



# **Networking requirements for the Connector Cloud Manager**

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August 16, 2021

This PDF was generated from [https://docs.netapp.com/us-en/occm/reference\\_networking\\_cloud\\_manager.html](https://docs.netapp.com/us-en/occm/reference_networking_cloud_manager.html) on September 09, 2021. Always check docs.netapp.com for the latest.

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# Networking requirements for the Connector

Set up your networking so the Connector can manage resources and processes within your public cloud environment. The most important step is ensuring outbound internet access to various endpoints.



If your network uses a proxy server for all communication to the internet, you can specify the proxy server from the Settings page. Refer to [Configuring the Connector to use a proxy server](#).

## Connection to target networks

A Connector requires a network connection to the type of working environment that you're creating and the services that you're planning to enable.

For example, if you install a Connector in your corporate network, then you must set up a VPN connection to the VPC or VNet in which you launch Cloud Volumes ONTAP.

## Possible conflict with IP addresses in the 172 range

If your network has a subnet configured in the 172 range, then you might experience connectivity failures from Cloud Manager. [Learn more about this known issue](#).

## Outbound internet access

The Connector requires outbound internet access to manage resources and processes within your public cloud environment. Outbound internet access is also required if you want to manually install the Connector on a Linux host or access the local UI running on the Connector.

The following sections identify the specific endpoints.

### Endpoints to manage resources in AWS

A Connector contacts the following endpoints when managing resources in AWS:



If your VPC uses a network access control list (ACL) to filter traffic, then make sure that you enable these endpoints for both outbound and inbound traffic.

Endpoints	Purpose
<p>AWS services (amazonaws.com):</p> <ul style="list-style-type: none"> <li>• CloudFormation</li> <li>• Elastic Compute Cloud (EC2)</li> <li>• Key Management Service (KMS)</li> <li>• Security Token Service (STS)</li> <li>• Simple Storage Service (S3)</li> </ul> <p>The exact endpoint depends on the region in which you deploy Cloud Volumes ONTAP. <a href="#">Refer to AWS documentation for details.</a></p>	Enables the Connector to deploy and manage Cloud Volumes ONTAP in AWS.
https://api.services.cloud.netapp.com:443	API requests to NetApp Cloud Central.
https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com	Provides access to software images, manifests, and templates.
https://cognito-idp.us-east-1.amazonaws.com https://cognito-identity.us-east-1.amazonaws.com https://sts.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.amazonaws.com	Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images.
https://cloudmanagerinfraprod.azurecr.io *.blob.core.windows.net	Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager.
https://kinesis.us-east-1.amazonaws.com	Enables NetApp to stream data from audit records.
https://cloudmanager.cloud.netapp.com	Communication with the Cloud Manager service, which includes Cloud Central accounts.
https://netapp-cloud-account.auth0.com	Communication with NetApp Cloud Central for centralized user authentication.
support.netapp.com:443 https://mysupport.netapp.com	Communication with NetApp AutoSupport. Note that the Connector communicates with support.netapp.com:443, which redirects to https://mysupport.netapp.com.
https://support.netapp.com/svcgw https://support.netapp.com/ServiceGW/entitlement https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com	Communication with NetApp for system licensing and support registration.
https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com	Enables NetApp to collect information needed to troubleshoot support issues.

Endpoints	Purpose
<a href="https://ipa-signer.cloudmanager.netapp.com">https://ipa-signer.cloudmanager.netapp.com</a>	Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP)
Various third-party locations, for example: <ul style="list-style-type: none"> <li>• <a href="https://repo1.maven.org/maven2">https://repo1.maven.org/maven2</a></li> <li>• <a href="https://oss.sonatype.org/content/repositories">https://oss.sonatype.org/content/repositories</a></li> <li>• <a href="https://repo.typesafe.com">https://repo.typesafe.com</a></li> </ul> Third-party locations are subject to change.	During upgrades, Cloud Manager downloads the latest packages for third-party dependencies.

## Endpoints to manage resources in Azure

A Connector contacts the following endpoints when managing resources in Azure:

Endpoints	Purpose
<a href="https://management.azure.com">https://management.azure.com</a> <a href="https://login.microsoftonline.com">https://login.microsoftonline.com</a>	Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in most Azure regions.
<a href="https://management.microsoftazure.de">https://management.microsoftazure.de</a> <a href="https://login.microsoftonline.de">https://login.microsoftonline.de</a>	Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in the Azure Germany regions.
<a href="https://management.usgovcloudapi.net">https://management.usgovcloudapi.net</a> <a href="https://login.microsoftonline.com">https://login.microsoftonline.com</a>	Enables Cloud Manager to deploy and manage Cloud Volumes ONTAP in the Azure US Gov regions.
<a href="https://api.services.cloud.netapp.com:443">https://api.services.cloud.netapp.com:443</a>	API requests to NetApp Cloud Central.
<a href="https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com">https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com</a>	Provides access to software images, manifests, and templates.
<a href="https://cognito-idp.us-east-1.amazonaws.com">https://cognito-idp.us-east-1.amazonaws.com</a> <a href="https://cognito-identity.us-east-1.amazonaws.com">https://cognito-identity.us-east-1.amazonaws.com</a> <a href="https://sts.amazonaws.com">https://sts.amazonaws.com</a> <a href="https://cloud-support-netapp-com-accelerated.s3.amazonaws.com">https://cloud-support-netapp-com-accelerated.s3.amazonaws.com</a>	Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images.
<a href="https://cloudmanagerinfraprod.azurecr.io">https://cloudmanagerinfraprod.azurecr.io</a> <a href="https://*.blob.core.windows.net">*.blob.core.windows.net</a>	Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager.
<a href="https://kinesis.us-east-1.amazonaws.com">https://kinesis.us-east-1.amazonaws.com</a>	Enables NetApp to stream data from audit records.
<a href="https://cloudmanager.cloud.netapp.com">https://cloudmanager.cloud.netapp.com</a>	Communication with the Cloud Manager service, which includes Cloud Central accounts.
<a href="https://netapp-cloud-account.auth0.com">https://netapp-cloud-account.auth0.com</a>	Communication with NetApp Cloud Central for centralized user authentication.

Endpoints	Purpose
support.netapp.com:443 https://mysupport.netapp.com	Communication with NetApp AutoSupport. Note that the Connector communicates with support.netapp.com:443, which redirects to https://mysupport.netapp.com.
https://support.netapp.com/svcgw https://support.netapp.com/ServiceGW/entitlement https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com	Communication with NetApp for system licensing and support registration.
https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com	Enables NetApp to collect information needed to troubleshoot support issues.
https://ipa-signer.cloudmanager.netapp.com	Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP)
*.blob.core.windows.net	Required for HA pairs when using a proxy.
<p>Various third-party locations, for example:</p> <ul style="list-style-type: none"> <li>• https://repo1.maven.org/maven2</li> <li>• https://oss.sonatype.org/content/repositories</li> <li>• https://repo.typesafe.com</li> </ul> <p>Third-party locations are subject to change.</p>	During upgrades, Cloud Manager downloads the latest packages for third-party dependencies.

## Endpoints to manage resources in GCP

A Connector contacts the following endpoints when managing resources in GCP:

Endpoints	Purpose
https://www.googleapis.com	Enables the Connector to contact Google APIs for deploying and managing Cloud Volumes ONTAP in GCP.
https://api.services.cloud.netapp.com:443	API requests to NetApp Cloud Central.
https://cloud.support.netapp.com.s3.us-west-1.amazonaws.com	Provides access to software images, manifests, and templates.

Endpoints	Purpose
<a href="https://cognito-idp.us-east-1.amazonaws.com">https://cognito-idp.us-east-1.amazonaws.com</a> <a href="https://cognito-identity.us-east-1.amazonaws.com">https://cognito-identity.us-east-1.amazonaws.com</a> <a href="https://sts.amazonaws.com">https://sts.amazonaws.com</a> <a href="https://cloud-support-netapp-com-accelerated.s3.amazonaws.com">https://cloud-support-netapp-com-accelerated.s3.amazonaws.com</a>	Enables the Connector to access and download manifests, templates, and Cloud Volumes ONTAP upgrade images.
<a href="https://cloudmanagerinfraprod.azurecr.io">https://cloudmanagerinfraprod.azurecr.io</a> <a href="https://*.blob.core.windows.net">*.blob.core.windows.net</a>	Access to software images of container components for an infrastructure that's running Docker and provides a solution for service integrations with Cloud Manager.
<a href="https://kinesis.us-east-1.amazonaws.com">https://kinesis.us-east-1.amazonaws.com</a>	Enables NetApp to stream data from audit records.
<a href="https://cloudmanager.cloud.netapp.com">https://cloudmanager.cloud.netapp.com</a>	Communication with the Cloud Manager service, which includes Cloud Central accounts.
<a href="https://netapp-cloud-account.auth0.com">https://netapp-cloud-account.auth0.com</a>	Communication with NetApp Cloud Central for centralized user authentication.
<a href="https://support.netapp.com:443">support.netapp.com:443</a> <a href="https://mysupport.netapp.com">https://mysupport.netapp.com</a>	Communication with NetApp AutoSupport. Note that the Connector communicates with <a href="https://support.netapp.com:443">support.netapp.com:443</a> , which redirects to <a href="https://mysupport.netapp.com">https://mysupport.netapp.com</a> .
<a href="https://support.netapp.com/svcgw">https://support.netapp.com/svcgw</a> <a href="https://support.netapp.com/ServiceGW/entitlement">https://support.netapp.com/ServiceGW/entitlement</a> <a href="https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com">https://eval.lic.netapp.com.s3.us-west-1.amazonaws.com</a> <a href="https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com">https://cloud-support-netapp-com.s3.us-west-1.amazonaws.com</a>	Communication with NetApp for system licensing and support registration.
<a href="https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com">https://client.infra.support.netapp.com.s3.us-west-1.amazonaws.com</a> <a href="https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com">https://cloud-support-netapp-com-accelerated.s3.us-west-1.amazonaws.com</a> <a href="https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com">https://trigger.asup.netapp.com.s3.us-west-1.amazonaws.com</a>	Enables NetApp to collect information needed to troubleshoot support issues.
<a href="https://ipa-signer.cloudmanager.netapp.com">https://ipa-signer.cloudmanager.netapp.com</a>	Enables Cloud Manager to generate licenses (for example, a FlexCache license for Cloud Volumes ONTAP)
<p>Various third-party locations, for example:</p> <ul style="list-style-type: none"> <li>• <a href="https://repo1.maven.org/maven2">https://repo1.maven.org/maven2</a></li> <li>• <a href="https://oss.sonatype.org/content/repositories">https://oss.sonatype.org/content/repositories</a></li> <li>• <a href="https://repo.typesafe.com">https://repo.typesafe.com</a></li> </ul> <p>Third-party locations are subject to change.</p>	During upgrades, Cloud Manager downloads the latest packages for third-party dependencies.

## Endpoints to install the Connector on a Linux host

You have the option to manually install the Connector software on your own Linux host. If you do, the installer for the Connector must access the following URLs during the installation process:

- <http://dev.mysql.com/get/mysql-community-release-el7-5.noarch.rpm>
- <https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm>
- <https://s3.amazonaws.com/aws-cli/awscli-bundle.zip>
- \*.blob.core.windows.net

The host might try to update operating system packages during installation. The host can contact different mirroring sites for these OS packages.

## Endpoints accessed from your web browser when using the local UI

While you should perform almost all tasks from the SaaS user interface, a local user interface is still available on the Connector. The machine running the web browser must have connections to the following endpoints:

Endpoints	Purpose
The Connector host	<p>You must enter the host's IP address from a web browser to load the Cloud Manager console.</p> <p>Depending on your connectivity to your cloud provider, you can use the private IP or a public IP assigned to the host:</p> <ul style="list-style-type: none"><li>• A private IP works if you have a VPN and direct connect access to your virtual network</li><li>• A public IP works in any networking scenario</li></ul> <p>In any case, you should secure network access by ensuring that security group rules allow access from only authorized IPs or subnets.</p>
<a href="https://auth0.com">https://auth0.com</a> <a href="https://cdn.auth0.com">https://cdn.auth0.com</a> <a href="https://netapp-cloud-account.auth0.com">https://netapp-cloud-account.auth0.com</a> <a href="https://services.cloud.netapp.com">https://services.cloud.netapp.com</a>	Your web browser connects to these endpoints for centralized user authentication through NetApp Cloud Central.
<a href="https://widget.intercom.io">https://widget.intercom.io</a>	For in-product chat that enables you to talk to NetApp cloud experts.

## Ports and security groups

There's no incoming traffic to the Connector, unless you initiate it. HTTP and HTTPS provide access to the [local UI](#), which you'll use in rare circumstances. SSH is only needed if you need to connect to the host for troubleshooting.

## Rules for the Connector in AWS

The security group for the Connector requires both inbound and outbound rules.



**Inbound rules**

Protocol	Port	Purpose
SSH	22	Provides SSH access to the Connector host
HTTP	80	Provides HTTP access from client web browsers to the local user interface and connections from Cloud Data Sense
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface
TCP	3128	Provides the Cloud Data Sense instance with internet access, if your AWS network doesn't use a NAT or proxy

**Outbound rules**

The predefined security group for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

**Basic outbound rules**

The predefined security group for the Connector includes the following outbound rules.

Protocol	Port	Purpose
All TCP	All	All outbound traffic
All UDP	All	All outbound traffic

**Advanced outbound rules**

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

Service	Protocol	Port	Destination	Purpose
Active Directory	TCP	88	Active Directory forest	Kerberos V authentication
	TCP	139	Active Directory forest	NetBIOS service session
	TCP	389	Active Directory forest	LDAP
	TCP	445	Active Directory forest	Microsoft SMB/CIFS over TCP with NetBIOS framing
	TCP	464	Active Directory forest	Kerberos V change & set password (SET_CHANGE)
	TCP	749	Active Directory forest	Active Directory Kerberos V change & set password (RPCSEC_GSS)
	UDP	137	Active Directory forest	NetBIOS name service
	UDP	138	Active Directory forest	NetBIOS datagram service
	UDP	464	Active Directory forest	Kerberos key administration

Service	Protocol	Port	Destination	Purpose
API calls and AutoSupport	HTTP	443	Outbound internet and ONTAP cluster management LIF	API calls to AWS and ONTAP, and sending AutoSupport messages to NetApp
API calls	TCP	3000	ONTAP cluster management LIF	API calls to ONTAP
	TCP	8088	Backup to S3	API calls to Backup to S3
DNS	UDP	53	DNS	Used for DNS resolve by Cloud Manager
Cloud Data Sense	HTTP	80	Cloud Data Sense instance	Cloud Data Sense for Cloud Volumes ONTAP

## Rules for the Connector in Azure

The security group for the Connector requires both inbound and outbound rules.

### Inbound rules

Port	Protocol	Purpose
22	SSH	Provides SSH access to the Connector host
80	HTTP	Provides HTTP access from client web browsers to the local user interface
443	HTTPS	Provides HTTPS access from client web browsers to the local user interface

### Outbound rules

The predefined security group for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

#### Basic outbound rules

The predefined security group for the Connector includes the following outbound rules.

Port	Protocol	Purpose
All	All TCP	All outbound traffic
All	All UDP	All outbound traffic

#### Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

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Active Directory	88	TCP	Active Directory forest	Kerberos V authentication
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	389	TCP	Active Directory forest	LDAP
	445	TCP	Active Directory forest	Microsoft SMB/CIFS over TCP with NetBIOS framing
	464	TCP	Active Directory forest	Kerberos V change & set password (SET_CHANGE)
	749	TCP	Active Directory forest	Active Directory Kerberos V change & set password (RPCSEC_GSS)
	137	UDP	Active Directory forest	NetBIOS name service
	138	UDP	Active Directory forest	NetBIOS datagram service
	464	UDP	Active Directory forest	Kerberos key administration
API calls and AutoSupport	443	HTTPS	Outbound internet and ONTAP cluster management LIF	API calls to AWS and ONTAP, and sending AutoSupport messages to NetApp
API calls	3000	TCP	ONTAP cluster management LIF	API calls to ONTAP
DNS	53	UDP	DNS	Used for DNS resolve by Cloud Manager

## Rules for the Connector in GCP

The firewall rules for the Connector requires both inbound and outbound rules.

### Inbound rules

Protocol	Port	Purpose
SSH	22	Provides SSH access to the Connector host
HTTP	80	Provides HTTP access from client web browsers to the local user interface
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface

### Outbound rules

The predefined firewall rules for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

#### Basic outbound rules

The predefined firewall rules for the Connector includes the following outbound rules.

Protocol	Port	Purpose
All TCP	All	All outbound traffic

Protocol	Port	Purpose
All UDP	All	All outbound traffic

#### Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

Service	Protocol	Port	Destination	Purpose
Active Directory	TCP	88	Active Directory forest	Kerberos V authentication
	TCP	139	Active Directory forest	NetBIOS service session
	TCP	389	Active Directory forest	LDAP
	TCP	445	Active Directory forest	Microsoft SMB/CIFS over TCP with NetBIOS framing
	TCP	464	Active Directory forest	Kerberos V change & set password (SET_CHANGE)
	TCP	749	Active Directory forest	Active Directory Kerberos V change & set password (RPCSEC_GSS)
	UDP	137	Active Directory forest	NetBIOS name service
	UDP	138	Active Directory forest	NetBIOS datagram service
	UDP	464	Active Directory forest	Kerberos key administration
API calls and AutoSupport	HTTPS	443	Outbound internet and ONTAP cluster management LIF	API calls to GCP and ONTAP, and sending AutoSupport messages to NetApp
API calls	TCP	3000	ONTAP cluster management LIF	API calls to ONTAP
DNS	UDP	53	DNS	Used for DNS resolve by Cloud Manager

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