AWS Snowball Edge Developer Guide

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What Is AWS Snowball Edge?

AWS Snowball Edge is a type of Snowball device with on-board storage and compute power for select AWS capabilities. Snowball Edge can do local processing and edge-computing workloads in addition to transferring data between your local environment and the AWS Cloud.

Each Snowball Edge device can transport data at speeds faster than the internet. This transport is done by shipping the data in the appliances through a regional carrier. The appliances are rugged, complete with E Ink shipping labels.

Snowball Edge devices have three options for device configurations—*Storage Optimized*, *Compute Optimized*, and *Compute Optimized with GPU*. When this guide refers to Snowball Edge devices, it's referring to all options of the device. When specific information applies only to one or more optional configurations of devices (such as how the Snowball Edge with GPU has an on-board GPU), it is called out specifically. For more information, see Snowball Edge Device Options (p. 4).

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AWS Snowball Edge Features

Snowball Edge devices have the following features:

- Large amounts of storage capacity or compute functionality for devices. This depends on the options you choose when you create your job.
- Network adapters with transfer speeds of up to 100 Gbit/second.
- Encryption is enforced, protecting your data at rest and in physical transit.
- You can import or export data between your local environments and Amazon S3, and physically transport the data with one or more devices without using the internet.
- Snowball Edge devices are their own rugged box. The built-in E Ink display changes to show your shipping label when the device is ready to ship.
- Snowball Edge devices come with an on-board LCD display that can be used to manage network connections and get service status information.
- You can cluster Snowball Edge devices for local storage and compute jobs to achieve data durability across 5–10 devices and locally grow or shrink storage on demand.
- You can use the file interface to read and write data to an AWS Snowball Edge device through a file share or Network File System (NFS) mount point.

- You can write Python-language Lambda functions and associate them with Amazon S3 buckets when you create an AWS Snowball Edge device job. Each function triggers when a local Amazon S3 PUT object action is run on the associated bucket on the device.
- Snowball Edge devices have Amazon S3 and Amazon EC2 compatible endpoints available, enabling programmatic use cases.
- Snowball Edge devices support the new `sbe1`, `sbe-c`, and `sbe-g` instance types, which you can use to run compute instances on the device using Amazon Machine Images (AMIs).

Prerequisites for Using Snowball Edge

The Amazon S3 bucket associated with the job must use the Amazon S3 standard storage class. Before creating your first job, keep the following in mind.

For jobs that import data into Amazon S3, follow these steps:

- Create an AWS account with AWS Identity and Access Management (IAM) administrator-level permissions. For more information, see Setting Up Your AWS Access for AWS Snowball Edge (p. 19).
- Confirm that the files and folders to transfer are named according to the object key naming guidelines for Amazon S3. Any files or folders with names that don't meet these guidelines aren't imported into Amazon S3.
- Plan what data you want to import into Amazon S3. For more information, see Planning Your Large Transfer (p. 51).

Before exporting data from Amazon S3, follow these steps:

- Understand what data is exported when you create your job. For more information, see Using Export Ranges (p. 209).
- For any files with a colon (`:`) in the file name, change the file names in Amazon S3 before you create the export job to get these files. Files with a colon in the file name fail export to Microsoft Windows Server.

For jobs using compute instances:

- Before you can add any AMIs to your job, you must have an AMI in your AWS account and it must be a supported image type. Currently, supported AMIs are based on the Amazon Linux 2, CentOS 7 (x86_64) - with Updates HVM, or Ubuntu 16.04 LTS - Xenial (HVM) images. You can get these images from the AWS Marketplace.
- If you're using SSH to connect to the instances running on a Snowball Edge, you must already have the key pair for connecting to the instance.
- For information specific to using compute instances on a device, see Using Amazon EC2 Compute Instances (p. 129).

Services Related to the AWS Snowball Edge

You can use an AWS Snowball Edge device with the following related AWS services:

- **Amazon S3** – Transfer data to an AWS Snowball Edge device using the Amazon S3 API for Snowball Edge, which supports a subset of the Amazon S3 API operations. You can do this in a single Snowball Edge device or in a cluster of devices for increased data durability.

You can also import data that is hosted on an AWS Snowball Edge device to Amazon S3 and your local environment through a shipped Snowball Edge device. For more information, see the Amazon Simple Storage Service User Guide.

- **Amazon EC2** – Run compute instances on a Snowball Edge device using the Amazon EC2 compatible endpoint, which supports a subset of the Amazon EC2 API operations. For more information about using Amazon EC2 in AWS, see Getting started with Amazon EC2 Linux instances.
- **AWS Lambda powered by AWS IoT Greengrass** – Invoke Lambda functions based on Amazon S3 storage actions made on an AWS Snowball Edge device. These Lambda functions are associated with an AWS Snowball Edge device during job creation. For more information about using Lambda, see the AWS Lambda Developer Guide.
- **Amazon Elastic Block Store (Amazon EBS)** – Provide block-level storage volumes for use with EC2 instances. For more information, see Amazon Elastic Block Store (Amazon EBS).
- **AWS Identity and Access Management (IAM)** – Use this service to securely control access to AWS resources. For more information, see What is IAM?
- **AWS Security Token Service (AWS STS)** – Request temporary, limited-privilege credentials for IAM users or for users that you authenticate (federated users). For more information, see Temporary security credentials in IAM.
- **Amazon EC2 Systems Manager** – Use this service to view and control your infrastructure on AWS. For more information, see What is AWS Systems Manager?

Accessing the Service

You can either use the AWS Snow Family Management Console or the job management API to create and manage jobs. For information about the job management API, see Job Management API Reference for AWS Snowball.

Accessing an AWS Snowball Edge Device

After your Snowball Edge device or devices are onsite, you can access them in several different ways. You can use the LCD display (used only for network configuration) that's built into each device, the Amazon S3 and Amazon EC2 compatible endpoints, or the available file interface. For more information, see Using an AWS Snowball Edge Device (p. 80).

Pricing for the AWS Snowball Edge

For information about the pricing and fees associated with the service and its devices, see AWS Snowball Edge Pricing.

Are You a First-Time AWS Snowball User?

If you are a first-time user of the AWS Snow Family service, we recommend that you read the following sections in order:

1. For information about device types and options, see AWS Snowball Edge Device Differences (p. 4).
2. To learn more about the types of jobs, see Understanding AWS Snowball Edge Jobs (p. 204).
3. For an end-to-end overview of how to use an AWS Snowball Edge device, see How AWS Snowball Edge Works (p. 8).

4. When you're ready to get started, see Getting Started (p. 33).
5. For information about using compute instances on a device, see Using Amazon EC2 Compute Instances (p. 129).

AWS Snowball Edge Device Differences

This guide contains documentation for the Snowball Edge devices. You can use these devices to move huge amounts of data into and out of Amazon S3. You can order them using the job management API or the AWS Snow Family console. For frequently asked questions and pricing information, see AWS Snowball.

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Snowball Edge Device Options

Snowball Edge devices have the following options for device configurations:

- **Snowball Edge Storage Optimized (for data transfer)** – This Snowball Edge device option has a 100 TB (80 TB usable) storage capacity.
- **Snowball Edge Storage Optimized (with EC2 compute functionality)** – This Snowball Edge device option has up to 80 TB of usable storage space, 24 vCPUs, and 80 GB of memory for compute functionality. It also comes with 1 TB of additional SSD storage space for block volumes attached to Amazon EC2 AMIs.
- **Snowball Edge Compute Optimized** – This Snowball Edge device option has the most compute functionality, with 104 vCPUs, 416 GB of memory, and 28 TB of dedicated NVMe SSD for compute instances. This device configuration is available only in these regions: US East (Ohio) Region, US East (N. Virginia) Region, US West (N. California) Region, US West (Oregon) Region and AWS GovCloud (US).

  In other regions, Snowball Edge Compute Optimized has 52 vCPUs, 208 GB of memory, 42 TB (39.5 TB usable) storage space, and 7.68 of dedicated NVMe SSD for compute instances.
- **Snowball Edge Compute Optimized with GPU** – This Snowball Edge device option is identical to the Compute Optimized option, except for an installed GPU, equivalent to the one available in the P3 Amazon EC2 instance type. It has a storage capacity of 28 TB of dedicated NVMe SSD for compute instances.

For more information about the compute functionality of these three options, see Using Amazon EC2 Compute Instances (p. 129). Job creation and disk capacity differences in terabytes are described here.

> **Note**
> When this guide refers to *Snowball Edge devices*, it's referring to all optional variants of the device. Whenever specific information applies only to one or more optional configurations (such as how the Snowball Edge Compute Optimized with GPU option has an on-board GPU peripheral), it is mentioned explicitly.

The following table summarizes the differences between the various device options. For hardware specification information, see AWS Snowball Edge Device Specifications (p. 11).

	Snowball Edge Storage Optimized (for data transfer)	**Snowball Edge Storage Optimized (with EC2 compute functionality)**	**Snowball Edge Compute Optimized (in these regions: US East (Ohio) Region, US East (N. Virginia) Region, US West (N. California) Region, US West (Oregon) Region and AWS GovCloud (US))**	**Snowball Edge Compute Optimized (in other regions)**
CPU	AMD Naples, 32 cores, 3.4Ghz	Intel Xeon D processor, 16 cores, 1.8Ghz	AMD Rome, 64 cores, 2 Ghz	AMD Naples, 32 cores, 3.4Ghz
vCPUs		24	104	52
Usable memory		80 GB	416 GB	208 GB
Security card	Yes	Yes	Yes	Yes
GPU (optional)	None	None	None (NVidia V100)	None (NVidia V100)
SSD		1 TB SATA	28 TB NVMe	7.68 TB NVMe
Usable HDD	80 TB	80 TB		39.5 TB usable
Network interfaces	• 2x 10 Gbit – RJ45 • 1x 25 Gbit – SFP28 • 1x 100 Gbit – QSFP28	• 1x 10 Gbit – RJ45 • 1x 25 Gbit – SFP28 • 1x 40 Gbit – QSFP+	• 2x 10 Gbit – RJ45 • 1x 25 Gbit – SFP28 • 1x 100 Gbit – QSFP28	• 2x 10 Gbit – RJ45 • 1x 25 Gbit – SFP28 • 1x 100 Gbit – QSFP28
Physical security features	• Hidden magnetic screws • Intrusion switches • NFC tags • Anti-tamper inserts • Android app for tamper detection • GPS and cellular • Conformal coating	• Hidden magnetic screws • Anti-tamper inserts • Conformal coating	• Hidden magnetic screws • Intrusion switches • NFC tags • Anti-tamper inserts • Android app for tamper detection • GPS and cellular • Conformal coating	• Hidden magnetic screws • Intrusion switches • NFC tags • Anti-tamper inserts • Android app for tamper detection • GPS and cellular • Conformal coating

AWS Snow Family Use Case Differences

The following table shows the different use cases for the different AWS Snow Family devices.

Use case	Snowball Edge	AWS Snowcone	
Import data into Amazon S3	✓	✓	
Export from Amazon S3	✓		
Durable local storage	✓		
Local compute with AWS Lambda	✓		
Local compute instances	✓	✓	
Durable Amazon S3 storage in a cluster of devices	✓		
Use with AWS IoT Greengrass (IoT)	✓		
Transfer files through NFS with a GUI	✓	✓	
GPU workloads	✓		

Note
Workloads that need GPU support require the Snowball Edge Compute Optimized with GPU option.

AWS Snow Family Tool Differences

The following outlines the different tools used with the Snow Family devices, and how they are used.

Snowball Edge Tools

AWS OpsHub for Snow Family

- The Snow Family devices now offer a user-friendly tool, AWS OpsHub for Snow Family, that you can use to manage your devices and local AWS services. You use AWS OpsHub on a client computer to perform tasks such as unlocking and configuring single or clustered devices, transferring files, and launching and managing instances running on Snow Family devices. For more information, see Using AWS OpsHub for Snow Family to Manage Snowball Devices.

Snowball Edge client with Snowball Edge

- Download the Snowball Edge client from the AWS Snowball Edge Resources page and install it on your own computer.
- Use the Snowball Edge client to unlock the Snowball Edge or the cluster of Snowball Edge devices. For more information, see Using the Snowball Edge Client (p. 81).
- The Snowball Edge client doesn't transfer data.

Amazon S3 interface with Snowball Edge

- Is already installed on the Snowball Edge by default. It does not need to be downloaded or installed.
- Can transfer data to or from the Snowball Edge. For more information, see Transferring Files Using the Amazon S3 Interface (p. 98).
- Encrypts data on the Snowball Edge while the data is transferred to the device.

File interface with Snowball Edge

- Is already installed on the Snowball Edge by default. It does not need to be downloaded or installed.
- Can transfer data by dragging and dropping files up to 150 GB in size from your computer to the buckets on the Snowball Edge through an easy-to-configure NFS mount point. For more information, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).
- Encrypts data on the Snowball Edge while the data is transferred to the device.

AWS IoT Greengrass console with Snowball Edge

- With a Snowball Edge, you can use the AWS IoT Greengrass console to update your AWS IoT Greengrass group and the core running on the Snowball Edge.

Items Provided for Snowball Edge

The following outlines the network adapters, cables used, and cables provided for the Snowball Edge device.

Network interface	Snowball Edge support	Cables provided with device	
RJ45	✓	Not provided.	
SFP28	✓	Not provided.	
SFP28 (with optic connector)	✓	No cables provided. No optic connector provided for Snowball Edge devices.	
QSFP	✓	No cables or optics provided.	

For more information about the network interfaces, cables, and connectors, see Supported Network Hardware (p. 16).

How AWS Snowball Edge Works

AWS Snowball Edge devices are owned by AWS, and they reside at your on-premises location while they're in use.

There are three job types you can use with an AWS Snowball Edge device. Although the job types differ in their use cases, every job type has the same workflow for how you order, receive, and return devices. Regardless of the job type, every job follows a data erasure of the National Institute of Standards and Technology (NIST) 800-88 standard after the job completes.

The shared workflow

1. **Create the job** – Each job is created in the AWS Snow Family Management Console or programmatically through the job management API. The status for a job can be tracked in the console or through the API.
2. **A device is prepared for your job** – We prepare an AWS Snowball Edge device for your job, and the status of your job is now **Preparing Snowball**.
3. **A device is shipped to you by your region's carrier** – The carrier takes over from here, and the status of your job is now **In transit to you**. You can find your tracking number and a link to the tracking website on the console or with the job management API. For information about who your region's carrier is, see Shipping Considerations for AWS Snowball (p. 223).
4. **Receive the device** – A few days later, your region's carrier delivers the AWS Snowball Edge device to the address that you provided when you created the job, and the status of your job changes to **Delivered to you**. When it arrives, you'll notice that it didn't arrive in a box, because the device is its own shipping container.
5. **Get your credentials and download the Snowball Edge client** – Get ready to start transferring data by getting your credentials, your job manifest, and the manifest's unlock code, and then downloading the Snowball Edge client.
   - The Snowball Edge client is the tool that you use to manage the flow of data from the device to your on-premises data destination.

     You can download and install the Snowball Edge client from the AWS Snowball resources page.

     You must download the Snowball Edge client from the AWS Snowball Edge Resources page and install on a powerful workstation that you own.
   - The manifest is used to authenticate your access to the device, and it is encrypted so that only the unlock code can decrypt it. You can get the manifest from the console or with the job management API when the device is on-premises at your location.
   - The unlock code is a 29-character code used to decrypt the manifest. You can get the unlock code from the console or with the job management API. We recommend that you keep the unlock code saved somewhere separate from the manifest to prevent unauthorized access to the device while it's at your facility.
6. **Position the hardware** – Move the device into your data center and open it following the instructions on the case. Connect the device to power and your local network.
7. **Power on the device** – Next, power on the device by pressing the power button above the LCD display. Wait a few minutes, and the **Ready** screen appears.
8. **Get the IP address for the device** – The LCD display has a **CONNECTION** tab on it. Tap this tab and get the IP address for the AWS Snowball Edge device.
9. **Use the Snowball Edge client to unlock the device** – When you use the Snowball Edge client to unlock the AWS Snowball Edge device, enter the IP address of the device, the path to your manifest,

and the unlock code. The Snowball Edge client decrypts the manifest and uses it to authenticate your access to the device.

10. **Use the device** – The device is up and running. You can use it to transfer data or for local compute and storage. You can read and write data with the Amazon S3 interface or the Network File System (NFS) mount point.
11. **Prepare the device for its return trip** – After you're done with the device in your on-premises location and the file interface status is **Complete**, press the power button above the LCD display. It takes about 20 seconds or so for the device to power off. Unplug the device and its power cables into the cable nook on top of the device, and shut all three of the device's doors. The device is now ready to be returned.
12. **Your region's carrier returns the device to AWS** – When the carrier has the AWS Snowball Edge device, the status for the job becomes **In transit to AWS**.

    Note
    There are additional steps for export and cluster jobs. For more information, see How Export Jobs Work (p. 9) and How a Clustered Local Compute and Storage Job Works (p. 10).

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How Import Jobs Work

Each import job uses a single Snowball appliance. After you create a job in the AWS Snow Family Management Console or the job management API, we ship a Snowball to you. When it arrives in a few days, you connect the Snowball Edge device to your network and transfer the data that you want imported into Amazon S3 onto the device. When you're done transferring data, ship the Snowball back to AWS, and we import your data into Amazon S3.

How Export Jobs Work

Each export job can use any number of AWS Snowball Edge devices. If the listing contains more data than can fit on a single device, multiple devices are provided to you. Each job part has exactly one device associated with it. After your job parts are created, your first job part enters the **Preparing Snowball** status.

Note
The listing operation used to split your job into parts is a function of Amazon S3, and you are billed for it the same way as any Amazon S3 operation.

Soon after that, we start exporting your data onto a device. Typically, exporting data takes one business day. However, this process can take longer depending on the amount and type of data. When the export is done, AWS gets the device ready for pickup by your region's carrier. When it arrives, you connect the AWS AWS Snowball Edge device to your network and transfer the data that you want to import from Amazon S3 onto the device.

When you're done transferring data, ship the device back to AWS. When we receive the device for your export job part, we erase it completely. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards. This step marks the completion of that particular job part.

- For keylisting

Before we export the objects in the S3 bucket, we scan the bucket. If the bucket is altered after the scan, the job could encounter delays because we scan for missing or altered objects.

- For S3 Glacier Flexible Retrieval

  It is important to note that AWS Snowball cannot export objects in the S3 Glacier Flexible Retrieval storage class. These objects must be restored before AWS Snowball can successfully export the objects in the bucket.

How Local Compute and Storage Jobs Work

You can use the local compute and storage functionality of an AWS Snowball Edge device with all job types in AWS Regions that support Lambda. The compute functionality is named AWS Lambda powered by AWS IoT Greengrass, where Python-language AWS Lambda functions can be triggered by Amazon S3 PUT object actions on buckets specified when you created the job. For more information, see Local Compute and Storage Only Jobs (p. 213).

How a Clustered Local Compute and Storage Job Works

A cluster job is a special kind of job for local storage and compute only. It is for those workloads that require increased data durability and storage capacity. For more information, see Local Cluster Option (p. 214).

> **Note**
> Like standalone local storage and compute jobs, the data stored in a cluster can't be imported into Amazon S3 without ordering additional devices as a part of separate import jobs. If you order these devices, you can transfer the data from the cluster to the devices and import the data when you return the devices for the import jobs.

Clusters have 5–10 AWS Snowball Edge devices, called *nodes*. When you receive the nodes from your regional carrier, connect all the nodes to power and your network to obtain their IP addresses. You use these IP addresses to unlock all the nodes of the cluster at once with a single unlock command, using the IP address of one of the nodes. For more information, see Using the Snowball Edge Client (p. 81).

You can write data to an unlocked cluster by using the Amazon S3 interface or the NFS mount point through the leader node and the data distributed among the other nodes.

When you're done with your cluster, ship all the nodes back to AWS. When we receive the cluster node, we perform a complete erasure of the Snowball. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Snowball Edge Videos and Blogs

- AWS Snowball Edge Data Migration
- AWS OpsHub for Snow Family
- Novetta delivers IoT and Machine Learning to the edge for disaster response
- Enable large-scale database migrations with DMS and AWS Snowball
- Data Migration Best Practices with AWS Snowball Edge
- AWS Snowball resources

AWS Snowball Edge Device Specifications

In this section, you can find specifications for AWS Snowball Edge device types and the hardware.

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Snowball Edge Storage Optimized (for Data Transfer) Specifications

The following table contains hardware specifications for Snowball Edge Storage Optimized devices.

Item	Snowball Edge Storage Optimized (for Data Transfer) specifications
Storage specifications	
HDD storage capacity	72 TB of usable
Power supply specifications	
Power	In AWS Regions in the US: NEMA 5–15p 100–220 volts. In all AWS Regions, a power cable is included
Power consumption	304 watts for an average use case, though the power supply is rated for 1200 watts.
Voltage	100 – 240V AC
Frequency	47/63 Hz
Data and network connections	2x 10 Gbit – RJ45 1x 25 Gbit – SFP28 1x 100 Gbit – QSFP28
Cables	Each AWS Snowball Edge device ships country-specific power cables. No other cables or optics are provided. For more information, see Supported Network Hardware (p. 16).
Thermal requirements	AWS Snowball Edge devices are designed for office operations, and are ideal for data center operations.

Item	Snowball Edge Storage Optimized (for Data Transfer) specifications
Decibel output	On average, an AWS Snowball Edge device produces 68 decibels of sound, typically quieter than a vacuum cleaner or living-room music.
Dimensions and weight specifications	
Weight	49.7 pounds (22.54 Kg)
Height	15.5 inches (394 mm)
Width	10.6 inches (265 mm)
Length	28.3 inches (718 mm)
Environment specifications	
Vibration	Non-operational use equivalent to ASTM D4169 Truck level I 0.73 GRMS
Shock	Operational use equivalent to 70G (MIL-S-901) Non-operational use equivalent to 50G (ISTA-3A)
Altitude	Operational use equivalent to 0–3,000 meters (0–10,000 feet) Non-operational use equivalent to 0–12,000 meters
Temperature range	0–45°C (operational)

Snowball Edge Storage Optimized (with EC2) Specifications

The following table contains hardware specifications for Snowball Edge Storage Optimized (with EC2) devices.

Item	Snowball Edge Storage Optimized (with EC2) specifications
Compute and memory specifications	
CPU	24 vCPUs
RAM	80 GB
Storage specifications	
HDD storage capacity	80 TB usable (for object and block storage)
SSD storage capacity	1 TB usable SATA SSD storage (for block storage)
Power supply specifications	

Item	Snowball Edge Storage Optimized (with EC2) specifications
Power	In AWS Regions in the US: NEMA 5–15p 100–220 volts. In all AWS Regions, a power cable is included
Power consumption	304 watts for an average use case, though the power supply is rated for 1200 watts
Voltage	100 – 240V AC
Frequency	47/63 Hz
Data and network connections	1x 10 Gbit – RJ45 1x 25 Gbit – SFP28 1x 100 Gbit – QSFP28
Cables	Each AWS Snowball Edge device ships country-specific power cables. No other cables or optics are provided. For more information, see Supported Network Hardware (p. 16).
Thermal requirements	AWS Snowball Edge devices are designed for office operations, and are ideal for data center operations.
Decibel output	On average, an AWS Snowball Edge device produces 68 decibels of sound, typically quieter than a vacuum cleaner or living-room music.
Dimensions and weight specifications	
Weight	49.7 pounds (22.45 Kg)
Height	15.5 inches (394 mm)
Width	10.6 inches (265 mm)
Length	28.3 inches (718 mm)
Environment specifications	
Vibration	Non-operational use equivalent to ASTM D4169 Truck level I 0.73 GRMS
Shock	Operational use equivalent to 70G (MIL-S-901) Non-operational use equivalent to 50G (ISTA-3A)
Altitude	Operational use equivalent to 0–3,000 meters (0–10,000 feet) Non-operational use equivalent to 0–12,000 meters
Temperature range	0–45°C (operational)

Compute Optimized Device Specifications

This device configuration is available in these regions: US East (Ohio) Region, US East (N. Virginia) Region, US West (N. California) Region, US West (Oregon) Region and AWS GovCloud (US).

Item	Snowball Edge Compute Optimized specifications
Compute and memory specifications	
CPU	104 vCPUs
RAM	512 GB RAM (416 GB RAM - Customer usable)
GPU	nVidia V100 (available in Compute Optimized with GPU configuration)
Storage specifications	
SSD storage capacity	28 TB NVMe SSD
Power supply specifications	
Power	In AWS Regions in the US: NEMA 5–15p 100–220 volts. In all AWS Regions, a power cable is included
Power consumption	304 watts for an average use case, though the power supply is rated for 1200 watts
Voltage	100 – 240V AC
Frequency	47/63 Hz
Data and network connections	2x 10 Gbit – RJ45 1x 25 Gbit – SFP28 1x 100 Gbit – QSFP28
Cables	Each AWS Snowball Edge device ships country-specific power cables. No other cables or optics are provided. For more information, see Supported Network Hardware (p. 16).
Thermal requirements	AWS Snowball Edge devices are designed for office operations, and are ideal for data center operations.
Decibel output	On average, an AWS Snowball Edge device produces 68 decibels of sound, typically quieter than a vacuum cleaner or living-room music.
Dimensions and weight specifications	
Weight	49.7 pounds (22.45 Kg)
Height	15.5 inches (394 mm)
Width	10.6 inches (265 mm)
Length	28.3 inches (718 mm)
Environment specifications	
Vibration	Non-operational use equivalent to ASTM D4169 Truck level I 0.73 GRMS
Shock	Operational use equivalent to 70G (MIL-S-901)

Item	Snowball Edge Compute Optimized specifications
	Non-operational use equivalent to 50G (ISTA-3A)
Altitude	Operational use equivalent to 0–3,000 meters (0–10,000 feet) Non-operational use equivalent to 0–12,000 meters
Temperature range	0–45°C (operational)

Snowball Edge Compute Optimized Specifications in Other Regions

Item	Snowball Edge Compute Optimized specifications
Compute and memory specifications	
CPU	52 vCPUs
RAM	208 GB RAM Customer usable
GPU	nVidia V100 (available in Compute Optimized with GPU configuration)
Storage specifications	
HDD storage capacity	42 TB (39.5 usable)
SSD storage capacity	7.68 TB NVMe SSD
Power supply specifications	
Power	In AWS Regions in the US: NEMA 5–15p 100–220 volts. In all AWS Regions, a power cable is included
Power consumption	304 watts for an average use case, though the power supply is rated for 1200 watts
Voltage	100 – 240V AC
Frequency	47/63 Hz
Data and network connections	2x 10 Gbit – RJ45 1x 25 Gbit – SFP28 1x 100 Gbit – QSFP28
Cables	Each AWS Snowball Edge device ships country-specific power cables. No other cables or optics are provided. For more information, see Supported Network Hardware (p. 16).
Thermal requirements	AWS Snowball Edge devices are designed for office operations, and are ideal for data center operations.
Decibel output	On average, an AWS Snowball Edge device produces 68 decibels of sound, typically quieter than a vacuum cleaner or living-room music.
Dimensions and weight specifications	

Item	Snowball Edge Compute Optimized specifications
Weight	49.7 pounds (22.45 Kg)
Height	15.5 inches (394 mm)
Width	10.6 inches (265 mm)
Length	28.3 inches (718 mm)
Environment specifications	
Vibration	Non-operational use equivalent to ASTM D4169 Truck level I 0.73 GRMS
Shock	Operational use equivalent to 70G (MIL-S-901) Non-operational use equivalent to 50G (ISTA-3A)
Altitude	Operational use equivalent to 0–3,000 meters (0–10,000 feet) Non-operational use equivalent to 0–12,000 meters
Temperature range	0–45°C (operational)

Supported Network Hardware

To use the AWS Snowball Edge device, you need your own network cables. For RJ45 cables, there are no specific recommendations. SFP+ and QSFP+ cables and modules from Mellanox and Finisar have been verified to be compatible with the device.

After you open the back panel of the AWS Snowball Edge device, you see the network ports similar to the ports shown in the following screenshot.

These ports support the following network hardware.

SFP

This port provides a 10G/25G SFP28 interface compatible with SFP28 and SFP+ transceiver modules and direct-attach copper (DAC) cables. You need to provide your own transceivers or DAC cables.

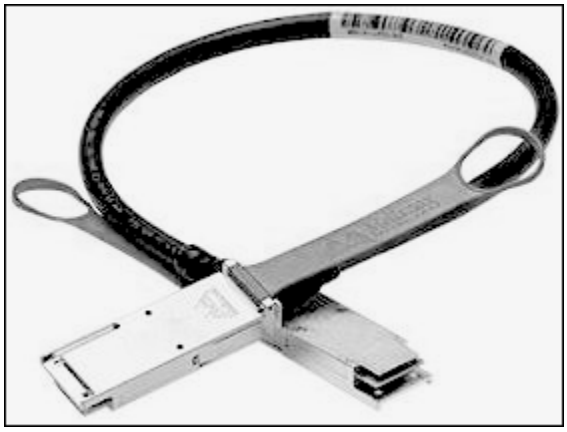
- For 10G operation, you can use any SFP+ option. Examples include:
  - 10Gbase-LR (single mode fiber) transceiver
  - 10Gbase-SR (multi-mode fiber) transceiver
  - SFP+ DAC cable
- For 25G operation, you can use any SFP28 option. Examples include:

- 25Gbase-LR (single mode fiber) transceiver
- 25Gbase-SR (multi-mode fiber) transceiver
- SFP28 DAC cable

QSFP

This port provides a 40G QSFP+ interface on storage optimized devices and a 40/50/100G QSFP+ interface on compute optimized devices. Both are compatible with QSFP+ transceiver modules and DAC cables. You need to provide your own transceivers or DAC cables. Examples include the following:

- 40Gbase-LR4 (single mode fiber) transceiver
- 40Gbase-SR4 (multi-mode fiber) transceiver
- QSFP+ DAC

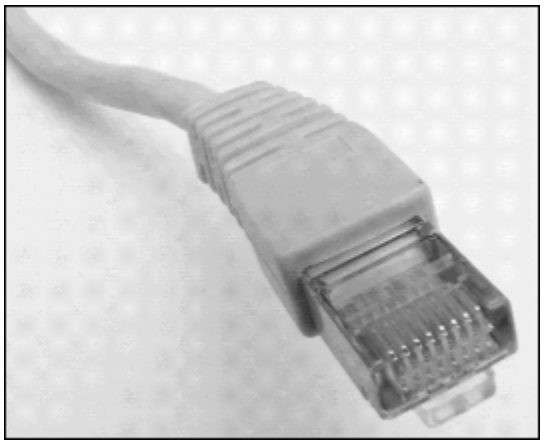


RJ45

This port provides 1Gbase-TX/10Gbase-TX operation. It is connected via UTP cable terminated with a RJ45 connector. Compute optimized devices have two RJ45 ports.

1G operation is indicated by a blinking amber light. 1G operation is not recommended for large-scale data transfers to the Snowball Edge device, as it dramatically increases the time it takes to transfer data.

10G operation isbe-s indicated by a blinking green light. It requires a Cat6A UTP cable with a maximum operating distance of 180 feet (55 meters).



Setting Up Your AWS Access for AWS Snowball Edge

Before you use AWS Snowball Edge for the first time, you need to complete the following tasks:

1. Sign Up for AWS (p. 19).

   Note
   In the Asia Pacific (Mumbai) AWS Region service is provided by Amaz on Internet Services Private Limited (AISPL). For information on signing up for Amazon Web Services in the Asia Pacific (Mumbai) AWS Region, see Signing Up for AISPL.

2. Create an IAM User (p. 19).

Sign Up for AWS

When you sign up for Amazon Web Services (AWS), your AWS account is automatically signed up for all services in AWS, including AWS Snow Family. You are charged only for the services that you use. For more information about pricing and fees, see AWS Snowball Edge Pricing. AWS Snowball Edge is not free to use. For more information on what AWS services are free, see AWS Free Usage Tier.

If you have an AWS account already, skip to the next task. If you don't have an AWS account, use the following procedure to create one.

To create an AWS account

1. Open https://portal.aws.amazon.com/billing/signup.
2. Follow the online instructions.

   Part of the sign-up procedure involves receiving a phone call and entering a verification code on the phone keypad.

   When you sign up for an AWS account, an *AWS account root user* is created. The root user has access to all AWS services and resources in the account. As a security best practice, assign administrative access to an administrative user, and use only the root user to perform tasks that require root user access.

Note your AWS account number, because you'll need it for the next task.

Create an IAM User

Services in AWS, such as AWS Snowball Edge, require that you provide credentials when you access them, so that the service can determine whether you have permission to access its resources. AWS recommends not using the root credentials of your AWS account to make requests. Instead, create an AWS Identity and Access Management (IAM) user, and grant that user full access. We refer to these users as IAM users with administrator-level credentials.

You can use the administrator user credentials, instead of root credentials of your account, to interact with AWS and perform tasks, such as to create an Amazon S3 bucket, create users, and grant them permissions. For more information, see Root Account Credentials vs. IAM User Credentials in the *AWS General Reference* and IAM Best Practices in *IAM User Guide*.

If you signed up for AWS but have not created an IAM user for yourself, you can create one using the IAM console.

To create an administrator user, choose one of the following options.

Choose one way to manage your administra	**To**	**By**	**You can also**
In IAM Identity Center (Recommended)	Use short-term credentials to access AWS. This aligns with the security best practices. For information about best practices, see Security best practices in IAM in the *IAM User Guide*.	Following the instructions in Getting started in the *AWS IAM Identity Center (successor to AWS Single Sign-On) User Guide*.	Configure programmatic access by Configuring the AWS CLI to use AWS IAM Identity Center (successor to AWS Single Sign-On) in the *AWS Command Line Interface User Guide*.
In IAM (Not recommended)	Use long-term credentials to access AWS.	Following the instructions in Creating your first IAM admin user and user group in the *IAM User Guide*.	Configure programmatic access by Managing access keys for IAM users in the *IAM User Guide*.

To sign in as this new IAM user, sign out of the AWS Management Console, then use the following URL, where *your_aws_account_id* is your AWS account number without the hyphens (for example, if your AWS account number is 1234-5678-9012, your AWS account ID is 123456789012).

```
https://your_aws_account_id.signin.aws.amazon.com/console/
```

Type the IAM user name and password that you just created. When you're signed in, the navigation bar displays "*your_user_name @ your_aws_account_id*".

If you don't want the URL for your sign-in page to contain your AWS account ID, you can create an account alias. From the IAM dashboard, choose **Create Account Alias** and type an alias, such as your company name. To sign in after you create an account alias, use the following URL.

```
https://your_account_alias.signin.aws.amazon.com/console/
```

To verify the sign-in link for IAM users for your account, open the IAM console and check under **AWS account Alias** on the dashboard.

If you're going to create AWS Snowball Edge jobs through an IAM user that is not an administrator user, that user needs certain permissions to use the AWS Snow Family Management Console effectively. For more information on those permissions, see Permissions Required to Use the AWS Snowball Console (p. 241).

Next Step

Getting Started (p. 33)

Before You Order a Snowball Edge device

AWS Snowball Edge is a region-specific service. So before you plan your job, be sure that the service is available in your region. Ensure that your location and Amazon S3 bucket are within the same AWS Region or the same country because it will impact your ability to order the device.

As part of the order process, you create an AWS Identity and Access Management (IAM) role and an AWS Key Management Service (AWS KMS) key. The KMS key is used for encrypting the data during transit and at rest on the Snowball Edge device. For more information about creating IAM roles and KMS keys, see Creating an AWS Snowball Edge Job.

Topics

Questions about the Local Environment

Understanding your dataset and how the local environment is set up will help you complete your data transfer. Consider the following before placing your order.

What data are you transferring?

Transferring a large number of small files does not work well with AWS Snowball Edge. This is because Snowball Edge encrypts each individual object. Small files include files under 1 MB in size. We recommend that you zip them up before transferring them onto the AWS Snowball Edge device. We also recommend that you have no more than 500,000 files or directories within each directory.

Will the data be accessed during the transfer?

It is important to have a static dataset, (that is, no users or systems are accessing the data during transfer). If not, the file transfer can fail due to a checksum mismatch. The files won't be transferred and the files will be marked as `Failed`.

We recommend that if you are using the file interface, you only use one method of transferring data to the AWS Snowball Edge. Copying data with both the file interface and the Amazon S3 interface can result in read/write conflicts.

To prevent corrupting your data, don't disconnect an AWS Snowball Edge device or change its network settings while transferring data. Files should be in a static state while being written to the device. Files that are modified while they are being written to the device can result in read/write conflicts.

Will the network support AWS Snowball data transfer?

Snowball Edge supports the *RJ45*, *SFP+*, or *QSFP+* networking adapters. Verify that your switch is a gigabit switch. Depending on the brand of switch, it might say **gigabit** or **10/100/1000**. Snowball Edge devices do not support a megabit switch, or 10/100 switch.

Working with Files That Contain Special Characters

It's important to note that if your objects contain special characters, you might encounter errors. Although Amazon S3 allows special characters, we highly recommend that you avoid the following characters:

- Backslash ("\")
- Left curly brace ("{")
- Right curly brace ("}")
- Left square bracket ("[")
- Right square bracket ("]")
- 'Less Than' symbol ("<")
- 'Greater Than' symbol (">")
- Non-printable ASCII characters (128–255 decimal characters)
- Caret ("^")
- Percent character ("%")
- Grave accent / back tick ("`")
- Quotation marks
- Tilde ("~")
- 'Pound' character ("#")
- Vertical bar / pipe ("|")

If your files have one or more of these characters, rename them before you copy them to the AWS Snowball Edge device. Windows users who have spaces in their file names should be careful when copying individual objects or running a recursive command. Surround individual objects that have spacing in the name with quotation marks. The following are examples of such files.

Operating system	File name: test file.txt
Windows	`“C:\Users\<username>\desktop\test file.txt”`
iOS	`/Users/<username>/test\ file.txt`
Linux	`/home/<username>/test\ file.txt`

Note
The only object metadata that is transferred is the object name and size. If you want additional metadata to be copied, you can use the file interface or other tools to copy the data to Amazon S3.

Using Amazon EC2 on Snowball

This section provides an overview of using Amazon EC2 compute instances on an AWS Snowball Edge device. It includes conceptual information, procedures, and examples.

Note
These Amazon EC2 features on AWS Snowball are not supported in the Asia Pacific (Mumbai) and Europe (Paris) AWS Regions.

You can run Amazon EC2 compute instances hosted on an AWS Snowball Edge with the `sbe1`, `sbe-c`, and `sbe-g` instance types:

- The `sbe1` instance type works on devices with the Snowball Edge Storage Optimized option.
- The `sbe-c` instance type works on devices with the Snowball Edge Compute Optimized option.
- Both the `sbe-c` and `sbe-g` instance types work on devices with the Snowball Edge Compute Optimized with GPU option.

All the compute instance types supported on Snowball Edge device options are unique to AWS Snowball Edge devices. Like their cloud-based counterparts, these instances require Amazon Machine Images (AMIs) to launch. You choose the AMI for an instance before you create your Snowball Edge job.

To use a compute instance on a Snowball Edge, create a job and specify your AMIs. You can do this using the AWS Snowball Management Console, the AWS Command Line Interface (AWS CLI), or one of the AWS SDKs. Typically, to use your instances, there are some housekeeping prerequisites that you must perform before creating your job.

After your device arrives, you can start managing your AMIs and instances. You can manage your compute instances on a Snowball Edge through an Amazon EC2-compatible endpoint. This type of endpoint supports many of the Amazon EC2 CLI commands and actions for the AWS SDKs. You can't use the AWS Management Console on the Snowball Edge to manage your AMIs and compute instances.

When you're done with your device, return it to AWS. If the device was used in an import job, the data transferred using the Amazon S3 interface or the file interface is imported into Amazon S3. Otherwise, we perform a complete erasure of the device when it is returned to AWS. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Important
Data in compute instances running on a Snowball Edge isn't imported into AWS.

Using Compute Instances on Clusters

You can use compute instances on clusters of Snowball Edge devices. The procedures and guidance for doing so are the same as for using compute instances on a standalone device.

When you create a cluster job with AMIs, a copy of each AMI exists on each node in the cluster. You can have only 10 AMIs associated with a cluster of devices regardless of the number of nodes on the cluster. When you launch an instance in a cluster, you declare the node to host the instance in your command and the instance runs on a single node.

Clusters must be either compute-optimized or storage-optimized. You can have a cluster of compute-optimized nodes, and some number of them can have GPUs. You can have a cluster made entirely of storage-optimized nodes. A cluster can't be made of a combination of compute-optimized nodes and storage-optimized nodes.

Pricing for Compute Instances on Snowball Edge

There are additional costs associated with using compute instances. For more information, see AWS Snowball Edge Pricing.

Prerequisites

Before creating your job, keep the following information in mind:

- Before you add any AMIs to your job request, make sure that you have created an AMI that is supported in your AWS account. Currently, supported AMIs are based on the CentOS 7 (x86_64) - with

Updates HVM and Ubuntu 16.04 LTS - Xenial (HVM) images. You can get these images from the AWS Marketplace website.

- All AMIs must be based on Amazon Elastic Block Store (Amazon EBS), with a single volume.
- If you are connecting to a compute instance running on a Snowball Edge, you must use Secure Shell (SSH). To do so, you first add the key pair. For more information, see Configuring an AMI to Use SSH to Connect to Compute Instances Launched on the Device (p. 147).

Creating a Linux AMI from an Instance

You can create an AMI using the AWS Management Console or the command line. Start with an existing AMI, launch an instance, customize it, create a new AMI from it, and finally, launch an instance of your new AMI.

To create an AMI from an instance using the console

1. Select an appropriate EBS-backed AMI as a starting point for your new AMI, and configure it as needed before launch. For more information, see Launching an instance using the Launch Instance Wizard in the *Amazon EC2 User Guide for Linux Instances*.
2. Choose **Launch** to launch an instance of the EBS-backed AMI that you selected. Accept the default values as you step through the wizard. For more information, see Launching an instance using the Launch Instance Wizard.
3. While the instance is running, connect to it. You can perform the following actions on your instance to customize it for your needs:
   - Install software and applications.
   - Copy data.
   - Reduce start time by deleting temporary files, defragmenting your hard drive, and zeroing out free space.
   - Attach additional Amazon EBS volumes.
4. (Optional) Create snapshots of all the volumes attached to your instance. For more information about creating snapshots, see Creating Amazon EBS snapshots in the *Amazon EC2 User Guide for Linux Instances*.
5. In the navigation pane, choose **Instances**, and choose your instance. Choose **Actions**, choose **Image**, and then choose **Create image**.

   Tip
   If this option isn't available, your instance isn't an Amazon EBS-backed instance.
6. In the **Create Image** dialog box, specify the following information, and then choose **Create image**.
   - **Image name** - A unique name for the image.
   - **Image description** - An optional description of the image, up to 255 characters.
   - **No reboot** - This option is not selected by default. Amazon EC2 shuts down the instance, takes snapshots of any attached volumes, creates and registers the AMI, and then reboots the instance. Select **No reboot** to avoid having your instance shut down.

     Warning
     If you select **No reboot**, we can't guarantee the file system integrity of the created image.
   - **Instance Volumes** - The fields in this section enable you to modify the root volume, and add more Amazon EBS and instance store volumes. For information about each field, pause on the **i** icon next to each field to display field tooltips. Some important points are listed following:
     - To change the size of the root volume, locate **Root** in the **Volume Type** column. For **Size (GiB)**, enter the required value.
     - If you select **Delete on Termination**, when you terminate the instance created from this AMI, the Amazon EBS volume is deleted. If you clear **Delete on Termination**, when you terminate the

instance, the Amazon EBS volume is not deleted. For more information, see Preserving Amazon EBS volumes on instance termination in the *Amazon EC2 User Guide for Linux Instances*.

- To add an Amazon EBS volume, choose **Add New Volume** (which adds a new row). For **Volume Type**, choose **EBS**, and fill in the fields in the row. When you launch an instance from your new AMI, additional volumes are automatically attached to the instance. Empty volumes must be formatted and mounted. Volumes based on a snapshot must be mounted.
- To add an instance store volume, see Adding instance store volumes to an AMI in the *Amazon EC2 User Guide for Linux Instances*. When you launch an instance from your new AMI, additional volumes are automatically initialized and mounted. These volumes don't contain data from the instance store volumes of the running instance on which you based your AMI.

7. To view the status of your AMI while it is being created, in the navigation pane, choose **AMIs**. Initially, the status is pending but should change to available after a few minutes.

   (Optional) To view the snapshot that was created for the new AMI, choose **Snapshots**. When you launch an instance from this AMI, we use this snapshot to create its root device volume.
8. Launch an instance from your new AMI. For more information, see Launching an instance using the Launch Instance Wizard in the *Amazon EC2 User Guide for Linux Instances*.
9. The new running instance contains all of the customizations that you applied in previous steps.

To Create an AMI from an Instance Using the Command Line

You can use one of the following commands. For more information about these command line interfaces, see Accessing Amazon EC2 in the *Amazon EC2 User Guide for Linux Instances*.

- create-image (AWS CLI)
- New-EC2Image (AWS Tools for Windows PowerShell)

Creating a Linux AMI from a Snapshot

If you have a snapshot of the root device volume of an instance, you can create an AMI from this snapshot using the AWS Management Console or the command line.

To create an AMI from a snapshot using the console

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, under **Elastic Block Store**, choose **Snapshots**.
3. Choose the snapshot, choose **Actions**, and then choose **Create image**.
4. In the **Create image from EBS snapshot** dialog box, complete the fields to create your AMI. Then choose **Create**. If you're re-creating a parent instance, choose the same options as the parent instance.

   - **Architecture** – Choose **i386** for 32-bit or **x86_64** for 64-bit.
   - **Root device name** – Enter the appropriate name for the root volume. For more information, see Device naming on Linux instances in the *Amazon EC2 User Guide for Linux Instances*.
   - **Virtualization type** – Choose whether instances launched from this AMI use paravirtual (PV) or hardware virtual machine (HVM) virtualization. For more information, see Linux AMI virtualization types.
   - (PV virtualization type only) **Kernel ID** and **RAM disk ID** – Choose the AKI and ARI from the lists. If you choose the default AKI, or you don't choose an AKI, you must specify an AKI every time you launch an instance using this AMI. In addition, your instance might fail the health checks if the default AKI is incompatible with the instance.

- (Optional) **Block Device Mappings** – Add volumes or expand the default size of the root volume for the AMI. For more information about resizing the file system on your instance for a larger volume, see Extending a Linux File system after resizing a volume in the *Amazon EC2 User Guide for Linux Instances*.

To Create an AMI from a Snapshot Using the Command Line

To create an AMI from a snapshot, you can use one of the following commands. For more information about these command line interfaces, see Accessing Amazon EC2 in the *Amazon EC2 User Guide for Linux Instances*.

- register-image (AWS CLI)
- Register-EC2Image (AWS Tools for Windows PowerShell)

Using Amazon S3 on Snowball

As part of the order process, you are asked to create an AWS Identity and Access Management (IAM) role and AWS Key Management Service (AWS KMS) key. The KMS key is used for encrypting the data during transit and at rest on the Snowball Edge device. For more information about creating IAM roles and KMS keys, see Creating an AWSAWS Snowball Edge Job.

> **Important**
> If the imported data must be encrypted in the S3 bucket using Server-Side Encryption with keys stored in AWS KMS (SSE-KMS), see Amazon S3 Encryption with AWS KMS (p. 28).
> If the imported data must be encrypted in the S3 bucket using Server-Side Encryption with Amazon S3 managed keys (SSE-S3), see Amazon S3 Encryption with Server-Side Encryption (p. 30).

How Import Works

Each import job uses a single Snowball Edge device. After you create a job, we ship a Snowball Edge device to you. When it arrives, you connect the Snowball Edge device to your network and transfer the data that you want to import to Amazon S3 onto that Snowball Edge. When you're done transferring data, ship the Snowball Edge back to AWS. We then import your data into Amazon S3.

> **Important**
> Snowball Edge cannot write to buckets if you have turned on S3 Object Lock. We also cannot write to your bucket if IAM policies on the bucket prevent writing to the bucket.

How Export Works

Each export job can use any number of AWS Snowball Edge devices. After you create a job, a listing operation starts in Amazon S3. This listing operation splits your job into parts. Each job part has exactly one device associated with it. After your job parts are created, your first job part enters the **Preparing** Snowball status.

> **Note**
> The listing operation to split your job into parts is a function of Amazon S3, and you are billed the same as Amazon S3 operation.

We then start exporting your data onto a device. Typically, exporting data takes one business day. However, this process can take longer. When the export is done, AWS gets the device ready for your regional carrier to pick up.

When the device arrives at your site, you connect it to your network and transfer the data that you want to import into Amazon S3 onto the device. When you're done transferring the data, ship the device back to AWS. When we receive the returned device, we erase it completely. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

This step marks the completion of that particular job part. If there are more job parts, the next job part now is prepared for shipping.

> **Important**
> Snowball Edge is unable to export files that are in S3 Glacier storage class. These objects must be restored before we can export the files. If we encounter files in S3 Glacier storage class, we contact you to let you know, but this might add delays to your export job.

Amazon S3 Encryption with AWS KMS

You can use the default AWS managed or customer managed encryption keys to protect your data when importing or exporting data.

Using Amazon S3 Default Bucket Encryption with AWS KMS Managed Keys

To enable AWS managed encryption with AWS KMS

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the Amazon S3 bucket that you want to encrypt.
3. In the wizard that appears on the right side, choose **Properties**.
4. In the **Default encryption** box, choose **Disabled** (this option is grayed out) to enable default encryption.
5. Choose **AWS-KMS** as the encryption method, and then choose the KMS key that you want to use. This key is used to encrypt objects that are PUT into the bucket.
6. Choose **Save**.

After the Snowball Edge job is created, and before the data is imported, add a statement to the existing IAM role policy. This is the role you created during the ordering process. Depending on the job type, the default role name looks similar to `Snowball-import-s3-only-role` or `Snowball-export-s3-only-role`.

The following are examples of such a statement.

For importing data

If you use server-side encryption with AWS KMS managed keys (SSE-KMS) to encrypt the Amazon S3 buckets associated with your import job, you also need to add the following statement to your IAM role.

Example Example: Snowball import IAM role

```
{
    "Effect": "Allow",
    "Action": [
        "kms: GenerateDataKey",
 "kms: Decrypt"
    ],
    "Resource":"arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-
efgh-111111111111"
}
```

For exporting data

If you use server-side encryption with AWS KMS managed keys to encrypt the Amazon S3 buckets associated with your export job, you also must add the following statement to your IAM role.

Example Snowball import IAM role

```
{
    "Effect": "Allow",
    "Action": [
        "kms:Decrypt"
    ],
    "Resource":"arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-
efgh-111111111111"
}
```

Using S3 Default Bucket Encryption with AWS KMS Customer Keys

You can use the default Amazon S3 bucket encryption with your own KMS keys to protect data you are importing and exporting.

For importing data

To enable customer managed encryption with AWS KMS

1. Sign in to the AWS Management Console and open the AWS Key Management Service (AWS KMS) console at https://console.aws.amazon.com/kms.
2. To change the AWS Region, use the Region selector in the upper-right corner of the page.
3. In the left navigation pane, choose **Customer managed keys**, and then choose the KMS key associated with the buckets that you want to use.
4. Expand **Key Policy** if it is not already expanded.
5. In the **Key Users** section, choose **Add** and search for the IAM role. Choose the IAM role, and then choose **Add**.
6. Alternatively, you can choose **Switch to Policy view** to display the key policy document and add a statement to the key policy. The following is an example of the policy.

Example Example: Policy for the AWS KMS customer managed key

```
{
  "Sid": "Allow use of the key",
  "Effect": "Allow",
  "Principal": {
    "AWS": [
      "arn:aws:iam::111122223333:role/snowball-import-s3-only-role"
    ]
  },
  "Action": [
    "kms:Decrypt",
    "kms:GenerateDataKey"
  ],
  "Resource": "*"
}
```

After this policy has been added to the AWS KMS customer managed key, it is also needed to update the IAM role associated with the Snowball job. By default, the role is `snowball-import-s3-only-role`.

Example Example: The Snowball import IAM role

```
{
  "Effect": "Allow",
  "Action": [
    "kms: GenerateDataKey",
    "kms: Decrypt"
  ],
  "Resource": "arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-efgh-111111111111"
}
```

For more information, see Using Identity-Based Policies (IAM Policies) for AWS Snowball (p. 240).

The KMS key that is being used looks like the following:

`“Resource”:“arn:aws:kms:region:AccoundID:key/*”`

For exporting data

Example Example: Policy for the AWS KMS customer managed key

```
{
  "Sid": "Allow use of the key",
  "Effect": "Allow",
  "Principal": {
    "AWS": [
      "arn:aws:iam::111122223333:role/snowball-import-s3-only-role"
    ]
  },
  "Action": [
    "kms:Decrypt",
    "kms:GenerateDataKey"
  ],
  "Resource": "*"
}
```

After this policy has been added to the AWS KMS customer managed key, it is also needed to update the IAM role associated with the Snowball job. By default, the role looks like the following:

`snowball-export-s3-only-role`

Example Example: The Snowball export IAM role

```
{
  "Effect": "Allow",
  "Action": [
    "kms: GenerateDataKey",
    "kms: Decrypt"
  ],
  "Resource": "arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-efgh-111111111111"
}
```

After this policy has been added to the AWS KMS customer managed key, it is also needed to update the IAM role associated with the Snowball job. By default, the role is `snowball-export-s3-only-role`.

Amazon S3 Encryption with Server-Side Encryption

AWS Snowball supports server-side encryption with Amazon S3 managed encryption keys (SSE-S3). Server-side encryption is about protecting data at rest, and SSE-S3 has strong, multifactor encryption

to protect your data at rest in Amazon S3. For more information about SSE-S3, see Protecting Data Using Server-Side Encryption with Amazon S3-Managed Encryption Keys (SSE-S3) in the *Amazon Simple Storage Service User Guide*.

Note
Currently, AWS Snowball doesn't support server-side encryption with customer-provided keys (SSE-C). However, you might want to use that SSE type to protect data that has been imported, or you might already use it on data you want to export. In these cases, keep the following in mind:

- **Import** – If you want to use SSE-C to encrypt the objects that you've imported into S3, copy those objects into another bucket that has SSE-KMS or SSE-S3 encryption established as a part of that bucket's bucket policy.
- **Export** – If you want to export objects that are encrypted with SSE-C, first copy those objects to another bucket that either has no server-side encryption, or has SSE-KMS or SSE-S3 specified in that bucket's bucket policy.

Snowball Edge Clusters

A *cluster* is a logical grouping of AWS Snowball Edge devices, in groups of 5–10 devices. A cluster is created with a single job. A cluster offers increased durability and storage capacity. This section provides information about Snowball Edge clusters.

For the AWS Snowball service, a cluster is a collective of Snowball Edge devices, used as a single logical unit, for local storage and compute purposes.

A cluster offers these primary benefits over a standalone Snowball Edge used for local storage and compute purposes:

- **Increased durability** – The data stored in a cluster of Snowball Edge devices has increased data durability. In addition, the data on the cluster remains as safe and viable even during possible Snowball Edge outages in the cluster. Clusters can withstand the loss of two nodes before the data it becomes a concern. You can also add or replace nodes.
- **Increased storage** – The total available storage is 45 terabytes of data per node in the cluster. So in a five-node cluster, there are 225 terabytes of available storage space. In contrast, there are about 80 terabytes of available storage space in a standalone Snowball Edge. Clusters that have more than five nodes have even more storage space.

A cluster of Snowball Edge devices is made of leaderless nodes. Any node can write data to and read data from the entire cluster, and all nodes can perform the behind-the-scenes management of the cluster.

Snowball Edge Cluster Quorums

A *quorum* represents the minimum number of Snowball Edge devices in a cluster that must be communicating with each other to maintain some level of operation. There are two levels of quorum for Snowball Edge clusters—a read/write quorum and a read quorum.

Suppose that you upload your data to a cluster of Snowball Edge devices. With all devices healthy, you have a *read/write quorum* for your cluster. If one of those nodes goes offline, you reduce the operational capacity of the cluster, but you can still read and write to the cluster. In that case, the cluster still has a read/write quorum.

If two nodes in your cluster go offline, any additional or ongoing write operations fail, but any data that was successfully written to the cluster can be accessed and read. This is called a *read quorum*.

Finally, if a third node goes offline, the cluster is offline and the data in the cluster becomes unavailable. In this case, you might be able fix it, but the data could be permanently lost depending on the severity of the event. If it is a temporary external power event, and you can bring the three Snowball Edge devices back online and unlock all the nodes in the cluster, your data becomes available again.

Important
If a minimum quorum of healthy nodes doesn't exist, contact AWS Support.

You can determine the quorum state of your cluster by determining your node's lock state and network reachability. The `snowballEdge describe-cluster` command reports back the lock and network reachability state for every node in an unlocked cluster. Ensuring that the devices in your cluster are healthy and connected is an administrative responsibility that you take on when you create the cluster job. For more information about the different client commands, see Commands for the Snowball Edge Client.

Considerations for Cluster Jobs for AWS Snowball Edge

Keep the following considerations in mind when planning to use a cluster of Snowball Edge devices:

- We recommend that you have a redundant power supply to reduce potential performance and stability issues for your cluster.
- Like standalone local storage and compute jobs, the data stored in a cluster can't be imported into Amazon S3 without ordering additional devices as a part of separate import jobs. If you order these devices, you can transfer the data from the cluster to the devices and import the data when you return the devices for the import jobs.
- To get data onto a cluster from Amazon S3, create a separate export job and copy the data from the devices of the export job onto the cluster.
- You can use the console, the AWS CLI, or AWS SDK to create a cluster job.
- Cluster nodes have node IDs. A *node ID* is the same as the job ID for a device that you can get from the console, the AWS CLI, the AWS SDKs, or the Snowball Edge client. You can use node IDs to remove old nodes from clusters. You can get a list of node IDs by using the `snowballEdge describe-device` command on an unlocked device or the `describe-cluster` on an unlocked cluster.
- The lifespan of a cluster is limited by the security certificate granted to the cluster devices when the cluster is provisioned.
- When AWS receives a returned device that was part of a cluster, we perform a complete erasure of the device. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Getting Started

With an AWS Snowball Edge device, you can access the storage and compute power of the AWS Cloud locally and cost effectively in places where connecting to the internet might not be an option. You can also transfer hundreds of terabytes or petabytes of data between your on-premises data centers and Amazon Simple Storage Service (Amazon S3).

Following, you can find general instructions for creating and completing your first AWS Snowball Edge device job in the AWS Snow Family Management Console. The console presents the most common workflows, separated into job types. You can find more information about specific components of the AWS Snowball Edge device in this documentation. For an overview of the service as a whole, see How AWS Snowball Edge Works (p. 8).

The getting started exercises assume that you use the AWS Snow Family Management Console to create your job, the AWS OpsHub for Snow Family to unlock and manage the AWS Snowball Edge device, and the Amazon S3 interface to read and write data. If you'd rather create your job programmatically with more options for the jobs you're creating, you can use the job management API. For more information, see AWS Snowball API Reference.

Before you can get started, you must create an AWS account and an administrator user in AWS Identity and Access Management (IAM). For information, see Setting Up Your AWS Access for AWS Snowball Edge (p. 19).

Topics

Creating a Snowball Edge Job

Regardless of the type of job that you're creating for Snowball Edge, there is a set of common tasks that you perform in the AWS Snow Family Management Console. These tasks include the following:

- Creating a job
- Monitoring the status of your job

- Setting up the device
- Unlocking the device
- Transferring data
- Returning the device

The following sections provide step-by-step instructions for performing these tasks. When there is a job type-specific consideration, it is called out specifically in a note.

You can use the AWS Snow Family Management Console to create and manage jobs. Depending on your use case, and regardless of your job type, the process for creating a new job in the AWS Snow Family Management Console follows a standard workflow.

You can also create and manage jobs using the job management API. For more information, see the *AWS Snowball API Reference*.

Topics

Step 1: Plan Your Job

The first step in creating a job is to determine the type of job that you need and to start planning it using the AWS Snow Family Management Console.

To plan your job

1. Sign in to the AWS Management Console, and open the AWS Snow Family Management Console. If this is your first time creating a job in this AWS Region, you will see the **AWS Snow Family** page. Otherwise you will see the list of pre-existing jobs.
2. If this is your first job, choose **Order an AWS Snow family device**, or if you are expecting multiple jobs to migrate over 500 TB of data, choose **Create your large data migration plan greater than 500 TB,** otherwise choose **Create Job** located in the left navigation bar. Choose **Next step** to open the **Plan your job** page.
3. Depending on your use case, choose one of the following job types:

   - **Import into Amazon S3** – Choose this option to have ship an empty Snowball Edge device to you. You connect the device to your local network and run the Snowball Edge client. You copy data onto the device using NFS share, ship it back to AWS, and your data is uploaded to AWS.
   - **Export from Amazon S3** – Choose this option to export data from your Amazon S3 bucket to your device. AWS loads your data on the device and ships it to you. You connect the device to your local network and run the Snowball Edge client. You copy data from your device to your servers. When you are done, ship the device to AWS, and your data is erased from the device.
   - **Local compute and storage only** – Choose this option to perform compute and storage workloads on the device without transferring any data.
4. To increase storage capacity and durability, you can order multiple devices in a cluster.

If you choose **Local compute and storage only**, and if you want to create a cluster, enter a name for the cluster and the number of devices that you want in the cluster. The number of devices must be between 5 and 10 in the **Make this a cluster - optional** section. For more information about clusters, see Using a Snowball Edge Cluster.

5. Choose **Next** to continue.

Step 2: Choose Your Shipping Preferences

Receiving and returning a Snow Family device involves shipping the device back and forth, so it's important that you provide accurate shipping information.

To provide shipping details

1. On the AWS Snow Family Management Console, in the **Shipping Address** section, choose an existing address or add a new address.

   - If you choose **Use recent address**, the addresses on file are displayed. Carefully choose the address that you want from the list.
   - If you choose **Add a new address**, provide the requested address information. The AWS Snow Family Management Console saves your new shipping information.

     Note
     The country that you provide in the address must match the destination country for the device and must be valid for that country.

2. In the **Shipping speed** section, choose a shipping speed for the job. This speed shows how quickly the device ships between destinations and doesn't reflect how soon it will arrive after today's date. The shipping speeds you can choose are:

   - **One-Day Shipping (1 business day)**
   - **Two-Day Shipping (2 business days)**
   - **See this list of all other shipping speeds**

3. Choose **Next**.

Step 3: Choose Your Job Details

In this step, you provide details for your AWS Snow Family device job, including the job name, AWS Region, device type, Amazon S3 bucket name, and Amazon Machine Image (AMI).

To add job details

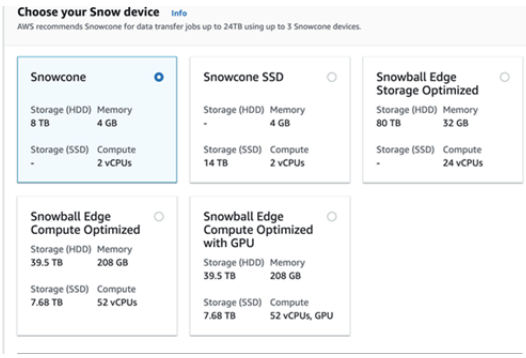
1. On the AWS Snow Family Management Console, in the **Name your job** section, provide a name for your job in the **Job name** box.
2. In the **Choose your Snow device** section, choose the Snow Family device.

   Note
   Some of these options might not be available in certain AWS Regions.

   AWS Snowball Edge device options

   - **Snowball Edge Storage Optimized** – 80 TB storage (HDD), 32 GB memory, 24 vCPUs
   - **Snowball Edge Compute Optimized** – 39.5 TB storage (HDD), 7.68 TB storage (SSD), 208 GB memory, 52 vCPUs

- **Snowball Edge Compute Optimized with GPU** – 39.5 TB storage, 7.68 TB storage (SSD), 208 GB memory, 52 vCPUs with GPU



Note

- When you're ordering clustered jobs, only the Snowball Edge device type is supported.
- The device capacity is optional.
- The availability of device types differs by AWS Region. For more information about Region availability, see AWS Regional Services.

3. In the **Choose your data transfer mechanism** section, choose either **S3** or **NFS**.

   Warning
   The NFS transfer type does not support the S3 interface. If you proceed with the NFS Transfer Type, you must mount the NFS share to transfer objects. Using the AWS CLI to transfer objects will fail. See Using NFS for Offline Data Transfer for more information.

4. Depending on the transfer mechanism that you chose, do one of the following:

   - In the **Choose your S3 storage** section, choose to create a new Amazon S3 bucket, or choose the S3 bucket that you want to use in the **Bucket name** list. You can include additional S3 buckets. These buckets appear on your device as local S3 buckets.
   - In the **Choose your NFS storage** section, choose to create a new S3 bucket, or choose the S3 bucket that you want to use in the **Bucket name** list. You can include additional S3 buckets. These buckets appear on your device as Network File System (NFS) mount points.

5. In the **Compute using EC2 instances - *optional*** section, choose **EC2 AMI name**. This option enables you to use compute Amazon EC2 instances in a cluster. It loads your Snowball Edge device with Amazon EC2 AMIs, and enables your device to function as a mobile data center.

   For more information, see Using Amazon EC2 Compute Instances.

   This feature incurs additional charges. For more information, see AWS Snowball Edge Pricing.

6. Choose an AMI in the **Source AMI name** list. Or, search for an AMI in the **Source AMI name** box and choose **Next**.

Step 4: Choose Your Security Preferences

Setting security adds the permissions and encryption settings for your AWS Snow Family devices job to help protect your data while in transit.

To set security for your job

1. In the **Encryption** section, choose the **KMS key** that you want to use.

- If you want to use the default AWS Key Management Service (AWS KMS) key, choose **aws/importexport (default)**. This is the default key that protects your import and export jobs when no other key is defined.
- If you want to provide your own AWS KMS key, choose **Enter a key ARN**, provide the Amazon Resource Name (ARN) in the **key ARN** box, and choose **Use this KMS key**. The key ARN will be added to the list.

2. In the **Service access** section, do one of the following:

- Choose **Create service role** to grant AWS Snow Family permissions to use Amazon S3 and Amazon Simple Notification Service (Amazon SNS) on your behalf. The role grants AWS Security Token Service (AWS STS) AssumeRole trust to the Snow service
- Choose **Add an existing role to use**, to specify the **IAM role** that you want, or you can use the default role.

  For **Policy name**, choose the import policy that you want to use.

  Add the `Condition` object and `aws:SourceAccount` or `aws:SourceARN` elements to the access policy to restrict the Snow service so that it acts as only one AWS account numbers. Or add both to be most restrictive.

  To restrict the Snow service so that it acts as only one or more account numbers, add one `aws:SourceAccount` element to the access policy and the account ID as the value.

  To restrict the Snow service so that it acts as only one or more ARNs, add one `aws:SourceArn` element to the access policy and the ARN as the value.

Example of `Condition` object to restrict Snow service actions

Example of restricting Snow service actions by ARN and account IDs.

```
"Condition": {
    "StringEquals": {
        "aws:SourceAccount": "AWS_ACCOUNT_ID"
    }
    "ArnLike": {
        "aws:SourceArn": "arn:aws:snowball:REGION:AWS_ACCOUNT_ID:RESOURCE_ID"
    }
}
```

The following shows these conditions included in a policy.

```
{
"Version": "2012-10-17",
"Id": "__default_policy_ID",
"Statement": [
    {
  "Sid": "__default_statement_ID",
  "Effect": "Allow",
  "Principal": {
  "AWS": "*"
  },
  "Action": [
    "SNS:GetTopicAttributes",
    "SNS:SetTopicAttributes",
    "SNS:AddPermission",
```

```
        "SNS:RemovePermission",
        "SNS:DeleteTopic",
        "SNS:Subscribe",
        "SNS:ListSubscriptionsByTopic",
        "SNS:Publish"
      ],
     "Resource": "arn:aws:sns:us-east-1:123456789012:my-sns-topic",
     "Condition": {
            "StringEquals": {
                "aws:SourceAccount": "111122223333"
            },
            "ArnLike": {
                "aws:SourceArn": "arn:aws:sns:us-east-1:555555555555:my-sns-topic"
            }
        }
    }
    ]
    }
```

Example Example policies for Snowball Edge devices

The following is an example of an Amazon S3 import-only role policy.

```
{
        "Version": "2012-10-17",
        "Statement": [
            {
                "Effect": "Allow",
                "Action": [
                    "s3:GetBucketPolicy",
                    "s3:GetBucketLocation",
                    "s3:ListBucketMultipartUploads",
                    "s3:ListBucket",
                    "s3:PutObject",
                    "s3:AbortMultipartUpload",
                    "s3:ListMultipartUploadParts",
                    "s3:PutObjectAcl",
                    "s3:GetObject"
                ],
                "Resource": [
                    "arn:aws:s3:::DOC-EXAMPLE-BUCKET1",
                    "arn:aws:s3:::DOC-EXAMPLE-BUCKET2/*"
                 ]
            }
        ]
    }
```

```
    {
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "importexport.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
```

```
}
```

The following is an example of an Amazon S3 export role policy.

```
{
        "Version": "2012-10-17",
        "Statement": [
            {
                "Effect": "Allow",
                "Action": [
                    "s3:GetBucketLocation",
                    "s3:GetObject",
                    "s3:ListBucket",
                    "s3:GetBucketPolicy"
                ],
                "Resource": [
                    "arn:aws:s3:::DOC-EXAMPLE-BUCKET3",
                    "arn:aws:s3:::DOC-EXAMPLE-BUCKET1/*"
                ]
            }
        ]
    }
```

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "importexport.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

Note
You can modify the trust relationship and restrict access to this role based on the customer account number and source arn. See **Restricting Access to the Snow Role Policy (p. 39)** on how to modify the trust relationship to restrict access.

3. Choose **Next.** If the selected **IAM role** has defined a restricted access, the **Create Job** procedure will fail if the access criteria is not met.
4. Choose **Allow**.
5. Choose **Next**.

Restricting Access to the Snow Role Policy

You can restrict access to the selected role based on the customer account number and source arn.

1. In the navigation pane of the IAM console, choose **Roles**. The console displays the roles for your account.
2. Choose the name of the role that you want to modify, and select the **Trust relationships** tab on the details page.
3. Choose **Edit trust relationships**. Update the trust policy to one of the following:

To restrict access by **customer account number**:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "importexport.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition":{
          "StringEquals":{
          "aws:SourceAccount":"111122223333"
          }
      }
    }
  ]
}
```

To restrict access by **source arn**:

```
{
    "Version": "2012-10-17",
    "Statement": [{
        "Effect": "Allow",
        "Principal": {
            "Service": "importexport.amazonaws.com"
        },
        "Action": "sts:AssumeRole",
        "Condition": {
            "ArnLike": {
                "aws:SourceArn": "arn:aws:snowball:REGION:555555555555:RESOURCE_ID"
            }
        }
    }]
}
```

To restrict access by both **customer account number** and **source arn**:

```
{
    "Version": "2012-10-17",
    "Statement": [{
        "Effect": "Allow",
        "Principal": {
            "Service": "importexport.amazonaws.com"
        },
        "Action": "sts:AssumeRole",
        "Condition": {
            "StringEquals": {
                "aws:SourceAccount": "111122223333"
            },
            "ArnLike": {
                "aws:SourceArn": "arn:aws:snowball:REGION:111122223333:RESOURCE_ID"
            }
        }
    }]
}
```

Step 5: Choose Your Notification Preferences

Notifications update you on the latest status of your AWS Snow Family devices jobs. You create an SNS topic and receive emails from Amazon Simple Notification Service (Amazon SNS) as your job status changes.

To set up notifications

1. In the **Set notifications** section, do one of the following:
   - If you want to use an existing SNS topic, choose **Use an existing SNS topic**, and choose the topic Amazon Resource Name (ARN) from the list.
   - If you want to create a new SNS topic, choose **Create a new SNS topic**. Enter a name for your topic and provide an email address.
2. Choose **Next**.

The notification will be about one of the following states of your job:

- Job created
- Preparing device
- Preparing shipment
- In transit to you
- Delivered to you
- In transit to AWS
- At sorting facility
- At AWS
- Importing
- Completed
- Canceled

Step 6: Download AWS OpsHub

The AWS Snow Family devices offer a user-friendly tool, AWS OpsHub for Snow Family, that you can use to manage your devices and local AWS services.

With AWS OpsHub installed on your client computer, you can perform tasks such as the following:

- Unlocking and configuring single or clustered devices
- Transferring files
- Launching and managing instances running on Snow Family devices.

For more information, see Using AWS OpsHub for Snow Family to Manage Devices (p. 56).

To download and install AWS OpsHub for Snow Family

1. In the AWS Snowball resources, click AWS OpsHub. In the AWS OpsHub section with the Download links, choose the appropriate download link to install AWS OpsHub for your operating system.
2. In the **AWS OpsHub** section, choose **Download** for your operating system, and follow the installation steps. When you are finished, choose **Next**.

Step 7: Review and Create Your Job

After you provide all the necessary job details for your AWS Snow Family devices job, review the job and create it.

1. On the AWS Snow Family Management Console, in the **Review job order** page, review all the sections before you create the job. If you want to make changes, choose **Edit** for the appropriate section, and edit the information.
2. When you are done reviewing and editing, choose **Create job**. After you create a job, you can cancel it within an hour without incurring any charges.

   Jobs are subject to export control laws in specific countries and might require an export license. US export and re-export laws also apply. Diversion from the country and US laws and regulations is prohibited.

   Note
   Snow Family devices jobs are not fulfilled with a power supply, and one must be provided separately.

After your job is created, you can see the status of the job in the **Job status** section. For detailed information about job statuses, see Job Statuses.

Receiving the Snowball Edge

When you receive the AWS Snowball Edge device, you might notice that it doesn't come in a box. The device is its own physically rugged shipping container. When the device first arrives, inspect it for damage or obvious tampering. If you notice anything that looks suspicious about the device, don't connect it to your internal network. Instead, contact AWS Support and inform them of the issue so that a new device can be shipped to you.

Important
The AWS Snowball Edge device is the property of AWS. Tampering with an AWS Snowball Edge device is a violation of the AWS Acceptable Use Policy. For more information, see AWS Acceptable Use Policy.

The device looks like the following image.

If you're ready to connect the device to your internal network, see the next section.

Next: Connecting to Your Local Network (p. 43)

Connecting to Your Local Network

Using the following procedure, you connect the AWS Snowball Edge device to your local network. The device doesn't need to be connected to the internet. The device has three doors: a front, a back, and a top.

To connect the device to your network

1. Open the front and back doors, sliding them inside the device door slots. Doing this gives you access to the touch screen on the LCD display embedded in the front of the device, and the power and network ports in the back.
2. Open the top door and remove the provided power cable from the cable nook, and plug the device into power.
3. Choose one of your RJ45, SFP+, or QSFP+ network cables, and plug the device into your network. The network ports are on the back of the device.
4. Power on the AWS Snowball Edge device by pressing the power button above the LCD display.
5. When the device is ready, the LCD display shows a short video while the device is getting ready to start. After about 10 minutes, the device is ready to be unlocked.
6. (Optional) Change the default network settings through the LCD display by choosing **CONNECTION**.

   You can change your IP address to a different static address, which you provide by using the following procedure.

To change the IP address of an AWS Snowball Edge device

1. On the LCD display, choose **CONNECTION**.

   A screen appears that shows you the current network settings for the AWS Snowball Edge device. The IP address below the drop-down box is automatically updated to reflect the DHCP address that the AWS Snowball Edge device requested.
2. (Optional) Change the IP address to a static IP address. You can also keep it as is.

The device is now connected to your network.

> **Important**
> To prevent corrupting your data, don't disconnect the AWS Snowball Edge device or change its connection settings while it's in use.

Next: Getting Your Credentials and Tools (p. 44)

Getting Your Credentials and Tools

Each job has a set of credentials that you must get from the AWS Snow Family Management Console or the job management API to authenticate your access to the Snowball. These credentials are an encrypted manifest file and an unlock code. The manifest file contains important information about the job and permissions associated with it.

> **Note**
> You get your credentials after the device has been provisioned.

To get your credentials using the console

1. Sign in to the AWS Management Console and open the AWS Snow Family Management Console.
2. On the console, search the table for the specific job to download the job manifest for, and then choose that job.
3. Expand that job's **Job status** pane, and choose **View job details**.
4. In the details pane that appears, expand **Credentials** and then do the following:

   - Make a note of the unlock code (including the hyphens), because you need to provide all 29 characters to transfer data.

- In the dialog box, choose **Download manifest**, and follow the instructions to download the job manifest file to your computer. The name of your manifest file includes your **Job ID**.

  Note
  We recommend that you don't save a copy of the unlock code in the same location in the workstation as the manifest for that job. For more information, see Best Practices for the AWS Snowball Edge Device (p. 216).

Now that you have your credentials, the next step is to download the Snowball Edge client, which is used to unlock the AWS Snowball Edge device.

Next: Downloading and Installing the Snowball Edge client (p. 45)

Downloading and Installing the Snowball Edge client

The Snowball Edge client is the tool that you use to unlock the AWS Snowball Edge device. We recommend that you use the AWS OpsHub for Snow Family application. For instructions, see Using AWS OpsHub for Snow Family to Manage Devices (p. 56).

You can download and install the Snowball Edge client from AWS Snowball resources page to a powerful workstation that you own.

Next: Unlocking the Snowball Edge (p. 45)

Unlocking the Snowball Edge

Use the procedure described here or the section in OpsHub for Snow Family to manage devices

To unlock the AWS Snowball Edge device, run the `snowballEdge unlock-device` command. To run this command, the AWS Snowball Edge device that you use for your job must be onsite, plugged into power and network, and turned on. In addition, the LCD display on the front of the AWS Snowball Edge device must indicate that the device is ready for use.

To unlock the device with the Snowball Edge client

1. Get your manifest and unlock code.

   a. Download a copy of the manifest from the AWS Snow Family Management Console. Your job's manifest is encrypted so that only the job's unlock code can decrypt it. Make a note of the path to the manifest file on your local server.

   b. Get the unlock code, a 29-character code that also appears when you download your manifest. We recommend that you write down the unlock code and keep it in a separate location from the manifest that you downloaded, to prevent unauthorized access to the AWS Snowball Edge device while it's at your facility.
2. Find the IP address for the AWS Snowball Edge device on the LCD display of the AWS Snowball Edge device, under the **Connections** tab. Make a note of that IP address.
3. Run the `snowballEdge unlock-device` command to authenticate your access to the AWS Snowball Edge device with the endpoint of the AWS Snowball Edge device and your credentials, as follows.

```
snowballEdge unlock-device --endpoint https://ip address --manifest-file /Path/to/
manifest/file --unlock-code
 29 character unlock code
```

Following is an example of the command to unlock the Snowball Edge client.

```
snowballEdge unlock-device --endpoint https://192.0.2.0 --manifest-file /Downloads/
JID2EXAMPLE-0c40-49a7-9f53-916aEXAMPLE81-manifest.bin  --unlock-code 12345-abcde-12345-
ABCDE-12345
```

In this example, the IP address for the device is `192.0.2.0`, the job manifest file that you downloaded is `JID2EXAMPLE-0c40-49a7-9f53-916aEXAMPLE81-manifest.bin`, and the 29-character unlock code is `12345-abcde-12345-ABCDE-12345`.

When you've entered the preceding command with the right variables for your job, you get a confirmation message. This message means that you're authorized to access the device for this job.

Job-Type Specific Consideration

If you're unlocking a cluster, you need to specify only the IP address for one of the cluster nodes. For more information, see Using the Snowball Edge Client (p. 81).

Now you can begin using the AWS Snowball Edge device.

Next: Setting Up Local Users (p. 46)

Setting Up Local Users

Following are steps to set up a local administrator on your AWS Snowball Edge device.

1. **Retrieve your root user credentials**

   Use the `snowballEdge list-access-keys` and `snowballEdge get-secret-access-key` to get your local credentials. For more information, see Getting Credentials (p. 86).
2. **Configure the root user credential using `aws configure`**

   Supply the `AWS Access Key ID`, `AWS Secret Access Key`, and `Default region name`. The region name must be `snow`. Optionally supply a `Default output format`. For more information about configuring the AWS CLI, see Configuring the AWS CLI in the *AWS Command Line Interface User Guide*.
3. **Create one or more local users on your device**

   Use the `create-user` command to add users to your device.

   ```
   aws iam create-user --endpoint endpointIPaddress:6078  --profile ProfileID --region
    snow --user-name UserName
   ```

   After you add users according to your business needs, you can store your AWS root credentials in a safe location and only use them for account and service management tasks. For more information about creating IAM users, see Creating an IAM user in your AWS account in the *IAM User Guide*.
4. **Create an access key for your user**

Use the `create-access-key` command to create an access key for your user.

```
aws iam create-access-key --endpoint endpointIPaddress --profile ProfileID --region
 snow --user-name UserName
```

Save the access key information to a file and distribute to your users.

5. **Create an access policy**

   You might want different users to have different levels of access to functionality on your device. The following example creates a policy document named `s3-only-policy` and attaches it to a user.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "s3:*",
      "Resource": "*"
    }
  ]
}
```

```
aws iam create-policy --endpoint endpointIPaddress --profile ProfileID --region snow --
policy-name s3-only-policy --policy-document file://s3-only-policy
```

6. **Attach the policy to your user**

   Use the `attach-user-policy` to attach the s3-only-policy to a user.

   ```
   aws iam attach-user-policy --endpoint endpointIPaddress --
   profile ProfileID --region snow --user-name UserName --policy-arn
   arn:aws:iam::AccountID:UserName
   ```

For more information about using IAM locally, see Using IAM Locally (p. 173).

Next: Using Your Snowball Edge (p. 47)

Using Your Snowball Edge

Now you can use the AWS Snowball Edge device. Regardless of your job type, keep the following information in mind while using the device:

- You can use the AWS OpsHub for Snow Family application to read or write data to the device or cluster of devices. You can also use it to manage your device. For more information about AWS OpsHub, see Using AWS OpsHub for Snow Family to Manage Devices (p. 56).
- You can use the built-in Amazon S3 interface to read or write data to a device or cluster of devices. The interface can work through the AWS Command Line Interface (AWS CLI using version 1.16.14 or earlier), one of the AWS SDKs, or your own RESTful application. For more information about AWS OpsHub, see Transferring Files Using the Amazon S3 Interface (p. 98).
- You can use the file interface to read or write data to a device or a cluster of devices. For more information, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).

- There is at least one directory at the root level of the device. This directory and any others at the root level have the same names as the buckets that were chosen when this job was created. Data cannot be transferred directly into the root directory. It must instead go into one of these bucket directories or into their subdirectories.

When you're done using the AWS Snowball Edge device, it's time to prepare the device for its return trip to AWS.

Next: Powering Off the Snowball Edge (p. 48)

Powering Off the Snowball Edge

When you've finished transferring data on to the AWS Snowball Edge device, prepare it for its return trip to AWS. Before you continue, make sure that all data transfer to the device has stopped. If you were using the file interface to transfer data, disable it before you power off the device. For more information, see Disabling the File Interface (p. 114).

When all communication with the device has ended, turn it off by pressing the power button located above the LCD display. It takes about 20 seconds for the device to shut down.

Next: Returning the Snowball Edge Device (p. 48)

Returning the Snowball Edge Device

The prepaid shipping label on the E Ink display contains the correct address to return the AWS Snowball Edge device. For information about how to return the device, see Shipping Carriers (p. 224).

The device is delivered to an AWS sorting facility and forwarded to the AWS data center. The carrier automatically reports back a tracking number for your job to the AWS Snow Family Management Console. You can access that tracking number, and also a link to the tracking website, by viewing the job's status details in the console, or by making calls to the job management API.

> **Important**
> Unless personally instructed otherwise by AWS, never affix a separate shipping label to the device. Always use the shipping label that is on the E Ink display.

In addition, you can track the status changes of your job through the AWS Snow Family Management Console. You can use Amazon SNS notifications if you selected that option during job creation, or you can make calls to the job management API. For more information about this API, see AWS Snowball API Reference.

The final status values include when the AWS Snowball Edge device has been received by AWS, when data import begins, and when the job is completed.

Disconnecting the Snowball Edge

Disconnect the AWS Snowball Edge device cables. Secure the device's power cable into the cable nook beneath the top door on the device.

Pull out and close the front and back doors. When they close completely, you hear an audible click. When the return shipping label appears on the E Ink display on top of the device, it's ready to be returned. To see who your region's carrier is, see Shipping Carriers (p. 224).

Job-Type Specific Consideration

Important
If you are importing data, don't delete your local copies of the transferred data until the import to Amazon S3 is successful at the end of the process, and you can verify the results of the data transfer.

Monitoring the Import Status

To monitor the status of your import job in the console, sign in to the AWS Snow Family Management Console. Choose the job you want to track from the table, or search for it by your chosen parameters in the search bar above the table. After you select the job, detailed information appears for that job within the table, including a bar that shows real-time status of your job.

After your device arrives at AWS, your job status changes from **In transit to AWS** to **At AWS**. On average, it takes a day for your data import into Amazon S3 to begin. When it does, the status of your job changes to **Importing**. From this point on, it takes an average of two business days for your import to reach **Completed** status.

Now your first data import job into Amazon S3 using AWS Snowball is complete. You can get a report about the data transfer from the console. To access this report from the console, select the job from the table, and expand it to reveal the job's detailed information. Choose **Get report** to download your job completion report as a PDF file. For more information, see Getting Your Job Completion Report and Logs on the Console (p. 49).

Next: Getting Your Job Completion Report and Logs on the Console (p. 49)

Getting Your Job Completion Report and Logs on the Console

When data is imported into or exported out of Amazon S3, you get a downloadable PDF job report. For import jobs, this report becomes available at the very end of the import process. For export jobs, your job report typically becomes available for you while the AWS Snowball Edge device for your job part is being delivered to you.

The job report provides you insight into the state of your Amazon S3 data transfer. The report includes details about your job or job part for your records. The job report also includes a table that provides a high-level overview of the total number of objects and bytes transferred between the device and Amazon S3.

For deeper visibility into the status of your transferred objects, you can look at the two associated logs: a success log and a failure log. The logs are saved in comma-separated value (CSV) format, and the name of each log includes the ID of the job or job part that the log describes.

You can download the report and the logs from the AWS Snow Family Management Console.

To get your job report and logs

1. Sign in to the AWS Management Console and open the AWS Snow Family Management Console.
2. Choose your job or job part from the table and expand the status pane.

   Three options appear for getting your job report and logs: **Get job report**, **Download success log**, and **Download failure log**.
3. Choose the log you want to download.

The following list describes the possible values for the report:

- **Completed** – The transfer was completed successfully. You can find more detailed information in the success log.
- **Completed with errors** – Some or all of your data was not transferred. You can find more detailed information in the failure log.

Next: Where Do I Go from Here? (p. 50)

Where Do I Go from Here?

Now that you've read through the previous sections and begun your first job, you can learn more about using AWS Snowball Edge device tools and interfaces in detail from the following topics:

- Using an AWS Snowball Edge Device (p. 80)
- Using the Snowball Edge Client (p. 81)
- Transferring Files Using the Amazon S3 Interface (p. 98)

We also recommend that you learn about the job management API for AWS Snowball. For more information, see AWS Snowball API Reference.

If you're importing data into Amazon S3 for the first time, you might want to learn more about what you can do with your data after it's there. For more information, see Getting started with Amazon S3.

Large Data Migration with Snowball Edge

Large data migration is the transfer of existing data greater than 500 TB from your on-premise devices to AWS. The migration requires careful planning and preparation to ensure that all the data has been successfully migrated to AWS. When data migration is complete, you can perform post-migration activities including planning, creating backups, quality testing, and validation of results.

We recommend that you have a data migration strategy in place before starting your migration to avoid the potential for missed deadlines, exceeding budgets and migration failures. AWS Snow services helps you to place, order, and track your large data migration projects via the large data migration feature in the AWS console.

The topics, Planning Your Large Transfer (p. 51) and Calibrating a Large Transfer (p. 53) describe a manual data migration process. You can streamline the manual steps as described in the topics Creating a Large Data Migration Plan (p. 53) and Using the Large Data Migration Plan (p. 54).

Topics

Planning Your Large Transfer

We recommend that you plan and calibrate large data transfers between the AWS Snowball Edge devices that you have on site and your servers using the guidelines in the following sections.

Topics

Step 1: Understand What You're Moving to the Cloud

Before you create your first job using an AWS Snowball Edge device, ensure that you know the size of the data that you want to transfer, where it is currently stored, and the destination that you want to transfer it to. For data transfers that are a petabyte in scale or larger, this administrative housekeeping makes it much easier when your AWS Snowball Edge devices arrive.

If you're migrating data into the AWS Cloud for the first time, we recommend that you design a cloud migration model. Cloud migration doesn't happen overnight. It requires a careful planning process to ensure that all systems work as expected.

When you're done with this step, you should know the total amount of data that you're going to move into the cloud.

Step 2: Calculate Your Target Transfer Rate

It's important to estimate how quickly you can transfer data to the Snowball Edge devices that are connected to each of your servers. This estimated speed equals your target transfer rate. This rate is the rate at which you can expect data to move into an AWS Snowball Edge device given the realities of your local network architecture.

> **Note**
> For large data transfers, we recommend using the Amazon S3 interface to transfer your data.

Capture a baseline transfer rate by calculating the transfer of a representative subset of your data to the Snowball Edge device, or by creating a 10 GB sample file to measure the throughput.

While determining your target transfer speed, keep in mind that you can change the speed by changing the network speed, the size of the files being transferred, and the speed at which data can be read from your local servers. The Amazon S3 interface copies data to the AWS Snowball Edge device as quickly as your conditions allow.

Step 3: Determine How Many AWS Snowball Edge Devices You Need

Using the total amount of data that you plan to move into the cloud, the estimated transfer speed, and the number of days that you want to allow to move the data into AWS, determine how many Snowball Edge devices you need for your large-scale data migration. Depending on the device type, Snowball Edge devices have approximately 39.5 TB or 80 TB of usable space. For example, if you want to move 300 TB of data to AWS over 10 days and you have a transfer speed of 250 MB/s, you need four Snowball Edge devices.

Step 4: Create Your Jobs

After you know how many AWS Snowball Edge devices you need, you can create an import job for each device. Because each AWS Snowball Edge device import job involves a single Snowball Edge device, you must create multiple import jobs. For more information, see Creating an AWS Snowball Edge Job.

Step 5: Separate Your Data into Transfer Segments

As a best practice for large data transfers involving multiple jobs, we recommend that you separate your data into a number of smaller, more manageable data transfer segments. This allows you to transfer segments one at a time, or multiple segments in parallel. When planning your segments, make sure that the data for the segments combined fit on the AWS Snowball Edge device for the job. For example, you can separate your transfer into segments in any of the following ways:

- You can create 10 segments of 8 TB each for an AWS Snowball Edge device.
- For large files, each file can be an individual segment up to the 5 TB size limit for objects in Amazon S3.
- Each segment can be a different size, and each individual segment can be made up of the same kind of data—for example, small files in one segment, compressed archives in another, large files in another segment, and so on. This approach can help you to determine your average transfer rate for different types of files.

> **Note**
> Metadata operations are performed for each file that's transferred. Regardless of a file's size, this overhead remains the same. Therefore, you get faster performance by compressing small files into a larger bundle, batching your files, or transferring larger individual files.

Creating data transfer segments can make it easier for you to quickly resolve transfer issues because trying to troubleshoot a large, heterogeneous transfer after the transfer runs for a day or more can be complex.

When you've finished planning your petabyte-scale data transfer, we recommend that you transfer a few segments onto the AWS Snowball Edge device from your server to calibrate your speed and total transfer time.

Calibrating a Large Transfer

You can calibrate a large transfer by transferring a representative set of your data transfer segments. Choose a number of the data segments that you have defined and transfer them to a Snowball Edge device. Make a record of the transfer speed and total transfer time for each operation. If the calibration's results are less than the target transfer rate, you may be able to copy multiple parts of your data transfer at the same time. In this case, repeat the calibration with the additional data transfer segment.

Continue adding parallel copy operations during calibration until you see diminishing returns in the sum of the transfer speed of all instances currently transferring data. End the last active instance and make a note of your new target transfer rate.

You can transfer data faster with the AWS Snowball Edge device by transferring data in parallel using one of the following scenarios:

- Using multiple sessions of the S3 interface on a workstation against a single Snowball Edge device.
- Using multiple sessions of the S3 interface on multiple workstations against a single Snowball Edge device.
- Using multiple sessions of the S3 interface (using a single or multiple workstations) targeting multiple Snowball Edge devices.

When you complete these steps, you should know how quickly you can transfer data to an AWS Snowball Edge device.

Creating a Large Data Migration Plan

The AWS Snow Family large data migration plan feature enables you to plan, track, monitor, and manage large data migrations from 500 TB to multiple petabytes when using multiple Snow Family service products.

Use the large data migration plan feature to collect information about data migration goals, such as the size of the data to move to AWS and the number of Snow Family devices needed to migrate the data simultaneously. Use the plan to create a projected schedule for your data migration project and the recommended job ordering schedule to meet your goals.

To create a large data migration plan

> **Note**
> The data migration plan is supported for import job use cases only.

1. Sign in to the AWS Snow Family Management Console. If this is your first time using Snow Family in this AWS Region, you will see the AWS Snow Family page. Otherwise, you will see the list of pre-existing jobs.
2. If this is your first data migration plan, choose **Create your large data migration plan** for migrations larger than 500 TB from the main page. Otherwise, choose **Large data migration plan** from the left navigation bar. Choose **Create data migration plan** to open the plan creation wizard.

3. In the **Name your data migration plan** section, provide a name for the plan in the **Data migration plan name** box. The plan name can have up to 64 characters. Valid characters are A-Z, a-z, 0-9, and . - (hyphen). A plan name must not start with aws:.
4. In the **Shipping Address** section, choose an existing address or create a new one.
   - If you choose **Use recent address**, the addresses on file are displayed. Choose the address you want from the list.
   - If you choose **Add a new address**, provide the requested address information. The AWS Snow Family Management Console saves your new shipping information.

     Note
     The country in the address must match the destination country for the device, and must be valid for that country.
5. In **Concurrent devices**, enter the number of Snow Family devices that you can simultaneously copy data on your premises
6. In **Total data to be migrated to AWS**, enter the size of the data that you want to migrate to AWS. A large data migration plan is only allowed for data migrations larger than 500 TB. Place Snow Family job orders individually for your data transfer project.
7. In **Service Access**, do one of the following:
   - Allow Snow to create a new service-linked role for you with all of the necessary permissions to publish CloudWatch metrics and Amazon SNS notifications for your Snow Family jobs.
   - Or, add an existing service role that has the necessary permissions . You can see an example of how to set up this role in Example 4: Expected Role Permissions and Trust Policy (p. 249).
8. In **Send notifications**, choose whether to send notifications. Note that if you choose **Do not send notification about data migration plans**, you will not receive any notifications from the plan you are creating but you will still receive job notifications.
9. In **Set notifications** section, do one of the following:
   - To use an existing topic, choose **Use an existing SNS topic**, and then choose the topic Amazon Resource Name (ARN) from the list.
   - To create a new topic, choose **Create a new SNS topic**. Enter a name for your topic and provide an email address.
10. Choose **Create data migration plan** to create the plan.

Using the Large Data Migration Plan

After you create your large data migration plan, you can use the resulting schedule and dashboard to guide you through the rest of the migration process.

Jobs ordered list

Each plan displays a job ordered list. This is empty at first. When you start to order jobs, you can add jobs to your plan by selecting **Add job** from the **Actions** menu. Jobs that you add here are tracked on the monitoring dashboard.

Similarly, you may remove the job from the job ordered list by selecting **Remove job** from the **Actions** menu.

We recommend using the job ordering schedule provided in the plan for a smooth data migration.

Recommended job ordering schedule

After you create an AWS Snow Family large migration plan, you'll see a recommended job ordering schedule for creating new jobs. This schedule automatically adjusts based on the average data ingested per job and the average duration for completing an end-to-end job. Follow this recommended schedule to simplify the decision making process for placing new job orders.

Monitoring dashboard

After you add jobs to your plan, you can see metrics on the dashboard as the jobs return to AWS for ingestion. These metrics can help you to track your progress:

- **Data migrated to AWS** – The amount of data that's been migrated to AWS so far..
- **Average data migrated per job** – The average amount of data per job in terabytes.
- **Total Snow Jobs** – The number of Snowball Edge jobs ordered compared to the remaining jobs to be ordered.
- **Average duration for a migration job** – The average duration of a job in days.
- **Snow Job Status** – The number of jobs in each status.

Using AWS OpsHub for Snow Family to Manage Devices

The Snow Family devices now offer a user-friendly tool, AWS OpsHub for Snow Family, that you can use to manage your devices and local AWS services. You use AWS OpsHub on a client computer to perform tasks such as unlocking and configuring single or clustered devices, transferring files, and launching and managing instances running on Snow Family devices. You can use AWS OpsHub to manage both the Storage Optimized and Compute Optimized Snow device types. The AWS OpsHub application is available at no additional cost to you.

AWS OpsHub takes all the existing operations available in the Snowball API and presents them as a graphical user interface. This interface helps you quickly migrate data to the AWS Cloud and deploy edge computing applications on Snow Family devices.

AWS OpsHub provides a unified view of the AWS services that are running on Snow Family devices and automates operational tasks through AWS Systems Manager. With AWS OpsHub, users with different levels of technical expertise can manage a large number of Snow Family devices. With a few clicks, you can unlock devices, transfer files, manage Amazon EC2 instances, and monitor device metrics.

When your Snow device arrives at your site, you download, install, and launch the AWS OpsHub application on a client machine, such as a laptop. After installation, you can unlock the device and start managing it and using supported AWS services locally. AWS OpsHub provides a dashboard that summarizes key metrics such as storage capacity and active instances on your device. It also provides a selection of AWS services that are supported on the Snow Family devices. Within minutes, you can begin transferring files to the device.

Topics

Unlocking a device

When your device arrives at your site, the first step is to connect and unlock it. AWS OpsHub lets you sign in, unlock, and manage devices using the following methods:

- **Locally** – To sign in to a device locally, you must power on the device and connect it to your local network. Then provide an unlock code and a manifest file.
- **Remotely** – To sign in to a device remotely, you must power on the device and make sure that it can connect to *`device-order-region`*`.amazonaws.com` through your network. Then provide the AWS

Identity and Access Management (IAM) credentials (access key and secret key) for the AWS account that is linked to your device.

For information on enabling remote management and creating an associated account, see Enabling Snow Device Management (p. 184).

Topics

Unlocking a device locally

To connect and unlock your device locally

1. Open the flap on your device, locate the power cord, and connect it to a power source.
2. Connect the device to your network using an Ethernet cable (typically an RJ45 cable), then open the front panel and power on the device.
3. Open the AWS OpsHub application. If you are a first-time user, you are prompted to choose a language. Then choose **Next**.
4. On the **Get started with OpsHub** page, choose **Sign in to local devices**, and then choose **Sign in**.
5. On the **Sign in to local devices** page, choose your Snow Family devices type, and then choose **Sign in**.

   If you don't have a device, you can order one.
6. On the **Sign in** page, enter the **Device IP address** and **Unlock code**. To select the device manifest, choose **Choose file**, and then choose **Sign in**.
7. (Optional) Save your device's credentials as a *profile*. Name the profile and choose **Save profile name**. For more information about profiles, see Managing Profiles (p. 74).
8. On the **Local devices** tab, choose a device to see its details, such as the network interfaces and AWS services that are running on the device. You can also see details for clusters from this tab, or manage your devices just as you do with the AWS Command Line Interface (AWS CLI). For more information, see Managing AWS services on your device (p. 60).

   For devices that have AWS Snow Device Management installed, you can choose **Enable remote management** to turn on the feature. For more information, see Using AWS Snow Device Management to Manage Devices (p. 183).

Unlocking a device remotely

To connect and unlock your device remotely

1. Open the flap on your device, locate the power cord, and connect it to a power source.
2. Connect the device to your network using an Ethernet cable (typically an RJ45 cable), then open the front panel and power on the device.

   Note
   To be unlocked remotely, your device must be able to connect to *`device-order-region`*`.amazonaws.com`.
3. Open the AWS OpsHub application. If you are a first-time user, you are prompted to choose a language. Then choose **Next**.
4. On the **Get started with OpsHub** page, choose **Sign in to remote devices**, and then choose **Sign in**.

5. On the **Sign in to remote devices** page, enter the AWS Identity and Access Management (IAM) credentials (access key and secret key) for the AWS account that is linked to your device, and then choose **Sign in**.
6. On the **Remote devices** tab, choose your device to see its details, such as its state and network interfaces. Then choose **Unlock** to unlock the device.

   From the remote device's details page, you can also reboot your devices and manage them just as you do with the AWS Command Line Interface (AWS CLI). To view remote devices in different AWS Regions, choose the current Region on the navigation bar, and then choose the Region that you want to view. For more information, see Managing AWS services on your device (p. 60).

Verifying the signature of AWS OpsHub (optional)

You can install the AWS OpsHub for Snow Family application on a Linux client machine. The AWS OpsHub application installer packages for Linux are cryptographically signed. You can use a public key to verify that the installer package is original and unmodified. If the files are damaged or altered, the verification fails. You can verify the signature of the installer package using GNU Privacy Guard (GPG). This verification is optional. If you choose to verify the signature of the application, you can do it at any time.

You can download the SIGNATURE file for the Linux installer from AWS Snowcone Resources or Snowball Edge Resources.

To verify the AWS OpsHub package on a Linux client machine

1. Copy the following public key, save it to a file, and name the file—for example, `opshub-public-key.pgp`.

```
-----BEGIN PGP PUBLIC KEY BLOCK-----
xsFNBF/hGf8BEAC9HCDV8uljDX02Jxspi6kmPu4xqf4ZZLQsSqJcHU61oL/c
/zAN+mUqJT9aJ1rr0QFGVD1bMogecUPflTWlDkEEpG8ZbX5P8vR+EElO/rW/
WtqizSudy6qy59ZRK+YVSDx7DZyuJmIO7j00UADCL+95ZQN9vqwHNjBHsgfQ
l/1Tqhy81ozTZXcI/+u+99YLaugJIP6ZYIeDfpxnghqyVtaappBFTAyfG67Y
N/5mea1VqJzd8liFpIFQnl+X7U2x6emDbM01yJWV3aMmPwhtQ7iBdt5a4x82
EF5bZJ8HSRMvANDILD/9VTN8VfUQGKFjFY2GdX9ERwvfTb47bbv9Z28Vl284
4lw2w1Bl007FoO2v/Y0ukrN3VHCpmJQS1IiqZbYRa0DVK6UR5QNvUlj5fwWs
4qW9UDPhT/HDuaMrMFCejEn/7wvRUrGVtzCT9F56Al/dwRSxBejQQEb1AC8j
uuyi7gJaPdyNntROEFTD7iO2L6X2jB4YLfvGxP7Xeq1Y37t8NKF8CYTpOry/
Wvw0iKZFbo4AkiI0aLyBCk9HBXhUKa9x06gOnhh1UFQrPGrk60RPQKqL76HA
E2ewzGDa90wlRBUAt2nRQpyNYjoASBvz/cAr3e0nuWsIzopZIenrxI5ffcjY
f6UWA/OK3ITHtYHewVhseDyEqTQ4MUIWQS4NAwARAQABzTlBV1MgT3BzSHVi
IGZvciBTbm93IEZhbWlseSA8YXdzLW9wc2h1Yi1zaWduZXJAYW1hem9uLmNv
bT7CwY0EEAEIACAFAl/hGf8GCwkHCAMCBBUICgIEFgIBAAIZAQIbAwIeAQAh
CRAhgc9adPNF8RYhBDcvpelIaY930bOvqiGBz1p080XxGbcP+gPZX7LzKc1Y
w9CT3UHgkAIawOSXYktujzoYVxAz8/j3jEkCY0dKnfyqvWZDiJAXnzmxWWbg
cxg1g0GXNXCM4lAd68CmbAOLoLTaWSQX30ZbswzhbtX2ADAlopV8RLBik7fm
bS9FyuubDRhfYRQq0fpjUGXFiEgwg6aMFxsrGLlv4QD7t+6ftFIe/mxLbjR4
iMgtr8FIPXbgn05YYY/LeF4NIgX4iLEqRbAnfWjPzqQ1spFWAotIzDmZqby+
WdWThrH4K1rwtYM8sDhqRnMnqJrGFZzk7aDhVPwF+FOVMmPeEN5JRazEeUrl
VZaSw6mu0n4FMGSXuwGgdvmkqnMe6I5/xLdU4IOPNhp0UmakDWOq/a1dREDE
ZLMQDMINphmeQno4inGmwbRo63gitD4ZNR5sWwfuwty25lo8Ekv7jkkp3mSv
pdxn5tptttnPaSPcSIX/4EDl19Tu0i7aup+v30t7eikYDSZG6g9+jHB3Va9e
/VWShFSgy8Jm2+qq/ujUQDAGTCfSuY9jg1ITsog6ayEZa/2upDJ1m+4OHK4p
8DrEzP/3jTahT8q5ofFWSRDL17d3lTSU+JBmPE3mz311FNXgiO8w+taY320z
+irHtb3iSiiukbjS8s0maVgzszRqS9mhaEn4LL0zoqrUicmXgTyFB7n2LuYv
O7vxMO5xxhGQwsF2BBABCAAJBQJf4RoCAhsDACEJEBFZvzT/tDi5FiEEi+O9
V+UAYN9Gnw36EVm/NP+0OLnnEQ/+J4C0Mn8j0AebXrwBiFs83sQo2q+WHL1S
MRc1g5gRFDXs6h1Gv+TGXRen7j1oeaddWvgOtUBxqmCOjr+8AKH0OtiBWSuO
lsS8JU5rindEsKUrKTwcG2wyZFoe1zlE8xPkLRSRN5ZbbgKsTz16l1HgCCId
```

```
Do+WJdDkWGWxmtDvzjM32EI/PVBd108ga9aPwXdhLwOdKAjZ4JrJXLUQJjRI
IVDSyMObEHOUM6a/+mWNZazNfo0LsGWqGVa6Xn5WJWlwR1S78vPNfO3BQYuO
YRjaVQR+kPtB9aSAZNi5sWfk6NrRNd1Q78d067uhhejsjRt7Mja2fEL4Kb1X
nK4U/ps7XlO3o/VjblneZOhJK6kAKU172tnPJTJ31JbOxX73wsMWDYZRZVcK
9X9+GFrpwhKHWKKPjpMOt/FRxNepvqRl72TkgBPqGH2TMOFdB1f/uQprvqge
PBbS0JrmBIH9/anIqgtMdtcNQB/0erLdCDqI5afOuD1OLcLwdJwG9/bSrfwT
TVEE3WbXmJ8pZgMzlHUiZE6V2DSadV/YItk50IOjjrOVHOHvlFMwGCEAIFzf
9P/pNi8hpEmlRphRiOVVcdQ30bH0M0gPHu5V9flIhyCL1zU3LjYTHkq0yJD5
YDA1xO1MYq3DcSM513OVBbLmuVS2GpcsTCYqlgQA6h/zzMwz+/7OwU0EX+EZ
/wEQAOAY8ULmcJIQWIr14V0jylpJeD3qwj7wd+QsBzJ+mOpOB/3ZFAhQiNOl
9yCDlHeiZeAmWYX9OIXrNiIdcHy+WTAp4G+NaMpqE52qhbDjz+IbvLpl1yDH
bYEHPjnTHXEy2lbvKAJOKkw/2RcQOi4dodGnq5icyYj+9gcuHvnVwbrQ96Ia
0D7c+b5T+bzFqk90nIcztrMRuhDLJnJpi7OjpvQwfq/TkkZA+mzupxfSkq/Y
N9qXNEToT/VI2gn/LS0X4Ar1l2KxBjzNEsQkwGSiWSYtMA5J+Tj5ED0uZ/qe
omNblAlD4bm7Na8NAoLxCtAiDq/f3To9Xb18lHsndOmfLCb/BVgP4edQKTIi
C/OZHy9QJlfmN0aq7JVLQAuvQNEL88RKW6YZBqkPd3P6zdc7sWDLTMXMOd3I
e6NUvU7pW0E9NyRfUF+oT4s9wAJhAodinAi8Zi9rEfhK1VCJ76j7bcQqYZe0
jXD3IJ7T+X2XA8M/BmypwMW0Soljzhwh044RAasr/fAzpKNPB318JwcQunIz
u2N3CeJ+zrsomjcPxzehwsSVq1lzaL2ureJBLOKkBgYxUJYXpbS01ax1TsFG
09ldANOs9Ej8CND37GsNnuygjOgWXbX6MNgbvPs3H3zi/AbMunQ1VBlw07JX
zdM1hBQZh6w+NeiEsK1T6wHi7IhxABEBAAHCwXYEGAEIAAkFAl/hGf8CGwwA
IQkQIYHPWnTzRfEWIQQ3L6XpSGmPd9Gzr6ohgc9adPNF8TMBD/9TbU/+PVbF
ywKvwi3GLOlpY7BXn8lQaHyunMGuavmO8OfaRROynkH0ZqLHCp6bIajFOfvF
b7c0Jamzx8Hg+SIdl6yRpRY+fA4RQ6PNnnmT93ZgWW3EbjPyJGlm0/rt03SR
+0yn4/ldlg2KfBX4pqMoPCMKUdWxGrmDETXsGihwZ0gmCZqXe8lK122PYkSN
JQQ+LlfjKvCaxfPKEjXYTbIbfyyhCR6NzAOVZxCrzSz2xDrYWp/V002Klxda
0ix6r2aEHf+xYEUhOaBt8OHY5nXTuRReCVU789MUVtCMqD2u6amdo4BR0kWA
QNg4yavKwV+LVtyYh2Iju9VSyv4xL1Q4xKHvcAUrSH73bHG7b7jkUJckD0f4
twhjJk/Lfwe6RdnVo2WoeTvE93w+NAq2FXmvbiG7eltl0XfQecvQU3QNbRvH
U8B96W0w8UXJdvTKg4f0NbjSw7iJ3x5naixQ+rA8hLV8xOgn2LX6wvxT/SEu
mn20KX+fPtJELK7v/NheFLX1jsKLXYo4jHrkfIXNsNUhg/x2E71kAjbeT3s+
t9kCtxt2iXDDZvpIbmGO4QkvLFvoROaSmN6+8fupe3e+e2yN0e6xGTuE60gX
I2+X1p1g9IduDYTpoI2OXleHyyMqGEeIb4gOiiSloTp5oi3EuAYRGflXuqAT
VA19bKnpkBsJ0A==
=tD2T
-----END PGP PUBLIC KEY BLOCK-----
```

2. Import the public key into your keyring, and note the returned key value.

   GPG

   ```
   gpg --import opshub-public-key.pgp
   ```

   Example output

   ```
   gpg: key 1655BBDE2B770256: public key "AWS OpsHub for Snow Family <aws-opshub-
   signer@amazon.com>" imported
   gpg: Total number processed: 1
   gpg:               imported: 1
   ```

3. Verify the fingerprint. Be sure to replace *key-value* with the value from the preceding step. We recommend that you use GPG to verify the fingerprint.

   ```
   gpg --fingerprint key-value
   ```

   This command returns output similar to the following.

   ```
   pub   rsa4096 2020-12-21 [SC]
         372F A5E9 4869 8F77 D1B3  AFAA 2181 CF5A 74F3 45F1
   uid           [ unknown] AWS OpsHub for Snow Family <aws-opshub-signer@amazon.com>
   sub   rsa4096 2020-12-21 [E]
   ```

The fingerprint should match the following:

```
372F A5E9 4869 8F77 D1B3 AFAA 2181 CF5A 74F3 45F1
```

If the fingerprint doesn't match, don't install the AWS OpsHub application. Contact AWS Support.

4. Verify the installer package, and download the SIGNATURE file according to your instance's architecture and operating system if you haven't already done so.
5. Verify the installer package signature. Be sure to replace *signature-filename* and *OpsHub-download-filename* with the values that you specified when downloading the SIGNATURE file and AWS OpsHub application.

   GPG

   ```
   gpg --verify signature-filename OpsHub-download-filename
   ```

   This command returns output similar to the following.

   GPG

   ```
   gpg: Signature made Mon Dec 21 13:44:47 2020 PST
   gpg:                using RSA key 1655BBDE2B770256
   gpg: Good signature from "AWS OpsHub for Snow Family <aws-opshub-
   signer@amazon.com>" [unknown]
   gpg: WARNING: This key is not certified with a trusted signature!
   gpg:          There is no indication that the signature belongs to the owner.
   Primary key fingerprint: 9C93 4C3B 61F8 C434 9F94  5CA0 1655 BBDE 2B77 0256
   ```

   When using GPG, if the output includes the phrase `BAD signature`, check whether you performed the procedure correctly. If you continue to get this response, contact AWS Support and don't install the agent. The warning message about the trust doesn't mean that the signature is not valid, only that you have not verified the public key. A key is trusted only if you or someone who you trust has signed it.

Managing AWS services on your device

With AWS OpsHub, you can use and manage AWS services on your Snow Family devices. Currently, AWS OpsHub supports the following resources:

- Amazon Elastic Compute Cloud (Amazon EC2) instances – Use Amazon EC2 instances to run software installed on a virtual server without sending it to the AWS Cloud for processing.
- Network File System (NFS) – Use file shares to move data to your device. You can ship the device to AWS to transfer your data to the AWS Cloud, or use DataSync to transfer to other AWS Cloud locations.

Topics

Using Amazon EC2 compute instances locally

You can use AWS OpsHub to run pre-installed software on virtual servers (instances) locally on your device, and also to manage Amazon EC2 instances on your device.

Topics

Launching an Amazon EC2 instance

Follow these steps to launch an Amazon EC2 instance using AWS OpsHub.

To launch an Amazon EC2 instance

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. All your compute resources appear in the **Resources** section.
3. If you have Amazon EC2 instances running on your device, they appear in the **Instance name** column under **Instances**. You can see details of each instance on this page.
4. Choose **Launch instance**. The launch instance wizard opens.
5. For **Device**, choose the Snow device that you want to launch the Amazon EC2 instance on.
6. For **Image (AMI)**, choose an Amazon Machine Image (AMI) from the list. This AMI is used to launch your instance.
7. For **Instance type**, choose one from the list.
8. Choose how you want to attach an IP address to the instance. You have the following options:

   - **Create public IP address (VNI)** – Choose this option to create a new IP address using a physical network interface. Choose a physical network interface and IP address assignment.
   - **Use existing IP address (VNI)** – Choose this option to use an existing IP address and then use existing virtual network interfaces. Choose a physical network interface and a virtual network interface.
   - **Do not attach IP address** – Choose this option if you don't want to attach an IP address.
9. Choose how you want to attach a key pair to the instance. You have the following options:

   Create key pair – Choose this option to create a new key pair and launch the new instance with this key pair.

   Use existing key pair – Choose this option to use an existing key pair to launch the instance.

   Do not attach IP address – Choose this option if you don't want to attach a key pair. You must acknowledge that you won't able to connect to this instance unless you already know the password that is built into this AMI.

For more information, see Working with key pairs (p. 62).

10. Choose **Launch**. You should see your instance launching in the **Compute instances** section. The **State** is **Pending** and then changes to **Running** when done.

Stopping an Amazon EC2 instance

Use the following steps to use AWS OpsHub to stop an Amazon EC2 instance.

To stop an Amazon EC2 instance

1. Open the AWS OpsHub application.
2. In the **Start computing** section of the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page.

   All your compute resources appear in the **Resources** section.
3. If you have Amazon EC2 instances running on your device, they appear in the **Instance name** column under **Instances**.
4. Choose the instance that you want to stop, and choose **Stop**. The **State** changes to **Stopping**, and then to **Stopped** when done.

Starting an Amazon EC2 instance

Use these steps to start an Amazon EC2 instance using AWS OpsHub.

To start an Amazon EC2 instance

1. Open the AWS OpsHub application.
2. In the **Start computing** section of the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page.

   Your compute resources appear in the **Resources** section.
3. In the **Instance name** column, under **Instances**, find the instance that you want to start.
4. Choose the instance, and then choose **Start**. The **State** changes to **Pending**, and then changes to **Running** when done.

Working with key pairs

When you launch an Amazon EC2 instance and intend to connect to it using SSH, you have to provide a key pair. You can use Amazon EC2 to create a new key pair, or you can import an existing key pair or manage your key pairs.

To create, import, or manage key pairs

1. Open **Compute** on the AWS OpsHub dashboard.
2. In the navigation pane, choose the **Compute (EC2)** page, and then choose the **Key Pairs** tab. You are redirected to the Amazon EC2 console where you can create, import, or manage your key pairs.
3. For instructions on how to create and import key pairs, see Amazon EC2 key pairs and Linux instances in the *Amazon EC2 User Guide for Linux Instances*.

Terminating an Amazon EC2 instance

After you terminate an Amazon EC2 instance, you can't restart the instance.

To terminate an Amazon EC2 instance

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. You can see all your compute resources in the **Resources** section.
3. In the **Instance name** column, under **Instances**, find the instance that you want to terminate.
4. Choose the instance, and choose **Terminate**. The **State** changes to **Terminating**, and then to **Terminated** when done.

   After the instance is terminated, you can't restart it.

Using storage volumes locally

Amazon EC2 instances use Amazon EBS volumes for storage. In this procedure, you create a storage volume and attach it to your instance using AWS OpsHub.

To create a storage volume

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page.
3. Choose the **Storage volumes** tab. If you have storage volumes on your device, the details about the volumes appear under **Storage volumes**.
4. Choose **Create volume** to open the **Create volume** page.
5. Choose the device that you want to create the volume on, enter the size (in GiBs) that you want to create, and choose the type of volume.
6. Choose **Submit**. The **State** is **Creating**, and changes to **Available** when done. You can see your volume and details about it in the **Volumes** tab.

To attach a storage volume to your instance

1. Choose the volume that you created, and then choose **Attach volume**.
2. For **Compute instance Id**, choose the instance you want to attach the volume to.
3. For **Volume Device Name**, enter the device name of your volume (for example, **`/dev/sdh`** or **`xvdh`**).
4. Choose **Attach**.

If you no longer need the volume, you can detach it from the instance and then delete it.

Importing an image into your device as an Amazon EC2 AMI

You can import a snapshot of your image into your Snowball Edge device and register it as an Amazon EC2 Amazon Machine Image (AMI). A snapshot is basically a copy of your storage volume that you can use to create an AMI or another storage volume. By doing this, you can bring your own image from an external source onto your device and launch it as an Amazon EC2 instance.

Follow these steps to complete the import of your image.

1. Upload your snapshot into an Amazon S3 bucket on your device.
2. Set up the required permissions to grant access to Amazon S3, Amazon EC2, and VM Import/Export, the feature that is used to import and export snapshots.
3. Import the snapshot from the S3 bucket into your device as an image.
4. Register the image as an Amazon EC2 AMI.
5. Launch the AMI as an Amazon EC2 instance.

Note
Be aware of the following limitations when uploading snapshots to Snow Family devices.

- Snow Family devices currently only support importing snapshots that are in the RAW image format.
- Snow Family devices currently only support importing snapshots with sizes from 1 GB to 1 TB.

Step 1: Upload a snapshot into an S3 bucket on your device

You must upload your snapshot to Amazon S3 on your device before you import it. This is because snapshots can only be imported from Amazon S3 available on your device or cluster. During the import process, you choose the S3 bucket on your device to store the image in.

To upload a snapshot to Amazon S3

- To create an S3 bucket, see Creating Amazon S3 Storage.

  To upload a snapshot to an S3 bucket, see Uploading Files to Amazon S3 Storage.

Step 2: Import the snapshot from an S3 bucket

When your snapshot is uploaded to Amazon S3, you can import it to your device. All snapshots that have been imported or are in the process of being imported are shown in **Snapshots** tab.

To import the snapshot to your device

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. All your compute resources appear in the **Resources** section.
3. Choose the **Snapshots** tab to see all the snapshots that have been imported to your device. The image file in Amazon S3 is a .raw file that is imported to your device as a snapshot. You can filter by snapshot ID or the state of the snapshot to find specific snapshots. You can choose a snapshot ID to see details of that snapshot.
4. Choose the snapshot that you want to import, and choose **Import snapshot** to open the **Import snapshot** page.
5. For **Device**, choose the IP address of the Snow Family device that you want to import to.
6. For **Import description** and **Snapshot description**, enter a description for each.
7. In the **Role** list, choose a role to use for the import. Snow Family devices use VM Import/Export to import snapshots. AWS assumes this role and uses it to import the snapshot on your behalf. If you don't have a role configured on your AWS Snowball Edge, open the AWS Identity and Access Management (IAM in AWS OpsHub where you can create a local IAM role. The role also needs a policy that has the required VM Import/Export permissions to perform the import. You must attach this policy to the role. For more details on this please refer to Using IAM Locally.

The following is an example of the policy.

```
{
   "Version":"2012-10-17",
   "Statement":[
      {
         "Effect":"Allow",
         "Principal":{
            "Service":"vmie.amazonaws.com"
         },
         "Action":"sts:AssumeRole"
      }
   ]
}
```

Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.

The role you create should have minimum permissions to access Amazon S3 The following is example of a minimum policy.

```
{
   "Version":"2012-10-17",
   "Statement":[
      {
         "Effect":"Allow",
         "Action":[
            "s3:GetBucketLocation",
            "s3:GetObject",
            "s3:ListBucket",
            "s3:GetMetadata"
         ],
         "Resource":[
            "arn:aws:s3:::import-snapshot-bucket-name",
            "arn:aws:s3:::import-snapshot-bucket-name/*"
         ]
      }
   ]
}
```

8. Choose **Browse S3** and choose the S3 bucket that contains the snapshot that you want to import. Choose the snapshot, and choose **Submit**. The snapshot begins to download onto your device. You can choose the snapshot ID to see the details. You can cancel the import process from this page.

Step 3: Register the snapshot as an Amazon EC2 AMI

The process of creating an Amazon EC2 AMI from an image imported as a snapshot is known as *registering*. Images that are imported to your device must be registered before they can be launched as Amazon EC2 instances.

To register an image imported as a snapshot

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. All your compute resources appear in the **Resources** section.
3. Choose the **Images** tab. You can filter the images by name, ID, or state to find a specific image.
4. Choose the image that you want to register, and choose **Register image**.

5. On the **Register image** page, provide a **Name** and **Description**.
6. For **Root volume**, specify the name of the root device.

   In the **Block device** section, you can change the size of the volume and the volume type.
7. If you want the volume to be deleted when the instance is terminated, choose **Delete on termination**.
8. If you want to add more volumes, choose **Add new volume**.
9. When you are done, choose **Submit**.

Step 4: Launch the Amazon EC2 AMI

- For more information, see Launching an Amazon EC2 instance.

Deleting a snapshot

If you no longer need a snapshot, you can delete it from your device. The image file in Amazon S3 is a .raw file that is imported to your device as a snapshot. If the snapshot that you are deleting is used by an image, it can't be deleted. After import is completed, you can also delete the .raw file that you uploaded to Amazon S3 on your device.

To delete a snapshot

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. All your compute resources appear in the **Resources** section.
3. Choose the **Snapshot** tab to see all snapshots that have been imported. You can filter by snapshot ID or state of the snapshot to find specific snapshots.
4. Choose the snapshot that you want to delete, and choose **Delete**. You can choose multiple snapshots.
5. In the **Delete snapshot confirmation** box, choose **Delete snapshot**. If your deletion is successful, the snapshot is removed from the list under the **Snapshots** tab.

Deregistering an AMI

To deregister an AMI

1. Open the AWS OpsHub application.
2. In the **Start computing** section on the dashboard, choose **Get started**. Or, choose the **Services** menu at the top, and then choose **Compute (EC2)** to open the **Compute** page. All your compute resources appear in the **Resources** section.
3. Choose the **Images** tab. All your images are listed. You can filter the images by name, ID, or state to find a specific image.
4. Choose the image that you want to deregister, and choose **Deregister**.
5. In the confirmation dialog box, confirm the image ID and choose **Deregister image**. When deregistering is successful, the image is removed from the list of images.

Managing an Amazon EC2 cluster

An Amazon EC2 *cluster* is a group of devices that provision together as a cluster of devices. To use a cluster, the AWS services on your device must be running at your default endpoint. You also must choose the specific device in the cluster that you want to talk to. You use a cluster on a per-device basis.

To create an Amazon EC2 cluster

1. Connect and log in to your Snow device. For instructions on how to log in to your device, see Unlocking a device (p. 56).
2. On the **Choose device** page, choose **Snowball Edge cluster**, and then choose **Next**.
3. On the **Connect to your device** page, provide the IP address of the device and the IP addresses of other devices in the cluster.
4. Choose **Add another** device to add more devices, and then choose **Next**.
5. On the **Provide the keys** page, enter the device client unlock code, upload the device manifest, and choose **Unlock device**.

   Snowball Edge devices use 256-bit encryption to help ensure both security and full chain-of-custody for your data.
6. (Optional) Enter a name to create a profile, and then choose **Save profile name**. You are directed to the dashboard, where you see all your clusters.

   You can now start using AWS services and managing your cluster. You manage instances in the cluster the same way you manage individual instances. For instructions, see Managing AWS services on your device (p. 60) or Managing Your Devices (p. 73).

Managing Amazon S3 storage

You can use AWS OpsHub to create and manage Amazon Simple Storage Service (Amazon S3) storage on your Snow Family devices.

Topics

Accessing Amazon S3 Storage

You can upload files to your device and access the files locally. You can physically move them to another location on the device, or import them back to the AWS Cloud when the device is returned.

Snow Family devices use Amazon S3 buckets to store and manage files on your device.

To access an S3 bucket

1. Open the AWS OpsHub application.
2. In the **Manage file storage** section of the dashboard, choose **Get started**.

   If your device has been ordered with the Amazon S3 transfer mechanism, they appear in the **Buckets** section of the **File & object storage** page. On the **File & object storage** page, you can see details of each bucket.

Note
If the device was ordered with the NFS transfer mechanism, the bucket name will appear under the mount points section after NFS service is configure and activated. For more information on using the file interface, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).

Uploading files to Amazon S3 storage

To upload a file

1. In the **Manage file storage** section on the dashboard, choose **Get started**.

   If you have Amazon S3 buckets on your device, they appear in the **Buckets** section on the **File storage** page. You can see details of each bucket on the page.
2. Choose the bucket that you want to upload files into.
3. Choose **Upload files**, or drag and drop the files in the bucket, and choose **OK**.

   Note
   To upload larger files, you can use the multipart upload feature in Amazon S3 using the AWS CLI. For learning more about configuring S3 CLI settings, see CLI S3 Configuration. For information on multipart upload, see Multipart Upload Overview in the *.Amazon Simple Storage Service User Guide*
   Uploading a folder from a local machine to Snowball Edge using the AWS OpsHub is supported. If the folder size is very large, it takes some time to read the file/folder selection. Currently, there is no progress tracker for file reading. However, a progress tracker is displayed once the upload process kicks off.

Downloading files from Amazon S3 storage

To download a file

1. In the **Manage file storage** section of the dashboard, choose **Get started**. If you have S3 buckets on your device, they appear in the **Buckets** section on the **File storage** page. You can see details of each bucket on the page.
2. Choose the bucket that you want to download files from and navigate to the file that you want to download.
3. In the **Actions** menu, choose **Download**.
4. Choose a location to download the file to, and choose **OK**.

Deleting files from Amazon S3 storage

If you no longer need a file, you can delete it from your Amazon S3 bucket.

To delete a file

1. In the **Manage file storage** section of the dashboard, choose **Get started**. If you have Amazon S3 buckets on your device, they appear in the **Buckets** section on the **File storage** page. You can see details of each bucket on the page.
2. Choose the bucket you want to delete files from, and navigate to the file that you want to delete.
3. On the **Actions** menu, choose **Delete**.
4. In the dialog box that appears, choose **Confirm delete**.

Using NFS file shares to manage file storage

You can use AWS OpsHub to upload files to your device and move them to other locations or the AWS Cloud when you return the device, or use AWS DataSync to transfer files.

Topics

You can configure your Snow Family device as an NFS file system and use your native file system to manage files on your device. You can upload files from an on-premises location to your device and then transfer the files to AWS or move them to other locations. You can use the AWS OpsHub defaults to configure NFS automatically or you can configure it manually yourself.

> **Note**
> You can provide CIDR blocks of IP ranges that are allowed to mount the NFS shares exposed by the device. For example, `10.0.0.0/16`. If you don't provide allowed CIDR blocks, all mount requests will be denied.
> Be aware that data transferred through NFS is not encrypted in transit.
> Other than the allowed hosts by CIDR blocks, your Snow Family device doesn't provide any authentication or authorization mechanism for the NFS shares.

> **Note**
> File names are object keys. The name for a key is a sequence of Unicode characters whose UTF-8 encoding is at most 1,024 bytes long. We recommend using NFSv4.1 where possible and encode file names with Unicode UTF-8 to ensure a successful data import. File names that are not encoded with UTF-8 might not be uploaded to S3 or might be uploaded to S3 with a different file name, depending on the NFS encoding that you use.
> Ensure that the maximum length of your file path is less than 1024 characters. Snow Family devices do not support file paths that are greater that 1024 characters. Exceeding this file path length will result in file import errors.
> For more information, see Working with object metadata in the *Amazon Simple Storage Service User Guide*.

Mounting NFS on a Windows client

If your client computer is using Windows 10 Enterprise or Windows 7 Enterprise, you first must start NFS service on Windows before you configure NFS in the AWS OpsHub application.

To mount NFS on a Windows client

1. On your client computer, open **Start**, choose **Control Panel** and choose **Programs**.
2. Choose **Turn Windows features on or off**.
3. Under **Services for NFS**, choose **Client for NFS** and choose **OK**.

Configuring NFS automatically (quick setup)

The NFS service is not running on the device by default so you need to start it to enable data transfer on the device. With a few clicks, your Snow Family device can automatically figure NFS for you, or you can configure it manually yourself.

Note
In Linux, mounting and unmount NFS endpoints requires root permissions.

To start and enable NFS on your Snow Family device automatically

1. In the **Transfer data** section on the dashboard, choose **Enable & start**. This could take a minute or two to complete.
2. When the NFS service is started, the IP address of the NFS server is shown on the dashboard and the **Transfer data** section indicates that the service is active.
3. Choose **Open in Explorer** (in Windows and Linux) to open the file share in your client's file browser and start transferring files from your client to your Snow Family device. You can copy and paste, or drag and drop files from your client computer into the file share. In Windows, your file share looks like the following `buckets(\\12.123.45.679)(Z:)`.

Configuring NFS manually

You can manually configure NFS by providing IP address (VNI) and restrict access to your file share.

To configure NFS manually

1. At the bottom of **Transfer data** section, on the dashboard, choose **Configure manually**.
2. Choose **Enable & start** to open the **Start NFS** wizard. The **Physical network interface** field is populated.
3. Choose **Create IP address (VNI)** or choose **Use existing IP address**.
4. If you choose **Create IP address (VNI)**, then choose **DHCP** or **Static IP** in the **IP Address assignment** list box.

   Important
   If you use a DHCP network, it is possible that the NFS client's IP address could be reassigned by the DCHP server. This can happen after the device has been disconnected and the IP addresses are recycled. If you set an allowed host range and the address of the client changes, another client can pick up that address. In this case, the new client will have access to the share. To prevent this, use DHCP reservations or static IP addresses.

   If you choose **Use existing IP address**, then choose a virtual interface from the **Virtual network interface** list box.
5. **Restrict NFS to allowed hosts** is selected by default. This restricts access to the NFS service to hosts you allow but you can choose **Allow all hosts**. We recommend restricting access. For more information about using NFS, see Using NFS for Offline Data Transfer.
6. In the **Allowed hosts** text box, provide the CIDR blocks of hosts that you want to allow to connect to the NFS service. For example, `10.0.0.0/16`.
7. Choose **Add allowed host** to add more hosts to allow.
8. Choose **Start NFS**. It could take about a minute or two to start. NFS uses 1 GB of ram and one of your CPUs. This limits the number of instances available.

   Important
   Don't turn off your device while the service is starting.
9. From the **Network File System (NFS) resource** section, the **State** of the NFS service shows as **Active**. Use the copy icon to copy the IP address of the NFS service. You will need this IP address for connect your NFS service when are ready to transfer files.
10. In the **Mount paths** box, you can filter and look for your endpoints.
11. For **Endpoint name**, choose an endpoint from the list, and choose **Mount NFS endpoint**. In Linux, mounting and unmount NFS endpoints requires root permissions. This endpoint is configured

with the S3 bucket you specified when you ordered the device. The endpoint is shown under **NFS endpoints**. The endpoint is configured as an NFS file and shares. It appears as a drive letter and you can use your native operating system to drag and drop files onto and out of your device.

The following are the default mount options:

- Windows: `mount -o nolock rsize=128 wsize=128 mtype=hard ipaddress:/buckets/BucketName *`
- Linux: `mount -t nfs ipaddress:/buckets/BucketName mount_point`
- macOS: `mount -t nfs -o vers=3,rsize=131072,wsize=131072,nolocks,hard,retrans=2 ipaddress:/buckets/$bucketname mount_point`

12. Choose the icon next to the drive letter to open the file share in your client's file browser. Then start transferring files from your client to your Snow Family device. You can copy and paste, or drag and drop files from your client computer into the file share. In Windows, your file share looks like the following: `buckets(\\12.123.45.679)(Z:)`

Stopping data transfer

To stop data transfer

1. From the dashboard, choose **Services** and then choose **File Storage**.
2. On the **File Storage** page, choose **Disable data transfer**. It usually takes up to 2 minutes for the NFS endpoints to disappear from the dashboard.

Using AWS IoT Greengrass to run pre-installed software on Amazon EC2 instances

AWS IoT Greengrass is an open source Internet of Things (IoT) edge runtime and cloud service that helps you build, deploy, and manage IoT applications on your devices. You can use AWS IoT Greengrass to build software that enables your devices to act locally on the data that they generate, run predictions based on machine learning models, and filter and aggregate device data. For detailed information about AWS IoT Greengrass, see What is AWS IoT Greengrass? in the *AWS IoT Greengrass Version 2 Developer Guide*.

By using AWS IoT Greengrass on your Snow Family device, you enable the device to collect and analyze data closer to where it is generated, react autonomously to local events, and communicate securely with other devices on the local network.

Setting up your Amazon EC2 instance

Note
To install AWS IoT Greengrass Version 2 on a Snow Family device, make sure that your device is connected to the internet. After installation, the internet is not required for a Snow Family device to work with AWS IoT Greengrass.

To set up an EC2 instance for AWS IoT Greengrass V2

1. On the AWS OpsHub dashboard, in the **Start Green Grass** section, choose **Get Started**.

2. Choose **Launch instance**.
3. Configure the instance with the settings that you want. The instance should have a public IP address and an SSH key.
4. Choose **Launch** in the launch instance window to launch the instance.
5. Open the Amazon EC2 console, and choose the **Instance** tab. Choose the instance and verify that it's running.

   Take note of the public IP address and SSH key name that are associated with the instance.
6. Connect to the EC2 instance using SSH. To do so, run the following command on the computer that is connected to your device. Replace *ssh-key* with the key you used to launch the EC2 instance. Replace *public-ip-address* with the public IP address of the EC2 instance.

```
ssh -i ssh-key ec2-user@ public-ip-address
```

Important
If your computer uses an earlier version of Microsoft Windows, you might not have the SSH command, or you might have SSH but can't connect to your EC2 instance. To connect to your EC2 instance, you can install and configure PuTTY, which is a no-cost, open source SSH client. You must convert the SSH key from `.pem` format to PuTTY format and connect to your EC2 instance. For instructions on how to convert from `.pem` to PuTTY format, see the PuTTY documentation.

Installing AWS IoT Greengrass

Next, you set up your EC2 instance as an AWS IoT Greengrass Core device that you can use for local development.

To install AWS IoT Greengrass

1. Use the following command to install the prerequisite software for AWS IoT Greengrass. This command installs the AWS Command Line Interface (AWS CLI) v2, Python 3, and Java 8.

```
curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awscliv2.zip" &&
 unzip awscliv2.zip &&sudo ./aws/install && sudo yum -y install python3 java-1.8.0-
openjdk
```

2. Grant the root user permission to run the AWS IoT Greengrass software and modify the root permission from `root ALL=(ALL) ALL` to `root ALL=(ALL:ALL) ALL` in the sudoers config file.

```
sudo sed -in 's/root\tALL=(ALL)/root\tALL=(ALL:ALL)/' /etc/sudoers
```

3. Use the following command to download the AWS IoT Greengrass Core software.

```
curl -s https://d2s8p88vqu9w66.cloudfront.net/releases/greengrass-nucleus-latest.zip >
 greengrass-nucleus-latest.zip && unzip greengrass-nucleus-latest.zip -d GreengrassCore
  && rm greengrass-nucleus-latest.zip
```

4. Install and configure the AWS IoT Greengrass Core software. For instructions, see Getting started with AWS IoT Greengrass V2 in the *AWS IoT Greengrass Developer Guide*.

   Skip steps 1–3 and start with step 4. Steps 1–3 are not needed.

When you are finished, you will have an AWS IoT Greengrass core running on your Snow Family device for your local use.

Managing Your Devices

You use the AWS OpsHub to manage your Snow Family devices. On the **Device details** page, you can perform the same tasks that you do using the AWS CLI, including changing the alias of your device, rebooting the device, and checking for updates.

Topics

Rebooting your device

Follow these steps to use AWS OpsHub to reboot your Snow device.

> **Important**
> We highly recommend that you suspend all activities on the device before you reboot the device. Rebooting a device stops running instances, interrupts any writing to Amazon S3 buckets on the device, and stops any write operations from the file interface without clearing the cache.

To reboot a device

1. On the AWS OpsHub dashboard, find your device under **Devices**. Then choose the device to open the device details page.
2. Choose the **Device Power** menu, then choose **Reboot**. A dialog box appears.
3. In the dialog box, choose **Reboot**. Your device starts to reboot.

Shutting down your device

Follow these steps to use AWS OpsHub to shut down your Snow device.

> **Important**
> We highly recommend that you suspend all activities on the device before you shut down the device. Shutting down a device stops running instances, interrupts any writing to Amazon S3 buckets on the device, and stops any write operations from the file interface without clearing the cache.

To shut down a device

1. On the AWS OpsHub dashboard, find your device under **Devices**. Then choose the device to open the device details page.
2. Choose the **Device Power** menu, then choose **Shutdown**. A dialog box appears.
3. In the dialog box, choose **Shutdown**. Your device starts to shut down.

Editing Your Device Alias

Use these steps to edit your device alias using AWS OpsHub.

To edit your device's alias

1. On the AWS OpsHub dashboard, find your device under **Devices**. Choose the device to open the device details page.
2. Choose the **Edit device alias** tab.
3. For **Device alias**, enter a new name, and choose **Save alias**.

Getting Updates for Your Device and the AWS OpsHub Application

You can check for updates for your device and install them. You can also configure AWS OpsHub to automatically update the application to the latest version.

Updating your device

Follow these steps to use AWS OpsHub to update your Snow device.

To update your device

1. On the AWS OpsHub dashboard, find your device under **Devices**. Choose the device to open the device details page.
2. Choose the **Check for updates** tab.

   The **Check for updates** page displays the current software version on your device and the latest software version, if there is one.
3. If there is an update, choose **Update**. Otherwise, choose **Close**.

Updating your AWS OpsHub application

AWS OpsHub automatically updates the application to the latest version. Follow these steps to verify that automatic update is enabled.

To verify that automatic updates are enabled for AWS OpsHub

1. On the AWS OpsHub dashboard, choose **Preferences**.
2. Open the **Updates** tab.
3. Verify that **Automatic updates enabled** is selected. Automatic update is enabled by default.

   If **Automatic updates enabled** is not selected, you will not get the latest version of the AWS OpsHub application.

Managing Profiles

A *profile* is a persistent storage of your credentials on your local file system. You can create a profile when you first unlock your device, or you can create one after your device is running. You can create new profiles, edit existing profiles, or delete them.

To create a profile

1. In the upper-right corner of the application, choose your name, and then choose **Manage profile**.

2. On the **Manage profiles** page, choose **Create profile**. You create a profile for each device.

   If your device is locked, see Unlocking a device (p. 56) for instructions.
3. Provide the name for the profile, the IP address of your device, and the unlock code.
4. Choose **Upload**, upload the manifest, and then choose **Create device**.

   You now have a new profile for your device. You use this profile to log in to the device.

To edit a profile

1. In the upper-right corner of the application, choose your name, and then choose **Manage profile**.

   All your profiles appear on the page.
2. On the **Manage profiles** page, choose the profile that you want to edit.
3. On the next page, choose **Edit**. Make the changes that you want for your device, and choose **Save device**.

To delete a profile

1. In the upper-right corner of the application, choose your name, and then choose **Manage profile**.

   All your profiles appear on the page.
2. Choose the profile that you want to delete, and choose **Delete profile**.

Automating Your Management Tasks

You can use AWS OpsHub to automate operational tasks that you perform frequently on your Snow Family devices. You can create a task for reoccurring actions that you might want to perform on resources, such as restarting virtual servers, stopping Amazon EC2 instances, and so on. You provide an automation document that safely performs operational tasks and runs the operation on AWS resources in bulk. You can also schedule common IT workflows.

> **Note**
> Automating tasks is not supported on clusters.
> To use tasks, the Amazon EC2 Systems Manager service must be started first. To start a service on your Snowball Edge, see Starting a Service on Your Snowball Edge (p. 86).

Topics

Creating and Starting a Task

When you create a task, you specify the types of resources that the task should run on, and then provide a task document that contains the instructions that run the task. The task document is either in YAML or JSON format. You then provide the required parameters for the task and start the task.

To create a task

1. In the **Launch tasks** section of the dashboard, choose **Get started** to open the **Tasks** page. If you have created tasks, they appear under **Tasks**.

2. Choose **Create task** and provide details for the task.
3. For **Name**, enter a unique name for the task.

   Tip
   The name must be between 3 and 128 characters. Valid characters are `a-z`, `A-Z`, `0-9`, `.`, `_`, and `-`.
4. Optionally, you can choose a target type from the **Target type-optional** list. This is the type of resource that you want the task to run on.

   For example, you can specify **`/AWS::EC2::Instance`** for the tasks to run on an Amazon EC2 instance or **`/`** to run on all resource types.
5. In the **Content** section, choose **YAML** or **JSON**, and provide the script that performs the task. You have two options, YAML or JSON format. For examples, see Task Examples (p. 76).
6. Choose **Create**. The task that you created then appears on the **Tasks** page.

To start a task

1. In the **Launch tasks** section of the dashboard, choose **Get started** to open the **Tasks** page. Your tasks appear under **Tasks**.
2. Choose your task to open the **Start task** page.
3. Choose **Simple execution** to run on targets.

   Choose **Rate control** to run safely on multiple targets and define concurrency and error thresholds. For this option, you provide the additional target and error threshold information in the **Rate control** section.
4. Provide the required input parameters, and choose **Start task**.

   The status of the task is **Pending**, and changes to **Success** when the task has run successfully.

Task Examples

The following example restarts an Amazon EC2 instance. It requires two input parameters: `endpoint` and `instance ID`.

YAML example

```
description: Restart EC2 instance
schemaVersion: '0.3'
parameters:
  Endpoint:
    type: String
    description: (Required) EC2 Service Endpoint URL
  Id:
    type: String
    description: (Required) Instance Id
mainSteps:
  - name: restartInstance
    action: aws:executeScript
    description: Restart EC2 instance step
    inputs:
      Runtime: python3.7
      Handler: restart_instance
      InputPayload:
        Endpoint: "{{ Endpoint }}"
        Id: "{{ Id }}"
```

```
      TimeoutSeconds: 30
      Script: |-
        import boto3
        import time
        def restart_instance(payload, context):
            ec2_endpoint = payload['Endpoint']
            instance_id = payload['Id']
            ec2 = boto3.resource('ec2', endpoint_url=ec2_endpoint)
            instance = ec2.Instance(instance_id)
            if instance.state['Name'] != 'stopped':
                instance.stop()
                instance.wait_until_stopped()
            instance.start()
            instance.wait_until_running()
            return {'InstanceState': instance.state}
```

JSON example

```
{
  "description" : "Restart EC2 instance",
  "schemaVersion" : "0.3",
  "parameters" : {
    "Endpoint" : {
      "type" : "String",
      "description" : "(Required) EC2 Service Endpoint URL"
    },
    "Id" : {
      "type" : "String",
      "description" : "(Required) Instance Id"
    }
  },
  "mainSteps" : [ {
    "name" : "restartInstance",
    "action" : "aws:executeScript",
    "description" : "Restart EC2 instance step",
    "inputs" : {
      "Runtime" : "python3.7",
      "Handler" : "restart_instance",
      "InputPayload" : {
        "Endpoint" : "{{ Endpoint }}",
        "Id" : "{{ Id }}"
      },
      "TimeoutSeconds" : 30,
      "Script" : "import boto3\nimport time\ndef restart_instance(payload, context):\n
            ec2_endpoint = payload['Endpoint']\n    instance_id = payload['Id']\n
            ec2 = boto3.resource('ec2', endpoint_url=ec2_endpoint)\n
            instance = ec2.Instance(instance_id)\n
            if instance.state['Name'] != 'stopped':\n
            instance.stop()\n
            instance.wait_until_stopped()\n
            instance.start()\n
            instance.wait_until_running()\n
            return {'InstanceState': instance.state}"
    }
  } ]
}
```

Viewing Details of a Task

You can view details of a management task, such as the description and the parameters that are required to run the task.

To view details of a task

1. In the **Launch tasks** section of the dashboard, choose **Get started** to open the **Tasks** page.
2. On the **Tasks** page, locate and choose the task that you want to see details of.
3. Choose **View details**, and choose one of the tabs to see the details. For example, the **Parameters** tab shows you the input parameters in the script.

Deleting a Task

Follow these steps to delete a management task.

To delete a task

1. In the **Launch tasks** section of the dashboard, choose **Get started** to open the **Tasks** page.
2. Locate the task that you want to delete. Choose the task, and then choose **Delete**.

Setting the NTP time servers for your device

Follow these steps to view and update which time servers your device must synchronize time with.

To check time sources

1. On the AWS OpsHub dashboard, find your device under **Devices**. Choose the device to open the device details page.
2. You will see a list of time sources that your device is synchronizing time with in the **Time sources** table.

   The T**ime sources** table has four columns:

   - **Address**: The DNS name / IP address of the time source
   - **State**: The current connection status between the device and that time source, there are 5 possible states:
     - **CURRENT**: Time source is currently being used to synchronize time
     - **COMBINED**: Time source is combined with the current source
     - **EXCLUDED**: Time source is excluded by the combining algorithm
     - **LOST**: Connection with the time source has been lost
     - **UNAVAILABILITY**: An invalid time source where the combining algorithm has deemed to be either a falseticker or has too much variability
   - **Type**: Network Time Protocol (NTP) sources can be a server or peer. A server can be set by the user using the **update-time-server** command, whereas a peer can only be set up using other Snowball Edge devices in the cluster and are automatically set up when the cluster is associated.
   - **Stratum**: The stratum of the source. **Stratum 1** indicates a source with a locally attached reference clock. A source that is synchronized to a Stratum 1 source is set at **Stratum 2**. A source that is synchronized to a stratum 2 source is set at **Stratum 3**, and so on.

To update the time servers

1. On the AWS OpsHub dashboard, find your device under **Devices**. Choose the device to open the device details page.

2. You will see a list of time sources that your device is synchronizing time with in the **Time sources** table.
3. Choose **Update time servers** on the **Time sources** table.
4. Provide the DNS name or the IP address of the time servers you would like your device to synchronize time with, and choose **Update**.

Supported NTP device types and software versions

NTP isn't available on any version 2 storage and compute device types. Snowball Edge version 3 storage and compute device types with software version 77 or later support NTP, however. To check if NTP is enabled, use the Snowball Edge CLI command `describe-time-sources`.

Using an AWS Snowball Edge Device

Following, you can find an overview of the AWS Snowball Edge device. Snowball Edge is a physically rugged device protected by AWS Key Management Service (AWS KMS) that you use for local storage and compute, or to transfer data between your on-premises servers and Amazon Simple Storage Service (Amazon S3).

For information about unlocking an AWS Snowball Edge device, see Using the Snowball Edge Client (p. 81).

When the device first arrives, inspect it for damage or obvious tampering.

> **Warning**
> If you notice anything that looks suspicious about the device, don't connect it to your internal network. Instead, contact AWS Support, and a new one will be shipped to you.

The following image shows what the AWS Snowball Edge device looks like.

The device has three doors—a front, a back, and a top—that all can be opened by latches. The top door contains the power cable for the device. The other two doors can be opened and slid inside the device so that they're out of the way while you're using it. By opening the doors, you get access to the LCD E Ink display embedded in the front side of the device, and the power and network ports in the back.

After your device arrives and is powered on, you're ready to use it.

Topics

Using the Snowball Edge Client

Following, you can find information about how to get and use the Snowball Edge client with your AWS Snowball Edge device. The Snowball Edge client is a standalone terminal application that you run on your local server to unlock the device and get credentials, logs, and status information. You can also use the client for administrative tasks for a cluster. While using the Snowball Edge client, you can get additional support information by running the `snowballEdge help` command.

When you read and write data to the AWS Snowball Edge device, you use the Amazon S3 interface or the file interface.

> **Note**
> In January 2018, there was a feature update for clusters, making them leaderless. The cluster update is backward-compatible with older clusters.

Downloading and Installing the Snowball Edge Client

You can download and install the Snowball Edge client from AWS Snowball resources.

You can download and install the Snowball Edge client from AWS Snowball Edge Resources. On that page, you can find the installation package for your operating system. Follow the instructions to install the Snowball Edge client. Running the Snowball Edge client from a terminal in your workstation might require using a specific path, depending on your operating system:

- **Microsoft Windows** – When the client has been installed, you can run it from any directory without any additional preparation.
- **Linux** – The Snowball Edge client must be run from the `~/snowball-client-linux-`*`build_number`*`/bin/` directory. The Snowball Edge client is only supported on 64-bit Linux distributions.
- **macOS** – The `install.sh` script copies folders from the Snowball Edge client .tar file to the `/usr/local/bin/snowball` directory. If you run this script, you can then run the Snowball Edge client from any directory if `/usr/local/bin` is a path in your `bash_profile`. You can verify your path using the `echo $PATH` command.

Commands for the Snowball Edge Client

Following, you can find information on the Snowball Edge client commands, including examples of use and sample outputs.

Topics

Configuring a Profile for the Snowball Edge Client

Every time you run a command for the Snowball Edge client, you provide your manifest file, unlock code, and an IP address. You can get the first two of these from the AWS Snow Family Management Console or the job management API. For more information about getting your manifest and unlock code, see Getting Credentials (p. 86).

You have the option of using the `snowballEdge configure` command to store the path to the manifest, the 29-character unlock code, and the endpoint as a profile. After configuration, you can use other Snowball Edge client commands without having to manually enter these values for a particular job. After you configure the Snowball Edge client, the information is saved in a plaintext JSON format to *`home directory`*`/.aws/snowball/config/snowball-edge.config`.

The endpoint is the IP address, with `https://` added to it. You can locate the IP address for the AWS Snowball Edge device on the AWS Snowball Edge device LCD display. When the AWS Snowball Edge device is connected to your network for the first time, it automatically gets a DHCP IP address, if a DHCP server is available. If you want to use a different IP address, you can change it from the LCD display. For more information, see Using an AWS Snowball Edge Device (p. 80).

> **Important**
> Anyone who can access the configuration file can access the data on your Snowball Edge devices or clusters. Managing local access control for this file is one of your administrative responsibilities.

Usage

You can use this command in two ways: inline, or when prompted. This usage example shows the prompted method.

```
snowballEdge configure
```

Example Output

```
Configuration will stored at home directory\.aws\snowball\config\snowball-edge.config
Snowball Edge Manifest Path: /Path/to/manifest/file
Unlock Code: 29 character unlock code
Default Endpoint: https://192.0.2.0
```

You can have multiple profiles if you have multiple jobs at once, or if you want the option of managing a cluster from different endpoints. For more information about multiple AWS CLI profiles, see Named profiles in the *AWS Command Line Interface User Guide*.

Getting Your QR Code for NFC Validation

You can use this command to generate a device-specific QR code for use with the AWS Snowball Edge Verification App. You can download this app from the Apple App Store or the Google Play store. For more information about NFC validation, see Validating NFC Tags (p. 234).

Usage

```
snowballEdge get-app-qr-code --output-file ~/downloads/snowball-qr-code.png
```

Example Output

```
QR code is saved to ~/downloads/snowball-qr-code.png
```

Unlocking Snowball Edge Devices

To unlock a standalone AWS Snowball Edge device, run the `snowballEdge unlock-device` command. To unlock a cluster, use the `snowballEdge unlock-cluster` command. These commands authenticate your access to the AWS Snowball Edge device.

> **Note**
> To unlock the devices associated with your job, the devices must be on-site, plugged into power and the network, and turned on. In addition, the LCD display on the front of the AWS Snowball Edge device must indicate that the device is ready for use.

Usage (configured Snowball Edge client)

```
snowballEdge unlock-device
```

Example Single Device Unlock Input

```
snowballEdge unlock-device
```

Example Single Device Unlock Output

```
Your Snowball Edge device is unlocking. You may determine the unlock state of your device
 using the describe-device command. Your Snowball Edge device will be available for use
 when it is in the UNLOCKED state.
```

Cluster Usage

When you unlock a cluster, you provide the endpoint for one of your nodes, and all the IP addresses for the other devices in your cluster.

```
snowballEdge unlock-cluster --endpoint https://192.0.2.0 --manifest-file Path/to/manifest/
file --unlock-code 01234-abcde-ABCDE-01234 --device-ip-addresses 192.0.2.0 192.0.2.1
 192.0.2.2 192.0.2.3 192.0.2.4
```

Example Cluster Unlock Output

```
Your Snowball Edge Cluster is unlocking. You may determine the unlock state of your cluster
 using the describe-device command. Your Snowball Edge Cluster will be available for use
 when your Snowball Edge devices are in the UNLOCKED state.
```

Updating a Snowball Edge

Use the following commands to download and install updates for your Snowball Edge device. For procedures that use these commands, see Updating Software on an AWS Snowball Edge (p. 219).

`snowballEdge check-for-updates` – Returns version information about the Snowball Edge software available in the cloud, and the current version installed on the device.

Usage (configured Snowball Edge client)

```
snowballEdge check-for-updates
```

Example Output

```
Latest version: 102
Installed version: 101
```

`snowballEdge describe-device-software` – Returns the current software version for the device. Additionally, if the update is being downloaded, the download state is also displayed. If a software update is in progress, the version manifest of update, and state of installation is also displayed. Following is a list of possible outputs:

- NA – No software updates are currently in progress.
- `Downloading` – New software is being downloaded.
- `Installing` – New software is being installed.
- `Requires Reboot` – New software has been installed, and the device needs to be restarted.

  Warning
  We highly recommend that you suspend all activity on the device before you restart the device. Restarting a device stops running instances, interrupts any writing to Amazon S3 buckets on the device, and stops any write operations from the file interface without clearing the cache. All of these processes can result in lost data.

Usage (configured Snowball Edge client)

```
snowballEdge describe-device-software
```

Example Output

```
Installed version: 101
Installing version: 102
Install State: Downloading
```

`snowballEdge download-updates` – Starts downloading the latest software updates for your Snowball Edge.

Usage (configured Snowball Edge client)

```
snowballEdge download-updates
```

Example Output

```
Download started. Run describe-device-software API for additional information.
```

`snowballEdge install-updates` – Starts installing the latest software updates for your Snowball Edge that were already downloaded.

Usage (configured Snowball Edge client)

```
snowballEdge install-updates
```

Example Output

```
Installation started.
```

`snowballEdge reboot-device` – Reboots the device.

> **Warning**
> We highly recommend that you suspend all activity on the device before you restart the device. Restarting a device stops running instances, interrupts any writing to Amazon S3 buckets on the device, and stops any write operations from the file interface without clearing the cache. All of these processes can result in lost data.

Usage (configured Snowball Edge client)

```
snowballEdge reboot-device
```

Example Output

```
Rebooting device now.
```

`snowballEdge configure-auto-update-strategies` – Configures an automatic update strategy.

Usage (configured Snowball Edge client)

```
snowballEdge configure-auto-update-strategy --auto-check autoCheck [--auto-check-frequency
autoCheckFreq] --auto-download autoDownload
[--auto-download-frequency autoDownloadFreq]
--auto-install autoInstall
[--auto-install-frequency autoInstallFreq]
--auto-reboot autoReboot [--endpoint
endpoint]
```

Example Output

```
Successfully configured auto update strategy. Run describe-auto-update-strategies for
 additional information.
```

`snowballEdge describe-auto-update-strategies` – Returns any currently configured automatic update strategy.

Usage (configured Snowball Edge client)

```
snowballEdge describe-auto-update-strategies
```

Example Output

```
auto-update-strategy {[
auto-check:true,
auto-check-frequency: "0 0 * * FRI", // CRON Expression String, Every Friday at midnight
auto-download:true,
auto-download-frequency: "0 0 * * SAT", // CRON Expression String, Every Saturday at
midnight
auto-install:true,
auto-install-frequency: "0 13 * * Sun", // CRON Expression String, Every Saturday at
midnight
auto-reboot: false;
]}
```

Getting Credentials

Using the `snowballEdge list-access-keys` and `snowballEdge get-secret-access-key` commands, you can get the credentials of the admin user of your AWS account on Snowball Edge. You can use these credentials to create AWS Identity and Access Management (IAM) users and roles, and to authenticate your requests when using the AWS CLI or with an AWS SDK. These credentials are only associated with an individual job for Snowball Edge, and you can use them only on the device or cluster of devices. The device or devices don't have any IAM permissions in the AWS Cloud.

> **Note**
> If you're using the AWS CLI with the Snowball Edge, you must use these credentials when you configure the CLI. For information about configuring credentials for the AWS CLI, see Configuring the AWS CLI in the *AWS Command Line Interface User Guide*.

Usage (configured Snowball Edge client)

```
snowballEdge list-access-keys
```

Example Output

```
{
  "AccessKeyIds" : [ "AKIAIOSFODNN7EXAMPLE" ]
}
```

Usage (configured Snowball Edge client)

```
snowballEdge get-secret-access-key --access-key-id Access Key
```

Example Output

```
[snowballEdge]
aws_access_key_id = AKIAIOSFODNN7EXAMPLE
aws_secret_access_key = wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
```

Starting a Service on Your Snowball Edge

Snowball Edge devices support multiple services, in addition to Amazon S3. These include compute instances, the file interface, and AWS IoT Greengrass. Amazon S3 and Amazon EC2 are always on by

default, and can't be stopped or restarted with the Snowball Edge client. However, the file interface and AWS IoT Greengrass can be started with the `snowballEdge start-service` command. To get the service ID for each service, you can use the `snowballEdge list-services` command.

Before you run this command, create a single virtual network interface to bind to the service that you're starting. For more information, see Creating a Virtual Network Interface (p. 154).

Usage (configured Snowball Edge client)

```
snowballEdge start-service --service-id service_id --virtual-network-interface-
arns virtual-network-interface-arn
```

Example Output

```
Starting the AWS service on your Snowball Edge. You can determine the status of the AWS
 service using the describe-service command.
```

Stopping a Service on Your Snowball Edge

To stop a service running on your Snowball Edge, you can use the `snowballEdge stop-service` command.

The Amazon S3, Amazon EC2, AWS STS, and IAM services cannot be stopped.

> **Warning**
> Data loss can occur if the file interface is stopped before remaining buffered data is written to the device. For more information on using the file interface, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).

Usage (configured Snowball Edge client)

```
snowballEdge stop-service --service-id service_id
```

Example Output

```
Stopping the AWS service on your Snowball Edge. You can determine the status of the AWS
 service using the describe-service command.
```

Getting Your Certificate for Transferring Data

To transfer data to a Snowball Edge, use the Amazon S3 interface. To use the S3 interface over the HTTPS protocol, you must provide a certificate. The certificates are generated by each Snowball Edge device. If you unlock your Snowball Edge device with a different IP address, a new certificate is generated and the old certificate is no longer valid to use with the endpoint. You can get the new, updated certificate from the Snowball Edge again using the `get-certificate` command.

You can list these certificates and download them from your Snowball Edge device with the following commands:

- `list-certificates` – Lists the Amazon Resource Names (ARNs) for the certificates available for use.

  Usage (configured Snowball Edge client)

  ```
  snowballEdge list-certificates
  ```

Example Output

```
{
  "Certificates" : [ {
    "CertificateArn" : "arn:aws:snowball-
device:::certificate/78EXAMPLE516EXAMPLEf538EXAMPLEa7",
    "SubjectAlternativeNames" : [ "192.0.2.0" ]
  } ]
}
```

- `get-certificate` – Gets a specific certificate, based on the ARN provided.

  Usage (configured Snowball Edge client)

```
snowballEdge get-certificate --certificate-arn arn:aws:snowball-
device:::certificate/78EXAMPLE516EXAMPLEf538EXAMPLEa7
```

  Example Output

```
-----BEGIN CERTIFICATE-----
Certificate
-----END CERTIFICATE-----
```

  For information about configuring your certificate, see Specifying the S3 Interface as the AWS CLI Endpoint (p. 100).

Starting NFS and Restricting Access

Important
Don't start the NFS service if you intend to use Amazon Elastic Block Store (Amazon EBS). The first time NFS is started, all storage is allocated to NFS. It is not possible to reallocate NFS storage to Amazon EBS, even if the NFS service is stopped.

Note
You can provide CIDR blocks for IP ranges that are allowed to mount the NFS shares exposed by the device. For example, `10.0.0.0/16`. If you don't provide allowed CIDR blocks, all mount requests will be denied.
Be aware that data transferred through NFS is not encrypted in transit.
Other than the allowed hosts by CIDR blocks, Snowcone doesn't provide an authentication or authorization mechanism for the NFS shares.

Start NFS with the `snowballEdge start-service` command. To get the service ID for the NFS service, you can use the `snowballEdge list-services` command.

Before you run this command, create a single virtual network interface to bind to the service that you're starting. For more information, see Creating a Virtual Network Interface. You can restrict access to your file shares and data in your Amazon S3 buckets and see what restrictions are currently in place. You do this by allocating CIDR blocks for allowed hosts that can access your file share and S3 buckets when you start the NFS service.

Usage (configured Snowball Edge client)

```
snowballEdge start-service --service-id nfs --virtual-network-interface-arns
 arn:aws:snowball-device:::interface/s.ni-12345fgh45678j --service-configuration
 AllowedHosts=ip address-1/32,ip address-2/24
```

Example Example Output

```
Starting the service on your Snowball Edge. You can determine the status of the service
 using the describe-service command.
```

Restricting Access to NFS Shares When NFS is Running

You can restrict access your file shares and data in your Amazon S3 buckets after you have started NFS. You can see what restrictions are currently in place, and give each bucket different access restrictions. You do this by allocating CIDR blocks for hosts that can access your file share and S3 buckets when you start the NFS service. The following is an example command.

Usage (configured Snowball Edge client)

```
snowballEdge start-service \
    --service-id nfs \
    --virtual-network-interface-arns virtual-network-interface-arn --service-configuration
 AllowedHosts=ip-address-1/32,ip-address-1/24
```

To see the current restrictions, use the `describe-service` command.

```
snowballEdge describe-service --service-id nfs
```

AWS Snowball Edge Logs

When you transfer data between your on-premises data center and a Snowball Edge, logs are automatically generated. If you encounter unexpected errors during data transfer to the device, you can use the following commands to save a copy of the logs to your local server.

There are three commands related to logs:

- `list-logs` – Returns a list of logs in JSON format. This list reports the size of the logs in bytes, the ARN for the logs, the service ID for the logs, and the type of logs.

  Usage (configured Snowball Edge client)

  ```
  snowballEdge list-logs
  ```

  Example Output

  ```
  {
    "Logs" : [ {
      "LogArn" : "arn:aws:snowball-device:::log/s3-storage-JIEXAMPLE2f-1234-4953-a7c4-
  dfEXAMPLE709",
      "LogType" : "SUPPORT",
      "ServiceId" : "s3",
      "EstimatedSizeBytes" : 53132614
    }, {
      "LogArn" : "arn:aws:snowball-device:::log/fileinterface-JIDEXAMPLEf-1234-4953-a7c4-
  dfEXAMPLE709",
      "LogType" : "CUSTOMER",
      "ServiceId" : "fileinterface",
      "EstimatedSizeBytes" : 4446
    }]
  }
  ```

- `get-log` – Downloads a copy of a specific log from the Snowball Edge to your server at a specified path. CUSTOMER logs are saved in the `.zip` format, and you can extract this type of log to view its contents. SUPPORT logs are encrypted and can only be read by AWS Support engineers. You have the option of specifying a name and a path for the log.

  Usage (configured Snowball Edge client)

```
snowballEdge get-log --log-arn arn:aws:snowball-device:::log/fileinterface-
JIDEXAMPLEf-1234-4953-a7c4-dfEXAMPLE709
```

  Example Output

```
Logs are being saved to download/path/snowball-edge-logs-1515EXAMPLE88.bin
```

- `get-support-logs` – Downloads a copy of all the SUPPORT type of logs from the Snowball Edge to your service at a specified path.

  Usage (configured Snowball Edge client)

  Snowball Edge client

```
snowballEdge get-support-logs
```

  Example Output

```
Logs are being saved to download/path/snowball-edge-logs-1515716135711.bin
```

  Important
  CUSTOMER type might contain sensitive information about your own data. To protect this potentially sensitive information, we strongly suggest that you delete these logs once you're done with them.

Getting Device Status

You can determine the status and general health of your Snowball Edge devices with the following Snowball Edge client commands:

- `describe-device`

  Usage (configured Snowball Edge client)

```
snowballEdge describe-device
```

  Example Output

```
{
  "DeviceId" : "JID-EXAMPLE12345-123-456-7-890",
  "UnlockStatus" : {
    "State" : "UNLOCKED"
  },
  "ActiveNetworkInterface" : {
    "IpAddress" : "192.0.2.0"
  },
  "PhysicalNetworkInterfaces" : [ {
    "PhysicalNetworkInterfaceId" : "s.ni-EXAMPLEd9ecbf03e3",
```

```
    "PhysicalConnectorType" : "RJ45",
    "IpAddressAssignment" : "STATIC",
    "IpAddress" : "0.0.0.0",
    "Netmask" : "0.0.0.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "EX:AM:PL:E0:12:34"
  }, {
    "PhysicalNetworkInterfaceId" : "s.ni-EXAMPLE4c3840068f",
    "PhysicalConnectorType" : "QSFP",
    "IpAddressAssignment" : "STATIC",
    "IpAddress" : "0.0.0.0",
    "Netmask" : "0.0.0.0",
    "DefaultGateway" : "192.0.2.2",
    "MacAddress" : "EX:AM:PL:E0:56:78"
  }, {
    "PhysicalNetworkInterfaceId" : "s.ni-EXAMPLE0a3a6499fd",
    "PhysicalConnectorType" : "SFP_PLUS",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.168.1.231",
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.3",
    "MacAddress" : "EX:AM:PL:E0:90:12"
  } ]
}
```

- `describe-cluster`

  Usage (configured Snowball Edge client)

```
snowballEdge describe-cluster
```

  Example Output

```
{
  "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5",
  "Devices" : [ {
    "DeviceId" : "JIDEXAMPLE2-bc53-4618-a538-917EXAMPLE94",
    "UnlockStatus" : {
      "State" : "UNLOCKED"
    },
    "ActiveNetworkInterface" : {
      "IpAddress" : "192.0.2.0"
    },
    "ClusterAssociation" : {
      "State" : "ASSOCIATED",
      "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5"
    },
    "NetworkReachability" : {
      "State" : "REACHABLE"
    }
  }, {
    "DeviceId" : "JIDEXAMPLE2-bc53-4618-a538-917EXAMPLE94",
    "UnlockStatus" : {
      "State" : "UNLOCKED"
    },
    "ActiveNetworkInterface" : {
      "IpAddress" : "192.0.2.1"
    },
    "ClusterAssociation" : {
      "State" : "ASSOCIATED",
      "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5"
    },
    "NetworkReachability" : {
```

```
      "State" : "REACHABLE"
    }
  }, {
    "DeviceId" : "JIDEXAMPLE2-bc53-4618-a538-917EXAMPLE94",
    "UnlockStatus" : {
      "State" : "UNLOCKED"
    },
    "ActiveNetworkInterface" : {
      "IpAddress" : "192.0.2.2"
    },
    "ClusterAssociation" : {
      "State" : "ASSOCIATED",
      "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5"
    },
    "NetworkReachability" : {
      "State" : "REACHABLE"
    }
  }, {
    "DeviceId" : "JIDEXAMPLE2-bc53-4618-a538-917EXAMPLE94",
    "UnlockStatus" : {
      "State" : "UNLOCKED"
    },
    "ActiveNetworkInterface" : {
      "IpAddress" : "192.0.2.3"
    },
    "ClusterAssociation" : {
      "State" : "ASSOCIATED",
      "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5"
    },
    "NetworkReachability" : {
      "State" : "REACHABLE"
    }
  }, {
    "DeviceId" : "JIDEXAMPLE2-bc53-4618-a538-917EXAMPLE94",
    "UnlockStatus" : {
      "State" : "UNLOCKED"
    },
    "ActiveNetworkInterface" : {
      "IpAddress" : "192.0.2.4"
    },
    "ClusterAssociation" : {
      "State" : "ASSOCIATED",
      "ClusterId" : "CIDEXAMPLE7-5402-4c19-9feb-7c9EXAMPLEd5"
    },
    "NetworkReachability" : {
      "State" : "REACHABLE"
    }
  } ]
}
```

Getting Service Status

You can determine the status and general health of the services running on Snowball Edge devices with the `describe-service` command. You can first run the `list-services` command to see what services are running.

- `list-services`

  Usage (configured Snowball Edge client)

```
snowballEdge list-services
```

Example Output

```
{
  "ServiceIds" : [ “greengrass”, "fileinterface", "s3", "ec2" ]
}
```

- `describe-service`

  This command returns a status value for a service. It also includes state information that might be helpful in resolving issues you encounter with the service. Those states are as follows.

  - `ACTIVE` – The service is running and available for use.
  - `ACTIVATING` – The service is starting up, but it is not yet available for use.
  - `DEACTIVATING` – The service is in the process of shutting down.
  - `INACTIVE` – The service is not running and is not available for use.

  Usage (configured Snowball Edge client)

```
snowballEdge describe-service --service-id service-id
```

  Example Output

```
{
"ServiceId" : "s3",
  "Status" : {
    "State" : "ACTIVE"
  },
"Storage" : {
"TotalSpaceBytes" : 99608745492480,
"FreeSpaceBytes" : 99608744468480
},
"Endpoints" : [ {
"Protocol" : "http",
"Port" : 8080,
"Host" : "192.0.2.0"
}, {
"Protocol" : "https",
"Port" : 8443,
"Host" : "192.0.2.0",
"CertificateAssociation" : {
"CertificateArn" : "arn:aws:snowball-
device:::certificate/6d955EXAMPLEdb71798146EXAMPLE3f0"
}
} ]
}
```

Removing a Node from a Cluster

The `disassociate-device` command removes a node from a Snowball Edge cluster. If you want to replace an unhealthy node, use this command. For more information about clusters, see Using an AWS Snowball Edge Cluster (p. 199).

> **Important**
> Use the `disassociate-device` command only when you are removing an unhealthy node. This command fails and returns an error if you try to remove a healthy node.

Don't use this command to remove a node that was accidentally powered off or disconnected from the network and is therefore temporarily unavailable to the rest of the cluster. Nodes removed with this command can't be added to any cluster, and must be returned to AWS.

If a node was accidentally powered off or disconnected from the network, plug the node back into power and the network, and use the `associate-device` command. You can't use the `disassociate-device` command to disassociate a node if it's powered on and healthy.

Usage (configured Snowball Edge client)

```
snowballEdge disassociate-device --device-id Job ID for the Device
```

Example Output

```
Disassociating your Snowball Edge device from the cluster. Your Snowball Edge device will
 be disassociated from the cluster when it is in the "DISASSOCIATED" state. You can use the
 describe-cluster command to determine the state of your cluster.
```

Adding a Node to a Cluster

The `associate-device` command adds a node to a cluster of Snowball Edge devices. If you power off a node, it reverts from being unlocked to being locked. To unlock that node, you can use this command. Use this command to replace an unavailable node with a new node that you ordered as a replacement. For more information about clusters, see Using an AWS Snowball Edge Cluster (p. 199).

Usage (configured Snowball Edge client)

```
snowballEdge associate-device --device-ip-address IP Address
```

Example Output

```
Associating your Snowball Edge device with the cluster. Your Snowball Edge device will be
 associated with the cluster when it is in the ASSOCIATED state. You can use the describe-
cluster command to determine the state of your cluster.
```

Creating Tags for Your Device

Adds or overwrites the specified tags on your device. You can create a maximum of 50 tags. Each tag consists of a key-value pair. The value is optional.

> **Note**
> Don't put sensitive data in your tags.

Usage (configured Snowball Edge client)

```
snowballEdge create-tags --tag Key=Name,Value=user-test --tag Key=Stage,Value=beta
```

For more information, run the `describe-tags` command.

Example Output

```
Tag(s) [Key=Name,Value=test, Key=Stage,Value=beta] created.
```

Deleting Tags from Your Device

The `delete-tags` command deletes the specified tags from your Snowball Edge device.

Usage (configured Snowball Edge client)

```
snowballEdge delete-tags --tag Key=Stage,Value=beta
    Tag(s) [Key=Stage,Value=beta] deleted.
```

For more information, run the `describe-tags` command.

> **Note**
> If you want to delete multiple tags at the same time, you can specify multiple key-value pairs, like the following:
> `delete-tags --tag Key=Name,Value=test --tag Key=Stage,Value=Beta`
> If you specify a tag key without a tag value, any tag with this key regardless of its value is deleted. If you specify a tag key with an empty string as the tag value, only tags that have an empty string as the value are deleted.

Describing Tags on Your Device

The `describe-tags` command describes the tags on your Snowball Edge device.

Usage (configured Snowball Edge client)

```
snowballEdge describe-tags
```

For more information, run the `describe-tags` command.

Example Output

```
{
  "Tags" : [ {
    "Key" : "Name",
    "Value" : "user-test"
  }, {
    "Key" : "Stage",
    "Value" : "beta"
  } ]
}
```

Creating a Direct Network Interface

- `create-direct-network-interface` – Creates a direct network interface (DNI). Creates a direct network interface to use with Amazon EC2 compute instances on your device. You can find the direct network interfaces available on your device by using the `describe-direct-network-interfaces` command.

Usage (configured Snowball Edge client)

```
snowballEdge create-direct-network-interface [--endpoint endpoint] [--instance-
id instanceId] [--mac macAddress]
                                [--manifest-file manifestFile] [--physical-network-
interface-id physicalNetworkInterfaceId]
                                [--profile profile] [--unlock-code unlockCode] [--
vlan vlanId]
```

Getting Information About a Direct Network Interface

- `describe-direct-network-interface` – Gets the direct network interfaces on your device. A direct network interface can be used to configure networking for Amazon EC2 compute instances and

services on your device. You can create a new direct network interface by using the `create-direct-network-interface` command.

Usage (configured Snowball Edge client)

```
snowballEdge describe-direct-network-interfaces [--endpoint endpoint] [--manifest-
file manifestFile] [--profile profile] [--unlock-code unlockCode]
```

Updating a Direct Network Interface

- `update-direct-network-interface` – Updates a direct network interface. Use this command to update a direct network interface that will be used with Amazon EC2 compute instances on your device. You can find the direct network interfaces that are available on your device by using the `describe-direct-network-interfaces` command. When you are modifying a network interface that is attached to an Amazon EC2 instance, the interface will first be detached.

Usage (configured Snowball Edge client)

```
snowballEdge update-direct-network-interface [--direct-network-interface-
arn directNetworkInterfaceArn] [--endpoint endpoint]
                                [--mac macAddress]
                                [--manifest-file manifestFile] [--profile profile] [--
unlock-code unlockCode]
                                [--vlan vlanId] [--attach-instance-id instanceId | --
detach]
```

Deleting a Direct Network Interface

- `delete-direct-network-interface` – Deletes a direct network interface that is no longer in use. To delete a direct network interface associated with your Amazon EC2 compute instance, you must first disassociate the direct network interface from your instance.

Usage (configured Snowball Edge client)

```
snowballEdge delete-direct-network-interface [--direct-network-interface-
arn directNetworkInterfaceArn] [--endpoint endpoint]
                                [--manifest-file manifestFile] [--profile profile] [--
unlock-code unlockCode]
```

Setting Time Servers

You can set up an external Network Time Protocol (NTP) server. You can use the NTP CLI commands when the device is in both locked and unlocked states. The manifest and unlock code are required. You can set these either with the `snowballEdge configure` command or by using the `--manifest-file` and `--unlock-code` options. Note that you can use the `snowballEdge` CLI on both AWS Snowcone Edge and AWS Snowcone.

It is your responsibility to provide a secure NTP time server. To set which NTP time servers the device connects to, use the `update-time-servers` CLI command.

Note
The `update-time-servers` command will override the previous NTP time servers settings.

Supported NTP device types and software versions

NTP isn't available on any version 2 storage and compute device types. Snowball Edge version 3 storage and compute device types with software version 77 or later support NTP, however. To check if NTP is enabled, use the Snowball Edge CLI command `describe-time-sources`.

Usage

```
snowballEdge update-time-servers time.google.com
```

Example Example Output

```
Updating time servers now.
```

Checking Time Sources

To see which NTP time sources the device are currently connected to, use the `describe-time-sources` Snowball Edge CLI command.

Usage

```
snowballEdge describe-time-sources
```

Example Example Output

```
{
  "Sources" : [ {
    "Address" : "172.31.2.71",
    "State" : "LOST",
    "Type" : "PEER",
    "Stratum" : 10
  }, {
    "Address" : "172.31.3.203",
    "State" : "LOST",
    "Type" : "PEER",
    "Stratum" : 10
  }, {
    "Address" : "172.31.0.178",
    "State" : "LOST",
    "Type" : "PEER",
    "Stratum" : 10
  }, {
    "Address" : "172.31.3.178",
    "State" : "LOST",
    "Type" : "PEER",
    "Stratum" : 10
  }, {
    "Address" : "216.239.35.12",
    "State" : "CURRENT",
    "Type" : "SERVER",
    "Stratum" : 1
  } ]
}
```

The `describe-time-sources` command returns a list of time source states. Each time source state contains the `Address`, `State`, `Type`, and `Stratum` fields. Following are the meanings of these fields.

- `Address` – The DNS name / IP address of the time source.
- `State` – The current connection status between the device and that time source. There are five possible states:.
  - `CURRENT` – The time source is currently being used to synchronize time.

  - `COMBINED` – The time source is combined with the current source.
  - `EXCLUDED` – The time source is excluded by the combining algorithm.
  - `LOST` – The connection with the time source has been lost.
  - `UNACCEPTABLE` – An invalid time source where the combining algorithm has deemed to be either a falseticker or has too much variability.
- `Type` – An NTP time source can be either a server or a peer. Servers can be set by the `update-time-servers` command. Peers can only be other Snowball Edge devices in the cluster and are automatically set up when the cluster is associated.
- `Stratum` – This field shows the stratum of the source. Stratum 1 indicates a source with a locally attached reference clock. A source that is synchronized to a stratum 1 source is at stratum 2. A source that is synchronized to a stratum 2 source is at stratum 3, and so on..

An NTP time source can either be a server or a peer. A server can be set by the user with the `update-time-servers` command, whereas a peer could only be other Snowball Edge devices in the cluster. In the example output, `describe-time-sources` is called on a Snowball Edge that is in a cluster of 5. The output contains 4 peers and 1 server. The peers have a stratum of 10 while the server has a stratum of 1; therefore, the server is selected to be the current time source.

Transferring Files Using the Amazon S3 Interface

Following is an overview of the Amazon S3 interface, which you can use to transfer data programmatically to and from the AWS Snowball Edge device using Amazon S3 REST API actions. This Amazon S3 REST API support is limited to a subset of actions. You can use this subset of actions with one of the AWS SDKs to transfer data programmatically. You can also use the subset of supported AWS Command Line Interface (AWS CLI) commands for Amazon S3 to transfer data programmatically.

If your solution uses the AWS SDK for Java version 1.11.0 or newer, you must use the following `S3ClientOptions`:

- `disableChunkedEncoding()` – Indicates that chunked encoding is not supported with the interface.
- `setPathStyleAccess(true)` – Configures the interface to use path-style access for all requests.

For more information, see Class S3ClientOptions.Builder in the *Amazon AppStream SDK for Java*.

> **Important**
> We recommend that you use only one method at a time to read and write data to a local bucket on an AWS Snowball Edge device. Using both the file interface and the Amazon S3 interface on the same bucket at the same time can result in read/write conflicts.
> the section called "Rate Limits on AWS Snowball Edge" (p. 258) details the limits.
> For AWS services to work properly on a Snowball Edge, you must allow the ports for the services. For details, see Ports Required to Use AWS Services on an AWS Snowball Edge Device (p. 182).

Topics

Downloading and Installing the AWS CLI Version 1.16.14

Currently, Snowball Edge devices support only version 1.16.14 and earlier of the AWS CLI. Use the following procedure for your operating system to perform this task.

Install the AWS CLI on Linux operating systems

Run this chained command:

```
curl "https://s3.amazonaws.com/aws-cli/awscli-bundle-1.16.14.zip" -o "awscli-
bundle.zip";unzip awscli-bundle.zip;sudo ./awscli-bundle/install -i /usr/local/aws -b /usr/
local/bin/aws;/usr/local/bin/aws --version;
```

Install the AWS CLI on Windows operating systems

Download and run the installer file for your operating system:

- 32-bit
- 64-bit

Using the AWS CLI and API Operations on Snowball Edge

When using the AWS CLI or API operations to issue IAM, Amazon S3, and Amazon EC2 commands on Snowball Edge, you must specify the Region as "snow." You can do this using `AWS configure` or within the command itself, as in the following examples.

```
aws configure --profile abc
AWS Access Key ID [None]: AKIAIOSFODNN7EXAMPLE
AWS Secret Access Key [None]: 1234567
Default region name [None]: snow
Default output format [None]: json
```

Or

```
aws s3 ls --profile snowballEdge --endpoint http://192.0.2.0:8080 --region snow
```

Authorization with the Amazon S3 API interface for AWS Snowball

When you use the Amazon S3 interface, every interaction is signed with the AWS Signature Version 4 algorithm by default. This authorization is used only to verify the data traveling from its source to the interface. All encryption and decryption happens on the device. Unencrypted data is never stored on the device.

When using the interface, keep the following in mind:

- To get the local Amazon S3 credentials to sign your requests to the AWS Snowball Edge device, run the `snowballEdge list-access-keys` and `snowballEdge get-secret-access-keys` Snowball

Edge client commands. For more information, see Using the Snowball Edge Client (p. 81). These local Amazon S3 credentials include a pair of keys: an access key and a secret key. These keys are only valid for the devices associated with your job. They can't be used in the AWS Cloud because they have no AWS Identity and Access Management (IAM) counterpart.

- The encryption key is not changed by what AWS credentials you use. Signing with the Signature Version 4 algorithm is only used to verify the data traveling from its source to the interface. Thus, this signing never factors into the encryption keys used to encrypt your data on the Snowball.

Getting and Using Local Amazon S3 Credentials

Every interaction with a Snowball Edge is signed with the AWS Signature Version 4 algorithm. For more information about the algorithm, see Signature Version 4 Signing Process in the *AWS General Reference*.

You can get the local Amazon S3 credentials to sign your requests to the Snowball Edge client Edge device by running the `snowballEdge list-access-keys` and `snowballEdge get-secret-access-key` Snowball Edge client information, see Getting Credentials (p. 86). These local Amazon S3 credentials include a pair of keys: an access key ID and a secret key. These credentials are only valid for the devices that are associated with your job. They can't be used in the AWS Cloud because they have no IAM counterpart.

You can add these credentials to the AWS credentials file on your server. The default credential profiles file is typically located at `~/.aws/credentials`, but the location can vary per platform. This file is shared by many of the AWS SDKs and by the AWS CLI. You can save local credentials with a profile name as in the following example.

```
[snowballEdge]
aws_access_key_id = AKIAIOSFODNN7EXAMPLE
aws_secret_access_key = wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
```

Specifying the S3 Interface as the AWS CLI Endpoint

When you use the AWS CLI to issue a command to the AWS Snowball Edge device, you specify that the endpoint is the Amazon S3 interface. You have the choice of using the HTTPS endpoint, or an unsecured HTTP endpoint, as shown following.

HTTPS secured endpoint

```
aws s3 ls --profile snowballEdge --endpoint https://192.0.2.0:8443 --ca-bundle path/to/certificate
```

HTTP unsecured endpoint

```
aws s3 ls --profile snowballEdge --endpoint http://192.0.2.0:8080
```

If you use the HTTPS endpoint of 8443, your data is securely transferred from your server to the Snowball Edge. This encryption is ensured with a certificate that's generated by the Snowball Edge when it gets a new IP address. After you have your certificate, you can save it to a local `ca-bundle.pem` file. Then you can configure your AWS CLI profile to include the path to your certificate, as described following.

To associate your certificate with the interface endpoint

1. Connect the Snowball Edge to power and the network, and turn it on.
2. After the device has finished booting up, make a note of its IP address on your local network.
3. From a terminal on your network, make sure you can ping the Snowball Edge.

4. Run the `snowballEdge get-certificate` command in your terminal. For more information on this command, see Getting Your Certificate for Transferring Data (p. 87).
5. Save the output of the `snowballEdge get-certificate` command to a file, for example `ca-bundle.pem`.
6. Run the following command from your terminal.

```
aws configure set profile.snowballEdge.ca_bundle /path/to/ca-bundle.pem
```

After you complete the procedure, you can run CLI commands with these local credentials, your certificate, and your specified endpoint, as in the following example.

```
aws s3 ls --profile snowballEdge --endpoint https://192.0.2.0:8443
```

Unsupported Amazon S3 Features for Snowball Edge

Using the Amazon S3 interface, you can programmatically transfer data to and from a Snowball Edge with Amazon S3 API actions. However, not all Amazon S3 transfer features and API actions are supported for use with a Snowball Edge device. For example, the following features and actions are not supported for use with Snowball Edge:

- TransferManager – This utility transfers files from a local environment to Amazon S3 with the SDK for Java. Consider using the supported API actions or AWS CLI commands with the interface instead.
- GET Bucket (List Objects) Version 2 – This implementation of the GET action returns some or all (up to 1,000) of the objects in a bucket. Consider using the GET Bucket (List Objects) Version 1 action or the ls AWS CLI command.

Batching Small Files

Each copy operation has some overhead because of encryption. To speed up the process of transferring small files to your AWS Snowball Edge device, you can batch them together in a single archive. When you batch files together, they can be auto-extracted when they are imported into Amazon S3, if they were batched in one of the supported archive formats.

Typically, files that are 1 MB or smaller should be included in batches. There's no hard limit on the number of files you can have in a batch, though we recommend that you limit your batches to about 10,000 files. Having more than 100,000 files in a batch can affect how quickly those files import into Amazon S3 after you return the device. We recommend that the total size of each batch be no larger than 100 GB.

Batching files is a manual process, which you manage. After you batch your files, transfer them to a Snowball Edge device using the AWS CLI `cp` command with the `--metadata snowball-auto-extract=true` option. Specifying `snowball-auto-extract=true` automatically extracts the contents of the archived files when the data is imported into Amazon S3, so long as the size of the batched file is no larger than 100 GB.

Note
Any batches larger than 100 GB are not extracted when they are imported into Amazon S3.

To batch small files

1. Decide on what format you want to batch your small files in. The auto-extract feature supports the TAR, `ZIP`, and `tar.gz` formats.
2. Identify which small files you want to batch together, including their size and the total number of files that you want to batch together.

3. Batch your files on the command line as shown in the following examples.

   - For Linux, you can batch the files in the same command line used to transfer your files to the device.

     ```
     tar -cf - /Logs/April | aws s3 cp - s3://mybucket/batch01.tar --metadata snowball-
     auto-extract=true --endpoint http://192.0.2.0:8080
     ```

     Note
     Alternatively, you can use the archive utility of your choice to batch the files into one or more large archives. However, this approach requires extra local storage to save the archives before you transfer them to the Snowball.

   - For Windows, use the following example command to batch the files when all files are in the same directory from which the command is run:

     ```
     7z a -tzip -so "test" | aws s3 cp - s3://mybucket/batch01.zip --metadata snowball-
     auto-extract=true --endpoint http://192.0.2.0:8080
     ```

     To batch files from a different directory from which the command is run, use the following example command:

     ```
     7z a -tzip -so "test" "c:\temp" | aws s3 cp - s3://mybucket/batch01.zip --metadata
      snowball-auto-extract=true --endpoint http://10.x.x.x:8080
     ```

     Note
     For Microsoft Windows 2016, tar is not available, but you can download it from the *Tar for Windows* website.
     You can download 7 ZIP from the 7ZIP website.

4. Repeat until you've archived all the small files that you want to transfer to Amazon S3 using a Snowball Edge.
5. Transfer the archived files to the Snowball. If you want the data to be auto-extracted, and you used one of the supported archive formats mentioned previously in step 1, use the AWS CLI `cp` command with the `--metadata snowball-auto-extract=true` option.

   Note
   If there are non-archive files, don't use this command.

When creating the archive files, the extraction will maintain the current data structure. This means if you create an archive file that contains files and folders, Snowball Edge will recreate this during the ingestion to Amazon S3 process.

The archive file will be extracted in the same directory it is stored in and the folder structures will be built out accordingly. Keep in mind that when copying archive files, it is important to set the flag `--metadata snowball-auto-extract=true`. Otherwise, Snowball Edge will not extract the data when it's imported into Amazon S3.

Using the example in step 3, if you have the folder structure of /Logs/April/ that contains files `a.txt`, `b.txt` and `c.txt`. If this archive file was placed in the root of /mybucket/ then the data would look like the following after the extraction:

```
/mybucket/Logs/April/a.txt
/mybucket/Logs/April/b.txt
/mybucket/Logs/April/c.txt
```

If the archive file was placed into /mybucket/Test/, then the extraction would look as like the following:

```
/mybucket/Test/Logs/April/a.txt
/mybucket/Test/Logs/April/b.txt
/mybucket/Test/Logs/April/c.txt
```

Supported AWS CLI Commands

Following, you can find information about how to specify the Amazon S3 interface as the endpoint for applicable AWS Command Line Interface (AWS CLI) commands. You can also find the list of AWS CLI commands for Amazon S3 that are supported for transferring data to the AWS Snowball Edge device with the interface.

> **Note**
> For information about installing and setting up the AWS CLI, including specifying what Regions you want to make AWS CLI calls against, see AWS Command Line Interface User Guide.

Currently, Snowball Edge devices support only version 1.16.14 and earlier of the AWS CLI. You can download and install this version of the AWS CLI from GitHub. Use the following procedure to perform this task.

> **Note**
> Be sure to install version 2.6.5+ or 3.4+ of Python before you install version 1.16.14 of the AWS CLI.

Supported AWS CLI Commands for Amazon S3

Following is a description of the subset of AWS CLI commands and options for Amazon S3 that the AWS Snowball Edge device supports. If a command or option isn't listed, it's not supported. You can declare some unsupported options, like `--sse` or `--storage-class`, along with a command. However, these are ignored and have no impact on how data is imported.

- cp – Copies a file or object to or from the AWS Snowball Edge device. The following are options for this command:
  - `--dryrun` (Boolean) – The operations that would be performed using the specified command are displayed without being run.
  - `--quiet` (Boolean) – Operations performed by the specified command are not displayed.
  - `--include` (string) – Don't exclude files or objects in the command that match the specified pattern. For details, see Use of Exclude and Include Filters in the *AWS CLI Command Reference*.
  - `--exclude` (string) – Exclude all files or objects from the command that matches the specified pattern.
  - `--follow-symlinks | --no-follow-symlinks` (Boolean) – Symbolic links (symlinks) are followed only when uploading to Amazon S3 from the local file system. Amazon S3 doesn't support symbolic links, so the contents of the link target are uploaded under the name of the link. When neither option is specified, the default is to follow symlinks.
  - `--only-show-errors` (Boolean) – Only errors and warnings are displayed. All other output is suppressed.
  - `--recursive` (Boolean) – The command is performed on all files or objects under the specified directory or prefix.
  - `--page-size` (integer) – The number of results to return in each response to a list operation. The default value is 1000 (the maximum allowed). Using a lower value might help if an operation times out.
  - `--metadata` (map) – A map of metadata to store with the objects in Amazon S3. This map is applied to every object that is part of this request. In a sync, this functionality means that files that haven't changed don't receive the new metadata. When copying between two Amazon S3 locations, the `metadata-directive` argument defaults to `REPLACE` unless otherwise specified.
- ls – Lists objects on the AWS Snowball Edge device. The following are options for this command:

- `--human-readable` (Boolean) – File sizes are displayed in human-readable format.
- `--summarize` (Boolean) – Summary information is displayed. This information is the number of objects and their total size.
- `--recursive` (Boolean) – The command is performed on all files or objects under the specified directory or prefix.
- `--page-size` (integer) – The number of results to return in each response to a list operation. The default value is 1000 (the maximum allowed). Using a lower value might help if an operation times out.

- rm – Deletes an object on the AWS Snowball Edge device. The following are options for this command:
  - `--dryrun` (Boolean) – The operations that would be performed using the specified command are displayed without being run.
  - `--include` (string) – Don't exclude files or objects in the command that match the specified pattern. For details, see Use of Exclude and Include Filters in the *AWS CLI Command Reference*.
  - `--exclude` (string) – Exclude all files or objects from the command that matches the specified pattern.
  - `--recursive` (Boolean) – The command is performed on all files or objects under the specified directory or prefix.
  - `--page-size` (integer) – The number of results to return in each response to a list operation. The default value is 1000 (the maximum allowed). Using a lower value might help if an operation times out.
  - `--only-show-errors` (Boolean) – Only errors and warnings are displayed. All other output is suppressed.
  - `--quiet` (Boolean) – Operations performed by the specified command are not displayed.
- sync – Syncs directories and prefixes. This command copies new and updated files from the source directory to the destination. This command only creates directories in the destination if they contain one or more files.

  Important
  Syncing from one directory to another directory on the same Snowball Edge isn't supported.
  Syncing from one AWS Snowball device to another AWS Snowball device isn't supported.
  You can only use this option to sync the contents between your on-premises data storage and a Snowball Edge.

  - `--dryrun` (Boolean) – The operations that would be performed using the specified command are displayed without being run.
  - `--quiet` (Boolean) – Operations performed by the specified command are not displayed.
  - `--include` (string) – Don't exclude files or objects in the command that match the specified pattern. For details, see Use of Exclude and Include Filters in the *AWS CLI Command Reference*.
  - `--exclude` (string) – Exclude all files or objects from the command that matches the specified pattern.
  - `--follow-symlinks` or `--no-follow-symlinks` (Boolean) – Symbolic links (symlinks) are followed only when uploading to Amazon S3 from the local file system. Amazon S3 doesn't support symbolic links, so the contents of the link target are uploaded under the name of the link. When neither option is specified, the default is to follow symlinks.
  - `--only-show-errors` (Boolean) – Only errors and warnings are displayed. All other output is suppressed.
  - `--no-progress` (Boolean) – File transfer progress is not displayed. This option is only applied when the `--quiet` and `--only-show-errors` options are not provided.
  - `--page-size` (integer) – The number of results to return in each response to a list operation. The default value is 1000 (the maximum allowed). Using a lower value might help if an operation times out.
  - `--metadata` (map) – A map of metadata to store with the objects in Amazon S3. This map is applied to every object that is part of this request. In a sync, this functionality means that files that

haven't changed don't receive the new metadata. When copying between two Amazon S3 locations, the `metadata-directive` argument defaults to `REPLACE` unless otherwise specified.

Important
Syncing from one directory to another directory on the same Snowball Edge isn't supported.
Syncing from one AWS Snowball device to another AWS Snowball device isn't supported. You can only use this option to sync the contents between your on-premises data storage and a Snowball Edge.

- `--size-only` (Boolean) – With this option, the size of each key is the only criterion used to decide whether to sync from source to destination.
- `--exact-timestamps` (Boolean) – When syncing from Amazon S3 to local storage, same-sized items are ignored only when the timestamps match exactly. The default behavior is to ignore same-sized items unless the local version is newer than the Amazon S3 version.
- `--delete` (Boolean) – Files that exist in the destination but not in the source are deleted during sync.

You can work with files or folders with spaces in their names, such as `my photo.jpg` or `My Documents`. However, make sure that you handle the spaces properly in the AWS CLI commands. For more information, see Specifying parameter values for the AWS CLI in the *AWS Command Line Interface User Guide*.

Supported REST API Actions

Following, you can find REST API actions that you can use with an AWS Snowball Edge device and Amazon S3.

Topics

Supported REST API Actions for Snowball Edge

HEAD Snowball Edge

Description

Currently, there's only one Snowball Edge REST API operation, which you can use to return status information for a specific device. This operation returns the status of a Snowball Edge. This status includes information that can be used by AWS Support for troubleshooting purposes.

You can't use this operation with the AWS SDKs or the AWS CLI. We recommend that you use `curl` or an HTTP client. The request doesn't need to be signed for this operation.

Request

In the following example, the IP address for the Snowball Edge is *192.0.2.0*. Replace this value with the IP address of your actual device.

```
curl -X HEAD http://192.0.2.0:8080
```

Response

```
<Status xsi:schemaLocation="http://s3.amazonaws.com/doc/2006-03-01/" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance">
```

```
    <snowballIp>127.0.0.1</snowballIp>
    <snowballPort>8080</snowballPort>
    <snowballId>device-id</snowballId>
    <totalSpaceInBytes>499055067136</totalSpaceInBytes>
    <freeSpaceInBytes>108367699968</freeSpaceInBytes>
    <jobId>job-id</jobId>
    <snowballServerVersion>1.0.1</snowballServerVersion>
    <snowballServerBuild>DevBuild</snowballServerBuild>
    <snowballClientVersion>Version 1.0</snowballClientVersion>
    <snowballRoundTripLatencyInMillis>33</snowballRoundTripLatencyInMillis>
</Status>
```

Supported REST API Actions for Amazon S3

Following, you can find the list of Amazon S3 REST API actions that are supported for using the Amazon S3 interface. The list includes links to information about how the API actions work with Amazon S3. The list also covers any differences in behavior between the Amazon S3 API action and the AWS Snowball Edge device counterpart. All responses coming back from an AWS Snowball Edge device declare `Server` as `AWSSnowball`, as in the following example.

```
HTTP/1.1 201 OK
x-amz-id-2: JuKZqmXuiwFeDQxhD7M8KtsKobSzWA1QEjLbTMTagkKdBX2z7Il/jGhDeJ3j6s80
x-amz-request-id: 32FE2CEB32F5EE25
Date: Fri, 08 2016 21:34:56 GMT
Server: AWSSnowball
```

Amazon S3 REST API calls require SigV4 signing. If you're using the AWS CLI or an AWS SDK to make these API calls, the SigV4 signing is handled for you. Otherwise, you need to implement your own SigV4 signing solution. For more information, see Authenticating requests (AWS Signature Version 4) in the *Amazon Simple Storage Service User Guide.*

- GET Bucket (List Objects) version 1 – Supported. However, in this implemetation of the GET operation, the following is not supported:
  - Pagination
  - Markers
  - Delimiters
  - When the list is returned, the list is not sorted

  Only version 1 is supported. GET Bucket (List Objects) version 2 is not supported.
- GET Service
- HEAD Bucket
- HEAD Object
- GET Object – is a DOWNLOAD of an object from the Snow device's S3 bucket.
- PUT Object – When an object is uploaded to an AWS Snowball Edge device using `PUT Object`, an ETag is generated.

  The ETag is a hash of the object. The ETag reflects changes only to the contents of an object, not its metadata. The ETag might or might not be an MD5 digest of the object data. For more information about ETags, see Common Response Headers in the *Amazon Simple Storage Service API Reference.*
- DELETE Object
- Initiate Multipart Upload – In this implementation, initiating a multipart upload request for an object already on the AWS Snowball Edge device first deletes that object. It then copies it in parts to the AWS Snowball Edge device.
- List Multipart Uploads
- Upload Part

- Complete Multipart Upload
- Abort Multipart Upload

Note
Any Amazon S3 REST API actions not listed here are not supported. Using any unsupported REST API actions with your Snowball Edge returns an error message saying that the action is not supported.

Transferring Files to AWS Snowball Edge Using the File Interface

Following, you can find information about using the file interface for the AWS Snowball Edge device. Using this file interface, you can drag and drop files from your computer into Amazon S3 buckets on the Snowball Edge device.

Note
If you created your job before July 17, 2018, this information doesn't apply to your device. Instead, see Transferring Files Using the Amazon S3 Interface (p. 98).

Topics

Overview of the File Interface

The file interface exposes a Network File System (NFS) mount point for each bucket on your AWS Snowball Edge device. You can mount the file share from your NFS client using standard Linux, Microsoft Windows, or macOS commands. You can use standard file operations to access the file share.

After the file share has been mounted, a new **file interface** tab appears on the LCD screen on the front of the Snowball Edge device. From this tab, you can get transfer status information, see your NFS mount point IP addresses, and secure NFS client access to specific buckets.

You can use the local LCD display on the AWS Snowball Edge device to disable or enable the file interface. By unlocking the AWS Snowball Edge device, you have all the permissions necessary to read and write data through the file interface.

Topics

Benefits of the File Interface

You might want to use the file interface to read and write data because of the following benefits:

- You can more easily read, write, and delete files by using the file interface.
- You can use the local LCD display on the AWS Snowball Edge device to monitor the file interface status.

- The file interface preserves user-defined metadata in objects. This metadata includes permissions, ownership, and timestamps and can be useful for tracking.
- Because files are written to the buckets on the device, adding files can trigger associated AWS Lambda powered by AWS IoT Greengrass functions.

Prerequisites for Using the File Interface

Before you can use the file interface, the following steps must occur:

- You must create a job for your Snowball Edge device.
- Your Snowball Edge device must arrive at your location.
- You must unlock your device by using the Snowball Edge client.
- You must enable the NFS client service on your workstation client to mount the file interface share.

If one or more of those steps haven't occurred, see the following topics:

- For information about creating a job to use a Snowball Edge device, see Getting Started (p. 33).
- For information about unlocking a Snowball Edge device, see Transferring Files Using the Amazon S3 Interface (p. 98).
- For information about unlocking a Snowball Edge device, see unlocking a device.

> **Important**
> For AWS services to work properly on a Snowball Edge device, you must allow the ports for the services. For details, see Ports Required to Use AWS Services on an AWS Snowball Edge Device (p. 182).

Considerations for Using the File Interface

While using the file interface, keep the following considerations in mind:

- The maximum size of a file that you can transfer to the file interface on a Snowball Edge device is 150 GB.
- We recommend that you use only one method at a time of reading and writing data to each bucket on a Snowball Edge device. Using both the file interface and the Amazon S3 interface on the same bucket might result in undefined behavior.
- The file interface supports all NFS file operations, except truncate, rename, or changing ownership. Requests that use these unsupported file operations are rejected with error messages sent to your NFS client. Attempts to change a file's permissions after the file has been created on the Snowball Edge device are ignored without error.
- If the Snowball Edge device has a power failure or is rebooted, data in the file interface buffer persists. On reboot, this buffered data is uploaded to buckets on the device. When **Write status** on the **File interface** tab shows 100 percent with a green progress bar, all data in the file interface buffer is uploaded to the buckets on the device.
- Don't write data to a Snowball Edge device that is full, or write more data than the size of the remaining available storage. Either action causes errors that might corrupt your data. Before writing data, we recommend that you determine the remaining amount of space on the Snowball Edge device. Then compare that to the amount of data you want to copy over using the file interface before copying the data.
- When you've finished copying data to the Snowball Edge device using the file interface, you must disable the file interface to avoid losing any data that might be in the buffer but not yet written to the Amazon S3 bucket. For more information, see Disabling the File Interface (p. 114).

- We recommend that you keep a local copy of all data that is written to the file interface until the Snowball Edge device has been shipped back to AWS and the data has been ingested to Amazon S3.

Starting the File Interface

Before you can use the file interface, you must use the Snowball Edge client to start it.

Important
It can take an hour or more for the file interface to activate. Don't power off or restart the device during this time.

To start the file interface

1. Run the `snowballEdge describe-device` command to get the list of network interface IDs. For more information about this command, see Getting Device Status (p. 90).
2. Create a virtual network interface. As part of this process, identify the ID for the physical network interface that you want to use, and make a note of it. The following examples show how to run the command to create a virtual network interface with the two different IP address assignment methods, either `DHCP` or `STATIC`.

```
snowballEdge create-virtual-network-interface \
--physical-network-interface-id s.ni-abcd1234 \
--ip-address-assignment DHCP

        //OR//

snowballEdge create-virtual-network-interface \
--physical-network-interface-id s.ni-abcd1234 \
--ip-address-assignment STATIC \
--static-ip-address-configuration IpAddress=192.0.2.0,Netmask=255.255.255.0
```

Example

Output

```
{
     "VirtualNetworkInterface" : {
          "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/s.ni-
abcd1234",
          "PhysicalNetworkInterfaceId" : "s.ni-abcd1234",
          "IpAddressAssignment" : "DHCP",
          "IpAddress" : "192.0.2.0",
          "Netmask" : "255.255.255.0",
          "DefaultGateway" : "192.0.2.10",
          "MacAddress" : "1a:2b:3c:4d:5e:6f"
     }
}
```

3. When the command returns a JSON structure that includes the IP address, make a note of that IP address.
4. Start the file interface service using the virtual network interface, as in the following example.

```
snowballEdge start-service \
--service-id fileinterface \
--virtual-network-interface-arns arn:aws:snowball-device:::interface/
s.ni-abcd1234abcd1234a
```

Example

Output

```
Starting the AWS service on your Snowball Edge. You can determine the status of the AWS
 service using the describe-service command.
```

5. It can take an hour or more for the file interface to activate. To see if the service has started, or if it's still activating, you can run the `snowballEdge describe-service --service-id fileinterface` Snowball Edge client command.

It takes an hour or more for the file interface to activate. After that time, the file interface will start. Anytime you need the IP address for the file interface, you can use the `snowballEdge describe-virtual-network-interfaces` Snowball Edge client command.

Mounting a Bucket with the File Interface

The following contains guidance on mounting a file share on a Snowball Edge device to the NFS client on your computer using the file interface. It includes information about the supported NFS clients and procedures for enabling those clients on Linux, macOS, and Windows operating systems.

Topics

Supported NFS Clients for the File Interface

The file interface supports the following NFS clients:

Clients with NFSv4 support

- Amazon Linux
- macOS
- Red Hat Enterprise Linux (RHEL) 7

Clients with NFSv3 support

- Windows 10, Windows Server 2012, and Windows Server 2016
- Windows 7 and Windows Server 2008. For these clients, the maximum supported NFS I/O size is 32 KB. Because of this factor, you might experience degraded performance on these versions of Windows.

Getting the IP Address for the File Share of a Bucket on a Snowball Edge device

You can mount the file shares with a simple command, if you have the IP address for the file share on a Snowball Edge device. You can find the file share's IP address on the LCD display in the **CONNECTION** tab. You can't use the file interface if this IP address is blank. Ensure that the file interface gets an IP address.

> **Important**
> The IP address for the file interface is not the IP address that you used to unlock the Snowball Edge device. The IP address for the file interface can either be a static IP or one issued by your DHCP server.

To get the IP address for the file interface

1. Access the LCD display on the front of the AWS Snowball Edge device.
2. Tap **CONNECTION** at the top of the LCD display to open the network connection tab.
3. From the dropdown list in the center of the page, choose **file interface**.

   The IP address below this list updates to reflect the DHCP address that the AWS Snowball Edge device requested for the file interface. You can change it to a static IP address, or leave it as is.

Now that you have your IP address, you're ready to mount a bucket on the Snowball Edge device using the appropriate mount command for your computer's operating system.

Mounting a File Share with the File Interface on Linux

When you mount file shares on your Linux server, we recommend that you first update your NFS client with the following command.

```
$sudo yum install nfs-utils
```

When the file interface is enabled, it exposes an NFS mount point for each local bucket on the device. The file interface supports NFS versions 3, 4.0, and 4.1. You can mount the file shares with a simple command with the IP address for the file interface. For more information, see Getting the IP Address for the File Share of a Bucket on a Snowball Edge device (p. 111).

When you have the IP address, you can mount a bucket with the following command.

```
mount -t nfs -o nolock IP Address:/BucketName local/mount/directory
```

For example, suppose that the IP address for the file interface is 192.0.1.0 and your bucket name is `test-bucket`. You want to mount your bucket to the `mnt/test-bucket` directory on your local Linux server. In this case, your command looks like the following.

```
mount -t nfs -o nolock 192.0.1.0:/test-bucket mnt/test-bucket
```

Mounting a File Share with the File Interface on macOS

You can mount the file shares with a simple command with the IP address for the file interface. For more information, see Getting the IP Address for the File Share of a Bucket on a Snowball Edge device (p. 111). When you mount file shares on macOS, you must declare the version of the NFS

protocol that you're using when you run the `mount` command. For example, if you're using the NFSv3.0 protocol, you use the `vers=3` option.

```
mount -t nfs -o vers=3,nolock IP Address:/BucketName local mount directory
```

For example, suppose that the IP address for the file interface is 192.0.1.0, your bucket name is `test-bucket`, and you want to mount your bucket to the `private/mybucket` directory on your macOS machine. In this case, your command looks like the following.

```
sudo mount_nfs -o vers=3,nolock -v 192.0.1.0:/test-bucket private/mybucket
```

Mounting a File Share with the File Interface on Microsoft Windows

When you mount file shares on your Windows server, you must turn on the Windows Client for NFS. You also must assign the mount point a drive letter with the `mount` command.

> **Note**
> For a Windows 7 or Windows Server 2008 server, the maximum supported NFS I/O size is 32 KB. Because of this limit, you might experience degraded performance for the file interface on these versions of Windows.

To turn on Windows Client for NFS

1. In Windows, from the **Start** menu, search for **Turn Windows features on or off**, and choose the application of the same name that appears in the search results.
2. In the **Windows Features** dialog box that appears, scroll through the list of features until you find **Services for NFS**.
3. Expand **Services for NFS**, and select the **Client for NFS** check box.
4. Choose **OK**.

You can mount the file shares with a simple command with the IP address for the file interface. For more information, see Getting the IP Address for the File Share of a Bucket on a Snowball Edge device (p. 111). You can now mount the file shares on the AWS Snowball Edge device to an unused drive on your Windows server as in the following example.

```
mount -o nolock IP Address:/BucketName DriveLetter:
```

For example, suppose that the IP address for the file interface is 192.0.1.0, your bucket name is `test-bucket`, and you want to mount your bucket to the `Z` drive on your Windows server. In this case, your command looks like the following.

```
mount -o nolock 192.0.1.0:/test-bucket Z:
```

Monitoring the File Interface

When you use the file interface, it's important to monitor its overall health and current status. You can perform these tasks by using the **file interface** tab on the LCD display on the front of the AWS Snowball Edge device.

Topics

Getting the Status of the File Interface

On the **file interface** tab, there are two health indicators, **Status** and **Write status**. The following list describes how to work with these indicators:

- **Status** indicates the operational status of the file interface as a whole. It has the following possible values:
  - **Enabled** – The file interface is up and running normally.
  - **Disabling** – The file interface is stopped, and nothing can be written to it.
  - **Disabled** – The file interface has stopped and the mount point is no longer available. In addition, all the data in the device's memory buffer has been encrypted and written to the local Amazon S3 buckets.
  - **Error** – An error has occurred. If you see this status, contact AWS Support.
- **Write status** uses a progress bar to show you the progress of the current write operation running on the AWS Snowball Edge device:
  - At 0–99 percent, a write operation is actively happening on the device and data is in the buffer. Don't disconnect the device before the write operation is completed.
  - At 100 percent, with a green progress bar, the last write operation has been completed successfully. There is no data in the buffer, and no new write operations have begun.

Securing Your NFS Connection

When a job for an AWS Snowball Edge device is created on the AWS Management Console, all Amazon S3 buckets selected for the job are enabled by default as active file shares. When the device arrives at your site, and you set up, connect, and unlock it, anyone on your network who can see the IP address for the file interface can access the file shares for each bucket.

Therefore, we recommend that you secure the buckets by specifying which NFS clients are allowed to access your buckets. You can do this from the LCD screen on the front of the Snowball Edge device with the following procedure.

To allow only certain NFS clients to access the file shares for your buckets on a Snowball Edge device

1. On the LCD display, tap **File interface** to open its tab.
2. From **Allowed clients**, choose your bucket from the dropdown list.
3. Tap **Edit** to reveal the text boxes where you can enter your IP addresses.
4. In the top box, use the onscreen keyboard to enter the IP address of a computer that you want to mount the file share for that bucket to.
5. If you have other computers connected to this same bucket, enter their IP addresses in the subsequent text boxes.

You have now secured the file share for one of your buckets on the Snowball Edge device. To secure access to the data in your device, repeat this process for all the file shares for the buckets on the Snowball Edge device.

After you specify an IP address for an allowed client, you can return that file share to unrestricted again by changing the IP address to `0.0.0.0`. If the IP address of the computer connected to it ever changes, you must update the IP address for that allowed client.

Disabling the File Interface

When you're done using the file interface, we recommend disabling the file interface after the **Write Status** on the AWS Snowball Edge device is set to **Complete**. Disabling the file interface helps you avoid data loss by ensuring that all files have been written to the device.

When you're done with the file interface, you can stop it with the `snowballEdge stop-service` Snowball Edge client command. For more information, see Stopping a Service on Your Snowball Edge (p. 87).

Using NFS for Offline Data Transfer

Your Snow Family device contains a file interface that provides access to the internal device storage. To import your data offline to Amazon S3 with your Snow Family device, you connect the device to your on-premises network and then use AWS OpsHub to unlock it. You can copy data from on-premises storage devices to the Snow Family device through the NFS file interface.

After you copy the data to the Snow Family device, the E Ink shipping label will be updated to ensure that the device is automatically sent to the correct AWS facility. You can track the Snow Family device by using Amazon SNS generated text messages or emails, and the console. For information about AWS OpsHub, see Using AWS OpsHub for Snow Family to Manage Devices (p. 56).

> **Note**
> File names are object keys in your local S3 bucket on the Snow Family device. The key name is a sequence of Unicode characters whose UTF-8 encoding is at most 1,024 bytes long. We recommend using NFSv4.1 where possible and encode file names with Unicode UTF-8 to ensure a successful data import. File names that are not encoded with UTF-8 might not be uploaded to S3 or might be uploaded to S3 with a different file name depending on the NFS encoding you use.
> Ensure that the maximum length of your file path is less than 1024 characters. Snow Family devices do not support file paths that are greater that 1024 characters. Exceeding this file path length will result in file import errors.
> For more information, see Object keys in the *Amazon Simple Storage Service User Guide*.

You can transfer up to 8 TB with a single Snowcone device and transfer larger datasets with multiple devices, either in parallel, or sequentially. For example, you can transfer 24 TB of data with three Snowcone devices. For larger data transfers jobs, you can use the Snowball Edge Storage Optimized device. You can transfer up to 80 TB with a single Snowball Edge Storage Optimized device and transfer larger datasets with multiple devices, either in parallel, or sequentially.

> **Note**

- You can only transfer upto 40M files using a single Snow Family device. If you require to transfer more than 40M files in a single job, please batch the files in order to reduce the file numbers per each transfer. Individual files can be of any size and the maximum file size can be upto size of 5TB. This is not a snow limitation it is a S3 limitation. S3 limits file size to max of 5TB.
- You can provide CIDR blocks for IP ranges that are allowed to mount the NFS shares exposed by the device. For example, `10.0.0.0/16`. If you don't provide allowed CIDR blocks, all mount requests will be denied. For details, see Restricting Access to NFS Shares When NFS is Running.
- For NFS based transfers, standard POSIX style meta-data will be added to your objects as they get imported to Amazon S3 from Snowball Edge. In addition, you'll see meta-data "x-amz-meta-user-agent aws-datasync" as we currently use AWS DataSync as part of the internal import mechanism to Amazon S3 for Snowball Edge import with NFS option.

NFS Configuration for Snowball Edge

NFS is ubiquitous (existing or being everywhere at the same time). Every laptop, workstation, and server has an IP connection and every modern operating system has a built-in NFS client. Object storage systems typically use the Amazon S3 API which is less ubiquitous than NFS, especially in the private data center. Amazon S3 does not support NFS. Hence before ordering the SBE, you must decide to use either the S3 interface or NFS interface. If you choose the NFS interface, mount NFS bucket of SBE as a volume.

Prerequisite

- 2 IP addresses:
  - One for physical network interface to activate SBE (e.g. 192.168.0.9)
  - The 2nd for virtual network interface to mount SBE (e.g. 192.168.0.10)
- Workstation

How to Configure Snowball Edge

confirm NFS service is Active

```
snowballEdge describe-service --service-id nfs --profile sbe1
{
  "ServiceId" : "nfs",
  "Status" : {
    "State" : "ACTIVE"
  }
}
```

If the State is Active, you can mount the SBE volume, otherwise you have to re-start service or create virtual network interface

Create a Virtual Network Interface and Start NFS Service

Check if virtual network interface exists already

```
$ snowballEdge describe-virtual-network-interfaces --profile sbe1
```

Identify physical interface ID

```
$ snowballEdge describe-device --profile sbe1
```

Create virtual network interface and identify v-nic arn

```
$ snowballEdge create-virtual-network-interface \
--physical-network-interface-id s.ni-abcd1234 \
--ip-address-assignment STATIC \
--static-ip-address-configuration IpAddress=192.168.0.10,Netmask=255.255.255.0
--profile sbe1
```

start NFS service

```
$ snowballEdge start-service --virtual-network-interface-arns arn:aws:snowball-
device:::interface/s.ni-8712e3a5cb180e65d --service-id nfs --service-configuration
 AllowedHosts=0.0.0.0/0 –profile sbe1
```

check service status

```
$ snowballEdge describe-service --service-id nfs --profile sbe1

{
 "ServiceId" : "nfs",
 "Status" : {
 "State" : "ACTIVE"
 },
 "Endpoints" : [ {
 "Protocol" : "nfs",
 "Port" : 2049,
 "Host" : "192.168.0.10"
 } ],
 "ServiceConfiguration" : {
 "AllowedHosts" : [ "192.168.0.6/32", "11.160.2.156/32", "192.168.0.10/32" ]
 }
}
```

Mount SBE

On the workstation, you can mount the SBE volume which is the bucket name of NFS storage.

```
$ sudo mkdir /mnt/local
$ sudo mount -t nfs 192.168.0.10:/buckets/your-nfs-bucket-name /mnt/local
```

After mounting SBE volume, you can check the volume size with 'df' command.

```
$ df -h* */mnt/local
Filesystem            Size  Used Avail Use% Mounted on
192.168.0.10          80TB  20G   79TB  1%  /mnt/local
```

Note

- Check capacity of mounting point **/mnt/local** , shows near "80TB" available capacity for storage optimized Snow Family devices, as an example.
- For more information, see NFS data transfer for Storage Optimized devices.

Troubleshooting NFS Issues

The following are errors you might encounter when using NFS on Snow Family devices.

I Get a DEACTIVATED error message

You get this message if you turn off your Snow Family device without first stopping the NFS service. The next time you start NFS, it might fail with a DEACTIVATED error message.

For example: Starting the service on your Snowball Edge.

```
snowballEdge start-service --service-id nfs --virtual-network-interface-arns
arn:aws:snowball-device:::interface/s.ni-84991da69040a7xxx
```

You can determine the status of the service by using the `describe-service` command.

```
snowballEdge describe-service --service-id nfs
{
  "ServiceId" : "nfs",
  "Status" : {
    "State" : "DEACTIVATED"
  }
}
```

How To Correct the Issue

To correct the problem, stop and restart the NFS service using the following steps.

Step 1: Use the `describe-service` command to determine the status of the service:

```
snowballEdge describe-service --service-id nfs
{
  "ServiceId" : "nfs",
  "Status" : {
    "State" : "DEACTIVATED"
  }
}
```

Step 2: Use the `stop-service` command to stop the NFS service:

```
snowballEdge stop-service --service-id nfs --profile 11
```

Step 3: Use the `start-service` command to start the NFS service normally:

```
snowballEdge start-service  --virtual-network-interface-arns arn:aws:snowball-
device:::interface/s.ni-8712e3a5cb180e65d --service-id nfs  --service-configuration
 AllowedHosts=0.0.0.0/0  --profile 11
```

Step 4: Use the `describe-service` command to make sure the service is ACTIVE:

snowballEdge describe-service --service-id nfs

```
{
 "ServiceId" : "nfs",
 "Status" : {
 "State" : "ACTIVE"
 },
 "Endpoints" : [ {
 "Protocol" : "nfs",
 "Port" : 2049,
 "Host" : "192.168.0.10"
 } ],
 "ServiceConfiguration" : {
 "AllowedHosts" : [ "192.168.0.6/32", "11.160.2.156/32", "192.168.0.10/32" ]
 }
}
```

Using an AWS Snowball Edge device with a Tape Gateway

Using an AWS Snowball Edge device with a Tape Gateway provides a secure, offline solution for migrating your tape data. A Snowball Edge device with a Tape Gateway lets you to migrate petabytes of data stored on physical tapes to AWS without changing your existing tape-based backup workflows, and without extreme network infrastructure or bandwidth-usage requirements. A standard Tape Gateway temporarily stores your tape data in the gateway cache and uses your network connection to transfer the data asynchronously to the AWS Cloud. However, a Snowball Edge device with a Tape Gateway stores your tape data on the device itself until you return it to AWS, and uses your network connection only for device-management traffic.

A Tape Gateway is a type of AWS Storage Gateway—a virtual appliance that emulates a physical tape library and works with your existing backup software to help you transfer data into the AWS Cloud. After you receive your Snowball Edge device, you unlock it, set up a Tape Gateway on it, copy your tape data to it, and then ship it back to AWS. AWS then stores your tape data in secure, durable, and low-cost Amazon S3 Glacier Flexible Retrieval or S3 Glacier Deep Archive storage. With this combination of technologies, you can migrate your tape data to AWS in situations where you have network-connectivity limitations, bandwidth constraints, or high connection costs. Moving tape data to AWS helps you decrease your physical-tape infrastructure expenses and gain online access to your tape-based data at any time.

The following sections provide detailed instructions on ordering, deploying, using, and troubleshooting a Snowball Edge device with a Tape Gateway. For more information about creating and managing a Tape Gateway on your Snowball Edge device, see Using a Tape Gateway on an AWS Snowball Edge device in the *AWS Storage Gateway User Guide*.

Ordering a Snowball Edge device with a Tape Gateway

Use the following procedure to order a Snowball Edge device preinstalled with a Tape Gateway and the hardware specifications necessary to back up your tape data. For more detailed information about ordering Snow Family devices, see Creating a Snowball Edge Job (p. 33).

To order your device

1. Sign in to the AWS Management Console, open the AWS Snow Family Management Console, and select the AWS Region where you want to order your device.
2. On the **AWS Snow Family** page, choose **Order an AWS Snow Family device**.
3. For **Snow Family jobs**, choose **Import virtual tapes into AWS Storage Gateway**.
4. For **Snow job assistance**, review the best practices and resources provided, then indicate your acknowledgement.
5. For **Shipping address**, choose where you want to ship your device.
6. For **Shipping speed**, choose how quickly you want to receive your device.
7. For **Job name**, enter a name to identify this job and its associated device.
8. For **Choose your Snow device**, choose **Snowball Edge Storage Optimized**.

   Note
   Snowball Edge Storage Optimized is the only Snow Family device that supports a Tape Gateway.
9. For **Encryption**, choose the AWS Key Management Service (AWS KMS) key that you want to use to encrypt your data.
10. For **Set notifications**, choose the Amazon Simple Notification Service (Amazon SNS) topic through which you will receive status notifications about your job order.

11. For each subsection on the **Review and create your job** page, make sure that the options you selected are correct. To make changes, choose **Edit**. When you're finished, choose **Create job** to complete your order.

Now that your order has been placed, you can track it on the **Jobs** page of the AWS Snow Family Management Console. From there, you can also download and install the Snow Family management software—AWS OpsHub for Snow Family—while you wait for your Snowball Edge device to arrive.

Deploying a Snowball Edge device with a Tape Gateway

After you receive your Snowball Edge device with a Tape Gateway, use the following procedure to connect and unlock it, launch the Tape Gateway application service on it, and obtain the IP address for the Tape Gateway. The Tape Gateway IP address is different from the IP address of the Snowball Edge device as a whole, and is required for activating the Tape Gateway in the AWS Storage Gateway console. You must activate the Tape Gateway before you can start backing up your tape data.

To deploy your device

1. Connect the device to your local network and note its IP address. For more information, see Connecting to Your Local Network (p. 43).
2. On a computer connected to the same local network as your device, download and install the latest version of AWS OpsHub for Snow Family from the **Jobs** page of the AWS Snow Family Management Console. For more information, see Using AWS OpsHub for Snow Family to Manage Devices (p. 56).
3. Obtain the job manifest and unlock code for your device from the AWS Snow Family Management Console. For more information, see Getting Your Credentials and Tools (p. 44).
4. Using AWS OpsHub for Snow Family and the credentials and IP address that you obtained in the previous steps, sign in and unlock the device. For more information, see Unlocking a device (p. 56).
5. In AWS OpsHub for Snow Family, do the following to start the Tape Gateway application service on your device:

    a. From the **Local devices** page, choose the job name associated with your device to view its management dashboard.
    b. Under **Services**, choose **Tape Gateway**, then choose **Start service**.
    c. In the dialog box that appears, choose a virtual network interface for the Tape Gateway application service to use. Note the IP address of the interface that you select. This is the Tape Gateway IP address, which you will need when you activate the Tape Gateway in the AWS Storage Gateway console.
    d. Choose **Start service**.

Now that your Snowball Edge device is deployed, the Tape Gateway application service is running, and you've obtained the Tape Gateway IP address, you must activate the gateway in the AWS Storage Gateway console. To do this, choose **Open Storage Gateway management console** from your device's AWS OpsHub management dashboard, then follow the procedures described in Using a Tape Gateway on an AWS Snowball Edge device in the *AWS Storage Gateway User Guide*.

Troubleshooting and best practices for a Snowball Edge device with a Tape Gateway

To avoid problems and keep your Snowball Edge device with a Tape Gateway running smoothly, refer to the following tips and guidelines:

- After you order, receive, and deploy your Snowball Edge device, you must create and activate your Tape Gateway from the same AWS Region. Attempting to create and activate the Tape Gateway in any AWS Region other than where the Snowball Edge was ordered is not supported, and will not work.
- To back up your tape data using your Snowball Edge device with a Tape Gateway, connect the virtual tape devices on the gateway to a Windows or Linux client on your network, and then access them using your preferred backup software. For more information about connecting the gateway to a client and testing it with your backup software, see Using Your Tape Gateway in the *AWS Storage Gateway User Guide*.
- When a virtual tape is in the **Available** state in the Storage Gateway console, it is ready to be mounted using your preferred backup software, and its full capacity is reserved in physical storage on the Snowball Edge device. When you eject a virtual tape, its status changes from **Available** to **In transit to VTS**, and only the specific amount of data written to the tape remains reserved on the Snowball Edge device. You don't need to eject virtual tapes from your backup software before shipping your Snowball Edge device back to AWS. Any virtual tapes left in the **Available** state are automatically ejected during the data-transfer process at the AWS facility.
- After you copy the data to your Snowball Edge device, you can schedule a pickup appointment to ship the device back to AWS. The E Ink shipping label is automatically updated to ensure that the device is sent to the correct AWS facility. For more information, see Shipping an AWS Snowball Edge (p. 224).

  You can track the device by using Amazon SNS generated text messages and emails.
- After your tape data is successfully transferred to the AWS Cloud and your Snowball Edge job is complete, you must manually delete the associated Tape Gateway using the Storage Gateway console.
- In rare cases, data corruption or other technical difficulties might prevent AWS from transferring specific virtual tapes to the AWS Cloud after receiving your Snowball Edge device. In such a case, you must use the Storage Gateway console to delete the virtual tapes that failed to transfer before you can re-attempt the transfer on another Snowball Edge device.
- A Snowball Edge device with a Tape Gateway supports only importing virtual tape data to AWS, and cannot be used to access data that has already been imported. To access your imported tape data, set up a standard Tape Gateway hosted on a virtual machine, hardware appliance, or Amazon EC2 instance, and transfer the data from AWS over a network connection.
- A Snowball Edge device that is configured for a Tape Gateway is not intended for use with other Snowball Edge services or resources, such as Amazon S3, Network File System (NFS) file systems, AWS Lambda, or Amazon EC2. To use those services or resources, you must create a new Snowball Edge job to order a separate, appropriately configured device. For instructions, see Creating a Snowball Edge Job (p. 33).
- To troubleshoot a Snowball Edge device with a Tape Gateway, or if directed to do so by AWS Support, you might need to connect to your gateway's local console. The local console is a configuration interface that runs on the Snowball Edge device that's hosting your gateway. You can use this local console to perform maintenance tasks specific to the gateway on that device. For more information, see Performing Maintenance Tasks on the Local Console in the *AWS Storage Gateway User Guide*.

  To access the local console for the Tape Gateway running on your Snowball Edge device:

  1. From the command prompt on a computer connected to the same local network as your device, run the following command:

     ```
     ssh user_name@xxx.xxx.xxx.xxx
     ```

     To run this command, replace *user_name* with your local console user name, and replace *xxx.xxx.xxx.xxx* with the Tape Gateway IP address that you obtained when you launched the Tape Gateway on your Snowball Edge device. For instructions on how to obtain the Tape Gateway IP address, see Deploying a Snowball Edge device with a Tape Gateway (p. 119).
  2. Enter your password.

Note
If this is your first time logging in to the local console on this device, the default user name is `admin`, and the default password is `password`. Change the default password immediately after you log in. For more information, see Logging in to the Local Console Using Default Credentials in the *AWS Storage Gateway User Guide*.

Using the AWS Snow Family API with a Snowball Edge device with a Tape Gateway

The AWS Snow Family API and AWS Command Line Interface (AWS CLI) work the same for a Snowball Edge device with a Tape Gateway as they do for a standard Snowball Edge device, with the following exceptions:

- After you receive your Snowball Edge device and use the `unlock-device --manifest-file` AWS CLI command to unlock it, you can use the `list-services` command to return the `ServiceId` for the Tape Gateway application service. You must provide this value to start the Tape Gateway application service on your device.

```
snowballEdge list-services
{
    "ServiceIds" : [ "tapegateway" ]
}
```

- You can use the `describe-device` command to return the `PhysicalNetworkInterfaceId` for each physical network interface on your Snowball Edge device. You must provide this value when you create the virtual network interface for the Tape Gateway application service.

```
snowballEdge describe-device

{
  "DeviceId" : "JID-EXAMPLE12345-123-456-7-890",
  "UnlockStatus" : {
    "State" : "UNLOCKED"
  },
  "ActiveNetworkInterface" : {
    "IpAddress" : "192.0.2.0"
  },
  "PhysicalNetworkInterfaces" : [ {
    "PhysicalNetworkInterfaceId" : "s.ni-EXAMPLEd9ecbf03e3",
    "PhysicalConnectorType" : "RJ45",
    "IpAddressAssignment" : "STATIC",
    "IpAddress" : "0.0.0.0",
    "Netmask" : "0.0.0.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "EX:AM:PL:E0:12:34"
  }, {
    "PhysicalNetworkInterfaceId" : "s.ni-EXAMPLE4c3840068f",
    "PhysicalConnectorType" : "QSFP",
    "IpAddressAssignment" : "STATIC",
    "IpAddress" : "0.0.0.0",
    "Netmask" : "0.0.0.0",
    "DefaultGateway" : "192.0.2.2",
    "MacAddress" : "EX:AM:PL:E0:56:78"
  }, {
    "PhysicalNetworkInterfaceId" : "s.ni-abcd1234",
    "PhysicalConnectorType" : "SFP_PLUS",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.168.1.231",
```

```
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.3",
    "MacAddress" : "EX:AM:PL:E0:90:12"
  } ]
}
```

- You can use the `create-virtual-network-interface` command to create the virtual network interface for the Tape Gateway application service. You must provide the `PhysicalNetworkInterfaceId` and specify the method of IP address assignment, such as DHCP. This command returns the `VirtualNetworkInterfaceArn` that you must provide when you start the Tape Gateway application service on your device.

```
snowballEdge create-virtual-network-interface \ --physical-network-interface-id s.ni-
abcd1234 \ --ip-address-assignment DHCP

{
     "VirtualNetworkInterface" : {
         "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/s.ni-
abcd1234",
         "PhysicalNetworkInterfaceId" : "s.ni-abcd1234",
         "IpAddressAssignment" : "DHCP",
         "IpAddress" : "192.0.2.0",
         "Netmask" : "255.255.255.0",
         "DefaultGateway" : "192.0.2.10",
         "MacAddress" : "1a:2b:3c:4d:5e:6f"
     }
}
```

- You can use the `start-service` command to start the Tape Gateway application service on your Snowball Edge device. You must provide the `ServiceId` and `VirtualNetworkInterfaceArn` for the Tape Gateway application service.

```
snowballEdge start-service \
--service-id tapegateway \
--virtual-network-interface-arns arn:aws:snowball-device:::interface/s.ni-
abcd1234abcd1234
```

- You can use the `describe-service` command to check whether the Tape Gateway application service is active. You must provide the Tape Gateway `ServiceId`.

```
snowballEdge describe-service –service-id service-id

                    {
"ServiceId" : "tapegateway",
  "Status" : {
    "State" : "ACTIVE"
  },
"Storage" : {
"TotalSpaceBytes" : 99608745492480,
"FreeSpaceBytes" : 99608744468480
},
"Endpoints" : [ {
"Protocol" : "iSCSI",
"Port" : 860,
"Host" : "192.0.2.0"
}, {
"Protocol" : "iSCSI",
"Port" : 3260,
"Host" : "192.0.2.0",
} ]
}
```

For more detailed information about the Snow Family API, see the AWS Snow Family API Reference.

Using AWS Lambda with an AWS Snowball Edge

Following, you can find an overview of AWS Lambda powered by AWS IoT Greengrass as used in an AWS Snowball Edge device. With this feature, you can run Lambda functions locally on a Snowball Edge. To use Lambda powered by AWS IoT Greengrass functions with Snowball Edge, you must create your jobs in an AWS Region supported by AWS IoT Greengrass. For a list of valid AWS Regions, see AWS IoT Greengrass in the *AWS General Reference*. Lambda on Snowball Edge is available, wherever Lambda and Snowball Edge are available.

If you created your job before July 17, 2018, this information doesn't apply to your device.

Note
These features are only supported in the following AWS Regions:

- Asia Pacific (Tokyo)
- Asia Pacific (Sydney)
- Canada (Central)
- US East (N. Virginia)
- US West (Oregon)

Before You Start

Before you create a Python-language Lambda function to run on your Snowball Edge, we recommend that you familiarize yourself with the following services, concepts, and related topics.

Prerequisites for AWS IoT Greengrass

AWS IoT Greengrass is software that extends AWS Cloud capabilities to local devices. AWS IoT Greengrass makes it possible for local devices to collect and analyze data closer to the source of information, while also securely communicating with each other on local networks. More specifically, developers who use AWS IoT Greengrass can author serverless code (Lambda functions) in the AWS Cloud. They can then conveniently deploy this code to devices for local execution of applications.

The following AWS IoT Greengrass concepts are important to understand when using AWS IoT Greengrass with a Snowball Edge:

- **AWS IoT Greengrass requirements** – For a full list of AWS IoT Greengrass requirements, see Requirements in the *AWS IoT Greengrass Developer Guide*.
- **AWS IoT Greengrass core** – Each Snowball Edge has the AWS IoT Greengrass core software. For more information about the AWS IoT Greengrass core software, see Greengrass Core Software in the *AWS IoT Greengrass Developer Guide*.
- **AWS IoT Greengrass group** – A Snowball Edge is part of an AWS IoT Greengrass group as the group's core device. For more information about groups, see AWS Greengrass IoT Groups in the *AWS IoT Greengrass Developer Guide*.
- **MQTT** – AWS IoT Greengrass uses the industry-standard, lightweight Message Queue Telemetry Transport (MQTT) protocol to communicate within a group. Within a Snowball Edge, there is an IoT device associated with the Amazon S3 interface. When data is written using Amazon S3 PUT object operations on buckets specified at job creation, these operations trigger MQTT messages. These messages in turn trigger any associated Lambda functions. In addition, any MQTT-compatible device or software in your AWS IoT Greengrass group can trigger the Lambda functions, if you define the related MQTT message to do so.

- **Associated service role** – Before you can use AWS IoT Greengrass with a Snowball Edge as a core device, you must associate an AWS IoT Greengrass service role with your account. This association allows AWS IoT Greengrass to access your Lambda functions and AWS IoT resources. For more information, see Associating an AWS IoT Greengrass Service Role with Your Account (p. 124).

Prerequisites for AWS Lambda

AWS Lambda is a compute service that lets you run code without provisioning or managing servers. The following Lambda concepts are important to understand when using Lambda with a Snowball Edge:

- **Lambda functions** – Your custom code, uploaded and published to Lambda and used on a Snowball Edge. For more information, see Lambda Functions in the *AWS Lambda Developer Guide*.
- **Lambda console** – The console in which you upload, update, and publish your Python-language Lambda functions for use on a Snowball Edge. For a sample on how to use the Lambda console, see Step 2: Create a HelloWorld Lambda Function and Explore the Console in the *AWS Lambda Developer Guide*.
- **Python** – The high-level programming language used for your Lambda functions powered by AWS IoT Greengrass on a Snowball Edge. AWS IoT Greengrass supports Python version 2.7.

Related Topics

The following topics are related to running AWS Lambda powered by AWS IoT Greengrass functions on a Snowball Edge:

- Limitations for Lambda Powered by AWS IoT Greengrass (p. 259)
- Customer Managed Policy Examples (p. 246)

Next:

Getting Started with Lambda Powered by AWS IoT Greengrass (p. 124)

Getting Started with Lambda Powered by AWS IoT Greengrass

To get started with AWS Lambda powered by AWS IoT Greengrass functions on an AWS Snowball Edge device, take the following steps:

1. Associating an AWS IoT Greengrass Service Role with Your Account (p. 124)
2. Configuring AWS IoT Greengrass with a Snowball Edge (p. 125)
3. Creating Your Job (p. 126)
4. Creating a Virtual Network Interface (p. 126)
5. Starting AWS IoT Greengrass on a Snowball Edge (p. 126)
6. Using Lambda Powered by AWS IoT Greengrass Functions on a Snowball Edge (p. 128)

Associating an AWS IoT Greengrass Service Role with Your Account

Before you can use AWS IoT Greengrass with a Snowball Edge as a core device, you must associate an AWS IoT Greengrass service role with your account. This association allows AWS IoT Greengrass to access

your Lambda functions and AWS IoT resources. If you try to create a job for a Snowball Edge before you associate the service role, the job creation request fails.

The following procedures show how to configure and store your AWS IoT Greengrass settings in the cloud. This configuration means that you can push Lambda function changes to the Snowball Edge and changes to other devices in your AWS IoT Greengrass group. The first procedure uses the AWS Identity and Access Management (IAM) console, and the second procedure uses the AWS Command Line Interface (AWS CLI).

To create an AWS IoT Greengrass service role in the IAM console

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. For **Role Type**, choose **AWS Greengrass Role**.
3. Select **AWSGreengrassResourceAccessPolicy**, and then choose **Next Step**.
4. Enter a name for your role, and then choose **Create Role**.

After creating the role, make a note of the role Amazon Resource Name (ARN), and use it in the next procedure.

To associate the AWS IoT Greengrass service role with your account

1. Install the AWS CLI on your computer, if you haven't already. For more information, see Installing the AWS CLI in the *AWS Command Line Interface User Guide*.
2. Configure the AWS CLI on your computer, if you haven't already. For more information, see Configuring the AWS CLI in the *AWS Command Line Interface User Guide*.
3. Open a terminal on your computer and run the following AWS CLI command, with the AWS IoT Greengrass role ARN you created in the first procedure.

```
aws greengrass associate-service-role-to-account --role-
arn arn:aws:iam::123EXAMPLE12:role/GreengrassRole
```

Now you can create a job for a Snowball Edge and use AWS Lambda powered by AWS IoT Greengrass.

Configuring AWS IoT Greengrass with a Snowball Edge

When you create a compute job for a Snowball Edge, the service automatically configures the following AWS IoT Greengrass elements:

- **AWS IoT Greengrass core software** – The AWS IoT Greengrass distributable has been pre-installed on the Snowball Edge.
- **AWS IoT Greengrass group** – When you create a compute job, an AWS IoT Greengrass group named *JobID*_group is created and provisioned. The core of this group is named *JobID*_core, and it has a device in it named *JobID*_s3adapter. The Amazon S3 interface is registered as an IoT device in your AWS IoT Greengrass group. This registration is because the S3 interface sends MQTT messages for every Amazon S3 PUT object action for the buckets on the Snowball Edge.

If you have other configuration changes that you want to make for the AWS IoT Greengrass group associated with a Snowball Edge, you can make them after you unlock the device and connect it to the internet.

Creating Your Job

Create a job in the AWS Snow Family Management Console and associate the Amazon Resource Name (ARN) for at least one published Lambda function with a bucket. For a walkthrough on creating your first job, see Creating an AWS Snowball Edge Job.

All the Lambda functions that you choose during job creation are triggered by MQTT messages sent by the IoT device associated with the Amazon S3 interface. These MQTT messages are triggered when an Amazon S3 PUT object action is made against the bucket on the AWS Snowball Edge device.

Creating a Virtual Network Interface

When the Snowball Edge arrives, unlock the device, and create a virtual network interface to bind to AWS IoT Greengrass. Each Snowball Edge has three network interfaces (NICs), the physical network interface controllers for the device. These are the RJ45, SFP, and QSFP ports on the back of the device.

Each virtual NIC (VNIC) is based on the physical one, and you can have any number of VNICs associated with each NIC. To create a virtual network interface, use the `snowballEdge create-virtual-network-interface` command.

> **Note**
> `--static-ip-address-configuration` is only a valid option when using `STATIC` for `--ip-address-assignment`.

Usage (configured Snowball Edge client)

```
snowballEdge create-virtual-network-interface --ip-address-assignment [DHCP or STATIC]
 --physical-network-interface-id [physical network interface id] --static-ip-address-
configuration IpAddress=[IP address],NetMask=[Netmask]
```

Usage (Snowball Edge client not configured)

```
snowballEdge create-virtual-network-interface --endpoint https://[ip address] --manifest-
file /path/to/manifest --unlock-code [unlock code] --ip-address-assignment [DHCP or STATIC]
 --physical-network-interface-id [physical network interface id] --static-ip-address-
configuration IpAddress=[IP address],NetMask=[Netmask]
```

Example Creating VNICs (DHCP)

```
./snowballEdge create-virtual-network-interface --ip-address-assignment dhcp --physical-
network-interface-id s.ni-8EXAMPLEaEXAMPLEd
{
  "VirtualNetworkInterface" : {
    "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/
s.ni-8EXAMPLE8EXAMPLEf",
    "PhysicalNetworkInterfaceId" : "s.ni-8EXAMPLEaEXAMPLEd",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.0.2.0",
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "EX:AM:PL:E1:23:45"
  }
}
```

Starting AWS IoT Greengrass on a Snowball Edge

Before you can use AWS Lambda powered by AWS IoT Greengrass, you need to use the Snowball Edge client to start it.

Note
It can take several minutes to start AWS IoT Greengrass on a Snowball Edge. We recommend using the `describe-service` Snowball Edge client command after you start the service to determine when it's active. For more information, see Getting Service Status (p. 92).

To start AWS Lambda powered by AWS IoT Greengrass

1. Run the `snowballEdge describe-device` command to get the list of network interface IDs. For more information on this command, see Getting Device Status (p. 90).
2. Identify the ID for the physical network interface that you want to use, and make a note of it. The following examples show running this command with the two different IP address assignment methods, either `DHCP` or `STATIC`.

```
snowballEdge create-virtual-network-interface \
--physical-network-interface-id s.ni-abcd1234 \
--ip-address-assignment DHCP

        //OR//

snowballEdge create-virtual-network-interface \
--physical-network-interface-id s.ni-abcd1234 \
--ip-address-assignment STATIC \
--static-ip-address-configuration IpAddress=192.0.2.0,Netmask=255.255.255.0
```

3. The command returns a JSON structure that includes the virtual network interface ARN. Make a note of that ARN.
4. Start the AWS IoT Greengrass service using the virtual network interface, as in the following example.

```
snowballEdge start-service \
--service-id greengrass\
--virtual-network-interface-arns arn:aws:snowball-device:::interface/
s.ni-abcd1234abcd1234a
```

AWS Lambda powered by AWS IoT Greengrass has now started. Anytime you need the IP address or virtual network interface ARN for the AWS IoT Greengrass, you can use the `snowballEdge describe-virtual-network-interfaces` Snowball Edge client command.

Connecting to the Internet to Update AWS IoT Greengrass Group Certificates

Every time you start the AWS IoT Greengrass service, you must log into the AWS IoT Greengrass console with the account used to create the job in the AWS Snow Family Management Console and initiate an AWS IoT Greengrass group deployment to the AWS IoT Greengrass core. For more information, see https://docs.aws.amazon.com/greengrass/v2/developerguide/import-lambda-function-console.html in the *AWS IoT Greengrass Developer Guide*. After that, you can disconnect the device from the internet. The associated AWS IoT Greengrass group then functions in offline mode.

Important
When the IP address for any device in the local AWS IoT Greengrass group changes, reconnect the Snowball Edge to the internet so it can get new certificates.

Using Lambda Powered by AWS IoT Greengrass Functions on a Snowball Edge

Now that the service is started, and you've initiated an AWS IoT Greengrass group deployment to the AWS IoT Greengrass core, you can trigger Lambda functions by writing data to the Amazon S3 buckets on the device. Unless programmed otherwise, Lambda functions are triggered by MQTT messages sent by the IoT device associated with the Amazon S3 interface. These MQTT messages are in turn triggered by Amazon S3 PUT object actions. Amazon S3 PUT object actions occur through the NFS interface (with a write operation), the AWS CLI (using the Amazon S3 interface), or programmatically through one of the SDKs or a REST application of your own design.

You can use your Lambda powered by AWS IoT Greengrass functions to run Python code against public endpoints among AWS services in the cloud. For this Python code execution to work, your AWS Snowball Edge device must be connected to the internet. For more information, see the AWS Lambda Developer Guide.

Updating Existing Functions

You can update existing Lambda functions in the console. If you do, and if your AWS Snowball Edge device is connected to the internet, a deployment agent notifies each Lambda function of the updated AWS IoT Greengrass group configuration. For more information, see Create a Deployment in the *AWS IoT Greengrass Developer Guide*.

Adding New Functions

After your Snowball Edge arrives and you unlock it and connect it to the internet, you can add or remove Lambda functions. These new Lambda functions don't have to be triggered by Amazon S3 PUT object actions. Instead, the event that you programmed to trigger the new functions performs function triggering, as with typical Lambda functions running in an AWS IoT Greengrass group.

Testing Lambda Powered by AWS IoT Greengrass Functions

You can test your Lambda functions before you create your job, or after you've started AWS IoT Greengrass on the device. When testing your Python-coded function in the Lambda console, before creating your job, you might encounter errors. If that happens, see Error handling and automatic retries in the *AWS Lambda Developer Guide*.

To test your Lambda functions on-premises, use the following procedure.

To test your Lambda functions on-premises

1. Create a subscription in the AWS IoT Greengrass console. For more information, see Configure subscriptions in the *AWS IoT Greengrass Developer Guide*.
2. Deploy the AWS IoT Greengrass group containing that subscription to the AWS IoT Greengrass core running on the Snowball Edge device. In this subscription, you specify the following:
   - The **Source** as the device with Snowball Edge Job ID generated when you created the job.
   - The **Target** as the AWS IoT service.
3. After the deployment is successfully completed, log into the AWS IoT console with the account used to create your job.
4. Choose **Test**, and then choose **Subscribe to a topic**.
5. For **Subscription topic**, enter the name of the bucket on the Snowball Edge to copy an object into.
6. Choose **Subscribe to topic**. The MQTT client page then shows you the subscription to the bucket that you specified.
7. Using the AWS CLI, Amazon S3 interface, or one of the AWS SDKs, copy an object to the specified bucket.

A JSON object then displays the payloads included in the MQTT message published to the AWS IoT Greengrass core backing the AWS IoT Greengrass service running on the Snowball Edge device. This payload includes the name of the object and the name of the bucket the object was PUT into.

You've now successfully tested your Lambda function. The JSON object indicates that the MQTT message published to the AWS IoT Greengrass core was received successfully, and the associated Lambda function was run. For information about adding AWS IoT Greengrass subscriptions to your AWS IoT Greengrass group, see Configure subscriptions in the *AWS IoT Greengrass Developer Guide*.

Stopping AWS IoT Greengrass

When you're done with Lambda powered by AWS IoT Greengrass, you can stop it with the `snowballEdge stop-service` Snowball Edge client command. For more information, see Stopping a Service on Your Snowball Edge (p. 87).

Lambda powered by AWS IoT Greengrass running on a Snowball Edge device is stateless. As a result, any data (including AWS IoT Greengrass configuration, certificates, and Lambda functions) running on the device is lost when the AWS IoT Greengrass service enters the `DEACTIVATING` state or becomes `INACTIVE`.

Using Amazon EC2 Compute Instances

This section provides an overview of using Amazon EC2 compute instances on an AWS Snowball Edge device, including conceptual information, procedures, and examples.

Topics

Overview

You can run Amazon EC2 compute instances hosted on a Snowball Edge with the `sbe1`, `sbe-c`, and `sbe-g` instance types. The `sbe1` instance type works on devices with the Snowball Edge Storage Optimized

option. The sbe-c instance type works on devices with the Snowball Edge Compute Optimized option. Both the sbe-c and sbe-g instance types work on devices with the Snowball Edge Compute Optimized with GPU option. For a list of supported instance types, see Quotas for Compute Instances on a Snowball Edge Device (p. 144).

All three compute instance types supported for use on Snowball Edge device options are unique to Snowball Edge devices. Like their cloud-based counterparts, these instances require Amazon Machine Images (AMIs) to launch. You choose the AMI to be that base image for an instance in the cloud, before you create your Snowball Edge job.

To use a compute instance on a Snowball Edge, create a job and specify your AMIs. You can do this using the AWS Snow Family Management Console, the AWS CLI, or one of the AWS SDKs. Typically, there are some housekeeping prerequisites that you must perform before creating your job, to use your instances.

After your device arrives, you can start managing your AMIs and instances. You can manage your compute instances on a Snowball Edge through an Amazon EC2–compatible endpoint. This type of endpoint supports many of the Amazon EC2 CLI commands and actions for the AWS SDKs. You can't use the AWS Management Console on the Snowball Edge to manage your AMIs and compute instances.

When you're done with your device, return it to AWS. If the device was used in an import job, the data transferred using the Amazon S3 interface or the NFS interface is imported into Amazon S3. Otherwise, we perform a complete erasure of the device when it is returned to AWS. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Important

- Using encrypted AMIs on Snowball Edge devices is not supported.
- Data in compute instances running on a Snowball Edge isn't imported into AWS.

Compute Instances on Clusters

You can use compute instances on clusters of Snowball Edge devices. The procedures and guidance for doing so are the same as for using compute instances on a standalone device.

When you create a cluster job with AMIs, a copy of each AMI exists on each node in the cluster. For that reason, there can only be 10 AMIs associated with a cluster of devices, regardless of the number of nodes on the cluster. When you launch an instance in a cluster, you declare the node to host the instance in your command, and the instance runs on a single node.

Clusters must be either compute optimized or storage optimized. You can have a cluster of compute optimized nodes, and some number of them can have GPUs. You can have a cluster made entirely of storage optimized nodes. A cluster can't be made of a combination of compute optimized nodes and storage optimized nodes.

Pricing for Compute Instances on Snowball Edge

There are additional costs associated with using compute instances. For more information, see AWS Snowball Edge Pricing.

Using an Amazon EC2 AMI on Your Device

To use an Amazon Machine Image (AMI) on your AWS Snow Family device, you must first add it to the device. You can add an AMI in the following ways:

- Upload the AMI when you order the device.

- Add the AMI when your device arrives at your site.

Amazon EC2 compute instances that come with your Snow Family devices are launched based on the Amazon EC2 AMIs that you add to your device. Amazon EC2 AMIs support both Linux and Microsoft Windows operating systems.

Linux

The following Linux operating systems are supported:

- Amazon Linux 2 for Snow Family
- CentOS 7 (x86_64) - with Updates HVM
- Ubuntu 16.04 LTS - Xenial (HVM)

Windows

The following Windows operating systems are supported:

- Windows Server 2012 R2
- Windows Server 2016
- Windows Server 2019

You can add Windows AMIs to your device by importing your Windows virtual machine (VM) image into AWS using VM Import/Export. Or, you can import the image into your device right after the device is deployed to your site. For more information, see Adding a Microsoft Windows AMI (p. 133).

> **Note**
> Windows AMIs that originated in AWS can't be added to your device.
> AMIs imported locally must be in BIOS boot mode as UEFI is not supported.

Snow Family supports the Bring Your Own License (BYOL) model. For more information, see Adding a Microsoft Windows AMI (p. 133).

Topics

Adding an AMI When Ordering Your Device

When you order your device, you can add AMIs to the device by choosing **Enable Compute with EC2** in the AWS Snow Family Management Console. When you choose **Add AMI**, you see the **Source AMI name** list that contains all the AMIs that can be loaded onto your device. The AMIs fall into the following categories:

- **AMIs from AWS Marketplace** — These are AMIs created from the list of supported AMIs. For information about creating an AMI from the supported AMIs from AWS Marketplace, see Adding an AMI from AWS Marketplace (p. 132).
- **AMIs uploaded using VM Import/Export** — When you order your device, the AMIs that were uploaded using VM Import/Export are listed in the console. For more information, see Importing a VM as an Image Using VM Import/Export in the *VM Import/Export User Guide*. For information about supported virtualization environments, see VM Import/Export Requirements.

Adding an AMI from AWS Marketplace

Follow these steps to add an AMI from AWS Marketplace:

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Launch a new instance of a supported AMI in AWS Marketplace.

   Note
   When you launch your instance, make sure that the storage size you assign to the instance is appropriate for your use case. In the Amazon EC2 console, you do this in the **Add storage** step.
   For a list of the supported compute instance storage volumes and sizes on a Snowball Edge device, see Amazon Elastic Compute Cloud endpoints and quotas in the *AWS General Reference*.
3. Install and configure the applications that you want to run on the Snowball Edge, and make sure that they work as expected.

   Important

   - Only single volume AMIs are supported.
   - The EBS volume in your AMI should be 10 TB or less. We recommend that you provision the EBS volume size needed for the data in the AMI. This will help decrease the time it takes to export your AMI and load it into your device. You can resize or add more volumes to your instance after your device is deployed.
   - The EBS snapshot in your AMI must not be encrypted.
4. Make a copy of the PEM or PPK file that you used for the SSH key pair when you created this instance. Save this file to the server that you plan to use to communicate with the Snowball Edge device. Make a note of the path to this file because you will need it when you use SSH to connect to the EC2 instance on your device.

   Important
   If you don't follow this procedure, you can't connect to your instances with SSH when you receive your Snowball Edge device.
5. Save the instance as an AMI. For more information, see Amazon EC2 User Guide for Linux Instances in the *Amazon EC2 User Guide for Linux Instances.*
6. Repeat steps 1–4 for each of the instances that you want to connect to using SSH. Be sure to make copies of each of the SSH key pairs, and keep track of the AMIs that they're associated with.
7. Now, when you order your device, these AMIs are available to add to your device.

Adding an AMI Locally

When the device arrives on your site, you can add new AMIs to it. For instructions, see Importing an Image into Your Device as an Amazon EC2 AMI (p. 134). Keep in mind that although all VMs are supported, only supported AMIs have been tested for full functionality.

Note
When you use VM Import/Export to add AMIs to your device or import a VM after your device is deployed, you can add VMs that use any operating system. However, only supported operating systems have been tested and validated on Snow Family devices. You are responsible for adhering to the terms and conditions of any operating system or software that is in the virtual image that you import onto your device.

Important
For AWS services to function properly on a Snowball Edge, you must allow the ports for the services. For details, see Ports Required to Use AWS Services on an AWS Snowball Edge Device (p. 182).

Adding a Microsoft Windows AMI

For virtual machines (VMs) that use a supported Windows operating system, you can add the AMI by importing your Windows VM image into AWS using VM Import/Export, or by importing it into your device directly after it is deployed to your site.

Bring Your Own License (BYOL)

Snowball Edge supports importing Microsoft Windows AMIs onto your device with your own license. Bring Your Own License (BYOL) is the process of bringing an AMI that you own with its on-premises license to AWS. AWS provides both shared and dedicated deployment options for the BYOL option.

You can add your Windows VM image to your device by importing it into AWS using VM Import/Export or by importing it into your device directly after it is deployed to your site. You can't add Windows AMIs that originated in AWS. Therefore, you must create and import your own Windows VM image and bring your own license if you want to use the AMI on your Snow Family device. For more information about Windows licensing and BYOL, see Amazon Web Services and Microsoft: Frequently Asked Questions.

Creating a Windows VM Image to Import into Your Device

To create a Windows VM image, you need a virtualization environment, such as VirtualBox, which is supported for the Windows and macOS operating systems. When you create a VM for Snow devices, we recommend that you allocate at least two cores with at least 4 GB of RAM. When the VM is up and running, you must install your operating system (Windows Server 2012, 2016, or 2019). To install the required drivers for the Snow Family device, follow the instructions in this section.

For a Windows AMI to run on a Snow device, you must add specific drivers to the device. Specifically, you must add the VirtIO, FLR, NetVCM, Vioinput, Viorng, Vioscsi, Vioserial, and Vistor drivers. You can download the VirtIO file that contains all the required drivers.

> **Note**
> If you plan to import your VM image directly to your deployed Snow device, the VM image file must be in the RAW format.

To create a Windows image

1. On your Microsoft Windows computer, choose **Start** and enter **`devmgmt.msc`** to open **Device Manager**.
2. In the main menu, choose **Actions**, and then choose **Add legacy hardware**.
3. In the wizard, choose **Next**.
4. Choose **Install the hardware that I manually select from a list (advanced)**, and choose **Next**.
5. Choose **Show All Devices** and choose **Next**.
6. Choose **Have Disk**, open the **Copy manufacturer's files from** list, and browse to the ISO file.
7. In the ISO file, browse to the `Driver\W2K8R2\amd64` directory, and then find the `.INF` file.
8. Choose the **.INF** file, choose **Open**, and then choose **OK**.
9. When you see the driver name, choose **Next**, and then choose **Next** two more times. Then choose **Finish**.

   This installs a device using the new driver. The actual hardware doesn't exist, so you will see a yellow exclamation mark that indicates an issue on the device. You must fix this issue.

To fix the hardware issue

1. Open the context (right-click) menu for the device that has the exclamation mark.

2. Choose **Uninstall**, clear **Delete the driver software for this device**, and choose **OK**.

   The driver is installed, and you are ready to launch the AMI on your device.

Importing a VM Image into Your Device

After you prepare your VM image, you can use one of the options to import the image to your device.

- **In the cloud using VM Import/Export** — When you import your VM image into AWS and register it as an AMI, you can add it to your device when you place an order from the AWS Snow Family Management Console. For more information, see Importing a VM as an Image Using VM Import/Export in the *VM Import/Export User Guide*.
- **Locally on your device that is deployed at your site** — You can import your VM image directly into your device using AWS OpsHub for Snow Family or the AWS Command Line Interface (AWS CLI).

  For information about using AWS OpsHub, see Using Amazon EC2 Compute Instances Locally.

  For information about using the AWS CLI, see Importing an Image into Your Device as an Amazon EC2 AMI (p. 134).

Importing an Image into Your Device as an Amazon EC2 AMI

Using the AWS CLI, you can use the AWS feature VM Import/Export to import images into your AWS Snowball Edge device as EC2 instances. After you import an image, you register it as an Amazon Machine Image (AMI) and launch it as an Amazon EC2 instance.

Topics

Step 1: Prepare the Image

You can either export an image from the AWS Cloud using VM Import/Export, or generate the image locally using your choice of virtualization platform. You can also export your image from the AWS Cloud.

- To import an image from AWS using VM Import/Export, see Importing a VM as an Image Using VM Import/Export.
- To export an image from an AMI to AWS using VM Import/Export, see Exporting a VM Directly from an Amazon Machine Image (AMI).

Note
Be aware of the following limitations when uploading images to a Snowball Edge device.

- Snow Family devices currently only support importing snapshots that are in the RAW image format.
- Snow Family devices currently only support importing snapshots with sizes from 1 GB to 1 TB.

When you have the image, you must upload it to Amazon S3 on your device because you can only import images as snapshots from Amazon S3 that are available on your device or cluster. During the importing process, you choose the S3 bucket on your Snowball Edge device to store the image in.

Upload Images to your Amazon S3 Device

Check your S3 buckets:

```
aws s3 ls --endpoint http://snowball-ip:8080 --profile profile-name
```

To store your images, Choose the Amazon S3 bucket on your device to import images as snapshots:

```
aws s3 cp image-path s3://S3-bucket-name --endpoint http://snowball-ip:8080 --
profile profile-name
```

Step 2: Set Up Required Permissions

For the import to be successful, you must set up permissions for VM Import/Export, Amazon EC2, and the user.

Note
The service roles and policies that provide these permissions are located on the Snow Family device.

Permissions Required for VM Import/Export

Before you can start the import process, you must create an IAM role with a trust policy that allows Snowball VM Import/Export to assume the role. Additional permissions are given to the role to allow VM Import/Export to access the image stored in the S3 bucket on the device.

Create a trust policy json file

Following is an example trust policy required to be attached to the role so that VM Import/Export can access the snapshot that needs to be imported from the S3 bucket.

```
{
   "Version":"2012-10-17",
   "Statement":[
      {
         "Effect":"Allow",
         "Principal":{
            "Service":"vmie.amazonaws.com"
         },
         "Action":"sts:AssumeRole"
      }
   ]
}
```

Create a role with the trust policy json file

The role name can be vmimport. You can change it by using the --role-name option in the command:

```
aws iam create-role --role-name role-name --assume-role-policy-document file:///trust-policy-json-path --profile profile-name --endpoint http://snowball-ip:6078 --region snow
```

The following is an example output from the `create-role` command.

```
{
   "Role":{
      "AssumeRolePolicyDocument":{
         "Version":"2012-10-17",
         "Statement":[
            {
               "Action":"sts:AssumeRole",
               "Effect":"Allow",
               "Principal":{
                  "Service":"vmie.amazonaws.com"
               }
            }
         ]
      },
      "MaxSessionDuration":3600,
      "RoleId":"AROACEMGEZDGNBVGY3TQOJQGEZAAAABQBB6NSGNAAAABPSVLTREPY3FPAFOLKJ3",
      "CreateDate":"2022-04-19T22:17:19.823Z",
      "RoleName":"vmimport",
      "Path":"/",
      "Arn":"arn:aws:iam::123456789012:role/vmimport"
   }
}
```

Create a policy for the role

The following example policy has the minimum required permissions to access Amazon S3. Change the Amazon S3 bucket name to the one which has your images. You also can use prefixes to further narrow down the location where VM Import/Export can import snapshots from. Create a policy json file like this.

```
{
   "Version":"2012-10-17",
   "Statement":[
      {
         "Effect":"Allow",
         "Action":[
            "s3:GetBucketLocation",
            "s3:GetObject",
            "s3:ListBucket",
            "s3:GetMetadata"
         ],
         "Resource":[
            "arn:aws:s3:::import-snapshot-bucket-name",
            "arn:aws:s3:::import-snapshot-bucket-name/*"
         ]
      }
   ]
}
```

Create a policy with the policy file:

```
aws iam create-policy --policy-name policy-name --policy-document file:///policy-json-file-path --profile profile-name --endpoint http://snowball-ip:6078 --region snow
```

The following is an output example from the create-policy command.

```
{
   "Policy":{
      "PolicyName":"vmimport-resource-policy",
      "PolicyId":"ANPACEMGEZDGNBVGY3TQOJQGEZAAAABOOEE3IIHAAAABWZJPI2VW4UUTFEDBC2R",
      "Arn":"arn:aws:iam::123456789012:policy/vmimport-resource-policy",
      "Path":"/",
      "DefaultVersionId":"v1",
      "AttachmentCount":0,
      "IsAttachable":true,
      "CreateDate":"2020-07-25T23:27:35.690000+00:00",
      "UpdateDate":"2020-07-25T23:27:35.690000+00:00"
   }
}
```

Attach the policy to the role

Attach a policy to the preceding role and grant permissions to access the required resources. This allows the local VM Import/Export service to download the snapshot from Amazon S3 on the device.

```
aws iam attach-role-policy --role-name role-name --policy-arn
 arn:aws:iam::123456789012:policy/policy-name --profile profile-name --endpoint
 http://snowball-ip:6078 --region snow
```

Permissions Required by the Caller

In addition to the role for the Snowball Edge VM Import/Export to assume, you also must ensure that the user has the permissions that allow them to pass the role to VMIE. If you use the default root user to perform the import, the root user already has all the permissions required, so you can skip this step, and go to step 3.

Attach the following two IAM permissions to the user account that is doing the import.

- `pass-role`
- `get-role`

Create a policy for the role

The following is an example policy that allows a user to perform the `get-role` and `pass-role` actions for the IAM role.

```
{
   "Version":"2012-10-17",
   "Statement":[
        {
            "Effect":"Allow",
            "Action": "iam:GetRole",
            "Resource":"*"
        },
        {
            "Sid": "iamPassRole",
            "Effect": "Allow",
            "Action": "iam:PassRole",
            "Resource": "*",
            "Condition": {
                "StringEquals": {
                    "iam:PassedToService": "importexport.amazonaws.com"
                }
            }
        }
```

```
   ]
}
```

Create a policy with the policy file:

```
aws iam create-policy --policy-name policy-name --policy-document file:///policy-json-file-
path --profile profile-name --endpoint http://snowball-ip:6078 --region snow
```

The following is an output example from the create-policy command.

```
{
   "Policy":{
      "PolicyName":"caller-policy",
      "PolicyId":"ANPACEMGEZDGNBVGY3TQOJQGEZAAAABOOOTUOE3AAAAAAPPBEUM7Q7ARPUE53C6R",
      "Arn":"arn:aws:iam::123456789012:policy/caller-policy",
      "Path":"/",
      "DefaultVersionId":"v1",
      "AttachmentCount":0,
      "IsAttachable":true,
      "CreateDate":"2020-07-30T00:58:25.309000+00:00",
      "UpdateDate":"2020-07-30T00:58:25.309000+00:00"
   }
}
```

After the policy has been generated, attach the policy to the IAM users that will call the Amazon EC2 API or CLI operation to import the snapshot.

```
aws iam attach-user-policy --user-name your-user-name --policy-arn
 arn:aws:iam::123456789012:policy/policy-name --profile profile-name --endpoint
 http://snowball-ip:6078 --region snow
```

Permissions Required to Call Amazon EC2 APIs on Your Device

To import a snapshot, the IAM user must have the `ec2:ImportSnapshot` permissions. If restricting access to the user is not required, you can use the `ec2:*` permissions to grant full Amazon EC2 access. The following are the permissions that can be granted or restricted for Amazon EC2 on your device. Create a policy file with the content shown:

```
{
   "Version":"2012-10-17",
   "Statement":[
      {
         "Effect":"Allow",
         "Action":[
            "ec2:ImportSnapshot",
            "ec2:DescribeImportSnapshotTasks",
            "ec2:CancelImportTask",
            "ec2:DescribeSnapshots",
            "ec2:DeleteSnapshot",
            "ec2:RegisterImage",
            "ec2:DescribeImages",
            "ec2:DeregisterImage"
         ],
         "Resource":"*"
      }
   ]
}
```

Create a policy with the policy file:

```
aws iam create-policy --policy-name policy-name --policy-document file:///policy-json-file-
path --profile profile-name --endpoint http://snowball-ip:6078 --region snow
```

The following is an output example from the create-policy command.

```
{
    "Policy":
        {
            "PolicyName": "ec2-import.json",
            "PolicyId": "ANPACEMGEZDGNBVGY3TQOJQGEZAAAABQBGPDQC5AAAAATYN62UNBFYTF5WVCSCZS",
            "Arn": "arn:aws:iam::123456789012:policy/ec2-import.json",
            "Path": "/",
            "DefaultVersionId": "v1",
            "AttachmentCount": 0,
            "IsAttachable": true,
            "CreateDate": "2022-04-21T16:25:53.504000+00:00",
            "UpdateDate": "2022-04-21T16:25:53.504000+00:00"
        }
}
```

After the policy has been generated, attach the policy to the IAM users that will call the Amazon EC2 API or CLI operation to import the snapshot.

```
aws iam attach-user-policy --user-name your-user-name --policy-arn
 arn:aws:iam::123456789012:policy/policy-name --profile profile-name --endpoint
 http://snowball-ip:6078 --region snow
```

Step 3: Import the Snapshot to Amazon S3 on Your Device

The next step is to import your snapshot into the Amazon S3 on your device. The value of S3Bucket should be the bucket which has your image, S3Key should be the image file path in this bucket:

```
aws ec2 import-snapshot --disk-container "Format=RAW,UserBucket={S3Bucket=bucket-
name,S3Key=image-file}" --profile profile-name --endpoint http://snowball-ip:8008 --region
 snow
```

For more information, see import-snapshot.

This command doesn't support the following switches.

- [--client-data `value`]
- [--client-token `value`]
- [--dry-run]
- [--no-dry-run]
- [--encrypted]
- [--no-encrypted]
- [--kms-key-id `value`]
- [--tag-specifications `value`]

Example Example output

```
{
   "ImportTaskId":"s.import-snap-1234567890abc",
```

```
   "SnapshotTaskDetail":{
      "DiskImageSize":2.0,
      "Encrypted":false,
      "Format":"RAW",
      "Progress":"3",
      "Status":"active",
      "StatusMessage":"pending",
      "UserBucket":{
         "S3Bucket":"bucket",
         "S3Key":"vmimport/image01"
      }
   }
}
```

Note
Snowball Edge currently only allows one active import job to run at a time, per device. To start a new import task, either wait for the current task to finish, or choose another available node in a cluster. You can also choose to cancel the current import if you want. To prevent delays, don't reboot the Snowball Edge device while the import is in progress. If you reboot the device, the import will fail, and progress will be deleted when the device becomes accessible. To check the status of your snapshot import task status, use the following command:

```
aws ec2 describe-import-snapshot-tasks --import-task-ids id --profile profile-name
 --endpoint http://snowball-ip:8008 --region snow
```

Step 4: Register the Snapshot as an AMI

When the snapshot import to the device is successful, you can register it using the `register-image` command.

Note
You can only register an AMI when all its snapshots are available.

For more information, see register-image.

Example Example command

```
aws ec2 register-image \
--name ami-01 \
--description my-ami-01 \
--block-device-mappings "[{\"DeviceName\": \"/dev/sda\",\"Ebs\":{\"Encrypted\":false,
\"DeleteOnTermination\":true,\"SnapshotId\":\"snapshot-id\",\"VolumeSize\":30}}]" \
--root-device-name /dev/sda1 \
--profile profile-name \
--endpoint http://snowball-ip:8008 \
--region snow
```

Following is an example of block device mapping JSON. For more information, see block device mapping.

```
[
    {
        "DeviceName": "/dev/sda",
        "Ebs":
            {
                "Encrypted": false,
                "DeleteOnTermination": true,
                "SnapshotId": "snapshot-id",
                "VolumeSize": 30
            }
```

```
    }
]
```

Example Example output

```
{
    "ImageId": "s.ami-8de47d2e397937318"
 }
```

Step 5: Launch an instance from the AMI

To launch an instance, see run-instances.

The image-id value is the output of previous registry step:

```
aws ec2 run-instances --image-id image-id --instance-type instance-type --profile profile-
name --endpoint http://snowball-ip:8008 --region snow
```

```
{
   "Instances":[
      {
         "SourceDestCheck":false,
         "CpuOptions":{
            "CoreCount":1,
            "ThreadsPerCore":2
         },
         "InstanceId":"s.i-12345a73123456d1",
         "EnaSupport":false,
         "ImageId":"s.ami-1234567890abcdefg",
         "State":{
            "Code":0,
            "Name":"pending"
         },
         "EbsOptimized":false,
         "SecurityGroups":[
            {
               "GroupName":"default",
               "GroupId":"s.sg-1234567890abc"
            }
         ],
         "RootDeviceName":"/dev/sda1",
         "AmiLaunchIndex":0,
         "InstanceType":"sbe-c.large"
      }
   ],
   "ReservationId":"s.r-1234567890abc"
}
```

Describe Import Tasks

To see the current state of the import progress, you can run the Amazon EC2 `describe-import-snapshot-tasks` command. This API supports pagination and filtering on the `task-state`.

Example Example command

```
aws ec2 describe-import-snapshot-tasks --import-task-ids id --profile profile-name --
endpoint http://snowball-ip:8008 --region snow
```

Example Example output

```
{
        "ImportSnapshotTasks": [
            {
                "ImportTaskId": "s.import-snap-8f6bfd7fc9ead9aca",
                "SnapshotTaskDetail": {
                    "Description": "Created by AWS-Snowball-VMImport service for s.import-
snap-8f6bfd7fc9ead9aca",
                    "DiskImageSize": 8.0,
                    "Encrypted": false,
                    "Format": "RAW",
                    "Progress": "3",
                    "SnapshotId": "s.snap-848a22d7518ad442b",
                    "Status": "active",
                    "StatusMessage": "pending",
                    "UserBucket": {
                        "S3Bucket": "bucket1",
                        "S3Key": "image1"
                    }
                }
            }
        ]
 }
```

Note
This API only shows output for tasks that have successfully completed or been marked as deleted within the last 7 days. Filtering only supports `Name=task-state`, `Values=active | deleting | deleted | completed`

This command doesn't support the following switches.

- [--dry-run]
- [--no-dry-run]

Cancel an Import Task

To cancel an import task, run the `cancel-import-task` command.

Example Example command

```
aws ec2 cancel-import-task --import-task-id import-task-id --profile profile-name --
endpoint http://snowball-ip:8008 --region snow
```

Example Example output

```
{
        "ImportTaskId": "s.import-snap-8234ef2a01cc3b0c6",
        "PreviousState": "active",
        "State": "deleting"
}
```

Note
Only tasks that are not in a completed state can be canceled.

This command doesn't support the following switches.

- [--dry-run]

- [--no-dry-run]

Describe Snapshots

After a snapshot is imported, you can use this command to describe it. To filter the snapshots, you can pass in `--snapshot-ids` with the snapshot ID from the previous import task response. This API supports pagination and filter on `volume-id`, `status`, and `start-time`.

Example Example command

```
aws ec2 describe-snapshots --snapshot-ids snapshot-id --profile profile-name --endpoint
 http://snowball-ip:8008 --region snow
```

Example Example output

```
{
    "Snapshots": [
        {
            "Description": "Created by AWS-Snowball-VMImport service for s.import-
snap-8f6bfd7fc9ead9aca",
            "Encrypted": false,
            "OwnerId": "123456789012",
            "SnapshotId": "s.snap-848a22d7518ad442b",
            "StartTime": "2020-07-30T04:31:05.032000+00:00",
            "State": "completed",
            "VolumeSize": 8
        }
    ]
 }
```

This command doesn't support the following switches.

- [--restorable-by-user-ids `value`]
- [--dry-run]
- [--no-dry-run]

Delete a Snapshot from Your Device

To remove snapshots that you own and you no longer need, you can use the `delete-snapshot` command.

Example Example command

```
aws ec2 delete-snapshot --snapshot-id snapshot-id --profile profile-name --endpoint
 http://snowball-ip:8008 --region snow
```

> **Note**
> Snowball Edge does not support deleting snapshots that are in a **PENDING** state or if it is designated as a root device for an AMI.

This command doesn't support the following switches.

- [--dry-run]

- [--no-dry-run]

Deregister an AMI

To deregister AMIs that you no longer need, you can run the `deregister-image` command. Deregistering an AMI that is in the **Pending** state is not currently supported.

Example Example command

```
aws ec2 deregister-image --image-id image-id --profile profile-name --endpoint
 http://snowball-ip:8008 --region snow
```

This command doesn't support the following switches.

- [--dry-run]
- [--no-dry-run]

Using the AWS CLI and API Operations on Snowball Edge

When using the AWS Command Line Interface (AWS CLI) or API operations to issue IAM, Amazon S3 and Amazon EC2 commands on Snowball Edge, you must specify the `region` as "snow." You can do this using `AWS configure` or within the command itself, as in the following examples.

```
aws configure --profile ProfileName
AWS Access Key ID [None]: defgh
AWS Secret Access Key [None]: 1234567
Default region name [None]: snow
Default output format [None]: json
```

Or

```
aws s3 ls --profile ProfileName --endpoint http://192.0.2.0:8080 --region snow
```

Quotas for Compute Instances on a Snowball Edge Device

The following are storage quotas and shared resource limitations for compute resources on an AWS Snowball Edge device.

Storage Quotas

The storage available for compute resources is a separate resource from the dedicated Amazon S3 storage on a Snowball Edge device. The quotas for storage are as follows:

- **Storage quotas for the Snowball Edge Storage Optimized option** – The total available storage for Amazon S3 is between 60 TB and 80 TB depending on whether you're using compute instances on the device. If you are using compute instances, then total available dedicated storage for `sbe1` compute instances for the Snowball Edge Storage Optimized option is 1,000 GB.

- **Storage quotas for the Snowball Edge Compute Optimized and with GPU options** – The total available dedicated storage for `sbe-c` and `sbe-g` instances is 7.68 TB. The total available storage remaining is 42 TB.

The following tables outline the available compute resources for Snowball Edge devices.

Feature	Limitation
Number of AMIs on a single Snowball Edge Storage Optimized option	10
Number of AMIs on a single Snowball Edge Compute Optimized option	20
Number of AMIs on a single Snowball Edge Compute Optimized with GPU option	20
Number of volumes per instance	10
Concurrently running (or stopped) instances	Varies depending on available resources

Instance type	vCPU cores	Memory (GiB)	GPUs	Supported device option
`sbe1.small`	1	1	0	storage optimized
`sbe1.medium`	1	2	0	storage optimized
`sbe1.large`	2	4	0	storage optimized
`sbe1.xlarge`	4	8	0	storage optimized
`sbe1.2xlarge`	8	16	0	storage optimized
`sbe1.4xlarge`	16	32	0	storage optimized
`sbe1.6xlarge`	24	32	0	storage optimized
`sbe-c.small`	1	2	0	compute optimized
`sbe-c.medium`	1	4	0	compute optimized
`sbe-c.large`	2	8	0	compute optimized
`sbe-c.xlarge`	4	16	0	compute optimized
`sbe-c.2xlarge`	8	32	0	compute optimized
`sbe-c.4xlarge`	16	64	0	compute optimized
`sbe-c.8xlarge`	32	128	0	compute optimized
`sbe-c.12xlarge`	48	192	0	compute optimized
`sbe-c.16xlarge`	64	256	0	compute optimized
`sbe-c.24xlarge`	96	384	0	compute optimized
`sbe-g.small`	1	2	1	with GPU

Instance type	vCPU cores	Memory (GiB)	GPUs	Supported device option
sbe-g.medium	1	4	1	with GPU
sbe-g.large	2	8	1	with GPU
sbe-g.xlarge	4	16	1	with GPU
sbe-g.2xlarge	8	32	1	with GPU
sbe-g.4xlarge	16	64	1	with GPU
sbe-g.8xlarge	32	128	1	with GPU
sbe-g.12xlarge	48	192	1	with GPU

Shared Compute Resource Limitations

All services on a Snowball Edge device use some of the finite resources on the device. A Snowball Edge device with its available compute resources maximized can't launch new compute resources. For example, if you try to start the NFS interface while also running a `sbe1.4xlarge` compute instance on a storage optimized device, the NFS interface service doesn't start. The following outlines the available resources on the different device options as well as resource requirements for each service.

- If no compute services are `ACTIVE`:
  - On a storage optimized option, you have 24 vCPUs and 32 GiB of memory for your compute instances.
  - On a compute optimized option, you have 52 vCPUs and 208 GiB of memory for your compute instances. This is also true for the with GPU option.
- While AWS IoT Greengrass and AWS Lambda powered by AWS IoT Greengrass are `ACTIVE`:
  - On a storage optimized option, these services use 4 vCPU cores and 8 GiB of memory.
  - On a compute optimized option, these services use 1 vCPU core and 1 GiB of memory. This is also true for the GPU option.
  - While the NFS interface is `ACTIVE`, it uses 8 vCPU cores and 16 GiB of memory on a Snowball Edge device.

You can determine whether a service is `ACTIVE` on a Snowball Edge by using the command `snowballEdge describe-service` on the Snowball Edge client. For more information, see Getting Service Status (p. 92).

Creating a Compute Job

In this section, you create your first Amazon EC2 compute instance job for an AWS Snowball Edge device.

Important
Be aware of the following points before you create your job:

- Make sure that the vCPU, memory, and storage values associated with your AMI match the type of instance that you want to create.
- If you're going to use Secure Shell (SSH) to connect to the instance *after* you launch the instance on your Snowball Edge, you must first perform the following procedure. You can't update the AMIs on your Snowball Edge after the fact. You must do this step before creating the job.

Configuring an AMI to Use SSH to Connect to Compute Instances Launched on the Device

To use Secure Shell (SSH) to connect to your compute instances on Snowball Edge devices, you must perform the following procedure. This procedure adds the SSH key to the AMI before creating your job. We also recommend that you use this procedure to set up your applications on the instance that you plan to use as the AMI for your job.

> **Important**
> If you don't follow this procedure, you can't connect to your instances with SSH when you receive your Snowball Edge device.

To put an SSH key into an AMI

1. Launch a new instance in the AWS Cloud based on the CentOS 7 (x86_64) - with Updates HVM, Ubuntu 16.04 LTS - Xenial (HVM), and Amazon Linux 2 AMI image, or Windows.

   When you launch your instance, make sure that the storage size that you assign to the instance is appropriate for your later use on the Snowball Edge. In the Amazon EC2 console, you do this in **Step 4: Add Storage**. For a list of the supported sizes for compute instance storage volumes on a Snowball Edge, see Quotas for Compute Instances on a Snowball Edge Device (p. 144).
2. Install and configure the applications that you want to run on the Snowball Edge, and test that they work as expected.
3. Make a copy of the PEM/PPK file that you used for the SSH key pair to create this instance. Save this file to the server that you plan to use to communicate with the Snowball Edge. This file is required for using SSH to connect to the launched instance on your device, so make a note of the path to this file.
4. Save the instance as an AMI. For more information, see Creating an Amazon EBS-Backed Linux AMI in the *Amazon EC2 User Guide for Linux Instances.*
5. Repeat this procedure for each of the instances that you want to connect to using SSH. Make sure that you make copies of your different SSH key pairs and take note of the AMIs they're associated with.

Creating Your Job in the Console

Your next step is to create a job. Your job can be of any job type, including a cluster. Using the AWS Snow Family Management Console, follow the instructions provided in see Creating an AWS Snowball Edge Job. When you get to the **Step 3: Give job details** page in the job creation wizard, perform the following additional steps.

1. Choose **Enable compute with EC2**.
2. Choose **Add an AMI**.
3. In the dialog box that opens, choose an AMI and then choose **Save**.
4. Add up to 10 total AMIs to your job.
5. Continue creating your job as normal.

Creating Your Job in the AWS CLI

You can also create your job using the AWS CLI. To do this, open a terminal and run the following command, replacing the red text with your actual values.

```
aws snowball create-job --job-type IMPORT --resources '{"S3Resources":
[{"BucketArn":"arn:aws:s3:::bucket-name"}],"Ec2AmiResources":[{"AmiId":"ami-12345678"}]}'
```

```
 --description Example --address-id ADIEXAMPLE60-1234-1234-5678-41fEXAMPLE57  --kms-key-
arn arn:aws:kms:us-west-2:012345678901:key/eEXAMPLE-1234-1234-5678-5b4EXAMPLE8e --role-
arn arn:aws:iam::012345678901:role/snowball-local-s3-lambda-us-west-2-role --snowball-
capacity-preference T100 --shipping-option SECOND_DAY --snowball-type EDGE
```

After it arrives and you unlock your device, use the Snowball Edge client to get your local credentials. For more information, see Getting Credentials (p. 86).

Network Configuration for Compute Instances

After you launch your compute instances on a Snow Family device, you must provide it with an IP address by creating a network interface. Snow Family devices support two kinds of network interfaces, a virtual network interface and a direct network interface.

Virtual network interface (VNI)

A virtual network interface is the standard network interface for connecting to an EC2 instance on your Snow Family device. You must create a VNI for each of your EC2 instances regardless of whether you also use a direct network interface or not. The traffic passing through a VNI is protected by the security groups that you set up. You can only associate VNIs with the physical network port you use to control your Snow Family device.

> **Note**
> VNI: All physical interfaces (RJ45, SFP+, and QSFP) are supported.

Direct network interface (DNI)

A direct network interface (DNI) is an advanced network feature that enables use cases like multicast streams, transitive routing, and load balancing. By providing instances with layer 2 network access without any intermediary translation or filtering, you can gain increased flexibility over the network configuration of your Snow Family device and improved network performance. DNIs support VLAN tags and customizing the MAC address. Traffic on DNIs is not protected by security groups.

Snowcone devices support eight DNIs per EC2 instance, with a maximum of 63 per device.

On Snowball Edge devices, DNIs can be associated with the SFP or QSFP ports. DNIs cannot be associated with RJ45 ports. Each optical port supports a maximum of seven DNIs. DNIs do not have to be associated to the physical network port you use to control your Snow Family device. One EC2 instance can support four DNIs and another instance can support three, for a maximum of seven per device.

Topics

Prerequisites

Before you configure a VNI or a DNI, be sure that you've done the following prerequisites.

1. Make sure there's power to your device and that one of your physical network interfaces, like the RJ45 port, is connected with an IP address.
2. Get the IP address associated with the physical network interface that you're using on the Snow Family device.
3. Configure your Snowball Edge client. For more information, see Configuring a Profile for the Snowball Edge Client.

4. Unlock the device. We recommend using AWS OpsHub for Snow Family to unlock your device. For instructions, see Unlocking a Device.

   If you want to use the CLI command, run the following command, and provide the information that appears in the dialog box.

   ```
   snowballEdge configure
   ```

   ```
   Snowball Edge Manifest Path: manifest.bin

   Unlock Code: unlock code

   Default Endpoint: https://device ip
   ```

5. Run the following command.

   ```
   snowballEdge unlock-device
   ```

   The device display update indicates that it is unlocked.

6. Launch an EC2 instance on the device. You will associate the VNI with this instance.
7. Run the `snowballEdge describe-device` command to get the list of physical network interface IDs.
8. Identify the ID for the physical network interface that you want to use, and make a note of it.

Setting Up a Virtual Network Interface (VNI)

After you have identified the ID for your physical network interface, you can set up a virtual network interface (VNI). Use the following procedure set up a VNI. Make sure that you perform the prerequisite tasks before you create a VNI.

Create a VNI and associate IP address

1. Run the `snowballEdge create-virtual-network-interface` command. The following examples show running this command with the two different IP address assignment methods, either `DHCP` or `STATIC`. The `DHCP` method uses Dynamic Host Configuration Protocol (DHCP).

   ```
   snowballEdge create-virtual-network-interface \
   --physical-network-interface-id s.ni-abcd1234 \
   --ip-address-assignment DHCP

          //OR//

   snowballEdge create-virtual-network-interface \
   --physical-network-interface-id s.ni-abcd1234 \
   --ip-address-assignment STATIC \
   --static-ip-address-configuration IpAddress=192.0.2.0,Netmask=255.255.255.0
   ```

   The command returns a JSON structure that includes the IP address. Make a note of that IP address for the `ec2 associate-address` AWS CLI command later in the process.

   Anytime you need this IP address, you can use the `snowballEdge describe-virtual-network-interfaces` Snowball Edge client command, or the `aws ec2 describe-addresses` AWS CLI command to get it.

2. To associate your newly created IP address with your instance, use the following command, replacing the red text with your values:

```
aws ec2 associate-address --public-ip 192.0.2.0 --instance-id s.i-01234567890123456 --
endpoint Snow Family device physical IP address:8008
```

Setting Up a Direct Network Interface (DNI)

Note
The direct network interface feature is available on or after January 12, 2021 and is available in all AWS Regions where Snow Family devices are available.

Prerequisites

Before you set up a direct network interface (DNI), you must perform the tasks in the prerequisites section.

1. Perform the prerequisite tasks before setting up the DNI. For instructions, see Prerequisites (p. 148).
2. Additionally, you must launch an instance on your device, create a VNI, and associate it with the instance. For instructions, see Setting Up a Virtual Network Interface (VNI) (p. 149).

   Note
   If you added direct networking to your existing device by performing an in-the-field software update, you must restart the device twice to fully enable the feature.

Create a DNI and associate IP address

1. Create a direct network interface and attach it to the Amazon EC2 instance by running the following command. You will need the MAC address of the device for the next step.

   ```
   create-direct-network-interface [--endpoint endpoint] [--instance-id instanceId] [--
   mac macAddress]
                                   [--physical-network-interface-
   id physicalNetworkInterfaceId]
                                   [--unlock-code unlockCode] [--vlan vlanId]
   ```

   OPTIONS

   `--endpoint <endpoint>` The endpoint to send this request to. The endpoint for your devices will be a URL using the `https` scheme followed by an IP address. For example, if the IP address for your device is 123.0.1.2, the endpoint for your device would be https://123.0.1.2.

   `--instance-id <instanceId>` The EC2 instance ID to attach the interface to (optional).

   `--mac <macAddress>` Sets the MAC address of the network interface (optional).

   `--physical-network-interface-id <physicalNetworkInterfaceId>` The ID for the physical network interface on which to create a new virtual network interface. You can determine the physical network interfaces available on your Snowball Edge using the `describe-device` command.

   `--vlan <vlanId>` Set the assigned VLAN for the interface (optional). When specified, all traffic sent from the interface is tagged with the specified VLAN ID. Incoming traffic is filtered for the specified VLAN ID, and has all VLAN tags stripped before being passed to the instance.
2. If you didn't associate your DNI with an instance in step 1, you can associate it by running the Updating a Direct Network Interface (p. 96) command.
3. After you create a DNI and associate it with your EC2 instance, you must make two configuration changes inside your Amazon EC2 instance.

- The first is to change ensure that packets meant for the VNI associated with the EC2 instance are sent through eth0.
- The second change configures your direct network interface to use either DCHP or static IP when booting.

The following are examples of shell scripts for Amazon Linux 2 and CentOS Linux that make these configuration changes.

Amazon Linux 2

```
# Mac address of the direct network interface.
# You got this when you created the direct network interface.
DNI_MAC=[MAC ADDRESS FROM CREATED DNI]

# Configure routing so that packets meant for the VNI always are sent through eth0.
PRIVATE_IP=$(curl -s http://169.254.169.254/latest/meta-data/local-ipv4)
PRIVATE_GATEWAY=$(ip route show to match 0/0 dev eth0 | awk '{print $3}')
ROUTE_TABLE=10001
echo "from $PRIVATE_IP table $ROUTE_TABLE" > /etc/sysconfig/network-scripts/rule-
eth0
echo "default via $PRIVATE_GATEWAY dev eth0 table $ROUTE_TABLE" > /etc/sysconfig/
network-scripts/route-eth0
echo "169.254.169.254 dev eth0" >> /etc/sysconfig/network-scripts/route-eth0

# Query the persistent DNI name, assigned by udev via ec2net helper.
#   changable in /etc/udev/rules.d/70-persistent-net.rules
DNI=$(ip --oneline link | grep -i $DNI_MAC | awk -F ': ' '{ print $2 }')

# Configure DNI to use DHCP on boot.
cat << EOF > /etc/sysconfig/network-scripts/ifcfg-$DNI
DEVICE="$DNI"
NAME="$DNI"
HWADDR=$DNI_MAC
ONBOOT=yes
NOZEROCONF=yes
BOOTPROTO=dhcp
TYPE=Ethernet
MAINROUTETABLE=no
EOF

# Make all changes live.
systemctl restart network
```

CentOS Linux

```
# Mac address of the direct network interface. You got this when you created the
 direct network interface.
DNI_MAC=[MAC ADDRESS FROM CREATED DNI]
# The name to use for the direct network interface. You can pick any name that
 isn't already in use.
DNI=eth1

# Configure routing so that packets meant for the VNIC always are sent through
 eth0
PRIVATE_IP=$(curl -s http://169.254.169.254/latest/meta-data/local-ipv4)
PRIVATE_GATEWAY=$(ip route show to match 0/0 dev eth0 | awk '{print $3}')
ROUTE_TABLE=10001
echo from $PRIVATE_IP table $ROUTE_TABLE > /etc/sysconfig/network-scripts/rule-eth0
echo default via $PRIVATE_GATEWAY dev eth0 table $ROUTE_TABLE > /etc/sysconfig/
network-scripts/route-eth0
```

```
# Configure your direct network interface to use DHCP on boot.
cat << EOF > /etc/sysconfig/network-scripts/ifcfg-$DNI
DEVICE="$DNI"
NAME="$DNI"
HWADDR="$DNI_MAC"
ONBOOT=yes
NOZEROCONF=yes
BOOTPROTO=dhcp
TYPE=Ethernet
EOF

# Rename DNI device if needed.
CURRENT_DEVICE_NAME=$(LANG=C ip -o link | awk -F ': ' -vIGNORECASE=1 '!/link\/
ieee802\.11/ && /'"$DNI_MAC"'/ { print $2 }')
ip link set $CURRENT_DEVICE_NAME name $DNI

# Make all changes live.
systemctl restart network
```

Using SSH to Connect to Your Compute Instance on a Snowball Edge

To use SSH to connect to your compute instances on AWS Snowball Edge devices, you must first provide the SSH key to the Amazon Machine Image (AMI) before creating your job. For more information, see Configuring an AMI to Use SSH to Connect to Compute Instances Launched on the Device (p. 147). If you haven't followed that procedure, you can't use SSH to connect to your instances.

To connect to your instance with SSH

1. Make sure that your device is powered on, connected to the network, and unlocked. For more information, see Connecting to Your Local Network (p. 43).
2. Make sure that you have your network settings configured for your compute instances. For more information, see Network Configuration for Compute Instances (p. 148).
3. Check your notes to find the PEM or PPK key pair that you used for this specific instance. Make a copy of those files somewhere on your computer. Make a note of the path to the PEM file.
4. Connect to your instance through SSH as in the following example command. The IP address is the IP address of the virtual network interface (VNIC) that you set up in Network Configuration for Compute Instances (p. 148).

   ```
   ssh -i path/to/PEM/key/file instance-user-name@192.0.2.0
   ```

   For more information, see Connecting to Your Linux Instance Using SSH in the *Amazon EC2 User Guide for Linux Instances.*

Transferring Data from EC2 Compute Instances to S3 Buckets on the Same Snowball Edge

You can transfer data between compute instances and Amazon S3 buckets on the same Snowball Edge device. You do this by using the supported AWS CLI commands and the appropriate endpoints. For example, assume that you want to move data from a directory in my `sbe1.xlarge` instance into the Amazon S3 bucket, `myBucket` on the same device. Assume also that you're using the Amazon S3 endpoint `192.0.2.1:8080`. You use the following procedure.

Note
This procedure only works if you've followed the instructions in Configuring an AMI to Use SSH to Connect to Compute Instances Launched on the Device (p. 147).

To transfer data between a compute instance and a bucket on the same Snowball Edge

1. Use SSH to connect to your compute instance.
2. Download and install the AWS CLI. If your instance doesn't already have the AWS CLI, download and install it. For more information, see Installing the AWS Command Line Interface.
3. Configure the AWS CLI on your compute instance to work with the Amazon S3 endpoint on the Snowball Edge. For more information, see Getting and Using Local Amazon S3 Credentials (p. 100).
4. Use the supported Amazon S3 AWS CLI commands to transfer data. For example:

```
aws s3 cp ~/june2018/results s3://myBucket/june2018/results --recursive --endpoint
 http://192.0.2.1:8080
```

Snowball Edge Client Commands for Compute Instances

The Snowball Edge client is a standalone terminal application that you can run on your local server. You can use it to perform some administrative tasks on your Snowball Edge device or cluster of devices. For more information about how to use the Snowball Edge client, including how to start and stop services with it, see Using the Snowball Edge Client (p. 81).

Following, you can find information about the Snowball Edge client commands that are specific to compute instances, including examples of use.

For a list of Amazon EC2 commands you can use on your AWS Snowball Edge device, see Supported AWS CLI Commands for Amazon EC2 on a Snowball Edge (p. 157).

Creating a Launch Configuration to Autostart Amazon EC2 Instances

To automatically start Amazon EC2 compute instances on your AWS Snowball Edge device after it is unlocked, you can create a launch configuration. To do so, use the `snowballEdge create-autostart-configuration` command, as shown following.

Usage

```
snowballEdge create-autostart-configuration --physical-connector-type [SFP_PLUS or RJ45
 or QSFP] --ip-address-assignment [DHCP or STATIC] [--static-ip-address-configuration
 IpAddress=[IP address],NetMask=[Netmask]] --launch-template-id [--launch-template-version]
```

Updating a Launch Configuration to Autostart EC2 Instances

To update an existing launch configuration on your Snowball Edge, use the `snowballEdge update-autostart-configuration` command. You can find its usage following. To enable or disable a launch configuration, specify the `--enabled` parameter.

Usage

```
snowballEdge update-autostart-configuration --autostart-configuration-arn [--physical-
connector-type [SFP_PLUS or RJ45 or QSFP]] [--ip-address-assignment [DHCP or STATIC]]
```

```
 [--static-ip-address-configuration IpAddress=[IP address],NetMask=[Netmask]][--launch-
template-id] [--launch-template-version] [--enabled]
```

Deleting a Launch Configuration to Autostart EC2 Instances

To delete a launch configuration that's no longer in use, use the `snowballEdge delete-autostart-configuration` command, as follows.

Usage

```
snowballEdge delete-autostart-configuration --autostart-configuration-arn
```

Listing Launch Configurations to Autostart EC2 Instances

To list the launch configurations that you have created on your Snowball Edge, use the `describe-autostart-configurations` command, as follows.

Usage

```
snowballEdge describe-autostart-configurations
```

Creating a Virtual Network Interface

To run a compute instance on your Snowball Edge or start the NFS interface on your Snowball Edge, you first create a virtual network interface (VNIC). Each Snowball Edge has three network interfaces (NICs), the physical network interface controllers for the device. These are the RJ45, SFP, and QSFP ports on the back of the device.

Each VNIC is based on a physical one, and you can have any number of VNICs associated with each NIC. To create a virtual network interface, use the `snowballEdge create-virtual-network-interface` command.

> **Note**
> The `--static-ip-address-configuration` parameter is valid only when using the `STATIC` option for the `--ip-address-assignment` parameter.

Usage

You can use this command in two ways: with the Snowball Edge client configured, or without the Snowball Edge client configured. The following usage example shows the method with the Snowball Edge client configured.

```
snowballEdge create-virtual-network-interface --ip-address-assignment [DHCP or STATIC]
 --physical-network-interface-id [physical network interface id] --static-ip-address-
configuration IpAddress=[IP address],NetMask=[Netmask]
```

The following usage example shows the method without the Snowball Edge client configured.

```
snowballEdge create-virtual-network-interface --endpoint https://[ip address] --manifest-
file /path/to/manifest --unlock-code [unlock code] --ip-address-assignment [DHCP or STATIC]
 --physical-network-interface-id [physical network interface id] --static-ip-address-
configuration IpAddress=[IP address],NetMask=[Netmask]
```

Example Example: Creating VNICs (Using DHCP)

```
snowballEdge create-virtual-network-interface --ip-address-assignment dhcp --physical-
network-interface-id s.ni-8EXAMPLEaEXAMPLEd
```

```
{
  "VirtualNetworkInterface" : {
    "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/
s.ni-8EXAMPLE8EXAMPLEf",
    "PhysicalNetworkInterfaceId" : "s.ni-8EXAMPLEaEXAMPLEd",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.0.2.0",
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "EX:AM:PL:E1:23:45"
  }
}
```

Describing Your Virtual Network Interfaces

To describe the VNICs that you previously created on your device, use the `snowballEdge describe-virtual-network-interfaces` command. You can find its usage following.

Usage

You can use this command in two ways: with the Snowball Edge client configured, or without the Snowball Edge client configured. The following usage example shows the method with the Snowball Edge client configured.

```
snowballEdge describe-virtual-network-interfaces
```

The following usage example shows the method without the Snowball Edge client configured.

```
snowballEdge describe-virtual-network-interfaces --endpoint https://[ip address] --
manifest-file /path/to/manifest --unlock-code [unlock code]
```

Example Example: Describing VNICs

```
snowballEdge describe-virtual-network-interfaces
[
  {
    "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/
s.ni-8EXAMPLE8EXAMPLE8",
    "PhysicalNetworkInterfaceId" : "s.ni-8EXAMPLEaEXAMPLEd",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.0.2.0",
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "EX:AM:PL:E1:23:45"
  },{
    "VirtualNetworkInterfaceArn" : "arn:aws:snowball-device:::interface/
s.ni-1EXAMPLE1EXAMPLE1",
    "PhysicalNetworkInterfaceId" : "s.ni-8EXAMPLEaEXAMPLEd",
    "IpAddressAssignment" : "DHCP",
    "IpAddress" : "192.0.2.2",
    "Netmask" : "255.255.255.0",
    "DefaultGateway" : "192.0.2.1",
    "MacAddress" : "12:34:5E:XA:MP:LE"
  }
]
```

Updating a Virtual Network Interface

After creating a virtual network interface (VNIC), you can update its configuration using the `snowballEdge update-virtual-network-interface` command. After providing the Amazon

Resource Name (ARN) for a particular VNIC, you provide values only for whatever elements you are updating.

Usage

You can use this command in two ways: with the Snowball Edge client configured, or without the Snowball Edge client configured. The following usage example shows the method with the Snowball Edge client configured.

```
snowballEdge update-virtual-network-interface --virtual-network-interface-arn [virtual
 network-interface-arn] --ip-address-assignment [DHCP or STATIC] --physical-network-
interface-id [physical network interface id] --static-ip-address-configuration
 IpAddress=[IP address],NetMask=[Netmask]
```

The following usage example shows the method without the Snowball Edge client configured.

```
snowballEdge update-virtual-network-interface --endpoint https://[ip address] --
manifest-file /path/to/manifest --unlock-code [unlock code] --virtual-network-interface-
arn [virtual network-interface-arn] --ip-address-assignment [DHCP or STATIC] --physical-
network-interface-id [physical network interface id] --static-ip-address-configuration
 IpAddress=[IP address],NetMask=[Netmask]
```

Example Example: Updating a VNIC (Using DHCP)

```
snowballEdge update-virtual-network-interface --virtual-network-interface-arn
 arn:aws:snowball-device:::interface/s.ni-8EXAMPLEbEXAMPLEd --ip-address-assignment dhcp
```

Deleting a Virtual Network Interface

To delete a virtual network interface, you can use the `snowballEdge delete-virtual-network-interface` command.

Usage

You can use this command in two ways: with the Snowball Edge client configured, or without the Snowball Edge client configured. The following usage example shows the method with the Snowball Edge client configured.

```
snowballEdge delete-virtual-network-interface --virtual-network-interface-arn [virtual
 network-interface-arn]
```

The following usage example shows the method without the Snowball Edge client configured.

```
snowballEdge delete-virtual-network-interface --endpoint https://[ip address] --manifest-
file /path/to/manifest --unlock-code [unlock code] --virtual-network-interface-arn [virtual
 network-interface-arn]
```

Example Example: Deleting a VNIC

```
snowballEdge delete-virtual-network-interface --virtual-network-interface-arn
 arn:aws:snowball-device:::interface/s.ni-8EXAMPLEbEXAMPLEd
```

Using the Amazon EC2 Endpoint

Following, you can find an overview of the Amazon Elastic Compute Cloud (Amazon EC2) endpoint. Using this endpoint, you can manage your Amazon Machine Images (AMIs) and compute instances programmatically using Amazon EC2 API operations.

Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint

When you use the AWS CLI to issue a command to the AWS Snowball Edge device, you can specify that the endpoint is the Amazon EC2 endpoint. You have the choice of using the HTTPS endpoint, or an unsecured HTTP endpoint, as shown following.

HTTPS secured endpoint

```
aws ec2 describe-instances --endpoint https://192.0.2.0:8243 --ca-bundle path/to/
certificate
```

HTTP unsecured endpoint

```
aws ec2 describe-instances --endpoint http://192.0.2.0:8008
```

If you use the HTTPS endpoint of 8243, your data in transit is encrypted. This encryption is ensured with a certificate that's generated by the Snowball Edge when it is unlocked. After you have your certificate, you can save it to a local `ca-bundle.pem` file. Then you can configure your AWS CLI profile to include the path to your certificate, as described following.

To associate your certificate with the Amazon EC2 endpoint

1. Connect the Snowball Edge to power and network, and turn it on.
2. After the device has finished unlocking, make a note of its IP address on your local network.
3. From a terminal on your network, make sure you can ping the Snowball Edge.
4. Run the `snowballEdge get-certificate` command in your terminal. For more information on this command, see Getting Your Certificate for Transferring Data (p. 87).
5. Save the output of the `snowballEdge get-certificate` command to a file, for example `ca-bundle.pem`.
6. Run the following command from your terminal.

   ```
   aws configure set profile.snowballEdge.ca_bundle /path/to/ca-bundle.pem
   ```

After you complete the procedure, you can run CLI commands with these local credentials, your certificate, and your specified endpoint.

Supported AWS CLI Commands for Amazon EC2 on a Snowball Edge

Following, you can find information about how to specify the Amazon EC2 endpoint for applicable AWS CLI commands. For information about installing and setting up the AWS CLI, including specifying what Regions you want to make AWS CLI calls against, see the AWS Command Line Interface User Guide.

List of Supported Amazon EC2 AWS CLI Commands on a Snowball Edge

Following, you can find a description of the subset of AWS CLI commands and options for Amazon EC2 that are supported on Snowball Edge devices. If a command or option isn't listed following, it's not supported. You can declare some unsupported options along with a command. However, these are ignored.

- associate-address – Associates a virtual IP address with an instance for use on one of the three physical network interfaces on the device:
  - --instance-id – The ID of a single `sbe` instance.

  - --public-ip – The virtual IP address that you want to use to access your instance.
- attach-volume – Attaches an Amazon EBS volume to a stopped or running instance on your device and exposes it to the instance with the specified device name.
  - --device `value` – The device name.
  - --instance-id – The ID of a target Amazon EC2 instance.
  - --volume-id `value` – The ID of the EBS volume.
- authorize-security-group-egress – Adds one or more egress rules to a security group for use with a Snowball Edge device. Specifically, this action permits instances to send traffic to one or more destination IPv4 CIDR address ranges. For more information, see Security Groups in Snowball Edge Devices (p. 170).
  - --group-id `value` – The ID of the security group
  - [--ip-permissions `value`] – One or more sets of IP permissions.
- authorize-security-group-ingress – Adds one or more ingress rules to a security group. When calling `authorize-security-group-ingress`, you must specify a value either for `group-name` or `group-id`.
  - [--group-name `value`] – The name of the security group.
  - [--group-id `value`] – The ID of the security group
  - [--ip-permissions `value`] – One or more sets of IP permissions.
  - [--protocol `value`] The IP protocol. Possible values are `tcp`, udp, and `icmp`. The `--port` argument is required unless the "all protocols" value is specified (-1).
  - [--port `value`] – For TCP or UDP, the range of ports to allow. This value can be a single integer or a range (minimum–maximum).

    For ICMP, a single integer or a range (`type-code`) in which `type` represents the ICMP type number and `code` represents the ICMP code number. A value of -1 indicates all ICMP codes for all ICMP types. A value of -1 just for `type` indicates all ICMP codes for the specified ICMP type.
  - [--cidr `value`] – The CIDR IP range.
- create-launch-template – Creates a launch template. A *launch template* contains the parameters to launch an instance. When you launch an instance using `RunInstances`, you can specify a launch template instead of providing the launch parameters in the request. You can create up to 100 templates per device.
  - --launch-template-name `string` – A name for the launch template.
  - --launch-template-data `structure` – The information for the launch template. The following attributes are supported:
    - `ImageId`
    - `InstanceType`
    - `SecurityGroupIds`
    - `TagSpecifications`
    - `UserData`

    JSON syntax:

```
{
    "ImageId":"string",
    "InstanceType":"sbe-c.large",
    "SecurityGroupIds":["string", ...],
    "TagSpecifications":[{"ResourceType":"instance","Tags":
[{"Key":"Name","Value":"Test"},
    {"Key":"Stack","Value":"Gamma"}]}],
    "UserData":"this is my user data"
}
```

- [--version-description `string`] – A description for the first version of the launch template.
- --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).

- create-launch-template-version – Creates a new version for a launch template. You can specify an existing version of a launch template from which to base the new version. Launch template versions are numbered in the order in which they are created. You can't specify, change, or replace the numbering of launch template versions. You can create up to 100 versions of each launch template.

  Specify either the launch template ID or launch template name in the request.

  - --launch-template-id `string` – The ID of the launch template.
  - --launch-template-name `string` – A name for the launch template.
  - --launch-template-data `structure` – The information for the launch template. The following attributes are supported:
    - `ImageId`
    - `InstanceType`
    - `SecurityGroupIds`
    - `TagSpecifications`
    - `UserData`

    JSON syntax:

```
{
    "ImageId":"string",
    "InstanceType":"sbe-c.large",
    "SecurityGroupIds":["string", ...],
    "TagSpecifications":[{"ResourceType":"instance","Tags":
[{"Key":"Name","Value":"Test"},
     {"Key":"Stack","Value":"Gamma"}]}],
    "UserData":"this is my user data"
}
```

  - [--source-version `string`] – The version number of the launch template on which to base the new version. The new version inherits the same launch parameters as the source version, except for parameters that you specify in `launch-template-data`.
  - [--version-description `string`] – A description for the first version of the launch template.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).

- create-tags – Adds or overwrites one or more tags for the specified resource. Each resource can have a maximum of 50 tags. Each tag consists of a key and optional value. Tag keys must be unique for a resource. The following resources are supported:
  - AMI
  - Instance
  - Launch template
  - Security group
  - Key pair
- create-security-group – Creates a security group on your Snowball Edge. You can create up to 50 security groups. When you create a security group, you specify a friendly name of your choice:
  - --group-name `value` – The name of the security group.
  - --description `value` – A description of the security group. This is informational only. This value can be up to 255 characters in length.

- create-volume – Creates an Amazon EBS volume that can be attached to an instance on your device.
  - [--size `value`] – The size of the volume in GiBs, which can be from 1 GiB to 1 TB (1000 GiBs).
  - [--snapshot-id `value`] – The snapshot from which to create the volume.
  - [--volume-type `value`] – The volume type. If no value is specified, the default is `sbg1`. Possible values include the following:
    - `sbg1` for magnetic volumes
    - `sbp1` for SSD volumes
  - [--tag-specification `value`] – A list of tags to apply to the volume during creation.
- delete-launch-template – Deletes a launch template. Deleting a launch template deletes all of its versions.

  Specify either the launch template ID or launch template name in the request.
  - --launch-template-id `string` – The ID of the launch template.
  - --launch-template-name `string` – A name for the launch template.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).
- delete-launch-template-version – Deletes one or more versions of a launch template. You can't delete the default version of a launch template; you must first assign a different version as the default. If the default version is the only version for the launch template, delete the entire launch template by using the `delete-launch-template` command.

  Specify either the launch template ID or launch template name in the request.
  - --launch-template-id `string` – The ID of the launch template.
  - --launch-template-name `string` – A name for the launch template.
  - --versions (list) `"string" "string"` – The version numbers of one or more launch template versions to delete.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).
- delete-security-group – Deletes a security group.

  If you attempt to delete a security group that is associated with an instance, or is referenced by another security group, the operation fails with `DependencyViolation`.
  - --group-name `value` – The name of the security group.
  - --description `value` – A description of the security group. This is informational only. This value can be up to 255 characters in length.
- delete-tags – Deletes the specified set of tags from the specified resource (AMI, compute instance, launch template, or security group).
- delete-volume – Deletes the specified Amazon EBS volume. The volume must be in the `available` state (not attached to an instance).
  - --volume-id `value` – The ID of the volume.
- describe-addresses – Describes one or more of your virtual IP addresses associated with the same number of `sbe` instances on your device.
  - --public-ips – One or more of the virtual IP addresses associated with your instances.
- describe-images – Describes one or more of the images (AMIs) available to you. Images available to you are added to the Snowball Edge device during job creation.
  - --image-id – The Snowball AMI ID of the AMI.
- describe-instance-attribute – Describes the specified attribute of the specified instance. You can specify only one attribute at a time. The following attributes are supported:

  - `instanceInitiatedShutdownBehavior`
  - `instanceType`
  - `userData`
- describe-instances – Describes one or more of your instances. The response returns any security groups that are assigned to the instances.
  - --instance-ids – The IDs of one or more `sbe` instances that were stopped on the device.
  - --page-size – The size of each page to get in the call. This value doesn't affect the number of items returned in the command's output. Setting a smaller page size results in more calls to the device, retrieving fewer items in each call. Doing this can help prevent the calls from timing out.
  - --max-items – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command.
  - --starting-token – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response.
- describe-instance-status – Describes the status of the specified instances or all of your instances. By default, only running instances are described, unless you specifically indicate to return the status of all instances. Instance status includes the following components:
  - **Status checks** – Snow device performs status checks on running Amazon EC2 instances to identify hardware and software issues.
  - **Instance state** – You can manage your instances from the moment you launch them through their termination.

  With this command following filters are supported.
  - `[--filters]` (list)

    The filters.
    - `instance-state-code` – The code for the instance state, as a 16-bit unsigned integer. The high byte is used for internal service reporting purposes and should be ignored. The low byte is set based on the state represented. The valid values are 0 (pending), 16 (running), 32 (shutting-down), 48 (terminated), 64 (stopping), and 80 (stopped).
    - `instance-state-name` – The state of the instance (`pending` | `running` | `shutting-down` | `terminated` | `stopping` | `stopped`).
    - `instance-status.reachability` – Filters on instance status where the name is `reachability` (`passed` | `failed` | `initializing` | `insufficient-data`).
    - `instance-status.status` – The status of the instance (`ok` | `impaired` | `initializing` | `insufficient-data` | `not-applicable`).
    - `system-status.reachability` – Filters on system status where the name is reachability (`passed` | `failed` | `initializing` | `insufficient-data`).
    - `system-status.status` – The system status of the instance (`ok` | `impaired` | `initializing` | `insufficient-data` | `not-applicable`).
  - JSON Syntax:

```
[
  {
    "Name": "string",
    "Values": ["string", ...]
  }
  ...
]
```

  - `[--instance-ids]` (list)

The instance IDs.

Default: Describes all of your instances.

- `[--dry-run|--no-dry-run]` (boolean)

  Checks whether you have the required permissions for the action, without actually making the request, and provides an error response. If you have the required permissions, the error response is `DryRunOperation`.

  Otherwise, it is `UnauthorizedOperation`.

- `[--include-all-instances | --no-include-all-instances]` (boolean)

  When `true`, includes the health status for all instances. When `false`, includes the health status for running instances only.

  Default: `false`

- `[--page-size]` (integer) – The size of each page to get in the call. This value doesn't affect the number of items returned in the command's output. Setting a smaller page size results in more calls to the device, retrieving fewer items in each call. Doing this can help prevent the calls from timing out.
- `[--max-items]` (integer) – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command.
- `[--starting-token]` (string) – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response.

- describe-launch-templates – Describes one or more launch templates. The `describe-launch-templates` command is a paginated operation. You can make multiple calls to retrieve the entire dataset of results.

  Specify either the launch template IDs or launch template names in the request.

  - --launch-template-ids (list) `"string" "string"` – A list of IDs of the launch templates.
  - --launch-template-names (list) `"string" "string"` – A list of names for the launch templates.
  - --page-size – The size of each page to get in the call. This value doesn't affect the number of items returned in the command's output. Setting a smaller page size results in more calls to the device, retrieving fewer items in each call. Doing this can help prevent the calls from timing out.
  - --max-items – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command.
  - --starting-token – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).

- describe-launch-template-versions – Describes one or more versions of a specified launch template. You can describe all versions, individual versions, or a range of versions. The `describe-launch-template-versions` command is a paginated operation. You can make multiple calls to retrieve the entire dataset of results.

  Specify either the launch template IDs or launch template names in the request.

  - --launch-template-id `string` – The ID of the launch template.
  - --launch-template-name `string` – A name for the launch template.

- [--versions (list) `"string" "string"`] – The version numbers of one or more launch template versions to delete.
- [--min-version `string`] – The version number after which to describe launch template versions.
- [--max-version `string`] – The version number up to which to describe launch template versions.
- --page-size – The size of each page to get in the call. This value doesn't affect the number of items returned in the command's output. Setting a smaller page size results in more calls to the device, retrieving fewer items in each call. Doing this can help prevent the calls from timing out.
- --max-items – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command.
- --starting-token – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response.
- --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).

- describe-security-groups – Describes one or more of your security groups.

  The `describe-security-groups` command is a paginated operation. You can issue multiple API calls to retrieve the entire dataset of results.

  - [--group-name `value`] – The name of the security group.
  - [--group-id `value`] – The ID of the security group.
  - [--page-size `value`] – The size of each page to get in the AWS service call. This size doesn't affect the number of items returned in the command's output. Setting a smaller page size results in more calls to the AWS service, retrieving fewer items in each call. This approach can help prevent the AWS service calls from timing out. For usage examples, see Pagination in the *AWS Command Line Interface User Guide*.
  - [--max-items `value`] – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command. Don't use the `NextToken` response element directly outside of the AWS CLI. For usage examples, see Pagination in the *AWS Command Line Interface User Guide*.
  - [--starting-token `value`] – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response. For usage examples, see Pagination in the *AWS Command Line Interface User Guide*.
- describe-tags – Describes one or more of the tags for specified resource (`image`, `instance`, or security group). With this command, the following filters are supported:
  - launch-template
  - resource-id
  - resource-type – `image` or `instance`
  - key
  - value
- describe-volumes – Describes the specified Amazon EBS volumes.
  - [--max-items `value`] – The total number of items to return in the command's output. If the total number of items available is more than the value specified, `NextToken` is provided in the command's output. To resume pagination, provide the `NextToken` value in the `starting-token` argument of a subsequent command.
  - [--starting-token `value`] – A token to specify where to start paginating. This token is the `NextToken` value from a previously truncated response.
  - [--volume-ids `value`] – One or more volume IDs.
- detach-volume – Detaches an Amazon EBS volume from a stopped or running instance.

  - [--device `value`] – The device name.
  - [--instance-id] – The ID of a target Amazon EC2 instance.
  - --volume-id `value` – The ID of the volume.
- disassociate-address – Disassociates a virtual IP address from the instance it's associated with.
  - --public-ip – The virtual IP address that you want to disassociate from your instance.
- get-launch-template-data – Retrieves the configuration data of the specified instance. You can use this data to create a launch template.
  - --instance-id – The ID of a single `sbe` instance.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).
- modify-launch-template – Modifies a launch template. You can specify which version of the launch template to set as the default version. When you launch an instance without specifying a launch template version, the default version of the launch template applies.

  Specify either the launch template ID or launch template name in the request.
  - --launch-template-id `string` – The ID of the launch template.
  - --launch-template-name `string` – A name for the launch template.
  - --default-version `string` – The version number of the launch template to set as the default version.
  - --endpoint `snowballEndpoint` – A value that enables you to manage your compute instances programmatically using Amazon EC2 API operations. For more information, see Specifying the Amazon EC2 Endpoint as the AWS CLI Endpoint (p. 157).
- modify-instance-attribute – Modifies an attribute of the specified instance. The following attributes are supported:
  - `instanceInitiatedShutdownBehavior`
  - `userData`
- revoke-security-group-egress – Removes one or more egress rules from a security group:
  - [--group-id `value`] – The ID of the security group
  - [--ip-permissions `value`] – One or more sets of IP permissions.
- revoke-security-group-ingress – Revokes one or more ingress rules to a security group. When calling `revoke-security-group-ingress`, you must specify a value for either `group-name` or `group-id`.
  - [--group-name `value`] – The name of the security group.
  - [--group-id `value`] – The ID of the security group.
  - [--ip-permissions `value`] – One or more sets of IP permissions.
  - [--protocol `value`] The IP protocol. Possible values are `tcp`, `udp`, and `icmp`. The `--port` argument is required unless the "all protocols" value is specified (-1).
  - [--port `value`] – For TCP or UDP, the range of ports to allow. A single integer or a range (minimum–maximum).

    For ICMP, a single integer or a range (`type-code`) in which `type` represents the ICMP type number and `code` represents the ICMP code number. A value of -1 indicates all ICMP codes for all ICMP types. A value of -1 just for `type` indicates all ICMP codes for the specified ICMP type.
  - [--cidr `value`] – The CIDR IP range.
- run-instances – Launches a number of compute instances by using a Snowball AMI ID for an AMI.

  Note
  It can take up to an hour and a half to launch a compute instance on a Snowball Edge, depending on the size and type of the instance.

- [--block-device-mappings (list)] – The block device mapping entries. The parameters DeleteOnTermination, VolumeSize, and VolumeType are supported. Boot volumes must be type sbg1.

  The JSON syntax for this command is as follows.

```
{
   "DeviceName": "/dev/sdh",
   "Ebs":
   {
      "DeleteOnTermination": true|false,
      "VolumeSize": 100,
      "VolumeType": "sbp1"|"sbg1"
   }
}
```

- --count – Number of instances to launch. If a single number is provided, it is assumed to be the minimum to launch (defaults to 1). If a range is provided in the form min:max, then the first number is interpreted as the minimum number of instances to launch and the second is interpreted as the maximum number of instances to launch.
- --image-id – The Snowball AMI ID of the AMI, which you can get by calling describe-images. An AMI is required to launch an instance.
- --InstanceInitiatedShutdownBehavior – By default, when you initiate a shutdown from your instance (using a command such as shutdown or poweroff), the instance stops. You can change this behavior so that it terminates instead. The parameters stop and terminate are supported. The default is stop. For more information, see Changing the instance initiated shutdown behavior in the *Amazon EC2 User Guide for Linux Instances*.
- --instance-type – The sbe instance type.
- --launch-template structure – The launch template to use to launch the instances. Any parameters that you specify in the run-instances command override the same parameters in the launch template. You can specify either the name or ID of a launch template, but not both.

```
{
   "LaunchTemplateId": "string",
   "LaunchTemplateName": "string",
   "Version": "string"
}
```

- --security-group-ids – One or more security group IDs. You can create a security group using CreateSecurityGroup. If no value is provided, the ID for the default security group is assigned to created instances.
- --tag-specifications – The tags to apply to the resources during launch. You can only tag instances on launch. The specified tags are applied to all instances that are created during launch. To tag a resource after it has been created, use create-tags.
- --user-data – The user data to make available to the instance. If you are using the AWS CLI, base64-encoding is performed for you, and you can load the text from a file. Otherwise, you must provide base64-encoded text.
- --key-name (string) – The name of the key pair. You can create a key pair using CreateKeyPair or ImportKeyPair.

  Warning
  If you don't specify a key pair, you can't connect to the instance unless you choose an AMI that is configured to allow users another way to log in.

- start-instances – Starts an sbe instance that you've previously stopped. All resources attached to the instance persist through starts and stops, but are erased if the instance is terminated.
  - --instance-ids – The IDs of one or more sbe instances that were stopped on the device.

- stop-instances – Stops an `sbe` instance that is running. All resources attached to the instance persist through starts and stops, but are erased if the instance is terminated.
  - --instance-ids – The IDs of one or more `sbe` instances to be stopped on the device.
- terminate-instances – Shuts down one or more instances. This operation is idempotent; if you terminate an instance more than once, each call succeeds. All resources attached to the instance persist through starts and stops, but data is erased if the instance is terminated.

  Note
  By default, when you use a command like `shutdown` or `poweroff` to initiate a shutdown from your instance, the instance stops. However, you can use the `InstanceInitiatedShutdownBehavior` attribute to change this behavior so that these commands terminate your instance. For more information, see Changing the instance initiated shutdown behavior in the *Amazon EC2 User Guide for Linux Instances*.

  - --instance-ids – The IDs of one or more `sbe` instances to be terminated on the device. All associated data stored for those instances will be lost.
- create-key-pair – Creates a 2048-bit RSA key pair with the specified name. Amazon EC2 stores the public key and displays the private key for you to save to a file. The private key is returned as an unencrypted PEM-encoded PKCS#1 private key. If a key with the specified name already exists, Amazon EC2 returns an error.
  - --key-name (string) – A unique name for the key pair.

    Constraints: Up to 255 ASCII characters.
  - [--tag-specifications] (list) – The tags to apply to the new key pair.

```
{
    "ResourceType": "image"|"instance"|"key-pair"|"launch-template"|"security-group",
    "Tags": [
      {
        "Key": "string",
        "Value": "string"
      }
      ...
    ]
  }
  ...
```

- import-key-pair –
  - --key-name (string) – A unique name for the key pair.

    Constraints: Up to 255 ASCII characters.
  - --public-key-material (blob) – The public key. For API calls, the text must be base64-encoded. For command line tools, base64-encoding is performed for you.
  - [--tag-specifications] (list) – The tags to apply to the new key pair.

```
{
    "ResourceType": "image"|"instance"|"key-pair"|"launch-template"|"security-group",
    "Tags": [
      {
        "Key": "string",
        "Value": "string"
      }
      ...
    ]
  }
```

- describe-key-pairs –

  [--filters] (list) – The filters.

- key-pair-id – The ID of the key pair.
- key-name – The name of the key pair.
- tag-key – The key of a tag assigned to the resource. Use this filter to find all resources assigned a tag with a specific key, regardless of the tag value.
- [--tag-specifications] (list) – The tags to apply to the new key pair.
- tag :key – The key/value combination of a tag assigned to the resource. Use the tag key in the filter name and the tag value as the filter value. For example, to find all resources that have a tag with the key `Owner` and the value `Team A`, specify `tag:Owner` for the filter name and `Team A` for the filter value.

```
{
    "Name": "string",
    "Values": ["string", ...]
  }
  ...
```

- [--key-names] (list) – The key pair names.

  Default: Describes all your key pairs.
- [--key-pair-ids] (list) – The IDs of the key pairs.
- delete-key-pair –
  - [--key-name] (string) – The name of the key pair.
  - [--key-pair-id] (string) – The ID of the key pair.

Supported Amazon EC2 API Operations

Following, you can find Amazon EC2 API operations that you can use with a Snowball Edge, with links to their descriptions in the *Amazon EC2 API Reference.* Amazon EC2 API calls require Signature Version 4 (SigV4) signing. If you're using the AWS CLI or an AWS SDK to make these API calls, the SigV4 signing is handled for you. Otherwise, you need to implement your own SigV4 signing solution. For more information, see Getting and Using Local Amazon S3 Credentials (p. 100).

- AssociateAddress – Associates an Elastic IP address with an instance or a network interface.
- AttachVolume – The following request parameters are supported:
  - `Device`
  - `InstanceId`
  - `VolumeId`
- AuthorizeSecurityGroupEgress – Adds one or more egress rules to a security group for use with a Snowball Edge device. Specifically, this action permits instances to send traffic to one or more destination IPv4 CIDR address ranges.
- AuthorizeSecurityGroupIngress – Adds one or more ingress rules to a security group. When calling AuthorizeSecurityGroupIngress, you must specify a value either for `GroupName` or `GroupId`.
- CreateVolume – The following request parameters are supported:
  - `SnapshotId`
  - `Size`
  - `VolumeType`
  - `TagSpecification.N`
- CreateLaunchTemplate – The following request parameters are supported:
  - `ImageId`
  - `InstanceType`
  - `SecurityGroupIds`

  - `TagSpecifications`
  - `UserData`
- CreateLaunchTemplateVersion
- CreateTags – The following request parameters are supported:
  - `AMI`
  - `Instance`
  - `Launch template`
  - `Security group`
- CreateSecurityGroup – Creates a security group on your Snowball Edge. You can create up to 50 security groups. When you create a security group, you specify a friendly name of your choice.
- DeleteLaunchTemplate
- DeleteLaunchTemplateVersions
- DeleteSecurityGroup – Deletes a security group. If you attempt to delete a security group that is associated with an instance, or is referenced by another security group, the operation fails with `DependencyViolation`.
- DeleteTags – Deletes the specified set of tags from the specified set of resources.
- DeleteVolume – The following request parameters are supported:
  - `VolumeId`
- DescribeAddresses
- DescribeImages
- DescribeInstanceAttribute – The following attributes are supported:
  - `instanceType`
  - `userData`
- DescribeInstanceStatus
- DescribeLaunchTemplates
- DescribeLaunchTemplateVersions
- DescribeInstances
- DescribeSecurityGroups – Describes one or more of your security groups. `DescribeSecurityGroups` is a paginated operation. You can issue multiple API calls to retrieve the entire dataset of results.
- DescribeTags – With this command, the following filters are supported:
  - `resource-id`
  - `resource-type` – AMI or compute instance only
  - `key`
  - `value`
- DescribeVolume – The following request parameters are supported:
  - `MaxResults`
  - `NextToken`
  - `VolumeId.N`
- DetachVolume – The following request parameters are supported:
  - `Device`
  - `InstanceId`
  - `VolumeId`
- DisassociateAddress
- GetLaunchTemplateData
- ModifyLaunchTemplate
- ModifyInstanceAttribute – Only the `userData` attribute is supported.

- RevokeSecurityGroupEgress – Removes one or more egress rules from a security group.
- RevokeSecurityGroupIngress – Revokes one or more ingress rules to a security group. When calling RevokeSecurityGroupIngress, you must specify a value either for `group-name` or `group-id`.
- RunInstances –

  Note
  It can take up to an hour and a half to launch a compute instance on a Snowball Edge, depending on the size and type of the instance.
- StartInstances
- StopInstances – Resources associated with a stopped instance persist. You can terminate the instance to free up these resources. However, any associated data is deleted.
- TerminateInstances

Autostarting Amazon EC2 Instances with Launch Templates

You can automatically start your Amazon EC2 instances on your AWS Snowball Edge device using launch templates and Snowball Edge client launch configuration commands.

A *launch template* contains the configuration information necessary to create an Amazon EC2 instance on your Snowball Edge. You can use a launch template to store launch parameters so you don't have to specify them every time that you start an EC2 instance on your Snowball Edge.

When you use autostart configurations on your Snowball Edge, you configure the parameters that you want your Amazon EC2 instance to start with. After your Snowball Edge is configured, when you reboot and unlock it, it uses your autostart configuration to launch an instance with the parameters that you specified. If an instance that you launched using an autostart configuration is stopped, the instance starts running when you unlock your device.

Note
After you first configure an autostart configuration, restart your device to launch it. All subsequent instance launches (after planned or unplanned reboots) happen automatically after your device is unlocked.

A launch template can specify the Amazon Machine Image (AMI) ID, instance type, user data, security groups, and tags for an Amazon EC2 instance when you launch that instance. For a list of supported instance types, see Quotas for Compute Instances on a Snowball Edge Device (p. 144).

To automatically launch EC2 instances on your Snowball Edge, take the following steps:

1. When you order your AWS Snowball Edge device, create a job with compute instances. For more information, see Creating a Compute Job (p. 146).
2. After receiving your Snowball Edge, unlock it.
3. Use the EC2 API command `aws ec2 create-launch-template` to create a launch template.
4. Use the Snowball Edge client command `snowballEdge create-autostart-configuration` to bind your EC2 launch template to your network configuration. For more information, see Creating a Launch Configuration to Autostart Amazon EC2 Instances (p. 153).
5. Reboot, then unlock your device. Your EC2 instances are automatically started using the attributes specified in your launch template and your Snowball Edge client command `create-autostart-configuration`.

To view the status of your running instances, use the EC2 API command `describe-autostart-configurations`.

Note
There is no console or job management API for AWS Snowball support for launch templates. You use EC2 and Snowball Edge client CLI commands to automatically start EC2 instances on your AWS Snowball Edge device.

Using Block Storage with Your Amazon EC2 Instances

With block storage on Snowball Edge, you can add or remove block storage based on the needs of your applications. Volumes that are attached to an Amazon EC2 instance are exposed as storage volumes that persist independently from the life of the instance. You can manage block storage using the familiar Amazon EBS API.

Certain Amazon EBS commands are supported by using the EC2 endpoint. Supported commands include `attach-volume`, `create-volume`, `delete-volume`, `detach-volume`, and `describe-volumes`. For more information about these commands, see List of Supported Amazon EC2 AWS CLI Commands on a Snowball Edge (p. 157).

Important
Be sure to unmount any file systems on the device within your operating system before detaching the volume. Failure to do so can potentially result in data loss.

Following, you can find Amazon EBS volume quotas and differences between Amazon EBS volumes on your device and Amazon EBS volumes in the cloud:

- Amazon EBS volumes are only available to EC2 instances running on the device hosting the volumes.
- Volume types are limited to either capacity-optimized HDD (`sbg1`) or performance-optimized SSD (`sbp1`). The default volume type is `sbg1`.
- Snowball Edge shares HDD memory between Amazon S3 objects and Amazon EBS. If you use HDD-based block storage on AWS Snowball Edge, it reduces the amount of memory available for Amazon S3 objects. Likewise, Amazon S3 objects reduce the amount of memory available for Amazon EBS block storage on HDD volumes.
- Amazon EC2 root volumes always use the IDE driver. Additional Amazon EBS volumes will preferentially use the Virtio driver if available. If the Virtio driver isn't available, SBE defaults to the IDE driver. The Virtio driver allows for better performance and is recommended.
- When creating Amazon EBS volumes, the `encrypted` parameter isn't supported. However, all data on your device is encrypted by default. .
- Volumes can be from 1 GB to 10 TB in size.
- Up to 10 Amazon EBS volumes can be attached to a single EC2 instance.
- There is no formal limit to the number of Amazon EBS volumes you can have on your AWS Snowball Edge device. However, total Amazon EBS volume capacity is limited by the available space on your device.

Security Groups in Snowball Edge Devices

A *security group* acts as a virtual firewall that controls the traffic for one or more instances. When you launch an instance, you associate one or more security groups with the instance. You can add rules to each security group to allow traffic to or from its associated instances. For more information, see Amazon EC2 security groups for Linux instances in the *Amazon EC2 User Guide for Linux Instances*.

Security groups in Snowball Edge devices are similar to security groups in the AWS Cloud. Virtual private clouds (VPCs) aren't supported on Snowball Edge devices.

Following, you can find the other differences between Snowball Edge security groups and EC2-VPC security groups:

- Each Snowball Edge has a limit of 50 security groups.

- The default security group allows all inbound and outbound traffic.
- Traffic between local instances can use either the private instance IP address or a public IP address. For example, suppose that you want to connect using SSH from instance A to instance B. In this case, your target IP address can be either the public IP or private IP address of instance B, if the security group rule allows the traffic.
- Only the parameters listed for AWS CLI actions and API calls are supported. These typically are a subset of those supported in EC2-VPC instances.

For more information about supported AWS CLI actions, see List of Supported Amazon EC2 AWS CLI Commands on a Snowball Edge (p. 157). For more information on supported API operations, see Supported Amazon EC2 API Operations (p. 167).

Supported Instance Metadata and User Data

Instance metadata is data about your instance that you can use to configure or manage the running instance. Snowball Edge supports a subset of instance metadata categories for your compute instances. For more information, see Instance metadata and user data in the *Amazon EC2 User Guide for Linux Instances.*

The following categories are supported. Using any other categories returns a `404` error message.

Supported instance metadata categories on a Snowball Edge

Data	Description
`ami-id`	The AMI ID used to launch the instance.
`hostname`	The private IPv4 DNS hostname of the instance.
`instance-id`	The ID of this instance.
`instance-type`	The type of instance.
`local-hostname`	The private IPv4 DNS hostname of the instance.
`local-ipv4`	The private IPv4 address of the instance.
`mac`	The instance's media access control (MAC) address.
`network/interfaces/macs/`*`mac`*`/local-hostname`	The interface's local hostname.
`network/interfaces/macs/`*`mac`*`/local-ipv4s`	The private IPv4 addresses associated with the interface.
`network/interfaces/macs/`*`mac`*`/mac`	The instance's MAC address.
`network/interfaces/macs/`*`mac`*`/public-ipv4s`	The Elastic IP addresses associated with the interface.
`public-ipv4`	The public IPv4 address.
`public-keys/0/openssh-key`	Public key. Only available if supplied at instance launch time.
`reservation-id`	The ID of the reservation.
userData	Shell scripts to send instructions to an instance at launch.

Supported instance dynamic data categories on a Snowball Edge

Data	Description
instance-identity/document	JSON containing instance attributes. Only `instanceId`, `imageId`, `privateIp`, and `instanceType` have values, and the other returned attributes are null. For more information, see Instance Identity Documents in the *Amazon EC2 User Guide for Linux Instances*.

User Data in Snowball Compute Instances

User data is supported for use with shell scripts for compute instances on a Snowball Edge. Using shell scripts, you can send instructions to an instance at launch. You can change user data with the `modify-instance-attribute` AWS CLI command, or the `ModifyInstanceAttribute` API action.

To change user data

1. Stop your compute instance with the `stop-instances` AWS CLI command.
2. Using the `modify-instance-attribute` AWS CLI command, modify the `userData` attribute.
3. Restart your compute instance with the `start-instances` AWS CLI command.

Only shell scripts are supported with compute instances. There is no support for `cloud-init` package directives on compute instances running on a Snowball Edge. For more information about working with AWS CLI commands, see the *AWS CLI Command Reference*.

Stopping EC2 Instances

To avoid accidentally deleting the Amazon EC2 instances that you create on your device, don't shut down your instances from the operating system. For example, don't use the `shutdown` or `reboot` commands. Shutting down an instance from within the operating system has the same effect as calling the terminate-instances command.

Instead, use the stop-instances command to suspend Amazon EC2 instances that you want to preserve.

Troubleshooting Compute Instances on Snowball Edge Devices

Following, you can find troubleshooting tips for Snowball Edge jobs with compute instances.

Topics

Virtual Network Interface Has an IP Address of 0.0.0.0

This issue can occur if the physical network interface (NIC) you associated with your virtual network interface (VNIC) also has an IP address of 0.0.0.0. This effect can happen if the NIC wasn't configured with an IP address (for instance, if you've just powered on the device). It can also happen if you're using

the wrong interface. For example, you might be trying to get the IP address of the SFP+ interface, but it's the RJ45 interface that's connected to your network.

Action to Take

If this occurs, you can do the following:

- Create a new VNIC, associated with a NIC that has an IP address. For more information, see Network Configuration for Compute Instances (p. 148).
- Update an existing VNIC. For more information, see Updating a Virtual Network Interface (p. 155).

Snowball Edge Hangs When Launching a Large Compute Instance

It can appear that your Snowball Edge has stopped launching an instance. This is generally not the case. However, it can take an hour or more for the largest compute instances to launch.

To check the status of your instances, use the AWS CLI command `aws ec2 describe-instances` run against the HTTP or HTTPS Amazon EC2 endpoint on the Snowball Edge.

My Instance Has One Root Volume

Instances have one root volume by design. All `sbe` instances have a single root volume, but with Snowball Edge, you can add or remove block storage based on the needs of your applications. For more information, see Using Block Storage with Your Amazon EC2 Instances (p. 170).

Unprotected Private Key File Error

This error can occur if your .pem file on your compute instance has insufficient read/write permissions.

Action to Take

You can resolve this by changing the permissions for the file with the following procedure:

1. Open a terminal and navigate to the location that you saved your .pem file to.
2. Enter the following command.

```
chmod 400 filename.pem
```

Using IAM Locally

AWS Identity and Access Management (IAM) helps you securely control access to AWS resources that run on your AWS Snowball Edge device. You use IAM to control who is authenticated (signed in) and authorized (has permissions) to use resources.

IAM is supported locally on your device. You can use the local IAM service to create new users and attach IAM policies to them. You can use these policies to allow the access necessary to perform assigned tasks. For example, you can give a user the ability to transfer data, but limit their ability to create new Amazon EC2 instances.

Additionally, you can create local, session-based credentials using AWS Security Token Service (AWS STS) on your device. For information about the IAM service, see Getting started in the *IAM User Guide*.

Your device's root credentials can't be disabled, and you can't use policies within your account to explicitly deny access to the AWS account root user. We recommend that you secure your root user access keys and create IAM user credentials for everyday interaction with your device.

Important
The documentation in this section applies to using IAM locally on an AWS Snowball Edge device. For information about using IAM in the AWS Cloud, see Identity and Access Management in AWS Snowball (p. 235).
For AWS services to work properly on a Snowball Edge, you must allow the ports for the services. For details, see Ports Required to Use AWS Services on an AWS Snowball Edge Device (p. 182).

Topics

Using the AWS CLI and API Operations on Snowball Edge

When using the AWS CLI or API operations to issue IAM, AWS STS, Amazon S3, and Amazon EC2 commands on Snowball Edge, you must specify the `region` as "`snow`." You can do this using `aws configure` or within the command itself, as in the following examples.

```
aws configure --profile abc
AWS Access Key ID [None]: AKIAIOSFODNN7EXAMPLE
AWS Secret Access Key [None]: 1234567
Default region name [None]: snow
Default output format [None]: json
```

Or

```
aws iam list-users --profile snowballEdge --endpoint http://192.0.2.0:6078 --region snow
```

Note
The access key ID and access secret key that are used locally on AWS Snowball Edge can't be interchanged with the keys in the AWS Cloud.

List of Supported IAM AWS CLI Commands on a Snowball Edge

Following is a description of the subset of AWS CLI commands and options for IAM that are supported on Snowball Edge devices. If a command or option isn't listed following, it's not supported. Unsupported parameters for commands are noted in the description.

- attach-role-policy – Attaches the specified managed policy to the specified IAM role.
- attach-user-policy – Attaches the specified managed policy to the specified user.
- create-access-key – Creates a new local IAM secret access key and corresponding AWS access key ID for the specified user.
- create-policy – Creates a new IAM managed policy for your device.
- create-role – Creates a new local IAM role for your device. The following parameters are **not** supported:

  - `Tags`
  - `PermissionsBoundary`
- create-user – Creates a new local IAM user for your device. The following parameters are **not** supported:
  - `Tags`
  - `PermissionsBoundary`
- delete-access-key – Deletes a new local IAM secret access key and corresponding AWS access key ID for the specified user.
- delete-policy – Deletes the specified managed policy.
- delete-role – Deletes the specified role.
- delete-user – Deletes the specified user.
- detach-role-policy – Removes the specified managed policy from the specified role.
- detach-user-policy – Removes the specified managed policy from the specified user.
- get-policy – Retrieves information about the specified managed policy, including the policy's default version and the total number of local IAM users, groups, and roles to which the policy is attached.
- get-policy-version – Retrieves information about the specified version of the specified managed policy, including the policy document.
- get-role – Retrieves information about the specified role, including the role's path, GUID, ARN, and the role's trust policy that grants permission to assume the role.
- get-user – Retrieves information about the specified IAM user, including the user's creation date, path, unique ID, and ARN.
- list-access-keys – Returns information about the access key IDs associated with the specified IAM user.
- list-attached-role-policies – Lists all managed policies that are attached to the specified IAM role.
- list-attached-user-policies – Lists all managed policies that are attached to the specified IAM user.
- list-entities-for-policy – Lists all local IAM users, groups, and roles that the specified managed policy is attached to.
  - `--EntityFilter`: Only the `user` and `role` values are supported.
- list-policies – Lists all the managed policies that are available in your local AWS account. The following parameter is **not** supported:
  - `--PolicyUsageFilter`
- list-roles – Lists the local IAM roles that have the specified path prefix.
- list-users – Lists the IAM users that have the specified path prefix.
- update-access-key – Changes the status of the specified access key from Active to Inactive, or vice versa.
- update-assume-role-policy – Updates the policy that grants an IAM entity permission to assume a role.
- update-role – Updates the description or maximum session duration setting of a role.
- update-user – Updates the name and/or the path of the specified IAM user.

Supported IAM API Operations

Following are the IAM API operations that you can use with a Snowball Edge, with links to their descriptions in the IAM API Reference.

- AttachRolePolicy – Attaches the specified managed policy to the specified IAM role.
- AttachUserPolicy – Attaches the specified managed policy to the specified user.
- CreateAccessKey – Creates a new local IAM secret access key and corresponding AWS access key ID for the specified user.
- CreatePolicy – Creates a new IAM managed policy for your device.

- CreateRole – Creates a new local IAM role for your device.
- CreateUser – Creates a new local IAM user for your device.

  The following parameters are **not** supported:
  - `Tags`
  - `PermissionsBoundary`
- DeleteAccessKey– Deletes the specified access key.
- DeletePolicy – Deletes the specified managed policy.
- DeleteRole – Deletes the specified role.
- DeleteUser – Deletes the specified user.
- DetachRolePolicy – Removes the specified managed policy from the specified role.
- DetachUserPolicy – Removes the specified managed policy from the specified user.
- GetPolicy – Retrieves information about the specified managed policy, including the policy's default version and the total number of local IAM users, groups, and roles to which the policy is attached.
- GetPolicyVersion – Retrieves information about the specified version of the specified managed policy, including the policy document.
- GetRole – Retrieves information about the specified role, including the role's path, GUID, ARN, and the role's trust policy that grants permission to assume the role.
- GetUser – Retrieves information about the specified IAM user, including the user's creation date, path, unique ID, and ARN.
- ListAccessKeys – Returns information about the access key IDs associated with the specified IAM user.
- ListAttachedRolePolicies – Lists all managed policies that are attached to the specified IAM role.
- ListAttachedUserPolicies – Lists all managed policies that are attached to the specified IAM user.
- ListEntitiesForPolicy – Retrieves information about the specified IAM user, including the user's creation date, path, unique ID, and ARN.
  - `--EntityFilter`: Only the `user` and `role` values are supported.
- ListPolicies – Lists all the managed policies that are available in your local AWS account. The following parameter is **not** supported:
  - `--PolicyUsageFilter`
- ListRoles – Lists the local IAM roles that have the specified path prefix.
- ListUsers – Lists the IAM users that have the specified path prefix.
- UpdateAccessKey – Changes the status of the specified access key from Active to Inactive, or vice versa.
- UpdateAssumeRolePolicy – Updates the policy that grants an IAM entity permission to assume a role.
- UpdateRole – Updates the description or maximum session duration setting of a role.
- UpdateUser – Updates the name and/or the path of the specified IAM user.

Supported IAM Policy Version and Grammar

Following is the local IAM support version 2012-10-17 of the IAM policy and a subset of the policy grammar.

Policy type	Supported grammar
Identity-based policies (user/role policy)	"`Effect`", "`Action`" and "`Resource`" **Note** Local IAM doesn't support "`Condition`", "`NotAction`", "`NotResource`" and "`Principal`".

Policy type	Supported grammar
Resource-based policies (role trust policy)	"Effect", "Action" and "Principal" **Note** For Principal, only AWS account ID or principal ID is allowed.

IAM Policy Examples

Note
AWS Identity and Access Management (IAM) users need "snowballdevice:*" permissions to use the AWS OpsHub for Snow Family application (p. 56) to manage Snow Family devices.

The following are examples of policies that grant permissions to a Snowball Edge device.

Example 1: Allows the GetUser call for a sample user through the IAM API

Use the following policy to allow the GetUser call for a sample user through the IAM API.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "VisualEditor0",
            "Effect": "Allow",
            "Action": "iam:GetUser",
            "Resource": "arn:aws:iam:::user/example-user"
        }
    ]
}
```

Example 2: Allows Full Access to the Amazon S3 API

Use the following policy to allow full access to the Amazon S3 API.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "VisualEditor0",
            "Effect": "Allow",
            "Action": "s3:*",
            "Resource": "*"

        }
    ]
}
```

Example 3: Allows Read and Write Access to a Specific Amazon S3 Bucket

Use the following policy to allow read and write access to a specific bucket.

```
{
```

```
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "ListObjectsInBucket",
            "Effect": "Allow",
            "Action": "s3:ListBucket",
            "Resource": "arn:aws:s3:::bucket-name"
        },
        {
            "Sid": "AllObjectActions",
            "Effect": "Allow",
            "Action": "s3:*Object",
            "Resource": "arn:aws:s3:::bucket-name/*"
        }
    ]
}
```

Example 4: Allows List, Get, and Put Access to a Specific Amazon S3 Bucket

Use the following policy to allow List, Get, and Put Access to a specific S3 bucket.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:PutObject",
                "s3:GetObject",
                "s3:List*"
            ],
            "Resource": "arn:aws:s3:::examplebucket/*"
        }
    ]
}
```

Example 5: Allows Full Access to the Amazon EC2 API

Use the following policy to allow full access to Amazon EC2.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "ec2:*",
            "Resource": "*"
        }
    ]
}
```

Example 6: Allows Access to Start and Stop Amazon EC2 Instances

Use the following policy to allow access to start and stop Amazon EC2 instances.

```
{
```

```
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "ec2:StartInstances",
                "ec2:StopInstances"
            ],
            "Resource": "*"
        }
    ]
}
```

Example 7: Denies Calls to DescribeLaunchTemplates but Allows All Calls to DescribeImages

Use the following policy to deny calls to `DescribeLaunchTemplates` but allow all calls to `DescribeImages`.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Deny",
            "Action": [
                "ec2:DescribeLaunchTemplates"
            ],
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "ec2:DescribeImages"
            ],
            "Resource": "*"
        }
    ]
}
```

Example 8: Policy for API Calls

Lists all the managed policies that are available on your Snow device, including your own customer-defined managed policies. More details in list-policies.

```
aws iam list-policies --endpoint http://ip-address:6078 --profile snowballEdge --region
 snow
{
    "Policies": [
        {
            "PolicyName": "Administrator",
            "Description": "Root user admin policy for Account 123456789012",
            "CreateDate": "2020-03-04T17:44:59.412Z",
            "AttachmentCount": 1,
            "IsAttachable": true,
            "PolicyId": "policy-id",
            "DefaultVersionId": "v1",
            "Path": "/",
            "Arn": "arn:aws:iam::123456789012:policy/Administrator",
            "UpdateDate": "2020-03-04T19:10:45.620Z"
        }
    ]
```

```
}
```

TrustPolicy Example

A trust policy returns a set of temporary security credentials that you can use to access AWS resources that you might normally not have access to. These temporary credentials consist of an access key ID, a secret access key, and a security token. Typically, you use `AssumeRole` in your account for cross-account access.

The following is an example of a trust policy. For more information about trust policy, see AssumeRole in the *AWS Security Token Service API Reference*.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": [
                    "arn:aws:iam::AccountId:root" //You can use the Principal ID instead of
 the account ID.
                ]
            },
            "Action": [
                "sts:AssumeRole"
            ]
        }
    ]
}
```

Using AWS Security Token Service

The AWS Security Token Service (AWS STS) helps you request temporary, limited-privilege credentials for IAM users.

> **Important**
> For AWS services to work properly on a Snowball Edge, you must allow the ports for the services. For details, see Ports Required to Use AWS Services on an AWS Snowball Edge Device (p. 182).

Topics

Using the AWS CLI and API Operations on Snowball Edge

When using the AWS CLI or API operations to issue IAM, AWS STS, Amazon S3, and Amazon EC2 commands on Snowball Edge, you must specify the `region` as "`snow`." You can do this using `AWS configure` or within the command itself, as in the following examples.

```
aws configure --profile snowballEdge
```

```
AWS Access Key ID [None]: defgh
AWS Secret Access Key [None]: 1234567
Default region name [None]: snow
Default output format [None]: json
```

Or

```
aws iam list-users --profile snowballEdge --endpoint http://192.0.2.0:6078 --region snow
```

Note
The access key ID and access secret key that are use locally on AWS Snowball Edge can't be interchanged with the keys in the AWS Cloud.

Supported AWS STSAWS CLI Commands on a Snowball Edge

Only the assume-role command is supported locally.

The following parameters are supported for `assume-role`:

- `role-arn`
- `role-session-name`
- `duration-seconds`

Example Command

To assume a role, use the following command.

```
    aws sts assume-role --role-arn "arn:aws:iam::123456789012:role/example-role" --role-
session-name AWSCLI-Session  --endpoint http://snow-device-IP-address:7078
```

For more information about using the `assume-role` command, see How do I assume an IAM role using the AWS CLI?

For more information about using AWS STS, see Using Temporary Security Credentials in the *IAM User Guide*.

Supported AWS STS API Operations

Only the AssumeRole API is supported locally.

The following parameters are supported for `AssumeRole`:

- `RoleArn`
- `RoleSessionName`
- `DurationSeconds`

Example

To assume a role, use the following.

```
https://sts.amazonaws.com/
?Version=2011-06-15
&Action=AssumeRole
&RoleSessionName=session-example
&RoleArn=arn:aws:iam::123456789012:role/demo
&DurationSeconds=3600
```

Ports Required to Use AWS Services on an AWS Snowball Edge Device

For AWS services to work properly on an AWS Snowball Edge device, you must allow the network ports for the service.

The following is a list of network ports that are required for each AWS service.

Port	Protocol	Comment
22 (HTTP)	TCP	Device health check and for EC2 SSH
2049 (HTTP)	TCP	NFS endpoint
6078 (HTTP)	TCP	IAM HTTP endpoint
6089 (HTTPS)	TCP	IAM HTTPS endpoint
7078 (HTTP)	TCP	STS HTTP endpoint
7089 (HTTPS)	TCP	STS HTTPS endpoint
8080 (HTTP)	TCP	S3 HTTP endpoint
8443 (HTTPS)	TCP	S3 HTTPS endpoint
8008 (HTTP)	TCP	EC2 HTTP endpoint
8243 (HTTPS)	TCP	EC2 HTTPS endpoint
9091 (HTTP)	TCP	Endpoint for device management

Using AWS Snow Device Management to Manage Devices

AWS Snow Device Management allows you to manage your Snow Family device and local AWS services remotely. All Snow Family devices support Snow Device Management, and it comes preinstalled on new devices in most AWS Regions where Snow Family devices are available.

You can order a new device installed with Snow Device Management in the following ways:

- When you order a new Snow Family device from the AWS Management Console, you specify which state Snow Device Management is in when the device arrives. Snow Device Management can be installed in the following states:
  - `INSTALLED_ONLY` – Snow Device Management is installed but not activated.
  - `INSTALLED_AUTOSTART` – Snow Device Management is installed, and the device attempts to connect to its AWS Region when it is powered on.
- When you order a new Snow Family device through the AWS Command Line Interface (AWS CLI) or an AWS SDK, you use the `--remote-management` parameter to specify the `INSTALLED_ONLY` or `INSTALLED_AUTOSTART` states when running the `create-job` command. If you don't specify a value for this parameter, Snow Device Management defaults to `INSTALLED_ONLY` for supported devices.

  Note
  It is not possible to order a new Snow Family device without preinstalled Snow Device Management feature artifacts. The `NOT_INSTALLED` state exists only to identify devices that don't support the feature or that were already in the field before its launch. If you don't want to use Snow Device Management, set it to the INSTALLED_ONLY state.
  Snow Device Management can't be added to a Snow Family device that is already deployed in the field. To use Snow Device Management, you must order a new device with the feature preinstalled.

The following example shows the syntax for the `--remote-management` parameter, in addition to other parameters that you might include for a typical `create-job` command. For more information, see Job Management API Reference in the "AWS Snow Family API Reference" guide.

Command

```
aws snowball create-job \
        --job-type IMPORT \
        --remote-management INSTALLED_AUTOSTART
        --device-configuration '{"SnowconeDeviceConfiguration": {"WirelessConnection":
 {"IsWifiEnabled": false} } }' \
        --resources '{"S3Resources":[{"BucketArn":"arn:aws:s3:::bucket-name"}]}' \
        --description "Description here" \
        --address-id ADID00000000-0000-0000-0000-000000000000 \
        --kms-key-arn arn:aws:kms:us-
west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab \
        --role-arn arn:aws:iam::000000000000:role/SnowconeImportGamma \
        --snowball-capacity-preference T8 \
        --shipping-option NEXT_DAY \
        --snowball-type SNC1_HDD \
        --region us-west-2 \
```

Topics

- Managing devices remotely (p. 184)

Managing devices remotely

If you specified INSTALLED_AUTOSTART for Snow Device Management during the job order, the feature is ready to use immediately when your Snow Family device arrives and is powered on for the first time.

If you specified INSTALLED_ONLY when ordering your device, you must change the feature state to INSTALLED_AUTOSTART before the device can call back to its AWS Region to enable remote management. You can enable Snow Device Management at any time after you receive and unlock your device.

Enabling Snow Device Management

Follow this procedure to enable Snow Device Management using the Snowball Edge CLI.

Note
This procedure requires the Snowball Edge client. Make sure you've installed the latest Snowball Edge client before you proceed. For more information, see Downloading and Installing the Snowball Client.

To enable Snow Device Management on your device

1. To download the manifest file for the job from AWS, use the following command. Replace *placeholder values* with your information.

   Command

   ```
   aws snowball get-job-manifest
   --job-id JID970A5018-F8KE-4D06-9F7B-335C1C7221E4
   ```

   Output

   ```
   {
       "ManifestURI": "https://awsie-frosty-manifests-prod.s3.us-east-1.amazonaws.com/
   JID970A5018-F8KE-4D06-9F7B-335C1C7221E4_manifest.bin"
   }
   ```

2. To download the unlock code for the job from AWS, use the following command. Replace *placeholder values* with your information.

   Command

   ```
   aws snowball get-job-unlock-code
   --job-id JID970A5018-F8KE-4D06-9F7B-335C1C7221E4
   ```

   Output

```
{
    "UnlockCode": "7c0e1-bab84-f7675-0a2b6-f8k33"
}
```

3. Use a compatible power adapter to power your device and turn it on. Then connect the device to your network using an Ethernet cable or a Wi-Fi connection. For more information, see AWS Snowcone Power Supply and Accessories.
4. Make note of the local IP address shown on the device's display. You'll need this IP address for the next steps. This IP address is either obtained automatically through DHCP or statically configured.
5. To unlock the device, use the following command. Replace *placeholder values* with your information. For the `--endpoint` parameter, specify the device local IP address you noted previously.

   Command

```
snowballEdge unlock-device
--manifest-file JID1717d8cc-2dc9-4e68-aa46-63a3ad7927d2_manifest.bin
--unlock-code 7c0e1-bab84-f7675-0a2b6-f8k33
--endpoint https://10.186.0.56:9091
```

   Output

```
Your Snowball Edge device is unlocking. You may determine the unlock state of your
 device using the describe-device command.
Your Snowball Edge device will be available for use when it is in the UNLOCKED state.
```

6. (Optional) To describe the features of the device, use the following command. Replace *placeholder values* with your information. For the `--endpoint` parameter, specify the device local IP address you noted previously.

   Command

```
snowballEdge describe-features
--manifest-file JID1717d8cc-2dc9-4e68-aa46-63a3ad7927d2_manifest.bin
--unlock-code 7c0e1-bab84-f7675-0a2b6-f8k33
--endpoint https://10.186.0.56:9091
```

   Output

```
{
  "RemoteManagementState" : "INSTALLED_ONLY"
}
```

7. To enable Snow Device Management, use the following command. Replace *placeholder values* with your information. For the `--endpoint` parameter, specify the device local IP address you noted previously.

Command

```
snowballEdge set-features
--remote-management-state INSTALLED_AUTOSTART
--manifest-file JID1717d8cc-2dc9-4e68-aa46-63a3ad7927d2_manifest.bin
--unlock-code 7c0e1-bab84-f7675-0a2b6-f8k33
--endpoint https://10.186.0.56:9091
```

Output

```
{
  "RemoteManagementState" : "INSTALLED_AUTOSTART"
}
```

8. On the AWS account from which the device was ordered, create an AWS Identity and Access Management (IAM) role, and add the following policy to the role. Then, assign the role to the IAM user who will log in to remotely manage your device with Snow Device Management. For more information, see Creating IAM roles and Creating an IAM user in your AWS account.

   Policy

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "snow-device-management:ListDevices",
                "snow-device-management:DescribeDevice",
                "snow-device-management:DescribeDeviceEc2Instances",
                "snow-device-management:ListDeviceResources",
                "snow-device-management:CreateTask",
                "snow-device-management:ListTasks",
                "snow-device-management:DescribeTask",
                "snow-device-management:CancelTask",
                "snow-device-management:DescribeExecution",
                "snow-device-management:ListExecutions",
                "snow-device-management:ListTagsForResource",
                "snow-device-management:TagResource",
                "snow-device-management:UntagResource"
            ],
            "Resource": "*"
        }
    ]
}
```

Snow Device Management CLI commands

This section describes the AWS CLI commands that you can use to manage your Snow Family devices remotely with Snow Device Management. You can also perform some remote management tasks using AWS OpsHub for Snow Family. For more information, see Unlocking a device remotely (p. 57).

Note
Before managing your device, make sure it is powered on, connected to your network, and can connect to the AWS Region where it was provisioned.

Topics

Create a task

To instruct one or more target devices to perform a task, such as unlocking or rebooting, use `create-task`. You specify target devices by providing a list of managed device IDs with the `--targets` parameter, and specify the tasks to perform with the `--command` parameter. Only a single command can be run on a device at a time.

Supported commands:

- `unlock` (no arguments)
- `reboot` (no arguments)

To create a task to be run by the target devices, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management create-task
--targets smd-fictbgr3rbcjeqa5
--command reboot={}
```

Exceptions

```
ValidationException
ResourceNotFoundException
InternalServerException
ThrottlingException
AccessDeniedException
ServiceQuotaExceededException
```

Output

```
{
    "taskId": "st-ficthmqoc2pht111",
    "taskArn": "arn:aws:snow-device-management:us-west-2:000000000000:task/st-
cjkwhmqoc2pht111"
}
```

Check task status

To check the status of a remote task running on one or more target devices, use the `describe-execution` command.

A task can have one of the following states:

- `QUEUED`
- `IN_PROGRESS`
- `CANCELED`
- `FAILED`
- `COMPLETED`
- `REJECTED`
- `TIMED_OUT`

To check the status of a task, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management describe-execution \
--taskId st-ficthmqoc2phtlef \
--managed-device-id smd-fictqic6gcldf111
```

Output

```
{
    "executionId": "1",
    "lastUpdatedAt": "2021-07-22T15:29:44.110000+00:00",
    "managedDeviceId": "smd-fictqic6gcldf111",
    "startedAt": "2021-07-22T15:28:53.947000+00:00",
    "state": "SUCCEEDED",
    "taskId": "st-ficthmqoc2pht111"
}
```

Check device info

To check device-specific information, such as the device type, software version, IP addresses, and lock status, use the `describe-device` command. The output also includes the following:

- `lastReachedOutAt` – When the device last contacted the AWS Cloud. Indicates that the device is online.

- `lastUpdatedAt` – When data was last updated on the device. Indicates when the device cache was refreshed.

To check device info, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management describe-device \
--managed-device-id smd-fictqic6gcldf111
```

Exceptions

```
ValidationException
ResourceNotFoundException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "associatedWithJob": "JID2bf11d5a-ea1e-414a-b5b1-3bf7e6a6e111",
    "deviceCapacities": [
        {
            "available": 158892032000,
            "name": "HDD Storage",
            "total": 158892032000,
            "unit": "Byte",
            "used": 0
        },
        {
            "available": 0,
            "name": "SSD Storage",
            "total": 0,
            "unit": "Byte",
            "used": 0
        },
        {
            "available": 3,
            "name": "vCPU",
            "total": 3,
            "unit": "Number",
            "used": 0
        },
        {
            "available": 5368709120,
            "name": "Memory",
            "total": 5368709120,
            "unit": "Byte",
            "used": 0
        },
        {
            "available": 0,
            "name": "GPU",
            "total": 0,
```

```
            "unit": "Number",
            "used": 0
        }
    ],
    "deviceState": "UNLOCKED",
    "deviceType": "SNC1_HDD",
    "lastReachedOutAt": "2021-07-23T21:21:56.120000+00:00",
    "lastUpdatedAt": "2021-07-23T21:21:56.120000+00:00",
    "managedDeviceId": "smd-fictqic6gcldf111",
    "managedDeviceArn": "arn:aws:snow-device-management:us-west-2:000000000000:managed-
device/smd-fictqic6gcldf111"
    "physicalNetworkInterfaces": [
        {
            "defaultGateway": "10.0.0.1",
            "ipAddress": "10.0.0.2",
            "ipAddressAssignment": "DHCP",
            "macAddress": "ab:cd:ef:12:34:56",
            "netmask": "255.255.252.0",
            "physicalConnectorType": "RJ45",
            "physicalNetworkInterfaceId": "s.ni-530f866d526d4b111"
        },
        {
            "defaultGateway": "10.0.0.1",
            "ipAddress": "0.0.0.0",
            "ipAddressAssignment": "STATIC",
            "macAddress": "ab:cd:ef:12:34:57",
            "netmask": "0.0.0.0",
            "physicalConnectorType": "RJ45",
            "physicalNetworkInterfaceId": "s.ni-8abc787f0a6750111"
        }
    ],
    "software": {
        "installState": "NA",
        "installedVersion": "122",
        "installingVersion": "NA"
    },
    "tags": {
        "Project": "PrototypeA"
    }
}
```


Check Amazon EC2 instance state

To check the current state of the Amazon EC2 instance, use the `describe-ec2-instances` command. The output is similar to that of the `describe-device` command, but the results are sourced from the device cache in the AWS Cloud and include a subset of the available fields.

To check the state of the Amazon EC2 instance, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management describe-device-ec2-instances \
--managed-device-id smd-fictbgr3rbcje111 \
--instance-ids s.i-84fa8a27d3e15e111
```

Exceptions

```
ValidationException
ResourceNotFoundException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "instances": [
        {
            "instance": {
                "amiLaunchIndex": 0,
                "blockDeviceMappings": [
                    {
                        "deviceName": "/dev/sda",
                        "ebs": {
                            "attachTime": "2021-07-23T15:25:38.719000-07:00",
                            "deleteOnTermination": true,
                            "status": "ATTACHED",
                            "volumeId": "s.vol-84fa8a27d3e15e111"
                        }
                    }
                ],
                "cpuOptions": {
                    "coreCount": 1,
                    "threadsPerCore": 1
                },
                "createdAt": "2021-07-23T15:23:22.858000-07:00",
                "imageId": "s.ami-03f976c3cadaa6111",
                "instanceId": "s.i-84fa8a27d3e15e111",
                "state": {
                    "name": "RUNNING"
                },
                "instanceType": "snc1.micro",
                "privateIpAddress": "34.223.14.193",
                "publicIpAddress": "10.111.60.160",
                "rootDeviceName": "/dev/sda",
                "securityGroups": [
                    {
                        "groupId": "s.sg-890b6b4008bdb3111",
                        "groupName": "default"
                    }
                ],
                "updatedAt": "2021-07-23T15:29:42.163000-07:00"
            },
            "lastUpdatedAt": "2021-07-23T15:29:58.
071000-07:00"
        }
    ]
}
```

Check task metadata

To check the metadata for a given task on a device, use the `describe-task` command. The metadata for a task includes the following items:

- The target devices
- The status of the task

- When the task was created
- When data was last updated on the device
- When the task was completed
- The description (if any) that was provided when the task was created

To check a task's metadata, use the following command. Replace each *user input placeholder* with your own information.

Command

```
aws snow-device-management describe-task \
--task-id st-ficthmqoc2pht111
```

Exceptions

```
ValidationException
ResourceNotFoundException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "completedAt": "2021-07-22T15:29:46.758000+00:00",
    "createdAt": "2021-07-22T15:28:42.613000+00:00",
    "lastUpdatedAt": "2021-07-22T15:29:46.758000+00:00",
    "state": "COMPLETED",
    "tags": {},
    "targets": [
        "smd-fictbgr3rbcje111"
    ],
    "taskId": "st-ficthmqoc2pht111",
    "taskArn": "arn:aws:snow-device-management:us-west-2:000000000000:task/st-
ficthmqoc2pht111"
}
```

Cancel a task

To send a cancel request for a specific task, use the `cancel-task` command. You can cancel only tasks in the QUEUED state that have not yet run. Tasks that are already running can't be canceled.

> **Note**
> A task that you're attempting to cancel might still run if it is processed from the queue before the `cancel-task` command changes the task's state.

To cancel a task, use the following command. Replace each *user input placeholder* with your own information.

Command

```
aws snow-device-management cancel-task \
--task-id st-ficthmqoc2pht111
```

Exceptions

```
ValidationException
ResourceNotFoundException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "taskId": "st-ficthmqoc2pht111"
}
```

List commands and syntax

To return a list of all supported commands for the Snow Device Management API, use the `help` command. You can also use the `help` command to return detailed information about and syntax for a given command.

To list all the supported commands, use the following command.

Command

```
aws snow-device-management help
```

To return detailed information and syntax for a command, use the following command. Replace *command* with the name of the command that you're interested in.

Command

```
aws snow-device-management command help
```

List remote-manageable devices

To return a list of all devices on your account that have Snow Device Management enabled in the AWS Region where the command is run, use the `list-devices` command. `--max-results` and `--next-token` are optional. For more information, see Using AWS CLI pagination options in the "AWS Command Line Interface User Guide".

To list remote-manageable devices, use the following command. Replace each *user input placeholder* with your own information.

Command

```
aws snow-device-management list-devices \
--max-results 10
```

Exceptions

```
ValidationException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "devices": [
        {
            "associatedWithJob": "ID2bf11d5a-ea1e-414a-b5b1-3bf7e6a6e111",
            "managedDeviceId": "smd-fictbgr3rbcjeqa5",
            "managedDeviceArn": "arn:aws:snow-device-management:us-
west-2:000000000000:managed-device/smd-fictbgr3rbcje111"
            "tags": {}
        }
    ]
}
```

List task status across devices

To return the status of tasks for one or more target devices, use the `list-executions` command. To filter the return list to show tasks that are currently in a single specific state, use the `--state` parameter. `--max-results` and `--next-token` are optional. For more information, see Using AWS CLI pagination options in the "AWS Command Line Interface User Guide".

A task can have one of the following states:

- `QUEUED`
- `IN_PROGRESS`
- `CANCELED`
- `FAILED`
- `COMPLETED`
- `REJECTED`
- `TIMED_OUT`

To list task status across devices, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management list-executions \
--taskId st-ficthmqoc2phtlef \
--state SUCCEEDED \
--max-results 10
```

Exceptions

```
ValidationException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "executions": [
        {
            "executionId": "1",
            "managedDeviceId": "smd-fictbgr3rbcje111",
            "state": "SUCCEEDED",
            "taskId": "st-ficthmqoc2pht111"
        }
    ]
}
```

List available resources

To return a list of the AWS resources available for a device, use the `list-device-resources` command. To filter the list by a specific type of resource, use the `--type` parameter. Currently, Amazon EC2 instances are the only supported resource type. `--max-results` and `--next-token` are optional. For more information, see Using AWS CLI pagination options in the "AWS Command Line Interface User Guide".

To list the available resources for a device, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management list-device-resources \
--managed-device-id smd-fictbgr3rbcje111 \
--type AWS::EC2::Instance
--next-token YAQGPwAT9l3wVKaGYjt4yS34MiQLWvzcShe9oIeDJr05AT4rXSprqcqQhhBEYRfcerAp0YYbJmRT=
--max-results 10
```

Exceptions

```
ValidationException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
```

```
    "resources": [
        {
            "id": "s.i-84fa8a27d3e15e111",
            "resourceType": "AWS::EC2::Instance"
        }
    ]
}
```

List device or task tags

To return a list of tags for a managed device or task, use the `list-tags-for-resource` command.

To list the tags for a device, use the following command. Replace the example Amazon Resource Name (ARN) with the ARN for your device.

Command

```
aws snow-device-management list-tags-for-resource
--resource-arn arn:aws:snow-device-management:us-west-2:123456789012:managed-device/smd-fictbgr3rbcjeqa5
```

Exceptions

```
AccessDeniedException
InternalServerException
ResourceNotFoundException
ThrottlingException
```

Output

```
{
    "tags": {
        "Project": "PrototypeA"
    }
}
```

List tasks by status

Use the `list-tasks` command to return a list of tasks from the devices in the AWS Region where the command is run. To filter the results by `IN_PROGRESS`, `COMPLETED`, or `CANCELED` status, use the `--state` parameter. `--max-results` and `--next-token` are optional. For more information, see Using AWS CLI pagination options in the "AWS Command Line Interface User Guide".

To list tasks by status, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management list-tasks \
--state IN_PROGRESS \
--next-token K8VAMqKiP2Cf4xGkmH8GMyZrgOF8FUb+d1OKTP9+P4pUb+8PhW+6MiXh4= \
--max-results 10
```

Exceptions

```
ValidationException
InternalServerException
ThrottlingException
AccessDeniedException
```

Output

```
{
    "tasks": [
        {
            "state": "IN_PROGRESS",
            "tags": {},
            "taskId": "st-ficthmqoc2phtlef",
            "taskArn": "arn:aws:snow-device-management:us-west-2:000000000000:task/st-
ficthmqoc2phtlef"

        }
    ]
}
```

Apply tags

To add or replace a tag for a device, or for a task on a device, use the `tag-resource` command. The `--tags` parameter accepts a comma-separated list of `Key=Value` pairs.

To apply tags to a device, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management tag-resource \
--resource-arn arn:aws:snow-device-management:us-west-2:123456789012:managed-device/smd-
fictbgr3rbcjeqa5 \
--tags Project=PrototypeA
```

Exceptions

```
AccessDeniedException
InternalServerException
ResourceNotFoundException
ThrottlingException
```

Remove tags

To remove a tag from a device, or from a task on a device, use the `untag-resources` command.

To remove tags from a device, use the following command. Replace each *`user input placeholder`* with your own information.

Command

```
aws snow-device-management untag-resources \
--resource-arn arn:aws:snow-device-management:us-west-2:123456789012:managed-device/smd-fictbgr3rbcjeqa5 \
--tag-keys Project
```

Exceptions

```
AccessDeniedException
InternalServerException
ResourceNotFoundException
ThrottlingException
```

Using an AWS Snowball Edge Cluster

A *cluster* is a logical grouping of AWS Snowball Edge devices, in groups of 5–10 devices. A cluster is created as a single job, which offers increased durability and storage capacity. This section provides conceptual, usage, and administrative information about Snowball Edge clusters, in addition to walkthroughs for common Snowball Edge procedures.

> **Note**
> In January 2018, there was a feature update for clusters, making them leaderless. The cluster update is backward-compatible with older clusters. .

Topics

Clustering Overview

For the AWS Snowball service, a cluster is a collective of Snowball Edge devices used as a single logical unit for local storage and compute purposes.

A cluster offers two primary benefits over a standalone Snowball Edge for local storage and computing:

- **Increased durability** – The data stored in a cluster of Snowball Edge devices enjoys increased data durability over a single device. In addition, the data on the cluster remains as safe and viable as it was previously, despite possible Snowball Edge outages in the cluster. Clusters can withstand the loss of two nodes before the data is in danger. You can also add or replace nodes.
- **Increased storage** – The total available storage is 45 terabytes of data per node in a cluster of Snowball Edge Storage Optimized devices. Thus, in a five-node cluster, there are 225 terabytes of available storage space. In contrast, there are about 80 terabytes of available storage space in a standalone Snowball Edge. Clusters that have more than five nodes have even more storage space.

A cluster of Snowball Edge devices is made of leaderless nodes. Any node can write data to and read data from the entire cluster, and all nodes are capable of performing the behind-the-scenes management of the cluster.

Snowball Edge Cluster Quorums

A *quorum* represents the minimum number of Snowball Edge devices in a cluster that must be communicating with each other to maintain some level of operation. There are two levels of quorum for Snowball Edge clusters—a read/write quorum and a read quorum.

Suppose that you upload your data to a cluster of Snowball Edge devices. With all devices healthy, you have a *read/write quorum* for your cluster. If one of those nodes goes offline, you reduce the operational capacity of the cluster. However, you can still read and write to the cluster. In that sense, with the cluster operating all but one node, the cluster still has a read/write quorum.

If two nodes in your cluster are down, any additional or ongoing write operations fail. But any data that was successfully written to the cluster can be accessed and read. This is called a *read quorum*.

Finally, suppose that a third node loses power. Then the cluster is offline, and the data in the cluster is unavailable. You might be able fix this, or the data might be permanently lost, depending on the severity

of the event. If it is a temporary external power event, and you can power the three Snowball Edge devices back on and unlock all the nodes in the cluster, your data is available again.

Important
If a minimum quorum of healthy nodes doesn't exist, contact AWS Support.

You can determine the quorum state of your cluster by determining your node's lock state and network reachability. The `snowballEdge describe-cluster` command reports back the lock and network reachability state for every node in an unlocked cluster. Ensuring that the devices in your cluster are healthy and connected is an administrative responsibility that you take on when you create the cluster job. For more information about the different client commands, see Commands for the Snowball Edge Client (p. 81).

Considerations for Cluster Jobs for AWS Snowball Edge

Keep the following considerations in mind when planning to use a cluster of Snowball Edges:

- We recommend that you have a redundant power supply to reduce potential performance and stability issues for your cluster.
- As with standalone local storage and compute jobs, the data stored in a cluster can't be imported into Amazon S3 without ordering additional devices as a part of separate import jobs. If you order these devices, you can transfer the data from the cluster to the devices and import the data when you return the devices for the import jobs.
- To get data onto a cluster from Amazon S3, create a separate export job and copy the data from the devices of the export job onto the cluster.
- You can create a cluster job from the console, the AWS CLI, or one of the AWS SDKs. For a guided walkthrough of creating a job, see Getting Started (p. 33).
- Cluster nodes have node IDs. A *node ID* is the same as the job ID for a device that you can get from the console, the AWS CLI, the AWS SDKs, and the Snowball Edge client. You can use node IDs to remove old nodes from clusters. You can get a list of node IDs by using the `snowballEdge describe-device` command on an unlocked device or the `describe-cluster` on an unlocked cluster.
- The lifespan of a cluster is limited by the security certificate granted to the cluster devices when the cluster is provisioned. By default, Snowball Edge devices can be used for up to 360 days before they need to be returned. At the end of that time, the devices stop responding to read/write requests. If you need to keep one or more devices for longer than 360 days, contact AWS Support.
- When AWS receives a returned device that was part of a cluster, we perform a complete erasure of the device. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Related Topics

Beyond the content presented here, you can find other topics in this guide that are relevant to clusters:

- Getting Started (p. 33) – Outlines how to get started creating your first job. The techniques in this section work for all job types, including cluster jobs.
- Commands for the Snowball Edge Client (p. 81) – Contains a list of commands for the Snowball Edge client tool. These commands include the Snowball Edge administrative commands to unlock a cluster, get the status information for the nodes and the cluster as a whole, remove unavailable nodes, and add new nodes.
- Administering a Cluster (p. 201) – Contains information about the administrative tasks you perform with a cluster, like adding and removing nodes, and includes helpful procedures.

Administering a Cluster

The following sections provide information about the primary administrative tasks needed to operate a healthy cluster of Snowball Edge devices.

Topics

Most administrative tasks require that you use the Snowball Edge client and its commands that perform the following actions:

- Unlocking Snowball Edge Devices (p. 83)
- Getting Device Status (p. 90) of a cluster
- Removing a Node from a Cluster (p. 93)
- Adding a Node to a Cluster (p. 94)

Reading and Writing Data to a Cluster

After you unlock a cluster, you're ready to read and write data to it. You can use the Amazon S3 interface to read and write data to a cluster. For more information, see Transferring Files Using the Amazon S3 Interface (p. 98).

To write data to a cluster, you must have a read/write quorum with no more than one unavailable node. To read data from a cluster, you must have a read quorum of no more than two unavailable nodes. For more information about quorums, see Snowball Edge Cluster Quorums (p. 199).

Reconnecting an Unavailable Cluster Node

A node can become temporarily unavailable due to an issue (like power or network loss) without damaging the data on the node. When this happens, it affects the status of your cluster. A node's network reachability and lock status is reported in the Snowball Edge client by using the `snowballEdge describe-cluster` command.

We recommend that you physically position your cluster so you have access to the front, back, and top of all nodes. This way, you can access the power and network cables on the back, the shipping label on the top to get your node ID, and the LCD screen on the front of the device for the IP address and other administrative information.

When you detect that a node is unavailable, we recommend that you try one of the following procedures, depending on the scenario that caused the unavailability.

To reconnect an unavailable node

1. Ensure that the node has power.
2. Ensure that the node is connected to the same internal network that the rest of the cluster is on.
3. Wait for the node to finish powering up (if it needed to be powered up).
4. Run the `snowballEdge unlock-cluster` command, or the `snowballEdge associate-device` command. For an example, see Unlocking Snowball Edge Devices (p. 83).

To reconnect an unavailable node that lost network but didn't lose power

1. Ensure that the node is connected to the same internal network that the rest of the cluster is on.
2. Run the `snowballEdge describe-device` command to see when the previously unavailable node is added back to the cluster. For an example, see Getting Device Status (p. 90).

After you perform the preceding procedures, your nodes should be working normally. You should also have a read/write quorum. If that's not the case, then one or more of your nodes might have a more serious issue and might need to be removed from the cluster.

Removing an Unhealthy Node from a Cluster

Rarely, a node in your cluster might become unhealthy. If the node is unavailable, we recommend going through the procedures listed in Reconnecting an Unavailable Cluster Node (p. 201) first.

If doing so doesn't resolve the issue, then the node might be unhealthy. An unhealthy node can occur if the node has taken damage from an external source, if there was an unusual electrical event, or if some other unlikely event occurs. If this happens, you need to remove the node from the cluster before you can add a new node as a replacement.

When you detect that a node is unhealthy and needs to be removed, we recommend that you do so with the following procedure.

To remove an unhealthy node

1. Ensure that the node is unhealthy and not just unavailable. For more information, see Reconnecting an Unavailable Cluster Node (p. 201).
2. Disconnect the unhealthy node from the network and power it off.
3. Run the `snowballEdge dissassociate-device` Snowball Edge client command. For more information, see Removing a Node from a Cluster (p. 93).
4. Order a replacement node using the console, the AWS CLI, or one of the AWS SDKs.
5. Return the unhealthy node to AWS. When we have the node, we perform a complete erasure of the device. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

After you successfully remove a node, your data is still available on the cluster if you still have a read quorum. To have a read quorum, a cluster must have no more than two unavailable nodes. Therefore, we recommend that you order replacement nodes as soon as you remove an unavailable node from the cluster.

Adding or Replacing a Node in a Cluster

You can add a new node after you have removed an unhealthy node from a cluster. You can also add a new node to increase local storage.

To add a new node, you first need to order a replacement. You can order a replacement node from the console, the AWS CLI, or one of the AWS SDKs. If you're ordering a replacement node from the console, you can order replacements for any job that hasn't been canceled or completed.

To order a replacement node from the console

1. Sign in to the AWS Snow Family Management Console.
2. Find and choose a job for a node that belongs to the cluster that you created from the Job dashboard.

3. For **Actions**, choose **Replace node**.

   Doing this opens the final step of the job creation wizard, with all settings identical to how the cluster was originally created.
4. Choose **Create job**.

Your replacement Snowball Edge is now on its way to you. When it arrives, use the following procedure to add it to your cluster.

To add a replacement node

1. Position the new node for the cluster such that you have access to the front, back, and top of all nodes.
2. Ensure that the node has power.
3. Ensure that the node is connected to the same internal network that the rest of the cluster is on.
4. Wait for the node to finish powering up (if it needed to be powered up).
5. Run the `snowballEdge associate-device` command. For an example, see Adding a Node to a Cluster (p. 94).

Understanding AWS Snowball Edge Jobs

A *job* in AWS Snowball is a discrete unit of work, defined when you create it in the console or the job management API. With the AWS Snowball Edge device, there are three different job types, all of which are capable of local storage and compute functionality. This functionality uses the file interface or the Amazon S3 interface to read and write data. It triggers Lambda functions based on Amazon S3 PUT object API actions running locally on the AWS Snowball Edge device.

Important
With an AWS Snowball Edge device, all jobs can use the compute functionality in AWS Regions where AWS Lambda is supported. How the compute functionality is implemented in AWS Snowball jobs is specific to Snowball—the functionality can differ significantly from how Lambda works in the cloud. Before creating your first compute job, we recommend that you familiarize yourself with how AWS Lambda powered by AWS IoT Greengrass works. For more information, see Using AWS Lambda with an AWS Snowball Edge (p. 123).

- Importing Jobs into Amazon S3 (p. 208) – The transfer of 80 TB or less of your local data copied onto a single device, and then moved into Amazon S3. For import jobs, Snowball devices and jobs have a one-to-one relationship. Each job has exactly one device associated with it. If you need to import more data, you can create new import jobs or clone existing ones. When you return a device of this job type, that data on it is imported into Amazon S3.
- Exporting Jobs from Amazon S3 (p. 209) – The transfer of any amount of data (located in Amazon S3), copied onto any number of Snowball Edge devices, and then moved one AWS Snowball Edge device at a time into your on-premises data destination. When you create an export job, it's split into job parts. Each job part is no more than 80 TB in size, and each job part has exactly one AWS Snowball Edge device associated with it. When you return a device of this job type, it's erased.
- Local Compute and Storage Only Jobs (p. 213) – These jobs involve one AWS Snowball Edge device, or multiple devices used in a cluster. These jobs don't start with data in their buckets like an export job, and they can't have data imported into Amazon S3 at the end like an import job. When you return a device of this job type, it's erased. With this job type, you also have the option of creating a cluster of devices. A cluster improves local storage durability and you can scale up or down with local storage capacity.

  In Regions where Lambda is not available, this job type is called *Local storage only*.

Job Details

Before creating a job, ensure the prerequisites (p. 2) are met. Each job is defined by the details that you specify when it's created. The following table describes all the details of a job.

Console identifier	API identifier	Detail description
Job name	`Description`	A name for the job, containing alphanumeric characters, spaces, and any Unicode special characters.
Job type	`JobType`	The type of job, either import, export, or local compute and storage.

Console identifier	API identifier	Detail description
Job ID	`JobId`	A unique 39-character label that identifies your job. The job ID appears at the bottom of the shipping label that appears on the E Ink display, and in the name of a job's manifest file.
Address	`AddressId`	The address that the device will be shipped to. In the case of the API, this is the ID for the address data type.
Created date	CreationDate	The date that you created this job.
Shipping speed	`ShippingOption`	Speed options are based on region. For more information, see Shipping Speeds (p. 229).
IAM role ARN	RoleARN	This Amazon Resource Name (ARN) is the AWS Identity and Access Management (IAM) role that is created during job creation with write permissions for your Amazon S3 buckets. The creation process is automatic, and the IAM role that you allow AWS Snowball to assume is only used to copy your data between your S3 buckets and the Snowball. For more information, see Permissions Required to Use the AWS Snowball Console (p. 241).
AWS KMS key	`KmsKeyARN`	In AWS Snowball, AWS Key Management Service (AWS KMS) encrypts the keys on each Snowball. When you create your job, you also choose or create an ARN for an AWS KMS encryption key that you own. For more information, see AWS Key Management Service in AWS Snowball Edge (p. 233).
Snowball capacity	`SnowballCapacityPreference`	AWS Snowball devices come in two sizes: 80 TB for Storage Optimized or 42 TB for Compute Optimized. The available size depends on your AWS Region.
Storage service	N/A	The AWS storage service associated with this job, in this case Amazon S3.

Console identifier	API identifier	Detail description
Resources	`Resources`	The AWS storage service resources associated with your job. In this case, these are the Amazon S3 buckets that your data is transferred to or from.
Job type	`JobType`	The type of job, either import, export, or local compute and storage.
Snowball type	`SnowballType`	The type of device used, either a Snowball or an AWS Snowball Edge device.
Cluster ID	`ClusterId`	A unique 39-character label that identifies your cluster.

Job Statuses

Each AWS Snowball Edge device job has a *status*, which changes to denote the current state of the job. This job status information doesn't reflect the health, the current processing state, or the storage used for the associated devices.

To see the status of a job

1. Log into the AWS Snow Family Management Console.
2. On the **Job dashboard**, choose the job.
3. Click on your job name within the console.
4. The Job Status pane will be located near the top and reflects the status of the job.

AWS Snowball Edge device job statuses

Console Identifier	API Identifier	Status Description
Job created	`New`	Your job has just been created. This status is the only one during which you can cancel a job or its job parts, if the job is an export job.
Preparing appliance	`PreparingAppliance`	AWS is preparing a device for your job.
Exporting	`InProgress`	AWS is exporting your data from Amazon S3 onto a device.
Preparing shipment	`PreparingShipment`	AWS is preparing to ship a device to you. The expected shipping tracking information is

Console Identifier	API Identifier	Status Description
		provided for customers in the status.
In transit to you	`InTransitToCustomer`	The device has been shipped to the address you provided during job creation.
Delivered to you	`WithCustomer`	The device has arrived at the address you provided during job creation.
In transit to AWS	`InTransitToAWS`	You have shipped the device back to AWS.
At sorting facility	`WithAWSSortingFacility`	The device for this job is at our internal sorting facility. Any additional processing for import jobs into Amazon S3 will begin soon, typically within 2 days.
At AWS	`WithAWS`	Your shipment has arrived at AWS. If you're importing data, your import typically begins within a day of its arrival.
Importing	`InProgress`	AWS is importing your data into Amazon Simple Storage Service (Amazon S3).
Completed	`Complete`	Your job or a part of your job has completed successfully.
Canceled	`Cancelled`	Your job has been canceled.

Cluster Statuses

Each cluster has a *status*, which changes to denote the current general progress state of the cluster. Each individual node of the cluster has its own job status.

This cluster status information doesn't reflect the health, the current processing state, or the storage used for the cluster or its nodes.

Console Identifier	API Identifier	Status Description
Awaiting Quorum	`AwaitingQuorum`	The cluster hasn't been created yet, because there aren't enough nodes to begin processing the cluster request. For a cluster to be created, it must have at least five nodes.
Pending	`Pending`	Your cluster has been created, and we're getting its nodes ready to ship out. You can track the status of each node with that node's job status.
Delivered to you	`InUse`	At least one node of the cluster is at the address you provided during job creation.
Completed	`Complete`	All the nodes of the cluster have been returned to AWS.
Canceled	`Cancelled`	The request to make a cluster was canceled. Cluster requests can only be canceled before they enter the Pending state.

Importing Jobs into Amazon S3

With an import job, your data is copied to the AWS Snowball Edge device with the built-in Amazon S3 interface or NFS mount point. Your data source for an import job should be on-premises. In other words, the storage devices that hold the data to be transferred should be physically located at the address that you provided when you created the job.

When you import files, each file becomes an object in Amazon S3 and each directory becomes a prefix. If you import data into an existing bucket, any existing objects with the same names as newly imported objects are overwritten. The import job type is also capable of local storage and compute functionality. This functionality uses the file interface or Amazon S3 interface to read and write data, and triggers Lambda functions based off of Amazon S3 PUT object API actions running locally on the AWS Snowball Edge device.

When all of your data has been imported into the specified Amazon S3 buckets in the AWS Cloud, AWS performs a complete erasure of the device. This erasure follows the NIST 800-88 standards.

After your import is complete, you can download a job report. This report alerts you to any objects that failed the import process. You can find additional information in the success and failure logs.

Important
Don't delete your local copies of the transferred data until you can verify the results of the job completion report and review your import logs.

Exporting Jobs from Amazon S3

Note
Tags and metadata are NOT currently supported, in other words, all tags and metadata would be removed when exporting objects from S3 buckets.

Your data source for an export job is one or more Amazon S3 buckets. After the data for a job part is moved from Amazon S3 to an AWS Snowball Edge device, you can download a job report. This report alerts you to any objects that failed the transfer to the device. You can find more information in your job's success and failure logs.

You can export any number of objects for each export job, using as many devices as it takes to complete the transfer. Each AWS Snowball Edge device for an export job's job parts is delivered one after another, with subsequent devices shipping to you after the previous job part enters the **In transit to AWS** status.

When you copy objects into your on-premises data destination from a device using the Amazon S3 interface or the NFS mount point, those objects are saved as files. If you copy objects into a location that already holds files, any existing files with the same names are overwritten. The export job type is also capable of local storage and compute functionality. This functionality uses the file interface or Amazon S3 interface to read and write data, and triggers Lambda functions based off of Amazon S3 PUT object API actions running locally on the AWS Snowball Edge device.

When AWS receives a returned device, we completely erase it, following the NIST 800-88 standards.

Important
Don't change, update, or delete the exported Amazon S3 objects until you can verify that all of your contents for the entire job have been copied to your on-premises data destination.

When you create an export job, you can export an entire Amazon S3 bucket or a specific range of objects keys.

Using Export Ranges

When you create an export job in the AWS Snow Family Management Console or with the job management API, you can export an entire Amazon S3 bucket or a specific range of objects keys. Object key names uniquely identify objects in a bucket. If you export a range, you define the length of the range by providing either an inclusive range beginning, an inclusive range ending, or both.

Ranges are UTF-8 binary sorted. UTF-8 binary data is sorted in the following way:

- The numbers 0–9 come before both uppercase and lowercase English characters.
- Uppercase English characters come before all lowercase English characters.
- Lowercase English characters come last when sorted against uppercase English characters and numbers.
- Special characters are sorted among the other character sets.

For more information about the specifics of UTF-8, see UTF-8 on Wikipedia.

Export Range Examples

Assume that you have a bucket containing the following objects and prefixes, sorted in UTF-8 binary order:

- 01
- Aardvark
- Aardwolf
- Aasvogel/apple
- Aasvogel/arrow/object1
- Aasvogel/arrow/object2
- Aasvogel/banana
- Aasvogel/banker/object1
- Aasvogel/banker/object2
- Aasvogel/cherry
- Banana
- Car

Specified range beginning	Specified range ending	Objects in the range that will be exported
(none)	(none)	All of the objects in your bucket
(none)	Aasvogel	01 Aardvark Aardwolf Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2 Aasvogel/cherry
(none)	Aasvogel/banana	01 Aardvark Aardwolf Aasvogel/apple Aasvogel/arrow/object1

Specified range beginning	Specified range ending	Objects in the range that will be exported
		Aasvogel/arrow/object2 Aasvogel/banana
Aasvogel	(none)	Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2 Aasvogel/cherry Banana Car
Aardwolf	(none)	Aardwolf Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2 Aasvogel/cherry Banana Car

Specified range beginning	Specified range ending	Objects in the range that will be exported
Aar	(none)	Aardvark Aardwolf Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2 Aasvogel/cherry Banana Car
car	(none)	No objects are exported, and you get an error message when you try to create the job. Note that *car* is sorted below *Car* according to UTF-8 binary values.
Aar	Aarrr	Aardvark Aardwolf
Aasvogel/arrow	Aasvogel/arrox	Aasvogel/arrow/object1 Aasvogel/arrow/object2
Aasvogel/apple	Aasvogel/banana	Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana

Specified range beginning	Specified range ending	Objects in the range that will be exported
Aasvogel/apple	Aasvogel/banker	Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2
Aasvogel/apple	Aasvogel/cherry	Aasvogel/apple Aasvogel/arrow/object1 Aasvogel/arrow/object2 Aasvogel/banana Aasvogel/banker/object1 Aasvogel/banker/object2 Aasvogel/cherry

Export Jobs Best Practices

- Ensure data is in Amazon S3, batch small files before ordering the job
- Ensure key ranges are specified in the export job definition if you have millions of objects in your bucket
- Ensure begin key marker and end key marker are not the same
- Update object keys to remove slash in the name as objects with trailing slashes in their names (/ or \) are not transferred to Snowball Edge

Local Compute and Storage Only Jobs

Local compute and storage jobs enable you to use Amazon S3 and AWS Lambda powered by AWS IoT Greengrass locally, without an internet connection. While local storage and compute functionality also exists for the import and export job types, this job type is only for local use. You can't export data from Amazon S3 onto the device or import data into Amazon S3 when the device is returned.

Topics

Local Compute Jobs

The local compute functionality is AWS Lambda powered by AWS IoT Greengrass. It can automatically run Python-language code in response to Amazon S3 PUT object action API calls to the AWS Snowball Edge device. You write the Python code as a Lambda function in the Lambda console.

Buckets and Lambda functions have a one-to-one relationship, meaning that one Lambda function can be associated with one bucket when the job is created. For more information, see Using AWS Lambda with an AWS Snowball Edge (p. 123).

Local Storage Jobs

You can read and write objects to an AWS Snowball Edge device using the Amazon S3 interface or the file interface. The S3 interface comes built-into the device, and it supports Amazon S3 REST API actions. This Amazon S3 REST API support is limited to a subset of S3 REST API actions. For more information, see Transferring Files Using the Amazon S3 Interface (p. 98).

When you've finished using the device, return it to AWS, and the device will be erased. This erasure follows the National Institute of Standards and Technology (NIST) 800-88 standards.

Local Cluster Option

A cluster is a logical grouping of Snowball Edge devices, in groups of 5–10 devices. A cluster is created as a single job, which offers increased durability and storage size when compared to other AWS Snowball job offerings. For more information about cluster jobs, see Using an AWS Snowball Edge Cluster (p. 199).

Cloning a Job in the Console

When you first create an import job or a local compute and storage job, you might discover that you need more than one AWS Snowball Edge device. Because import jobs and local compute and storage jobs are associated with a single device, requiring more than one device means that you need to create more than one job. When creating additional jobs, you can go through the job creation wizard again in the console, or you can clone an existing job.

> **Note**
> Cloning a job is a shortcut available in the console to make creating additional jobs easier. If you're creating jobs with the job management API, you can simply run the job creation command again.

Cloning a job means re-creating it exactly, except for an automatically modified name. Cloning is a simple process.

To clone a job in the console

1. In the AWS Snow Family Management Console, choose your job from the table.
2. For **Actions**, choose **Clone job**.

   The **Create job** wizard opens to the last page, **Step 6: Review**.
3. Review the information and make any changes you want by choosing the appropriate **Edit** button.

4. To create your cloned job, choose **Create job**.

Cloned jobs are named in the format ***Job Name*-clone-*number***. The number is automatically added to the job name and represents the number of times you've cloned this job after the first time you clone it. For example, **AprilFinanceReports-clone** represents the first cloned job of **AprilFinanceReports** job, and **DataCenterMigration-clone-42** represents the forty-second clone of the **DataCenterMigration** job.

Canceling Jobs in the Console

If you need to cancel a job request or a cluster creation request for any reason, you have at least an hour after you created the request to do so. You can only cancel jobs when they have **Job created** status. After a job begins processing, contact AWS Support to cancel it. Likewise, to cancel a cluster creation request, you have about an hour. After a cluster creation request begins processing, contact AWS Support to cancel it.

To cancel a job in the console

1. Sign in to the AWS Management Console and open the AWS Snow Family Management Console.
2. Search for and choose your job from the table.
3. From **Actions**, choose **Cancel job**.

You have now cancelled your job.

Best Practices for the AWS Snowball Edge Device

To help get the maximum benefit and satisfaction with your AWS Snowball Edge device, we recommend that you follow these best practices.

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Security

The following are recommendations and best practices for maintaining security while working with an AWS Snowball Edge device.

General Security

- If you notice anything that looks suspicious about the AWS Snowball Edge device, don't connect it to your internal network. Instead, contact AWS Support, and a new AWS Snowball Edge device will be shipped to you.
- We recommend that you don't save a copy of the unlock code in the same location on the workstation as the manifest for that job. Saving these in different locations helps prevent unauthorized parties from gaining access to the AWS Snowball Edge device. For example, you can save a copy of the manifest to your local server, and email the code to a user that unlocks the device. This approach limits access to the AWS Snowball Edge device to individuals who have access to files saved on the server and the user's email address.
- The credentials displayed, when you run the Snowball Edge client commands list-access-keys and get-secret-access-key, are a pair of access keys used to access your device.

  These keys are only associated with the job and the local resources on the device. They don't map to your AWS account or any other AWS account. If you try to use these keys to access services and resources in the AWS Cloud, they will fail because they only work for the local resources associated with your job.

For information about how to use AWS Identity and Access Management (IAM) policies to control access, see AWS-Managed (Predefined) Policies for AWS Snowball Edge (p. 243).

Network Security

- We recommend that you only use one method at a time for reading and writing data to a local bucket on an AWS Snowball Edge device. Using both the file interface and the Amazon S3 interface on the same Amazon S3 bucket at the same time can result in read/write conflicts.
- To prevent corrupting your data, don't disconnect the AWS Snowball Edge device or change its network settings while transferring data.
- Files that are being written to on the device should be in a static state. Files that are modified while they are being written to can result in read/write conflicts.

- For more information about improving performance of your AWS Snowball Edge device, see Performance (p. 217).

Resource Management

Consider the following best practices for managing jobs and resources on your AWS Snowball Edge device.

- The 10 free days for performing your on-premises data transfer start the day after the AWS Snowball Edge device arrives at your data center. This applies only to Snowball Edge device types.
- The **Job created** status is the only status in which you can cancel a job. When a job changes to a different status, you can't cancel the job. This applies to clusters.
- For import jobs, don't delete your local copies of the transferred data until the import into Amazon S3 is successful. As part of your process, be sure to verify the results of the data transfer.

Performance

Following, you can find recommendations and information about AWS Snowball Edge device performance. This section describes performance in general terms, because on-premises environments have a different way of doing things—different network technologies, different hardware, different operating systems, different procedures, and so on.

The following table outlines how your network's transfer rate impacts how long it takes to fill a Snowball Edge device with data. Transferring smaller files reduces your transfer speed due to increased overhead. If you have many small files, we recommend that you zip them up into larger archives before transferring them onto a Snowball Edge device.

Rate (MB/s)	82 TB transfer time
800	1.22 days
450	2.11 days
400	2.37 days
300	3.16 days
277	3.42 days
200	4.75 days
100	9.49 days
60	15.53 days
30	31.06 days
10	85.42 days

To provide meaningful guidance about performance, the following sections describe how to determine when to use the AWS Snowball Edge device and how to get the most out of the service.

Topics

Performance Recommendations

The following practices are highly recommended, because they have the largest impact on improving the performance of your data transfer:

- We recommend that you have no more than 500,000 files or directories within each directory.
- We recommend that all files transferred to a Snowball Edge device be no smaller than 1 MB in size.
- If you have many files smaller than 1 MB in size, we recommend that you zip them up into larger archives before transferring them onto a Snowball Edge device.

Speeding Up Data Transfer

One of the major ways that you can improve the performance of an AWS Snowball Edge device is to speed up the transfer of data going to and from a device. In general, you can improve the transfer speed from your data source to the device in the following ways. This following list is ordered from largest to smallest positive impact on performance:

1. **Perform multiple write operations at one time** – To do this, run each command from multiple terminal windows on a computer with a network connection to a single AWS Snowball Edge device.
2. **Transfer small files in batches** – Each copy operation has some overhead because of encryption. To speed up the process, batch files together in a single archive. When you batch files together, they can be auto-extracted when they are imported into Amazon S3. For more information, see Batching Small Files (p. 101).
3. **Don't perform other operations on files during transfer** – Renaming files during transfer, changing their metadata, or writing data to the files during a copy operation has a negative impact on transfer performance. We recommend that your files remain in a static state while you transfer them.
4. **Reduce local network use** – Your AWS Snowball Edge device communicates across your local network. So you can improve data transfer speeds by reducing other local network traffic between the AWS Snowball Edge device, the switch it's connected to, and the computer that hosts your data source.
5. **Eliminate unnecessary hops** – We recommend that you set up your AWS Snowball Edge device, your data source, and the computer running the terminal connection between them so that they're the only machines communicating across a single switch. Doing so can improve data transfer speeds.

> **Note**
> The data transfer rate using the file interface is typically between 25 MB/s and 40 MB/s. If you need to transfer data faster than this, use the Amazon S3 interface, which has a data transfer rate typically between 250 MB/s and 400 MB/s. For more information about using the file interface, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107). For more information about using the Amazon S3 interface, see Transferring Files Using the Amazon S3 Interface (p. 98).

Updating Software on an AWS Snowball Edge

You can download software updates from AWS and install them on AWS Snowball Edge devices in your on-premises environments. These updates happen in the background. You can continue to use your devices as normal while the latest software is downloaded securely from AWS to your device. However, to apply downloaded updates, you must restart the device.

Warning
We highly recommend that you suspend all activity on your device before restarting it. Restarting a device stops running instances, interrupts any writing to local Amazon S3 buckets, and stops any write operations from the file interface without clearing the cache. All of these processes can result in lost data.

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Prerequisites

Before you can update your device, the following prerequisites must be met:

- You've created your job, have the device on-premises, and you've unlocked it. For more information, see Getting Started (p. 33).
- Updating a Snowball Edge is done through the Snowball Edge client. The Snowball Edge client must be downloaded and installed on a computer in your local environment that has a network connection to the device you want to update. For more information, see Using the Snowball Edge Client (p. 81).
- (Optional) We recommend that you configure a profile for the Snowball Edge client. For more information, see Configuring a Profile for the Snowball Edge Client (p. 82).

After you complete these tasks, you can download and install updates for Snowball Edge devices.

Downloading Updates

There are two primary ways that you can download an update for a Snowball Edge device:

- You can trigger manual updates at any time using specific Snowball Edge client commands.
- You can programmatically determine a time to automatically update the device.

The following procedure outlines the process of manually downloading updates. For information about automatically updating your Snowball Edge device, see `snowballEdge configure-auto-update-strategy` in Updating a Snowball Edge (p. 84).

Note
If your device has no access to the internet, you can download an update file using the GetSoftwareUpdates API. Then point to a local file location when you call `download-updates` using the `--uri` option, as in the following example.

```
snowballEdge download-updates --uri file:///tmp/local-update
```

To check for and download Snowball Edge software updates

1. Open a terminal window, and ensure that the Snowball Edge device is unlocked using the `snowballEdge describe-device` command. If the device is locked, use the `snowballEdge unlock-device` command to unlock it.
2. When the device is unlocked, run the `snowballEdge check-for-updates` command. This command returns the latest available version of the Snowball Edge software, and also the current version installed on the device.
3. If your device software is out of date, run the `snowballEdge download-updates` command.

   Note
   If your device is not connected to the internet, first download an update file using the GetSoftwareUpdates API. Then run the `snowballEdge download-updates` command using the `--uri` option with a local path to the file that you downloaded, as in the following example.

   ```
   snowballEdge download-updates --uri file:///tmp/local-update
   ```

4. You can check the status of this download with the `snowballEdge describe-device-software` command. While an update is downloading, you display the status using this command.

   Example output

   ```
   Install State: Downloading
   ```

Installing Updates

After downloading updates, you must install them and restart your device for the updates to take effect. The following procedure guides you through manually installing updates.

To install Snowball Edge software updates that were already downloaded

1. Open a terminal window, and ensure that the Snowball Edge device is unlocked using the `snowballEdge describe-device` command. If the device is locked, use the `snowballEdge unlock-device` command to unlock it.
2. Run the `snowballEdge install-updates` command.
3. You can check the status of this installation with the `snowballEdge describe-device-software` command. While an update is installing, you display the status with this command.

   Example output

   ```
   Install State: Installing //Possible values[NA, Installing, Requires Reboot]
   ```

   You've successfully installed a software update for your Snowball Edge device. Installing an update does not automatically apply the update to the device. To finish installing the update, the device must be restarted.

   We highly recommend that you suspend all activity on the device before you restart the device. Restarting a device stops running instances, interrupts any writing to Amazon S3 buckets on the device, and stops any write operations from the file interface without clearing the cache.

   Warning
   Restarting your Snowball Edge device without stopping all activity on the device can result in lost data.

To stop a service running on your Snowball Edge, you can use the `snowballEdge stop-service` command.

The Amazon S3, Amazon EC2, AWS STS, and IAM services cannot be stopped.

4. Run the `snowballEdge list-services` command to list the currently running services on the device.
5. Run the `snowballEdge describe-service` command for each of the running services, to see their status.
6. Use this information to stop those services (setting the services to the `INACTIVE` state).
7. When all the services on the device have stopped, run the `snowballEdge reboot-device` command twice. This command immediately power-cycles the device to complete installation of the downloaded software updates.
8. When the device powers on after the second reboot, open a terminal window and use the `snowballEdge unlock-device` command to unlock the device.
9. Run the `snowballEdge check-for-updates` command. This command returns the latest available version of the Snowball Edge software, and also the current version that is installed on the device.

You have now successfully updated your device and confirmed that your device is up to date with the latest Snowball Edge software.

Update the SSL Certificate

If you plan to keep your Snow Family device for more than 360 days, you will need to update the Secure Sockets Layer (SSL) certificate on the device to avoid interruption of your use of the device. If the certificate expires, you will not be able to use the device and will have to return it to AWS.

This topic explains how update your device after you determined when the certificate will expire.

Note
Request an update from AWS at least two weeks before the certificate will expire to avoid interruption of your use of the device.

1. Use a tool like OpenSSL to determine when the certificate will expire. For example, use the `openssl s_client` command to connect to the device and see information about the certificate.

   Example of openssL s_client command syntax on Windows

   ```
   openssl s_client -connect IP.ADDRESSOFSNOW:9091
   ```

   Example of openssl s_client command syntax on macOS

   ```
   openssl s_client -connect IP.ADDRESSOFSNOW:9091 | openssl x509 -noout -date
   ```

   In the output of the command, the value of `NotAfter` is the date and time at which the certificate expires.

Example value of NotAfter output of openssl s_client command

```
…
NotAfter: Sep  3 19:11:50 2022 GMT
…
```

2. Contact AWS Support and request an SSL certificate update.
3. AWS Support will provide an update file. Download (p. 219) and install (p. 220) the update file.
4. Use the new unlock code and manifest file to unlock the device (p. 83).

Shipping Considerations for AWS Snowball

The following sections provide information about how shipping is handled for an AWS Snowball Edge device and a list that shows each AWS Region that is supported. The shipping rate you choose for a job applies to both sending and receiving the AWS Snowball Edge device or devices used for that job. For information about shipping charges, see AWS Snowball Edge Pricing.

When you create a job, you specify a shipping address and shipping speed. This shipping speed doesn't indicate how soon you can expect to receive the AWS Snowball Edge device from the day you created the job. It only shows the time that the device is in transit between AWS and your shipping address. That time doesn't include any time for processing. That depends on factors that include job type (exports take longer than imports, typically) and job size (cluster jobs take longer than individual jobs, typically). Also, carriers generally only pick up outgoing Snowball Edge devices once a day. Thus, processing before shipping can take a day or more.

> **Note**
> Snowball Edge devices can only be used to import or export data within the AWS Region where the devices were ordered.

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Preparing an AWS Snowball Edge for Shipping

The following explains how to prepare an AWS Snowball Edge device and ship it back to AWS.

To prepare an AWS Snowball Edge device for shipping

1. Make sure that you've finished transferring all the data for this job to or from the AWS Snowball Edge device. Unlock the device.
2. Press the power button above the LCD display. It takes about 20 seconds for the device to power off.

   > **Note**
   > If you've powered off and unplugged the AWS Snowball Edge device, and your shipping label doesn't appear after about a minute on the E Ink display on top of the device, contact AWS Support.
3. Disconnect and stow the power cable the AWS Snowball Edge device was sent with in the cable nook on top of the device.
4. Close the three doors on the back, the top, and the front of the AWS Snowball Edge device. Press in on each one at a time until you hear and feel them click.

You don't need to pack the AWS Snowball Edge device in a container, because it is its own physically rugged shipping container. The E Ink display on the top of the AWS Snowball Edge device changes to your return shipping label when the device is turned off.

Region-Based Shipping Restrictions

Before you create a job, you should sign in to the console from the AWS Region that your Amazon S3 data is housed in. A few shipping restrictions apply:

- AWS Snowball Edge devices are not shipped between international countries—for example, from Asia Pacific (India) to Asia Pacific (Australia).

The sole exception to crossing international countries is among EU Member Countries. For data transfers in the EU Regions, we only ship AWS Snowball Edge devices to the EU member countries listed:

- Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Shipments domestically within the same country is permitted. Examples:

- For data transfers in the United Kingdom Region, we ship devices domestically within the UK.
- For data transfers in Asia Pacific (Mumbai), we ship devices within India.

> **Note**
> AWS doesn't ship AWS Snowball Edge devices to post office boxes.

Shipping an AWS Snowball Edge

The prepaid shipping label contains the correct address to return the AWS Snowball Edge device. For information about how to return your AWS Snowball Edge device, see Shipping Carriers (p. 224).

The AWS Snowball Edge device is delivered to an AWS sorting facility and forwarded to the AWS data center. Package tracking is available through your region's carrier. You can track status changes for your job by using the AWS Snow Family Management Console.

> **Important**
> Unless personally instructed otherwise by AWS, never affix a separate shipping label to the AWS Snowball Edge device. Always use the shipping label that is displayed on the AWS Snowball Edge device E Ink display.

Shipping Carriers

When you create a job, you provide the address that you want the AWS Snowball Edge device shipped to. The carrier that supports your region handles the shipping of devices from AWS to you, and from you back to AWS.

Whenever an AWS Snowball Edge device is shipped, you get a tracking number. You can find each job's tracking number and a link to the tracking website from the AWS Snow Family Management Console job dashboard, or by using API calls to the job management API.

The outbound shipping information for your device is available when the job transitions to **Preparing shipment** status.

Following is the list of supported carriers for AWS Snowball Edge devices by region:

- For India, Blue Dart is the carrier.

- For Korea, Japan, Australia, and Indonesia, Kuehne + Nagel, is the carrier.
- For China and Hong Kong, S.F. Express is the carrier.
- For all other regions, UPS is the carrier.

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AWS Snowball Pickups in the EU, US, South Africa, and Canada

In the EU, US, South Africa, and Canada, keep the following information in mind for UPS to pick up an AWS Snowball Edge device:

- You arrange for UPS to pick up the AWS Snowball Edge device by scheduling a pickup with UPS directly, or take the AWS Snowball Edge device to a UPS package drop-off facility to be shipped to AWS.
- The prepaid UPS shipping label on the E Ink display contains the correct address to return the AWS Snowball Edge device.
- The AWS Snowball Edge device is delivered to an AWS sorting facility and forwarded to the AWS data center. UPS automatically reports back a tracking number for your job.

> **Important**
> Unless personally instructed otherwise by AWS, never affix a separate shipping label to the AWS Snowball Edge device. Always use the shipping label that is displayed on the device's E Ink display.

For data transfers in the EU Regions, we only ship Snowball Edge devices to the following EU member countries: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

UPS services for Snow family of products is domestic only within a country.

AWS Snowball Pickups in UK

In the United Kingdom, keep the following information in mind for UPS to pick up a Snowball Edge:

- You arrange for UPS to pick up the AWS Snowball Edge device by scheduling a pickup with UPS directly, or take the AWS Snowball Edge device to a UPS package drop-off facility to be shipped to AWS.
- The prepaid UPS shipping label on the E Ink display contains the correct address to return the AWS Snowball Edge device.
- The AWS Snowball Edge device is delivered to an AWS sorting facility and forwarded to the AWS data center. UPS automatically reports back a tracking number for your job.

Important
Unless personally instructed otherwise by AWS, never affix a separate shipping label to the AWS Snowball Edge device. Always use the shipping label that is displayed on the device's E Ink display.

UPS services for Snow family of products is domestic only within a country.

Note
Since January 2021, UK is no longer a part of EU. Orders between UK and other EU countries are international orders, a non-general Availability process only approved through a special international process. If a customer has been approved and is returning a device from an EU-country back to LHR or from UK back to an EU-country, they must first request a return to `<snowball-shipping@amazon.com>` so a Commercial Invoice can be provided prior to arranging pick up/drop off with UPS.

AWS Snowball Pickups in Brazil

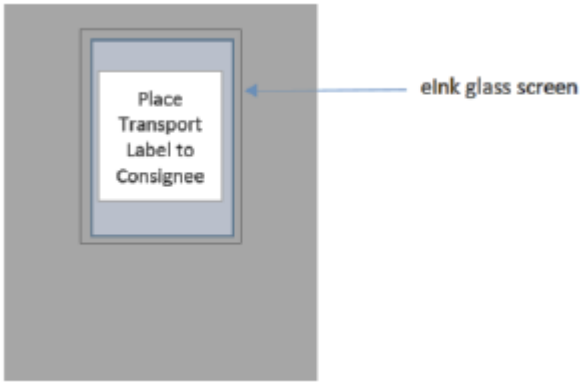
In Brazil, keep the following information in mind for UPS to pick up a Snowball Edge:

- When you're ready to return a Snowball Edge, call 0800-770-9035 to schedule a pickup with UPS.
- Snowball Edge is available domestically within Brazil, which includes 26 states and the Distrito Federal.
- If you have a Cadastro Nacional de Pessoa Juridica (CNPJ) tax ID, be sure that you know this ID before you create your job.
- You should issue the appropriate document to return the Snowball Edge device. Confirm with your tax department which of the documents following is required in your state, according to your ICMS registration:
  - **Within São Paulo –** A non-ICMS declaration and an Electronic Tax Invoice (NF-e) are usually required.
  - **Outside São Paulo** – The following are usually required:
    - A non-ICMS declaration
    - A nota fiscal avulsa
    - An Electronic Tax Invoice (NF-e)

Note
For non-ICMS taxpayer declaration, we recommend that you generate four copies of the declaration: one for your records, the other three for transport.

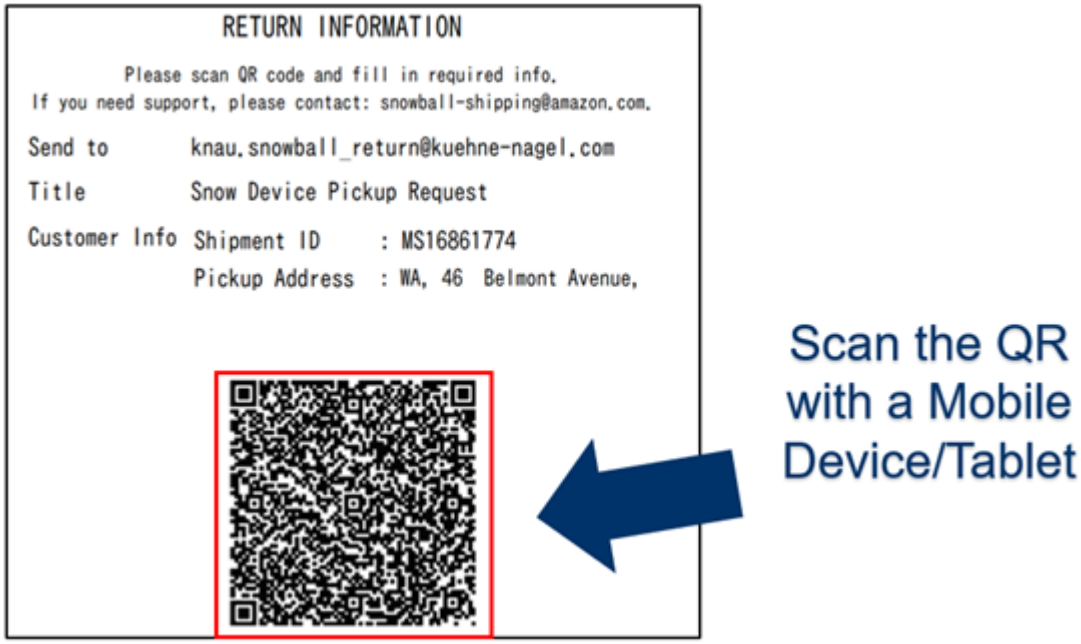
AWS Snowball Pickups in Australia

In Australia, if you're shipping an AWS Snowball Edge device back to AWS, place the return transport label (found in the pouch containing these instructions) over the E Ink label on the Snow device.



Note
If you have not received a return label with your Snow device, email knau.snowball_return@kuehne-nagel.com with your device serial number or your reference number.

To arrange the return of the Snow Family device, scan the QR code on the return instructions with your mobile device. On your device, a hyperlink to an email message appears. The message contains information such as email address, subject, and control number or consignment number. Fill in the pickup date, name, and contact details, or provide a new pickup address if there are any changes.



AWS Snowball Pickups in India

In India, Blue Dart picks up the Snowball device. When you are ready to return your Snowball device, turn it off and prepare it for return shipping. To schedule pickup, email snowball-pickup@amazon.com with **Snowball Pickup Request** in the subject line. In the email, include the following information:

- **Job ID** – The job ID associated with the Snowball that you want returned to AWS.
- **AWS account ID** – The ID for the AWS account that created the job.
- **Earliest Pickup Time** (your local time) – The earliest time of day that you want the Snowball picked up.
- **Latest Pickup Time** (your local time) – The latest time of day that you want the Snowball picked up.
- **Special Instructions** (optional) – Any special instructions for picking up the Snowball, including contact details for coordinating pickup.

The Snowball team arranges the pickup with Blue Dart and sends you a confirmation email. Blue Dart provides you with a paper shipping label and picks up the Snowball device.

Important
When using a Snowball in India, remember to file all relevant tax paperwork with your state.

AWS Snowball Edge Pickups in Korea

In Korea, Kuehne + Nagel handles your pickups. When you are ready to return your device, send an email to snowball-shipping@amazon.com with *Snowball Pickup Request* in the subject line so we can schedule the pickup for you. In the body of the email, include the following information:

- **Job ID** – The job ID associated with the Snowball that you want returned to AWS.
- **Pickup Address** - The address where the device is picked up.
- **Pickup Date** - The soonest day you would like the device picked up.
- **Point of contact details** – the name, email address, and local phone number that Kuehne + Nagel can use to get in touch with you if needed.

Soon, you will get a follow-up email from the Snowball team with information regarding the pickup at the address your device you provided. Power cycle the device and be ready for pickup usually between 1300 and 1500.

AWS Snowball Edge Pickups in Hong Kong

In Hong Kong, S.F. Express handles your pickups. When you are ready to return your device, send an email to snowball-shipping-ap-east-1@amazon.com with *Snowball Pickup Request* in the subject line so we can schedule the pickup for you. In the body of the email, include the following information:

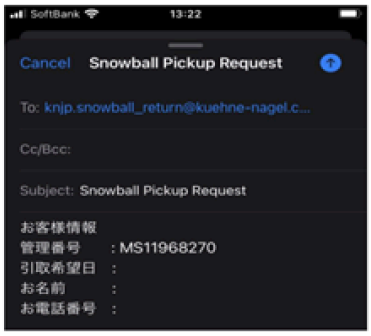
- Job ID
- AWS account ID
- Contact name
- Contact phone number
- Contact email address
- The day you want the device(s) picked up
- Earliest pickup time
- Latest pickup time
- Pickup address

Once you arrange a pickup date with S.F. Express, it can't be rescheduled.

The device will be delivered to AWS by S.F. Express. The S.F. Express tracking number for the return shipment tells you when it was delivered.

AWS Snowball Pickups in Singapore, Japan, and Indonesia

In Singapore, Japan, and Indonesia, when you are ready to return your device, scan the QR code displayed on the return E Ink label with your mobile phone. This will take you directly onto an email template. Please fill in pick up date/time and contact details.



Note
If your pickup address is different from the address where the device was delivered, please add the new address in the email body so the appointed carrier can be informed.

Shipping Speeds

Each country has different shipping speeds available. These shipping speeds are based on the country in which you're shipping an AWS Snowball Edge device. Shipping speeds are as follows:

- **Australia, Japan, Singapore, Indonesia, S.Korea** – When shipping within these countries, you have access to the standard shipping speed of 1 – 3 days.
- **Brazil** – When shipping within Brazil, you have access to UPS Domestic Express Saver shipping, which delivers within two business days during commercial hours. Shipping speeds might be affected by interstate border delays.
- **European Union (EU)** – When shipping to any of the countries within the EU, you have access to express shipping. Typically, AWS Snowball Edge devices shipped express are delivered in about a day. In addition, most countries in the EU have access to standard shipping, which typically takes less than a week, one way.
- **Hong Kong** – When shipping within Hong Kong, you have access to express shipping.
- **India** – When shipping within India, Snowcone are sent out within 7 working days of AWS receiving all related tax documents.
- **United Kingdom (UK)** – When shipping to any of the UK, you have access to express shipping. Typically, AWS Snowball Edge devices shipped express are delivered in about a day. In addition, you have access to standard shipping, which typically takes less than a week, one way.
- **United States of America (US) and Canada** – When shipping in the US or in Canada, you have access to one-day shipping and two-day shipping.

Security for AWS Snowball Edge

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The shared responsibility model describes this as security *of* the cloud and security *in* the cloud:

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS compliance programs. To learn about the compliance programs that apply to AWS Snowball, see AWS Services in Scope by Compliance Program.
- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using AWS Snowball. The following topics show you how to configure AWS Snowball to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your AWS Snowball resources.

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Data Protection in AWS Snowball Edge

AWS Snowball conforms to the AWS shared responsibility model, which includes regulations and guidelines for data protection. AWS is responsible for protecting the global infrastructure that runs all the AWS services. AWS maintains control over data hosted on this infrastructure, including the security configuration controls for handling customer content and personal data. AWS customers and APN partners, acting either as data controllers or data processors, are responsible for any personal data that they put in the AWS Cloud.

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For data protection purposes, we recommend that you protect AWS account credentials and set up individual user accounts with AWS Identity and Access Management (IAM), so that each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We recommend TLS 1.2 or later.

- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing personal data that is stored in Amazon S3.
- If you require FIPS 140-2 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see Federal Information Processing Standard (FIPS) 140-2.

We strongly recommend that you never put sensitive identifying information, such as your customers' account numbers, into free-form fields such as a **Name** field. This includes when you work with AWS Snowball or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into AWS Snowball or other services might get picked up for inclusion in diagnostic logs. When you provide a URL to an external server, don't include credentials information in the URL to validate your request to that server.

For more information about data protection, see the AWS Shared Responsibility Model and GDPR blog post on the *AWS Security Blog*.

Protecting Data in the Cloud

AWS Snowball protects your data when you're importing or exporting data into Amazon S3, when you create a job, and when your device is updated. The following sections describe how you can protect your data when you use Snowball Edge and are online or interacting with AWS in the cloud.

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Encryption for AWS Snowball Edge

When you're using a Snowball Edge to import data into S3, all data transferred to a device is protected by SSL encryption over the network. To protect data at rest, AWS Snowball Edge uses server side-encryption (SSE).

Server-Side Encryption in AWS Snowball Edge

AWS Snowball Edge supports server-side encryption with Amazon S3–managed encryption keys (SSE-S3). Server-side encryption is about protecting data at rest, and SSE-S3 has strong, multifactor encryption to protect your data at rest in Amazon S3. For more information on SSE-S3, see Protecting Data Using Server-Side Encryption with Amazon S3-Managed Encryption Keys (SSE-S3) in the *Amazon Simple Storage Service User Guide*.

Currently, AWS Snowball Edge doesn't offer server-side encryption with customer-provided keys (SSE-C). However, you might want to use that SSE type to protect data that has been imported, or you might already use it on data you want to export. In these cases, keep the following in mind:

- **Import** –

  If you want to use SSE-C to encrypt the objects that you've imported into Amazon S3, you should consider using SSE-KMS or SSE-S3 encryption instead established as a part of that bucket's bucket policy. However, if you have to use SSE-C to encrypt the objects that you've imported into Amazon

S3, then you will have to copy the object within your bucket to encrypt with SSE-C. A sample CLI command to achieve this is shown below:

```
aws s3 cp s3://mybucket/object.txt s3://mybucket/object.txt --sse-c --sse-c-key
 1234567891SAMPLEKEY
```

or

```
aws s3 cp s3://mybucket s3://mybucket --sse-c --sse-c-key 1234567891SAMPLEKEY --recursive
```

- **Export** – If you want to export objects that are encrypted with SSE-C, first copy those objects to another bucket that either has no server-side encryption, or has SSE-KMS or SSE-S3 specified in that bucket's bucket policy.

Enabling SSE-S3 for Data Imported into Amazon S3 from a Snowball Edge

Use the following procedure in the Amazon S3 Management Console to enable SSE-S3 for data being imported into Amazon S3. No configuration is necessary in the AWS Snow Family Management Console or on the Snowball device itself.

To enable SSE-S3 encryption for the data that you're importing into Amazon S3, simply set the bucket policies for all the buckets that you're importing data into. You update the policies to deny upload object (`s3:PutObject`) permission if the upload request doesn't include the `x-amz-server-side-encryption` header.

To enable SSE-S3 for data imported into Amazon S3

1. Sign in to the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the bucket that you're importing data into from the list of buckets.
3. Choose **Permissions**.
4. Choose **Bucket Policy**.
5. In the **Bucket policy editor**, enter the following policy. Replace all the instances of *YourBucket* in this policy with the actual name of your bucket.

```
{
  "Version": "2012-10-17",
  "Id": "PutObjPolicy",
  "Statement": [
    {
      "Sid": "DenyIncorrectEncryptionHeader",
      "Effect": "Deny",
      "Principal": "*",
      "Action": "s3:PutObject",
      "Resource": "arn:aws:s3:::YourBucket/*",
      "Condition": {
        "StringNotEquals": {
          "s3:x-amz-server-side-encryption": "AES256"
        }
      }
    },
    {
      "Sid": "DenyUnEncryptedObjectUploads",
      "Effect": "Deny",
      "Principal": "*",
      "Action": "s3:PutObject",
      "Resource": "arn:aws:s3:::YourBucket/*",
      "Condition": {
```

```
        "Null": {
          "s3:x-amz-server-side-encryption": "true"
        }
      }
    }
  ]
}
```

6. Choose **Save**.

You've finished configuring your Amazon S3 bucket. When your data is imported into this bucket, it is protected by SSE-S3. Repeat this procedure for any other buckets, as necessary.

AWS Key Management Service in AWS Snowball Edge

AWS Key Management Service (AWS KMS) is a managed service that makes it easy for you to create and control the encryption keys used to encrypt your data. AWS KMS uses hardware security modules (HSMs) to protect the security of your keys. Specifically, the Amazon Resource Name (ARN) for the AWS KMS key that you choose for a job in AWS Snowball Edge is associated with a KMS key. That KMS key is used to encrypt the unlock code for your job. The unlock code is used to decrypt the top layer of encryption on your manifest file. The encryption keys stored within the manifest file are used to encrypt and de-encrypt the data on the device.

In AWS Snowball Edge, AWS KMS protects the encryption keys used to protect data on each AWS Snowball Edge device. When you create your job, you also choose an existing KMS key. Specifying the ARN for an AWS KMS key tells AWS Snowball which AWS KMS keys to use to encrypt the unique keys on the AWS Snowball Edge device. For more information on AWS Snowball Edge supported Amazon S3 server-side-encryption options , see Server-Side Encryption in AWS Snowball Edge (p. 231).

Using the Managed Customer AWS KMS keys for Snowball Edge

If you'd like to use the managed customer AWS KMS keys for Snowball Edge created for your account, follow these steps.

To select the AWS KMS keys for your job

1. On the AWS Snow Family Management Console, choose **Create job**.
2. Choose your job type, and then choose **Next**.
3. Provide your shipping details, and then choose **Next**.
4. Fill in your job's details, and then choose **Next**.
5. Set your security options. Under **Encryption**, for **KMS key** either choose the AWS managed key or a custom key that was previously created in AWS KMS, or choose **Enter a key ARN** if you need to enter a key that is owned by a separate account.

   Note
   The AWS KMS key ARN is a globally unique identifier for customer managed keys.
6. Choose **Next** to finish selecting your AWS KMS key.

Creating a Custom KMS Envelope Encryption Key

You have the option of using your own custom AWS KMS envelope encryption key with AWS Snowball Edge. If you choose to create your own key, that key must be created in the same region that your job was created in.

To create your own AWS KMS key for a job, see Creating Keys in the *AWS Key Management Service Developer Guide*.

Protecting Data On Your Device

Securing your AWS Snowball Edge

Following are some security points that we recommend you consider when using AWS Snowball Edge, and also some high-level information on other security precautions that we take when a device arrives at AWS for processing.

We recommend the following security approaches:

- When the device first arrives, inspect it for damage or obvious tampering. If you notice anything that looks suspicious about the device, don't connect it to your internal network. Instead, contact AWS Support, and a new device will be shipped to you.
- You should make an effort to protect your job credentials from disclosure. Any individual who has access to a job's manifest and unlock code can access the contents of the device sent for that job.
- Don't leave the device sitting on a loading dock. Left on a loading dock, it can be exposed to the elements. Although each AWS Snowball Edge device is rugged, weather can damage the sturdiest of hardware. Report stolen, missing, or broken devices as soon as possible. The sooner such an issue is reported, the sooner another one can be sent to complete your job.

> **Note**
> The AWS Snowball Edge devices are the property of AWS. Tampering with a device is a violation of the AWS Acceptable Use Policy. For more information, see http://aws.amazon.com/aup/.

We perform the following security steps:

- When transferring data with the Amazon S3 interface, object metadata is not persisted. The only metadata that remains the same is `filename` and `filesize`. All other metadata is set as in the following example: `-rw-rw-r-- 1 root root [filesize] Dec 31 1969 [path/filename]`
- When transferring data with the file interface, object metadata is persisted.
- When a device arrives at AWS, we inspect it for any signs of tampering and to verify that no changes were detected by the Trusted Platform Module (TPM). AWS Snowball Edge uses multiple layers of security designed to protect your data, including tamper-resistant enclosures, 256-bit encryption, and an industry-standard TPM designed to provide both security and full chain of custody for your data.
- Once the data transfer job has been processed and verified, AWS performs a software erasure of the Snowball device that follows the National Institute of Standards and Technology (NIST) guidelines for media sanitization.

Validating NFC Tags

Snowball Edge Compute Optimized and Snowball Edge Storage Optimized (for data transfer) devices have NFC tags built into them. You can scan these tags with the AWS Snowball Edge Verification App, available on Android. Scanning and validating these NFC tags can help you verify that your device has not been tampered with before you use it.

Validating NFC tags includes using the Snowball Edge client to generate a device-specific QR code to verify that the tags you're scanning are for the right device.

The following procedure describes how to validate the NFC tags on a Snowball Edge device. Before you get started, make sure you've performed the following first five steps of the getting started exercise:

1. Create your Snowball Edge job. For more information, see Creating an AWSAWS Snowball Edge Job
2. Receive the device. For more information, see Receiving the Snowball Edge (p. 42).

3. Connect to your local network. For more information, see Connecting to Your Local Network (p. 43).
4. Get your credentials and tools. For more information, see Getting Your Credentials and Tools (p. 44).
5. Download and install the Snowball Edge client. For more information, see Downloading and Installing the Snowball Edge client (p. 45).

To validate the NFC tags

1. Run the `snowballEdge get-app-qr-code` Snowball Edge client command. If you run this command for a node in a cluster, provide the serial number (`--device-sn`) to get a QR code for a single node. Repeat this step for each node in the cluster. For more information on using this command, see Getting Your QR Code for NFC Validation (p. 83).

   The QR code is saved to a location of your choice as a .png file.
2. Navigate to the .png file that you saved, and open it so that you can scan the QR code with the app.
3. You can scan these tags using the AWS Snowball Edge Verification App available on iOS and Android.
4. Start the app, and follow the on-screen instructions.

You've now successfully scanned and validated the NFC tags for your device.

If you encounter issues while scanning, try the following:

- Confirm that your device has the Snowball Edge Compute Optimized options (with or without GPU).
- Download the app on another phone, and try again.
- Move the device to an isolated area of the room, away from interference from other NFC tags, and try again.
- If issues persist, contact AWS Support.

Identity and Access Management in AWS Snowball

Every AWS Snowball job must be authenticated. You do this by creating and managing the IAM users in your account. Using IAM, you can create and manage users and permissions in AWS.

AWS Snowball users must have certain IAM-related permissions to access the AWS Snowball AWS Management Console to create jobs. An IAM user that creates an import or export job must also have access to the right Amazon Simple Storage Service (Amazon S3) resources, such as the Amazon S3 buckets to be used for the job, AWS KMS resources, Amazon SNS topic, and Amazon EC2 AMI for edge compute jobs.

> **Important**
> For information about using IAM locally on your device, see Using IAM Locally (p. 173).

Topics

- Access Control for Snow Family Console and Creating Jobs (p. 235)

Access Control for Snow Family Console and Creating Jobs

As with all AWS services, access to AWS Snowball requires credentials that AWS can use to authenticate your requests. Those credentials must have permissions to access AWS resources, such an Amazon S3 bucket or an AWS Lambda function. AWS Snowball differs in two ways:

1. Jobs in AWS Snowball do not have Amazon Resource Names (ARNs).
2. Physical and network access control for a device on-premises is your responsibility.

The following sections provide details on how you can use AWS Identity and Access Management (IAM) and AWS Snowball to help secure your resources by controlling who can access them in the AWS Cloud, and also local access control recommendations.

Authentication

You can access AWS as any of the following types of identities:

- **AWS account root user**

  When you create an AWS account, you begin with one sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account *root user* and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you do not use the root user for your everyday tasks. Safeguard your root user credentials and use them to perform the tasks that only the root user can perform. For the complete list of tasks that require you to sign in as the root user, see Tasks that require root user credentials in the *AWS General Reference*.
- **IAM users and groups**

  An *IAM user* is an identity within your AWS account that has specific permissions for a single person or application. Where possible, we recommend relying on temporary credentials instead of creating IAM users who have long-term credentials such as passwords and access keys. However, if you have specific use cases that require long-term credentials with IAM users, we recommend that you rotate access keys. For more information, see Rotate access keys regularly for use cases that require long-term credentials in the *IAM User Guide*.

  An *IAM group* is an identity that specifies a collection of IAM users. You can't sign in as a group. You can use groups to specify permissions for multiple users at a time. Groups make permissions easier to manage for large sets of users. For example, you could have a group named *IAMAdmins* and give that group permissions to administer IAM resources.

  Users are different from roles. A user is uniquely associated with one person or application, but a role is intended to be assumable by anyone who needs it. Users have permanent long-term credentials, but roles provide temporary credentials. To learn more, see When to create an IAM user (instead of a role) in the *IAM User Guide*.
- **IAM role**

  An IAM role is an IAM identity that you can create in your account that has specific permissions. An IAM role is similar to an IAM user in that it is an AWS identity with permissions policies that determine what the identity can and cannot do in AWS. However, instead of being uniquely associated with one person, a role is intended to be assumable by anyone who needs it. Also, a role does not have standard long-term credentials such as a password or access keys associated with it. Instead, when you assume a role, it provides you with temporary security credentials for your role session. IAM roles with temporary credentials are useful in the following situations:

  - **Federated user access** – To assign permissions to a federated identity, you create a role and define permissions for the role. When a federated identity authenticates, the identity is associated with the role and is granted the permissions that are defined by the role. For information about roles for federation, see Creating a role for a third-party Identity Provider in the *IAM User Guide*. If you use IAM Identity Center, you configure a permission set. To control what your identities can access after

they authenticate, IAM Identity Center correlates the permission set to a role in IAM. For information about permissions sets, see Permission sets in the *AWS IAM Identity Center (successor to AWS Single Sign-On) User Guide*.

- **AWS service access** – A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Creating a role to delegate permissions to an AWS service in the *IAM User Guide*.
- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see Using an IAM role to grant permissions to applications running on Amazon EC2 instances in the *IAM User Guide*.

Access Control in the AWS Cloud

You can have valid credentials to authenticate your requests in AWS. However, unless you have permissions you cannot create or access AWS resources. For example, you must have permissions to create a job for AWS Snowball.

The following sections describe how to manage cloud-based permissions for AWS Snowball. We recommend that you read the overview first.

Overview of Managing Access Permissions to Your Resources in the AWS Cloud

Every AWS resource is owned by an AWS account, and permissions to create or access a resource are governed by permissions policies. An account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles), and some services (such as AWS Lambda) also support attaching permissions policies to resources.

> **Note**
> An *account administrator* (or administrator user) is a user with administrator privileges. For more information, see IAM Best Practices in the *IAM User Guide*.

When granting permissions, you decide who is getting the permissions, the resources they get permissions for, and the specific actions that you want to allow on those resources.

Topics

Resources and Operations

In AWS Snowball, the primary resource is a *job*. AWS Snowball also has devices like the Snowball and the AWS Snowball Edge device, however, you can only use those devices in the context of an existing job. Amazon S3 buckets and Lambda functions are resources of Amazon S3 and Lambda respectively.

As mentioned previously, jobs don't have Amazon Resource Names (ARNs) associated with them. However, other services' resources, like Amazon S3 buckets, do have unique (ARNs) associated with them as shown in the following table.

AWS Snowball provides a set of operations to create and manage jobs. For a list of available operations, see the AWS Snowball API Reference.

Understanding Resource Ownership

The AWS account owns the resources that are created in the account, regardless of who created the resources. Specifically, the resource owner is the AWS account of the principal entity (that is, the root account, an IAM user, or an IAM role) that authenticates the resource creation request. The following examples illustrate how this works:

- If you use the root account credentials of your AWS account to create a S3 bucket, your AWS account is the owner of the resource (in AWS Snowball, the resource is the job).
- If you create an IAM user in your AWS account and grant permissions to create a job to that user, the user can create a job. However, your AWS account, to which the user belongs, owns the job resource.
- If you create an IAM role in your AWS account with permissions to create a job, anyone who can assume the role can create a job. Your AWS account, to which the role belongs, owns the job resource.

Managing Access to Resources in the AWS Cloud

A *permissions policy* describes who has access to what. The following section explains the available options for creating permissions policies.

> **Note**
> This section discusses using IAM in the context of AWS Snowball. It doesn't provide detailed information about the IAM service. For complete IAM documentation, see What Is IAM? in the *IAM User Guide*. For information about IAM policy syntax and descriptions, see AWS IAM Policy Reference in the *IAM User Guide*.

Policies attached to an IAM identity are referred to as *identity-based* policies (IAM polices) and policies attached to a resource are referred to as *resource-based* policies. AWS Snowball supports only identity-based policies (IAM policies).

Topics

Identity-Based Policies (IAM Policies)

You can attach policies to IAM identities. For example, you can do the following:

- **Attach a permissions policy to a user or a group in your account** – To grant a user permissions to create a job, you can attach a permissions policy to a user or group that the user belongs to.
- **Attach a permissions policy to a role (grant cross-account permissions)** – You can attach an identity-based permissions policy to an IAM role to grant cross-account permissions. For example, the administrator in Account A can create a role to grant cross-account permissions to another AWS account (for example, Account B) or an AWS service as follows:
  1. Account A administrator creates an IAM role and attaches a permissions policy to the role that grants permissions on resources in Account A.
  2. Account A administrator attaches a trust policy to the role identifying Account B as the principal who can assume the role.
  3. Account B administrator can then delegate permissions to assume the role to any users in Account B. Doing this allows users in Account B to create or access resources in Account A. The principal

in the trust policy can also be an AWS service principal if you want to grant an AWS service permissions to assume the role.

For more information about using IAM to delegate permissions, see Access Management in the *IAM User Guide*.

The following is an example policy that allows a user to perform the `CreateJob` action for your AWS account.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
        "Sid": "VisualEditor0",
        "Effect": "Allow",
        "Action": [
            "snowball:DescribeAddress",
            "snowball:CreateJob",
            "snowball:DescribeAddresses",
            "snowball:CreateAddress"
        ],
        "Resource": "*"
      },
   ]
}
```

For more information about using identity-based policies with AWS Snowball, see Using Identity-Based Policies (IAM Policies) for AWS Snowball (p. 240). For more information about users, groups, roles, and permissions, see Identities (Users, Groups, and Roles) in the *IAM User Guide*.

Resource-Based Policies

Other services, such as Amazon S3, also support resource-based permissions policies. For example, you can attach a policy to an S3 bucket to manage access permissions to that bucket. AWS Snowball doesn't support resource-based policies.

Specifying Policy Elements: Actions, Effects, and Principals

For each job (see Resources and Operations (p. 237)), the service defines a set of API operations (see AWS Snowball API Reference) to create and manage said job. To grant permissions for these API operations, AWS Snowball defines a set of actions that you can specify in a policy. For example, for a job, the following actions are defined: `CreateJob`, `CancelJob`, and `DescribeJob`. Note that, performing an API operation can require permissions for more than one action.

The following are the most basic policy elements:

- **Resource** – In a policy, you use an Amazon Resource Name (ARN) to identify the resource to which the policy applies. For more information, see Resources and Operations (p. 237).

  Note
  This is supported for Amazon S3, Amazon EC2, AWS Lambda, AWS KMS, and many other services.
  Snowball does not support specifying a resource ARN in the `Resource` element of an IAM policy statement. To allow access to Snowball, specify `"Resource": "*"` in your policy.
- **Action** – You use action keywords to identify resource operations that you want to allow or deny. For example, depending on the specified `Effect`, `snowball:*` either allows or denies the user permissions to perform all operations.

Note
This is supported for Amazon EC2, Amazon S3, and IAM.

- **Effect** – You specify the effect when the user requests the specific action—this can be either allow or deny. If you don't explicitly grant access to (allow) a resource, access is implicitly denied. You can also explicitly deny access to a resource, which you might do to make sure that a user cannot access it, even if a different policy grants access.

  Note
  This is supported for Amazon EC2, Amazon S3, and IAM.

- **Principal** – In identity-based policies (IAM policies), the user that the policy is attached to is the implicit principal. For resource-based policies, you specify the user, account, service, or other entity that you want to receive permissions (applies to resource-based policies only). AWS Snowball doesn't support resource-based policies.

To learn more about IAM policy syntax and descriptions, see AWS IAM Policy Reference in the *IAM User Guide*.

For a table showing all of the AWS Snowball API actions, see AWS Snowball API Permissions: Actions, Resources, and Conditions Reference (p. 250).

Specifying Conditions in a Policy

When you grant permissions, you can use the IAM policy language to specify the conditions when a policy should take effect. For example, you might want a policy to be applied only after a specific date. For more information about specifying conditions in a policy language, see Condition in the *IAM User Guide*.

To express conditions, you use predefined condition keys. There are no condition keys specific to AWS Snowball. However, there are AWS-wide condition keys that you can use as appropriate. For a complete list of AWS-wide keys, see Available Keys for Conditions in the *IAM User Guide*.

Using Identity-Based Policies (IAM Policies) for AWS Snowball

This topic provides examples of identity-based policies that demonstrate how an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles). These policies thereby grant permissions to perform operations on AWS Snowball resources in the AWS Cloud.

Important
We recommend that you first review the introductory topics that explain the basic concepts and options available for you to manage access to your AWS Snowball resources. For more information, see Overview of Managing Access Permissions to Your Resources in the AWS Cloud (p. 237).

The sections in this topic cover the following:

The following shows an example of a permissions policy.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
```

```
      "Action": [
        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:ListBucket"
      ],
      "Resource": "arn:aws:s3:::*"
    },
    {
       "Effect": "Allow",
       "Action": [
          "snowball:*",
          "importexport:*"
       ],
       "Resource": "*"
    }
  ]
}
```

The policy has two statements:

- The first statement grants permissions for three Amazon S3 actions (`s3:GetBucketLocation`, `s3:GetObject`, and `s3:ListBucket`) on all Amazon S3 buckets using the *Amazon Resource Name (ARN)* of `arn:aws:s3:::*`. The ARN specifies a wildcard character (*) so the user can choose any or all Amazon S3 buckets to export data from.
- The second statement grants permissions for all AWS Snowball actions. Because these actions don't support resource-level permissions, the policy specifies the wildcard character (*) and the `Resource` value also specifies a wild card character.

The policy doesn't specify the `Principal` element because in an identity-based policy you don't specify the principal who gets the permission. When you attach a policy to a user, the user is the implicit principal. When you attach a permissions policy to an IAM role, the principal identified in the role's trust policy gets the permissions.

For a table showing all of the AWS Snowball job management API actions and the resources that they apply to, see AWS Snowball API Permissions: Actions, Resources, and Conditions Reference (p. 250).

Permissions Required to Use the AWS Snowball Console

The permissions reference table lists the AWS Snowball job management API operations and shows the required permissions for each operation. For more information about job management API operations, see AWS Snowball API Permissions: Actions, Resources, and Conditions Reference (p. 250).

To use the AWS Snow Family Management Console, you need to grant permissions for additional actions as shown in the following permissions policy:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:GetBucketLocation",
                "s3:GetBucketPolicy",
                "s3:ListBucket",
                "s3:ListBucketMultipartUploads",
                "s3:ListAllMyBuckets"
            ],
            "Resource": "arn:aws:s3:::*"
        },
        {
```

```
            "Effect": "Allow",
            "Action": [
                "s3:CreateBucket",
                "s3:PutObject",
                "s3:AbortMultipartUpload",
                "s3:ListMultipartUploadParts",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "lambda:GetFunction",
                "lambda:GetFunctionConfiguration"
            ],
            "Resource": "arn:aws:lambda:*::function:*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "lambda:ListFunctions"
            ],
            "Resource": "arn:aws:*:::*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "kms:CreateGrant",
                "kms:GenerateDataKey",
                "kms:Decrypt",
                "kms:Encrypt",
                "kms:RetireGrant",
                "kms:ListKeys",
                "kms:DescribeKey",
                "kms:ListAliases"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "iam:AttachRolePolicy",
                "iam:CreatePolicy",
                "iam:CreateRole",
                "iam:ListRoles",
                "iam:ListRolePolicies",
                "iam:PutRolePolicy"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": "iam:PassRole",
            "Resource": "*",
            "Condition": {
                "StringEquals": {
                    "iam:PassedToService": "importexport.amazonaws.com"
                }
            }
        },
        {
```

```
            "Effect": "Allow",
            "Action": [
                 "ec2:DescribeImages",
                 "ec2:ModifyImageAttribute"
            ],
            "Resource": [
                 "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "sns:CreateTopic",
                "sns:ListTopics",
                "sns:GetTopicAttributes",
                "sns:SetTopicAttributes",
                "sns:ListSubscriptionsByTopic",
                "sns:Subscribe"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "greengrass:getServiceRoleForAccount"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "snowball:*"
            ],
            "Resource": [
                "*"
            ]
        }
    ]
}
```

The AWS Snowball console needs these additional permissions for the following reasons:

- `ec2:` – These allow the user to describe Amazon EC2 instances and modify their attributes for local compute purposes. For more information, see Using Amazon EC2 Compute Instances (p. 129).
- `lambda:` – These allow the user to select Lambda functions for local compute purposes. For more information, see Using AWS Lambda with an AWS Snowball Edge (p. 123).
- `kms:` – These allow the user to create or choose the KMS key that will encrypt your data. For more information, see AWS Key Management Service in AWS Snowball Edge (p. 233).
- `iam:` – These allow the user to create or choose an IAM role ARN that AWS Snowball will assume to access the AWS resources associated with job creation and processing.
- `sns:` – These allow the user to create or choose the Amazon SNS notifications for the jobs they create. For more information, see Notifications for the AWS Snowball Edge (p. 254).

AWS-Managed (Predefined) Policies for AWS Snowball Edge

AWS addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. Managed policies grant necessary permissions for common use cases so you can

avoid having to investigate what permissions are needed. For more information, see AWS Managed Policies in the *IAM User Guide*.

You can use the following AWS-managed policies with AWS Snowball.

Creating an IAM Role Policy for Snowball Edge

An IAM role policy must be created with read and write permissions for your Amazon S3 buckets. The IAM role must also have a trust relationship with Snowball. Having a trust relationship means that AWS can write the data in the Snowball and in your Amazon S3 buckets, depending on whether you're importing or exporting data.

When you create a job in the AWS Snow Family Management Console, creating the necessary IAM role occurs in step 4 in the **Permission** section. This process is automatic. The IAM role that you allow Snowball to assume is only used to write your data to your bucket when the Snowball with your transferred data arrives at AWS. The following procedure outlines that process.

To create the IAM role for your import job

1. Sign in to the AWS Management Console and open the AWS Snowball console at https://console.aws.amazon.com/importexport/.
2. Choose **Create job**.
3. In the first step, fill out the details for your import job into Amazon S3, and then choose **Next**.
4. In the second step, under **Permission**, choose **Create/Select IAM Role**.

   The IAM Management Console opens, showing the IAM role that AWS uses to copy objects into your specified Amazon S3 buckets.
5. Review the details on this page, and then choose **Allow**.

   You return to the AWS Snow Family Management Console, where **Selected IAM role ARN** contains the Amazon Resource Name (ARN) for the IAM role that you just created.
6. Choose **Next** to finish creating your IAM role.

The preceding procedure creates an IAM role that has write permissions for the Amazon S3 buckets that you plan to import your data into. The IAM role that is created has one of the following structures, depending on whether it's for an import job or export job.

IAM Role for an Import Job

```
        {
"Version": "2012-10-17",
"Statement": [
  {
    "Effect": "Allow",
    "Action": [
      "s3:GetBucketLocation",
      "s3:ListBucketMultipartUploads"
    ],
    "Resource": "arn:aws:s3:::*"
  },
  {
    "Effect": "Allow",
    "Action": [
      "s3:GetBucketPolicy",
      "s3:PutObject",
      "s3:AbortMultipartUpload",
      "s3:ListMultipartUploadParts",
      "s3:PutObjectAcl"
```

```
      ],
      "Resource": "arn:aws:s3:::*"
    }
  ]
}
```

If you use server-side encryption with AWS KMS–managed keys (SSE-KMS) to encrypt the Amazon S3 buckets associated with your import job, you also need to add the following statement to your IAM role.

```
{
     "Effect": "Allow",
     "Action": [
       "kms:GenerateDataKey"
     ],
     "Resource": "arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-
efgh-111111111111"
}
```

If the object sizes are larger, the Amazon S3 client that is used for the import process uses multipart upload. If you initiate a multipart upload using SSE-KMS, then all the uploaded parts are encrypted using the specified AWS KMS key. Because the parts are encrypted, they must be decrypted before they can be assembled to complete the multipart upload. So you must have permission to decrypt the AWS KMS key (`kms:Decrypt`) when you run a multipart upload to Amazon S3 with SSE-KMS.

The following is an example of an IAM role needed for an import job that needs `kms:Decrypt` permission.

```
{
    "Effect": "Allow",
     "Action": [
       "kms:GenerateDataKey","kms:Decrypt"

     ],
     "Resource": "arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-
efgh-111111111111"
}
```

The following is an example of an IAM role needed for an export job.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "s3:GetBucketLocation",
        "s3:GetBucketPolicy",
        "s3:GetObject",
        "s3:ListBucket"
      ],
      "Resource": "arn:aws:s3:::*"
    }
  ]
}
```

If you use server-side encryption with AWS KMS–managed keys to encrypt the Amazon S3 buckets associated with your export job, you also need to add the following statement to your IAM role.

```
{
     "Effect": "Allow",
```

```
    "Action": [
           “kms:Decrypt”
     ],
    "Resource": "arn:aws:kms:us-west-2:123456789012:key/abc123a1-abcd-1234-
efgh-111111111111"
}
```

You can create your own custom IAM policies to allow permissions for API operations for AWS Snowball job management. You can attach these custom policies to the IAM users or groups that require those permissions.

Customer Managed Policy Examples

In this section, you can find example user policies that grant permissions for various AWS Snowball job management actions. These policies work when you are using AWS SDKs or the AWS CLI. When you are using the console, you need to grant additional permissions specific to the console, which is discussed in Permissions Required to Use the AWS Snowball Console (p. 241).

> **Note**
> All examples use the us-west-2 region and contain fictitious account IDs.

Examples

Example 1: Role Policy That Allows a User to Create a Job with the API

The following permissions policy is a necessary component of any policy that is used to grant job or cluster creation permission using the job management API. The statement is needed as a Trust Relationship policy statement for the Snowball IAM role.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "importexport.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "sts:ExternalId": "AWSIE"
        }
      }
    }
  ]
}
```

Example 2: Role Policy for Creating Import Jobs

You use the following role trust policy for creating import jobs for Snowball Edge that use AWS Lambda powered by AWS IoT Greengrass functions.

```
                {
"Version": "2012-10-17",
"Statement": [
    {
        "Effect": "Allow",
        "Action": [
            "s3:GetBucketLocation",
            "s3:ListBucketMultipartUploads"
        ],
        "Resource": "arn:aws:s3:::*"
    },
    {
        "Effect": "Allow",
        "Action": [
            "s3:GetBucketPolicy",
            "s3:PutObject",
            "s3:AbortMultipartUpload",
            "s3:ListMultipartUploadParts",
            "s3:PutObjectAcl"
        ],
        "Resource": "arn:aws:s3:::*"
    },
    {
        "Effect": "Allow",
        "Action": [
            "snowball:*"
        ],
        "Resource": [
            "*"
        ]
    },
    {
        "Effect": "Allow",
        "Action": [
            "iot:AttachPrincipalPolicy",
            "iot:AttachThingPrincipal",
            "iot:CreateKeysAndCertificate",
            "iot:CreatePolicy",
            "iot:CreateThing",
            "iot:DescribeEndpoint",
            "iot:GetPolicy"
        ],
        "Resource": [
            "*"
        ]
    },
    {
        "Effect": "Allow",
        "Action": [
            "lambda:GetFunction"
        ],
        "Resource": [
            "*"
        ]
    },
    {
        "Effect": "Allow",
        "Action": [
            "greengrass:CreateCoreDefinition",
            "greengrass:CreateDeployment",
            "greengrass:CreateDeviceDefinition",
            "greengrass:CreateFunctionDefinition",
            "greengrass:CreateGroup",
            "greengrass:CreateGroupVersion",
            "greengrass:CreateLoggerDefinition",
            "greengrass:CreateSubscriptionDefinition",
```

```
                "greengrass:GetDeploymentStatus",
                "greengrass:UpdateGroupCertificateConfiguration",
                "greengrass:CreateGroupCertificateAuthority",
                "greengrass:GetGroupCertificateAuthority",
                "greengrass:ListGroupCertificateAuthorities",
                "greengrass:ListDeployments",
                "greengrass:GetGroup",
                "greengrass:GetGroupVersion",
                "greengrass:GetCoreDefinitionVersion"
            ],
            "Resource": [
                "*"
            ]
        }
    ]
}
```

Example 3: Role Policy for Creating Export Jobs

You use the following role trust policy for creating export jobs for Snowball Edge that use AWS Lambda powered by AWS IoT Greengrass functions.

```
                {
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:GetBucketLocation",
                "s3:GetObject",
                "s3:ListBucket"
            ],
            "Resource": "arn:aws:s3:::*"
        },
        {
           "Effect": "Allow",
           "Action": [
                "snowball:*"
           ],
           "Resource": [
                "*"
           ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "iot:AttachPrincipalPolicy",
                "iot:AttachThingPrincipal",
                "iot:CreateKeysAndCertificate",
                "iot:CreatePolicy",
                "iot:CreateThing",
                "iot:DescribeEndpoint",
                "iot:GetPolicy"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
```

```
                "lambda:GetFunction"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "greengrass:CreateCoreDefinition",
                "greengrass:CreateDeployment",
                "greengrass:CreateDeviceDefinition",
                "greengrass:CreateFunctionDefinition",
                "greengrass:CreateGroup",
                "greengrass:CreateGroupVersion",
                "greengrass:CreateLoggerDefinition",
                "greengrass:CreateSubscriptionDefinition",
                "greengrass:GetDeploymentStatus",
                "greengrass:UpdateGroupCertificateConfiguration",
                "greengrass:CreateGroupCertificateAuthority",
                "greengrass:GetGroupCertificateAuthority",
                "greengrass:ListGroupCertificateAuthorities",
                "greengrass:ListDeployments",
                "greengrass:GetGroup",
                "greengrass:GetGroupVersion",
                "greengrass:GetCoreDefinitionVersion"
            ],
            "Resource": [
                "*"
            ]
        }
    ]
}
```

Example 4: Expected Role Permissions and Trust Policy

The following expected role permissions policy is a necessary for an existing service role to use. It is a one time set up.

```
{
    "Version": "2012-10-17",
    "Statement":
    [
        {
            "Effect": "Allow",
            "Action": "sns:Publish",
            "Resource": ["[[snsArn]]"]
        },
        {
            "Effect": "Allow",
            "Action":
            [
                "cloudwatch:ListMetrics",
                "cloudwatch:GetMetricData",
                "cloudwatch:PutMetricData"
            ],
            "Resource":
            [
                "*"
            ],
            "Condition": {
                    "StringEquals": {
                        "cloudwatch:namespace": "AWS/SnowFamily"
                    }
```

```
            }
        }
    ]
}
```

The following expected role trust policy is a necessary for an existing service role to use. It is a one time set up.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "importexport.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

AWS Snowball API Permissions: Actions, Resources, and Conditions Reference

When you are setting up Access Control in the AWS Cloud (p. 237) and writing a permissions policy that you can attach to an IAM identity (identity-based policies), you can use the following list as a reference. The includes each AWS Snowball job management API operation and the corresponding actions for which you can grant permissions to perform the action. It also includes for each API operation the AWS resource for which you can grant the permissions. You specify the actions in the policy's `Action` field, and you specify the resource value in the policy's `Resource` field.

You can use AWS-wide condition keys in your AWS Snowball policies to express conditions. For a complete list of AWS-wide keys, see Available Keys in the *IAM User Guide*.

> **Note**
> To specify an action, use the `snowball:` prefix followed by the API operation name (for example, `snowball:CreateJob`).

Logging and Monitoring in AWS Snowball

Monitoring is an important part of maintaining the reliability, availability, and performance of AWS Snowball and your AWS solutions. You should collect monitoring data so that you can more easily debug a multi-point failure if one occurs. AWS provides several tools for monitoring your AWS Snowball resources and responding to potential incidents:

AWS CloudTrail Logs

CloudTrail provides a record of actions taken by a user, role, or an AWS service in the AWS Snowball Job Management API or when using the AWS Console. Using the information collected by CloudTrail, you can determine the API request that was made to AWS Snowball service, the IP address from which the request was made, who made the request, when it was made, and additional details. For more information, see Logging AWS Snowball Edge API Calls with AWS CloudTrail (p. 255).

Compliance Validation for AWS Snowball

Third-party auditors assess the security and compliance of AWS Snowball as part of multiple AWS compliance programs, such as SOC, PCI, FedRAMP, HIPAA, and others.

For a list of AWS services in scope of specific compliance programs, see AWS Services in Scope by Compliance Program. For general information, see AWS Compliance Programs.

You can download third-party audit reports using AWS Artifact. For more information, see Downloading Reports in AWS Artifact.

Your compliance responsibility when using AWS Snowball is determined by the sensitivity of your data, your organization's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- Security and Compliance Quick Start Guides – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.
- Architecting for HIPAA Security and Compliance Whitepaper – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.
- AWS Compliance Resources – This collection of workbooks and guides might apply to your industry and location.
- AWS Config – This AWS service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- AWS Security Hub – This AWS service provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.

Resilience

The AWS global infrastructure is built around AWS Regions and Availability Zones. AWS Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between Availability Zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about AWS Regions and Availability Zones, see AWS Global Infrastructure.

Infrastructure Security in AWS Snowball

As a managed service, AWS Snowball is protected by the AWS global network security procedures that are described in the Amazon Web Services: Overview of Security Processes whitepaper.

You use AWS published API calls to access AWS Snowball through the network. Clients must support Transport Layer Security (TLS) 1.0 or later. We recommend TLS 1.2 or later. Clients must also support cipher suites with perfect forward secrecy (PFS) such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Ephemeral Diffie-Hellman (ECDHE). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.

Data Validation with Snowball Edge Jobs

Following, you'll find information about how AWS Snowball Edge validates data transfers, and the manual steps you can take to help ensure data integrity during and after a job.

Topics

Checksum Validation of Transferred Data

When you copy a file from a local data source using the Amazon S3 interface to the Snowball Edge, a number of checksums are created. These checksums are used to automatically validate data as it's transferred.

At a high level, these checksums are created for each file (or for parts of large files). For the Snowball Edge, these checksums are visible when you run the following AWS CLI command against a bucket on the device. The checksums are used to validate the integrity of your data throughout the transfers and help ensure that your data is copied correctly.

```
aws s3api list-objects --bucket bucket-name --endpoint http://ip:8080 --profile edge-
profile
```

When these checksums don't match, the associated data is not imported into Amazon S3.

Local Inventory Creation During Snowball Transfer

Create a local inventory of files copied to the Snowball when using the Amazon S3 Interface or CLI. The content of the local inventory can be used to compare with what is on the local storage or server.

For example,

```
aws s3 cp folder/ s3://bucket --recursive > inventory.txt
```

Common Validation Errors

When a validation error occurs, the corresponding data (a file or a part of a large file) is not written to the destination. The following are common causes for validation errors:

- Trying to copy symbolic links.

- Trying to copy files that are actively being modified. The attempt fails checksum validation and is marked as a failed transfer.
- Trying to copy files that are larger than 5 TB in size.
- Trying to copy part sizes that are larger than 512 MB in size.
- Trying to copy files to a Snowball Edge device that is already at full data storage capacity.
- Trying to copy files to a Snowball Edge device that doesn't follow the object key naming guidelines for Amazon S3.

When any one of these validation errors occurs, it is logged. You can take steps to manually identify what files failed validation and why. For information, see Manual Data Validation for Snowball Edge After Import into Amazon S3 (p. 253).

Manual Data Validation for Snowball Edge After Import into Amazon S3

After an import job has completed, you have several options to manually validate the data in Amazon S3, as described following.

Check job completion report and associated logs

Whenever data is imported into or exported out of Amazon S3, you get a downloadable PDF job report. For import jobs, this report becomes available at the end of the import process. For more information, see Getting Your Job Completion Report and Logs on the Console (p. 49).

S3 inventory

If you transferred a huge amount of data into Amazon S3 in multiple jobs, going through each job completion report might not be an efficient use of time. Instead, you can get an inventory of all the objects in one or more Amazon S3 buckets. Amazon S3 inventory provides a comma-separated values (CSV) file showing your objects and their corresponding metadata on a daily or weekly basis. This file covers objects for an Amazon S3 bucket or a shared prefix (that is, objects that have names that begin with a common string).

When you have the inventory of the Amazon S3 buckets that you've imported data into, you can easily compare it against the files that you transferred on your source data location. In this way, you can quickly identify what files where not transferred.

Use the Amazon S3 sync command

If your workstation can connect to the internet, you can do a final validation of all your transferred files by running the AWS CLI command `aws s3 sync`. This command syncs directories and S3 prefixes. This command recursively copies new and updated files from the source directory to the destination. For more information, see sync in the *AWS CLI Command Reference*.

> **Important**
> If you specify your local storage as the destination for this command, make sure that you have a backup of the files that you sync against. These files are overwritten by the contents in the specified Amazon S3 source.

Notifications for the AWS Snowball Edge

The AWS Snowball Edge device is designed to take advantage of the robust notifications delivered by Amazon Simple Notification Service (Amazon SNS). While creating a job, you can provide a list of comma-separated email addresses to receive email notifications for your job.

You configure Amazon SNS to send text messages for these status notifications from the Amazon SNS console. For more information, see Mobile text messaging (SMS) in the *Amazon Simple Notification Service Developer Guide*.

After you create your job, every email address that you specified to get Amazon SNS notifications receives an email from AWS notifications asking for confirmation to the topic subscription. For each email address to receive additional notifications, a user of the account must confirm the subscription by choosing **Confirm subscription**.

The Amazon SNS notification emails are tailored for each triggering state, and include a link to the AWS Snow Family Management Console.

Logging AWS Snowball Edge API Calls with AWS CloudTrail

The AWS Snowball or Snow Family service integrates with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or service. CloudTrail captures all API calls for AWS Snow Family service. The calls captured include calls from the AWS Snowball Family console and code calls to the AWS Snowball Family Job Management API. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for AWS Snowball Family API calls. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request made with AWS Snowball Family API, the IP address of the request made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, see the AWS CloudTrail User Guide.

AWS Snowball Edge Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When activity occurs in AWS Snowball Edge, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see Viewing Events with CloudTrail Event History in the *AWS CloudTrail User Guide.*

For an ongoing record of events in your AWS account, including events for AWS Snowball Edge, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all AWS Regions. The trail logs events from all AWS Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following topics in the *AWS CloudTrail User Guide*:

- Overview for Creating a Trail
- CloudTrail Supported Services and Integrations
- Configuring Amazon SNS Notifications for CloudTrail
- Receiving CloudTrail Log Files from Multiple Regions and Receiving CloudTrail Log Files from Multiple Accounts

All job management actions are documented in the AWS Snowball API Reference and are logged by CloudTrail with the following exceptions:

- The CreateAddress operation is not logged to protect customer sensitive information.
- All read-only API calls (for API operations beginning with the prefix of `Get`, `Describe`, or `List`) don't record response elements.

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.

- Whether the request was made by another AWS service.

For more information, see the CloudTrail userIdentity Element in the *AWS CloudTrail User Guide*.

Understanding Log File Entries for AWS Snowball Edge

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the DescribeJob operation.


```
    {"Records": [
  {
      "eventVersion": "1.05",
      "userIdentity": {
          "type": "Root",
          "principalId": "111122223333",
          "arn": "arn:aws:iam::111122223333:root",
          "accountId": "111122223333",
          "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
          "sessionContext": {"attributes": {
              "mfaAuthenticated": "false",
              "creationDate": "2019-01-22T21:58:38Z"
          }},
          "invokedBy": "signin.amazonaws.com"
      },
      "eventTime": "2019-01-22T22:02:21Z",
      "eventSource": "snowball.amazonaws.com",
      "eventName": "DescribeJob",
      "awsRegion": "eu-west-1",
      "sourceIPAddress": "192.0.2.0",
      "userAgent": "signin.amazonaws.com",
      "requestParameters": {"jobId": "JIDa1b2c3d4-0123-abcd-1234-0123456789ab"},
      "responseElements": null,
      "requestID": "12345678-abcd-1234-abcd-ab0123456789",
      "eventID": "33c7ff7c-3efa-4d81-801e-7489fe6fff62",
      "eventType": "AwsApiCall",
      "recipientAccountId": "444455556666"
  }
]}
```

AWS Snowball Edge Quotas

Following, you can find information about limitations on using the AWS Snowball Edge device.

Important
When you transfer data into Amazon Simple Storage Service (Amazon S3) using a Snowball Edge, keep in mind that individual Amazon S3 objects can range in size from a minimum of 0 bytes to a maximum of 5 terabytes (TB).

Topics

Region Availability for AWS Snowball Edge

The following table highlights the regions where AWS Snowball Edge is available.

Region	Snowball Edge availability
US East (Ohio)	✓
US East (N. Virginia)	✓
US West (N. California)	✓
US West (Oregon)	✓
Canada (Central)	✓
Asia Pacific (Mumbai)	✓
Asia Pacific (Singapore)	✓
Asia Pacific (Sydney)	✓
Asia Pacific (Tokyo)	✓
Europe (Frankfurt)	✓
Europe (Ireland)	✓
Europe (London)	✓
South America (São Paulo)	✓

For information about supported AWS Regions and endpoints, see AWS Snow Family endpoints and quotas in the AWS General Reference

Limitations for AWS Snowball Edge Jobs

The following limitations exist for creating AWS Snowball Edge device jobs:

- For security purposes, jobs using an AWS Snowball Edge device must be completed within 360 days of being prepared. If you need to keep one or more devices for longer than 360 days, contact AWS Support. Otherwise, after 360 days, the device becomes locked, can no longer be accessed, and must be returned. If the AWS Snowball Edge device becomes locked during an import job, we can still transfer the existing data on the device into Amazon S3.
- Currently, the AWS Snowball Edge device doesn't support server-side encryption with customer-provided keys (SSE-C). AWS Snowball Edge does support server-side encryption with Amazon S3 managed encryption keys (SSE-S3) and server-side encryption with AWS Key Management Service managed keys (SSE-KMS). For more information, see Protecting data using server-side encryption in the *Amazon Simple Storage Service User Guide*.
- If you're using an AWS Snowball Edge device to import data, and you need to transfer more data than will fit on a single Snowball Edge device, create additional jobs. Each export job can use multiple Snowball Edge devices.
- The default service limit for the number of Snowball Edge devices you can have at one time is 1. If you want to increase your service limit or create a cluster job, contact AWS Support.
- Metadata for objects transferred to a device is not persisted, unless it's transferred with the file interface. The only metadata that remains the same is `filename` and `filesize`. All other metadata is set as in the following example:

  ```
  -rw-rw-r-- 1 root root [filesize] Dec 31 1969 [path/filename]
  ```

Rate Limits on AWS Snowball Edge

The Rate Limiter is used to control the rate of requests in a server cluster environment.

Amazon Snow S3 Adapter Connection Limit

The maximum connection limit is 1000 for Snowball Edge on Amazon S3. Any connections beyond 1000 are dropped.

Limitations on Transferring On-Premises Data with a Snowball Edge Device

The following limitations exist for transferring data to or from an AWS Snowball Edge device on-premises:

- Files must be in a static state while being written. Files that are modified while being transferred are not imported into Amazon S3.
- Jumbo frames are not supported—that is, Ethernet frames with more than 1500 bytes of payload.
- When selecting what data to export, keep in mind that objects with trailing slashes in their names (/ or \) are not transferred. Before exporting any objects with trailing slashes, update their names to remove the slash.

- When using multipart data transfer, the maximum part size is 512 megabytes (MB).

Limitations for Lambda Powered by AWS IoT Greengrass

If you allocate the minimum recommendation of 128 MB of memory for each of your functions, you can have up to seven Lambda functions in a single job. This limitation occurs because the physical nature of the Snowball Edge limits the amount of memory available for running Lambda functions on the device.

Limitations on Shipping a Snowball Edge

The following limitations exist for shipping an AWS Snowball Edge device:

- AWS will not ship a Snowball Edge device to a post office box.
- AWS will not ship a Snowball Edge device between non-US Regions—for example, from EU (Ireland) to EU (Frankfurt), or to Asia Pacific (Sydney).
- Moving a Snowball Edge device to an address outside of the country specified when the job was created is not allowed and is a violation of the AWS service terms.

For more information about shipping, see Shipping Considerations for AWS Snowball (p. 223).

Limitations on Processing Your Returned Snowball Edge for Import

To import your data into AWS, the device must meet the following requirements:

- The AWS Snowball Edge device must not be compromised. Except for opening the three doors on the front, back, and top, or to add and replace the optional air filter, don't open the AWS Snowball Edge device for any reason.
- The device must not be physically damaged. You can prevent damage by closing the three doors on the Snowball Edge device until the latches make an audible clicking sound.
- The E Ink display on the Snowball Edge device must be visible. It must also show the return label that was automatically generated when you finished transferring your data onto the AWS Snowball Edge device.

Note
All Snowball Edge devices returned that don't meet these requirements are erased without having any work performed on them.

Troubleshooting AWS Snowball Edge

Keep the following general guidelines in mind when troubleshooting.

- Objects in Amazon S3 have a maximum file size of 5 TB.
- Objects transferred onto an AWS Snowball Edge device have a maximum key length of 933 bytes. Key names that include characters that take up more than 1 byte each still have a maximum key length of 933 bytes. When determining key length, you include the file or object name and also its path or prefixes. Thus, files with short file names within a heavily nested path can have keys longer than 933 bytes. The bucket name is not factored into the path when determining the key length. Some examples follow.

Object name	Bucket name	Path plus bucket name	Key Length
`sunflower-1.jpg`	`pictures`	`sunflower-1.jpg`	15 characters
`receipts.csv`	`MyTaxInfo`	`/Users/Eric/Documents/2016/January/`	47 characters
`bhv.1`	`$7$zWwwXKQj$gLAOoZCj$r8p`	`/.VfV/FqGC3QN$7BXys3KHYePfuIOMNjY83dVxugPYlxVg/evpcQEJLT/rSwZc$MlVVf/$hwefVISRqwepB$/BiiD/PPF$twRAjrD/fIMp/0NY`	135 characters

- For security purposes, jobs using an AWS Snowball Edge device must be completed within 360 days of being prepared. If you need to keep one or more devices for longer than 360 days, contact AWS Support. Otherwise, after 360 days,the device becomes locked, can no longer be accessed, and must be returned. If the AWS Snowball Edge device becomes locked during an import job, we can still transfer the existing data on the device into Amazon S3.
- If you encounter unexpected errors using an AWS Snowball Edge device, we want to hear about it. Copy the relevant logs and include them along with a brief description of the issues that you encountered in a message to AWS Support. For more information about logs, see Commands for the Snowball Edge Client (p. 81).

Topics

How to Identify Your Device

There are two Snowball device types, Snowball and Snowball Edge. If you're not sure which type of device you have, see AWS Snowball Edge Device Differences (p. 4).

Troubleshooting Boot-up problems

The following information can help you troubleshoot certain issues you might have with booting-up your Snow Family devices.

- Allow 10 minutes for a device to boot up. Avoid moving or using the device during this time.
- Ensure both ends of the cable supplying power are connected securely.
- Replace the cable supplying power with another cable that you know is good.
- Connect the cable supplying power to another source of power that you know is good.

Troubleshooting Connection Problems

The following information can help you troubleshoot certain issues that you might have with connecting to your Snowball Edge:

- Routers and switches that work at a rate of 100 megabytes per second don't work with a Snowball Edge. We recommend that you use a switch that works at a rate of 1 GB per second (or faster).
- If you experience odd connection errors with the device, power off the Snowball Edge, unplug all the cables, and leave it for 10 minutes. After 10 minutes have passed, restart the device, and try again.
- Ensure that no antivirus software or firewalls block the Snowball Edge device's network connection.
- Be aware that the file interface and Amazon S3 interface have different IP addresses.

For more advanced connection troubleshooting, you can take the following steps:

- If you can't communicate with the Snowball Edge, ping the IP address of the device. If the ping returns `no connect`, confirm the IP address for the device and confirm your local network configuration.
- If the IP address is correct and the lights on the back of the device are flashing, use telnet to test the device on ports 22, 9091, and 8080. Testing port 22 determines whether the Snowball Edge is working correctly. Testing port 9091 determines whether the AWS CLI can be used to send commands to the device. Testing port 8080 helps ensure that the device can write to the Amazon S3 buckets on it. If you can connect on port 22 but not on port 8080, first power off the Snowball Edge and then unplug all the cables. Leave the device for 10 minutes, and then reconnect it and start again.

Troubleshooting Manifest File Problems

Each job has a specific manifest file associated with it. If you create multiple jobs, track which manifest is for which job.

If you lose a manifest file or if a manifest file is corrupted, you can redownload the manifest file for a specific job. You do so using the console, AWS CLI, or one of the AWS APIs.

Troubleshooting Credentials Problems

Use the following topics to help you resolve credentials issues with the Snowball Edge.

Unable to Locate AWS CLI Credentials

If you're communicating with the AWS Snowball Edge device through the Amazon S3 interface using the AWS CLI, you might encounter an error message that says Unable to locate credentials. You can configure credentials by running "aws configure".

Action to take

Configure the AWS credentials that the AWS CLI uses to run commands for you. For more information, see Configuring the AWS CLI in the *AWS Command Line Interface User Guide*.

Error Message: Check Your Secret Access Key and Signing

When using the Amazon S3 interface to transfer data to a Snowball Edge, you might encounter the following error message.

```
An error occurred (SignatureDoesNotMatch) when calling the CreateMultipartUpload operation:
 The request signature we calculated does not match the signature you provided.
Check your AWS secret access key and signing method. For more details go to:
http://docs.aws.amazon.com/AmazonS3/latest/dev/
RESTAuthentication.html#ConstructingTheAuthenticationHeader
```

Action to take

Get your credentials from the Snowball Edge client. For more information, see Getting Credentials (p. 86).

Troubleshooting Data Transfer Problems

If you encounter performance issues while transferring data to or from a Snowball Edge, see Performance (p. 217) for recommendations and guidance on improving transfer performance. The following can help you troubleshoot issues that you might have with your data transfer to or from a Snowball Edge:

- You can't transfer data into the root directory of the Snowball Edge. If you have trouble transferring data into the device, make sure that you're transferring data into a subdirectory. The top-level subdirectories have the names of the Amazon S3 buckets that you included in the job. Put your data in those subdirectories.
- If you're using Linux and you can't upload files with UTF-8 characters to an AWS Snowball Edge device, it might be because your Linux server doesn't recognize UTF-8 character encoding. You can correct this issue by installing the `locales` package on your Linux server and configuring it to use one of the UTF-8 locales like `en_US.UTF-8`. You can configure the `locales` package by exporting the environment variable `LC_ALL`, for example: `export LC_ALL=en_US.UTF-8`

- When you use the Amazon S3 interface with the AWS CLI, you can work with files or folders with spaces in their names, such as `my photo.jpg` or `My Documents`. However, make sure that you handle the spaces properly. For more information, see Specifying parameter values for the AWS CLI in the *AWS Command Line Interface User Guide*.

Troubleshooting Problems with Transferring Data Using the File Interface

If you encounter issues while transferring data with the file interface, keep the following considerations in mind:

- The maximum size of a file that you can transfer to the file interface on a Snowball Edge is 150 GB. If you try to transfer a file larger than 150 GB, the file interface writes the first 150 GB of that file, and then returns an error message indicating that the file is too large.
- We recommend that you use only one method at a time of reading and writing data to each bucket on a Snowball Edge device. Using both the file interface and the Amazon S3 interface on the same bucket might result in undefined behavior.
- The file interface supports all NFS file operations, except truncation, renaming, and changing ownership. Requests that use these unsupported file operations are rejected with error messages sent to your NFS client. Attempts to change a file's permissions after the file has been created on the Snowball Edge are ignored without an error message.
- If the Snowball Edge has a power failure or is rebooted, data in the file interface buffer persists. On reboot, this buffered data is uploaded to buckets on the device. When **Write status** on the **File interface** tab shows 100 percent with a green progress bar, all data in the file interface buffer is uploaded to the buckets on the device.
- Don't write data to a Snowball Edge that is full. Also don't write more data to a Snowball Edge than can fit in the remaining available storage. Either action causes errors that might corrupt your data. We recommend that you use the Snowball Edge client's `snowballEdge describe-device` command to determine the remaining amount of space on the Snowball Edge. Then compare the remaining space to the amount of data that you want to copy using the file interface before copying the data.
- When you've finished copying data to the Snowball Edge using the file interface, you must disable the file interface. You do so to avoid losing any data that might be in the buffer but not yet written to the Amazon S3 bucket. For more information, see Disabling the File Interface (p. 114).
- We recommend that you keep a local copy of all data that is written to the file interface until the Snowball Edge has been shipped back to AWS and the data has been ingested to Amazon S3.

Troubleshooting AWS CLI Problems

Use the following topics to help you resolve problems when working with an AWS Snowball Edge device and the AWS CLI.

AWS CLI Error Message: "Profile Cannot Be Null"

When working with the AWS CLI, you might encounter an error message that says Profile cannot be null. You can encounter this error if the AWS CLI hasn't been installed or an AWS CLI profile hasn't been configured.

Action to take

Ensure that you have downloaded and configured the AWS CLI on your workstation. For more information, see Install the AWS CLI Using the Bundled Installer (Linux, macOS, or Unix) in the *AWS Command Line Interface User Guide.*

Null Pointer Error When Transferring Data with the AWS CLI

When using the AWS CLI to transfer data, you might encounter a null pointer error. This error can occur in the following conditions:

- If the specified file name is misspelled, for example `flowwer.png` or `flower.npg` instead of `flower.png`
- If the specified path is incorrect, for example `C:\Doccuments\flower.png` instead of `C:\Documents\flower.png`
- If the file is corrupted

Action to take

Confirm that your file name and path are correct, and try again. If you continue to experience this issue, confirm that the file has not been corrupted, abandon the transfer, or attempt repairs to the file.

Troubleshooting Import Job Problems

Sometimes files fail to import into Amazon S3. If the following issue occurs, try the actions specified to resolve your issue. If a file fails import, you might need to try importing it again. Importing it again might require a new job for Snowball Edge.

Files failed import into Amazon S3 due to invalid characters in object names

This problem occurs if a file or folder name has characters that aren't supported by Amazon S3. Amazon S3 has rules about what characters can be in object names. For more information, see Object key naming guidelines.

Action to take

If you encounter this issue, you see the list of files and folders that failed import in your job completion report.

In some cases, the list is prohibitively large, or the files in the list are too large to transfer over the internet. In these cases, you should create a new Snowball import job, change the file and folder names to comply with Amazon S3 rules, and transfer the files again.

If the files are small and there isn't a large number of them, you can copy them to Amazon S3 through the AWS CLI or the AWS Management Console. For more information, see How do I upload files and folders to an S3 bucket? in the *Amazon Simple Storage Service User Guide.*

Troubleshooting Export Job Problems

Sometimes files fail to export into your workstation. If the following issue occurs, try the actions specified to resolve your issue. If a file fails export, you might need to try exporting it again. Exporting it again might require a new job for Snowball Edge.

Files failed export to a Microsoft Windows Server

A file can fail export to a Microsoft Windows Server if it or a related folder is named in a format not supported by Windows. For example, if your file or folder name has a colon (`:`) in it, the export fails because Windows doesn't allow that character in file or folder names.

Action to take

1. Make a list of the names that are causing the error. You can find the names of the files and folders that failed export in your logs. For more information, see AWS Snowball Edge Logs (p. 89).
2. Change the names of the objects in Amazon S3 that are causing the issue to remove or replace the unsupported characters.
3. If the list of names is prohibitively large, or if the files in the list are too large to transfer over the internet, create a new export job specifically for those objects.

   If the files are small and there isn't a large number of them, copy the renamed objects from Amazon S3 through the AWS CLI or the AWS Management Console. For more information, see How do I download an object from an S3 bucket? in the *Amazon Simple Storage Service User Guide.*

API Reference

In addition to using the console, you can use the AWS Snowball API to programmatically configure and manage AWS Snowball Edge device and its resources. This section describes the device operations and data types and contains the API Reference documentation for AWS Snowball Edge device.

Topics

Document History

- **API version: 1.0**
- **Latest documentation update:** August 24th, 2022

The following table describes important changes to the *AWS Snowball Edge Developer Guide* after July 2018. For notifications about documentation updates, you can subscribe to the RSS feed.

Change	Description	Date
New AWS Region supported (p. 267)	AWS Snowball is now supported in the Asia Pacific (Jakarta) Region. For information about endpoints for this region, see Snowball Edge Endpoints and Quotas in the *AWS General Reference*. For information on shipping, see Shipping Considerations for Snowball Edge.	September 7, 2022
Large Data Migration for Snowball Edge (p. 267)	Snowball Edge now supports automating a large data migration plan. For more information see Large Data Migration (manual steps) and Create a Large Data Migration Plan to initiate automation if desired.	April 27, 2022
Introducing AWS Snow Device Management (p. 267)	Snow Device Management allows you to manage your Snowball Edge device and local AWS services remotely. All Snowball Edge devices support Snow Device Management, and it comes pre-installed on new devices in most AWS Regions where Snowball Edge is available. For more information, see Using AWS Snow Device Management to Manage Devices	April 27, 2022
NFS Configuration for Snowball Edge (p. 267)	Added NFS Configuration for Snowball Edge for Storage Optimized devices.	April 21, 2022
Rate Limits for Load Balancer (p. 267)	Snowball Edge now supports Rate Limits to distribute requests in a server cluster environment.	April 19, 2022
Support for Snowball Edge with Tape Gateway (p. 267)	You can now order a Snowball Edge device that is specially	November 30, 2021

	configured to host the Tape Gateway service. This combination of technologies facilitates secure offline tape data migration. For more information, see Using AWS Snowball Edge with Tape Gateway.	
Support for Network Time Protocol (NTP) server configuration (p. 267)	Snowball Edge devices now support external Network Time Protocol (NTP) server configuration.	November 16, 2021
Support for NFS offline data transfer (p. 267)	Snowball Edge devices now support offline data transfer using NFS. For more information, see Using NFS for Offline Data Transfer.	August 4, 2021
New AWS Region supported (p. 267)	Snowball Edge devices are now available in the Africa (Cape Town) AWS Region. For more information, see Snowball Edge Endpoints and Quotas in the *AWS General Reference*. For information on shipping, see Shipping Considerations for Snowball Edge.	November 23, 2020
Support for importing your own image into your device (p. 267)	You can now import a snapshot of your image into your Snowball Edge device and register it as an Amazon EC2 Machine Image (AMI). For more information, see Importing an Image into Your Device as an Amazon EC2 AMI .	November 9, 2020
New AWS Region supported (p. 267)	Snowball Edge devices are now available in the Europe (Milan) AWS Region. For more information, see Snowball Edge Endpoints and Quotas in the *AWS General Reference*. For information on shipping, see Shipping Considerations for Snowball Edge.	September 30, 2020
Content restructure (p. 267)	Created a Getting Started section that aligns with the AWS Snow Family Management Console workflow and updated other sections for clarity. For more information, see Getting Started with an AWS Snowball Edge.	September 17, 2020

Introducing AWS OpsHub for Snow Family (p. 267)	The Snow Family devices now offer a user-friendly tool, AWS OpsHub for Snow Family, that you can use to manage your devices and local AWS services. For more information, see Using AWS OpsHub for Snow Family to Manage Snowball Devices.	April 16, 2020
AWS Identity and Access Management (IAM) is now available locally on the AWS Snowball Edge device (p. 267)	You can now use AWS Identity and Access Management (IAM) to securely control access to AWS resources running on your AWS Snowball Edge device. For more information, see Using IAM Locally.	April 16, 2020
Introducing a new Snowball Edge Storage Optimized (for data transfer) device option (p. 267)	Snowball now adds a new storage optimized device based on the current compute-optimized and GPU devices. For more information, see Snowball Edge Device Options.	March 23, 2020
NFC tag validation support (p. 267)	Snowball Edge Compute Optimized devices (with or without the GPU) have NFC tags built into them. You can scan these tags with the AWS Snowball Edge Verification App, available on Android. For more information, see Validating NFC Tags.	December 13, 2018
Security groups are now available for compute instances (p. 267)	Security groups in Snowball Edge devices are similar to security groups in the AWS Cloud, with some subtle differences. For more information, see Security Groups in Snowball Edge Devices.	November 26, 2018
Introducing on-premises update (p. 267)	You can now update the software that makes a Snowball Edge device run in your local environment. Note that on-premises updates require an internet connection. For more information, see Updating an Snowball Edge.	November 26, 2018
Introducing new device options for Snowball Edge (p. 267)	Snowball Edge devices come in three options – storage optimized, compute optimized, and with GPU. For more information, see Snowball Edge Device Options.	November 15, 2018

New AWS Region supported (p. 267)	Snowball Edge devices are now available in the Asia Pacific (Mumbai). Note that compute instances and AWS Lambda powered by AWS IoT Greengrass are not supported in this region.	September 24, 2018
Introducing support for Amazon EC2 compute instances on Snowball Edge devices (p. 267)	AWS Snowball now supports local jobs using Amazon EC2 compute instances running on Snowball Edge devices.	July 17, 2018
Improved troubleshooting content (p. 267)	The troubleshooting chapter has been updated and reorganized.	July 11, 2018

The following table describes documentation releases for the AWS Snowball Edge device before July 2018.

Change	Description	Date
New AWS Region supported	AWS Snowball is now supported in the Asia Pacific (Singapore) region. For more information on shipping in this AWS Region, see Shipping Considerations for AWS Snowball (p. 223).	April 3, 2018
Automatically extracted batches of small files are now supported	You can now batch many small files together into a larger archive, and specify that those batches are automatically extracted when the data is imported into Amazon S3. Batching small files together can significantly improve your transfer performance when moving data from your on-premises server to a Snowball Edge device. For more information, see Batching Small Files (p. 101).	March 20, 2018
Major feature revision to the Snowball Edge client and cluster update	The new major feature revision for the Snowball Edge client includes performance improvements, profiles, and support for the cluster update. For more information, see Using the Snowball Edge Client (p. 81). Clusters are now leaderless. All nodes can read and write data to the cluster. For more information, see Using an AWS Snowball Edge Cluster (p. 199).	February 5, 2018

Change	Description	Date
New AWS Region supported	AWS Snowball is now supported in the Europe (Paris) region. For more information on shipping in this AWS Region, see Shipping Considerations for AWS Snowball (p. 223).	December 18, 2017
Improved AWS CLI support for the Amazon S3 interface	You can now use the `s3 sync` command with the Amazon S3 interface to sync data between a Snowball Edge and your local computer. For more information, see Supported AWS CLI Commands for Amazon S3 (p. 103).	November 10, 2017
Updated file interface file size support	The file interface can now support files up to 150 GB in size. For more information, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).	October 4, 2017
New AWS Region supported	AWS Snowball Edge is now supported in the Asia Pacific (Tokyo) region, with region-specific shipping options. For more information, see Shipping Considerations for AWS Snowball (p. 223).	September 19, 2017
New AWS Region supported	AWS Snowball Edge is now supported in the South America (São Paulo) region, with region-specific shipping options. For more information, see Shipping Considerations for AWS Snowball (p. 223).	August 8, 2017
Updated AWS IoT Greengrass and Lambda functionality	Lambda functions running on AWS Snowball Edge devices can now be added, updated, removed, or replaced, once the devices are on-premises. In addition, AWS Snowball Edge devices can now be used as AWS IoT Greengrass core devices. For more information, see Using AWS Lambda with an AWS Snowball Edge (p. 123).	July 25, 2017

Change	Description	Date
New AWS Region supported	AWS Snowball Edge is now supported in the Canada (Central) region, with region-specific shipping options. For more information, see Shipping Considerations for AWS Snowball (p. 223).	June 29, 2017
Updated file interface functionality	With the file interface, you can now choose the Network File System (NFS) clients that are allowed to access the file share on the Snowball Edge, in addition to accessing other support and troubleshooting features. For more information, see Transferring Files to AWS Snowball Edge Using the File Interface (p. 107).	June 21, 2017
Updated cluster functionality	Clusters can now be created in groups of 5–10 AWS Snowball Edge devices. For more information, see Using an AWS Snowball Edge Cluster (p. 199).	June 5, 2017
Documentation update	Documentation navigation has been updated for clarity and consistency, and a regional limitations section has been added. For more information, see Region Availability for AWS Snowball Edge (p. 257).	May 8, 2017

Change	Description	Date
Updated compute information	The following updates have been made for AWS Lambda powered by AWS IoT Greengrass functions: • Event objects are now JSON objects like their cloud-based counterparts. • When you choose a function for a job, you also choose a specific version of the function. Each version of a function now has a separate Amazon Resource Name (ARN). • To improve latency, functions are loaded in memory when a job is created. When creating a compute job, keep in mind that you have a total of 3.744 GB of memory available for all the functions. If you need more functions than the memory can support, you need to create more jobs.	December 6, 2016
Introducing AWS AWS Snowball Edge	The AWS Snowball service now has two devices, the standard Snowball and the AWS Snowball Edge device. With the new Snowball Edge, you can now create local storage and compute jobs, harnessing the power of the AWS Cloud locally, without an internet connection.	November 30, 2016

AWS glossary

For the latest AWS terminology, see the AWS glossary in the *AWS General Reference*.