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# AWS IoT 1-Click

## Developer Guide



## **AWS IoT 1-Click: Developer Guide**

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## Table of Contents

What Is AWS IoT 1-Click? .....	1
AWS IoT 1-Click Components .....	1
How AWS IoT 1-Click Works .....	3
AWS IoT 1-Click Devices .....	3
Claiming Devices .....	3
Projects, Templates, and Placements .....	4
Getting Started with the AWS IoT 1-Click Console .....	6
Claiming Devices .....	6
Creating a Project .....	6
Example: Meeting Room Satisfaction Project .....	7
AWS IoT 1-Click Mobile App .....	9
AWS IoT 1-Click Programming Model .....	10
AWS IoT 1-Click Callback Events .....	11
AWS IoT 1-Click Click Events .....	11
AWS IoT 1-Click Health Events .....	12
Device Methods .....	12
Monitoring with CloudWatch Metrics .....	14
Logging AWS IoT 1-Click API Calls with AWS CloudTrail .....	15
AWS IoT 1-Click Information in CloudTrail .....	15
Example: AWS IoT 1-Click Log File Entries .....	16
AWS CloudFormation Integration .....	18
Authentication and Access control for AWS IoT 1-Click .....	19
AWS IoT 1-Click Resources and Operations .....	19
Using Identity-Based Policies (IAM Policies) for AWS IoT 1-Click .....	19
AWS Managed (Predefined) Policies for AWS IoT 1-Click .....	20
AWS IoT Enterprise Button User Guide .....	23
AWS IoT 1-Click Appendix .....	25
AWS IoT 1-Click Supported Devices .....	25
AWS IoT 1-Click Service Limits .....	26
Document History .....	27
AWS Glossary .....	28

# What Is AWS IoT 1-Click?

AWS IoT 1-Click makes it easy for enterprise customers to incorporate simple IoT devices into their workflows without having to manufacture devices, write firmware, or configure them for secure connectivity. Our manufacturing partners create devices that can securely connect to AWS IoT right out of the box. These devices can trigger [AWS Lambda](#) functions that are written in languages like Java, Python, and C#. The Lambda functions can implement business logic on their own or trigger actions in the AWS Cloud or on-premises.

AWS IoT 1-Click aims to simplify the Internet of Things for customers by abstracting as much detail related to the device hardware and firmware as possible. This makes it possible to view AWS IoT 1-Click devices as software components hosted in the AWS Cloud. As with any other software component, these devices conform to well-defined interfaces. AWS IoT 1-Click has interfaces defined per device type. You can use these interfaces to build and base your applications on.

With AWS IoT 1-Click, you can group devices by function, location, or other criteria. This logical grouping of devices is called a *“project”* in AWS IoT 1-Click. You can use projects to associate groups of devices with Lambda functions for desired actions.

Projects contain templates that specify what type of devices are used, what Lambda functions they invoke, and what optional attributes, such as contextual data for location or function, are defined for these devices.

Once the project is created and templates defined, you can add placements within the project - each of which follows the template and specifies actual devices by their serial numbers and attribute values (key/value pairs) that make sense to the specific location or function for that particular placement.

## AWS IoT 1-Click Components

### **Claim**

Refers to the process of associating an AWS IoT 1-Click device with an AWS account using the AWS IoT 1-Click console, AWS IoT 1-Click mobile app, or the AWS IoT 1-Click API.

### **Claim code**

A value used to claim a number of AT&T LTE-M buttons at once (that is, in bulk). You can also use device IDs to claim devices. See the **Device ID** entry.

### **Device**

A physical device, such as the AWS IoT Enterprise Button or the AT&T LTE-M Button.

### **Device attributes**

Either default or custom data associated with a particular device in the form of key-value pairs. Default attributes are derived from the placement. See the **placement** entry.

### **Device ID**

All devices have a device ID, such as a device serial number (DSN). A device ID can be used to register an AWS IoT 1-Click device with AWS IoT 1-Click. A claim code is not the same as a device ID. See the **Claim code** entry.

### **Placement**

A group of one or more templates representing devices (for example, a room containing two templated buttons). To populate a placement, you use the AWS IoT 1-Click console or the AWS IoT 1-Click mobile app to choose templated devices.

**Placement name**

The name of the placement, which often includes a geographic location or object ID (for example, Room 217, North Dumpster, or Container 314).

**Project**

A named group of zero or more placements (containing templated devices).

**Project name**

A descriptive name for a group of placements (for example, "Meeting Room Satisfaction" or "Charter Container Pickup").

**Template**

Used to provide default behavior and default attributes for a group of devices. A physical device uses a particular template to inherit the properties of that template: its Lambda function and default device attributes. A template defines the behavior and default attributes for a class of device(s) in a placement. A project can have more than one template.

**Unclaim**

The process of disassociating an AWS IoT 1-Click device from an AWS account. For example, a person who wants to lend an AWS IoT 1-Click device should first disassociate the device from the AWS account so that the new user can associate the device with their own AWS account.

# How AWS IoT 1-Click Works

Here is the AWS IoT 1-Click workflow:

1. Choose from a set of supported devices.
2. Associate AWS Lambda functions with devices to trigger actions. You can use one of your own Lambda functions or one of the predefined functions provided by the service.
3. Physically deploy your devices and use the AWS IoT 1-Click console, AWS IoT 1-Click mobile app, or AWS IoT 1-Click API to enable them.
4. Get information about device status and usage by using ready-made AWS IoT 1-Click reports or building your own.

## AWS IoT 1-Click Devices

AWS IoT 1-Click-supported devices:

- Are ready-made. Customers do not need to design or manufacture them.
- Can be added to AWS IoT 1-Click accounts by using the [claim feature \(p. 6\)](#).
- Are pre-provisioned with certificates at the point of manufacture and configured to connect securely to AWS IoT. You don't need to spend time installing certificates for AWS IoT 1-Click devices.
- Each AWS IoT 1-Click device *type* emits events in a standard format defined by AWS IoT 1-Click. For example, all AWS IoT 1-Click devices of the `button` type have the same event format, regardless of the manufacturer.
- Have a device type and a product type. The device type indicates the format of events emitted by the device and the device methods it supports. For more information, see [AWS IoT 1-Click Programming Model \(p. 10\)](#). The product type provides manufacturer and the branding details. For example, if the device type is `button`, the product type might be AT&T LTE-M Button.

### Important

AWS IoT 1-Click-supported devices are configured in the factory to connect to a particular [AWS Region](#). These are called *device regions*. This association of a device to a *device region* is required to ensure that devices connect securely to AWS IoT without additional user input. For this reason, the device region cannot be changed.

Events emitted by AWS IoT 1-Click devices are always routed through the pre-configured device region, so you can access device-related Amazon CloudWatch Logs and AWS CloudTrail metrics in this same AWS Region. The device region is also where enabled devices are billed.

Placement, template, and project data is stored in the AWS Region associated with your account. This region can be different from the device region.

For information about AWS IoT 1-Click supported devices, including how to purchase and [claim \(p. 3\)](#) them, see [AWS IoT 1-Click Appendix \(p. 25\)](#).

## Claiming Devices

When AWS IoT 1-Click devices leave the factory, they are not associated with an AWS customer account. Customers must go through a claim process to use the devices in their accounts. There are two ways to claim devices:

- **Using a claim code:** If you receive a claim code (in the format C-~~xxxxxx~~) from your point of purchase, you can enter it into the AWS IoT 1-Click console or the AWS IoT 1-Click mobile app to claim devices pertaining to a single order. Not all devices, including the AWS IoT Enterprise Button, can be claimed using a claim code.
- **Using a device ID:** You can use the device ID (the device serial number, also known as the DSN) to claim devices through the AWS IoT 1-Click console or the AWS IoT 1-Click mobile app. All AWS IoT 1-Click devices can be claimed using a device ID.

For more information about how to claim devices, see [AWS IoT 1-Click Appendix \(p. 25\)](#) and [Claiming Devices \(p. 6\)](#).

## Projects, Templates, and Placements

Devices can be organized by function, location, or by any other criteria. This logical grouping of devices is called a project. You can use projects to associate groups of devices with Lambda functions.

Projects contain templates that specify which type of devices are used, which Lambda functions they invoke, and attribute names to hold contextual data like location or function.

Once the project is created and templates defined, you can add placements in the project. Placements follow the template and specify devices by their serial numbers and attribute values that make sense to the specific location or function of that placement.

The following examples illustrate the use of projects and placements.

Example 1:

In the `SalesPersonNotification` project, 10 customers receive a button they can press to contact a salesperson. There are 10 placements, one for each customer. Each placement has values for `CustomerName` (for example, Mr. Jones), `SalesPersonPhoneNumber` (for example, 1-555-555-1234), and button serial number (for example, G030PM12345678). The device template, `NotificationButton`, is contained in the placement. The `CustomerName` and `SalesPersonPhoneNumber` attributes are defined for each placement. When a customer clicks the button, AWS IoT 1-Click invokes `SendSMSLambda` with the `CustomerName` and `SalesPersonPhoneNumber` values associated with that button. The SMS is sent based on those values.

- **Placement template:**
  - Since each customer gets one button to notify a sales person, one device template named `NotificationButton` is created.
  - The device template (contained in the placement) specifies that the `NotificationButton`, when clicked, will call the `SendSMSLambda` Lambda function.
  - Attributes called `CustomerName` and `SalesPersonPhoneNumber` are defined for each placement.
- **Placements:** 10 placements are created, one per customer. Each placement has specific values for `CustomerName` (e.g., "Mr. Jones"), `SalesPersonPhoneNumber` (e.g., 1-555-555-1234) and button serial number (e.g., G030PM12345678).
- **Operation:** When a customer clicks his button, AWS IoT 1-Click invokes `SendSMSLambda` with the `CustomerName` and `SalesPersonPhoneNumber` values associated with that particular button - and an SMS is sent based on those values.

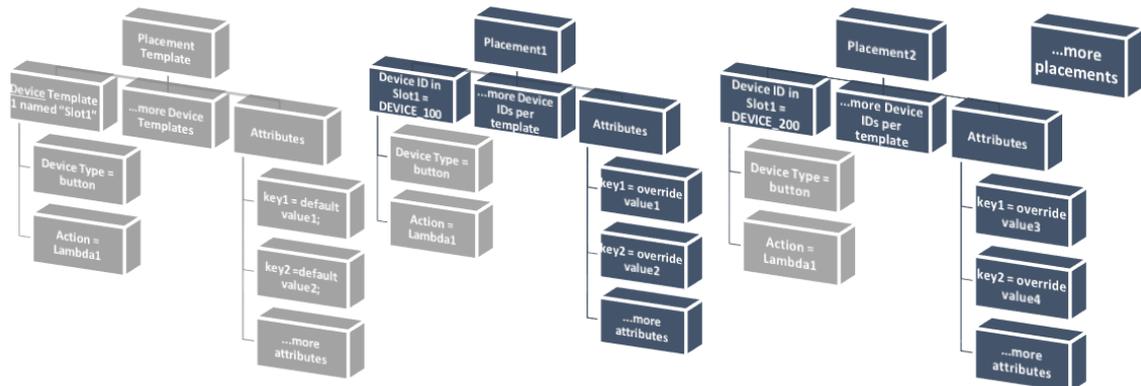
Example 2:

In the `MeetingRoomFeedback` project, user satisfaction is tracked through the pressing of Thumbs Up and Thumbs Down buttons in each of 50 conference rooms. There are two device templates, `ThumbsUp` and `ThumbsDown`. When the Thumbs Up button is clicked, the `PositiveFeedbackLambda` function

is called. When the Thumbs Down button is clicked, the `NegativeFeedbackLambda` is called. A `MeetingRoomNumber` attribute is defined to hold the room number for each placement. 50 device placements are created, one per conference room. Each placement contains the `MeetingRoomNumber` key set to a room number (for example, 1001) and two buttons, as identified by their unique serial numbers (for example, G030PM12345678 and G030PM23456789). When a button is clicked in a meeting room, AWS IoT 1-Click invokes the `PositiveFeedbackLambda` function or `NegativeFeedbackLambda` function with the `MeetingRoomNumber` value. Feedback can then be processed and tabulated.

- **Project name:** `MeetingRoomFeedback`
- **Placement template:**
  - Since each room gets two buttons, two device templates are created, respectively named `ThumbsUp` and `ThumbsDown`.
  - The device templates specify that `ThumbsUp` buttons will call `PositiveFeedbackLambda` when clicked, and that `ThumbsDown` buttons will call `NegativeFeedbackLambda` when clicked.
  - An attribute called `MeetingRoomNumber` is defined to hold the room number for each placement.
- **Placements:** 50 device placements are created, one placement per room. Each placement contains the `MeetingRoomNumber` key set to a particular room number pair (e.g., 1001) and two buttons as identified by their unique serial numbers (e.g., G030PM12345678 and G030PM23456789).
- **Operation:** When a button is clicked in a meeting room, AWS IoT 1-Click invokes the `PositiveFeedbackLambda` function or `NegativeFeedbackLambda` function with the `MeetingRoomNumber` value – and feedback can be processed and tabulated.

The following diagram shows these concepts:



For more information, see [Getting Started with the AWS IoT 1-Click Console \(p. 6\)](#).

# Getting Started with the AWS IoT 1-Click Console

The following topics describe how to do common AWS IoT 1-Click tasks.

## Topics

- [Claiming Devices \(p. 6\)](#)
- [Creating a Project \(p. 6\)](#)

## Claiming Devices

The following procedure shows you how to claim one or more AWS IoT 1-Click supported devices.

1. Sign in to your AWS account. If you do not have an AWS account, open <https://aws.amazon.com/>, choose **Create an AWS Account**, and follow the online instructions.
2. From the AWS Management Console, search for "1-Click," and then choose AWS IoT 1-Click.
3. If you're using one or more AWS IoT Enterprise Buttons, install the AWS IoT 1-Click mobile app for iOS or Android and connect the buttons to your local Wi-Fi network. The AWS IoT 1-Click mobile app is available from the **Onboard** page of the AWS IoT 1-Click console. This step is not required for the LTE-M Button because it uses the cellular network.
4. Choose **Onboard**, and then choose **Claim devices**.
5. Enter one or more [device IDs \(p. 1\)](#) (such as a device serial number) or [claim codes \(p. 1\)](#), separated by commas, and then choose **Claim**. If the **Claim** button is unavailable, double-check all the values you entered.
6. Press the button(s) on your device(s), and then choose **Done**. A list of all known devices should be displayed.

## Creating a Project

The following procedure shows you how to create an AWS IoT 1-Click project for your AWS IoT 1-Click supported device(s).

1. Sign in to your AWS account and open the AWS IoT 1-Click console.
2. Choose **Onboard**, and then choose **Create a project**.
3. Type a name and optional description for the project, and then choose **Next**.
4. To define one or more templates for your placement, under **Program a device template**, choose **Start**.
5. To define a template for any button device, choose **All button types**.
6. For **Device template name**, type a descriptive name for your template. Under **Action**, choose **Send SMS** or **Send email**. You can use the **Custom action using a Lambda function** option and choose one of your own Lambda functions. Enter the phone number, email address, or Lambda function name, depending on your choice. For more information about creating Lambda functions, see the [AWS Lambda Developer Guide](#).
7. Under **Add another device template (if you need multiple devices per placement)** choose **Add**.

8. Enter an attribute key-value pair. You can enter additional key-value pairs, if necessary.
9. Choose **Create project**.

The following section, [Example: Meeting Room Satisfaction Project \(p. 7\)](#), provides a real-world example of how to use the AWS IoT 1-Click console to create a project.

## Example: Meeting Room Satisfaction Project

The following example might help you understand AWS IoT 1-Click concepts.

- A project to track the satisfaction of 50 meeting rooms (and associated AV equipment) is created and named `MeetingRoomSat`.
- Each meeting room will receive two devices (buttons), one physically marked "Satisfied" and the other marked "Unsatisfied". Since there are two buttons per room, two templates are created, one named `Satisfied` and the other named `Unsatisfied`.
- The `Satisfied` template is configured to invoke a Lambda function called `SatLambda`.
- The `Unsatisfied` template is configured to invoke a Lambda function called `UnsatLambda`.
- For both of these templates, an attribute (key/value pair) named `MeetingRoomNum` (key) is created whose value is `TBD` (the `TBD` value will be changed to the room number when both buttons are physically placed in a room).
- 50 placements are created, one for each room. Each placement has the two templates associated with it (i.e., `Satisfied` and `Unsatisfied`).
- Two buttons are physical labeled and placed in a room. Then, using the AWS IoT 1-Click mobile app or the AWS IoT 1-Click console and the button's serial numbers, the "Satisfied" and "Unsatisfied" marked buttons are associated with one of the 50 placements. This process continues until all remaining placements are deployed.
- When a room button is clicked in a meeting room, AWS IoT 1-Click invokes either the `SatLambda` or `UnsatLambda` function with the `MeetingRoomNum` value – and feedback can be processed and stored in the cloud.
- Later, another template can be added to the project so that the 50 existing placements now contain a slot for a new button to indicate that more towels or other toiletries are needed in each bathroom.

The following provides an example of using the AWS IoT 1-Click console to create a project for monitoring meeting room satisfaction in an office building (as part of a group of office buildings).

To monitor the satisfaction of meeting rooms, including their audio/video equipment, two AWS IoT Enterprise buttons, one labeled "Satisfied" and the other labeled "Unsatisfied", are placed in each meeting room. This is a pilot project, the results of which can be used to improve meeting room customer satisfaction in other buildings on campus.

At the end of a meeting, participants are encouraged to press either the "Satisfied" or "Unsatisfied" button to record their overall satisfaction with the meeting room and its equipment. This data is then used to identify meeting rooms with non-functional A/V equipment or other problems.

The AWS IoT 1-Click console can be used to set up this project:

1. From the AWS IoT 1-Click console, choose **Create a project**.
2. For the project name, type `MeetingRoomSatisfaction`. For the project description, type `Project used to track customer meeting room satisfaction, including A/V equipment`. Choose **Next**.
3. Under **Program a device template** choose **Start**, and then choose **All button types**.
4. For **Device template name**, type `Satisfied`. This is the template used for all buttons labeled "Satisfied." For **Action**, choose **Send email**.

**Note**

If the meeting room satisfaction pilot is successful, under **Action**, you might choose **Custom action using a Lambda function**. This custom Lambda function could send an email or store the "Satisfied" button data in an Amazon DynamoDB table for later analysis.

For information about creating Lambda functions, see the [AWS Lambda Developer Guide](#).

5. Under **Add another device template (if you need multiple devices per placement)** choose **Add**, and then choose **All button types**. For **Device template name**, type **Unsatisfied**. This is the template used for all buttons labeled "Unsatisfied." For **Action**, choose **Send email**.
6. For **Required email default value**, type an email address. For **Required subject default value**, type **Meeting Room Feedback**. For **Required body default value**, type **Either positive or negative meeting room feedback has been provided**.
7. For **Attribute key**, type **Building**. For **Default value**, type **Headquarters**. The meeting room satisfaction pilot is taking place in the company's headquarters building. If the pilot is successful, it will be deployed to the company's other buildings. Therefore, it's important to know from which building the meeting room devices are providing information for.
8. In the second key-value pair row, for **Attribute key**, type **Room**. For **Default value**, type **TBD**. The **TBD** value will be changed to a meeting room number when the buttons are placed there (using either the AWS IoT 1-Click mobile app or AWS IoT 1-Click console).
9. Choose **Create project**.

Using the AWS IoT 1-Click mobile app, when a "Satisfied" button is placed in a meeting room, the **Satisfied** template becomes associated with it and the **TBD** value is replaced with the meeting room number. The same is true for when the "Unsatisfied" button is placed in a meeting room.

# AWS IoT 1-Click Mobile App

The AWS IoT 1-Click mobile app lets you:

- Conveniently configure and monitor AWS IoT 1-Click devices in the field using a user interface similar to the AWS IoT 1-Click console.
- Configure Wi-Fi credentials for Wi-Fi-connected AWS IoT 1-Click devices (such as the AWS IoT Enterprise Button).

The AWS IoT 1-Click mobile app is available for iPhone and Android mobile devices. To download the app, go to the [App Store](#) or [Google Play](#), and search for AWS IoT 1-Click.

# AWS IoT 1-Click Programming Model

To build applications using AWS IoT 1-Click devices, programmers use the [AWS IoT 1-Click Devices API](#) and the [AWS IoT 1-Click Projects API](#). The Devices API interacts with the AWS IoT 1-Click devices component and handles events coming from devices. These events include enabling and disabling the devices and defining event formats and the actions (Lambda functions) that they trigger. The Devices API is tightly coupled with the AWS components that reside in the region where the manufacturer registered the devices. This is why [AWS device regions \(p. 3\)](#) might be different from the region where the customer is using the devices. The Projects API interacts with the AWS IoT 1-Click Projects service and is used to manage AWS IoT 1-Click devices in aggregate, which makes it possible to:

- Group devices into projects.
- Create templates used to set actions for all devices in the project.
- Define attributes storing contextual data pertinent to the project.

You can use the AWS IoT 1-Click programming model to program individual devices by using the Devices API. In this case, you will use the AWS IoT 1-Click device type. The API defines standard event formats and a list of methods that form the programming interface for all devices of that type. To invoke methods pertaining to a given device type, a programmer can use the [InvokeDeviceMethod API](#) and specify the device method as a parameter.

For example, all AWS IoT 1-Click devices that have the device type "button" emit events associated with clicks and have methods to set callback functions that are invoked when the device is clicked. For information about the button interface, see [Interfaces by Device Type \(p. 3\)](#). Here is the code to set this callback function:

```
String methodParameters = mapper.writeValueAsString(
    SetOnClickCallbackRequestParameters.builder()
        .deviceId(deviceId)
        .callback(DeviceCallback.builder()
            .awsLambdaArn("arn:aws:lambda:us-
west-2:123456789012:MyButtonListener")
            .build())
        .build());
InvokeDeviceMethodRequest request = new InvokeDeviceMethodRequest()
    .withDeviceMethod(new DeviceMethod()
        .withDeviceType("button")
        .withMethodName("setOnClickCallback"))
    .withDeviceMethodParameters(methodParameters);
```

You use the Projects API to program a fleet of devices. Using the APIs, you first define what each placement looks like, including device templates and attributes for each placement. After that is done, you create placements with specific device IDs. Each placement follows the same template. Here is the sample code to do this:

```
final Map<String, String> callbacks = new HashMap<>();
callbacks.put("onClickCallback", "arn:aws:lambda:us-west-2:123456789012:MyButtonListener");
final DeviceTemplate item = DeviceTemplate.builder()
    .withDeviceType("button")
    .withCallbackOverrides(callbacks)
```

```
        .build();
final Map<String, DeviceTemplate> deviceTemplateMap = new HashMap<>();
deviceTemplateMap.put("MyDevice", item);

final Map<String, String> placementDefaultAttributes = new HashMap<>();
placementDefaultAttributes.put("location", "Seattle")

request = CreateProjectRequest.builder()
    .withProjectName("HelloWorld")
    .withDescription("My first project!")
    .withPlacementTemplate(PlacementTemplate.builder()
        .withDefaultAttributes(placementDefaultAttributes)
        .withDeviceTemplates(deviceTemplateMap)
        .build())
    .build();
projectsClient.createProject(request)
```

## AWS IoT 1-Click Callback Events

AWS IoT 1-Click allows you to subscribe to device events by registering callbacks. An example of a callback is an AWS Lambda function owned and implemented by you, the AWS IoT 1-Click customer. This callback is invoked every time there is an event available for it to consume. For information about events and their payloads, see the [AWS IoT 1-Click Click Events \(p. 11\)](#) and [AWS IoT 1-Click Health Events \(p. 12\)](#) sections.

### AWS IoT 1-Click Click Events

Devices of type `button` publish a click event each time they are clicked. You can subscribe to this event by:

- Calling the device `SetOnClickCallback` method on a device.
- Configuring the associated project appropriately, as shown in the earlier create project code example.

In the following example, be aware that the `placementInfo` section is only present when the device has an associated placement. For more information, see [Projects, Templates, and Placements \(p. 4\)](#).

```
{
  "deviceEvent": {
    "buttonClicked": {
      "clickType": "SINGLE",
      "reportedTime": "2018-05-04T23:26:33.747Z"
    }
  },
  "deviceInfo": {
    "attributes": {
      "key3": "value3",
      "key1": "value1",
      "key4": "value4"
    },
    "type": "button",
    "deviceId": " G030PMXXXXXXXXXX ",
    "remainingLife": 5.00
  },
  "placementInfo": {
    "projectName": "test",
    "placementName": "myPlacement",
    "attributes": {
```

```

    "location": "Seattle",
    "equipment": "printer"
  },
  "devices": {
    "myButton": " G030PMXXXXXXXXXX "
  }
}

```

## AWS IoT 1-Click Health Events

Devices publish a health event based on the health parameters calculated by the AWS IoT 1-Click service, but you set their corresponding thresholds. The following example represents the JSON payload of a health event for device G030PMXXXXXXXXXX with a remaining life of 10% (note "remainingLifeLowerThan": 10 key-value pair).

```

{
  "deviceEvent": {
    "deviceHealthMonitor": {
      "condition": {
        "remainingLifeLowerThan": 10
      }
    }
  },
  "deviceInfo": {
    "attributes": {
      "key2": "value2",
      "key1": "value1",
      "projectRegion": "us-west-2"
    },
    "type": "button",
    "deviceId": "G030PMXXXXXXXXXX",
    "remainingLife": 5.4
  }
}

```

## Device Methods

AWS IoT 1-Click device methods are APIs that are supported by devices of a certain device-type, as demonstrated in the following table. The full list of device methods supported by any device can be retrieved by calling [GetDeviceMethods](#).

Device Type	Method Name	Description
device	getDeviceHealthParameters	Gets the device's health parameters, such as remainingLife.
device	setDeviceHealthMonitorCallback	Sets a callback to be called when the device health parameters are below a threshold.
device	getDeviceHealthMonitorCallback	Gets the configured callback which is called when the health parameters are below a threshold.

Device Type	Method Name	Description
button	setOnClickListenerCallback	Sets a callback to be called when the button has been clicked.
button	setOnClickListenerCallback	Gets the configured callback which is called when the button is clicked.

# Monitoring AWS IoT 1-Click with Amazon CloudWatch

AWS IoT 1-Click automatically monitors devices on your behalf and reports metrics through [Amazon CloudWatch](#). These metrics are reported in the device region where the devices were registered by the manufacturer. For more information about device regions, see [How AWS IoT 1-Click Works \(p. 3\)](#). You can find the metrics in the Amazon CloudWatch dashboard under the **IoT1Click** namespace.

Amazon CloudWatch Events enables you to automate your AWS services and respond automatically to system events, such as application availability issues or resource changes. Events from AWS services are delivered to CloudWatch Events in near real time. You can write simple rules to indicate which events are of interest to you and which automated actions to take when an event matches a rule. The following actions that can be triggered:

- Invoking an AWS Lambda function.
- Invoking Amazon EC2 Run Command.
- Relaying the event to Amazon Kinesis Data Streams.
- Activating an AWS Step Functions state machine.
- Notifying an Amazon SNS topic or an AWS SMS queue.

AWS IoT 1-Click tracks and reports the following metrics:

- **TotalEvents** tracks the number of events published by devices. This metric can be viewed and graphed by device event, project, device type, or product type.
- **RemainingLife** represents the approximate percentage of life remaining for a device. AWS IoT 1-Click reports this number based on the manufacturer's rating of the device. For example, if a button is designed to last for approximately 2000 clicks, and 500 clicks have been recorded, the **RemainingLife** value is reported as 75%. The **RemainingLife** metric can be viewed and graphed by project, device type, or product type. Customers can use the **RemainingLife** metric to set up alarms that are triggered when devices fall below a certain threshold. Customers can then query the **RemainingLife** of devices by using the `GetDeviceHealthParameters` method to identify devices that have low **RemainingLife** values.
- **CallbackInvocationErrors** tracks failures in invoking the callbacks (Lambda functions) when the device emits an event. The **CallbackInvocationErrors** metric can be viewed and graphed by invoked callback (Lambda function ARNs set as callbacks) or by project. Customers can set up alarms for the **CallbackInvocationErrors** metric to be notified when AWS IoT 1-Click was unable to route events from their devices to their configured Lambda functions.

For more information, see the [Amazon CloudWatch Events User Guide](#).

# Logging AWS IoT 1-Click API Calls with AWS CloudTrail

AWS IoT 1-Click is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in AWS IoT 1-Click. CloudTrail captures API calls for AWS IoT 1-Click as events. The calls captured include calls from the AWS IoT 1-Click console and code calls to the AWS IoT 1-Click API operations. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for AWS IoT 1-Click. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to AWS IoT 1-Click, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

## AWS IoT 1-Click Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When supported event activity occurs in AWS IoT 1-Click, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see [Viewing Events with CloudTrail Event History](#).

For an ongoing record of events in your AWS account, including events for AWS IoT 1-Click, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all AWS Regions. The trail logs events from all Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- [Overview for Creating a Trail](#)
- [CloudTrail Supported Services and Integrations](#)
- [Configuring Amazon SNS Notifications for CloudTrail](#)
- [Receiving CloudTrail Log Files from Multiple Regions](#) and [Receiving CloudTrail Log Files from Multiple Accounts](#)

The AWS IoT 1-Click [Devices API](#) supports logging the following actions as events in CloudTrail log files:

- [ListDevices](#)
- [DescribeDevice](#)
- [GetDeviceMethods](#)
- [UpdateDeviceState](#)
- [InvokeDeviceMethod](#)

The AWS IoT 1-Click [Projects API](#) supports logging the following actions as events in CloudTrail log files:

- [CreateProject](#)
- [UpdateProject](#)

- [DescribeProject](#)
- [ListProjects](#)
- [DeleteProject](#)
- [CreatePlacement](#)
- [UpdatePlacement](#)
- [DescribePlacement](#)
- [ListPlacements](#)
- [DeletePlacement](#)
- [AssociateDeviceWithPlacement](#)
- [DisassociateDeviceFromPlacement](#)
- [GetDevicesInPlacement](#)

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the [CloudTrail userIdentity Element](#).

## Example: AWS IoT 1-Click Log File Entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the `DescribeDevice` action.

```
{
  "eventVersion": "1.05",
  "userIdentity": {
    "type": "IAMUser",
    "principalId": "EX_PRINCIPAL_ID",
    "arn": "arn:aws:iam::012345678910:user/Alice",
    "accountId": "012345678910",
    "accessKeyId": "EXAMPLE_KEY_ID",
    "userName": "Alice"
  },
  "eventTime": "2018-04-12T18:57:27Z",
  "eventSource": "iot1click.amazonaws.com",
  "eventName": "DescribeDevice",
  "awsRegion": "us-west-2",
  "sourceIPAddress": "127.0.0.1",
  "userAgent": "console.aws.amazon.com",
  "requestParameters": {
    "deviceId": "G030PM12345678"
  },
  "responseElements": null,
  "requestID": "573c5654-3e83-11e8-9eac-c999bd01134e",
  "eventID": "be323b62-082a-4352-929d-085d2a3249b0",
}
```

```
"readOnly": true,  
"eventType": "AwsApiCall",  
"recipientAccountId": "012345678910"  
}
```

The following example shows a CloudTrail log entry that demonstrates the CreateProject action.

```
{  
  "eventVersion": "1.05",  
  "userIdentity": {  
    "type": "IAMUser",  
    "principalId": "EX_PRINCIPAL_ID",  
    "arn": "arn:aws:iam::012345678910:user/Alice",  
    "accountId": "012345678910",  
    "accessKeyId": "EXAMPLE_KEY_ID",  
    "userName": "Alice"  
  },  
  "eventTime": "2018-04-12T20:31:02Z",  
  "eventSource": "iot1click.amazonaws.com",  
  "eventName": "CreateProject",  
  "awsRegion": "us-west-2",  
  "sourceIPAddress": "127.0.0.1",  
  "userAgent": "console.aws.amazon.com",  
  "requestParameters": {  
    "description": "",  
    "placementTemplate": {  
      "defaultAttributes": "****",  
      "deviceTemplates": {  
        "happyId": {  
          "deviceType": "button",  
          "callbackOverrides": {  
            "onClickCallback": "arn:aws:lambda:us-  
west-2:012345678910:function:rating_buttons_happy"  
          }  
        },  
        "sadId": {  
          "deviceType": "button",  
          "callbackOverrides": {  
            "onClickCallback": "arn:aws:lambda:us-  
west-2:012345678910:function:rating_buttons_sad"  
          }  
        }  
      }  
    }  
  }  
}
```

# AWS CloudFormation Integration

AWS IoT 1-Click is integrated with AWS CloudFormation, a common language for you to describe and provision all your infrastructure resources in a cloud environment (i.e., Amazon EC2, Auto Scaling, Amazon SNS, etc.) AWS CloudFormation allows you to use a simple text file to model and provision, in an automated and secure manner, all the resources needed for your applications across all regions and accounts. This file serves as the single source of truth for your cloud environment. For more information, see the [AWS CloudFormation User Guide](#) as well as the AWS IoT 1-Click topics (such as [AWS::IoT1Click::Project](#)) in the *AWS CloudFormation User Guide*.

# Authentication and Access control for AWS IoT 1-Click

Access to AWS IoT 1-Click APIs requires credentials. Those credentials must have permissions to access AWS resources, such as an AWS IoT 1-Click project or device. The following sections provide details on how you can use AWS Identity and Access Management (IAM) and AWS IoT 1-Click to help secure access to your resources.

Every AWS resource is owned by an AWS account, and permissions to create or access a resource are governed by permissions policies. An account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles), and some services (such as AWS Lambda) also support attaching permissions policies to resources. When granting permissions, the administrator decides who is getting the permissions, the resources they get permissions for, and the specific actions that they want to allow on those resources.

## AWS IoT 1-Click Resources and Operations

In AWS IoT 1-Click, the primary resources are projects and devices. In a policy, you use an Amazon Resource Name (ARN) to identify the resource that the policy applies to. These resources have unique Amazon Resource Names (ARNs) associated with them, as shown in the following table.

Resource Type	ARN Format
Device	arn:aws:iot1click:region:account-id:devices/device-id
Project	arn:aws:iot1click:region:account-id:projects/project-name

AWS IoT 1-Click implements APIs to work with AWS IoT 1-Click resources. These are referred to as Actions in IAM. For a list of available operations, see the table at the end of this topic.

## Using Identity-Based Policies (IAM Policies) for AWS IoT 1-Click

This topic provides examples of identity-based policies that demonstrate how an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles) and thereby grant permissions to perform operations on AWS IoT 1-Click resources.

The following shows an example of a permissions policy.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
```

```
    "Effect": "Allow",
    "Action": [
      "iot1click:CreateProject"
    ],
    "Resource": "*"
  }
]
```

The policy has one statement - which grants permissions for one AWS IoT 1-Click action (`iot1click:CreateProject`) on a resource using the Amazon Resource Name (ARN) for the application. The ARN in this case specifies a wildcard character (\*) to indicate that the permission is granted for any resource.

For a table showing all of the AWS IoT 1-Click API operations and the resources that they apply to, see [AWS IoT 1-Click API Permissions: Actions, Permissions, and Resources Reference](#) (p. 20).

## AWS Managed (Predefined) Policies for AWS IoT 1-Click

Amazon Web Services addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. These AWS managed policies grant necessary permissions for common use cases so that you can avoid having to investigate what permissions are needed. For more information, see [AWS Managed Policies](#) in the *IAM User Guide*.

The following AWS managed policies, which you can attach to users in your account, are specific to AWS IoT 1-Click and are grouped by use case scenario:

- `AWSIoT1ClickFullAccess`: Grants full access to AWS IoT 1-Click resources by using the AWS Management Console. The granted permissions include all AWS IoT 1-Click actions to manage devices and projects.
- `AWSIoT1ClickReadOnlyAccess`: Grants read-only access to AWS IoT 1-Click resources by using the AWS Management Console. This access enables a user to list AWS IoT 1-Click devices and projects, and to review project configuration.

### Note

You can review these permission policies by signing in to the IAM Console (<https://console.aws.amazon.com/iam/>) and searching for the specific policy name(s) there.

You can also create your own custom IAM policies to allow permissions for AWS IoT 1-Click actions and resources. You can attach these custom policies to the IAM users or groups that require those permissions.

## AWS IoT 1-Click API Permissions: Actions, Permissions, and Resources Reference

When you are setting up Access Control in the AWS Cloud and writing a permissions policy that you can attach to an IAM identity (identity-based policies), you can use the following table as a reference. The table lists each AWS IoT 1-Click API operation, the corresponding actions for which you can grant permissions to perform the action, and the AWS resource for which you can grant the permissions. You specify the actions in the policy's `Action` field, and you specify the resource value in the policy's `Resource` field.

You can use AWS-wide condition keys in your AWS IoT 1-Click policies to express conditions. For a complete list of AWS-wide keys, see [Available Keys](#) in the *IAM User Guide*.

**Note**

To specify an action, use the `iot1click:` prefix followed by the API operation name (for example, `iot1click:ListProjects`).

IoT 1-Click Operations	Required Permissions (API Actions)	Resources
ListDevices	iot1click:ListDevices	*
DescribeDevice	iot1click:DescribeDevice	arn:aws:iot1click:region:account-id:devices/device-id
GetDeviceMethods	iot1click:GetDeviceMethods	arn:aws:iot1click:region:account-id:devices/device-id
UpdateDeviceState	iot1click:UpdateDeviceState	arn:aws:iot1click:region:account-id:devices/device-id
InvokeDeviceMethod	iot1click:InvokeDeviceMethod	arn:aws:iot1click:region:account-id:devices/device-id
ListDeviceEvents	iot1click:ListDeviceEvents	arn:aws:iot1click:region:account-id:devices/device-id
InitializeDeviceClaim	iot1click:InitializeDeviceClaim	arn:aws:iot1click:region:account-id:devices/device-id
FinalizeDeviceClaim	iot1click:FinalizeDeviceClaim	arn:aws:iot1click:region:account-id:devices/device-id
UnclaimDevice	iot1click:UnclaimDevice	arn:aws:iot1click:region:account-id:devices/device-id
ClaimDeviceByClaimCode	iot1click:ClaimDeviceByClaimCode	*
CreateProject	iot1click>CreateProject	arn:aws:iot1click:region:account-id:projects/project-name
UpdateProject	iot1click:UpdateProject	arn:aws:iot1click:region:account-id:projects/project-name
DescribeProject	iot1click:DescribeProject	arn:aws:iot1click:region:account-id:projects/project-name
ListProjects	iot1click:ListProjects	*
DeleteProject	iot1click>DeleteProject	arn:aws:iot1click:region:account-id:projects/project-name
CreatePlacement	iot1click>CreatePlacement	arn:aws:iot1click:region:account-id:projects/project-name
UpdatePlacement	iot1click:UpdatePlacement	arn:aws:iot1click:region:account-id:projects/project-name
DescribePlacement	iot1click:DescribePlacement	arn:aws:iot1click:region:account-id:projects/project-name
ListPlacements	iot1click:ListPlacements	arn:aws:iot1click:region:account-id:projects/project-name

<b>IoT 1-Click Operations</b>	<b>Required Permissions (API Actions)</b>	<b>Resources</b>
DeletePlacement	iot1click:DeletePlacement	arn:aws:iot1click:region:account-id:projects/project-name
AssociateDeviceWithPlacement	iot1click:AssociateDeviceWithPlacement	arn:aws:iot1click:region:account-id:projects/project-name
DissociateDeviceFromPlacement	iot1click:DissociateDeviceFromPlacement	arn:aws:iot1click:region:account-id:projects/project-name
GetDevicesInPlacement	iot1click:GetDevicesInPlacement	arn:aws:iot1click:region:account-id:projects/project-name

# AWS IoT Enterprise Button User Guide

The AWS IoT Enterprise Button is a simple and easy to configure Wi-Fi-based button. It is designed for enterprises and developers to easily integrate with existing business workflows and systems using the AWS IoT 1-Click service.

The AWS IoT Enterprise Button supports three types of clicks:

- Single
- Double
- Long press

To function correctly, you must configure the button's Wi-Fi connection using the AWS IoT 1-Click mobile app (iOS or Android). After the connection is configured and claimed through the mobile app or console, the button should be flashing solid green when a single, double, or long press click occurs.

If you suspect there is an issue with the button after completing the button configuration, use the information in this table to help you troubleshoot:

Color	Status	Recommendation
Blinking white	Connecting to Wi-Fi, obtaining IP address, or connecting to AWS IoT.	N/A
Solid green	Successfully connected to Wi-Fi and published a message to AWS IoT.	N/A
Blinking blue	Button is in configuration mode.	Wait for process to complete.
Solid orange	Wi-Fi not configured.	Configure Wi-Fi using the AWS IoT 1-Click mobile app.
Red: short, short, short	There was an error connecting to the configured wireless network.	Check if any network settings have changed or if the button is too far away from the Wi-Fi router.
Red: short, short, long	There was an error obtaining an IP address from the wireless network.	Check for wireless network issues.
Red: short, long, short	There was an error performing a host name lookup.	Check for wireless network issues.
Red: short, long, long	Cannot connect to AWS IoT.	Check for wireless network issues. If no network issues exist and the problem persists, contact <a href="#">AWS Support Center</a> and provide the device serial number

Color	Status	Recommendation
		(DSN). You'll find it on the back of the button.
Red: long, short, short	Cannot establish a secure connection with the server.	Check your certificate in case it's invalid or try to upload a new certificate, and then test again.
Red: long, short, long	Received an HTTP 403 forbidden error.	Contact the <a href="#">AWS Support Center</a> and provide the DSN. You'll find it on the back of the button.

# AWS IoT 1-Click Appendix

This section provides additional AWS IoT 1-Click information as indicated by the following.

## AWS IoT 1-Click Supported Devices

Product	Device type	Device ID prefix	To claim device	Purchase link	Device region <sup>†</sup>
AWS IoT Enterprise Button	Button	G030PM (the first 6 digits of the device serial number)	<ol style="list-style-type: none"><li>1. Use the device serial number.</li><li>2. Use the AWS IoT 1-Click mobile app to configure Wi-Fi.</li><li>3. Use the AWS IoT 1-Click mobile app or the AWS IoT 1-Click console to claim the device.</li></ol>	<a href="https://www.amazon.com">Amazon.com</a>	US West (Oregon)
AT&T LTE-M Button (US only)	Button	B9GHXT (the first 6 digits of the device ID)	<ol style="list-style-type: none"><li>1. Use the claim code associated with the device(s).</li><li>2. Use the AWS IoT 1-Click mobile app or the AWS IoT 1-Click console to claim the device(s).</li></ol>	<a href="https://www.att.com/iot">AT&amp;T IoT Marketplace</a>	US West (Oregon)

<sup>†</sup>For information about device regions, see [AWS IoT 1-Click Devices \(p. 3\)](#).

**Note**

AWS IoT 1-Click does not support AWS IoT buttons whose device serial numbers (DSN) begin with G030JF, G030MD, and G030PT. To learn how to connect these buttons to the AWS IoT cloud (without using AWS IoT 1-Click), see [Cloud Programmable Dash Button](#).

## AWS IoT 1-Click Service Limits

- You can have a maximum of 5 device templates per placement template. This corresponds to 5 devices per placement.
- There is a maximum of 512 AWS IoT 1-Click projects per [AWS Region](#) per account.

# Document History for Developer Guide

The following table describes the documentation for this release of AWS IoT 1-Click.

- **API version: latest**
- **Latest documentation update:** May 31, 2018

Change	Description	Date
Release	Initial release of the documentation.	May 14, 2018
Editorial	Editorial improvements.	May 31, 2018

# AWS Glossary

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