following deployment types are supported, but you must ensure that internode latencies are below 300 milliseconds:
  - Hybrid deployments with some Cisco ISE nodes on premises and some nodes in AWS.
  - Inter-region deployments through VPC peering connections.
- Amazon EC2 user data scripts are not supported.
- In the Cisco ISE CFT that you configure, you define Volume Size in GB. However, AWS creates EBS storage volumes in Gibibyte (GiB). Therefore, when you enter 600 as the Volume Size in the Cisco ISE CFT, AWS creates 600 GiB (or 644.25 GB) of EBS volume.
- When you run the restore operation during a configuration data backup through the Cisco ISE CLI or GUI, do not include the `ADE-OS` parameter.
- A Cisco ISE primary server that is configured using a Cisco ISE AMI is automatically enrolled as a Cisco TrustSec AAA Server in Cisco ISE, with incorrect hostname and IP address values. You must enroll the Cisco ISE server with the correct details and delete the automatically added server from the list of Cisco TrustSec AAA servers. For information on configuring Cisco TrustSec AAA servers, see the topic "Configure Cisco TrustSec AAA Servers" in the Chapter "Segmentation" in the [Cisco ISE Administrator Guide](#).
- Userdata retrieval only works for Metadata V1 (IMDSv1); it does not work with V2.



---

**Note**

- The communication from on-prem devices to the VPC must be secure.
  - In Cisco ISE Release 3.1 Patch 3, Cisco ISE sends traffic to AWS Cloud through IP address 169.254.169.254 to obtain the instance details. This is to check if it is a cloud instance and can be ignored in on-prem deployments.
-

## Guidelines and Recommendations

### Supported AWS Regions for Catalyst Center VA

You can create a Catalyst Center VA in any of the following 15 supported AWS regions:

- ap-northeast-1 (Tokyo)
- ap-northeast-2 (Seoul)
- ap-south-1 (Mumbai)
- ap-southeast-1 (Singapore)
- ap-southeast-2 (Sydney)
- ca-central-1 (Canada)
- eu-central-1 (Frankfurt)
- eu-south-1 (Milan)
- eu-west-1 (Ireland)
- eu-west-2 (London)
- eu-west-3 (Paris)
- us-east-1 (Virginia)
- us-east-2 (Ohio)
- us-west-1 (N. California)
- us-west-2 (Oregon)

### Scale Numbers and Latency Recommendations

The latency between the Catalyst Center VA and a managed device should be ~100 milliseconds RTT or less. After 100 milliseconds, longer execution times could be experienced for certain events, such as inventory collection, provisioning, and image update (SWIM). Cisco does not support an RTT of more than 300 milliseconds. For more details on RTT and supported scale, see the [Cisco Catalyst Center Data Sheet](#).

**Table 3: Cisco Recommended RTT**

Source Device	Target Device	Maximum RTT Supported
Catalyst Center Node	Cisco ISE	300 milliseconds
Catalyst Center Node	Wireless Controller	200 milliseconds
Wireless Controller	Access Points	200 milliseconds (flex mode)
Wireless Controller	Cisco ISE	100 milliseconds

The following tables list the number of devices and site elements that Catalyst Center VA supports.

**Table 4: Deployment Scale Numbers**

Network Component	Maximum Number Supported
Endpoints	25,000
Device	1000
Access Points	4000
Site Elements	2500

**Table 5: Fabric-Specific Deployment Scale Numbers**

Network Component	Maximum Number Supported
Endpoint	25,000
Devices	2000
Access Points	3000
Site Elements	2500
<b>Per Fabric Site Scale</b>	
Fabric Nodes	500
Virtual Networks	64
IP Pools	100

### Supported Scale for Cisco ISE Hosted on AWS

The following table lists the VM specifications and associated AWS instance type according to the Cisco appliance model you use. For specific scale details, see the [Performance and Scalability Guide for Cisco Identity Services Engine](#) guide.

Virtual Environment	Cisco Appliance Model						
	Cisco SNS 3615	Cisco SNS 3595	Cisco SNS 3655	Cisco SNS 3695	Cisco SNS 3715	Cisco SNS 3755	Cisco SNS 3795
VM	16 vCPU 32 GB	16 vCPU 64 GB	24 vCPU 96 GB	24 vCPU 256 GB	24 vCPU 32 GB	40 vCPU 32 GB	40 vCPU 256GB
AWS	c5.4xlarge*	m5.4xlarge	c5.9xlarge* m5.8xlarge	m5.16xlarge	c5.9xlarge* m5.8xlarge	m5.16xlarge	m5.16xlarge

### Supported AMI Type and Scale for Catalyst 9800-CL Wireless Controller

For the first release of the Catalyst 9800-CL Wireless Controller on cloud, Cisco supports the following instance type:

- c5.xlarge: 4 vCPUs, 8 GB RAM, 8GB Disk with 1 vNIC



The allocated resources allow the instance to scale up to 1,000 APs and 10,000 clients.

## Security Considerations

Follow the security guidelines that are detailed in the [Cisco Catalyst Center Security Best Practices](#) guide.

## Guidelines for Integrating Cisco ISE on AWS with Catalyst Center on AWS

Cisco ISE on AWS can be integrated with Catalyst Center on AWS. To integrate them in the cloud, consider the following guidelines:

- Cisco ISE on AWS should be deployed in a separate VPC from the one reserved for Cisco Global Launchpad.
- You can use VPC or Transit Gateway (TGW) peering, depending on your environment.
- To connect the Catalyst Center on AWS with Cisco ISE on AWS using a VPC or TGW peering, add the required routing entries to the VPC or TGW peering route tables and to the route table that is attached to the subnet associated with Catalyst Center on AWS or Cisco ISE on AWS.
- In addition to basic accessibility rules, you need to allow the following inbound ports for attaching a security group to the Cisco ISE instance in the cloud:
  - For Catalyst Center on AWS and Cisco ISE on AWS integration, allow TCP ports 9060, 5222 and 8910.
  - For radius authentication, allow UDP ports 1812, 1813, and any other enabled ports.
  - For device administration via TACACS, allow TCP port 49.
  - For additional settings, such as Datagram Transport Layer Security (DTLS) or RADIUS Change of Authorization (CoA) made on Cisco ISE on AWS, allow the corresponding ports.

## Cost: Billable AWS Resources

Each case is a little different, but here are some drivers of cost for running Catalyst Center VA in your AWS environment:

1. **Region:** AWS costs can vary from region to region (for example, eu-east-1 vs. eu-central-1).
2. **Compute:** Reserved instance of r5a.8xlarge machine type is required to guarantee CPU and memory to the virtual machine.
3. **EBS Storage:** At least 4TB storage reserved with a minimum of 2500 IOPS and 180 Mbps or IOPS Bandwidth (gp3 EBS). EBS storage accrues charges based on the capacity used, even when an EC2 virtual machine is shut down or deleted. EBS storage needs to be deleted separately from the EC2 instance in order to stop charges. Backing up Catalyst Center on AWS may add to storage costs.
4. **Bandwidth:** AWS charges for outbound traffic from the AWS cloud to external destinations, such as backing up Catalyst Center to an offsite corporate data center and pushing a large number of software images from the cloud to on-premises devices. The overall cost depends on the your EDP pricing. These points are examples only, not an exhaustive list of cost drivers.

To model the cost, see [AWS Cost Calculator for Catalyst Center VA](#).

For an estimate of a configuration with the following main components, see the [AWS Pricing Calculator](#):

- **Catalyst Center on AWS:** Advance EC2 instance (r5a.8xlarge) with EBS Volume (gp3 SSD) and EBS Storage amount (4096 GB)
- **Cisco ISE:** Advance EC2 instance (c5.4xlarge) with EBS Volume (gp2 SSD) and EBS Storage amount (600 GB)
- **Catalyst 9800-CL Wireless Controller:** Advance EC2 instance (c5.xlarge) with EBS Volume (gp2 SSD) and EBS Storage amount (16 GB) (gp2)

- **Region:** us-east-1

## Deploy the Solution

### Deploy Catalyst Center VA

There are three ways to deploy Catalyst Center on AWS:

- **Automated Deployment:** Cisco Global Launchpad configures Catalyst Center on AWS. It helps you create the services and components that are required for the cloud infrastructure. For example, it helps create Virtual Private Clouds (VPCs), subnets, security groups, IPsec VPN tunnels, and gateways. Then the Catalyst Center Amazon Machine Image (AMI) deploys as an Amazon Elastic Compute Cloud (EC2) instance with the prescribed configuration in a new VPC along with subnets, transit gateways, and other essential resources like Amazon CloudWatch for monitoring, Amazon DynamoDB for state storage, and security groups.  
  
Cisco provides two methods for you to use Cisco Global Launchpad. You can download and install Cisco Global Launchpad on a local machine, or you can access Cisco Global Launchpad hosted by Cisco. Regardless of the method, Cisco Global Launchpad provides the tools you need to install and manage your Catalyst Center Virtual Appliance (VA).
- **Manual Deployment Using AWS CloudFormation:** You manually deploy the Catalyst Center AMI on your AWS. Instead of using the Cisco Global Launchpad deployment tool, you use AWS CloudFormation, which is a deployment tool within AWS. Then you manually configure Catalyst Center by creating the AWS infrastructure, establishing a VPN tunnel, and deploying your Catalyst Center VA.
- **Manual Deployment Using AWS Marketplace:** You manually deploy the Catalyst Center AMI on your AWS account. Instead of using the Cisco Global Launchpad deployment tool, you use AWS Marketplace, which is an online software store within AWS. You launch the software through the Amazon EC2 launch console, and then you manually deploy Catalyst Center by creating the AWS infrastructure, establishing a VPN tunnel, and configuring your Catalyst Center VA. Note that for this deployment method, only Launch through EC2 is supported. The other two launch options (Launch from Website and Copy to Service Catalog) are not supported.

If you have minimal experience with the AWS administration, the automated method with Cisco Global Launchpad offers the most streamlined, supportive installation process. If you are familiar with the AWS administration and have existing VPCs, the manual methods offer an alternative installation process.

Consider the benefits and drawbacks of each method with the following table:

Automated Deployment with Cisco Global Launchpad	Manual Deployment Using AWS CloudFormation	Manual Deployment Using AWS Marketplace
<ul style="list-style-type: none"> <li>• It helps create the AWS infrastructure, such as VPCs, subnets, security groups, IPsec VPN tunnels, and gateways, in your AWS account.</li> <li>• It automatically completes the installation of Catalyst Center.</li> <li>• It provides access to your VAs.</li> <li>• It provides manageability of your VAs.</li> <li>• Deployment time is approximately 1 to 1½ hours.</li> <li>• Automated alerts are sent to your Amazon CloudWatch dashboard.</li> <li>• You can choose between an automated cloud or enterprise Network File System (NFS) backup.</li> <li>• Any manual alterations made to the automated configuration workflow of Catalyst Center on AWS can cause conflict with the automated deployment.</li> </ul>	<ul style="list-style-type: none"> <li>• The AWS CloudFormation file is required to create a Catalyst Center VA on AWS.</li> <li>• You create the AWS infrastructure, such as VPCs, subnets, and security groups, in your AWS account.</li> <li>• You establish a VPN tunnel.</li> <li>• You deploy Catalyst Center.</li> <li>• Deployment time is approximately from a few hours to a few days.</li> <li>• You need to manually configure monitoring through the AWS console.</li> <li>• You can only configure an on-premises NFS for backups.</li> </ul>	<ul style="list-style-type: none"> <li>• The AWS CloudFormation file is <i>not</i> required to create a Catalyst Center VA on AWS.</li> <li>• You create the AWS infrastructure, such as VPCs, subnets, and security groups, in your AWS account.</li> <li>• You establish a VPN tunnel.</li> <li>• You deploy Catalyst Center.</li> <li>• Deployment time is approximately from a few hours to a few days.</li> <li>• You need to manually configure monitoring through the AWS console.</li> <li>• You can only configure an on-premises NFS for backups.</li> </ul>

## Use Cisco Global Launchpad to Automatically Deploy Catalyst Center on AWS

You provide Cisco Global Launchpad with the needed details to create the AWS infrastructure in your AWS account, which includes a VPC, an IPsec VPN tunnel, gateways, subnets, and security groups. As a result, Cisco Global Launchpad deploys the Catalyst Center AMI as an Amazon EC2 instance with the prescribed configuration in a separate VPC. The configuration includes the subnets, transit gateways, and other essential resources like AWS CloudFormation for monitoring, Amazon DynamoDB for state storage, and security groups.

Using Cisco Global Launchpad, you can also access and manage your VAs, as well as manage the user settings. For information, see the [Cisco Global Launchpad Administrator Guide](#).

### Automated Deployment Workflow

To deploy Catalyst Center on AWS using the automated method, follow these high-level steps:

1. Meet the prerequisites. See [Prerequisites for Automated Deployment, on page 8](#).
2. (Optional) Integrate Cisco ISE and your Catalyst Center on AWS together. See [Guidelines for Integrating Cisco ISE on AWS with Catalyst Center on AWS, on page 26](#).
3. Install Cisco Global Launchpad or access Cisco Global Launchpad hosted by Cisco. See [Install Cisco Global Launchpad, on page 29](#) or [Access Hosted Cisco Global Launchpad, on page 30](#).
4. Create a new VA pod to contain your Catalyst Center instance. See [Create a New VA Pod, on page 50](#).

5. If you're using an existing TGW and existing attachments, such as a VPC, as your preferred on-premises connectivity option, manually configure the TGW routing table on AWS and add the routing configuration to your existing Customer Gateway (CGW). See [Manually Configure Routing on Your Existing Gateway or Direct Connect Attachment, on page 61](#).
6. Create your new instance of Catalyst Center. See [Create a New Catalyst Center, on page 62](#).
7. (Optional) If necessary, troubleshoot any issues that arise during the deployment. See [Troubleshoot the Deployment for Cisco Global Launchpad, on page 107](#).
8. Manage your Catalyst Center VA using Cisco Global Launchpad. See the [Cisco Global Launchpad Administrator Guide](#).

## Install Cisco Global Launchpad

This procedure shows you how to install Cisco Global Launchpad using Docker containers for the server and client applications.

### Before you begin

Make sure that you have Docker CE installed on your machine.

### Procedure

**Step 1** Go to the [Cisco Software Download](#) site and download the following files:

- Launchpad-desktop-client-2.0.0.tar.gz
- Launchpad-desktop-server-2.0.0.tar.gz

**Step 2** Verify that the TAR file is genuine and from Cisco.

**Step 3** Load the Docker images from the downloaded files:

```
docker load < Launchpad-desktop-client-2.0.0.tar.gz
```

```
docker load < Launchpad-desktop-server-2.0.0.tar.gz
```

**Step 4** Use the **docker images** command to display a list of the Docker images in the repository and verify that you have the latest copies of the server and client applications. In the files, the **TAG** column should display the numbers starting with **2.0**.

For example:

```
$ docker images
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
6d69ed844d37	466518672524.dkr.ecr.us-west-2.amazonaws.com/platform-ui/valaunchpad-client-docker:2.0.2	"docker-entrypoint.s..."	18 hours ago	Up 18 hours	0.0.0.0:90->80/tcp	client
811cca2a0b86	466518672524.dkr.ecr.us-west-2.amazonaws.com/val/valaunchpad-server:2.0.2	"/usr/bin/dumb-init ..."	18 hours ago	Up 18 hours	0.0.0.0:9090->8080/tcp	server

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
466518672524.dkr.ecr.us-west-2.amazonaws.com/val/valaunchpad-server	2.0.2	7a8ef127dd8d	About an hour ago	574MB
466518672524.dkr.ecr.us-west-2.amazonaws.com/platform-ui/valaunchpad-client-docker	2.0.2	09357ca299b1	2 hours ago	2.01GB

**Step 5** Run the server application:

```
docker run -d -p <server-port-number>:8080 -e DEBUG=true --name server <server_image_id>
```

For example:

```
$ docker run -d -p 9090:8080 -e DEBUG=true --name server 7a8ef127dd8d
```

**Step 6** Run the client application:

```
docker run -d -p <client-port-number>:80 -e CHOKIDAR_USEPOLLING=true -e  
REACT_APP_API_URL=http://localhost:<server-port-number> --name client <client_image_id>
```

For example:

```
$ docker run -d -p 90:80 -e CHOKIDAR_USEPOLLING=true  
-e REACT_APP_API_URL=http://localhost:9090 --name client 09357ca299b1
```

#### Note

Make sure that the exposed server port number and the REACT\_APP\_API\_URL port number are the same. In the preceding steps, port number 9090 is used in both examples.

**Step 7** Use the **docker ps -a** command to verify that the server and client applications are running. The **STATUS** column should show that the applications are up.

For example:

```
$ docker ps -a
```

REPOSITORY	TAG	IMAGE ID
466518672524.dkr.ecr.us-west-2.amazonaws.com/val/valalaunchpad-server	2.0.0	7a8ef127dd8d
466518672524.dkr.ecr.us-west-2.amazonaws.com/platform-ui/valalaunchpad-client-docker	2.0.0	09357ca299b1

#### Note

If you encounter an issue while running the server or client applications, see [Troubleshoot Docker Errors, on page 107](#).

**Step 8** Verify that the server application is accessible by entering the URL in the following format:

```
http://<localhost>:<server-port-number>/api/valalaunchpad/aws/v1/api-docs/
```

For example:

```
http://192.0.2.2:9090/api/valalaunchpad/aws/v1/api-docs/
```

The APIs being used for the Catalyst Center VA are displayed in the window.

**Step 9** Verify that the client application is accessible by entering the URL in the following format:

```
http://<localhost>:<client-port-number>/valalaunchpad
```

For example:

```
http://192.0.2.1:90/valalaunchpad
```

The Cisco Global Launchpad login window is displayed.

#### Note

It can take a few minutes to load the Cisco Global Launchpad login window while the client and server applications load the artifacts.

---

## Access Hosted Cisco Global Launchpad

You can access Cisco Global Launchpad through Cisco DNA Portal.

If you are new to Cisco DNA Portal, you must create a Cisco account and a Cisco DNA Portal account. Then you can log in to Cisco DNA Portal to access Cisco Global Launchpad.



If you are familiar with Cisco DNA Portal and have a Cisco account and a Cisco DNA Portal account, you can directly log in to Cisco DNA Portal to access Cisco Global Launchpad.

### *Create a Cisco Account*

To access Cisco Global Launchpad through Cisco DNA Portal, you must create a Cisco account first.

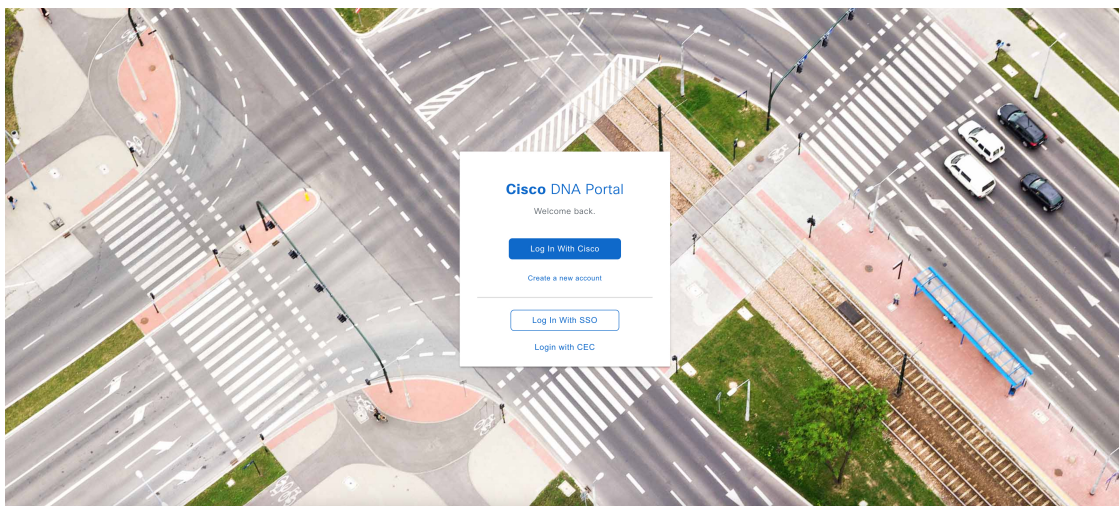
## **Procedure**

---

**Step 1** In your browser, enter:

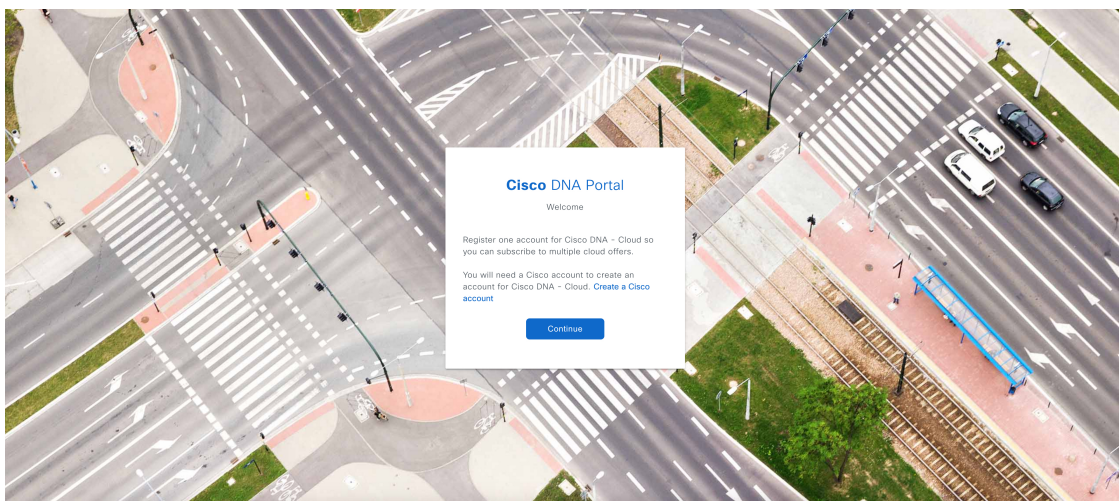
**`dna.cisco.com`**

The **Cisco DNA Portal** login window is displayed.





**Step 2** Click **Create a new account**.

**Step 3** On the **Cisco DNA Portal Welcome** window, click **Create a Cisco account**.



**Step 4** On the **Create Account** window, complete the required fields and then click **Register**.


---

### Create Account

\* Indicates required field

Email \*

Password \*

First name \*

Last name \*

Country or region \*

Please select \*

By clicking Register, I confirm that I have read and agree to the [Cisco Online Privacy Statement](#) and the [Cisco Web Site Terms and Conditions](#).

**Register**

[Back to log in](#)

**Step 5** Verify your account by going to the email that you registered your account with and clicking **Activate Account**.

Hi [Name],

Welcome to Cisco!

Please click the button to activate your account.

**Activate Account**

Expires in 7 days.

After activating your account, you can:

- [Login](#) with your email and password.
- Manage your [Cisco account profile](#) and request access to Cisco applications and services.
- [Become a customer](#) by associating a contract number or bill-to ID to your account or [order services](#) directly through our global network of certified partners.
- [Become a partner](#) by associating your account with a partner company or [register your company](#) as a partner.
  - Access [supply chain](#) tools and resources.

Visit [help](#) for login, password, and account information.  
[Contact support](#) for help accessing your account.

## Create a Cisco DNA Portal Account

To access Cisco Global Launchpad through Cisco DNA Portal, you must create a Cisco DNA Portal account.

### Before you begin

Make sure that you have a Cisco account. For more information, see [Create a Cisco Account, on page 31](#).

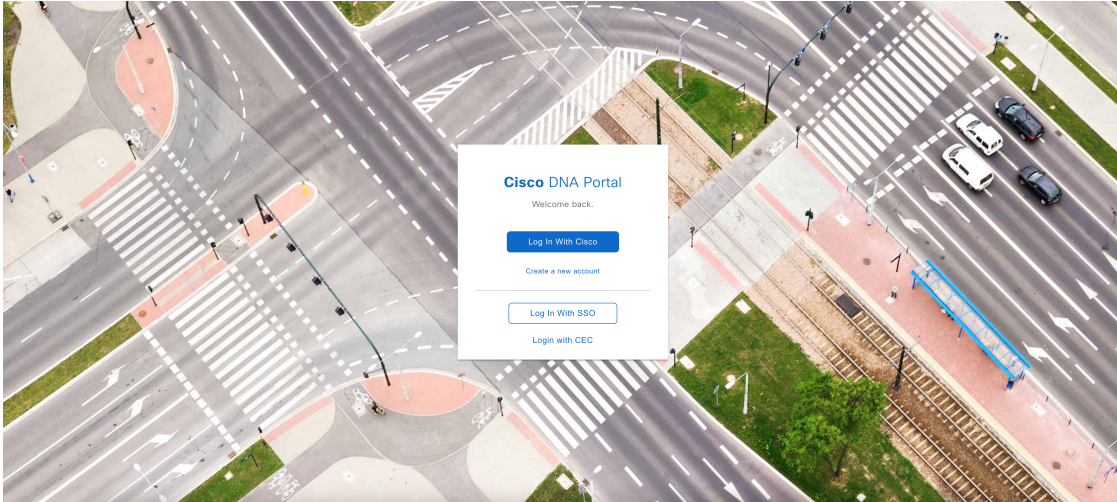


## Procedure

**Step 1** In your browser, enter:

**dna.cisco.com**

The **Cisco DNA Portal** login window is displayed.



**Step 2** Click **Log In With Cisco**.

**Step 3** Enter your Cisco account's email in the **Email** field, and click **Next**.

A screenshot of the Cisco DNA Portal login page. At the top right is a globe icon with 'US' and 'EN' options. Below it is the Cisco logo. The main section is titled 'Log in' and contains an 'Email' label above a text input field. Below the input field is a large blue 'Next' button. Underneath the button are three links: 'Unlock account?', 'Forgot email address?', and 'Help'. At the bottom of the form, it says 'Don't have an account? Sign up'.

**Step 4** Enter your Cisco account's password in the **Password** field.

< Back

US  
EN

**cisco**

Log in

Email

Password

Log in

[Forgot password?](#)

[Unlock account?](#)

[Help](#)

Don't have an account? [Sign up](#)

[Back to log in](#)

**Step 5** Click **Log in**.

**Step 6** On the **Cisco DNA Portal Welcome** window, enter the name of your organization or team in the **Name your account** field. Then click **Continue**.

**Cisco DNA Portal**

Welcome, [redacted]

What's the name of your organization, company, or team?

Name your account\*

Ex. Hearst or Hearst Construction

Cancel Continue

**Step 7** On the **Cisco DNA Portal Confirm CCO Profile** window, do the following:

- Verify the details are correct.
- After reading, acknowledging, and agreeing with the conditions, check the check box.
- Click **Create Account**.

## Cisco DNA Portal

Confirm CCO Profile

Confirm that this is the Cisco profile you would like to register with, or [login to a different CCO](#).

Your Name   
Your Email   
Organization Name SELF

☐ I agree that Cisco DNA Portal is governed by the [Cisco End User License Agreement](#) and that I have read and acknowledge the [Cisco Privacy Statement](#).

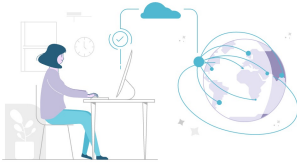
*Note: If you do not have the authority to bind your company and its affiliates, or if you do not agree with the terms of the Cisco Universal Cloud Agreement, do not check this box.*

Create Account

After successfully creating an account, the **Cisco DNA Portal** home page is displayed.

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Select an offer below and enjoy your trip with Cisco DNA Portal.



Offers

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Application Experience enables Cisco DNA Center users to integrate with AppX cloud service to collect quality metrics and to enrich Cisco DNA Center application dashboards to get better visibility on the network.

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Cisco DNA Center Cloud provides complete, cloud-based lifecycle management of Cisco Catalyst 9300, 9300, and 9500 Series Switches and Cisco Catalyst 9100 Series Access Points in Embedded Wireless Controller (EWC) mode. Network administrators can manage their wired and wireless network infrastructure at the site-level using a secure cloud user interface.

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SAN Insights Discovery as a SaaS offering on DNAC Cloud. This is a much-awaited pre-sales tool for Cisco Sales, Account team and Partners. It provides a comprehensive health check of any customer SAN fabric. SID works for existing Brocade and Cisco SAN fabrics. SID helps the Cisco team to better understand what the customer has and how Cisco can help moving forward.

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**Plug and Play as a Service**

Plug and Play as a service enables users to securely day-0 onboard Catalyst 9K family of devices. During onboarding process you can upgrade image and deploy configuration to the device. After onboarding you can redirect the device to be managed by DNA controller.

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### Log In to the Cisco DNA Portal with Cisco

To access Cisco Global Launchpad through Cisco DNA Portal, you must log in to Cisco DNA Portal.

### Before you begin

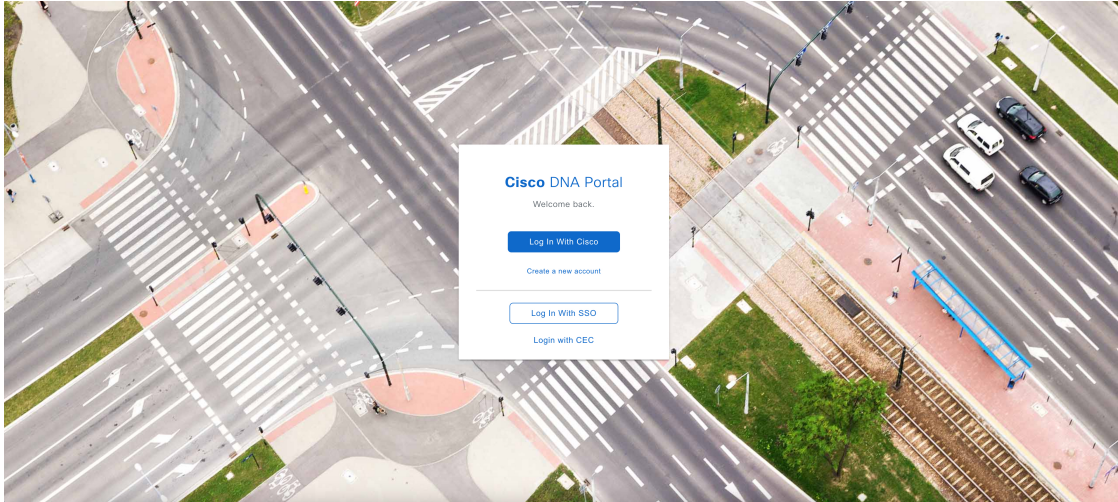
Make sure that you have a Cisco account and a Cisco DNA Portal account. For more information, see [Create a Cisco Account, on page 31](#) and [Create a Cisco DNA Portal Account, on page 32](#).

## Procedure

**Step 1** In your browser, enter:

**dna.cisco.com**

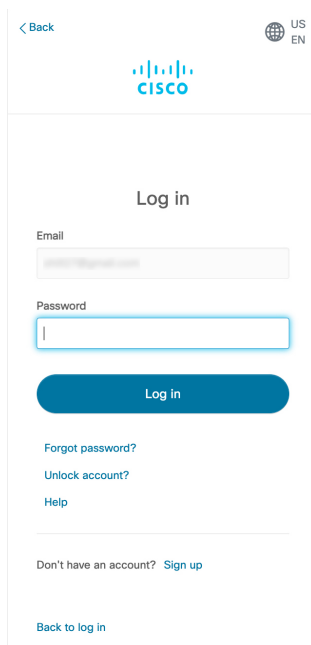
The **Cisco DNA Portal** login window is displayed.



**Step 2** Click **Log In With Cisco**.

**Step 3** Enter your Cisco account's email in the **Email** field, and click **Next**.

**Step 4** Enter your Cisco account's password in the **Password** field.

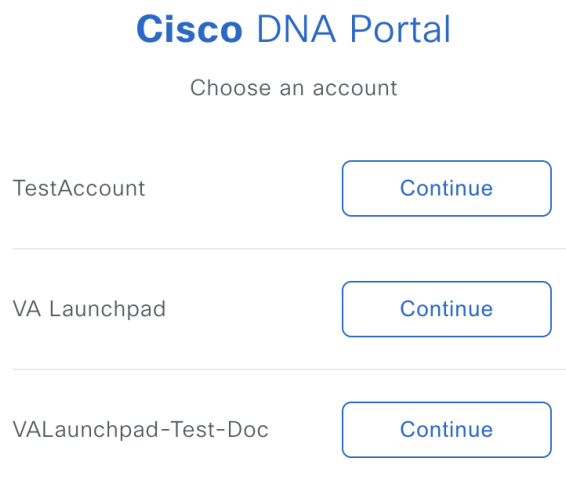


The screenshot shows the Cisco DNA Portal login interface. At the top left is a '< Back' link. In the top center is the Cisco logo. At the top right is a globe icon with 'US' and 'EN' labels. Below the header, the text 'Log in' is centered. Underneath, there are two input fields: 'Email' and 'Password'. The 'Email' field contains the text 'test@va.com'. Below the password field is a blue 'Log in' button. Under the button are three links: 'Forgot password?', 'Unlock account?', and 'Help'. At the bottom of the form area, there is a link 'Don't have an account? Sign up' and a link 'Back to log in'.

**Step 5** Click **Log in**.

If you have only one Cisco DNA Portal account, the **Cisco DNA Portal** home page is displayed.

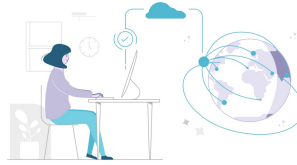
**Step 6** (Optional) If you have multiple Cisco DNA Portal accounts, choose the account that you want to log in to by clicking the account's adjacent **Continue** button.



The screenshot shows the Cisco DNA Portal account selection page. The title 'Cisco DNA Portal' is at the top in blue. Below it is the subtitle 'Choose an account'. There are three rows of account options, each with a text label on the left and a 'Continue' button on the right. The first row is 'TestAccount', the second is 'VA Launchpad', and the third is 'VALaunchpad-Test-Doc'.

The **Cisco DNA Portal** home page is displayed.

Subscribe and maintain your offers more efficiently with Cisco DNA Portal. Select an offer below and enjoy your trip with Cisco DNA Portal.



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## Log In to Cisco Global Launchpad

The Cisco Global Launchpad supports the following authentication methods:

- [Log In Using IAM, on page 38](#): This method uses the credentials from your Cisco account.
- [Log In Using Federated Identity, on page 41](#): Federated access ensures that an identity provider (IdP), such as your organization, is responsible for user authentication and sending information to Cisco Global Launchpad to help determine the scope of resource access to be granted after login. For the first-time login, the user will have an admin user role, which creates the CiscoDNACenter role. The admin can assign this role to subsequent users. The CiscoDNACenter role has the same permissions as the CiscoDNACenter user group. For details about the permissions granted by this role, see the [Cisco Catalyst Center on AWS Deployment Guide](#).

You can use the saml2aws CLI or the AWS CLI to generate tokens to log in to Cisco Global Launchpad as a federated user. For information, see the following topics:

- [Generate Federated User Credentials Using saml2aws, on page 44](#)
- [Generate Federated User Credential Using AWS CLI, on page 45](#)



**Note** Cisco Global Launchpad does not store your AWS credentials.

### Log In Using IAM

This procedure shows you how to log in to Cisco Global Launchpad using identity and access management (IAM). If your company uses MFA, you can choose to log in using this method.



**Note** Do not open the application in more than one browser tab, in multiple browser windows, or in multiple browser applications at the same time.

## Before you begin

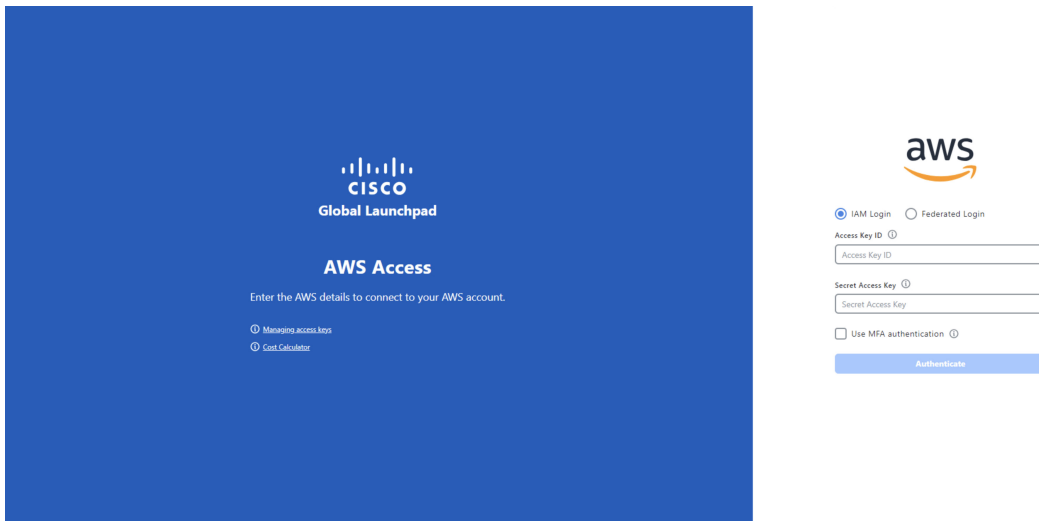
Make sure the following requirements are met:

- Your AWS account has the administrator access permission assigned to it.
- Cisco Global Launchpad is installed or you have access to the hosted Cisco Global Launchpad.
- You have your AWS Access Key ID and Secret Access Key on hand.
- If your company uses multifactor authentication (MFA), MFA needs to be set up in AWS before you log in. For information, see the [Enabling a virtual multi-factor authentication \(MFA\) device \(console\)](#) topic in the AWS documentation.

## Procedure

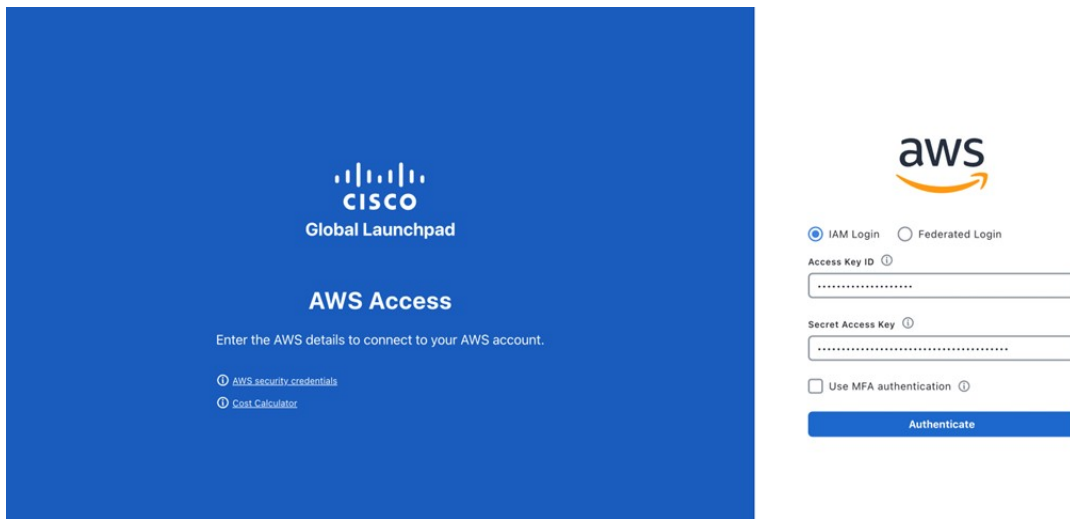
---

**Step 1** Under the AWS logo, click the **IAM Login** radio button.

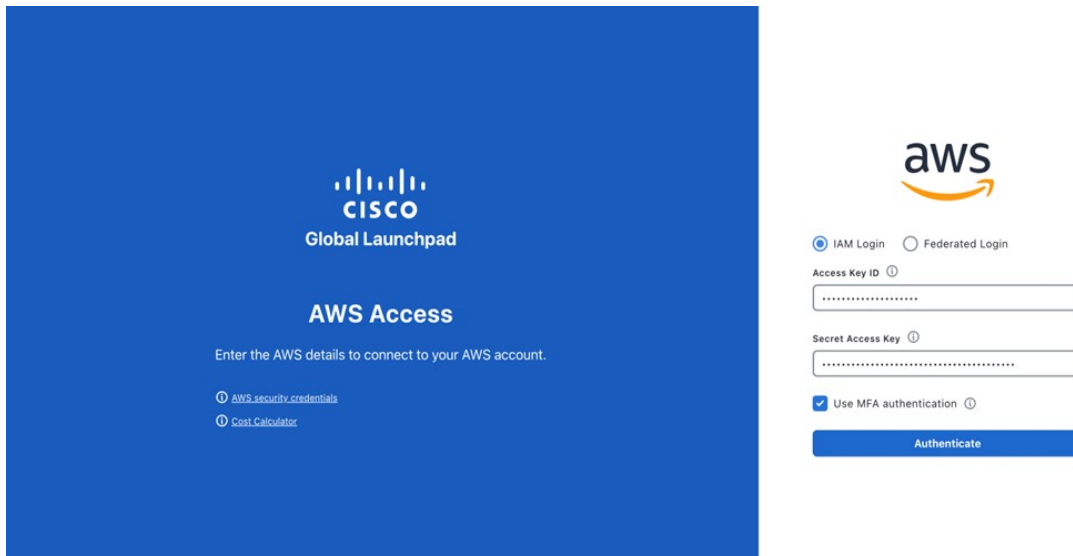


**Step 2** Enter your credentials in the fields.

For information about how to get an Access Key ID and Secret Access Key, see the AWS [Managing access keys](#) topic in the *AWS Identity and Access Management User Guide* on the AWS website.



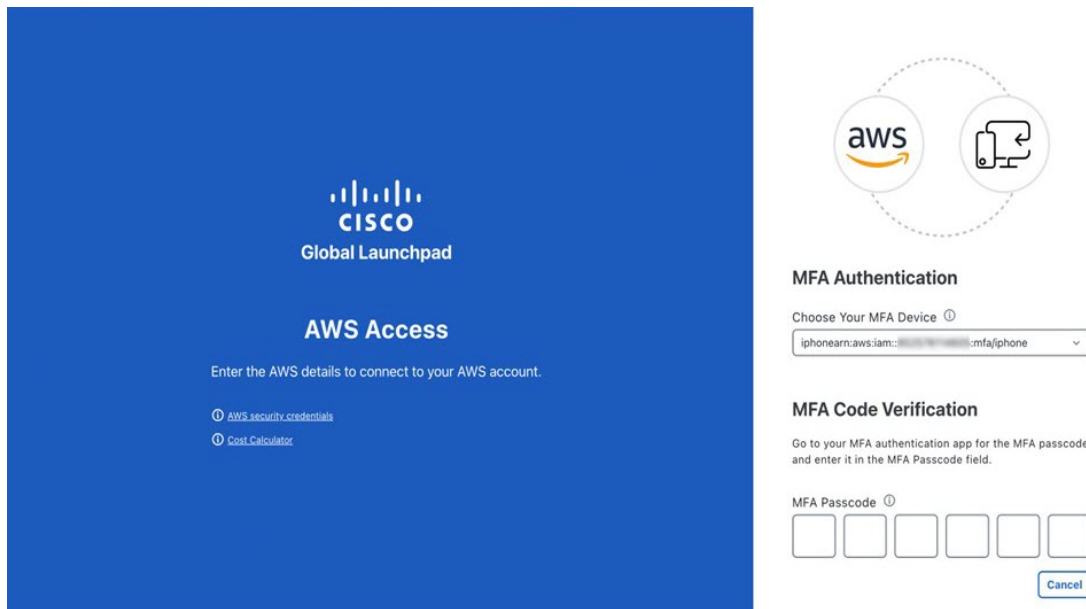
**Step 3** (Optional) If your company uses MFA, click the **Use MFA authentication** check box.



**Step 4** Click **Authenticate**.

If you are logging in with MFA, choose your MFA device from the drop-down list and enter your MFA passcode.





After logging in successfully, the **Login Status** screen is displayed. This page displays the statuses of various operations that the system performs when you log in. Then the **Dashboard** pane is displayed and the us-east-1 region is selected by default.

**Step 5** If you're prompted to update the region version, follow the prompts to complete the update.

**Step 6** If you encounter any login errors, you need to resolve them and log in again.

### Log In Using Federated Identity

This procedure shows you how to log in to Cisco Global Launchpad using a federated identity.



#### Note

Do not open the application in more than one browser tab, in multiple browser windows, or in multiple browser applications at the same time.

### Before you begin

Make sure the following requirements are met:

- Your AWS account has the administrator access permission assigned to it.
- Cisco Global Launchpad is installed or you have access to the hosted Cisco Global Launchpad.
- You have your AWS Account ID, Access Key ID, and Secret Access Key on hand. For information about how to obtain these credentials, see [Generate Federated User Credentials Using saml2aws, on page 44](#) or [Generate Federated User Credential Using AWS CLI, on page 45](#).

### Procedure

## Step 1

From a browser window, do one of the following:

- If you installed Cisco Global Launchpad locally, enter the Cisco Global Launchpad URL in the following format:

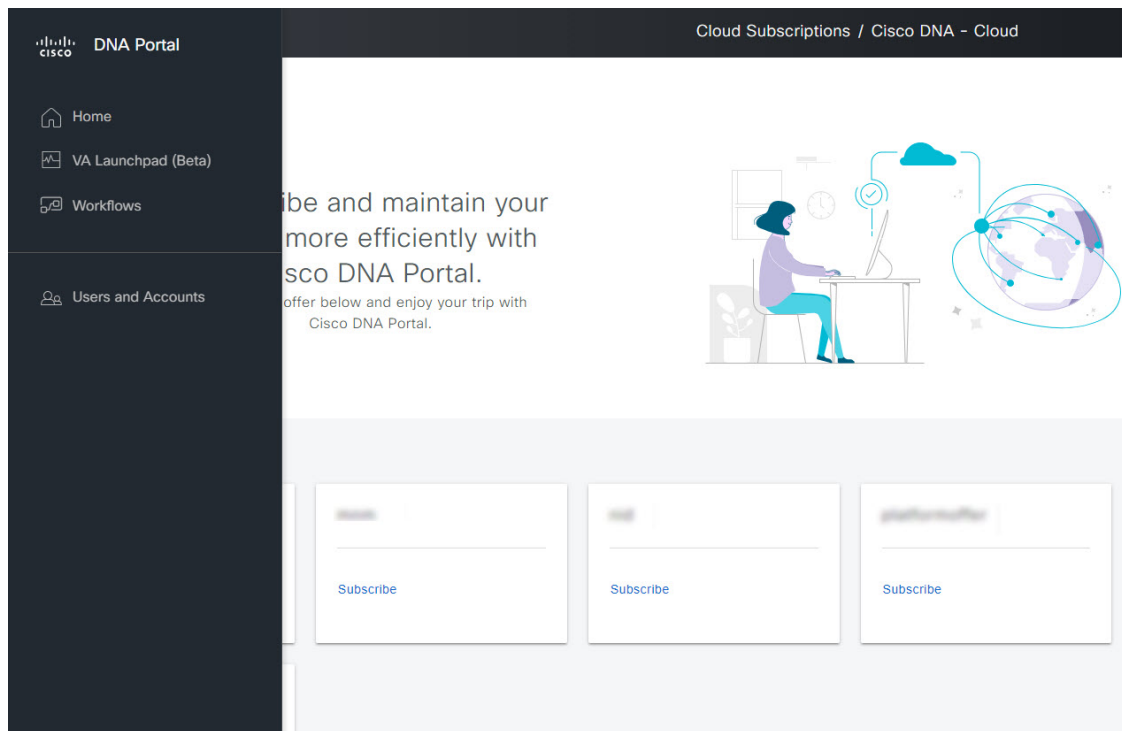
**http://<localhost>:<client-port-number>/valaunchpad**

For example:

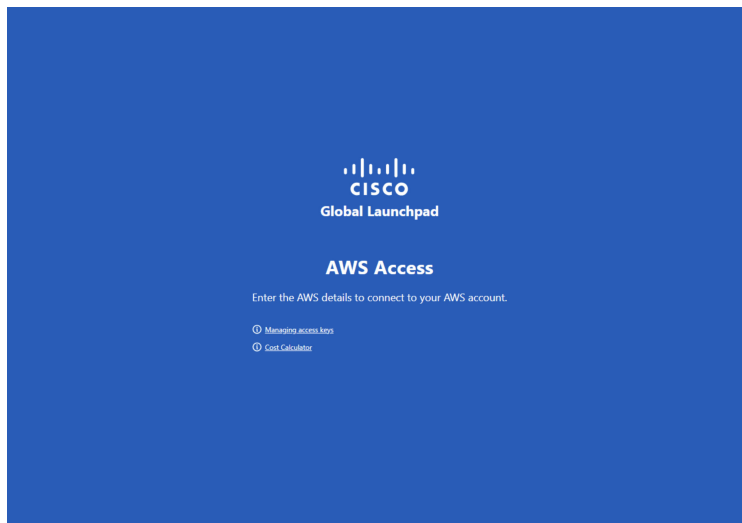
**http://192.0.2.1:90/valaunchpad**

- If you are accessing the hosted Cisco Global Launchpad, enter **dna.cisco.com** and follow the on-screen prompts to log in. (For more information, see [Log In to the Cisco DNA Portal with Cisco, on page 35.](#))

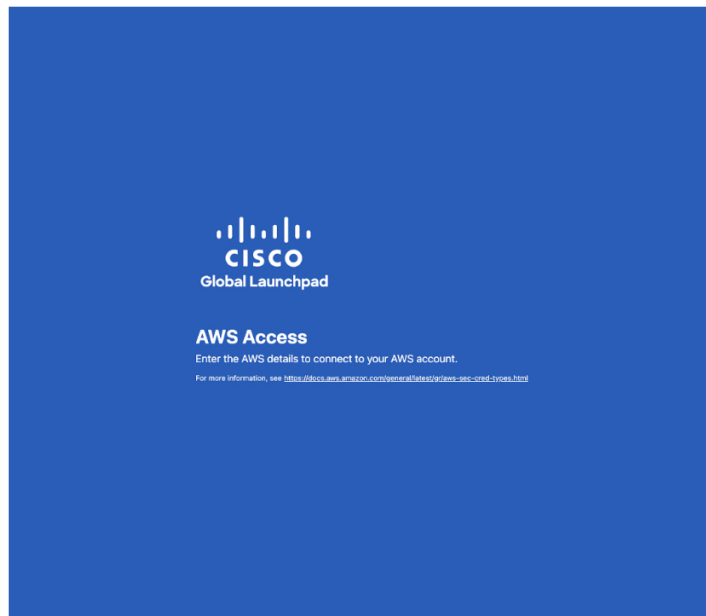
From the **Cisco DNA Portal** home page, click the menu icon and choose **VA Launchpad**.



The AWS login window is displayed.



**Step 2** Under the AWS logo, click the **Federated Login** radio button.



**Step 3** Enter your credentials in the fields.

For more information, see [Generate Federated User Credentials Using saml2aws](#), on page 44 or [Generate Federated User Credential Using AWS CLI](#), on page 45.

**Step 4** Click **Authenticate**.

After you log in successfully, the **Login Status** screen is displayed. This page displays the statuses of various operations that the system performs when you log in. Then the **Dashboard** pane is displayed and the us-east-1 region is selected by default.

**Step 5** If you're prompted to update the region version, follow the prompts to complete the update.

**Step 6** If you encounter any login errors, you must resolve them and log in again.

---

## Generate Federated User Credentials Using saml2aws

You can generate temporary AWS credentials using a Command Line Interface (CLI) tool and use the generated credentials to log in to Cisco Global Launchpad.

### Procedure

---

**Step 1** From the CLI, install saml2aws. For information, see the detailed instructions on [Github](#).

**Step 2** Verify the installation by entering **saml2aws**.

If the installation is successful, the following output is displayed:

```
[redacted] ~ % saml2aws
usage: saml2aws [<flags>] <command> [<args> ...]

A command line tool to help with SAML access to the AWS token service.

Flags:
  --help                Show context-sensitive help (also try --help-long
                        and --help-man).
  --version             Show application version.
  --verbose             Enable verbose logging
  --quiet              silences logs
  -i, --provider=PROVIDER This flag is obsolete. See:
                        https://github.com/Versent/saml2aws#configuring-i
dp-accounts
  --config=CONFIG       Path/filename of saml2aws config file (env:
                        SAML2AWS_CONFIGFILE)
  -a, --idp-account="default" The name of the configured IDP account. (env:
                        SAML2AWS_IDP_ACCOUNT)
  --idp-provider=IDP-PROVIDER The configured IDP provider. (env:
                        SAML2AWS_IDP_PROVIDER)
  --mfa=MFA             The name of the mfa. (env: SAML2AWS_MFA)
  -s, --skip-verify     Skip verification of server certificate. (env:
```

**Step 3** Configure your account.

- Enter **saml2aws configure**.
- At the **Please choose a provider** prompt, use the up- or down-arrow keys to choose a provider or enter the provider name. When done, press **Enter**.
- At the **AWS Profile** prompt, press **Enter** to use the default AWS profile.
- At the **URL** prompt, enter the URL of your identity provider (IdP) and press **Enter**.

**Note**

You can get this information from your IdP.

- At the prompts, enter your username and password and press **Enter**.

**Step 4** Generate your federated credentials.

- Enter **saml2aws login**.
- At the prompts, enter your username and password.
- At the prompt, select either the **Admin** or **CiscoDNACenter** role and press **Enter**.

**Note**

Ensure that the tokens created for these roles have a minimum expiry of 180 minutes (3 hours).

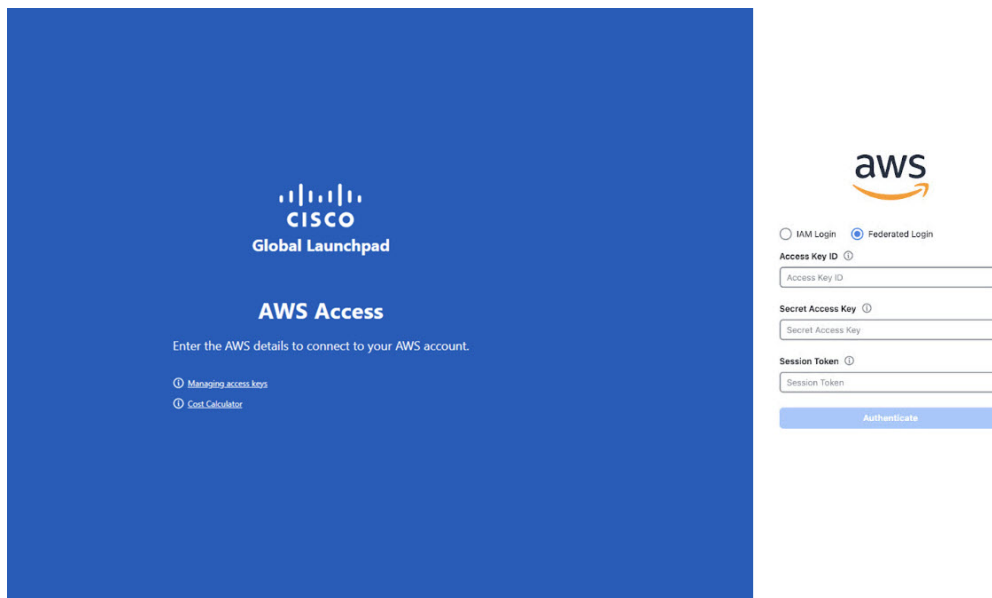
Your credentials are generated and stored in `~/aws/credentials`.

**Step 5** Download the credentials by entering **saml2aws** script.

**Step 6** Note the values of the following parameters as you will use them to log in to Cisco Global Launchpad as a federated user:

- `AWS_ACCESS_KEY_ID`
- `AWS_SECRET_ACCESS_KEY`
- `AWS_SESSION_TOKEN`

**Step 7** On the Cisco Global Launchpad login window, select **Federated Login** and enter the generated credentials in the corresponding fields.



---

## Generate Federated User Credential Using AWS CLI

You can generate temporary AWS credentials using the AWS Command Line Interface (CLI) and use these credentials to log in to Cisco Global Launchpad.

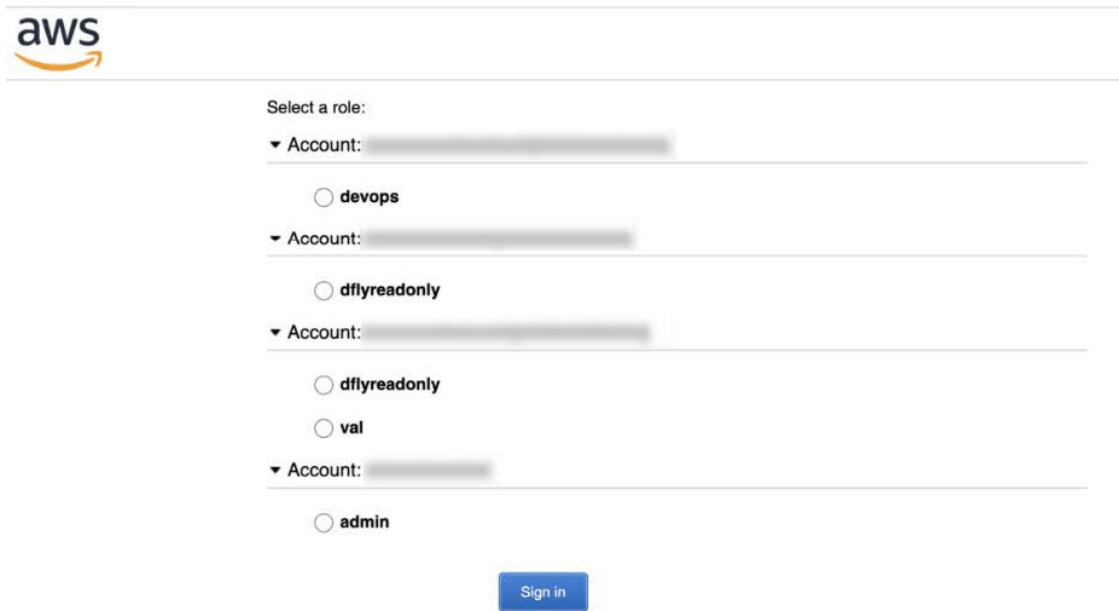
### Procedure

---

**Step 1** In a browser window, navigate to the **AWS Single Sign On (SSO)/Active Directory (AD)** window.

**Step 2** In the **AWS Single Sign On (SSO)/Active Directory (AD)** window, click the AWS Console link.

The following window is displayed.

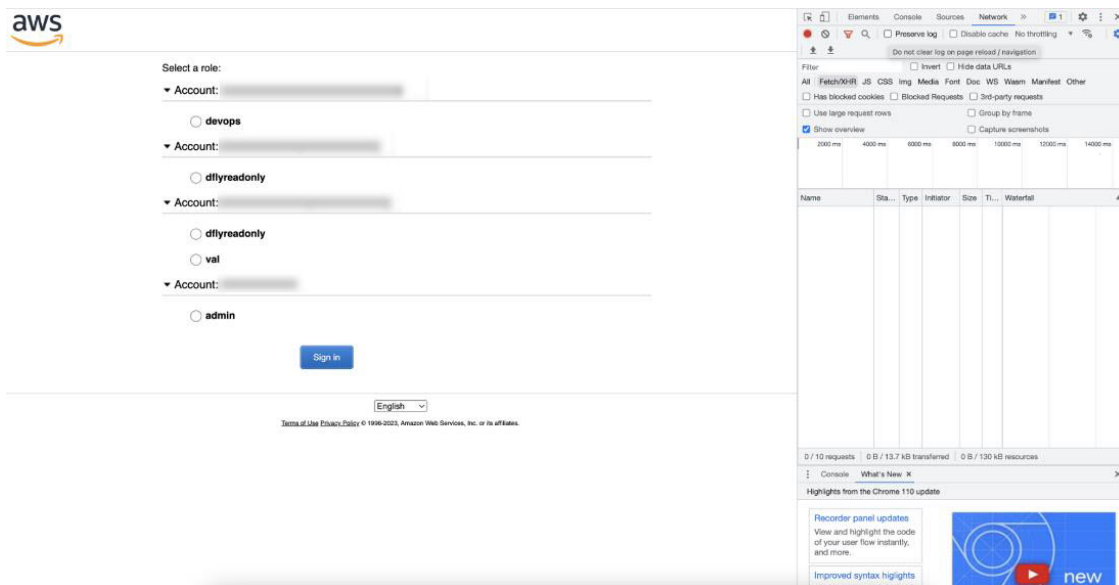


**Step 3** Right-click anywhere in the window, and from the drop-down menu, choose **Inspect Element** or **Inspect** (depending on the browser).

**Note**

You can also press the **F12** key to open the **Developer Tools** panel.

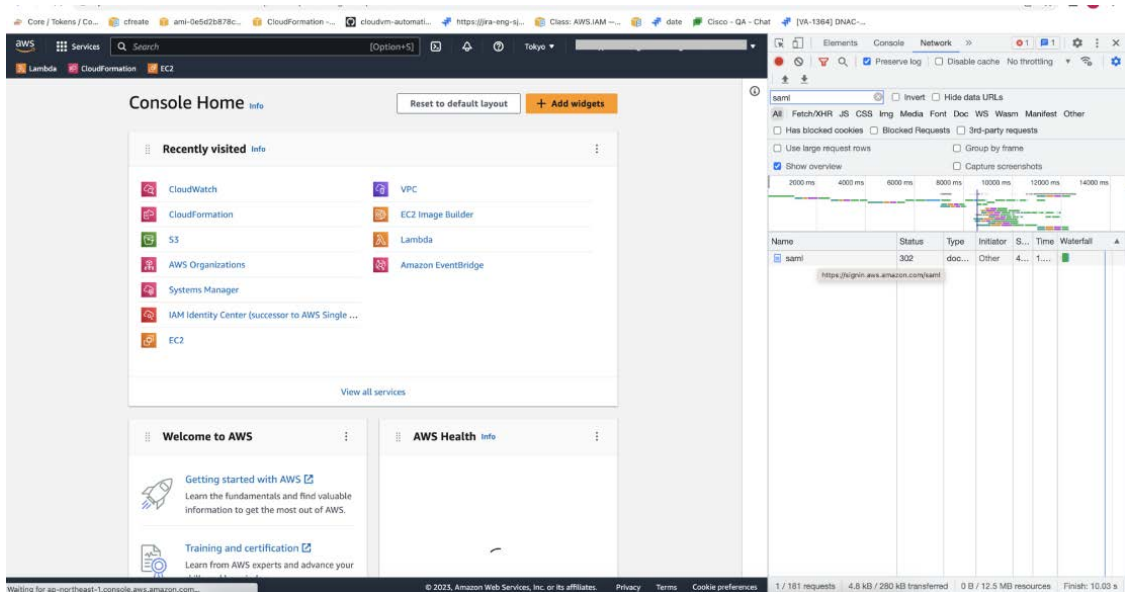
The **Developer Tools** panel is displayed, similar to the following window.



**Step 4** In the **Developer Tools** panel, click the **Network** tab and check the **Preserve Log** check box. (This option can be found on the tool panel, right beside the Magnifying Glass icon.)

**Step 5** In the **AWS Console**, click **Sign In**.

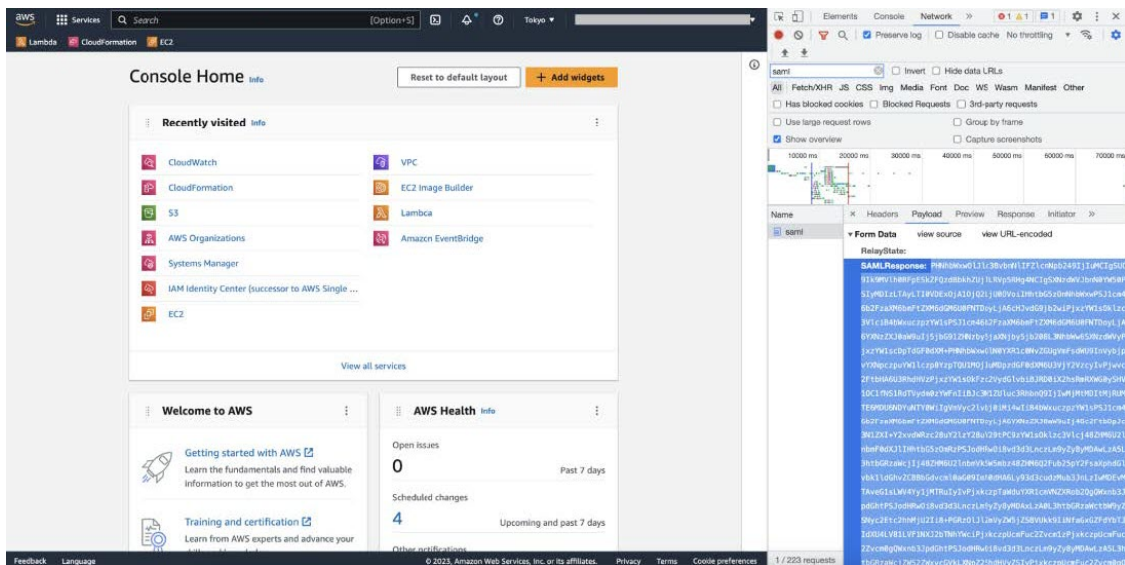
**Step 6** In the **Developer Tools** panel, filter the required API calls by entering **saml** in the **Filter** field.



**Step 7** Click the API request named **saml**.

**Step 8** Click the **Payload** tab.

The saml API response is displayed under the Form Data tab.

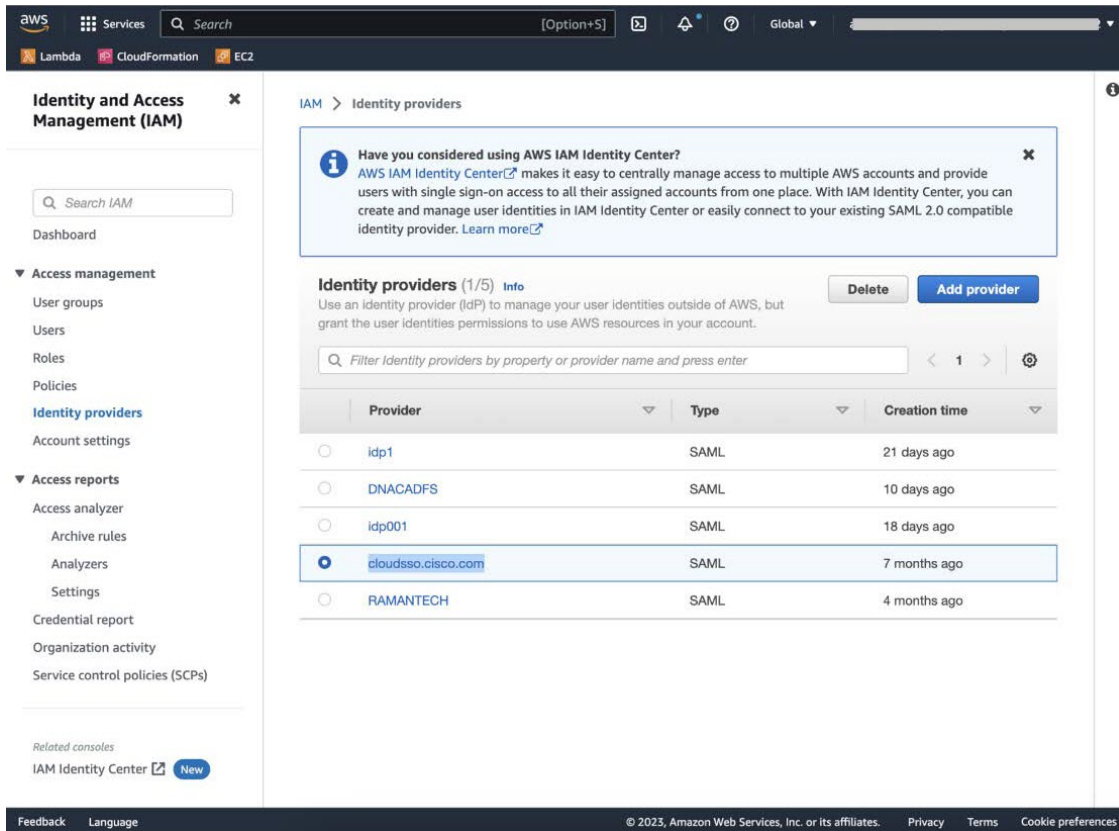


**Step 9** Copy the value of the SAML response.

#### Note

Be sure to copy the entire value, but do not copy the SAMLResponse field name.

**Step 10** Navigate to your AWS Console, choose **IAM > Access Management > Identity Providers**, and select your IdP.



### Step 11

Obtain the following details for your IdP:

- Role assigned to the IdP
- Amazon Resource Name (ARN) of the IdP

### Step 12

From the AWS CLI, enter the following command:

```
aws sts assume-role-with-saml --role-arn <Role-Arn> --principal-arn <IDP-Arn> --saml-assertion <SAML response>
```

The variables in this command refer to the values obtained earlier, as follows:

- **<Role-Arn>**: Role assigned to the IdP, obtained in Step 11.
- **<IDP-Arn>**: Amazon Resource Name (ARN) of the IdP, obtained in Step 11.
- **<SAML response>**: Value of the SAML response, obtained in Step 9.

For example:



```
aws sts assume-role-with-saml --role-arn
arn:aws:iam::059356109852:role/ADFS-AWS-ADMIN --principal-arn
arn:aws:iam::059356109852:saml-provider/cloudsso.cisco.com --saml-
assertion
MIIC6jCCAdKgAwIBAgIQPP5He1K6QoZPQrIuPjzCUTANBgkqhkiG9w0BAQsFADAxMS8wLQY
DVQDEyZBREZTIFNpZ25pbmcgLSBFQzJBTUFaLU1IMUYzQ0Quc3NvLmNvbTAeFw0yMzAyMDY
wNTUyNDJaFw0yNDYyMDYwNTUNDJAMDExLzAtBgNVBAMTJkFERlMgU2lnbm1uZyAtIEVDMkF
NQVotTUgXRjNDRC5zc28uY29tMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAs1
Sx/rQJ/wAOJ6ZRBbgYkfe7TMPsnOTqX0C+dh+yQ30+X9xqRDPVKuSDHrv72bsGwk/
2VRdb38xdVueuFYRavyVPzjsSF95fkjC3qFDN+R5Dk1Cnba7GT6i+HGfacEpL8Vqd3jzNgh
guskM1OrHDKDv5ksNMxppHIDPlVhyRCdKEtP1PG5gBftoKvBZX+RxYcTaVUK/
NrMfkWmklyQTNrmpUDj+NAwGGjr4byjH8hUu59cFJetatzJo8qxuWWtPBtd+ESs/
DVR5dpilfyEBi4Dc22X91kOShJpeDu08EGfR605/nmRErlyy/p5f2sPKM0/
ix+XlQIDAQABMA0GCSqGSIb3DQEBCwUAA4IBAQA7kt4HeU/
zohOSDnnfmXYpYi8WrJFxMvTS6CjwE8eYZ6BwByEI4PjxcjPOu+sVNxrtBzJUwyPM+LKKMs
zYn5VQ/skrwc1jW5P4msUMj4/J5K4vuYcKbJS4VyASKVZmWUWC23WhpC3U8ft6F7Jynp/
omrEh6Xrc4f4SqFdvIz35h2Sd/
HbcDp+sHZZm4TgnA2XuSuvv0NJPF2VsRHMCMSn3eBTQfbbD5naLEpitjU8Zy5qW+Ic8Up51
ATNzPP+kmaQY6SxPLeuAarrnp4vDrD7hpzhneRfWX8h9v/Fg+wlnOsEeD1FYyLRoc
```

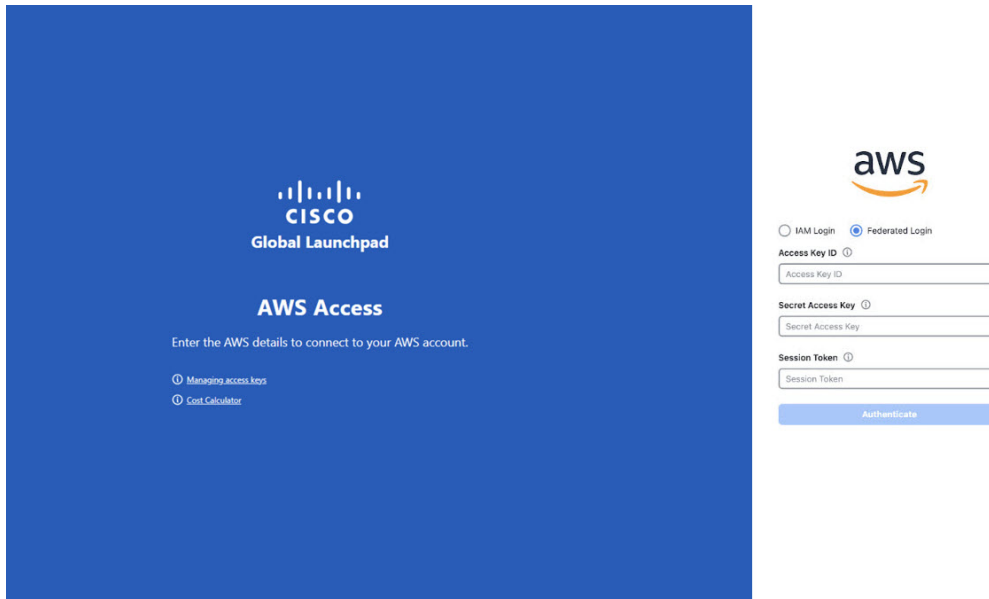
Output similar to the following output is displayed:

```
{
  "Credentials": {
    "AccessKeyId": "xxxx",
    "SecretAccessKey": "xxxxx",
    "SessionToken": "xxxxxxxxxx",
    "Expiration": "2023-03-10T18:07:15+00:00"
  },
  "AssumedRoleUser": {
    "AssumedRoleId": "xxx:user@sso.com",
    "Arn": "arn:aws:sts::059356109852:assumed-role/ADFS-AWS-ADMIN/user@sso.com"
  },
  "Subject": "SSO\\USER",
  "SubjectType": "transient",
  "Issuer": "http://EC2AMAZ-MH1F3CD.sso.com/adfs/services/trust",
  "Audience": "https://signin.aws.amazon.com/saml",
  "NameQualifier": "POIUYTRFVNMKJGFKJHJHJcYLQCePSAZg="
}
```

**Step 13** Note the values of the following generated credentials:

- AccessKeyId
- SecretAccessKey
- SessionToken

**Step 14** On the Cisco Global Launchpad login window, select **Federated Login** and enter the generated credentials from Step 13 in the corresponding fields.



---

## Create a New VA Pod

A VA pod is the AWS hosting environment for the Catalyst Center VA. The hosting environment includes AWS resources, such as the Catalyst Center VA EC2 instance, Amazon Elastic Block Storage (EBS), backup NFS server, security groups, routing tables, Amazon CloudWatch logs, Amazon Simple Notification System (SNS), VPN Gateway (VPN GW), TGW, and so on.

Using Cisco Global Launchpad, you can create multiple VA pods—one VA pod for each Catalyst Center VA.



### Note

- The AWS Super Administrator user can set a limit on the number of VA pods that can be created in each region. The VPCs used for resources outside of Cisco Global Launchpad contribute to this number as well. For example, if your AWS account has a limit of five VPCs and two are in use, you can only create three more VA pods in the selected region.
- On some steps, all the resources must be set up successfully to proceed to the next step. If all the resources haven't been set up successfully, the proceed button is disabled. If all the resources have been set up successfully and the proceed button is disabled, wait a few seconds because the resources are still loading. After all the configurations are complete, the button is enabled.
- Your VA pod configuration doesn't change when you update Cisco Global Launchpad to a later release, you downgrade to an earlier Cisco Global Launchpad release, or you update the region setup where your VA pod is located.

---

This procedure guides you through the steps to create a new VA pod.

## Before you begin

Your AWS account must have administrator access permission to perform this procedure. For information, see [Prerequisites for Automated Deployment](#), on page 8.

## Procedure

---

## Step 1

If you are an admin user logging in for the first time, enter your email address in the **Email ID** field and click **Submit**. If you are a subuser, proceed to [Create a New VA Pod, on page 50](#).

### Email Address

Enter the email address to which notifications should be sent when AWS infrastructure alerts are logged.

Email Id

Submit

You can subscribe to the Amazon SNS to receive alerts about deployed resources, changes, and resource over-utilization. Further, alarms can be set up to notify you if Amazon CloudWatch detects any unusual behavior in Cisco Global Launchpad. In addition, AWS Config evaluates and assesses your configured resources and sends audit logs of the results as well. For more information, see "Subscribe to the Amazon SNS Email Subscription" and "View Amazon CloudWatch Alarms" in the [Cisco Global Launchpad Administrator Guide](#).

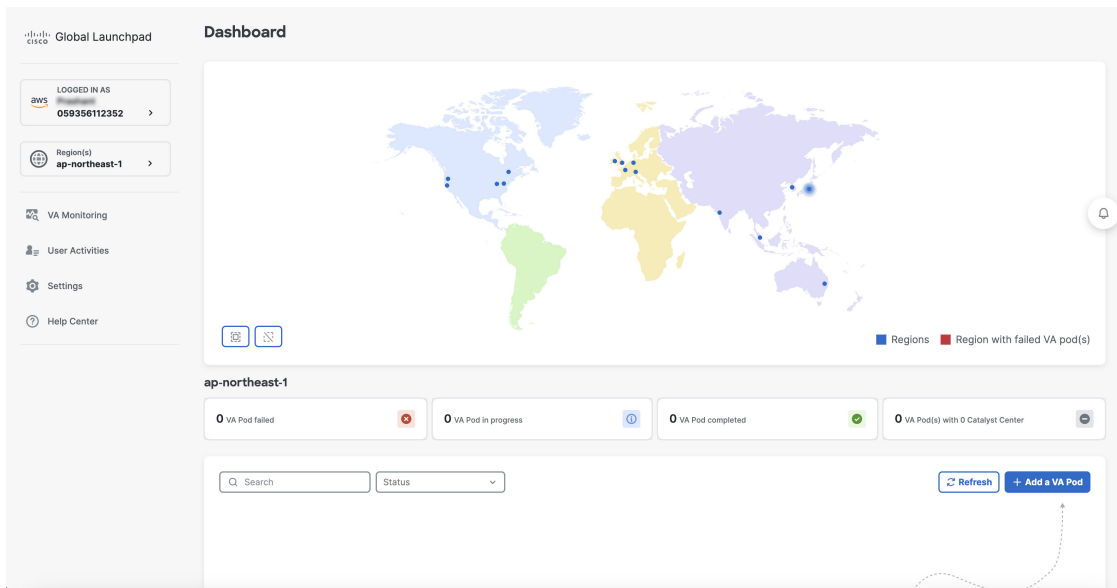
After you enter your email, several processes happen:

- The CiscoDNACenter user group is created in your AWS account with all the required policies attached. The admin user can add subusers to this group to allow subusers to log in to Cisco Global Launchpad.
- An Amazon S3 bucket is automatically created to store the state of the deployment. We recommend that you do not delete this or any other bucket from the AWS account, either globally or for each region. Doing so could impact the Cisco Global Launchpad deployment workflow.
- If you are logging in to a region for the first time, Cisco Global Launchpad creates several resources in AWS. This process can take some time, depending on whether the region was previously enabled or not. Until the process completes, you cannot create a new VA pod. During this time, the following message is displayed: "**Setting up the initial region configuration. This might take a couple of minutes.**"

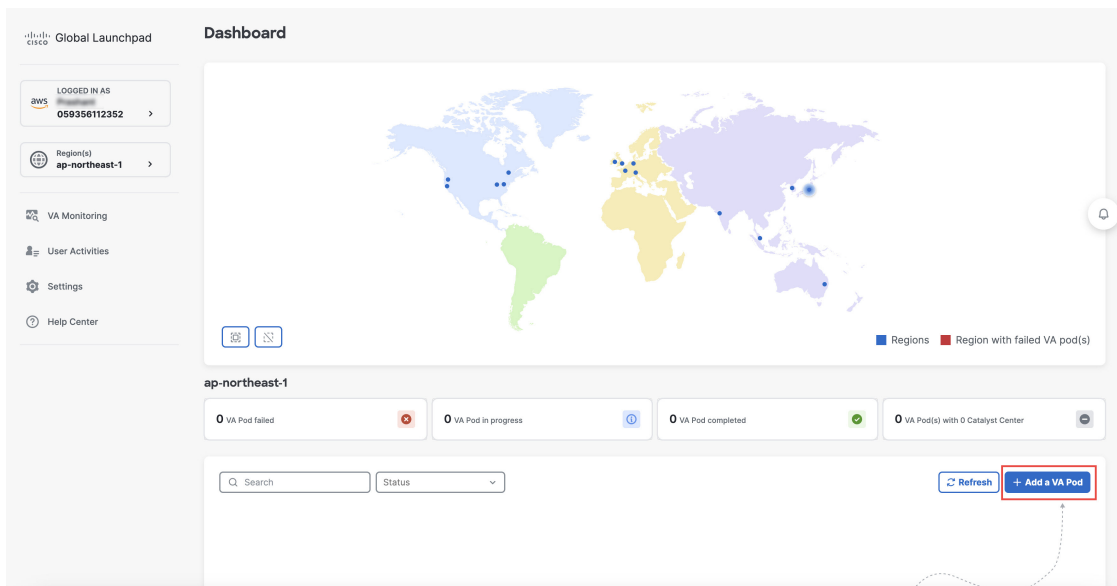
After you log in successfully, the **Dashboard** pane is displayed.

### Note

If you're prompted to update the region setup, follow the prompts to complete the update. For more information, see "Update a Region Setup" in the [Cisco Global Launchpad Administrator Guide](#).



## Step 2 Click + Add a VA pod.



## Step 3 Configure the AWS infrastructure, which includes the region, VPC, private subnet, routing table, security group, virtual gateway, and CGW, by completing the following steps:

a) Configure the following **VA pod environment details** fields:

- **Region name:** Choose a region from the drop-down list.
- **VA pod name:** Assign a name to the new VA pod. Keep the following restrictions in mind:
  - The name must be unique within the region. (This means that you can use the same name across multiple regions.)
  - The name must have at least four characters and can have at most 12 characters.

- The name can include letters (A-Z), numbers (0-9), and dashes (-).
- **Availability zone:** Click this drop-down list and choose an availability zone, which is an isolated location within your selected region.
- **AWS VPC CIDR:** Enter a unique VPC subnet to use to launch the AWS resources. Keep the following guidelines in mind:
  - The recommended CIDR range is /25.
  - In IPv4 CIDR notation, the last octet (the fourth octet) of the IP address can only have the values 0 or 128.
  - This subnet should not overlap with your corporate subnet.

b) Under **Transit gateway (TGW)**, choose one of the following options:

- **VPN GW:** Choose this option if you have a single VA pod, and you want to use a VPN gateway. A VPN GW is the VPN endpoint on the Amazon side of your Site-to-Site VPN connection. It can be attached to only a single VPC.
- **New VPN GW + New TGW:** Choose this option if you have multiple VA pods or VPCs, and you want to use the TGW as a transit hub to interconnect multiple VPCs and on-premises networks. It can also be used as a VPN endpoint for the Amazon side of the Site-to-Site VPN connection.

**Note**

You can create only one TGW per region.

- **Existing TGW:** Choose this option if you have an existing TGW that you want to use to create a new VA pod, and then choose one of the following options:
  - **New VPN GW:** Choose this option if you want to create a new VPN gateway for your existing TGW.

**1 Configure the AWS Infrastructure**  
Enter EC2 and VPN Details

**2 Configure the On-Premises Tunnel Endpoint**  
Precheck with AWS

**3 Network Connectivity Check**  
Check IPsec tunnel connection

### On-Premises Connectivity

Choose the appropriate option for your on-premises network connectivity.

**Transit Gateway (TGW)**

VPN GW   New VPN GW + New TGW   **Existing TGW**

Select

**VPN/Direct Connect Attachment**

Select existing gateway or create new gateway for on-premises connectivity

**New VPN GW**   **Existing Attachment**

**VPN Details**

To download a sample configuration based on your enterprise gateway, enter your VPN details. Then, modify the sample configuration, so you can use advanced algorithms, certificates, and IPv6.

**CGW (Enterprise Firewall/Router)**

Enter Customer Gateway IP

[Exit](#) [Next](#)

- **Existing attachment:** Choose this option if you want to use an existing VPN or direct-connect attachment. From the **Select attachment ID**, drop-down list, choose an attachment ID.

**1 Configure the AWS Infrastructure**  
Enter EC2 and VPN Details

**2 Configure the On-Premises Tunnel Endpoint**  
Precheck with AWS

**3 Network Connectivity Check**  
Check IPsec tunnel connection

### On-Premises Connectivity

Choose the appropriate option for your on-premises network connectivity.

**Transit Gateway (TGW)**

☐ VPN GW   ☐ New VPN GW + New TGW   ☒ Existing TGW

New...(tgw-0ffc44383088c0ee0)

**VPN/Direct Connect Attachment**

Select existing gateway or create new gateway for on-premises connectivity

☐ New VPN GW   ☒ Existing Attachment

Select

Tes... (cgw-0b1467d5fc47c7439)

DC (de403590-42fa-49a3-8c79-2b2720f7e1f1)

☐ Small   ☒ Medium   ☐ Large

**Backup Target**

☐ Enterprise Backup (NFS)   ☒ Cloud Backup (NFS)

[Exit](#) [Next](#)

If you choose this option, you must also configure routing on your existing gateway or direct connect attachment.

For information, see [Manually Configure Routing on Your Existing Gateway or Direct Connect Attachment, on page 61](#).

- c) Do one of the following:

- If you selected **Existing TGW** and **Existing attachments** as your preferred connectivity options, proceed to [Step 3.d, on page 55](#).
- If you selected **VPN GW**, **New VPN GW + New TGW**, or **Existing TGW + New VPN GW**, provide the following VPN details:
  - **Customer gateway (Enterprise firewall/router)**: Enter the IP address of your Enterprise firewall or router to form an IPsec tunnel with the AWS VPN gateway.
  - **VPN vendor**: From the drop-down list, choose a VPN vendor.  
The following VPN vendors are not supported: **Barracuda**, **Sophos**, **Vyatta**, and **Zyxel**. For more information, see [Troubleshoot VA Pod Configuration Errors, on page 109](#).
  - **Platform**: From the drop-down list, choose a platform.
  - **Software**: From the drop-down list, choose a software.

d) For the **Customer profile** size, leave the default **Medium** setting.

The customer profile size applies to both the Catalyst Center VA instance and the backup instance. The **Medium** configures the instances as follows:

- **Cisco Catalyst Center instance**: r5a.8xlarge, 32 vCPU, 256-GB RAM, and 4-TB storage.

**Important**

Catalyst Center VA supports only the r5a.8xlarge instance size. Any changes to this configuration aren't supported. Additionally, the r5a.8xlarge instance size isn't supported in specific availability zones. To view the list of unsupported availability zones, see the [Release Notes for Cisco Global Launchpad](#).

- **Backup instance**: T3.micro, 2 vCPU, 500-GB storage, and 1-GB RAM

e) For the **Backup target (NFS)**, choose one of the following options as the destination for your backups:

- **Enterprise backup**: Choose this option if you want the backup to be stored in the on-premises servers.
- **Cloud backup**: Choose this option if you want the backup to be stored in AWS.

Note the following backup details. You will use this information later to log in to the cloud backup server:

- **SSH IP address**: <BACKUP VM IP>
- **SSH port**: 22
- **Server path**: /var/catalyst-backup/
- **Username**: maglev
- **Password**: <xxxx#####>

Your backup server password is dynamically created. The password is composed of the first four characters of the VA pod name and the backup server's IP address without the periods.

For example, if the VA pod name is DNAC-SJC and the backup server's IP address is 10.0.0.1, the backup server password is DNAC10001.

**Note**

- You can find the VA pod name on the **Dashboard** pane after you choose the region that it's deployed in.

- You can find the backup server's IP address on the **View Catalyst Center** pane. For more information, see "View Catalyst Center VA Details" in the [Cisco Global Launchpad Administrator Guide](#).

- **Passphrase:** <Passphrase>

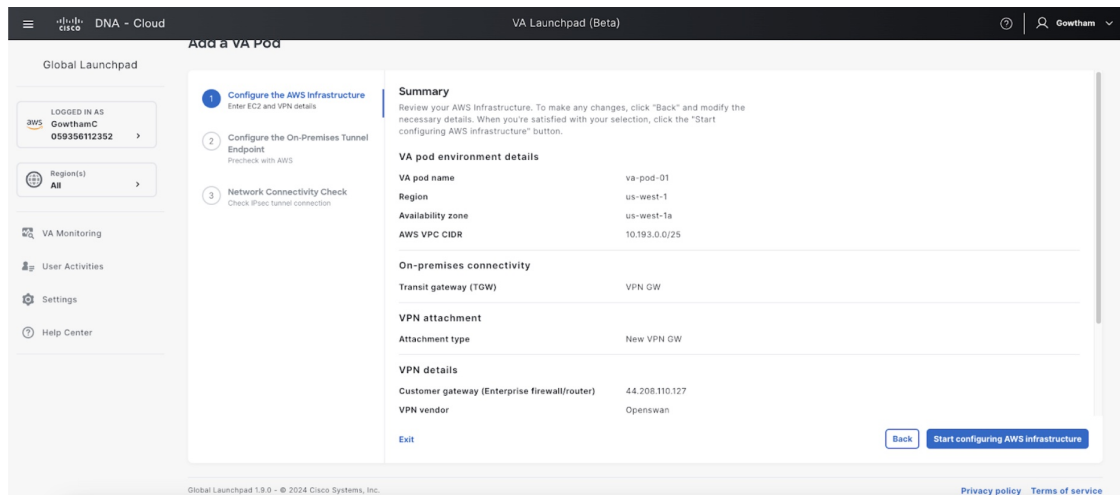
Your passphrase is used to encrypt the security-sensitive components of the backup. These security-sensitive components include certificates and credentials.

This passphrase is required and you will be prompted to enter this passphrase when restoring the backup files. Without this passphrase, backup files are not restored.

- **Open ports:** 22, 2049, 873, and 111

f) Click **Next**.

The **Summary** pane is displayed.



g) Review the environment and VPN details that you entered. If you're satisfied, click **Start configuring AWS infrastructure**.

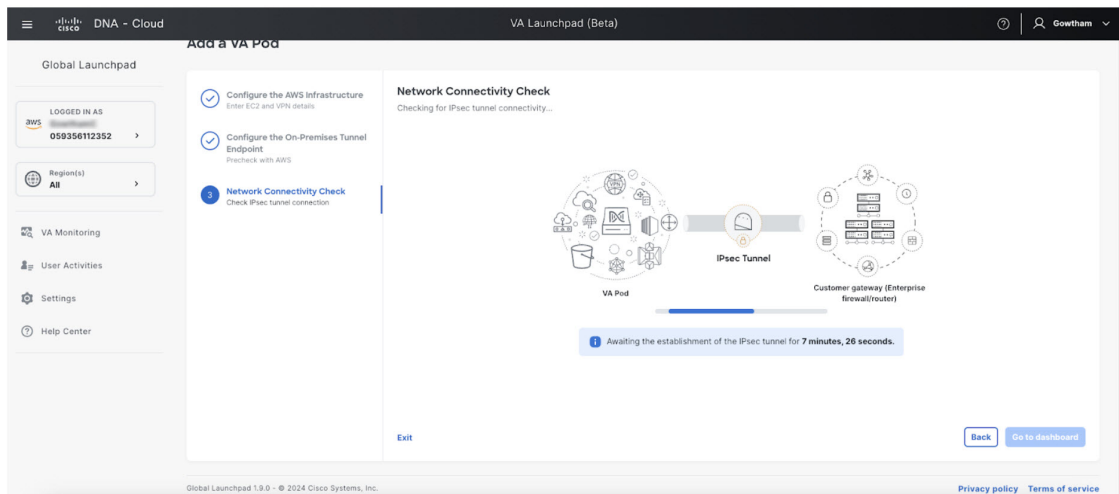
**Important**

This setup takes about 20 minutes to complete.

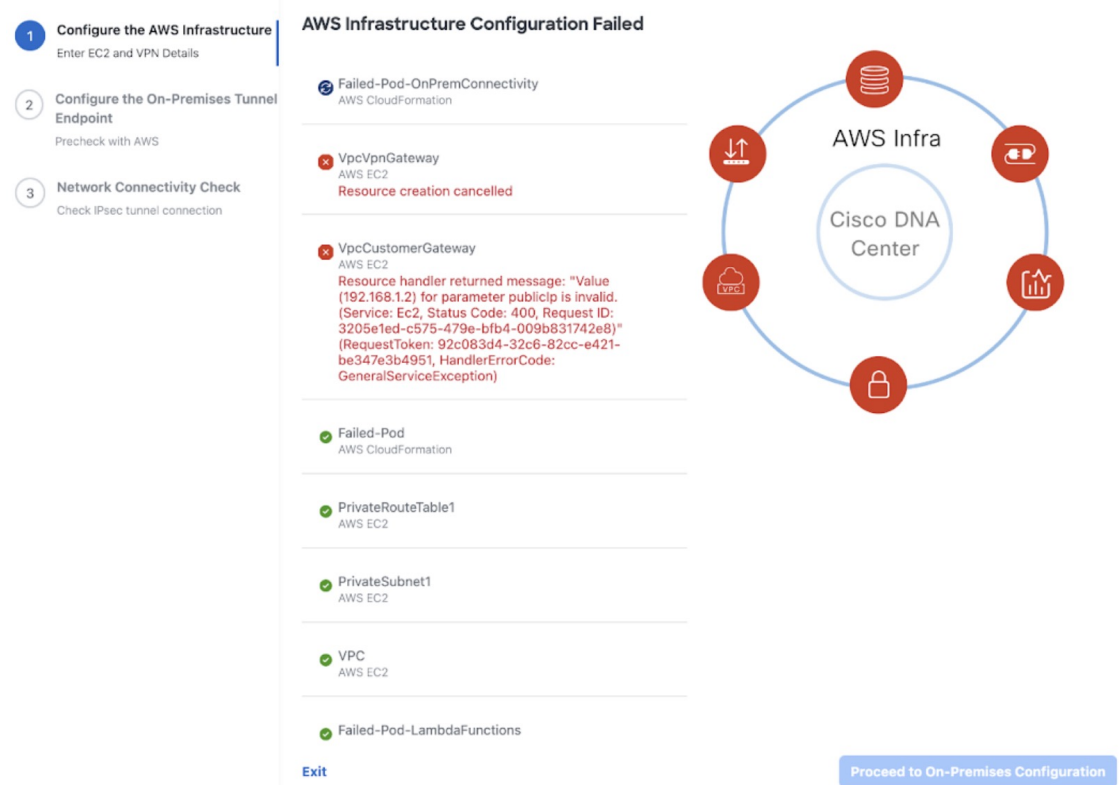
You can exit the screen to any other page in Cisco Global Launchpad, and the process continues in the background. However, if you close the tab or window or refresh the page, any active background process pauses.

h) After the AWS infrastructure is successfully configured, the **AWS Infrastructure Configured** pane is displayed.





If the AWS infrastructure configuration fails, exit Cisco Global Launchpad and see [Troubleshoot VA Pod Configuration Errors, on page 109](#) for information about possible causes and solutions.



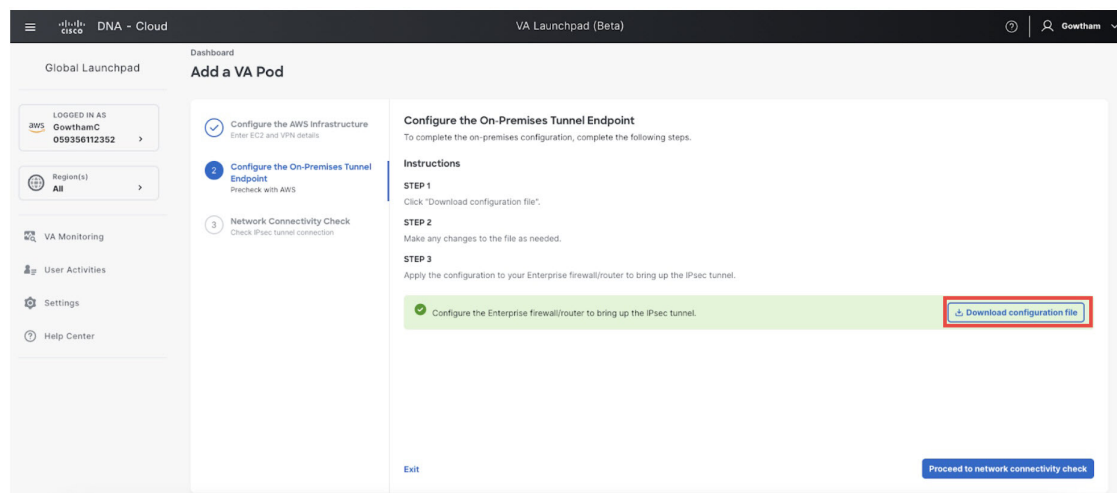
#### Step 4

Download the on-premises configuration file by completing the following steps:

- After the AWS infrastructure is successfully configured, click **Proceed to on-premises configuration**.
- In the **Configure the On-Premises Tunnel Endpoint** pane, click **Download configuration file**. Forward this file to your network administrator to configure the on-premises-side IPsec tunnel.

This file is generated based on the on-premises vendor, platform, and version that were selected during the configuration of the AWS infrastructure. The file contains the unique VPN connection IDs that were created for the VPC. Only a few things need to be modified according to on-premise firewall/router. For example, if you have an ASA firewall/router needs to be modified, you need to modify the static route configuration to the VPC subnet that you have chosen.

```
route Tunnel-int-vpn-0bbef6e1331a37048-0 10.0.0.0 255.255.0.0 169.254.184.85 100
```



Make sure your network administrator configures only one IPsec tunnel.

#### Note

- The network administrator can make the necessary changes to this configuration file and apply it to your Enterprise firewall or router to bring up the IPsec tunnels.

The provided configuration file enables you to bring up two tunnels between AWS and the Enterprise router or firewall.

- Most virtual private gateway solutions have one tunnel up and the other down. You can have both tunnels up and use the Equal Cost Multiple Path (ECMP) networking feature. ECMP processing enables the firewall or router to use equal-cost routes to transmit traffic to the same destination. To do this, your router or firewall must support ECMP. Without ECMP, we recommend that you either keep one tunnel down and manually failover or use a solution, such as an IP SLA, to automatically bring up the tunnel in a failover scenario.

c) Click **Proceed to network connectivity check** button.

#### Step 5

Check the status of your network configuration based on the on-premises connectivity preferences that you selected during the AWS infrastructure configuration by completing one of the following actions:

- If you selected **VPN GW** as your preferred on-premises connectivity option, the IPsec tunnel configuration status is displayed, as follows:
  - If the network administrator hasn't configured the IPsec tunnel yet, a padlock is displayed on the IPsec tunnel:



- Ask your network administrator to verify that the IPsec tunnel on the Enterprise firewall or router is up. After the IPsec tunnel comes up, the IPsec tunnel turns green:



#### Note

If the IPsec tunnel is up and you cannot access Catalyst Center VA from the CGW, check that the correct values were passed during the IPsec tunnel configuration. Cisco Global Launchpad reports the tunnel status from AWS and doesn't perform additional checks.

- If you selected **New VPN GW + New TGW** or **Existing TGW and new VPN GW** as your preferred on-premises connectivity option, Cisco Global Launchpad checks whether your VPC is connected to the TGW, which in turn is connected to your on-premises firewall or router.

#### Note

For the TGW-to-Enterprise firewall or router connection to succeed, your network administrator must add the configuration to your on-premises firewall or router.

The connection status is displayed, as follows:

- If the connection from the TGW to your on-premises firewall or router isn't connected yet, it's grayed out:



- After TGW connectivity is successfully established, the TGW connection is green:



- If you selected **Existing TGW** and **Existing Attachment** as your preferred on-premises connectivity option, make sure that routing is configured between the existing TGW and the newly attached VPC, where Catalyst Center VA is launched. For information, see [Manually Configure Routing on Your Existing Gateway or Direct Connect Attachment, on page 61](#).

The connection status is displayed, as follows:

- If your VPC is not attached to the TGW, the TGW connection is grayed out:



- After TGW connectivity is successfully established, the TGW connection is green:



**Step 6** Click **Go to dashboard** to return to the **Dashboard** pane, where you can create more VA pods and manage your existing ones.

### Manually Configure Routing on Your Existing Gateway or Direct Connect Attachment

If you selected **Existing Transit Gateway** and **Existing Attachments** as your preferred connectivity option while creating a new VA pod, Cisco Global Launchpad creates a VPC to launch Catalyst Center and attaches this VPC to your existing TGW.

For Cisco Global Launchpad to establish the TGW connection, you must manually configure the TGW routing table on AWS and add the routing configuration of your existing CGW or direct connect attachment.

### Procedure

- Step 1** From the AWS console, go to **VPC service**.
- Step 2** In the left navigation pane, under **Transit Gateways**, choose **Transit gateway route tables** and select the existing TGW route table.
- Step 3** In the **Transit gateway route tables** window, click the **Associations** tab, choose the attachment to associate from the drop-down list, and then click **Create association**.  
The association can be your existing CGW or direct connect attachment.

Network Firewall rule groups

Virtual private network (VPN)

Customer gateways

Virtual private gateways

Site-to-Site VPN Connections

Client VPN Endpoints

AWS Cloud WAN

Network Manager

Transit gateways

Transit gateways

Transit gateway attachments

Transit gateway policy tables

Transit gateway route tables

Transit gateway multicast

Traffic Mirroring

Mirror sessions

Mirror targets

Mirror filters

Settings

Transit gateway route tables (1/1) info

Filter transit gateway route tables

<input checked="" type="checkbox"/>	Name	Transit gateway route table ID	Transit gateway ID	State	Default association route table	Default propagation route table		
<input checked="" type="checkbox"/>	TEST-0-2-5-	tgw-rtb-	9f635	tgw-	07ec6	Available	No	No

tgw-rtb- / 9f635 / TEST-0-2-5- RouteTable

Details Associations Propagations Prefix list references Routes Tags

Associations (3) info

Filter associations

<input type="checkbox"/>	Attachment ID	Resource type	Resource ID	State		
<input type="checkbox"/>	tgw-attach-	35a9b	VPC	vpc-	78310	Associated
<input type="checkbox"/>	tgw-attach-	242e7	VPN	vpn-	2f151	Associated
<input type="checkbox"/>	tgw-attach-	2fa5f	VPC	vpc-	000c9	Associated

**Step 4** In the **Transit gateway route tables** window, click the **Propagations** tab and then click **Create propagation**.

Network Firewall rule groups

Virtual private network (VPN)

Customer gateways

Virtual private gateways

Site-to-Site VPN Connections

Client VPN Endpoints

AWS Cloud WAN

Network Manager

Transit gateways

Transit gateways

Transit gateway attachments

Transit gateway policy tables

Transit gateway route tables

Transit gateway multicast

Traffic Mirroring

Mirror sessions

Mirror targets

Mirror filters

Settings

Transit gateway route tables (1/1) info

Filter transit gateway route tables

<input checked="" type="checkbox"/>	Name	Transit gateway route table ID	Transit gateway ID	State	Default association route table	Default propagation route table		
<input checked="" type="checkbox"/>	TEST-0-2-5-	tgw-rtb-	9f635	tgw-	07ec6	Available	No	No

tgw-rtb- / 9f635 / TEST-0-2-5- RouteTable

Details Associations Propagations Prefix list references Routes Tags

Propagations (3) info

Filter propagations

<input type="checkbox"/>	Attachment ID	Resource type	Resource ID	State		
<input type="checkbox"/>	tgw-attach-	242e7	VPN	vpn-	2f151	Enabled
<input type="checkbox"/>	tgw-attach-	35a9b	VPC	vpc-	78310	Enabled
<input type="checkbox"/>	tgw-attach-	2fa5f	VPC	vpc-	000c9	Enabled

**Step 5** To ensure that the static route between the respective VPC and VPN is active, click the **Routes** tab and then click **Create static route**.

**Step 6** Ensure that your on-premises router configuration is updated to route the network traffic destined for the CIDR ranges that are allocated to your CGW or direct connect attachment in your AWS environment.

For example: `route tunnel-int-vpn-0b57b508d80a07291-1 10.0.0.0 255.255.0.0 192.168.44.37 200`

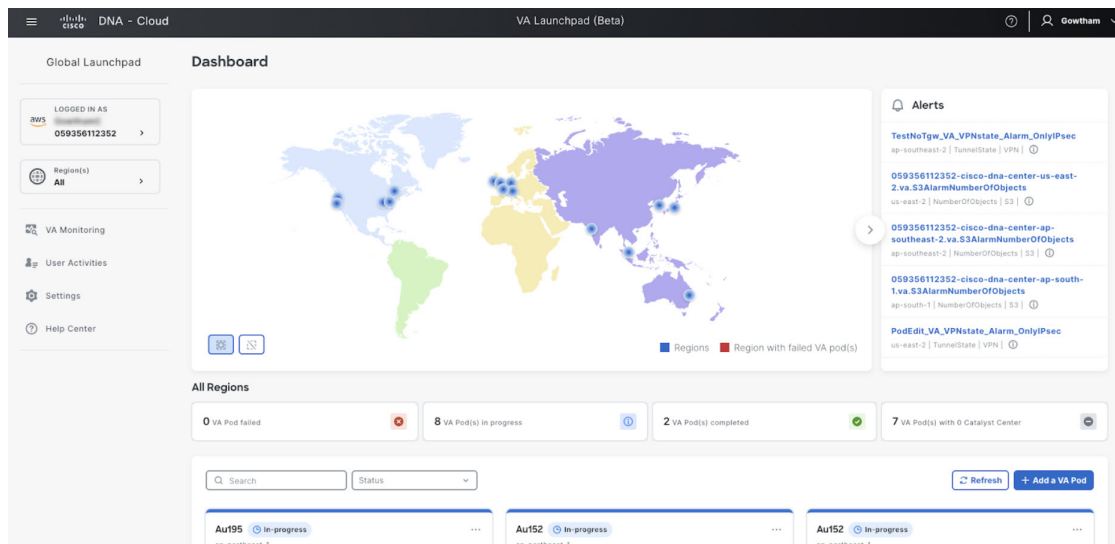
## Create a New Catalyst Center

Use this procedure to configure a new Catalyst Center VA.

## Procedure

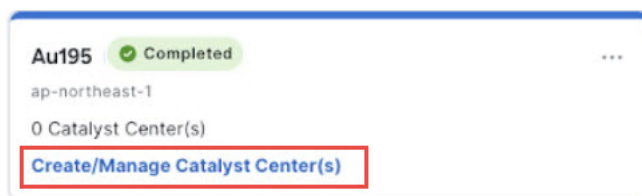
## Step 1

In the **Dashboard** pane, below the map, locate the VA pod where you want to create your Catalyst Center VA.



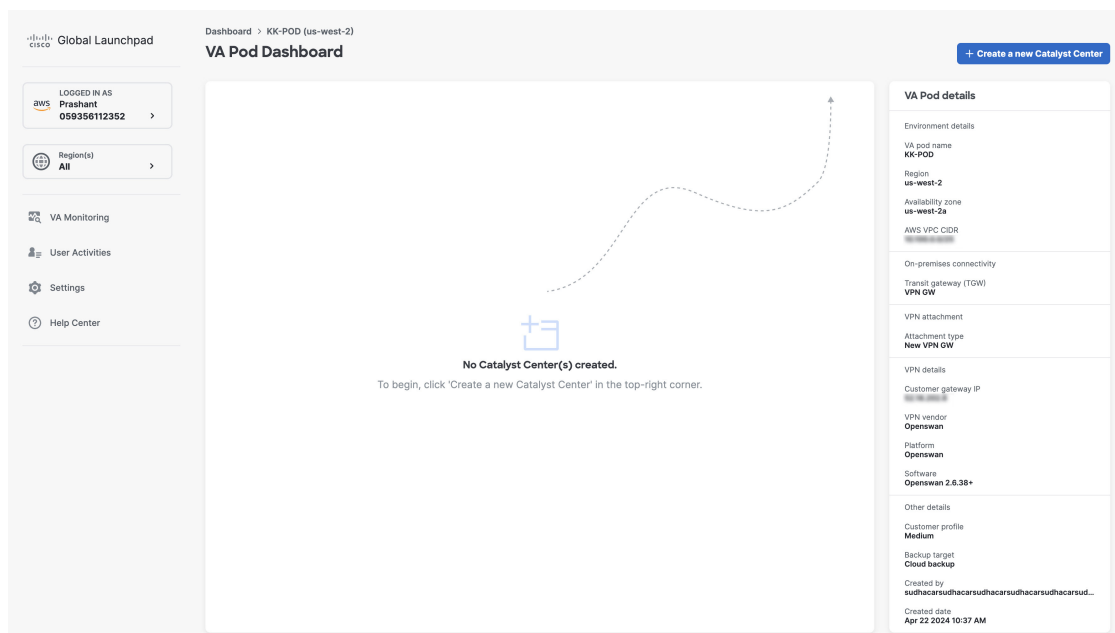
## Step 2

In the VA pod card, click **Create/Manage Catalyst Center(s)**.



## Step 3

In the **VA Pod Dashboard** pane, click + **Create a new Catalyst Center**.



## Step 4

Enter the following details:

- **Catalyst Center version:** From the drop-down list, choose a version.
- **Enterprise DNS:** Enter the IP address of your Enterprise DNS. Ensure that the Enterprise DNS is reachable from the VA pod in which you're creating the Catalyst Center VA.

**Note**

- Cisco Global Launchpad checks the on-premises network connection using UDP port 53 with the DNS server IP address that you entered.
- The DNS server cannot be updated through Cisco Global Launchpad after deploying Catalyst Center VA on AWS. However, you can update the DNS server using the AWS console. For more information, see [Update the DNS Server on a Catalyst Center VA Using the AWS Console, on page 111](#).
- **Catalyst Center IP address:** IP address of the Catalyst Center. To access the Catalyst Center directly using its domain name instead of its IP address, add an A record (address record) to the Enterprise DNS with the FQDN and this IP address.
- **FQDN (Fully Qualified Domain Name):** Enter the FQDN for the Catalyst Center VA as configured on your DNS server.
- **Proxy details:** Select one of the following HTTPS network proxy options:
  - **No proxy:** No proxy server is used.
  - **Unauthenticated:** The proxy server does not require authentication. Enter the URL and port number of the proxy server.
  - **Proxy authentication:** The proxy server requires authentication. Enter the URL, port number, username, and password details for the proxy server.
- **Catalyst Center virtual appliance credentials:** Enter a CLI password to use to log in to the Catalyst Center VA.

The password must conform to the following constraints:

- Cannot contain any tab or line breaks.
- Must have at least 8 characters
- Must have a character from at least three of the following categories:
  - Lowercase letter
  - Uppercase letter
  - Number
  - Special character

Save this password for future reference.

**Note**

The username is maglev.



**Step 5** Click **Validate** to validate the Enterprise DNS server and FQDN configured on the DNS server.

#### Note

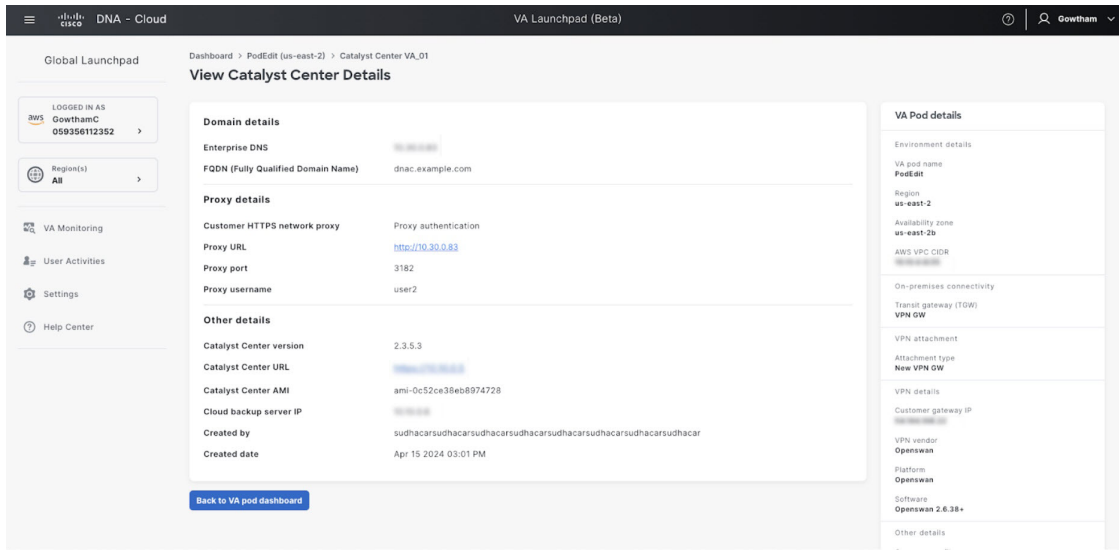
If the DNS server, proxy server, or FQDN checks fail, continue with your configuration as follows:

- If the DNS server validation fails, you cannot continue creating your Catalyst Center VA. Make sure that the entered DNS server IP address is reachable from the VA pod.
- If the proxy server validation fails, you can still continue with your configuration because even if the invalid proxy details aren't fixed, the Catalyst Center VA works.
- If the FQDN validation fails, you can still continue with creating your Catalyst Center VA. However, you need to fix the FQDN configuration.

**Step 6** In the **Summary** window, review the configuration details.

#### Note

The Catalyst Center IP address is a statically assigned IP address that is maintained across AWS availability zone outages to ensure uninterrupted connectivity and to minimize disruptions during critical network operations.

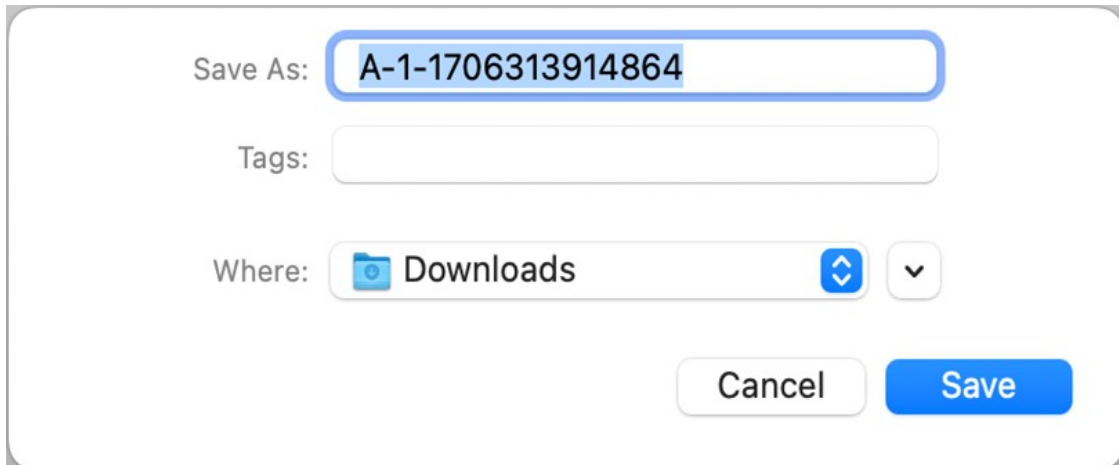


**Step 7** If you're satisfied with the configuration, click **Generate PEM key file**.

**Step 8** In the **Download PEM key file** dialog box, click **Download PEM key file**. If you click **Cancel**, you're returned to the **Summary** window.

#### Important

Because the PEM key isn't stored in your AWS account, you need to download it. You need the PEM key to access the Catalyst Center VA that is being created.



**Step 9** After you downloaded the PEM file, click **Start Catalyst Center configuration**.

## Summary

Review your Cisco Catalyst Center VA Configuration and make any changes as needed. When you're ready, click "Start Cisco Catalyst Center Configuration".

### Domain Details

Enterprise DNS	100.100.100.100	✓
FQDN	dnac.cisco.cloud	✗
Cisco Catalyst Center IP Address	10.10.10.10	

### Proxy Details ✓

Customer HTTP Network Proxy	No Proxy
-----------------------------	----------

### Other Details

Cisco Catalyst Center Version	2.3.5.3
-------------------------------	---------

Note : You can continue deploying Cisco Catalyst Center but you should fix FQDN to make it work.

[Exit](#)

[Back](#)

[Start Cisco Catalyst Center Configuration](#)

Cisco Global Launchpad configures the Catalyst Center VA environment. After the environment is configured, Catalyst Center VA boots. Initially, Cisco Global Launchpad displays the outer ring in gray. When Port 2222 is validated, the image turns amber. When Port 443 is validated, the image turns green.

### Note

This process takes 45-60 minutes.

You can exit the screen to any other page in Cisco Global Launchpad, and the process continues in the background. However, if you close the tab or window or refresh the page, any active background process pauses.

After Catalyst Center VA is done booting, the configuration is complete. You can now view your Catalyst Center VA details.

## Catalyst Center Configuration In Progress

It can take 45 minutes for the Catalyst Center VA to boot. Check back again later.

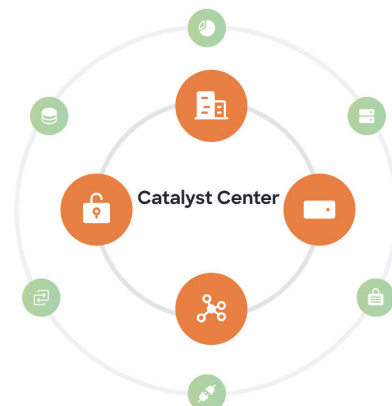
### Catalyst Center details

Catalyst Center URL	https://10.10.10.10
Cloud backup server IP address	10.10.10.10

✓ TesNewTgw-1714386499663-InstanceLaunch  
AWS CloudFormation

✓ TesNewTgw-1714386499663-BackupInstance  
AWS CloudFormation

✓ BackUpInstance  
AWS EC2



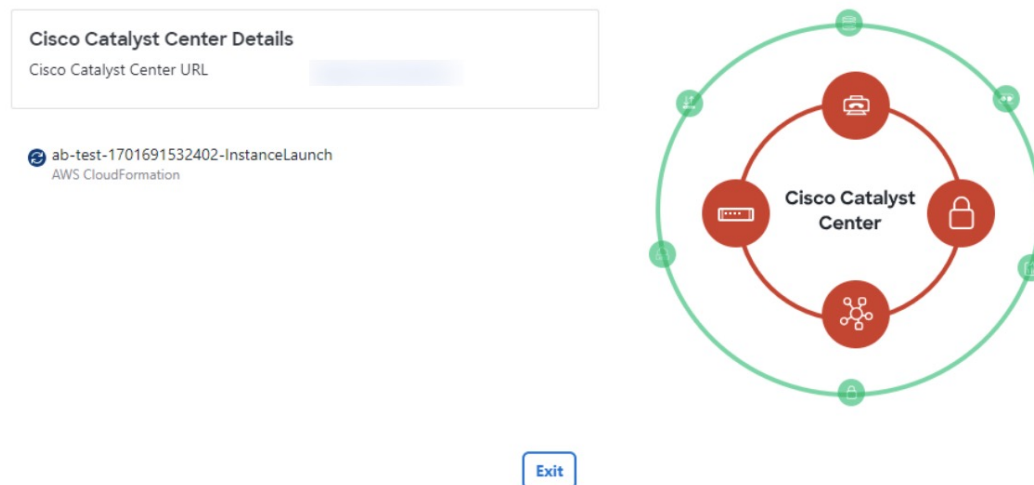
[Manage Catalyst Centers](#)

### Tip

While the **Catalyst Center configuration in progress** window is displayed, record the backup server's IP address for later use. Your backup server password is a combination of the first four characters of the VA pod name and the backup server's IP address without the periods.

If the configuration fails, exit to the **VA pod dashboard** pane. For information, see [Troubleshoot Catalyst Center VA Configuration Errors, on page 110](#).

### Cisco Catalyst Center Configuration Failed



**Step 10** To return to the **VA Pod Dashboard** pane, click **Back to VA Pod dashboard**.

---

## Use AWS CloudFormation to Manually Deploy Catalyst Center on AWS

If you're familiar with AWS administration, you have the option of deploying the Catalyst Center AMI manually on your AWS account using AWS CloudFormation.

With this method, you need to create the AWS infrastructure, establish a VPN tunnel, and deploy Catalyst Center.

### Deploy Catalyst Center on AWS Manually Using AWS CloudFormation

You can manually deploy Catalyst Center on AWS using AWS CloudFormation. The provided AWS CloudFormation template contains the relevant details for all required parameters.

#### Before you begin

- You have the AWS environment set up with all the required components. For information, see [Prerequisites for Manual Deployment Using AWS CloudFormation, on page 11](#).
- The VPN tunnel is up.

#### Procedure

---

**Step 1** Depending on which file you want to download, do one of the following:

- Go to the [Cisco Software Download](#) site and download the following file:

`Catalyst_Center_2.3.7.7_VA_InstanceLaunch_CFT-2.0.0.tar.gz`

- Go to the [Cisco Software Download](#) site and download the following file:

`Catalyst_Center_2.3.7.6_VA_InstanceLaunch_CFT-2.0.0.tar.gz`

- Go to the [Cisco Software Download](#) site and download the following file:

`Catalyst_Center_2.3.5.6_VA_InstanceLaunch_CFT-1.9.0.tar.gz`

- Go to the [Cisco Software Download](#) site and download the following file:

`Catalyst_Center_2.3.5.3_VA_InstanceLaunch_CFT-1.9.0.tar.gz`

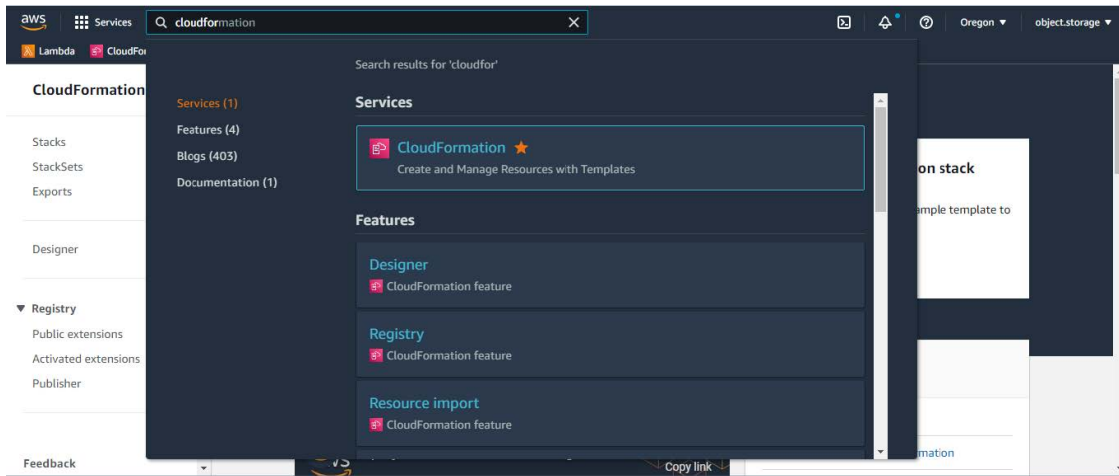
The TAR file contains the AWS CloudFormation template that you use to create your Catalyst Center VA instance. The AWS CloudFormation template contains several AMIs, each with a different AMI ID based on a specific region. Use the appropriate AMI ID for your region:

Region	Catalyst Center AMI ID
<b>2.3.7.7</b>	
ap-northeast-1 (Tokyo)	<a href="#">ami-05075aa903866775f</a>
ap-northeast-2 (Seoul)	<a href="#">ami-0744232fb85e1e6dd</a>
ap-south-1 (Mumbai)	<a href="#">ami-0849e21a92d7a9169</a>
ap-southeast-1 (Singapore)	<a href="#">ami-0ecec4e2de41dc36cd</a>
ap-southeast-2 (Sydney)	<a href="#">ami-041be10622357da11</a>
ca-central-1 (Canada)	<a href="#">ami-06c317bd03a7011dc</a>
eu-central-1 (Frankfurt)	<a href="#">ami-0798f49f910aba4e8</a>
eu-south-1 (Milan)	<a href="#">ami-0521e46d211700fce</a>
eu-west-1 (Ireland)	<a href="#">ami-0db1b1b1fdd0ca2ce</a>
eu-west-2 (London)	<a href="#">ami-0bf147263b8dc6307</a>
eu-west-3 (Paris)	<a href="#">ami-016098505ac363956</a>
us-east-1 (Virginia)	<a href="#">ami-088f34e9566dd6aae</a>
us-east-2 (Ohio)	<a href="#">ami-0b816d6043e715eca</a>
us-west-1 (Northern California)	<a href="#">ami-0dbd9780afda8b0a6</a>
us-west-2 (Oregon)	<a href="#">ami-05a8f0bcd39ebcf99</a>
<b>2.3.7.6</b>	
ap-northeast-1 (Tokyo)	<a href="#">ami-08ad4bd10d070c09a</a>
ap-northeast-2 (Seoul)	<a href="#">ami-0ec2a639f930691b7</a>

<b>Region</b>	<b>Catalyst Center AMI ID</b>
ap-south-1 (Mumbai)	ami-07485e862164f326d
ap-southeast-1 (Singapore)	ami-00b5bc52d24c09f12
ap-southeast-2 (Sydney)	ami-0575952d1ff2cc022
ca-central-1 (Canada)	ami-03c57cff0af7fd85
eu-central-1 (Frankfurt)	ami-0fa7805ddb7fc499e
eu-south-1 (Milan)	ami-0be6aa7f3c5be37db
eu-west-1 (Ireland)	ami-08a54e16cf62ba31f
eu-west-2 (London)	ami-0e3d36b0ed7ac30c5
eu-west-3 (Paris)	ami-0bc76a7a77134fa22
us-east-1 (Virginia)	ami-0028fe42e8d42234c
us-east-2 (Ohio)	ami-011ea8960d9266ab3
us-west-1 (Northern California)	ami-04581c0954527a2f5
us-west-2 (Oregon)	ami-080cdcf6ee76059d9
<b>2.3.5.6</b>	
ap-northeast-1 (Tokyo)	ami-0ac2eea5a703ea8cb
ap-northeast-2 (Seoul)	ami-0b3e9aa0015061b97
ap-south-1 (Mumbai)	ami-02c45b73032dd0447
ap-southeast-1 (Singapore)	ami-04e283a4a539a8082
ap-southeast-2 (Sydney)	ami-0447a235b1fa0a033
ca-central-1 (Canada)	ami-0961589c3cd05e0f4
eu-central-1 (Frankfurt)	ami-0785a32d2b94a2a4b
eu-south-1 (Milan)	ami-00840536450fef577
eu-west-1 (Ireland)	ami-0d71b41e8bbbfe12f
eu-west-2 (London)	ami-037dfc620f4939e17
eu-west-3 (Paris)	ami-07887f75def0b64a3
us-east-1 (Virginia)	ami-0bd62c55c197b832e
us-east-2 (Ohio)	ami-014f97feb1e8bd03b
us-west-1 (Northern California)	ami-01514c3ca84981e39

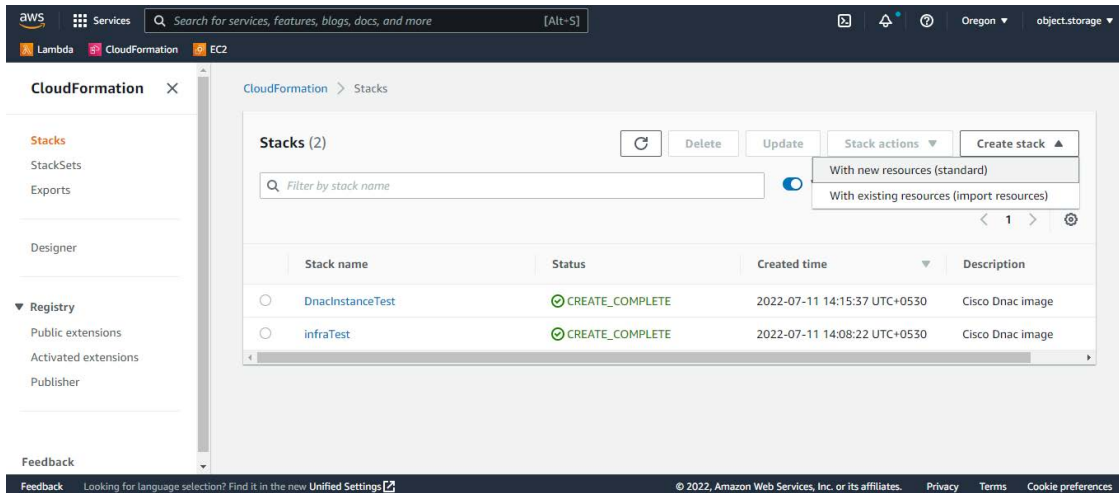
Region	Catalyst Center AMI ID
us-west-2 (Oregon)	ami-0c92216a92bef4d85
<b>2.3.5.3</b>	
ap-northeast-1 (Tokyo)	ami-0e15eb31bcb994472
ap-northeast-2 (Seoul)	ami-043e1b9f3ccace4b2
ap-south-1 (Mumbai)	ami-0bbdbd7bcc1445c5f
ap-southeast-1 (Singapore)	ami-0c365aa4cfb5121a9
ap-southeast-2 (Sydney)	ami-0d2d9e5ebb58de8f7
ca-central-1 (Canada)	ami-0485cfdbda5244c6e
eu-central-1 (Frankfurt)	ami-0677a8e229a930434
eu-south-1 (Milan)	ami-091f667a02427854d
eu-west-1 (Ireland)	ami-0a8a59b277dff9306
eu-west-2 (London)	ami-0cf5912937286b42e
eu-west-3 (Paris)	ami-0b12cfdd092ef754e
us-east-1 (Virginia)	ami-08ad555593196c1de
us-east-2 (Ohio)	ami-0c52ce38eb8974728
us-west-1 (Northern California)	ami-0b83a898072e12970
us-west-2 (Oregon)	ami-02b6cd5eee1f3b521

- Step 2** Verify that the TAR file is genuine and from Cisco. For detailed steps, see [Verify the Catalyst Center VA TAR File, on page 19](#).
- Step 3** Log in to the AWS console.  
The AWS console is displayed.
- Step 4** In the search bar, enter **cloudformation**.



**Step 5** From the drop-down menu, choose **CloudFormation**.

**Step 6** Click **Create stack** and choose **With new resources (standard)**.



**Step 7** Under **Specify template**, select **Upload a template file**, and choose the AWS CloudFormation template that you downloaded in [Step 1, on page 68](#).



The screenshot shows the AWS CloudFormation console interface. On the left, there is a navigation pane with a menu icon and a list of steps: Step 3 (Configure stack options), Step 4 (Review), and Review. The main content area is titled 'Prepare template' and 'Specify template'. Under 'Prepare template', there are three radio buttons: 'Template is ready' (selected), 'Use a sample template', and 'Create template in Designer'. Under 'Specify template', there are two radio buttons: 'Amazon S3 URL' and 'Upload a template file' (selected). Below the 'Upload a template file' option, there is a 'Choose file' button and a 'No file chosen' status. A 'View in Designer' button is also present. At the bottom, there are 'Cancel' and 'Next' buttons.

**Step 8** Enter a stack name and review the following parameters:

- **EC2 Instance Configuration**

- **Environment Name:** Assign a unique environment name.

The environment name is used to differentiate the deployment and is prepended to your AWS resource names. If you use the same environment name as a previous deployment, the current deployment will fail.

- **Private Subnet ID:** Enter the VPC subnet to be used for Catalyst Center.
- **Security Group:** Enter the security group to be attached to the Catalyst Center VA that you are deploying.
- **Keypair:** Enter the SSH keypair used to access the CLI of Catalyst Center VA that you are deploying.

CloudFormation > Stacks > Create stack

Step 1  
[Create stack](#)

Step 2  
**Specify stack details**

Step 3  
[Configure stack options](#)

Step 4  
[Review](#)

### Specify stack details

**Provide a stack name**

Stack name

Stack name can include letters (A-Z and a-z), numbers (0-9), and dashes (-).

**Parameters**

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

**EC2 Instance Configuration**

**EnvironmentName**  
String that will be prefixed to AWS resource names

**PrivateSubnet1ID**  
VPC Subnet to use for Cisco DNA Center

• **Catalyst Center Configuration:** Enter the following information:

- **CatalystCenterInstanceIP:** Catalyst Center IP address.
- **CatalystCenterNetmask:** Catalyst Center netmask.
- **CatalystCenterGateway:** Catalyst Center gateway address.
- **CatalystCenterDnsServer:** Enterprise DNS Server.
- **CatalystCenterPassword:** Catalyst Center password.

**Note**

You can use the Catalyst Center password to access the Catalyst Center VA CLI through the AWS EC2 Serial Console. The password must:

- Omit any tab or line breaks
- Have a minimum of eight characters
- Contain characters from at least three of the following categories:
  - Lowercase letters (a-z)
  - Uppercase letters (A-Z)
  - Numbers (0-9)
  - Special characters (for example, ! or #)

- **CatalystCenterFQDN:** Catalyst Center FQDN.

- **CatalystCenterHttpsProxy**: (Optional) Enterprise HTTPS proxy.
- **CatalystCenterHttpsProxyUsername**: (Optional) HTTPS proxy username.
- **CatalystCenterHttpsProxyPassword**: (Optional) HTTPS proxy password.



**Cisco Catalyst Center Configuration**

**CatalystCenterInstanceIP**  
Cisco Catalyst Center IP Address

**CatalystCenterNetmask**  
Cisco Catalyst Center Netmask

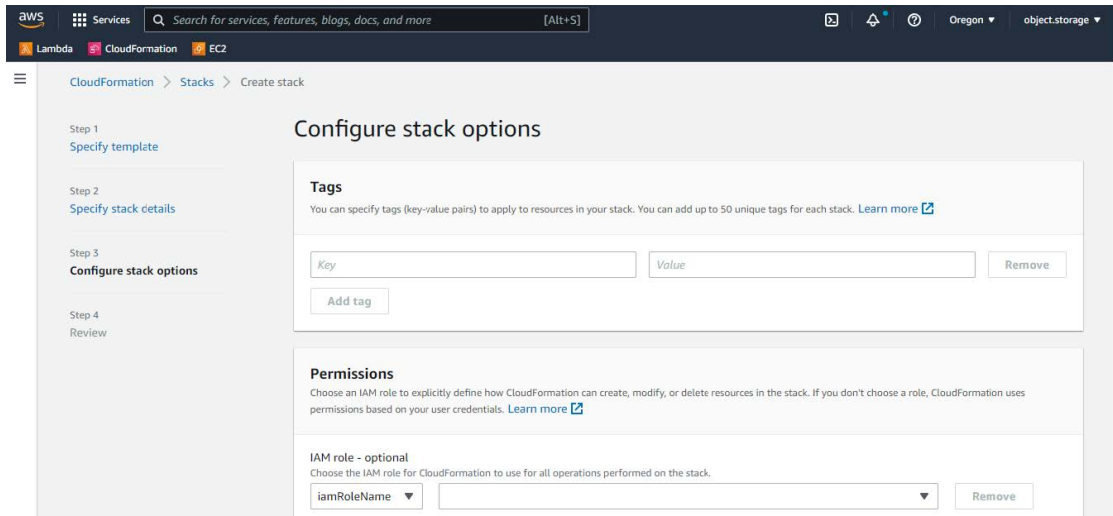
**CatalystCenterGateway**  
Cisco Catalyst Center Gateway Address

**CatalystCenterDnsServer**  
Enterprise DNS Server

**CatalystCenterPassword**  
Cisco Catalyst Center Password

**CatalystCenterFQDN**  
Cisco Catalyst Center FQDN

**Step 9** (Optional) Click **Next** to configure the stack options.



**Configure stack options**

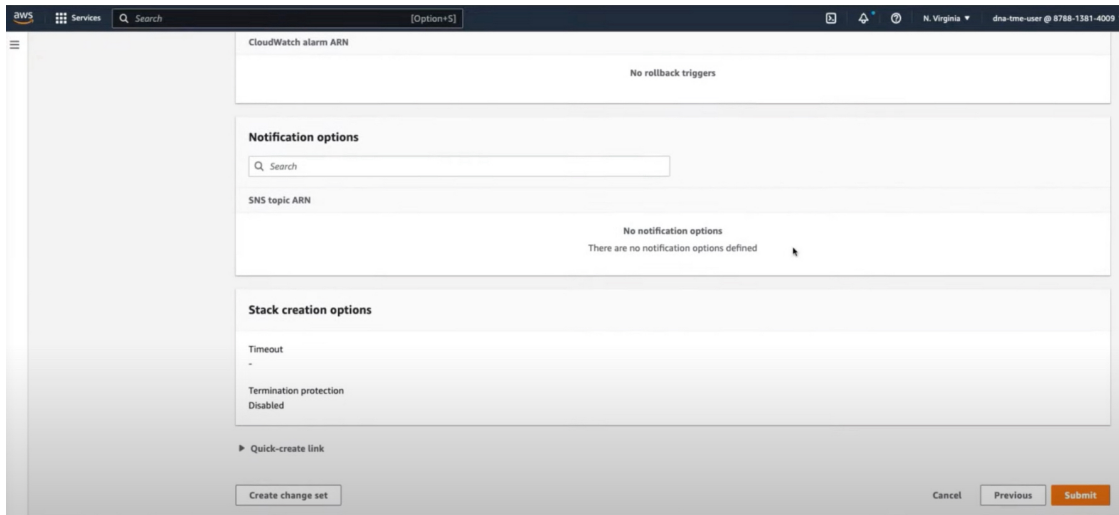
**Tags**  
You can specify tags (key-value pairs) to apply to resources in your stack. You can add up to 50 unique tags for each stack. [Learn more](#)

**Permissions**  
Choose an IAM role to explicitly define how CloudFormation can create, modify, or delete resources in the stack. If you don't choose a role, CloudFormation uses permissions based on your user credentials. [Learn more](#)

**IAM role - optional**  
Choose the IAM role for CloudFormation to use for all operations performed on the stack.

**Step 10** Click **Next** to review your stack information.

**Step 11** If you are satisfied with the configuration, click **Submit** to finish.



The stack creation process usually takes from 45 to 60 minutes.

---

## Validate the Deployment

To ensure that your environment setup and Catalyst Center VA configuration are working, perform the following validation checks.

### Before you begin

Ensure that your stack creation on AWS CloudFormation has no errors.

### Procedure

---

- Step 1** From the Amazon EC2 console, validate the network and system configuration and verify that the Catalyst Center IP address is correct.
- Step 2** Send a ping to the Catalyst Center IP address to ensure that your host details and network connection are valid.
- Step 3** Establish an SSH connection with Catalyst Center to verify that Catalyst Center is authenticated.
- Step 4** Test HTTPS accessibility to the Catalyst Center GUI using one of the following methods:
  - Use a browser.  
For more information about browser compatibility, see the [Cisco Catalyst Center Release Notes](#).
  - Use Telnet through the CLI.
  - Use curl through the CLI.

---

## Use AWS Marketplace to Manually Deploy Catalyst Center on AWS

If you're familiar with AWS administration, you have the option of deploying Catalyst Center manually on your AWS account using AWS Marketplace.

## Deploy Catalyst Center on AWS Manually Using AWS Marketplace

For instructions on how to deploy Catalyst Center on AWS using AWS Marketplace, do one of the following:

- Go to the [Cisco Software Download](#) site and download the following file:

`Deploy-cisco-dna-center-using-aws-marketplace-2.0.0.tar.gz`

## Validate the Deployment

To ensure that your environment setup and Catalyst Center VA configuration are working, perform the following validation checks.

### Before you begin

Ensure that your stack creation on AWS Marketplace has no errors.

### Procedure

---

- Step 1** From the Amazon EC2 console, validate the network and system configuration and verify that the Catalyst Center IP address is correct.
  - Step 2** Send a ping to the Catalyst Center IP address to ensure that your host details and network connection are valid.
  - Step 3** Establish an SSH connection with Catalyst Center to verify that Catalyst Center is authenticated.
  - Step 4** Test HTTPS accessibility to the Catalyst Center GUI using one of the following methods:
    - Use a browser.  
For more information about browser compatibility, see the [Catalyst Center VA Release Notes](#).
    - Use Telnet through the CLI.
    - Use curl through the CLI.
- 


## Post-Installation Tasks

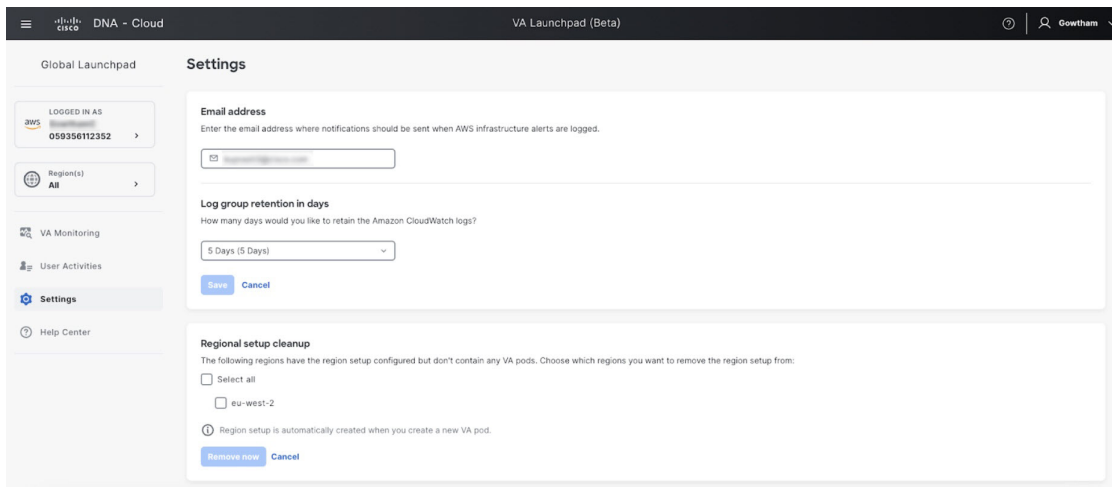
### Subscribe to the Amazon SNS Email Subscription

To receive email notifications from Amazon Simple Notification System (SNS), you can subscribe to the Amazon SNS email subscription in Cisco Global Launchpad settings. Amazon SNS sends AWS alerts about deployed resources, changes, or resource over-utilization to the provided email.

### Procedure

---

- Step 1** In the left navigation pane, click the settings icon (.
- Step 2** In the **Settings** pane, in the **Email to notify** area, enter the preferred email address in the **Email ID** field.



When you update an email ID, the old email address is unsubscribed and the new email address is subscribed. Alerts about VA pods that are created after the email change are sent to the new email address. Alerts about existing VA Pods are not sent to the new email address.

If an existing user account has not confirmed their email subscription and updates their subscription with a new email address, both the old and new email addresses are subscribed and remain configured in Amazon SNS.

#### Note

Multiple user accounts should not concurrently update their email ID. If this occurs, the latest updated email ID is used for email notification.

**Step 3** Click **Save**.


---

## Configure Log Retention

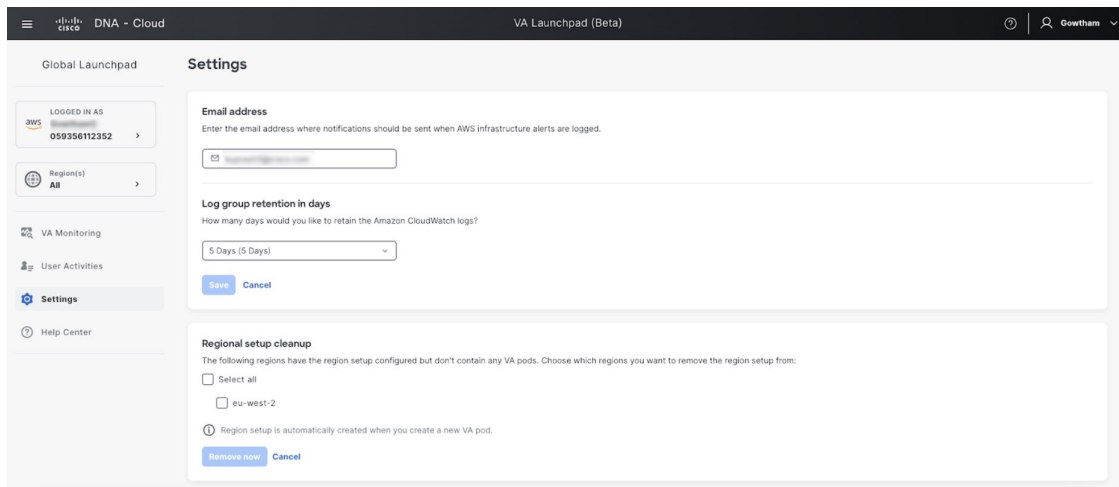
You can set the number of days to keep Amazon CloudWatch logs. By default, the logs are kept indefinitely.

## Procedure

---

**Step 1** In the left navigation pane, click the settings icon (.

The **Settings** pane is displayed.



- Step 2** Under **Log Group Retention In Days**, click the **Select Log Group Retention In Days** drop-down list and choose a retention period for the Amazon CloudWatch logs.
- Step 3** Click **Save**.

## Cisco Prime Infrastructure to Catalyst Center Migration

This section provides an overview on how to migrate from Cisco Prime Infrastructure to Catalyst Center. Migration involves two steps—the first step is to conduct a readiness check followed by the second step to migrate the sites and devices to Catalyst Center. For information on how to use the Catalyst Center readiness tool for Cisco Prime Infrastructure (PDART), see [Use PDART - a Cisco Catalyst Center Readiness Tool](#).

After assessing the migration readiness, the Prime Data Migration Tool (PDMT) can be used to migrate data from Cisco Prime to Catalyst Center. You can download the tool from [here](#). For more information on the migration process, see [Validated Profile: Cisco Prime Infrastructure to Cisco Catalyst Center Migration](#).

For information on compatibility of the PDMT versions with Catalyst Center releases, see [Cisco Prime Infrastructure and Cisco Catalyst Center Compatibility Matrix](#).

## Multiple Catalyst Centers—Limited Availability

Multiple Catalyst Center allows you to define a single global set of virtual networks for software-defined access across multiple Catalyst Center clusters integrated with a single Cisco ISE system. This Multiple Catalyst Center functionality is a Limited Availability offering in Catalyst Center on ESXi.

To facilitate global administration of Cisco SD-Access across multiple Catalyst Center clusters with a consistent set of virtual networks, the Multiple Catalyst Center feature leverages the existing secure connection with Cisco ISE to propagate virtual networks, Security Group Tags (SGTs), access contracts, and Group-Based Access Control (GBAC) Policy from one cluster to another cluster, all integrated with the same Cisco ISE deployment. Cisco ISE takes the information learned from one cluster (the Author node) and propagates it to the other clusters (Reader nodes).

Because there are significant caveats for the Multiple Catalyst Center functionality, the Cisco SD-Access Design Council reviews the requests and provides guidance for use of the Multiple Catalyst Center to participants in the Limited Availability program.

Contact your account team to submit a request to the Cisco SD-Access Design Council to participate in the Limited Availability program.

Customers who are using Cisco ISE Version 3.1 or earlier must request and install the Limited Availability package before enabling Multiple Catalyst Center.



---

**Note** After this functionality is enabled, it can be disabled only by deleting Cisco ISE. In addition, if this functionality is enabled, because pxGrid is a required component of the solution, pxGrid cannot be disabled subsequently.

---

## Deploy Cisco ISE on AWS

The following sections describe how to deploy Cisco ISE on AWS.

### Launch a Cisco ISE CloudFormation Template Through AWS Marketplace

This method may launch standalone Cisco ISE instances only. To create a Cisco ISE deployment, see the Chapter "Deployment" in the *Cisco ISE Administrator Guide* for your release.



- 
- Note**
- You cannot add multiple DNS or NTP servers through the CFT. After you create a Cisco ISE instance, you can add more DNS or NTP servers through the Cisco ISE CLI. However, from Cisco ISE Release 3.4, you can add secondary and tertiary DNS or NTP servers through the CFT.
  - You cannot configure IPv6 DNS or NTP servers through the CFT. You can use the Cisco ISE CLI to configure IPv6 servers.
- 

The Cisco ISE CFT creates an instance of the General Purpose SSD (gp2) volume type.



---

**Note** From Cisco ISE Release 3.4, OpenAPI services are enabled automatically, and hence, there's no need to send OpenAPI-related options while launching an instance.

---

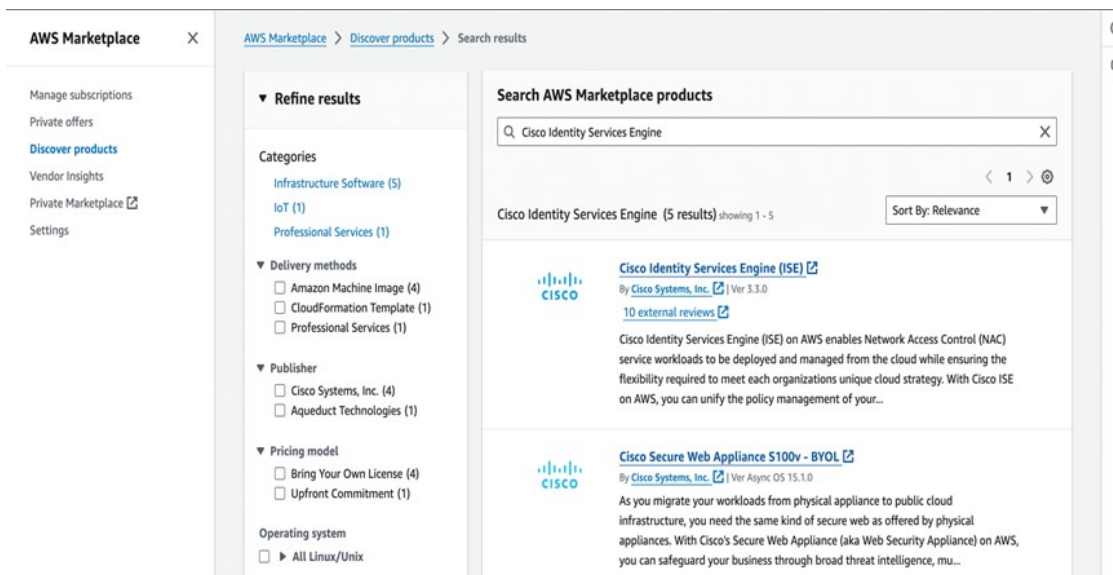
### Before you begin

In AWS, create the security groups and management networks that you want to include in your Cisco ISE CFT configuration.

### Procedure

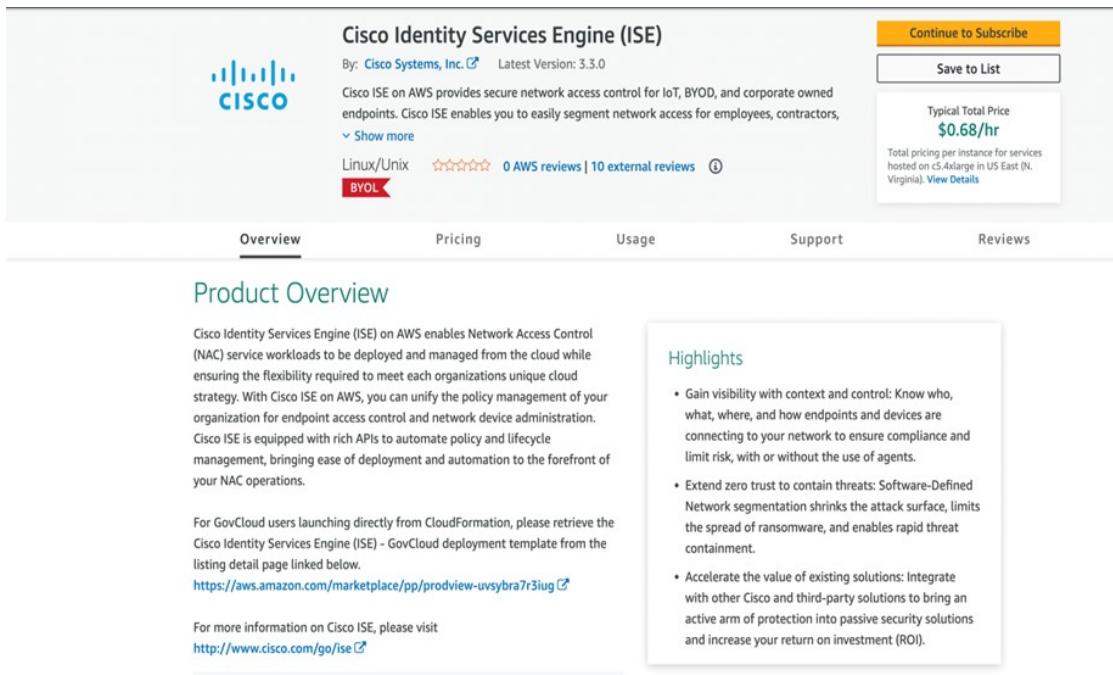
- 
- Step 1** Log in to the Amazon Management Console at <https://console.aws.amazon.com/>, and search for **AWS Marketplace Subscriptions**.
- Step 2** In the **Manage Subscriptions** window that is displayed, click **Discover Products** in the left pane.
- Step 3** Enter **Cisco Identity Services Engine (ISE)** in the search bar.





**Step 4** Click the product name.

**Step 5** In the new window that is displayed, click **Continue to Subscribe**.




**Step 6** Click **Continue to Configuration**.

**Step 7** In the **Configure this software** area, click **Learn More** and then click **Download CloudFormation Template** to download the Cisco ISE CFT to your local system. You can use this template to automate the configuration of other Cisco ISE instances, as required.

You can also click **View Template** in the **Learn More** dialog box to view the CFT in the AWS CloudFormation Designer.

Learn more

Here are the details of what the CloudFormation template launches in the customer environment.



IseEc2Ins...  
Instance

[Download CloudFormation Template](#)


[View Template in CloudFormation Designer](#)

## Step 8

Choose the required values from the **Software Version** and **AWS Region** drop-down lists.

## Step 9

Click **Continue to Launch**.


Cisco Identity Services Engine (ISE)

Continue to Launch

### Configure this software

Choose a fulfillment option and software version to launch this software.

Fulfillment option

CloudFormation Template

CloudFormation Template

Deploy a complete solution configuration using a CloudFormation template

Cisco Identity Services Engine (ISE)

Software version

3.3.0 (Jul 09, 2023)

Whats in This Version
Cisco Identity Services Engine (ISE)
running on c5.4xlarge
Learn more

Region

US West (Oregon)

Use of Local Zones or WaveLength infrastructure deployment may alter your final pricing.

**Product Code:** basttrzv6xwc4ym2uup6bh730

[Release notes \(updated July 9, 2023\)](#)

#### Pricing information

This is an estimate of typical software and infrastructure costs based on your configuration. Your actual charges for each statement period may differ from this estimate.

#### Software Pricing

Cisco Identity Services Engine (ISE)	\$0/hr
<b>BYOL</b>	
running on c5.4xlarge	

- Step 10** Choose **Launch CloudFormation** from the **Choose Action** drop-down list.
- Step 11** Click **Launch**.

The screenshot shows the Cisco Identity Services Engine (ISE) launch page. At the top, there is a header with the Cisco logo and the text "Cisco Identity Services Engine (ISE)". Below the header, there are navigation links: "< Product Detail", "Subscribe", "Configure", and "Launch". The main heading is "Launch this software" in green. Below this, a subheading reads "Review the launch configuration details and follow the instructions to launch this software." The configuration details are listed in a table:

Configuration details	
Fulfillment option	Cisco Identity Services Engine (ISE) Cisco Identity Services Engine (ISE) <i>running on c5.4xlarge</i>
Software version	3.3.0
Region	US West (Oregon)

Below the table is a button labeled "Usage instructions". At the bottom, there is a "Choose Action" section with a dropdown menu set to "Launch CloudFormation" and a note: "Choose this action to launch your configuration through the AWS CloudFormation console." To the right of the dropdown is a large orange "Launch" button.

- Step 12** In the **Create Stack** window, click the **Template Is Ready** and **Amazon S3 URL** radio buttons.
- Step 13** Click **Next**.
- Step 14** In the new window, enter a value in the **Stack Name** field.
- Step 15** Enter the required details in the following fields in the **Parameters** area:
- **Hostname:** This field only supports alphanumeric characters and hyphens (-). The length of the hostname can't exceed 19 characters.
  - **Instance Key Pair:** To access the Cisco ISE instance through SSH, choose the PEM file that you created in AWS for the username. Create a PEM key pair in AWS now if you have not configured one already. An example of an SSH command in this scenario is `ssh -i mykeypair.pem iseadmin@myhostname.compute-1.amazonaws.com`.
  - **Management Security Group:** Choose the security group from the drop-down list. You must create the security group in AWS before configuring this CFT.

**Note**

You can add only one security group in this step. You can add additional security groups in Cisco ISE after installation. The network traffic rules that you want to be available in Cisco ISE at launch must be configured in the security group that you add here.

- **Management Network:** Choose the subnet to be used for the Cisco ISE interface. To enable IPv6 addresses, you must associate an IPv6 CIDR block with your VPC and subnets. Create a subnet in AWS now if you have not configured one already.

- **Management Private IP:** Enter the IPv4 address from the subnet that you chose earlier. If this field is left blank, the AWS DHCP assigns an IP address.

After the Cisco ISE instance is created, copy the private IP address from the **Instance Summary** window. Then, map the IP and hostname in your DNS server before you create a Cisco ISE deployment.

- **Timezone:** Choose a system time zone from the drop-down list.
- **Instance Type:** Choose a Cisco ISE instance type from the drop-down list.
- **EBS Encryption:** Choose **True** from the drop-down list to enable encryption. The default value for this field is **False**. The default value for this field is **False**. In Cisco ISE Release 3.3 and later releases, the default value of the **EBS Encryption** field is **True**.
- (Optional) **KMS Key:** Enter the **KMS Key** or Amazon Resource Name or alias for data encryption.

**Note**

This is an optional field applicable for Cisco ISE Release 3.3 and later releases. If the **KMS Key** is provided, it will be used for data encryption. If the **KMS Key** is not provided, the default key will be used for data encryption.

- **Volume Size:** Specify the volume size, in GB. The accepted range is 300 GB to 2400 GB. We recommend 600 GB for production use. Configure a volume size lesser than 600 GB only for evaluation purposes. When you terminate the instance, the volume is also deleted.

**Note**

AWS creates EBS storage volumes in Gibibyte (GiB). When you enter 600 in the **Volume Size** field, AWS creates 600 GiB (or 644.25 GB) of EBS volume.

- **DNS Domain:** Accepted values for this field are ASCII characters, numerals, hyphen (-), and period (.).
- **Name Server:** Enter the IP address of the name server in the correct syntax.

**Note**

You can add only one DNS server in this step. You can add additional DNS servers through the Cisco ISE CLI after installation. From Cisco ISE Release 3.4, you can add secondary and tertiary DNS servers as well in this step. If the **Secondary DNS Server** field is left blank, you cannot use the **Tertiary DNS Server** option.

- **NTP Server:** Enter the IP address or hostname of the NTP server in correct syntax, for example, **time.nist.gov**. Your entry is not verified on submission. If you use the wrong syntax, Cisco ISE services might not come up on launch.

**Note**

If the IP address or the hostname that you enter here is incorrect, Cisco ISE cannot synchronize with the NTP server. Use an SSH terminal to log in to Cisco ISE and then use the Cisco ISE CLI to configure the correct NTP server.

You can add only one NTP server in this step. You can add additional NTP servers through the Cisco ISE CLI after installation. From Cisco ISE Release 3.4, you can also add secondary and tertiary NTP servers in this step. If the **Secondary NTP Server** field is left blank, you cannot use the **Tertiary NTP Server** option.

- **ERS:** To enable External RESTful Services (ERS) services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.

- **OpenAPI:** To enable OpenAPI services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.
- **pxGrid:** To enable pxGrid services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.
- **pxGrid Cloud:** The default value for this field is **no**.
- **Enter Password:** Enter the administrative password that must be used for GUI. The password must be compliant with the Cisco ISE password policy. The password is displayed in plain text in the **User Data** area of the instance settings window in the AWS console. See the "User Password Policy" section in the Chapter "Basic Setup" of the *Cisco ISE Administrator Guide* for your release.
- **Confirm Password:** Re-enter the administrative password.

**Step 16** Click **Next** to initiate the instance-creation process.

## Launch Cisco ISE with CloudFormation Template

This method may launch standalone Cisco ISE instances only. To create a Cisco ISE deployment, see the chapter "Deployment" in the *Cisco ISE Administrator Guide* for your release.



### Note

- You cannot add multiple DNS or NTP servers through the CFT. After you create a Cisco ISE instance, you can add additional DNS or NTP servers through the Cisco ISE CLI. However, from Cisco ISE Release 3.4, you can add secondary and tertiary DNS or NTP servers through the CFT.
- You cannot configure IPv6 DNS or NTP servers through the CFT. You can only use the Cisco ISE CLI to configure IPv6 servers.

The Cisco ISE CFT creates an instance of the General Purpose SSD (gp2) volume type.



### Note

From Cisco ISE Release 3.4, OpenAPI services are enabled automatically; there's no need to send OpenAPI-related options while launching an instance.

## Before you begin

In AWS, create the security groups and management networks that you want to include in your Cisco ISE CFT configuration.

## Procedure

- Step 1** Log in to the Amazon Management Console at <https://console.aws.amazon.com/> and search for **AWS Marketplace Subscriptions**.
- Step 2** In the **Manage Subscriptions** window, click **Discover Products** in the left pane.
- Step 3** Enter **Cisco Identity Services Engine (ISE)** in the search bar.
- Step 4** Click the product name.
- Step 5** In the new window that is displayed, click **Continue to Subscribe**.
- Step 6** Click **Continue to Configuration**.

**Step 7** In the **Configure this software** area, click **Learn More** and then click **Download CloudFormation Template** to download the Cisco ISE CFT to your local system. You can use this template to automate the configuration of other Cisco ISE instances, as required.

You can also click **View Template** in the **Learn More** dialog box to view the CFT in the AWS CloudFormation Designer.

**Step 8** Using the AWS search bar, search for **CloudFormation**.

**Step 9** From the **Create Stack** drop-down list, choose **With new resources (standard)**.

**Step 10** In the **Create Stack** window, choose **Template Is Ready** and **Upload a Template File**.

**Step 11** Click **Choose File** and upload the CFT file that you downloaded in [Step 7](#).

**Step 12** Click **Next**.

**Step 13** In the new window, enter a value in the **Stack Name** field.

**Step 14** Enter the required details in the following fields in the **Parameters** area:

- **Hostname:** This field only supports alphanumeric characters and hyphens (-). The length of the hostname can't exceed 19 characters.
- **Instance Key Pair:** To access the Cisco ISE instance through SSH, choose the PEM file that you created in AWS for the username admin. Create a PEM key pair in AWS now if you have not configured one already. An example of an SSH command in this scenario is `ssh -i mykeypair.pem admin@myhostname.compute-1.amazonaws.com`.
- **Management Security Group:** Choose the security group from the drop-down list. You must create the security group in AWS before configuring this CFT.

**Note**

You can add only one security group in this step. You can add additional security groups in Cisco ISE after installation. The network traffic rules that you want available in Cisco ISE at instance launch must be configured in the security group that you add here.

- **Management Network:** Choose the subnet to be used for the Cisco ISE interface. To enable IPv6 addresses, you must associate an IPv6 CIDR block with your VPC and subnets. Create a subnet in AWS now if you have not configured one already.
- **Management Private IP:** Enter the IPv4 address from the subnet that you chose earlier. If this field is left blank, the AWS DHCP assigns an IP address.

After the Cisco ISE instance is created, copy the private IP address from the **Instance Summary** window. Then, map the IP address and hostname in your DNS server before you create a Cisco ISE deployment.

- **Timezone:** Choose a system time zone from the drop-down list.
- **Instance Type:** Choose a Cisco ISE instance type from the drop-down list.
- **EBS Encryption:** Choose **True** from the drop-down list to enable encryption. The default value for this field is **False**. In Cisco ISE Release 3.3 and later, the default value of the **EBS Encryption** field is **True**.
- (Optional) **KMS Key:** Enter the **KMS Key** or Amazon Resource Name or alias for data encryption.

**Note**

This is an optional field applicable for Cisco ISE Release 3.3 and later. If the **KMS Key** is provided, it will be used for data encryption. If the **KMS Key** is not provided, the default key will be used for data encryption.

- **Volume Size:** Specify the volume size in GB. The accepted range is 300 GB to 2400 GB. We recommend 600 GB for production use. Configure a volume size less than 600 GB only for evaluation purposes. When you terminate the instance, the volume is also deleted.

**Note**

AWS creates EBS storage volumes in Gibibyte (GiB). When you enter 600 in the **Volume Size** field, AWS creates 600 GiB (or 644.25 GB) of EBS volume.

- **DNS Domain:** Accepted values for this field are ASCII characters, numerals, hyphens (-), and periods (.).
- **Name Server:** Enter the IP address of the name server in correct syntax.

**Note**

You can add only one DNS server in this step. You can add additional DNS servers through the Cisco ISE CLI after installation.

From Cisco ISE Release 3.4, you can also add secondary and tertiary NTP servers in this step. If the **Secondary DNS Server** field is left blank, you cannot use the **Tertiary DNS Server** option.

- **NTP Server:** Enter the IP address or hostname of the NTP server in correct syntax; for example, **time.nist.gov**. Your entry is not verified on submission. If you use the wrong syntax, Cisco ISE services might not come up on launch.

**Note**

If the IP address or the hostname that you enter here is incorrect, Cisco ISE cannot synchronize with the NTP server. Use an SSH terminal to log in to Cisco ISE and use the Cisco ISE CLI to configure the correct NTP server.

You can add only one NTP server in this step. You can add additional NTP servers through the Cisco ISE CLI after installation.

From Cisco ISE Release 3.4, you can also add secondary and tertiary NTP servers in this step. If the **Secondary NTP Server** field is left blank, you cannot use the **Tertiary NTP Server** option.

- **ERS:** To enable ERS services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.
- **OpenAPI:** To enable OpenAPI services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.
- **pxGrid:** To enable pxGrid services at Cisco ISE launch, enter **yes**. The default value for this field is **no**.
- **pxGrid Cloud:** The default value for this field is **no**.

**Note**

The pxGrid Cloud feature is not available because there are dependencies on complementary product releases. Do not enable pxGrid Cloud services.

- **Enter Password:** Enter the administrative password that must be used for GUI. The password must be compliant with the Cisco ISE password policy. The password is displayed in plain text in the **User Data** area of the instance settings window in the AWS console. See the "User Password Policy" section in the chapter "Basic Setup" of the [Cisco ISE Administrator Guide](#) for your release.
- **Confirm Password:** Re-enter the administrative password.

**Step 15** Click **Next** to initiate the instance-creation process.

---



## Launch a Cisco ISE AMI



**Note** From Cisco ISE Release 3.4, OpenAPI services are enabled automatically, and hence, there's no need to send OpenAPI-related options while launching an instance.

### Procedure

- 
- Step 1** Log in to your Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
- Step 2** In the left pane, click **Instances**.
- Step 3** In the **Instances** window, click **Launch Instances**.
- Step 4** In the **Step 1: Choose AMI** window, in the left menu, click **AWS Marketplace**.
- Step 5** In the search field, enter **Cisco Identity Services Engine**.
- Step 6** In the **Cisco Identity Services Engine (ISE)** option, click **Select**.
- A **Cisco Identity Services Engine (ISE)** dialog box is displayed with various details of the AMI.
- Step 7** Review the information and click **Continue** to proceed.
- Step 8** In the **Step 2: Choose an Instance Type** window, click the radio button next to the instance type that you want to use. The supported instance types are:
- c5.4xlarge
  - m5.4xlarge
  - c5.9xlarge
- Step 9** Click **Next: Configure Instance Details**.
- Step 10** In the **Step 3: Configure Instance Details** window, enter the required details in the following fields:
- **Number of Instances:** Enter **1** in this field.
  - **Network:** From the drop-down list, choose the VPC in which you want to launch the Cisco ISE instance.
  - **Subnet:** From the drop-down list, choose the subnet in which you want to launch the Cisco ISE instance.
  - **Network Interfaces:** The drop-down list displays **New Network Interface** by default, which means that an IP address is auto-assigned to Cisco ISE by the connected DHCP server. You can choose to enter an IP address in this field to assign a fixed IP address to Cisco ISE. You can also choose an existing network interface from the same subnet, from the **Network Interfaces** drop-down list. You can only configure one interface during the setup process. After Cisco ISE is installed, you can add more interfaces through Cisco ISE.
- Step 11** In the **Advanced Details** area, in the **User Data** area, click the **As Text** radio button and enter the key-value pairs in the following format:
- ```
hostname=<hostname of Cisco ISE>
primarynameserver=<IPv4 address>
secondarynameserver=<IPv4 address of secondary nameserver> (Applicable to Cisco ISE 3.4 and later releases)
tertiarynameserver=<IPv4 address of tertiary nameserver> (Applicable to Cisco ISE 3.4 and later releases)
```



dnsdomain=<example.com>

ntpserver=<IPv4 address or FQDN of the NTP server>

secondaryntpserver=<IPv4 address or FQDN of the secondary NTP server> (Applicable to Cisco ISE 3.4 and later releases)

tertiaryntpserver=<IPv4 address or FQDN of the tertiary NTP server> (Applicable to Cisco ISE 3.4 and later releases)

timezone=<timezone>

username=<admin>

password=<password>

ersapi=<yes/no>

openapi=<yes/no>

pxGrid=<yes/no>

pxgrid\_cloud=<yes/no>

### Important

From Cisco ISE Release 3.4,

- a. The **ntpserver** field name is changed to **primaryntpserver**. If you use **ntpserver**, Cisco ISE services will not start.
- b. OpenAPI is enabled by default. Hence, the **openapi=<yes/no>** field is not required.
- c. If you leave the **secondarynameserver** field blank and use only the **tertiarynameserver** field, the Cisco ISE services will not start.
- d. If you leave the **secondaryntpserver** field blank and use only the **tertiaryntpserver** field, the Cisco ISE services will not start.

You must use the correct syntax for each of the fields that you configure through the user data entry. The information you enter in the **User Data** field is not validated when it is entered. If you use the wrong syntax, Cisco ISE services might not come up when you launch the AMI. The following are the guidelines for the configurations that you submit through the **User Data** field:

- **hostname**: Enter a hostname that contains only alphanumeric characters and hyphen (-). The length of the hostname must not exceed 19 characters and cannot contain underscores (\_).
- **primarynameserver**: Enter the IP address of the primary name server. Only IPv4 addresses are supported. From Cisco ISE Release 3.4, you can configure **secondarynameserver** and **tertiarynameserver** during installation by using the **secondarynameserver** and **tertiarynameserver** fields.
- **dnsdomain**: Enter the FQDN of the DNS domain. The entry can contain ASCII characters, numerals, hyphens (-), and periods (.).
- **ntpserver**: Enter the IPv4 address or FQDN of the NTP server that must be used for synchronization, for example, time.nist.gov. From Cisco ISE Release 3.4, you can configure secondary and tertiary NTP servers during installation by using the **secondaryntpserver** and **tertiaryntpserver** fields.
- **timezone**: Enter a timezone, for example, Etc/UTC. We recommend that you set all the Cisco ISE nodes to the Coordinated Universal Time (UTC) timezone, especially if your Cisco ISE nodes are installed in a distributed deployment. This procedure ensures that the timestamps of the reports and logs from the various nodes in your deployment are always synchronized.

- **username:** The default username that you configure must be **admin**. If you configure a username other than **admin**, you will not be able to access the Cisco ISE CLI when you launch the AMI.
- **password:** Configure a password for GUI-based login to Cisco ISE. The password that you enter must comply with the Cisco ISE password policy. The password must contain 6 to 25 characters and include at least one numeral, one uppercase letter, and one lowercase letter. The password cannot contain or be the same as the username or its reverse (iseadmin or nimdaesi), cisco, or ocsic. The allowed special characters are @~\*!,+=\_-. See the "User Password Policy" section in the Chapter "Basic Setup" of the [Cisco ISE Administrator Guide](#) for your release.
- **ersapi:** Enter **yes** to enable ERS, or **no** to disallow ERS.
- **openapi:** Enter **yes** to enable OpenAPI, or **no** to disallow OpenAPI.
- **pxGrid:** Enter **yes** to enable pxGrid, or **no** to disallow pxGrid.
- **pxgrid\_cloud:** Enter **yes** to enable pxGrid Cloud or **no** to disallow pxGrid Cloud. To enable pxGrid Cloud, you must enable pxGrid. If you disallow pxGrid, but enable pxGrid Cloud, pxGrid Cloud services are not enabled at launch.

**Step 12** Click **Next: Add Storage**.

**Step 13** In the **Step 4: Add Storage** window:

- a) Enter a value in the **Size (GiB)** column.

The valid range for this field is 279.4 to 2235.2 GiB. In a production environment, you must configure storage equal to or greater than 558.8 GiB. Storage lesser than 558.8 GiB only supports an evaluation environment. Note that Cisco ISE is created with storage defined in GB. The GiB value that you enter here is automatically converted into GB values during the Cisco ISE image-creation process. In GB, the valid storage range is 300 to 2400 GB, with 600 GB as the minimum value for a Cisco ISE in a production environment.

- b) From the **Volume Type** drop-down list, choose **General Purpose SSO (gp2)**.  
 c) To enable EBS encryption, from the **Encryption** drop-down list, choose an encryption key.

**Note**

Do not click the **Add New Volume** button that is displayed on this window.

**Step 14** Click **Next: Add Tags**.

**Step 15** (Optional) In the **Step 5: Add Tags** window, click **Add Tag** and enter the required information in the **Key** and **Value** fields. The check boxes in the **Instances**, **Volumes**, and **Network Interfaces** columns are checked by default. If you have chosen a specific network interface in the **Step 3: Configure Instance Details** window, you must uncheck the **Network Interfaces** check box for each tag that you add in this window.

**Step 16** Click **Next: Configure Security Group**.

**Step 17** In the **Step 6: Configure Security Group** window, in **Assign a security group area**, you can choose to create a new security group or choose an existing security group by clicking the corresponding radio button.

- a) If you choose **Create a new security group**, enter the required details in the **Type**, **Protocol**, **Port Range**, **Source**, and **Description** fields.  
 b) If you choose **Select an existing security group**, check the check boxes next to the security groups you want to add.

**Step 18** Click **Review and Launch**.

**Step 19** In the **Step 7: Review Instance Launch** window, review all the configurations that you have created in this workflow. You can edit the values of these sections by clicking the corresponding **Edit** link.

**Step 20** Click **Launch**.

**Step 21** In the **Select an existing key pair or create a new key pair** dialog box choose one of the following options from the drop-down list:

- **Choose an existing key pair**
- **Create a new key pair**

**Note**

To use SSH to log in to Cisco ISE, use a key pair where the username is **iseadmin**. The key pair must be kept intact. If the key pair is lost or corrupted, you cannot recover your Cisco ISE because you cannot map a new key pair to the existing instance.

**Step 22** Check the check box for the acknowledgment statement and click **Launch Instances**.

The **Launch Status** window displays the progress of the instance creation.

---

## Postinstallation Notes and Tasks

To check the status of the instance launch, in the left pane of the AWS console, click **Instances**. The **Status Check** column for the instance displays **Initializing** while the instance is being configured. When the instance is ready and available, the column displays **x checks done**.

You can access the Cisco ISE GUI or CLI about 30 minutes after the Cisco ISE EC2 instance is built. You can access the CLI and GUI of Cisco ISE with the IP address that AWS provides for your instance, and log in to the Cisco ISE administration portal or console.

When the Cisco ISE instance is ready and available for use, carry out the following steps:

1. When you create a key pair in AWS, you are prompted to download the key pair into your local system. Download the key pair because it contains specific permissions that you must update to successfully log in to your Cisco ISE instance from an SSH terminal.

If you use Linux or MacOS, run the following command from your CLI:

```
sudo chmod 0400 mykeypair.pem
```

If you use Windows:

- a. Right-click the key file in your local system.
  - b. Choose **Properties > Security > Advanced**.
  - c. In the **Permissions** tab, assign full control to the appropriate user by clicking the corresponding option, and click **Disable Inheritance**.
  - d. In the **Block Inheritance** dialog box, click **Convert inherited permissions into explicit permissions on this object**.
  - e. In the **Permissions** tab, in the **Permissions entries** area, choose system and administrator users by clicking the corresponding entries, and then click **Remove**.
  - f. Click **Apply**, and then click **OK**.
2. Access the Cisco ISE CLI by running the following command in your CLI application:  

```
ssh -i mykeypair.pem admin@<Cisco ISE Private IP Address>
```
  3. At the login prompt, enter **admin** as the username.

4. At the system prompt, enter **show application version ise** and press **Enter**.
5. To check the status of the Cisco ISE processes, enter **show application status ise** and press **Enter**.  
If the output displays that an application server is in Running state, Cisco ISE is ready for use.
6. You can then log in to the Cisco ISE GUI.
7. Carry out the postinstallation tasks listed in [List of Post-Installation Tasks, on page 92](#).

## List of Post-Installation Tasks

After you install Cisco ISE, you must perform the following mandatory tasks:

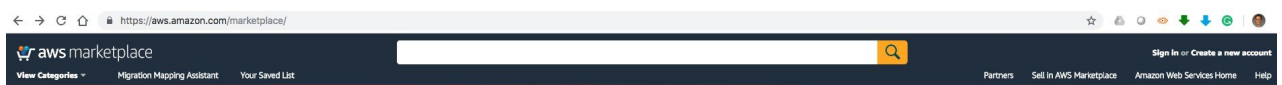
**Table 6: Mandatory Post-Installation Tasks**

| Task                             | Link in the Administration Guide                                                                                                                              |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Apply the latest patches, if any | See the section "Software Patch Installation Guidelines" in Chapter "Maintain and Monitor" in the <i>Cisco ISE Administrator Guide</i> for your release.      |
| Install Licenses                 | See the <a href="#">Cisco ISE Licensing Guide</a> for more information. See Chapter "Licensing" in the <i>Cisco ISE Administrator Guide</i> for your release. |
| Install Certificates             | See the section "Certificate Management in Cisco ISE" in Chapter "Basic Setup" in the <i>Cisco ISE Administrator Guide</i> for your release.                  |
| Create Repository for Backups    | See the section "Create Repositories" in Chapter "Maintain and Monitor" in the <i>Cisco ISE Administrator Guide</i> for your release.                         |
| Configure Backup Schedules       | See the section "Schedule a Backup" in Chapter "Maintain and Monitor" in the <i>Cisco ISE Administrator Guide</i> for your release.                           |
| Deploy Cisco ISE personas        | See the section "Cisco ISE Distributed Deployment" in Chapter "Deployment" in the <i>Cisco ISE Administrator Guide</i> for your release.                      |

## Launch a C9800-CL from AWS Marketplace with CloudFormation Template

### Procedure

- Step 1** Sign in AWS Marketplace: <https://aws.amazon.com/marketplace/>

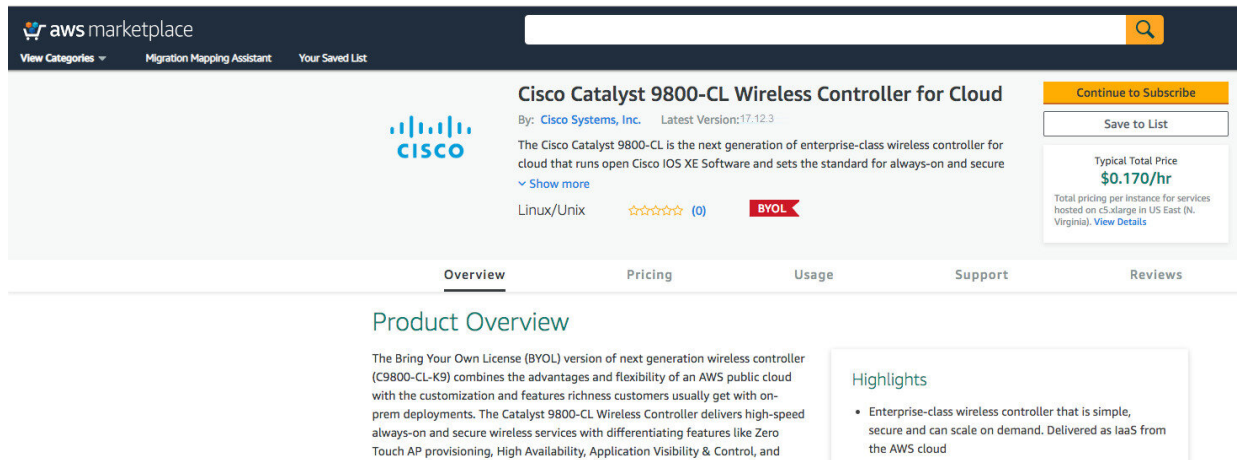


- Step 2** Search for Catalyst 9800 or C9800-CL and from the search results, click the Cisco Catalyst 9800-CL Wireless Controller for Cloud page.



### Step 3

The product overview page displays information about the product, support, and licensing, and an estimated cost of deploying the C9800-CL in the different AWS regions.




As you scroll down the page, you see information about the topology and the CloudFormation template.

aws marketplace

View Categories ▾ Migration Mapping Assistant Your Saved List

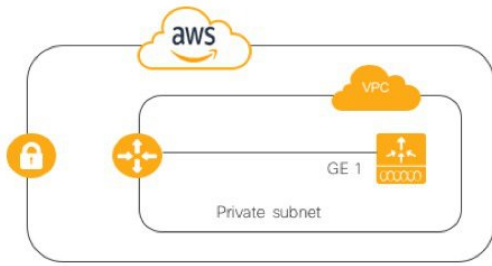
CISCO Cisco Catalyst 9800-CL Wireless Controller for Cloud

Overview Pricing Usage

 Cisco Catalyst C9800-CL Wireless Controller CloudFormation Template

Cisco® Catalyst® 9800-CL - Cloud Formation Template

[View Template Components](#)  
[View Usage Instructions](#)  
[Close CloudFormation Template](#)



[Download CloudFormation Template](#)  
[View Template in CloudFormation Designer](#)

**End User License Agreement**

By subscribing to this product you agree to terms and conditions outlined in the product [End User License Agreement \(EULA\)](#)

Click **Download CloudFormation Template** if you want to look at the file. (You can open the file with any notepad type of program.)

#### Step 4


Click **Continue to Subscribe**.

aws marketplace


Search

About ▾ Categories ▾ Delivery Methods ▾ Solutions ▾ AWS IQ ▾ Resources ▾ Your Saved List 1

Become a Channel Partner Sell in AWS Marketplace Amazon Web Services Home Help

 You have access to this product. You or someone in your organization has already purchased entitlements for this product. You can [view your subscriptions](#) or share access to it via [AWS License Manager](#)


[View Subscription](#)

 Cisco Catalyst 9800-CL Wireless Controller for Cloud

By: Cisco Systems, Inc. Latest Version: 17.12.3

The Cisco Catalyst 9800-CL is the next generation of enterprise-class wireless controller for cloud that runs open Cisco IOS XE Software and sets the standard for always-on and secure

[Show more](#)

Linux/Unix  1 AWS review

BYOL

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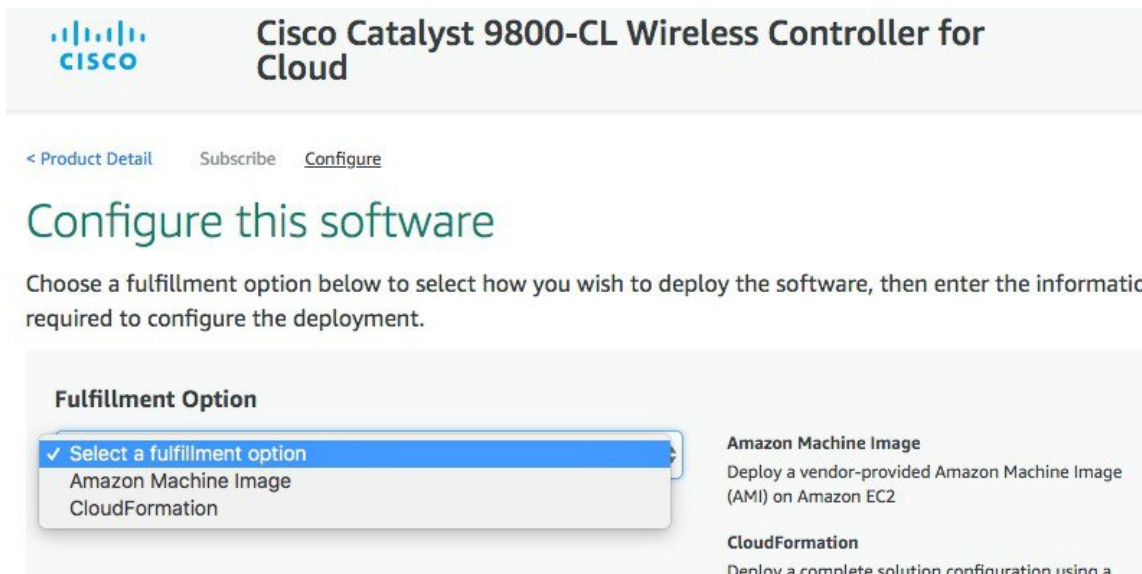
Typical Total Price  
**\$0.17/hr**

Total pricing per instance for services hosted on CL-Range in US East (IL, Virginia). [View Details](#)

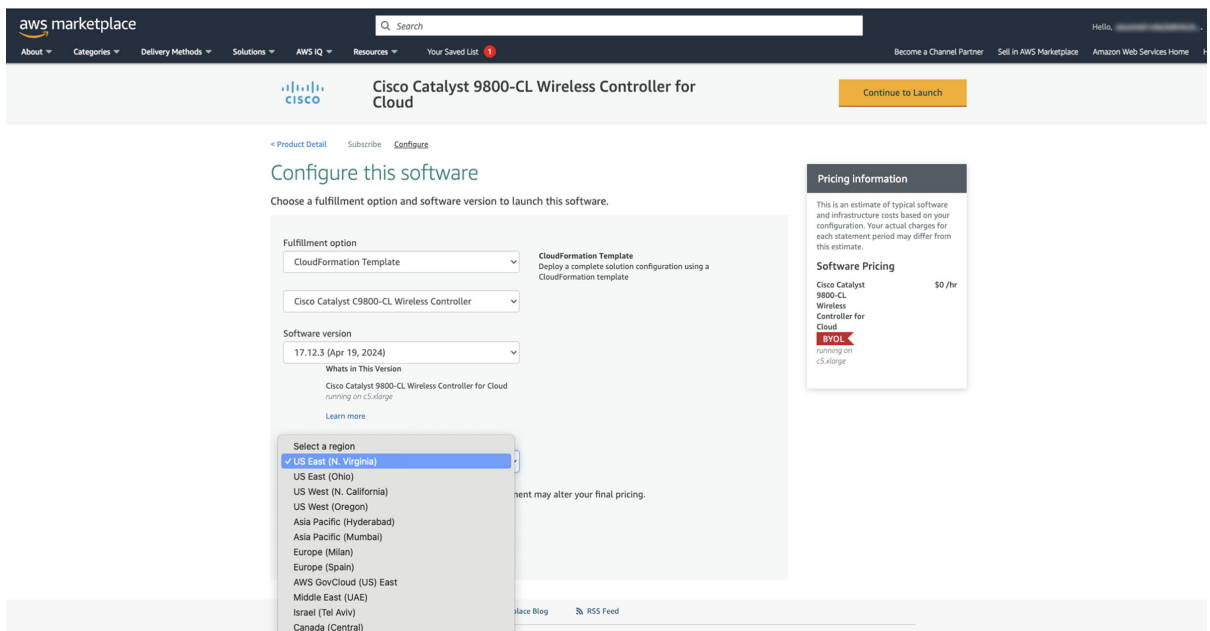
Click **Continue to Configuration**.



**Step 5** From the **Fulfillment Option** drop-down list, choose **CloudFormation**.

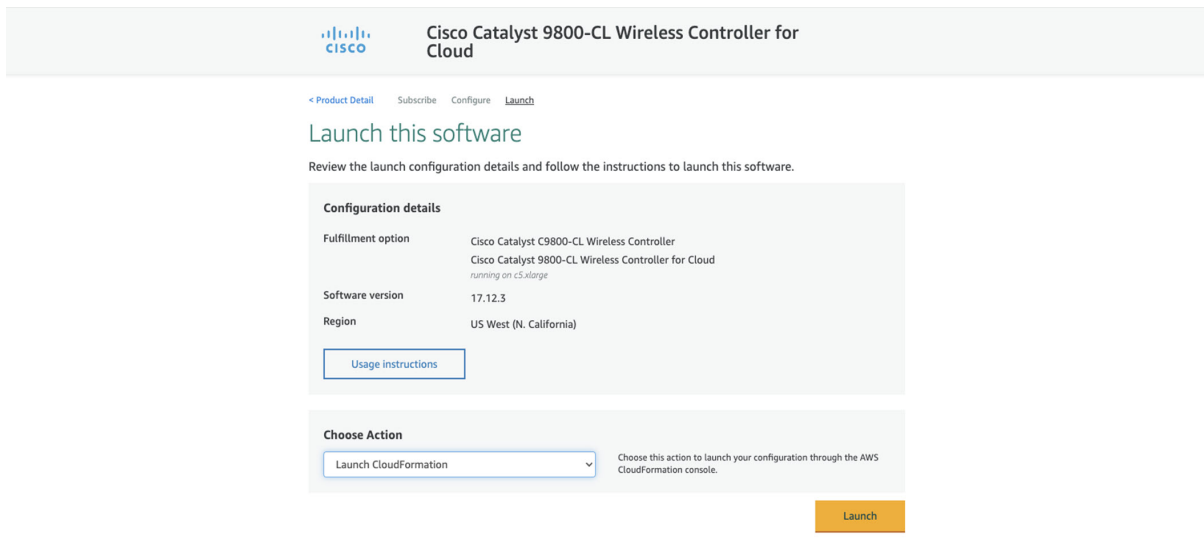


Scroll down and choose the region where you want to create the C9800-CL instance.



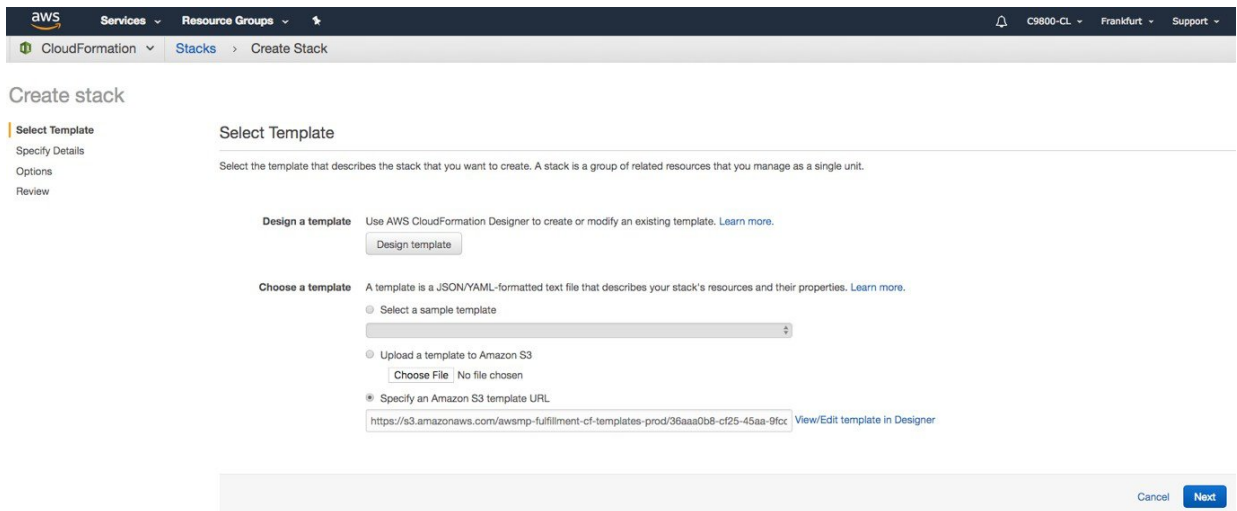
Click **Continue to Launch**.

**Step 6** Click **Launch**.



## Step 7

You are redirected automatically to the CloudFormation service in the AWS console, and the template is selected.



Click **Next**.

### Note

If you have requirements that need a default template change, you can upload a specific template by clicking **Upload a template to Amazon S3** and choosing the file to upload.

## Step 8

Enter the stack and instance details. The stack name is any name of your choice. Enter the C9800 hostname and choose the previously created key pair.



## Specify Details

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AW

**Stack name**

## Parameters

### Instance Details

**Hostname**  Specify the hostname of C9800-CL instance

**Instance Key Pair**    
 Pem file for access to created instance

### Step 9

Enter the network details. Choose the subnet and security group to assign to the wireless management interface. Make sure that the subnet and security group that you choose belong to the same selected VPC.

Optionally, you can enter the IP address that will be assigned to the C9800 instance within the selected subnet. Make sure that the specific IP belongs to the subnet you selected and is not already in use. Otherwise, the stack creation will fail.

### Network Details

**Management Network**    
 Subnet for Wireless Management interface

**Management Security Group**    
 Choose the security group to be attached to the interfaces

**Management IP address**  [Optional] Provide the desired IP for the instance in the selected subnet. Note: Make sure the IP is not already taken.

### Step 10

Enter the username and password to remotely connect to the instance. This step is optional. If you don't configure the username and password, you can log in via SSH using the default AWS user (ec2-user) and the instance key pair specified in the preceding step. Choose the instance type according to the scale. Cisco supports c5.xlarge (the default value), which corresponds to the supported scale of 1000 APs and 10,000 clients.

### User Details

**Username**  Specify the username

**Enter Password**  Specify the password

**Confirm Password**  Retype the password

### Other parameters

**C9800InstanceType**  Specify instance type for Cisco Catalyst C9800-CL Wireless Controller

[Cancel](#) [Previous](#) [Next](#)

Click **Next**.

**Step 11** Leave the option page to the default and click **Next**.

**Step 12** Review the settings and click **Create**.

**Options**

**Tags**  
No tags provided

**Rollback Triggers**  
No monitoring time provided  
No rollback triggers provided

**Advanced**

|                               |          |
|-------------------------------|----------|
| <b>Notification</b>           |          |
| <b>Termination Protection</b> | Disabled |
| <b>Timeout</b>                | none     |
| <b>Rollback on failure</b>    | Yes      |

[Quick Create Stack](#) (Create stacks similar to this one, with most details auto-populated)

[Cancel](#) [Previous](#) [Create](#)

**Step 13** Wait several seconds for the status to change from CREATE\_IN\_PROGRESS to CREATE\_COMPLETE.

| aws Services Resource Groups         |                  |                              |                 |                                                        |
|--------------------------------------|------------------|------------------------------|-----------------|--------------------------------------------------------|
| CloudFormation Stacks                |                  |                              |                 |                                                        |
| Create Stack Actions Design template |                  |                              |                 |                                                        |
| Filter: Active c9800-stack           |                  |                              |                 |                                                        |
|                                      | Stack Name       | Created Time                 | Status          | Description                                            |
| <input type="checkbox"/>             | c9800-stack-name | 2018-11-09 08:30:55 UTC+0100 | CREATE_COMPLETE | AWS CloudFormation Template for Cisco Catalyst 9800-CL |

If the stack creation fails, the status shows ROLLBACK COMPLETE. Click the stack name to see the failure reason. In the following example, the IP address that was chosen was already assigned.

Stacks: **Create Stack** | Actions | Design template

Filter: Active | c9800-demo | Showing 1 stack

| Stack Name  | Created Time                 | Status            | Description                                                                          |
|-------------|------------------------------|-------------------|--------------------------------------------------------------------------------------|
| c9800-demo1 | 2018-10-29 12:45:33 UTC+0100 | ROLLBACK_COMPLETE | AWS CloudFormation Template for Cisco Catalyst 9800-CL Wireless Controller for Cloud |

Overview | Outputs | Resources | **Events** | Template | Parameters | Tags | Stack Policy | Change Sets | Rollback Triggers

Filter by: Status | Search events

| 2018-10-29        | Status               | Type                       | Logical ID  | Status Reason                                                                                                                                                                                                                                     |
|-------------------|----------------------|----------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12:45:53 UTC+0100 | ROLLBACK_COMPLETE    | AWS::CloudFormation::Stack | c9800-demo1 |                                                                                                                                                                                                                                                   |
| 12:45:52 UTC+0100 | DELETE_COMPLETE      | AWS::EC2::Instance         | EC2Instance |                                                                                                                                                                                                                                                   |
| 12:45:39 UTC+0100 | ROLLBACK_IN_PROGRESS | AWS::CloudFormation::Stack | c9800-demo1 |                                                                                                                                                                                                                                                   |
| 12:45:38 UTC+0100 | CREATE_FAILED        | AWS::EC2::Instance         | EC2Instance | The following resource(s) failed to create: [EC2Instance] . Rollback requested by user. Address 10.10.10.5 is in use. (Service: AmazonEC2; Status Code: 400; Error Code: InvalidIPAddressInUse; Request ID: 47e75fd4-913b-4275-9bcc-1d3d49749d11) |
| 12:45:37 UTC+0100 | CREATE_IN_PROGRESS   | AWS::EC2::Instance         | EC2Instance |                                                                                                                                                                                                                                                   |
| 12:45:33 UTC+0100 | CREATE_IN_PROGRESS   | AWS::CloudFormation::Stack | c9800-demo1 | User Initiated                                                                                                                                                                                                                                    |

**Step 14** Go to the EC2 dashboard and click **Running Instances**.

aws Services | Resource Groups | ⭐

**EC2 Dashboard**

- Events
- Tags
- Reports
- Limits
- INSTANCES
  - Instances
  - Launch Templates

**Resources**

You are using the following Amazon EC2 resources in the EU Central (Frankfurt) region:

|                     |                   |
|---------------------|-------------------|
| 4 Running Instances | 2 Elastic IPs     |
| 0 Dedicated Hosts   | 0 Snapshots       |
| 4 Volumes           | 0 Load Balancers  |
| 1 Key Pairs         | 3 Security Groups |
| 0 Placement Groups  |                   |

**Step 15** The new instance is in Initializing state. Wait for several minutes until it changes to green.

Launch Instance | Connect | Actions

search : c9800-sta | Add filter

| aws:cloudfor   | Instance ID         | Instance Type | Instance State | Status Checks | Alarm Status | IPv4 Public IP | Launch Time                   | Security Groups     | Private IP Addr |
|----------------|---------------------|---------------|----------------|---------------|--------------|----------------|-------------------------------|---------------------|-----------------|
| c9800-stack... | i-0d8fba28ce9593106 | c5.xlarge     | running        | Initializing  | None         | -              | November 9, 2018 at 8:31:0... | C9800-CL_securit... | 10.10.20.8      |

Notice that the instance has the requested private IP and no public IP. At this point, the cloud instance of your Catalyst 9800 Wireless Controller is ready to use through a VPN connection.

#### Note

For security reasons, you can restrict access to your instance. For example, you can allow only CAPWAP from a certain IP range so that only those APs can register to the controller. You might need to enable the following protocols (inbound and outbound):

| Ports                   | Protocol        |
|-------------------------|-----------------|
| UDP 5246/5247/5248      | CAPWAP          |
| TCP 22                  | SSH, SCP        |
| TCP 21                  | FTP             |
| ICMP                    | Ping            |
| UDP 161, 162            | SNMP/SNMP traps |
| TCP 443/80              | HTTPS/HTTP      |
| TCP/UDP 49              | TACACS+         |
| UDP 53                  | DNS Server      |
| UDP 1812/1645/1813/1646 | Radius          |
| UDP 123                 | NTP Server      |
| UDP 514                 | Syslog          |

---

## C9800-CL Configuration via CLI: Skip the Day-0 Guided Flow

If you want to skip the day-0 web-based guided flow and use the CLI to configure the basic settings, complete the following steps. After completing these steps, you can access the GUI for the day-1 configuration.

For C9800-CL on AWS cloud, GigabitEthernet 1 is the only available interface and has the following characteristics:

- It is a Layer 3 interface (AWS only supports this type of interface)
- It gets its IP address by using DHCP

There is no wireless CLI wizard for C9800-CL. The following steps are manual.

### Procedure

---

**Step 1** Access the CLI via SSH.

Use the .pem file to authenticate with the certificate.

- chmod 400 <file>.pem
- ssh -i "file name.pem" ec2-user@<c9800-CL IP>

**Step 2** Optionally, set the hostname:

```
WLC(config)#hostname C9800
```

**Step 3** Enter the config mode and add login credentials:

```
C9800(config)#username <name> privilege 15 password <yourpwd>
```

**Step 4** Verify the GigabitEthernet 1 configuration and IP address. The interface is configured for DHCP.

```

c9800#sh run int gig 1
Building configuration...
Current configuration : 99 bytes
!
interface GigabitEthernet1
ip address dhcp
negotiation auto
no mop enabled
no mop sysid
end
c9800#sh ip int brief
Interface  IP-Address  OK? Method Status  Protocol
GigabitEthernet1    10.10.30.231    YES DHCP    up    up
Vlan1      unassigned    YES unset    administratively down down

```

**Step 5** Disable the wireless network to configure the country code.

```

C9800(config)#ap dot11 5ghz shutdown
Disabling the 802.11a network may strand mesh APs.
Are you sure you want to continue? (y/n) [y]: y
C9800(config)#ap dot11 24ghz shutdown
Disabling the 802.11b network may strand mesh APs.
Are you sure you want to continue? (y/n) [y]: y

```

**Step 6** Configure the AP country domain. This configuration triggers the GUI to skip the day-0 flow, because the C9800 requires a country code to be operational.

```

C9800(config)# c9800-10-30(config)#ap country ?
WORD  Enter the country code (e.g. US,MX,IN) upto a maximum of 20 countries

```

**Step 7** A certificate is required for the AP to join the virtual C9800. This can be created automatically via the day-0 flow or manually by entering the following commands.

- Specify the interface to be the wireless management interface:

```

C9800(config)#wireless management interface gig 1

```

- In exec mode, enter the following command:

```

C9800#wireless config vwlc-ssc key-size 2048 signature-algo sha256 password 0 <pwd>
Configuring vWLC-SSC...
Script is completed

```

The script automates the certificate creation and verifies the certificate installation:

```

C9800#show wireless management trustpoint
Trustpoint Name : ewlc-default-tp
Certificate Info : Available
Certificate Type : SSC
Certificate Hash : e55e61b683181ff0999ef317bb5ec7950ab86c9e
Private key Info : Available

```

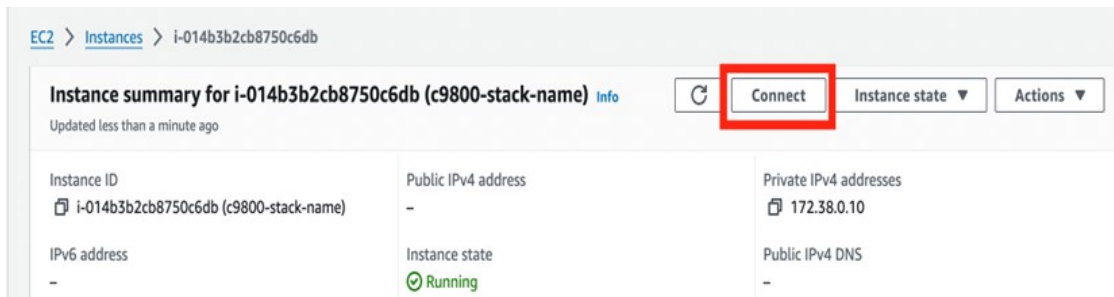
**Note**

You can skip the certificate/trustpoint configuration but if you do so, APs will not be able to join. You will need to go to the GUI and import the desired certificate.

To access the main dashboard, go to <https://<IP of the wireless management interface>>. Use the credentials you entered earlier. Because the device has a country code configured, the GUI skips the day-0 page. You will get access to the main dashboard for day-1 configuration.

**Step 8** To provision the Cisco Catalyst 9800-CL Wireless Controller from Catalyst Center, change the management interface from DHCP to static:

- a) Navigate to the AWS console and find the EC2 dashboard.
- b) Click **Connect**.



- c) Unconfigure the DHCP IP address under interface GigabitEthernet 1 and configure the static IP address 172.38.0.10. For more information on discovering and provisioning the Cisco Catalyst 9800-CL Wireless Controller, see [Validated Profile: Wireless Automation Deployment Using Cisco Catalyst Center](#).

**Step 9** Perform the SWIM upgrade using Catalyst Center on the Cisco Catalyst 9800-CL Wireless Controller. See "Update the Software Image for the Cisco Catalyst 9800-CL Wireless Controller" in [Validated Profile: Wireless Automation Deployment Using Cisco Catalyst Center](#).

## Operate the Solution

### High Availability

Cisco Catalyst Center on AWS high availability (HA) implementation is as follows:

- Single-node Elastic Compute Cloud (EC2) HA within an Availability Zone (AZ) is enabled by default.
- When a Catalyst Center EC2 instance crashes, AWS automatically brings up another instance with the same IP address. This ensures uninterrupted connectivity and minimizes disruptions during critical network operations.
- The experience and Recovery Time Objective (RTO) are similar to a power outage sequence in a bare-metal Catalyst Center appliance.

### About Backup and Restore

Use the backup and restore functions in Catalyst Center VA to create backup files. You can restore the backup files to the same appliance (in case your Catalyst Center becomes unusable) or use them to migrate your Catalyst Center to a different appliance, for example:

- Back up data from a Catalyst Center hardware appliance and restore the data to a Catalyst Center VA.
- Back up data from one Catalyst Center VA and restore the data to another Catalyst Center VA.



**Important** NetFlow data is not backed up when you back up Catalyst Center's automation and Assurance data.

## Backup and Restore—VA to VA

This procedure provides a high-level overview of how you can back up the data from one (source) Catalyst Center VA and restore it to another (target) Catalyst Center VA. For detailed instructions, see the "Backup and Restore" chapter in the [Cisco Catalyst Center Administrator Guide](#).

### Before you begin

- Make sure that you successfully deployed two Catalyst Center VAs with Cisco Global Launchpad, AWS CloudFormation, or AWS Marketplace.
- Make sure that both Catalyst Center VAs are up and running.
- Make sure that the backup server is connected to the source Catalyst Center VA through a VPN.
- Make sure that the backup server is reachable from the target Catalyst Center VA.
- If you're using a Cloud backup (NFS) server, you'll need to know the backup password in order to log into the server.

Your backup server password is dynamically created. The password is composed of the first four characters of the VA pod name and the backup server's IP address without the periods. For example, if the VA pod name is DNAC-SJC and the backup server's IP address is 10.0.0.1, the backup server password is DNAC10001.



---

**Note** You can find the VA pod name on the **Dashboard** pane after you choose the region that it's deployed in. You can find the backup server's IP address in the **View Catalyst Center** pane.

---

### Procedure

- 
- |               |                                                                                                                                                                                     |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Back up the data from the source Catalyst Center VA to a backup server.                                                                                                             |
| <b>Step 2</b> | Bring up the target Catalyst Center VA that you want to restore the data to.                                                                                                        |
| <b>Step 3</b> | Connect the target Catalyst Center VA to the backup server. (See Step 1.)                                                                                                           |
| <b>Step 4</b> | Configure the backup server on the target Catalyst Center VA.                                                                                                                       |
| <b>Step 5</b> | Restore the data to the target Catalyst Center VA.                                                                                                                                  |
| <b>Step 6</b> | Reestablish connectivity with Cisco ISE. For more information, see "Configure Authentication and Policy Servers" in the <a href="#">Cisco Catalyst Center Administrator Guide</a> . |

#### **Note**

For deployments running non-Cisco ISE AAA servers, use the **System Health** tool to confirm that Catalyst Center can reach these servers and connectivity is established.

- |               |                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 7</b> | If self-signed certificates were in place on your network's devices, reprovision them in order to update their Catalyst Center certificates. For more information, see "Update Device Configuration Using Telemetry" in the <a href="#">Cisco Catalyst Center User Guide</a> . |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### **Note**

You can skip this step if you have third-party CA certificates installed on your network devices.

---

## Backup and Restore—Hardware Appliance to VA

This procedure provides a high-level overview of how you can back up the data from a Catalyst Center hardware appliance and restore it to a Catalyst Center VA. For detailed instructions, see the "Backup and Restore" chapter in the [Cisco Catalyst Center Administrator Guide](#).

### Before you begin

- Make sure that the hardware appliance used for the backup is a 44-core Catalyst Center appliance.
- If you're using a Cloud backup (NFS) server, you'll need to know the backup password in order to log into the server.

Your backup server password is dynamically created. The password is composed of the first four characters of the VA pod name and the backup server's IP address without the periods. For example, if the VA pod name is DNAC-SJC and the backup server's IP address is 10.0.0.1, the backup server password is DNAC10001.



---

**Note** You can find the VA pod name on the **Dashboard** pane after you choose the region that it's deployed in.  
You can find the backup server's IP address in the **View Catalyst Center** pane.

---

### Procedure

---

**Step 1** Back up the data from the Catalyst Center hardware appliance.

Make sure that the backup server is connected to Catalyst Center through a VPN.

**Step 2** Create a Catalyst Center VA.

Make sure the Catalyst Center VA is up and running.

**Step 3** Connect the Catalyst Center VA to the backup server from Step 1.

Make sure that the backup server is reachable from the Catalyst Center VA.

**Step 4** Configure the backup server on the Catalyst Center VA.

**Step 5** Restore the data on to the Catalyst Center VA.

**Step 6** Reestablish connectivity with Cisco ISE. For more information, see "Configure Authentication and Policy Servers" in the [Cisco Catalyst Center Administrator Guide](#).

**Note**

For deployments running non-Cisco ISE AAA servers, use the **System Health** tool to confirm that Catalyst Center can reach these servers and connectivity is established.

**Step 7** If self-signed certificates were in place on your network's devices, reprovision them in order to update their Catalyst Center certificates. For more information, see "Update Device Configuration Using Telemetry" in the [Cisco Catalyst Center User Guide](#).

**Note**

You can skip this step if you have third-party CA certificates installed on your network devices.

---



## Manage Catalyst Center VA Operations in Launchpad (Automated Mode)

### Edit a VA Pod

You can edit only those VA pods that were created with connectivity. For those VA pods that were defined with another connectivity type, the **Edit VA pod** option is disabled in the dropdown list.

#### Procedure

---

- Step 1** On the **Dashboard** pane, locate the VA pod that you want to edit.
- Step 2** In the bottom-right corner of the VA pod card, click the ellipsis icon (...) and choose **Edit VA Pod**.
- Step 3** In the **Modify VPN Details** page, make the relevant edits and click **Next**.
- Step 4** Review the edited details, and when you're ready, click **Proceed to On-Prem Configuration**.
- Step 5** Configure the on-premises connectivity.
- a) From the **Configure On-premise** screen, click **Download Configuration File**.
  - b) Forward this file to your network administrator to configure the on-premises-side of the tunnel.  
  
The network administrator can make the necessary changes to this file and apply this configuration to your Enterprise firewall or router to bring up the tunnel.
  - c) Click **Proceed to Network Connectivity Check**.
- Step 6** Check the status of your network configuration.
- While your network administrator is configuring the tunnel, the tunnel configuration status displays as not configured with a padlock icon.
- After your network administrator completes the tunnel configuration and the tunnel is successfully established, the configuration status displays green with a success icon.
- Step 7** (Optional) To return to the **Dashboard** pane, click **Go to Dashboard**.
- 

### Delete a VA Pod

You can delete a VA pod using Cisco Global Launchpad.



#### Note

- You can't delete a VA pod while its still in the process of being created.
  - You can't delete a VA pod while a Catalyst Center VA in the pod is being deleted. You must wait for the Catalyst Center VA deletion to finish.
- 

#### Procedure

---

- Step 1** On the **Dashboard** pane, locate the VA pod.
- Step 2** In the bottom-right corner of the VA pod card, click the ellipsis icon (...) and choose **Delete VA Pod**.

#### Note

If a Catalyst Center VA in a VA pod is in the process of being deleted, the **Delete VA Pod** option is not available.

**Step 3** In the **Confirmation** dialog box, in the text field, type **DELETE**.

**Step 4** Click **Delete** to confirm that the deletion of the VA pod.

Deleting a VA pod takes approximately 20 to 40 minutes.

---

## View Catalyst Center VA Details

You can view Catalyst Center VA details in Cisco Global Launchpad.

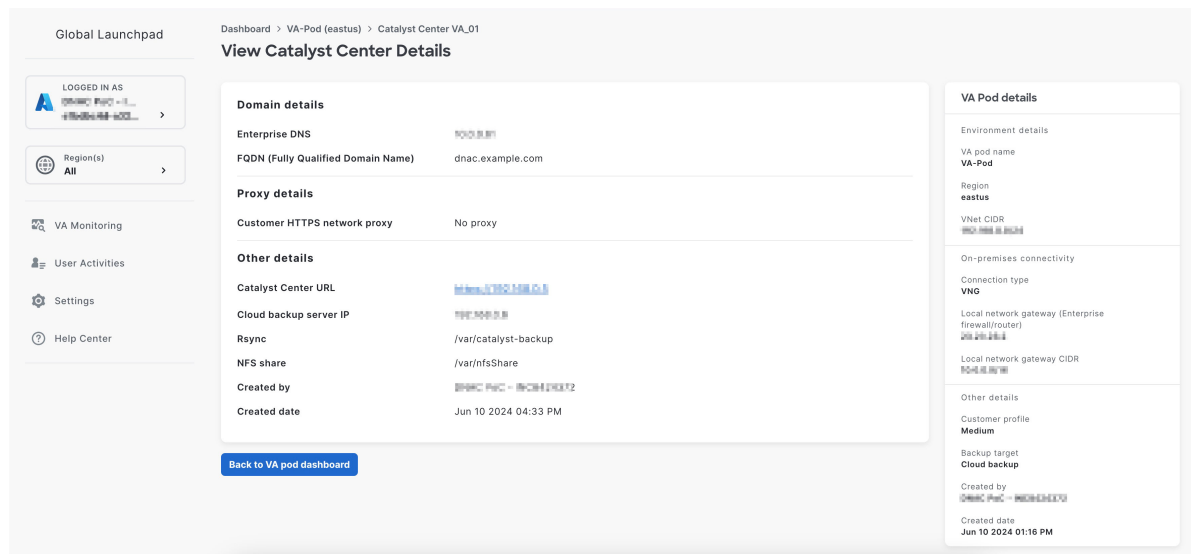
### Procedure

---

**Step 1** On the **Dashboard** pane, locate the VA pod containing the Catalyst Center VA you want to view, and in the VA pod card, click **Create/Manage Catalyst Center(s)**.

**Step 2** In the bottom-right corner of the Catalyst Center VA card, click the ellipsis icon (...) and choose **View Details**.

**Step 3** In the **View Catalyst Center** pane, view information, such as the Catalyst Center domain FQDN and network proxy. To the right of the **View Catalyst Center** pane, VA pod details are displayed.



**Step 4** (Optional) To exit this window, click **Back to Catalyst Center(s)**.

---

## Delete an Existing Catalyst Center VA

You can delete an existing Catalyst Center VA from Cisco Global Launchpad.

### Procedure

---

- Step 1** On the **Dashboard** pane, locate the VA pod containing the Catalyst Center VA you want to delete, and in the VA pod card, click **Create/Manage Cisco Catalyst Center(s)**.
- Step 2** In the bottom-right corner of the Catalyst Center VA card, click the ellipsis icon (...) and choose **Delete Catalyst Center**.
- Step 3** In the **Confirmation** dialog box, in the text field, type **DELETE**.
- Step 4** Click **Delete** to confirm that the deletion of the Catalyst Center VA.

## Troubleshoot the Deployment for Cisco Global Launchpad

Cisco Global Launchpad is designed to help you seamlessly configure Catalyst Center on AWS with minimal intervention. This section shows you how to troubleshoot common issues during the deployment of Catalyst Center on AWS.



**Note** We recommend against making manual changes with Cisco Global Launchpad through the AWS console, because it can lead to issues that Cisco Global Launchpad cannot resolve.

If you have any issues that are not addressed in this section, contact Cisco TAC.

### Troubleshoot Docker Errors

If the error "port is already in use" displays while running the Docker images for Cisco Global Launchpad, you can troubleshoot it with the following possible solutions:

| Error                                                                                                             | Possible Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>If you receive the following error while running the server application:</p> <pre>port is already in use</pre> | <p>On Docker, run the server application:</p> <pre>docker run -d -p &lt;server-port-number&gt;:8080 -e SECRET_KEY=&lt;your-secret-key&gt; --name server --pull=always dockerhub.cisco.com/maglev-docker/server:x.x.x-latest</pre> <p><b>Note</b><br/>You can use any available server port.</p> <p>While running the server application, run the client application:</p> <pre>docker run -d -p 90:80 -e REACT_APP_API_URL=http://localhost:&lt;client-port-number&gt; --name client --pull=always dockerhub.cisco.com/maglev-docker/client:x.x.x</pre> <p><b>Note</b><br/>You must use the same port number that you used to run the server application.</p> |
| <p>If you receive the following error while running the client application:</p> <pre>port is already in use</pre> | <p>On Docker, run the client application:</p> <pre>docker run -d -p &lt;client-port-name&gt;:80 --name client --pull=always dockerhub.cisco.com/maglev-docker/client:x.x.x</pre> <p><b>Note</b><br/>You can use any available server port.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |

## Troubleshoot Login Errors

When you log in to Cisco Global Launchpad, you may encounter a login error. You can troubleshoot common login errors with the following possible solutions:

| Error                                                                           | Possible Solution                                                                                                                                                                                |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Invalid credentials.</b>                                                     | Re-enter your credentials and check that they're entered correctly.                                                                                                                              |
| <b>You don't have enough access.</b>                                            | For admin users, verify that your account has administrator access permission.<br>For subusers, verify that your administrator added you to the CiscoDNACenter user group.                       |
| <b>An operation to delete is in progress, please try again after some time.</b> | If an admin user deletes the <AccountId>-cisco-dna-center global bucket from your AWS account and then tries to log in, this login error can occur. Wait 5 minutes for the deletion to complete. |

## Troubleshoot a Hosted Cisco Global Launchpad Error

On hosted Cisco Global Launchpad, when you trigger a root cause analysis (RCA) from the **Trigger RCA** pane, the **Rate exceeded** error can occur.

| Error                 | Possible Solution                                                                                                                                                                                                                       |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Rate exceeded.</b> | This error displays when a region receives the maximum number of API requests (10,000 per second).<br><br>To resolve this issue, increase the limit in AWS with the Service Quotas service, or retry the operation after a few seconds. |

## Troubleshoot Region Issues

You can troubleshoot region issues with the following possible solutions:

| Issue                                                                                                                                                                                                                               | Possible Solution                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| While creating a new VA pod in a new region, Cisco Global Launchpad displays an error message or the screen freezes for more than 5 minutes and does not display a configuration-in-progress message.                               | Make sure that any manual process on the AWS console has completed successfully, and try this step again. If the problem persists, contact Cisco TAC.<br><br><b>Note</b><br>To avoid such conflicts, we recommend that you don't make any manual changes to the VA pods. Instead, use the Cisco Global Launchpad for all actions. |
| Your region setup fails and Cisco Global Launchpad displays a <b>Bucket [name] did not stabilize</b> error similar to the following:<br><br><div>Bucket 059356112352-cisco-dna-center-eu-south-1.va.storage did not stabilize</div> | Open a case with <a href="#">AWS</a> and ask that they delete the failed resources from the back end.                                                                                                                                                                                                                             |

## Troubleshoot VA Pod Configuration Errors

You can troubleshoot VA pod configuration errors with the following possible solutions:

| Error                                                                                                                                                                                   | Possible Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| + Create VA Pod button disabled                                                                                                                                                         | <p>Hover your cursor over the disabled button to learn more about why it's disabled.</p> <p>The following are likely reasons why you can't create a new VA pod:</p> <ul style="list-style-type: none"> <li>• <b>You have reached the limit of VPC service quota:</b> For every region, a limit is set by your AWS administrator for how many VPCs can be created. Typically, there are 5 VPCs per region, and each VPC can have only one VA pod. However, you may want to contact your AWS administrator for the exact number.</li> </ul> <p>Note that any VPC used for resources outside of Cisco Global Launchpad contributes to this limit. For example, if your AWS account has a limit of five VPCs and two are in use, you can only create three more VA pods in the selected region.</p> <p>To create new VA pods, ask your AWS administrator to change the limit or delete some of your existing VA pods or VPCs on your AWS account. For more information, see the AWS <a href="#">Creating a service quota increase</a> topic in the <i>AWS Support User Guide</i> on the AWS website.</p> <ul style="list-style-type: none"> <li>• <b>Pod deletion in progress:</b> The deletion of the last VA pod in the region is in progress. Wait a few minutes, and then retry creating a new VA pod.</li> </ul> |
| AMI ID for this region is not available for your account.                                                                                                                               | <p>When you click + <b>Create a new VA pod</b>, Cisco Global Launchpad validates the AMI ID for your selected region.</p> <p>If you encounter this error, the validation failed and you can't create a new pod in this region. Contact Cisco TAC to help you resolve the issue.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Your VPN configuration is invalid. At this step you cannot update it so please delete the instance and create a new one.                                                                | <p>When configuring a VA pod, the following VPN vendors are not supported:</p> <ul style="list-style-type: none"> <li>• Barracuda</li> <li>• Sophos</li> <li>• Vyatta</li> <li>• Zyxel</li> </ul> <p>If you are using an unsupported VPN vendor, the following error message is displayed on the <b>Configure the on-premises tunnel endpoint</b> window:</p> <pre>Your VPN configuration is invalid. At this step, you cannot update it, so please delete the instance and create a new one.</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| CustomerGateway with type "ipsec.1", ip-address "xx.xx.xx.xx", and bgp-asn "65000" already exists (RequestToken: f78ad45d-b4f8-d02b-9040-f29e5f5f86cf, HandlerErrorCode: AlreadyExists) | <p>You may encounter this error if you try to create more than one VA pod at a time.</p> <p>To resolve this error, delete the failed VA pod and recreate it. Ensure that you create only one VA pod at a time.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Error                                                                                                                                     | Possible Solution                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AWS infrastructure failed.</b>                                                                                                         | <p>If the AWS configuration fails, return to the <b>Dashboard</b> pane and create a new VA pod.</p> <p><b>Note</b><br/>You can delete the VA pod that failed to configure.</p>                                                                                                                                                     |
| <b>AWS configuration fails when editing a VA Pod</b>                                                                                      | <p>Make sure that any manual process on the AWS console completed successfully, and try this step again. If the problem persists, contact Cisco TAC.</p> <p><b>Note</b><br/>To avoid such conflicts, we recommend that you do not make any manual changes to the VA pods. Instead, use Cisco Global Launchpad for all actions.</p> |
| <b>Deleting VA Pod has failed</b>                                                                                                         | <p>Make sure that any manual process on the AWS console completed successfully, and try this step again. If the problem persists, contact Cisco TAC.</p> <p><b>Note</b><br/>To avoid such conflicts, we recommend that you do not make any manual changes to the VA pods. Instead, use Cisco Global Launchpad for all actions.</p> |
| <b>The resource you are trying to delete has been modified recently. Please refresh the page to get the latest changes and try again.</b> | <p>If you encounter this error while deleting a VA pod, contact Cisco TAC.</p>                                                                                                                                                                                                                                                     |

### Troubleshoot a Network Connectivity Error

While creating a VA pod, if the IPsec tunnel or TGW connection isn't established, make sure that the tunnel is up on your on-premises firewall or router.

If the tunnel from the VA pod to TWG is green and the tunnel from the TWG to CGW is gray, make sure that:



- You forwarded the correct configuration file to your network administrator.
- Your network administrator made the necessary changes to the configuration file.
- Your network administrator finished applying this configuration to your Enterprise firewall or router.

### Troubleshoot Catalyst Center VA Configuration Errors

You can troubleshoot errors that occur while configuring a Catalyst Center VA with the following possible solutions:

| Error                           | Possible Solution                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Environment Setup failed</b> | <ol style="list-style-type: none"> <li>1. On Cisco Global Launchpad, return to the <b>Create/Manage Cisco Catalyst Center(s)</b> pane.</li> <li>2. Delete the Catalyst Center VA.</li> <li>3. Create a new Catalyst Center VA.</li> </ol> |
| <b>Delete Failed</b>            | If the Catalyst Center VA deletion fails, contact Cisco TAC.                                                                                                                                                                              |

## Update the DNS Server on a Catalyst Center VA Using the AWS Console

To update the DNS server IP address configured on a Catalyst Center VA, use the consent token you obtained from Cisco TAC and follow the steps in this procedure.

### Before you begin

Contact Cisco TAC to get a consent token to be able to get full shell access.

### Procedure

- 
- Step 1** Log in to the AWS console.
- Step 2** Choose **EC2 > Instances**.
- Step 3** Choose the instance ID that you want to change and click **Connect**.  
The **Connect to instance** page is displayed with the **EC2 Instance Connect** tab selected by default.

aws Services Search [Option+S]

EC2 > Instances > i-01c5739a0d7c6e465 > Connect to instance

## Connect to instance [Info](#)

Connect to your instance i-01c5739a0d7c6e465 (Catalyst Center VA - 02) using any of these options

EC2 Instance Connect Session Manager SSH client EC2 serial console

**The instance does not have a public IPv4 address**  
To connect using the EC2 Instance Connect browser-based client, the instance must have a public IPv4 address.

Instance ID  
i-01c5739a0d7c6e465 (Catalyst Center VA - 02)

Connection Type

☒ Connect using EC2 Instance Connect  
Connect using the EC2 Instance Connect browser-based client, with a public IPv4 address.

☐ Connect using EC2 Instance Connect Endpoint  
Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

Public IP address  
-

Username  
Enter the username defined in the AMI used to launch the instance. If you didn't define a custom username, use the default username, root.

root

**Note:** In most cases, the default username, root, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Cancel Connect

#### Step 4

Click the **EC2 serial console** tab.

The Catalyst Center VA instance ID and serial port are displayed.

aws Services Search [Option+S]

EC2 > Instances > i-01c5739a0d7c6e465 > Connect to instance

## Connect to instance [Info](#)

Connect to your instance i-01c5739a0d7c6e465 (Catalyst Center VA - 02) using any of these options

EC2 Instance Connect Session Manager SSH client **EC2 serial console**

Instance ID  
i-01c5739a0d7c6e465 (Catalyst Center VA - 02)

Serial port  
tty50

Cancel **Connect**

#### Step 5

Click **Connect**.

The Maglev console is displayed.



```

aws Services Search [Option+S]

Welcome to the Maglev Appliance (ttyS0)
maglev-master-100-2704-4-00 login: maglev
Password:

Welcome to the Maglev Appliance

System information as of Mon Jan 29 17:10:57 UTC 2024

System load:          4.54
Usage of /:           11.5% of 60.71GB
Memory usage:         66%
Swap usage:           0%
Processes:            1555
Users logged in:      0
IP address for enterprise: 100.2704.4.100
IP address for cluster:   100.2704.4.100
IP address for docker0:   100.2704.4.1
IP address for node-local-dns: 100.2704.10.10
IP address for kube-ipv6: 100.2704.51.100

Maglev Restricted Shell is active
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

[Monday Jan 29 17:11:07 UTC] maglev@ 100.2704.4.00 (maglev-master-100-2704-4-00)
$

[Monday Jan 29 17:11:07 UTC] maglev@ 100.2704.4.00 (maglev-master-100-2704-4-00)
$

```

- Step 6** At the **Login** prompt, enter **maglev** as the username.
- Step 7** At the **Password** prompt, enter the password that was configured during the initial deployment, regardless of whether you deployed your Catalyst Center VA using Cisco Global Launchpad, AWS CloudFormation, or AWS Marketplace.
- Step 8** Gain full shell access by using the consent token that you obtained from Cisco TAC:

```
$ _shell -v consent-token
```

For example:

```
_shell -v n1+hPAAAAQ000AQAAAABAgAEAAAAAAMBYkk2bmhXcW14OGtqUXoy
a09UTX1zM252UnN1UnFwTEFEQVQvejJjQm9kNX1oN2thSFk3MzZBek9CMEJR
UUZad2QNCkhPNVZMNjhMUXMyb0h1OXQ2eW1TR01yT1hwZkRPSmNuc1c2QUJ5ZGtVZ0N2OU1mMXZtTC90em1MNldWcVdjY2gNCkh3eEd5MytZWmRVUTN
kek1xOWNiWi9rLzVlTkozQ2RrYy9SMXEya2NOV09uMEdvZE11c1lZN01ENjZvVk5zZlMNCktseHZxTi9tVXF0cW1
vaG9NZFY4SnVOY3NBcXkxQkZOMzZHdS9XQ2N4S2tpdlNUV1VOTVVRXU1TjVRUD16d1YnCMYyWW1ZdUFnSGNOcnV
veUhoTzZYYjRIWnJWNDDxSG5qR0REUjV3TE90bnNXalpBL2tsRzNzN01Ia1ZaY0VzMVENCkVoc3FZUGU5Z2Z0TWF
6YXVKRmtxVmc9PQ==
```

- Step 9** Set the terminal to display in color:
- ```
export TERM=xterm
```
- Step 10** Run the **sudo maglev-config update** command.
- The Configuration wizard presents an abbreviated version of the same series of screens shown in, for example, Configure a Secondary Node Using the Maglev Wizard in the [Cisco Catalyst Center Appliance Installation Guide](#).
- When the DNS server IP address setting is displayed, change the DNS server IP address to the preferred one. After you finish making changes on each screen, choose **next>>**, as needed, to proceed through the Configuration wizard.
- Step 11** At the end of the configuration process, a message appears, stating that the Configuration wizard is now ready to apply your changes. The following options are available:
- **<<back**: Review and verify your changes.

- **<cancel>**: Discard your changes and exit the Configuration wizard.
- **proceed>>**: Save your changes and begin applying them.

**Step 12** To complete the change, choose **proceed>>**. The Configuration wizard applies the changes you made. At the end of the configuration process, a **CONFIGURATION SUCCEEDED!** message appears.

## Troubleshoot Concurrency Errors

You troubleshoot the concurrency errors with the following possible solutions:

Error	Possible Solution
<b>Unable to delete a Pod or a Catalyst Center created by another user.</b>	<p>You cannot delete a component, such as a VA pod or Catalyst Center VA, that another user created while a different action is in progress on the component. After the action completes, you or any other user can delete the component.</p> <p>For example, you cannot delete a VA pod or Catalyst Center VA while it is in any of the following processes or states:</p> <ul style="list-style-type: none"> <li>• Another user is in the process of creating the Catalyst Center VA.</li> <li>• Another user is in the process of deleting the Catalyst Center VA.</li> <li>• The Catalyst Center VA is in a failed state after a deletion attempt.</li> </ul>
<b>The status of a Pod has been changed recently.</b>	<p>If you tried to delete a VA pod, the original user account that created the VA pod may have performed a concurrent action. This concurrency issue changes the status of the selected VA pod.</p> <p>To view the updated status of the VA pod, click <b>Refresh</b>.</p>

## Troubleshoot Other Deployment Issues

You can troubleshoot other issues that occur while deploying a Catalyst Center VA on AWS with the following possible solutions:

Issue	Possible Reasons and Solutions
<b>Resources are green, but the Proceed button is disabled.</b>	<p>On some steps, you can only proceed if all the resources have been set up successfully. To ensure the integrity of the deployment, the <b>Proceed</b> button remains disabled until the setup is complete and all the resources have been configured and loaded.</p> <p>Sometimes, the screen shows that the resources have been successfully set up, but the <b>Proceed</b> button is still disabled. In this case, you need to wait a few more seconds for some resources to load. After all the resources have been configured and loaded, the <b>Proceed</b> button is enabled.</p>
<b>Failure when deploying multiple VA pods with the same CGW in single region.</b>	<p>Make sure that:</p> <ul style="list-style-type: none"> <li>• The CGW IP address is the IP address of your Enterprise firewall or router.</li> <li>• The CGW IP address is a valid public address.</li> <li>• The CGW IP address hasn't been used for another VA pod within the same region. In each region, multiple VA pods cannot have the same CGW IP address. To use the same CGW IP address for more than one VA pod, deploy each VA pod in a different region.</li> </ul>

Issue	Possible Reasons and Solutions
<b>Unable to SSH or ping the Catalyst Center VA.</b>	You cannot connect via SSH or ping the Catalyst Center VA, although the tunnel is up and the application status is complete (green). This issue might occur if the on-premises CGW is configured incorrectly. Verify the CGW configuration and try again.
<b>Session ended</b>	<p>If your session times out while operations are in progress, such as triggering an RCA, the operations may abruptly end and display a <b>Session ended</b> notification.</p> <p>If your session times out, click <b>Ok</b>, log back in, and restart the operations.</p>

## Password Recovery and Reset on AWS

The following tasks guide you through the tasks that help your reset your Cisco ISE virtual machine password. Choose the tasks that you need and carry out the steps detailed.

### Change the Cisco ISE GUI Password via the Serial Console

#### Procedure

- 
- Step 1** Log in to your AWS account and go to the EC2 dashboard.
- Step 2** From the left-side menu, click **Instances**.
- Step 3** Click the instance ID for which you want to change the password. If you know the password, skip to [Step 5, on page 115](#) of this task.
- Step 4** To log in to the serial console, you must use the original password that was set at the installation of the instance. To view the configured password, complete the following steps:
- Click **Actions**.
  - Choose **Instance Settings**.
  - Click **Edit user data**.
- The current user data is displayed, including the password.
- Step 5** Click **Connect**.
- The EC2 serial console tab is displayed.
- Step 6** Click **Connect**.
- Step 7** A new browser tab is displayed. If the screen is black, press **Enter** to view the login prompt.
- Step 8** Log in to the serial console. If the password that was displayed in [Step 4, on page 115](#) does not work, see the Password Recovery section.
- Step 9** Use the **application reset-passwd ise iseadmin** command to set a new web UI password for the iseadmin account.
- 

### Create New Public Key Pair

Through this task, you add additional key pairs to a repository. The existing key pair that was created at the time of Cisco ISE instance configuration is not replaced by the new public key that you create.

## Procedure

---

- Step 1** Create a new public key in AWS. For instructions on how to create public key pairs, see [Create key pairs](#).
- Step 2** Log in to the AWS serial console as detailed in the preceding task.
- Step 3** To create a new repository to save the public key to, see [Creating a private repository](#).  
If you already have a repository that is accessible through the CLI, skip to the next step.
- Step 4** To import the new public key, use the command **crypto key import <public key filename> repository <repository name>**
- Step 5** When the import is complete, you can log in to Cisco ISE via SSH using the new public key.
- 

## Password Recovery

There is no mechanism for password recovery for Cisco ISE on AWS. You may need to create new Cisco ISE instances and perform backup and restore of configuration data.

Editing the user data for an EC2 instance in AWS does not change the CLI password that is used to log in to the serial console, as the setup script is not run. The Cisco ISE virtual instance is not affected.

## Trigger a Root Cause Analysis

On Cisco Global Launchpad, you can trigger a root cause analysis (RCA) to help you identify the root cause of cloud infrastructure or Catalyst Center VA deployment issues. The RCA operation collects logs from the cloud provider and stores them in your cloud storage. The RCA bundle includes logs about backups, backend operations, resources, alarms, and events.

## Procedure

---

- Step 1** On the **Dashboard** pane, locate the VA pod containing the Catalyst Center VA that you want to trigger an RCA on, and in the VA pod card, click **Create/Manage Cisco Catalyst Center(s)**.
- Step 2** In the bottom-right corner of the Catalyst Center VA card, click the ellipsis icon (...) and choose **Trigger RCA**.
- Step 3** In the **Trigger RCA** window, in the **RCA Logs** area, click **Trigger RCA** to gather and bundle the logs.

### Note

In the **Trigger RCA** window, if previous RCAs have been performed, you can view the last five successfully triggered RCAs in the **RCA history** table.

This process takes a few minutes. After the process completes, the URL to the bundle, where the logs are located, is displayed.

- Step 4** Under **Destination**, click the URL that is displayed.  
The Azure console opens in a new browser window. After you log in, locate the destination link within the container and click it.
-

## AWS Config and Audit Log Details

AWS Config is an AWS tool that continually assesses, monitors, and evaluates resource configurations to aid in operational troubleshooting by correlating configuration changes to specified events and states. Cisco Global Launchpad uses AWS Config to audit the configuration. When AWS Config detects a change in the configuration, Cisco Global Launchpad generates an email notifying you that configuration changes have taken place.

## View Amazon CloudWatch Alarms

Cisco Global Launchpad uses Amazon CloudWatch alarms to monitor resource usage and check for unusual behavior. The AWS RCA feature also uses Amazon CloudWatch alarms.

If a threshold is met, alerts are sent to the email ID that you configured during your first log in to Cisco Global Launchpad or to the email ID in the user settings, if it was updated.



### Note

- The Amazon CloudWatch alarms for lambda functions remain in the insufficient data state unless a failure occurs in the corresponding lambda function execution. When a lambda function fails, Amazon CloudWatch gathers the metrics and triggers the alarm. The threshold for all lambda alarms is one, so Amazon CloudWatch can capture alerts if there are any failure.
- For some alarms, like S3, the metrics are only reported once per day at midnight in Greenwich Mean Time (GMT). So it may take 24 to 48 hours for the dashboard metrics to update, which is an expected behavior.

### Before you begin

Make sure you successfully configured your AWS account.

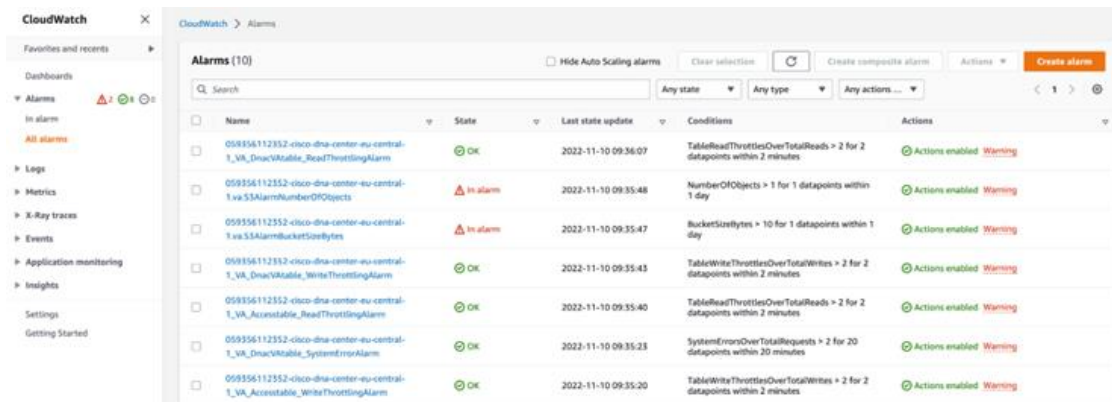
### Procedure

**Step 1** Log in to the AWS console.

The AWS console is displayed. The **Alerts** area displays critical alerts from AWS CloudWatch. This area shows the name of the alarm that generated each alert, and shows the region name, metric name, and namespace for each alarm.

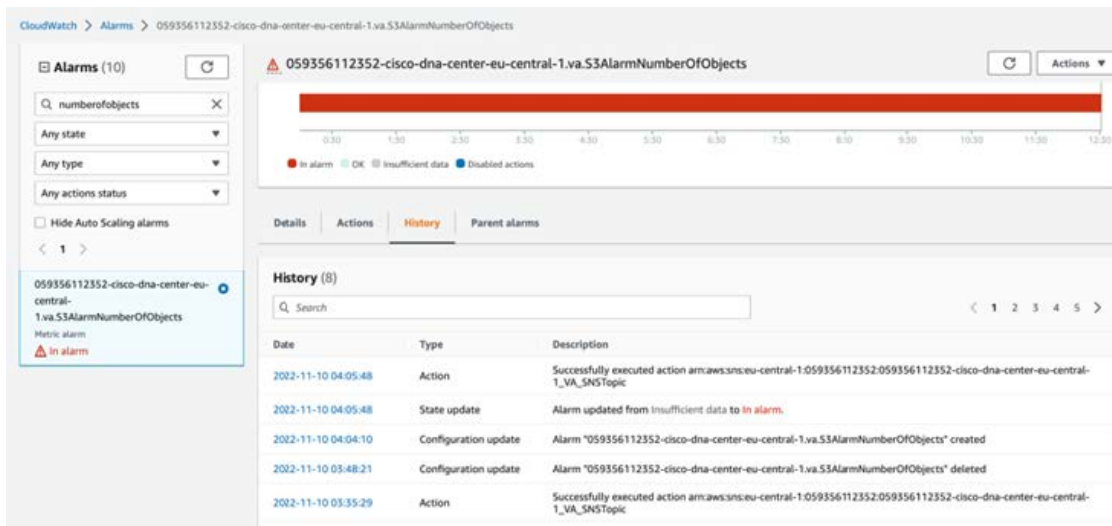
**Step 2** In the **Alerts** area

- Hover your cursor over an **Information** icon to see the reason that the corresponding alarm was triggered.
- Click the name of an alarm to display the **Alarms** page.



**Step 3** On the **Alarms** page, enter the environment name used to deploy Catalyst Center in the **Search** field. Alarms pertaining to the Catalyst Center instance with the specified environment name are displayed.

**Step 4** Click the name of an alarm. Details about the alarm are displayed in the **Details** tab. To view other information, click the **Actions**, **History**, or **Parent alarms** tabs.



## Hardware and Software Used for Validation

This solution was validated using the following hardware and software:

**Table 7: Hardware and Software**

Component	Version
Catalyst Center	2.3.7.7
Cisco ISE	3.3 P3

Component	Version
Wireless Controller 9800-CL	17.12.3
Catalyst Switches	17.12.4
Access Points	17.12.3

## Glossary

Term	Definition
AZ	availability zone
Cisco ISE	Cisco Identity Services Engine
HA	high availability
VA	virtual appliance
VPC	virtual private cloud

## Feedback and Discussion

For comments and suggestions about our guides, join the discussion on [Cisco Community](#).

## References

- [Deploy Using Cisco Global Launchpad 2.0](#)
- [Cisco ISE on Amazon Web Services](#)
- [Deployment Guide for Cisco Catalyst 9800 Wireless Controller for Cloud \(C9800-CL\) on Amazon Web Services](#)

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