



Getting Started with Kerlink WAL-e and AWS IoT Core for LoRaWAN

Getting Started Guide

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1.0	Initial version
1.1	Based on AWS Template
1.2	Typo corrections, add references

Reference	Description
[1]	https://wikikerlink.fr/wirnet-productline/doku.php?id=wiki:lora:aws
[2]	E-DMK-Quick Start - WAL-e

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This guide will walk you through the unboxing, connection, and installation of Kerlink WAL-e LoRaWAN sensor to be used with AWS IoT Core for LoRaWAN.

The WAL-e (Wide Area Location equipment) is designed as a demonstration end-device.

1 Unboxing

The package contains the following elements:

- Kerlink WAL-e product, including casing and batteries
- A quick-start guide [2]. It is recommended to read the quick start guide to get the benefit of the full functionality of the product.
- LoRaWAN credentials label



Figure 1: Kerlink WAL-e hardware

1.1 Start-up

When enabling the product, by activating or replacing the battery, the WAL-e will start with a LoRaWAN Over-The-Air Activation (OTAA) procedure. It is necessary to be under the coverage of a working LoRaWAN network and that the end-device is declared on that network. This guide helps you declare your device on AWS IoT Core for LoRaWAN.

2 Add your WAL-e to AWS IoT Core for LoRaWAN

To register your device on AWS IoT Core for LoRaWAN, you need an AWS account with access to AWS IoT Core for LoRaWAN service and the device's LoRaWAN credentials you received with the product.

First, follow the "Getting Started with Kerlink Gateways and AWS IoT Core for LoRaWAN" [1] tutorial to setup your gateway. It is the required step before being able to register a device.

2.1 WAL-e credentials and device profile

This section describes the LoRaWAN device characteristics of Kerlink WAL-e. These characteristics are required in the next sections to configure your device in AWS IoT Core for LoRaWAN.

WAL-e LoRaWAN credentials are provided on a printed sticker inside the box. The following figure depicts the credentials sticker.

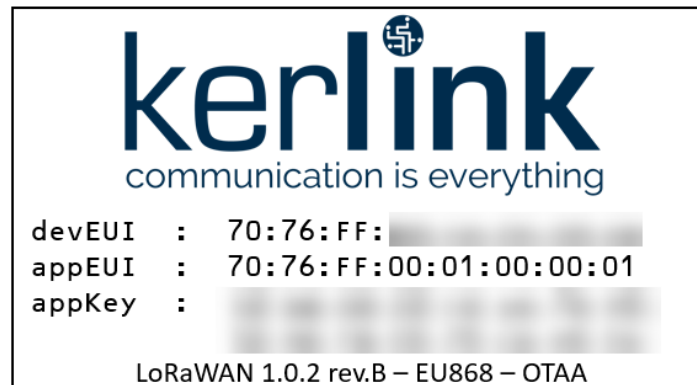


Figure 2: WAL- example credential sticker

WAL-e device profile has the following parameters:

- Supports Class A (no Class B nor Class C support)
- LoRaWAN MAC version: 1.0.2
- LoRaWAN Regional Parameters version: 1.0.2 revision B
- Supports Join (OTAA)
- Maximum EIRP: 0dBm
- Maximum Duty Cycle: 1% for EU868 devices, 100% for US915 devices.
- RF Region: depending on your order, EU868 or US915.

2.2 AWS IoT Core for LoRaWAN Get Started

Note: The following section has been provided by AWS. Please contact AWS support for additional information.

To connect your device to AWS IoT Core for LoRaWAN, follow these steps.

2.2.1 Preparation

Locate and note the following specifications about your endpoint device.

- LoRaWAN region. This must match the gateway LoRaWAN region. The following Frequency bands (RF regions) are supported:
 - EU868
 - US915
 - EU433
- MAC Version. This must be one of the following:

- V1.0.2
- v1.0.3
- v1.1
- OTAA v1.0x and OTAA v1.1 are supported.
- ABP v1.0x and ABP v1.1 are supported.

Locate and note the following information from your device manufacturer:

- For OTAA v1.0x devices: DevEUI, AppKey, AppEUI
- For OTAA v1.1 devices: DevEUI, AppKey, NwkKey, JoinEUI
- For ABP v1.0x devices: DevEUI, DevAddr, NwkSkey, AppSkey
- For ABP v1.1 devices: DevEUI, DevAddr, NwkSkey, FNwkSIntKey, SNwkSIntKey, AppSkey

2.2.2 Register the Device

Now register an endpoint device with AWS IoT Core for LoRaWAN as follows:

- Go to the [AWS IoT Core console](#).
- Select **Wireless connectivity** in the navigation panel on the left.
- Select **Devices**
- Choose **Add wireless device**
- On the **Add device** page, select the LoRaWAN specification version (OTAA v1.0x) in the drop-down under **Wireless device specification**.
- Under **LoRaWAN specification and wireless device configuration**, enter the **DevEUI** and confirm it in the **Confirm DevEUI** field.
- Enter the remaining fields as per the OTAA/ABP choice you made above.
- Enter a name for your device in the **Wireless device name – optional** field.
- In the **Profiles** section, under **Wireless device profile**, find a drop-down option that corresponds to your device and region.
 - NOTE: Compare your device details to ensure the device profile is correct. If there are no valid default options, you will have to create a new profile (see the section [Verify Profiles](#)).
- Choose **Next**
- Choose the destination you created earlier (*ProcessLoRa*) from the drop-down under **Choose destination**.
- Choose **Add device**
- You will see a message saying “*Wireless device added*”, indicating that your device has been set up successfully.

2.2.3 Verify Profiles

AWS IoT Core for LoRaWAN supports device profiles and service profiles. Device profiles contain the communication and protocol parameter values the device needs to communicate with the network server. Service profiles describe the communication parameters the device needs to communicate with the application server.

Some pre-defined profiles are available for device and service profiles. Before proceeding, verify that these profile settings match the devices you will be setting up to work with AWS IoT Core for LoRaWAN.

- Navigate to the [AWS IoT Core console](#). In the navigation pane, choose **Wireless connectivity**.
- In the navigation pane, choose **Profiles**
- In the **Device Profiles** section, there are some pre-defined profiles listed.
- Check each of the profiles to determine if one of them will work for you.
- If not, select **Add device profile** and set up the parameters as needed. For US 915 WAL-e as an example, the values are:
 - MacVersion 1.0.2
 - RegParamsRevision Regional Parameters v1.0.2B
 - MaxEirp 0
 - MaxDutyCycle 100
 - RfRegion US915
 - SupportsJoin true
- Continue once you have a device profile that will work for you.
- In the **Service Profiles** section, there are some pre-defined profiles listed. Check each of the profiles to determine if one of them will work for you.
- If not, select **Add service profile** and set up the parameters as needed. As an example, the Default service profile parameters are shown below. However, only the AddGwMetadata setting can be changed at this time.
 - UIRate 60
 - UIBucketSize 4096
 - DIRate 60
 - DIBucketSize 4096
 - AddGwMetadata true
 - DevStatusReqFreq 24
 - DrMax15
 - TargetPer 5
 - MinGwDiversity 1

Proceed only if you have a device and service profile that will work for you.

2.2.4 Set up a Destination for device traffic

Because most LoRaWAN devices don't send data to AWS IoT Core for LoRaWAN in a format that can be consumed by AWS services, traffic must first be sent to a Destination. A Destination represents the AWS IoT rule that processes a device's data for use by AWS services. This AWS IoT rule contains the SQL statement that selects the device's data and the topic rule actions that send the result of the SQL statement to the services that will use it.

For more information on Destinations, refer to the AWS [LoRaWAN developer guide](#).

A destination consists of a Rule and a Role. To set up the destination:

- Navigate to the [AWS IoT Core console](#). In the navigation pane, choose **Wireless connectivity**, and then **Destinations**
- Choose **Add Destination**
- On the **Add destination** page, in the **Permissions** section select the IAM role you had created earlier, from the drop-down.
- Under **Destination details** enter *ProcessLoRa* as the **Destination name**, and an appropriate description under **Destination description – optional**.
- For **Rule name** enter *LoRaWANRouting*. Ignore the section **Rules configuration – Optional** for now. The Rule will be set up later in the sample application – see Create the IoT Rule for the destination
- Choose **Add Destination**. You will see a message “*Destination added*”, indicating the destination has been successfully added.

2.2.5 Create the Destination rule

In this step, you create the IoT rule that forwards the device payload to your application. This rule is associated with the destination created earlier in [Set up a Destination for device traffic](#).

- Navigate to the [AWS IoT Core console](#).
- In the navigation pane, choose **Act**. Then, choose **Rules**.
- On the Rules page, choose **Create**.
- On the **Create a rule** page, for **Name**, enter *LoRaWANRouting*. For **Description**, enter a description of your choice. Note the name of your rule. The information will be needed when you provision devices to run on AWS IoT Core for LoRaWAN.
- Leave the default Rule query statement: ‘SELECT * FROM 'iot/topic' unchanged.
- Under **Set one or more actions** choose Add action.
- On the Select an action page, choose **Republish a message to an AWS IoT topic**. Scroll down and choose **Configure action**.
- On the Configure action page, for **Topic**, enter *uplinks/wale*. The AWS IoT Rules Engine will forward messages to this topic.
- Under **Choose or create a role to grant AWS IoT access to perform this action**, choose **Create Role**.
- For **Name**, enter a name of your choice.
- Choose **Create role** to complete the role creation. You will see a “Policy Attached” tag next to the role name, indicating that the Rules Engine has been given permission to execute the action.
- Choose **Add action**.
- Then, choose **Create rule**.
- A “Success” message will be displayed at the top of the panel, and the destination has a rule bound to it.

You can now check that the decoded data is received and republished by AWS by triggering a condition or event on the device itself.

1. Go to the AWS IoT console. In the navigation pane, select **Test**, and choose **MQTT client**.
2. Subscribe to the wildcard topic **#** to receive messages from all topics
3. You should see traffic similar to that shown below.

```
a84041000181bfbe/project/sensor/decodedNovember 11, 2020, 18:15:14 (UTC-0800) Export Hide  
{  
  "Ext_sensor": "Temperature Sensor",  
  "BatteryV": 3.049,  
  "Alert_Temp": "76.39",  
  "Humidity": "41.5",  
  "Probe_Temp": "327.67",  
  "DevEUI": "a84041000181bfbe",  
  "Timestamp": "2020-11-12T02:15:14Z"  
}
```

Congratulations! Your device is now registered on AWS IoT Core for LoRaWAN and is able to publish its data on AWS IoT Core. You can now create a sample application to decode and take benefits from your Kerlink WAL-e.

Refer to “Getting Started with Kerlink WAL-e Amazon Web Services” in [1].

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