
Amazon Simple Notification Service

Developer Guide

API Version 2010-03-31



Amazon Simple Notification Service: Developer Guide

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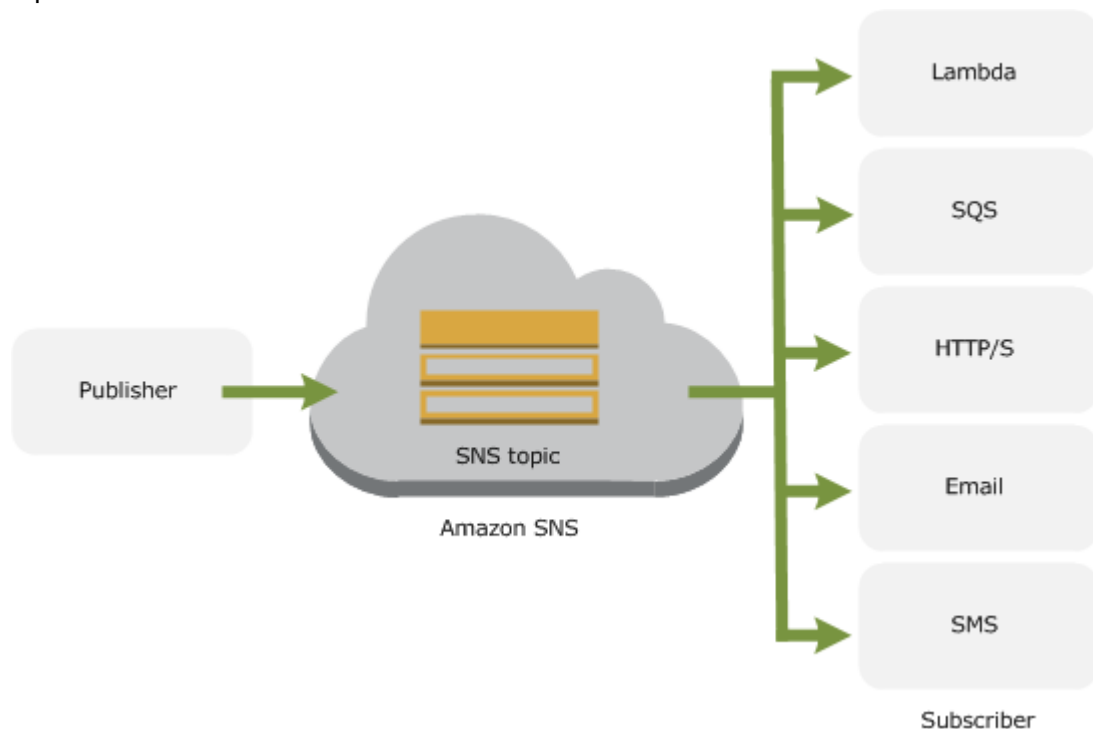
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What is Amazon Simple Notification Service?

Amazon Simple Notification Service (Amazon SNS) is a web service that coordinates and manages the delivery or sending of messages to subscribing endpoints or clients. In Amazon SNS, there are two types of clients—publishers and subscribers—also referred to as producers and consumers. Publishers communicate asynchronously with subscribers by producing and sending a message to a topic, which is a logical access point and communication channel. Subscribers (i.e., web servers, email addresses, Amazon SQS queues, AWS Lambda functions) consume or receive the message or notification over one of the supported protocols (i.e., Amazon SQS, HTTP/S, email, SMS, Lambda) when they are subscribed to the topic.



When using Amazon SNS, you (as the owner) create a topic and control access to it by defining policies that determine which publishers and subscribers can communicate with the topic. A publisher sends messages to topics that they have created or to topics they have permission to publish to. Instead of including a specific destination address in each message, a publisher sends a message to the topic. Amazon SNS matches the topic to a list of subscribers who have subscribed to that topic, and delivers the message to each of those subscribers. Each topic has a unique name that identifies the Amazon SNS endpoint for publishers to post messages and subscribers to register for notifications. Subscribers receive all messages published to the topics to which they subscribe, and all subscribers to a topic receive the same messages.

Topics

- [Are You a First-Time Amazon Simple Notification Service User? \(p. 2\)](#)

- [Beyond the Getting Started Section \(p. 2\)](#)
- [Accessing Amazon SNS \(p. 2\)](#)
- [Common Amazon SNS Scenarios \(p. 3\)](#)

Are You a First-Time Amazon Simple Notification Service User?

If you are a first-time user of Amazon SNS, we recommend that you begin by reading the [Getting Started with Amazon Simple Notification Service \(p. 5\)](#) section. This section walks you through creating a topic, subscribing to it, publishing a message to it, unsubscribing from it, and finally, deleting the topic.

Beyond the Getting Started Section

Beyond the getting started section, you'll probably want to learn more about Amazon SNS operations. The following sections provide detailed information about working with Amazon SNS:

- [Managing Access to Your Amazon SNS Topics \(p. 12\)](#)

You have detailed control over which endpoints a topic allows, who is able to publish to a topic, and under what conditions. This section shows you how to control access through the use of *access control policies*.

- [Monitoring Amazon SNS with CloudWatch \(p. 187\)](#)

Amazon SNS and CloudWatch are integrated so you can collect, view, and analyze metrics for every active Amazon SNS topic.

- [Sending Amazon SNS Messages to Amazon SQS Queues \(p. 104\)](#)

You can use Amazon SNS to send messages to one or more Amazon SQS queues.

- [Sending SMS Messages with Amazon SNS \(p. 117\)](#)

You can use Amazon Simple Notification Service (Amazon SNS) to send SMS notifications to SMS-enabled mobile phones and smart phones.

- [Sending Amazon SNS Messages to HTTP/HTTPS Endpoints \(p. 143\)](#)

You can use Amazon SNS to send notification messages to one or more HTTP or HTTPS endpoints.

Accessing Amazon SNS

If you have an AWS account, you can access Amazon SNS in any of the following ways.

AWS Management Console

The AWS Management Console provides a web interface where you can manage your compute, storage, and other cloud resources. Within the AWS Management Console, individual services have their own console. To open the Amazon SNS console, log in to <https://console.aws.amazon.com/> and choose **SNS** from the console home page, or use the SNS console direct URL: <https://console.aws.amazon.com/sns/>. For a tutorial that helps you complete common SNS tasks in the console, see [Getting Started with Amazon Simple Notification Service \(p. 5\)](#).

AWS Command Line Interface (CLI)

Provides commands for a broad set of AWS products, and is supported on Windows, Mac, and Linux. To get started, see [AWS Command Line Interface User Guide](#). For more information about the commands for Amazon SNS, see [sns](#) in the *AWS CLI Command Reference*.

AWS Tools for Windows PowerShell

Provides commands for a broad set of AWS products for those who script in the PowerShell environment. To get started, see the [AWS Tools for Windows PowerShell User Guide](#). For more information about the cmdlets for Amazon SNS, see [Amazon Simple Notification Service](#) in the *AWS Tools for PowerShell Cmdlet Reference*.

AWS SDKs

AWS provides SDKs (software development kits) that consist of libraries and sample code for various programming languages and platforms (Java, Python, Ruby, .NET, iOS, Android, etc.). The SDKs provide a convenient way to create programmatic access to Amazon SNS and AWS. For example, the SDKs take care of tasks such as cryptographically signing requests, managing errors, and retrying requests automatically. For information about the AWS SDKs, including how to download and install them, see the [Tools for Amazon Web Services](#) page.

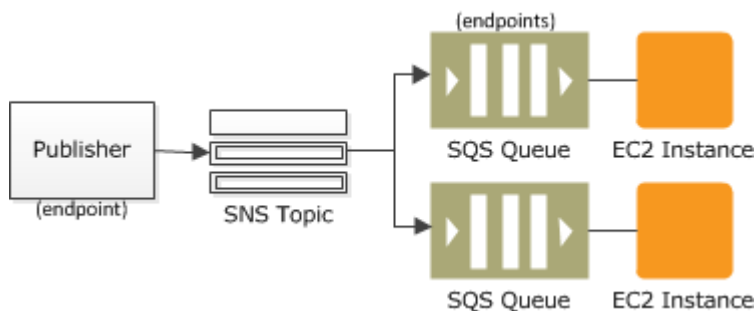
Amazon SNS Query API

You can access Amazon SNS and AWS programmatically by using the Amazon SNS Query API, which lets you issue requests directly to the service. For more information, see the [Amazon Simple Notification Service API Reference](#).

Common Amazon SNS Scenarios

Fanout

The "fanout" scenario is when an Amazon SNS message is sent to a topic and then replicated and pushed to multiple Amazon SQS queues, HTTP endpoints, or email addresses. This allows for parallel asynchronous processing. For example, you could develop an application that sends an Amazon SNS message to a topic whenever an order is placed for a product. Then, the Amazon SQS queues that are subscribed to that topic would receive identical notifications for the new order. The Amazon EC2 server instance attached to one of the queues could handle the processing or fulfillment of the order while the other server instance could be attached to a data warehouse for analysis of all orders received.



Another way to use "fanout" is to replicate data sent to your production environment with your development environment. Expanding upon the previous example, you could subscribe yet another queue to the same topic for new incoming orders. Then, by attaching this new queue to your development environment, you could continue to improve and test your application using data received from your production environment. For more information about sending Amazon SNS messages to Amazon SQS queues, see [Sending Amazon SNS Messages to Amazon SQS Queues \(p. 104\)](#). For more

information about sending Amazon SNS messages to HTTP/S endpoints, see [Sending Amazon SNS Messages to HTTP/HTTPS Endpoints \(p. 143\)](#).

Application and System Alerts

Application and system alerts are notifications, triggered by predefined thresholds, sent to specified users by SMS and/or email. For example, since many AWS services use Amazon SNS, you can receive immediate notification when an event occurs, such as a specific change to your AWS Auto Scaling group.

Push Email and Text Messaging

Push email and text messaging are two ways to transmit messages to individuals or groups via email and/or SMS. For example, you could use Amazon SNS to push targeted news headlines to subscribers by email or SMS. Upon receiving the email or SMS text, interested readers could then choose to learn more by visiting a website or launching an application. For more information about using Amazon SNS to send SMS notifications, see [Sending SMS Messages with Amazon SNS \(p. 117\)](#).

Mobile Push Notifications

Mobile push notifications enable you to send messages directly to mobile apps. For example, you could use Amazon SNS for sending notifications to an app, indicating that an update is available. The notification message can include a link to download and install the update. For more information about using Amazon SNS to send direct notification messages to mobile endpoints, see [Amazon SNS Mobile Push Notifications \(p. 37\)](#)

Getting Started with Amazon Simple Notification Service

This section contains information for you to understand [Amazon SNS](#) concepts and quickly set up and use available tools and interfaces for creating and publishing to topics. To get started with push notification messages, see [Amazon SNS Mobile Push Notifications \(p. 37\)](#).

Topics

- [Before You Begin \(p. 5\)](#)
- [Create a Topic \(p. 5\)](#)
- [Subscribe to a Topic \(p. 6\)](#)
- [Publish to a Topic \(p. 7\)](#)
- [Clean Up \(p. 9\)](#)
- [Using the AWS SDK for Java with Amazon SNS \(p. 10\)](#)

Before You Begin

To use Amazon SNS, you need an AWS account. If you don't already have one, use the following procedure.

To sign up for AWS account

1. Open <https://aws.amazon.com/>, and then choose **Create an AWS Account**.

Note

This might be unavailable in your browser if you previously signed into the AWS Management Console. In that case, choose **Sign in to a different account**, and then choose **Create a new AWS account**.

2. Follow the online instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

To get started with Amazon SNS

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. Click the **Get Started** button.

You should now be on the SNS Home page.

Create a Topic

Now that you're signed up for Amazon SNS, you're ready to create a topic. A topic is a communication channel to send messages and subscribe to notifications. It provides an access point for publishers and subscribers to communicate with each other. In this section you create a topic named *MyTopic*.

To create a topic

1. In the [Amazon SNS console](#), click **Create topic**.

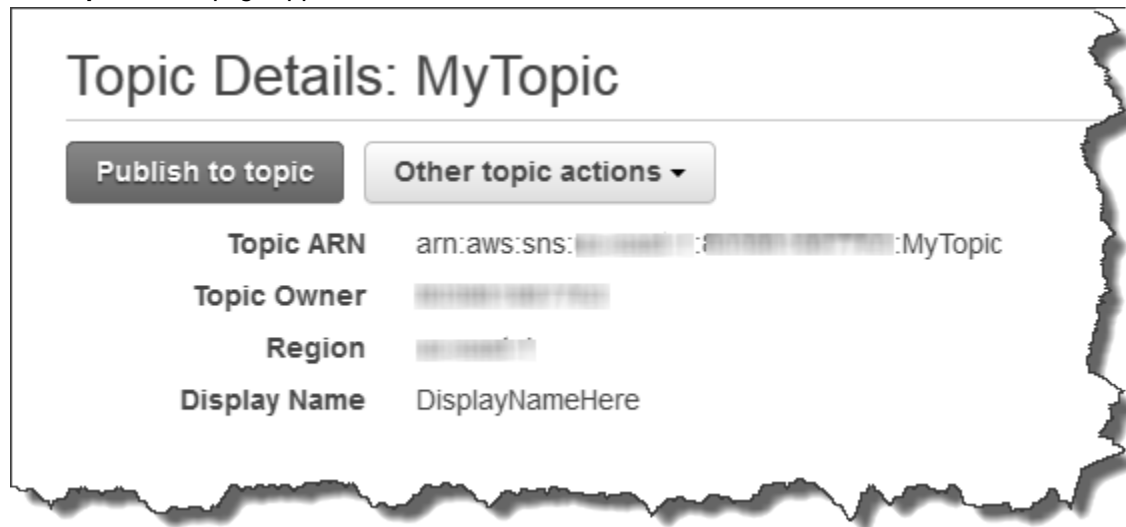
The **Create topic** dialog box appears.

2. In the **Topic name** box, type a topic name.
3. Click **Create topic**.

The new topic appears in the **Topics** page.

4. Select the new topic and then click the topic ARN.

The **Topic Details** page appears.



5. Copy the topic **ARN** for the next task.

```
arn:aws:sns:us-west-2:111122223333:MyTopic
```

Subscribe to a Topic

To receive messages published to a topic, you have to subscribe an endpoint to that topic. An endpoint is a mobile app, web server, email address, or an Amazon SQS queue that can receive notification messages from Amazon SNS. Once you subscribe an endpoint to a topic and the subscription is confirmed, the endpoint will receive all messages published to that topic.

In this section you subscribe an endpoint to the topic you just created in the previous section. You configure the subscription to send the topic messages to your email account.

To subscribe to a topic

1. Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. Click **Create subscription**.

The **Create Subscription** dialog box appears.

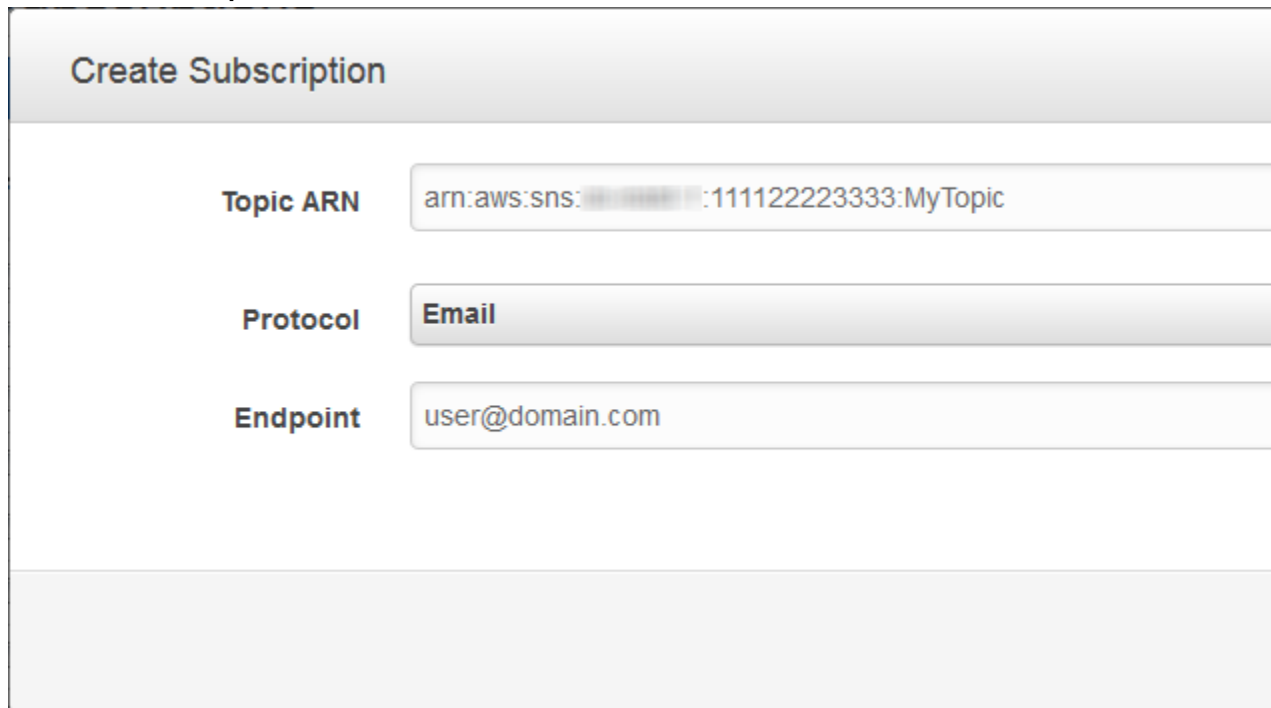
3. In the **Topic ARN** field, paste the topic ARN you created in the previous task, for example:
`arn:aws:sns:us-west-2:111122223333:MyTopic`.

4. In the **Protocol** drop-down box, select **Email**.
5. In the **Endpoint** box, type an email address you can use to receive the notification.

Important

Entourage Users: Entourage strips out the confirmation URL. Type an email address you can access in a different email application.

6. Click **Create subscription**.



The screenshot shows the 'Create Subscription' form in the AWS SNS console. The form has a title bar 'Create Subscription' and three input fields. The first field is labeled 'Topic ARN' and contains the value 'arn:aws:sns:us-east-1:111122223333:MyTopic'. The second field is labeled 'Protocol' and has a dropdown menu with 'Email' selected. The third field is labeled 'Endpoint' and contains the value 'user@domain.com'.

7. Go to your email application and open the message from AWS Notifications, and then click the link to confirm your subscription.

Your web browser displays a confirmation response from Amazon SNS.

Publish to a Topic

Publishers send messages to topics. Once a new message is published, Amazon SNS attempts to deliver that message to every endpoint that is subscribed to the topic. In this section you publish a message to the email address you defined in the previous task.

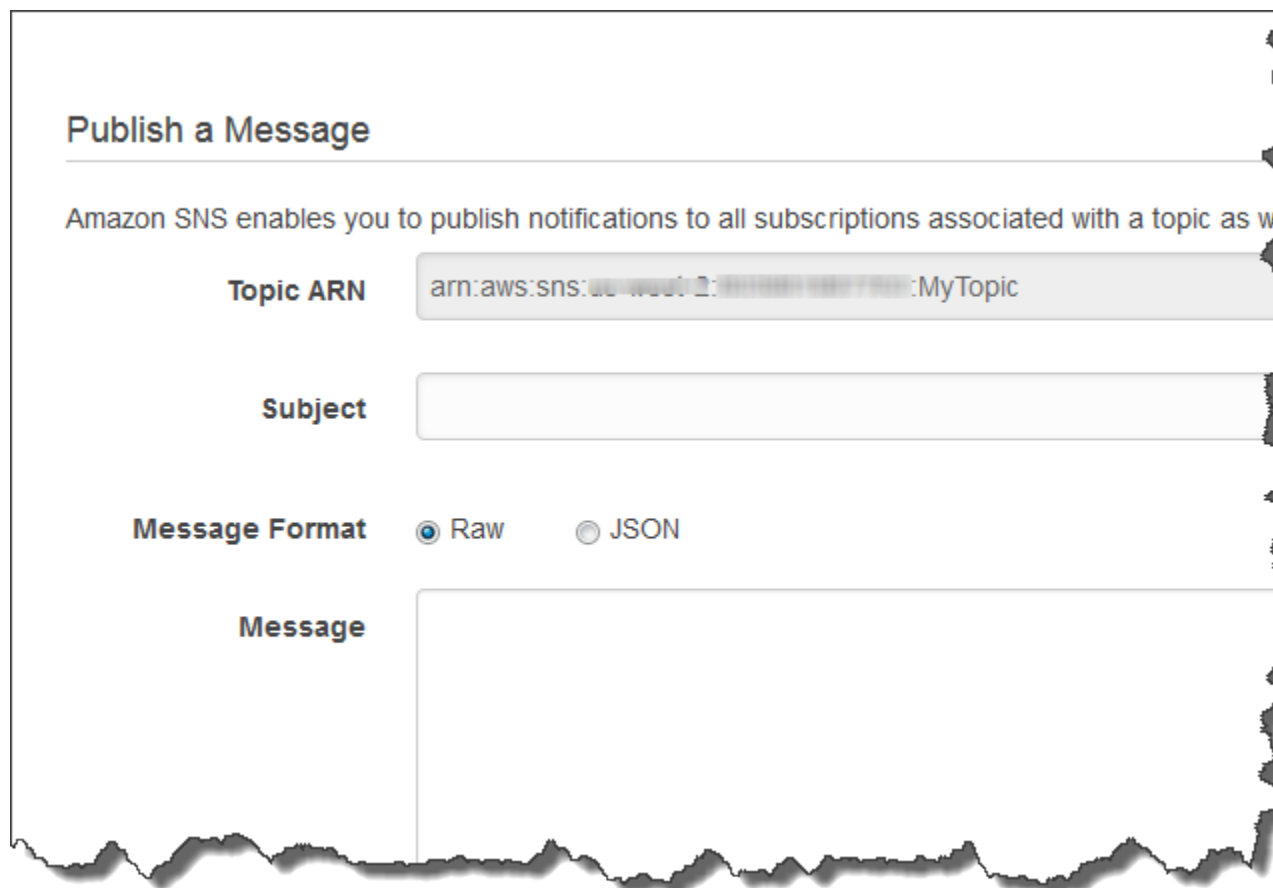
To publish to a topic

1. Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.

In the left navigation pane, click **Topics** and then select the topic you want to publish to.

2. Click the **Publish to topic** button.

The **Publish a Message** page appears.



The screenshot shows the 'Publish a Message' interface in the AWS Management Console. At the top, the title 'Publish a Message' is followed by a descriptive sentence: 'Amazon SNS enables you to publish notifications to all subscriptions associated with a topic as w'. Below this, there are four main input fields: 'Topic ARN' with a text box containing 'arn:aws:sns:us-west-2:123456789012:MyTopic', 'Subject' with an empty text box, 'Message Format' with two radio buttons ('Raw' is selected, 'JSON' is unselected), and 'Message' with a large empty text area.

3. In the **Subject** box, type a subject line for your message.
4. In the **Message** box, type a brief message.
5. Click **Publish Message**.

A confirmation dialog box appears.

You can now use your email application to open the message from AWS Notifications and read the message.

Create Different Messages for Each Protocol

You can use message formatting support to customize the messages you send for each protocol. For example, a notification that goes to both email and SMS subscribers can be tailored to each type of client. SMS users can receive a short version of the message, while email users can receive a longer, more detailed version.

To publish to a topic with message formatting

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select a topic.
3. Click the **Publish to topic** button.

The **Publish a message** page appears.

4. Click the **JSON Message Generator** button.
5. In the **Message** box, type a brief message.
6. In this example for the **Target Platforms**, select **email** and **sms**.
7. Click the **Generate JSON** button.

You can now modify the message text so that it is tailored to each type of client.

The SMS message can contain up to 160 ASCII (or 70 Unicode) characters. If the message exceeds this length, Amazon SNS sends it as multiple messages, each fitting within the character limit. Messages are not cut off in the middle of a word but on whole-word boundaries.

Email messages can be up to 256 KB in size.

In the following example, messages are specified for the default, email, and SMS protocols.

```
{
  "default": "Message body text here.",
  "email": "Message body text here.",
  "sms": "Message body text here."
}
```

8. Click **Publish message**.

A confirmation dialog box appears.

Clean Up

You have created a topic, subscribed to it, and published a message to the topic. Now you clean up your environment by unsubscribing from the topic and then deleting the topic.

To unsubscribe from a topic

1. Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.

In the left navigation pane, click **Subscriptions**.

The **Subscriptions** page opens.

2. Select your subscription in the subscription list. This will be the only listing on the page, unless you created more than one subscription.
3. Click the **Other actions** drop-down list and then click **Delete subscription(s)**.

The **Delete** confirmation dialog box appears.

4. Click **Delete**.

The subscription is deleted, unless it is a pending subscription, meaning it has not yet been confirmed. You cannot delete a pending subscription, but if it remains pending for 3 days, Amazon SNS automatically deletes it.

To delete a topic

Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.

1. In the left navigation pane, click **Topics**, and then select the topic you want to delete.
2. Click the **Actions** drop-down list and select **Delete topics**.

The **Delete** confirmation dialog box appears.

3. Click **Delete**.

When you delete a topic, you also delete all subscriptions to that topic.

Using the AWS SDK for Java with Amazon SNS

The SDK for Java provides a class named [AmazonSNSClient](#) that you can use to interact with Amazon SNS. For information about downloading the AWS SDK for Java, go to [AWS SDK for Java](#).

The `AmazonSNSClient` class defines methods that map to underlying Amazon SNS Query API actions. (These actions are described in the [Amazon SNS API Reference](#)). When you call a method, you must create a corresponding request object and response object. The request object includes information that you must pass with the actual request. The response object includes information returned from Amazon SNS in response to the request.

For example, the `AmazonSNSClient` class provides the `createTopic` method to create a topic to which notifications can be published. This method maps to the underlying [CreateTopic](#) API action. You create a [CreateTopicRequest](#) object to pass information with the `createTopic` method.

The following import statements are used with the provided java samples.

```
import com.amazonaws.services.sns.AmazonSNSClient;
import com.amazonaws.auth.ClasspathPropertiesFileCredentialsProvider;
import com.amazonaws.regions.Region;
import com.amazonaws.regions.Regions;
import com.amazonaws.services.sns.model.CreateTopicRequest;
import com.amazonaws.services.sns.model.CreateTopicResult;
import com.amazonaws.services.sns.model.SubscribeRequest;
import com.amazonaws.services.sns.model.PublishRequest;
import com.amazonaws.services.sns.model.PublishResult;
import com.amazonaws.services.sns.model.DeleteTopicRequest;
```

The following example shows how to create a new Amazon SNS client, set the Amazon SNS endpoint to use, and then create a new topic.

Note

In some of the following examples, the `getCachedResponseMetadata` method is used to show how to programmatically retrieve the request ID for a previously executed successful Amazon SNS request. This is typically used for debugging issues and is helpful when requesting assistance from Amazon Web Services.

Create a Topic

```
//create a new SNS client and set endpoint
AmazonSNSClient snsClient = new AmazonSNSClient(new
    ClasspathPropertiesFileCredentialsProvider());
snsClient.setRegion(Region.getRegion(Regions.US_EAST_1));

//create a new SNS topic
CreateTopicRequest createTopicRequest = new CreateTopicRequest("MyNewTopic");
CreateTopicResult createTopicResult = snsClient.createTopic(createTopicRequest);
//print TopicArn
System.out.println(createTopicResult);
//get request id for CreateTopicRequest from SNS metadata
System.out.println("CreateTopicRequest - " +
    snsClient.getCachedResponseMetadata(createTopicRequest));
```

When you run this example, the following is displayed in the console output window of your IDE, such as Eclipse:


```
{TopicArn: arn:aws:sns:us-east-1:123456789012:MyNewTopic}  
CreateTopicRequest - {AWS_REQUEST_ID=93f7fc90-f131-5ca3-ab18-b741fef918b5}
```

The TopicArn is assigned to a string variable to use in additional operations.

```
String topicArn = "arn:aws:sns:us-east-1:123456789012:MyNewTopic";
```

The following examples show how to subscribe to, publish to, and delete a topic.

Subscribe to a Topic

```
//subscribe to an SNS topic  
SubscribeRequest subRequest = new SubscribeRequest(topicArn, "email", "name@example.com");  
snsClient.subscribe(subRequest);  
//get request id for SubscribeRequest from SNS metadata  
System.out.println("SubscribeRequest - " +  
    snsClient.getCachedResponseMetadata(subRequest));  
System.out.println("Check your email and confirm subscription.");
```

When you run this example, the following is displayed in the console output window of your IDE:

```
SubscribeRequest - {AWS_REQUEST_ID=9b7ff59a-f917-533a-a6bd-be4bf6df0acf}  
Check your email and confirm subscription.
```

Publish to a Topic

```
//publish to an SNS topic  
String msg = "My text published to SNS topic with email endpoint";  
PublishRequest publishRequest = new PublishRequest(topicArn, msg);  
PublishResult publishResult = snsClient.publish(publishRequest);  
//print MessageId of message published to SNS topic  
System.out.println("MessageId - " + publishResult.getMessageId());
```

When you run this example, the following is displayed in the console output window of your IDE:

```
MessageId - 9b888f80-15f7-5c30-81a2-c4511a3f5229
```

Delete a Topic

```
//delete an SNS topic  
DeleteTopicRequest deleteTopicRequest = new DeleteTopicRequest(topicArn);  
snsClient.deleteTopic(deleteTopicRequest);  
//get request id for DeleteTopicRequest from SNS metadata  
System.out.println("DeleteTopicRequest - " +  
    snsClient.getCachedResponseMetadata(deleteTopicRequest));
```

When you run this example, the following is displayed in the console output window of your IDE:

```
DeleteTopicRequest - {AWS_REQUEST_ID=067a4980-4e93-5bfc-b88c-0251415bc852}
```

Managing Access to Your Amazon SNS Topics

Topics

- [Overview \(p. 12\)](#)
- [Special Information for Amazon SNS Policies \(p. 29\)](#)
- [Controlling User Access to Your AWS Account \(p. 30\)](#)

[Amazon SNS](#) supports other protocols beside email. You can use HTTP, HTTPS, and Amazon SQS queues. You have detailed control over which endpoints a topic allows, who is able to publish to a topic, and under what conditions. This appendix shows you how to control through the use of *access control policies*.

The main portion of this section includes basic concepts you need to understand, how to write a policy, and the logic Amazon Web Services (AWS) uses to evaluate policies and decide whether to give the requester access to the resource. Although most of the information in this section is service-agnostic, there are some Amazon SNS-specific details you need to know. For more information, see [Special Information for Amazon SNS Policies \(p. 29\)](#).

Overview

Topics

- [When to Use Access Control \(p. 12\)](#)
- [Key Concepts \(p. 13\)](#)
- [Architectural Overview \(p. 15\)](#)
- [Using the Access Policy Language \(p. 18\)](#)
- [Evaluation Logic \(p. 20\)](#)
- [Example Cases for Amazon SNS Access Control \(p. 25\)](#)

This section describes basic concepts you need to understand to use the access policy language to write policies. It also describes the general process for how access control works with the access policy language, and how policies are evaluated.

When to Use Access Control

You have a great deal of flexibility in how you grant or deny access to a resource. However, the typical use cases are fairly simple:

- You want to grant another AWS account a particular type of topic action (e.g., Publish). For more information, see [Allowing AWS account Access to a Topic \(p. 25\)](#).
- You want to limit subscriptions to your topic to only the HTTPS protocol. For more information, see [Limiting Subscriptions to HTTPS \(p. 25\)](#).
- You want to allow Amazon SNS to publish messages to your Amazon SQS queue. For more information, see [Publishing to an Amazon SQS Queue \(p. 26\)](#).

Key Concepts

The following sections describe the concepts you need to understand to use the access policy language. They're presented in a logical order, with the first terms you need to know at the top of the list.

Permission

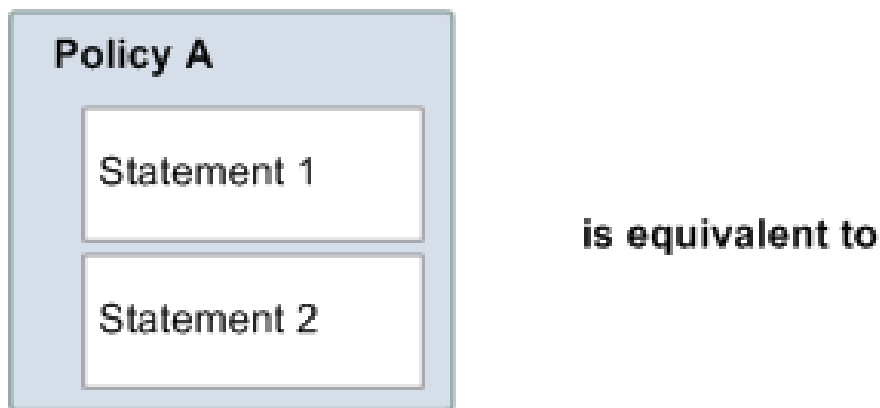
A *permission* is the concept of allowing or disallowing some kind of access to a particular resource. Permissions essentially follow this form: "A is/isn't allowed to do B to C where D applies." For example, *Jane* (A) has permission to *publish* (B) to *TopicA* (C) as long as *she uses the HTTP protocol* (D). Whenever Jane publishes to TopicA, the service checks to see if she has permission and if the request satisfies the conditions set forth in the permission.

Statement

A *statement* is the formal description of a single permission, written in the access policy language. You always write a statement as part of a broader container document known as a *policy* (see the next concept).

Policy

A *policy* is a document (written in the access policy language) that acts as a container for one or more statements. For example, a policy could have two statements in it: one that states that Jane can subscribe using the email protocol, and another that states that Bob cannot publish to TopicA. As shown in the following figure, an equivalent scenario would be to have two policies, one that states that Jane can subscribe using the email protocol, and another that states that Bob cannot publish to TopicA.



Issuer

The *issuer* is the person who writes a policy to grant permissions for a resource. The issuer (by definition) is always the resource owner. AWS does not permit AWS service users to create policies for resources they don't own. If John is the resource owner, AWS authenticates John's identity when he submits the policy he's written to grant permissions for that resource.

Principal

The *principal* is the person or persons who receive the permission in the policy. The principal is A in the statement "A has permission to do B to C where D applies." In a policy, you can set the principal to "anyone" (i.e., you can specify a wildcard to represent all people). You might do this, for example, if you don't want to restrict access based on the actual identity of the requester, but instead on some other identifying characteristic such as the requester's IP address.

Action

The *action* is the activity the principal has permission to perform. The action is B in the statement "A has permission to do B to C where D applies." Typically, the action is just the operation in the request to AWS. For example, Jane sends a request to Amazon SNS with `Action=Subscribe`. You can specify one or multiple actions in a policy.

Resource

The *resource* is the object the principal is requesting access to. The resource is C in the statement "A has permission to do B to C where D applies."

Conditions and Keys

The *conditions* are any restrictions or details about the permission. The condition is D in the statement "A has permission to do B to C where D applies." The part of the policy that specifies the conditions can be the most detailed and complex of all the parts. Typical conditions are related to:

- Date and time (e.g., the request must arrive before a specific day)
- IP address (e.g., the requester's IP address must be part of a particular CIDR range)

A *key* is the specific characteristic that is the basis for access restriction. For example, the date and time of request.

You use both *conditions* and *keys* together to express the restriction. The easiest way to understand how you actually implement a restriction is with an example: If you want to restrict access to before May 30, 2010, you use the condition called `DateLessThan`. You use the key called `aws:CurrentTime` and set it to the value `2010-05-30T00:00:00Z`. AWS defines the conditions and keys you can use. The AWS service itself (e.g., Amazon SQS or Amazon SNS) might also define service-specific keys. For more information, see [Special Information for Amazon SNS Policies](#) (p. 29).

Requester

The *requester* is the person who sends a request to an AWS service and asks for access to a particular resource. The requester sends a request to AWS that essentially says: "Will you allow me to do B to C where D applies?"

Evaluation

Evaluation is the process the AWS service uses to determine if an incoming request should be denied or allowed based on the applicable policies. For information about the evaluation logic, see [Evaluation Logic](#) (p. 20).

Effect

The *effect* is the result that you want a policy statement to return at evaluation time. You specify this value when you write the statements in a policy, and the possible values are *deny* and *allow*.

For example, you could write a policy that has a statement that *denies* all requests that come from Antarctica (effect=deny given that the request uses an IP address allocated to Antarctica). Alternately, you could write a policy that has a statement that *allows* all requests that *don't* come from Antarctica (effect=allow, given that the request doesn't come from Antarctica). Although the two statements sound like they do the same thing, in the access policy language logic, they are different. For more information, see [Evaluation Logic \(p. 20\)](#).

Although there are only two possible values you can specify for the effect (allow or deny), there can be three different results at policy evaluation time: *default deny*, *allow*, or *explicit deny*. For more information, see the following concepts and [Evaluation Logic \(p. 20\)](#).

Default Deny

A *default deny* is the default result from a policy in the absence of an allow or explicit deny.

Allow

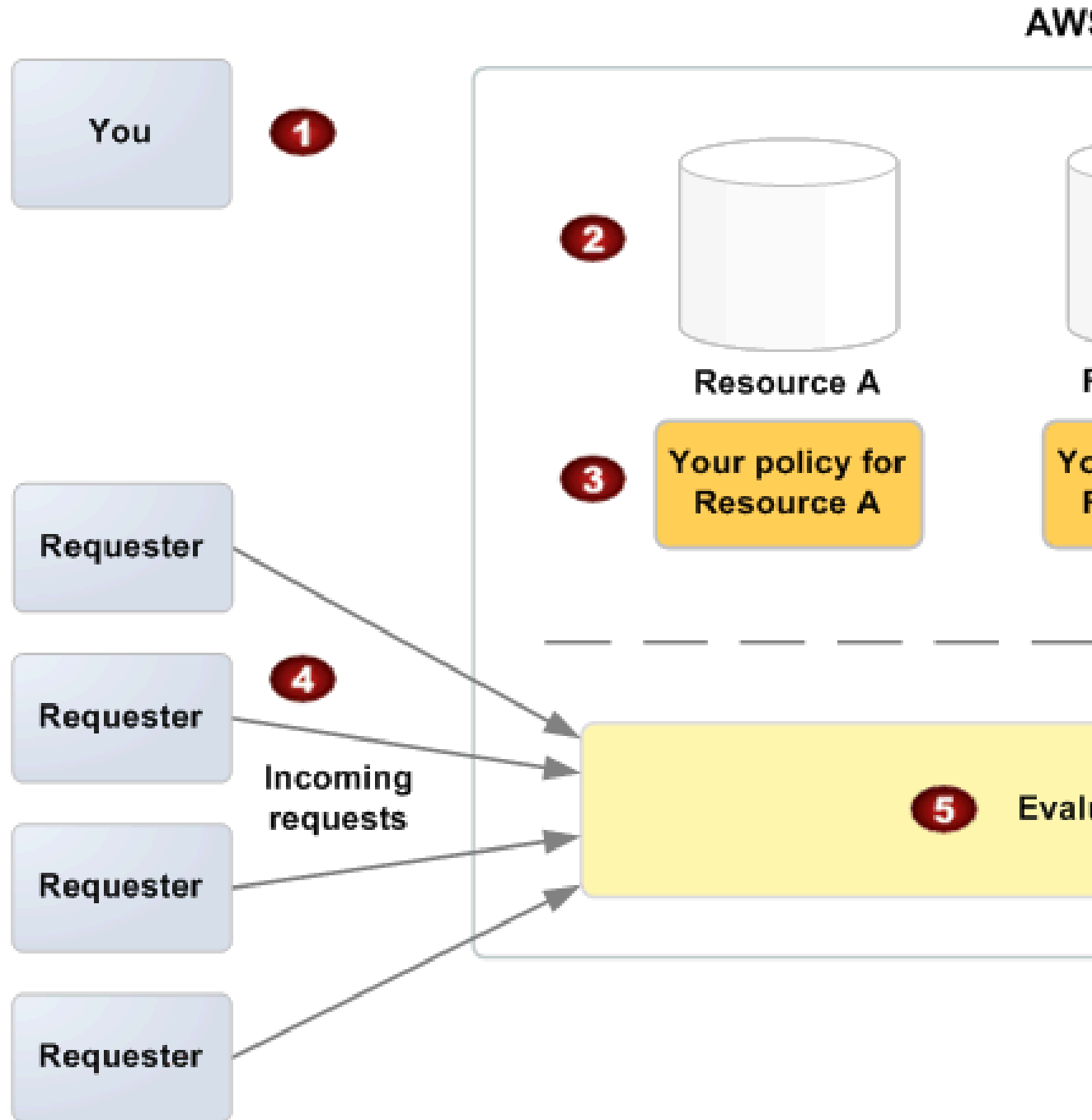
An *allow* results from a statement that has effect=allow, assuming any stated conditions are met. Example: Allow requests if they are received before 1:00 p.m. on April 30, 2010. An allow overrides all default denies, but never an explicit deny.

Explicit Deny

An *explicit deny* results from a statement that has effect=deny, assuming any stated conditions are met. Example: Deny all requests if they are from Antarctica. Any request that comes from Antarctica will always be denied no matter what any other policies might allow.

Architectural Overview

The following figure and table describe the main components that interact to provide access control for your resources.

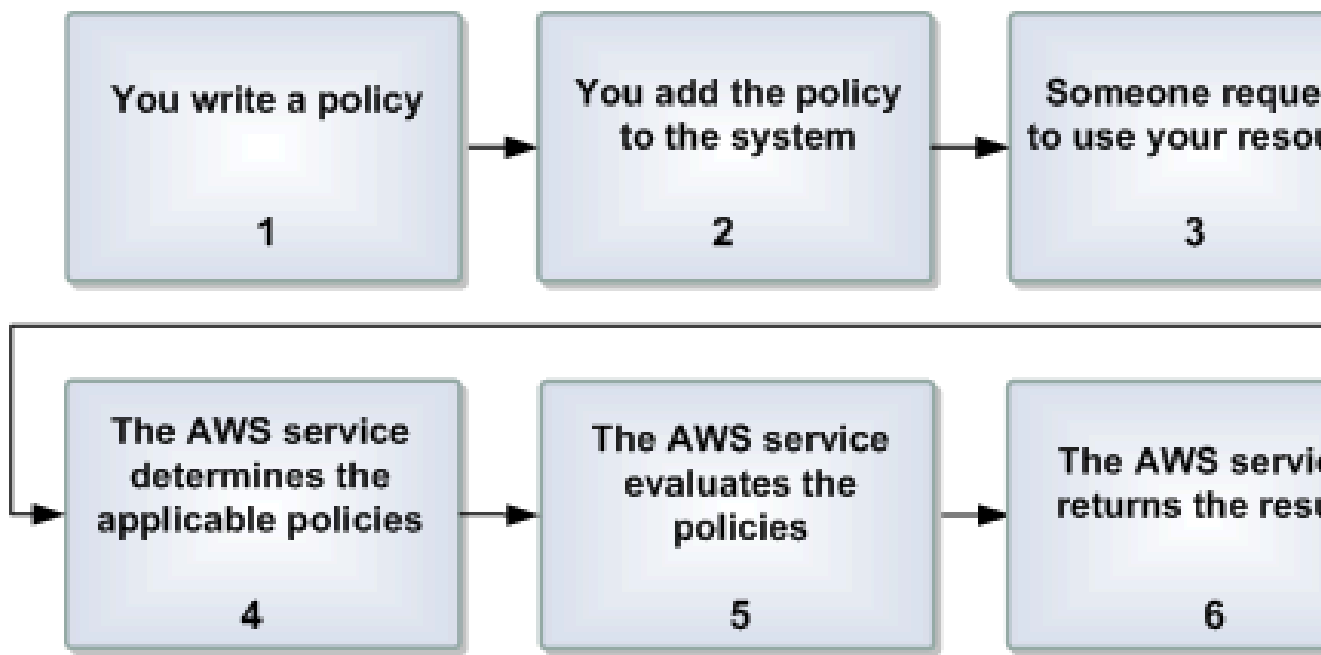


1	You, the resource owner.
2	Your resources (contained within the AWS service; e.g., Amazon SQS queues).
3	Your policies.

	Typically you have one policy per resource, although you could have multiple. The AWS service itself provides an API you use to upload and manage your policies.
4	Requesters and their incoming requests to the AWS service.
5	<p>The access policy language evaluation code.</p> <p>This is the set of code within the AWS service that evaluates incoming requests against the applicable policies and determines whether the requester is allowed access to the resource. For information about how the service makes the decision, see Evaluation Logic (p. 20).</p>

Using the Access Policy Language

The following figure and table describe the general process of how access control works with the access policy language.



Process for Using Access Control with the Access Policy Language

1	<p>You write a policy for your resource.</p> <p>For example, you write a policy to specify permissions for your Amazon SNS topics.</p>
2	<p>You upload your policy to AWS.</p> <p>The AWS service itself provides an API you use to upload your policies. For example, you use the Amazon SNS <code>SetTopicAttributes</code> action to upload a policy for a particular Amazon SNS topic.</p>
3	<p>Someone sends a request to use your resource.</p> <p>For example, a user sends a request to Amazon SNS to use one of your topics.</p>
4	<p>The AWS service determines which policies are applicable to the request.</p> <p>For example, Amazon SNS looks at all the available Amazon SNS policies and determines which ones are applicable (based on what the resource is, who the requester is, etc.).</p>
5	<p>The AWS service evaluates the policies.</p> <p>For example, Amazon SNS evaluates the policies and determines if the requester is allowed to use your topic or not. For information about the decision logic, see Evaluation Logic (p. 20).</p>
6	<p>The AWS service either denies the request or continues to process it.</p>

For example, based on the policy evaluation result, the service either returns an "Access denied" error to the requester or continues to process the request.

Related Topics

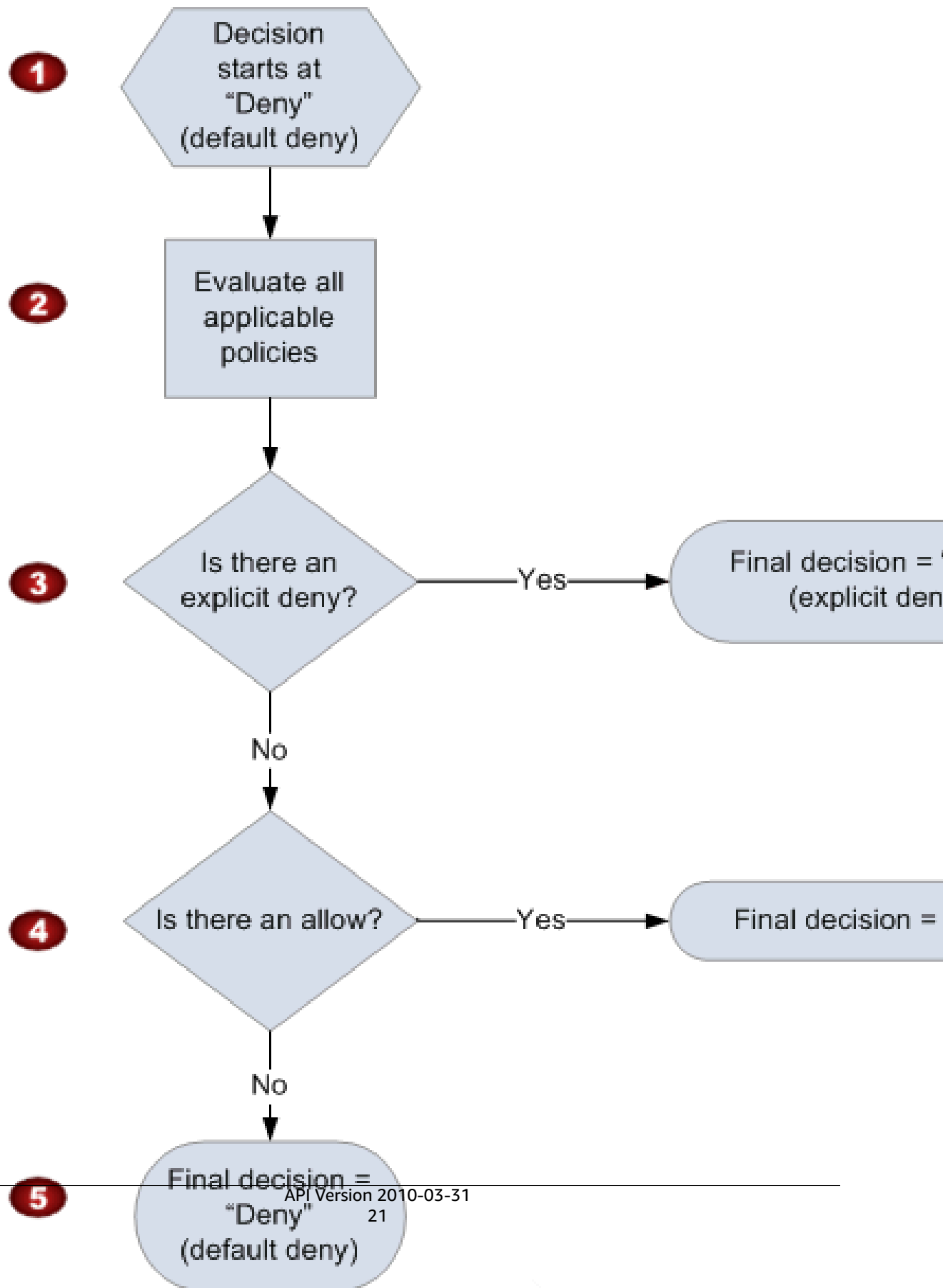
- [Architectural Overview \(p. 15\)](#)

Evaluation Logic

The goal at evaluation time is to decide whether a given request should be allowed or denied. The evaluation logic follows several basic rules:

- By default, all requests to use your resource coming from anyone but you are denied
- An allow overrides any default denies
- An explicit deny overrides any allows
- The order in which the policies are evaluated is not important

The following flow chart and discussion describe in more detail how the decision is made.



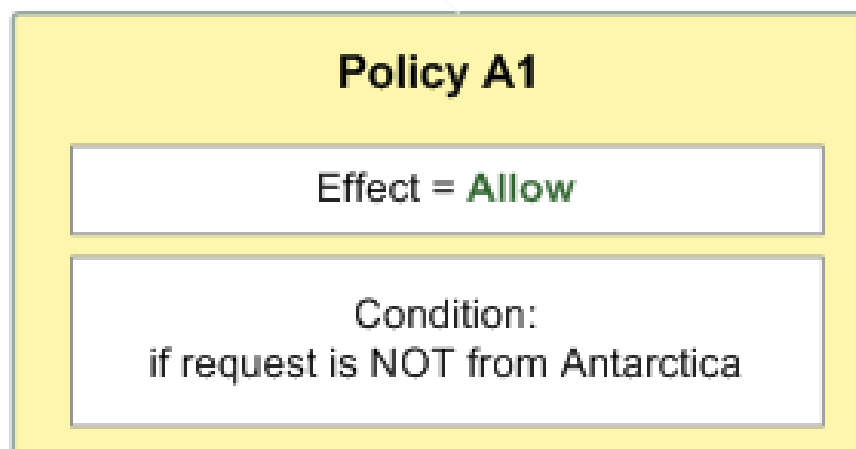
1	The decision starts with a default deny.
2	<p>The enforcement code then evaluates all the policies that are applicable to the request (based on the resource, principal, action, and conditions).</p> <p>The order in which the enforcement code evaluates the policies is not important.</p>
3	<p>In all those policies, the enforcement code looks for an explicit deny instruction that would apply to the request.</p> <p>If it finds even one, the enforcement code returns a decision of "deny" and the process is finished (this is an explicit deny; for more information, see Explicit Deny (p. 15)).</p>
4	<p>If no explicit deny is found, the enforcement code looks for any "allow" instructions that would apply to the request.</p> <p>If it finds even one, the enforcement code returns a decision of "allow" and the process is done (the service continues to process the request).</p>
5	If no allow is found, then the final decision is "deny" (because there was no explicit deny or allow, this is considered a <i>default deny</i> (for more information, see Default Deny (p. 15))).

The Interplay of Explicit and Default Denials

A policy results in a default deny if it doesn't directly apply to the request. For example, if a user requests to use Amazon SNS, but the policy on the topic doesn't refer to the user's AWS account at all, then that policy results in a default deny.

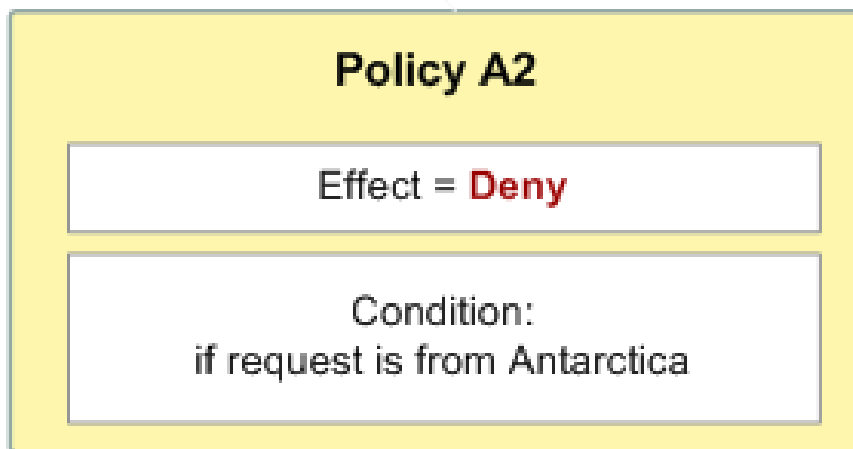
A policy also results in a default deny if a condition in a statement isn't met. If all conditions in the statement are met, then the policy results in either an allow or an explicit deny, based on the value of the Effect element in the policy. Policies don't specify what to do if a condition isn't met, and so the default result in that case is a default deny.

For example, let's say you want to prevent requests coming in from Antarctica. You write a policy (called Policy A1) that allows a request only if it doesn't come from Antarctica. The following diagram illustrates the policy.



If someone sends a request from the U.S., the condition is met (the request is not from Antarctica). Therefore, the request is allowed. But, if someone sends a request from Antarctica, the condition isn't met, and the policy's result is therefore a default deny.

You could turn the result into an explicit deny by rewriting the policy (named Policy A2) as in the following diagram. Here, the policy explicitly denies a request if it comes from Antarctica.



If someone sends a request from Antarctica, the condition is met, and the policy's result is therefore an explicit deny.

The distinction between a default deny and an explicit deny is important because a default deny can be overridden by an allow, but an explicit deny can't. For example, let's say there's another policy that allows requests if they arrive on June 1, 2010. How does this policy affect the overall outcome when coupled with the policy restricting access from Antarctica? We'll compare the overall outcome when coupling the date-based policy (we'll call Policy B) with the preceding policies A1 and A2. Scenario 1 couples Policy A1 with Policy B, and Scenario 2 couples Policy A2 with Policy B. The following figure and discussion show the results when a request comes in from Antarctica on June 1, 2010.

Scenario 1

Request arrives from Antarctica on
June 1, 2010



Policy Evaluation

Policy A1

Effect = **Allow**

Condition:
if request is NOT from Antarctica

OR

Policy B

Effect = Allow

Condition:
if request comes in on June 1, 2010



Result

API Version 2010-03-31
Policy A1 Result: Default Deny

OR Policy B Result: Allow

In Scenario 1, Policy A1 returns a default deny, as described earlier in this section. Policy B returns an allow because the policy (by definition) allows requests that come in on June 1, 2010. The allow from Policy B overrides the default deny from Policy A1, and the request is therefore allowed.

In Scenario 2, Policy B2 returns an explicit deny, as described earlier in this section. Again, Policy B returns an allow. The explicit deny from Policy A2 overrides the allow from Policy B, and the request is therefore denied.

Example Cases for Amazon SNS Access Control

Topics

- [Allowing AWS account Access to a Topic \(p. 25\)](#)
- [Limiting Subscriptions to HTTPS \(p. 25\)](#)
- [Publishing to an Amazon SQS Queue \(p. 26\)](#)
- [Allowing Any AWS Resource to Publish to a Topic \(p. 27\)](#)
- [Allowing an Amazon S3 Bucket to Publish to a Topic \(p. 27\)](#)

This section gives a few examples of typical use cases for access control.

Allowing AWS account Access to a Topic

Let's say you have a topic in the Amazon SNS system. In the simplest case, you want to allow one or more AWS accounts access to a specific topic action (e.g., Publish).

You can do this by using the Amazon SNS API action `AddPermission`. It takes a topic, a list of AWS account IDs, a list of actions, and a label, and automatically creates a new statement in the topic's access control policy. In this case, you don't write a policy yourself, because Amazon SNS automatically generates the new policy statement for you. You can remove the policy statement later by calling `RemovePermission` with its label.

For example, if you called `AddPermission` on the topic `arn:aws:sns:us-east-1:444455556666:MyTopic`, with AWS account ID `1111-2222-3333`, the `Publish` action, and the label `give-1234-publish`, Amazon SNS would generate and insert the following access control policy statement:

```
{
  "Version": "2012-10-17",
  "Id": "AWSAccountTopicAccess",
  "Statement": [
    {
      "Sid": "give-1234-publish",
      "Effect": "Allow",
      "Principal": {
        "AWS": "111122223333"
      },
      "Action": ["sns:Publish"],
      "Resource": "arn:aws:sns:us-east-1:444455556666:MyTopic"
    }
  ]
}
```

Once this statement is added, the user with AWS account `1111-2222-3333` can publish messages to the topic.

Limiting Subscriptions to HTTPS

In this use case, you want to allow subscription requests to your topic *only by HTTPS*, for security.

You need to know how to write your own policy for the topic because the Amazon SNS `AddPermission` action doesn't let you specify a protocol restriction when granting someone access to your topic. In this case, you would write your own policy, and then use the `SetTopicAttributes` action to set the topic's `Policy` attribute to your new policy.

The following example of a full policy gives the AWS account ID 1111-2222-3333 the ability to subscribe to notifications from a topic.

```
{
  "Version": "2012-10-17",
  "Id": "SomePolicyId",
  "Statement" : [
    {
      "Sid": "Statement1",
      "Effect": "Allow",
      "Principal" : {
        "AWS": "111122223333"
      },
      "Action": ["sns:Subscribe"],
      "Resource": "arn:aws:sns:us-east-1:444455556666:MyTopic",
      "Condition" : {
        "StringEquals" : {
          "sns:Protocol": "https"
        }
      }
    }
  ]
}
```

Publishing to an Amazon SQS Queue

In this use case, you want to publish messages from your topic to your Amazon SQS queue. Like Amazon SNS, Amazon SQS uses Amazon's access control policy language. To allow Amazon SNS to send messages, you'll need to use the Amazon SQS action `SetQueueAttributes` to set a policy on the queue.

Again, you'll need to know how to write your own policy because the Amazon SQS `AddPermission` action doesn't create policy statements with conditions.

Note that the example presented below is an Amazon SQS policy (controlling access to your queue), not an Amazon SNS policy (controlling access to your topic). The actions are Amazon SQS actions, and the resource is the Amazon Resource Name (ARN) of the queue. You can determine the queue's ARN by retrieving the queue's `QueueArn` attribute with the `GetQueueAttributes` action.

```
{
  "Version": "2012-10-17",
  "Id": "MyQueuePolicy",
  "Statement" : [
    {
      "Sid": "Allow-SNS-SendMessage",
      "Effect": "Allow",
      "Principal" : "*",
      "Action": ["sqs:SendMessage"],
      "Resource": "arn:aws:sqs:us-east-1:444455556666:MyQueue",
      "Condition" : {
        "ArnEquals" : {
          "aws:SourceArn": "arn:aws:sns:us-east-1:444455556666:MyTopic"
        }
      }
    }
  ]
}
```



```
}
```

This policy uses the `aws:SourceArn` condition to restrict access to the queue based on the source of the message being sent to the queue. You can use this type of policy to allow Amazon SNS to send messages to your queue only if the messages are coming from one of your own topics. In this case, you specify a particular one of your topics, whose ARN is `arn:aws:sns:us-east-1:444455556666:MyTopic`.

The preceding policy is an example of the Amazon SQS policy you could write and add to a specific queue. It would grant Amazon SNS and other AWS products access. Amazon SNS gives a default policy to all newly created topics. The default policy gives all other AWS products access to your topic. This default policy uses an `aws:SourceArn` condition to ensure that AWS products access your topic only on behalf of AWS resources you own.

Allowing Any AWS Resource to Publish to a Topic

In this case, you want to configure a topic's policy so that another AWS account's resource (e.g., Amazon S3 bucket, Amazon EC2 instance, or Amazon SQS queue) can publish to your topic. This example assumes that you write your own policy and then use the `SetTopicAttributes` action to set the topic's `Policy` attribute to your new policy.

In the following example statement, the topic owner in these policies is 1111-2222-3333 and the AWS resource owner is 4444-5555-6666. The example gives the AWS account ID 4444-5555-6666 the ability to publish to `My-Topic` from any AWS resource owned by the account.

```
{
  "Version": "2012-10-17",
  "Id": "MyAWSPolicy",
  "Statement" : [
    {
      "Sid": "My-statement-id",
      "Effect": "Allow",
      "Principal" : "*",
      "Action": "sns:Publish",
      "Resource": "arn:aws:sns:us-east-1:111122223333:My-Topic",
      "Condition": {
        "StringEquals": {
          "AWS:SourceAccount": "444455556666"
        }
      }
    }
  ]
}
```

Allowing an Amazon S3 Bucket to Publish to a Topic

In this case, you want to configure a topic's policy so that another AWS account's Amazon S3 bucket can publish to your topic. For more information about publishing notifications from Amazon S3, go to [Setting Up Notifications of Bucket Events](#).

This example assumes that you write your own policy and then use the `SetTopicAttributes` action to set the topic's `Policy` attribute to your new policy.

The following example statement uses the `ArnLike` condition to make sure the ARN of the resource making the request (the `AWS:SourceARN`) is an Amazon S3 ARN. You could use a similar condition to restrict the permission to a set of Amazon S3 buckets, or even to a specific bucket. In this example, the topic owner is 1111-2222-3333 and the Amazon S3 owner is 4444-5555-6666. The example states that any Amazon S3 bucket owned by 4444-5555-6666 is allowed to publish to `My-Topic`.

```
{
```

```
"Version": "2012-10-17",
"Id": "MyAWSPolicy",
"Statement" : [
  {
    "Sid": "My-statement-id",
    "Effect": "Allow",
    "Principal" : "*",
    "Action": "sns:Publish",
    "Resource": "arn:aws:sns:us-east-1:111122223333:My-Topic",
    "Condition": {
      "StringEquals": { "AWS:SourceAccount": "444455556666" } ,
      "ArnLike": { "AWS:SourceArn": "arn:aws:s3:*:*:*" }
    }
  }
]
```

Special Information for Amazon SNS Policies

The following list gives information specific to the Amazon SNS implementation of access control:

- Each policy must cover only a single topic (when writing a policy, don't include statements that cover different topics)
- Each policy must have a unique policy `Id`
- Each statement in a policy must have a unique statement `sid`

Amazon SNS Policy Limits

The following table lists the maximum limits for policy information.

Name	Maximum Limit
Bytes	30 kb
Statements	100
Principals	1 to 200 (0 is invalid.)
Resource	1 (0 is invalid. The value must match the ARN of the policy's topic.)

Valid Amazon SNS Policy Actions

Amazon SNS supports the actions shown in the following table.

Action	Description
sns:AddPermission	Grants permission to add permissions to the topic policy.
sns>DeleteTopic	Grants permission to delete a topic.
sns:GetTopicAttributes	Grants permission to receive all of the topic attributes.
sns:ListSubscriptionsByTopic	Grants permission to retrieve all the subscriptions to a specific topic.
sns:Publish	Grants permission to publish to a topic or endpoint. For more information, see Publish in the Amazon Simple Notification Service API Reference
sns:RemovePermission	Grants permission to remove any permissions in the topic policy.
sns:SetTopicAttributes	Grants permission to set a topic's attributes.
sns:Subscribe	Grants permission to subscribe to a topic.

Amazon SNS Keys

Amazon SNS uses the following service-specific keys. You can use these in policies that restrict access to `Subscribe` requests.

- **sns:Endpoint**—The URL, email address, or ARN from a `Subscribe` request or a previously confirmed subscription. Use with string conditions (see [Example Policies for Amazon SNS \(p. 34\)](#)) to restrict access to specific endpoints (e.g., `*@example.com`).
- **sns:Protocol**—The `protocol` value from a `Subscribe` request or a previously confirmed subscription. Use with string conditions (see [Example Policies for Amazon SNS \(p. 34\)](#)) to restrict publication to specific delivery protocols (e.g., `https`).

Important

When you use a policy to control access by `sns:Endpoint`, be aware that DNS issues might affect the endpoint's name resolution in the future.

Controlling User Access to Your AWS Account

Topics

- [IAM and Amazon SNS Policies Together \(p. 30\)](#)
- [Amazon SNS ARNs \(p. 33\)](#)
- [Amazon SNS Actions \(p. 34\)](#)
- [Amazon SNS Keys \(p. 34\)](#)
- [Example Policies for Amazon SNS \(p. 34\)](#)
- [Using Temporary Security Credentials \(p. 36\)](#)

Amazon Simple Notification Service integrates with AWS Identity and Access Management (IAM) so that you can specify which Amazon SNS actions a user in your AWS account can perform with Amazon SNS resources. You can specify a particular topic in the policy. For example, you could use variables when creating an IAM policy that gives certain users in your organization permission to use the `Publish` action with specific topics in your AWS account. For more information, see [Policy Variables](#) in the *Using IAM* guide.

Important

Using Amazon SNS with IAM doesn't change how you use Amazon SNS. There are no changes to Amazon SNS actions, and no new Amazon SNS actions related to users and access control.

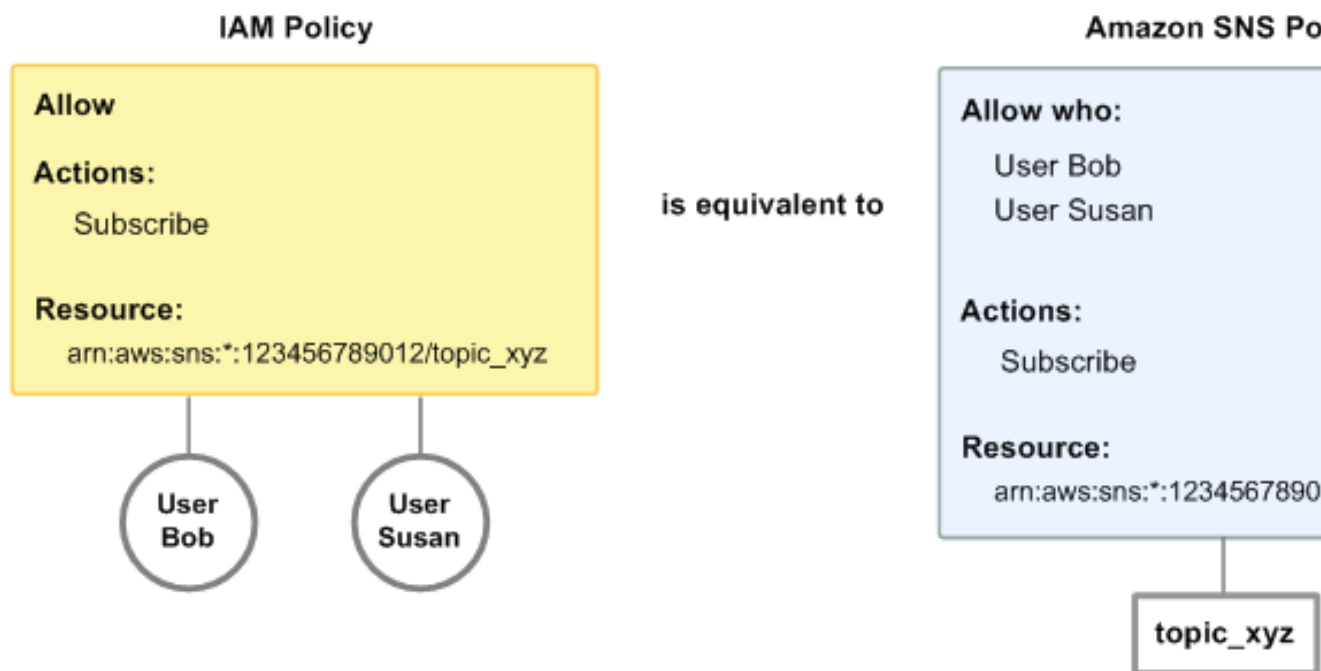
For examples of policies that cover Amazon SNS actions and resources, see [Example Policies for Amazon SNS \(p. 34\)](#).

IAM and Amazon SNS Policies Together

You use an IAM policy to restrict your users' access to Amazon SNS actions and topics. An IAM policy can restrict access only to users within your AWS account, not to other AWS accounts.

You use an Amazon SNS policy with a particular topic to restrict who can work with that topic (e.g., who can publish messages to it, who can subscribe to it, etc.). Amazon SNS policies can give access to other AWS accounts, or to users within your own AWS account.

To give your users permissions for your Amazon SNS topics, you can use IAM policies, Amazon SNS policies, or both. For the most part, you can achieve the same results with either. For example, the following diagram shows an IAM policy and an Amazon SNS policy that are equivalent. The IAM policy allows the Amazon SNS `Subscribe` action for the topic called `topic_xyz` in your AWS account. The IAM policy is attached to the users Bob and Susan (which means that Bob and Susan have the permissions stated in the policy). The Amazon SNS policy likewise gives Bob and Susan permission to access `Subscribe` for `topic_xyz`.



Note

The preceding example shows simple policies with no conditions. You could specify a particular condition in either policy and get the same result.

There is one difference between AWS IAM and Amazon SNS policies: The Amazon SNS policy system lets you grant permission to other AWS accounts, whereas the IAM policy doesn't.

It's up to you how you use both of the systems together to manage your permissions, based on your needs. The following examples show how the two policy systems work together.

Example 1

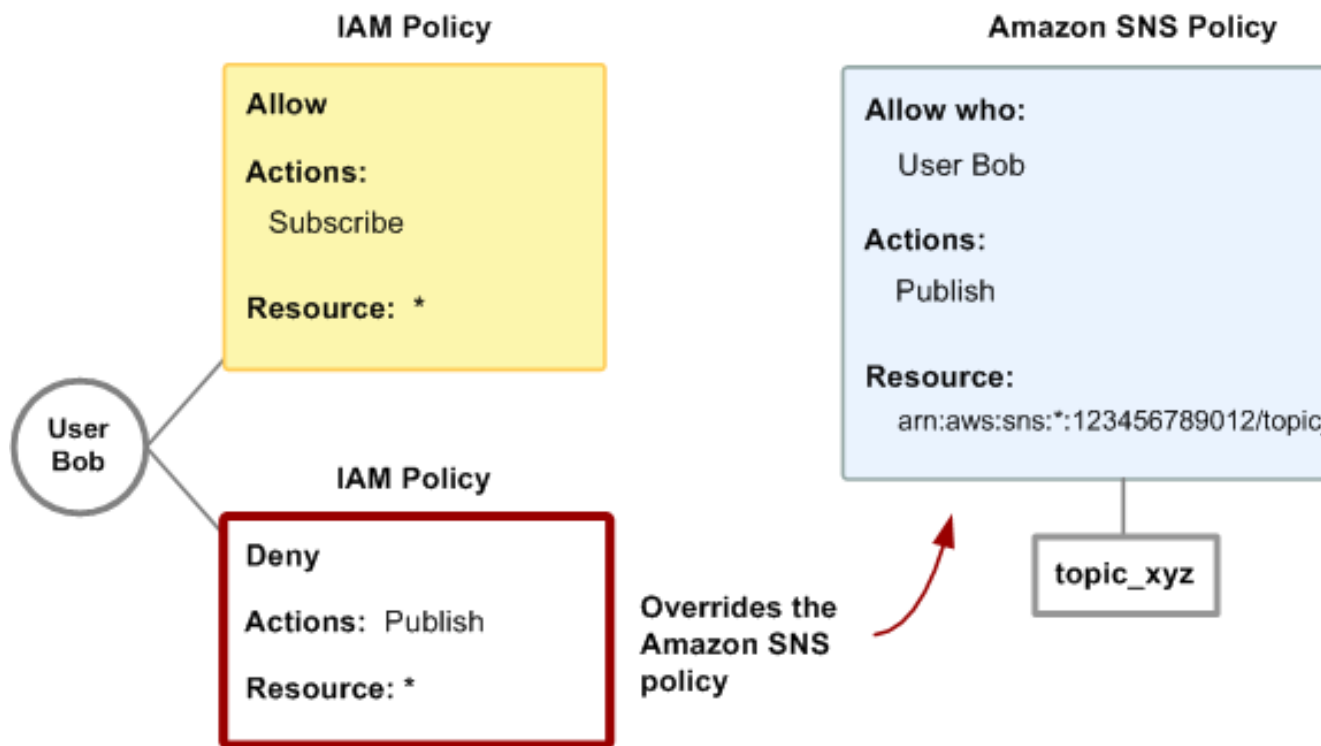
In this example, both an IAM policy and an Amazon SNS policy apply to Bob. The IAM policy gives him permission for `Subscribe` on any of the AWS account's topics, whereas the Amazon SNS policy gives him permission to use `Publish` on a specific topic (`topic_xyz`). The following diagram illustrates the concept.



If Bob were to send a request to subscribe to any topic in the AWS account, the IAM policy would allow the action. If Bob were to send a request to publish a message to topic_xyz, the Amazon SNS policy would allow the action.

Example 2

In this example, we build on example 1 (where Bob has two policies that apply to him). Let's say that Bob publishes messages to topic_xyz that he shouldn't have, so you want to entirely remove his ability to publish to topics. The easiest thing to do is to add an IAM policy that denies him access to the `Publish` action on all topics. This third policy overrides the Amazon SNS policy that originally gave him permission to publish to topic_xyz, because an explicit deny always overrides an allow (for more information about policy evaluation logic, see [Evaluation Logic \(p. 20\)](#)). The following diagram illustrates the concept.



For examples of policies that cover Amazon SNS actions and resources, see [Example Policies for Amazon SNS \(p. 34\)](#). For more information about writing Amazon SNS policies, go to the [technical documentation for Amazon SNS](#).

Amazon SNS ARNs

For Amazon SNS, topics are the only resource type you can specify in a policy. Following is the Amazon Resource Name (ARN) format for topics.

```
arn:aws:sns:region:account_ID:topic_name
```

For more information about ARNs, go to [ARNs](#) in *IAM User Guide*.

Example

Following is an ARN for a topic named my_topic in the us-east-1 region, belonging to AWS account 123456789012.

```
arn:aws:sns:us-east-1:123456789012:my_topic
```

Example

If you had a topic named my_topic in each of the different Regions that Amazon SNS supports, you could specify the topics with the following ARN.

```
arn:aws:sns:*:123456789012:my_topic
```

You can use * and ? wildcards in the topic name. For example, the following could refer to all the topics created by Bob that he has prefixed with bob_.

```
arn:aws:sns:*:123456789012:bob_*
```

As a convenience to you, when you create a topic, Amazon SNS returns the topic's ARN in the response.

Amazon SNS Actions

In an IAM policy, you can specify any actions that Amazon SNS offers. However, the `ConfirmSubscription` and `Unsubscribe` actions do not require authentication, which means that even if you specify those actions in a policy, IAM won't restrict users' access to those actions.

Each action you specify in a policy must be prefixed with the lowercase string `sns:`. To specify all Amazon SNS actions, for example, you would use `sns:*`. For a list of the actions, go to the [Amazon Simple Notification Service API Reference](#).

Amazon SNS Keys

Amazon SNS implements the following AWS-wide policy keys, plus some service-specific keys.

For a list of context keys supported by each AWS service and a list of AWS-wide policy keys, see [AWS Service Actions and Condition Context Keys](#) and [Global and IAM Condition Context Keys](#) in the *IAM User Guide*.

Amazon SNS uses the following service-specific keys. Use these keys in policies that restrict access to `Subscribe` requests.

- **sns:Endpoint**—The URL, email address, or ARN from a `Subscribe` request or a previously confirmed subscription. Use with string conditions (see [Example Policies for Amazon SNS \(p. 34\)](#)) to restrict access to specific endpoints (e.g., `*@yourcompany.com`).
- **sns:Protocol**—The protocol value from a `Subscribe` request or a previously confirmed subscription. Use with string conditions (see [Example Policies for Amazon SNS \(p. 34\)](#)) to restrict publication to specific delivery protocols (e.g., `https`).

Example Policies for Amazon SNS

This section shows several simple policies for controlling user access to Amazon SNS.

Note

In the future, Amazon SNS might add new actions that should logically be included in one of the following policies, based on the policy's stated goals.

Example 1: Allow a group to create and manage topics

In this example, we create a policy that gives access to `CreateTopic`, `ListTopics`, `SetTopicAttributes`, and `DeleteTopic`.

```
{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": [
      "sns:CreateTopic", "sns:ListTopics", "sns:SetTopicAttributes", "sns>DeleteTopic"
    ],
    "Resource": "*"
  }]
}
```



```
    }  
  ]  
}
```

Example 2: Allow the IT group to publish messages to a particular topic

In this example, we create a group for IT, and assign a policy that gives access to `Publish` on the specific topic of interest.

```
{  
  "Version": "2012-10-17",  
  "Statement": [{  
    "Effect": "Allow",  
    "Action": "sns:Publish",  
    "Resource": "arn:aws:sns:*:123456789012:topic_xyz"  
  }]  
}
```

Example 3: Give users in the AWS account ability to subscribe to topics

In this example, we create a policy that gives access to the `Subscribe` action, with string matching conditions for the `sns:Protocol` and `sns:Endpoint` policy keys.

```
{  
  "Version": "2012-10-17",  
  "Statement": [{  
    "Effect": "Allow",  
    "Action": ["sns:Subscribe"],  
    "Resource": "*",  
    "Condition": {  
      "StringLike": {  
        "SNS:Endpoint": "*@yourcompany.com"  
      }  
    },  
    "StringEquals": {  
      "sns:Protocol": "email"  
    }  
  }]  
}
```

Example 4: Allow a partner to publish messages to a particular topic

You can use an Amazon SNS policy or an IAM policy to allow a partner to publish to a specific topic. If your partner has an AWS account, it might be easier to use an Amazon SNS policy. However, anyone in the partner's company who possesses the AWS security credentials could publish messages to the topic. This example assumes that you want to limit access to a particular person (or application). To do this you need to treat the partner like a user within your own company, and use a IAM policy instead of an Amazon SNS policy.

For this example, we create a group called `WidgetCo` that represents the partner company; we create a user for the specific person (or application) at the partner company who needs access; and then we put the user in the group.

We then attach a policy that gives the group `Publish` access on the specific topic named *WidgetPartnerTopic*.

We also want to prevent the `WidgetCo` group from doing anything else with topics, so we add a statement that denies permission to any Amazon SNS actions other than `Publish` on any topics other

than WidgetPartnerTopic. This is necessary only if there's a broad policy elsewhere in the system that gives users wide access to Amazon SNS.

```
{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": "sns:Publish",
    "Resource": "arn:aws:sns:*:123456789012:WidgetPartnerTopic"
  },
  {
    "Effect": "Deny",
    "NotAction": "sns:Publish",
    "NotResource": "arn:aws:sns:*:123456789012:WidgetPartnerTopic"
  }
]
}
```

Using Temporary Security Credentials

In addition to creating IAM users with their own security credentials, IAM also enables you to grant temporary security credentials to any user allowing this user to access your AWS services and resources. You can manage users who have AWS accounts; these users are IAM users. You can also manage users for your system who do not have AWS accounts; these users are called federated users. Additionally, "users" can also be applications that you create to access your AWS resources.

You can use these temporary security credentials in making requests to Amazon SNS. The API libraries compute the necessary signature value using those credentials to authenticate your request. If you send requests using expired credentials Amazon SNS denies the request.

For more information about IAM support for temporary security credentials, go to [Granting Temporary Access to Your AWS Resources](#) in *Using IAM*.

Example Using Temporary Security Credentials to Authenticate an Amazon SNS Request

The following example demonstrates how to obtain temporary security credentials to authenticate an Amazon SNS request.

```
http://sns.us-east-1.amazonaws.com/
?Name=My-Topic
&Action=CreateTopic
&Signature=gfzIF53exFVdpSNb8Aiwn3Lv%2FNYXh6S%2Br3yySK70oX4%3D
&SignatureVersion=2
&SignatureMethod=HmacSHA256
&Timestamp=2010-03-31T12%3A00%3A00.000Z
&SecurityToken=SecurityTokenValue
&AWSAccessKeyId=Access Key ID provided by AWS Security Token Service
```

Amazon SNS Mobile Push Notifications

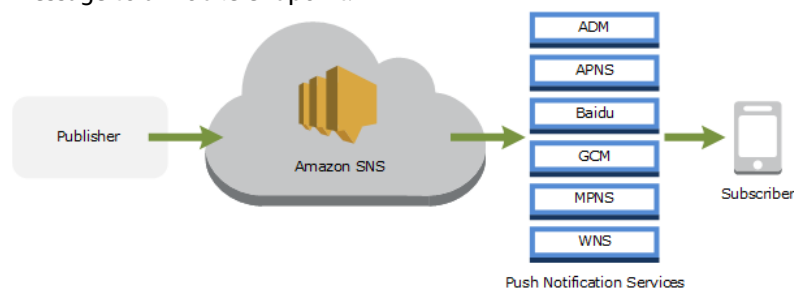
With [Amazon SNS](#), you have the ability to send push notification messages directly to apps on mobile devices. Push notification messages sent to a mobile endpoint can appear in the mobile app as message alerts, badge updates, or even sound alerts.

Overview

You send push notification messages to both mobile devices and desktops using one of the following supported push notification services:

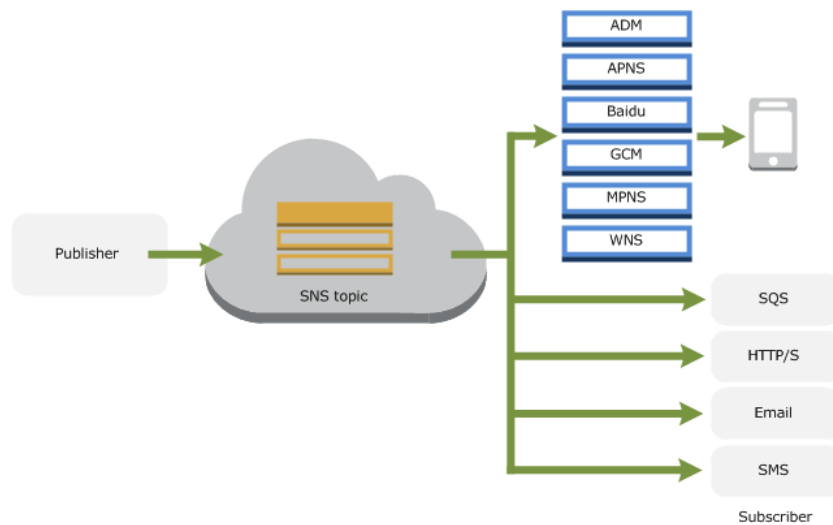
- Amazon Device Messaging (ADM)
- Apple Push Notification Service (APNS) for both iOS and Mac OS X
- Baidu Cloud Push (Baidu)
- Google Cloud Messaging for Android (GCM)
- Microsoft Push Notification Service for Windows Phone (MPNS)
- Windows Push Notification Services (WNS)

The following figure shows an overview of how Amazon SNS is used to send a direct push notification message to a mobile endpoint.



Push notification services, such as APNS and GCM, maintain a connection with each app and associated mobile device registered to use their service. When an app and mobile device register, the push notification service returns a device token. Amazon SNS uses the device token to create a mobile endpoint, to which it can send direct push notification messages. In order for Amazon SNS to communicate with the different push notification services, you submit your push notification service credentials to Amazon SNS to be used on your behalf. For more information, see [Amazon SNS Mobile Push High-Level Steps](#) (p. 39)

In addition to sending direct push notification messages, you can also use Amazon SNS to send messages to mobile endpoints subscribed to a topic. The concept is the same as subscribing other endpoint types, such as Amazon SQS, HTTP/S, email, and SMS, to a topic, as described in [What is Amazon Simple Notification Service?](#) (p. 1). The difference is that Amazon SNS communicates using the push notification services in order for the subscribed mobile endpoints to receive push notification messages sent to the topic. The following figure shows a mobile endpoint as a subscriber to an Amazon SNS topic. The mobile endpoint communicates using push notification services where the other endpoints do not.



Prerequisites

To begin using Amazon SNS mobile push notifications, you need the following:

- A set of credentials for connecting to one of the supported push notification services: ADM, APNS, Baidu, GCM, MPNS, or WNS.
- A device token or registration ID for the mobile app and device.
- Amazon SNS configured to send push notification messages to the mobile endpoints.
- A mobile app that is registered and configured to use one of the supported push notification services.

Registering your application with a push notification service requires several steps. Amazon SNS needs some of the information you provide to the push notification service in order to send direct push notification messages to the mobile endpoint. Generally speaking, you need the required credentials for connecting to the push notification service, a device token or registration ID (representing your mobile device and mobile app) received from the push notification service, and the mobile app registered with the push notification service.

The exact form the credentials take differs between mobile platforms, but in every case, these credentials must be submitted while making a connection to the platform. One set of credentials is issued for each mobile app, and it must be used to send a message to any instance of that app.

The specific names will vary depending on which push notification service is being used. For example, when using APNS as the push notification service, you need a *device token*. Alternatively, when using GCM, the device token equivalent is called a *registration ID*. The *device token* or *registration ID* is a string that is sent to the application by the operating system of the mobile device. It uniquely identifies an instance of a mobile app running on a particular mobile device and can be thought of as unique identifiers of this app-device pair.

Amazon SNS stores the credentials (plus a few other settings) as a platform application resource. The device tokens (again with some extra settings) are represented as objects called platform endpoints. Each platform endpoint belongs to one specific platform application, and every platform endpoint can be communicated with by using the credentials that are stored in its corresponding platform application.

The following sections include the prerequisites for each of the supported push notification services. Once you've obtained the prerequisite information, you can send a push notification message using the

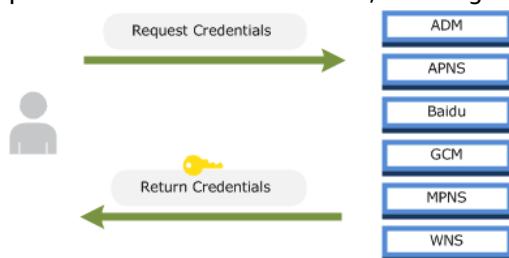
AWS Management Console or the Amazon SNS mobile push APIs. For more information, see [Amazon SNS Mobile Push High-Level Steps \(p. 39\)](#).

Amazon SNS Mobile Push High-Level Steps

This section provides the high-level steps you must perform to use Amazon SNS mobile push. First, for the mobile platforms you want to support you must complete the prerequisites, such as obtaining the required credentials and device token. For more information, see [Prerequisites \(p. 38\)](#). Then, you use the information you obtained from the mobile platforms with Amazon SNS to send a message to a mobile device. This information should help you gain a better understanding of the steps involved when using the Amazon SNS mobile push, as described in [Using Amazon SNS Mobile Push \(p. 77\)](#).

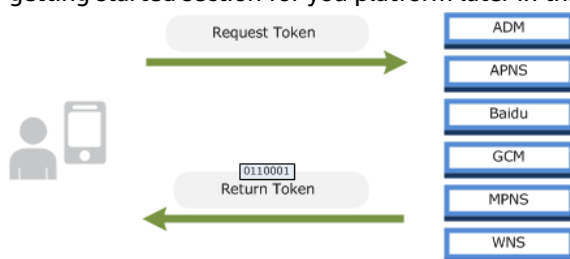
Step 1: Request Credentials from Mobile Platforms

To use Amazon SNS mobile push, you must first request the necessary credentials from the mobile platforms. For more information, see the getting started section for your platform later in this guide.



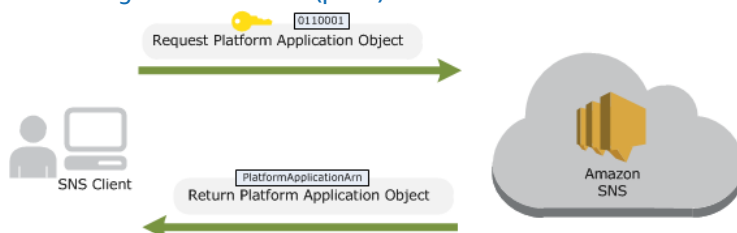
Step 2: Request Token from Mobile Platforms

You then use the returned credentials to request a token for your mobile app and device from the mobile platforms. The token you receive represents your mobile app and device. For more information, see the getting started section for your platform later in this guide.



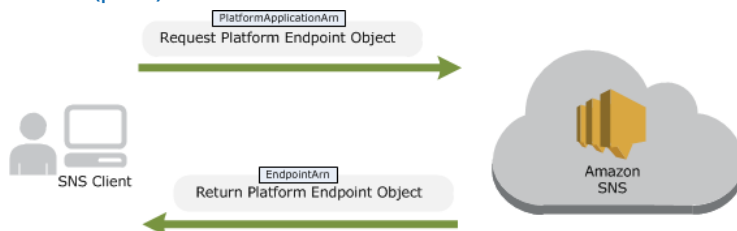
Step 3: Create Platform Application Object

The credentials and token are then used to create a platform application object (`PlatformApplicationArn`) from Amazon SNS. For more information, see [Create a Platform Endpoint and Manage Device Tokens \(p. 82\)](#).



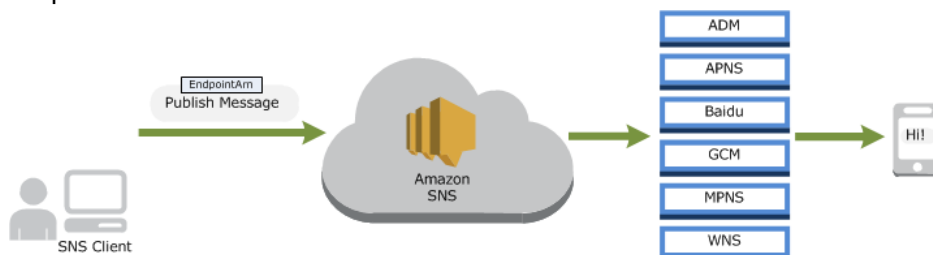
Step 4: Create Platform Endpoint Object

The `PlatformApplicationArn` is then used to create a platform endpoint object (`EndpointArn`) from Amazon SNS. For more information, see [Create a Platform Endpoint and Manage Device Tokens](#) (p. 82).



Step 5: Publish Message to Mobile Endpoint

The `EndpointArn` is then used to publish a message to an app on a mobile device. For more information, see [Send a Direct Message to a Mobile Device](#) (p. 86) and the [Publish](#) API in the Amazon Simple Notification Service API Reference.



Getting Started with Amazon Device Messaging

Amazon Device Messaging (ADM) is a service that enables you to send push notification messages to Kindle Fire apps. This section describes how to obtain the ADM prerequisites and send a push notification message using Amazon SNS and ADM.

Topics

- [ADM Prerequisites](#) (p. 40)
- [Step 1: Create a Kindle Fire App with the ADM Service Enabled](#) (p. 41)
- [Step 2: Obtain a Client ID and Client Secret](#) (p. 41)
- [Step 3: Obtain an API Key](#) (p. 42)
- [Step 4: Obtain a Registration ID](#) (p. 42)
- [Step 5: Sending a Push Notification Message to a Kindle Fire app using Amazon SNS and ADM](#) (p. 43)

ADM Prerequisites

To send push notifications to a Kindle Fire app using Amazon SNS and ADM, you need the following:

- Kindle Fire app with the ADM service enabled
- Client ID and client secret

- API key
- Registration ID

If you already have these prerequisites, then you can send a push notification message to a Kindle Fire app using either the Amazon SNS console or the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). For more information about using the Amazon SNS API, see [Step 5: Sending a Push Notification Message to a Kindle Fire app using Amazon SNS and ADM \(p. 43\)](#).

Step 1: Create a Kindle Fire App with the ADM Service Enabled

To send a push notification message to a Kindle Fire app, you must have an Amazon developer account, set up your development environment, created a Kindle Fire app with ADM enabled, and registered the app with ADM. For more information, see [Integrating Your App with ADM](#).

To create a Kindle Fire app

1. Create an Amazon developer account by following the instructions at [Create an Account](#).
2. Set up your development environment for developing mobile apps for Kindle Fire tablets. For more information, see [Setting Up Your Development Environment](#).
3. Create a Kindle Fire app. For more information, see [Creating Your First Kindle Fire App](#).

Note

If you do not already have a Kindle Fire app registered with ADM, then you can use the sample Kindle Fire app provided by AWS as a template to get started. For more information, see [Step 4: Obtain a Registration ID \(p. 42\)](#).

4. On the [Amazon App Distribution Portal](#), click **Apps and Services**, click the name of your Kindle Fire app, and then click **Device Messaging**.
5. Verify that ADM is enabled for the app. If your app is not listed on the Amazon App Distribution Portal, then add it and enable ADM.

Step 2: Obtain a Client ID and Client Secret

ADM uses a client ID and client secret to verify your server's identity. For more information, [Obtaining ADM Credentials](#).

To obtain a client ID and client secret

1. On the [Amazon App Distribution Portal](#), click **Apps and Services**, click the name of your Kindle Fire app, and then click **Security Profile**. You should see a security profile associated with your app. If not, click **Security Profiles** to create a new security profile.
2. Click **View Security Profile**. Make note of the client ID and client secret.

Step 3: Obtain an API Key

Note

To obtain an API key

- ## Step 4: Obtain a Registration ID

To obtain a registration ID from ADM for your app

- After the sample Kindle Fire app has been imported into your IDE, you need to add the API key for your Kindle Fire app to the `strings.xml` file, which is included in the sample Kindle Fire app.

- ```
<string name="api key"></string>
```



4. Run the app to see the registration ID as output to the Android logging system. If you are using Eclipse with the Android ADT plug-in, you can see the registration ID in the **LogCat** display window. For example, the output containing the registration ID will look similar to the following:

```
amzn1.adm-registration.v2.Example...1cwWJUvgkcPPYcaXCpPWmG3Bqn-
wiqIEzp5zZ7y_jsM0PKPxKhddCzx6paEsyay9Zn3D4wNUJb8m6HXrBf9dqaEw
```

You should now have the necessary information from ADM (client ID, client secret, API key, and registration ID) to send push notification messages to your mobile endpoint. You can now send a push notification message to the Kindle Fire app on your device by either using the Amazon SNS console or the Amazon SNS API. To use the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). To use the Amazon SNS API, see [Step 5: Sending a Push Notification Message to a Kindle Fire app using Amazon SNS and ADM \(p. 43\)](#).

## Step 5: Sending a Push Notification Message to a Kindle Fire app using Amazon SNS and ADM

This section describes how to use the prerequisite information to send a push notification message to your Kindle Fire app using Amazon SNS and ADM. You add the gathered prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file.

### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. Create a new Java project in Eclipse (**File | New | Java Project**).
2. Import the `SNSSamples` folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the `SNSSamples` folder, click **OK**, and then click **Finish**.
3. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open the `AwsCredentials.properties` file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**
2. Click the **Libraries** tab, and then click **Add Library...**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to `SNSMobilePush.java`

1. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open `SNSMobilePush.java` in Eclipse.
2. Uncomment `sample.demoKindleAppNotification()`; . It should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
// sample.demoAndroidAppNotification();
sample.demoKindleAppNotification();
// sample.demoAppleAppNotification();
// sample.demoAppleSandboxAppNotification();
// sample.demoBaiduAppNotification();
// sample.demoWNSAppNotification();
// sample.demoMPNSAppNotification();
```

3. Locate the `demoKindleAppNotification` method and enter the registration ID you received from ADM for the value of the registration ID string. For example, it should look similar to the following:

```
String registrationId = "amzn1.adm-
registration.v2.Example...1cwWJUvgkcPPYcaXCpPWmG3Bqn-
wiqIEzp5zZ7y_jsM0PKPxKhddCzx6paEsyay9Zn3D4wNUJb8m6HXrBf9dqaEw";
```

4. Enter the client ID for your app. For example, it should look similar to the following:

```
String clientId = "amzn1.application-oa2-client.EXAMPLE7423654b79fc9f062fEXAMPLE";
```

5. Enter the client secret for your app. For example, it should look similar to the following:

```
String clientSecret =
"EXAMPLE01658e75ceb7bf9f71939647b1aa105c1c8eaccabaf7d41f68EXAMPLE";
```

6. Enter a name for your app. App names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

```
String applicationName = "admpushapp";
```

7. Run the Java application. You should see output similar to the following in the output window of your IDE:

```
=====
Getting Started with Amazon SNS
=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/ADM/mypushappname}
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/ADM/mypushappname/97e9ced9-
f136-3893-9d60-775467eafebb}
{"ADM": "{ \"data\": { \"message\": \"ENTER YOUR MESSAGE\" } }"}
Published. MessageId=b35fb4bz-b503-4e37-83d4-feu4218d6da6
```

On your Kindle Fire device, you should see a push notification message appear within the Kindle Fire app.

## Getting Started with Apple Push Notification Service

Apple Push Notification Service (APNS) is a service that enables you to send push notification messages to iOS and OS X apps. This section describes how to obtain the APNS prerequisites and send a push notification message using Amazon SNS and APNS.

### Topics

- [APNS Prerequisites \(p. 45\)](#)
- [Step 1: Create an iOS App \(p. 45\)](#)
- [Step 2: Obtain an APNS SSL Certificate \(p. 45\)](#)
- [Step 3: Obtain the App Private Key \(p. 46\)](#)
- [Step 4: Verify the Certificate and App Private Key \(p. 46\)](#)
- [Step 5: Obtain a Device Token \(p. 47\)](#)
- [Next Steps \(p. 47\)](#)
- [Send a push notification message to an iOS app using Amazon SNS and APNS \(p. 47\)](#)
- [Send a push notification message to a VoIP iOS app using Amazon SNS and APNS \(p. 49\)](#)
- [Send a push notification message to a Mac OS X app using Amazon SNS and APNS \(p. 50\)](#)

## APNS Prerequisites

To send push notifications to mobile devices using Amazon SNS and APNS, you need to obtain the following:

- iOS app registered with APNS
- APNS SSL certificate
- App private key
- Device token

If you already have these prerequisites, you can send a push notification message to an iOS app using either the Amazon SNS console or you can use the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). For more information about using the Amazon SNS API, see [Send a push notification message to an iOS app using Amazon SNS and APNS \(p. 47\)](#).

## Step 1: Create an iOS App

To get started with sending a push notification message to an iOS app, you must have an Apple developer account, created an App ID (application identifier), registered your iOS device, and created an iOS Provisioning Profile. For more information, see the [Local and Remote Notification Programming Guide](#) in the iOS Developer Library.

### Note

If you do not already have an iOS app registered with APNS, then you can use the sample iOS app provided by AWS as a template to get started. For more information, see [Step 5: Obtain a Device Token \(p. 47\)](#).

## Step 2: Obtain an APNS SSL Certificate

Amazon SNS requires the APNS SSL certificate of the app in the .pem format when using the Amazon SNS API. When using the Amazon SNS console you can upload the certificate in .p12 format and Amazon SNS will convert it to .pem and display it in the console. You use the Keychain Access application on your Mac computer to export the APNS SSL certificate. For more information about the SSL certificate, see [Provisioning and Development](#) in the Apple Local and Push Notification Programming Guide.

### To download an APNS SSL certificate

1. On the [Apple Developer web site](#), click **Member Center**, click **Certificates, Identifiers and Profiles**, and then click **Certificates**.

2. Select the certificate you created for iOS APNS development, click **Download**, and then save the file, which will have the .cer extension type.

### To convert the APNS SSL certificate from .cer format to .pem format

The following steps use the openssl utility.

- At a command prompt, type the following command. Replace `myapnsappcert.cer` with the name of the certificate you downloaded from the Apple Developer web site.

```
openssl x509 -in myapnsappcert.cer -inform DER -out myapnsappcert.pem
```

The newly created .pem file will be used to configure Amazon SNS for sending mobile push notification messages.

## Step 3: Obtain the App Private Key

Amazon SNS requires an app private key in the .pem format. You use the **Keychain Access** application on your Mac computer to export the app private key.

### To obtain the app private key

The private key associated with the SSL certificate can be exported from the Keychain Access application on your Mac computer. This is based on the assumption that you have already imported the .cer file you downloaded from the Apple Developer web site into Keychain Access. You can do this either by copying the .cer file into Keychain Access or double-clicking the .cer file.

1. Open Keychain Access, select **Keys**, and then highlight your app private key.
2. Click **File**, click **Export Items...**, and then enter a name in the **Save As:** field.
3. Accept the default .p12 file format and then click **Save**.

The .p12 file will then be converted to .pem file format.

### To convert the app private key from .p12 format to .pem format

- At a command prompt, type the following command. Replace `myapnsappprivatekey.p12` with the name of the private key you exported from Keychain Access.

```
openssl pkcs12 -in myapnsappprivatekey.p12 -out myapnsappprivatekey.pem -nodes -clcerts
```

The newly created .pem file will be used to configure Amazon SNS for sending mobile push notification messages.

## Step 4: Verify the Certificate and App Private Key

You can verify the .pem certificate and private key files by using them to connect to APNS.

### To verify the certificate and private key by connecting to APNS

- At a command prompt, type the following command. Replace `myapnsappcert.pem` and `myapnsappprivatekey.pem` with the name of your certificate and private key.

```
openssl s_client -connect gateway.sandbox.push.apple.com:2195 -cert myapnsappcert.pem -
key myapnsappprivatekey.pem
```

## Step 5: Obtain a Device Token

When you register your app with APNS to receive push notification messages, a device token (64-byte hexadecimal value) is generated. The following steps describe how to use the sample iOS app provided by AWS to obtain a device token from APNS. You can use this sample iOS app to help you get started with Amazon SNS push notifications. For more information, see [Configuring Remote Notification Support](#) in the Apple Local and Remote Notification Programming Guide.

### To obtain a device token from APNS for your app

1. Download and unzip the [snsmobilepush.zip](#) file.
2. Navigate to the `AppleMobilePushApp` folder and then open either the `iOS 7 and earlier` or `iOS 8` folder.
3. In Xcode, open the `AmazonMobilePush.xcodeproj` project.
4. Run the app in Xcode. In the output window, you should see the device token displayed, which is similar to the following:

```
Device Token = <example 29z6j5c4 df46f809 505189c4 c83fjcgf 7f6257e9 8542d2jt 3395kj73>
```

#### Note

Do not include spaces in the device token when submitting it to Amazon SNS.

## Next Steps

You should now have the necessary information from APNS (SSL certificate, app private key, and device token) to send push notification messages to your mobile endpoint. You can now send a notification to the iOS app on your device by either using the Amazon SNS console or the Amazon SNS API.

- To send a notification to the iOS app on your device using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#).
- To use the Amazon SNS API, see [Send a push notification message to an iOS app using Amazon SNS and APNS \(p. 47\)](#).
- To send a push notification message to a VoIP app using Amazon SNS and APNS, see [Send a push notification message to a VoIP iOS app using Amazon SNS and APNS \(p. 49\)](#).
- To send a push notification message to a Mac OS X app using Amazon SNS and APNS, see [Send a push notification message to a Mac OS X app using Amazon SNS and APNS \(p. 50\)](#).

## Send a push notification message to an iOS app using Amazon SNS and APNS

This section describes how to use the prerequisite information with the Amazon SNS API to send a push notification message to your iOS app using Amazon SNS and APNS. You add the prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file.

You can also use the Amazon SNS console. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#).

### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. Create a new Java project in Eclipse (**File | New | Java Project**).
2. Import the SNSSamples folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the SNSSamples folder, click **OK**, and then click **Finish**.
3. In the SNSSamples\src\com\amazonaws\sns\samples\mobilepush folder, open the AwsCredentials.properties file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**
2. Click the **Libraries** tab, and then click **Add Library...**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to SNSMobilePush.java

1. In the SNSSamples\src\com\amazonaws\sns\samples\mobilepush folder, open SNSMobilePush.java in Eclipse.
2. Depending on which APNS you are using, uncomment either sample.demoAppleAppNotification(); or sample.demoAppleSandboxAppNotification();. For example, if you're using demoAppleSandboxAppNotification, it should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
// sample.demoAndroidAppNotification();
// sample.demoKindleAppNotification();
// sample.demoAppleAppNotification();
sample.demoAppleSandboxAppNotification();
// sample.demoBaiduAppNotification();
// sample.demoWNSAppNotification();
// sample.demoMPNSAppNotification();
```

3. Locate the demoAppleSandboxAppNotification method and enter the device token you received from APNS for the value of the device token string. For example, it should look similar to the following:

```
String deviceToken = "example29z6j5c4df46f809505189c4c83fjcgf7f6257e98542d2jt3395kj73";
```

4. Enter the APNS SSL certificate for your app. At the beginning of each new line in your certificate, you must add \n. For example, it should look similar to the following:

```
String certificate = "-----BEGIN CERTIFICATE-----
\nMIICiTCcAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UEBhMC
\nVVMxCzAJBgNVBAGTAldBMRAdG9yYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQKEwZBbWV6
\nBgkqhkiG9w0BCQEWEG5vb25lQG9w0BjYXpvaW5jb20wHhcNMTEwNDI1MjA0NTIwWhcN
\nMTIwNDI1MjA0NTIwWjCBiDELMAkGA1UEBhMCVVMxCzAJBgNVBAGTAldBMRAdG9yYD
```

```
\nVQQHEwdTZWF0dGx1MQ8wDQYDVQKKEwZBbWF6b24xFDASBgNVBAsTC0lBTSBDb25z
\nb2xlMRIwEAYDVQQDEw1UZXR0Q21sYWMxHZAAdBgkqhkiG9w0BCQEWEG5vb25lQGFT
\nYXpvi5jb20wgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMaK0dn+a4GmWIWJ
\n21uUSfwfEvySWtC2XADZ4nB+BLygVIk60CpiwsZ3G93vUEIO3IyNoH/f0wYK8m9T
\nrDhUdUZg3qX4waLG5M43q7Wgc/MbQITxOUSQv7c7ugFFDzQGBZzswY6786m86gpe
\nIbb3OhjZnzcVQAaRHdlQWIMm2nrAgMBAAEwDQYJKoZIhvcNAQEFBQADgYEAtCu4\nnnUhVVxYUntneD9+h8Mg9q6q
+auNKyExzyLwaxlAoo7TJHidbtS4J5iNmZgXLOfkb
\nFFBjvSfpJILJ00zbbNYS5f6GuoEDmFJl0ZxBHjJnyp378OD8uTs7fLvJx79LjSTb
\nNYiytVbZPQUQ5Yaxu2jXnimvw3rrszlaEXAMPLE=\n-----END CERTIFICATE-----";
```

5. Enter the private key for your app. At the beginning of each new line in your certificate, you must add \n. For example, it should look similar to the following:

```
String privateKey = "-----BEGIN RSA PRIVATE KEY-----
\nMJIciTCHaFiCCQD9m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UEBhMC
\nWVMxCzAJBgNVBAGTAldBMRAwDgYDVQHEwdTZWF0dGx2MQ8wDQYDVQKKEwZBbWF6b25lQGFT
FYai3z96EXAMPLE=\n-----END RSA PRIVATE KEY-----";
```

6. Enter a name for your app. App names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

```
String applicationName = "mypushappname";
```

7. Run the Java application. You should see output similar to the following in the output window of your IDE:

```
=====
Getting Started with Amazon SNS
=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/APNS_SANDBOX/
mypushappname}
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/APNS_SANDBOX/
pushapp/97e9ced9-f136-3893-9d60-775467eafebb}
{"default":"This is the default Message","APNS_SANDBOX":{" \\"aps\\" : { \\"alert\\" :
 \\"You have got email.\\", \\"badge\\" : 9,\\"sound\\" : \\"default\\"}}"}
Published. MessageId=d65fb4bb-b903-5e37-83d4-feb4818d6da3
```

On your iOS device, you should see a message notification.

## Send a push notification message to a VoIP iOS app using Amazon SNS and APNS

To send a push notification message to a VoIP app using Amazon SNS and APNS, you must first complete the prerequisites in [APNS Prerequisites](#) (p. 45).

### Note

If you do not already have an iOS app registered with APNS, you can download and use the [snsmobilepush.zip](#) sample file provided by AWS as a template to get started. For more information, see [Step 5: Obtain a Device Token](#) (p. 47).

### To register your mobile app with AWS

1. Go to <https://console.aws.amazon.com/sns/> and click **Create platform application**.
2. In the **Application name** box, enter a name to represent your app.

App names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long.

3. In the **Push Notification Platform** field, select **Apple Development** or **Apple Production**.
4. In the **Push Certification Type** field, select **VoIP Push Certificate**.
5. Select the password encrypted certificate and private key, as exported from Keychain Access on your Mac computer in the .p12 file format.
6. Enter your password, and then click **Create Platform Application**.

## Send a push notification message to a Mac OS X app using Amazon SNS and APNS

To send a push notification message to a Mac OS X app using Amazon SNS and APNS, you must first complete the prerequisites in [APNS Prerequisites \(p. 45\)](#).

### Note

If you do not already have a Mac OS X app registered with APNS, you can download and use a sample application such as [PushyMac](#), which is available from the Apple Developer web site.

### To register your mobile app with AWS

1. Go to <https://console.aws.amazon.com/sns/> and click **Create platform application**.
2. In the **Application name** box, enter a name to represent your app.

App names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long.

3. In the **Push Notification Platform** field, select **Apple Development** or **Apple Production**.
4. In the **Push Certification Type** field, select **MacOS Push Certificate**.
5. Select the password encrypted certificate and private key, as exported from Keychain Access on your Mac computer in the .p12 file format.
6. Enter your password, and then click **Create Platform Application**.

## Getting Started with Baidu Cloud Push

Baidu Cloud Push is a Chinese cloud service. Using Baidu, you can send push notification messages to mobile devices. This section describes how to obtain the Baidu prerequisites and send a push notification message using Amazon SNS and Baidu.

### Topics

- [Baidu Prerequisites \(p. 51\)](#)
- [Step 1: Create a Baidu Account \(p. 51\)](#)
- [Step 2: Register as a Baidu Developer \(p. 53\)](#)
- [Step 3: Create a Baidu Cloud Push Project \(p. 56\)](#)
- [Step 4: Download and Install the Android Demo App from Baidu \(p. 59\)](#)
- [Step 5: Obtain a User Id and Channel Id from Baidu \(p. 62\)](#)
- [Step 6: Send a Push Notification Message to a Mobile Endpoint using Amazon SNS and Baidu \(p. 63\)](#)



## Baidu Prerequisites

To send a push notification message to mobile devices using Amazon SNS and Baidu, you need the following:

- Baidu account
- Registration as a Baidu developer
- Baidu cloud push project
- API key and secret key from a Baidu cloud push project
- Baidu user ID and channel ID
- Android demo app

If you already have these prerequisites, then you can send a push notification message to a mobile endpoint using the Amazon SNS API. For more information about using the Amazon SNS API, see [Step 6: Send a Push Notification Message to a Mobile Endpoint using Amazon SNS and Baidu](#) (p. 63).

## Step 1: Create a Baidu Account

To use Baidu, you must first create an account.

### Important

In order to create a Baidu account there is a verification step where you must enter Chinese Simplified characters. The easiest way to accomplish this task is for someone that can read Chinese to assist. Another option is to use Amazon Mechanical Turk for creating the Baidu account. Once you have the account and password created for Baidu, you could login and change the password without needing to enter Chinese Simplified characters. For more information about Mechanical Turk, see the [Amazon Mechanical Turk Requester User Interface](#).

### To create a Baidu account

1. On the [Baidu Portal](#), in the top right corner, click 注册 (Registration).

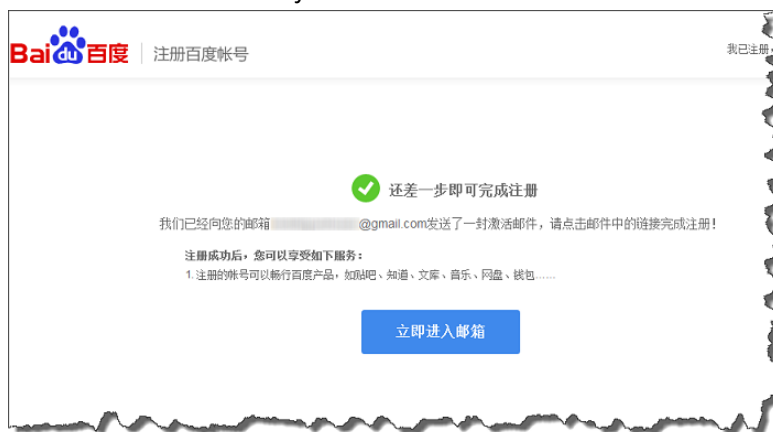
[搜索设置](#) | [登录](#) | [注册](#)



2. Enter an email address, password, and verification code, and then click 注册 (Registration).



You should then see a page similar to the following, informing you that an activation email has been sent to the email address you entered.



3. Login to your email account, open the activation email you received from Baidu, and click the provided link:



4. After you click the provided link in the activation email from Baidu, you must then enter the verification code (Chinese Simplified characters).





4. Click **马上开始 (Start Now)**



5. Enter your name, description, and mobile phone number for receiving a verification text message, and then click **发送验证码 (Send Verification Code)**.

A screenshot of the Baidu Open Cloud developer registration form. The form is titled '填写开发者信息' (Fill in developer information) and has three steps: '填写开发者信息', '验证邮箱' (Verify email), and '提交应用 / 使用开放云服务' (Submit application / Use open cloud services). The first step is active. The form includes fields for: '类型' (Type) with radio buttons for '个人' (Individual) and '公司' (Company); '开发者来源' (Developer source) with a dropdown menu; '开发者姓名' (Developer name) with a text input field; '开发者简介' (Developer introduction) with a text area; 'Email地址' (Email address) with a text input field and a '修改' (Modify) link; '手机号' (Mobile phone number) with a text input field and a '发送验证码' (Send verification code) button highlighted with a red box; '验证码' (Verification code) with a text input field; '开发者官方网站' (Developer official website) with a text input field; and '品牌LOGO' (Brand logo) with a text input field and a note about the logo size and format.

You should then receive a text message with a verification number, similar to the following:



6. Complete the developer registration by entering the verification number and then click **提交 (Submit)** on the bottom of the page.

The screenshot shows the '填写开发者信息' (Fill in developer information) step of the Baidu Open Cloud registration process. At the top, there is a progress bar with three icons: a pencil for '填写开发者信息', an envelope for '验证邮箱', and an upload arrow for '提交应用 / 使用开放云服务'. Below the progress bar, a message states: '成为一名百度开发者需要您完善以下信息，以便使用强大的应用分发渠道和丰富的开放云服务' (To become a Baidu developer, you need to complete the following information to use the powerful application distribution channels and rich open cloud services). The form fields include: '类型' (Type) with radio buttons for '个人' (Personal) and '公司' (Company); '开发者来源' (Developer source) with a dropdown menu; '开发者姓名' (Developer name) with a text input field; '开发者简介' (Developer introduction) with a text area; 'Email地址' (Email address) with a text input field and a '修改' (Modify) link; '手机号' (Mobile phone number) with a text input field and a '发送验证码' (Send verification code) button; '验证码' (Verification code) with a text input field; '开发者官方网站' (Developer official website) with a text input field; and '品牌LOGO' (Brand logo) with a text input field and a note: '112px\*54px, 支持PNG/JPG/GIF格式, 应用提交至PC' (112px\*54px, supports PNG/JPG/GIF format, application submitted to PC). The '验证码' field is highlighted with a red box.

Upon successful registration, you should see the following:

The screenshot shows the '验证邮箱' (Verify email) step of the Baidu Open Cloud registration process. At the top, there is a progress bar with three icons: a pencil for '填写开发者信息', an envelope for '验证邮箱', and an upload arrow for '提交应用 / 使用开放云服务'. Below the progress bar, a message states: '邮箱验证成功，恭喜 您成为百度开发者！' (Email verification successful, congratulations on becoming a Baidu developer!). Below this, a message states: '百度开放云平台不仅将百度的技术和大数据能力开放给广大开发者，更有强大的应用推广渠道，双剑合璧为您的成功加速！' (Baidu Open Cloud platform not only opens up Baidu's technology and big data capabilities to developers, but also has powerful application promotion channels, and the combination of the two will accelerate your success!). At the bottom, there is a blue button labeled '去创建应用 >>' (Go to create application >>).

After registering as a Baidu developer, you can then proceed to the next step to create a Baidu cloud push project. This assumes that you are still logged in. If you are not logged in, then you can use the following login procedure.

### To login to Baidu

1. On the [Baidu Portal](#), in the top right corner, click **登录 (Login)**.

[搜索设置](#) [登录](#) [注册](#)



[新闻](#) [网页](#) [贴吧](#) [知道](#) [音乐](#) [图片](#) [视频](#) [地图](#)

[百科](#) [文库](#) [hao123](#) | [更多>>](#)

2. Enter your Baidu username (email address) and password and then click **登录 (Login)**.

登录百度帐号

百度开放云

Baidu username (email address)

password

☒ 下次自动登录 [忘记密码?](#)

登录

立即注册

## Step 3: Create a Baidu Cloud Push Project

When you create a Baidu cloud push project, you receive your app ID, API key, and secret key.

### To create a Baidu cloud push project

1. On the [Baidu Portal](#), click **更多 (More)**.



2. Click **百度开放云平台 (Baidu's Open Cloud Platform)**



3. On the next page, near the top right corner, click **开发者服务 (Developer Services)**.



4. Click **云推送 (Cloud Push)**.



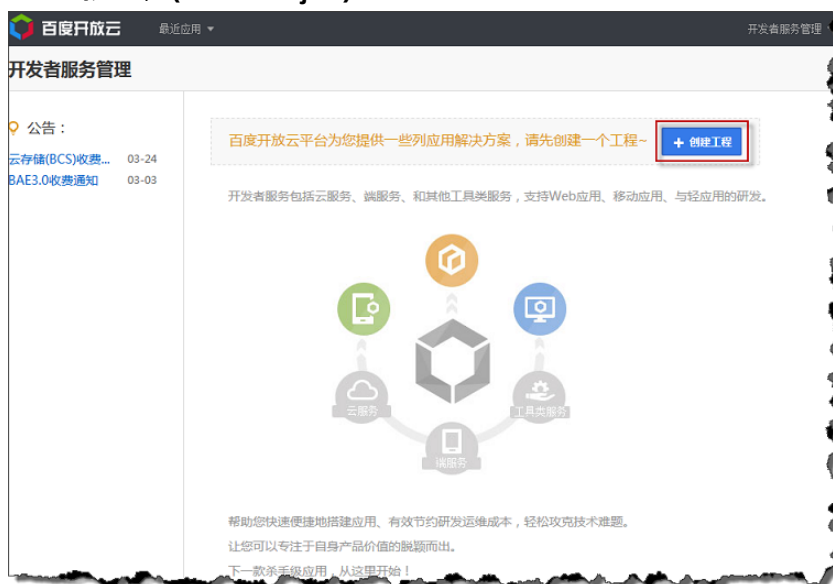
5. Click **管理控制台 (Management Console)**.



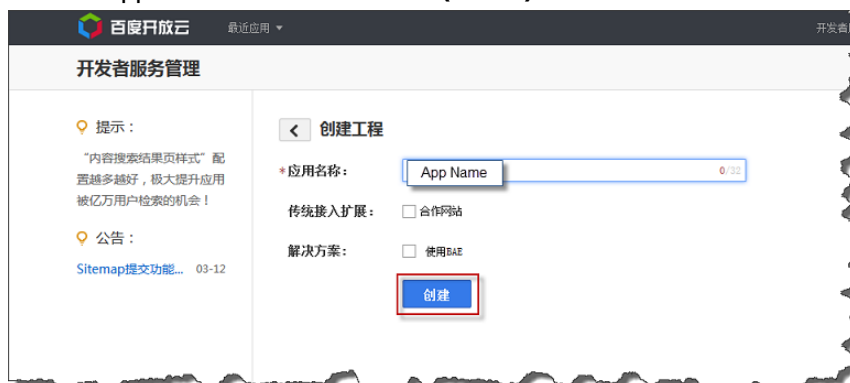
6. Click **管理控制台 (Management Console)** to enter information for an Android project.



7. Click **创建工程 (Create Project)**.

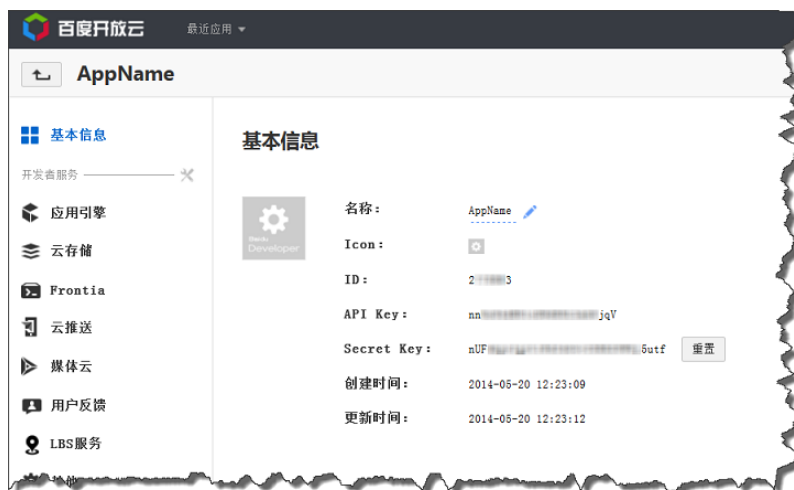


8. Enter an app name and then click **创建 (Create)**.





9. Upon successful completion of the project, you will then see a page similar to the following with your **app ID**, **API Key**, and **Secret Key**. Make note of the API key and secret key, as they will be needed later.



## Step 4: Download and Install the Android Demo App from Baidu

Baidu generates an Android demo app that you can download and install to your mobile device.

### To download and install the Android demo app from Baidu

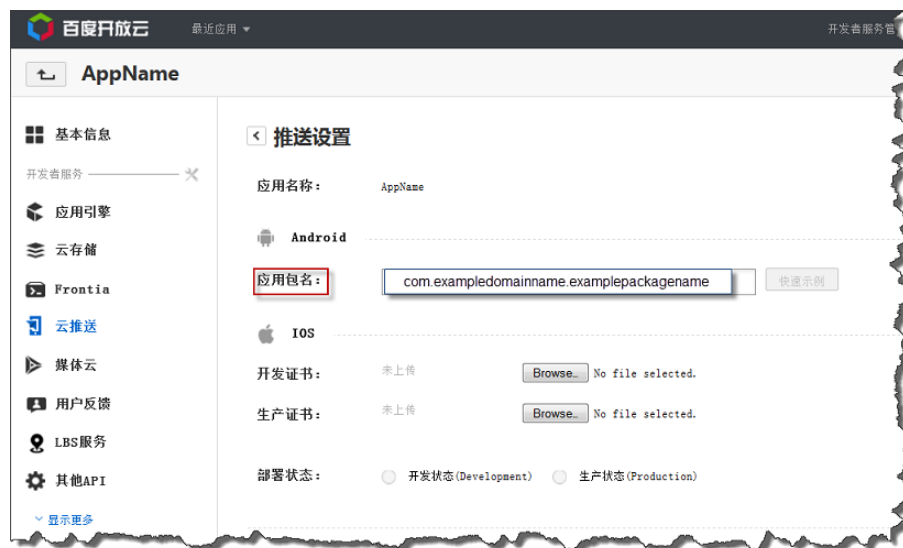
1. Starting from the page that displays the app ID, API Key, and Secret Key, click **云推送 (Cloud Push)**



2. Click **推送设置 (Push Settings)**



- Using reverse domain name notation, enter a package name in the 应用包名 (App Package Name) box.



- Click 保存设置 (Save Settings)

AppName

基本信息

开发服务

应用引擎

云存储

Frontia

云推送

媒体云

用户反馈

LBS服务

其他API

显示更多

推送设置

应用名称: AppName

Android

应用包名: com.exampledomainname.examplepackagename

iOS

开发证书: 未上传 Browse... No file selected.

生产证书: 未上传 Browse... No file selected.

部署状态: ☐ 开发状态 (Development) ☐ 生产状态 (Production)

离线消息: ☐ 不保存, 终端离线时的消息将被忽略 ☒ 保存 5 小时, 终端上线后可收到服务器临时缓存的消息

保存设置

You should then see the 保存成功 ! (Successfully saved!) message displayed.



5. Next, click 快速示例 (Quick Example).

百度开放云 最近应用 开发服务

AppName

基本信息

开发服务

应用引擎

云存储

Frontia

云推送

推送设置

应用名称: AppName

Android

应用包名: com.exampledomainname.examplepackagename

iOS

开发证书: 未上传 Browse... No file selected.

生产证书: 未上传 Browse... No file selected.

部署状态: ☐ 开发状态 (Development) ☐ 生产状态 (Production)

离线消息: ☐ 不保存, 终端离线时的消息将被忽略 ☒ 保存 5 小时, 终端上线后可收到服务器临时缓存的消息

快速示例

You should then see a page similar to the following:



6. On the Android mobile device you want to test with, scan the QR code icon using a code scanner, such as [QR Droid](#), to get a link to a demo app provided by Baidu.

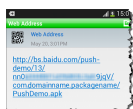
#### Note

You can also download the demo app by clicking **下载Android示例 (Download Android Sample)**

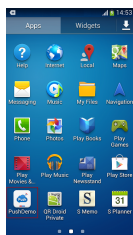


The Baidu Push Demo app is included in the downloaded `PushDemo.zip` package. You can use the demo app as an example for creating your own app to use with Baidu. In addition, the push service jar file (`pushservice-4.0.0.jar`) from Baidu is included in the `PushDemo.zip` package. You must use the jar file from Baidu in order to create a new app.

7. Click the link you receive after scanning the scan code. This will download the demo app provided by Baidu onto your mobile device.



8. After the download has completed, install the demo app onto your mobile device. You should then see the following **Push Demo** app installed:



## Step 5: Obtain a User Id and Channel Id from Baidu

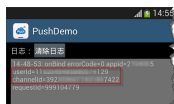
Baidu generates a user Id and channel Id that you will need to send a push notification message using Baidu.

### To obtain the user Id and channel Id from Baidu

1. Open **Push Demo** and then click, in the bottom right, 无账号绑定 (**Bind Without Baidu Account**).



You should then see a screen similar to the following with the **userId** and **channelId**.



2. Make a note of the **userId** and **channelId**, as you will be using them in the next step.

#### Note

For an example of Java code that is used to retrieve the **userId** and **channelId**, see the `onBind` method in the `MyPushMessageReceiver.java` file of the Push Demo app from Baidu. For more information, see the [Android integration guide](#). To translate this guide into English, you can paste the URL, <http://developer.baidu.com/wiki/index.php?title=docs/cplat/push/guide>, into [Bing Translator](#) and then click **Translate**.

## Step 6: Send a Push Notification Message to a Mobile Endpoint using Amazon SNS and Baidu

This section describes how to send a push notification message to your mobile endpoint. You add the gathered prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file. Included in the `SNSMobilePush.java` file are examples on how to create a mobile endpoint and use message attributes for structuring the message. For additional information and examples on how to create mobile endpoints and use message attributes with Baidu, see [Creating an Amazon SNS Endpoint for Baidu \(p. 65\)](#) and [Using Message Attributes for Structuring the Message \(p. 66\)](#).

#### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. In Eclipse, create a new Java project (**File | New | Java Project**).
2. Import the `SNSSamples` folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the `SNSSamples` folder, click **OK**, and then click **Finish**.
3. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open the `AwsCredentials.properties` file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**

2. Click the **Libraries** tab, and then click **Add Library....**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to `SNSMobilePush.java`

1. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open `SNSMobilePush.java` in Eclipse and uncomment `sample.demoBaiduAppNotification()`; it should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
//sample.demoAndroidAppNotification();
//sample.demoKindleAppNotification();
//sample.demoAppleAppNotification();
//sample.demoAppleSandboxAppNotification();
sample.demoBaiduAppNotification();
//sample.demoWNSAppNotification();
//sample.demoMPNSAppNotification();
```

2. Locate the `demoBaiduAppNotification` method and enter the user ID and channel ID you received from Baidu for the value of the `userId` and `channelId` strings. For example, it should look similar to the following:

```
String userId = "EXAMPLE-
kLMchcX0v3xOxWVhG6TfdBp...KT2TGkvnKyTvLuSpzK_qsHgxB_UpmcUa7G16g3EXAMPLE";
String channelId = "EXAMPLE<channelId>EXAMPLE";
```

3. Enter the secret key for your application. For example, it should look similar to the following:

```
String secretKey = "EXAMPLE<secretkey>EXAMPLE";
```

4. Enter the API key for your application. For example, it should look similar to the following:

```
String apiKey = "EXAMPLExV21cV2zEKTlNys625zfk2jh4EXAMPLE";
```

5. Enter a name for your application. Application names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

```
String applicationName = "baidupushapp";
```

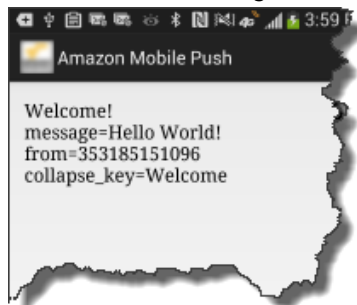
6. Run the application. You should see output similar to the following in the output window of your IDE:

```
=====
Getting Started with Amazon SNS
=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/BAIDU/TestApp}
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/BAIDU/
TestApp/8f3fd0d-520b-38d1-8ed2-3301a477eef3}
{Message Body: {"BAIDU":{"title":"New Notification Received from SNS",
"description":"Hello World!\"}}}
{Message Attributes: {"AWS.SNS.MOBILE.BAIDU.MessageKey": "default-channel-msg-key"},
("AWS.SNS.MOBILE.BAIDU.DeployStatus": "1"),("AWS.SNS.MOBILE.BAIDU.MessageType": "0")}
Published!
```

```
{MessageId=56a3a3e6-4b4b-59b4-8d1d-eff592c0ffa1}
```

On your Android device, you should see a push notification message appear within the Android app, similar to the following:



## Creating an Amazon SNS Endpoint for Baidu

This section provides additional information and examples on how to create an Amazon SNS endpoint to use with Baidu. You create an Amazon SNS endpoint, using the combined `userId` and `channelId` received from Baidu, to represent the app and mobile device. The endpoint is then used by Amazon SNS for publishing notification messages using the Baidu push notification service to the app on the mobile device.

The following Java example shows how to create an Amazon SNS endpoint for a Baidu app and mobile device.

```
Map<String ,String> attributes = new HashMap<String ,String>();

// Insert your UserId. This is a mandatory field.
attributes.put("UserId", "9999999999");

// Insert your ChannelId. This is a mandatory field.
attributes.put("ChannelId", "1234567890");

CreatePlatformEndpointRequest createPlatformEndpointRequest = new
 CreatePlatformEndpointRequest();

// Baidu endpoints are identified by a combination of the userId and channelId which must
// be supplied as endpoint attributes,
// without which a valid endpoint cannot be successfully created.
createPlatformEndpointRequest.setAttributes(attributes);

// Insert your ChannelId. This is a mandatory field.
createPlatformEndpoint.setPlatformToken("1234567890");

// Insert your Customer User Data. This is an optional field.
createPlatformEndpoint.setCustomUserData("Test Endpoint");

// Insert your Platform Application Arn. This is a mandatory field.
createPlatformEndpoint.setPlatformApplicationArn("arn:aws:sns:us-west-2:123456789012:app/
BAIDU/TestApp");
String endpointArn = snsClient.createPlatformEndpoint(createPlatformEndpointRequest);
```

Note the following considerations when using the Amazon SNS API to create an endpoint for use with Baidu:

- In `CreateEndpointRequest`, the platform token field should contain the `channelId`.

- If you specify the endpoint attribute "Token" in the attributes map, this field must encapsulate the channelId as well.
- The channelId should also be specified as an endpoint attribute with the name "ChannelId".
- The value of the "ChannelId" endpoint attribute and the platform token field and/or "Token" endpoint attribute must be identical to construct a successful request.
- The userId should be specified as an endpoint attribute with the name "UserId".
- For a successful response, the request must contain valid UserId and ChannelId values in the attributes. Also, the ChannelId parameter entered using setPlatformToken(String), which is a part of CreatePlatformEndpointRequest, must be the same as the ChannelId specified in the attributes map.

## Using Message Attributes for Structuring the Message

This section provides additional information and examples for using message attributes to structure a message and send a push notification message to a mobile endpoint.

The following Java example shows how to send a push notification message to a mobile endpoint and how to use the optional message attributes for structuring the message. If an attribute is not sent, a default value is auto-set in its place.

### Note

The push notification message cannot exceed 256 bytes, which is the maximum size allowed by Baidu.

```
Map<String, MessageAttributeValue> messageAttributes = new HashMap<String,
 MessageAttributeValue>();

// Insert your desired value of Deploy Status here. 1 = DEV, 2 = PROD
messageAttributes.put("AWS.SNS.MOBILE.BAIDU.DeployStatus", new
 MessageAttributeValue().withDataType("String").withStringValue("1"));

// Insert your desired value of Message Type here. 0 = IN-APP MESSAGE, 1 = ALERT
 NOTIFICATION
messageAttributes.put("AWS.SNS.MOBILE.BAIDU.MessageType", new
 MessageAttributeValue().withDataType("String").withStringValue("1"));

// Insert your desired value of Message Key
messageAttributes.put("AWS.SNS.MOBILE.BAIDU.MessageKey", new
 MessageAttributeValue().withDataType("String").withStringValue("test-message"));

PublishRequest publishRequest = new PublishRequest();
publishRequest.setMessageAttributes(messageAttributes);
String message = "{\"title\":\"Test_Title\",\"description\":\"Test_Description\"}";
publishRequest.setMessage(message);
publishRequest.setTargetArn("arn:aws:sns:us-west-2:999999999999:endpoint/BAIDU/
TestApp/309fc7d3-bc53-3b63-ac42-e359260ac740");
PublishResult publishResult = snsClient.publish(publishRequest);
```

Note the following considerations when using the optional message attributes for structuring the message:

- `AWS.SNS.MOBILE.BAIDU.DeployStatus`

Possible Values (Default = 1):

1 – Tags the notification as being sent in a development environment

2 – Tags the notification as being sent in a production environment

- `AWS.SNS.MOBILE.BAIDU.MessageType`



Possible Values (Default = 1):

0 – Generates an in-app message

1 – Generates an alert notification. Alert notifications are restricted to the following format:

```
{"title": "<TITLE>", "description": "<DESCRIPTION>"}
```

<TITLE> and <DESCRIPTION> are the title and description you desire for your alert notification. If the message is incorrectly formatted JSON, the request fails.

- `AWS.SNS.MOBILE.BAIDU.MessageKey`

A short message identifier you can attach to your message

## Getting Started with Google Cloud Messaging for Android

Google Cloud Messaging for Android (GCM) is a service that enables you to send push notification messages to an Android app. This section describes how to obtain the GCM prerequisites and send a push notification message to a mobile endpoint.

### Topics

- [GCM Prerequisites \(p. 67\)](#)
- [Step 1: Create a Google API Project and Enable the GCM Service \(p. 67\)](#)
- [Step 2: Obtain the Server API Key \(p. 68\)](#)
- [Step 3: Obtain a Registration ID from GCM \(p. 68\)](#)
- [Step 4: Send a Push Notification Message to a Mobile Endpoint using GCM \(p. 69\)](#)

## GCM Prerequisites

To send push notification messages to an Android app, you need the following:

- Android app registered with GCM
- Registration ID
- Server API key (sender auth token)

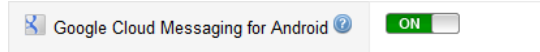
If you already have these prerequisites, then you can either use the Amazon SNS console to send a push notification message to the mobile endpoint or you can use the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). For more information about using the Amazon SNS API, see [Step 4: Send a Push Notification Message to a Mobile Endpoint using GCM \(p. 69\)](#).

## Step 1: Create a Google API Project and Enable the GCM Service

To send an push notification message to an Android app, you must have a Google API project and enable the GCM service.

### To create a Google API project and enable the GCM service

1. On the [Google APIs Console web site](#), verify that you have a Google API project.
2. Click **Services**, and make sure **Google Cloud Messaging for Android** is turned on.



## Step 2: Obtain the Server API Key

To communicate with GCM on your behalf, Amazon SNS uses your server API key. This key will be used in a later step to send a push notification to a mobile endpoint.

### To obtain the server API key

1. On the [Google APIs Console web site](#), click **API Access** and make note of the server API key with the **Key for server apps (with IP locking)** label.
2. If you have not yet created a server API key, then click **Create new Server key**. This key will be used later in this section to send a push notification to a mobile endpoint.

## Step 3: Obtain a Registration ID from GCM

When you register your app with GCM to receive push notification messages, a registration ID is generated. Amazon SNS uses this value to determine which app and associated device to send mobile push notifications to.

The following steps show how to use the sample Android app provided by AWS to obtain a registration ID from GCM. You can use this sample Android app to help you get started with Amazon SNS push notifications. This sample app requires the Android SDK, the Google Play Services SDK, and the Android Support Library package. For more information about these SDKs, see [Get the Android SDK](#) and [Setup Google Play Services SDK](#). For more information about the Android Support Library package, see [Support Library Setup](#).

#### Note

The provided sample Android app is compatible with physical devices running Android version 2.3 or later and with virtual devices running Google API 17 or later.

### To obtain a registration ID from GCM for your app

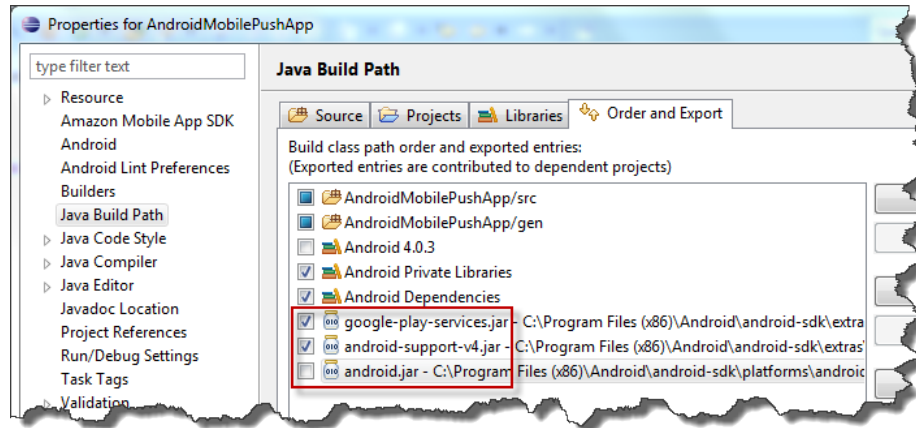
1. Download and unzip the [snsmobilepush.zip](#) file.
2. Import the `AndroidMobilePushApp` folder into your IDE. In Eclipse, click **File, Import**, expand the **Android** folder, click **Existing Android Code Into Workspace**, click **Next**, browse to the folder `AndroidMobilePushApp`, click **OK**, and then click **Finish**.

After the sample Android app has been imported into your IDE, you need to add the Project Number for your Google API project to the `strings.xml` file, which is included in the sample Android app.

3. Add the Project Number for your Google API project to the `strings.xml` file. In your IDE, you will find the file included in the **values** folder, which is a subfolder of **res**. The string will look similar to the following:

```
<string name="project_number">012345678912</string>
```

4. Add `google-play-services.jar`, `android-support-v4.jar`, and `android.jar` to the Java Build Path. Select `google-play-services.jar` and `android-support-v4.jar` for export, but do not select `android.jar` for export.



5. Run the app to see the registration ID as output to the Android logging system. If you are using Eclipse with the Android ADT plug-in, you can see the registration ID in the **LogCat** display window. For example, the output containing the registration ID will look similar to the following:

```
06-05 11:50:43.587: V/Registration(14146): Registered,
 registrationId: = ExampleI7fFackhJ1xjlqT64RaBkcGHochmf1VQAr9k-
 IBJtKjp7fedYPzEwT_Pq3Tu0lroqro1cwWJUvgkcPPYcaXCpFWmG3Bqn-
 wiqIEzp5zZ7y_jsM0PKPxKhddCzx6paEsyay9Zn3D4wNUJb8m6HXrBf9dqaEw, error = null,
 unregistered = null
```

The installed app will appear on your Android device:



You should now have a registration ID, server API key, and Android app registered with GCM. You can now send a notification to the Android app on your device by either using the Amazon SNS console or the Amazon SNS API. To use the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). To use the Amazon SNS API, see [Step 4: Send a Push Notification Message to a Mobile Endpoint using GCM \(p. 69\)](#).

## Step 4: Send a Push Notification Message to a Mobile Endpoint using GCM

This section describes how to send a push notification message to your mobile endpoint. You add the gathered prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the `snsmobilepush.zip` file.

### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. In Eclipse, create a new Java project (**File | New | Java Project**).
2. Import the `SNSSamples` folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the `SNSSamples` folder, click **OK**, and then click **Finish**.
3. In the `SNSSamples/src/com/amazonaws/sns/samples/mobilepush` folder, open the `AwsCredentials.properties` file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**
2. Click the **Libraries** tab, and then click **Add Library...**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to `SNSMobilePush.java`

1. In the `SNSSamples/src/com/amazonaws/sns/samples/mobilepush` folder, open `SNSMobilePush.java` in Eclipse and uncomment `sample.demoAndroidAppNotification()`; It should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
sample.demoAndroidAppNotification();
// sample.demoKindleAppNotification();
// sample.demoAppleAppNotification();
// sample.demoAppleSandboxAppNotification();
// sample.demoBaiduAppNotification();
// sample.demoWNSAppNotification();
// sample.demoMPNSAppNotification();
```

2. Locate the `demoAndroidAppNotification` method and enter the registration ID you received from GCM for the value of the registration ID string. For example, it should look similar to the following:

```
String registrationId = "EXAMPLE-
kLMchcX0v3xOxWVhG6TfdBp...KT2TGkvnKyTvLuSpzK_qSHgxVB_UpmcUa7G16g3EXAMPLE";
```

3. Enter the API key for your application. For example, it should look similar to the following:

```
String serverAPIKey = "EXAMPLExV21cV2zEKTLNys625zfk2jh4EXAMPLE";
```

4. Enter a name for your application. Application names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

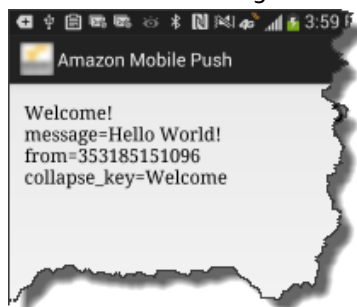
```
String applicationName = "gcmpushapp";
```

5. Run the application. You should see output similar to the following in the output window of your IDE:

```
=====
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=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/GCM/gcmpushapp}
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/GCM/
gcmpushapp/5e3e9847-3183-3f18-a7e8-671c3a57d4b3}
{"default":"This is the default message","GCM":{"\"delay_while_idle\":true,
\"collapse_key\":\"Welcome\",\"data\":{\"\"message\":\"Visit Amazon!\",\"url\":\"http://
www.amazon.com/\"},\"time_to_live\":125,\"dry_run\":false}}
Published. MessageId=1ca8d7d1-c261-5bfc-8689-9db269c4e46c
```

On your Android device, you should see a push notification message appear within the Android app, similar to the following:



## Getting Started with MPNS

Microsoft Push Notification Service for Windows Phone (MPNS) is a service that enables you to send push notification messages to Windows Phone 7+ and Windows Phone 8.0 apps. This section describes how to obtain the MPNS prerequisites and send a push notification message using Amazon SNS and MPNS. You can send both unauthenticated and authenticated push notification messages with MPNS. For better security and to avoid throttling limits imposed by MPNS, you should send authenticated push notification messages.

### Topics

- [MPNS Prerequisites \(p. 71\)](#)
- [Step 1: Set Up Your Windows Phone App to Receive Push Notifications Messages \(p. 72\)](#)
- [Step 2: Get a Push Notification URI from MPNS \(p. 72\)](#)
- [Step 3: Create a Windows Developer Account \(p. 72\)](#)
- [Step 4: Upload TLS Certificate \(p. 72\)](#)
- [Step 5: Send a Push Notification Message to a Windows Phone app using Amazon SNS and MPNS \(p. 72\)](#)

## MPNS Prerequisites

To send an unauthenticated push notification message to a Windows Phone app using Amazon SNS and MPNS, you need the following:

- Windows Phone app configured to use MPNS
- Push notification URI from MPNS

To send an authenticated push notification message to a Windows Phone app using Amazon SNS and MPNS, you also need the following:

- HTTPS Push notification URI from MPNS
- Registered as a Windows app developer
- Transport Layer Security (TLS) certificate

If you already have these prerequisites, then you can send a push notification message to a Windows Phone app using either the Amazon SNS console or the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). For more information about using the Amazon SNS API, see [Step 5: Send a Push Notification Message to a Windows Phone app using Amazon SNS and MPNS \(p. 72\)](#).

## Step 1: Set Up Your Windows Phone App to Receive Push Notifications Messages

To send a push notification message to your Windows Phone app, you must enable the app for the MPNS service. For more information, see [Setting up your app to receive push notifications for Windows Phone 8](#).

## Step 2: Get a Push Notification URI from MPNS

To create a mobile endpoint with Amazon SNS you need a push notification URI from MPNS. You can either get an HTTP or HTTPS push notification URI from MPNS. For better security and to avoid throttling limits imposed by MPNS, you should get an HTTPS push notification URI for sending authenticated messages. For more information about getting an HTTPS push notification URI, see [Setting up an authenticated web service to send push notifications for Windows Phone 8](#).

## Step 3: Create a Windows Developer Account

To send authenticated messages using MPNS you must create a Windows developer account. For more information about opening a Windows developer account, see [Opening a developer account](#).

## Step 4: Upload TLS Certificate

To send authenticated messages using MPNS, you must upload a TLS certificate obtained from one of the trusted certificate authorities (CA) for Windows Phone to your Windows developer account. You must also submit the complete TLS certificate chain and associated private key to Amazon SNS. This is to help with establishing a secure connection to MPNS with Amazon SNS on your behalf. Amazon SNS requires the TLS certificate and private key in the .pem format. You can use different utilities, such as openssl, for converting and exporting certificates. For more information, see [Setting up an authenticated web service to send push notifications for Windows Phone 8](#) and [SSL root certificates for Windows Phone OS 7.1](#). For more information about openssl, see <http://www.openssl.org/>.

## Step 5: Send a Push Notification Message to a Windows Phone app using Amazon SNS and MPNS

This section describes how to use the prerequisite information with the Amazon SNS API to send a push notification message to your Windows Phone app using Amazon SNS and MPNS. You add the

gathered prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file.

You can also use the Amazon SNS console. However, to send toast notifications, you must use the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push](#) (p. 77).

#### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. In Eclipse, create a new Java project (**File | New | Java Project**).
2. Import the `SNSSamples` folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the `SNSSamples` folder, click **OK**, and then click **Finish**.
3. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open the `AwsCredentials.properties` file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**
2. Click the **Libraries** tab, and then click **Add Library...**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to `SNSMobilePush.java`

1. In the `SNSSamples\src\com\amazonaws\sns\samples\mobilepush` folder, open `SNSMobilePush.java` in Eclipse and uncomment `sample.demoMPNSAppNotification()`; . It should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
//sample.demoAndroidAppNotification();
//sample.demoKindleAppNotification();
//sample.demoAppleAppNotification();
//sample.demoAppleSandboxAppNotification();
//sample.demoBaiduAppNotification();
//sample.demoWNSAppNotification();
sample.demoMPNSAppNotification();
```

2. Locate the `demoMPNSAppNotification` method and enter the notification URI you received from MPNS for the value of the `notificationChannelURI` string.
3. Enter a name for your application. Application names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

```
String applicationName = "mpnspushapp";
```

4. Enter the MPNS TLS certificate in .pem file format. You must include the complete certificate chain, beginning with the root CA certificate at the top and ending with the issued certificate at



the bottom. At the beginning of each new line in your certificate, you must add `\n`. For example, it should look similar to the following:

```
String certificateChain = "-----BEGIN CERTIFICATE-----
\nMIICiTCCAfiCCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UEBhMC
\nVVMxCzAJBgNVBAGTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQKEwZBbWF6\n\nBkgkqhkiG9w0BCQEWEG5vb25lQGFTYXpvi5jb20wHhcNMTEwNDI1MjA0NTIxWhcN
\nMTIwNDIOMjA0NTIxWjCBiDELMAkGA1UEBhMCVVMxCzAJBgNVBAGTAldBMRAwDgYD
\nVQQHEwdTZWF0dGx1MQ8wDQYDVQQKEwZBbWF6b24xZDASBgNVBAstC01BTSBDb25z
\nb2x1MRIwEAYDVQQDEw1UZXR0Q2lsYWMxH2AdBgkqhkiG9w0BCQEWEG5vb25lQGFT
\nYXpvi5jb20wZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMaK0dn+a4GmWIWJ
\n21uUSfwfEvySWtC2XADZ4nB+BLyGVIk60CpiwsZ3G93vUEIO3IyNoH/f0wYK8m9T
\nrDHudUZg3qX4waLG5M43q7Wgc/MbQITxOUSQv7c7ugFFDzQGBzZswY6786m86gpe
\nIbb30hjZnzcVQAARHhdlQWIMm2nrAgMBAAEwDQYJKoZIhvcNAQEFBQADgYEAtCu4\n+auNKyExzyLwaxlAoo7TJHidbtS4J5iNmZgXL0Fkb
\nFFBjvSfpJILJ00zbhNYS5f6GuoEdmFJl0ZxBHjJnyp378OD8uTs7fLvJx79LjStb
\nNYiytVbZPQUQ5Yaxu2jXnimvw3rrszlaEXAMPLE=\n-----END CERTIFICATE-----";
```

5. Enter the private key for the MPNS TLS certificate in .pem file format. At the beginning of each new line in your certificate, you must add `\n`. For example, it should look similar to the following:

```
String privateKey = "-----BEGIN RSA PRIVATE KEY-----
\nMIICiTCChafICCQD9m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UEBhMC
\nVVMxCzAJBgNVBAGTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQKEwZBbWF6\n\nFYai3z96EXAMPLE=\n-----END RSA PRIVATE KEY-----";
```

6. Run the application. You should see output similar to the following in the output window of your IDE:

```
=====
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=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/MPNS/TestApp}
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/MPNS/TestApp/557597f8-
be4a-3035-8c6d-bb7fa8b20fef}
{Message Body: {"MPNS": "<?xml version='1.0' encoding='utf-8'><wp:Notification
xmlns:wp='WPNotification'><wp:Title><wp:Count>23</wp:Count><wp:Title>This is a tile
notification</wp:Title></wp:Title></wp:Notification>"}
{Message Attributes: {"AWS.SNS.MOBILE.MPNS.Type": "token"},
{"AWS.SNS.MOBILE.MPNS.NotificationClass": "realtime"}}
Published!
{MessageId=ce9855bf-395f-5a1a-a4b9-19ace305780d}
```

On your Windows Phone, you should see a push notification message appear within the app.

## Getting Started with WNS

Windows Push Notification Services (WNS) is a service that enables you to send push notification messages and updates to Windows 8 (and later) and Windows Phone 8.1 (and later) apps. This section describes how to obtain the WNS prerequisites and send a push notification message using Amazon SNS and WNS.

### Topics

- [WNS Prerequisites \(p. 75\)](#)
- [Step 1: Set Up Your App to Receive Push Notifications Messages \(p. 75\)](#)



- [Step 2: Get a Push Notification URI from WNS \(p. 75\)](#)
- [Step 3: Get a Package Security Identifier from WNS \(p. 75\)](#)
- [Step 4: Get a Secret Key from WNS \(p. 75\)](#)
- [Step 5: Send a Push Notification Message to an App using Amazon SNS and WNS \(p. 75\)](#)

## WNS Prerequisites

To send push notification messages to Windows devices using Amazon SNS and WNS, you need the following:

- Windows 8 (and later) or Windows Phone 8.1 app configured to use WNS
- Push notification URI from WNS
- Package security identifier
- Secret key

If you already have these prerequisites, then you can send a push notification message to an app using either the Amazon SNS console or the Amazon SNS API. For more information about using the Amazon SNS console, see [Using Amazon SNS Mobile Push \(p. 77\)](#). For more information about using the Amazon SNS API, see [Step 5: Send a Push Notification Message to an App using Amazon SNS and WNS \(p. 75\)](#).

## Step 1: Set Up Your App to Receive Push Notifications Messages

To send push notification message to your app, you must enable the app for the WNS service. For more information, see [Windows Push Notification Services](#).

## Step 2: Get a Push Notification URI from WNS

To create a mobile endpoint with Amazon SNS, you need a push notification URI from WNS. For more information, see [Windows Push Notification Services](#).

## Step 3: Get a Package Security Identifier from WNS

To create a mobile endpoint with Amazon SNS, you need a package security identifier from WNS. For more information, see [Windows Push Notification Services](#).

## Step 4: Get a Secret Key from WNS

To create a mobile endpoint with Amazon SNS, you need a secret key from WNS. For more information, see [Windows Push Notification Services](#).

## Step 5: Send a Push Notification Message to an App using Amazon SNS and WNS

This section describes how to use the prerequisite information to send a push notification message to your app using Amazon SNS and WNS. You add the gathered prerequisite information to the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file.

### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

### To add the sample to Eclipse

1. In Eclipse, create a new Java project (**File | New | Java Project**).
2. Import the SNSSamples folder to the top-level directory of the newly created Java project. In Eclipse, right-click the name of the Java project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the SNSSamples folder, click **OK**, and then click **Finish**.
3. In the SNSSamples\src\com\amazonaws\sns\samples\mobilepush folder, open the AwsCredentials.properties file and add your AWS security credentials.

### To add the AWS SDK for Java to the Build Path

1. Right-click the Java project folder, click **Build Path**, and then click **Configure Build Path...**
2. Click the **Libraries** tab, and then click **Add Library...**
3. Click **AWS SDK for Java**, click **Next**, and then click **Finish**.

### To add the prerequisite information to SNSMobilePush.java

1. In the SNSSamples\src\com\amazonaws\sns\samples\mobilepush folder, open SNSMobilePush.java in Eclipse and uncomment sample.demoWNSAppNotification();. It should look similar to the following:

```
SNSMobilePush sample = new SNSMobilePush(sns);
// TODO: Uncomment the services you wish to use.
//sample.demoAndroidAppNotification();
//sample.demoKindleAppNotification();
//sample.demoAppleAppNotification();
//sample.demoAppleSandboxAppNotification();
//sample.demoBaiduAppNotification();
sample.demoWNSAppNotification();
//sample.demoMPNSAppNotification();
```

2. Locate the demoWNSAppNotification method and enter the string values for the push notification URI, package security identifier, and secret key.
3. Enter a name for your application. Application names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long. For example, it should look similar to the following:

```
String applicationName = "wnspushapp";
```

4. Run the application. You should see output similar to the following in the output window of your IDE:

```
=====
Getting Started with Amazon SNS
=====

{PlatformApplicationArn: arn:aws:sns:us-west-2:111122223333:app/WNS/TestApp}
```

```
{EndpointArn: arn:aws:sns:us-west-2:111122223333:endpoint/WNS/TestApp/17cc2f2a-
dfa8-3450-90c6-e1f88d820f3d}
{Message Body: {"WNS": "<badge version=\"1\" value=\"23\"/>"}}
{Message Attributes: ("AWS.SNS.MOBILE.WNS.Type": "wns/badge"),
("AWS.SNS.MOBILE.WNS.CachePolicy": "cache")}
Published!
{MessageId=d4899281-927e-5f68-9fd0-de9248be6d47}
```

On your Windows device, you should see a push notification message appear within the app.

## Using Amazon SNS Mobile Push

This section describes how to use the AWS Management Console with the information described in [Prerequisites \(p. 38\)](#) to register your mobile app with AWS, add device tokens (also referred to as registration IDs), send a direct message to a mobile device, and send a message to mobile devices subscribed to an Amazon SNS topic.

### Topics

- [Register Your Mobile App with AWS \(p. 77\)](#)
- [Add Device Tokens or Registration IDs \(p. 79\)](#)
- [Create a Platform Endpoint and Manage Device Tokens \(p. 82\)](#)
- [Send a Direct Message to a Mobile Device \(p. 86\)](#)
- [Send Messages to Mobile Devices Subscribed to a Topic \(p. 86\)](#)
- [Send Custom Platform-Specific Payloads in Messages to Mobile Devices \(p. 87\)](#)

## Register Your Mobile App with AWS

For Amazon SNS to send notification messages to mobile endpoints, whether it is direct or with subscriptions to a topic, you first need to register the app with AWS. To register your mobile app with AWS, enter a name to represent your app, select the platform that will be supported, and provide your credentials for the notification service platform. After the app is registered with AWS, the next step is to create an endpoint for the app and mobile device. The endpoint is then used by Amazon SNS for sending notification messages to the app and device.

### To register your mobile app with AWS

1. Go to <https://console.aws.amazon.com/sns/v2/home> and click **Create platform application**.
2. In the **Application name** box, enter a name to represent your app.

App names must be made up of only uppercase and lowercase ASCII letters, numbers, underscores, hyphens, and periods, and must be between 1 and 256 characters long.

3. In the **Push notification platform** box, select the platform that the app is registered with and then enter the appropriate credentials.

#### Note

If you are using one of the APNS platforms, then you can select **Choose file** to upload the .p12 file (exported from Keychain Access) to Amazon SNS.

For detailed instructions on how to acquire the following information, see [Getting Started with Amazon Device Messaging \(p. 40\)](#), [Getting Started with Apple Push Notification Service \(p. 44\)](#), [Getting Started with Baidu Cloud Push \(p. 50\)](#), [Getting Started with Google Cloud Messaging for Android \(p. 67\)](#), [Getting Started with MPNS \(p. 71\)](#), or [Getting Started with WNS \(p. 74\)](#).

| Platform          | Credentials                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADM               | Client ID – Go to the <a href="#">Amazon Mobile App Distribution Portal</a> , click <b>Apps and Services</b> , click the name of your Kindle Fire app, and then click <b>Security Profile</b> .     |
|                   | Client Secret – Go to the <a href="#">Amazon Mobile App Distribution Portal</a> , click <b>Apps and Services</b> , click the name of your Kindle Fire app, and then click <b>Security Profile</b> . |
| APNS              | Certificate – Select the password encrypted certificate and private key, as exported from Keychain Access on your Mac computer in the .p12 file format.                                             |
|                   | Certificate Password – Enter the password.                                                                                                                                                          |
| APNS_SANDBOX      | Certificate – Same as previous for APNS.                                                                                                                                                            |
|                   | Certificate Password – Same as previous for APNS.                                                                                                                                                   |
| APNS_VOIP         | Certificate – Same as previous for APNS.                                                                                                                                                            |
|                   | Certificate Password – Same as previous for APNS.                                                                                                                                                   |
| APNS_VOIP_SANDBOX | Certificate – Same as previous for APNS.                                                                                                                                                            |
|                   | Certificate Password – Same as previous for APNS.                                                                                                                                                   |
| MACOS             | Certificate – Same as previous for APNS.                                                                                                                                                            |
|                   | Certificate Password – Same as previous for APNS.                                                                                                                                                   |
| MACOS_SANDBOX     | Certificate – Same as previous for APNS.                                                                                                                                                            |
|                   | Certificate Password – Same as previous for APNS.                                                                                                                                                   |
| Baidu             | API Key – Enter the API key you received after creating a Baidu cloud push project, as described in <a href="#">Step 3: Create a Baidu Cloud Push Project (p. 56)</a> .                             |
|                   | Client Secret – Enter the secret key you received after creating a Baidu cloud push project, as described in <a href="#">Step 3: Create a Baidu Cloud Push Project (p. 56)</a> .                    |

| Platform | Credentials                                                                                                                                                                                                                                                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GCM      | API Key – Go to the <a href="#">Google APIs Console web site</a> , click <b>API Access</b> , and make note of the server API key with the <b>Key for server apps (with IP locking)</b> label. If you have not yet created a server API key, then click <b>Create new Server key...</b> |
| MPNS     | Certificate – Enter the TLS certificate for your Windows developer account, as described in <a href="#">Step 4: Upload TLS Certificate (p. 72)</a> .                                                                                                                                   |
|          | Private Key – Enter the private key for the TLS certificate, as described in <a href="#">Step 4: Upload TLS Certificate (p. 72)</a> .                                                                                                                                                  |
| WNS      | Client Secret – Enter the client secret, as described in <a href="#">How to authenticate with the Windows Push Notification Service (WNS)</a> .                                                                                                                                        |
|          | Package Security Identifier (SID) – Enter the SID, as described in <a href="#">How to authenticate with the Windows Push Notification Service (WNS)</a> .                                                                                                                              |

4. After you have entered this information, then click **Add New App**.

This registers the app with Amazon SNS, which creates a platform application object for the selected platform and then returns a corresponding PlatformApplicationArn.

## Add Device Tokens or Registration IDs

When you first register an app and mobile device with a notification service, such as Apple Push Notification Service (APNS) and Google Cloud Messaging for Android (GCM), device tokens or registration IDs are returned from the notification service. When you add the device tokens or registration IDs to Amazon SNS, they are used with the PlatformApplicationArn API to create an endpoint for the app and device. When Amazon SNS creates the endpoint, an EndpointArn is returned. The EndpointArn is how Amazon SNS knows which app and mobile device to send the notification message to.

You can add device tokens and registration IDs to Amazon SNS using the following methods:

- Manually add a single token to AWS using the AWS Management Console
- Migrate existing tokens from a CSV file to AWS using the AWS Management Console
- Upload several tokens using the CreatePlatformEndpoint API
- Register tokens from devices that will install your apps in the future

### To manually add a device token or registration ID

1. Go to <https://console.aws.amazon.com/sns/v2/home>, click **Apps**, click your app, and then click **Add Endpoints**.
2. In the **Endpoint Token** box, enter either the token ID or registration ID, depending on which notification service. For example, with ADM and GCM you enter the registration ID.

3. (Optional) In the **User Data** box, enter arbitrary information to associate with the endpoint. Amazon SNS does not use this data. The data must be in UTF-8 format and less than 2KB.
4. Finally, click **Add Endpoints**.

Now with the endpoint created, you can either send messages directly to a mobile device or send messages to mobile devices that are subscribed to a topic.

### To migrate existing tokens from a CSV file to AWS

You can migrate existing tokens contained in a CSV file. The CSV file cannot be larger than 2MB. When migrating several tokens, it is recommended to use the `CreatePlatformEndpoint` API. Each of the tokens in the CSV file must be followed by a newline. For example, your CSV file should look similar to the following:

```
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--KMTlmMWxwRkxMaDNST2luZz01,"User data
with spaces requires quotes"
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--
KMTlmMWxwRkxMaDNST2luZz04,"Data,with,commas,requires,quotes"
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--KMTlmMWxwRkxMaDNST2luZz02,"Quoted data
requires ""escaped"" quotes"
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--KMTlmMWxwRkxMaDNST2luZz03,"{"key":
"json is allowed", "value":"endpoint", "number": 1}"
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--
KMTlmMWxwRkxMaDNST2luZz05,SimpleDataNoQuotes
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--KMTlmMWxwRkxMaDNST2luZz06,"The following
line has no user data"
amzn1.adm-registration.v1.XpvSSUk0Rc3hTVVV--TOKEN--KMTlmMWxwRkxMaDNST2luZz07
APBTKzPGLCyT6E6oOfpdwLpcRNxQp5vCPFiFeru9oZylc22HvZSwQTDgmmw9WdNLXMerUPxmpX0w1,"Different
token style"
```

1. Go to <https://console.aws.amazon.com/sns/v2/home>, click **Apps**, click your app, and then click **Add Endpoints**.
2. Click **Migrate existing tokens over to AWS**, click **Choose File**, select your CSV file, and then click **Add Endpoints**.

### To upload several tokens using the `CreatePlatformEndpoint` API

The following steps show how to use the sample Java app (bulkupload package) provided by AWS to upload several tokens (device tokens or registration IDs) to Amazon SNS. You can use this sample app to help you get started with uploading your existing tokens.

#### Note

The following steps use the Eclipse Java IDE. The steps assume you have installed the AWS SDK for Java and you have the AWS security credentials for your AWS account. For more information, see [AWS SDK for Java](#). For more information about credentials, see [How Do I Get Security Credentials?](#) in the *AWS General Reference*.

1. Download and unzip the [snsmobilepush.zip](#) file.
2. Create a new Java Project in Eclipse.
3. Import the `SNSSamples` folder to the top-level directory of the newly created Java Project. In Eclipse, right-click the name of the Java Project and then click **Import**, expand **General**, click **File System**, click **Next**, browse to the `SNSSamples` folder, click **OK**, and then click **Finish**.
4. Download a copy of the [OpenCSV library](#) and add it to the Build Path of the bulkupload package.
5. Open the `BulkUpload.properties` file contained in the bulkupload package.

6. Add the following to `BulkUpload.properties`:

- The `ApplicationArn` to which you want to add endpoints.
- The absolute path for the location of your CSV file containing the tokens.
- The names for CSV files (such as `goodTokens.csv` and `badTokens.csv`) to be created for logging the tokens that Amazon SNS parses correctly and those that fail.
- (Optional) The characters to specify the delimiter and quote in the CSV file containing the tokens.
- (Optional) The number of threads to use to concurrently create endpoints. The default is 1 thread.

Your completed `BulkUpload.properties` should look similar to the following:

```
applicationarn:arn:aws:sns:us-west-2:111122223333:app/GCM/gcmpushapp
csvfilename:C:\\mytokendirectory\\mytokens.csv
goodfilename:C:\\mylogfiles\\goodtokens.csv
badfilename:C:\\mylogfiles\\badtokens.csv
delimiterchar:','
quotechar:""
numofthreads:5
```

7. Run the `BatchCreatePlatformEndpointSample.java` application to upload the tokens to Amazon SNS.

In this example, the endpoints that were created for the tokens that were uploaded successfully to Amazon SNS would be logged to `goodTokens.csv`, while the malformed tokens would be logged to `badTokens.csv`. In addition, you should see STD OUT logs written to the console of Eclipse, containing content similar to the following:

```
<1>[SUCCESS] The endpoint was created with Arn arn:aws:sns:us-west-2:111122223333:app/
GCM/gcmpushapp/165j2214-051z-3176-b586-138o3d420071
<2>[ERROR: MALFORMED CSV FILE] Null token found in /mytokendirectory/mytokens.csv
```

## To register tokens from devices that will install your apps in the future

You can use one of the following two options:

- **Use the Amazon Cognito service:** Your mobile app will need credentials to create endpoints associated with your Amazon SNS platform application. We recommend that you use temporary credentials that expire after a period of time. For most scenarios, we recommend that you use Amazon Cognito to create temporary security credentials. For more information, see the [Amazon Cognito Developer Guide](#). If you would like to be notified when an app registers with Amazon SNS, you can register to receive an Amazon SNS event that will provide the new endpoint ARN. You can also use the `ListEndpointByPlatformApplication` API to obtain the full list of endpoints registered with Amazon SNS.
- **Use a proxy server:** If your application infrastructure is already set up for your mobile apps to call in and register on each installation, you can continue to use this setup. Your server will act as a proxy and pass the device token to Amazon SNS mobile push notifications, along with any user data you would like to store. For this purpose, the proxy server will connect to Amazon SNS using your AWS credentials and use the `CreatePlatformEndpoint` API call to upload the token information. The newly created endpoint Amazon Resource Name (ARN) will be returned, which your server can store for making subsequent publish calls to Amazon SNS.

## Create a Platform Endpoint and Manage Device Tokens

When an app and mobile device register with a push notification service, the push notification service returns a device token. Amazon SNS uses the device token to create a mobile endpoint, to which it can send direct push notification messages. For more information, see [Prerequisites \(p. 38\)](#) and [Amazon SNS Mobile Push High-Level Steps \(p. 39\)](#).

This section describes the recommended approach for creating a platform endpoint and managing device tokens.

### Topics

- [Create a Platform Endpoint \(p. 82\)](#)
- [Pseudo Code \(p. 82\)](#)
- [Java Example \(p. 83\)](#)
- [Troubleshooting \(p. 85\)](#)

## Create a Platform Endpoint

To push notifications to an app with Amazon SNS, that app's device token must first be registered with Amazon SNS by calling the create platform endpoint action. This action takes the Amazon Resource Name (ARN) of the platform application and the device token as parameters and returns the ARN of the created platform endpoint.

The create platform endpoint action does the following:

- If the platform endpoint already exists, then do not create it again. Return to the caller the ARN of the existing platform endpoint.
- If the platform endpoint with the same device token but different settings already exists, then do not create it again. Throw an exception to the caller.
- If the platform endpoint does not exist, then create it. Return to the caller the ARN of the newly-created platform endpoint.

You should not call the create platform endpoint action immediately every time an app starts, because this approach does not always provide a working endpoint. This can happen, for example, when an app is uninstalled and reinstalled on the same device and the endpoint for it already exists but is disabled. A successful registration process should accomplish the following:

1. Ensure a platform endpoint exists for this app-device combination.
2. Ensure the device token in the platform endpoint is the latest valid device token.
3. Ensure the platform endpoint is enabled and ready to use.

## Pseudo Code

The following pseudo code describes a recommended practice for creating a working, current, enabled platform endpoint in a wide variety of starting conditions. This approach works whether this is a first time the app is being registered or not, whether the platform endpoint for this app already exists, and whether the platform endpoint is enabled, has the correct device token, and so on. It is safe to call it multiple times in a row, as it will not create duplicate platform endpoints or change an existing platform endpoint if it is already up to date and enabled.



```
retrieve the latest device token from the mobile operating system
if (the platform endpoint ARN is not stored)
 # this is a first-time registration
 call create platform endpoint
 store the returned platform endpoint ARN
endif

call get endpoint attributes on the platform endpoint ARN

if (while getting the attributes a not-found exception is thrown)
 # the platform endpoint was deleted
 call create platform endpoint with the latest device token
 store the returned platform endpoint ARN
else
 if (the device token in the endpoint does not match the latest one) or
 (get endpoint attributes shows the endpoint as disabled)
 call set endpoint attributes to set the latest device token and then enable the
 platform endpoint
 endif
endif
endif
```

This approach can be used any time the app wants to register or re-register itself. It can also be used when notifying Amazon SNS of a device token change. In this case, you can just call the action with the latest device token value. Some points to note about this approach are:

- There are two cases where it may call the create platform endpoint action. It may be called at the very beginning, where the app does not know its own platform endpoint ARN, as happens during a first-time registration. It is also called if the initial get endpoint attributes action call fails with a not-found exception, as would happen if the application knows its endpoint ARN but it was deleted.
- The get endpoint attributes action is called to verify the platform endpoint's state even if the platform endpoint was just created. This happens when the platform endpoint already exists but is disabled. In this case, the create platform endpoint action succeeds but does not enable the platform endpoint, so you must double-check the state of the platform endpoint before returning success.

## Java Example

Here is an implementation of the previous pseudo code in Java:

```
class RegistrationExample {

 AmazonSNSClient client = new AmazonSNSClient(); //provide credentials here

 private void registerWithSNS() {

 String endpointArn = retrieveEndpointArn();
 String token = "Retrieved from the mobile operating system";

 boolean updateNeeded = false;
 boolean createNeeded = (null == endpointArn);

 if (createNeeded) {
 // No platform endpoint ARN is stored; need to call createEndpoint.
 endpointArn = createEndpoint();
 createNeeded = false;
 }

 System.out.println("Retrieving platform endpoint data...");
 // Look up the platform endpoint and make sure the data in it is current, even if
 // it was just created.
 try {
```

```

 GetEndpointAttributesRequest geaReq =
 new GetEndpointAttributesRequest()
 .withEndpointArn(endpointArn);
 GetEndpointAttributesResult geaRes =
 client.getEndpointAttributes(geaReq);

 updateNeeded = !geaRes.getAttributes().get("Token").equals(token)
 || !geaRes.getAttributes().get("Enabled").equalsIgnoreCase("true");

 } catch (NotFoundException nfe) {
 // We had a stored ARN, but the platform endpoint associated with it
 // disappeared. Recreate it.
 createNeeded = true;
 }

 if (createNeeded) {
 createEndpoint();
 }

 System.out.println("updateNeeded = " + updateNeeded

 if (updateNeeded) {
 // The platform endpoint is out of sync with the current data;
 // update the token and enable it.
 System.out.println("Updating platform endpoint " + endpointArn);
 Map attribs = new HashMap();
 attribs.put("Token", token);
 attribs.put("Enabled", "true");
 SetEndpointAttributesRequest saeReq =
 new SetEndpointAttributesRequest()
 .withEndpointArn(endpointArn)
 .withAttributes(attribs);
 client.setEndpointAttributes(saeReq);
 }
}

/**
 * @return never null
 * */
private String createEndpoint() {

 String endpointArn = null;
 try {
 System.out.println("Creating platform endpoint with token " + token);
 CreatePlatformEndpointRequest cpeReq =
 new CreatePlatformEndpointRequest()
 .withPlatformApplicationArn(applicationArn)
 .withToken(token);
 CreatePlatformEndpointResult cpeRes = client
 .createPlatformEndpoint(cpeReq);
 endpointArn = cpeRes.getEndpointArn();
 } catch (InvalidParameterException ipe) {
 String message = ipe.getMessage();
 System.out.println("Exception message: " + message);
 Pattern p = Pattern
 .compile(".*Endpoint (arn:aws:sns[^]+) already exists " +
 "with the same token.*");
 Matcher m = p.matcher(message);
 if (m.matches()) {
 // The platform endpoint already exists for this token, but with
 // additional custom data that
 // createEndpoint doesn't want to overwrite. Just use the
 // existing platform endpoint.
 endpointArn = m.group(1);
 } else {
 // Rethrow the exception, the input is actually bad.

```

```
 throw ipe;
 }
}
storeEndpointArn(endpointArn);
return endpointArn;
}

/**
 * @return the ARN the app was registered under previously, or null if no
 * platform endpoint ARN is stored.
 */
private String retrieveEndpointArn() {
 // Retrieve the platform endpoint ARN from permanent storage,
 // or return null if null is stored.
 return arnStorage;
}

/**
 * Stores the platform endpoint ARN in permanent storage for lookup next time.
 */
private void storeEndpointArn(String endpointArn) {
 // Write the platform endpoint ARN to permanent storage.
 arnStorage = endpointArn;
}
}
```

An interesting thing to note about this implementation is how the `InvalidParameterException` is handled in the `createEndpoint` method. Amazon SNS rejects create platform endpoint requests when an existing platform endpoint has the same device token and a non-null `CustomUserData` field, because the alternative is to overwrite (and therefore lose) the `CustomUserData`. The `createEndpoint` method in the preceding code captures the `InvalidParameterException` thrown by Amazon SNS, checks whether it was thrown for this particular reason, and if so, extracts the ARN of the existing platform endpoint from the exception. This succeeds, since a platform endpoint with the correct device token exists.

For more information, see [Using Amazon SNS Mobile Push APIs \(p. 95\)](#).

## Troubleshooting

### Repeatedly Calling Create Platform Endpoint with an Outdated Device Token

Especially for GCM endpoints, you may think it is best to store the first device token the application is issued and then call the create platform endpoint with that device token every time on application startup. This may seem correct since it frees the app from having to manage the state of the device token and Amazon SNS will automatically update the device token to its latest value. However, this solution has a number of serious issues:

- Amazon SNS relies on feedback from GCM to update expired device tokens to new device tokens. GCM retains information on old device tokens for some time, but not indefinitely. Once GCM forgets about the connection between the old device token and the new device token, Amazon SNS will no longer be able to update the device token stored in the platform endpoint to its correct value; it will just disable the platform endpoint instead.
- The platform application will contain multiple platform endpoints corresponding to the same device token.
- Amazon SNS imposes a limit to the number of platform endpoints that can be created starting with the same device token. Eventually, the creation of new endpoints will fail with an invalid parameter exception and the following error message: "This endpoint is already registered with a different token."

## Re-Enabling a Platform Endpoint Associated with an Invalid Device Token

When a mobile platform (such as APNS or GCM) informs Amazon SNS that the device token used in the publish request was invalid, Amazon SNS disables the platform endpoint associated with that device token. Amazon SNS will then reject subsequent publishes to that device token. While you may think it is best to simply re-enable the platform endpoint and keep publishing, in most situations doing this will not work: the messages that are published do not get delivered and the platform endpoint becomes disabled again soon afterward.

This is because the device token associated with the platform endpoint is genuinely invalid. Deliveries to it cannot succeed because it no longer corresponds to any installed app. The next time it is published to, the mobile platform will again inform Amazon SNS that the device token is invalid, and Amazon SNS will again disable the platform endpoint.

To re-enable a disabled platform endpoint, it needs to be associated with a valid device token (with a set endpoint attributes action call) and then enabled. Only then will deliveries to that platform endpoint become successful. The only time re-enabling a platform endpoint without updating its device token will work is when a device token associated with that endpoint used to be invalid but then became valid again. This can happen, for example, when an app was uninstalled and then re-installed on the same mobile device and receives the same device token. The approach presented above does this, making sure to only re-enable a platform endpoint after verifying that the device token associated with it is the most current one available.

## Send a Direct Message to a Mobile Device

You can send Amazon SNS push notification messages directly to an endpoint, which represents an app and mobile device, by completing the following steps.

### To send a direct message

1. Go to <https://console.aws.amazon.com/sns/v2/home>.
2. In the left **Navigation** pane, click **Apps** and click the app that you want to send a message to.
3. On the **Application Details** screen, select **Endpoint Actions** and then click **Publish**.
4. On the Publish dialog box, enter the message to appear in the app on the mobile device and then click **Publish**.

The notification message will then be sent from Amazon SNS to the platform notification service, which will then send the message to the app.

## Send Messages to Mobile Devices Subscribed to a Topic

You can also use Amazon SNS to send messages to mobile endpoints subscribed to a topic. The concept is the same as subscribing other endpoint types, such as Amazon SQS, HTTP/S, email, and SMS, to a topic, as described in [What is Amazon Simple Notification Service? \(p. 1\)](#). The difference is that Amazon SNS communicates through the notification services in order for the subscribed mobile endpoints to receive notifications sent to the topic.

### To send to endpoints subscribed to a topic

1. Follow the steps as described in [Subscribe to a Topic \(p. 6\)](#). You just need to select **Application** in the **Protocol** drop-down menu and then enter the mobile endpoint Amazon Resource Name (ARN) in the **Endpoint** box.
2. Follow the steps to publish messages to a topic, as described in [Publish to a Topic \(p. 7\)](#), then all mobile endpoints that are subscribed to the topic will be sent the message.

## Send Custom Platform-Specific Payloads in Messages to Mobile Devices

You can use either the Amazon SNS console or APIs to send custom platform-specific payloads in messages to mobile devices. The following sections describe how to use the Amazon SNS console to create and send custom platform-specific payloads for each of the supported notification services. For information on using the Amazon SNS APIs, see [Using Amazon SNS Mobile Push APIs \(p. 95\)](#) and the AWS sample file `SNSMobilePush.java`, which is included in the [snsmobilepush.zip](#) file.

### JSON Formatted Message Data

When sending platform-specific payloads in messages using the Amazon SNS console, the data must be key-value pair strings and formatted as JSON with quotation marks escaped. The following example, including formatting and spaces for readability, shows a sample custom message for the GCM platform with key-value pair within the message body and formatted as JSON.

```
{
 "GCM": "{
 "data": {
 "message": "Check out these awesome deals!",
 "url": "www.amazon.com"
 }
 }"
```

When sending messages using the console quotation marks must be escaped (`\`), as the following example shows.

```
{
 "GCM": "{
 \"data\": {
 \"message\": \"Check out these awesome deals!\",
 \"url\": \"www.amazon.com\"
 }
 }"
```

When entered in the Amazon SNS console, the example should look similar to the following:

```
{
"GCM": "{\\\"data\\\":{\\\"message\\\":\\\"Check out these awesome deals!\\\",\\\"url\\\":\\\"www.amazon.com\\\"}}}"
}
```

### Platform-Specific Key-Value Pairs

In addition to sending custom data as key-value pairs, you can also send platform-specific key-value pairs within the JSON payload. For example, if you wanted to include `time_to_live` and `collapse_key` GCM parameters after the custom data key-value pairs included in the data GCM parameter, then the JSON payload without escaped quotation marks would look similar to the following:

```
{
 "GCM": "{
 "data": {
 "message": "Check out these awesome deals!",
 "url": "www.amazon.com"
 },
 "time_to_live": 3600,
 "collapse_key": "deals"
 }"
}
```

When entered in the Amazon SNS console, the example should look similar to the following:

```
{
 "GCM": "{ \"data\": { \"message\": \"Check out these awesome deals!\", \"url\": \"www.amazon.com\" }, \"time_to_live\": 3600, \"collapse_key\": \"deals\" }"
}
```

For a list of the supported key-value pairs in each of the push notification services supported in Amazon SNS, see the following links:

- APNS – [Apple Push Notification Service](#)
- GCM – [HTTP Connection Server Reference](#)
- ADM – [Sending a Message](#)

## Messages to an App on Multiple Platforms

To send a message to an app installed on devices for multiple platforms, such as GCM and APNS, you must first subscribe the mobile endpoints to a topic in Amazon SNS and then publish the message to the topic. The following example shows a message to send to subscribed mobile endpoints on APNS, GCM, and ADM:

```
{
 "default": "This is the default message which must be present when publishing a message to a topic. The default message will only be used if a message is not present for one of the notification platforms.",
 "APNS": "{ \"aps\": { \"alert\": \"Check out these awesome deals!\", \"url\": \"www.amazon.com\" } }",
 "GCM": "{ \"data\": { \"message\": \"Check out these awesome deals!\", \"url\": \"www.amazon.com\" } }",
 "ADM": "{ \"data\": { \"message\": \"Check out these awesome deals!\", \"url\": \"www.amazon.com\" } }"
}
```

# Using Amazon SNS Application Attributes for Message Delivery Status

Amazon Simple Notification Service (Amazon SNS) provides support to log the delivery status of push notification messages. After you configure application attributes, log entries will be sent to CloudWatch

Logs for messages sent from Amazon SNS to mobile endpoints. Logging message delivery status helps provide better operational insight, such as the following:

- Know whether a push notification message was delivered from Amazon SNS to the push notification service.
- Identify the response sent from the push notification service to Amazon SNS.
- Determine the message dwell time (the time between the publish timestamp and just before handing off to a push notification service).

To configure application attributes for message delivery status, you can use the AWS Management Console, AWS software development kits (SDKs), or query API.

#### Topics

- [Configuring Message Delivery Status Attributes with the AWS Management Console \(p. 89\)](#)
- [Amazon SNS Message Delivery Status CloudWatch Log Examples \(p. 89\)](#)
- [Configuring Message Delivery Status Attributes with the AWS SDKs \(p. 90\)](#)
- [Platform Response Codes \(p. 91\)](#)

## Configuring Message Delivery Status Attributes with the AWS Management Console

You can configure message delivery status attributes with the AWS Management Console.

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left **Navigation** pane, click **Apps**, and then click the app containing the endpoints for which you want receive CloudWatch Logs.
3. Click **Application Actions** and then click **Delivery Status**.
4. On the **Delivery Status** dialog box, click **Create IAM Roles**.

You will then be redirected to the IAM console.

5. Click **Allow** to give Amazon SNS write access to use CloudWatch Logs on your behalf.
6. Now, back on the **Delivery Status** dialog box, enter a number in the **Percentage of Success to Sample (0-100)** field for the percentage of successful messages sent for which you want to receive CloudWatch Logs.

#### Note

After you configure application attributes for message delivery status, all failed message deliveries generate CloudWatch Logs.

7. Finally, click **Save Configuration**. You will now be able to view and parse the CloudWatch Logs containing the message delivery status. For more information about using CloudWatch, see the [CloudWatch Documentation](#).

## Amazon SNS Message Delivery Status CloudWatch Log Examples

After you configure message delivery status attributes for an application endpoint, CloudWatch Logs will be generated. Example logs, in JSON format, are shown as follows:

#### SUCCESS

```
{
 "status": "SUCCESS",
 "notification": {
 "timestamp": "2015-01-26 23:07:39.54",
 "messageId": "9655abe4-6ed6-5734-89f7-e6a6a42de02a"
 },
 "delivery": {
 "statusCode": 200,
 "dwellTimeMs": 65,
 "token": "ExampleI7fFackhJ1xjlqT64RaBkcGHochmf1VQAr9k-
IBJtKjp7fedYPzEwT_Pq3Tu0lroqro1cwWJUvgkcPPYcaXCpPWmG3Bqn-
wiqIEzp5zZ7y_jsM0PKPxKhddCzx6paEsyay9Zn3D4wNUJb8m6HXrBf9dqaEw",
 "attempts": 1,
 "providerResponse": "{\\\"multicast_id\\\":5138139752481671853,\\\"success\\\":1,\\\"failure
\\\":0,\\\"canonical_ids\\\":0,\\\"results\\\":[\\\"message_id\\\":\\\"0:1422313659698010%d6ba8edff9fd7ecd
\\\"]}]\"",
 "destination": "arn:aws:sns:us-east-1:111122223333:endpoint/GCM/GCMPushApp/
c23e42de-3699-3639-84dd-65f84474629d"
 }
}
```

#### FAILURE

```
{
 "status": "FAILURE",
 "notification": {
 "timestamp": "2015-01-26 23:29:35.678",
 "messageId": "c3ad79b0-8996-550a-8bfa-24f05989898f"
 },
 "delivery": {
 "statusCode": 8,
 "dwellTimeMs": 1451,
 "token": "example29z6j5c4df46f809505189c4c83fjcgf7f6257e98542d2jt3395kj73",
 "attempts": 1,
 "providerResponse": "NotificationErrorResponse(command=8, status=InvalidToken,
id=1, cause=null)",
 "destination": "arn:aws:sns:us-east-1:111122223333:endpoint/APNS_SANDBOX/
APNSPushApp/986cb8a1-4f6b-34b1-9a1b-d9e9cb553944"
 }
}
```

For a list of push notification service response codes, see [Platform Response Codes](#) (p. 91).

## Configuring Message Delivery Status Attributes with the AWS SDKs

The [AWS SDKs](#) provide APIs in several languages for using message delivery status attributes with Amazon SNS.

The following Java example shows how to use the `SetPlatformApplicationAttributes` API to configure application attributes for message delivery status of push notification messages. You can use the following attributes for message delivery status: `SuccessFeedbackRoleArn`, `FailureFeedbackRoleArn`, and `SuccessFeedbackSampleRate`. The `SuccessFeedbackRoleArn` and `FailureFeedbackRoleArn` attributes are used to give Amazon SNS write access to use CloudWatch Logs on your behalf. The `SuccessFeedbackSampleRate` attribute is for specifying the sample rate percentage (0-100) of successfully delivered messages. After you configure the `FailureFeedbackRoleArn` attribute, then all failed message deliveries generate CloudWatch Logs.

```
SetPlatformApplicationAttributesRequest setPlatformApplicationAttributesRequest = new
SetPlatformApplicationAttributesRequest();
```



```
Map<String, String> attributes = new HashMap<>();
attributes.put("SuccessFeedbackRoleArn", "arn:aws:iam::111122223333:role/SNS_CWlogs");
attributes.put("FailureFeedbackRoleArn", "arn:aws:iam::111122223333:role/SNS_CWlogs");
attributes.put("SuccessFeedbackSampleRate", "5");
setPlatformApplicationAttributesRequest.withAttributes(attributes);
setPlatformApplicationAttributesRequest.setPlatformApplicationArn("arn:aws:sns:us-west-2:111122223333:app/GCM/GCMPushApp");
sns.setPlatformApplicationAttributes(setPlatformApplicationAttributesRequest);
```

For more information about the SDK for Java, see [Getting Started with the AWS SDK for Java](#).

## Platform Response Codes

The following is a list of links for the push notification service response codes:

| Push Notification Service                                    | Response Codes                                                                                     |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Amazon Device Messaging (ADM)                                | See <i>Response Format</i> in <a href="#">Sending a Message via Amazon Device Messaging</a>        |
| Apple Push Notification Service (APNS)                       | See <i>HTTP/2 Response from APNs</i> in <a href="#">Communicating with APNs</a> .                  |
| Google Cloud Messaging for Android (GCM)                     | See <a href="#">Downstream message error response codes</a> in the GCM Connection Server Reference |
| Microsoft Push Notification Service for Windows Phone (MPNS) | See <a href="#">Push Notification Service response codes</a>                                       |
| Windows Push Notification Services (WNS)                     | See "Response codes" in <a href="#">Push notification service request and response headers</a>     |

## Application Event Notifications

Amazon SNS provides support to trigger notifications when certain application events occur. You can then take some programmatic action on that event. Your application must include support for a push notification service such as Apple Push Notification Service (APNS), Google Cloud Messaging for Android (GCM), and Windows Push Notification Services (WNS). You set application event notifications using the Amazon SNS console, AWS CLI, or the AWS SDKs.

### Topics

- [Available Application Events \(p. 91\)](#)
- [Sending Application Event Notifications \(p. 92\)](#)

## Available Application Events

Application event notifications track when individual platform endpoints are created, deleted, and updated, along with delivery failures. The attribute name for each application event is as follows:

| Attribute name       | Description                                                                            |
|----------------------|----------------------------------------------------------------------------------------|
| EventEndpointCreated | A notification is triggered when a new platform endpoint is added to your application. |

| Attribute name       | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EventEndpointDeleted | A notification is triggered when any of the platform endpoints associated with your application is deleted.                                                                                                                                                                                                                                                                                                              |
| EventEndpointUpdated | A notification is triggered when any of the attributes of the platform endpoints associated with your application are changed.                                                                                                                                                                                                                                                                                           |
| EventDeliveryFailure | <p>A notification is triggered when a delivery to any of the platform endpoints associated with your application encounters a permanent failure.</p> <p><b>Note</b><br/>To track delivery failures on the platform application side, subscribe to message delivery status events for the application. For more information, see <a href="#">Using Amazon SNS Application Attributes for Message Delivery Status</a>.</p> |

Each of the preceding attributes can be associated with an application. The application can then receive these event notifications.

## Sending Application Event Notifications

To send application event notifications, you specify a topic to receive the notifications for each type of event. As Amazon SNS sends the notifications, the topic can route them to endpoints that will take programmatic action.

### Important

High-volume applications will create a large number of application event notifications (e.g., tens of thousands), which will overwhelm endpoints meant for human use, such as email addresses, phone numbers, and mobile applications. Consider the following guidelines when you send application event notifications to a topic:

- Each topic that receives notifications should contain only subscriptions for programmatic endpoints, such as HTTP or HTTPS endpoints, Amazon SQS queues, or AWS Lambda functions.
- To reduce the amount of processing that is triggered by the notifications, limit each topic's subscriptions to a small number (e.g., five or fewer).

You can send application event notifications by using the Amazon SNS console, the AWS Command Line Interface (AWS CLI), or the AWS SDKs.

## AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the service navigation pane, choose **Applications**.
3. Choose the name of the application that you want to send event notifications for.
4. Choose **Actions, Configure events**.
5. For each of the events that you want to send event notifications for, type the ARN of the Amazon SNS topic that will receive the notifications.
6. Choose **Save configuration**. The event notifications are set.

## AWS CLI

Run the `set-platform-application-attributes` command.

The following example sets the same Amazon SNS topic for all four application events:

```
aws sns set-platform-application-attributes
--platform-application-arn arn:aws:sns:us-east-1:12345EXAMPLE:app/GCM/
MyGCMPlatformApplication
--attributes EventEndpointCreated="arn:aws:sns:us-
east-1:12345EXAMPLE:MyGCMPlatformApplicationEvents",
EventEndpointDeleted="arn:aws:sns:us-east-1:12345EXAMPLE:MyGCMPlatformApplicationEvents",
EventEndpointUpdated="arn:aws:sns:us-east-1:12345EXAMPLE:MyGCMPlatformApplicationEvents",
EventDeliveryFailure="arn:aws:sns:us-east-1:12345EXAMPLE:MyGCMPlatformApplicationEvents"
```

## AWS SDKs

Call one of the following APIs, depending on your target programming language or platform:

| Programming language or platform | API reference links                                         |
|----------------------------------|-------------------------------------------------------------|
| Android                          | <a href="#">setPlatformApplicationAttributes</a>            |
| iOS                              | <a href="#">AWSSNSSetPlatformApplicationAttributesInput</a> |
| Java                             | <a href="#">setPlatformApplicationAttributes</a>            |
| JavaScript                       | <a href="#">setPlatformApplicationAttributes</a>            |
| .NET                             | <a href="#">SetPlatformApplicationAttributes</a>            |
| PHP                              | <a href="#">SetPlatformApplicationAttributes</a>            |
| Python (boto)                    | <a href="#">set_platform_application_attributes</a>         |
| Ruby                             | <a href="#">set_platform_application_attributes</a>         |
| Unity                            | <a href="#">SetPlatformApplicationAttributesAsync</a>       |
| Windows PowerShell               | <a href="#">Set-SNSPlatformApplicationAttributes</a>        |

# Using the Amazon SNS Time To Live (TTL) Message Attribute for Mobile Push Notifications

Amazon Simple Notification Service (Amazon SNS) provides support for setting a *Time To Live (TTL)* message attribute for mobile push notifications messages. This is in addition to the existing capability of setting TTL within the Amazon SNS message body for the mobile push notification services that support this, such as Amazon Device Messaging (ADM) and Google Cloud Messaging for Android (GCM).

The TTL message attribute is used to specify expiration metadata about a message. This allows you to specify the amount of time that the push notification service, such as Apple Push Notification Service (APNS) or GCM, has to deliver the message to the endpoint. If for some reason (such as the mobile device has been turned off) the message is not deliverable within the specified TTL, then the message will be dropped and no further attempts to deliver it will be made. To specify TTL within message attributes, you can use the AWS Management Console, AWS software development kits (SDKs), or query API.

### Topics

- [TTL Message Attributes for Push Notification Services \(p. 94\)](#)
- [Precedence Order for Determining TTL \(p. 94\)](#)
- [Specifying TTL with the AWS Management Console \(p. 95\)](#)
- [Specifying TTL with the AWS SDKs \(p. 95\)](#)

## TTL Message Attributes for Push Notification Services

The following is a list of the TTL message attributes for push notification services that you can use to set when using the AWS SDKs or query API:

| Push Notification Service                              | TTL Message Attribute           |
|--------------------------------------------------------|---------------------------------|
| Amazon Device Messaging (ADM)                          | AWS.SNS.MOBILE.ADM.TTL          |
| Apple Push Notification Service (APNS)                 | AWS.SNS.MOBILE.APNS.TTL         |
| Apple Push Notification Service Sandbox (APNS_SANDBOX) | AWS.SNS.MOBILE.APNS_SANDBOX.TTL |
| Baidu Cloud Push (Baidu)                               | AWS.SNS.MOBILE.BAIDU.TTL        |
| Google Cloud Messaging for Android (GCM)               | AWS.SNS.MOBILE.GCM.TTL          |
| Windows Push Notification Services (WNS)               | AWS.SNS.MOBILE.WNS.TTL          |

Each of the push notification services handle TTL differently. Amazon SNS provides an abstract view of TTL over all the push notification services, which makes it easier to specify TTL. When you use the AWS Management Console to specify TTL (in seconds), you only have to enter the TTL value once and Amazon SNS will then calculate the TTL for each of the selected push notification services when publishing the message.

TTL is relative to the publish time. Before handing off a push notification message to a specific push notification service, Amazon SNS computes the dwell time (the time between the publish timestamp and just before handing off to a push notification service) for the push notification and passes the remaining TTL to the specific push notification service. If TTL is shorter than the dwell time, Amazon SNS won't attempt to publish.

If you specify a TTL for a push notification message, then the TTL value must be a positive integer, unless the value of 0 has a specific meaning for the push notification service—such as with APNS and GCM. If the TTL value is set to 0 and the push notification service does not have a specific meaning for 0, then Amazon SNS will drop the message. For more information about the TTL parameter set to 0 when using APNS, see *Table A-3 Item identifiers for remote notifications* in the [Binary Provider API](#) documentation. For more information about the TTL parameter set to 0 when using GCM, see [Lifetime of a message](#).

## Precedence Order for Determining TTL

The precedence that Amazon SNS uses to determine the TTL for a push notification message is based on the following order, where the lowest number has the highest priority:

1. Message attribute TTL
2. Message body TTL
3. Push notification service default TTL (varies per service)
4. Amazon SNS default TTL (4 weeks)

If you set different TTL values (one in message attributes and another in the message body) for the same message, then Amazon SNS will modify the TTL in the message body to match the TTL specified in the message attribute.

## Specifying TTL with the AWS Management Console

You can specify TTL with the AWS Management Console.

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left **Navigation** pane, click **Apps**, and then click the app containing the endpoints you want to set TTL for when publishing a message.
3. Select the endpoints to publish a message to, click **Endpoint Actions** and then click **Publish**.
4. On the **Publish** dialog box, enter the number of seconds for **Time to Live (TTL)** and then click **Publish Message**.

## Specifying TTL with the AWS SDKs

The [AWS SDKs](#) provide APIs in several languages for using TTL with Amazon SNS.

For more information about the SDK for Java, see [Getting Started with the AWS SDK for Java](#).

The following Java example shows how to configure a TTL message attribute and publish the message to an endpoint, which in this example is registered with Baidu Cloud Push:

```
Map<String, MessageAttributeValue> messageAttributes = new HashMap<String,
 MessageAttributeValue>();

// Insert your desired value (in seconds) of TTL here. For example, a TTL of 1 day would be
// 86,400 seconds.
messageAttributes.put("AWS.SNS.MOBILE.BAIDU.TTL", new
 MessageAttributeValue().withDataType("String").withStringValue("86400"));

PublishRequest publishRequest = new PublishRequest();
publishRequest.setMessageAttributes(messageAttributes);
String message = "{\"title\":\"Test_Title\",\"description\":\"Test_Description\"}";
publishRequest.setMessage(message);
publishRequest.setMessageStructure("json");
publishRequest.setTargetArn("arn:aws:sns:us-east-1:999999999999:endpoint/BAIDU/
TestApp/318fc7b3-bc53-3d63-ac42-e359468ac730");
PublishResult publishResult = snsClient.publish(publishRequest);
```

For more information about using message attributes with Amazon SNS, see [Using Amazon SNS Message Attributes](#) (p. 173).

## Using Amazon SNS Mobile Push APIs

To use the Amazon SNS mobile push APIs, you must first meet the prerequisites for the push notification service, such as Apple Push Notification Service (APNS) and Google Cloud Messaging for Android (GCM). For more information about the prerequisites, see [Prerequisites](#) (p. 38).

To send a push notification message to a mobile app and device using the APIs, you must first use the `CreatePlatformApplication` action, which returns a `PlatformApplicationArn` attribute. The `PlatformApplicationArn` attribute is then used by `CreatePlatformEndpoint`, which returns an

`EndpointArn` attribute. You can then use the `EndpointArn` attribute with the `Publish` action to send a notification message to a mobile app and device, or you could use the `EndpointArn` attribute with the `Subscribe` action for subscription to a topic. For more information, see [Amazon SNS Mobile Push High-Level Steps \(p. 39\)](#).

The Amazon SNS mobile push APIs are as follows:

#### `CreatePlatformApplication`

Creates a platform application object for one of the supported push notification services, such as APNS and GCM, to which devices and mobile apps may register. Returns a `PlatformApplicationArn` attribute, which is used by the `CreatePlatformEndpoint` action.

#### `CreatePlatformEndpoint`

Creates an endpoint for a device and mobile app on one of the supported push notification services. `CreatePlatformEndpoint` uses the `PlatformApplicationArn` attribute returned from the `CreatePlatformApplication` action. The `EndpointArn` attribute, which is returned when using `CreatePlatformEndpoint`, is then used with the `Publish` action to send a notification message to a mobile app and device.

#### `CreateTopic`

Creates a topic to which messages can be published.

#### `DeleteEndpoint`

Deletes the endpoint for a device and mobile app on one of the supported push notification services.

#### `DeletePlatformApplication`

Deletes a platform application object.

#### `DeleteTopic`

Deletes a topic and all its subscriptions.

#### `GetEndpointAttributes`

Retrieves the endpoint attributes for a device and mobile app.

#### `GetPlatformApplicationAttributes`

Retrieves the attributes of the platform application object.

#### `ListEndpointsByPlatformApplication`

Lists the endpoints and endpoint attributes for devices and mobile apps in a supported push notification service.

#### `ListPlatformApplications`

Lists the platform application objects for the supported push notification services.

#### `Publish`

Sends a notification message to all of a topic's subscribed endpoints.

#### `SetEndpointAttributes`

Sets the attributes for an endpoint for a device and mobile app.

#### `SetPlatformApplicationAttributes`

Sets the attributes of the platform application object.

#### `Subscribe`

Prepares to subscribe an endpoint by sending the endpoint a confirmation message. To actually create a subscription, the endpoint owner must call the `ConfirmSubscription` action with the token from the confirmation message.

## Unsubscribe

Deletes a subscription.

# API Errors for Amazon SNS Mobile Push

Errors that are returned by the Amazon SNS APIs for mobile push are listed in the following table. For more information about the Amazon SNS APIs for mobile push, see [Using Amazon SNS Mobile Push APIs \(p. 95\)](#).

| Error                                                     | Description                                                                                                                                                                                                            | HTTPS Status Code | Action that Returns this Error |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| Application Name is null string                           | The required application name is set to null.                                                                                                                                                                          | 400               | CreatePlatformApplication      |
| Platform Name is null string                              | The required platform name is set to null.                                                                                                                                                                             | 400               | CreatePlatformApplication      |
| Platform Name is invalid                                  | An invalid or out-of-range value was supplied for the platform name.                                                                                                                                                   | 400               | CreatePlatformApplication      |
| APNS — Principal is not a valid certificate               | An invalid certificate was supplied for the APNS principal, which is the SSL certificate. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference. | 400               | CreatePlatformApplication      |
| APNS — Principal is a valid cert but not in a .pem format | A valid certificate that is not in the .pem format was supplied for the APNS principal, which is the SSL certificate.                                                                                                  | 400               | CreatePlatformApplication      |
| APNS — Principal is an expired certificate                | An expired certificate was supplied for the APNS principal, which is the SSL certificate.                                                                                                                              | 400               | CreatePlatformApplication      |
| APNS — Principal is not an Apple issued certificate       | A non-Apple issued certificate was supplied for the APNS principal, which is the SSL certificate.                                                                                                                      | 400               | CreatePlatformApplication      |
| APNS — Principal is not provided                          | The APNS principal, which is the SSL certificate, was not provided.                                                                                                                                                    | 400               | CreatePlatformApplication      |

| Error                                            | Description                                                                                                                                                                                   | HTTPS Status Code | Action that Returns this Error |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| APNS — Credential is not provided                | The APNS credential, which is the private key, was not provided. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference. | 400               | CreatePlatformApplication      |
| APNS — Credential are not in a valid .pem format | The APNS credential, which is the private key, is not in a valid .pem format.                                                                                                                 | 400               | CreatePlatformApplication      |
| GCM — serverAPIKey is not provided               | The GCM credential, which is the API key, was not provided. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference.      | 400               | CreatePlatformApplication      |
| GCM — serverAPIKey is empty                      | The GCM credential, which is the API key, is empty.                                                                                                                                           | 400               | CreatePlatformApplication      |
| GCM — serverAPIKey is a null string              | The GCM credential, which is the API key, is null.                                                                                                                                            | 400               | CreatePlatformApplication      |
| GCM — serverAPIKey is invalid                    | The GCM credential, which is the API key, is invalid.                                                                                                                                         | 400               | CreatePlatformApplication      |
| ADM — clientsecret is not provided               | The required client secret is not provided.                                                                                                                                                   | 400               | CreatePlatformApplication      |
| ADM — clientsecret is a null string              | The required string for the client secret is null.                                                                                                                                            | 400               | CreatePlatformApplication      |
| ADM — client_secret is empty string              | The required string for the client secret is empty.                                                                                                                                           | 400               | CreatePlatformApplication      |
| ADM — client_secret is not valid                 | The required string for the client secret is not valid.                                                                                                                                       | 400               | CreatePlatformApplication      |
| ADM — client_id is empty string                  | The required string for the client ID is empty.                                                                                                                                               | 400               | CreatePlatformApplication      |
| ADM — clientId is not provided                   | The required string for the client ID is not provided.                                                                                                                                        | 400               | CreatePlatformApplication      |



| Error                                                     | Description                                                                                                                                                                                                            | HTTPS Status Code | Action that Returns this Error |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| ADM — clientid is a null string                           | The required string for the client ID is null.                                                                                                                                                                         | 400               | CreatePlatformApplication      |
| ADM — client_id is not valid                              | The required string for the client ID is not valid.                                                                                                                                                                    | 400               | CreatePlatformApplication      |
| EventEndpointCreated has invalid ARN format               | EventEndpointCreated has invalid ARN format.                                                                                                                                                                           | 400               | CreatePlatformApplication      |
| EventEndpointDeleted has invalid ARN format               | EventEndpointDeleted has invalid ARN format.                                                                                                                                                                           | 400               | CreatePlatformApplication      |
| EventEndpointUpdated has invalid ARN format               | EventEndpointUpdated has invalid ARN format.                                                                                                                                                                           | 400               | CreatePlatformApplication      |
| EventDeliveryAttemptFailure has invalid ARN format        | EventDeliveryAttemptFailure has invalid ARN format.                                                                                                                                                                    | 400               | CreatePlatformApplication      |
| EventDeliveryFailure has invalid ARN format               | EventDeliveryFailure has invalid ARN format.                                                                                                                                                                           | 400               | CreatePlatformApplication      |
| EventEndpointCreated is not an existing Topic             | EventEndpointCreated is not an existing topic.                                                                                                                                                                         | 400               | CreatePlatformApplication      |
| EventEndpointDeleted is not an existing Topic             | EventEndpointDeleted is not an existing topic.                                                                                                                                                                         | 400               | CreatePlatformApplication      |
| EventEndpointUpdated is not an existing Topic             | EventEndpointUpdated is not an existing topic.                                                                                                                                                                         | 400               | CreatePlatformApplication      |
| EventDeliveryAttemptFailure is not an existing Topic      | EventDeliveryAttemptFailure is not an existing topic.                                                                                                                                                                  | 400               | CreatePlatformApplication      |
| EventDeliveryFailure is not an existing Topic             | EventDeliveryFailure is not an existing topic.                                                                                                                                                                         | 400               | CreatePlatformApplication      |
| Platform ARN is invalid                                   | Platform ARN is invalid.                                                                                                                                                                                               | 400               | SetPlatformAttributes          |
| Platform ARN is valid but does not belong to the user     | Platform ARN is valid but does not belong to the user.                                                                                                                                                                 | 400               | SetPlatformAttributes          |
| APNS — Principal is not a valid certificate               | An invalid certificate was supplied for the APNS principal, which is the SSL certificate. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference. | 400               | SetPlatformAttributes          |
| APNS — Principal is a valid cert but not in a .pem format | A valid certificate that is not in the .pem format was supplied for the APNS principal, which is the SSL certificate.                                                                                                  | 400               | SetPlatformAttributes          |

| Error                                               | Description                                                                                                                                                                                   | HTTPS Status Code | Action that Returns this Error |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| APNS — Principal is an expired certificate          | An expired certificate was supplied for the APNS principal, which is the SSL certificate.                                                                                                     | 400               | SetPlatformAttributes          |
| APNS — Principal is not an Apple issued certificate | A non-Apple issued certificate was supplied for the APNS principal, which is the SSL certificate.                                                                                             | 400               | SetPlatformAttributes          |
| APNS — Principal is not provided                    | The APNS principal, which is the SSL certificate, was not provided.                                                                                                                           | 400               | SetPlatformAttributes          |
| APNS — Credential is not provided                   | The APNS credential, which is the private key, was not provided. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference. | 400               | SetPlatformAttributes          |
| APNS — Credential are not in a valid .pem format    | The APNS credential, which is the private key, is not in a valid .pem format.                                                                                                                 | 400               | SetPlatformAttributes          |
| GCM — serverAPIKey is not provided                  | The GCM credential, which is the API key, was not provided. For more information, see <a href="#">CreatePlatformApplication</a> in the Amazon Simple Notification Service API Reference.      | 400               | SetPlatformAttributes          |
| GCM — serverAPIKey is a null string                 | The GCM credential, which is the API key, is null.                                                                                                                                            | 400               | SetPlatformAttributes          |
| ADM — clientId is not provided                      | The required string for the client ID is not provided.                                                                                                                                        | 400               | SetPlatformAttributes          |
| ADM — clientId is a null string                     | The required string for the client ID is null.                                                                                                                                                | 400               | SetPlatformAttributes          |
| ADM — clientsecret is not provided                  | The required client secret is not provided.                                                                                                                                                   | 400               | SetPlatformAttributes          |
| ADM — clientsecret is a null string                 | The required string for the client secret is null.                                                                                                                                            | 400               | SetPlatformAttributes          |

| Error                                                 | Description                                                 | HTTPS Status Code | Action that Returns this Error     |
|-------------------------------------------------------|-------------------------------------------------------------|-------------------|------------------------------------|
| EventEndpointUpdated has invalid ARN format           | EventEndpointUpdated has invalid ARN format.                | 400               | SetPlatformAttributes              |
| EventEndpointDeleted has invalid ARN format           | EventEndpointDeleted has invalid ARN format.                | 400               | SetPlatformAttributes              |
| EventEndpointUpdated has invalid ARN format           | EventEndpointUpdated has invalid ARN format.                | 400               | SetPlatformAttributes              |
| EventDeliveryAttemptFailure has invalid ARN format    | EventDeliveryAttemptFailure has invalid ARN format.         | 400               | SetPlatformAttributes              |
| EventDeliveryFailure has invalid ARN format           | EventDeliveryFailure has invalid ARN format.                | 400               | SetPlatformAttributes              |
| EventEndpointCreated is not an existing Topic         | EventEndpointCreated is not an existing topic.              | 400               | SetPlatformAttributes              |
| EventEndpointDeleted is not an existing Topic         | EventEndpointDeleted is not an existing topic.              | 400               | SetPlatformAttributes              |
| EventEndpointUpdated is not an existing Topic         | EventEndpointUpdated is not an existing topic.              | 400               | SetPlatformAttributes              |
| EventDeliveryAttemptFailure is not an existing Topic  | EventDeliveryAttemptFailure is not an existing topic.       | 400               | SetPlatformAttributes              |
| EventDeliveryFailure is not an existing Topic         | EventDeliveryFailure is not an existing topic.              | 400               | SetPlatformAttributes              |
| Platform ARN is invalid                               | The platform ARN is invalid.                                | 400               | GetPlatformApplicationAttributes   |
| Platform ARN is valid but does not belong to the user | The platform ARN is valid, but does not belong to the user. | 403               | GetPlatformApplicationAttributes   |
| Token specified is invalid                            | The specified token is invalid.                             | 400               | ListPlatformApplications           |
| Platform ARN is invalid                               | The platform ARN is invalid.                                | 400               | ListEndpointsByPlatformApplication |
| Platform ARN is valid but does not belong to the user | The platform ARN is valid, but does not belong to the user. | 404               | ListEndpointsByPlatformApplication |
| Token specified is invalid                            | The specified token is invalid.                             | 400               | ListEndpointsByPlatformApplication |
| Platform ARN is invalid                               | The platform ARN is invalid.                                | 400               | DeletePlatformApplication          |
| Platform ARN is valid but does not belong to the user | The platform ARN is valid, but does not belong to the user. | 403               | DeletePlatformApplication          |

| Error                                                 | Description                                                                   | HTTPS Status Code | Action that Returns this Error |
|-------------------------------------------------------|-------------------------------------------------------------------------------|-------------------|--------------------------------|
| Platform ARN is invalid                               | The platform ARN is invalid.                                                  | 400               | CreatePlatformEndpoint         |
| Platform ARN is valid but does not belong to the user | The platform ARN is valid, but does not belong to the user.                   | 404               | CreatePlatformEndpoint         |
| Token is not specified                                | The token is not specified.                                                   | 400               | CreatePlatformEndpoint         |
| Token is not of correct length                        | The token is not the correct length.                                          | 400               | CreatePlatformEndpoint         |
| Customer User data is too large                       | The customer user data cannot be more than 2048 bytes long in UTF-8 encoding. | 400               | CreatePlatformEndpoint         |
| Endpoint ARN is invalid                               | The endpoint ARN is invalid.                                                  | 400               | DeleteEndpoint                 |
| Endpoint ARN is valid but does not belong to the user | The endpoint ARN is valid, but does not belong to the user.                   | 403               | DeleteEndpoint                 |
| Endpoint ARN is invalid                               | The endpoint ARN is invalid.                                                  | 400               | SetEndpointAttributes          |
| Endpoint ARN is valid but does not belong to the user | The endpoint ARN is valid, but does not belong to the user.                   | 403               | SetEndpointAttributes          |
| Token is not specified                                | The token is not specified.                                                   | 400               | SetEndpointAttributes          |
| Token is not of correct length                        | The token is not the correct length.                                          | 400               | SetEndpointAttributes          |
| Customer User data is too large                       | The customer user data cannot be more than 2048 bytes long in UTF-8 encoding. | 400               | SetEndpointAttributes          |
| Endpoint ARN is invalid                               | The endpoint ARN is invalid.                                                  | 400               | GetEndpointAttributes          |
| Endpoint ARN is valid but does not belong to the user | The endpoint ARN is valid, but does not belong to the user.                   | 403               | GetEndpointAttributes          |
| Target ARN is invalid                                 | The target ARN is invalid.                                                    | 400               | Publish                        |
| Target ARN is valid but does not belong to the user   | The target ARN is valid, but does not belong to the user.                     | 403               | Publish                        |

| Error                                                         | Description                                                            | HTTPS Status Code | Action that Returns this Error |
|---------------------------------------------------------------|------------------------------------------------------------------------|-------------------|--------------------------------|
| Message format is invalid                                     | The message format is invalid.                                         | 400               | Publish                        |
| Message size is larger than supported by protocol/end-service | The message size is larger than supported by the protocol/end-service. | 400               | Publish                        |

# Sending Amazon SNS Messages to Amazon SQS Queues

[Amazon SNS](#) works closely with Amazon Simple Queue Service (Amazon SQS). Both services provide different benefits for developers. Amazon SNS allows applications to send time-critical messages to multiple subscribers through a “push” mechanism, eliminating the need to periodically check or “poll” for updates. Amazon SQS is a message queue service used by distributed applications to exchange messages through a polling model, and can be used to decouple sending and receiving components—without requiring each component to be concurrently available. By using Amazon SNS and Amazon SQS together, messages can be delivered to applications that require immediate notification of an event, and also persisted in an Amazon SQS queue for other applications to process at a later time.

When you subscribe an Amazon SQS queue to an Amazon SNS topic, you can publish a message to the topic and Amazon SNS sends an Amazon SQS message to the subscribed queue. The Amazon SQS message contains the subject and message that were published to the topic along with metadata about the message in a JSON document. The Amazon SQS message will look similar to the following JSON document.

```
{
 "Type" : "Notification",
 "MessageId" : "63a3f6b6-d533-4a47-aef9-fcf5cf758c76",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Subject" : "Testing publish to subscribed queues",
 "Message" : "Hello world!",
 "Timestamp" : "2012-03-29T05:12:16.901Z",
 "SignatureVersion" : "1",
 "Signature" : "EXAMPLEnTrFPa37tnVO0FF9Iau3MGzjJLRFySEoWz4uZHSj6ycK4ph71Zmdv0NtJ4dC/
El9FOGp3VuvchpaTraNHWhhq/
OsN1HVz20zxmf9b88R8GtqjfkB5woZZmz87HiM6CYDTo3l7LMwFT4VU7ELtyaBBafhPTg9O5CnKkg=",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem",
 "UnsubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-west-2:123456789012:MyTopic:c7fe3a54-
ab0e-4ec2-88e0-db410a0f2bee"
}
```

## Note

Instead of following the steps listed below, you can now subscribe an Amazon SQS queue to an Amazon SNS topic using the Amazon SQS console, which simplifies the process. For more information, see [Subscribe Queue to Amazon SNS Topic](#)

To enable an Amazon SNS topic to send messages to an Amazon SQS queue, follow these steps:

1. [Get the Amazon Resource Name \(ARN\) of the queue you want to send messages to and the topic to which you want to subscribe the queue.](#) (p. 105)
2. [Give `sqs:SendMessage` permission to the Amazon SNS topic so that it can send messages to the queue.](#) (p. 105)
3. [Subscribe the queue to the Amazon SNS topic.](#) (p. 106)
4. [Give IAM users or AWS accounts the appropriate permissions to publish to the Amazon SNS topic and read messages from the Amazon SQS queue.](#) (p. 107)
5. [Test it out by publishing a message to the topic and reading the message from the queue.](#) (p. 109)

To learn about how to set up a topic to send messages to a queue that is in a different AWS account, see [Sending Amazon SNS messages to an Amazon SQS queue in a different account](#) (p. 109).

To see an AWS CloudFormation template that creates a topic that sends messages to two queues, see [Using an AWS CloudFormation Template to Create a Topic that Sends Messages to Amazon SQS Queues](#) (p. 112).

## Step 1. Get the ARN of the queue and the topic.

When subscribing a queue to your topic, you'll need a copy of the ARN for the queue. Similarly, when giving permission for the topic to send messages to the queue, you'll need a copy of the ARN for the topic.

To get the queue ARN, you can use the Amazon SQS console or the [GetQueueAttributes](#) API action.

### To get the queue ARN from the Amazon SQS console

1. Sign in to the AWS Management Console and open the Amazon SQS console at <https://console.aws.amazon.com/sqs/>.
2. Select the box for the queue whose ARN you want to get.
3. From the **Details** tab, copy the ARN value so that you can use it to subscribe to the Amazon SNS topic.

To get the topic ARN, you can use the Amazon SNS console, the [sns-get-topic-attributes](#) command, or the [GetQueueAttributes](#) API action.

### To get the topic ARN from the Amazon SNS console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the navigation pane, select the topic whose ARN you want to get.
3. From the **Topic Details** pane, copy the **Topic ARN** value so that you can use it to give permission for the Amazon SNS topic to send messages to the queue.

## Step 2. Give permission to the Amazon SNS topic to send messages to the Amazon SQS queue

For an Amazon SNS topic to be able to send messages to a queue, you must set a policy on the queue that allows the Amazon SNS topic to perform the `sqs:SendMessage` action.

Before you subscribe a queue to a topic, you need a topic and a queue. If you haven't already created a topic or queue, create them now. For more information, see [Creating a Topic](#), and see [Creating a Queue](#) in the *Amazon Simple Queue Service Developer Guide*.

To set a policy on a queue, you can use the Amazon SQS console or the [SetQueueAttributes](#) API action. Before you start, make sure you have the ARN for the topic that you want to allow to send messages to the queue.

### To set a `SendMessage` policy on a queue using the Amazon SQS console

1. Sign in to the AWS Management Console and open the Amazon SQS console at <https://console.aws.amazon.com/sqs/>.
2. Select the box for the queue whose policy you want to set, click the **Permissions** tab, and then click **Add a Permission**.
3. In the **Add a Permission** dialog box, select **Allow** for **Effect**, select **Everybody (\*)** for **Principal**, and then select **SendMessage** from the **Actions** drop-down.

4. Add a condition that allows the action for the topic. Click **Add Conditions (optional)**, select **ArnEquals** for **Condition**, select **aws:SourceArn** for **Key**, and paste in the topic ARN for **Value**. Click **Add Condition**. The new condition should appear at the bottom of the box (you may have to scroll down to see this).
5. Click **Add Permission**.

If you wanted to create the policy document yourself, you would create a policy like the following. The policy allows MyTopic to send messages to MyQueue.

```
{
 "Version": "2012-10-17",
 "Statement": [
 {
 "Sid": "MySQLSPolicy001",
 "Effect": "Allow",
 "Principal": "*",
 "Action": "sqs:SendMessage",
 "Resource": "arn:aws:sqs:us-east-1:123456789012:MyQueue",
 "Condition": {
 "ArnEquals": {
 "aws:SourceArn": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }
 }
 }
]
}
```

## Step 3. Subscribe the queue to the Amazon SNS topic

To send messages to a queue through a topic, you must subscribe the queue to the Amazon SNS topic. You specify the queue by its ARN. To subscribe to a topic, you can use the Amazon SNS console, the [sns-subscribe](#) command, or the [Subscribe](#) API action. Before you start, make sure you have the ARN for the queue that you want to subscribe.

### To subscribe a queue to a topic using the Amazon SNS console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the navigation pane, select the topic.
3. Click **Create Subscription**, select **Amazon SQS** for **Protocol**, paste in the ARN for the queue that you want the topic to send messages to for **Endpoint**, and click **Subscribe**.
4. For the **Subscription request received!** message, click **Close**.

When the subscription is confirmed, your new subscription's **Subscription ID** displays its subscription ID. If the owner of the queue creates the subscription, the subscription is automatically confirmed and the subscription should be active almost immediately.

Usually, you'll be subscribing your own queue to your own topic in your own account. However, you can also subscribe a queue from a different account to your topic. If the user who creates the subscription is not the owner of the queue (for example, if a user from account A subscribes a queue from account B to a topic in account A), the subscription must be confirmed. For more information about subscribing a queue from a different account and confirming the subscription, see [Sending Amazon SNS messages to an Amazon SQS queue in a different account](#) (p. 109).



## Step 4. Give users permissions to the appropriate topic and queue actions

You should use AWS Identity and Access Management (IAM) to allow only appropriate users to publish to the Amazon SNS topic and to read/delete messages from the Amazon SQS queue. For more information about controlling actions on topics and queues for IAM users, see [Controlling User Access to Your AWS Account](#), and see [Controlling User Access to Your AWS Account](#) in the Amazon Simple Queue Service Developer Guide.

There are two ways to control access to a topic or queue:

- [Add a policy to an IAM user or group \(p. 107\)](#). The simplest way to give users permissions to topics or queues is to create a group and add the appropriate policy to the group and then add users to that group. It's much easier to add and remove users from a group than to keep track of which policies you set on individual users.
- [Add a policy to topic or queue \(p. 108\)](#). If you want to give permissions to a topic or queue to another AWS account, the only way you can do that is by adding a policy that has as its principal the AWS account you want to give permissions to.

You should use the first method for most cases (apply policies to groups and manage permissions for users by adding or removing the appropriate users to the groups). If you need to give permissions to a user in another account, you should use the second method.

### Adding a policy to an IAM user or group

If you added the following policy to an IAM user or group, you would give that user or members of that group permission to perform the `sns:Publish` action on the topic `MyTopic`.

```
{
 "Version": "2012-10-17",
 "Statement": [{
 "Sid": "AllowPublishToMyTopic",
 "Effect": "Allow",
 "Action": "sns:Publish",
 "Resource": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }]
}
```

If you added the following policy to an IAM user or group, you would give that user or members of that group permission to perform the `sqs:ReceiveMessage` and `sqs:DeleteMessage` actions on the queues `MyQueue1` and `MyQueue2`.

```
{
 "Version": "2012-10-17",
 "Statement": [{
 "Sid": "AllowReadDeleteMessageOnMyQueue",
 "Effect": "Allow",
 "Action": [
 "sqs:ReceiveMessage",
 "sqs:DeleteMessage"
],
 "Resource": [
 "arn:aws:sns:us-east-1:123456789012:MyQueue1",
 "arn:aws:sns:us-east-1:123456789012:MyQueue2"
]
 }]
}
```

```
],
 }
]
}
```

## Adding a policy to a topic or queue

The following example policies show how to give another account permissions to a topic and queue.

### Note

When you give another AWS account access to a resource in your account, you are also giving IAM users who have admin-level access (wildcard access) permissions to that resource. All other IAM users in the other account are automatically denied access to your resource. If you want to give specific IAM users in that AWS account access to your resource, the account or an IAM user with admin-level access must delegate permissions for the resource to those IAM users. For more information about cross-account delegation, see [Enabling Cross-Account Access](#) in the *Using IAM Guide*.

If you added the following policy to a topic MyTopic in account 123456789012, you would give account 111122223333 permission to perform the `sns:Publish` action on that topic.

```
{
 "Version": "2012-10-17",
 "Id": "MyTopicPolicy",
 "Statement": [
 {
 "Sid": "Allow-publish-to-topic",
 "Effect": "Allow",
 "Principal": {
 "AWS": "111122223333"
 },
 "Action": "sns:Publish",
 "Resource": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }
]
}
```

If you added the following policy to a queue MyQueue in account 123456789012, you would give account 111122223333 permission to perform the `sqs:ReceiveMessage` and `sqs:DeleteMessage` actions on that queue.

```
{
 "Version": "2012-10-17",
 "Id": "MyQueuePolicy",
 "Statement": [
 {
 "Sid": "Allow-Processing-Of-Messages-for-Queue",
 "Effect": "Allow",
 "Principal": {
 "AWS": "111122223333"
 },
 "Action": [
 "sqs:DeleteMessage",
 "sqs:ReceiveMessage"
],
 "Resource": [
 "arn:aws:sns:us-east-1:123456789012:MyQueue",
]
 }
]
}
```

## Step 5. Test it

You can test a topic's queue subscriptions by publishing to the topic and viewing the message that the topic sends to the queue.

### To publish to a topic using the Amazon SNS console

1. Using the credentials of the AWS account or IAM user with permission to publish to the topic, sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/>.
2. In the navigation pane, select the topic and click **Publish to Topic**.
3. In the **Subject** box, enter a subject (for example, **Testing publish to queue**) in the **Message** box, enter some text (for example, **Hello world!**), and click **Publish Message**. The following message appears: Your message has been successfully published.

### To view the message from the topic using the Amazon SQS console

1. Using the credentials of the AWS account or IAM user with permission to view messages in the queue, sign in to the AWS Management Console and open the Amazon SQS console at <https://console.aws.amazon.com/sqs/>.
2. Check the box for the queue that is subscribed to the topic.
3. From the **Queue Action** drop-down, select **View/Delete Messages** and click **Start Polling for Messages**. A message with a type of **Notification** appears.
4. In the **Body** column, click **More Details**. The **Message Details** box contains a JSON document that contains the subject and message that you published to the topic. The message looks similar to the following JSON document.

```
{
 "Type" : "Notification",
 "MessageId" : "63a3f6b6-d533-4a47-aef9-fcf5cf758c76",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Subject" : "Testing publish to subscribed queues",
 "Message" : "Hello world!",
 "Timestamp" : "2012-03-29T05:12:16.901Z",
 "SignatureVersion" : "1",
 "Signature" : "EXAMPLEnTrFPa37tnVO0FF9Iau3MGzjlJLRfySEoWz4uZHSj6ycK4ph71Zmdv0NtJ4dC/
El9FOGp3VuvchpaTraNHWhhq/
OsN1HVz20zxmf9b88R8GtqjFKB5woZzmz87HiM6CYDT03l7LMwFT4VU7ELtyaBBafhPTg9O5CnKkg=",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem",
 "UnsubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-west-2:123456789012:MyTopic:c7fe3a54-
ab0e-4ec2-88e0-db410a0f2bee"
}
```

5. Click **Close**. You have successfully published to a topic that sends notification messages to a queue.

## Sending Amazon SNS messages to an Amazon SQS queue in a different account

You can publish a notification to an Amazon SNS topic with one or more subscriptions to Amazon SQS queues in another account. You set up the topic and queues the same way you would if they were in the same account (see [Sending Amazon SNS Messages to Amazon SQS Queues \(p. 104\)](#)). The only

difference is how you handle subscription confirmation, and that depends on how you subscribe the queue to the topic.

#### Topics

- [Queue Owner Creates Subscription \(p. 110\)](#)
- [User Who Does Not Own the Queue Creates Subscription \(p. 111\)](#)

## Queue Owner Creates Subscription

When the queue owner creates the subscription, the subscription does not require confirmation. The queue starts receiving notifications from the topic as soon as the `Subscribe` action completes. To enable the queue owner to subscribe to the topic owner's topic, the topic owner must give the queue owner's account permission to call the `Subscribe` action on the topic. When added to the topic `MyTopic` in the account `123456789012`, the following policy gives the account `111122223333` permission to call `sns:Subscribe` on `MyTopic` in the account `123456789012`.

```
{
 "Version": "2012-10-17",
 "Id": "MyTopicSubscribePolicy",
 "Statement": [{
 "Sid": "Allow-other-account-to-subscribe-to-topic",
 "Effect": "Allow",
 "Principal": {
 "AWS": "111122223333"
 },
 "Action": "sns:Subscribe",
 "Resource": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }]
}
```

After this policy has been set on `MyTopic`, a user can log in to the Amazon SNS console with credentials for account `111122223333` to subscribe to the topic.

#### To add an Amazon SQS queue subscription to a topic in another account using the Amazon SQS console

1. Using the credentials of the AWS account containing the queue or an IAM user in that account, sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/>.
2. Make sure you have the ARNs for both the topic and the queue. You will need them when you create the subscription.
3. Make sure you have set `sqs:SendMessage` permission on the queue so that it can receive messages from the topic. For more information, see [Step 2. Give permission to the Amazon SNS topic to send messages to the Amazon SQS queue \(p. 105\)](#).
4. In the navigation pane, select the **SNS Dashboard**.
5. In the **Dashboard**, in the **Additional Actions** section, click **Create New Subscription**.
6. In the **Topic ARN** box, enter the ARN for the topic.
7. For **Protocol**, select **Amazon SQS**.
8. In the **Endpoint** box, enter the ARN for the queue.
9. Click **Subscribe**.
10. For the **Subscription request received!** message, you'll notice text that says you must confirm the subscription. Because you are the queue owner, the subscription does not need to be confirmed. Click **Close**. You've completed the subscription process and notification messages published to the topic can now be sent to the queue.

The user can also use the access key and secret key for the AWS account 111122223333 to issue the `sns-subscribe` command or call the [Subscribe](#) API action to subscribe an Amazon SQS queue to MyTopic in the account 123456789012. The following `sns-subscribe` command subscribes the queue MyQ from account 111122223333 to the topic MyTopic in account 123456789012.

```
aws sns subscribe --topic-arn arn:aws:sns:us-east-1:123456789012:MyTopic --protocol sqs --notification-endpoint arn:aws:sqs:us-east-1:111122223333:MyQ
```

#### Note

To be able to send, the queue must have permissions for Amazon SNS.

## User Who Does Not Own the Queue Creates Subscription

When a user who is not the queue owner creates the subscription (for example, when the topic owner in account A adds a subscription for a queue in account B), the subscription must be confirmed.

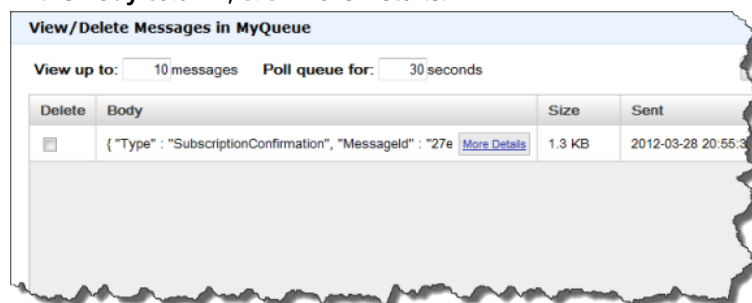
#### Important

Before you subscribe to the topic, make sure you have set `sqs:SendMessage` permission on the queue so that it can receive messages from the topic. See [Step 2. Give permission to the Amazon SNS topic to send messages to the Amazon SQS queue](#) (p. 105).

When the user calls the `Subscribe` action, a message of type `SubscriptionConfirmation` is sent to the queue and the subscription is displayed in the Amazon SNS console with its Subscription ID set to **Pending Confirmation**. To confirm the subscription, a user who can read messages from the queue must visit the URL specified in the `SubscribeURL` value in the message. Until the subscription is confirmed, no notifications published to the topic are sent to the queue. To confirm a subscription, you can use the Amazon SQS console or the [ReceiveMessage](#) API action.

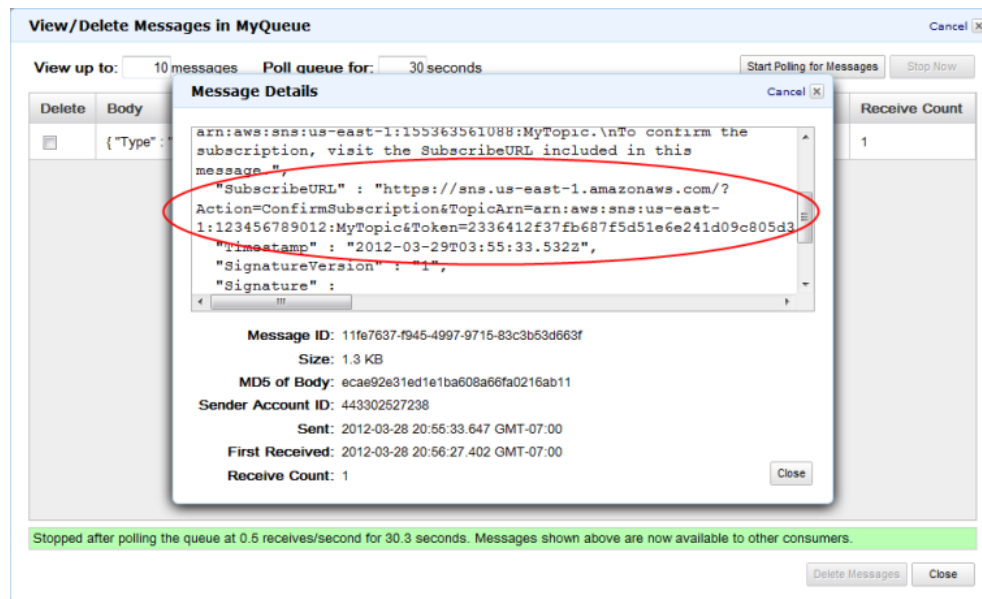
#### To confirm a subscription using the Amazon SQS console

1. Sign in to the AWS Management Console and open the Amazon SQS console at <https://console.aws.amazon.com/sqs/>.
2. Select the queue that has a pending subscription to the topic.
3. From the **Queue Action** drop-down, select **View/Delete Messages** and click **Start Polling for Messages**. A message with a type of `SubscriptionConfirmation` appears.
4. In the **Body** column, click **More Details**.



5. In the text box, find the **SubscribeURL** value and copy the URL. It will look similar to the following URL.

```
https://sns.us-west-2.amazonaws.com/?
Action=ConfirmSubscription&TopicArn=arn:aws:sns:us-
west-2:123456789012:MyTopic&Token=2336412f37fb687f5d51e6e241d09c805d352fe148e56f8cff30f023ff35db8bc
```



6. In a web browser, paste the URL into the address bar to visit the URL. You will see a response similar to the following XML document.

```
<ConfirmSubscriptionResponse xmlns="http://sns.amazonaws.com/doc/2010-03-31/">
 <ConfirmSubscriptionResult>
 <SubscriptionArn>arn:aws:sns:us-west-2:123456789012:MyTopic:c7fe3a54-ab0e-4ec2-88e0-db410a0f2bee</SubscriptionArn>
 </ConfirmSubscriptionResult>
 <ResponseMetadata>
 <RequestId>dd266ecc-7955-11e1-b925-5140d02da9af</RequestId>
 </ResponseMetadata>
</ConfirmSubscriptionResponse>
```

If you view the topic subscription in the Amazon SNS console, you will now see that subscription ARN replaces the **Pending Confirmation** message in the **Subscription ID** column. The subscribed queue is ready to receive messages from the topic.

## Using an AWS CloudFormation Template to Create a Topic that Sends Messages to Amazon SQS Queues

AWS CloudFormation enables you to use a template file to create and configure a collection of AWS resources together as a single unit. This section has an example template that makes it easy to deploy topics that publish to queues. The templates take care of the setup steps for you by creating two queues, creating a topic with subscriptions to the queues, adding a policy to the queues so that the topic can send messages to the queues, and creating IAM users and groups to control access to those resources.

For more information about deploying AWS resources using an AWS CloudFormation template, see [Get Started](#) in the *AWS CloudFormation User Guide*.

## Using an AWS CloudFormation Template to Set Up Topics and Queues Within an AWS Account

The example template creates an Amazon SNS topic that can send messages to two Amazon SQS queues with appropriate permissions for members of one IAM group to publish to the topic and another to read messages from the queues. The template also creates IAM users that are added to each group.

You can download this template (<https://s3.amazonaws.com/cloudformation-templates-us-east-1/SNSToSQS.template>) from the [AWS CloudFormation Sample Templates](#) page.

MySNSTopic is set up to publish to two subscribed endpoints, which are two Amazon SQS queues (MyQueue1 and MyQueue2). MyPublishTopicGroup is an IAM group whose members have permission to publish to MySNSTopic using the [Publish](#) API action or [sns-publish](#) command. The template creates the IAM users MyPublishUser and MyQueueUser and gives them login profiles and access keys. The user who creates a stack with this template specifies the passwords for the login profiles as input parameters. The template creates access keys for the two IAM users with MyPublishUserKey and MyQueueUserKey. AddUserToMyPublishTopicGroup adds MyPublishUser to the MyPublishTopicGroup so that the user will have the permissions assigned to the group.

MyRDMessageQueueGroup is an IAM group whose members have permission to read and delete messages from the two Amazon SQS queues using the [ReceiveMessage](#) and [DeleteMessage](#) API actions. AddUserToMyQueueGroup adds MyQueueUser to the MyRDMessageQueueGroup so that the user will have the permissions assigned to the group. MyQueuePolicy assigns permission for MySNSTopic to publish its notifications to the two queues.

```
{
 "AWSTemplateFormatVersion": "2010-09-09",

 "Description": "This Template creates an Amazon SNS topic that can send messages to two Amazon SQS queues with appropriate permissions for one IAM user to publish to the topic and another to read messages from the queues. MySNSTopic is set up to publish to two subscribed endpoints, which are two Amazon SQS queues (MyQueue1 and MyQueue2). MyPublishUser is an IAM user that can publish to MySNSTopic using the Publish API. MyTopicPolicy assigns that permission to MyPublishUser. MyQueueUser is an IAM user that can read messages from the two Amazon SQS queues. MyQueuePolicy assigns those permissions to MyQueueUser. It also assigns permission for MySNSTopic to publish its notifications to the two queues. The template creates access keys for the two IAM users with MyPublishUserKey and MyQueueUserKey. Note that you will be billed for the AWS resources used if you create a stack from this template.",

 "Parameters": {
 "MyPublishUserPassword": {
 "NoEcho": "true",
 "Type": "String",
 "Description": "Password for the IAM user MyPublishUser",
 "MinLength": "1",
 "MaxLength": "41",
 "AllowedPattern": "[a-zA-Z0-9]*",
 "ConstraintDescription": "must contain only alphanumeric characters."
 },
 "MyQueueUserPassword": {
 "NoEcho": "true",
 "Type": "String",
 "Description": "Password for the IAM user MyQueueUser",
 "MinLength": "1",
 "MaxLength": "41",
 "AllowedPattern": "[a-zA-Z0-9]*",
 "ConstraintDescription": "must contain only alphanumeric characters."
 }
 }
}
```

```
"Resources":{
 "MySNSTopic":{
 "Type":"AWS::SNS::Topic",
 "Properties":{
 "Subscription":[
 {
 "Endpoint":{"Fn::GetAtt":["MyQueue1","Arn"]},
 "Protocol":"sqs"
 },
 {
 "Endpoint":{"Fn::GetAtt":["MyQueue2","Arn"]},
 "Protocol":"sqs"
 }
]
 }
 },
 "MyQueue1":{
 "Type":"AWS::SQS::Queue"
 },
 "MyQueue2":{
 "Type":"AWS::SQS::Queue"
 },
 "MyPublishUser":{
 "Type":"AWS::IAM::User",
 "Properties":{
 "LoginProfile":{
 "Password":{"Ref":"MyPublishUserPassword"}
 }
 }
 },
 "MyPublishUserKey":{
 "Type":"AWS::IAM::AccessKey",
 "Properties":{
 "UserName":{"Ref":"MyPublishUser"}
 }
 },
 "MyPublishTopicGroup":{
 "Type":"AWS::IAM::Group",
 "Properties":{
 "Policies":[
 {
 "PolicyName":"MyTopicGroupPolicy",
 "PolicyDocument":{
 "Version":"2012-10-17",
 "Statement":[
 {
 "Effect":"Allow",
 "Action":[
 "sns:Publish"
],
 "Resource":{"Ref":"MySNSTopic"}
 }
]
 }
 }
]
 }
 },
 "AddUserToMyPublishTopicGroup":{
 "Type":"AWS::IAM::UserToGroupAddition",
 "Properties":{
 "GroupName":{"Ref":"MyPublishTopicGroup"},
 "Users":[{"Ref":"MyPublishUser"}]
 }
 },
}
```



```
"MyQueueUser":{
 "Type":"AWS::IAM::User",
 "Properties":{
 "LoginProfile":{
 "Password":{"Ref":"MyQueueUserPassword"}
 }
 }
},
"MyQueueUserKey":{
 "Type":"AWS::IAM::AccessKey",
 "Properties":{
 "UserName":{"Ref":"MyQueueUser"}
 }
},
"MyRDMessageQueueGroup":{
 "Type":"AWS::IAM::Group",
 "Properties":{
 "Policies":[
 {
 "PolicyName":"MyQueueGroupPolicy",
 "PolicyDocument":{
 "Version":"2012-10-17",
 "Statement":[
 {
 "Effect":"Allow",
 "Action":[
 "sqs:DeleteMessage",
 "sqs:ReceiveMessage"
],
 "Resource":[
 {"Fn::GetAtt":["MyQueue1","Arn"]},
 {"Fn::GetAtt":["MyQueue2","Arn"]}
]
 }
]
 }
]
 }
 },
 "AddUserToMyQueueGroup":{
 "Type":"AWS::IAM::UserToGroupAddition",
 "Properties":{
 "GroupName":{"Ref":"MyRDMessageQueueGroup"},
 "Users":[{"Ref":"MyQueueUser"}]
 }
 },
 "MyQueuePolicy":{
 "Type":"AWS::SQS::QueuePolicy",
 "Properties":{
 "PolicyDocument":{
 "Version":"2012-10-17",
 "Id":"MyQueuePolicy",
 "Statement":[
 {
 "Sid":"Allow-SendMessage-To-Both-Queues-From-SNS-Topic",
 "Effect":"Allow",
 "Principal": "*",
 "Action":["sqs:SendMessage"],
 "Resource": "*",
 "Condition":{
 "ArnEquals":{
 "aws:SourceArn":{"Ref":"MySNSTopic"}
 }
 }
 }
]
 }
 }
 }
}
```

```
 },
 "Queues": [{ "Ref": "MyQueue1" }, { "Ref": "MyQueue2" }]
 }
},
"Outputs": {
 "MySNSTopicTopicARN": {
 "Value": { "Ref": "MySNSTopic" }
 },
 "MyQueue1Info": {
 "Value": { "Fn::Join": [
 " ",
 [
 "ARN:",
 { "Fn::GetAtt": ["MyQueue1", "Arn"] },
 "URL:",
 { "Ref": "MyQueue1" }
]
] }
 },
 "MyQueue2Info": {
 "Value": { "Fn::Join": [
 " ",
 [
 "ARN:",
 { "Fn::GetAtt": ["MyQueue2", "Arn"] },
 "URL:",
 { "Ref": "MyQueue2" }
]
] }
 },
 "MyPublishUserInfo": {
 "Value": { "Fn::Join": [
 " ",
 [
 "ARN:",
 { "Fn::GetAtt": ["MyPublishUser", "Arn"] },
 "Access Key:",
 { "Ref": "MyPublishUserKey" },
 "Secret Key:",
 { "Fn::GetAtt": ["MyPublishUserKey", "SecretAccessKey"] }
]
] }
 },
 "MyQueueUserInfo": {
 "Value": { "Fn::Join": [
 " ",
 [
 "ARN:",
 { "Fn::GetAtt": ["MyQueueUser", "Arn"] },
 "Access Key:",
 { "Ref": "MyQueueUserKey" },
 "Secret Key:",
 { "Fn::GetAtt": ["MyQueueUserKey", "SecretAccessKey"] }
]
] }
 }
}
}
```

# Sending SMS Messages with Amazon SNS

You can use Amazon SNS to send text messages, or *SMS messages*, to SMS-enabled devices. You can [send a message directly to a phone number \(p. 120\)](#), or you can [send a message to multiple phone numbers \(p. 123\)](#) at once by subscribing those phone numbers to a topic and sending your message to the topic.

You can [set SMS preferences \(p. 117\)](#) for your AWS account to tailor your SMS deliveries for your use cases and budget. For example, you can choose whether your messages are optimized for cost or reliable delivery. You can also specify spending limits for individual message deliveries and monthly spending limits for your AWS account.

Where required by local laws and regulations (such as the US and Canada), SMS recipients can [opt out \(p. 131\)](#), which means that they choose to stop receiving SMS messages from your AWS account. After a recipient opts out, you can, with limitations, opt in the phone number again so that you can resume sending messages to it.

Amazon SNS supports SMS messaging in several regions, and you can send messages to more than 200 countries and regions. For more information, see [Supported Regions and Countries \(p. 135\)](#).

## Topics

- [Setting SMS Messaging Preferences \(p. 117\)](#)
- [Sending an SMS Message \(p. 120\)](#)
- [Sending an SMS Message to Multiple Phone Numbers \(p. 123\)](#)
- [Monitoring SMS Activity \(p. 126\)](#)
- [Managing Phone Numbers and SMS Subscriptions \(p. 131\)](#)
- [Reserving a Dedicated Short Code for SMS Messaging \(p. 134\)](#)
- [Supported Regions and Countries \(p. 135\)](#)

## Setting SMS Messaging Preferences

Use Amazon SNS to specify preferences for SMS messaging, such as how your deliveries are optimized (for cost or for reliable delivery), your monthly spending limit, how message deliveries are logged, and whether to subscribe to daily SMS usage reports.

These preferences take effect for every SMS message that you send from your account, but you can override some of them when you send an individual message. For more information, see [Sending an SMS Message \(p. 120\)](#).

## Topics

- [Setting Preferences \(Console\) \(p. 117\)](#)
- [Setting Preferences \(AWS SDKs\) \(p. 119\)](#)

## Setting Preferences (Console)

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).

3. In the navigation pane, choose **Text messaging (SMS)**.
4. On the **Text messaging (SMS)** page, choose **Manage text messaging preferences**.
5. On the **Text messaging preferences** page, for **Default message type**, select the type of SMS message that you will usually send:
  - **Promotional** (default) – Noncritical messages, such as marketing messages. Amazon SNS optimizes the message delivery to incur the lowest cost.
  - **Transactional** – Critical messages that support customer transactions, such as one-time passcodes for multi-factor authentication. Amazon SNS optimizes the message delivery to achieve the highest reliability.

You can override this setting when you send a message.

For pricing information for promotional and transactional messages, see [Global SMS Pricing](#).

6. For **Account spend limit**, type the maximum amount in USD that you want to spend on SMS messages each calendar month. When Amazon SNS determines that sending an SMS message would incur a cost that exceeds your spend limit for that month, Amazon SNS stops publishing SMS messages within minutes.

**Important**

Because Amazon SNS is a distributed system, it stops sending SMS messages within a time interval of minutes of the spend limit being exceeded. During that interval, if you continue to send SMS messages, you may incur costs that exceed your limit.

By default, the spend limit is set to 1.00 USD. If you want to raise the limit, submit an [SNS Text Messaging case](#) with AWS Support. For **New limit value**, enter your desired monthly spend limit. In the **Use Case Description** field, explain that you are requesting an SMS monthly spend limit increase. Typically, AWS Support processes your case within 2 business days. Depending on the spend limit you request and the complexity of your case, AWS Support might require an additional 3 - 5 days to ensure that your request can be processed.

7. For **IAM role for CloudWatch Logs access**, create an IAM role that allows Amazon SNS to write logs for SMS deliveries in CloudWatch Logs:
  - a. Choose **Create IAM role**.
  - b. On the **SNS is requesting permission to use resources in your account** page, choose **Allow**.
8. For **Default percentage of success to sample**, specify the percentage of successful SMS deliveries for which Amazon SNS will write logs in CloudWatch Logs. For example, to write logs only for failed deliveries, set this value to 0. To write logs for 10% of your successful deliveries, set it to 10. If you don't specify a percentage, Amazon SNS writes logs for all successful deliveries.
9. For **Default sender ID**, type a custom ID that contains up to 11 alphanumeric characters, including at least one letter and no spaces. The sender ID is displayed as the message sender on the receiving device. For example, you can use your business brand to make the message source easier to recognize.

Support for sender IDs varies by country or region. For example, messages delivered to U.S. phone numbers will not display the sender ID. For the countries and regions that support sender IDs, see [Supported Regions and Countries \(p. 135\)](#).

If you do not specify a sender ID, the message will display a long code as the sender ID in supported countries and regions. For countries and regions that require an alphabetic sender ID, the message displays *NOTICE* as the sender ID.

You can override the this setting when you send a message.

10. For **Reports storage**, type the name of the Amazon S3 bucket to receive daily SMS usage reports from Amazon SNS. Amazon SNS does not create daily usage reports unless you specify an Amazon S3 bucket to receive them. For more information, see [Viewing Daily SMS Usage Reports \(p. 129\)](#).

11. Choose **Update preferences**.

## Setting Preferences (AWS SDKs)

To set your SMS preferences by using one of AWS SDKs, use the action in that SDK that corresponds to the `SetSMSAttributes` request in the Amazon SNS API. With this request, you assign values to the different SMS attributes, such as your monthly spend limit and your default SMS type (promotional or transactional). For all SMS attributes, see [SetSMSAttributes](#) in the *Amazon Simple Notification Service API Reference*.

### Setting Preferences (AWS SDK for Java)

The following example uses the `setSMSAttributes` method of the `AmazonSNSClient` class to set values for the different attribute names:

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 setDefaultSmsAttributes(snsClient);
}

public static void setDefaultSmsAttributes(AmazonSNSClient snsClient) {
 SetSMSAttributesRequest setRequest = new SetSMSAttributesRequest()
 .addAttributesEntry("DefaultSenderId", "mySenderId")
 .addAttributesEntry("MonthlySpendLimit", "1")
 .addAttributesEntry("DeliveryStatusIAMRole",
 "arn:aws:iam::123456789012:role/mySnsRole")
 .addAttributesEntry("DeliveryStatusSuccessSamplingRate", "10")
 .addAttributesEntry("DefaultSMSType", "Transactional")
 .addAttributesEntry("UsageReportS3Bucket", "sns-sms-daily-usage");
 snsClient.setSMSAttributes(setRequest);
 Map<String, String> myAttributes = snsClient.getSMSAttributes(new
 GetSMSAttributesRequest()
 .getAttributes());
 System.out.println("My SMS attributes:");
 for (String key : myAttributes.keySet()) {
 System.out.println(key + " = " + myAttributes.get(key));
 }
}
```

This example sets the value for the `MonthlySpendLimit` attribute to 1.00 USD. By default, this is the maximum amount allowed by Amazon SNS. If you want to raise the limit, submit an [SNS Text Messaging case](#) with AWS Support. For **New limit value**, enter your desired monthly spend limit. In the **Use Case Description** field, explain that you are requesting an SMS monthly spend limit increase. Typically, AWS Support processes your case within 2 business days. Depending on the spend limit you request and the complexity of your case, AWS Support might require an additional 3 - 5 days to ensure that your request can be processed.

To verify that the attributes were set correctly, the example prints the result of the `getSMSAttributes` method. When you run this example, the attributes are displayed in the console output window of your IDE:

```
My SMS attributes:
DeliveryStatusSuccessSamplingRate = 10
UsageReportS3Bucket = sns-sms-daily-usage
DefaultSMSType = Transactional
DeliveryStatusIAMRole = arn:aws:iam::123456789012:role/mySnsRole
MonthlySpendLimit = 1
DefaultSenderId = mySenderId
```

## Sending an SMS Message

You can use Amazon SNS to send SMS messages to SMS-enabled devices. You can publish messages directly to the phone numbers for these devices, and you do not need to subscribe the phone numbers to an Amazon SNS topic.

Subscribing phone numbers to a topic can be still useful if you want to publish each message to multiple phone numbers at once. For steps on how to publish an SMS message to a topic, see [Sending an SMS Message to Multiple Phone Numbers \(p. 123\)](#).

When you send a message, you can control whether the message is optimized for cost or reliable delivery, and you can specify a sender ID. If you send the message programmatically by using the Amazon SNS API or AWS SDKs, you can specify a maximum price for the message delivery.

Each SMS message can contain up to 140 bytes, and the character limit depends on the encoding scheme. For example, an SMS message can contain:

- 160 GSM characters
- 140 ASCII characters
- 70 UCS-2 characters

If you publish a message that exceeds the size limit, Amazon SNS sends it as multiple messages, each fitting within the size limit. Messages are not cut off in the middle of a word but on whole-word boundaries. The total size limit for a single SMS publish action is 1600 bytes.

When you send an SMS message, specify the phone number using the E.164 format. E.164 is a standard for the phone number structure used for international telecommunication. Phone numbers that follow this format can have a maximum of 15 digits, and they are prefixed with the plus character (+) and the country code. For example, a U.S. phone number in E.164 format would appear as +1XXX5550100.

### Topics

- [Sending a Message \(Console\) \(p. 120\)](#)
- [Sending a Message \(AWS SDKs\) \(p. 121\)](#)

## Sending a Message (Console)

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).
3. In the navigation pane, choose **Text messaging (SMS)**.
4. On the **Text messaging (SMS)** page, choose **Send a text message (SMS)**. The **Send text message (SMS)** window opens.
5. For **Message type**, choose one of the following:
  - **Promotional** – Noncritical messages, such as marketing messages. Amazon SNS optimizes the message delivery to incur the lowest cost.
  - **Transactional** – Critical messages that support customer transactions, such as one-time passcodes for multi-factor authentication. Amazon SNS optimizes the message delivery to achieve the highest reliability.

This message-level setting overrides your default message type, which you set on the **Text messaging preferences** page.

For pricing information for promotional and transactional messages, see [Global SMS Pricing](#).

6. For **Number**, type the phone number to which you want to send the message.
7. For **Message**, type the message to send.
8. (Optional) For **Sender ID**, type a custom ID that contains up to 11 alphanumeric characters, including at least one letter and no spaces. The sender ID is displayed as the message sender on the receiving device. For example, you can use your business brand to make the message source easier to recognize.

Support for sender IDs varies by country and/or region. For example, messages delivered to U.S. phone numbers will not display the sender ID. For the countries and regions that support sender IDs, see [Supported Regions and Countries](#) (p. 135).

If you do not specify a sender ID, the message will display a long code as the sender ID in supported countries or regions. For countries and regions that require an alphabetic sender ID, the message displays *NOTICE* as the sender ID.

This message-level sender ID overrides your default sender ID, which you set on the **Text messaging preferences** page.

9. Choose **Send text message**.

## Sending a Message (AWS SDKs)

To send an SMS message by using one of the AWS SDKs, use the action in that SDK that corresponds to the `Publish` request in the Amazon SNS API. With this request, you can send an SMS message directly to a phone number. You can also use the `MessageAttributes` parameter to set values for the following attribute names:

### `AWS.SNS.SMS.SenderID`

A custom ID that contains up to 11 alphanumeric characters, including at least one letter and no spaces. The sender ID is displayed as the message sender on the receiving device. For example, you can use your business brand to make the message source easier to recognize.

Support for sender IDs varies by country and/or region. For example, messages delivered to U.S. phone numbers will not display the sender ID. For the countries and regions that support sender IDs, see [Supported Regions and Countries](#) (p. 135).

If you do not specify a sender ID, the message will display a long code as the sender ID in supported countries and regions. For countries or regions that require an alphabetic sender ID, the message displays *NOTICE* as the sender ID.

This message-level attribute overrides the account-level attribute `DefaultSenderId`, which you set by using the `SetSMSAttributes` request.

### `AWS.SNS.SMS.MaxPrice`

The maximum amount in USD that you are willing to spend to send the SMS message. Amazon SNS will not send the message if it determines that doing so would incur a cost that exceeds the maximum price.

This attribute has no effect if your month-to-date SMS costs have already exceeded the limit set for the `MonthlySpendLimit` attribute, which you set by using the `SetSMSAttributes` request.

If you are sending the message to an Amazon SNS topic, the maximum price applies to each message delivery to each phone number that is subscribed to the topic.

### `AWS.SNS.SMS.SMSType`

The type of message that you are sending:

- **Promotional (default)** – Noncritical messages, such as marketing messages. Amazon SNS optimizes the message delivery to incur the lowest cost.
- **Transactional** – Critical messages that support customer transactions, such as one-time passcodes for multi-factor authentication. Amazon SNS optimizes the message delivery to achieve the highest reliability.

This message-level attribute overrides the account-level attribute `DefaultSMSType`, which you set by using the `SetSMSAttributes` request.

## (Optional) Setting Message Attributes (AWS SDK for Java)

You set message attribute values by constructing a map that associates the attribute keys with `MessageAttributeValue` objects. Each `MessageAttributeValue` object is initialized with an attribute value, and each object declares the data type for the value. The following example sets the sender ID to "mySenderId", maximum price to 0.50 USD, and SMS type to promotional:

```
Map<String, MessageAttributeValue> smsAttributes =
 new HashMap<String, MessageAttributeValue>();
smsAttributes.put("AWS.SNS.SMS.SenderID", new MessageAttributeValue()
 .withStringValue("mySenderId") //The sender ID shown on the device.
 .withDataType("String"));
smsAttributes.put("AWS.SNS.SMS.MaxPrice", new MessageAttributeValue()
 .withStringValue("0.50") //Sets the max price to 0.50 USD.
 .withDataType("Number"));
smsAttributes.put("AWS.SNS.SMS.SMSType", new MessageAttributeValue()
 .withStringValue("Promotional") //Sets the type to promotional.
 .withDataType("String"));
```

When you send an SMS message, you will apply your attributes to the `PublishRequest` object.

## Sending a Message (AWS SDK for Java)

The following example uses the `publish` method of the `AmazonSNSClient` class to send a message directly to a phone number:

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 String message = "My SMS message";
 String phoneNumber = "+1XXX5550100";
 Map<String, MessageAttributeValue> smsAttributes =
 new HashMap<String, MessageAttributeValue>();
 //<set SMS attributes>
 sendSMSMessage(snsClient, message, phoneNumber, smsAttributes);
}

public static void sendSMSMessage(AmazonSNSClient snsClient, String message,
 String phoneNumber, Map<String, MessageAttributeValue> smsAttributes) {
 PublishResult result = snsClient.publish(new PublishRequest()
 .withMessage(message)
 .withPhoneNumber(phoneNumber)
 .withMessageAttributes(smsAttributes));
 System.out.println(result); // Prints the message ID.
}
```

When you run this example, the message ID is displayed in the console output window of your IDE:

```
{MessageId: 9b888f80-15f7-5c30-81a2-c4511a3f5229}
```



# Sending an SMS Message to Multiple Phone Numbers

You can publish a single SMS message to many phone numbers at once by subscribing those phone numbers to a topic. A topic is a communication channel to which you can add subscribers and then publish messages to all of those subscribers. A subscriber will receive all messages published to the topic until you cancel the subscription or the subscriber opts out of receiving SMS messages from your account.

## Topics

- [Sending a Message to a Topic \(Console\) \(p. 123\)](#)
- [Sending a Message to a Topic \(AWS SDKs\) \(p. 124\)](#)

## Sending a Message to a Topic (Console)

### To create a topic

Complete the following steps if you don't already have a topic to which you want to send SMS messages.

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).
3. In the navigation pane, choose **Topics**.
4. On the **Topics** page, choose **Create new topic**. The **Create new topic** window opens.
5. For **Topic name**, type a name.
6. (Optional) For **Display name**, type a custom prefix for your SMS messages. When you send a message to the topic, Amazon SNS prepends the display name followed by a right angle bracket (>) and a space. Display names are not case sensitive, and Amazon SNS converts display names to uppercase characters. For example, if the display name of a topic is `MyTopic` and the message is `Hello World!`, the message would appear as:

```
MYTOPIC> Hello World!
```

7. Choose **Create topic**. The topic name and Amazon Resource Name (ARN) are added to the table on the **Topics** page.

### To add SMS subscriptions

Subscriptions enable you to send an SMS message to multiple recipients by publishing the message just once to your topic.

1. On the **Topics** page, choose the topic ARN.
2. On the topic details page, choose **Create Subscription**.
3. For **Protocol**, select **SMS**.
4. For **Endpoint**, type the phone number to which you want to send messages.
5. Choose **Create Subscription**. The subscription information is added to the **Subscriptions** table.

You can repeat these steps to add more phone numbers, and you can add other types of subscriptions, such as email.

## To send the message

When you publish a message to a topic, Amazon SNS attempts to deliver that message to every phone number that is subscribed to the topic.

1. On the topic details page, choose **Publish to topic**.
2. On the **Publish a message** page, for **Subject**, leave the field blank unless your topic contains email subscriptions and you want to publish to both email and SMS subscriptions. The text that you enter for **Subject** is used as the email subject line.
3. For **Message**, type a message.

For information about the size limits for SMS messages, see [Sending an SMS Message \(p. 120\)](#).

If your topic has a display name, Amazon SNS adds it to the message, which increases the message length. The display name length is the number of characters in the name plus two characters for the right angle bracket (>) and space that Amazon SNS adds.

4. Choose **Publish message**. Amazon SNS sends the SMS message and displays a success message.

## Sending a Message to a Topic (AWS SDKs)

To send an SMS message to a topic by using one of AWS SDKs, use the actions in that SDK that correspond to the following requests in the Amazon SNS API:

### CreateTopic

Creates a topic to which you can subscribe phone numbers and then publish messages to all of those phone numbers at once by publishing to the topic.

### Subscribe

Subscribes a phone number to a topic.

### Publish

Sends a message to each phone number subscribed to a topic.

You can use the `MessageAttributes` parameter to set several attributes for the message (for example, the maximum price). For more information, see [Sending a Message \(AWS SDKs\) \(p. 121\)](#).

## Creating a Topic (AWS SDK for Java)

The following example uses the `createTopic` method of the `AmazonSNSClient` class to create a topic named "mySNSTopic":

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 String topicArn = createSNSTopic(snsClient);
}

public static String createSNSTopic(AmazonSNSClient snsClient) {
 CreateTopicRequest createTopic = new CreateTopicRequest("mySNSTopic");
 CreateTopicResult result = snsClient.createTopic(createTopic);
 System.out.println("Create topic request: " +
 snsClient.getCachedResponseMetadata(createTopic));
 System.out.println("Create topic result: " + result);
 return result.getTopicArn();
}
```

The example uses the `getCachedResponseMetadata` method to get the request ID.

When you run this example, the following is displayed in the console output window of your IDE:

```
{TopicArn: arn:aws:sns:us-east-1:123456789012:mySNSTopic}
CreateTopicRequest - {AWS_REQUEST_ID=93f7fc90-f131-5ca3-ab18-b741fef918b5}
```

## Adding an SMS Subscription to Your Topic (AWS SDK for Java)

The following example uses the `subscribe` method of the `AmazonSNSClient` class to add a subscription to a topic:

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 String phoneNumber = "+1XXX5550100";
 String topicArn = createSNSTopic(snsClient);
 subscribeToTopic(snsClient, topicArn, "sms", phoneNumber);
}

//<create SNS topic>

public static void subscribeToTopic(AmazonSNSClient snsClient, String topicArn,
 String protocol, String endpoint) {
 SubscribeRequest subscribe = new SubscribeRequest(topicArn, protocol,
 endpoint);
 SubscribeResult subscribeResult = snsClient.subscribe(subscribe);
 System.out.println("Subscribe request: " +
 snsClient.getCacheResponseMetadata(subscribe));
 System.out.println("Subscribe result: " + subscribeResult);
}
```

This example constructs the `subscribeRequest` object and passes it the following arguments:

- `topicArn` - The Amazon Resource Name (ARN) of the topic to which you are adding a subscription.
- `"sms"` - The protocol option for an SMS subscription.
- `endpoint` - The phone number that you are subscribing to the topic.

The example uses the `getCacheResponseMetadata` method to get the request ID for the subscribe request.

When you run this example, the ID of the subscribe request is displayed in the console window of your IDE:

```
SubscribeRequest - {AWS_REQUEST_ID=f38fe925-8093-5bd4-9c19-a7c7625de38c}
```

## (Optional) Setting Message Attributes (AWS SDK for Java)

You set message attribute values by constructing a map that associates the attribute keys with `MessageAttributeValue` objects. Each `MessageAttributeValue` object is initialized with an attribute value, and each object declares the data type for the value. The following example sets the sender ID to "mySenderId", maximum price to 0.50 USD, and SMS type to promotional:

```
Map<String, MessageAttributeValue> smsAttributes =
 new HashMap<String, MessageAttributeValue>();
smsAttributes.put("AWS.SNS.SMS.SenderID", new MessageAttributeValue()
 .withStringValue("mySenderId") //The sender ID shown on the device.
 .withDataType("String"));
smsAttributes.put("AWS.SNS.SMS.MaxPrice", new MessageAttributeValue()
 .withStringValue("0.50") //Sets the max price to 0.50 USD.
```

```
.withDataType("Number"));
smsAttributes.put("AWS.SNS.SMS.SMSType", new MessageAttributeValue()
.withStringValue("Promotional") //Sets the type to promotional.
.withDataType("String"));
```

For more information about message attributes, see [Sending a Message \(AWS SDKs\) \(p. 121\)](#)

When you send an SMS message, you will apply your attributes to the `PublishRequest` object.

## Publishing a Message to Your Topic (AWS SDK for Java)

The following example uses the `publish` method of the `AmazonSNSClient` class to publish an SMS message to a topic:

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 String message = "My SMS message";
 Map<String, MessageAttributeValue> smsAttributes =
 new HashMap<String, MessageAttributeValue>();
 //<set SMS attributes>
 String topicArn = createSNSTopic(snsClient);
 //<subscribe to topic>
 sendSMSMessageToTopic(snsClient, topicArn, message, smsAttributes);
}

//<create topic method>

//<subscribe to topic method>

public static void sendSMSMessageToTopic(AmazonSNSClient snsClient, String topicArn,
 String message, Map<String, MessageAttributeValue> smsAttributes) {
 PublishResult result = snsClient.publish(new PublishRequest()
 .withTopicArn(topicArn)
 .withMessage(message)
 .withMessageAttributes(smsAttributes));
 System.out.println(result);
}
```

Amazon SNS will attempt to deliver that message to every phone number that is subscribed to the topic.

This example constructs the `publishRequest` object while passing the topic Amazon Resource Name (ARN) and the message as arguments. The `publishResult` object captures the message ID returned by Amazon SNS.

When you run this example, the message ID is displayed in the console output window of your IDE:

```
{MessageId: 9b888f80-15f7-5c30-81a2-c4511a3f5229}
```

## Monitoring SMS Activity

By monitoring your SMS activity, you can keep track of destination phone numbers, successful or failed deliveries, reasons for failure, costs, and other information. Amazon SNS helps by summarizing statistics in the console, sending information to Amazon CloudWatch, and sending daily SMS usage reports to an Amazon S3 bucket that you specify.

### Topics

- [Viewing SMS Delivery Statistics \(p. 127\)](#)
- [Viewing Amazon CloudWatch Metrics and Logs for SMS Deliveries \(p. 127\)](#)

- [Viewing Daily SMS Usage Reports \(p. 129\)](#)

## Viewing SMS Delivery Statistics

You can use the Amazon SNS console to view statistics about your recent SMS deliveries.

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).
3. In the navigation pane, choose **Text messaging (SMS)**.
4. On the **Text messaging (SMS)** page, in the **Account stats** section, view the charts for your transactional and promotional SMS message deliveries. Each chart shows the following data for the preceding 15 days:
  - Delivery rate (percentage of successful deliveries)
  - Sent (number of delivery attempts)
  - Failed (number of delivery failures)

On this page, you can also choose the **Usage** button to go to the Amazon S3 bucket where you store your daily usage reports. For more information, see [Viewing Daily SMS Usage Reports \(p. 129\)](#).

## Viewing Amazon CloudWatch Metrics and Logs for SMS Deliveries

You can use Amazon CloudWatch and Amazon CloudWatch Logs to monitor your SMS message deliveries.

### Topics

- [Viewing Amazon CloudWatch Metrics \(p. 127\)](#)
- [Viewing CloudWatch Logs \(p. 127\)](#)
- [Example Log for Successful SMS Delivery \(p. 128\)](#)
- [Example Log for Failed SMS Delivery \(p. 128\)](#)
- [SMS Delivery Failure Reasons \(p. 129\)](#)

## Viewing Amazon CloudWatch Metrics

Amazon SNS automatically collects metrics about your SMS message deliveries and pushes them to Amazon CloudWatch. You can use CloudWatch to monitor these metrics and create alarms to alert you when a metric crosses a threshold. For example, you can monitor CloudWatch metrics to learn your SMS delivery rate and your month-to-date SMS charges.

For information about monitoring CloudWatch metrics, setting CloudWatch alarms, and the types of metrics available, see [Monitoring Amazon SNS with CloudWatch \(p. 187\)](#).

## Viewing CloudWatch Logs

You can collect information about successful and unsuccessful SMS message deliveries by enabling Amazon SNS to write to Amazon CloudWatch Logs. For each SMS message that you send, Amazon SNS will write a log that includes the message price, the success or failure status, the reason for failure (if the message failed), the message dwell time, and other information.

## To enable CloudWatch Logs for your SMS messages

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).
3. In the navigation pane, choose **Text messaging (SMS)**.
4. On the **Text messaging (SMS)** page, choose **Manage text messaging preferences**.
5. On the **Text messaging preferences** page, for **IAM role for CloudWatch Logs access**, create an IAM role that allows Amazon SNS to write logs for SMS deliveries in CloudWatch Logs:
  - a. Choose **Create IAM role**.
  - b. On the **SNS is requesting permission to use resources in your account** page, choose **Allow**.
6. For **Default percentage of success to sample**, specify the percentage of successful SMS deliveries for which Amazon SNS will write logs in CloudWatch Logs. For example, to write logs only for failed deliveries, set this value to 0. To write logs for 10% of your successful deliveries, set it to 10. If you don't specify a percentage, Amazon SNS writes logs for all successful deliveries.
7. Choose **Update preferences**.

For information about the other options on the **Text messaging preferences** page, see [Setting Preferences \(Console\) \(p. 117\)](#).

## Example Log for Successful SMS Delivery

The delivery status log for a successful SMS delivery will resemble the following example:

```
{
 "notification": {
 "messageId": "34d9b400-c6dd-5444-820d-fbeb0f1f54cf",
 "timestamp": "2016-06-28 00:40:34.558"
 },
 "delivery": {
 "phoneCarrier": "My Phone Carrier",
 "mnc": 270,
 "destination": "+1XXX5550100",
 "priceInUSD": 0.00645,
 "smsType": "Transactional",
 "mcc": 310,
 "providerResponse": "Message has been accepted by phone carrier",
 "dwellTimeMs": 599,
 "dwellTimeMsUntilDeviceAck": 1344
 },
 "status": "SUCCESS"
}
```

## Example Log for Failed SMS Delivery

The delivery status log for a failed SMS delivery will resemble the following example:

```
{
 "notification": {
 "messageId": "1077257a-92f3-5ca3-bc97-6a915b310625",
 "timestamp": "2016-06-28 00:40:34.559"
 },
 "delivery": {
 "mnc": 0,
 "destination": "+1XXX5550100",
 "priceInUSD": 0.00645,

```

```
 "smsType": "Transactional",
 "mcc": 0,
 "providerResponse": "Unknown error attempting to reach phone",
 "dwellTimeMs": 1420,
 "dwellTimeMsUntilDeviceAck": 1692
 },
 "status": "FAILURE"
}
```

## SMS Delivery Failure Reasons

The reason for a failure is provided with the `providerResponse` attribute. SMS messages might fail to deliver for the following reasons:

- Blocked as spam by phone carrier
- Destination is blacklisted
- Invalid phone number
- Message body is invalid
- Phone carrier has blocked this message
- Phone carrier is currently unreachable/unavailable
- Phone has blocked SMS
- Phone is blacklisted
- Phone is currently unreachable/unavailable
- Phone number is opted out
- This delivery would exceed max price
- Unknown error attempting to reach phone

## Viewing Daily SMS Usage Reports

You can monitor your SMS deliveries by subscribing to daily usage reports from Amazon SNS. Each day that you send at least one SMS message, Amazon SNS will deliver a usage report as a CSV file to an Amazon S3 bucket that you specify.

### Topics

- [Daily Usage Report Information \(p. 129\)](#)
- [Subscribing to Daily Usage Reports \(p. 130\)](#)

## Daily Usage Report Information

The usage report includes the following information for each SMS message that was successfully delivered by your account:

- Time that the message was published (in UTC)
- Message ID
- Destination phone number
- Message type
- Delivery status
- Message price (in USD)
- Part number (a message is split into multiple parts if it is too long for a single message)
- Total number of parts

## Subscribing to Daily Usage Reports

To subscribe to daily usage reports, you must create an Amazon S3 bucket with the appropriate permissions.

### To create an Amazon S3 bucket for your daily usage reports

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. Choose **Create Bucket**.
3. For **Bucket Name**, type a name, such as **sns-sms-daily-usage**. For information about conventions and restrictions for bucket names, see [Rules for Bucket Naming](#) in the *Amazon Simple Storage Service Developer Guide*.
4. Choose **Create**.
5. In the **All Buckets** table, select the bucket and choose **Properties**.
6. In the **Permissions** section, choose **Add bucket policy**.
7. In the **Bucket Policy Editor** window, provide a policy that allows the Amazon SNS service principal to write to your bucket. For an example, see [Example Bucket Policy \(p. 130\)](#).

If you use the example policy, remember to replace `my-s3-bucket` with the name of your bucket.

8. Choose **Save**.

### To subscribe to daily usage reports

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the navigation pane, choose **Text messaging (SMS)**.
3. On the **Text messaging (SMS)** page, choose **Manage text messaging preferences**.
4. On the **Text messaging preferences** page, for **Reports storage**, type the name of the Amazon S3 bucket that will receive the daily SMS usage reports.
5. Choose **Update preferences**.

For information about the other options on the **Text messaging preferences** page, see [Setting Preferences \(Console\) \(p. 117\)](#).

After you subscribe to daily usage reports, you can view the reports in the Amazon S3 console. You can also go to the **Text messaging (SMS)** page in the Amazon SNS console and choose the **Usage** button.

### Example Bucket Policy

The following policy allows the Amazon SNS service principal to perform the `s3:PutObject` and `s3:GetBucketLocation` actions. You can use this example when you create an Amazon S3 bucket to receive daily SMS usage reports from Amazon SNS.

```
{
 "Version": "2012-10-17",
 "Id": "sns-sms-daily-usage-policy",
 "Statement": [
 {
 "Sid": "AllowPutObject",
 "Effect": "Allow",
 "Principal": {
 "Service": "sns.amazonaws.com"
 },
 "Action": "s3:PutObject",
 "Resource": "arn:aws:s3:::my-s3-bucket/*"
 }
]
}
```



```
 "Action": "s3:PutObject",
 "Resource": "arn:aws:s3::my-s3-bucket/*"
 },
 {
 "Sid": "AllowGetBucketLocation",
 "Effect": "Allow",
 "Principal": {
 "Service": "sns.amazonaws.com"
 },
 "Action": "s3:GetBucketLocation",
 "Resource": "arn:aws:s3::my-s3-bucket"
 }
]
}
```

## Example Daily Usage Report

After you subscribe to daily usage reports, each day, Amazon SNS puts a CSV file with usage data in the following location:

```
<my-s3-bucket>/SMSUsageReports/<region>/YYYY/MM/DD/00x.csv.gz
```

Each file can contain up to 50,000 records. If the records for a day exceed this limit, Amazon SNS will add multiple files.

The following shows an example report:

```
PublishTimeUTC,MessageId,DestinationPhoneNumber,MessageType,DeliveryStatus,PriceInUSD,PartNumber,TotalF
2016-05-10T03:00:29.476Z,96a298ac-1458-4825-
a7eb-7330e0720b72,1XXX5550100,Promotional,Message has been accepted by phone
carrier,0.90084,1,1
2016-05-10T03:00:29.561Z,1e29d394-
d7f4-4dc9-996e-26412032c344,1XXX5550100,Promotional,Message has been accepted by phone
carrier,0.34322,1,1
2016-05-10T03:00:30.769Z,98ba941c-afc7-4c51-
ba2c-56c6570a6c08,1XXX5550100,Transactional,Message has been accepted by phone
carrier,0.27815,1,1
. . .
```

# Managing Phone Numbers and SMS Subscriptions

Amazon SNS provides several options for managing who receives SMS messages from your account. With a limited frequency, you can opt in phone numbers that have opted out of receiving SMS messages from your account. To stop sending messages to SMS subscriptions, you can remove subscriptions or the topics that publish to them.

## Topics

- [Opting Out of Receiving SMS Messages \(p. 131\)](#)
- [Managing Phone Numbers and Subscriptions \(Console\) \(p. 132\)](#)
- [Managing Phone Numbers and Subscriptions \(AWS SDKs\) \(p. 133\)](#)

## Opting Out of Receiving SMS Messages

Where required by local laws and regulations (such as the US and Canada), SMS recipients can use their devices to opt out by replying to the message with any of the following:

- ARRET (French)
- CANCEL
- END
- OPT-OUT
- OPTOUT
- QUIT
- REMOVE
- STOP
- TD
- UNSUBSCRIBE

To opt out, the recipient must reply to the same long code or short code that Amazon SNS used to deliver the message. After opting out, the recipient will no longer receive SMS messages delivered from your AWS account unless you opt in the phone number.

If the phone number is subscribed to an Amazon SNS topic, opting out does not remove the subscription, but SMS messages will fail to deliver to that subscription unless you opt in the phone number.

## Managing Phone Numbers and Subscriptions (Console)

You can use the Amazon SNS console to control which phone numbers receive SMS messages from your account.

### Opting in a Phone Number That Has Been Opted Out

You can view which phone numbers have been opted out of receiving SMS messages from your account, and you can opt in these phone numbers to resume sending messages to them.

You can opt in a phone number only once every 30 days.

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the console menu, set the region selector to a [region that supports SMS messaging \(p. 135\)](#).
3. In the navigation pane, choose **Text messaging (SMS)**.
4. On the **Text messaging (SMS)** page, choose **View opted out phone numbers**. The **Opted out phone numbers** page displays the opted out phone numbers.
5. Select the check box for the phone number that you want to opt in, and choose **Opt in**. The phone number is no longer opted out and will receive SMS messages that you send to it.

### Deleting an SMS Subscription

Delete an SMS subscription to stop sending SMS messages to that phone number when you publish to your topics.

1. In the navigation pane, choose **Subscriptions**.
2. Select the check boxes for the subscriptions that you want to delete. Then choose **Actions**, and choose **Delete Subscriptions**.
3. In the **Delete** window, choose **Delete**. Amazon SNS deletes the subscription and displays a success message.

## Deleting a Topic

Delete a topic when you no longer want to publish messages to its subscribed endpoints.

1. In the navigation pane, choose **Topics**.
2. Select the check boxes for the topics that you want to delete. Then choose **Actions**, and choose **Delete Topics**.
3. In the **Delete** window, choose **Delete**. Amazon SNS deletes the topic and displays a success message.

## Managing Phone Numbers and Subscriptions (AWS SDKs)

You can use the AWS SDKs to make programmatic requests to Amazon SNS and manage which phone numbers can receive SMS messages from your account.

### Viewing All Opted Out Phone Numbers

To view all opted out phone numbers, submit a `ListPhoneNumbersOptedOut` request with the Amazon SNS API. For example, using the AWS SDK for Java, you can use the `listPhoneNumbersOptedOut` method of the `AmazonSNSClient` class:

```
public static void main(String[] args) {
 AmazonSNSClient snsClient = new AmazonSNSClient();
 listOptOut(snsClient);
}

public static void listOptOut(AmazonSNSClient snsClient) {
 String nextToken = null;
 do {
 ListPhoneNumbersOptedOutResult result = snsClient
 .listPhoneNumbersOptedOut(new ListPhoneNumbersOptedOutRequest()
 .withNextToken(nextToken));
 nextToken = result.getNextToken();
 for (String phoneNum : result.getPhoneNumbers()) {
 System.out.println(phoneNum);
 }
 } while (nextToken != null);
}
```

Amazon SNS returns a paginated response, so this example repeats the request each time Amazon SNS returns a next token. When you run this example, it displays a list of all opted out phone numbers in the console output window of your IDE.

### Checking Whether a Phone Number Is Opted Out

To check whether a phone number is opted out, submit a `CheckIfPhoneNumberIsOptedOut` request with the Amazon SNS API. For example, using the AWS SDK for Java, you can use the `checkIfPhoneNumberIsOptedOut` method of the `AmazonSNSClient` class:

```
CheckIfPhoneNumberIsOptedOutRequest request = new
 CheckIfPhoneNumberIsOptedOutRequest().withPhoneNumber(phoneNumber);
System.out.println(snsClient.checkIfPhoneNumberIsOptedOut(request));
```

When you run this example, a true or false result is displayed in the console output window of your IDE:

```
{IsOptedOut: false}
```

## Opting In a Phone Number That Has Been Opted Out

To opt in a phone number, submit an `OptInPhoneNumber` request with the Amazon SNS API. For example, using the AWS SDK for Java, you can use the `optInPhoneNumber` method of the `AmazonSNSClient` class:

```
snsClient.optInPhoneNumber(new OptInPhoneNumberRequest().withPhoneNumber(phoneNumber));
```

You can opt in a phone number only once every 30 days.

## Deleting an SMS Subscription

To delete an SMS subscription from an Amazon SNS topic, get the subscription ARN by submitting a `ListSubscriptions` request with the Amazon SNS API, and then pass the ARN to an `Unsubscribe` request.

For example, using the AWS SDK for Java, you can get your subscription ARNs by using the `listSubscriptions` method of the `AmazonSNSClient` class:

```
ListSubscriptionsResult result = snsClient.listSubscriptions();
for (Subscription sub : result.getSubscriptions()) {
 System.out.println(sub);
}
```

You can delete a subscription by passing its ARN as a string argument to the `unsubscribe` method:

```
snsClient.unsubscribe(subscriptionArn);
```

## Deleting a Topic

To delete a topic and all of its subscriptions, get the topic ARN by submitting a `ListTopics` request with the Amazon SNS API, and then pass the ARN to the `DeleteTopic` request.

For example, using the AWS SDK for Java, you can get your topic ARNs by using the `listTopics` method of the `AmazonSNSClient` class:

```
ListTopicsResult result = snsClient.listTopics();
for (Topic t : result.getTopics()) {
 System.out.println(t);
}
```

You can delete a topic by passing its ARN as a string argument to the `deleteTopic` method:

```
snsClient.deleteTopic(topicArn);
```

# Reserving a Dedicated Short Code for SMS Messaging

To send SMS messages using a persistent short code, you can reserve a dedicated short code that is assigned to your account and available exclusively to you.

A short code is a 5 or 6 digit number that you can use to send SMS messages to certain destinations. Short codes are often used for application-to-person (A2P) messaging, two-factor authentication (2FA), and marketing. Unless you reserve a short code, Amazon SNS will assign a short code to your messages. This short code is shared with other Amazon SNS users, and it varies based upon destination and message type (transactional or promotional). By reserving a short code, you make it easier for your audience to recognize that your organization is the source of your messages.

Your dedicated short code is available exclusively to you, so others are unable to message your audience using the same short code. Consequently, your short code has some protection from malicious activity that might threaten your brand reputation or prompt wireless carriers to block your messages.

Amazon SNS can use your short code to message telephone numbers in the United States. For other destinations, Amazon SNS assigns a long code or alphanumeric code as required.

A dedicated short code supports a higher delivery rate, which enables you send up to 100 SMS messages per second. After you reserve a short code, you can request to increase this limit by submitting an [SNS Limit Increase case](#).

For pricing information, see [Worldwide SMS Pricing](#).

### To reserve a dedicated short code

1. Go to the [AWS Support Center](#).
2. Choose **Create case**.
3. For **Regarding**, select **Service Limit Increase**.
4. For **Limit Type**, select **SNS**.
5. For **Resource Type**, select **Dedicated SMS Short Codes for US destinations**.
6. For **Limit**, select the option that most closely resembles your use case.
7. For **New limit value**, specify how many short codes you want to reserve (typically, this value is 1).
8. For **Use Case Description**, summarize your use case, and summarize how your recipients will sign up for messages sent with your short code.
9. Select your preferred language and contact method, and choose **Submit**.

A customer service associate will contact you for additional information about your use case, including the customized messages your audience members will see when they reply to your short code with HELP or STOP. AWS will work with wireless carriers on your behalf to provision your short code. It typically takes 6 - 12 weeks for all carriers to approve your use case and provision the short code so that you can send messages to the subscribers in their networks. AWS will notify you when the short code provisioning is complete.

To discontinue your short code reservation, send a request to AWS Support.

## Supported Regions and Countries

Currently, Amazon SNS supports SMS messaging in the following AWS Regions:

Region Name	Region	Endpoint	Protocol
US East (N. Virginia)	us-east-1	sns.us-east-1.amazonaws.com	HTTP and HTTPS
US West (Oregon)	us-west-2	sns.us-west-2.amazonaws.com	HTTP and HTTPS

Region Name	Region	Endpoint	Protocol
EU (Ireland)	eu-west-1	sns.eu-west-1.amazonaws.com	HTTP and HTTPS
Asia Pacific (Tokyo)	ap-northeast-1	sns.ap-northeast-1.amazonaws.com	HTTP and HTTPS
Asia Pacific (Singapore)	ap-southeast-1	sns.ap-southeast-1.amazonaws.com	HTTP and HTTPS
Asia Pacific (Sydney)	ap-southeast-2	sns.ap-southeast-2.amazonaws.com	HTTP and HTTPS

You can use Amazon SNS to send SMS messages to the following countries and regions:

Country/Region	ISO Code	Supports Sender IDs
Afghanistan	AF	
Albania	AL	Yes
Algeria	DZ	
Andorra	AD	Yes
Angola	AO	Yes
Anguilla	AI	Yes
Antigua and Barbuda	AG	Yes
Argentina	AR	
Armenia	AM	Yes
Aruba	AW	Yes
Australia	AU	Yes
Austria	AT	Yes
Azerbaijan	AZ	
Bahamas	BS	Yes
Bahrain	BH	Yes
Bangladesh	BD	
Barbados	BB	Yes
Belarus	BY	Yes
Belgium	BE	
Belize	BZ	Yes
Benin	BJ	Yes
Bermuda	BM	Yes

Country/Region	ISO Code	Supports Sender IDs
Bhutan	BT	Yes
Bolivia	BO	Yes
Bosnia and Herzegovina	BA	Yes
Botswana	BW	Yes
Brazil	BR	
Brunei	BN	Yes
Bulgaria	BG	Yes
Burkina Faso	BF	Yes
Burundi	BI	Yes
Cambodia	KH	Yes
Cameroon	CM	Yes
Canada	CA	
Cape Verde	CV	Yes
Cayman Islands	KY	Yes
Central African Republic	CF	Yes
Chad	TD	Yes
Chile	CL	
China	CN	
Colombia	CO	
Comoros	KM	Yes
Cook Islands	CK	Yes
Costa Rica	CR	
Croatia	HR	
Cyprus	CY	Yes
Czech Republic	CZ	Yes
Democratic Republic of the Congo	CD	
Denmark	DK	Yes
Djibouti	DJ	Yes
Dominica	DM	Yes
Dominican republic	DO	

Country/Region	ISO Code	Supports Sender IDs
East Timor	TL	
Ecuador	EC	
Egypt	EG	
El Salvador	SV	
Equatorial Guinea	GQ	Yes
Estonia	EE	Yes
Ethiopia	ET	
Faroe Islands	FO	Yes
Fiji	FJ	Yes
Finland	FI	Yes
France	FR	Yes
French Guiana	GF	
Gabon	GA	Yes
Gambia	GM	Yes
Georgia	GE	Yes
Germany	DE	Yes
Ghana	GH	
Gibraltar	GI	Yes
Greece	GR	Yes
Greenland	GL	Yes
Grenada	GD	Yes
Guadeloupe	GP	Yes
Guam	GU	
Guatemala	GT	
Guinea	GN	Yes
Guinea-Bissau	GW	Yes
Guyana	GY	Yes
Haiti	HT	Yes
Honduras	HN	
Hong Kong	HK	Yes
Hungary	HU	



Country/Region	ISO Code	Supports Sender IDs
Iceland	IS	Yes
India	IN	
Indonesia	ID	
Iraq	IQ	
Ireland	IE	Yes
Israel	IL	Yes
Italy	IT	Yes
Ivory Coast	CI	
Jamaica	JM	Yes
Japan	JP	
Jordan	JO	Yes
Kazakhstan	KZ	
Kenya	KE	
Kiribati	KI	
Kuwait	KW	
Kyrgyzstan	KG	
Laos	LA	
Latvia	LV	Yes
Lebanon	LB	Yes
Lesotho	LS	Yes
Liberia	LR	Yes
Libya	LY	Yes
Liechtenstein	LI	Yes
Lithuania	LT	Yes
Luxembourg	LU	Yes
Macau	MO	Yes
Macedonia	MK	Yes
Madagascar	MG	Yes
Malawi	MW	Yes
Malaysia	MY	
Maldives	MV	Yes

Country/Region	ISO Code	Supports Sender IDs
Mali	ML	
Malta	MT	Yes
Martinique	MQ	Yes
Mauritania	MR	Yes
Mauritius	MU	Yes
Mexico	MX	
Moldova	MD	Yes
Monaco	MC	
Mongolia	MO	Yes
Montenegro	ME	Yes
Montserrat	MS	Yes
Morocco	MA	
Mozambique	MZ	
Myanmar	MM	
Namibia	NA	
Nepal	NP	
Netherlands	NL	Yes
Netherlands Antilles	AN	Yes
New Caledonia	NC	Yes
New Zealand	NZ	
Nicaragua	NI	
Niger	NE	Yes
Nigeria	NG	Yes
Norway	NO	Yes
Oman	OM	
Pakistan	PK	
Palau	PW	
Palestinian Territory	PS	Yes
Panama	PA	
Papua New Guinea	PG	Yes
Paraguay	PY	Yes

Country/Region	ISO Code	Supports Sender IDs
Peru	PE	Yes
Philippines	PH	
Poland	PL	Yes
Portugal	PT	Yes
Puerto Rico	PR	
Qatar	QA	
Republic of the Congo	CG	
Reunion Island	RE	Yes
Romania	RO	
Russia	RU	Yes
Rwanda	RW	Yes
Saint Kitts and Nevis	KN	
Saint Lucia	LC	
Saint Vincent and the Grenadines	VC	
Samoa	WS	Yes
Sao Tome and Principe	ST	Yes
Saudi Arabia	SA	
Senegal	SN	Yes
Serbia	RS	
Seychelles	SC	Yes
Sierra Leone	SL	Yes
Singapore	SG	Yes
Slovakia	SK	Yes
Slovenia	SI	Yes
Solomon Islands	SB	Yes
Somalia	SO	Yes
South Africa	ZA	
South Korea	KR	
South Sudan	SS	Yes
Spain	ES	Yes

Country/Region	ISO Code	Supports Sender IDs
Sri Lanka	LK	
Suriname	SR	Yes
Swaziland	SZ	Yes
Sweden	SE	Yes
Switzerland	CH	Yes
Taiwan	TW	
Tajikistan	TJ	Yes
Tanzania	TZ	Yes
Thailand	TH	
Togo	TG	Yes
Tonga	TO	Yes
Trinidad and Tobago	TT	Yes
Tunisia	TN	
Turkey	TR	
Turkmenistan	TM	Yes
Turks and Caicos Islands	TC	Yes
Uganda	UG	Yes
Ukraine	UA	Yes
United Arab Emirates	AE	
United Kingdom	GB	Yes
United States	US	
Uruguay	UY	
Uzbekistan	UZ	Yes
Vanuatu	VU	Yes
Venezuela	VE	
Vietnam	VN	
Virgin Islands, British	VG	Yes
Virgin Islands, US	VI	
Yemen	YE	Yes
Zambia	ZM	Yes
Zimbabwe	ZW	Yes

# Sending Amazon SNS Messages to HTTP/HTTPS Endpoints

You can use [Amazon SNS](#) to send notification messages to one or more HTTP or HTTPS endpoints. When you subscribe an endpoint to a topic, you can publish a notification to the topic and Amazon SNS sends an HTTP POST request delivering the contents of the notification to the subscribed endpoint. When you subscribe the endpoint, you select whether Amazon SNS uses HTTP or HTTPS to send the POST request to the endpoint. If you use HTTPS, then you can take advantage of the support in Amazon SNS for the following:

- **Server Name Indication (SNI)**—This allows Amazon SNS to support HTTPS endpoints that require SNI, such as a server requiring multiple certificates for hosting multiple domains. For more information about SNI, see [http://en.wikipedia.org/wiki/Server\\_Name\\_Indication](http://en.wikipedia.org/wiki/Server_Name_Indication).
- **Basic and Digest Access Authentication**—This allows you to specify a username and password in the HTTPS URL for the HTTP POST request, such as `https://user:password@domain.com` or `https://user@domain.com`. The username and password are encrypted over the SSL connection established when using HTTPS. Only the domain name is sent in plaintext. For more information about Basic and Digest Access Authentication, see <http://www.rfc-editor.org/info/rfc2617>

The request contains the subject and message that were published to the topic along with metadata about the notification in a JSON document. The request will look similar to the following HTTP POST request. For details about the HTTP header and the JSON format of the request body, see [HTTP/HTTPS Headers \(p. 194\)](#) and [HTTP/HTTPS Notification JSON Format \(p. 197\)](#).

```
POST / HTTP/1.1
x-amz-sns-message-type: Notification
x-amz-sns-message-id: da41e39f-ea4d-435a-b922-c6aae3915ebe
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
x-amz-sns-subscription-arn: arn:aws:sns:us-west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-beaa-fcfc21c8f55
Content-Length: 761
Content-Type: text/plain; charset=UTF-8
Host: ec2-50-17-44-49.compute-1.amazonaws.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "Notification",
 "MessageId" : "da41e39f-ea4d-435a-b922-c6aae3915ebe",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Subject" : "test",
 "Message" : "test message",
 "Timestamp" : "2012-04-25T21:49:25.719Z",
 "SignatureVersion" : "1",
 "Signature" :
 "EXAMPLELDMXvB8r9R83tGoNn0ecwd5UjllzsvSvbItzfaMpN2nk5HVS7XnOn/49IkxDKz8YrlH2qJXj2iZB0Zo2071c4qQk1fMUL",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem",
 "UnsubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-
west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-beaa-fcfc21c8f55"
}
```

To enable an Amazon SNS topic to send messages to an HTTP or HTTPS endpoint, follow these steps:

[Step 1: Make sure your endpoint is ready to process Amazon SNS messages \(p. 144\)](#)

[Step 2: Subscribe the HTTP/HTTPS endpoint to the Amazon SNS topic \(p. 147\)](#)

[Step 3: Confirm the subscription \(p. 147\)](#)

[Step 4: Set the delivery retry policy for the subscription \(optional\) \(p. 147\)](#)

[Step 5: Give users permissions to publish to the topic \(optional\) \(p. 148\)](#)

[Step 6: Send messages to the HTTP/HTTPS endpoint \(p. 149\)](#)

## Step 1: Make sure your endpoint is ready to process Amazon SNS messages

Before you subscribe your HTTP or HTTPS endpoint to a topic, you must make sure that the HTTP or HTTPS endpoint has the capability to handle the HTTP POST requests that Amazon SNS uses to send the subscription confirmation and notification messages. Usually, this means creating and deploying a web application (for example, a Java servlet if your endpoint host is running Linux with Apache and Tomcat) that processes the HTTP requests from Amazon SNS. When you subscribe an HTTP endpoint, Amazon SNS sends it a subscription confirmation request. Your endpoint must be prepared to receive and process this request when you create the subscription because Amazon SNS sends this request at that time. Amazon SNS will not send notifications to the endpoint until you confirm the subscription. Once you confirm the subscription, Amazon SNS will send notifications to the endpoint when a publish action is performed on the subscribed topic.

### To set up your endpoint to process subscription confirmation and notification messages

1. Your code should read the HTTP headers of the HTTP POST requests that Amazon SNS sends to your endpoint. Your code should look for the header field `x-amz-sns-message-type`, which tells you the type of message that Amazon SNS has sent to you. By looking at the header, you can determine the message type without having to parse the body of the HTTP request. There are two types that you need to handle: `SubscriptionConfirmation` and `Notification`. The `UnsubscribeConfirmation` message is used only when the subscription is deleted from the topic.

For details about the HTTP header, see [HTTP/HTTPS Headers \(p. 194\)](#). The following HTTP POST request is an example of a subscription confirmation message.

```
POST / HTTP/1.1
x-amz-sns-message-type: SubscriptionConfirmation
x-amz-sns-message-id: 165545c9-2a5c-472c-8df2-7ff2be2b3b1b
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
Content-Length: 1336
Content-Type: text/plain; charset=UTF-8
Host: example.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "SubscriptionConfirmation",
 "MessageId" : "165545c9-2a5c-472c-8df2-7ff2be2b3b1b",
 "Token" :
 "2336412f37fb687f5d51e6e241d09c805a5a57b30d712f794cc5f6a988666d92768dd60a747ba6f3beb71854e285d6ad0",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Message" : "You have chosen to subscribe to the topic arn:aws:sns:us-west-2:123456789012:MyTopic.\nTo confirm the subscription, visit the SubscribeURL included in this message.",
}
```

```
"SubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=ConfirmSubscription&TopicArn=arn:aws:sns:us-
west-2:123456789012:MyTopic&Token=2336412f37fb687f5d51e6e241d09c805a5a57b30d712f794cc5f6a988666d927
"Timestamp" : "2012-04-26T20:45:04.751Z",
"SignatureVersion" : "1",
"Signature" : "EXAMPLEPH
+DcEwjAPg8O9mY8dReBSwksfg2S7WKQcikcNKWLQjwu6A4VbeS0QHVCkhRS7fUQvi2egU3N858fiTDN6bkkOxYDVrY0Ad8L10Hs
"SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem"
}
```

2. Your code should parse the JSON document in the body of the HTTP POST request to read the name/value pairs that make up the Amazon SNS message. Use a JSON parser that handles converting the escaped representation of control characters back to their ASCII character values (for example, converting `\n` to a newline character). You can use an existing JSON parser such as the Jackson JSON Processor (<http://wiki.fasterxml.com/JacksonHome>) or write your own. In order to send the text in the subject and message fields as valid JSON, Amazon SNS must convert some control characters to escaped representations that can be included in the JSON document. When you receive the JSON document in the body of the POST request sent to your endpoint, you must convert the escaped characters back to their original character values if you want an exact representation of the original subject and messages published to the topic. This is critical if you want to verify the signature of a notification because the signature uses the message and subject in their original forms as part of the string to sign.
3. Your code should verify the authenticity of a notification, subscription confirmation, or unsubscribe confirmation message sent by Amazon SNS. Using information contained in the Amazon SNS message, your endpoint can recreate the signature so that you can verify the contents of the message by matching your signature with the signature that Amazon SNS sent with the message. For more information about verifying the signature of a message, see [Verifying the Signatures of Amazon SNS Messages](#) (p. 163).
4. Based on the type specified by the header field `x-amz-sns-message-type`, your code should read the JSON document contained in the body of the HTTP request and process the message. Here are the guidelines for handling the two primary types of messages:

### SubscriptionConfirmation

Read the value for `SubscribeURL` and visit that URL. To confirm the subscription and start receiving notifications at the endpoint, you must visit the `SubscribeURL` (for example, by sending an HTTP GET request to the URL). See the example HTTP request in the previous step to see what the `SubscribeURL` looks like. For more information about the format of the `SubscriptionConfirmation` message, see [HTTP/HTTPS Subscription Confirmation JSON Format](#) (p. 195). When you visit the URL, you will get back a response that looks like the following XML document. The document returns the subscription ARN for the endpoint within the `ConfirmSubscriptionResult` element.

```
<ConfirmSubscriptionResponse xmlns="http://sns.amazonaws.com/doc/2010-03-31/">
 <ConfirmSubscriptionResult>
 <SubscriptionArn>arn:aws:sns:us-west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-
beaa-fcfc21c8f55</SubscriptionArn>
 </ConfirmSubscriptionResult>
 <ResponseMetadata>
 <RequestId>075ecce8-8dac-11e1-bf80-f781d96e9307</RequestId>
 </ResponseMetadata>
</ConfirmSubscriptionResponse>
```

As an alternative to visiting the `SubscribeURL`, you can confirm the subscription using the [ConfirmSubscription](#) action with the `Token` set to its corresponding value in the `SubscriptionConfirmation` message. If you want to allow only the topic owner and subscription owner to be able to unsubscribe the endpoint, you call the `ConfirmSubscription` action with an AWS signature.

## Notification

Read the values for Subject and Message to get the notification information that was published to the topic.

For details about the format of the Notification message, see [HTTP/HTTPS Headers \(p. 194\)](#). The following HTTP POST request is an example of a notification message sent to the endpoint example.com.

```
POST / HTTP/1.1
x-amz-sns-message-type: Notification
x-amz-sns-message-id: 22b80b92-fdea-4c2c-8f9d-bdfb0c7bf324
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
x-amz-sns-subscription-arn: arn:aws:sns:us-west-2:123456789012:MyTopic:c9135db0-26c4-47ec-8998-413945fb5a96
Content-Length: 773
Content-Type: text/plain; charset=UTF-8
Host: example.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "Notification",
 "MessageId" : "22b80b92-fdea-4c2c-8f9d-bdfb0c7bf324",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Subject" : "My First Message",
 "Message" : "Hello world!",
 "Timestamp" : "2012-05-02T00:54:06.655Z",
 "SignatureVersion" : "1",
 "Signature" :
 "EXAMPLEw6JRNwm1LFQL4ICB0bnXrdB8ClRMTQFGBqWlpGbM78tJ4etTwC5zU7O3tS6tGpey3ejedNdOJ
 +1fkIp9F2/LmNVKb5aF1Yq+9rk9ZiPph5YlLmWsDcyC5T+Sy9/
 umic5S0UQc2PEtgdpVBahwN0dMW4JPwk0kAJJztnc=",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/
 SimpleNotificationService-f3ecfb7224c7233fe7bb5f59f96de52f.pem",
 "UnsubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
 Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-
 west-2:123456789012:MyTopic:c9135db0-26c4-47ec-8998-413945fb5a96"
}
```

5. Make sure that your endpoint responds to the HTTP POST message from Amazon SNS with the appropriate status code. The connection will time out in 15 seconds. If your endpoint does not respond before the connection times out or if your endpoint returns a status code outside the range of 200–4xx, Amazon SNS will consider the delivery of the message as a failed attempt.
6. Make sure that your code can handle message delivery retries from Amazon SNS. If Amazon SNS doesn't receive a successful response from your endpoint, it attempts to deliver the message again. This applies to all messages, including the subscription confirmation message. By default, if the initial delivery of the message fails, Amazon SNS attempts up to three retries with a delay between failed attempts set at 20 seconds. Note that the message request times out at 15 seconds. This means that if the message delivery failure was caused by a timeout, Amazon SNS will retry approximately 35 seconds after the previous delivery attempt. If you don't like the default delivery policy, you can set a different delivery policy on the endpoint.

To be clear, Amazon SNS attempts to retry only after a delivery attempt has failed. You can identify a message using the `x-amz-sns-message-id` header field. By comparing the IDs of the messages you have processed with incoming messages, you can determine whether the message is a retry attempt.

7. If you are subscribing an HTTPS endpoint, make sure that your endpoint has a server certificate from a trusted Certificate Authority (CA). Amazon SNS will only send messages to HTTPS endpoints



that have a server certificate signed by a CA trusted by Amazon SNS. For a list of trusted CAs, see [Certificate Authorities \(CA\) Recognized by Amazon SNS for HTTPS Endpoints](#) (p. 155).

8. Deploy the code that you have created to receive Amazon SNS messages. When you subscribe the endpoint, the endpoint must be ready to receive at least the subscription confirmation message.

## Step 2: Subscribe the HTTP/HTTPS endpoint to the Amazon SNS topic

To send messages to an HTTP or HTTPS endpoint through a topic, you must subscribe the endpoint to the Amazon SNS topic. You specify the endpoint using its URL. To subscribe to a topic, you can use the Amazon SNS console, the [sns-subscribe](#) command, or the [Subscribe](#) API action. Before you start, make sure you have the URL for the endpoint that you want to subscribe and that your endpoint is prepared to receive the confirmation and notification messages as described in Step 1.

### To subscribe an HTTP or HTTPS endpoint to a topic using the Amazon SNS console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select the topic.
3. Click the **Other actions** drop-down list and select **Subscribe to topic**.
4. In the **Protocol** drop-down list, select **HTTP** or **HTTPS**.
5. In the **Endpoint** box, paste in the URL for the endpoint that you want the topic to send messages to and then click **Create subscription**.
6. For the **Subscription request received!** message, click **Close**.

Your new subscription's **Subscription ID** displays PendingConfirmation. When you confirm the subscription, **Subscription ID** will display the subscription ID.

## Step 3: Confirm the subscription

After you subscribe your endpoint, Amazon SNS will send a subscription confirmation message to the endpoint. You should already have code that performs the actions described in [Step 1](#) (p. 144) deployed to your endpoint. Specifically, the code at the endpoint must retrieve the `SubscribeURL` value from the subscription confirmation message and either visit the location specified by `SubscribeURL` itself or make it available to you so that you can manually visit the `SubscribeURL`, for example, using a web browser. Amazon SNS will not send messages to the endpoint until the subscription has been confirmed. When you visit the `SubscribeURL`, the response will contain an XML document containing an element `SubscriptionArn` that specifies the ARN for the subscription. You can also use the Amazon SNS console to verify that the subscription is confirmed: The **Subscription ID** will display the ARN for the subscription instead of the `PendingConfirmation` value that you saw when you first added the subscription.

## Step 4: Set the delivery retry policy for the subscription (optional)

By default, if the initial delivery of the message fails, Amazon SNS attempts up to three retries with a delay between failed attempts set at 20 seconds. As discussed in [Step 1](#) (p. 144), your endpoint should

have code that can handle retried messages. By setting the delivery policy on a topic or subscription, you can control the frequency and interval that Amazon SNS will retry failed messages. You can set a delivery policy on a topic or on a particular subscription.

## Step 5: Give users permissions to publish to the topic (optional)

By default, the topic owner has permissions to publish the topic. To enable other users or applications to publish to the topic, you should use AWS Identity and Access Management (IAM) to give publish permission to the topic. For more information about giving permissions for Amazon SNS actions to IAM users, see [Controlling User Access to Your AWS Account](#).

There are two ways to control access to a topic:

- Add a policy to an IAM user or group. The simplest way to give users permissions to topics is to create a group and add the appropriate policy to the group and then add users to that group. It's much easier to add and remove users from a group than to keep track of which policies you set on individual users.
- Add a policy to the topic. If you want to give permissions to a topic to another AWS account, the only way you can do that is by adding a policy that has as its principal the AWS account you want to give permissions to.

You should use the first method for most cases (apply policies to groups and manage permissions for users by adding or removing the appropriate users to the groups). If you need to give permissions to a user in another account, use the second method.

If you added the following policy to an IAM user or group, you would give that user or members of that group permission to perform the `sns:Publish` action on the topic `MyTopic`.

```
{
 "Version": "2012-10-17",
 "Statement": [{
 "Sid": "AllowPublishToMyTopic",
 "Effect": "Allow",
 "Action": "sns:Publish",
 "Resource": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }]
}
```

The following example policy shows how to give another account permissions to a topic.

### Note

When you give another AWS account access to a resource in your account, you are also giving IAM users who have admin-level access (wildcard access) permissions to that resource. All other IAM users in the other account are automatically denied access to your resource. If you want to give specific IAM users in that AWS account access to your resource, the account or an IAM user with admin-level access must delegate permissions for the resource to those IAM users. For more information about cross-account delegation, see [Enabling Cross-Account Access](#) in the *Using IAM Guide*.

If you added the following policy to a topic `MyTopic` in account `123456789012`, you would give account `111122223333` permission to perform the `sns:Publish` action on that topic.

```
{
```

```
{
 "Version": "2012-10-17",
 "Id": "MyTopicPolicy",
 "Statement": [{
 "Sid": "Allow-publish-to-topic",
 "Effect": "Allow",
 "Principal": {
 "AWS": "111122223333"
 },
 "Action": "sns:Publish",
 "Resource": "arn:aws:sns:us-east-1:123456789012:MyTopic"
 }]
}
```

## Step 6: Send messages to the HTTP/HTTPS endpoint

You can send a message to a topic's subscriptions by publishing to the topic. To publish to a topic, you can use the Amazon SNS console, the [sns-publish](#) command, or the [Publish API](#).

If you followed [Step 1 \(p. 144\)](#), the code that you deployed at your endpoint should process the notification.

### To publish to a topic using the Amazon SNS console

1. Using the credentials of the AWS account or IAM user with permission to publish to the topic, sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/>.
2. In the left navigation pane, click **Topics** and then select a topic.
3. Click the **Publish to topic** button.
4. In the **Subject** box, enter a subject (for example, **Testing publish to my endpoint**).
5. In the **Message** box, enter some text (for example, **Hello world!**), and click **Publish message**.

The following message appears: Your message has been successfully published.

## Setting Amazon SNS Delivery Retry Policies for HTTP/HTTPS Endpoints

### Topics

- [Applying Delivery Policies to Topics and Subscriptions \(p. 151\)](#)
- [Setting the Maximum Receive Rate \(p. 153\)](#)
- [Immediate Retry Phase \(p. 153\)](#)
- [Pre-Backoff Phase \(p. 154\)](#)
- [Backoff Phase \(p. 154\)](#)
- [Post-Backoff Phase \(p. 155\)](#)

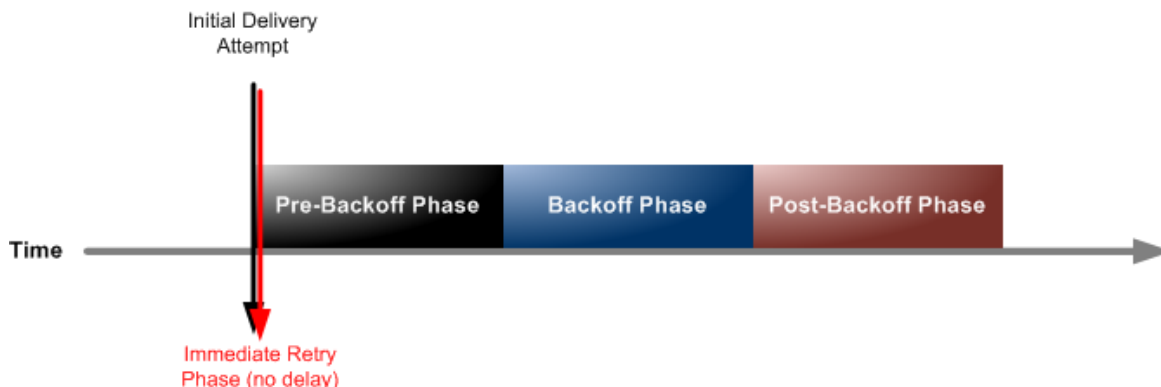
A successful Amazon SNS delivery to an HTTP/HTTPS endpoint sometimes requires more than one attempt. This can be the case, for example, if the web server that hosts the subscribed endpoint is

down for maintenance or is experiencing heavy traffic. If an initial delivery attempt doesn't result in a successful response from the subscriber, Amazon SNS attempts to deliver the message again. We call such an attempt a *retry*. In other words, a retry is an attempted delivery that occurs after the initial delivery attempt.

Amazon SNS only attempts a retry after a failed delivery attempt. Amazon SNS considers the following situations as a failed delivery attempt.

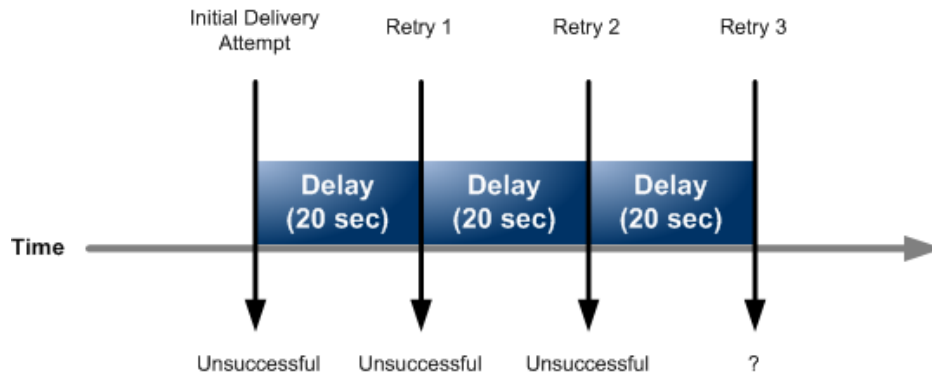
- HTTP status in the range 500-599.
- HTTP status outside the range 200-599.
- A request timeout (15 seconds). Note that if a request timeout occurs, the next retry will occur at the specified interval after the timeout. For example, if the retry interval is 20 seconds and a request times out, the start of the next request will be 35 seconds after the start of the request that timed out.
- Any connection error such as connection timeout, endpoint unreachable, bad SSL certificate, etc.

You can use delivery policies to control not only the total number of retries, but also the time delay between each retry. You can specify up to 100 total retries distributed among four discrete phases. The maximum lifetime of a message in the system is one hour. This one hour limit cannot be extended by a delivery policy.

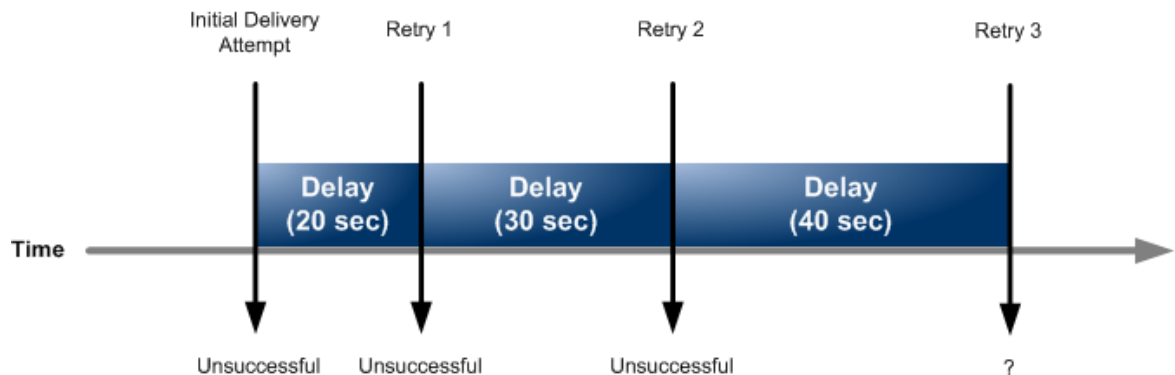


1. **Immediate Retry Phase (p. 153)**—Also called the *no delay phase*, this phase occurs immediately after the initial delivery attempt. The value you set for **Retries with no delay** determines the number of retries immediately after the initial delivery attempt. There is no delay between retries in this phase.
2. **Pre-Backoff Phase (p. 154)**—The pre-backoff phase follows the immediate retry phase. Use this phase to create a set of retries that occur before a backoff function applies to the retries. Use the **Minimum delay retries** setting to specify the number of retries in the Pre-Backoff Phase. You can control the time delay between retries in this phase by using the **Minimum delay** setting.
3. **Backoff Phase (p. 154)**—This phase is called the backoff phase because you can control the delay between retries in this phase using the retry backoff function. Set the **Minimum delay** and the **Maximum delay**, and then select a **Retry backoff function** to define how quickly the delay increases from the minimum delay to the maximum delay.
4. **Post-Backoff Phase (p. 155)**—The post-backoff phase follows the backoff phase. Use the **Maximum delay retries** setting to specify the number of retries in the post-backoff phase. You can control the time delay between retries in this phase by using the **Maximum delay** setting.

The backoff phase is the most commonly used phase. If no delivery policies are set, the default is to retry three times in the backoff phase, with a time delay of 20 seconds between each retry. The default value for both the **Minimum delay** and the **Maximum delay** is 20. The default number of retries is 3, so the default retry policy calls for a total of 3 retries with a 20 second delay between each retry. The following diagram shows the delay associated with each retry.



To see how the retry backoff function affects the time delay between retries, you can set the maximum delay to 40 seconds and leave the remaining settings at their default values. With this change, your delivery policy now specifies 3 retries during the backoff phase, a minimum delay of 20 seconds, and a maximum delay of 40 seconds. Because the default backoff function is linear, the delay between messages increases at a constant rate over the course of the backoff phase. Amazon SNS attempts the first retry after 20 seconds, the second retry after 30 seconds, and the final retry after 40 seconds. The following diagram shows the delay associated with each retry.



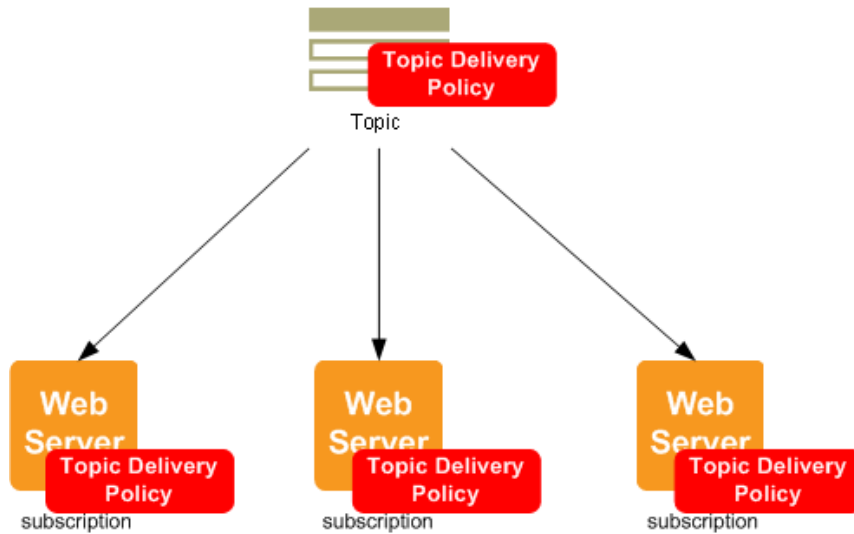
The maximum lifetime of a message in the system is one hour. This one hour limit cannot be extended by a delivery policy.

**Note**

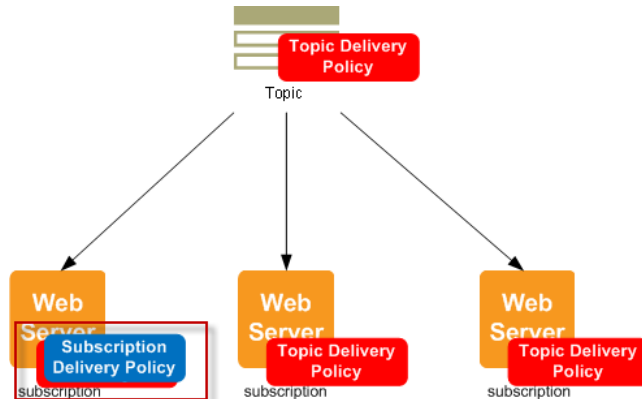
Only HTTP and HTTPS subscription types are supported by delivery policies. Support for other Amazon SNS subscription types (e.g., email, Amazon SQS, and SMS) is not currently available.

## Applying Delivery Policies to Topics and Subscriptions

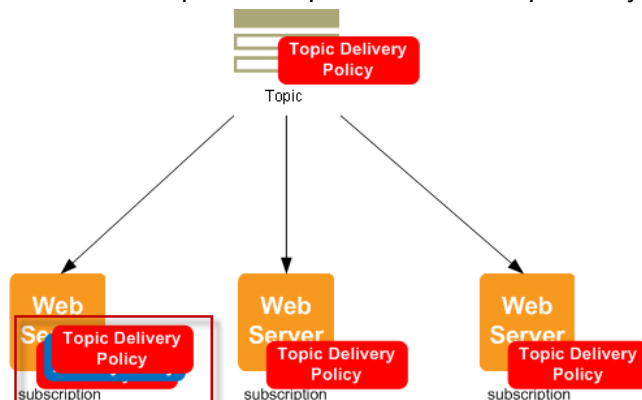
You can apply delivery policies to Amazon SNS topics. If you set a delivery policy on a topic, the policy applies to all of the topic's subscriptions. The following diagram illustrates a topic with a delivery policy that applies to all three subscriptions associated with that topic.



You can also apply delivery policies to individual subscriptions. If you assign a delivery policy to a subscription, the subscription-level policy takes precedence over the topic-level delivery policy. In the following diagram, one subscription has a subscription-level delivery policy whereas the two other subscriptions do not.



In some cases, you might want to ignore all subscription delivery policies so that your topic's delivery policy applies to all subscriptions even if a subscription has set its own delivery policy. To configure Amazon SNS to apply your topic delivery policy to all subscriptions, click **Ignore subscription override** in the **View/Edit Topic Delivery Policies** dialog box. The following diagram shows a topic-level delivery policy that applies to all subscriptions, even the subscription that has its own subscription delivery policy because subscription-level policies have been specifically ignored.



## Setting the Maximum Receive Rate

You can set the maximum number of messages per second that Amazon SNS sends to a subscribed endpoint by setting the **Maximum receive rate** setting. Amazon SNS holds messages that are awaiting delivery for up to an hour. Messages held for more than an hour are discarded.

- To set a maximum receive rate that applies to all of a topic's subscriptions, apply the setting at the topic level using the **Edit Topic Delivery Policy** dialog box. For more information, see [To set the maximum receive rate for a topic \(p. 153\)](#).
- To set a maximum receive rate that applies to a specific subscription, apply the setting at the subscription level using the **Edit Subscription Delivery Policy** dialog box. For more information, see [To set the maximum receive rate for a subscription \(p. 153\)](#).

### To set the maximum receive rate for a topic

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select the topic.
3. Click the **Other actions** drop-down list and select **Edit topic delivery policy**.
4. In the **Maximum receive rate** box, type an integer value (e.g., 2).
5. Click **Update policy** to save your changes.

### To set the maximum receive rate for a subscription

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select a topic ARN.
3. In the **Topic Details** pane, select a subscription and click **Edit topic delivery policy**.
4. In the **Maximum receive rate** box, type an integer value (e.g., 2).
5. Click **Update policy** to save your changes.

## Immediate Retry Phase

The immediate retry phase occurs directly after the initial delivery attempt. This phase is also known as the No Delay phase because it happens with no time delay between the retries. The default number of retries for this phase is 0.

### To set the number of retries in the immediate retry phase

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select a topic ARN.
3. In the **Topic Details** pane, select **Edit topic delivery policy** from the **Other topic actions** drop-down list.
4. In the **Retries with no delay** box, type an integer value.
5. Click **Update policy** to save your changes.

## Pre-Backoff Phase

The pre-backoff phase follows the immediate retry phase. Use this phase if you want to create a set of one or more retries that happen before the backoff function affects the delay between retries. In this phase, the time between retries is constant and is equal to the setting that you choose for the **Minimum delay**. The **Minimum delay** setting affects retries in two phases—it applies to all retries in the pre-backoff phase and serves as the initial time delay for retries in the backoff phase. The default number of retries for this phase is 0.

### To set the number of retries in the pre-backoff phase

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select a topic ARN.
3. In the **Topic Details** pane, select **Edit topic delivery policy** from the **Other topic actions** drop-down list.
4. In the **Minimum delay retries** box, type an integer value.
5. In the **Minimum delay** box, type an integer value to set the delay between messages in this phase.

The value you set must be less than or equal to the value you set for **Maximum delay**.

6. Click **Update policy** to save your changes.

## Backoff Phase

The backoff phase is the only phase that applies by default. You can control the number of retries in the backoff phase using **Number of retries**.

### Important

The value you choose for **Number of retries** represents the total number of retries, including the retries you set for **Retries with no delay**, **Minimum delay retries**, and **Maximum delay retries**.

You can control the frequency of the retries in the backoff phase with three parameters.

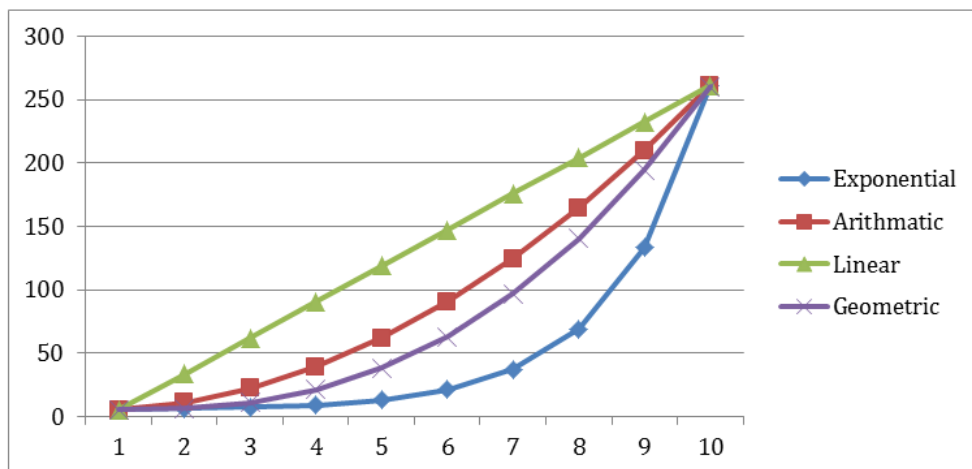
- **Minimum delay**—The minimum delay defines the delay associated with the first retry attempt in the backoff phase.
- **Maximum delay**—The maximum delay defines the delay associated with the final retry attempt in the backoff phase.
- **Retry backoff function**—The retry backoff function defines the algorithm that Amazon SNS uses to calculate the delays associated with all of the retry attempts between the first and last retries in the backoff phase.

You can choose from four retry backoff functions.

- Linear
- Arithmetic
- Geometric
- Exponential

The following screen shot shows how each retry backoff function affects the delay associated with messages during the backoff period. The vertical axis represents the delay in seconds associated with each of the 10 retries. The horizontal axis represents the retry number. The minimum delay is 5 seconds, and the maximum delay is 260 seconds.





## Post-Backoff Phase

The post-backoff phase is the final phase. Use this phase if you want to create a set of one or more retries that happen after the backoff function affects the delay between retries. In this phase, the time between retries is constant and is equal to the setting that you choose for the **Maximum delay**. The Maximum delay setting affects retries in two phases—it applies to all retries in the post-backoff phase and serves as the final time delay for retries in the backoff phase. The default number of retries for this phase is 0.

### To set the number of retries in the post-backoff phase

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left navigation pane, click **Topics** and then select a topic ARN.
3. In the **Topic Details** pane, select **Edit topic delivery policy** from the **Other topic actions** drop-down list.
4. In the **Maximum delay retries** box, type an integer value.
5. In the **Maximum delay** box, type an integer value to set the delay between messages in this phase.

The value you set must be greater than or equal to the value you set for **Minimum delay**.

6. Click **Update policy** to save your changes.

## Certificate Authorities (CA) Recognized by Amazon SNS for HTTPS Endpoints

If you subscribe an HTTPS endpoint to a topic, that endpoint must have a server certificate signed by a trusted Certificate Authority (CA). Amazon SNS will only deliver messages to HTTPS endpoints that have a signed certificate from a trusted CA that Amazon SNS recognizes. Amazon SNS recognizes the following CAs.

```
mozillacert81.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
mozillacert99.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F1:7F:6F:B6:31:DC:99:E3:A3:C8:7F:FE:1C:F1:81:10:88:D9:60:33
swisssignplatinumg2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 56:E0:FA:C0:3B:8F:18:23:55:18:E5:D3:11:CA:E8:C2:43:31:AB:66
```

```
mozillacert145.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 10:1D:FA:3F:D5:0B:CB:9B:B5:60:0C:19:55:A4:1A:F4:73:3A:04
mozillacert37.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
mozillacert4.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E3:92:51:2F:0A:CF:F5:05:DF:F6:DE:06:7F:75:37:E1:65:EA:57:4B
amzninternalitsecag2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): FA:07:FA:A6:35:D0:BC:98:72:3D:B3:08:8A:CD:CD:CD:3E:23:F9:ED
mozillacert70.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 78:6A:74:AC:76:AB:14:7F:9C:6A:30:50:BA:9E:A8:7E:FE:9A:CE:3C
mozillacert88.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): FE:45:65:9B:79:03:5B:98:A1:61:B5:51:2E:AC:DA:58:09:48:22:4D
mozillacert134.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 70:17:9B:86:8C:00:A4:FA:60:91:52:22:3F:9F:3E:32:BD:E0:05:62
mozillacert26.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11
verisignclass2g2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B3:EA:C4:47:76:C9:C8:1C:EA:F2:9D:95:B6:CC:A0:08:1B:67:EC:9D
mozillacert77.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 13:2D:0D:45:53:4B:69:97:CD:B2:D5:C3:39:E2:55:76:60:9B:5C:C6
mozillacert123.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 2A:B6:28:48:5E:78:FB:F3:AD:9E:79:10:DD:6B:DF:99:72:2C:96:E5
utndatacorpsgccca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 58:11:9F:0E:12:82:87:EA:50:FD:D9:87:45:6F:4F:78:DC:FA:D6:D4
mozillacert15.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 74:20:74:41:72:9C:DD:92:EC:79:31:D8:23:10:8D:C2:81:92:E2:BB
digicertglobalrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
mozillacert66.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DD:E1:D2:A9:01:80:2E:1D:87:5E:84:B3:80:7E:4B:B1:FD:99:41:34
mozillacert112.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
utnuserfirstclientauthemailca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B1:72:B1:A5:6D:95:F9:1F:E5:02:87:E1:4D:37:EA:6A:44:63:76:8A
verisignc2g1.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 67:82:AA:E0:ED:EE:E2:1A:58:39:D3:C0:CD:14:68:0A:4F:60:14:2A
mozillacert55.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AA:DB:BC:22:23:8F:C4:01:A1:27:BB:38:DD:F4:1D:DB:08:9E:F0:12
mozillacert101.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 99:A6:9B:E6:1A:FE:88:6B:4D:2B:82:00:7C:B8:54:FC:31:7E:15:39
mozillacert119.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 75:E0:AB:B6:13:85:12:27:1C:04:F8:5F:DD:DE:38:E4:B7:24:2E:FE
verisignc3g1.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A1:DB:63:93:91:6F:17:E4:18:55:09:40:04:15:C7:02:40:B0:AE:6B
mozillacert44.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 5F:43:E5:B1:BF:F8:78:8C:AC:1C:C7:CA:4A:9A:C6:22:2B:CC:34:C6
mozillacert108.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
mozillacert95.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
keynectisrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 9C:61:5C:4D:4D:85:10:3A:53:26:C2:4D:BA:EA:E4:A2:D2:D5:CC:97
mozillacert141.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 31:7A:2A:D0:7F:2B:33:5E:F5:A1:C3:4E:4B:57:E8:B7:D8:F1:FC:A6
equifaxsecureglobalebusinessca1, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 7E:78:4A:10:1C:82:65:CC:2D:E1:F1:6D:47:B4:40:CA:D9:0A:19:45
baltimorecodesigningca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 30:46:D8:C8:88:FF:69:30:C3:4A:FC:CD:49:27:08:7C:60:56:7B:0D
mozillacert33.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): FE:B8:C4:32:DC:F9:76:9A:CE:AE:3D:D8:90:8F:FD:28:86:65:64:7D
mozillacert0.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 97:81:79:50:D8:1C:96:70:CC:34:D8:09:CF:79:44:31:36:7E:F4:74
mozillacert84.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D3:C0:63:F2:19:ED:07:3E:34:AD:5D:75:0B:32:76:29:FF:D5:9A:F2
mozillacert130.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E5:DF:74:3C:B6:01:C4:9B:98:43:DC:AB:8C:E8:6A:81:10:9F:E4:8E
```

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mozillacert148.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 04:83:ED:33:99:AC:36:08:05:87:22:ED:BC:5E:46:00:E3:BE:F9:D7
mozillacert22.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 32:3C:11:8E:1B:F7:B8:B6:52:54:E2:E2:10:0D:D6:02:90:37:F0:96
verisignc1g1.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 90:AE:A2:69:85:FF:14:80:4C:43:49:52:EC:E9:60:84:77:AF:55:6F
mozillacert7.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
mozillacert73.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E
mozillacert137.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4A:65:D5:F4:1D:EF:39:B8:B8:90:4A:4A:D3:64:81:33:CF:C7:A1:D1
swisssignsilverg2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
mozillacert11.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
mozillacert29.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 74:F8:A3:C3:EF:E7:B3:90:06:4B:83:90:3C:21:64:60:20:E5:DF:CE
mozillacert62.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A1:DB:63:93:91:6F:17:E4:18:55:09:40:04:15:C7:02:40:B0:AE:6B
mozillacert126.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 25:01:90:19:CF:FB:D9:99:1C:B7:68:25:74:8D:94:5F:30:93:95:42
soneraclass1ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 07:47:22:01:99:CE:74:B9:7C:B0:3D:79:B2:64:A2:C8:55:E9:33:FF
mozillacert18.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 79:98:A3:08:E1:4D:65:85:E6:C2:1E:15:3A:71:9F:BA:5A:D3:4A:D9
mozillacert51.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
mozillacert69.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19
mozillacert115.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
verisignclass3g5ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4E:B6:D5:78:49:9B:1C:CF:5F:58:1E:AD:56:BE:3D:9B:67:44:A5:E5
utnuserfirsthardwareca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 04:83:ED:33:99:AC:36:08:05:87:22:ED:BC:5E:46:00:E3:BE:F9:D7
addtrustqualifiedca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4D:23:78:EC:91:95:39:B5:00:7F:75:8F:03:3B:21:1E:C5:4D:8B:CF
mozillacert40.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 80:25:EF:F4:6E:70:C8:D4:72:24:65:84:FE:40:3B:8A:8D:6A:DB:F5
mozillacert58.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8D:17:84:D5:37:F3:03:7D:EC:70:FE:57:8B:51:9A:99:E6:10:D7:B0
verisignclass3g3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 13:2D:0D:45:53:4B:69:97:CD:B2:D5:C3:39:E2:55:76:60:9B:5C:C6
mozillacert104.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4F:99:AA:93:FB:2B:D1:37:26:A1:99:4A:CE:7F:F0:05:F2:93:5D:1E
mozillacert91.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 3B:C0:38:0B:33:C3:F6:A6:0C:86:15:22:93:D9:DF:F5:4B:81:C0:04
thawtepersonalfreemailca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E6:18:83:AE:84:CA:C1:C1:CD:52:AD:E8:E9:25:2B:45:A6:4F:B7:E2
certplusclass3pprimeryca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 21:6B:2A:29:E6:2A:00:CE:82:01:46:D8:24:41:41:B9:25:11:B2:79
verisignc3g4.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 22:D5:D8:DF:8F:02:31:D1:8D:F7:9D:B7:CF:8A:2D:64:C9:3F:6C:3A
swisssigngoldg2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61
mozillacert47.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 1B:4B:39:61:26:27:6B:64:91:A2:68:6D:D7:02:43:21:2D:1F:1D:96
mozillacert80.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB
mozillacert98.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): C9:A8:B9:E7:55:80:5E:58:E3:53:77:A7:25:EB:AF:C3:7B:27:CC:D7
mozillacert144.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 37:F7:6D:E6:07:7C:90:C5:B1:3E:93:1A:B7:41:10:B4:F2:E4:9A:27
starfieldclass2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
```

```
mozillacert36.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 23:88:C9:D3:71:CC:9E:96:3D:FF:7D:3C:A7:CE:FC:D6:25:EC:19:0D
mozillacert3.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 87:9F:4B:EE:05:DF:98:58:3B:E3:60:D6:33:E7:0D:3F:FE:98:71:AF
globalsignr2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 75:E0:AB:B6:13:85:12:27:1C:04:F8:5F:DD:DE:38:E4:B7:24:2E:FE
mozillacert87.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
mozillacert133.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:B5:FF:67:9B:0C:79:96:1F:C8:6E:44:22:00:46:13:DB:17:92:84
mozillacert25.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4E:B6:D5:78:49:9B:1C:CF:5F:58:1E:AD:56:BE:3D:9B:67:44:A5:E5
verisignclasslg2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 27:3E:E1:24:57:FD:C4:F9:0C:55:E8:2B:56:16:7F:62:F5:32:E5:47
mozillacert76.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7
mozillacert122.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 02:FA:F3:E2:91:43:54:68:60:78:57:69:4D:F5:E4:5B:68:85:18:68
godaddysecurecertificationauthority, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 7C:46:56:C3:06:1F:7F:4C:0D:67:B3:19:A8:55:F6:0E:BC:11:FC:44
mozillacert14.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
equifaxsecureca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D2:32:09:AD:23:D3:14:23:21:74:E4:0D:7F:9D:62:13:97:86:63:3A
mozillacert65.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 69:BD:8C:F4:9C:D3:00:FB:59:2E:17:93:CA:55:6A:F3:EC:AA:35:FB
mozillacert111.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
certumtrustednetworkca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
mozillacert129.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E6:21:F3:35:43:79:05:9A:4B:68:30:9D:8A:2F:74:22:15:87:EC:79
mozillacert54.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 03:9E:ED:B8:0B:E7:A0:3C:69:53:89:3B:20:D2:D9:32:3A:4C:2A:FD
mozillacert100.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
mozillacert118.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 7E:78:4A:10:1C:82:65:CC:2D:E1:F1:6D:47:B4:40:CA:D9:0A:19:45
mozillacert151.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AC:ED:5F:65:53:FD:25:CE:01:5F:1F:7A:48:3B:6A:74:9F:61:78:C6
thawteprimaryrootcag3, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F1:8B:53:8D:1B:E9:03:B6:A6:F0:56:43:5B:17:15:89:CA:F3:6B:F2
quovadisrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DE:3F:40:BD:50:93:D3:9B:6C:60:F6:DA:BC:07:62:01:00:89:76:C9
thawteprimaryrootcag2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AA:DB:BC:22:23:8F:C4:01:A1:27:BB:38:DD:F4:1D:DB:08:9E:F0:12
deprecateditsec, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 12:12:0B:03:0E:15:14:54:F4:DD:B3:F5:DE:13:6E:83:5A:29:72:9D
entrustrootcag2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
mozillacert43.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F9:CD:0E:2C:DA:76:24:C1:8F:BD:F0:F0:AB:B6:45:B8:F7:FE:D5:7A
mozillacert107.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8E:1C:74:F8:A6:20:B9:E5:8A:F4:61:FA:EC:2B:47:56:51:1A:52:C6
trustcenterclass4caii, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A6:9A:91:FD:05:7F:13:6A:42:63:0B:B1:76:0D:2D:51:12:0C:16:50
mozillacert94.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99
mozillacert140.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
ttelesecglobalrootclass3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
amzninternalcorpca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 43:E3:E6:37:C5:88:05:67:91:37:E3:72:4D:01:7F:F4:1B:CE:3A:97
mozillacert32.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 60:D6:89:74:B5:C2:65:9E:8A:0F:C1:88:7C:88:D2:46:69:1B:18:2C
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mozillacert83.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A0:73:E5:C5:BD:43:61:0D:86:4C:21:13:0A:85:58:57:CC:9C:EA:46
verisignroot.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 36:79:CA:35:66:87:72:30:4D:30:A5:FB:87:3B:0F:A7:7B:B7:0D:54
mozillacert147.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 58:11:9F:0E:12:82:87:EA:50:FD:D9:87:45:6F:4F:78:DC:FA:D6:D4
camerfirmachambersca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 78:6A:74:AC:76:AB:14:7F:9C:6A:30:50:BA:9E:A8:7E:FE:9A:CE:3C
mozillacert21.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
mozillacert39.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AE:50:83:ED:7C:F4:5C:BC:8F:61:C6:21:FE:68:5D:79:42:21:15:6E
mozillacert6.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
verisignuniversalrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 36:79:CA:35:66:87:72:30:4D:30:A5:FB:87:3B:0F:A7:7B:B7:0D:54
mozillacert72.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
geotrustuniversalca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E6:21:F3:35:43:79:05:9A:4B:68:30:9D:8A:2F:74:22:15:87:EC:79
mozillacert136.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
mozillacert10.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 5F:3A:FC:0A:8B:64:F6:86:67:34:74:DF:7E:A9:A2:FE:F9:FA:7A:51
mozillacert28.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
mozillacert61.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E0:B4:32:2E:B2:F6:A5:68:B6:54:53:84:48:18:4A:50:36:87:43:84
mozillacert79.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
mozillacert125.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
mozillacert17.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 40:54:DA:6F:1C:3F:40:74:AC:ED:0F:EC:CD:DB:79:D1:53:FB:90:1D
mozillacert50.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8C:96:BA:EB:DD:2B:07:07:48:EE:30:32:66:A0:F3:98:6E:7C:AE:58
mozillacert68.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AE:C5:FB:3F:C8:E1:BF:C4:E5:4F:03:07:5A:9A:E8:00:B7:F7:B6:FA
mozillacert114.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 51:C6:E7:08:49:06:6E:F3:92:D4:5C:A0:0D:6D:A3:62:8F:C3:52:39
mozillacert57.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D6:DA:A8:20:8D:09:D2:15:4D:24:B5:2F:CB:34:6E:B2:58:B2:8A:58
verisignc2g3.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 61:EF:43:D7:7F:CA:D4:61:51:BC:98:E0:C3:59:12:AF:9F:EB:63:11
verisignclass2g3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 61:EF:43:D7:7F:CA:D4:61:51:BC:98:E0:C3:59:12:AF:9F:EB:63:11
mozillacert103.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 70:C1:8D:74:B4:28:81:0A:E4:FD:A5:75:D7:01:9F:99:B0:3D:50:74
mozillacert90.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC
verisignc3g3.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 13:2D:0D:45:53:4B:69:97:CD:B2:D5:C3:39:E2:55:76:60:9B:5C:C6
mozillacert46.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 40:9D:4B:D9:17:B5:5C:27:B6:9B:64:CB:98:22:44:0D:CD:09:B8:89
godaddyclass2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
verisignc4g3.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): C8:EC:8C:87:92:69:CB:4B:AB:39:E9:8D:7E:57:67:F3:14:95:73:9D
mozillacert97.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:37:1C:A6:E5:50:14:3D:CE:28:03:47:1B:DE:3A:09:E8:F8:77:0F
mozillacert143.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 36:B1:2B:49:F9:81:9E:D7:4C:9E:BC:38:0F:C6:56:8F:5D:AC:B2:F7
mozillacert35.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 2A:C8:D5:8B:57:CE:BF:2F:49:AF:F2:FC:76:8F:51:14:62:90:7A:41
mozillacert2.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 22:D5:D8:DF:8F:02:31:D1:8D:F7:9D:B7:CF:8A:2D:64:C9:3F:6C:3A
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utnuserfirstobjectca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): E1:2D:FB:4B:41:D7:D9:C3:2B:30:51:4B:AC:1D:81:D8:38:5E:2D:46  
mozillacert86.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 74:2C:31:92:E6:07:E4:24:EB:45:49:54:2B:E1:BB:C5:3E:61:74:E2  
mozillacert132.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 39:21:C1:15:C1:5D:0E:CA:5C:CB:5B:C4:F0:7D:21:D8:05:0B:56:6A  
addtrustclass1ca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): CC:AB:0E:A0:4C:23:01:D6:69:7B:DD:37:9F:CD:12:EB:24:E3:94:9D  
mozillacert24.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 59:AF:82:79:91:86:C7:B4:75:07:CB:CF:03:57:46:EB:04:DD:B7:16  
verisignc1g3.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 20:42:85:DC:F7:EB:76:41:95:57:8E:13:6B:D4:B7:D1:E9:8E:46:A5  
mozillacert9.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): F4:8B:11:BF:DE:AB:BE:94:54:20:71:E6:41:DE:6B:BE:88:2B:40:B9  
amzninternalrootca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): A7:B7:F6:15:8A:FF:1E:C8:85:13:38:BC:93:EB:A2:AB:A4:09:EF:06  
mozillacert75.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): D2:32:09:AD:23:D3:14:23:21:74:E4:0D:7F:9D:62:13:97:86:63:3A  
entrustevca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9  
secomscrootca2, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74  
camerfirmachambersignca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 4A:BD:EE:EC:95:0D:35:9C:89:AE:C7:52:A1:2C:5B:29:F6:D6:AA:0C  
secomscrootca1, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 36:B1:2B:49:F9:81:9E:D7:4C:9E:BC:38:0F:C6:56:8F:5D:AC:B2:F7  
mozillacert121.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): CC:AB:0E:A0:4C:23:01:D6:69:7B:DD:37:9F:CD:12:EB:24:E3:94:9D  
mozillacert139.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): DE:3F:40:BD:50:93:D3:9B:6C:60:F6:DA:BC:07:62:01:00:89:76:C9  
mozillacert13.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91  
mozillacert64.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 62:7F:8D:78:27:65:63:99:D2:7D:7F:90:44:C9:FE:B3:F3:3E:FA:9A  
mozillacert110.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17  
mozillacert128.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): A9:E9:78:08:14:37:58:88:F2:05:19:B0:6D:2B:0D:2B:60:16:90:7D  
entrust2048ca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31  
mozillacert53.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 7F:8A:B0:CF:D0:51:87:6A:66:F3:36:0F:47:C8:8D:8C:D3:35:FC:74  
mozillacert117.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74  
mozillacert150.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 33:9B:6B:14:50:24:9B:55:7A:01:87:72:84:D9:E0:2F:C3:D2:D8:E9  
thawteserverca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 9F:AD:91:A6:CE:6A:C6:C5:00:47:C4:4E:C9:D4:A5:0D:92:D8:49:79  
secomvalicertclass1ca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): E5:DF:74:3C:B6:01:C4:9B:98:43:DC:AB:8C:E8:6A:81:10:9F:E4:8E  
mozillacert42.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 85:A4:08:C0:9C:19:3E:5D:51:58:7D:CD:D6:13:30:FD:8C:DE:37:BF  
gtecybertrustglobalca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 97:81:79:50:D8:1C:96:70:CC:34:D8:09:CF:79:44:31:36:7E:F4:74  
mozillacert106.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): E7:A1:90:29:D3:D5:52:DC:0D:0F:C6:92:D3:EA:88:0D:15:2E:1A:6B  
equifaxsecurebusinesscal, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): DA:40:18:8B:91:89:A3:ED:EE:AE:DA:97:FE:2F:9D:F5:B7:D1:8A:41  
mozillacert93.pem, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 31:F1:FD:68:22:63:20:EE:C6:3B:3F:9D:EA:4A:3E:53:7C:7C:39:17  
quovadisrootca3, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85  
quovadisrootca2, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7  
soneraclass2ca, Apr 22, 2014, trustedCertEntry,  
Certificate fingerprint (SHA1): 37:F7:6D:E6:07:7C:90:C5:B1:3E:93:1A:B7:41:10:B4:F2:E4:9A:27

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mozillacert31.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
mozillacert49.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 61:57:3A:11:DF:0E:D8:7E:D5:92:65:22:EA:D0:56:D7:44:B3:23:71
mozillacert82.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 2E:14:DA:EC:28:F0:FA:1E:8E:38:9A:4E:AB:EB:26:C0:0A:D3:83:C3
mozillacert146.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 21:FC:BD:8E:7F:6C:AF:05:1B:D1:B3:43:EC:A8:E7:61:47:F2:0F:8A
baltimorecybertrustca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74
mozillacert20.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61
mozillacert38.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): CB:A1:C5:F8:B0:E3:5E:B8:B9:45:12:D3:F9:34:A2:E9:06:10:D3:36
mozillacert5.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
mozillacert71.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4A:BD:EE:EC:95:0D:35:9C:89:AE:C7:52:A1:2C:5B:29:F6:D6:AA:0C
verisignclass3g4ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 22:D5:D8:DF:8F:02:31:D1:8D:F7:9D:B7:CF:8A:2D:64:C9:3F:6C:3A
mozillacert89.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): C8:EC:8C:87:92:69:CB:4B:AB:39:E9:8D:7E:57:67:F3:14:95:73:9D
mozillacert135.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
camerfirmachamberscommerceca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 6E:3A:55:A4:19:0C:19:5C:93:84:3C:C0:DB:72:2E:31:30:61:F0:B1
mozillacert27.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
verisignclass3g2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:37:1C:A6:E5:50:14:3D:CE:28:03:47:1B:DE:3A:09:E8:F8:77:0F
mozillacert60.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
mozillacert78.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F
certumca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
deutschetelekomrootca2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:A4:08:C0:9C:19:3E:5D:51:58:7D:CD:D6:13:30:FD:8C:DE:37:BF
mozillacert124.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4D:23:78:EC:91:95:39:B5:00:7F:75:8F:03:3B:21:1E:C5:4D:8B:CF
mozillacert16.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DA:C9:02:4F:54:D8:F6:DF:94:93:5F:B1:73:26:38:CA:6A:D7:7C:13
secomevrootcal, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): FE:B8:C4:32:DC:F9:76:9A:CE:AE:3D:D8:90:8F:FD:28:86:65:64:7D
mozillacert67.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
globalsignr3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
mozillacert113.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31
aolrootca2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:B5:FF:67:9B:0C:79:96:1F:C8:6E:44:22:00:46:13:DB:17:92:84
trustcenteruniversalcai, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 6B:2F:34:AD:89:58:BE:62:FD:B0:6B:5C:CE:BB:9D:D9:4F:4E:39:F3
aolrootca1, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 39:21:C1:15:C1:5D:0E:CA:5C:CB:5B:C4:F0:7D:21:D8:05:0B:56:6A
mozillacert56.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): F1:8B:53:8D:1B:E9:03:B6:A6:F0:56:43:5B:17:15:89:CA:F3:6B:F2
verisignc2g2.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B3:EA:C4:47:76:C9:C8:1C:EA:F2:9D:95:B6:CC:A0:08:1B:67:EC:9D
verisignclass1g3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 20:42:85:DC:F7:EB:76:41:95:57:8E:13:6B:D4:B7:D1:E9:8E:46:A5
mozillacert102.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
addtrustexternalca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 02:FA:F3:E2:91:43:54:68:60:78:57:69:4D:F5:E4:5B:68:85:18:68
```

```
verisignclass3ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A1:DB:63:93:91:6F:17:E4:18:55:09:40:04:15:C7:02:40:B0:AE:6B
verisignc3g2.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 85:37:1C:A6:E5:50:14:3D:CE:28:03:47:1B:DE:3A:09:E8:F8:77:0F
mozillacert45.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
verisignc4g2.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 0B:77:BE:BB:CB:7A:A2:47:05:DE:CC:0F:BD:6A:02:FC:7A:BD:9B:52
digicertassuredidrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
verisignclass1ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): CE:6A:64:A3:09:E4:2F:BB:D9:85:1C:45:3E:64:09:EA:E8:7D:60:F1
mozillacert109.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71
thawtepremiumserverca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E0:AB:05:94:20:72:54:93:05:60:62:02:36:70:F7:CD:2E:FC:66:66
verisigntsaca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): BE:36:A4:56:2F:B2:EE:05:DB:B3:D3:23:23:AD:F4:45:08:4E:D6:56
mozillacert96.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
mozillacert142.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85
thawteprimaryrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 91:C6:D6:EE:3E:8A:C8:63:84:E5:48:C2:99:29:5C:75:6C:81:7B:81
mozillacert34.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9
mozillacert1.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 23:E5:94:94:51:95:F2:41:48:03:B4:D5:64:D2:A3:A3:F5:D8:8B:8C
mozillacert85.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
valicertclass2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 31:7A:2A:D0:7F:2B:33:5E:F5:A1:C3:4E:4B:57:E8:B7:D8:F1:FC:A6
mozillacert131.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 37:9A:19:7B:41:85:45:35:0C:A6:03:69:F3:3C:2E:AF:47:4F:20:79
mozillacert149.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 6E:3A:55:A4:19:0C:19:5C:93:84:3C:C0:DB:72:2E:31:30:61:F0:B1
geotrustprimaryca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 32:3C:11:8E:1B:F7:B8:B6:52:54:E2:E2:10:0D:D6:02:90:37:F0:96
mozillacert23.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 91:C6:D6:EE:3E:8A:C8:63:84:E5:48:C2:99:29:5C:75:6C:81:7B:81
verisignc1g2.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 27:3E:E1:24:57:FD:C4:F9:0C:55:E8:2B:56:16:7F:62:F5:32:E5:47
mozillacert8.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 3E:2B:F7:F2:03:1B:96:F3:8C:E6:C4:D8:A8:5D:3E:2D:58:47:6A:0F
mozillacert74.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
mozillacert120.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DA:40:18:8B:91:89:A3:ED:EE:AE:DA:97:FE:2F:9D:F5:B7:D1:8A:41
geotrustglobalca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DE:28:F4:A4:FF:E5:B9:2F:A3:C5:03:D1:A3:49:A7:F9:96:2A:82:12
mozillacert138.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E1:9F:E3:0E:8B:84:60:9E:80:9B:17:0D:72:A8:C5:BA:6E:14:09:BD
mozillacert12.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
comodoaaaca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
mozillacert63.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
certplusclass2primaryca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 74:20:74:41:72:9C:DD:92:EC:79:31:D8:23:10:8D:C2:81:92:E2:BB
mozillacert127.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): DE:28:F4:A4:FF:E5:B9:2F:A3:C5:03:D1:A3:49:A7:F9:96:2A:82:12
tteleseccglobalrootclass2ca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
mozillacert19.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B4:35:D4:E1:11:9D:1C:66:90:A7:49:EB:B3:94:BD:63:7B:A7:82:B7
```



```
digicerthighassuranceevrootca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
mozillacert52.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8B:AF:4C:9B:1D:F0:2A:92:F7:DA:12:8E:B9:1B:AC:F4:98:60:4B:6F
mozillacert116.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
globalsignca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
mozillacert41.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 6B:2F:34:AD:89:58:BE:62:FD:B0:6B:5C:CE:BB:9D:D9:4F:4E:39:F3
mozillacert59.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 36:79:CA:35:66:87:72:30:4D:30:A5:FB:87:3B:0F:A7:7B:B7:0D:54
mozillacert105.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 77:47:4F:C6:30:E4:0F:4C:47:64:3F:84:BA:B8:C6:95:4A:8A:41:EC
trustcenterclass2caii, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): AE:50:83:ED:7C:F4:5C:BC:8F:61:C6:21:FE:68:5D:79:42:21:15:6E
mozillacert92.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A3:F1:33:3F:E2:42:BF:CF:C5:D1:4E:8F:39:42:98:40:68:10:D1:A0
geotrustprimarycag3, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 03:9E:ED:B8:0B:E7:A0:3C:69:53:89:3B:20:D2:D9:32:3A:4C:2A:FD
entrustsslca, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 99:A6:9B:E6:1A:FE:88:6B:4D:2B:82:00:7C:B8:54:FC:31:7E:15:39
verisignc3g5.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 4E:B6:D5:78:49:9B:1C:CF:5F:58:1E:AD:56:BE:3D:9B:67:44:A5:E5
geotrustprimarycag2, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): 8D:17:84:D5:37:F3:03:7D:EC:70:FE:57:8B:51:9A:99:E6:10:D7:B0
mozillacert30.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): E7:B4:F6:9D:61:EC:90:69:DB:7E:90:A7:40:1A:3C:F4:7D:4F:E8:EE
mozillacert48.pem, Apr 22, 2014, trustedCertEntry,
Certificate fingerprint (SHA1): A0:A1:AB:90:C9:FC:84:7B:3B:12:61:E8:97:7D:5F:D3:22:61:D3:CC
```

## Verifying the Signatures of Amazon SNS Messages

You should verify the authenticity of a notification, subscription confirmation, or unsubscribe confirmation message sent by Amazon SNS. Using information contained in the Amazon SNS message, your endpoint can recreate the string to sign and the signature so that you can verify the contents of the message by matching the signature you recreated from the message contents with the signature that Amazon SNS sent with the message.

To help prevent spoofing attacks, you should do the following when verifying messages sent by Amazon SNS:

- Always use HTTPS when getting the certificate from Amazon SNS.
- Validate the authenticity of the certificate.
- Verify the certificate was received from Amazon SNS.
- When possible, use one of the supported AWS SDKs for Amazon SNS to validate and verify messages. For example, with the AWS SDK for PHP you would use the `isValid` method from the `MessageValidator` class.

For example code for a Java servlet that handles Amazon SNS messages, see [Example Code for an Amazon SNS Endpoint Java Servlet \(p. 165\)](#).

### To verify the signature of an Amazon SNS message when using HTTP query-based requests

1. Extract the name/value pairs from the JSON document in the body of the HTTP POST request that Amazon SNS sent to your endpoint. You'll be using the values of some of the name/value pairs to create the string to sign. When you are verifying the signature of an Amazon SNS message, it is critical that you convert the escaped control characters to their original character representations in

the `Message` and `Subject` values. These values must be in their original forms when you use them as part of the string to sign. For information about how to parse the JSON document, see [Step 1: Make sure your endpoint is ready to process Amazon SNS messages \(p. 144\)](#).

The `SignatureVersion` tells you the signature version. From the signature version, you can determine the requirements for how to generate the signature. For Amazon SNS notifications, Amazon SNS currently supports signature version 1. This section provides the steps for creating a signature using signature version 1.

2. Get the X509 certificate that Amazon SNS used to sign the message. The `SigningCertURL` value points to the location of the X509 certificate used to create the digital signature for the message. Retrieve the certificate from this location.
3. Extract the public key from the certificate. The public key from the certificate specified by `SigningCertURL` is used to verify the authenticity and integrity of the message.
4. Determine the message type. The format of the string to sign depends on the message type, which is specified by the `Type` value.
5. Create the string to sign. The string to sign is a newline character–delimited list of specific name/value pairs from the message. Each name/value pair is represented with the name first followed by a newline character, followed by the value, and ending with a newline character. The name/value pairs must be listed in byte-sort order.

Depending on the message type, the string to sign must have the following name/value pairs.

#### Notification

Notification messages must contain the following name/value pairs:

```
Message
MessageId
Subject (if included in the message)
Timestamp
TopicArn
Type
```

The following example is a string to sign for a `Notification`.

```
Message
My Test Message
MessageId
4d4dc071-ddbf-465d-bba8-08f81c89da64
Subject
My subject
Timestamp
2012-06-05T04:37:04.321Z
TopicArn
arn:aws:sns:us-east-1:123456789012:s4-MySNSTopic-1G1WEFCOXC0P
Type
Notification
```

#### SubscriptionConfirmation and UnsubscribeConfirmation

`SubscriptionConfirmation` and `UnsubscribeConfirmation` messages must contain the following name/value pairs:

```
Message
MessageId
SubscribeURL
Timestamp
Token
```

```
TopicArn
Type
```

The following example is a string to sign for a `SubscriptionConfirmation`.

```
Message
My Test Message
MessageId
3d891288-136d-417f-bc05-901c108273ee
SubscribeURL
https://sns.us-west-2.amazonaws.com/?
Action=ConfirmSubscription&TopicArn=arn:aws:sns:us-west-2:123456789012:s4-
MySNSTopic-1G1WEFCOXC0P&Token=2336412f37fb687f5d51e6e241d09c8058323f60b964268bfe08ce35640228c208a66d3621bd9f7b012918cfdcfe65e
Timestamp
2012-06-03T19:25:13.719Z
Token
2336412f37fb687f5d51e6e241d09c8058323f60b964268bfe08ce35640228c208a66d3621bd9f7b012918cfdcfe65e
TopicArn
arn:aws:sns:us-west-2:123456789012:s4-MySNSTopic-1G1WEFCOXC0P
Type
SubscriptionConfirmation
```

6. Decode the `Signature` value from Base64 format. The message delivers the signature in the `Signature` value, which is encoded as Base64. Before you compare the signature value with the signature you have calculated, make sure that you decode the `Signature` value from Base64 so that you compare the values using the same format.
7. Generate the derived hash value of the Amazon SNS message. Submit the Amazon SNS message, in canonical format, to the same hash function used to generate the signature.
8. Generate the asserted hash value of the Amazon SNS message. The asserted hash value is the result of using the public key value (from step 3) to decrypt the signature delivered with the Amazon SNS message.
9. Verify the authenticity and integrity of the Amazon SNS message. Compare the derived hash value (from step 7) to the asserted hash value (from step 8). If the values are identical, then the receiver is assured that the message has not been modified while in transit and the message must have originated from Amazon SNS. If the values are not identical, it should not be trusted by the receiver.

## Example Code for an Amazon SNS Endpoint Java Servlet

### Important

The following code snippets help you understand a Java servlet that processes Amazon SNS HTTP POST requests. You should make sure that any portions of these snippets are suitable for your purposes before implementing them in your production environment. For example, in a production environment to help prevent spoofing attacks, you should verify that the identity of the received Amazon SNS messages is from Amazon SNS. You can do this by checking that the DNS Name value (*DNS Name=sns.us-west-2.amazonaws.com* in *us-west-2*; this will vary by region) for the *Subject Alternative Name* field, as presented in the Amazon SNS Certificate, is the same for the received Amazon SNS messages. For more information about verifying server identity, see section 3.1. [Server Identity](#) in *RFC 2818*. Also see [Verifying the Signatures of Amazon SNS Messages](#) (p. 163)

The following method implements an example of a handler for HTTP POST requests from Amazon SNS in a Java servlet.

```
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException, SecurityException {
```

```
//Get the message type header.
String messagetype = request.getHeader("x-amz-sns-message-type");
//If message doesn't have the message type header, don't process it.
if (messagetype == null) {
 return;
}

// Parse the JSON message in the message body
// and hydrate a Message object with its contents
// so that we have easy access to the name/value pairs
// from the JSON message.
Scanner scan = new Scanner(request.getInputStream());
StringBuilder builder = new StringBuilder();
while (scan.hasNextLine()) {
 builder.append(scan.nextLine());
}
Message msg = readMessageFromJson(builder.toString());

// The signature is based on SignatureVersion 1.
// If the sig version is something other than 1,
// throw an exception.
if (msg.getSignatureVersion().equals("1")) {
 // Check the signature and throw an exception if the signature verification fails.
 if (isMessageSignatureValid(msg)) {
 log.info(">>Signature verification succeeded");
 } else {
 log.info(">>Signature verification failed");
 }
 throw new SecurityException("Signature verification failed.");
} else {
 log.info(">>Unexpected signature version. Unable to verify signature.");
 throw new SecurityException("Unexpected signature version. Unable to verify signature.");
}

// Process the message based on type.
if (messagetype.equals("Notification")) {
 //TODO: Do something with the Message and Subject.
 //Just log the subject (if it exists) and the message.
 String logMsgAndSubject = ">>Notification received from topic " +
msg.getTopicArn();
 if (msg.getSubject() != null) {
 logMsgAndSubject += " Subject: " + msg.getSubject();
 }
 logMsgAndSubject += " Message: " + msg.getMessage();
 log.info(logMsgAndSubject);
} else if (messagetype.equals("SubscriptionConfirmation")) {
 //TODO: You should make sure that this subscription is from the topic you expect.
 Compare topicARN to your list of topics
 //that you want to enable to add this endpoint as a subscription.

 //Confirm the subscription by going to the subscribeURL location
 //and capture the return value (XML message body as a string)
 Scanner sc = new Scanner(new URL(msg.getSubscribeURL()).openStream());
 StringBuilder sb = new StringBuilder();
 while (sc.hasNextLine()) {
 sb.append(sc.nextLine());
 }
 log.info(">>Subscription confirmation (" + msg.getSubscribeURL() + ") Return value:
" + sb.toString());
 //TODO: Process the return value to ensure the endpoint is subscribed.
} else if (messagetype.equals("UnsubscribeConfirmation")) {
 //TODO: Handle UnsubscribeConfirmation message.
 //For example, take action if unsubscribing should not have occurred.
 //You can read the SubscribeURL from this message and
```

```
 //re-subscribe the endpoint.
 log.info(">>Unsubscribe confirmation: " + msg.getMessage());
 } else {
 //TODO: Handle unknown message type.
 log.info(">>Unknown message type.");
 }
 log.info(">>Done processing message: " + msg.getMessageId());
}
```

The following example Java method creates a signature using information from a `Message` object that contains the data sent in the request body and verifies that signature against the original Base64-encoded signature of the message, which is also read from the `Message` object.

```
private static boolean isMessageSignatureValid(Message msg) {
 try {
 URL url = new URL(msg.getSigningCertURL());
 InputStream inStream = url.openStream();
 CertificateFactory cf = CertificateFactory.getInstance("X.509");
 X509Certificate cert = (X509Certificate)cf.generateCertificate(inStream);
 inStream.close();

 Signature sig = Signature.getInstance("SHA1withRSA");
 sig.initVerify(cert.getPublicKey());
 sig.update(getMessageBytesToSign(msg));
 return sig.verify(Base64.decodeBase64(msg.getSignature()));
 }
 catch (Exception e) {
 throw new SecurityException("Verify method failed.", e);
 }
}
```

The following example Java methods work together to create the string to sign for an Amazon SNS message. The `getMessageBytesToSign` method calls the appropriate string-to-sign method based on the message type and runs the string to sign as a byte array. The `buildNotificationStringToSign` and `buildSubscriptionStringToSign` methods create the string to sign based on the formats described in [Verifying the Signatures of Amazon SNS Messages \(p. 163\)](#).

```
private static byte [] getMessageBytesToSign (Message msg) {
 byte [] bytesToSign = null;
 if (msg.getType().equals("Notification"))
 bytesToSign = buildNotificationStringToSign(msg).getBytes();
 else if (msg.getType().equals("SubscriptionConfirmation") ||
msg.getType().equals("UnsubscribeConfirmation"))
 bytesToSign = buildSubscriptionStringToSign(msg).getBytes();
 return bytesToSign;
}

//Build the string to sign for Notification messages.
public static String buildNotificationStringToSign(Message msg) {
 String stringToSign = null;

 //Build the string to sign from the values in the message.
 //Name and values separated by newline characters
 //The name value pairs are sorted by name
 //in byte sort order.
 stringToSign = "Message\n";
 stringToSign += msg.getMessage() + "\n";
 stringToSign += "MessageId\n";
 stringToSign += msg.getMessageId() + "\n";
 if (msg.getSubject() != null) {
 stringToSign += "Subject\n";
 stringToSign += msg.getSubject() + "\n";
 }
}
```

```
 stringToSign += "Timestamp\n";
 stringToSign += msg.getTimestamp() + "\n";
 stringToSign += "TopicArn\n";
 stringToSign += msg.getTopicArn() + "\n";
 stringToSign += "Type\n";
 stringToSign += msg.getType() + "\n";
 return stringToSign;
 }

 //Build the string to sign for SubscriptionConfirmation
 //and UnsubscribeConfirmation messages.
 public static String buildSubscriptionStringToSign(Message msg) {
 String stringToSign = null;
 //Build the string to sign from the values in the message.
 //Name and values separated by newline characters
 //The name value pairs are sorted by name
 //in byte sort order.
 stringToSign = "Message\n";
 stringToSign += msg.getMessage() + "\n";
 stringToSign += "MessageId\n";
 stringToSign += msg.getMessageId() + "\n";
 stringToSign += "SubscribeURL\n";
 stringToSign += msg.getSubscribeURL() + "\n";
 stringToSign += "Timestamp\n";
 stringToSign += msg.getTimestamp() + "\n";
 stringToSign += "Token\n";
 stringToSign += msg.getToken() + "\n";
 stringToSign += "TopicArn\n";
 stringToSign += msg.getTopicArn() + "\n";
 stringToSign += "Type\n";
 stringToSign += msg.getType() + "\n";
 return stringToSign;
 }
}
```

# Invoking Lambda functions using Amazon SNS notifications

Amazon SNS and AWS Lambda are integrated so you can invoke Lambda functions with Amazon SNS notifications. When a message is published to an SNS topic that has a Lambda function subscribed to it, the Lambda function is invoked with the payload of the published message. The Lambda function receives the message payload as an input parameter and can manipulate the information in the message, publish the message to other SNS topics, or send the message to other AWS services.

In addition, Amazon SNS also supports message delivery status attributes for message notifications sent to Lambda endpoints. For more information, see [Using Amazon SNS Topic Attributes for Message Delivery Status](#).

## Prerequisites

To invoke Lambda functions using Amazon SNS notifications, you need the following:

- Lambda function
- Amazon SNS topic

For information on creating a Lambda function, see [Getting Started with AWS Lambda](#). For information on creating a Amazon SNS topic, see [Create a Topic](#).

## Configuring Amazon SNS with Lambda Endpoints with the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left **Navigation** pane, click **Topics**, and then click the topic to which you want to subscribe a Lambda endpoint.
3. Click **Actions** and then click **Subscribe to topic**.
4. In the **Protocol** drop-down box, select **AWS Lambda**.
5. In the **Endpoint** drop-down box, select the ARN for the Lambda function.
6. In the **Version or Alias** drop-down box, select an available version or alias to use. You can also choose **\$LATEST** to specify the latest version of the Lambda function. If you do not want to specify a version or alias, you can also choose **default**, which is functionally the same as **\$LATEST**. For more information, see [AWS Lambda Function Versioning and Aliases](#).
7. Click **Create subscription**.

When a message is published to an SNS topic that has a Lambda function subscribed to it, the Lambda function is invoked with the payload of the published message. For information on how to create a sample message history store using SNS, Lambda, and Amazon DynamoDB, see the AWS Mobile Development blog [Invoking AWS Lambda functions via Amazon SNS](#).

# Using Amazon SNS Topic Attributes for Message Delivery Status

Amazon SNS provides support to log the delivery status of notification messages sent to topics with the following Amazon SNS endpoints:

- Application
- HTTP
- Lambda
- SQS

After you configure the message delivery status attributes, log entries will be sent to CloudWatch Logs for messages sent to a topic subscribed to an Amazon SNS endpoint. Logging message delivery status helps provide better operational insight, such as the following:

- Knowing whether a message was delivered to the Amazon SNS endpoint.
- Identifying the response sent from the Amazon SNS endpoint to Amazon SNS.
- Determining the message dwell time (the time between the publish timestamp and just before handing off to an Amazon SNS endpoint).

To configure topic attributes for message delivery status, you can use the AWS Management Console, AWS software development kits (SDKs), or query API.

## Topics

- [Configuring Message Delivery Status Attributes with the AWS Management Console \(p. 170\)](#)
- [Configuring Message Delivery Status Attributes for Topics Subscribed to Amazon SNS Endpoints with the AWS SDKs \(p. 171\)](#)

## Configuring Message Delivery Status Attributes with the AWS Management Console

The following steps describe how to use the console to configure the message delivery status attributes for notifications from Amazon SNS to a AWS Lambda endpoint.

### To configure message delivery status for notifications from Amazon SNS to a Lambda endpoint:

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the left **Navigation** pane, click **Topics**, and then click the topic to which you want to receive message delivery status information.
3. Click **Actions** and then click **Delivery status**.
4. Click the **Lambda** check box.
5. On the **Delivery Status** dialog box, click **Create IAM Roles**.



You will then be redirected to the IAM console.

6. Click **Allow** to give Amazon SNS write access to use CloudWatch Logs on your behalf.
7. Switch back to the **Delivery Status** dialog box and enter a number in the **Percentage of Success to Sample (0-100)** field for the percentage of successful messages sent for which you want to receive CloudWatch Logs.

**Note**

After you configure application attributes for message delivery status, all failed message deliveries generate CloudWatch Logs.

8. Finally, click **Save Configuration**.

You will now be able to view and parse the CloudWatch Logs containing the message delivery status. For more information about using CloudWatch, see the [CloudWatch Documentation](#).

## Configuring Message Delivery Status Attributes for Topics Subscribed to Amazon SNS Endpoints with the AWS SDKs

The [AWS SDKs](#) provide APIs in several languages for using message delivery status attributes with Amazon SNS.

### Topic Attributes

You can use the following topic attribute name values for message delivery status:

#### Application

- ApplicationSuccessFeedbackRoleArn
- ApplicationSuccessFeedbackSampleRate
- ApplicationFailureFeedbackRoleArn

**Note**

In addition to being able to configure topic attributes for message delivery status of notification messages sent to Amazon SNS application endpoints, you can also configure application attributes for the delivery status of push notification messages sent to push notification services. For more information, see [Using Amazon SNS Application Attributes for Message Delivery Status](#).

#### HTTP

- HTTPSuccessFeedbackRoleArn
- HTTPSuccessFeedbackSampleRate
- HTTPFailureFeedbackRoleArn

#### Lambda

- LambdaSuccessFeedbackRoleArn
- LambdaSuccessFeedbackSampleRate
- LambdaFailureFeedbackRoleArn

## SQS

- `SQSSuccessFeedbackRoleArn`
- `SQSSuccessFeedbackSampleRate`
- `SQSFailureFeedbackRoleArn`

The `<ENDPOINT>SuccessFeedbackRoleArn` and `<ENDPOINT>FailureFeedbackRoleArn` attributes are used to give Amazon SNS write access to use CloudWatch Logs on your behalf. The `<ENDPOINT>SuccessFeedbackSampleRate` attribute is for specifying the sample rate percentage (0-100) of successfully delivered messages. After you configure the `<ENDPOINT>FailureFeedbackRoleArn` attribute, then all failed message deliveries generate CloudWatch Logs.

## Java Example to Configure Topic Attributes

The following Java example shows how to use the `SetTopicAttributes` API to configure topic attributes for message delivery status of notification messages sent to topics subscribed to Amazon SNS endpoints. In this example, it is assumed that string values have been set for `topicArn`, `attribName`, and `attribValue`.

```
final static String topicArn = ("arn:aws:sns:us-east-2:123456789012:MyTopic");
final static String attribName = ("LambdaSuccessFeedbackRoleArn");
final static String attribValue = ("arn:aws:iam::123456789012:role/SNSSuccessFeedback");
```

```
SetTopicAttributesRequest setTopicAttributesRequest = new SetTopicAttributesRequest();
setTopicAttributesRequest.withTopicArn(topicArn);
setTopicAttributesRequest.setAttributeName(attribName);
setTopicAttributesRequest.setAttributeValue(attribValue);
```

For more information about the SDK for Java, see [Getting Started with the AWS SDK for Java](#).

# Using Amazon SNS Message Attributes

Amazon Simple Notification Service (Amazon SNS) supports delivery of *message attributes*. Message attributes allow you to provide structured metadata items (such as time stamps, geospatial data, signatures, and identifiers) about the message. Message attributes are optional and separate from, but sent along with, the message body. This information can be used by the receiver of the message to help decide how to handle the message without having to first process the message body. Each message can have up to 10 attributes. To specify message attributes, you can use the AWS software development kits (SDKs) or query API.

## Important

To use message attributes with Amazon SQS endpoints, you must set the subscription attribute, `Raw Message Delivery`, to `True`. For more information about raw message delivery, see [Appendix: Large Payload and Raw Message Delivery \(p. 202\)](#).

You can also use message attributes to help structure the push notification message for mobile endpoints. In this scenario, the message attributes are only used to help structure the push notification message. The attributes are not delivered to the endpoint, as they are when sending messages with message attributes to Amazon SQS endpoints.

You can also use message attributes to make your messages filterable with subscription filter policies. You apply filter policies to topic subscriptions. With a filter policy applied, a subscription receives only those messages that have attributes that are accepted by the policy. For more information, see [Filtering Messages with Amazon SNS \(p. 178\)](#).

## Message Attribute Items and Validation

Each message attribute consists of the following items:

- **Name** – The message attribute name can contain the following characters: A-Z, a-z, 0-9, underscore(\_), hyphen(-), and period (.). The name must not start or end with a period, and it should not have successive periods. The name is case-sensitive and must be unique among all attribute names for the message. The name can be up to 256 characters long. The name cannot start with "AWS." or "Amazon." (or any variations in casing) because these prefixes are reserved for use by Amazon Web Services.
- **Type** – The supported message attribute data types are `String`, `String.Array`, `Number`, and `Binary`. The data type has the same restrictions on the content as the message body. The data type is case-sensitive, and it can be up to 256 bytes long. For more information, see the [Message Attribute Data Types and Validation \(p. 174\)](#) section.
- **Value** – The user-specified message attribute value. For string data types, the value attribute has the same restrictions on the content as the message body. For more information, see the [Publish](#) action in the *Amazon Simple Notification Service API Reference*.

Name, type, and value must not be empty or null. In addition, the message body should not be empty or null. All parts of the message attribute, including name, type, and value, are included in the message size restriction, which is 256 KB.

## Message Attribute Data Types and Validation

Message attribute data types identify how the message attribute values are handled by Amazon SNS. For example, if the type is a number, Amazon SNS validates that it's a number.

Amazon SNS supports the following logical data types:

- **String** – Strings are Unicode with UTF-8 binary encoding. For a list of code values, see [http://en.wikipedia.org/wiki/ASCII#ASCII\\_printable\\_characters](http://en.wikipedia.org/wiki/ASCII#ASCII_printable_characters).
- **String.Array** – An array, formatted as a string, that can contain multiple values. The values can be strings, numbers, or the keywords `true`, `false`, and `null`.
- **Number** – Numbers are positive or negative integers or floating-point numbers. Numbers have sufficient range and precision to encompass most of the possible values that integers, floats, and doubles typically support. A number can have a value from  $-10^9$  to  $10^9$ , with 5 digits of accuracy after the decimal point. Leading and trailing zeroes are trimmed.
- **Binary** – Binary type attributes can store any binary data; for example, compressed data, encrypted data, or images.

## Reserved Message Attributes for Mobile Push Notifications

The following table lists the reserved message attributes for mobile push notification services that you can use to structure your push notification message:

Push Notification Service	Reserved Message Attribute	Allowed Values
Baidu	AWS.SNS.MOBILE.BAIDU.DeployStatus (optional)	1—development environment. 2—production environment. (default 1)
	AWS.SNS.MOBILE.BAIDU.MessageType (optional)	0—in-app message. 1—alert notification. (default 1)
	AWS.SNS.MOBILE.BAIDU.MessageKey (optional)	A short message identifier you can attach to your message
MPNS	AWS.SNS.MOBILE.MPNS.Type ( <b>required</b> )	token (for tile notifications), toast, raw
	AWS.SNS.MOBILE.MPNS.NotificationClass ( <b>required</b> )	real time, priority, regular
WNS	AWS.SNS.MOBILE.WNS.Type ( <b>required</b> )	same as <a href="#">X-WNS-Type</a>
	AWS.SNS.MOBILE.WNS.CachePolicy (optional)	same as <a href="#">X-WNS-Cache-Policy</a>
	AWS.SNS.MOBILE.WNS.Group (optional)	same as <a href="#">X-WNS-Group</a>
	AWS.SNS.MOBILE.WNS.Match (optional)	same as <a href="#">X-WNS-Match</a>
	AWS.SNS.MOBILE.WNS.SuppressPopup (optional)	same as <a href="#">X-WNS-SuppressPopup</a>
		same as <a href="#">X-WNS-Tag</a>

Push Notification Service	Reserved Message Attribute	Allowed Values
	AWS.SNS.MOBILE.WNS.Tag (optional)	

For more information about using message attributes with Baidu, see [Using Message Attributes for Structuring the Message](#) (p. 66).

## Applying Message Attributes

You can publish a message with attributes by using the Amazon SNS console. Or, to apply message attributes programmatically, you can use the API, the AWS Command Line Interface (AWS CLI), or any AWS SDK that supports Amazon SNS, such as the AWS SDK for Java.

### Applying Message Attributes with the Console

Complete the following steps to publish a message with attributes by using the Amazon SNS console:

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the navigation pane, choose **Topics**. The **Topics** page provides all of the Amazon SNS topics that you have in the selected region.
3. If you don't have a topic, choose **Create a new topic**, and provide a value for **Topic name**. If you want to use the topic to send SMS messages, provide a value for **Display name**. Then, choose **Create topic**.
4. If you have one or more topics, select the topic to which you want to publish the message. Then, choose **Publish to topic**.
5. On the **Publish a message** page, provide a **Subject** and **Message**.
6. For **Message Attributes**, specify the key, attribute type, and value. For example, the following entry creates an attribute named **customer\_interests**. The attribute type is **String.Array**, and the value is an array of values.



If the attribute type is **String**, **String.Array**, or **Number**, Amazon SNS evaluates the message attribute against a subscription's filter policy, if present, before sending the message to that subscription.

#### Remember

If the attribute type is **String.Array**, enclose the array in brackets ([ ]). Within the array, enclose string values in double quotes. You don't need quotes for numbers or for the keywords `true`, `false`, and `null`.

### Applying Message Attributes with the AWS CLI

To publish a message with attributes using the AWS CLI, use the `publish` command with the `--message-attributes` parameter, as shown in the following example:

```
$ aws sns publish --topic-arn topic-arn --message "message" --message-attributes '{"store": {"DataType": "String", "StringValue": "example_corp"}}'
```

## Applying Message Attributes with the AWS SDK for Java

To publish a message with attributes using the AWS SDK for Java, use the [publish](#) method of the AmazonSNS client. Provide a `PublishRequest` object as the argument. When you initialize the `PublishRequest` object, use its `withMessageAttributes` method, which accepts a map of type `Map<String, MessageAttributeValue>`.

To simplify the process of publishing messages with attributes, you can add the following example class to your application and modify it as needed:

```
import com.amazonaws.services.sns.*;
import com.amazonaws.services.sns.model.MessageAttributeValue;
import com.amazonaws.services.sns.model.PublishRequest;
import com.amazonaws.services.sns.model.PublishResult;

import java.util.ArrayList;
import java.util.HashMap;
import java.util.Map;
import java.util.stream.Collectors;

public class SNSMessage {

 public String message;
 public Map<String, MessageAttributeValue> messageAttributes;

 public SNSMessage(String message) {
 this.message = message;
 messageAttributes = new HashMap<>();
 }

 public void setMessage(String message) { this.message = message; }

 public String getMessage() { return message; }

 public void addAttribute(String attributeName, String attributeValue) {
 MessageAttributeValue messageAttributeValue = new MessageAttributeValue()
 .withDataType("String")
 .withStringValue(attributeValue);
 messageAttributes.put(attributeName, messageAttributeValue);
 }

 public void addAttribute(String attributeName, ArrayList<?> attributeValues) {
 String valuesString, delimiter = ", ", prefix = "[", suffix = "]";
 if (attributeValues.get(0).getClass() == String.class) {
 delimiter = "\", \"";
 prefix = "[\"";
 suffix = "\"]";
 }
 valuesString = attributeValues
 .stream()
 .map(value -> value.toString())
 .collect(Collectors.joining(delimiter, prefix, suffix));
 MessageAttributeValue messageAttributeValue = new MessageAttributeValue()
 .withDataType("String.Array")
 .withStringValue(valuesString);
 messageAttributes.put(attributeName, messageAttributeValue);
 }

 public void addAttribute(String attributeName, Number attributeValue) {
 MessageAttributeValue messageAttributeValue = new MessageAttributeValue()
 .withDataType("Number")
 }
```

```
 .withStringValue(attributeValue.toString());
 messageAttributes.put(attributeName, messageAttributeValue);
 }

 public String publish(AmazonSNS snsClient, String topicArn) {
 PublishRequest request = new PublishRequest(topicArn, message)
 .withMessageAttributes(messageAttributes);
 PublishResult result = snsClient.publish(request);
 return result.getMessageId();
 }
}
```

This class stores a `messageAttributes` field as a map. You use the overloaded `addAttribute` methods to add attributes to your message. These methods can add attributes with the data type `String`, `String.Array`, or `Number`. When you're ready to publish your message, use the `publish` method, and provide an `AmazonSNS` client and topic ARN.

The following code shows how to initialize and use the example `SNSMessage` class:

```
// Initialize example message class
SNSMessage message = new SNSMessage(messageBody);

// Add message attribute with string value
message.addAttribute("store", "example_corp");
message.addAttribute("event", "order_placed");

// Add message attribute with a list of string values
ArrayList<String> interestsValues = new ArrayList<>();
interestsValues.add("soccer");
interestsValues.add("rugby");
interestsValues.add("hockey");
message.addAttribute("customer_interests", interestsValues);

// Add message attribute with number value
message.addAttribute("price_usd", 1000);

// Add boolean attribute for filtering with subscription filter policies.
// SNSMessage will apply a String.Array data type to this attribute,
// which makes it eligible for evaluating with a filter policy.
ArrayList<Boolean> encryptedVal = new ArrayList<>();
encrypted.add(false);
message.addAttribute("encrypted", encryptedVal);

// Publish message
message.publish(snsClient, topicArn);
```

## Applying Message Attributes with the Amazon SNS API

To publish a message with attributes using the Amazon SNS API, issue a request to the [Publish](#) action and use the `MessageAttributes` parameter.

# Filtering Messages with Amazon SNS

By default, a subscriber of an Amazon SNS topic receives every message published to the topic. To receive only a subset of the messages, a subscriber assigns a *filter policy* to the topic subscription.

A filter policy is a simple JSON object. The policy contains attributes that define which messages the subscriber receives. When you publish a message to a topic, Amazon SNS compares the message attributes to the attributes in the filter policy for each of the topic's subscriptions. If there is a match between the attributes, Amazon SNS sends the message to the subscriber. Otherwise, Amazon SNS skips the subscriber without sending the message to it. If a subscription lacks a filter policy, the subscription receives every message published to its topic.

With filter policies, you can simplify your usage of Amazon SNS by consolidating your message filtering criteria into your topic subscriptions. With this consolidation, you can offload the message filtering logic from subscribers and the message routing logic from publishers. Therefore, you don't need to filter messages by creating a separate topic for each filtering condition. Instead, you can use a single topic, and you can differentiate your messages with attributes. Each subscriber receives and processes only those messages accepted by its filter policy.

For example, you could use a single topic to publish all messages generated by transactions from your online retail site. To each message, you could assign an attribute that indicates the type of transaction, such as `order_placed`, `order_cancelled`, or `order_declined`. By creating subscriptions with filter policies, you can route each message to the queue that is meant to process the message's transaction type.

For a tutorial demonstrating how to implement message filtering with the AWS Management Console, see [Filter Messages Published to Topics](#). This tutorial shows how to apply filter policies to route messages to separate Amazon SQS queues.

## Subscription Filter Policies

You assign filter policies to Amazon SNS subscriptions. In a policy, you specify attribute names, and for each name, you assign a list of one or more values. A subscription accepts a message only if the message contains attributes that match those specified in the subscription's filter policy. Specifically, the subscription accepts the message if:

- a. Each attribute name in the filter policy matches an attribute name assigned to the message.
- b. For each matching attribute name, at least one match exists between the values that are assigned to that name in the filter policy and the message.

When Amazon SNS evaluates the message attributes against the policy, it ignores message attributes that are not specified in the policy.

The following examples show how filter policies might accept or reject a message published to a topic.

## Example Message with Attributes

The following example shows a message payload sent by an Amazon SNS topic that publishes customer transactions. The message includes attributes that describe the transaction: the name of the store, the type of event, the customer interests, and the price of the purchase.



```
{
 "Type" : "Notification",
 "MessageId" : "e3c4e17a-819b-5d95-a0e8-b306c25afda0",
 "TopicArn" : "arn:aws:sns:us-east-1:111122223333:MySnsTopic",
 "Message" : message body with transaction details . . .
 "Timestamp" : "2017-11-07T23:28:01.631Z",
 "SignatureVersion" : "1",
 "Signature" : signature . . .
 "UnsubscribeURL" : unsubscribe URL . . .
 "MessageAttributes" : {
 "customer_interests" : {"Type":"String.Array","Value":["soccer", "rugby", "hockey"]}
 "store" : {"Type":"String","Value":"example_corp"},
 "event" : {"Type":"String","Value":"order_placed"},
 "price_usd" : {"Type":"Number","Value":210.75}
 }
}
```

For information about applying attributes to a message, see [Using Amazon SNS Message Attributes \(p. 173\)](#).

Because this message includes attributes, any topic subscription that includes a filter policy can selectively accept or reject the message.

## Example Filter Policies

The following filter policies accept or reject the example message based on their attribute names and values.

### Example Policy That Accepts the Message

The attributes in the following policy match the attributes that are assigned to the example message:

```
{
 "store": ["example_corp"],
 "event": [{"anything-but":"order_cancelled"}],
 "customer_interests": ["rugby", "football", "baseball"],
 "price_usd": [{"numeric":[">=", 100]}]
}
```

If any single attribute in this policy doesn't match one that's assigned to the message, the policy rejects the message.

### Example Policy That Rejects the Message

The following policy has multiple mismatches between its attributes and the attributes that are assigned to the example message:

```
{
 "store": ["example_corp"],
 "event": ["order_cancelled"],
 "encrypted": [false],
 "customer_interests": ["basketball", "baseball"]
}
```

One or more mismatches cause the policy to reject the message.

Because the `encrypted` attribute name isn't present in the message attributes, that policy attribute rejects the message, regardless of the value that's assigned to it.

Filter policy attributes can have string or numeric values. With string and numeric values, you can use the following operations to match message attributes and filter messages.

## String Value Matching

String values are enclosed in double quotes in your policy JSON. With strings, you can use the following operations to match message attributes.

### Exact matching (whitelisting)

This matching occurs when a policy attribute value matches one or more message attribute values. For example, the policy attribute:

```
"customer_interests": ["rugby"]
```

Matches the message attribute:

```
"customer_interests" : { "Type": "String", "Value": "rugby" }
```

### Anything-but matching (blacklisting)

When a policy attribute value includes the `anything-but` keyword, it matches any message attribute that *doesn't* include the policy attribute value. For example, the policy attribute:

```
"customer_interests": [{ "anything-but": "rugby" }]
```

Matches message attributes such as:

```
"customer_interests" : { "Type": "String", "Value": "baseball" }
```

And:

```
"customer_interests" : { "Type": "String", "Value": "football" }
```

But not:

```
"customer_interests" : { "Type": "String", "Value": "rugby" }
```

### Prefix matching

When a policy attribute includes the `prefix` keyword, its value matches any message attribute value that begins with the specified characters. For example, the policy attribute:

```
"customer_interests": [{ "prefix": "bas" }]
```

Matches message attributes such as:

```
"customer_interests" : { "Type": "String", "Value": "baseball" }
```

And:

```
"customer_interests" : { "Type": "String", "Value": "basketball" }
```

But not:

```
"customer_interests" : { "Type": "String", "Value": "rugby" }
```

## Numeric Value Matching

Numeric values aren't enclosed in quotes in your policy JSON. With numeric values, you can use the following operations to match message attribute values.

### Exact matching

When a policy attribute value includes the `numeric` keyword and the `=` operator, it matches any message attribute that has the same name and an equal numeric value. For example, the policy attribute:

```
"price_usd": [{ "numeric": ["=", 301.5] }]
```

Matches message attributes such as:

```
"price_usd" : { "Type": "Number", "Value": 301.5 }
```

And:

```
"price_usd" : { "Type": "Number", "Value": 3.015e2 }
```

### Range matching

In addition to the `=` operator, a numeric policy attribute can include `<`, `<=`, `>`, and `>=`. For example, the policy attribute:

```
"price_usd": [{ "numeric": ["<", 0] }]
```

Matches message attributes with negative numeric values, and:

```
"price_usd": [{ "numeric": [">", 0, "<=", 150] }]
```

Matches message attributes with positive numbers up to 150.

## AND/OR Logic

Apply AND/OR logic to your filter policies as follows.

### AND logic

Apply AND logic by using multiple attribute names (keys). For example, the policy:

```
{
 "customer_interests": ["rugby"],
 "price_usd": [{ "numeric": [">", 100] }]
}
```

Matches messages with a `customer_interests` value of `rugby` **and** a `price_usd` value that's over 100.

#### OR logic

Apply OR logic by assigning multiple values to an attribute name. For example, the policy attribute:

```
"customer_interests": ["rugby", "football", "baseball"]
```

Matches messages with a `customer_interests` value of `rugby` **or** `football` **or** `baseball`.

## Constraints

When you create a filter policy, remember the following constraints:

- Amazon SNS compares the policy attributes only to message attributes that have a data type of `String`, `String.Array`, or `Number`. Message attributes with the `Binary` data type are ignored.
- The attribute comparison between policy and message is case sensitive for strings.
- As a JSON object, the filter policy can contain strings enclosed in quotes, numbers, and the unquoted keywords `true`, `false`, and `null`.
- A filter policy can have up to 10 attribute names.
- A numeric policy attribute can have a value from  $-10^9$  to  $10^9$ , with 5 digits of accuracy after the decimal point.
- The maximum size of a policy is 256 KB.
- When you're using the Amazon SNS API, the policy JSON must be passed as a valid UTF-8 string.
- By default, you can have up to 100 filter policies per AWS account per region. To increase this limit, submit an [SNS Limit Increase case](#).
- The total combination of values must not exceed 100. Calculate the total combination by multiplying the number of values in each array. For example, in the following policy, the first array has three values, the second has one value, and the third has two values. The total combination is calculated as  $3 \times 1 \times 2 = 6$ .

```
{
 "key_a": ["value_one", "value_two", "value_three"],
 "key_b": ["value_one"],
 "key_c": ["value_one", "value_two"]
}
```

## Applying Subscription Filter Policies

You can apply a filter policy to an Amazon SNS subscription by using the Amazon SNS console. Or, to apply policies programmatically, you can use the Amazon SNS API, the AWS Command Line Interface (AWS CLI), or any AWS SDK that supports Amazon SNS, such as the AWS SDK for Java.

### Applying a Filter Policy with the Console

Complete the following steps to apply a filter policy using the Amazon SNS console:

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the navigation pane, choose **Subscriptions**. The **Subscriptions** page provides all of the Amazon SNS subscriptions that you have in the selected region.

3. If you don't have a subscription, choose **Create subscription**, and provide values for **Topic ARN**, **Protocol**, and **Endpoint**.
4. If you have one or more subscriptions, select the subscription to which you want to apply a filter policy.
5. Choose **Actions**, and choose **Edit subscription filter policy** in the menu.
6. In the **Edit subscription filter policy** window, provide the JSON body of your filter policy.
7. Choose **Set subscription filter policy**. Amazon SNS applies your filter policy to the subscription.

## Applying a Filter Policy with the AWS CLI

To apply a filter policy with the AWS Command Line Interface (AWS CLI), use the `set-subscription-attributes` command, as shown in the following example:

```
$ aws sns set-subscription-attributes --subscription-arn arn:aws:sns: ... --attribute-name
FilterPolicy --attribute-value '{"store":["example_corp"],"event":["order_placed"]}'
```

For the `--attribute-name` option, specify `FilterPolicy`. For `--attribute-value`, specify your JSON policy.

To provide valid JSON for your policy, enclose the attribute names and values in double quotes. You must also enclose the entire policy argument in quotes. To avoid escaping quotes, you can use single quotes to enclose the policy and double quotes to enclose the JSON names and values, as shown in the example.

To verify that your filter policy was applied, use the `get-subscription-attributes` command. The attributes in the terminal output should show your filter policy for the `FilterPolicy` key, as shown in the following example:

```
$ aws sns get-subscription-attributes --subscription-arn arn:aws:sns: ...
{
 "Attributes": {
 "Endpoint": "endpoint . . .",
 "Protocol": "https",
 "RawMessageDelivery": "false",
 "EffectiveDeliveryPolicy": "delivery policy . . .",
 "ConfirmationWasAuthenticated": "true",
 "FilterPolicy": "{\"store\": [\"example_corp\"], \"event\": [\"order_placed\"]}",
 "Owner": "111122223333",
 "SubscriptionArn": "arn:aws:sns: . . .",
 "TopicArn": "arn:aws:sns: . . ."
 }
}
```

## Applying a Filter Policy with the SDK for Java

To apply a filter policy with the AWS SDK for Java, use the `setSubscriptionAttributes` method of the `AmazonSNS` client. Provide a `SetSubscriptionAttributesRequest` object as the argument, as shown in the following example:

```
AmazonSNS snsClient = AmazonSNSClientBuilder.defaultClient();
String filterPolicyString = "{\"store\": [\"example_corp\"], \"event\": [\"order_placed\"]}";
SetSubscriptionAttributesRequest request =
 new SetSubscriptionAttributesRequest(subscriptionArn, "FilterPolicy",
 filterPolicyString);
snsClient.setSubscriptionAttributes(request);
```

To initialize the `SetSubscriptionAttributesRequest` object, provide the following arguments:

- `subscriptionArn` – The Amazon Resource Name (ARN) of the subscription to which the policy is applied.
- `attributeName` – Must be "FilterPolicy".
- `attributeValue` – Your JSON filter policy as a string. Because you must enclose the string policy in double quotes, remember to escape the double quotes that enclose the attribute names and values, as in `\\"store\\"`.

The `SetSubscriptionAttributesRequest` class accepts the filter policy as a string. If you want to define your policy as a Java collection, create a map that associates each attribute name with a list of values. To assign the policy to a subscription, you first produce a string version of the policy from the contents of the map. You then pass the string as the `attributeValue` argument to `SetSubscriptionAttributesRequest`.

To simplify this process, you can add the following example class to your application and modify it as needed:

```
import com.amazonaws.services.sns.AmazonSNS;
import com.amazonaws.services.sns.model.SetSubscriptionAttributesRequest;
import java.util.ArrayList;
import java.util.HashMap;
import java.util.Map;
import java.util.stream.Collectors;

public class SNSMessageFilterPolicy {

 private enum AttributeType {
 String, Numeric, Prefix, List, AnythingBut
 }

 private class Attribute<T> {

 protected final T value;
 protected final AttributeType type;

 public Attribute(AttributeType type, T value) {
 this.value = value;
 this.type = type;
 }

 public String toString() {
 switch(type) {
 case Prefix:
 return String.format("{\"prefix\":\"%s\"}", value.toString());
 case Numeric:
 return String.format("{\"numeric\":%s}", value.toString());
 case List:
 ArrayList<T> values = (ArrayList<T>)value;
 return values
 .stream()
 .map(entry -> entry.toString())
 .collect(Collectors.joining(",", "[", "]"));
 case AnythingBut:
 return String.format("{\"anything-but\":\"%s\"}", value);
 default:
 return String.format("{\"%s\":\"%s\"}", value);
 }
 }
 }

 private class NumericValue<T extends Number> {
```

```

private final T lower;
private final T upper;
private final String lowerOp;
private final String upperOp;

public NumericValue(String op, T value) {
 lower = value;
 lowerOp = op;
 upper = null;
 upperOp = null;
}

public NumericValue(String lowerOp, T lower, String upperOp, T upper) {
 this.lower = lower;
 this.lowerOp = lowerOp;
 this.upper = upper;
 this.upperOp = upperOp;
}

public String toString() {
 StringBuffer s = new StringBuffer("[")
 .append('\n').append(lowerOp).append("\n").append(lower);
 if (upper != null) {
 s.append("\n").append(upperOp).append("\n").append(upper);
 }
 s.append("]");
 return s.toString();
}

private final Map<String, Attribute> filterPolicy = new HashMap<>();

public void addAttribute(String attributeName, String attributeValue) {
 filterPolicy.put(attributeName, new Attribute(AttributeType.String,
attributeValue));
}

public void addAttribute(String attributeName, ArrayList<String> attributeValues) {
 ArrayList<Attribute> attributes = new ArrayList<>();
 for (String s : attributeValues) {
 attributes.add(new Attribute(AttributeType.String, s));
 }
 filterPolicy.put(attributeName, new Attribute(AttributeType.List, attributes));
}

public void addAttributePrefix(String attributeName, String prefix) {
 filterPolicy.put(attributeName, new Attribute(AttributeType.Prefix, prefix));
}

public void addAttributeAnythingBut(String attributeName, String value) {
 filterPolicy.put(attributeName, new Attribute(AttributeType.AnythingBut, value));
}

public <T extends Number> void addAttribute(String attributeName, String op, T value)
{
 filterPolicy.put(attributeName, new Attribute(AttributeType.Numeric, new
NumericValue(op, value)));
}

public <T extends Number> void addAttributeRange(
 String attributeName, String lowerOp, T lower, String upperOp, T upper) {
 filterPolicy.put(
 attributeName,
 new Attribute(AttributeType.Numeric, new NumericValue(lowerOp, lower,
upperOp, upper)));
}

```

```
public void apply(AmazonSNS snsClient, String subscriptionArn) {
 SetSubscriptionAttributesRequest request =
 new SetSubscriptionAttributesRequest(subscriptionArn, "FilterPolicy",
formatFilterPolicy());
 snsClient.setSubscriptionAttributes(request);
}

public String formatFilterPolicy() {
 return filterPolicy.entrySet()
 .stream()
 .map(entry -> "\"" + entry.getKey() + "\": [" + entry.getValue() + "]")
 .collect(Collectors.joining(", ", "{", "}"));
}
}
```

This class stores a `filterPolicy` field as a map. You use the different `addAttribute` methods to add attributes to your policy. These methods accept the attribute name as a string, and they are specialized to accept different types of values. You can pass values as strings, lists of strings, numbers, or number ranges. You can add anything-but and prefix attributes. When you're ready to apply your policy to a subscription, use the `apply` method, and provide an `AmazonSNS` client and subscription ARN. This method produces a policy string from the contents of the `filterPolicy` map, and it applies the policy to the specified subscription.

The following code shows how to initialize and use the example `SNSMessageFilterPolicy` class:

```
// Initialize example filter policy class
SNSMessageFilterPolicy fp = new SNSMessageFilterPolicy();

// Add filter policy attribute with single value
fp.addAttribute("store", "example_corp");
fp.addAttribute("event", "order_placed");

// Add a prefix attribute
filterPolicy.addAttributePrefix("customer_interests", "bas");

// Add an anything-but attribute
filterPolicy.addAttributeAnythingBut("customer_interests", "baseball");

// Add filter policy attribute with a list of values
ArrayList<String> attributeValues = new ArrayList<>();
attributeValues.add("rugby");
attributeValues.add("soccer");
attributeValues.add("hockey");
fp.addAttribute("customer_interests", attributeValues);

// Add numeric attribute
filterPolicy.addAttribute("price_usd", "=", 0);

// Add numeric attribute with a range
filterPolicy.addAttributeRange("price_usd", ">", 0, "<=", 100);

// Apply filter policy attributes to SNS subscription
fp.apply(snsClient, subscriptionArn);
```

## Applying a Filter Policy with the Amazon SNS API

To apply a filter policy with the Amazon SNS API, make a request to the [SetSubscriptionAttributes](#) action. Set the `AttributeName` parameter to `FilterPolicy`, and set the `AttributeValue` parameter to your filter policy JSON.



# Monitoring Amazon SNS with CloudWatch

Amazon SNS and CloudWatch are integrated so you can collect, view, and analyze metrics for every active Amazon SNS notifications. Once you have configured CloudWatch for Amazon SNS, you can gain better insight into the performance of your Amazon SNS topics, push notifications, and SMS deliveries. For example, you can set an alarm to send you an email notification if a specified threshold is met for an Amazon SNS metric, such as `NumberOfNotificationsFailed`. For a list of all the metrics that Amazon SNS sends to CloudWatch, see [Amazon SNS Metrics \(p. 189\)](#). For more information about Amazon SNS push notifications, see [Amazon SNS Mobile Push Notifications \(p. 37\)](#)

The metrics you configure with CloudWatch for your Amazon SNS topics are automatically collected and pushed to CloudWatch every five minutes. These metrics are gathered on all topics that meet the CloudWatch guidelines for being active. A topic is considered active by CloudWatch for up to six hours from the last activity (i.e., any API call) on the topic.

## Note

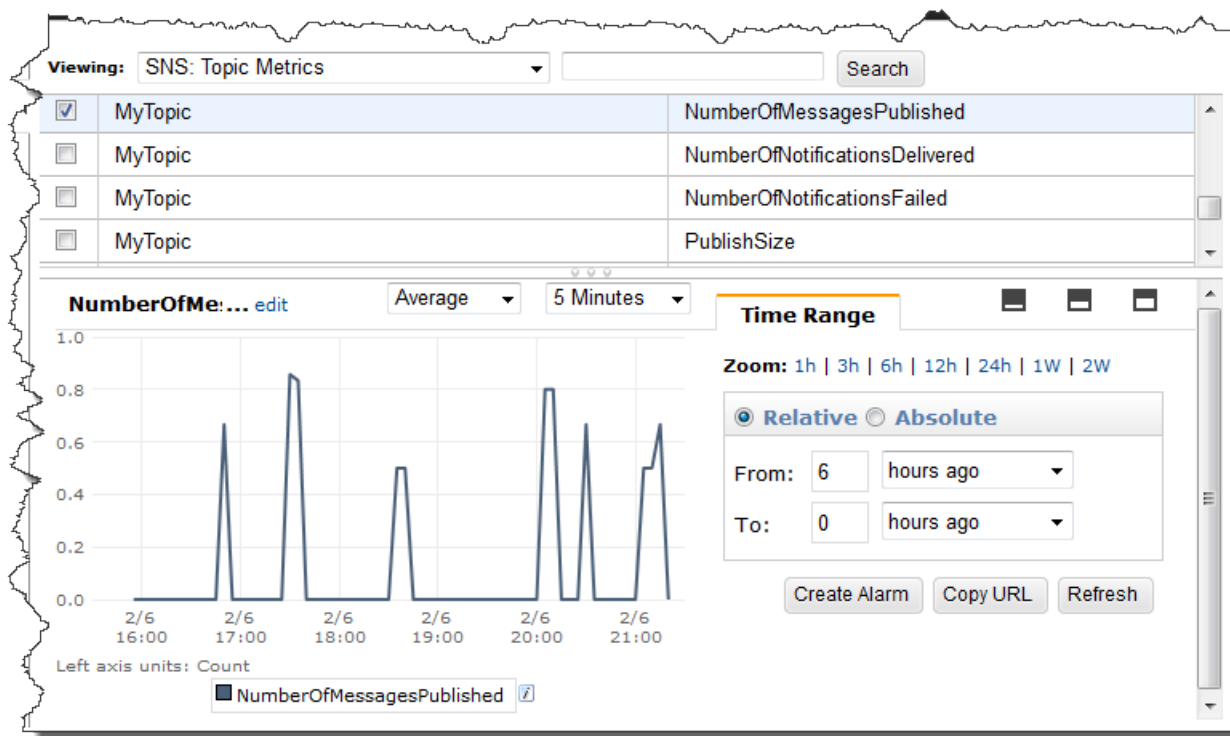
There is no charge for the Amazon SNS metrics reported in CloudWatch; they are provided as part of the Amazon SNS service.

## Access CloudWatch Metrics for Amazon SNS

You can monitor metrics for Amazon SNS using the CloudWatch console, CloudWatch's own command line interface (CLI), or programmatically using the CloudWatch API. The following procedures show you how to access the metrics using these different options.

### To view metrics using the CloudWatch console

1. Sign in to the AWS Management Console and open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. Click **View Metrics**.
3. From the **Viewing** drop-down menu select either **SNS: Topic Metrics**, **SNS: Push Notifications by Application**, **SNS: Push Notifications by Application and Platform**, or **SNS: Push Notifications by Platform** to show the available metrics.
4. Click a specific item to see more detail, such as a graph of the data collected. For example, the following graph of the selected metric, **NumberOfMessagesPublished**, shows the average number of published Amazon SNS messages for a five-minute period throughout the time range of 6 hours.



#### To access metrics from the CloudWatch CLI

- Call `mon-get-stats`. You can learn more about this and other metrics-related functions in the [Amazon CloudWatch User Guide](#).

#### To access metrics from the CloudWatch API

- Call `GetMetricStatistics`. You can learn more about this and other metrics-related functions in the [Amazon CloudWatch API Reference](#).

## Set CloudWatch Alarms for Amazon SNS Metrics

CloudWatch also allows you to set alarms when a threshold is met for a metric. For example, you could set an alarm for the metric, **NumberOfNotificationsFailed**, so that when your specified threshold number is met within the sampling period, then an email notification would be sent to inform you of the event.

#### To set alarms using the CloudWatch console

1. Sign in to the AWS Management Console and open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. Click **Alarms**, and then click the **Create Alarm** button. This launches the **Create Alarm** wizard.
3. Scroll through the Amazon SNS metrics to locate the metric you want to place an alarm on. Select the metric to create an alarm on and click **Continue**.
4. Fill in the **Name**, **Description**, **Threshold**, and **Time** values for the metric, and then click **Continue**.

5. Choose **Alarm** as the alarm state. If you want CloudWatch to send you an email when the alarm state is reached, either select a preexisting Amazon SNS topic or click **Create New Email Topic**. If you click **Create New Email Topic**, you can set the name and email addresses for a new topic. This list will be saved and appear in the drop-down box for future alarms. Click **Continue**.

**Note**

If you use **Create New Email Topic** to create a new Amazon SNS topic, the email addresses must be verified before they will receive notifications. Emails are sent only when the alarm enters an alarm state. If this alarm state change happens before the email addresses are verified, they will not receive a notification.

6. At this point, the **Create Alarm** wizard gives you a chance to review the alarm you're about to create. If you need to make any changes, you can use the **Edit** links on the right. Once you are satisfied, click **Create Alarm**.

For more information about using CloudWatch and alarms, see the [CloudWatch Documentation](#).

## Amazon SNS Metrics

Amazon SNS sends the following metrics to CloudWatch.

Metric	Description
NumberOfMessagesPublished	The number of messages published.  Units: <i>Count</i>  Valid Statistics: Sum
PublishSize	The size of messages published.  Units: <i>Bytes</i>  Valid Statistics: Minimum, Maximum, Average and Count
NumberOfNotificationsDelivered	The number of messages successfully delivered.  Units: <i>Count</i>  Valid Statistics: Sum
NumberOfNotificationsFailed	The number of messages that Amazon SNS failed to deliver. This metric is applied after Amazon SNS stops attempting message deliveries to Amazon SQS, email, SMS, or mobile push endpoints. Each delivery attempt to an HTTP or HTTPS endpoint adds 1 to the metric. For all other endpoints, the count increases by 1 when the message is not delivered (regardless of the number of attempts). You can control the number of retries for HTTP endpoints; for more information, see <a href="#">Setting Amazon SNS Delivery Retry Policies for HTTP/HTTPS Endpoints</a> (p. 149).  Units: <i>Count</i>  Valid Statistics: Sum, Average

Metric	Description
SMSThMonthToDateSpentUSD	<p>The charges you have accrued since the start of the current calendar month for sending SMS messages.</p> <p>You can set an alarm for this metric to know when your month-to-date charges are close to the monthly SMS spend limit for your account. When Amazon SNS determines that sending an SMS message would incur a cost that exceeds this limit, it stops publishing SMS messages within minutes.</p> <p>For information about setting your monthly SMS spend limit, or for information about requesting a spend limit increase with AWS, see <a href="#">Setting SMS Messaging Preferences</a> (p. 117).</p> <p>Units: <i>USD</i></p> <p>Valid Statistics: Maximum</p>
SMSSuccessRate	<p>The rate of successful SMS message deliveries.</p> <p>Units: <i>Count</i></p> <p>Valid Statistics: Sum, Average, Data Samples</p>

## Dimensions for Amazon Simple Notification Service Metrics

Amazon Simple Notification Service sends the following dimensions to CloudWatch.

Dimension	Description
Application	Filters on application objects, which represent an app and device registered with one of the supported push notification services, such as APNS and GCM.
Application,Platform	Filters on application and platform objects, where the platform objects are for the supported push notification services, such as APNS and GCM.
Country	Filters on the destination country or region of an SMS message. The country or region is represented by its ISO 3166-1 alpha-2 code.
Platform	Filters on platform objects for the push notification services, such as APNS and GCM.
TopicName	Filters on Amazon SNS topic names.
SMSType	Filters on the message type of SMS message. Can be <i>promotional</i> or <i>transactional</i> .

# Logging Amazon Simple Notification Service API Calls By Using AWS CloudTrail

Amazon SNS is integrated with CloudTrail, a service that captures API calls made by or on behalf of Amazon SNS in your AWS account and delivers the log files to an Amazon S3 bucket that you specify. CloudTrail captures API calls made from the Amazon SNS console or from the Amazon SNS API. Using the information collected by CloudTrail, you can determine what request was made to Amazon SNS, the source IP address from which the request was made, who made the request, when it was made, and so on. To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

## Amazon SNS Information in CloudTrail

When CloudTrail logging is enabled in your AWS account, API calls made to Amazon SNS actions are tracked in log files. Amazon SNS records are written together with other AWS service records in a log file. CloudTrail determines when to create and write to a new file based on a time period and file size.

The following actions are supported:

- [AddPermission](#)
- [ConfirmSubscription](#)
- [CreatePlatformApplication](#)
- [CreatePlatformEndpoint](#)
- [CreateTopic](#)
- [DeleteEndpoint](#)
- [DeletePlatformApplication](#)
- [DeleteTopic](#)
- [GetEndpointAttributes](#)
- [GetPlatformApplicationAttributes](#)
- [GetSubscriptionAttributes](#)
- [GetTopicAttributes](#)
- [ListEndpointsByPlatformApplication](#)
- [ListPlatformApplications](#)
- [ListSubscriptions](#)
- [ListSubscriptionsByTopic](#)
- [ListTopics](#)
- [RemovePermission](#)
- [SetEndpointAttributes](#)
- [SetPlatformApplicationAttributes](#)
- [SetSubscriptionAttributes](#)
- [SetTopicAttributes](#)

- [Subscribe](#)
- [Unsubscribe](#)

#### Note

When you are not logged in to Amazon Web Services (unauthenticated mode) and either the [ConfirmSubscription](#) or [Unsubscribe](#) actions are invoked, then they will not be logged to CloudTrail. Such as, when you click the provided link in an email notification to confirm a pending subscription to a topic, the `ConfirmSubscription` action is invoked in unauthenticated mode. In this example, the `ConfirmSubscription` action would not be logged to CloudTrail.

Every log entry contains information about who generated the request. The user identity information in the log helps you determine whether the request was made with root or IAM user credentials, with temporary security credentials for a role or federated user, or by another AWS service. For more information, see the `userIdentity` field in the [CloudTrail Event Reference](#).

You can store your log files in your bucket for as long as you want, but you can also define Amazon S3 lifecycle rules to archive or delete log files automatically. By default, your log files are encrypted by using Amazon S3 server-side encryption (SSE).

You can choose to have CloudTrail publish Amazon SNS notifications when new log files are delivered if you want to take quick action upon log file delivery. For more information, see [Configuring Amazon SNS Notifications](#).

You can also aggregate Amazon SNS log files from multiple AWS regions and multiple AWS accounts into a single Amazon S3 bucket. For more information, see [Aggregating CloudTrail Log Files to a Single Amazon S3 Bucket](#).

## Understanding Amazon SNS Log File Entries

CloudTrail log files contain one or more log entries where each entry is made up of multiple JSON-formatted events. A log entry represents a single request from any source and includes information about the requested action, any parameters, the date and time of the action, and so on. The log entries are not guaranteed to be in any particular order. That is, they are not an ordered stack trace of the public API calls.

The following example shows a CloudTrail log entry for the `ListTopics`, `CreateTopic`, and `DeleteTopic` actions.

```
{
 "Records": [
 {
 "eventVersion": "1.02",
 "userIdentity": {
 "type": "IAMUser",
 "userName": "Bob",
 "principalId": "EX_PRINCIPAL_ID",
 "arn": "arn:aws:iam::123456789012:user/Bob",
 "accountId": "123456789012",
 "accessKeyId": "AKIAIOSFODNN7EXAMPLE"
 },
 "eventTime": "2014-09-30T00:00:00Z",
 "eventSource": "sns.amazonaws.com",
 "eventName": "ListTopics",
 "awsRegion": "us-west-2",
 "sourceIPAddress": "127.0.0.1",
```

```

 "userAgent": "aws-sdk-java/unknown-version",
 "requestParameters": {
 "nextToken": "ABCDEF1234567890EXAMPLE=="
 },
 "responseElements": null,
 "requestID": "example1-b9bb-50fa-abdb-80f274981d60",
 "eventID": "example0-09a3-47d6-a810-c5f9fd2534fe",
 "eventType": "AwsApiCall",
 "recipientAccountId": "123456789012"
 },
 {
 "eventVersion": "1.02",
 "userIdentity": {
 "type": "IAMUser",
 "userName": "Bob",
 "principalId": "EX_PRINCIPAL_ID",
 "arn": "arn:aws:iam::123456789012:user/Bob",
 "accountId": "123456789012",
 "accessKeyId": "AKIAIOSFODNN7EXAMPLE"
 },
 "eventTime": "2014-09-30T00:00:00Z",
 "eventSource": "sns.amazonaws.com",
 "eventName": "CreateTopic",
 "awsRegion": "us-west-2",
 "sourceIPAddress": "127.0.0.1",
 "userAgent": "aws-sdk-java/unknown-version",
 "requestParameters": {
 "name": "hello"
 },
 "responseElements": {
 "topicArn": "arn:aws:sns:us-west-2:123456789012:hello-topic"
 },
 "requestID": "example7-5cd3-5323-8a00-f1889011fee9",
 "eventID": "examplec-4f2f-4625-8378-130ac89660b1",
 "eventType": "AwsApiCall",
 "recipientAccountId": "123456789012"
 },
 {
 "eventVersion": "1.02",
 "userIdentity": {
 "type": "IAMUser",
 "userName": "Bob",
 "principalId": "EX_PRINCIPAL_ID",
 "arn": "arn:aws:iam::123456789012:user/Bob",
 "accountId": "123456789012",
 "accessKeyId": "AKIAIOSFODNN7EXAMPLE"
 },
 "eventTime": "2014-09-30T00:00:00Z",
 "eventSource": "sns.amazonaws.com",
 "eventName": "DeleteTopic",
 "awsRegion": "us-west-2",
 "sourceIPAddress": "127.0.0.1",
 "userAgent": "aws-sdk-java/unknown-version",
 "requestParameters": {
 "topicArn": "arn:aws:sns:us-west-2:123456789012:hello-topic"
 },
 "responseElements": null,
 "requestID": "example5-4faa-51d5-aab2-803a8294388d",
 "eventID": "example8-6443-4b4d-abfd-1b867280d964",
 "eventType": "AwsApiCall",
 "recipientAccountId": "123456789012"
 },
]
}

```

# Appendix: Message and JSON Formats

Amazon SNS uses the following formats.

## Topics

- [HTTP/HTTPS Headers \(p. 194\)](#)
- [HTTP/HTTPS Subscription Confirmation JSON Format \(p. 195\)](#)
- [HTTP/HTTPS Notification JSON Format \(p. 197\)](#)
- [HTTP/HTTPS Unsubscribe Confirmation JSON Format \(p. 198\)](#)
- [SetSubscriptionAttributes Delivery Policy JSON Format \(p. 200\)](#)
- [SetTopicAttributes Delivery Policy JSON Format \(p. 200\)](#)

## HTTP/HTTPS Headers

When Amazon SNS sends a subscription confirmation, notification, or unsubscribe confirmation message to HTTP/HTTPS endpoints, it sends a POST message with a number of Amazon SNS-specific header values. You can use these header values to do things such as identify the type of message without having to parse the JSON message body to read the `Type` value.

### **x-amz-sns-message-type**

The type of message. The possible values are `SubscriptionConfirmation`, `Notification`, and `UnsubscribeConfirmation`.

### **x-amz-sns-message-id**

A Universally Unique Identifier, unique for each message published. For a notification that Amazon SNS resends during a retry, the message ID of the original message is used.

### **x-amz-sns-topic-arn**

The Amazon Resource Name (ARN) for the topic that this message was published to.

### **x-amz-sns-subscription-arn**

The ARN for the subscription to this endpoint.

The following HTTP POST header is an example of a header for a Notification message to an HTTP endpoint.

```
POST / HTTP/1.1
x-amz-sns-message-type: Notification
x-amz-sns-message-id: 165545c9-2a5c-472c-8df2-7ff2be2b3b1b
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
x-amz-sns-subscription-arn: arn:aws:sns:us-west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-
beaa-fcfcc21c8f55
Content-Length: 1336
Content-Type: text/plain; charset=UTF-8
Host: myhost.example.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent
```



# HTTP/HTTPS Subscription Confirmation JSON Format

After you subscribe an HTTP/HTTPS endpoint, Amazon SNS sends a subscription confirmation message to the HTTP/HTTPS endpoint. This message contains a `SubscribeURL` value that you must visit to confirm the subscription (alternatively, you can use the `Token` value with the [ConfirmSubscription](#)). Note that Amazon SNS will not send notifications to this endpoint until the subscription is confirmed.

The subscription confirmation message is a POST message with a message body that contains a JSON document with the following name/value pairs.

## Message

A string that describes the message. For subscription confirmation, this string looks like this:

```
You have chosen to subscribe to the topic arn:aws:sns:us-east-1:123456789012:MyTopic.
\nTo confirm the subscription, visit the SubscribeURL included in this message.
```

## MessageId

A Universally Unique Identifier, unique for each message published. For a message that Amazon SNS resends during a retry, the message ID of the original message is used.

## Signature

Base64-encoded "SHA1withRSA" signature of the Message, MessageId, Type, Timestamp, and TopicArn values.

## SignatureVersion

Version of the Amazon SNS signature used.

## SigningCertURL

The URL to the certificate that was used to sign the message.

## SubscribeURL

The URL that you must visit in order to confirm the subscription. Alternatively, you can instead use the `Token` with the [ConfirmSubscription](#) action to confirm the subscription.

## Timestamp

The time (GMT) when the subscription confirmation was sent.

## Token

A value you can use with the [ConfirmSubscription](#) action to confirm the subscription. Alternatively, you can simply visit the `SubscribeURL`.

## TopicArn

The Amazon Resource Name (ARN) for the topic that this endpoint is subscribed to.

## Type

The type of message. For a subscription confirmation, the type is `SubscriptionConfirmation`.

The following HTTP POST message is an example of a `SubscriptionConfirmation` message to an HTTP endpoint.

```
POST / HTTP/1.1
```

```
x-amz-sns-message-type: SubscriptionConfirmation
x-amz-sns-message-id: 165545c9-2a5c-472c-8df2-7ff2be2b3b1b
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
Content-Length: 1336
Content-Type: text/plain; charset=UTF-8
Host: myhost.example.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "SubscriptionConfirmation",
 "MessageId" : "165545c9-2a5c-472c-8df2-7ff2be2b3b1b",
 "Token" :
 "2336412f37fb687f5d51e6e241d09c805a5a57b30d712f794cc5f6a988666d92768dd60a747ba6f3beb71854e285d6ad02428",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Message" : "You have chosen to subscribe to the topic arn:aws:sns:us-
west-2:123456789012:MyTopic.\nTo confirm the subscription, visit the SubscribeURL included
in this message.",
 "SubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=ConfirmSubscription&TopicArn=arn:aws:sns:us-
west-2:123456789012:MyTopic&Token=2336412f37fb687f5d51e6e241d09c805a5a57b30d712f794cc5f6a988666d92768dd60a747ba6f3beb71854e285d6ad02428",
 "Timestamp" : "2012-04-26T20:45:04.751Z",
 "SignatureVersion" : "1",
 "Signature" : "EXAMPLEpH
+DcEwjAPg809mY8dReBSwksfg2S7WKQcikcNKWLQjwu6A4VbeS0QHVCkhRS7fUQvi2egU3N858fiTDN6bkkOxYDVrY0Ad8L10Hs3zH8",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem"
}
```

You can download the following JSON file to view the definition of the JSON format for a subscription confirmation: <https://sns.us-west-2.amazonaws.com/doc/2010-03-31/SubscriptionConfirmation.json>.

# HTTP/HTTPS Notification JSON Format

When Amazon SNS sends a notification to a subscribed HTTP or HTTPS endpoint, the POST message sent to the endpoint has a message body that contains a JSON document with the following name/value pairs.

## Message

The Message value specified when the notification was published to the topic.

## MessageId

A Universally Unique Identifier, unique for each message published. For a notification that Amazon SNS resends during a retry, the message ID of the original message is used.

## Signature

Base64-encoded "SHA1withRSA" signature of the Message, MessageId, Subject (if present), Type, Timestamp, and TopicArn values.

## SignatureVersion

Version of the Amazon SNS signature used.

## SigningCertURL

The URL to the certificate that was used to sign the message.

## Subject

The Subject parameter specified when the notification was published to the topic. Note that this is an optional parameter. If no Subject was specified, then this name/value pair does not appear in this JSON document.

## Timestamp

The time (GMT) when the notification was published.

## TopicArn

The Amazon Resource Name (ARN) for the topic that this message was published to.

## Type

The type of message. For a notification, the type is `Notification`.

## UnsubscribeURL

A URL that you can use to unsubscribe the endpoint from this topic. If you visit this URL, Amazon SNS unsubscribes the endpoint and stops sending notifications to this endpoint.

The following HTTP POST message is an example of a Notification message to an HTTP endpoint.

```
POST / HTTP/1.1
x-amz-sns-message-type: Notification
x-amz-sns-message-id: 22b80b92-fdea-4c2c-8f9d-bdfb0c7bf324
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
x-amz-sns-subscription-arn: arn:aws:sns:us-west-2:123456789012:MyTopic:c9135db0-26c4-47ec-8998-413945fb5a96
Content-Length: 773
Content-Type: text/plain; charset=UTF-8
Host: myhost.example.com
```

```
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "Notification",
 "MessageId" : "22b80b92-fdea-4c2c-8f9d-bdfb0c7bf324",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Subject" : "My First Message",
 "Message" : "Hello world!",
 "Timestamp" : "2012-05-02T00:54:06.655Z",
 "SignatureVersion" : "1",
 "Signature" :
 "EXAMPLEw6JRNwm1LFQL4ICB0bnXrdB8ClRMTQFGBqWlpGbM78tJ4etTwC5zU7O3tS6tGpey3eJedNdOJ
+1fkIp9F2/LmNVKb5aFlYq+9rk9ZiPph5YlLmWsDcyC5T+Sy9/
umic5S0UQc2PEtgdPVBahwN0dMW4JPwk0kAJJztnc=",
 "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/SimpleNotificationService-
f3ecfb7224c7233fe7bb5f59f96de52f.pem",
 "UnsubscribeURL" : "https://sns.us-west-2.amazonaws.com/?
Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-
west-2:123456789012:MyTopic:c9135db0-26c4-47ec-8998-413945fb5a96"
}
```

You can download the following JSON file to view the definition of the JSON format for a notification:  
<https://sns.us-west-2.amazonaws.com/doc/2010-03-31/Notification.json>.

## HTTP/HTTPS Unsubscribe Confirmation JSON Format

After an HTTP/HTTPS endpoint is unsubscribed from a topic, Amazon SNS sends an unsubscribe confirmation message to the endpoint.

The unsubscribe confirmation message is a POST message with a message body that contains a JSON document with the following name/value pairs.

### Message

A string that describes the message. For unsubscribe confirmation, this string looks like this:

```
You have chosen to deactivate subscription arn:aws:sns:us-
east-1:123456789012:MyTopic:2bcfbf39-05c3-41de-beaa-fcfc21c8f55.\nTo cancel this
operation and restore the subscription, visit the SubscribeURL included in this
message.
```

### MessageId

A Universally Unique Identifier, unique for each message published. For a message that Amazon SNS resends during a retry, the message ID of the original message is used.

### Signature

Base64-encoded "SHA1withRSA" signature of the Message, MessageId, Type, Timestamp, and TopicArn values.

### SignatureVersion

Version of the Amazon SNS signature used.

### SigningCertURL

The URL to the certificate that was used to sign the message.

### SubscribeURL

The URL that you must visit in order to re-confirm the subscription. Alternatively, you can instead use the Token with the [ConfirmSubscription](#) action to re-confirm the subscription.

### Timestamp

The time (GMT) when the unsubscribe confirmation was sent.

### Token

A value you can use with the [ConfirmSubscription](#) action to re-confirm the subscription. Alternatively, you can simply visit the SubscribeURL.

### TopicArn

The Amazon Resource Name (ARN) for the topic that this endpoint has been unsubscribed from.

### Type

The type of message. For a unsubscribe confirmation, the type is UnsubscribeConfirmation.

The following HTTP POST message is an example of a UnsubscribeConfirmation message to an HTTP endpoint.

```
POST / HTTP/1.1
x-amz-sns-message-type: UnsubscribeConfirmation
x-amz-sns-message-id: 47138184-6831-46b8-8f7c-afc488602d7d
x-amz-sns-topic-arn: arn:aws:sns:us-west-2:123456789012:MyTopic
x-amz-sns-subscription-arn: arn:aws:sns:us-west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-beaa-fcfc21c8f55
Content-Length: 1399
Content-Type: text/plain; charset=UTF-8
Host: myhost.example.com
Connection: Keep-Alive
User-Agent: Amazon Simple Notification Service Agent

{
 "Type" : "UnsubscribeConfirmation",
 "MessageId" : "47138184-6831-46b8-8f7c-afc488602d7d",
 "Token" :
 "2336412f37fb687f5d51e6e241d09c805a5a57b30d712f7948a98bac386edfe3e10314e873973b3e0a3c09119b722dedf2b5e",
 "TopicArn" : "arn:aws:sns:us-west-2:123456789012:MyTopic",
 "Message" : "You have chosen to deactivate subscription arn:aws:sns:us-west-2:123456789012:MyTopic:2bcfbf39-05c3-41de-beaa-fcfc21c8f55.\nTo cancel this operation and restore the subscription, visit the SubscribeURL included in this message.",
 "SubscribeURL" : "https://sns.us-west-2.amazonaws.com/?Action=ConfirmSubscription&TopicArn=arn:aws:sns:us-west-2:123456789012:MyTopic&Token=2336412f37fb687f5d51e6e241d09c805a5a57b30d712f7948a98bac386edfe3e10314e873973b3e0a3c09119b722dedf2b5e",
 "Timestamp" : "2012-04-26T20:06:41.581Z",
 "SignatureVersion" : "1",
 "Signature" : "EXAMPLEHXgJmXqnqSHTlqOck7TIZsnk8zpJJQbr8leD+8kAHcke3ClC4VPovdpZo9s/vR9GOznKab6sjGxE8uwqDI9HwpDm8lGxSlFGuwCruWeecnt7MdJCNh0XK4XQCbtGoXB762ePJfaSWi9tYwzW65zAFU04WkNBkNsIf6Cf3ecfb7224c7233fe7bb5f59f96de52f.pem"
}
```

You can download the following JSON file to view the definition of the JSON format for an unsubscribe confirmation: <https://sns.us-west-2.amazonaws.com/doc/2010-03-31/UnsubscribeConfirmation.json>.

## SetSubscriptionAttributes Delivery Policy JSON Format

If you send a request to the `SetSubscriptionAttributes` action and set the `AttributeName` parameter to a value of `DeliveryPolicy`, the value of the `AttributeValue` parameter must be a valid JSON object. For example, the following example sets the delivery policy to 5 total retries.

```
http://sns.us-east-1.amazonaws.com/
?Action=SetSubscriptionAttributes
&SubscriptionArn=arn%3Aaws%3Asns%3Aus-east-1%3A123456789012%3AMy-Topic
%3A80289ba6-0fd4-4079-afb4-ce8c8260f0ca
&AttributeName=DeliveryPolicy
&AttributeValue={"healthyRetryPolicy":{"numRetries":5}}
...
```

Use the following JSON format for the value of the `AttributeValue` parameter.

```
{
 "healthyRetryPolicy" : {
 "minDelayTarget" : <int>,
 "maxDelayTarget" : <int>,
 "numRetries" : <int>,
 "numMaxDelayRetries" : <int>,
 "backoffFunction" : "<linear|arithmetic|geometric|exponential>"
 },
 "throttlePolicy" : {
 "maxReceivesPerSecond" : <int>
 }
}
```

For more information about the `SetSubscriptionAttribute` action, go to [SetSubscriptionAttributes](#) in the *Amazon Simple Notification Service API Reference*.

## SetTopicAttributes Delivery Policy JSON Format

If you send a request to the `SetTopicAttributes` action and set the `AttributeName` parameter to a value of `DeliveryPolicy`, the value of the `AttributeValue` parameter must be a valid JSON object. For example, the following example sets the delivery policy to 5 total retries.

```
http://sns.us-east-1.amazonaws.com/
?Action=SetTopicAttributes
&TopicArn=arn%3Aaws%3Asns%3Aus-east-1%3A123456789012%3AMy-Topic
&AttributeName=DeliveryPolicy
&AttributeValue={"http":{"defaultHealthyRetryPolicy":{"numRetries":5}}}
...
```

Use the following JSON format for the value of the `AttributeValue` parameter.

```
{
 "http" : {
 "defaultHealthyRetryPolicy" : {
 "minDelayTarget": <int>,

```

```
"maxDelayTarget": <int>,
"numRetries": <int>,
"numMaxDelayRetries": <int>,
"backoffFunction": "<linear/arithmetic/geometric/exponential>"
},
"disableSubscriptionOverrides" : <boolean>,
"defaultThrottlePolicy" : {
 "maxReceivesPerSecond" : <int>
}
}
```

For more information about the SetTopicAttribute action, go to [SetTopicAttributes](#) in the *Amazon Simple Notification Service API Reference*.

# Appendix: Large Payload and Raw Message Delivery

With Amazon SNS and Amazon SQS, you now have the ability to send large payload messages that are up to 256KB (262,144 bytes) in size. To send large payloads (messages between 64KB and 256KB), you must use an AWS SDK that supports AWS Signature Version 4 (SigV4) signing. To verify whether SigV4 is supported for an AWS SDK, check the SDK release notes.

In addition to sending large payloads, with Amazon SNS you can now enable raw message delivery for messages delivered to either Amazon SQS endpoints or HTTP/S endpoints. This eliminates the need for the endpoints to process JSON formatting, which is created for the Amazon SNS metadata when raw message delivery is not selected. For example when enabling raw message delivery for an Amazon SQS endpoint, the Amazon SNS metadata is not included and the published message is delivered to the subscribed Amazon SQS endpoint as is. When enabling raw message delivery for HTTP/S endpoints, the messages will contain an additional HTTP header `x-amz-sns-rawdelivery` with a value of `true` to indicate that the message is being published raw instead of with JSON formatting. This enables those endpoints to understand what is being delivered and enables easier transition for subscriptions from JSON to raw delivery.

To enable raw message delivery using one of the AWS SDKs, you must use the `SetSubscriptionAttribute` action and configure the `RawMessageDelivery` attribute with a value of `true`. The default value is `false`.

## Enabling Raw Message Delivery with the AWS Management Console

You can enable raw message delivery using the AWS Management Console by setting the **Raw Message Delivery** subscription attribute to a value of `true`.

### To enable raw message delivery with the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. Select a topic that is subscribed to either an Amazon SQS endpoint or an HTTP/S endpoint and then click the topic ARN.

The **Topic Details** page appears.

3. Select the **Subscription ID** and then click the **Other subscription actions** drop-down box.
4. Click **Edit subscription attributes**, select **Raw Message Delivery**, and then click **Set subscription attributes**.



**Edit Subscription Attributes**

**Raw Message Delivery** ☒

[Cancel](#) [Set Subscription Attributes](#)

# Document History

The following table describes the important changes to the documentation since the last release of the *Amazon SNS Developer Guide*.

- **API version:** 2010-03-31
- **Latest documentation update:** March 12, 2018

Change	Description	Date Changed
New operations for subscription filter policies	In addition to exact matching with string values, filter policies support the following operations for matching message attributes: anything-but matching, prefix matching, exact numeric matching, and numeric range matching. For more information, see <a href="#">Filtering Messages (p. 178)</a> .	March 12, 2018
Subscription filter policies	Subscribers can selectively receive messages published to Amazon SNS topics by applying filter policies to topic subscriptions. For more information, see <a href="#">Filtering Messages (p. 178)</a> .	November 21, 2017
Applying message attributes	<a href="#">Applying Message Attributes (p. 175)</a> includes steps and examples for applying message attributes by using the Amazon SNS console, AWS CLI, and the AWS SDK for Java.	November 21, 2017
CloudWatch metric for SMS spend	Amazon SNS sends the <code>SMSMonthToDateSpentUSD</code> metric to CloudWatch. This metric shows the charges you have accrued since the start of the current calendar month for sending SMS messages. For more information, see <a href="#">Amazon SNS Metrics (p. 189)</a> .	March 31, 2017
Dedicated short codes for SMS	To send SMS messages using a persistent short code, you can reserve a dedicated short code that is assigned to your account and available exclusively to you. For more information, see <a href="#">Reserving a Dedicated Short Code for SMS Messaging (p. 134)</a> .	March 06, 2017
Amazon SNS supports worldwide SMS	Amazon SNS now supports SMS messaging to more than 200 countries and regions. You can send a message directly to a phone number, or you can send a message to multiple phone numbers at once by subscribing those phone numbers to a topic and sending your message to the topic. For more information, see <a href="#">Sending SMS Messages with Amazon SNS (p. 117)</a> .	June 28, 2016
Platform endpoints and device tokens	Added a topic about how to create a platform endpoint and manage device tokens for Amazon SNS mobile push notification. For more information, see <a href="#">Create a Platform Endpoint and Manage Device Tokens (p. 82)</a> .	September 23, 2015
Application event notifications	Added a topic about how to trigger notifications when certain application events occur. For more information, see <a href="#">Application Event Notifications (p. 91)</a> .	September 23, 2015

Change	Description	Date Changed
New support for VoIP and Mac OS X push notifications	Added new topics about sending push notification messages to VoIP and Mac OS X apps using Apple Push Notification Service. For more information, see <a href="#">Getting Started with Apple Push Notification Service (p. 44)</a> .	June 15, 2015
Invoking AWS Lambda functions	Added a topic on how to invoke Lambda functions using Amazon SNS notifications. For more information, see <a href="#">Invoking Lambda functions using Amazon SNS notifications (p. 169)</a> .	April 09, 2015
Using Amazon SNS topic attributes for message delivery status	Added a topic on using Amazon SNS topic attributes for message delivery status. For more information, see <a href="#">Using Amazon SNS Topic Attributes for Message Delivery Status (p. 170)</a> .	April 09, 2015
Support to log the delivery status of push notification messages	Added a topic on using Amazon SNS application attributes for message delivery status. For more information, see <a href="#">Using Amazon SNS Application Attributes for Message Delivery Status (p. 88)</a> .	February 05, 2015
Support for AWS CloudTrail with Amazon Simple Notification Service	Added a topic on logging Amazon SNS API calls by using CloudTrail. For more information, see <a href="#">Logging Amazon Simple Notification Service API Calls By Using AWS CloudTrail (p. 191)</a> .	October 09, 2014
Amazon SNS mobile push high-level steps	Added a topic about the high-level steps you must perform to use Amazon SNS mobile push. This information should help you gain a better understanding of the steps involved when using the Amazon SNS mobile push APIs. For more information, see <a href="#">Amazon SNS Mobile Push High-Level Steps (p. 39)</a> .	October 09, 2014
Support for authenticated messages with Microsoft Push Notification Service for Windows Phone	Updated a topic on how to send authenticated messages with MPNS. For more information, see <a href="#">Getting Started with MPNS (p. 71)</a> .	August 19, 2014
Support for setting a Time To Live (TTL) message attribute for mobile push notification messages	Added a topic on how to specify expiration metadata for a mobile push notification message. For more information, see <a href="#">Using the Amazon SNS Time To Live (TTL) Message Attribute for Mobile Push Notifications (p. 93)</a> .	July 10, 2014
Support for Baidu Cloud Push, Microsoft Push Notification Service for Windows Phone, and Windows Push Notification Services	Added topics on how to use Baidu, MPNS, and WNS, with Amazon SNS to send push notification messages to mobile devices. For more information, see <a href="#">Getting Started with Baidu Cloud Push (p. 50)</a> , <a href="#">Getting Started with MPNS (p. 71)</a> , and <a href="#">Getting Started with WNS (p. 74)</a> .	June 12, 2014

Change	Description	Date Changed
Message attributes	Message attributes allow you to provide structured metadata items about a message. For more information, see <a href="#">Using Amazon SNS Message Attributes (p. 173)</a> .	June 12, 2014
Amazon SNS samples in Java	Added a section about using the AWS SDK for Java with Amazon SNS. Examples in this section show how to create a new Amazon SNS client, set the Amazon SNS endpoint to use, and create a new topic. In addition, examples are provided on how to subscribe to, publish to, and delete a topic. For more information, see <a href="#">Using the AWS SDK for Java with Amazon SNS (p. 10)</a> .	April 23, 2014
Mobile push notifications	Added a topic about how to create and send custom platform-specific payloads in messages to mobile devices. For more information, see <a href="#">Send Custom Platform-Specific Payloads in Messages to Mobile Devices (p. 87)</a> .	December 17, 2013
Mobile push notifications	Added support to send notification messages directly to apps on mobile devices. For more information, see <a href="#">Amazon SNS Mobile Push Notifications (p. 37)</a> .	August 13, 2013
Initial Release	This is the first release of the <i>Amazon SNS Developer Guide</i> .	May 1, 2013