# **Kerlink** communication is everything

Getting Started with Kerlink Gateways and AWS IoT Core for LoRaWAN

**Getting Started Guide** 



## Getting Started with Kerlink Gateways and AWS IoT Core for LoRaWAN

|           | Redaction  | Validation | Approbation |
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| Signature |            |            |             |

| Version | Edits  |
|---------|--|
| 1.0     | Initial version  |
| 1.1     | Add AWS IoT Core for LoRaWAN missing screens and update credential section |
| 1.2     | Update after AWS review  |
| 1.3     | Update based on AWS template   |
| 1.4     | Typo corrections   |
| 1.5     | Update AWS information from template                                       |

| Reference | Description   |
|-----------|---|
| [1]       | https://wikikerlink.fr/wirnet-productline/doku.php?id=wiki:lora:aws |
|           |   |



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This guide will walk you through the unboxing, connection, and installation of Kerlink Wirnet iFemtocell Gateway to be used with AWS IoT Core for LoRaWAN.

When you order a Kerlink Wirnet iFemtocell Gateway with AWS IoT Core for LoRaWAN support, it comes preconfigured.

#### 1 Unboxing

The package contains the following elements:

- Kerlink iFemtocell gateway
- LoRa Antenna (862-873MHz, 902-928MHZ, 3dBi, 50Ω; vertical polarization)
- AC/DC Power supply (Input 110-240V, output 12V, 0.5A jack connector) (EU or US plug depending on the reference ordered)

#### 1.1 Cabling

First, connect the LoRa Antenna to the SMA connector on the Wirnet iFemtocell.

Then, plug an Ethernet cable to the Wirnet iFemtocell and to your network. The Wirnet iFemtocell will establish 2 connections to the Internet through your network: one to AWS, and one to Kerlink Wanesy Management Center.

Finally, connect the power jack to the Wirnet iFemtocell and plug the power supply to the wall socket.



Figure 1: Wirnet iFemtocell setup (EU version pictured)

#### **1.2 First boot**

The Wirnet iFemtocell will boot and eventually update its firmware to the latest version. Refer to the LEDs color to follow the bootstrap procedure.

To ensure the Wirnet<sup>™</sup> iFemtoCell is started up, check the behavior of the LED indicators:



| LED                 | Specification  |   |                                  |  |  |
|---------------------|--|---|----------------------------------|--|--|
| LED 1: Power/Status | A solid Green for Power LED                          | A solid Green for Power LED                         |                                  |  |  |
|                     | A Status Red LED                                     | A Status Red LED                                    |                                  |  |  |
|                     | Gateway Status                                       | "Status LED" Behavior                               |                                  |  |  |
|                     | Boot part 1  | Fix on  |                                  |  |  |
|                     | Boot part 2  | Heartbeat   | LED 1 LED 2 LED 3                |  |  |
|                     | Boot part 3  | Blink every second                                  |                                  |  |  |
|                     | Run time   | Off   | 000                              |  |  |
|                     | Power down sequence                                  | Heartbeat   |                                  |  |  |
|                     | Update   | Blink / 0.4 second                                  |                                  |  |  |
|                     | Restore backup                                       | Blink / 2 seconds                                   |                                  |  |  |
|                     | Restore stock  | Blink / 4 seconds                                   |                                  |  |  |
|                     |  |   |                                  |  |  |
| LED 2: Backhaul     | RED during boot                                      |   |                                  |  |  |
|                     | The applicative software pro                         | ovided by Kerlink is installed:                     | Dec.                             |  |  |
|                     | RED if applicative software                          | e is disconnected                                   | Ob/1                             |  |  |
|                     | <ul> <li>GREEN blinking during appression</li> </ul> | plicative software connection                       | korlink                          |  |  |
|                     | GREEN fix if applicative so                          | ftware is connected                                 | communication is everything      |  |  |
| LED 3: LoRa Data    | RED during boot                                      |   |                                  |  |  |
|                     | The applicative software pro                         |   |                                  |  |  |
|                     | Applicative software man                             | <ul> <li>Applicative software management</li> </ul> |                                  |  |  |
|                     | Rx: GREEN blinking                                   |   |                                  |  |  |
|                     | <ul> <li>Tx: RED blinking</li> </ul>                 |   | Figure 2: Wirnet iFemtocell LEDs |  |  |

Once LED 1 (Power/Status) and LED 2 (Backhaul) are solid green, your gateway is ready.

#### **2** Connect to Kerlink Wanesy Management Center

Once the gateway online, you can connect to Kerlink Wanesy Management Center. This is the central place to monitor, configure and remotely access your gateway.

#### 2.1 Log-in

Your sales contact will send you the credentials and URL to connect to WMC. Connect to the WMC instance and enter the username and password.





Figure 3: Wanesy Management Center login page

#### 2.2 Gateway overview

Once logged-in, go to "Management >> Gateway" menu. You will find your gateway on that page.

| ker <b>link</b>  | 10 <u>1</u> 0 go   |                       |            |         |                         |           | 台 Selection (0 gate | ways) 台 Selection (0 e | nd-devices) 🗘  | kerlink_demo |
|--|--------------------|-----------------------|------------|---------|-------------------------|-----------|---------------------|------------------------|----------------|--------------|
| communication is everything<br>Wanesy Management Center<br>3.2 | Select your fleet: | All fleets            |            |         |                         |           |                     |                        |                |              |
| 🗠 Management 🗸 🗸   | Filter             |                       |            |         |                         |           |                     |                        |                | >            |
| Fleets   | Gateways           |                       |            |         |                         |           |                     |                        |                | :            |
| Gateways   | Ċ, ^ EUI           | ≎ Fleet               | 0 Name     | © Brand | • Description           | Status    | Backhaul            | Door                   | GPS            |              |
| Clusters   | Ċ, 7276FF          | 0039040884 demo_fleet | iFemtocell | Kerlink | Wirnet iFemtoCell (868) | Connected | Ethernet            | Not applicable         | Not applicable |              |
| Multicast groups   | Rows per page: 10  |                       |            |         |                         |           |                     |                        | 1              | l - 1 of 1   |
| End-devices  |                    |                       |            |         |                         |           |                     |                        |                |              |
| КРІ  |                    |                       |            |         |                         |           |                     |                        |                |              |
| dig Workflows  |                    |                       |            |         |                         |           |                     |                        |                |              |
| Administration   |                    |                       |            |         |                         |           |                     |                        |                |              |
|  |                    |                       |            |         |                         |           |                     |                        |                |              |

Figure 4: Wanesy Management Center - Gateway management page

Select your gateway by clicking on its EUI. You will get the gateway overview with all the details you need. In case of multiple gateways, look for your gateway EUI using the "Filter" window. Enter in the EUI search field the last 6 digits of your Gateway's Board ID located on the label at the back of the Wirnet iFemtocell.



| orlink                         | 🛂 🧝 🥵   |
|--------------------------------|---|
| communication is everything    | Femboriel 77/14/7003/04484 Winet Femboriel (6d) Connected demonstration |
| Wanesy Management Center<br>32 | Overview Configurations Y KPI Data Y Remote access Y Spectrum Diagnostic Y  |
| Management Y                   | EUI 7276F70359040884  |
|                                | NAME iFentocell LAT. 48.152808*   |
| Fleets                         | FLEET demo_fleet  |
| Calousus                       | BRAND Kerlink Determine Determine ALT. 0 m  |
| Gateways                       | DESCRIPTION Winet IFemioCell (868)  |
| Clusters                       | REGION EU668  |
| to blanct ereame               | VSBULTY Public p Vienn 2 Vienni   |
| Multicast groups               | IP ADDRESS 10.8.2.192:10161   |
| End-devices                    | STATUS Connected (Ethernet)   |
|                                | DOOR Not applicable   |
| крі                            | GPS Not applicable  |
| Workflows >                    |   |
| Administration >               | rreduti a tew seconds ago Last atatifis Last events   |
|                                | CPU E 6% Date Name Value Date Name Value  |
| and the second second          | RAM 53 % No data 2020/10/27 15:29:00 HELLO 🗸  |
| and the state                  | System disk 42 % 2920/10/27 16.00.09 GPS LOCKED 🗸   |
|                                | User disk 1 % 2020/10/21 10.04.15 START 🗸   |
| 1                              | RSSI cellular 0 dBm 22020/10/08 15.19.42 DOOR CLOSED 🗸  |
|                                | Temperature         62.°C         2020/09/22 15:52:45         CONNECTION         TRUE         ✓   |
|                                | Uptime 6 days   |
|                                | Moderns :   |
| HI IN                          | Serial number Location Type Hard.version Soft.version Nb. antenna Central freq. Nb. front radiopath Nb. radiopath width Freq. min TX Freq. min T  |
| 1.30                           | 040884 1 TYPE_LORA_MONO 3904 4.3.3-5-g21/94bic_20200918162893 1 868 MHz 2 2 1.2 MHz 868 MHz 870 MHz 863 MHz 863 MHz   |
|                                | C 3   |

Figure 5: Wanesy Management Center - Gateway overview

Note or copy to your clipboard the **Gateway EUI** for the following registration on AWS.

You can use all the other menus to explore all the capabilities of your gateway and the associated service. This overview will be sufficient for the moment.

#### **3** Setup your AWS account and Permissions

*Note: The following sections (3.1, 3.2, 3.3) have been provided by AWS. Please contact AWS support for additional information.* 

If you don't have an AWS account, refer to the instructions in the guide <u>here</u>. The relevant sections are **Sign up for an AWS account** and **Create a user and grant permissions**.

#### 3.1 Overview

The high-level steps to get started with AWS IoT Core for LoRaWAN are as follows:

- 1. Set up Roles and Policies in IAM
- 2. Add a Gateway (see section Add the Gateway to AWS IoT)
- Add Device(s) (see "Getting Started with Kerlink WAL-e AWS IoT Core for LoRaWAN" in [1])

These steps are detailed below. For additional details, refer to the AWS <u>LoRaWAN developer</u> guide.

#### 3.2 Set up Roles and Policies in IAM

3.2.1 Add an IAM Role for CUPS server



Add an IAM role that will allow the Configuration and Update Server (CUPS) to handle the wireless gateway credentials.

This procedure needs to be done only once, but must be performed before a LoRaWAN gateway tries to connect with AWS IoT Core for LoRaWAN.

- Go to the <u>IAM Roles</u> page on the IAM console
- Choose Create role.
- On the Create Role page, choose Another AWS account.
- For Account ID, enter your account id.
- Choose Next: Permissions
- In the search box next to **Filter policies**, enter AWSIoTWirelessGatewayCertManager.
  - If the search results show the policy named AWSIoTWirelessGatewayCertManager, select it by clicking on the checkbox.
  - If the policy does not exist, please create it as follows:
    - Go to the <u>IAM console</u>
    - Choose **Policies** from the navigation pane.
    - Choose Create Policy. Then choose the JSON tab to open the policy editor. Replace the existing template with this trust policy document:



- Choose **Review Policy** to open the *Review* page.
- For Name, enter AWSIoTWirelessGatewayCertManager. Note that you must enter the name as AWSIoTWirelessGatewayCertManager and must not use a different name. This is for consistency with future releases.
- For **Description**, enter a description of your choice.
- Choose Create policy. You will see a confirmation message showing the policy has been created.
- Choose Next: Tags, and then choose Next: Review.



- In **Role name**, enter *IoTWirelessGatewayCertManagerRole*, and then choose **Create role**.
  - **Note** that you <u>must not</u> use a different name. This is for consistency with future releases.
- In the confirmation message, choose IoTWirelessGatewayCertManagerRole to edit the new role.
- In the **Summary**, choose the **Trust relationships** tab, and then choose **Edit trust** relationship.
- In the **Policy Document**, change the **Principal** property to represent the IoT Wireless service:



After you change the Principal property, the complete policy document should look like this:



• Choose **Update Trust Policy** to save your changes and exit.

At this point, you've created the *IoTWirelessGatewayCertManagerRole* and you won't need to do this again.

#### 3.2.2 Add IAM role for Destination to AWS IoT Core for LoRaWAN

Prepare your AWS account to work with AWS IoT Core for LoRaWAN. First, create an IAM role with permissions to describe the IoT end point and to deliver messages to IoT cloud. Then, update the trust policy to grant AWS IoT Core for LoRaWAN permission to assume this IAM role when delivering messages from devices to your account.

**NOTE** – The examples in this document are intended only for dev environments. All devices



in your fleet must have credentials with privileges that authorize only intended actions on specific resources. The specific permission policies can vary for your use case. Identify the permission policies that best meet your business and security requirements. For more information, refer to <u>Example policies</u> and Security Best practices.

- In the IAM console, choose **Roles** from the navigation pane to open the **Roles** page.
- Choose Create Role.
- In Select type of trusted entity, choose Another AWS account.
- In Account ID, enter your AWS account ID, and then choose Next: Permissions.
- Choose Next: Permissions
- Search for your IAM policy. Type in the policy name to find your policy. Select it.
- Choose Next: Tags.
- Choose **Next: Review** to open the Review page. For **Role name**, enter an appropriate name of your choice. For **Description**, enter a description of your choice.
- Choose Create role.

Create the corresponding policy

- Go to the <u>IAM console</u>
- Choose **Policies** from the navigation pane.
- Choose **Create Policy**. Then choose the **JSON** tab to open the policy editor. Replace the existing template with this trust policy document:

```
' "Version": "2012-10-17",
    "Statement": [
        {
        "Effect": "Allow",
        "Action":
    [
        "iot:DescribeEndpoint",
        "iot:Publish"
],
        "Resource": "*"
        }
    ]
}
```

- Choose **Review Policy** to open the Review page. For Name, enter a name of your choice. For **Description**, enter a description of your choice.
- Choose Create policy.

Update your policy's trust relationship.

- In the IAM console, choose Roles from the navigation pane to open the Roles page
- Enter the name of the role you created earlier in the search window, and click on the role name in the search results
- Choose the **Trust relationships** tab to navigate to the Trust relationships page.



• Choose **Edit trust relationship**. The principal AWS role in your trust policy document defaults to root. Replace the existing policy with this:

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

• Choose Update Trust Policy

#### 3.3 Add the Gateway to AWS IoT

To connect to AWS IoT Core for LoRaWAN, Kerlink Wirnet iFemtocell Gateway comes with Basic Station pre-installed and enabled.

Basic Station is a LoRaWAN Packet Forwarder. It is a program that runs on Kerlink gateways which forward LoRaWAN RF packets to AWS IoT Core for LoRaWAN network server.

#### 3.3.1 Preparation

To complete setting up your gateway, you need:

- LoRaWAN region. For example, if the gateway is deployed in a US region, the gateway must support LoRaWAN region US915.
- Gateway LNS-protocols. Currently, the LoRa Basics Station protocol is supported.
- Gateway ID: Gateway EUI you noted earlier.

#### 3.3.2 Add the LoRaWAN Gateway

To register the Gateway with AWS IoT Core for LoRaWAN, follow these steps:

- Go to the <u>AWS IoT Core console</u>.
- Select **Wireless connectivity** in the navigation panel on the left.
- Choose Intro, and then choose Get started. This step is needed to pre-populate the default profiles.
- Under Add LoRaWAN gateways and wireless devices, choose Add gateway.
- In the Add gateway section, fill in the GatewayEUI and Frequency band (RF Region) fields.
- Enter a descriptive name in the **Name optional** field. We recommend that you use the GatewayEUI as the name.



- Choose Add gateway
- On the **Configure your Gateway** page, find the section titled **Gateway certificate**.
- Select Create certificate.
- Once the **Certificate created and associated with your gateway** message is shown, select **Download certificates** to download the certificate (*xxxxx.cert.pem*) and private key (*xxxxx.private.key*).
- In the section **Provisioning credentials**, choose **Download server trust certificates** to download the CUPS (cups.trust) and LNS (lns.trust) server trust certificates.
- Copy the CUPS endpoint to your clipboard and paste it into a new text file named cups.uri.
- Copy the LNS endpoint to your clipboard and paste it into a new text file named tc.uri.
- Choose **Submit** to add the gateway.

#### **3.4 Prepare credentials for Basic Station**

Basic Station only recognize certificates and keys with specific names, so you need to rename the files as follow:

- You should have cups.trust
- Rename Ins.trust to tc.trust
- Copy the xxxxx.cert.pem to cups.crt
- Copy the xxxxx.cert.pem to tc.crt
- Copy the xxxxx.private.key to cups.key
- Copy the xxxxx.private.key to tc.key
- You should have the cups.uri and tc.uri file already.

#### **3.5 Upload credentials to your Wirnet iFemtocell**

To install those certificates on your gateway, login to Wanesy Management Center again. This time browse to your gateway and select **Remote access** >> **File Explorer**.



| kor <b>link</b>                 | 19 29 and Selection (0 gateways) 🖰 Selection (0 end-devices) 🗘 🎆 ker   |
|---------------------------------|--|
| communication is everything     | iFemboeii 7276/F0039040884 Winet Femboeii (868) Connected demo_Re-   |
| wanesy Management Center<br>3.2 | Overview Configurations Y KPI Data Y Remote access Y Spectrum Diagnostic Y   |
| 🗠 Management 🗸 🗸                |  |
| Fleets                          | \\ \ \ \ \ \   |
| Gateways                        |  |
| Clusters<br>Multicast groups    | Dit home         bin         boot         dev         etc         home         keros         lib         nonexistent         proc         nun         sbin         sys         user         user           >Di feros         > |
| End-devices                     | Consensistent     var     trp →     /var/trp   |
| КРІ                             | > Dinten<br>> Dinten<br>> Dinten   |
| B Workflows                     | ∑ va.<br>} D na.<br>> D na.  |
| Administration >                |  |
|                                 |  |
|                                 |  |
|                                 |  |
|                                 |  |
|                                 |  |
|                                 |  |

Figure 6: Wanesy Management Center - File Explorer

Navigate to /etc/station/ folder and upload your credential files there using the "Upload File" menu for each.



Figure 7: Wanesy Management Center: Upload file

#### **3.6 Enable the credentials**

To enable your credentials, go to **Remote access** >> **Command** and type the following command.

monit restart station



| korli <b>nk</b>                 | 10 <u>1</u> 0 <del>g</del> 0                                       | 台 Selection (0 gateways) | Selection (0 end-devices) | A serlink_demo |
|---------------------------------|--|--------------------------|---------------------------|----------------|
| communication is everything     | iFemtocell 7276FF0039040884 Winet iFemtoCell (868) Connected       |                          |                           | demo_fleet     |
| Wanesy Management Center<br>3.2 | Overview Configurations KPI Data Remote access Spectrum Diagnostic |                          |                           | :              |
| 🗠 Management 🗸 🗸                | [7276FF0035040884]# monit restart station<br>[7276FF0035040884]#   |                          |                           | ^              |
| Fleets                          |  |                          |                           |                |
| Gateways                        |  |                          |                           |                |
| Clusters                        |  |                          |                           |                |
| Multicast groups                |  |                          |                           |                |
| End-devices                     |  |                          |                           |                |
| KPI                             |  |                          |                           |                |
| d¦3 Workflows >                 |  |                          |                           |                |
| Administration                  |  |                          |                           |                |
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|                                 |  |                          |                           |                |
|                                 |  |                          |                           |                |
|                                 |  |                          |                           |                |

Figure 8: Wanesy Management Center - command

Going back to AWS IoT Core for LoRaWAN interface, you should see your gateway connected.



Congratulations! You can now move to end-device on-boarding with AWS IoT Core for LoRaWAN. Refer to "Getting Started with Kerlink WAL-e AWS IoT Core for LoRaWAN" in [1].

#### **End of Document**

Confidential