
AWS Server Migration Service

User Guide



AWS Server Migration Service: User Guide

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What Is AWS SMS?

AWS Server Migration Service automates the migration of your on-premises VMware vSphere or Microsoft Hyper-V/SCVMM virtual machines to the AWS Cloud. AWS SMS incrementally replicates your server VMs as cloud-hosted Amazon Machine Images (AMIs) ready for deployment on Amazon EC2. Working with AMIs, you can easily test and update your cloud-based images before deploying them in production.

By using AWS SMS to manage your server migrations, you can:

- **Simplify the cloud migration process.** You can begin migrating a group of servers with just a few clicks in the AWS Management Console. After the migration has initiated, AWS SMS manages all the complexities of the migration process, including automatically replicating volumes of live servers to AWS and creating new AMIs periodically. You can quickly launch EC2 instances from AMIs in the console.
- **Orchestrate multi-server migrations.** AWS SMS orchestrates server migrations by allowing you to schedule replications and track progress for a group of servers. You can schedule initial replications, configure replication intervals, and track progress for each server using the console.
- **Test server migrations incrementally:** With support for incremental replication, AWS SMS allows fast, scalable testing of migrated servers. Because AWS SMS replicates incremental changes to your on-premises servers and transfers only the delta to the cloud, you can test small changes iteratively and save on network bandwidth.
- **Support the most widely used operating systems.** AWS SMS supports the replication of operating system images containing Windows, as well as several major Linux distributions.
- **Minimize downtime.** Incremental AWS SMS replication minimizes the business impact associated with application downtime during the final cutover.

Use of AWS SMS is limited as follows:

- 50 concurrent VM migrations per account, unless a customer requests a limit increase.
- 90 days of service usage per VM (not per account), beginning with the initial replication of a VM. We terminate an ongoing replication after 90 days unless a customer requests a limit increase.

Pricing

There is no additional fee to use Server Migration Service. You pay the standard fees for the S3 buckets, EBS volumes, and data transfer used during the migration process, and for the EC2 instances that you run.

Server Migration Service (SMS) Requirements

Your VMware vSphere or Microsoft Hyper-V/SCVMM environment must meet the following requirements for you to use the Server Migration Service to migrate your on-premises virtualized servers to Amazon EC2.

General Requirements

Before setting up AWS SMS, take action as needed to meet all of the following requirements.

All VMs

- Disable any antivirus or intrusion detection software on the VM you are migrating. These services can be re-enabled after the migration process is complete.
- Disconnect any CD-ROM drives (virtual or physical) connected to the VM.

Windows VMs

- Enable Remote Desktop (RDP) for remote access.
- Install the appropriate version of .NET Framework on the VM. Note that .NET Framework 4.5 or later will be installed automatically on your VM if required.

Windows Version	.NET Framework Version
Windows Server 2008 or earlier	3.5 or later
Windows Server 2008 R2 or later	4.5 or later
Windows 8 or earlier	3.5 or later
Windows 8.1 or later	4.5 or later

- When preparing a Microsoft Windows VM for migration, configure a fixed pagefile size and ensure that at least 6 GiB of free space is available on the root volume. This is necessary for successful installation of the drivers.
- Make sure that your host firewall (such as Windows firewall) allows access to RDP. Otherwise, you will not be able to access your instance after the migration is complete.
- Apply the following hotfixes:
 - [You cannot change system time if RealTimeIsUniversal registry entry is enabled in Windows](#)
 - [High CPU usage during DST changeover in Windows Server 2008, Windows 7, or Windows Server 2008 R2](#)

Linux VMs

- Enable Secure Shell (SSH) for remote access.
- Make sure that your host firewall (such as iptables) allows access to SSH. Otherwise, you will not be able to access your instance after the migration is complete.
- Make sure that your Linux VM uses GRUB (GRUB legacy) or GRUB 2 as its bootloader.

- Make sure that the root volume of your Linux VM uses one of the following file systems:
 - EXT2
 - EXT3
 - EXT4
 - Btrfs
 - JFS
 - XFS

Programmatic Modifications to VMs

When importing a VM, AWS modifies the file system to make the imported VM accessible to the customer. The following actions may occur:

- [Linux] Installing Citrix PV drivers either directly in OS or modify `initrd/initramfs` to contain them.
- [Linux] Modifying network scripts to replace static IPs with dynamic IPs.
- [Linux] Modifying `/etc/fstab`, commenting out invalid entries and replacing device names with UUIDs. If no matching UUID can be found for a device, the `nofail` option is added to the device description. You will need to correct the device naming and remove `nofail` after import. As a best practice when preparing your VMs for import, we recommend that you specify your VM disk devices by UUID rather than device name.

Entries in `/etc/fstab` that contain distributed file system types (`nfs`, `cifs`, `smbfs`, `vboxsf`, `sshfs`, etc.) will be disabled.

- [Linux] Modifying grub bootloader settings such as the default entry and timeout.
- [Windows] Modifying registry settings to make the VM bootable.

When writing a modified file, AWS retains the original file at the same location under a new name.

AWS Server Migration Connector Requirements

The Server Migration Connector is a FreeBSD VM that you install in your on-premises virtualization environment. Its hardware and software requirements are as follows:

Requirements for VMware connector

- vCenter version 5.1 or higher (validated up to 6.5)
- ESXi 5.1 or higher (validated up to 6.5)
- Minimum 8 GiB RAM
- Minimum available disk storage of 20 GiB (thin-provisioned) or 250 GiB (thick-provisioned)
- Support for the following network services. Note that you might need to reconfigure your firewall to permit stateful outbound connections from the connector to these services.
 - DNS—Allow the connector to initiate connections to port 53 for name resolution.
 - HTTPS on vCenter—Allow the connector to initiate secure web connections to port 443 of vCenter. You can also configure a non-default port at your discretion.

Note

If your vCenter Server is configured to use a non-default port, enter both the vCenter's hostname and port, separated by a colon (for example, `HOSTNAME:PORT` or `IP:PORT`) in the vCenter Service Account page in **Connector setup**.

- HTTPS on ESXi—Allow the connector to initiate secure web connections to port 443 of the ESXi hosts containing the VMs you intend to migrate.

- NTP—Optionally, give the connector access to ntp.org on port 123. If the connector synchronises its clock with the ESXi host, this is unnecessary.
- Allow outbound connections from the connector to the following URL ranges:
 - *.amazonaws.com
 - *.aws.amazon.com
 - *.ntp.org (Optional; used only to validate that connector time is in sync with NTP.)

Requirements for Hyper-V connector

- Hyper-V role on Windows Server 2012 R2 or Windows Server 2016
- Active Directory 2012 or above
- [Optional] SCVMM 2012 SP1 or SCVMM 2016
- Minimum 8 GiB RAM
- Minimum available disk storage of 300 GiB
- Support for the following network services. Note that you might need to reconfigure your firewall to permit stateful outbound connections from the connector to these services.
 - DNS—Allow the connector to initiate connections to port 53 for name resolution.
 - HTTPS on WinRM port 5986 on your SCVMM or standalone Hyper-V host
 - Inbound HTTPS on port 443 of the connector—Allow the connector to receive secure web connections on port 443 from Hyper-V hosts containing the VMs you intend to migrate.
 - NTP—Optionally, give the connector access to ntp.org on port 123. If the connector synchronises its clock with the ESXi host, this is unnecessary.
- Allow outbound connections from the connector to the following URL ranges:
 - *.amazonaws.com
 - *.aws.amazon.com
 - *.ntp.org (Optional; used only to validate that connector time is in sync with NTP.)

Operating Systems Supported by AWS SMS

The following operating systems can be migrated to EC2 using SMS:

Windows (32- and 64-bit)

- Microsoft Windows Server 2003 (Standard, Datacenter, Enterprise) with Service Pack 1 (SP1) or later (32- and 64-bit)
- Microsoft Windows Server 2003 R2 (Standard, Datacenter, Enterprise) (32- and 64-bit)
- Microsoft Windows Server 2008 (Standard, Datacenter, Enterprise) (32- and 64-bit)
- Microsoft Windows Server 2008 R2 (Standard, Datacenter, Enterprise) (64-bit only)
- Microsoft Windows Server 2012 (Standard, Datacenter) (64-bit only)
- Microsoft Windows Server 2012 R2 (Standard, Datacenter) (64-bit only) (Nano Server installation not supported)
- Microsoft Windows Server 2016 (Standard, Datacenter) (64-bit only)
- Microsoft Windows Server, versions 1709, 1803 (Standard, Datacenter) (64-bit only)
- Microsoft Windows 7 (Professional, Enterprise, Ultimate) (US English) (32- and 64-bit)
- Microsoft Windows 8 (Professional, Enterprise) (US English) (32- and 64-bit)
- Microsoft Windows 8.1 (Professional, Enterprise) (US English) (64-bit only)
- Microsoft Windows 10 (Professional, Enterprise, Education) (US English) (64-bit only)

Linux/Unix (64-bit)

- Ubuntu 12.04, 12.10, 13.04, 13.10, 14.04, 14.10, 15.04, 16.04, 16.10
- Red Hat Enterprise Linux (RHEL) 5.1-5.11, 6.1-6.9, 7.0-7.3 (6.0 lacks required drivers)

Note

See [Limitations \(p. 7\)](#) for additional information about RHEL 5.x support.

- SUSE Linux Enterprise Server 11 with Service Pack 1 and kernel 2.6.32.12-0.7
- SUSE Linux Enterprise Server 11 with Service Pack 2 and kernel 3.0.13-0.27
- SUSE Linux Enterprise Server 11 with Service Pack 3 and kernel 3.0.76-0.11, 3.0.101-0.8, or 3.0.101-0.15
- SUSE Linux Enterprise Server 11 with Service Pack 4 and kernel 3.0.101-63
- SUSE Linux Enterprise Server 12 with kernel 3.12.28-4
- SUSE Linux Enterprise Server 12 with Service Pack 1 and kernel 3.12.49-11
- SUSE Linux Enterprise Server 12 with Service Pack 2 and kernel 4.4
- SUSE Linux Enterprise Server 12 with Service Pack 3 and kernel 4.4
- CentOS 5.1-5.11, 6.1-6.6, 7.0-7.3 (6.0 lacks required drivers)
- Debian 6.0.0-6.0.8, 7.0.0-7.8.0, 8.0.0
- Oracle Linux 6.1-6.6, 7.0-7.1
- Fedora Server 19-21

Volume Types and File Systems Supported by AWS SMS

AWS Server Migration Service supports migrating Windows and Linux instances with the following file systems:

Operating System	File System	Architecture	Partition Table	Data Volumes Supported	Boot Volumes Supported
Windows	NTFS	32-bit	MBR	✓	✓
			GPT	✓	
		64-bit	MBR	✓	✓
			GPT	✓	✓
Linux/Unix	ext2, ext3, ext4, Btrfs, JFS, XFS	64-bit	MBR	✓	✓
			GPT	✓	

AMIs with volumes using EBS encryption are not supported.

Licensing Options

When you create a new replication job, the AWS Server Migration Service console provides a **License type** option. The possible values include:

- **Auto** (default)

Detects the source-system operating system (OS) and applies the appropriate license to the migrated virtual machine (VM).

- **AWS**

Replaces the source-system license with an AWS license, if appropriate, on the migrated VM.

- **BYOL**

Retains the source-system license, if appropriate, on the migrated VM.

Note

If you choose a license type that is incompatible with your VM, the replication job fails with an error message. For more information, see the OS-specific information below.

The same licensing options are available through the AWS SMS API and CLI. For example:

```
aws sms create-replication-job --license-type <value>
```

The value of the `--license-type` parameter can be **AWS** or **BYOL**. Leaving it unset is the same as choosing **Auto** in the console.

Licensing for Linux

Linux operating systems support only BYOL licenses. Choosing **Auto** (the default) means that AWS SMS uses a BYOL license.

Migrated Red Hat Enterprise Linux (RHEL) VMs must use Cloud Access (BYOL) licenses. For more information, see [Red Hat Cloud Access](#) on the Red Hat website.

Migrated SUSE Linux Enterprise Server VMs must use SUSE Public Cloud Program (BYOS) licenses. For more information, see [SUSE Public Cloud Program—Bring Your Own Subscription](#).

Licensing for Windows

Windows server operating systems support either BYOL or AWS licenses. Windows client operating systems (such as Windows 10) support only BYOL licenses.

If you choose **Auto** (the default), AWS SMS uses the AWS license if the VM has a server OS. Otherwise, the BYOL license is used.

The following rules apply when you use your BYOL Microsoft license, either through MSDN or [Windows Software Assurance Per User](#):

- Your BYOL instances are priced at the prevailing Amazon EC2 Linux instance pricing, provided that you meet the following conditions:
 - Run on a Dedicated Host ([Dedicated Hosts](#))
 - Launch from VMs sourced from software binaries provided by you using AWS SMS, which are subject to the current terms and abilities of AWS SMS
 - Designate the instances as BYOL instances
 - Run the instances within your designated AWS regions, and where AWS offers the BYOL model
 - Activate using Microsoft keys that you provide or which are used in your key management system
- You must account for the fact that when you start an Amazon EC2 instance, it can run on any one of many servers within an Availability Zone. This means that each time you start an Amazon EC2 instance

(including a stop/start), it may run on a different server within an Availability Zone. You must account for this fact in light of the limitations on license reassignment, as described in the Microsoft Volume Licensing Product Terms available at [Licensing Terms](#), or consult your specific use rights to determine if your rights are consistent with this usage.

- You must be eligible to use the BYOL program for the applicable Microsoft software under your agreements with Microsoft, for example, under your MSDN user rights or under your Windows Software Assurance Per User Rights. You are solely responsible for obtaining all required licenses and for complying with all applicable Microsoft licensing requirements, including the PUR/PT. Further, you must have accepted Microsoft's End User License Agreement (Microsoft EULA), and by using the Microsoft Software under the BYOL program, you agree to the Microsoft EULA.
- AWS recommends that you consult with your own legal and other advisers to understand and comply with the applicable Microsoft licensing requirements. Usage of the Services (including usage of the **licenseType** parameter and **BYOL** flag) in violation of your agreements with Microsoft is not authorized or permitted.

Limitations

- When migrating VMs managed by Hyper-V/SCVMM, SMS supports both Generation 1 VMs (using either VHD or VHDX disk format) and Generation 2 VMs (VHDX only).
- AWS SMS does not support VMs on Hyper-V running any version of RHEL 5 if backed by a VHDX disk. We recommend converting disks in this format to VHD for migration.
- UEFI/EFI boot partitions are supported only for Windows boot volumes with VHDX as the image format. Otherwise, a VM's boot volume must use Master Boot Record (MBR) partitions. In either case, boot volume cannot exceed 2 TiB (uncompressed) due to MBR limitations.

Note

When AWS detects a Windows GPT boot volume with an UEFI boot partition, it converts it on-the-fly to an MBR boot volume with a BIOS boot partition. This is because EC2 does not directly support GPT boot volumes.

- An imported VM may fail to boot if the root partition is not on the same virtual hard drive as the MBR.
- An SMS replication job will fail for VMs with more than 22 volumes attached.
- AMIs with volumes using EBS encryption are not supported.
- On VMware, AWS SMS does not support VMs that use Raw Device Mapping (RDM). Only VMDK disk images are supported.
- A migrated VM may fail to boot if the root partition is not on the same virtual hard disk as the MBR.
- AWS SMS creates AMIs that use Hardware Virtual Machine (HVM) virtualization. It can't create AMIs that use Paravirtual (PV) virtualization. Linux PVHVM drivers are supported within migrated VMs.
- Migrated Linux VMs must use 64-bit images. Migrating 32-bit Linux images is not supported.
- Migrated Linux VMs should use default kernels for best results. VMs that use custom Linux kernels might not migrate successfully.
- When preparing Amazon EC2 Linux VMs for migration, make sure that at least 250 MiB of disk space is available on the root volume for installing drivers and other software. For Microsoft Windows VMs, configure a fixed pagefile size and ensure that at least 6 GiB of free space is available on the root volume.
- Multiple network interfaces are not currently supported. After migration, your VM will have a single virtual network interface that uses DHCP to assign addresses. Your instance receives a private IP address.
- A VM migrated into a VPC does not receive a public IP address, regardless of the auto-assign public IP setting for the subnet. Instead, you can allocate an Elastic IP address to your account and associate it with your instance.
- Internet Protocol version 6 (IPv6) IP addresses are not supported.

- VMs that are created as the result of a P2V conversion are not supported. A P2V conversion occurs when a disk image is created by performing a Linux or Windows installation process on a physical machine and then importing a copy of that Linux or Windows installation to a VM.
- AWS SMS does not install the single root I/O virtualization (SR-IOV) drivers except with imports of Microsoft Windows Server 2012 R2 VMs. These drivers are not required unless you plan to use enhanced networking, which provides higher performance (packets per second), lower latency, and lower jitter. For Microsoft Windows Server 2012 R2 VMs, SR-IOV drivers are automatically installed as a part of the migration process.
- AWS SMS does not currently support VMware SEsparse delta-file format.
- Because independent disks are unaffected by snapshots, AWS SMS does not support interval replication for VMDKs in independent mode.
- Windows language packs that use UTF-16 (or non-ASCII) characters are not supported for import. We recommend using the English language pack when importing Windows Server 2003, Windows Server 2008, and Windows Server 2012 R1 VMs.
- AWS SMS does not support VMs that have a mix of VHD and VHDX disk files.

Other Requirements

Support for VMware vMotion

AWS Server Migration Service partially supports vMotion, Storage vMotion, and other features based on virtual machine migration (such as DRS and Storage DRS) subject to the following limitations:

- Migrating a virtual machine to a new ESXi host or datastore after one replication run ends, and before the next replication run begins, is supported as long as the Server Migration Connector's vCenter service account has sufficient permissions on the destination ESXi host, datastores, and datacenter, and on the virtual machine itself at the new location.
- Migrating a virtual machine to a new ESXi host, datastore, and/or datacenter while a replication run is active—that is, while a virtual machine upload is in progress—is not supported.
- Cross vCenter vMotion is not supported for use with the AWS Server Migration Service.

Support for VMware vSAN

VMs on vSAN datastores are only supported when **Replication job type** on the **Configure replication jobs settings** page is set to **One-time migration**.

Support for VMware Virtual Volumes (VVols)

AWS does not provide support for migrating VMware Virtual Volumes. Some implementations may work, however.

VMs with Snapshots

AWS SMS supports only one-time migration on VMs where snapshot-based backup software is used. Also, avoid creating snapshots on VMs replicated through AWS SMS.

Getting Started with AWS Server Migration Service

This section describes procedures for setting up AWS Server Migration Service for either of the two supported platforms, VMware vSphere or Microsoft Hyper-V/SCVMM.

Contents

- [Configure Your AWS Account Permissions \(p. 9\)](#)
- [Installing the Server Migration Connector on VMware \(p. 11\)](#)
- [Installing the Server Migration Connector on Hyper-V \(p. 13\)](#)

Configure Your AWS Account Permissions

The following prerequisites apply to either platform supported by AWS SMS.

If your IAM user account, group, or role is assigned administrator permissions, then you have access to AWS SMS. To call the SMS API with the credentials of an IAM user that does not have administrative access to your AWS account, create a custom inline policy defined by the following JSON code and apply it to the IAM user:

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

Note

If you are using multiple connectors, we recommend that you create a unique IAM role for each connector to avoid having a single point of failure.

To create an IAM user in your AWS account

1. Create a new IAM user for your connector to communicate with AWS. Save the generated access key and secret key for use during the initial connector setup. For information about managing IAM users and permissions, see [Creating an IAM User in Your AWS Account](#).
2. Attach the managed IAM policy `ServerMigrationConnector` to the IAM user. For more information, see [Managed Policies and Inline Policies](#).
3. Use one of the following procedures to create an IAM role that grants permissions to AWS SMS to place migrated resources into your Amazon EC2 account. In AWS Regions that make an IAM role

template available, **option 1** works. If you find that no template for **AWS Server Migration Service** exists in your AWS Region, proceed to **option 2**.

To create an IAM role with a template (option 1)

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**, **Create role**.
3. Under **Choose the service that will use this role**, choose **SMS**, **Next: Permissions**.
4. Under **Attached permissions policies**, confirm that the policy **ServerMigrationServiceRole** is visible and choose **Next: Review**.
5. Under **Review**, for **Role name**, type **sms** (recommended). (Optional) You can apply a different name, but you must then specify the role name explicitly each time that you create a replication job.
6. Choose **Create role**. You should now see the **sms** role in the list of available roles.

Use the following option in AWS Regions that do not make an IAM role template available. This option also works as a manual alternative to **option 1** in all Regions.

To create an IAM role manually (option 2)

1. Create a local file named `trust-policy.json` with the following content:

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

2. Create a local file named `role-policy.json` with the following content:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ec2:ModifySnapshotAttribute",
        "ec2:CopySnapshot",
        "ec2:CopyImage",
        "ec2:Describe*",
        "ec2:DeleteSnapshot",
        "ec2:DeregisterImage",
        "ec2:CreateTags",
        "ec2:DeleteTags"
      ],
      "Resource": "*"
    }
  ]
}
```

```
}  
]
```

3. At a command prompt, go to the directory where you stored the two JSON policy files, and run the following commands to create the AWS SMS service role:

```
aws iam create-role --role-name sms --assume-role-policy-document file://trust-  
policy.json  
aws iam put-role-policy --role-name sms --policy-name sms --policy-document  
file://role-policy.json
```

Note

Your AWS CLI user must have permissions on IAM. You can grant these by attaching the `IAMFullAccess` managed policy to your AWS CLI user. For information about managing IAM users and permissions, see [Creating an IAM User in Your AWS Account](#).

Installing the Server Migration Connector on VMware

This topic describes the steps for setting up AWS SMS to migrate VMs from VMware to Amazon EC2. This information applies only to VMs in an on-premises VMware environment. For information about migrating VMs from Hyper-V, see [Installing the Server Migration Connector on Hyper-V \(p. 13\)](#).

From a client computer system on your LAN, complete the following steps to set up the AWS Server Migration Connector in your VMware environment. The following procedure assumes that you have already completed [Configure Your AWS Account Permissions \(p. 9\)](#).

To set up the connector for a VMware environment

1. Open the **AWS Server Migration Service** console and choose **Connectors, SMS Connector setup guide**.
2. On the **AWS Server Migration Connector setup** page, choose **Download OVA** to download the connector for VMware environments. You can also download the connector using the URL provided. The connector is a preconfigured FreeBSD VM in OVA format that is ready for deployment in your vCenter.
3. Set up your vCenter service account. Create a vCenter user with permissions necessary to create and delete snapshots on VMs that need be migrated to AWS and download their delta disks.

Note

As a best practice, we recommend that you limit vCenter permissions for the connector service account to only those vCenter data centers that contain the VMs that you intend to migrate. We also recommend that you lock down your vCenter service account permissions by assigning this user the `NoAccess` role in vCenter on the hosts, folders, and datastores that do not have any VMs for migration.

4. Create a role in vCenter with the following privileges:
 - **Datastore > Browse datastore and Low level file operations** (Datastore.Browse and Datastore.FileManagement)
 - **Host > Configuration > System Management** (Host.Config.SystemManagement)
 - **vApp > Export** (VApp.Export)
 - **Virtual Machine > Snapshot management > Create snapshot and Remove Snapshot** (VirtualMachine.State.CreateSnapshot and VirtualMachine.State.RemoveSnapshot)

5. Assign the role as follows:
 - a. Assign this vCenter role to the service account for the connector to use to log in to vCenter.
 - b. Assign this role with propagating permissions to the data centers that contain the VMs to migrate.
6. To manually verify your vCenter service account's permissions, verify that you can log in to vSphere Client with your connector service account credentials. Then, export your VMs as OVF templates, use the datastore browser to download files off the datastores that contain your VMs, and view the properties on the **Summary** tab of the ESXi hosts of your VMs.

To configure the connector

1. Deploy the connector OVA downloaded in the previous procedure to your VMware environment using vSphere Client.
2. Open the connector's virtual machine console and log in as `ec2-user` with the password `ec2pass`. Supply a new password if prompted.
3. Obtain the IP address of the connector as follows:
 - a. Run the command **`sudo setup.rb`**. This displays a configuration menu:

```
Choose one of the following options:
 1. Reset password
 2. Reconfigure network settings
 3. Restart services
 4. Factory reset
 5. Delete unused upgrade-related files
 6. Enable/disable SSL certificate validation
 7. Display connector's SSL certificate
 8. Generate log bundle
 0. Exit
Please enter your option [1-9]:
```

- b. Enter option 2. This displays current network information and a submenu for making changes to the network settings. The output should resemble the following:

```
Current network configuration: DHCP
IP: 192.0.2.100
Netmask: 255.255.254.0
Gateway: 192.0.2.1
DNS server 1: 192.0.2.200
DNS server 2: 192.0.2.201
DNS suffix search list: subdomain.example.com
Web proxy: not configured

Reconfigure your network:
 1. Renew or acquire a DHCP lease
 2. Set up a static IP
 3. Set up a web proxy for AWS communication
 4. Set up a DNS suffix search list
 5. Exit
Please enter your option [1-5]:
```

You need to enter this IP address in later procedures.

4. [Optional] Configure a static IP address for the connector. This prevents you from having to reconfigure the trusted hosts lists on your LAN each time DHCP assigns a new address to the connector.

In the **Reconfigure your network** menu, enter option **2**. This displays a form to supply network settings:

For each field, provide an appropriate value and press Enter. You should see output similar to the following:

```
Setting up static IP:
  1. Enter IP address: 192.0.2.50
  2. Enter netmask: 255.255.254.0
  3. Enter gateway: 192.0.2.1
  4. Enter DNS 1: 192.0.2.200
  5. Enter DNS 2: 192.0.2.201

Static IP address configured.
```

5. In the connector's network configuration menu, configure domain suffix values for the DNS suffix search list.
6. If your environment uses a web proxy to reach the internet, configure that now.
7. Before leaving the connector console, use **ping** to verify network access to the following targets inside and outside your LAN:
 - Inside your LAN, to your ESXi hosts and vCenter by hostname, FQDN, and IP address
 - Outside your LAN, to AWS
8. In a web browser, access the connector VM at its IP address (<https://ip-address-of-connector/>) to open the setup wizard, and choose **Get started now**.
9. Review the license agreement, select the check box, and choose **Next**.
10. Create a password for the connector.
11. Choose **Upload logs automatically** and **Server Migration Connector auto-upgrade**.
12. For **AWS Region**, choose your Region from the list. For **AWS Credentials**, enter the IAM credentials that you created in [Configure Your AWS Account Permissions \(p. 9\)](#). Choose **Next**.
13. For **vCenter Service Account**, enter the vCenter hostname, user name, and password from step 3. Choose **Next**.
14. After accepting the vCenter certificate, complete registration and then view the connector configuration dashboard.
15. Verify that the connector you registered shows up on the **Connectors** page.

Installing the Server Migration Connector on Hyper-V

This topic describes the steps for setting up AWS SMS to migrate VMs from Hyper-V to Amazon EC2. This information applies only to VMs in an on-premises Hyper-V environment. For information about migrating VMs from VMware, see [Installing the Server Migration Connector on VMware \(p. 11\)](#).

AWS SMS supports migration in either of two modes: from standalone Hyper-V servers, or from Hyper-V servers managed by System Center Virtual Machine Manager (SCVMM). The following sections describe the configuration common to both scenarios, followed by instructions to install and configure the AWS Server Migration Connector in your particular on-premises environment.

Considerations for migration scenarios

- The installation procedures for standalone Hyper-V and for SCVMM environments are not interchangeable.

- When configured in SCVMM mode, one Server Migration Connector appliance supports migration from one SCVMM (which may manage multiple Hyper-V servers).
- When configured in standalone Hyper-V mode, one Server Migration Connector appliance supports migration from multiple Hyper-V servers.
- AWS SMS supports deploying any number of connector appliances to support migration from multiple SCVMMs and multiple standalone Hyper-V servers in parallel.

All of the following procedures in this topic assume that you have created a properly configured IAM user as described in [Configure Your AWS Account Permissions \(p. 9\)](#).

Contents

- [About the Server Migration Connector Installation Script \(p. 14\)](#)
- [Step 1: Create a Service Account for Server Migration Connector in Active Directory \(p. 15\)](#)
- [Step 2: Download and Deploy the Server Migration Connector \(p. 15\)](#)
- [Step 3: Download and Install the Hyper-V/SCVMM Configuration Script \(p. 17\)](#)
- [Step 4: Validate the Integrity and Cryptographic Signature of the Script File \(p. 17\)](#)
- [Step 5: Run the Script \(p. 18\)](#)
- [Step 6: Configure the Connector \(p. 19\)](#)

About the Server Migration Connector Installation Script

The AWS SMS configuration script automates creation of appropriate permissions and network connections that allow AWS SMS to execute tasks on your Hyper-V environment. You must run the script as administrator on each Hyper-V and SCVMM host that you plan to use in migrating VMs. When you run the script, it performs the following actions:

1. **[All systems]** Checks whether the Windows Remote Management (WinRM) service is enabled on SCVMM and all Hyper-V hosts, enables it if necessary, and sets it to start automatically on boot.
2. **[All systems]** Enables PowerShell remoting, which allows the connector to execute PowerShell commands on that host over a WinRM connection.
3. **[All systems]** Creates a self-signed X.509 certificate, creates a WinRM HTTPS listener, and binds the certificate to the listener.
4. **[All systems]** Creates a firewall rule to accept incoming connections to the WinRM listener.
5. **[All systems]** Adds the IP address or domain name of the connector to the list of trusted hosts in the WinRM configuration. You must have this IP address or domain name configured before running the script so that you can provide it interactively.
6. **[All systems]** Enables Credential Security Support Provider (CredSSP) authentication with WinRM.
7. **[All systems]** Grants read and execute permissions to a pre-configured Active Directory user on WinRM configSDDL. This user is the same as the service account described below in [Step 1: Create a Service Account for Server Migration Connector in Active Directory \(p. 15\)](#).
8. **[Standalone Hyper-V only]** Adds the Active Directory user to the groups Hyper-V Administrators and Remote Management Users on your Hyper-V host.
9. **[Standalone Hyper-V only]** Gives read-only permissions to all VM data folders managed by this Hyper-V.
10. **[SCVMM only]** Grants "Execute Methods," "Enable Account," and "Remote Enable" permissions to the Active Directory user on two WMI objects, CIMV2 and SCVMM.

- 11**[SCVMM only]** Creates a Delegated Administrator role in SCVMM with permissions to access all Hyper-V hosts. It assigns the role to the Active Directory user. You can selectively remove access to hosts by editing this role in SCVMM.
- 12**[SCVMM only]** Checks whether a secure (HTTPS) network path exists between SCVMM and the Hyper-V hosts. If the script does not detect a secure channel, it returns an error and generates instructions for the administrator to secure the channel.
- 13**[SCVMM only]** Iterates through all the Hyper-V hosts managed by SCVMM and grants the Active Directory user read-only permissions on all VM folders on each Hyper-V host.

Step 1: Create a Service Account for Server Migration Connector in Active Directory

The Server Migration Connector requires a service account in Active Directory. As the connector configuration script is run on each SCVMM and Hyper-V host, it grants permissions on those hosts to this account.

Note

When configured in SCVMM mode, the SCVMM host and all the Hyper-V hosts that it manages must be located in a single Active Directory domain. If you have multiple Active Directory domains, configure a connector for each.

To create the Active Directory user

1. Using the Active Directory Administrative Center on the Windows computer where your Active Directory forest is installed, create a new user and assign a password to it.
2. Add the new user to the **Remote Management Users** group.

Step 2: Download and Deploy the Server Migration Connector

Download the [Server Migration Connector for Hyper-V and SCVMM](#) to your on-premises environment and install it on a Hyper-V host.

Note

This connector is meant only for installation in a Hyper-V environment. For information about installing in a VMware environment, see [Installing the Server Migration Connector on VMware \(p. 11\)](#).

To set up the connector for a Hyper-V environment

1. Open the **AWS Server Migration Service** console and choose **Connectors, SMS Connector setup guide**.
2. On the **AWS Server Migration Connector setup** page, choose **Download VHD ZIP** to download the connector for Hyper-V.
3. Transfer the downloaded connector file to your Hyper-V host, unzip it, and import the connector as a VM.
4. Open the connector's virtual machine console and log in as `ec2-user` with the password `ec2pass`. Supply a new password if prompted.
5. Obtain the IP address of the connector as follows:
 - a. Run the command **sudo setup.rb**. This displays a configuration menu:

Choose one of the following options:

```
1. Reset password
2. Reconfigure network settings
3. Restart services
4. Factory reset
5. Delete unused upgrade-related files
6. Enable/disable SSL certificate validation
7. Display connector's SSL certificate
8. Generate log bundle
0. Exit
Please enter your option [1-9]:
```

- b. Enter option 2. This displays current network information and a submenu for making changes to the network settings. The output should resemble the following:

```
Current network configuration: DHCP
IP: 192.0.2.100
Netmask: 255.255.254.0
Gateway: 192.0.2.1
DNS server 1: 192.0.2.200
DNS server 2: 192.0.2.201
DNS suffix search list: subdomain.example.com
Web proxy: not configured

Reconfigure your network:
1. Renew or acquire a DHCP lease
2. Set up a static IP
3. Set up a web proxy for AWS communication
4. Set up a DNS suffix search list
5. Exit
Please enter your option [1-5]:
```

You need to enter this IP address in later procedures.

6. [Optional] Configure a static IP address for the connector. This prevents you from having to reconfigure the trusted hosts lists on your LAN each time DHCP assigns a new address to the connector.

In the **Reconfigure your network** menu, enter option 2. This displays a form to supply network settings:

For each field, provide an appropriate value and press Enter. You should see output similar to the following:

```
Setting up static IP:
1. Enter IP address: 192.0.2.50
2. Enter netmask: 255.255.254.0
3. Enter gateway: 192.0.2.1
4. Enter DNS 1: 192.0.2.200
5. Enter DNS 2: 192.0.2.201

Static IP address configured.
```

7. In the connector's network configuration menu, configure domain suffix values for the DNS suffix search list.
8. If your environment uses a web proxy to reach the internet, configure that now.
9. Before leaving the connector console, use **ping** to verify network access to the following targets inside and outside your LAN:
- Inside your LAN, to your Hyper-V hosts and SCVMM by hostname, FQDN, and IP address
 - Outside your LAN, to AWS

Step 3: Download and Install the Hyper-V/SCVMM Configuration Script

AWS SMS provides a downloadable PowerShell script to configure the Windows environment to support communications with the Server Migration Connector. The same script is used for configuring either standalone Hyper-V or SCVMM. The script is cryptographically signed by AWS.

Download the script and hash files from the following URLs:

File	URL
Installation script	https://s3.amazonaws.com/sms-connector/aws-sms-hyperv-setup.ps1
MD5 hash	https://s3.amazonaws.com/sms-connector/aws-sms-hyperv-setup.ps1.md5
SHA256 hash	https://s3.amazonaws.com/sms-connector/aws-sms-hyperv-setup.ps1.sha256

After download, transfer the downloaded files to the computer or computers where you plan to run the script.

Step 4: Validate the Integrity and Cryptographic Signature of the Script File

Before running the script, we recommend that you validate its integrity and signature. These procedures assume that you have downloaded the script and the hash files, that they are installed on the desktop of the computer where you plan to run the script, and that you are signed in as the administrator. You may need to modify the procedures to match your setup.

To validate script integrity using cryptographic hashes (PowerShell)

1. Use one or both of the downloaded hash files to validate the integrity of the script file, ensuring that it has not changed in transit to your computer.
 - a. To validate with the MD5 hash, run the following command in a PowerShell window:

```
PS C:\Users\Administrator\Desktop> Get-FileHash aws-sms-hyperv-setup.ps1 -Algorithm MD5
```

This should return information similar to the following:

Algorithm	Hash
MD5	1AABAC6D068EEF6EXAMPLEDF50A05CC8

- b. To validate with the SHA256 hash, run the following command in a PowerShell window:

```
PS C:\Users\Administrator\Desktop> Get-FileHash aws-sms-hyperv-setup.ps1 -Algorithm SHA256
```

This should return information similar to the following:

Algorithm	Hash
-----------	------

```
-----  
SHA256 6B86B273FF34FCE19D6B804EFF5A3F574EXAMPLE22F1D49C01E52DDB7875B4B
```

- c.
2. Compare the returned hash values with the values provided in the downloaded files, `aws-sms-hyperv-setup.ps1.md5` and `aws-sms-hyperv-setup.ps1.sha256`.

Next, use either the Windows user interface or PowerShell to check that the script file includes a valid signature from AWS.

To check the script file for a valid cryptographic signature (Windows GUI)

1. In Windows Explorer, open the context (right-click) menu on the script file and choose **Properties**, **Digital Signatures**, **Amazon Web Services**, and **Details**.
2. Verify that the displayed information contains "This digital signature is OK" and that the signer is "Amazon Web Services, Inc."

To check the script file for a valid cryptographic signature (PowerShell)

- In a PowerShell window, run the following command:

```
PS C:\Users\Administrator\Desktop> Get-AuthenticodeSignature aws-sms-hyperv-setup.ps1 |  
Select *
```

A correctly signed script file should return information similar to the following:

```
SignerCertificate      : [Subject]  
                        CN="Amazon Web Services, Inc." ...  
                        [Issuer]  
                        CN=DigiCert EV Code Signing CA (SHA2), OU=www.digicert.com,  
                        O=DigiCert Inc, C=US  
                        ...  
TimeStamperCertificate :  
Status                : Valid  
StatusMessage         : Signature verified.  
Path                  : C:\Users\Administrator\Desktop\aws-sms-hyperv-setup.ps1  
                        ...
```

Step 5: Run the Script

This procedure assumes that you have downloaded the script onto the desktop of the computer where you plan to run the script, and that you are signed in as the administrator. You may need to modify the procedure shown to match your setup.

Note

If you are using SCVMM, you must first run this script on each Hyper-V host you plan to migrate from, and then run it on SCVMM.

1. Using RDP, log in to your SCVMM system or standalone Hyper-V host as administrator.
2. Run the script using the following PowerShell command:

```
PS C:\Users\Administrator\Desktop> .\aws-sms-hyperv-setup.ps1
```

Note

If your PowerShell execution policy is set to verify signed scripts, you are prompted for an authorization when you run the connector configuration script. Verify that the script is published by "Amazon Web Services, Inc." and choose "R" to run one time. You can view this setting using **Get-ExecutionPolicy** and modify it using **Set-ExecutionPolicy**.

- As the script runs, it prompts you for several pieces of information. Be prepared to respond to the following prompts:

Script action	Customer prompt	Customer action
Prompts for an option based on the connector's mode of operation (migrate from standalone Hyper-V vs. migrate using SCVMM), which determines what changes need to be made to your Windows environment.	0. Exit 1. Reconfigure standalone Hyper-V... 2. Reconfigure Hyper-V managed by SCVMM... 3. Reconfigure SCVMM... 4. Help/Support	<p>Choose 0 to exit the script.</p> <p>Choose 1 to reconfigure a standalone Hyper-V host to allow migration of its guest VMs.</p> <p>Choose 2 to reconfigure a Hyper-V host allow SCVMM to manage migration its guest VMs.</p> <p>Choose 3 to reconfigure SCVMM to allow migration of guest VMs on all Hyper-V hosts it manages.</p> <p>Option 4 links to this document and to information about AWS Support.</p>
Prompts for the Active Directory user that the connector uses when communicating with SCVMM and Hyper-V.	Enter the AD user that the connector will use (DOMAIN \user)	Provide the Active Directory user that you previously configured. For more information, see Step 1: Create a Service Account for Server Migration Connector in Active Directory (p. 15).
Prompts for the IP address or hostname of the connector.	Enter the IP Address or Hostname of the connector appliance	Provide the IP address or host name that you configured on the connector.
Prompts for confirmation before modifying your Windows environment.	Make changes to Windows system configuration? (Enter "yes" or "no")	Type "yes" and press Enter to start the reconfiguration. Entering "no" causes the script to exit.

Step 6: Configure the Connector

When the connector configuration has been successfully run, browse to the connector's web interface:

`https://ip-address-of-connector/`

Complete the following steps to set up the new connector.

To configure the connector

1. On the connector landing page, choose **Get started now**.
2. Review the license agreement, select the check box, and choose **Next**.
3. Create a password for the connector. The password must meet the displayed criteria. Choose **Next**.
4. On the **Network Info** page, you can (among other tasks) assign a static IP address to the connector if you have not already done so. Choose **Next**.
5. On the **Log Uploads and Upgrades** page, select **Upload logs automatically** and **Server Migration Connector auto-upgrade**, and choose **Next**.
6. On the **Server Migration Service** page, provide the following information:
 - For **AWS Region**, choose your Region from the list.
 - For **AWS Credentials**, enter the IAM credentials that you created in [Configure Your AWS Account Permissions](#) (p. 9). Choose **Next**.
7. On the **Choose your VM manager type** page, choose either **Microsoft® System Center Virtual Manager (SCVMM)** or **Microsoft® Hyper-V** depending on your environment. Selecting **VMware® vCenter** results in an error if you have installed the Hyper-V connector. Choose **Next**.
8. On the **Hyper-V: Host and Service Account Setup** or **SCVMM: Host and Service Account Setup** page, provide the account information for the Active Directory user that you created in [Step 1: Create a Service Account for Server Migration Connector in Active Directory](#) (p. 15), including **Username** and **Password**.
9.
 - [SCVMM only] Provide the SCVMM hostname to be served by this connector and choose **Next**. Inspect the certificate for the host, then choose **Trust** if the certificate is valid.
 - [Stand-alone Hyper-V only] Provide the Hyper-V hostname for each host to be served by this connector. To add additional hosts, use the plus symbol. To inspect the certificate for each host, choose **Verify Certificate**, then choose **Trust** if the certificate is valid. Choose **Next**.

Alternatively, you can select the host-specific option to **Ignore hostname mismatch and expiration errors...** for either SCVMM or Hyper-V host certificates. We do not recommend overriding security in production, but it may be useful during testing.

Note

If you have Hyper-V hosts located in multiple Active Directory domains, we recommend configuring a separate connector for each domain.

10. If you successfully authenticated with the connector, you should see the **Congratulations** page. Choose **Go to connector dashboard** to view the connector's health status.
11. To verify that the connector you registered is now listed, navigate to the **Connectors** page on the AWS Server Migration Service console.

Replicating VMs Using the AWS SMS Console

Use the AWS SMS console to import your server catalog and migrate your on-premises servers to Amazon EC2. You can perform the following tasks:

- [Replicate a server using the console \(p. 21\)](#)
- [Monitor and modify server replication jobs \(p. 22\)](#)
- [Shut down replication \(p. 22\)](#)

To replicate a server using the console

1. Install the Server Migration Connector as described in [Getting Started with AWS Server Migration Service \(p. 9\)](#), including the configuration of an IAM service role and permissions.
2. In a web browser, open the [SMS homepage](#).

Tip

If this link takes you to the AWS SMS setup page, trim the "gettingStarted" off of the end of the URL and press return.

3. In the navigation menu, choose **Connectors**. Verify that the connector you deployed in your VMware environment is shown with a status of healthy.
4. If you have not yet imported a catalog, choose **Servers, Import server catalog**. To reflect new servers added in your VMware environment after your previous import operation, choose **Re-import server catalog**. This process can take up to a minute.
5. Select a server to replicate and choose **Create replication job**.
6. On the **Configure server-specific settings** page, in the **License type** column, select the license type for AMIs to be created from the replication job. Linux servers can only use Bring Your Own License (BYOL). Windows servers can use either an AWS-provided license or BYOL. You can also choose **Auto** to allow AWS SMS to select the appropriate license. Choose **Next**.
7. On the **Configure replication job settings** page, the following settings are available:
 - For **Replication job type**, choose a value. The **replicate server every *interval*** option creates a repeating replication process that creates new AMIs at the interval you provide from the menu. The **One-time migration** option triggers a single replication of your server without scheduling repeating replications.
 - For **Start replication run**, configure your replication run to start either immediately or at a later date and time up to 30 days in the future. The date and time settings refer to your browser's local time.
 - For **IAM service role**, provide (if necessary) the IAM service role that you previously created.
 - (Optional) For **Description**, provide a description of the replication run.
 - For **Enable automatic AMI deletion**, configure AWS SMS to delete older replication AMIs in excess of a number that you provide in the field.
 - For **Enable notifications**, choose a value. If you choose **Yes**, you can configure Amazon Simple Notification Service (Amazon SNS) to notify a list of recipients when the replication job has completed, failed, or been deleted. For more information, see [What is Amazon Simple Notification Service?](#).

- For **Pause replication job on consecutive failures**, choose a value. The default is set to **Yes**. If the job encounters consecutive failures, it will be moved to the `PausedOnFailure` state and not marked `Failed` immediately.

Note

This option is not available for one-time replication jobs.

Choose **Next**.

8. On the **Review** page, review your settings. If the settings are correct, choose **Create**. To change the settings, choose **Previous**. After a replication job is set up, replication starts automatically at the specified time and interval.

In addition to your scheduled replication runs, you may also start up to two on-demand replication runs per 24-hour period. On the **Replication jobs** page, select a job and choose **Actions, Start replication run**. This starts a replication run that does not affect your scheduled replication runs, except in the case that the on-demand run is still ongoing at the time of your scheduled run. In this case, the scheduled run is skipped and rescheduled at the next interval. The same thing happens if a scheduled run is due while a previous scheduled run is still in progress.

To resume a replication job that is paused

1. Before attempting to resume a job that is in `PausedOnFailure` state, refer to [Troubleshooting AWS SMS](#) to identify and fix the root cause of the replication run failure.
2. In the AWS SMS console, choose **Replication jobs**. You can view all replication jobs by scrolling through the table. In the search bar, you can filter the table contents on specific values. Filter the jobs by `PausedOnFailure` to identify all the paused jobs.
3. To resume a paused job, select the job on the **Replication jobs** page and choose **Actions, Resume replication job**.

To monitor and modify server replication jobs

1. In the AWS SMS console, choose **Replication jobs**. You can view all replication jobs by scrolling through the table. In the search bar, you can filter the table contents on specific values.
2. Select a single replication job to view details about it in the lower pane. The **Job details** tab displays information about the current replication run, including the ID of the latest AMI created by the replication job. The **Run history** tab shows details about all of the replication runs for the selected replication job.
3. To change any job parameters, select a job on the **Replication jobs** page and choose **Actions, Edit replication job**. After entering new information in the **Edit configuration job** form, choose **Save** to commit your changes.

Note

You may need to refresh the page for the changes to become visible.

To shut down replication

1. After you have finished replicating a server, you can delete the replication job. Choose **Replication jobs**, select the desired job, choose **Actions**, and then choose **Delete replication jobs**. In the confirmation window, choose **Delete**. This stops the replication job and cleans up any artifacts created by the service (for example, the job's S3 bucket). This does not delete any AMIs created by runs of the stopped job.

Note

You may need to refresh the page for the changes to become visible.

2. To clear your server catalog after you no longer need it, choose **Servers, Clear server catalog**. The list of servers is removed from AWS SMS and your display.
3. When you are done using a connector and no longer need it for any replication jobs, you can disassociate it. Choose **Connectors** and select the connector to disassociate. Choose **Disassociate** at the top-right corner of its information section and choose **Disassociate** again in the confirmation window. This action deregisters the connector from AWS SMS.

Replicating VMs Using the CLI

This topic provides a CLI-based example of the workflow involved in using AWS SMS to inventory and migrate your on-premises servers to Amazon EC2.

To replicate a server using the CLI

1. Install the Server Migration Connector as described in [Getting Started with AWS Server Migration Service \(p. 9\)](#), including the configuration of an IAM service role and permissions.
2. Use the **get-connectors** command to obtain a list of connectors that are registered to you.

```
aws sms get-connectors --region us-east-1
```

3. After a connector has been installed and registered through the console, use the **import-server-catalog** command to create an inventory of your servers. This process can take up to a minute.

```
aws sms import-server-catalog --region us-east-1
```

Note

There are currently no CLI commands for installing or registering a connector.

4. Use the **get-servers** command to display a list of servers available for import to Amazon EC2.

```
aws sms get-servers --region us-east-1
```

The output should be similar to the following:

```
{
  "serverList": [
    {
      "serverId": "s-12345678",
      "serverType": "VIRTUAL_MACHINE",
      "vmServer": {
        "vmManagerName": "vcenter.yourcompany.com",
        "vmServerAddress": {
          "vmManagerId": "your-vcenter-instance-uuid",
          "vmId": "vm-123"
        },
        "vmName": "your-linux-vm",
        "vmPath": "/Datacenters/DC1/vm/VM Folder Path/your-linux-vm",
        "vmManagerType": "vSphere"
      }
    },
    {
      "replicationJobTerminated": false,
      "serverId": "s-23456789",
      "serverType": "VIRTUAL_MACHINE",
      "replicationJobId": "sms-job-12345678",
      "vmServer": {
        "vmManagerName": "vcenter.yourcompany.com",
        "vmServerAddress": {
          "vmManagerId": "your-vcenter-instance-uuid",
          "vmId": "vm-234"
        },
        "vmName": "Your Windows VM",
        "vmPath": "/Datacenters/DC1/vm/VM Folder Path/Your Windows VM",
        "vmManagerType": "vSphere"
      }
    }
  ]
}
```

```

    }
  ]
}

```

If you have not yet imported a server catalog, you see output similar to the following:

```

{
  "lastModifiedOn": 1477006131.856,
  "serverCatalogStatus": "NOT IMPORTED",
  "serverList": []
}

```

A catalog status of DELETED or EXPIRED also shows that no servers exist in the catalog.

5. Select a server to replicate, note the server ID, and use that as a parameter in the **create-replication-job** command.

```

aws sms create-replication-job --region us-east-1 --server-id s-12345678 --frequency 12
--seed-replication-time 2016-10-24T15:30:00-07:00

```

After the replication job is set up, it starts replicating automatically at the time specified with the `--seed-replication-time` parameter, expressed in seconds of the Unix epoch or according to ISO 8601. For more information, see [Specifying Parameter Values for the AWS Command Line Interface](#). Thereafter, the replication repeats with an interval specified by the `--frequency` parameter, expressed in hours.

6. You can view details of all running replication jobs using the **get-replication-jobs** command. If this command is used without parameters, it returns a list of all your replication jobs.

For example, the **get-replication-jobs** command returns information similar to the following:

```

{
  "replicationJobList": [
    {
      "vmServer": {
        "vmManagerName": "vcenter.yourcompany.com",
        "vmServerAddress": {
          "vmManagerId": "your-vcenter-instance-uuid",
          "vmId": "vm-1234"
        },
        "vmName": "VM name in vCenter",
        "vmPath": "/Datacenters/DC1/vm/VM Folder Path/VM name in vCenter"
      },
      "replicationRunList": [
        {
          "scheduledStartTime": 1487007010.0,
          "state": "Deleted",
          "type": "Automatic",
          "statusMessage": "Uploading",
          "replicationRunId": "sms-run-12345678"
        }
      ],
      "replicationJobId": "sms-job-98765432",
      "state": "Deleted",
      "frequency": 12,
      "seedReplicationTime": 1477007049.0,
      "roleName": "sms"
    },
    {
      "vmServer": {
        "vmManagerName": "vcenter.yourcompany.com",
        "vmServerAddress": {

```

```

        "vmManagerId": "your-vcenter-instance-uuid",
        "vmId": "vm-2345"
    },
    "vmName": "win2k12",
    "vmPath": "/Datacenters/DC1/vm/VM Folder Path/win2k12"
},
"replicationRunList": [
    {
        "scheduledStartTime": 1477008789.0,
        "state": "Active",
        "type": "Automatic",
        "statusMessage": "Converting",
        "replicationRunId": "sms-run-12345679"
    }
],
"replicationJobId": "sms-job-23456789",
"state": "Active",
"frequency": 24,
"seedReplicationTime": 1477008789.0,
"roleName": "sms"
}
]
}

```

This command returns a paginated response, with 50 items per page as the default. You may also specify a custom page length with the `--max-items` parameter, which takes an integer value denoting the number of items to return on one page.

7. You can also use the **get-replication-runs** command to retrieve details on all replication runs for a specific replication job. To do this, pass in a replication job ID to the command as follows:

```
aws sms get-replication-runs --replication-job-id sms-job-12345678 --region us-east-1
```

This command returns a list of all replication runs for the specified replication job, as well as details for that replication job, similar to the following:

```

{
  "replicationRunList": [
    {
      "scheduledStartTime": 1477310423.0,
      "state": "Active",
      "type": "Automatic",
      "statusMessage": "Converting",
      "replicationRunId": "sms-run-23456789"
    },
    {
      "amiId": "ami-abcdefab",
      "state": "Completed",
      "completedTime": 1477227683.652,
      "scheduledStartTime": 1477224023.0,
      "replicationRunId": "sms-run-34567890",
      "type": "Automatic",
      "statusMessage": "Completed"
    },
    {
      "amiId": "ami-efababcd",
      "state": "Completed",
      "completedTime": 1477144823.486,
      "scheduledStartTime": 1477137623.0,
      "replicationRunId": "sms-run-45678903",
      "type": "Automatic",
      "statusMessage": "Completed"
    }
  ]
}

```

```
]
}
```

As with the plain **get-replication-jobs** call, this call returns paginated results.

8. To change any of the parameters of a replication job after you have created it, use the **update-replication-job** command, by providing the replication job ID and any parameters to change.

```
aws sms update-replication-job --region us-east-1 --replication-job-id sms-job-12345678
--frequency 24 --next-replication-run-start-time 2016-10-24T15:30:00-07:00
```

9. In addition to your scheduled replication runs, you may also start up to two on-demand replication runs per 24-hour period. To do this, use the **start-on-demand-replication-run** command, which starts a replication run immediately. If another replication run is currently active, an on-demand replication run cannot be started.

```
aws sms start-on-demand-replication-run --replication-job-id sms-job-12345678 --
region us-east-1
```

If a scheduled replication run is expected to start while an on-demand replication run is ongoing, then the scheduled run is skipped and rescheduled for the next interval.

10. After you are finished replicating a server, you may stop the replication job using the **delete-replication-job** command. This stops the replication job and cleans up any artifacts created by the service (for example, the job's S3 bucket). This does not delete any AMIs created by runs of the stopped job.

```
aws sms delete-replication-job --region us-east-1 --replication-job-id sms-job-12345678
```

11. When you no longer need to maintain your catalog of servers, use the **delete-server-catalog** command to clear the catalog of servers maintained by the service.

```
aws sms delete-server-catalog --region us-east-1
```

12. When you are done using a connector, use the **disassociate-connector** command to deregister the connector from AWS SMS. Call this command only after all replications using that connector are complete.

```
aws sms disassociate-connector --region us-east-1 --connector-id c-12345678901234567
```

Using Amazon CloudWatch Events and AWS Lambda with AWS SMS

You can use Amazon CloudWatch Events with AWS Server Migration Service to automate actions based on your migration workflow. This requires you to create an IAM policy for Lambda to assume, a Lambda function to handle the event, and a CloudWatch Events rule that matches incoming events and routes them to the Lambda function.

Handling CloudWatch Events Rules for AWS SMS

The following procedure uses an AWS Lambda function to monitor AWS SMS job state changes and launches an Amazon EC2 instance whenever an AMI ID has been created.

To create a Lambda function that monitors job state changes

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. Create an IAM policy to provide permissions to execute an action (called by Lambda) and to write to the CloudWatch log when invoked by CloudWatch Events. The following example provides permissions to execute a `RunInstances` action. Assign the policy to the IAM role of the user that will handle the CloudWatch event.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "logs:CreateLogGroup",
        "logs:CreateLogStream",
        "logs:PutLogEvents"
      ],
      "Resource": "arn:aws:logs:*:*:*"
    },
    {
      "Effect": "Allow",
      "Action": [
        "ec2:RunInstances"
      ],
      "Resource": "*"
    }
  ]
}
```

3. Open the AWS Lambda console at <https://console.aws.amazon.com/lambda/>.
4. Choose **Create function**.
5. To ensure that your Lambda function is available from the CloudWatch console, create it in the region where the CloudWatch event will occur. For more information, see the [AWS Lambda Developer Guide](#). Name the function `LaunchInstanceFromAMI` and select **Python 2.7** as the runtime.
6. For **Role**, select **Choose an existing role**. Under **Existing role**, in the list of available roles, choose the role to which you added your policy.

7. Choose **Create function** and define a Lambda function similar to the one below. This sample function, written in Python 2.7, is invoked by CloudWatch Events when an AWS SMS job completion sends an event with an AMI ID. When invoked, it launches a `t2.micro` instance in the region of the event.

```
# Sample Lambda function to launch an EC2 instance from all AMI ID's created from a
# Server Migration Service replication job

import boto3

# main function
def lambda_handler(event, context):

    # create an ec2 client
    ec2 = boto3.client('ec2', region_name=event['region'])

    # match any event that returns an ami-id
    if 'ami-id' in event['detail']:
        imageId = event['detail']['ami-id']

        # launch instance from the AMI ID
        ec2.run_instances(
            ImageId=imageId,
            MaxCount=123,
            MinCount=1,
            InstanceType='t2.micro'
        )
        print 'launched instance with ami id: ' + imageId
    else:
        print 'did not launch instance'
```

8. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
9. Choose **Events, Create rule**. For **Service Name**, choose **Server Migration Service (SMS)**. For **Event Type**, choose **Server Migration Job State Change**.
10. Choose **Target, Add Target**.
11. For **Lambda function**, select the Lambda function that you previously created and choose **Configure details**.
12. On the **Configure rule details** page, type values for **Name** and **Description**. Select the **State** check box to activate the function (setting it to **Enabled**).
13. Choose **Create rule**.

Your rule should now appear on the **Rules** tab. In the example shown, the configured event should launch an EC2 instance each time that you receive an AMI ID.

Logging AWS Server Migration Service API Calls with AWS CloudTrail

AWS Server Migration Service is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in AWS SMS. CloudTrail captures all API calls for AWS SMS as events. The calls captured include calls from the AWS SMS console and code calls to the AWS SMS API operations. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for AWS SMS. 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 that was made to AWS SMS, the IP address from which the request was made, who made the request, when it was made, and additional details.

For more information, see the [AWS CloudTrail User Guide](#).

AWS SMS Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When activity occurs in AWS SMS, 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](#).

For an ongoing record of events in your AWS account, including events for AWS SMS, 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 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:

- [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 AWS SMS actions are logged by CloudTrail and are documented in the [AWS SMS API Reference](#). For example, calls to the [CreateReplicationJob](#), [GetConnectors](#), and [ImportServerCatalog](#) actions generate entries in the CloudTrail log files.

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](#).

Understanding AWS SMS Log File Entries

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 `CreateReplicationJob` action.

```
{
  "eventVersion": "1.05",
  "userIdentity": {
    "type": "IAMUser",
    "principalId": "0123456789abcdef01234",
    "arn": "arn:aws:iam::0123456789ab:user/sms-user",
    "accountId": "0123456789ab",
    "accessKeyId": "0123456789abcdef0123",
    "userName": "sms-user"
  },
  "eventTime": "2018-09-04T16:34:49Z",
  "eventSource": "sms.amazonaws.com",
  "eventName": "CreateReplicationJob",
  "awsRegion": "us-east-1",
  "sourceIPAddress": "1.2.3.4",
  "userAgent": "aws-sdk-java/example-sdk-version Linux/example-kernel-version ...",
  "requestParameters": {
    "roleName": "sms",
    "serverId": "s-01234567",
    "runOnce": true,
    "seedReplicationTime": "Sep 4, 2018 4:36:48 PM"
  },
  "responseElements": {
    "replicationJobId": "sms-job-012345677"
  },
  "requestID": "00000000-1111-2222-3333-444444444444",
  "eventID": "55555555-6666-7777-8888-999999999999",
  "eventType": "AwsApiCall",
  "recipientAccountId": "0123456789ab"
}
```

Troubleshooting AWS SMS

This section contains troubleshooting help for specific errors that you may encounter when using AWS SMS. Before using these procedures, confirm that your SMS setup and the server you are trying to migrate meet the requirements stated in [Server Migration Service \(SMS\) Requirements](#).

Certificate Error When Uploading a VM to Amazon S3

The connector may fail to replicate your VM because the VM is on an ESXi host with an SSL certificate problem. If this occurs, you see the following error message displayed in the **Latest run's status message** section: "ServerError: Failed to upload base disk(s) to S3. Please try again. If this problem persists, please contact AWS Support: vSphere certificate hostname mismatch: Certificate for <somehost.somedomain.com> doesn't match any of the subject alternative names: [localhost.localdomain]."

You can override this ESXi host certificate problem by completing the following procedures:

Topics

- [Upgrade Your Connector \(p. 32\)](#)
- [Re-Register Your Connector \(p. 32\)](#)

Upgrade Your Connector

This section is for customers who are manually upgrading the connector. If you have previously configured automatic upgrades, skip these steps and continue to [Re-Register Your Connector \(p. 32\)](#).

To upgrade your connector

1. Open the connector console.
2. Log in to the connector.
3. Choose **Upgrade**.
4. Wait for the connector to finish upgrading to version 1.0.11.13 or later.

Re-Register Your Connector

This section applies to all customers encountering the certificate mismatch problem.

To re-register your connector

1. Open the connector console.
2. Log in to the connector.
3. In the **General Health** section, check that the connector version is 1.0.11.13 or later.
4. Choose **Edit AWS Server Migration Service Settings**.
5. On the **Setup** page, for **AWS Region**, select the desired region from the list. For **AWS Credentials**, enter the IAM access key and secret key that you created in Step 2 of the [setup guide \(p. 9\)](#). Choose **Next**.

6. On the **vCenter Service Account** page, enter the vCenter hostname, user name, and password that you created in Step 3 of the [setup guide](#) (p. 9).
7. Select the **Ignore hostname mismatch and expiration errors for vCenter and ESXi certificates** check box. Choose **Next**.
8. Complete registration and view the connector configuration dashboard.
9. In the AWS SMS console, delete and restart your stuck replication jobs.

Server Migration Connector Fails To Connect To AWS with Error "PKIX path building failed"

In some customer environments, secure network traffic is proxied through a certificate re-signing mechanism for auditing and management purposes. This can cause your AWS credentials to fail when the connector attempts to contact AWS SMS. The error message contains "PKIX path building failed," indicating that an invalid certificate was presented.

For the connector to work in such an environment, the re-signing certificate (a user certificate that your organization trusts and uses to sign outbound packets) must be added to the connector's trust store, as described in the following steps.

To add the re-signing certificate to the connector trust store

1. On your connector system, disable the FreeBSD packet filter and enable SSH with the following commands:

```
sudo service pf stop
sudo service sshd onestart
```

2. Copy your user certificate to the connector by a method such as the following:

```
scp userCertFile ec2-user@10.0.0.100:/tmp/
```

3. Add the user certificate to the trust store:

```
keytool -importcert -keystore /usr/local/amazon/connector/config/jetty/trustStore -storepass AwScOnNeCtOr -file /tmp/userCertFileName -alias userCertName
```

4. Restart services using the following command (part of AWS Management Portal for vCenter):

```
sudo setup.rb
```

Select option **3** and type "yes".

5. Re-enable the packet filter:

```
sudo service pf start
```

Replication Run Fails During the Preparing Stage

In some cases, AWS SMS allows a replication job to continue scheduling incremental replication runs even when the latest replication run has failed. When the maximum allowed number of consecutive failures is reached, the default behavior for a replication job is to be paused. The job can be resumed

within four days, after which it is deleted. In such cases, the Amazon EBS snapshots from the latest replication run are shared with the customer account, and a status message for the failed replication run is sent. The message contains the snapshot IDs and states the reason for the failure. A typical status message resembles the following:

```
EBS snapshot(s) created with snapshot ID(s): snap-12345678abcdefgh. Another run has been  
scheduled after  
the last run failed due to an import failure. 2 re-try run(s) remaining before the job will  
be failed.
```

The reason for replication-run failures (including first-boot failures) often correlates closely with failures observed when Amazon EC2 VM Import/Export is used for VM migrations. For more information, see [Troubleshooting VM Import/Export](#).

Note

If you need further help with resolving a problem, contact AWS Support. EBS snapshots generated during a failed migration are shared with your account, and the snapshot IDs are included in the status message for the replication job. Be sure to have these details available when you contact Support.

Release Notes for AWS SMS

The following information describes the release history of AWS SMS and the Server Migration Connector. These notes are organized by virtualization environment starting with the most recent changes.

[Download the latest Server Migration Connector for vCenter environment.](#)

[Download the latest Server Migration Connector for Hyper-V/SCVMM environment.](#)

Releases for vCenter Environments

Release date	Version	Comment
Sept 18, 2018	Version 1.0.12.88	<ul style="list-style-type: none">Fixes to resume VM disk transfers interrupted by on-premises network outages.
June 11, 2018	Version 1.0.12.3	<ul style="list-style-type: none">Added support for VMs with disk-size larger than 4 TB using the S3 Manifest functionality.Minor bug fixes.
April 26, 2018	Version 1.0.11.34	<ul style="list-style-type: none">Support for AWS region South America (Sao Paulo).Minor bug fixes and performance improvements.
January 29, 2018	Version 1.0.10.x	<ul style="list-style-type: none">Support for AWS regions EU (London), EU (Paris), US West (N. California), and China (Beijing).Minor bug fixes and performance improvements.
November 08, 2017	Version 1.0.9.x	<ul style="list-style-type: none">Improved resilience in disk uploads.Bug fixes and other performance improvements.
August 29, 2017	Version 1.0.8.x	<ul style="list-style-type: none">Added French, Chinese, Korean and Japanese language support.Improved VM disk upload speeds.Minor bug fixes.
June 02, 2017	Version 1.0.7.12	<ul style="list-style-type: none">Support for AWS GovCloud (US) region.

Release date	Version	Comment
May 5, 2017	Version 1.0.5.2	<ul style="list-style-type: none">• Support for vCenter 5.1.• Support for one-time migration.• Improved error messages and security-related bug fixes.
Nov 3, 2016	Version 1.0.0.84	<ul style="list-style-type: none">• Server Migration Connector virtual appliance for VMware environments.• AWS Server Migration Service console to manage VM migrations and SMS replication tasks using a graphical interface.• AWS Server Migration Service CLI to manage VM migrations and SMS replication tasks using the command line.

Releases for Hyper-V/SCVMM Environments

Release date	Version	Comment
June 11, 2018	Version 1.1.0.304	<ul style="list-style-type: none">• Added support for VMs with disk-size larger than 4 TB using the S3 Manifest functionality.• Minor bug fixes.
April 25, 2018	Version 1.1.0.287	<ul style="list-style-type: none">• Support for migrating VMs from multiple Hyper-V servers using a single connector.• Support for AWS region South America (Sao Paulo).• Minor bug fixes.
February 28, 2018	Version 1.1.0.x	<ul style="list-style-type: none">• Support for AWS regions EU (London), EU (Paris), US West (N. California), and China (Beijing).• Minor bug fixes.
December 14, 2017	Version 1.1.0.76	<ul style="list-style-type: none">• Support for Microsoft's Hyper-V environment.

Document History for AWS SMS

The following table describes the documentation for this release of AWS SMS.

- **API version:** 2016-10-24
- **Latest documentation update:** November 30, 2017

AWS Server Migration Service User Guide

Change	Description	Date
First publication – support for VMware	AWS Server Migration Service User Guide	October 24, 2016
Updates and reorganization	AWS Server Migration Service User Guide	April 11, 2017
Support for Hyper-V and SCVMM	AWS Server Migration Service User Guide	November 30, 2017

AWS Glossary

For the latest AWS terminology, see the [AWS Glossary](#) in the *AWS General Reference*.