



# Copy and synchronize data

## Cloud Manager

NetApp

November 10, 2020

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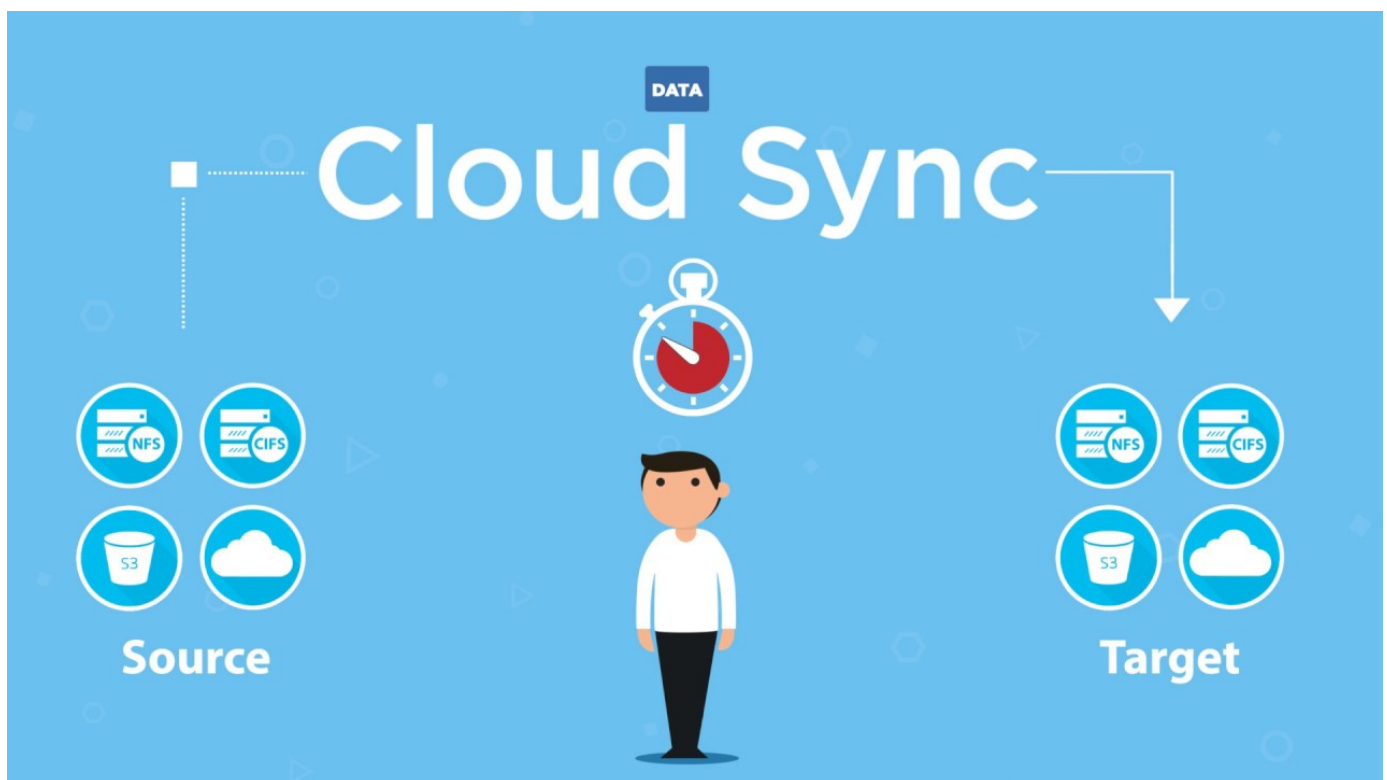
# Copy and synchronize data

## Cloud Sync overview

The NetApp Cloud Sync service offers a simple, secure, and automated way to migrate your data to any target, in the cloud or on your premises. Whether it's a file-based NAS dataset (NFS or SMB), Amazon Simple Storage Service (S3) object format, a NetApp StorageGRID® appliance, or any other cloud provider object store, Cloud Sync can convert and move it for you.

### Features

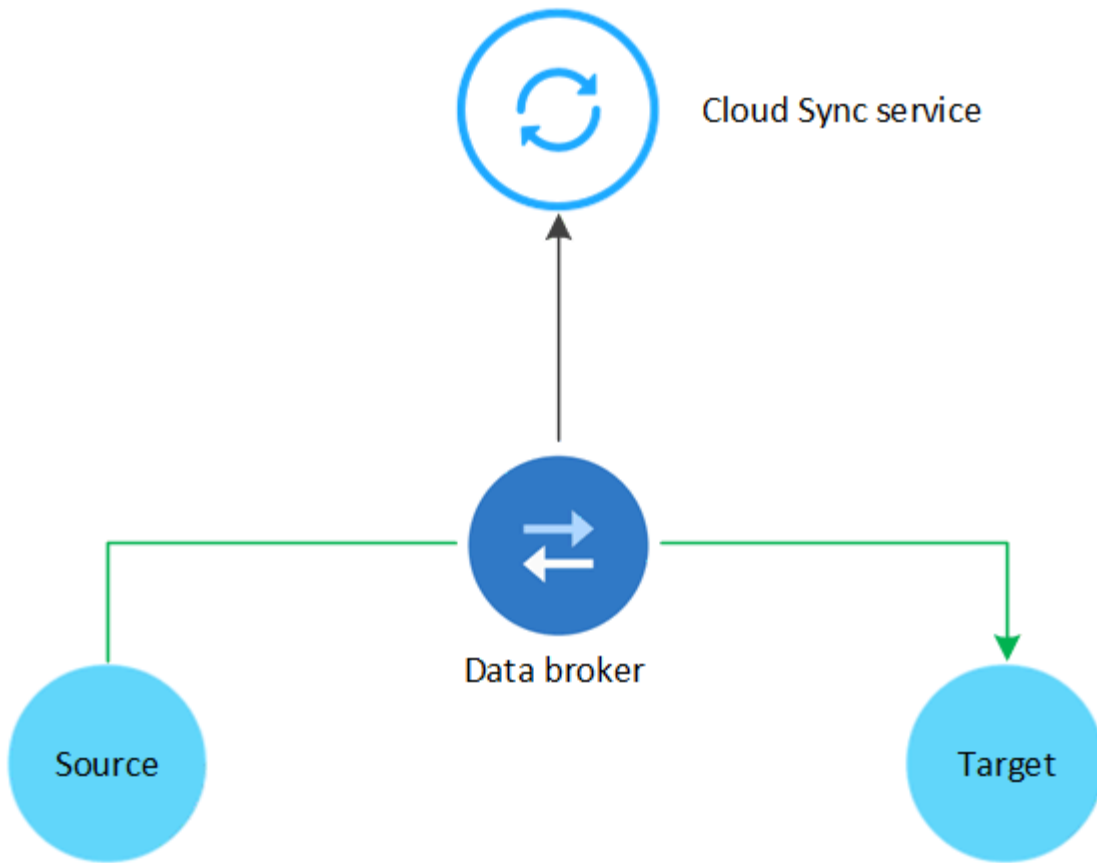
Watch the following video for an overview of Cloud Sync:



### How Cloud Sync works

Cloud Sync is a software-as-a-service (SaaS) platform that consists of a data broker, a cloud-based interface available through Cloud Manager, and a source and target.

The following image shows the relationship between Cloud Sync components:



The NetApp data broker software syncs data from a source to a target (this is called a *sync relationship*). You can run the data broker in AWS, Azure, Google Cloud Platform, or on your premises. The data broker needs an outbound internet connection over port 443 so it can communicate with the Cloud Sync service and contact a few other services and repositories. [View the list of endpoints.](#)

After the initial copy, the service syncs any changed data based on the schedule that you set.

## Supported storage types

Cloud Sync supports the following storage types:

- Any NFS server
- Any SMB server
- AWS EFS
- AWS S3
- Azure Blob
- Azure NetApp Files
- Cloud Volumes Service
- Cloud Volumes ONTAP
- Google Cloud Storage

- IBM Cloud Object Storage
- On-premises ONTAP cluster
- ONTAP S3 Storage
- StorageGRID

[Review the supported sync relationships.](#)

## Cost

There are two types of costs associated with using Cloud Sync: resource charges and service charges.

### Resource charges

Resource charges are related to the compute and storage costs for running the data broker in the cloud.

### Service charges

There are two ways to pay for sync relationships after your 14-day free trial ends. The first option is to subscribe from AWS or Azure, which enables you to pay hourly or annually. The second option is to purchase licenses directly from NetApp. Read the following sections for more details.

### Marketplace subscription

Subscribing to the Cloud Sync service from AWS or Azure enables you to pay at an hourly rate, or to pay annually. [You can subscribe through either AWS or Azure](#), depending on where you want to be billed.

### Hourly subscriptions

With an hourly pay-as-you-go subscription, the Cloud Sync service charges hourly based on the number of sync relationships that you create.

- [View pricing in Azure](#)
- [View pay-as-you-go pricing in AWS](#)

### Annual subscriptions

An annual subscription provides a license for 20 sync relationships that you pay for up front. If you go above 20 sync relationships and you've subscribed through Azure, you pay for the additional relationships by the hour.

[View annual pricing in AWS](#)

### Licenses from NetApp

Another way to pay for sync relationships up front is by purchasing licenses directly from NetApp. Each license enables you to create up to 20 sync relationships.

You can use these licenses with an AWS or Azure subscription. For example, if you have 25 sync relationships, you can pay for the first 20 sync relationships using a license and then pay-as-you-go from AWS or Azure with the remaining 5 sync relationships.

[Learn how to purchase licenses and add them to Cloud Sync.](#)

## **License terms**

Customers who purchase a Bring Your Own License (BYOL) to the Cloud Sync service should be aware of limitations associated with the license entitlement.

- Customers are entitled to leverage the BYOL license for a term not to exceed one year from the date of delivery.
- Customers are entitled to leverage the BYOL license to establish and not to exceed a total of 20 individual connections between a source and a target (each a “sync relationship”).
- A customer’s entitlement expires at the conclusion of the one-year license term, irrespective as to whether Customer has reached the 20 sync relationship limitation.
- In the event the Customer chooses to renew its license, unused sync relationships associated from the previous license grant DO NOT roll over to the license renewal.

## **Data privacy**

NetApp doesn’t have access to any credentials that you provide while using the Cloud Sync service. The credentials are stored directly on the data broker machine, which resides in your network.

Depending on the configuration that you choose, Cloud Sync might prompt you for credentials when you create a new relationship. For example, when setting up a relationship that includes an SMB server, or when deploying the data broker in AWS.

These credentials are always saved directly to the data broker itself. The data broker resides on a machine in your network, whether it’s on premises or in your cloud account. The credentials are never made available to NetApp.

The credentials are locally encrypted on the data broker machine using HashiCorp Vault.

## **Limitations**

- Cloud Sync is not supported in China.
- In addition to China, the Cloud Sync data broker is not supported in the following regions:
  - AWS GovCloud (US)
  - Azure US Gov
  - Azure US DoD

# Get started

## Quick start for Cloud Sync

Getting started with the Cloud Sync service includes a few steps.



### Prepare your source and target

Verify that your source and target are supported and set up. The most important requirement is to verify connectivity between the data broker and the source and target locations. [Learn more](#).



### Prepare a location for the NetApp data broker

The NetApp data broker software syncs data from a source to a target (this is called a *sync relationship*). You can run the data broker in AWS, Azure, Google Cloud Platform, or on your premises. The data broker needs an outbound internet connection over port 443 so it can communicate with the Cloud Sync service and contact a few other services and repositories. [View the list of endpoints](#).

Cloud Sync guides you through the installation process when you create a sync relationship, at which point you can deploy the data broker in the cloud or download an install script for your own Linux host.

- [Review AWS installation](#)
- [Review Azure installation](#)
- [Review GCP installation](#)
- [Review Linux host installation](#)



### Create your first sync relationship

Log in to [Cloud Manager](#), click **Sync**, and then drag and drop your selections for the source and target. Follow the prompts to complete the setup. [Learn more](#).



### Pay for your sync relationships after your free trial ends

Subscribe from AWS or Azure to pay-as-you-go or to pay annually. Or purchase licenses directly from NetApp. Just go to the License Settings page in Cloud Sync to set it up. [Learn more](#).

## Preparing the source and target

Prepare to sync data by verifying that your source and target are supported and

setup.

**Supported sync relationships**

Cloud Sync enables you to sync data from a source to a target (this is called a *sync relationship*). You should understand the supported relationships before you get started.

Source location	Supported target locations
AWS EFS	<ul style="list-style-type: none"><li>• AWS EFS</li><li>• AWS S3</li><li>• Azure Blob</li><li>• Azure NetApp Files (NFS)</li><li>• Cloud Volumes ONTAP (NFS)</li><li>• Cloud Volumes Service (NFS)</li><li>• IBM Cloud Object Storage</li><li>• Google Cloud Storage</li><li>• NFS server</li><li>• On-premises ONTAP cluster</li><li>• StorageGRID</li></ul>
AWS S3	<ul style="list-style-type: none"><li>• AWS EFS</li><li>• AWS S3</li><li>• Azure Blob</li><li>• Azure NetApp Files</li><li>• Cloud Volumes ONTAP</li><li>• Cloud Volumes Service</li><li>• IBM Cloud Object Storage</li><li>• Google Cloud Storage</li><li>• NFS server</li><li>• On-premises ONTAP cluster</li><li>• SMB Server</li><li>• StorageGRID</li></ul>



Source location	Supported target locations
Azure Blob	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files</li> <li>• Cloud Volumes ONTAP</li> <li>• Cloud Volumes Service</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
Azure NetApp Files (NFS)	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (NFS)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
Azure NetApp Files (SMB)	<ul style="list-style-type: none"> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (SMB)</li> <li>• Cloud Volumes ONTAP (SMB)</li> <li>• Cloud Volumes Service (SMB)</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
Cloud Volumes ONTAP (NFS)	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (NFS)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
Cloud Volumes ONTAP (SMB)	<ul style="list-style-type: none"> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (SMB)</li> <li>• Cloud Volumes ONTAP (SMB)</li> <li>• Cloud Volumes Service (SMB)</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
Cloud Volumes Service (NFS)	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (NFS)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
Cloud Volumes Service (SMB)	<ul style="list-style-type: none"> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (SMB)</li> <li>• Cloud Volumes ONTAP (SMB)</li> <li>• Cloud Volumes Service (SMB)</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
Google Cloud Storage	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files</li> <li>• Cloud Volumes ONTAP</li> <li>• Cloud Volumes Service</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
IBM Cloud Object Storage	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files</li> <li>• Cloud Volumes ONTAP</li> <li>• Cloud Volumes Service</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
NFS server	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (NFS)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
On-prem ONTAP cluster (NFS)	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (NFS)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• StorageGRID</li> </ul>
On-prem ONTAP cluster (SMB)	<ul style="list-style-type: none"> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (SMB)</li> <li>• Cloud Volumes ONTAP (SMB)</li> <li>• Cloud Volumes Service (SMB)</li> <li>• Google Cloud Storage</li> <li>• IBM Cloud Object Storage</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
ONTAP S3 Storage	<ul style="list-style-type: none"> <li>• StorageGRID</li> </ul>

Source location	Supported target locations
SMB server	<ul style="list-style-type: none"> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files (SMB)</li> <li>• Cloud Volumes ONTAP (NFS)</li> <li>• Cloud Volumes Service (NFS)</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• On-premises ONTAP cluster</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>
StorageGRID	<ul style="list-style-type: none"> <li>• AWS EFS</li> <li>• AWS S3</li> <li>• Azure Blob</li> <li>• Azure NetApp Files</li> <li>• Cloud Volumes ONTAP</li> <li>• Cloud Volumes Service</li> <li>• IBM Cloud Object Storage</li> <li>• Google Cloud Storage</li> <li>• NFS server</li> <li>• On-premises ONTAP cluster</li> <li>• ONTAP S3 Storage</li> <li>• SMB Server</li> <li>• StorageGRID</li> </ul>

Notes:

1. You can choose a specific Azure Blob storage tier when a Blob container is the target:
  - Hot storage
  - Cool storage
2. You can choose a specific S3 storage class when AWS S3 is the target:
  - Standard (this is the default class)

- Intelligent-Tiering
- Standard-Infrequent Access
- One Zone-Infrequent Access
- Glacier
- Glacier Deep Archive

## **Networking for the source and target**

- The source and target must have a network connection to the data broker.

For example, if an NFS server is in your data center and the data broker is in AWS, then you need a network connection (VPN or Direct Connect) from your network to the VPC.

- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

## **Source and target requirements**

Verify that your source and targets meet the following requirements.

### **AWS S3 bucket requirements**

Make sure that your AWS S3 bucket meets the following requirements.

## **Supported data broker locations for AWS S3**

Sync relationships that include S3 storage require a data broker deployed in AWS or on your premises. In either case, Cloud Sync prompts you to associate the data broker with an AWS account during installation.

- [Learn how to deploy the AWS data broker](#)
- [Learn how to install the data broker on a Linux host](#)

## **Supported AWS regions**

All regions are supported except for the China and GovCloud (US) regions.

## **Permissions required for S3 buckets in other AWS accounts**

When setting up a sync relationship, you can specify an S3 bucket that resides in an AWS account that isn't associated with the data broker.

[The permissions included in this JSON file](#) must be applied to that S3 bucket so the data broker can access it. These permissions enable the data broker to copy data to and from the bucket and to list the objects in the bucket.




Note the following about the permissions included in the JSON file:

1. *<BucketName>* is the name of the bucket that resides in the AWS account that isn't associated with the data broker.
2. *<RoleARN>* should be replaced with one of the following:
  - If the data broker was manually installed on a Linux host, *RoleARN* should be the ARN of the AWS user for which you provided AWS credentials when deploying the data broker.
  - If the data broker was deployed in AWS using the CloudFormation template, *RoleARN* should be the ARN of the IAM role created by the template.

You can find the Role ARN by going to the EC2 console, selecting the data broker instance, and clicking the IAM role from the Description tab. You should then see the Summary page in the IAM console that contains the Role ARN.

## Summary

Delete role

**Role ARN** arn:aws:iam::**542799174890**:role/tanyaBroker0304-DataBrokerIamRole-1VMHXXMW3AQ05 

Role description [Edit](#)

### Azure Blob storage requirements

Make sure that your Azure Blob storage meets the following requirements.

### Supported data broker locations for Azure Blob


The data broker can reside in any location when a sync relationship includes Azure Blob storage.

### Supported Azure regions

All regions are supported except for the China, US Gov, and US DoD regions.

### Connection string required for relationships that include Azure Blob and NFS/SMB

When creating a sync relationship between an Azure Blob container and an NFS or SMB server, you need to provide Cloud Sync with the storage account connection string:

 **a63cde60b553020** - Access keys

Storage account

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Storage Explorer (preview)

Settings

**Access keys**

CORS

Configuration

Encryption

Use access keys to authenticate your applications when making requests to this Azure storage account. Store your access keys securely - for example, using Azure Key Vault - and don't share them. We recommend regenerating your access keys regularly. You are provided two access keys so that you can maintain connections using one key while regenerating the other.

When you regenerate your access keys, you must update any Azure resources and applications that access this storage account to use the new keys. This action will not interrupt access to disks from your virtual machines. [Learn more](#)

Storage account name

a63cde60b553020

**key1**

Key

vScjFdvVZqIPyO/

Connection string

DefaultEndpoints

If you want to sync data between two Azure Blob containers, then the connection string must include a [shared access signature](#) (SAS). You also have the option to use a SAS when syncing between a Blob container and an NFS or SMB server.

The SAS must allow access to the Blob service and all resource types (Service, Container, and Object). The SAS must also include the following permissions:

- For the source Blob container: Read and List
- For the target Blob container: Read, Write, List, Add, and Create

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Storage Explorer (preview)

Settings

Access keys

CORS

Configuration

Encryption

**Shared access signature**

Firewalls and virtual networks

Advanced Threat Protection (pr...

Properties

Locks

Allowed services ⓘ

☒ Blob ☐ File ☐ Queue ☐ Table

Allowed resource types ⓘ

☒ Service ☒ Container ☒ Object

Allowed permissions ⓘ

☒ Read ☒ Write ☒ Delete ☒ List ☒ Add ☒ Create ☐ Update ☐ Process

Start and expiry date/time ⓘ

Start

2018-10-23

10:07:32 AM

End

2019-10-23

6:07:32 PM

(UTC-04:00) --- Current Time Zone ---

Allowed IP addresses ⓘ

for example, 168.1.5.65 or 168.1.5.65-168.1.5.70

Allowed protocols ⓘ

☒ HTTPS only ☐ HTTPS and HTTP

Signing key ⓘ

key1

Generate SAS and connection string

### Azure NetApp Files requirement

Use the Premium or Ultra service level when you sync data to or from Azure NetApp Files. You might experience failures and performance issues if the disk service level is Standard.



Consult a solutions architect if you need help determining the right service level. The volume size and volume tier determines the throughput that you can get.

[Learn more about Azure NetApp Files service levels and throughput.](#)

### Google Cloud Storage bucket requirements

Make sure that your Google Cloud Storage bucket meets the following requirements.

### Supported data broker locations for Google Cloud Storage

Sync relationships that include Google Cloud Storage require a data broker deployed in GCP or on your premises. Cloud Sync guides you through the data broker installation process when you create a sync relationship.

- [Learn how to deploy the GCP data broker](#)
- [Learn how to install the data broker on a Linux host](#)

## Supported GCP regions

All regions are supported.

## NFS server requirements

- The NFS server can be a NetApp system or a non-NetApp system.
- The file server must allow the data broker host to access the exports.
- NFS versions 3, 4.0, 4.1, and 4.2 are supported.

The desired version must be enabled on the server.

- If you want to sync NFS data from an ONTAP system, ensure that access to the NFS export list for an SVM is enabled (vserver nfs modify -vserver *svm\_name* -showmount enabled).



The default setting for showmount is *enabled* starting with ONTAP 9.2.

## ONTAP S3 Storage requirements

When you set up a sync relationship that includes [ONTAP S3 Storage](#), you'll need to provide the following:

- The IP address of the LIF that's connected to ONTAP S3
- The access key and secret key that ONTAP is configured to use

## SMB server requirements

- The SMB server can be a NetApp system or a non-NetApp system.
- The file server must allow the data broker host to access the exports.
- SMB versions 1.0, 2.0, 2.1, 3.0 and 3.11 are supported.
- Grant the "Administrators" group with "Full Control" permissions to the source and target folders.

If you don't grant this permission, then the data broker might not have sufficient permissions to get the ACLs on a file or directory. If this occurs, you'll receive the following error: "getxattr error 95"

## SMB limitation for hidden directories and files

An SMB limitation affects hidden directories and files when syncing data between SMB servers. If any of the directories or files on the source SMB server were hidden through Windows, the hidden attribute isn't copied to the target SMB server.

## **SMB sync behavior due to case-insensitivity limitation**

The SMB protocol is case-insensitive, which means uppercase and lowercase letters are treated as being the same. This behavior can result in overwritten files and directory copy errors, if a sync relationship includes an SMB server and data already exists on the target.

For example, let's say that there's a file named "a" on the source and a file named "A" on the target. When Cloud Sync copies the file named "a" to the target, file "A" is overwritten by file "a" from the source.

In the case of directories, let's say that there's a directory named "b" on the source and a directory named "B" on the target. When Cloud Sync tries to copy the directory named "b" to the target, Cloud Sync receives an error that says the directory already exists. As a result, Cloud Sync always fails to copy the directory named "b."

The best way to avoid this limitation is to ensure that you sync data to an empty directory.

## **Permissions for a SnapMirror destination**

If the source for a sync relationship is a SnapMirror destination (which is read-only), "read/list" permissions are sufficient to sync data from the source to a target.

## **Networking overview for Cloud Sync**

Networking for Cloud Sync includes connectivity between the data broker and the source and target locations, and an outbound internet connection from the data broker over port 443.

### **Data broker location**

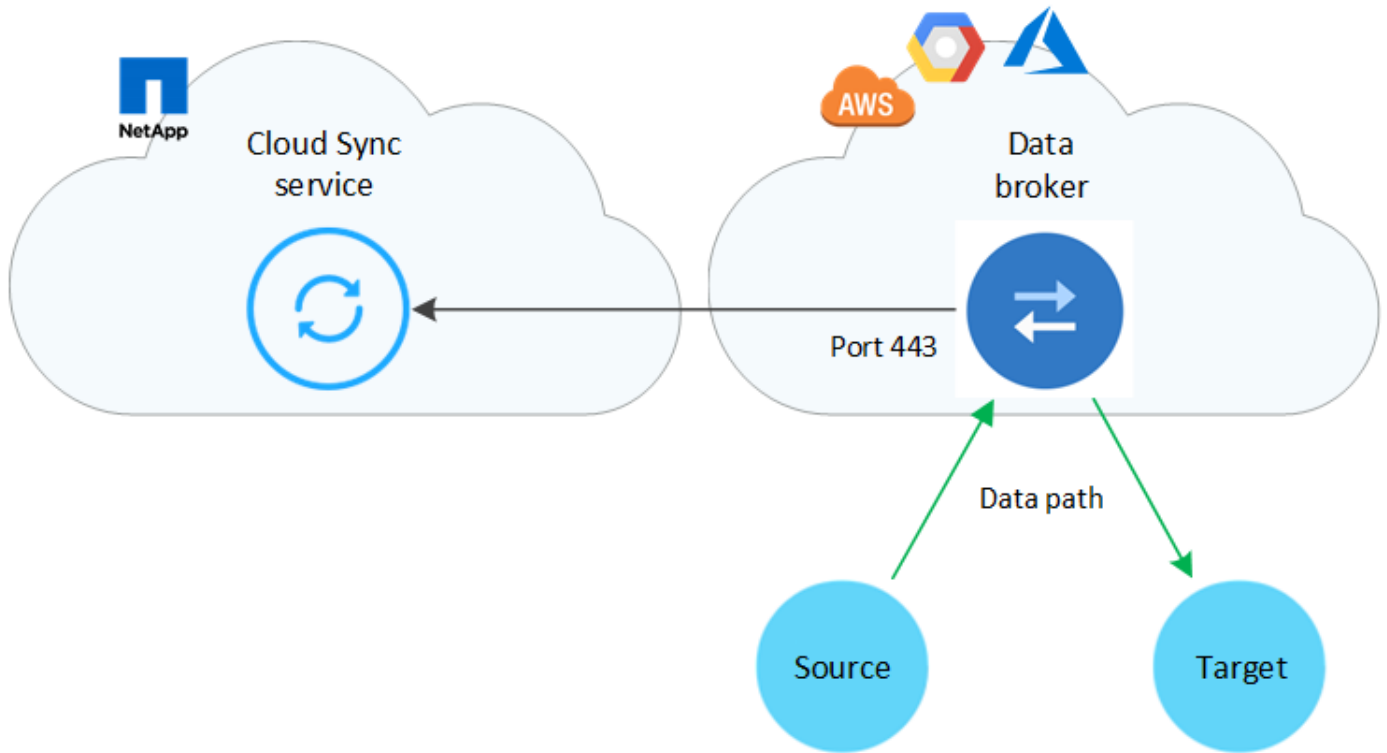
You can install the data broker in the cloud or on your premises.

#### **Data broker in the cloud**

The following image shows the data broker running in the cloud, in either AWS, GCP, or Azure. The source and target can be in any location, as long as there's a connection to the data broker. For example, you might have a VPN connection from your data center to your cloud provider.

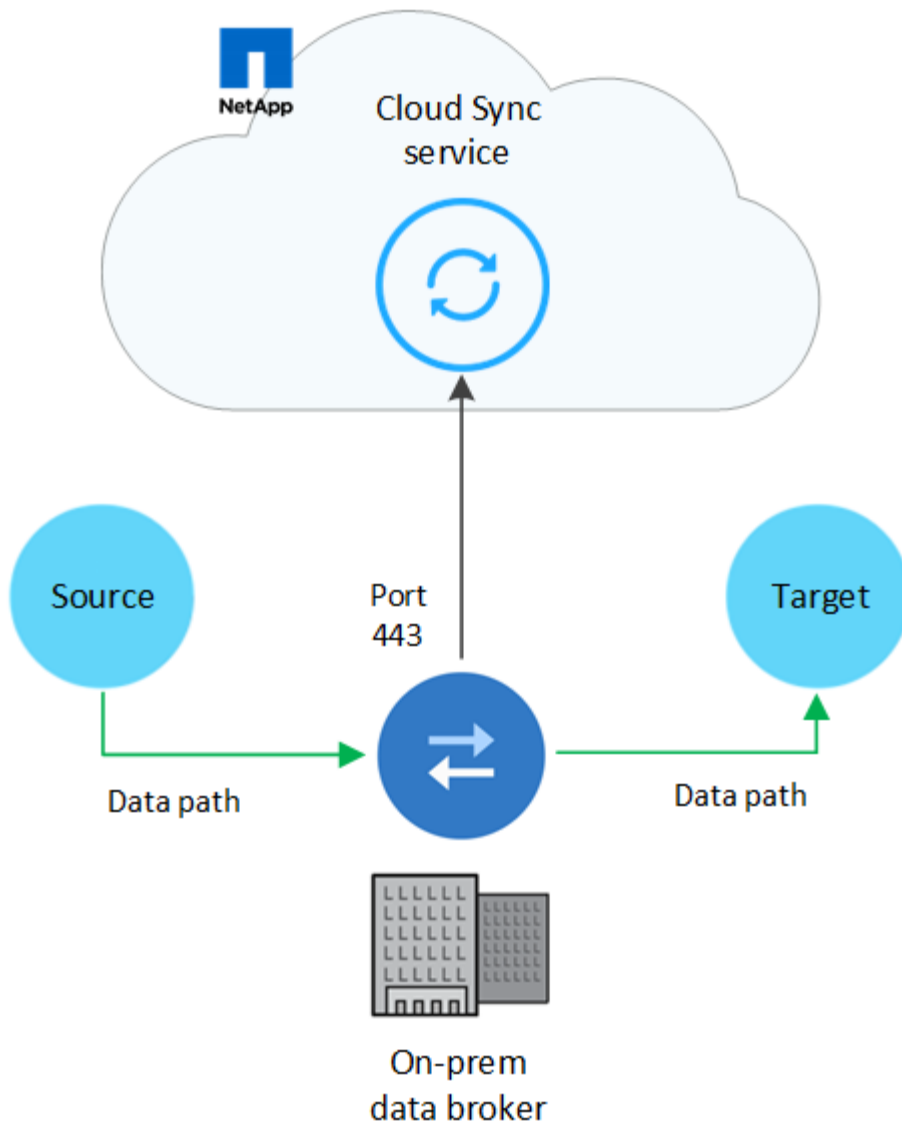


When Cloud Sync deploys the data broker in AWS, Azure, or GCP, it creates a security group that enables the required outbound communication.



### Data broker on your premises

The following image shows the data broker running on-prem, in a data center. Again, the source and target can be in any location, as long as there's a connection to the data broker.



## Networking requirements

- The source and target must have a network connection to the data broker.

For example, if an NFS server is in your data center and the data broker is in AWS, then you need a network connection (VPN or Direct Connect) from your network to the VPC.

- The data broker needs an outbound internet connection so it can poll the Cloud Sync service for tasks over port 443.
- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

## Networking endpoints

The NetApp data broker requires outbound internet access over port 443 to communicate with the Cloud Sync service and to contact a few other services and repositories. Your local web browser also

requires access to endpoints for certain actions. If you need to limit outbound connectivity, refer to the following list of endpoints when configuring your firewall for outbound traffic.

### Data broker endpoints

The data broker contacts the following endpoints:

Endpoints	Purpose
olcentgbl.trafficmanager.net:443	To contact a repository for updating CentOS packages for the data broker host. This endpoint is contacted only if you manually install the data broker on a CentOS host.
rpm.nodesource.com:443 registry.npmjs.org:443 nodejs.org:443	To contact repositories for updating Node.js, npm, and other 3rd party packages used in development.
tgz.pm2.io:443	To access a repository for updating PM2, which is a 3rd party package used to monitor Cloud Sync.
sqs.us-east-1.amazonaws.com:443 kinesis.us-east-1.amazonaws.com:443	To contact the AWS services that Cloud Sync uses for operations (queuing files, registering actions, and delivering updates to the data broker).
s3.region.amazonaws.com:443  For example: s3.us-east-2.amazonaws.com:443 <a href="#">See AWS documentation for a list of S3 endpoints</a>	To contact Amazon S3 when a sync relationship includes an S3 bucket.
cf.cloudsync.netapp.com:443 repo.cloudsync.netapp.com:443	To contact the Cloud Sync service.
support.netapp.com:443	To contact NetApp support when using a BYOL license for sync relationships.
fedoraproject.org:443	To install 7z on the data broker virtual machine during installation and updates. 7z is needed to send AutoSupport messages to NetApp technical support.

### Web browser endpoints

Your web browser needs access to the following endpoint to download logs for troubleshooting purposes:

logs.cloudsync.netapp.com:443



# How to install a data broker

## Installing the data broker in AWS

When you create a sync relationship, choose the AWS Data Broker option to deploy the data broker software on a new EC2 instance in a VPC. Cloud Sync guides you through the installation process, but the requirements and steps are repeated on this page to help you prepare for installation.

You also have the option to install the data broker on an existing Linux host in the cloud or on your premises. [Learn more](#).

## Supported AWS regions

All regions are supported except for the China and GovCloud (US) regions.

## Networking requirements

- The data broker needs an outbound internet connection so it can poll the Cloud Sync service for tasks over port 443.

When Cloud Sync deploys the data broker in AWS, it creates a security group that enables the required outbound communication. Note that you can configure the data broker to use a proxy server during the installation process.

If you need to limit outbound connectivity, see [the list of endpoints that the data broker contacts](#).

- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

## Permissions required to deploy the data broker in AWS

The AWS user account that you use to deploy the data broker must have the permissions included in [this NetApp-provided policy](#).

## Requirements to use your own IAM role with the AWS data broker

When Cloud Sync deploys the data broker, it creates an IAM role for the data broker instance. You can deploy the data broker using your own IAM role, if you prefer. You might use this option if your organization has strict security policies.

The IAM role must meet the following requirements:

- The EC2 service must be allowed to assume the IAM role as a trusted entity.
- [The permissions defined in this JSON file](#) must be attached to the IAM role so the data broker can function properly.

Follow the steps below to specify the IAM role when deploying the data broker.

### Installing the data broker


You can install a data broker in AWS when you create a sync relationship.

#### Steps

1. Click **Create New Sync**.
2. On the **Define Sync Relationship** page, choose a source and target and click **Continue**.

Complete the steps until you reach the **Data Broker** page.

3. On the **Data Broker** page, click **Create Data Broker** and then select **Amazon Web Services**.

If you already have a data broker, you'll need to click the  icon first.

4. Enter a name for the data broker and click **Continue**.
5. Enter an AWS access key so Cloud Sync can create the data broker in AWS on your behalf.

The keys aren't saved or used for any other purposes.

If you'd rather not provide access keys, click the link at the bottom of the page to use a CloudFormation template instead. When you use this option, you don't need to provide credentials because you are logging in directly to AWS.

The following video shows how to launch the data broker instance using a CloudFormation template:

► [https://docs.netapp.com/us-en/occm/media/video\\_cloud\\_sync.mp4](https://docs.netapp.com/us-en/occm/media/video_cloud_sync.mp4) (video)

6. If you entered an AWS access key, select a location for the instance, select a key pair, choose whether to enable a public IP address, and then select an existing IAM role, or leave the field blank so Cloud Sync creates the role for you.

If you choose your own IAM role, [you'll need to provide the required permissions](#).

### Basic Settings

**Location**

Region  

US West | Oregon ▼

VPC  

vpc-3c46c059 - 10.60.21.0/25 ▼

Subnet  

10.60.21.0/25 ▼

**Connectivity**

Key Pair  

newKey ▼

Enable Public IP?  
☒ Enable ☐ Disable

IAM Role (optional) ?

7. After the data broker is available, click **Continue** in Cloud Sync.

The following image shows a successfully deployed instance in AWS:

Select a NetApp Data Broker			
1 NetApp Data Brokers			
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> </div> <div> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border-radius: 50%; background-color: #007bff; color: white; display: flex; align-items: center; justify-content: center; margin-right: 5px;">✓</div> <div> <div style="display: flex; align-items: center;"> <div style="margin-left: 5px;">name</div> </div> <div style="text-align: right; color: green; font-weight: bold;">Active</div> </div> </div> </div></div>			
US West (Oregon) Region	10.60.21.0/25   vpc-3c46c059 VPC	10.60.21.5 Private IP	5f5002eecf378e000a560988 Broker ID
us-west-2c Availability Zone	10.60.21.0/25   subnet-e7f526be Subnet	i-0fc5c97e2f5f22c20 Instance ID	

8. Complete the pages in the wizard to create the new sync relationship.

#### Result

You have deployed a data broker in AWS and created a new sync relationship. You can use this data broker with additional sync relationships.

### Installing the data broker in Azure

When you create a sync relationship, choose the Azure Data Broker option to deploy the data broker software on a new virtual machine in a VNet. Cloud Sync guides you through the installation process, but the requirements and steps are repeated on this page to help you prepare for installation.

You also have the option to install the data broker on an existing Linux host in the cloud or on your

premises. [Learn more.](#)

### Supported Azure regions

All regions are supported except for the China, US Gov, and US DoD regions.

### Networking requirements

- The data broker needs an outbound internet connection so it can poll the Cloud Sync service for tasks over port 443.

When Cloud Sync deploys the data broker in Azure, it creates a security group that enables the required outbound communication.

If you need to limit outbound connectivity, see [the list of endpoints that the data broker contacts](#).

- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

### Authentication method

When you deploy the data broker, you'll need to choose an authentication method: a password or an SSH public-private key pair.

For help with creating a key pair, refer to [Azure Documentation: Create and use an SSH public-private key pair for Linux VMs in Azure](#).

### Installing the data broker


You can install a data broker in Azure when you create a sync relationship.

#### *Steps*


1. Click **Create New Sync**.
2. On the **Define Sync Relationship** page, choose a source and target and click **Continue**.

Complete the pages until you reach the **Data Broker** page.


3. On the **Data Broker** page, click **Create Data Broker** and then select **Microsoft Azure**.

If you already have a data broker, you'll need to click the  icon first.


**Select a Provider**




Microsoft Azure



Amazon Web Services



Google Cloud Platform



On-Prem Data Broker

4. Enter a name for the data broker and click **Continue**.
5. If you're prompted, log in to your Microsoft account. If you're not prompted, click **Log in to Azure**.

The form is owned and hosted by Microsoft. Your credentials are not provided to NetApp.

6. Choose a location for the data broker and enter basic details about the virtual machine.

**Location**


---

**Virtual Machine**


---

Subscription

OCCM Dev ▼

Azure Region

West US 2 ▼

VNet

Vnet1 ▼

Subnet

Subnet1 ▼

VM Name ?

netappdatabroker

User Name ?

databroker

Authentication Method:

☒ Password
☐ Public Key

Enter Password ?

.....

Resource Group:

☒ Generate a new group
☐ Use an existing group

7. Click **Continue** and keep the page open until the deployment is complete.

The process can take up to 7 minutes.

8. In Cloud Sync, click **Continue** once the data broker is available.
9. Complete the pages in the wizard to create the new sync relationship.

## Result

You have deployed a data broker in Azure and created a new sync relationship. You can use this data broker with additional sync relationships.

### Getting a message about needing admin consent?

If Microsoft notifies you that admin approval is required because Cloud Sync needs permission to access resources in your organization on your behalf, then you have two options:

1. Ask your AD admin to provide you with the following permission:

In Azure, go to **Admin Centers > Azure AD > Users and Groups > User Settings** and enable **Users can consent to apps accessing company data on their behalf**.

2. Ask your AD admin to consent on your behalf to **CloudSync-AzureDataBrokerCreator** using the following URL (this is the admin consent endpoint):

`https://login.microsoftonline.com/{FILL HERE YOUR TENANT ID}/v2.0/adminconsent?client_id=8ee4ca3a-bafa-4831-97cc-5a38923cab85&redirect_uri=https://cloudsync.netapp.com&scope=https://management.azure.com/user_impersonationhttps://graph.microsoft.com/User.Read`

As shown in the URL, our app URL is `https://cloudsync.netapp.com` and the application client ID is `8ee4ca3a-bafa-4831-97cc-5a38923cab85`.

## Installing the data broker in Google Cloud Platform

When you create a sync relationship, choose the GCP Data Broker option to deploy the data broker software on a new virtual machine instance in a VPC. Cloud Sync guides you through the installation process, but the requirements and steps are repeated on this page to help you prepare for installation.

You also have the option to install the data broker on an existing Linux host in the cloud or on your premises. [Learn more](#).

### Supported GCP regions

All regions are supported.

### Networking requirements

- The data broker needs an outbound internet connection so it can poll the Cloud Sync service for tasks over port 443.

When Cloud Sync deploys the data broker in GCP, it creates a security group that enables the

required outbound communication.

If you need to limit outbound connectivity, see [the list of endpoints that the data broker contacts](#).

- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

#### Permissions required to deploy the data broker in GCP

Ensure that the GCP user who deploys the data broker has the following permissions:

- `compute.networks.list`
- `compute.regions.list`
- `deploymentmanager.deployments.create`
- `deploymentmanager.deployments.delete`
- `deploymentmanager.operations.get`
- `iam.serviceAccounts.list`

#### Permissions required for the service account

When you deploy the data broker, you need to select a service account that has the following permissions:

- `logging.logEntries.create`
- `resourcemanager.projects.get`
- `storage.buckets.get`
- `storage.buckets.list`
- `storage.objects.*`

#### Installing the data broker


You can install a data broker in GCP when you create a sync relationship.

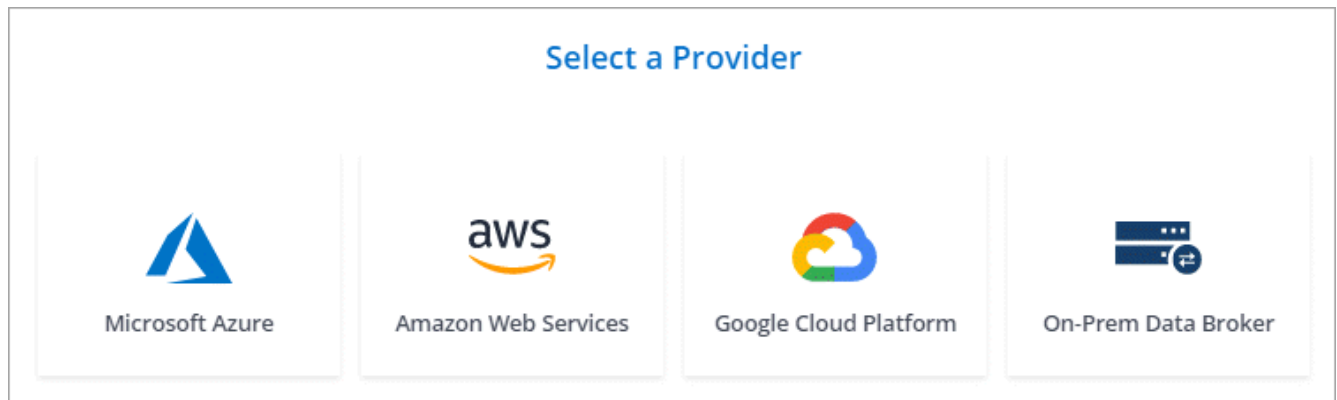
##### Steps

1. Click **Create New Sync**.
2. On the **Define Sync Relationship** page, choose a source and target and click **Continue**.

Complete the steps until you reach the **Data Broker** page.

3. On the **Data Broker** page, click **Create Data Broker** and then select **Google Cloud Platform**.

If you already have a data broker, you'll need to click the  icon first.



4. Enter a name for the data broker and click **Continue**.
5. If you're prompted, log in with your Google account.

The form is owned and hosted by Google. Your credentials are not provided to NetApp.

6. Select a project and service account and then choose a location for the data broker.

A screenshot of a web form titled "Basic Settings". The form is divided into two columns. The left column is headed "Project" and contains two dropdown menus: "Project" (with "OCCM-Dev" selected) and "Service Account" (with "test" selected). Below these is a link that says "Select a Service Account that includes [these permissions](#)". The right column is headed "Location" and contains three dropdown menus: "Region" (with "us-west1" selected), "Zone" (with "us-west1-a" selected), "VPC" (with "default" selected), and "Subnet" (with "default" selected).

7. Once the data broker is available, click **Continue** in Cloud Sync.

The instance takes approximately 5 to 10 minutes to deploy. You can monitor the progress from the Cloud Sync service, which automatically refreshes when the instance is available.

8. Complete the pages in the wizard to create the new sync relationship.

### Result

You've deployed a data broker in GCP and created a new sync relationship. You can use this data broker with additional sync relationships.



## Installing the data broker on a Linux host

When you create a sync relationship, choose the On-Prem Data Broker option to install the data broker software on an on-premises Linux host, or on an existing Linux host in the cloud. Cloud Sync guides you through the installation process, but the requirements and steps are repeated on this page to help you prepare for installation.

### Linux host requirements

- **Operating system:**

- CentOS 7.0, 7.7, and 8.0
- Red Hat Enterprise Linux 7.7 and 8.0
- Ubuntu Server 18.04 LTS
- SUSE Linux Enterprise Server 15 SP1

The command `yum update all` must be run on the host before you install the data broker.

A Red Hat Enterprise Linux system must be registered with Red Hat Subscription Management. If it is not registered, the system cannot access repositories to update required 3rd party software during installation.

- **RAM:** 16 GB
- **CPU:** 4 cores
- **Free disk space:** 10 GB
- **SELinux:** We recommend that you disable [SELinux](#) on the host.

SELinux enforces a policy that blocks data broker software updates and can block the data broker from contacting endpoints required for normal operation.

- **OpenSSL:** OpenSSL must be installed on the Linux host.

### Networking requirements

- The Linux host must have a connection to the source and target.
- The file server must allow the Linux host to access the exports.
- Port 443 must be open on the Linux host for outbound traffic to AWS (the data broker constantly communicates with the Amazon SQS service).
- NetApp recommends configuring the source, target, and data broker to use a Network Time Protocol (NTP) service. The time difference between the three components should not exceed 5 minutes.

## Enabling access to AWS

If you plan to use the data broker with a sync relationship that includes an S3 bucket, then you should prepare the Linux host for AWS access. When you install the data broker, you'll need to provide AWS keys for an AWS user that has programmatic access and specific permissions.

### Steps

1. Create an IAM policy using [this NetApp-provided policy](#). [View AWS instructions](#).
2. Create an IAM user that has programmatic access. [View AWS instructions](#).

Be sure to copy the AWS keys because you need to specify them when you install the data broker software.

## Enabling access to Google Cloud

If you plan to use the data broker with a sync relationship that includes a Google Cloud Storage bucket, then you should prepare the Linux host for GCP access. When you install the data broker, you'll need to provide a key for a service account that has specific permissions.

### Steps

1. Create a GCP service account that has Storage Admin permissions, if you don't already have one.
2. Create a service account key saved in JSON format. [View GCP instructions](#).

The file should contain at least the following properties: "project\_id", "private\_key", and "client\_email"



When you create a key, the file gets generated and downloaded to your machine.

3. Save the JSON file to the Linux host.

## Enabling access to Microsoft Azure

Access to Azure is defined per relationship by providing a storage account and a connection string in the Sync Relationship wizard.

## Installing the data broker


You can install a data broker on a Linux host when you create a sync relationship.

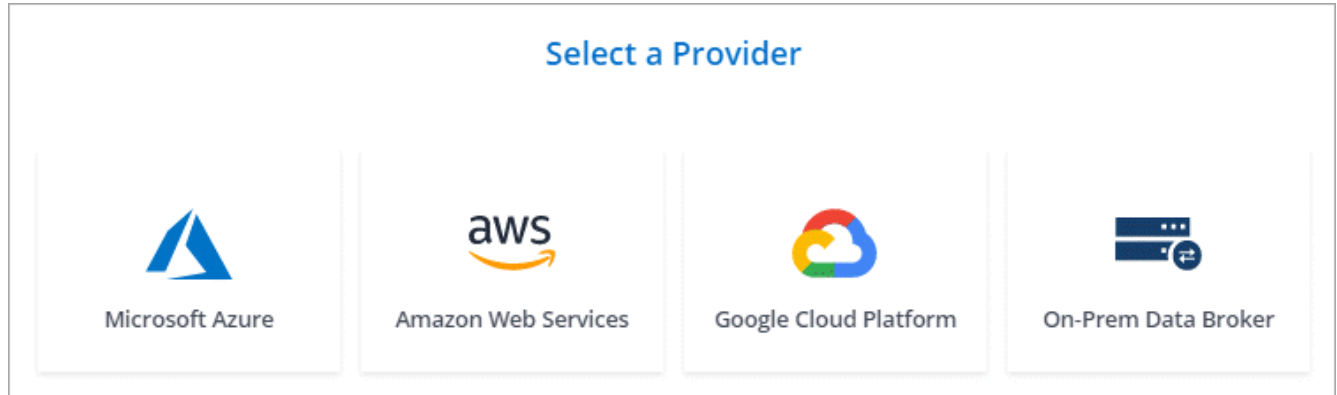
### Steps

1. Click **Create New Sync**.
2. On the **Define Sync Relationship** page, choose a source and target and click **Continue**.

Complete the steps until you reach the **Data Broker** page.

3. On the **Data Broker** page, click **Create Data Broker** and then select **On-Prem Data Broker**.

If you already have a data broker, you'll need to click the  icon first.



Even though the option is labeled **On-Prem Data Broker**, it applies to a Linux host on your premises or in the cloud.

4. Enter a name for the data broker and click **Continue**.

The instructions page loads shortly. You'll need to follow these instructions—they include a unique link to download the installer.

5. On the instructions page:
  - a. Select whether to enable access to **AWS**, **Google Cloud**, or both.
  - b. Select an installation option: **No proxy**, **Use proxy server**, or **Use proxy server with authentication**.
  - c. Use the commands to download and install the data broker.

The following steps provide details about each possible installation option. Follow the instructions page to get the exact command based on your installation option.

- d. Download the installer:

- No proxy:

```
curl <URI> -o data_broker_installer.sh
```

- Use proxy server:

```
curl <URI> -o data_broker_installer.sh -x <proxy_host>:<proxy_port>
```

- Use proxy server with authentication:

```
curl <URI> -o data_broker_installer.sh -x <proxy_username>:<proxy_password>@<proxy_host>:<proxy_port>
```

#### URI

Cloud Sync displays the URI of the installation file on the instructions page, which loads

when you follow the prompts to deploy the On-Prem Data Broker. That URI isn't repeated here because the link is generated dynamically and can be used only once. [Follow these steps to obtain the URI from Cloud Sync](#).

e. Switch to superuser, make the installer executable and install the software:



Each command listed below includes parameters for AWS access and GCP access. Follow the instructions page to get the exact command based on your installation option.

- No proxy configuration:

```
sudo -s
chmod +x data_broker_installer.sh
./data_broker_installer.sh -a <aws_access_key> -s <aws_secret_key> -g
<absolute_path_to_the_json_file>
```

- Proxy configuration:

```
sudo -s
chmod +x data_broker_installer.sh
./data_broker_installer.sh -a <aws_access_key> -s <aws_secret_key> -g
<absolute_path_to_the_json_file> -h <proxy_host> -p <proxy_port>
```

- Proxy configuration with authentication:

```
sudo -s
chmod +x data_broker_installer.sh
./data_broker_installer.sh -a <aws_access_key> -s <aws_secret_key> -g
<absolute_path_to_the_json_file> -h <proxy_host> -p <proxy_port> -u <proxy_username> -w
<proxy_password>
```

### AWS keys

These are the keys for the user that you should have prepared [following these steps](#). The AWS keys are stored on the data broker, which runs in your on-premises or cloud network. NetApp doesn't use the keys outside of the data broker.

### JSON file

This is the JSON file that contains a service account key that you should have prepared [following these steps](#).

6. Once the data broker is available, click **Continue** in Cloud Sync.
7. Complete the pages in the wizard to create the new sync relationship.

## Creating a sync relationship

When you create a sync relationship, the Cloud Sync service copies files from the source to the target. After the initial copy, the service syncs any changed data every

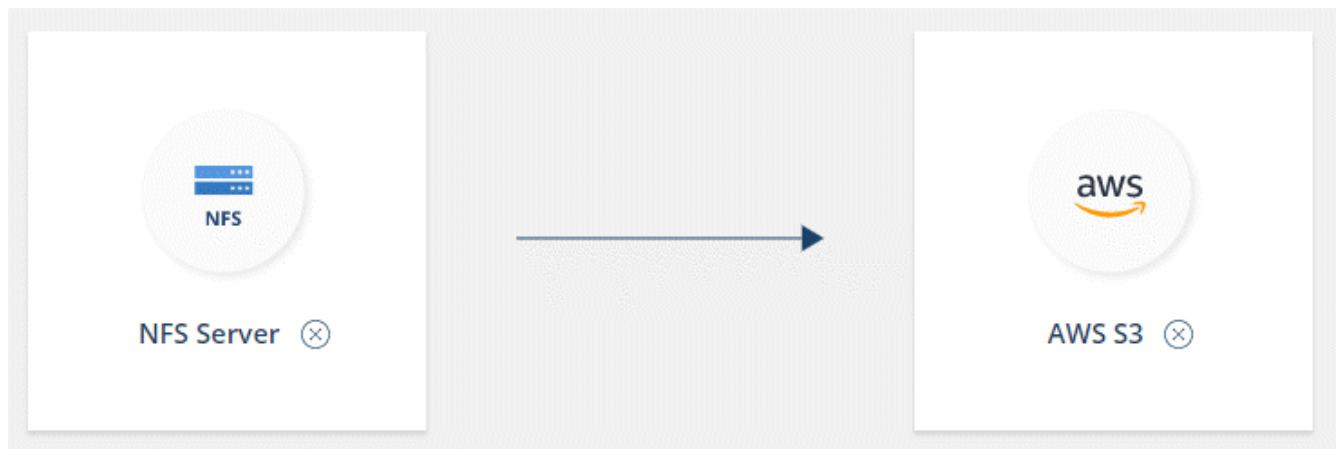
24 hours.

The steps below provide an example that shows how to set up a sync relationship from an NFS server to an S3 bucket.

#### *Steps*

1. In Cloud Manager, click **Sync**.
2. On the **Define Sync Relationship** page, choose a source and target.

The following steps provide an example of how to create a sync relationship from an NFS server to an S3 bucket.



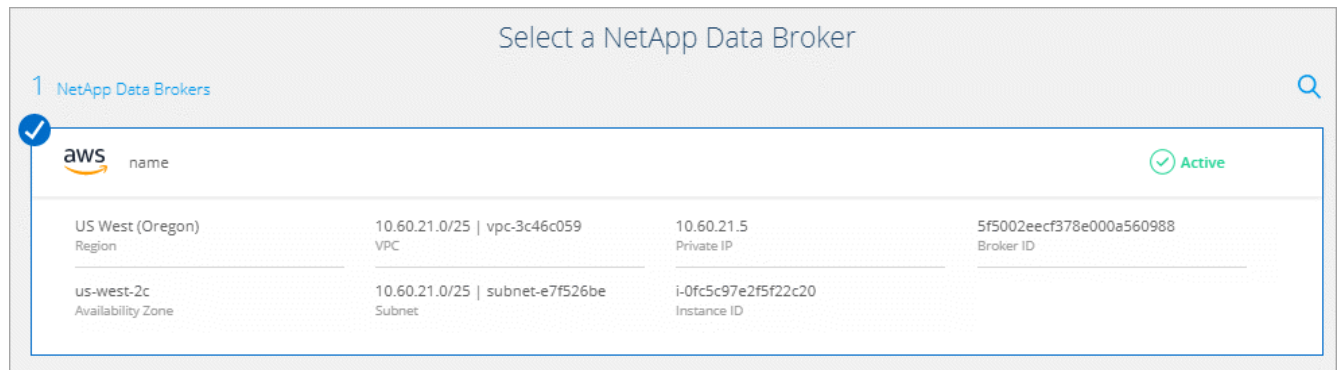
3. On the **NFS Server** page, enter the IP address or fully qualified domain name of the NFS server that you want to sync to AWS.
4. On the **Data Broker** page, follow the prompts to create a data broker virtual machine in AWS, Azure, or Google Cloud Platform, or to install the data broker software on an existing Linux host.

For more details, refer to the following pages:

- [Installing the data broker in AWS](#)
- [Installing the data broker in Azure](#)
- [Installing the data broker in GCP](#)
- [Installing the data broker on a Linux host](#)

5. After you install the data broker, click **Continue**.

The following image shows a successfully deployed data broker in AWS:



6. On the **Directories** page, select a top-level directory or subdirectory.

If Cloud Sync is unable to retrieve the exports, click **Add Export Manually** and enter the name of an NFS export.



If you want to sync more than one directory on the NFS server, then you must create additional sync relationships after you are done.

7. On the **AWS S3 Bucket** page, select a bucket:

- Drill down to select an existing folder within the bucket or to select a new folder that you create inside the bucket.
- Click **Add to the list** to select an S3 bucket that is not associated with your AWS account. [Specific permissions must be applied to the S3 bucket.](#)

8. On the **Bucket Setup** page, set up the bucket:

- Choose whether to enable S3 bucket encryption and then select an AWS KMS key, enter the ARN of a KMS key, or select AES-256 encryption.
- Select an S3 storage class. [View the supported storage classes.](#)

- On the **Settings** page, define how source files and folders are synced and maintained in the target location:

### Schedule

Choose a recurring schedule for future syncs or turn off the sync schedule. You can schedule a relationship to sync data as often as every 1 minute.

### Retries

Define the number of times that Cloud Sync should retry to sync a file before skipping it.

### Recently Modified Files

Choose to exclude files that were recently modified prior to the scheduled sync.

### Delete Files on Source

Choose to delete files from the source location after Cloud Sync copies the files to the target location. This option includes the risk of data loss because the source files are deleted after they're copied.

If you enable this option, you also need to change a parameter in the `local.json` file on the data broker. Open the file and change the parameter named `workers.transferrer.delete-on-source` to **true**.

### Delete Files on Target

Choose to delete files from the target location, if they were deleted from the source. The default is to never deletes files from the target location.

### Object tagging

When AWS S3 is the target in a sync relationship, Cloud Sync tags S3 objects with metadata that's

relevant to the sync operation. You can disable tagging of S3 objects, if it's not desired in your environment. There's no impact to Cloud Sync if you disable tagging—Cloud Sync just stores the sync metadata in a different way.

### File Types

Define the file types to include in each sync: files, directories, and symbolic links.

### Exclude File Extensions

Specify file extensions to exclude from the sync by typing the file extension and pressing **Enter**. For example, type *log* or *.log* to exclude \*.log files. A separator isn't required for multiple extensions. The following video provides a short demo:

► [https://docs.netapp.com/us-en/occm/media/video\\_file\\_extensions.mp4](https://docs.netapp.com/us-en/occm/media/video_file_extensions.mp4) (video)

### File Size

Choose to sync all files regardless of their size or just files that are in a specific size range.

### Date Modified

Choose all files regardless of their last modified date, files modified after a specific date, before a specific date, or between a time range.

10. On the **Relationship Tags** page, enter up to 9 relationship tags and then click **Continue**.

The Cloud Sync service assigns the tags to each object that it syncs to the S3 bucket.

11. Review the details of the sync relationship and then click **Create Relationship**.

### Result

Cloud Sync starts syncing data between the source and target.

## Paying for sync relationships after your free trial ends

There are two ways to pay for sync relationships after your 14-day free trial ends. The first option is to subscribe from AWS or Azure to pay-as-you-go or to pay annually. The second option is to purchase licenses directly from NetApp.

You can use licenses from NetApp with an AWS or Azure subscription. For example, if you have 25 sync relationships, you can pay for the first 20 sync relationships using a license and then pay-as-you-go from AWS or Azure with the remaining 5 sync relationships.

[Learn more about how licenses work.](#)



## What if I don't immediately pay after my free trial ends?

You won't be able to create any additional relationships. Existing relationships are not deleted, but you cannot make any changes to them until you subscribe or enter a license.

### Subscribing from AWS

AWS enables you to pay-as-you-go or to pay annually.

#### *Steps to pay-as-you-go*

1. Click **Sync > Licensing**.
2. Select **AWS**
3. Click **Subscribe** and then click **Continue**.
4. Subscribe from the AWS Marketplace, and then log back in to the Cloud Sync service to complete the registration.

The following video shows the process:

▶ [https://docs.netapp.com/us-en/occm/media/video\\_cloud\\_sync\\_registering.mp4](https://docs.netapp.com/us-en/occm/media/video_cloud_sync_registering.mp4) (video)

#### *Steps to pay annually*

1. [Go to the AWS Marketplace page](#).
2. Click **Continue to Subscribe**.
3. Select your contract options and click **Create contract**.

### Subscribing from Azure

Azure enables you to pay-as-you-go or to pay annually.

#### *What you'll need*

An Azure user account that has Contributor or Owner permissions in the relevant subscription.

#### *Steps*

1. Click **Sync > Licensing**.
2. Select **Azure**.
3. Click **Subscribe** and then click **Continue**.
4. In the Azure portal, click **Create**, select your options, and click **Subscribe**.

Select **Monthly** to pay by the hour, or **Yearly** to pay for a year up front.

5. When deployment is complete, click the name of the SaaS resource in the notification pop-up.

6. Click **Configure Account** to return to Cloud Sync.

The following video shows the process:

► [https://docs.netapp.com/us-en/occm/media/video\\_cloud\\_sync\\_registering\\_azure.mp4](https://docs.netapp.com/us-en/occm/media/video_cloud_sync_registering_azure.mp4) (video)

## Purchasing licenses from NetApp and adding them to Cloud Sync

To pay for your sync relationships up front, you must purchase one or more licenses and add them to the Cloud Sync service.

### Steps

1. Purchase a license by [contacting NetApp](#).
2. In Cloud Manager, click **Sync** > **Licensing**.
3. Click **Add License** and add the license.

# Tutorials

## Copying ACLs between SMB shares

Cloud Sync can copy access control lists (ACLs) between a source SMB share and a target SMB share. If needed, you can manually preserve the ACLs yourself by using robocopy.

### Choices

- [Set up Cloud Sync to automatically copy ACLs](#)
- [Manually copy the ACLs yourself](#)

## Setting up Cloud Sync to copy ACLs between SMB servers

Copy ACLs between SMB servers by enabling a setting when you create a relationship or after you create a relationship.

Note that this feature is available for new sync relationships created after the 23 Feb 2020 release. If you'd like to use this feature with existing relationships created prior to that date, then you'll need to recreate the relationship.

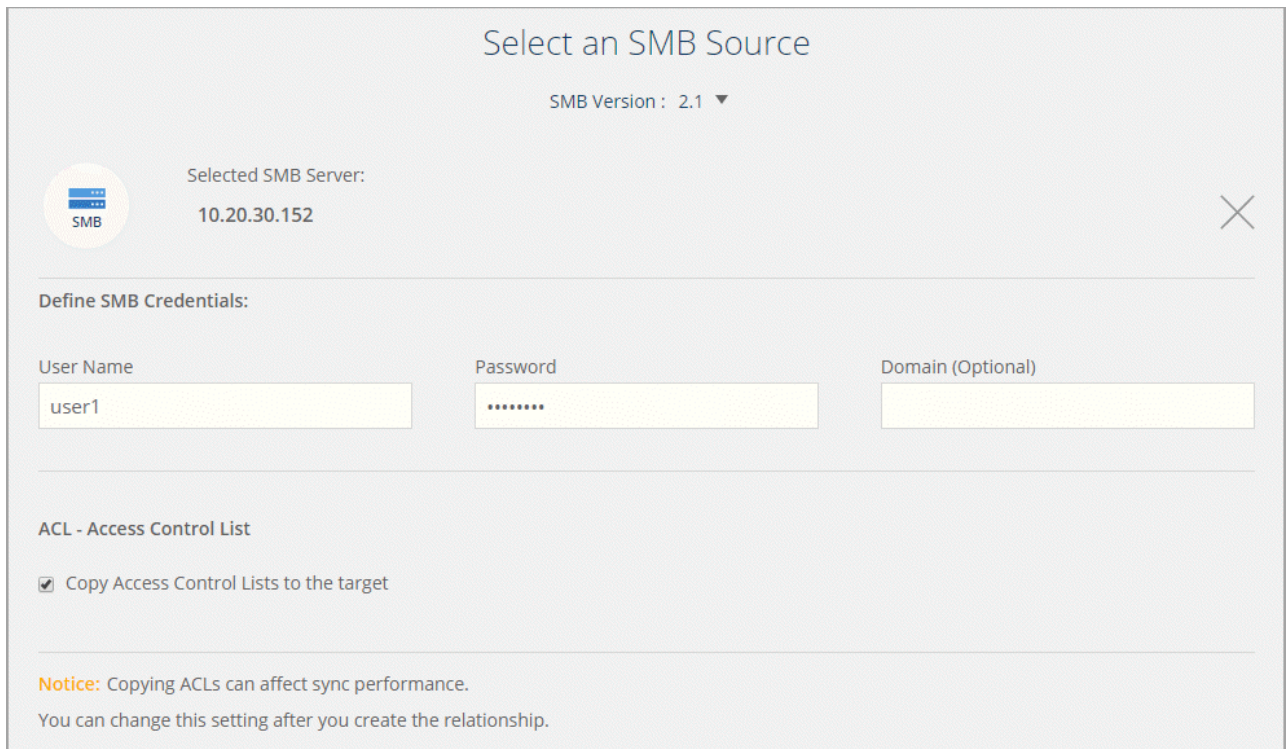
### What you'll need

- A new sync relationship or an existing sync relationship created after the 23 Feb 2020 release.
- Any type of data broker.

This feature works with *any* type of data broker: the AWS, Azure, Google Cloud Platform, or on-prem data broker. The on-prem data broker can run [any supported operating system](#).

### Steps for a new relationship

1. From Cloud Sync, click **Create New Sync**.
2. Drag and drop **SMB Server** to the source and target and click **Continue**.
3. On the **SMB Server** page:
  - a. Enter a new SMB server or select an existing server and click **Continue**.
  - b. Enter credentials for the SMB server.
  - c. Select **Copy Access Control Lists to the target** and click **Continue**.



4. Follow the remaining prompts to create the sync relationship.

### Steps for an existing relationship

1. Hover over the sync relationship and click the action menu.
2. Click **Settings**.
3. Select **Copy Access Control Lists to the target**.
4. Click **Save Settings**.

### Result

When syncing data, Cloud Sync preserves the ACLs between the source and target SMB shares.

### Manually copying ACLs

You can manually preserve ACLs between SMB shares by using the Windows robocopy command.

### Steps

1. Identify a Windows host that has full access to both SMB shares.
2. If either of the endpoints require authentication, use the **net use** command to connect to the endpoints from the Windows host.

You must perform this step before you use robocopy.

3. From Cloud Sync, create a new relationship between the source and target SMB shares or sync an existing relationship.
4. After the data sync is complete, run the following command from the Windows host to sync the ACLs and ownership:

```
robocopy /E /COPY:SOU /secfix [source] [target] /w:0 /r:0 /XD ~snapshots /UNILog: "[logfilepath]
```

Both *source* and *target* should be specified using the UNC format. For example:  
\\<server>\<share>\<path>

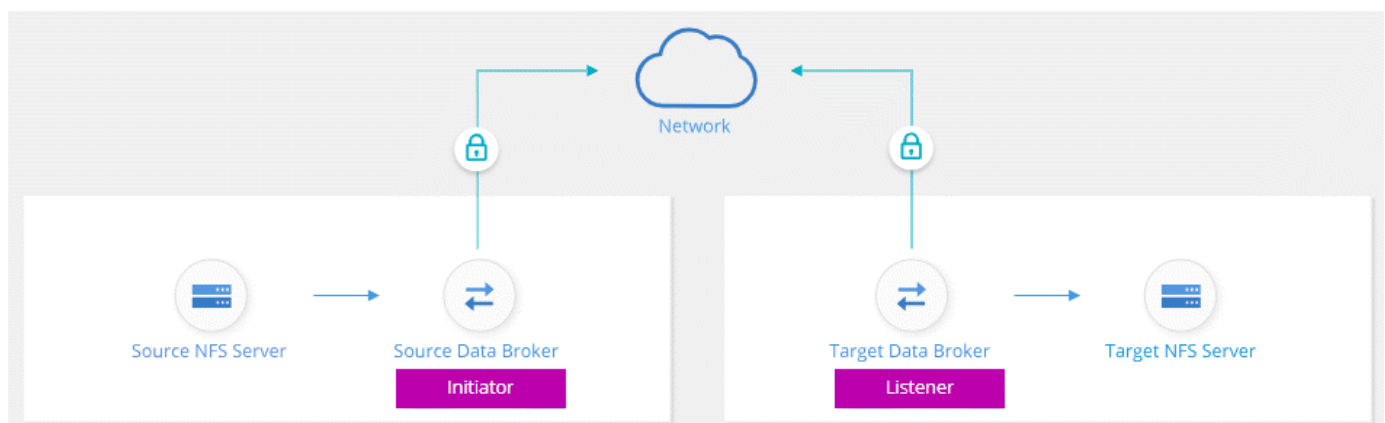
## Syncing NFS data using data-in-flight encryption

If your business has strict security policies, you can sync NFS data using data-in-flight encryption. This feature is supported from an NFS server to another NFS server and from Azure NetApp Files to Azure NetApp Files.

For example, you might want to sync data between two NFS servers that are in different networks. Or you might need to securely transfer data on Azure NetApp Files across subnets or regions.

### How data-in-flight encryption works

Data-in-flight encryption encrypts NFS data when it's sent over the network between two data brokers. The following image shows a relationship between two NFS servers and two data brokers:



One data broker functions as the *initiator*. When it's time to sync data, it sends a connection request to the other data broker, which is the *listener*. That data broker listens for requests on port 443. You can

use a different port, if needed, but be sure to check that the port is not in use by another service.

For example, if you sync data from an on-premises NFS server to a cloud-based NFS server, you can choose which data broker listens for the connection requests and which sends them.

Here's how in-flight encryption works:

1. After you create the sync relationship, the initiator starts an encrypted connection with the other data broker.
2. The source data broker encrypts data from the source using TLS 1.3.
3. It then sends the data over the network to the target data broker.
4. The target data broker decrypts the data before sending it to the target.
5. After the initial copy, the service syncs any changed data every 24 hours. If there is data to sync, the process starts with the initiator opening an encrypted connection with the other data broker.

If you prefer to sync data more frequently, [you can change the schedule after you create the relationship](#).

## Supported NFS versions

- For NFS servers, data-in-flight encryption is supported with NFS versions 3, 4.0, 4.1, and 4.2.
- For Azure NetApp Files, data-in-flight encryption is supported with NFS versions 3 and 4.1.

## What you'll need to get started

Be sure to have the following:

- Two NFS servers that meet [source and target requirements](#) or Azure NetApp Files in two subnets or regions.
- The IP addresses or fully qualified domain names of the servers.
- Network locations for two data brokers.

You can select an existing data broker but it must function as the initiator. The listener data broker must be a *new* data broker.

If you have not yet deployed a data broker, review the data broker requirements. Because you have strict security policies, be sure to review the networking requirements, which includes outbound traffic from port 443 and the [internet endpoints](#) that the data broker contacts.

- [Review AWS installation](#)
- [Review Azure installation](#)
- [Review GCP installation](#)
- [Review Linux host installation](#)

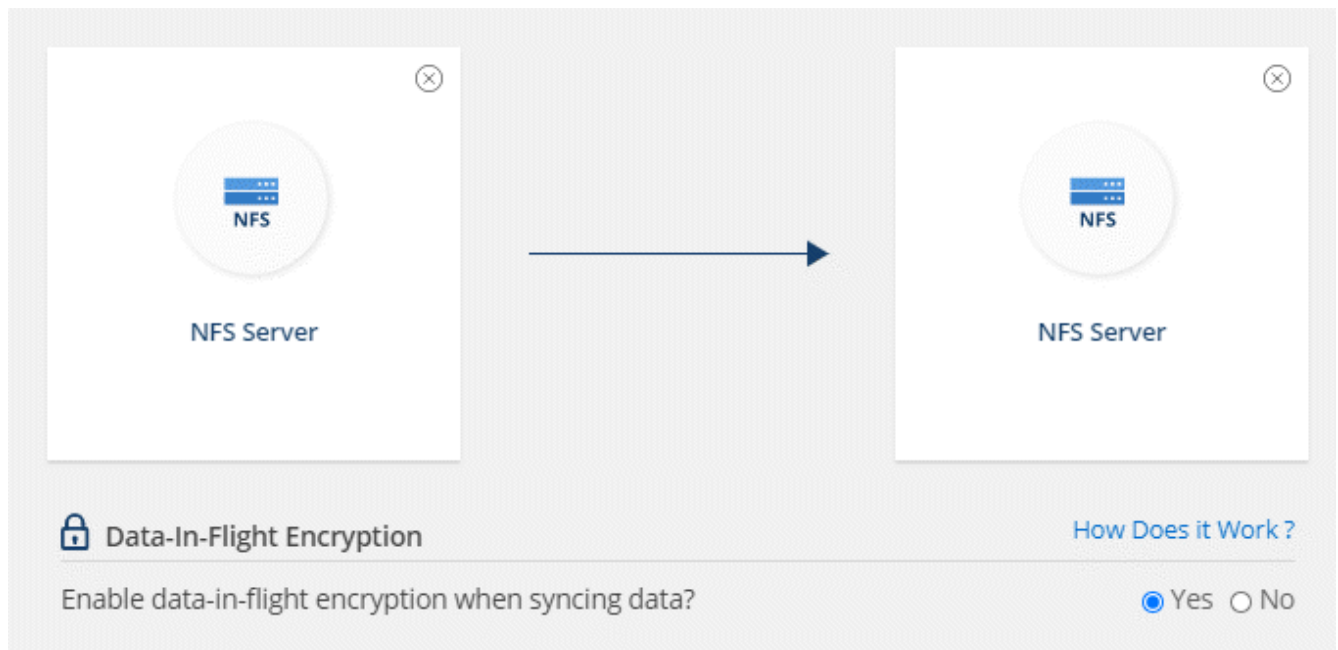
## Syncing NFS data using data-in-flight encryption

Create a new sync relationship between two NFS servers or between Azure NetApp Files, enable the in-flight encryption option, and follow the prompts.

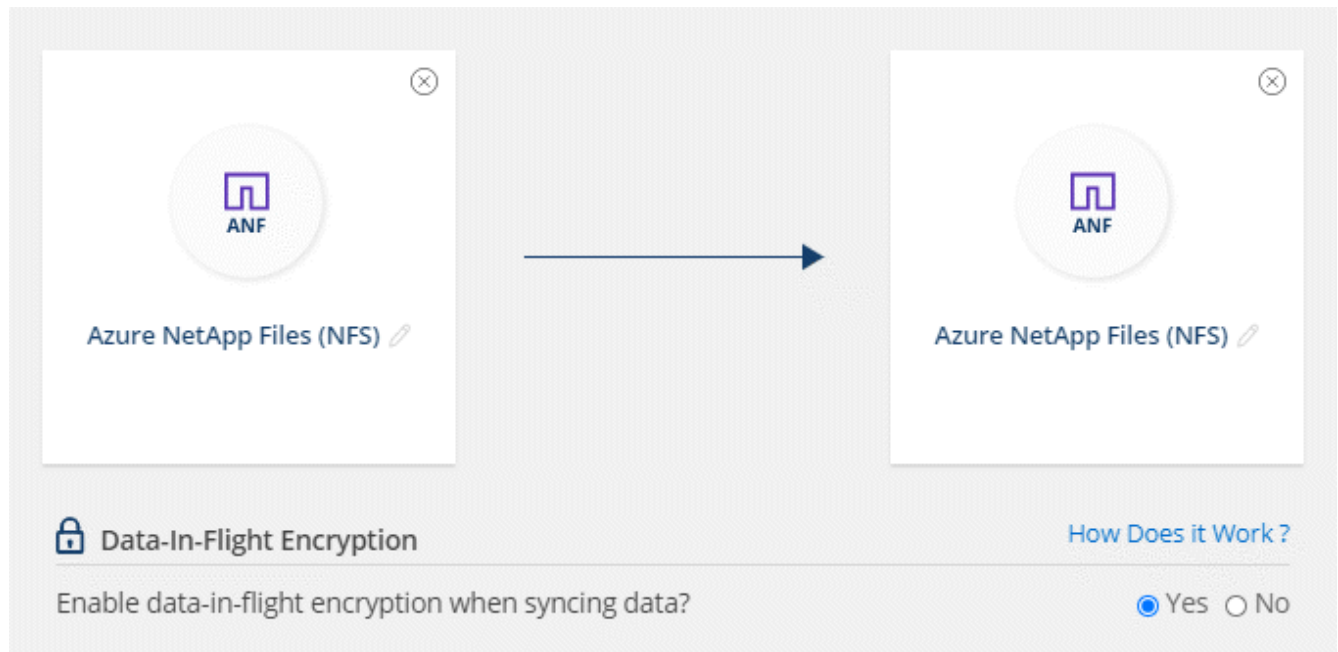
### Steps

1. Click **Create New Sync**.
2. Drag and drop **NFS Server** to the source and target locations or **Azure NetApp Files** to the source and target locations and select **Yes** to enable data-in-flight encryption.

The following image shows what you'd select to sync data between two NFS servers:



The following image shows what you'd select to sync data between Azure NetApp Files:

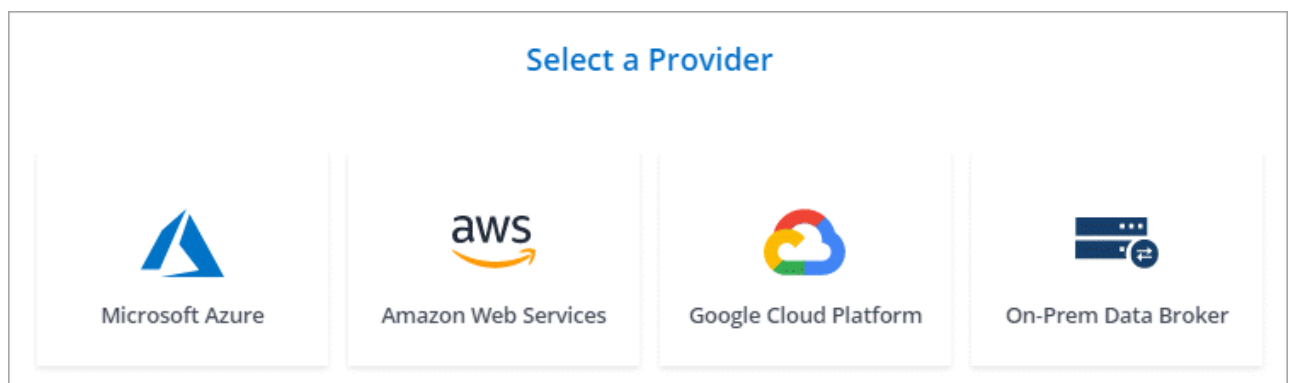


3. Follow the prompts to create the relationship:

- a. **NFS Server/Azure NetApp Files:** Choose the NFS version and then specify a new NFS source or select an existing server.
- b. **Define Data Broker Functionality:** Define which data broker *listens* for connection requests on a port and which one *initiates* the connection. Make your choice based on your networking requirements.
- c. **Data Broker:** Follow the prompts to add a new source data broker or select an existing data broker.

If the source data broker acts as the listener, then it must be a new data broker.

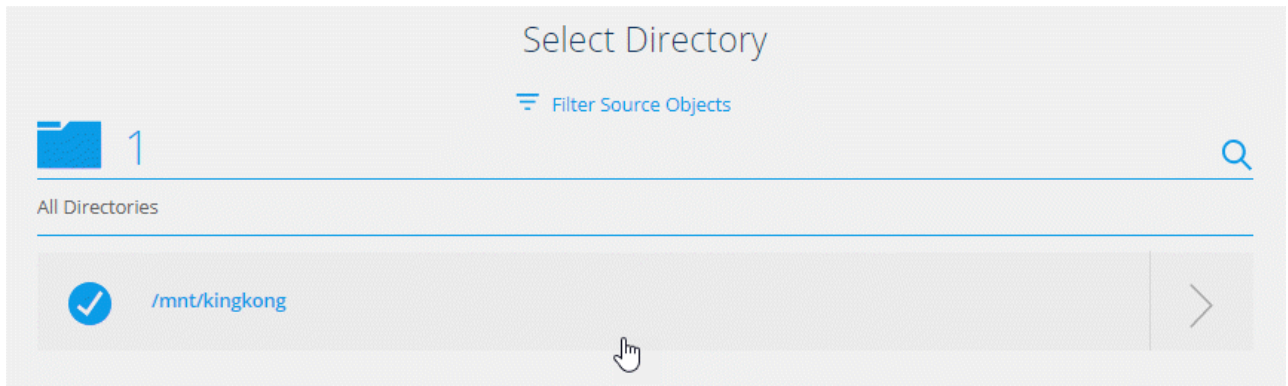
If you need a new data broker, Cloud Sync prompts you with the installation instructions. You can deploy the data broker in the cloud or download an installation script for your own Linux host.



- d. **Directories:** Choose the directories that you want to sync by selecting all directories, or by drilling down and selecting a subdirectory.



Click **Filter Source Objects** to modify settings that define how source files and folders are synced and maintained in the target location.



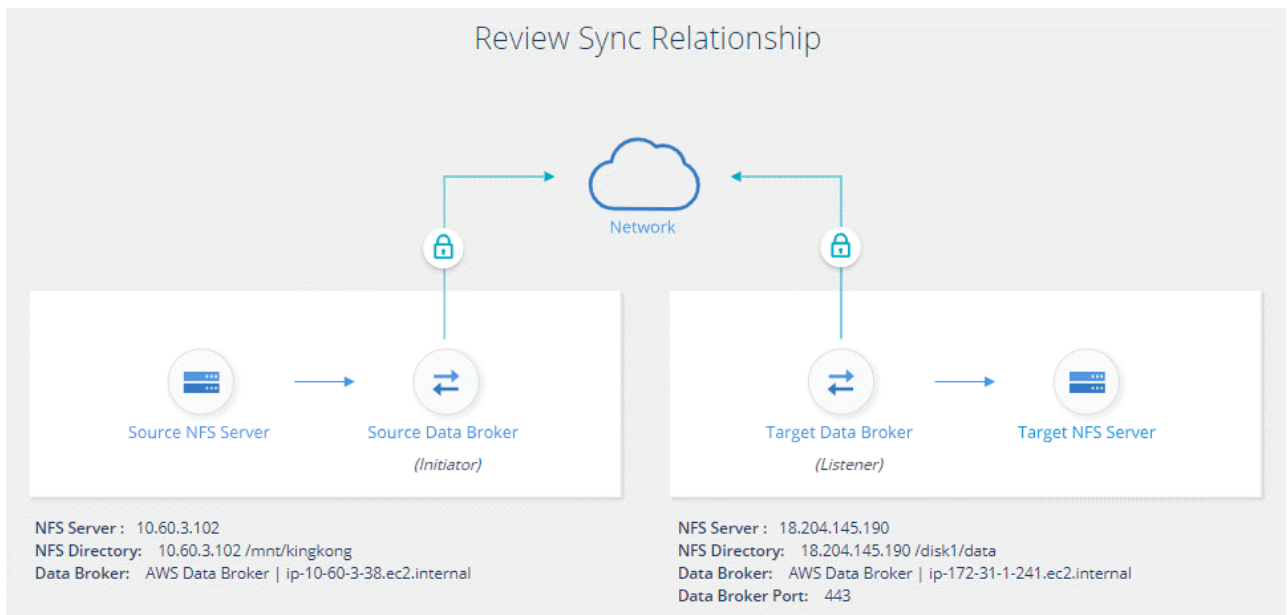
- e. **Target NFS Server/Target Azure NetApp Files:** Choose the NFS version and then enter a new NFS target or select an existing server.
- f. **Target Data Broker:** Follow the prompts to add a new source data broker or select an existing data broker.

If the target data broker acts as the listener, then it must be a new data broker.

Here's an example of the prompt when the target data broker functions as the listener. Notice the option to specify the port.

- g. **Target Directories:** Select a top-level directory, or drill down to select an existing subdirectory or to create a new folder inside an export.
- h. **Settings:** Define how source files and folders are synced and maintained in the target location.
- i. **Review:** Review the details of the sync relationship and then click **Create Relationship**.





### Result

Cloud Sync starts creating the new sync relationship. When it's done, click **View in Dashboard** to view details about the new relationship.

## Managing sync relationships

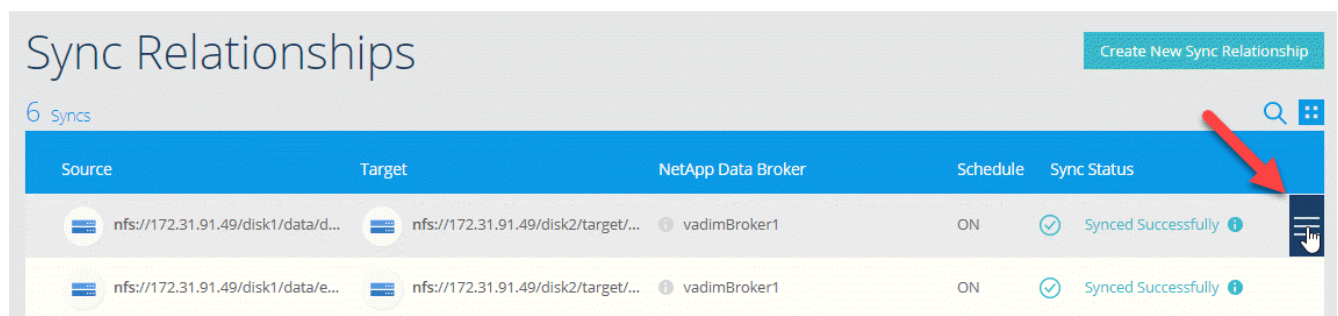
You can manage sync relationships at any time by immediately syncing data, changing schedules, and more.

### Performing an immediate data sync

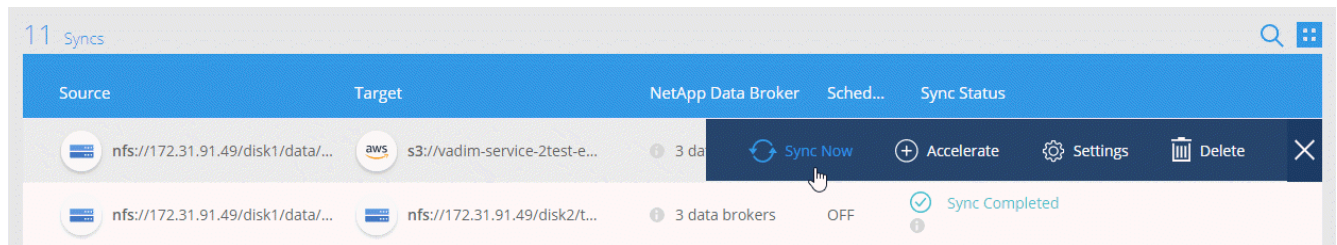
Rather than wait for the next scheduled sync, you can press a button to immediately sync data between the source and target.

### Steps

1. From the **Sync Dashboard**, hover over the sync relationship and click the action menu.



2. Click **Sync Now** and then click **Sync** to confirm.



## Result

Cloud Sync starts the data sync process for the relationship.

## Accelerating sync performance

Accelerate the performance of a sync relationship by adding an additional data broker to the relationship. The additional data broker must be a *new* data broker.

### How this works

If the existing data brokers in the relationship are used in other sync relationships, then Cloud Sync automatically adds the new data broker to those relationships, as well.

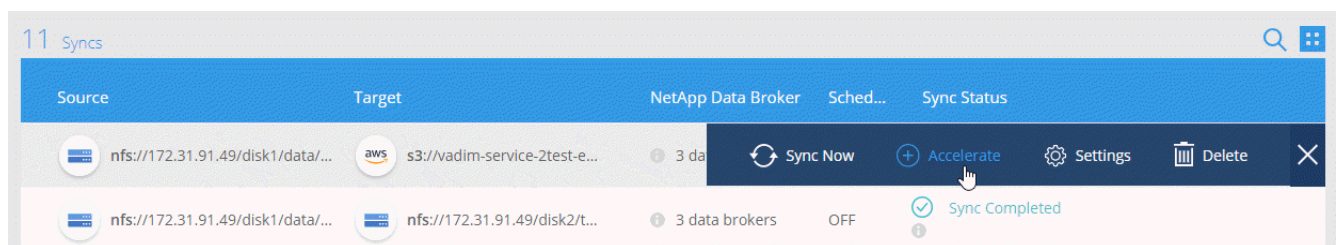
For example, let's say you have three relationships:

- Relationship 1 uses data broker A
- Relationship 2 uses data broker B
- Relationship 3 uses data broker A

You want to accelerate the performance of relationship 1 so you add a new data broker to that relationship (data broker C). Because data broker A is also used in relationship 3, the new data broker is automatically added to relationship 3, as well.

### Steps

1. Ensure that at least one of the existing data brokers in the relationship are online.
2. Hover over the sync relationship and click the action menu.
3. Click **Accelerate**.



4. Follow the prompts to create a new data broker.

## Result

Cloud Sync adds the new data broker to the sync relationships. The performance of the next data sync should be accelerated.

## Changing the settings for a sync relationship

Modify settings that define how source files and folders are synced and maintained in the target location.

- 1. Hover over the sync relationship and click the action menu.
- 2. Click **Settings**.
- 3. Modify any of the settings.

General

Schedule

ON | Every 1 Day

Retries

Retry 3 times before skipping file

Files and Directories

Recently Modified Files

Exclude files that are modified up to 30 Seconds before a scheduled sync

Delete Files On Source

Never delete files from the source location

Delete Files On Target

Never delete files from the target location

Object Tagging

Allow Cloud Sync to tag S3 objects

File Types

Include All: Files, Directories, Symbolic Links

Exclude File Extensions

None

File Size

All

Date Modified

All

Reset to defaults

Here’s a brief description of each setting:

### Schedule

Choose a recurring schedule for future syncs or turn off the sync schedule. You can schedule a

relationship to sync data as often as every 1 minute.

### Retries

Define the number of times that Cloud Sync should retry to sync a file before skipping it.

### Recently Modified Files

Choose to exclude files that were recently modified prior to the scheduled sync.

### Delete Files on Source

Choose to delete files from the source location after Cloud Sync copies the files to the target location. This option includes the risk of data loss because the source files are deleted after they're copied.

If you enable this option, you also need to change a parameter in the `local.json` file on the data broker. Open the file and change the parameter named `workers.transferrer.delete-on-source` to **true**.

### Delete Files on Target

Choose to delete files from the target location, if they were deleted from the source. The default is to never delete files from the target location.

### Object tagging

When AWS S3 is the target in a sync relationship, Cloud Sync tags S3 objects with metadata that's relevant to the sync operation. You can disable tagging of S3 objects, if it's not desired in your environment. There's no impact to Cloud Sync if you disable tagging—Cloud Sync just stores the sync metadata in a different way.

### File Types

Define the file types to include in each sync: files, directories, and symbolic links.

### Exclude File Extensions

Specify file extensions to exclude from the sync by typing the file extension and pressing **Enter**. For example, type `log` or `.log` to exclude `*.log` files. A separator isn't required for multiple extensions. The following video provides a short demo:

► [https://docs.netapp.com/us-en/occm/media/video\\_file\\_extensions.mp4](https://docs.netapp.com/us-en/occm/media/video_file_extensions.mp4) (video)

### File Size

Choose to sync all files regardless of their size or just files that are in a specific size range.

### Date Modified

Choose all files regardless of their last modified date, files modified after a specific date, before a specific date, or between a time range.

### Copy Access Control Lists to the target

Choose to copy access control lists (ACLs) between source SMB shares and target SMB shares. Note that this option is only available for sync relationships created after the 23 Feb 2020 release.

4. Click **Save Settings**.

#### *Result*

Cloud Sync modifies the sync relationship with the new settings.

## Deleting relationships

You can delete a sync relationship, if you no longer need to sync data between the source and target. This action does not delete the data broker instance and it does not delete data from the target.

#### *Steps*

1. Hover over the sync relationship and click the action menu.
2. Click **Delete** and then click **Delete** again to confirm.

#### *Result*

Cloud Sync deletes the sync relationship.

## Cloud Sync APIs

The Cloud Sync capabilities that are available through the web UI are also available through RESTful APIs.

### Getting started

To get started with the Cloud Sync APIs, you need to obtain a user token and your Cloud Central account ID. You'll need to add the token and account ID to the Authorization header when making API calls.

#### *Steps*

1. Obtain a user token from NetApp Cloud Central.

```
POST https://netapp-cloud-account.auth0.com/oauth/token
Header: Content-Type: application/json
Body:
{
  "username": "<user_email>",
  "scope": "profile",
  "audience": "https://api.cloud.netapp.com",
  "client_id": "UaVhOIXMWQs5i1WdDxauXe5Mqkb34NJQ",
  "grant_type": "password",
  "password": "<user_password>"
}
```

2. Obtain your Cloud Central account ID.

```
GET https://cloudsync.netapp.com/api/accounts
Headers: Authorization: Bearer <user_token>
Content-Type: application/json
```

This API will return a response like the following:

```
[
  {
    "accountId": "account-JeL97Ry3",
    "name": "Test"
  }
]
```

3. Add the user token and account ID in the Authorization header of each API call.

### Example

The following example shows an API call to create a data broker in Microsoft Azure. You would simply replace <user\_token> and <accountId> with the token and ID that you obtained in the previous steps.

```
POST https://cloudsync.netapp.com/api/data-brokers
Headers: Authorization: Bearer <user_token>
Content-Type: application/json
x-account-id: <accountId>
Body: { "name": "databroker1", "type": "AZURE" }
```

## What should I do when the token expires?

The user token from NetApp Cloud Central has an expiration date. To refresh the token, you need to call the API from step 1 again.

The API response includes an "expires\_in" field that states when the token expires.

## API reference

Documentation for each Cloud Sync API is available from [NetApp Cloud Central](#).

## Using list APIs

List APIs are asynchronous APIs, so the result does not return immediately (for example: `GET /data-brokers/{id}/list-nfs-export-folders` and `GET /data-brokers/{id}/list-s3-buckets`). The only response from the server is HTTP status 202. To get the actual result, you must use the `GET /messages/client` API.

### Steps

1. Call the list API that you want to use.
2. Use the `GET /messages/client` API to view the result of the operation.
3. Use the same API by appending it with the ID that you just received: `GET http://cloudsync.netapp.com/api/messages/client?last=<id_from_step_2>`

Note that the ID changes each time that you call the `GET /messages/client` API.

## Example

When you call the `list-s3-buckets` API, a result is not immediately returned:

```
GET http://cloudsync.netapp.com/api/data-brokers/<data-broker-id>/list-s3-buckets
Headers: Authorization: Bearer <user_token>
Content-Type: application/json
x-account-id: <accountId>
```

The result is HTTP status code 202, which means the message was accepted, but was not processed yet.

To get the result of the operation, you need to use the following API:

```
GET http://cloudsync.netapp.com/api/messages/client
Headers: Authorization: Bearer <user_token>
Content-Type: application/json
x-account-id: <accountId>
```

The result is an array with one object that includes an ID field. The ID field represents the last message that the server sent. For example:

```
[
  {
    "header": {
      "requestId": "init",
      "clientId": "init",
      "agentId": "init"
    },
    "payload": {
      "init": {}
    },
    "id": "5801"
  }
]
```

You would now make the following API call using the ID that you just received:

```
GET http://cloudsync.netapp.com/api/messages/client?last=<id_from_step_2>
Headers: Authorization: Bearer <user_token>
Content-Type: application/json
x-account-id: <accountId>
```

The result is an array of messages. Inside each message is a payload object, which consists of the name of the operation (as key) and its result (as value). For example:



```
[
  {
    "payload": {
      "list-s3-buckets": [
        {
          "tags": [
            {
              "Value": "100$",
              "Key": "price"
            }
          ],
          "region": {
            "displayName": "US West (Oregon)",
            "name": "us-west-2"
          },
          "name": "small"
        }
      ]
    },
    "header": {
      "requestId": "f687ac55-2f0c-40e3-9fa6-57fb8c4094a3",
      "clientId": "5beb032f548e6e35f4ed1ba9",
      "agentId": "5bed61f4489fb04e34a9aac6"
    },
    "id": "5802"
  }
]
```

## Cloud Sync technical FAQ

This FAQ can help if you're just looking for a quick answer to a question.

### Getting started

The following questions relate to getting started with Cloud sync.

#### How does Cloud Sync work?

Cloud Sync uses the NetApp data broker software to sync data from a source to a target (this is called a *sync relationship*).

The data broker controls the sync relationships between your sources and targets. After you set up a sync relationship, Cloud Sync analyzes your source system and breaks it up into multiple replication streams to push to your selected target data.

After the initial copy, the service syncs any changed data based on the schedule that you set.

### **How does the 14-day free trial work?**

The 14-day free trial starts when you sign up for the Cloud Sync service. You're not subject to NetApp charges for Cloud Sync relationships you create for 14 days. However, all resource charges for any data broker that you deploy still applies.

### **How much does Cloud Sync cost?**

There are two types of costs associated with using Cloud Sync: service charges and resource charges.

#### **Service charges**

For pay-as-you-go pricing, Cloud Sync service charges are hourly, based on the number of sync relationships that you create.

- [View pay-as-you-go pricing in AWS](#)
- [View annual pricing in AWS](#)
- [View pricing in Azure](#)

Cloud Sync licenses are also available through your NetApp representative. Each license enables 20 sync relationships for 12 months.

[Learn more about licenses.](#)

#### **Resource charges**

The resource charges are related to the compute and storage costs for running the data broker in the cloud.

### **How is Cloud Sync billed?**

There are two ways to pay for sync relationships after your 14-day free trial ends. The first option is to subscribe from AWS or Azure, which enables you to pay-as-you-go or to pay annually. The second option is to purchase licenses directly from NetApp.

### **Can I use Cloud Sync outside the cloud?**

Yes, you can use Cloud Sync in a non-cloud architecture. The source and target can reside on-premises and so can the data broker.

Note the following key points about using Cloud Sync outside of the cloud:

- For on-premises synchronization, a private Amazon S3 bucket is available through NetApp StorageGRID.
- The data broker does need an internet connection to communicate with the Cloud Sync service.

- If you don't purchase a license directly from NetApp, you will need an AWS or Azure account for the PAYGO Cloud Sync service billing.

### **How do I access Cloud Sync?**

Cloud Sync is available from Cloud Manager in the **Sync** tab.

### **Supported sources and targets**

The following questions related to the source and targets that are supported in a sync relationship.

#### **Which sources and targets does Cloud Sync support?**

Cloud Sync supports many different types of sync relationships. [View the entire list.](#)

#### **What versions of NFS and SMB does Cloud Sync support?**

Cloud Sync supports NFS version 3 and later, and SMB version 1 and later.

[Learn more about sync requirements.](#)

#### **When Amazon S3 is the target, can the data be tiered to a specific S3 storage class?**

Yes, you can choose a specific S3 storage class when AWS S3 is the target:

- Standard (this is the default class)
- Intelligent-Tiering
- Standard-Infrequent Access
- One Zone-Infrequent Access
- Glacier
- Glacier Deep Archive

#### **What about storage tiers for Azure Blob storage?**

You can choose a specific Azure Blob storage tier when a Blob container is the target:

- Hot storage
- Cool storage

### **Networking**

The following questions relate to networking requirements for Cloud Sync.

## **What are the networking requirements for Cloud Sync?**

The Cloud Sync environment requires that the data broker is connected with the source and the target through the selected protocol (NFS, SMB, EFS) or object storage API (Amazon S3, Azure Blob, IBM Cloud Object Storage).

In addition, the data broker needs an outbound internet connection over port 443 so it can communicate with the Cloud Sync service and contact a few other services and repositories.

For more details, [review networking requirements](#).

## **Are there networking limitations related to data broker connectivity?**

Data brokers require internet access. We don't support a proxy server when deploying the data broker in Azure or in Google Cloud Platform.

## **Data synchronization**

The following questions relate to how data synchronization works.

### **How often does synchronization occur?**

The default schedule is set for daily synchronization. After the initial synchronization, you can:

- Modify the sync schedule to your desired number of days, hours, or minutes
- Disable the sync schedule
- Delete the sync schedule (no data will be lost; only the sync relationship will be removed)

### **What is the minimum sync schedule?**

You can schedule a relationship to sync data as often as every 1 minute.

### **Does the data broker retry when a file fails to sync? Or does it timeout?**

The data broker doesn't timeout when a single file fails to transfer. Instead, the data broker retries 3 times before skipping the file. The retry value is configurable in the settings for a sync relationship.

[Learn how to change the settings for a sync relationship](#).

### **What if I have a very large dataset?**

If a single directory contains 600,000 files or more, [contact us](#) so we can help you configure the data broker to handle the payload. We might need to add additional memory to the data broker machine.

## **Security**

The following questions related to security.

## Is Cloud Sync secure?

Yes. All Cloud Sync service networking connectivity is done using [Amazon Simple Queue Service \(SQS\)](#).

All communication between the data broker and Amazon S3, Azure Blob, Google Cloud Storage, and IBM Cloud Object Storage is done through the HTTPS protocol.

If you're using Cloud Sync with on-premises (source or destination) systems, here's a few recommended connectivity options:

- An AWS Direct Connect, Azure ExpressRoute, or Google Cloud Interconnect connection, which is non-internet routed (and can only communicate with the cloud networks that you specify)
- A VPN connection between your on-premises gateway device and your cloud networks
- For extra secure data transfer with S3 buckets, Azure Blob storage, or Google Cloud Storage, an Amazon Private S3 Endpoint, Azure Virtual Network service endpoints, or Private Google Access may be established.

Any of these methods establishes a secure connection between your on-premises NAS servers and a Cloud Sync data broker.

## Is data encrypted by Cloud Sync?

- Cloud Sync supports data-in-flight encryption between source and target NFS servers. [Learn more](#).
- Encryption is not supported with SMB.
- When an Amazon S3 bucket is the target in a sync relationship, you can choose whether to enable data encryption using AWS KMS encryption or AES-256 encryption.

## Permissions

The following questions relate to data permissions.

### Are SMB data permissions synced to the target location?

You can set up Cloud Sync to preserve access control lists (ACLs) between a source SMB share and a target SMB share. Or you can manually copy the ACLs yourself. [Learn how to copy ACLs between SMB shares](#).

### Are NFS data permissions synced to the target location?

Cloud Sync automatically copies NFS permissions between NFS servers as follows:

- NFS version 3: Cloud Sync copies the permissions and the user group owner.
- NFS version 4: Cloud Sync copies the ACLs.

## Performance

The following questions relate to Cloud Sync performance.

### **What does the progress indicator for a sync relationship represent?**

The sync relationship shows the throughput of the data broker's network adapter. If you accelerated sync performance by using multiple data brokers, then the throughput is the sum of all traffic. This throughput refreshes every 20 seconds.

### **I'm experiencing performance issues. Can we limit the number of concurrent transfers?**

The data broker can sync 4 files at a time. If you have very large files (multiple TBs each), it can take a long time to complete the transfer process and performance might be impacted.

Limiting the number of concurrent transfers can help. [Contact us for help.](#)

### **Why am I experiencing low performance with Azure NetApp Files?**

When you sync data to or from Azure NetApp Files, you might experience failures and performance issues if the disk service level is Standard.

Change the service level to Premium or Ultra to enhance the sync performance.

[Learn more about Azure NetApp Files service levels and throughput.](#)

### **Why am I experiencing low performance with Cloud Volumes Service for AWS?**

When you sync data to or from a cloud volume, you might experience failures and performance issues if the level of performance for the cloud volume is Standard.

Change the Service level to Premium or Extreme to enhance the sync performance.

### **How many data brokers are required?**

When you create a new relationship, you start with a single data broker (unless you selected an existing data broker that belongs to an accelerated sync relationship). In many cases, a single data broker can meet the performance requirements for a sync relationship. If it doesn't, you can accelerate sync performance by adding additional data brokers. But you should first check other factors that can impact sync performance.

Multiple factors can impact data transfer performance. The overall sync performance might be impacted due to network bandwidth, latency, and network topology, as well as the data broker VM specs and storage system performance. For example, a single data broker in a sync relationship can reach 100 MB/s, while disk throughput on the target might only allow 64 MB/s. As a result, the data broker keeps trying to copy the data, but the target can't meet the performance of the data broker.

So be sure to check the performance of your networking and the disk throughput on the target.

Then you can consider accelerating sync performance by adding an additional data broker to share the load of that relationship. [Learn how to accelerate sync performance.](#)

## Deleting things

The following questions relate to deleting sync relationships and data from sources and targets.

### What happens if I delete my Cloud Sync relationship?

Deleting a relationship stops all future data syncs and terminates payment. Any data that was synced to the target remains as-is.

### What happens if I delete something from my source server? Is it removed from the target too?

By default, if you have an active sync relationship, the item deleted on the source server is not deleted from the target during the next synchronization. But there is an option in the sync settings for each relationship, where you can define that Cloud Sync will delete files in the target location if they were deleted from the source.

[Learn how to change the settings for a sync relationship.](#)

### What happens if I delete something from my target? Is it removed from my source too?

If an item is deleted from the target, it will not be removed from the source. The relationship is one-way—from source to target. On the next sync cycle, Cloud Sync compares the source to the target, identifies that the item is missing, and Cloud Sync copies it again from the source to the target.

## Troubleshooting

[NetApp Knowledgebase: Cloud Sync FAQ: Support and Troubleshooting](#)

## Data broker deep dive

The following question relates to the data broker.

### Can you explain the architecture of the data broker?

Sure. Here are the most important points:

- The data broker is a node.js application running on a Linux host.
- Cloud Sync deploys the data broker as follows:
  - AWS: From an AWS CloudFormation template
  - Azure: From Azure Resource Manager
  - Google: From Google Cloud Deployment Manager
  - If you use your own Linux host, you need to manually install the software

- The data broker software automatically upgrades itself to the latest version.
- The data broker uses AWS SQS as a reliable and secure communication channel and for control and monitoring. SQS also provides a persistency layer.
- You can add additional data brokers to a relationship to increase transfer speed and add high availability. There is service resiliency if one data broker fails.



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