

How To Connect LoRa RAK811 To The Things Network V1.0

Shenzhen Rakwireless Technology Co., Ltd

www.rakwireless.com

info@rakwireless.com

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After update the new version, this document without prior notice.

1. Introduction

This document mainly gives a detailed introduction about how to connect RAK811(Lora) to The Things Network.

RAK811 Low-Power Long Range LoRa Technology Transceiver module, provides an easy to use, small size, low-power solution for long range wireless data transmission.

First, The RAK811 module complies with the latest LoRaWAN Class A & C protocol specifications, it is simple to access LWPA IOT platforms, such Actility etc. Second, it also support Lora Point to Point communications, this function can help customers implement their own private long range Lora network fast.

Module integrates semtech SX1276 and stm32L, offer user an serials At commands with UART Interface .It is easy to accomplish their applications, such as simple long range sensor data applications with external host MCU, low-power feature is suitable for battery applications.

I will introduce the following four parts in detail:

- (1)Registered Account;
- (2)Configuration the Gateway;
- (3)Add Gateway to The Things Network;
- (4)Create a Application;
- (5)Add RAK811 to The Things Network;

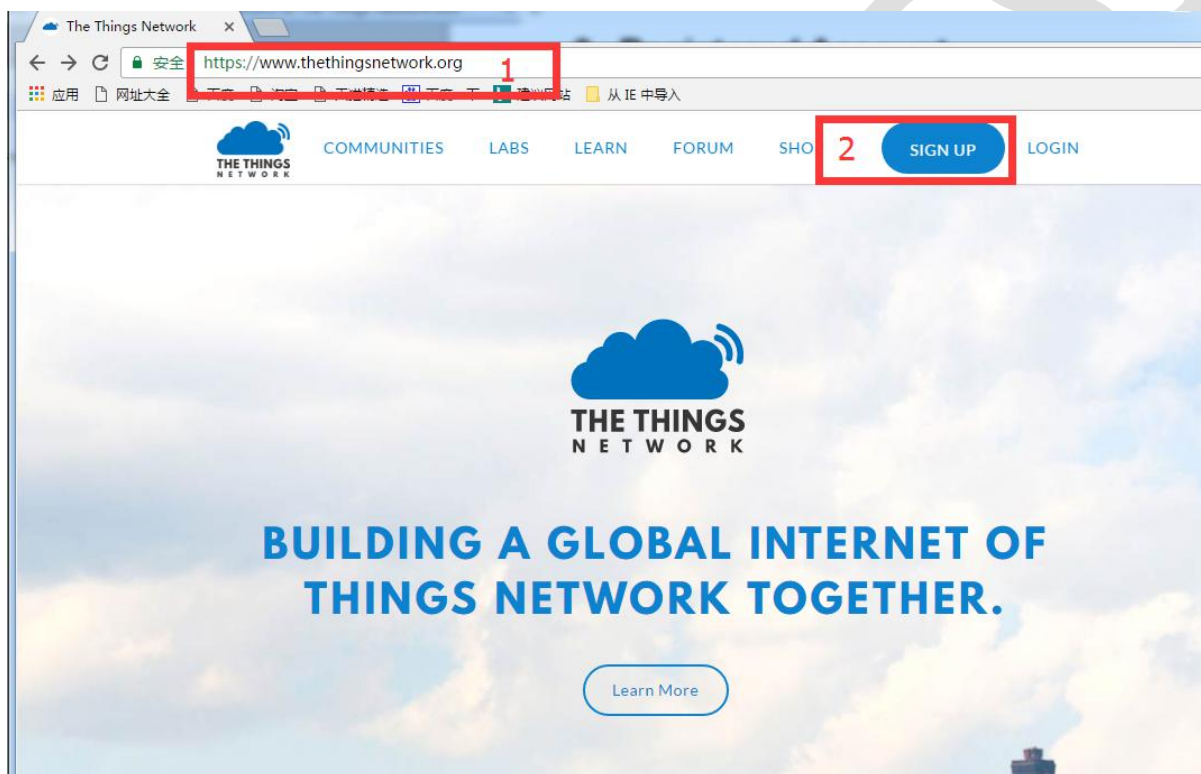
2. Registered Account

If you wanted connect the RAK811 to The Things Network, you need to register an account on The Things Network. Its website is <https://www.thethingsnetwork.org/>. Now, please follow the step below to register.

Please click the URL mentioned above, or copy and paste this URL and open with browser;

Step 1: Open this website;

Step 2: Click "SIGN UP";



Step 3: You will see a registration form, fill in the form as required. After filling, click "CREATE ACCOUNT" and complete registration;



CREATE AN ACCOUNT

Create an account for The Things Network and start exploring the world of Internet of Things with us.

USERNAME

This will be your username — pick a good one because you will **not** be able to change it.



EMAIL ADDRESS

You will occasionally receive account related emails. This email address is not public.



PASSWORD

Use at least 6 characters.



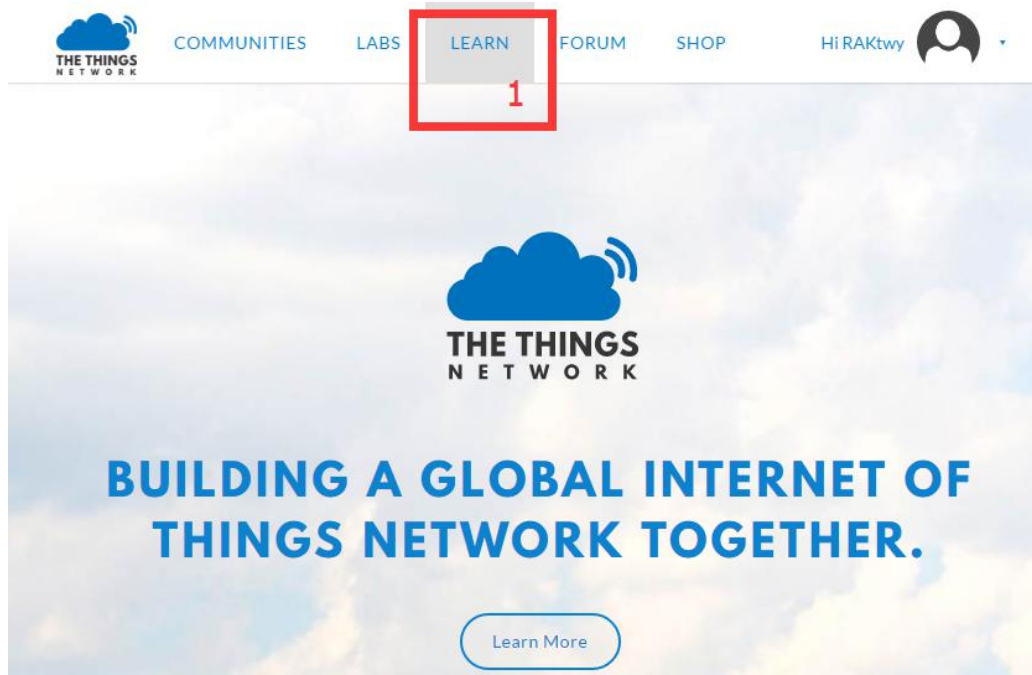
Create account

Step 4: Waiting a moment you will receive an email from The Things Network, it shows that you registered your account successfully and click on "Activate account" in the email to activate your account.

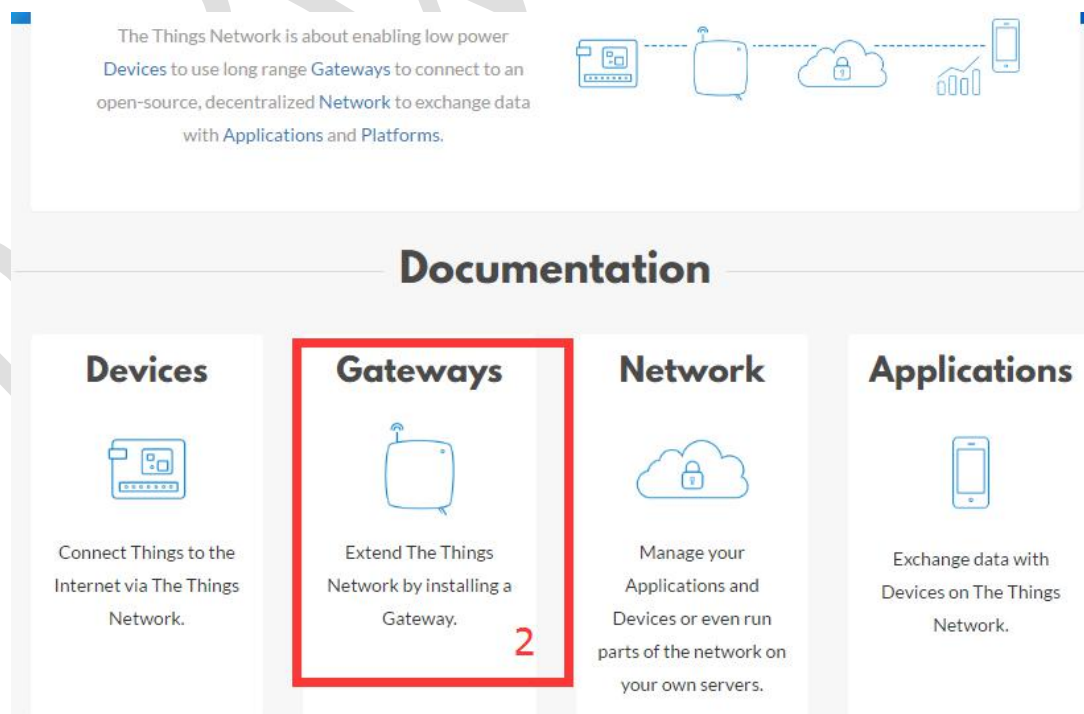
3. Configuration the Gateway

To add our gateway to The Things Network, we need to configuration the gateway. But how to configuration our gateway?

Step 1: Log in your account, and click on "LEARN" ;



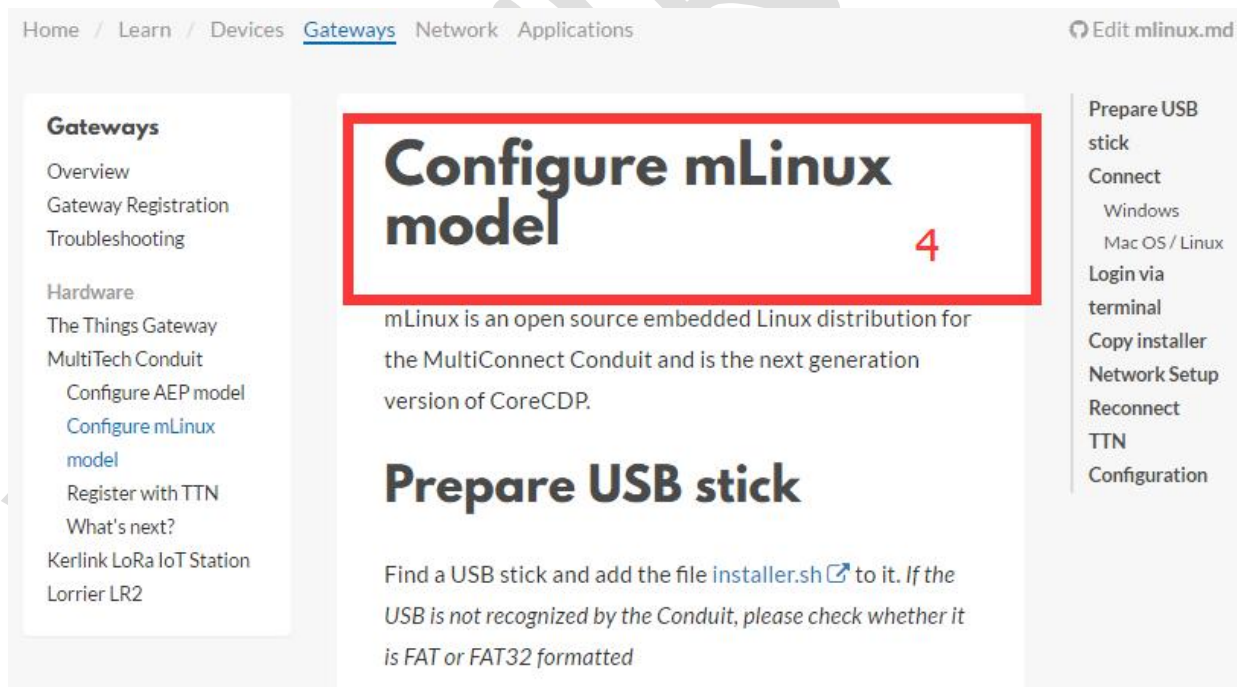
Step 2: Click on "GATEWAYS" ;



Step 3: I am here to demonstrate the use of MultiTech Conduit mlinux module. So, click on "MultiTech Conduit" - "Configure mLinux model" ;



Step 4: Connect your gateway to a network that can access Google, then according to the content of the web page, start configuration your gateway;



Step 5: Implement "cat /var/config/lora/local_config.json" ,get the gateway EUI;

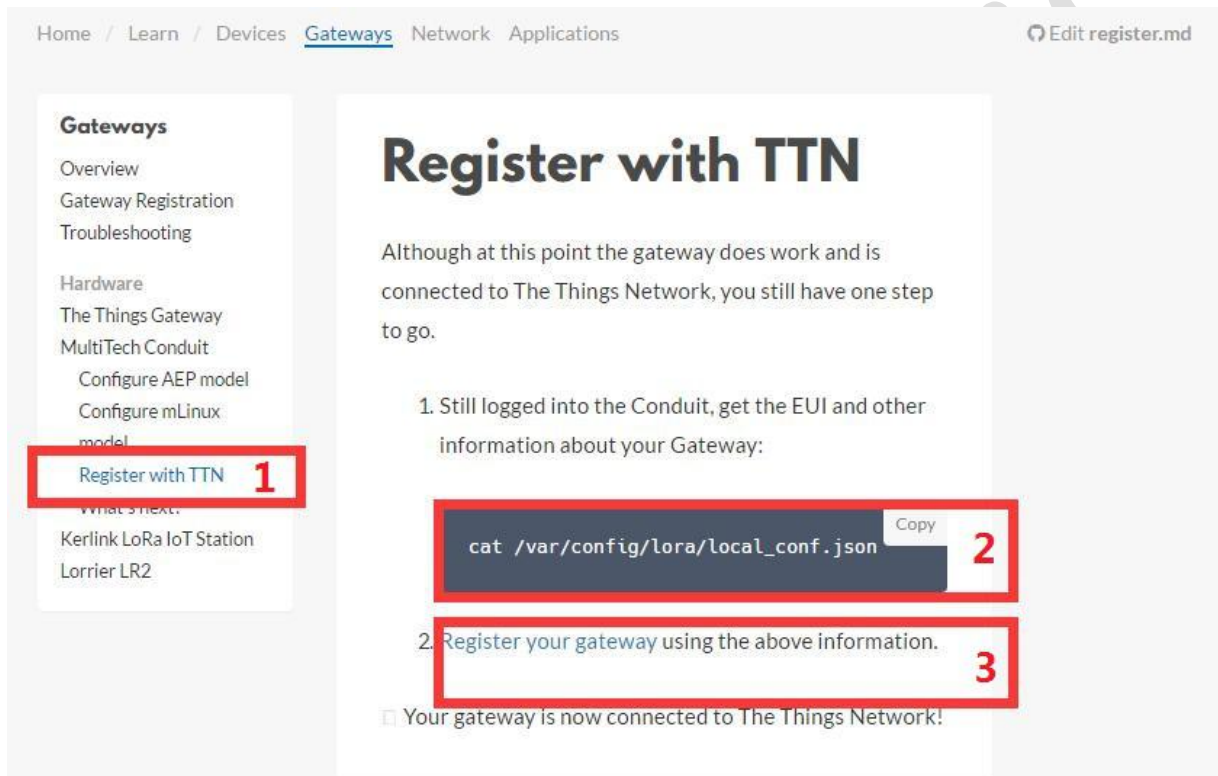
4. Add Gateway to The Things Network

After completing the gateway configuration. Now, we can start add Gateway to The Things Network;

Step 1: Click on "Register with TTN" ;

Step 2: Implement "cat /var/config/lora/local_config.json" ,get the gateway EUI;

Step 3: Click on "Resister your gateway" ;



Home / Learn / Devices Gateways Network Applications Edit register.md

Gateways

- Overview
- Gateway Registration
- Troubleshooting
- Hardware
- The Things Gateway
- MultiTech Conduit
- Configure AEP model
- Configure mLinux model
- Register with TTN 1**
- What's next?
- Kerlink LoRa IoT Station
- Lorrier LR2

Register with TTN

Although at this point the gateway does work and is connected to The Things Network, you still have one step to go.

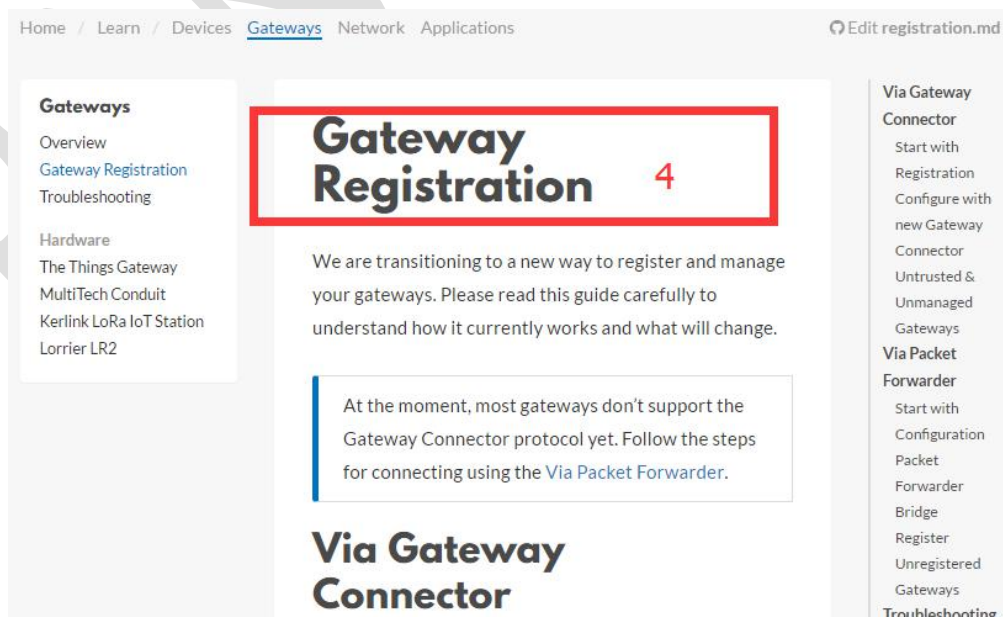
1. Still logged into the Conduit, get the EUI and other information about your Gateway:


```
cat /var/config/lora/local_config.json
```

Copy 2
2. Register your gateway using the above information. 3

☐ Your gateway is now connected to The Things Network!

Step 4: Read the content on this web page;



Home / Learn / Devices Gateways Network Applications Edit registration.md

Gateways

- Overview
- Gateway Registration 4**
- Troubleshooting
- Hardware
- The Things Gateway
- MultiTech Conduit
- Kerlink LoRa IoT Station
- Lorrier LR2

Gateway Registration

We are transitioning to a new way to register and manage your gateways. Please read this guide carefully to understand how it currently works and what will change.

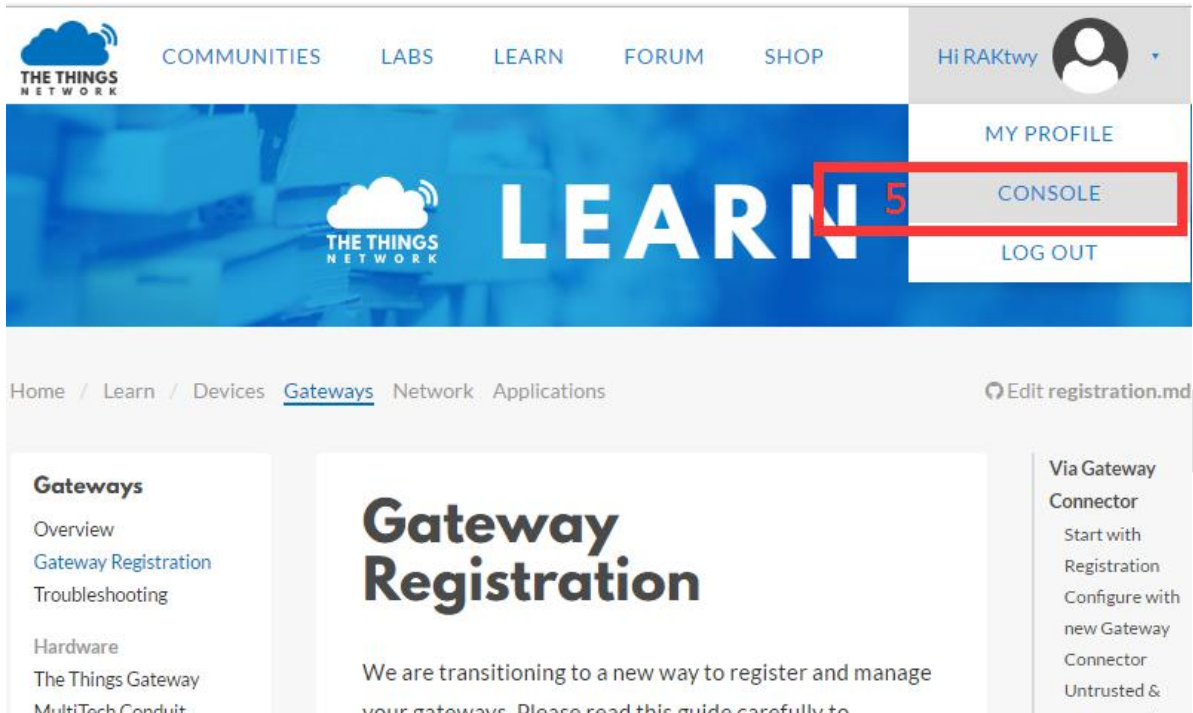
At the moment, most gateways don't support the Gateway Connector protocol yet. Follow the steps for connecting using the [Via Packet Forwarder](#).

Via Gateway Connector

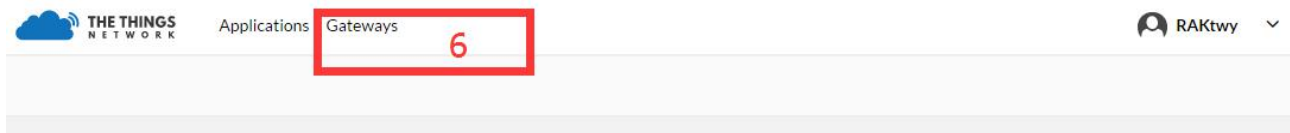
Via Gateway Connector

- Start with Registration
- Configure with new Gateway Connector
- Untrusted & Unmanaged Gateways
- Via Packet Forwarder
- Start with Configuration Packet Forwarder
- Bridge Register
- Unregistered Gateways
- Troubleshooting

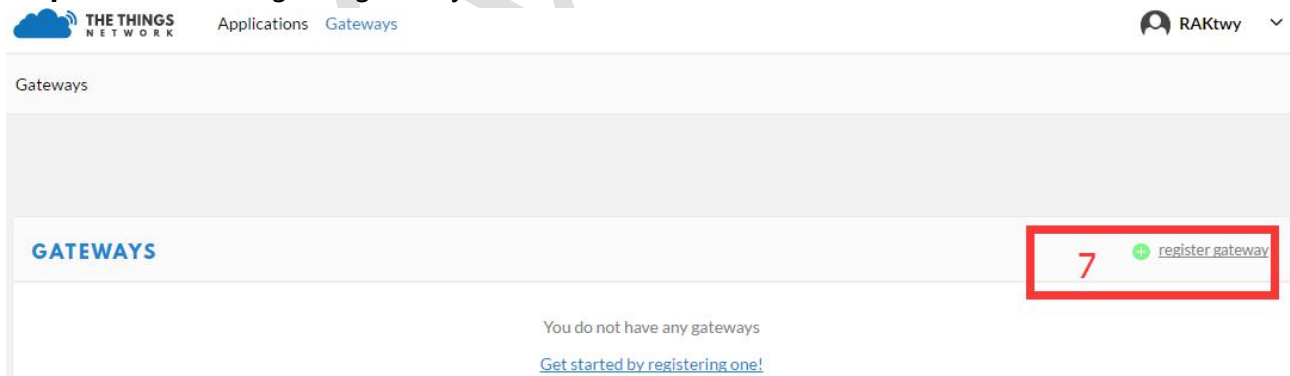
Step 5: Click on "CONSOLE" ;



Step 6: Click on "Gateway" ;



Step 7: Click on "register gateway" ;



Step 8: You will see a registration form, fill in the form as required.

Gateways > Register gateway

REGISTER GATEWAY

Protocol
 Use gateway connector if you want to set up an authenticated gateway, use packet forwarder to connect via a packet forwarder. [Which one should I choose?](#)

gateway connector packet forwarder

Gateway EUI
 The EUI of the gateway as read from the LoRa module

8 0 bytes

Description
 A human-readable description of the gateway

Frequency Plan
 The frequency plan this gateway will use

no selection

Location

Step 9: Click on "Register Gateway" , finish register;

Gateways > Register gateway

Google 地图数据 ©2017 GS(2011)6020 Google 使用条款

Antenna Placement
 The placement of the gateway antenna

indoor outdoor

9

Cancel Register Gateway

Step 10: Refresh the Gateways page . If it showing as the following picture, this indicates that we add the gateway to success

THE THINGS NETWORK Applications Gateways twy

Gateways

register gateway

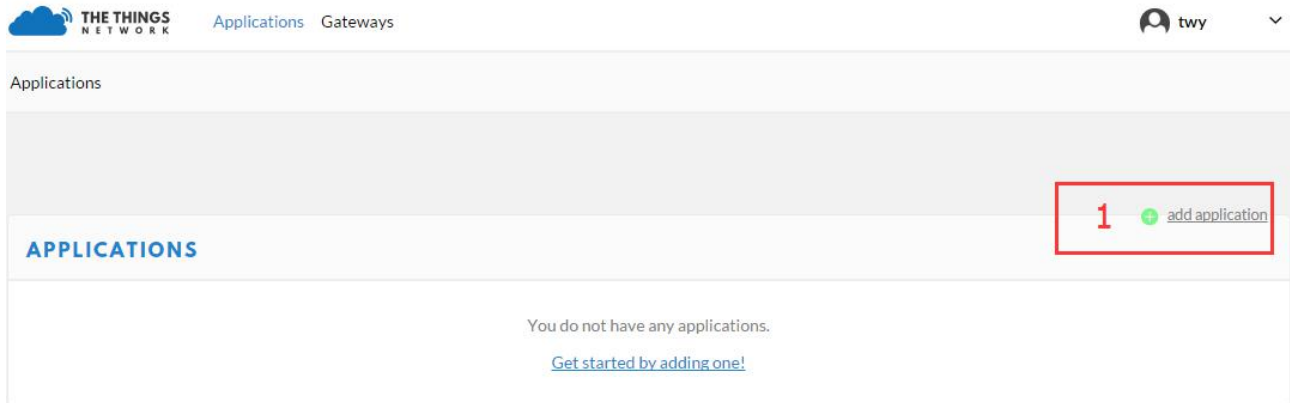
GATEWAYS

eui- b6cd RAK LoRa 10 connected EU_863.870

5. Create a Application

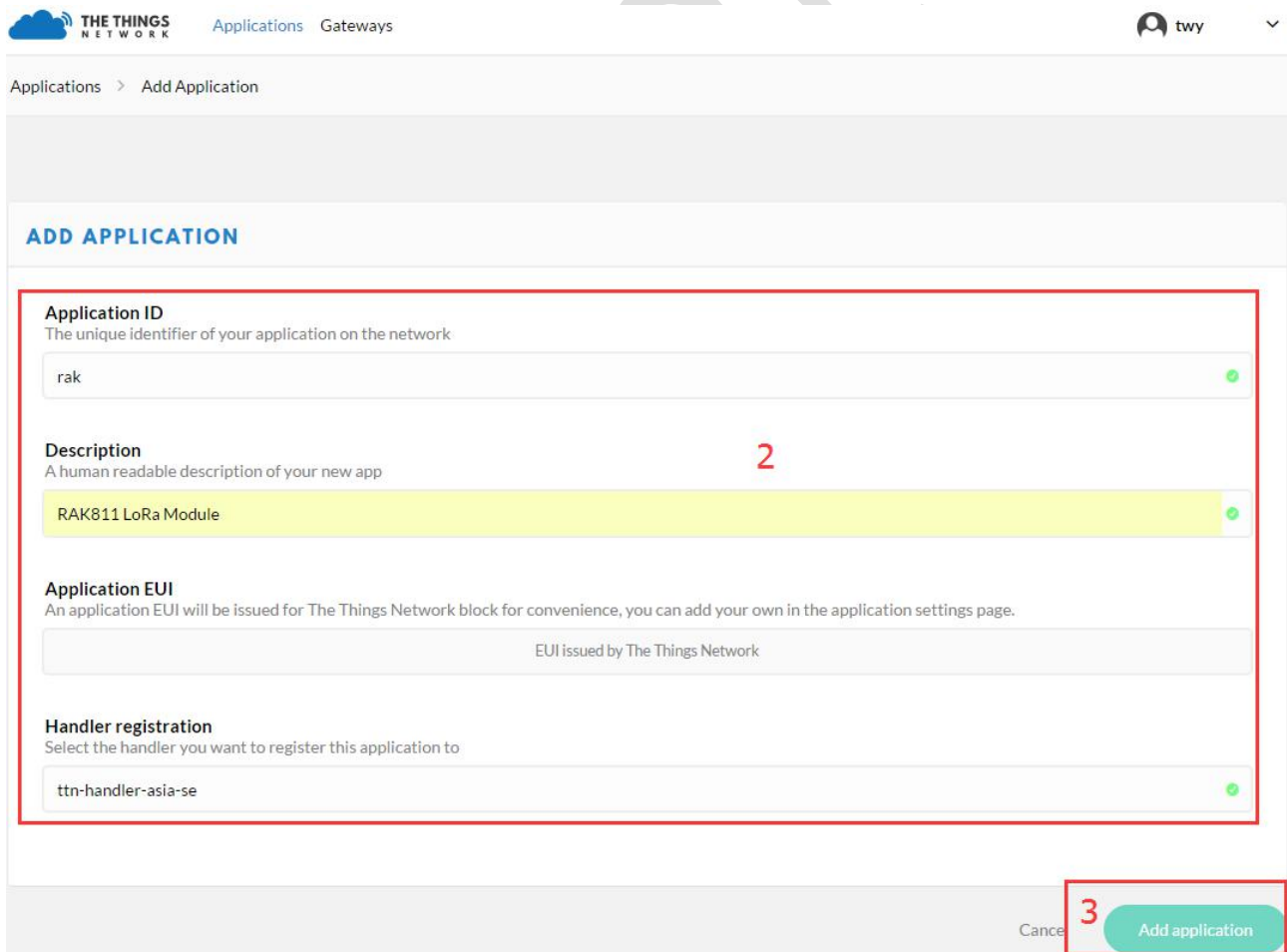
In this section, I will tell you how to create a application on TTN:

Step 1: Click on "add application" ;




Step 2: Fill in the following form as required;

Step 3: After completing, click on "Add application" ;


 This screenshot shows the 'Add Application' form in the TTN console. The navigation bar is the same as the previous screenshot. Below it, the breadcrumb 'Applications > Add Application' is shown. The heading 'ADD APPLICATION' is displayed. A large red box with the number '2' highlights the form fields: 'Application ID' (with value 'rak'), 'Description' (with value 'RAK811 LoRa Module'), 'Application EUI' (with a placeholder 'EUI issued by The Things Network'), and 'Handler registration' (with value 'ttn-handler-asia-se'). At the bottom right, a red box with the number '3' highlights the 'Add application' button. A 'Cancel' button is also visible next to it.

Step 4: It is a success add application "rak" ;

 **THE THINGS NETWORK**

Applications Gateways

twy

Applications > rak

Overview Devices Payload Formats Integrations Data Settings

APPLICATION OVERVIEW

documentation

Application ID rak

Description RAK811 LoRa Module

Created 9 minutes ago

Handler ttn-handler-asia-se


APPLICATION EUIs

manage euis

<> 70 B3 D5 7E F0 00 47 C0 hex

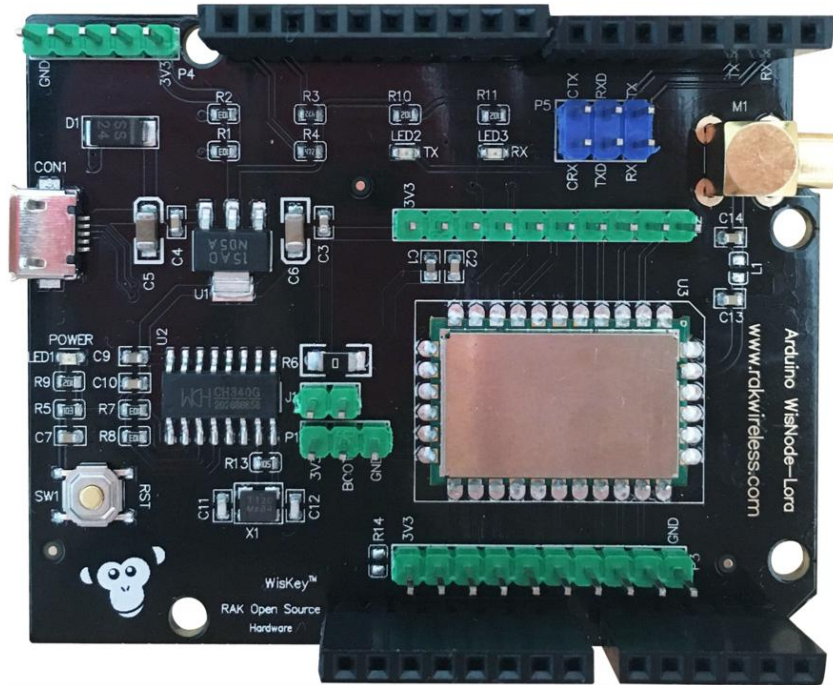
DEVICES

register device manage devices

 0 registered devices

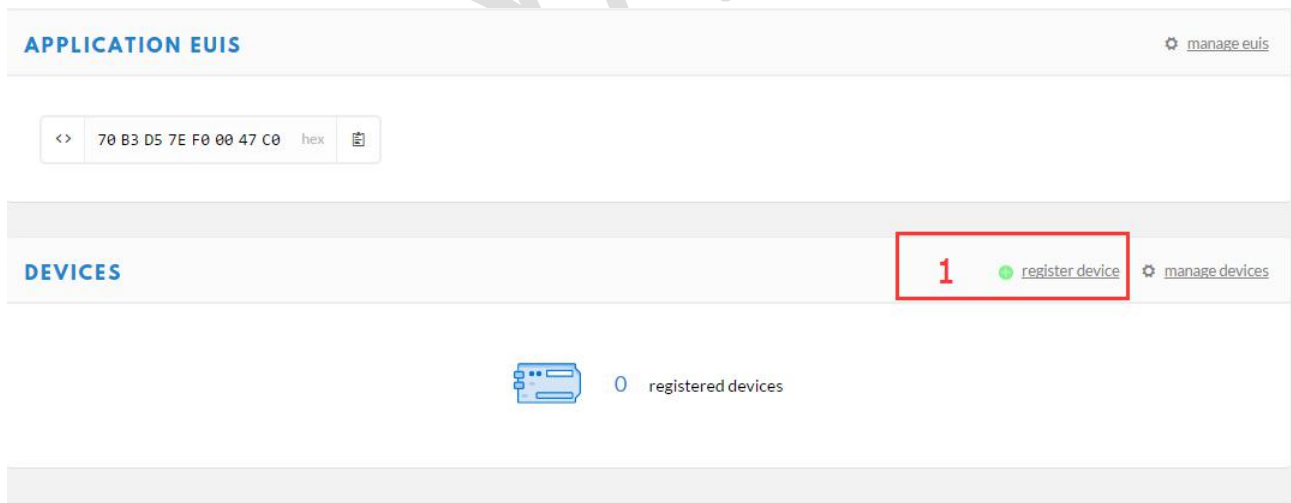
6. Add RAK811 to The Things Network

In this part, I will use WisNode-Lora EVB to demonstrate how to add our LoRa RAK811 module to TTN;



RAK WisNode-Lora EVB

Step 1: Click on "register device", start to register a RAK811 Lora module.



Step 2: Fill in the following form as required;

Step 3: After completing, click on "Register" ;

Device EUI: Enter the DevEUI for your device. This ID should come with the information included with your device, or can be found in the device use at+get_config=dev_eui.

REGISTER DEVICE
[bulk import devices](#)

Device ID
This is the unique identifier for the device in this app. The device ID will be immutable.

rak811

Device EUI
The device EUI is the unique identifier for this device on the network. You can change the EUI later.

60 C5 A8 FF FE
8 bytes

App Key
The App Key will be used to secure the communication between you device and the network.

this field will be generated

App EUI

70 B3 D5 7E F0 00 47 C0

Cancel
Register

Step 4 & Step 5: It is show that we register our RAK811 module successfully;

THE THINGS NETWORK
Applications
Gateways
twy

Applications > rak > Devices > rak811

Overview
Data
Settings

DEVICE OVERVIEW

Application ID rak

Device ID rak811

Activation Method OTAA

Device EUI
60 C5 A8 FF FE 00 00 01 hex

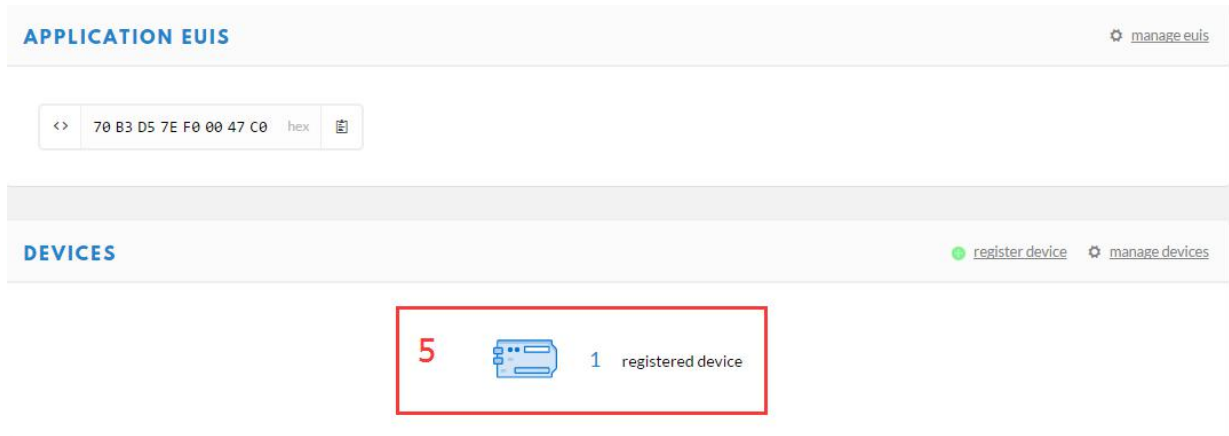
Application EUI
70 B3 D5 7E F0 00 47 C0 hex

App Key
hex

Status never seen

Frames up 0 reset frame counters

Frames down 0



Step 6: Use Micro USB interface to supply the module power. One end of the serial line is connected to the module, and one end is connected to the computer. Then open the Uart AssistTool, send AT command to operate the module.

Step 7: Send the AT command to the module in the following order, make the RAK811 module join the OTAA;

Boot information : Welcome to RAK811

Send: at+mode=0 /* SET LoraWAN work mode */
 Return: OK

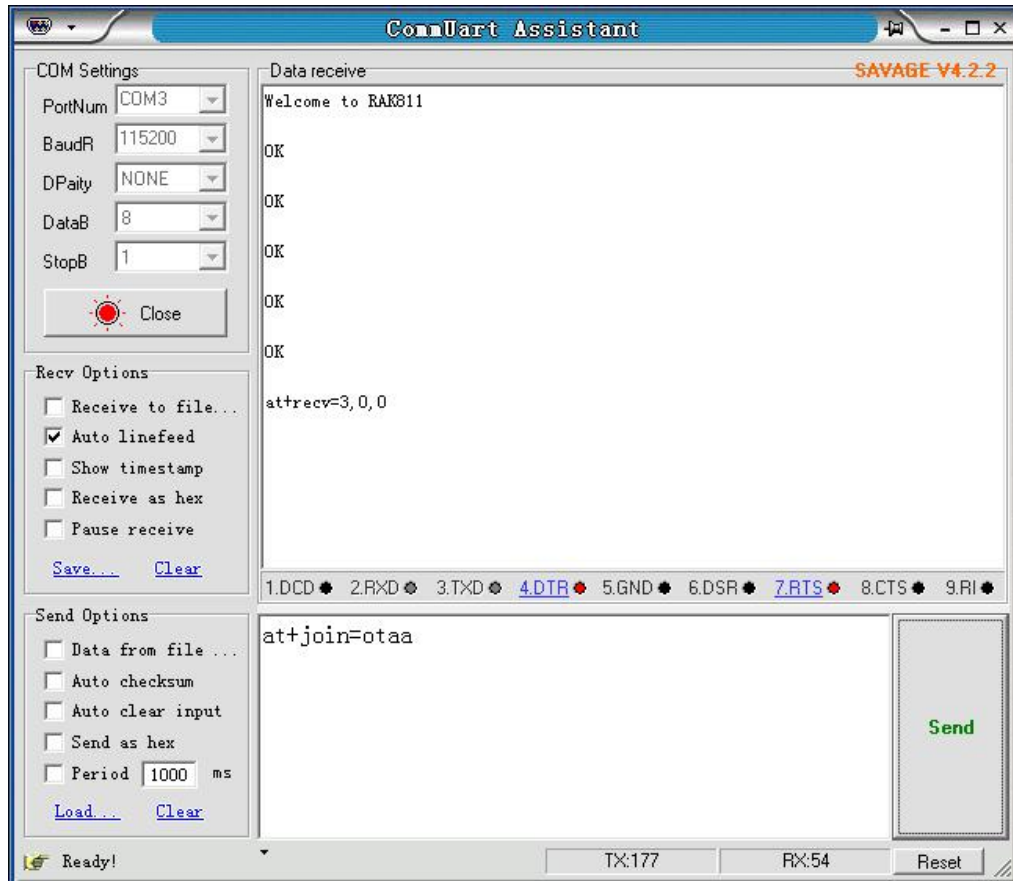
Send:at+set_config=dev_eui:60C5A8FFFE000001
 /* GET Dev_EUI check if NULL ,set the enter before information */
 Return: OK

Send: at+set_config=rx2:3,869525000 /*rx2 datarate: SF9*/
 Return: OK

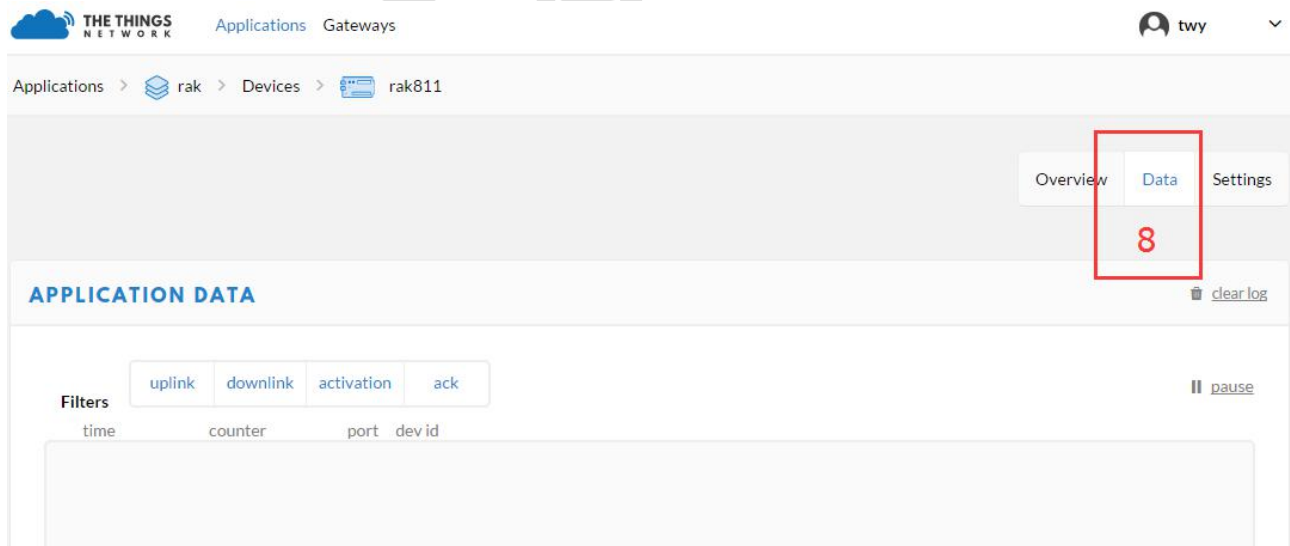
Send:
 at+set_config=app_eui:70B3D57EF00047C0&app_key:5D833B4696D5E01E2F8DC880E30BA5FE

/* SET Lora Gateway app_eui and apps_key, big endian*/
 /*This data show on Step 4*/
 Return: OK

Send: at+join=otaa /* Join otaa type*/
 Return: OK



Step 8: After join otaa, then can use the following AT command send data to TTN, we can see our module send data on TTN successfully;



Send: at+send=0,2,0000000000000007F000000000000000

Return: at+recv=2,0,0 /*unconfirmed mean tx success*/

Or

Send: at+send=1,2,00000000000000007F0000000000000000

Return: at+recv=1,0,0 /*confirmed mean receive ack from gateway*/

17:40:14	1	rak811	Downlink sent confirmed	45 55 55 55 66 35 63 45	>
17:40:13	2	rak811		00 00 00 00 00 00 00 7F 00 00 00 00 00 00 00	>
17:38:08		rak811	Activation		>

7. Modify Record

Version	Author	Data	Modify content
V1.0	Wenyong.tang	2017/04/24	Create Document