

Quick Start Guide

What do you need?

Before going through each and every step in the installation guide of the RAK4200 Evaluation Board, make sure to prepare the necessary items listed below:

1. **RAK4200 Evaluation Board**
2. Micro USB Cable
3. LoRa gateway in range, for testing
4. Windows PC
5. RAKDAP1 DAPLink Tool

 **NOTE**

To have an optimal antenna matching for the Low and High LoRa bands, there are two types of modules with different hardware. The L type module only works for the 433MHz and 470MHz LoRa bands. The H type module is for the 868MHz to 923MHz (the rest of the spectrum). Note that the hardware is specific for your selected band and can't be changed.

What's included in the Package?

- 1pc - RAK4200 Evaluation Board
- 1pc - Micro USB Cable
- 1pc - LoRa Antenna (iPEX)
- 2pcs - 4-pin Header
- 13pcs - Dupont Lines

 **NOTE**

This device released by RAKwireless is already pre-loaded with its latest firmware upon manufacturing. If you want to have your device firmware burned or upgraded, refer to the documentations below:

1. [Burning the Bootloader into the Device](#)
2. [Upgrading the Firmware](#)

Interfacing with RAK4200 Evaluation Board

To interface with the RAK4200 Evaluation Board with your Windows PC, you need to download the RAK Serial Port Tool [here](#).

 **WARNING**

Before powering the RAK4200 Evaluation Board, you should install the LoRa antenna first. Not doing so might damage the board

- Connect your RAK4200 Evaluation Board to your Windows PC using the provided micro USB cable.

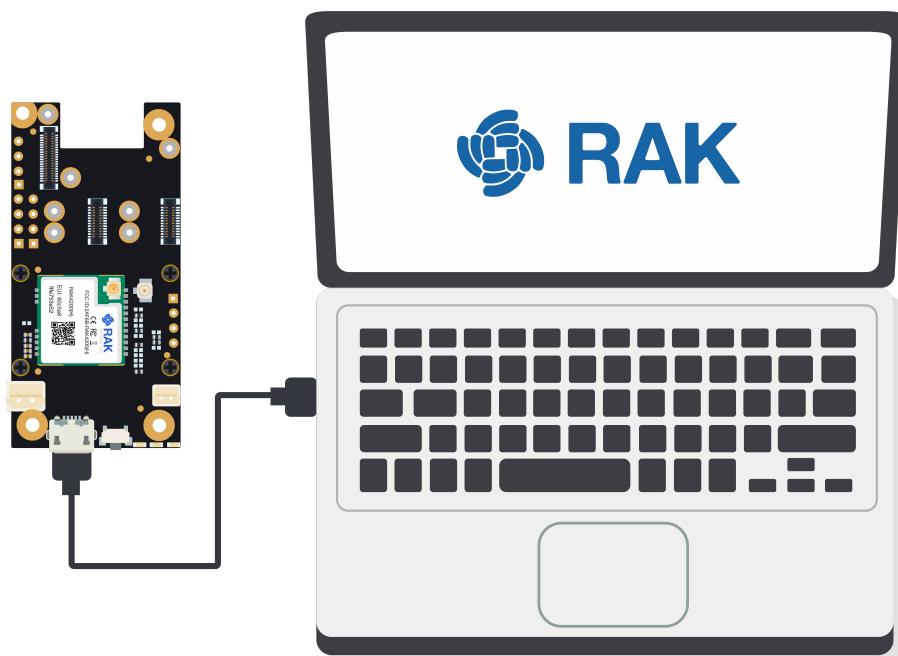


Figure 1: RAK4200 Evaluation Board to Laptop Connection

- Open the RAK Serial Port Tool :

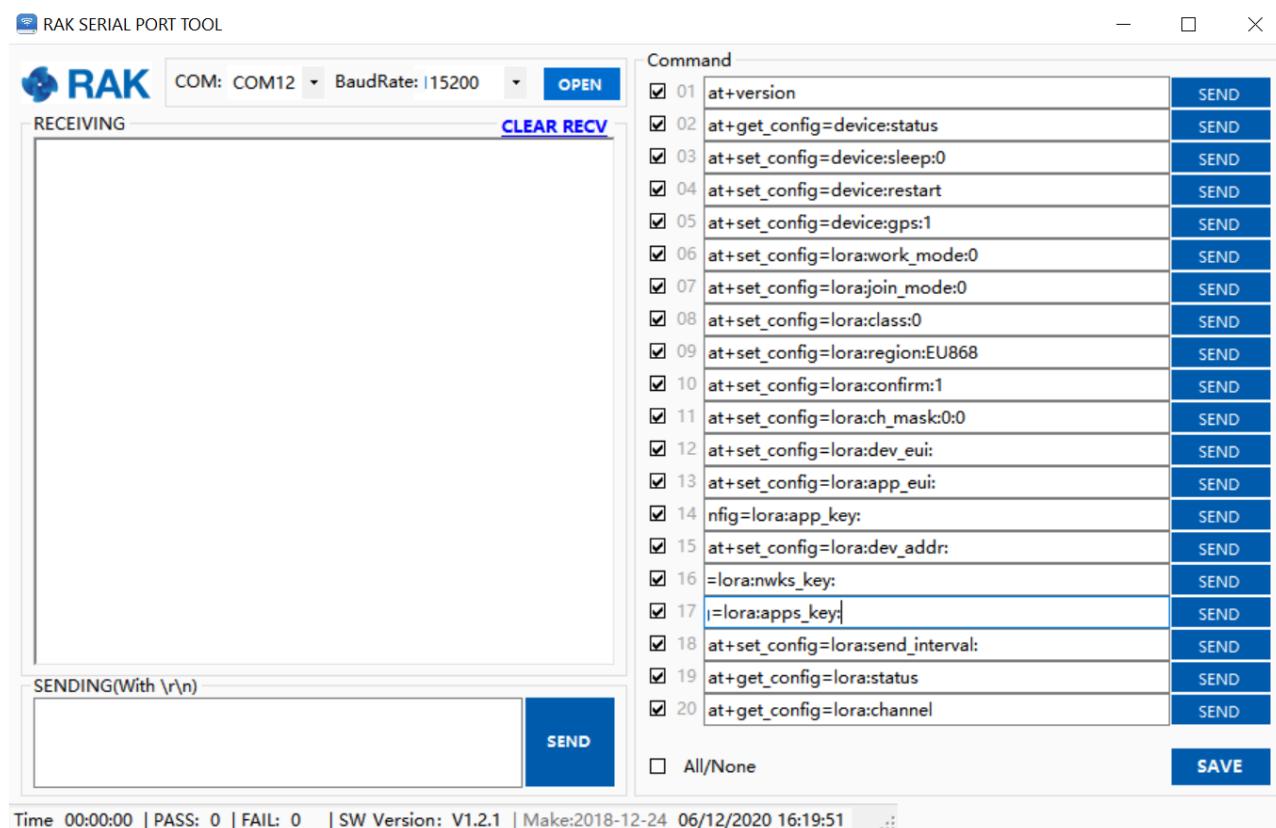


Figure 2: RAK Serial Port Tool

- Go to Device Manager by pressing: Windows + R and typing devmgmt.msc or search in the Start Menu.

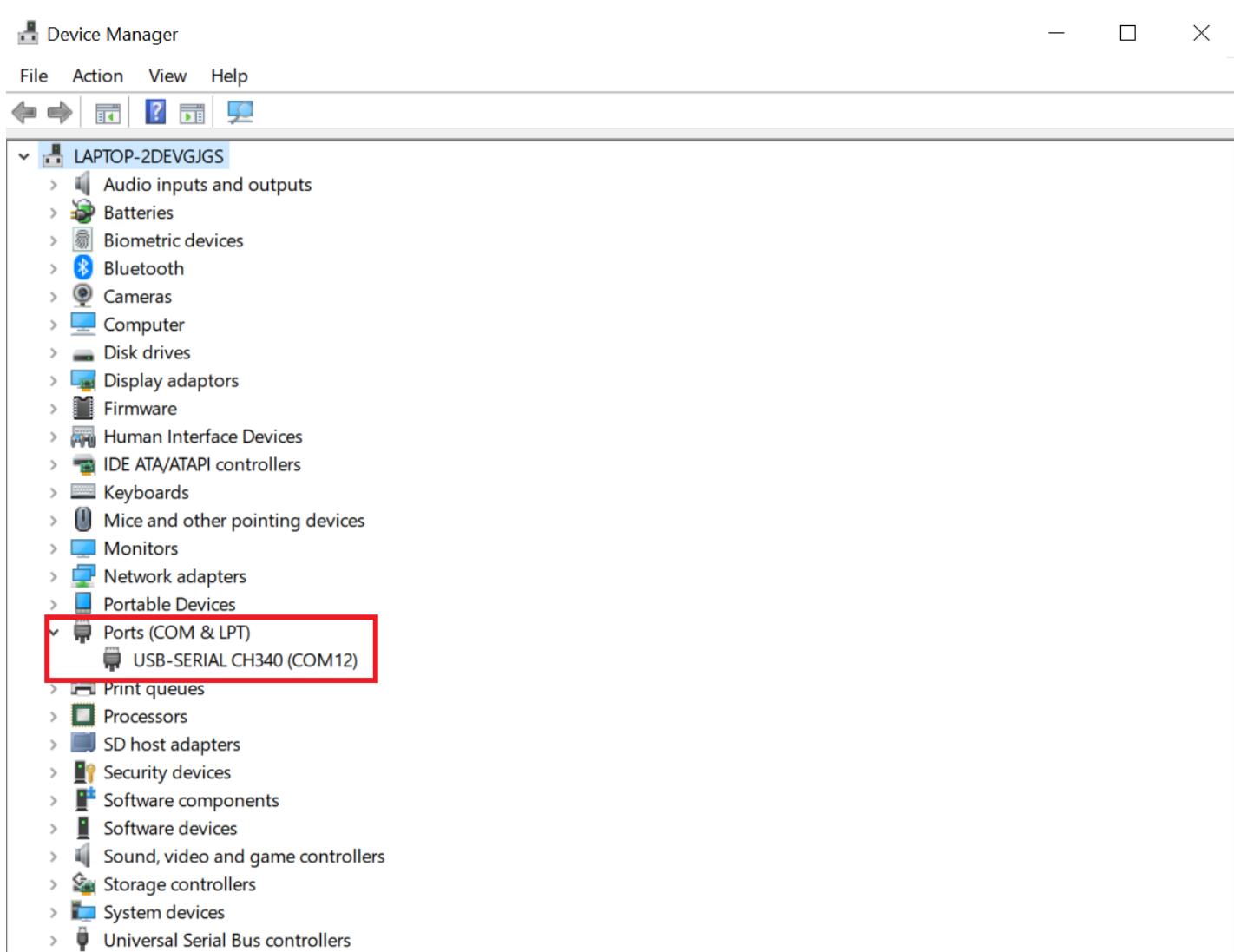


Figure 3: Device Manager

- Look for Ports (COM & LPT) and find the name **USB-SERIAL CH340**. Take note of the COM Port Number.

NOTE

If you didn't find any port with the name **USB-SERIAL CH340**, make sure you have installed the CH340 drivers in your Windows PC.

- Choose the correct Port Number from the Device Manager, select 115200 Baudrate then click Open button:

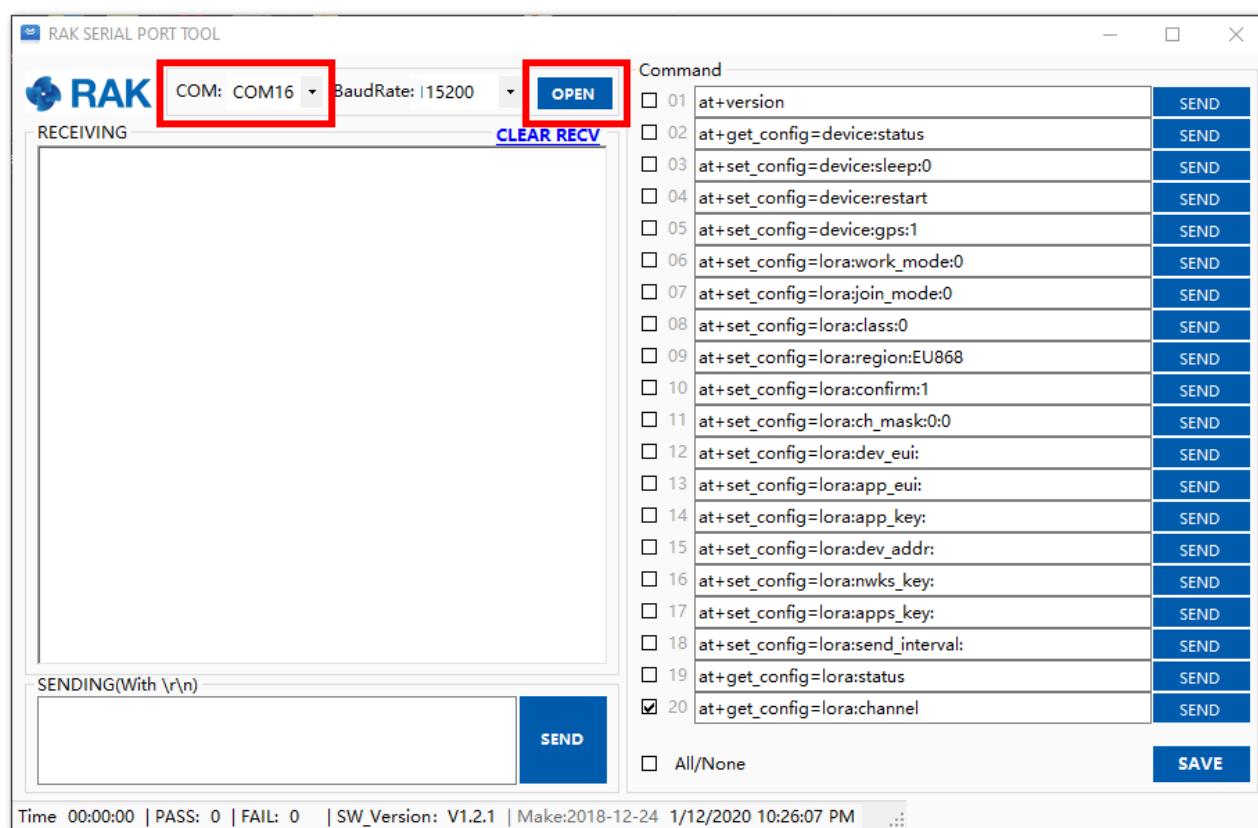


Figure 4: Correct Port Number and Baud rate

Connecting to The Things Network (TTN)

The Things Network is about enabling low power devices to be used in long range gateways that connect to an open-source, decentralized network and exchange data with Applications. Learn more about [The Things Network](#).

In this section, you will be connecting the RAK4200 Evaluation Board to The Things Network (TTN). If you don't have an account yet, head on to <https://www.thethingsnetwork.org/> and create one. Once done, log in to your account then go to the console as shown in Figure 5.

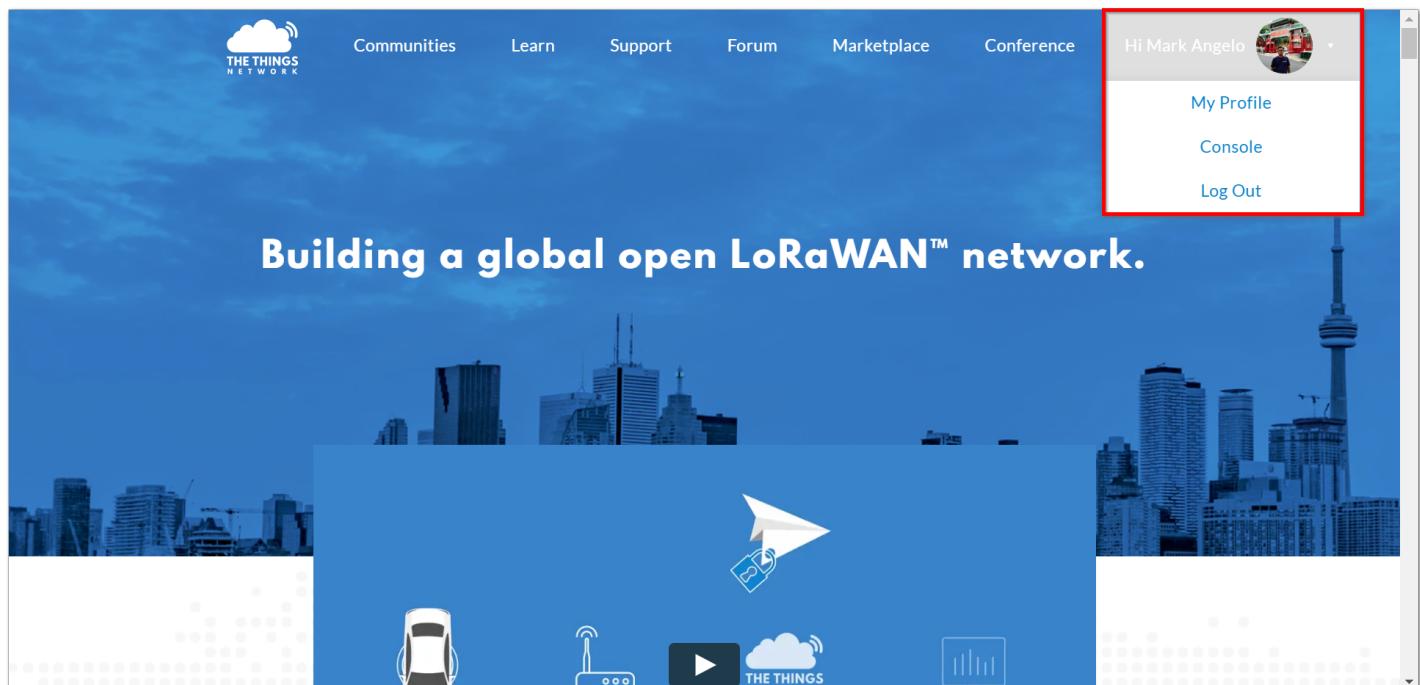


Figure 5: The Things Network Home Page

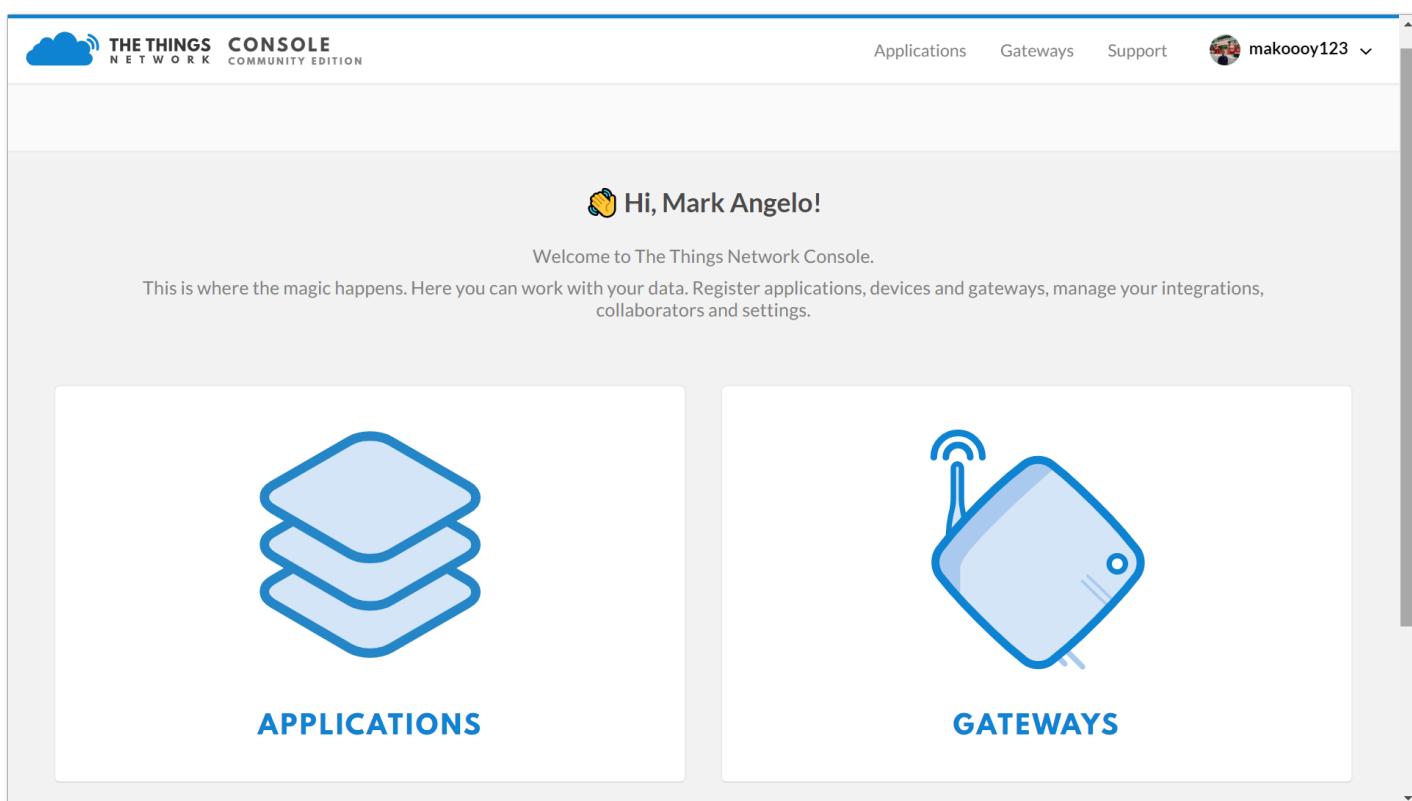
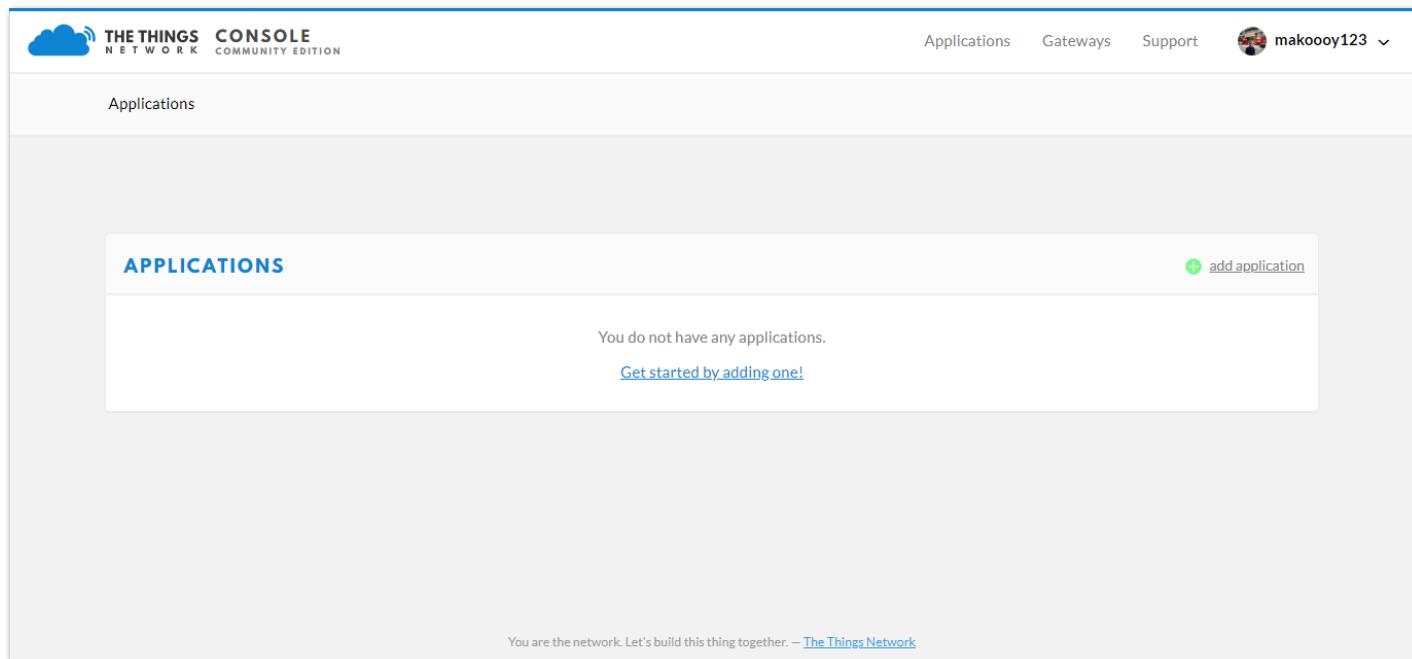


Figure 6: TTN Console Page

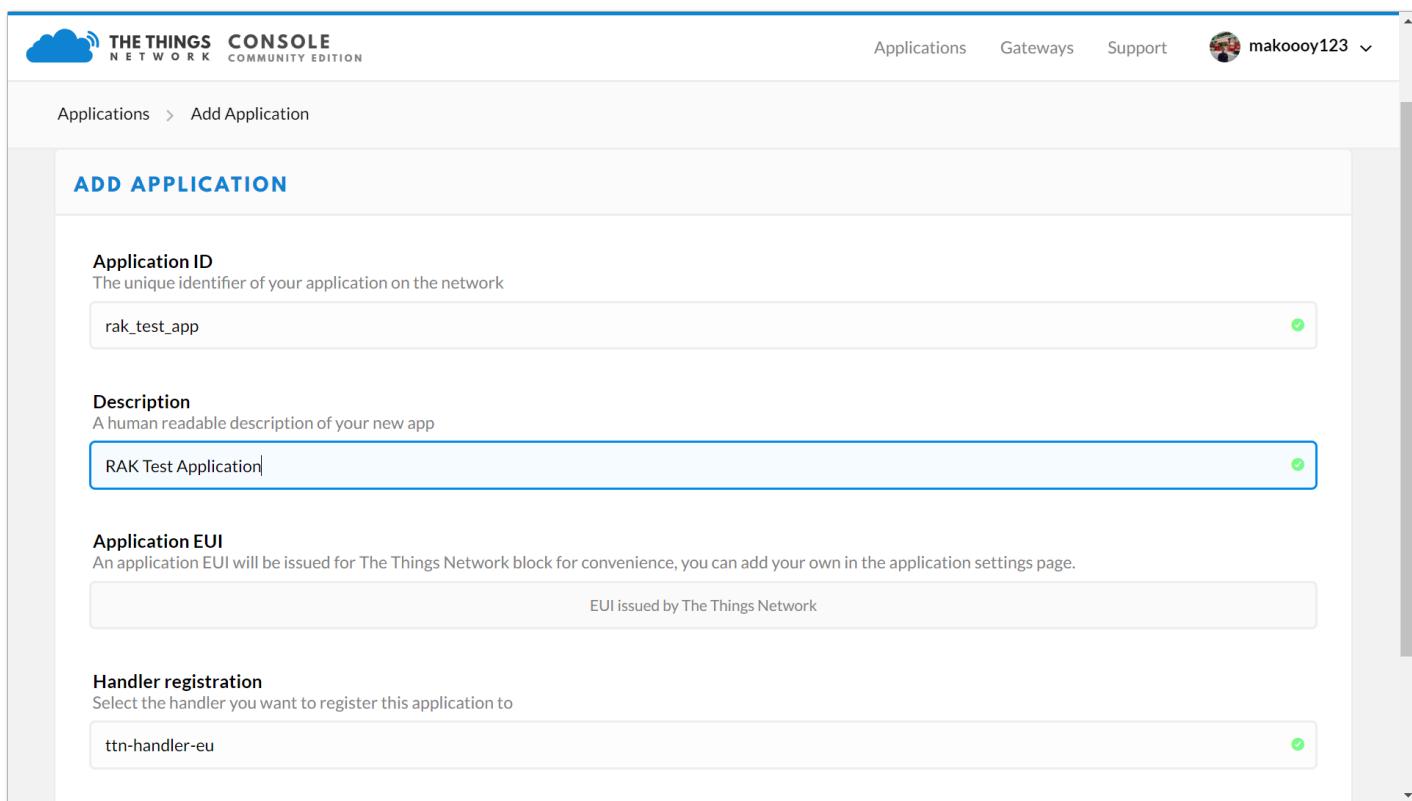
- Choose "APPLICATIONS"



The screenshot shows the 'APPLICATIONS' page within the The Things Network Console. The top navigation bar includes the 'THE THINGS NETWORK CONSOLE COMMUNITY EDITION' logo, 'Applications', 'Gateways', 'Support', and the user profile 'makoooy123'. The main content area is titled 'APPLICATIONS' and contains a message: 'You do not have any applications.' with a link 'Get started by adding one!'. A green button at the top right says 'add application'. At the bottom of the page, a footer note reads: 'You are the network. Let's build this thing together. — [The Things Network](#)'.

Figure 7: Application Page

- Click the "add application" button

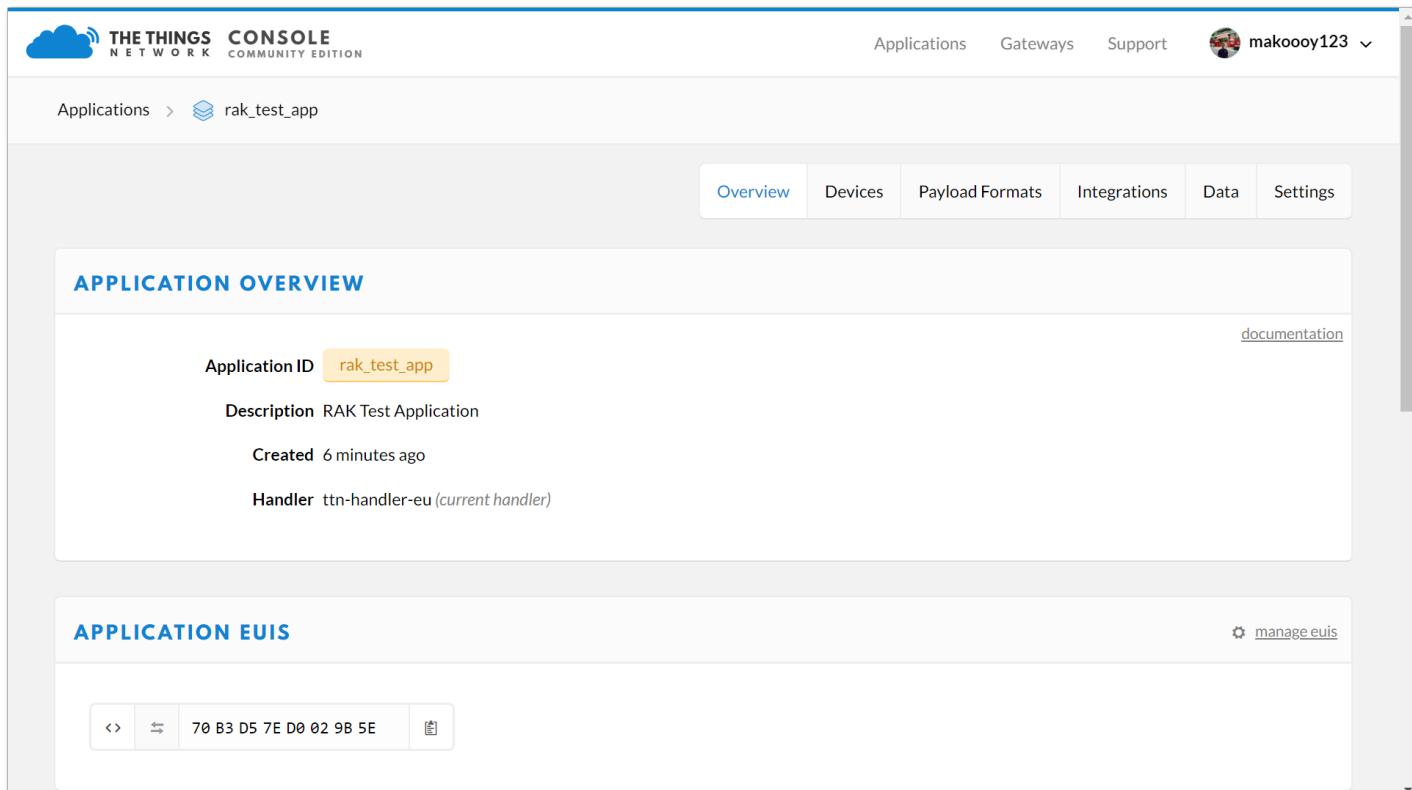


The screenshot shows the 'Add Application' page of the The Things Network Console. The 'Application ID' field contains 'rak_test_app'. The 'Description' field contains 'RAK Test Application'. The 'Handler registration' field contains 'ttn-handler-eu'. Other fields like 'Application EUI' and 'EUI issued by The Things Network' are also visible.

Figure 8: Adding an Application

Here are the things that you should take note in adding an application:

1. **Application ID:** a unique ID on the TTN network that should be in lower case with no spaces
 2. **Description:** This is a short and concise human readable description of your application
 3. **Application EUI:** automatically generated by TTN
 4. **Handler Registration:** select the handler you want to register this application to
- After you fill in the necessary information, press the "Add application" button at the bottom of this page. If you see the following page, this means that you have successfully registered your application.



The screenshot shows the 'Application Overview' page for the 'rak_test_app' application. It displays the following details:

- Application ID:** rak_test_app
- Description:** RAK Test Application
- Created:** 6 minutes ago
- Handler:** ttn-handler-eu (current handler)

Figure 9: Application Overview

- Scroll down until you see the Devices section, or you can also click the "Devices" button at the top:

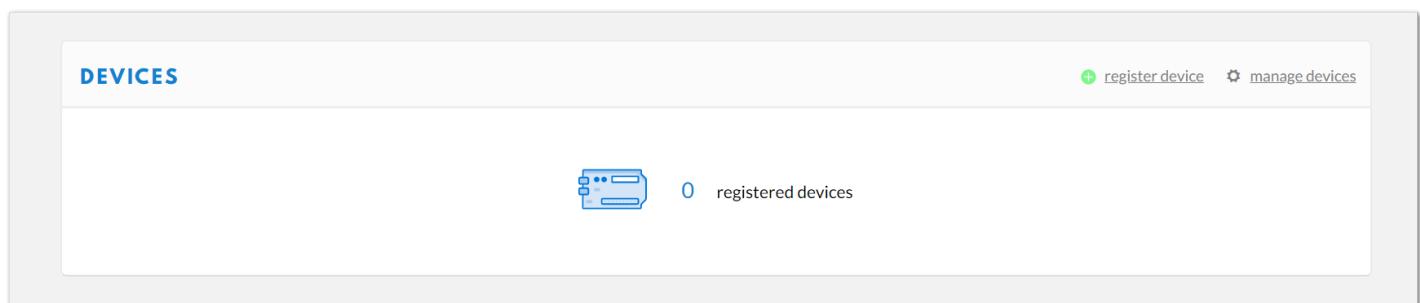


Figure 10: Device Section

- Click "Register device"

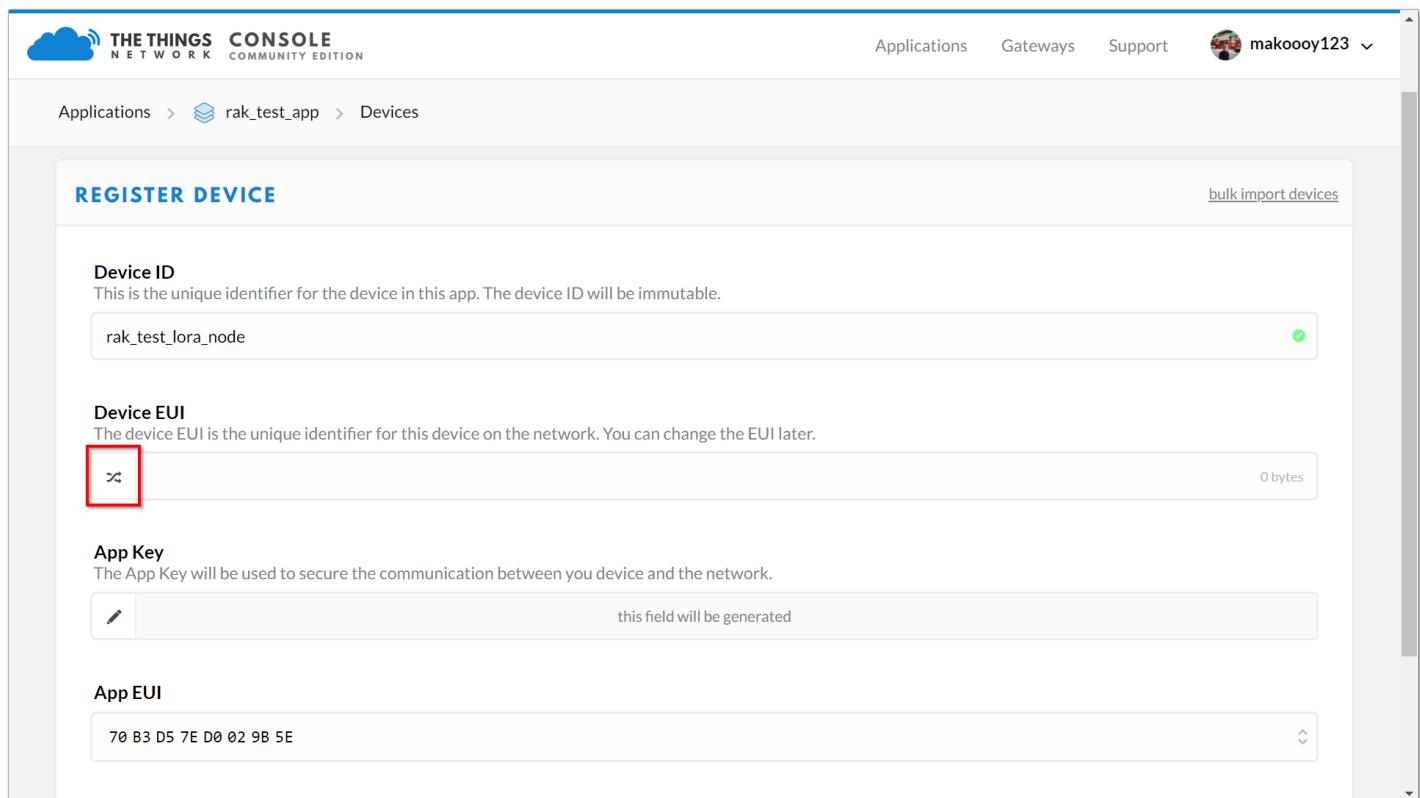


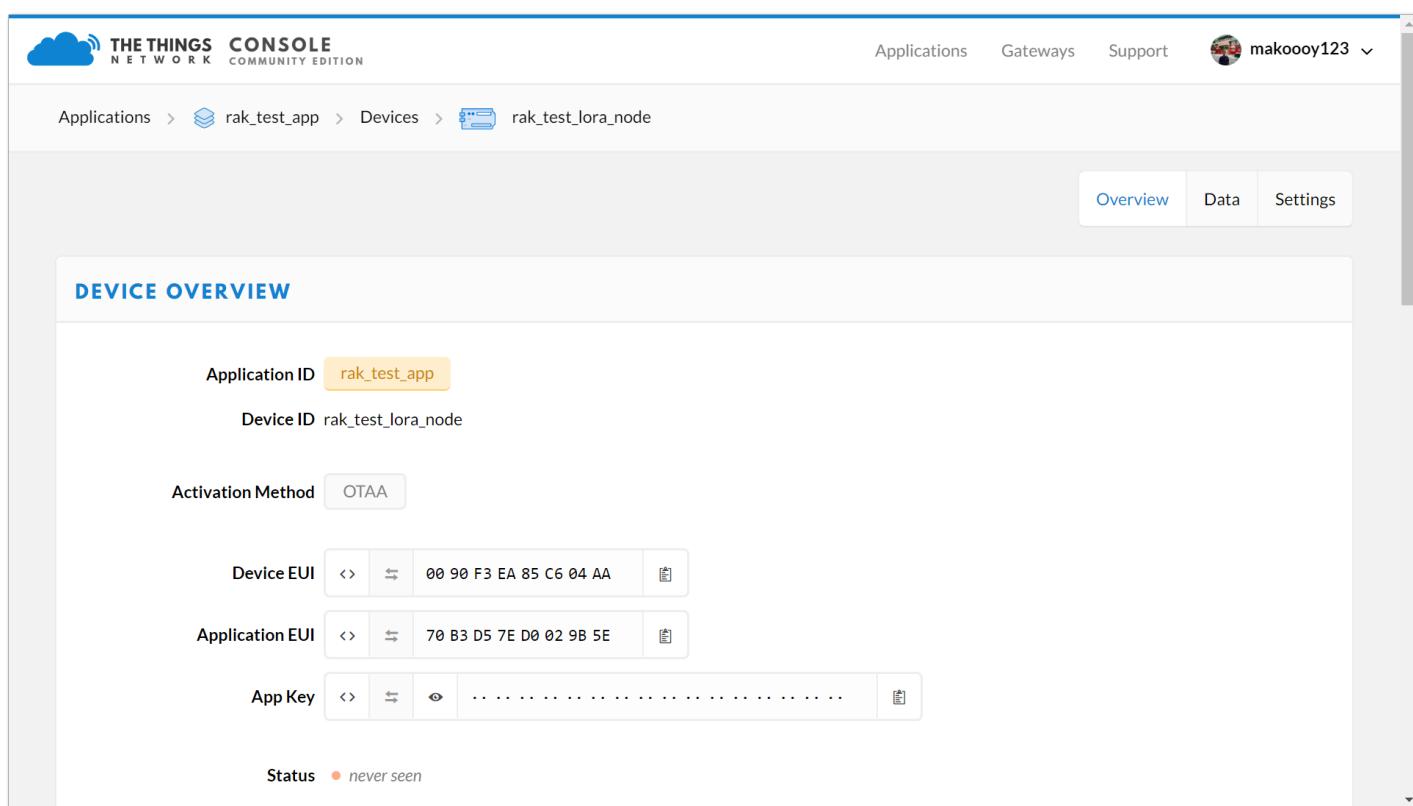
Figure 11: Add your Device

Here are the things that you should take note when registering your device:

1. **Device ID:** a unique identifier for your RAK4200 Evaluation Board in your application, and must be entered manually.
2. **Device EUI:** a unique identifier for your device in the network. You can change it later, if you want.

Click the following icon and the Device EUI will be automatically generated. The App Key should be in auto generation mode by default.

- Lastly, click the Register button. Now your device is registered under the corresponding application.



The screenshot shows the 'Device Overview' page for a device named 'rak_test_lora_node'. Key details include:

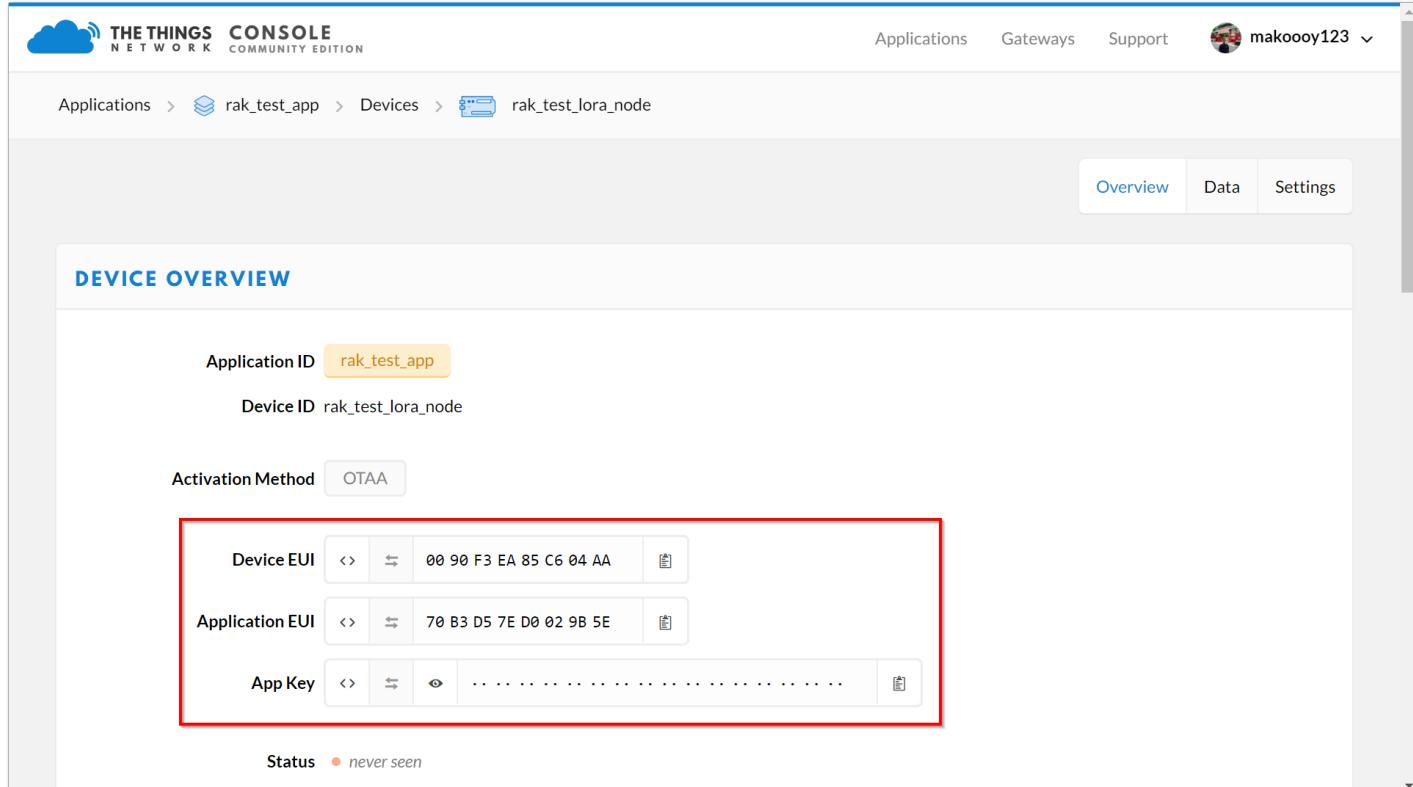
- Application ID:** rak_test_app
- Device ID:** rak_test_lora_node
- Activation Method:** OTAA
- Device EUI:** 00 90 F3 EA 85 C6 04 AA
- Application EUI:** 70 B3 D5 7E D0 02 9B 5E
- App Key:** (redacted)
- Status:** never seen

Figure 12: Device Overview

Depending on which authentication method you want to use, proceed to either the [OTAA Mode](#) or [ABP mode](#) section.

OTAA Mode

When setting up a new device in TTN, its default is to join in OTAA mode. For this configuration, you need the following three parameters: **Device EUI**, **Application EUI** and **App Key**. You can get them all from the [Overview page](#).



The screenshot shows the 'Device Overview' page for a device named 'rak_test_lora_node'. Key details include:

- Application ID:** rak_test_app
- Device ID:** rak_test_lora_node
- Activation Method:** OTAA
- Device EUI:** 00 90 F3 EA 85 C6 04 AA
- Application EUI:** 70 B3 D5 7E D0 02 9B 5E
- App Key:** (redacted)
- Status:** never seen

Figure 13: Device Overview Parameters



As an example, join in OTAA mode, EU868 frequency and the default LoRa class is Class A.

1. Set the LoRa join mode to **OTAA**:

```
at+set_config=lora:join_mode:0
```



Figure 14: AT Command for OTAA LoRa Join Mode via RAK Serial Port Tool

2. Set the LoRa class to **Class A**:

```
at+set_config=lora:class:0
```

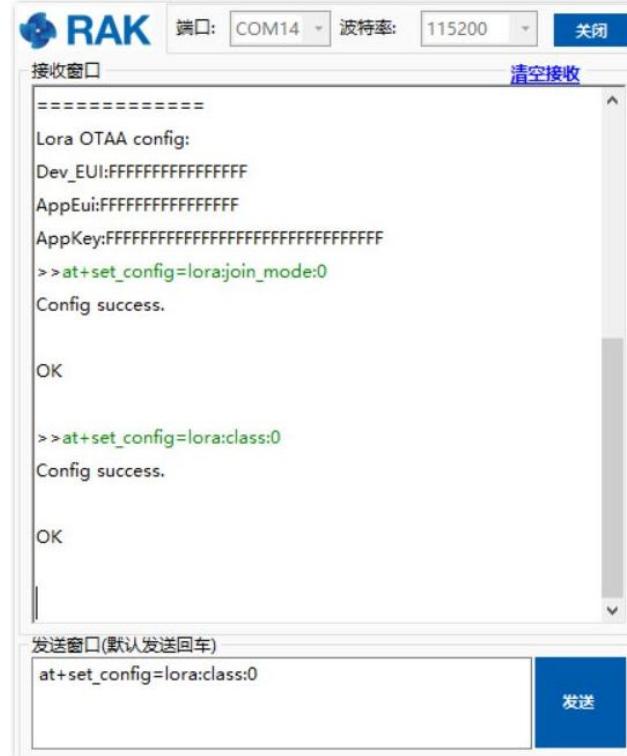


Figure 15: AT Command for OTAA LoRa Class via RAK Serial Port Tool

3. Set the frequency/region to **EU868**:

```
at+set_config=lora:region:EU868
```

sh



Figure 16: AT Command for OTAA LoRa Region Frequency via RAK Serial Port Tool

4. Set the Device EUI:

```
at+set_config=lora:dev_eui:XXXX
```

sh

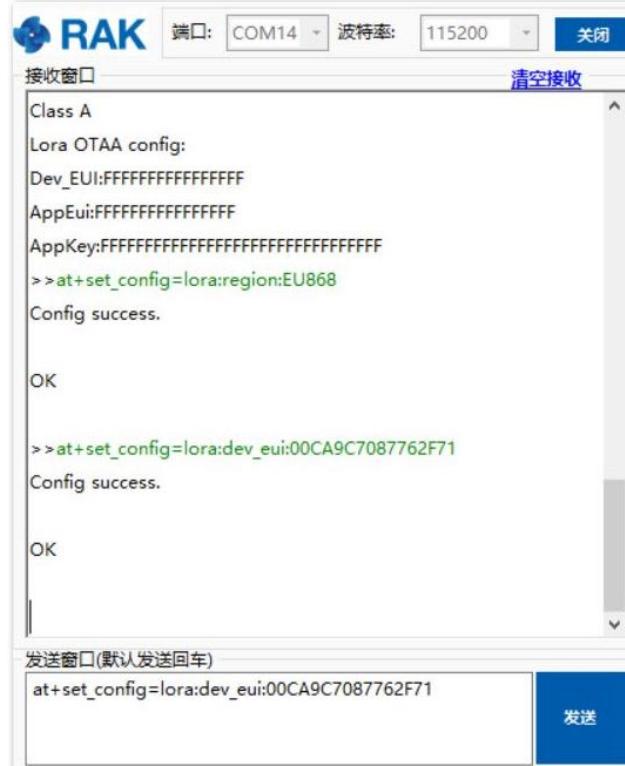


Figure 17: AT Command for OTAA LoRa Device EUI via RAK Serial Port Tool

5. Set the Application EUI:

```
at+set_config=lora:app_eui:XXXX
```

sh



Figure 18: AT Command for OTAA LoRa Application EUI via RAK Serial Port Tool

6. Set the Application Key:

```
at+set_config=lora:app_key:XXXX
```



Figure 19: AT Command for OTAA LoRa Application Key via RAK Serial Port Tool

 NOTE

After configuring all parameters, you need to reset RAK4200 Evaluation Board to save the parameters!

7. After resetting RAK4200 Evaluation Board, join in OTAA mode:

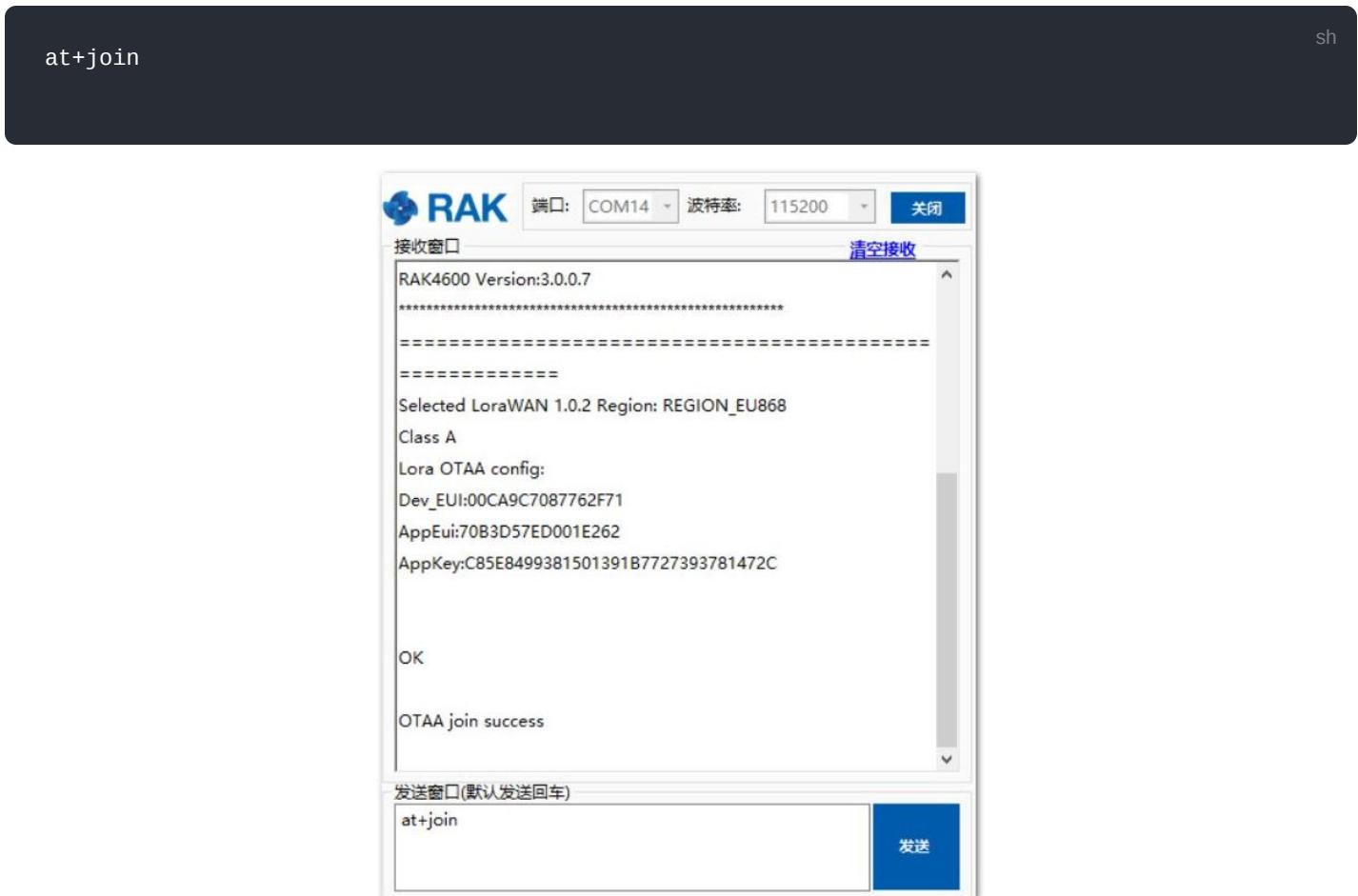


Figure 20: AT Command for OTAA LoRa Join via RAK Serial Port Tool

8. Joined successfully! Try to send data from the RAK4200 Evaluation Board to TTN:

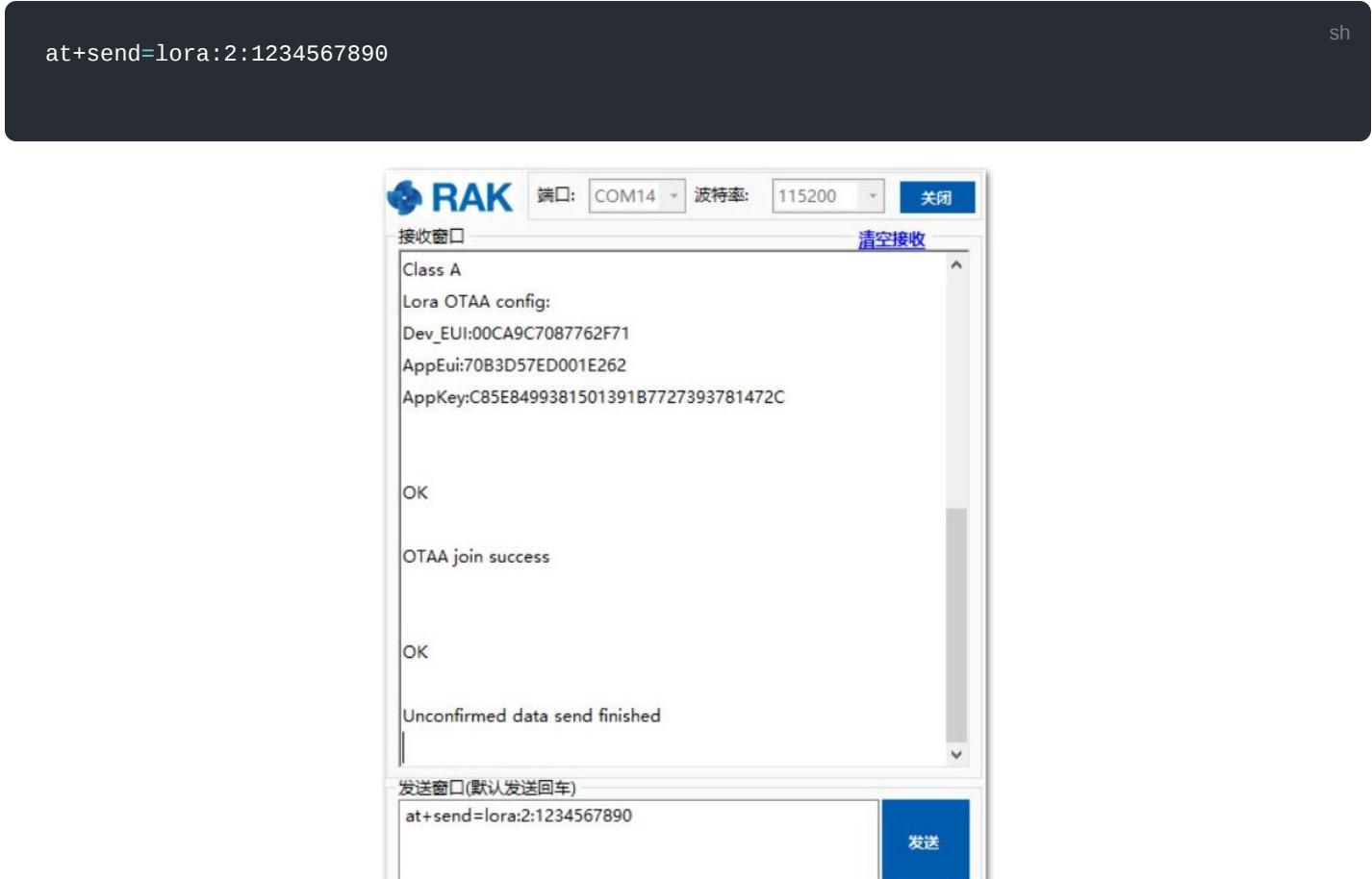


Figure 21: OTAA Test Sample Data Sent via RAK Serial Port Tool

You can see the data sent from RAK4200 Evaluation Board on TTN website as shown in Figure 22.

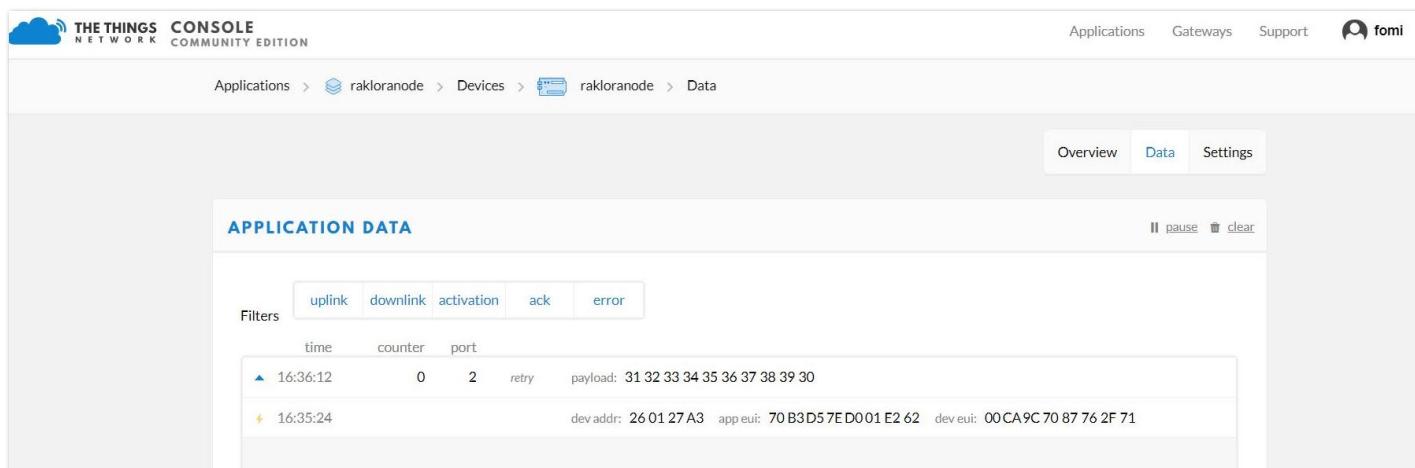


Figure 22: OTAA Test Sample Data Sent Viewed in The Things Network

ABP Mode

1. First, change the activation method to ABP as shown in Figure 23.

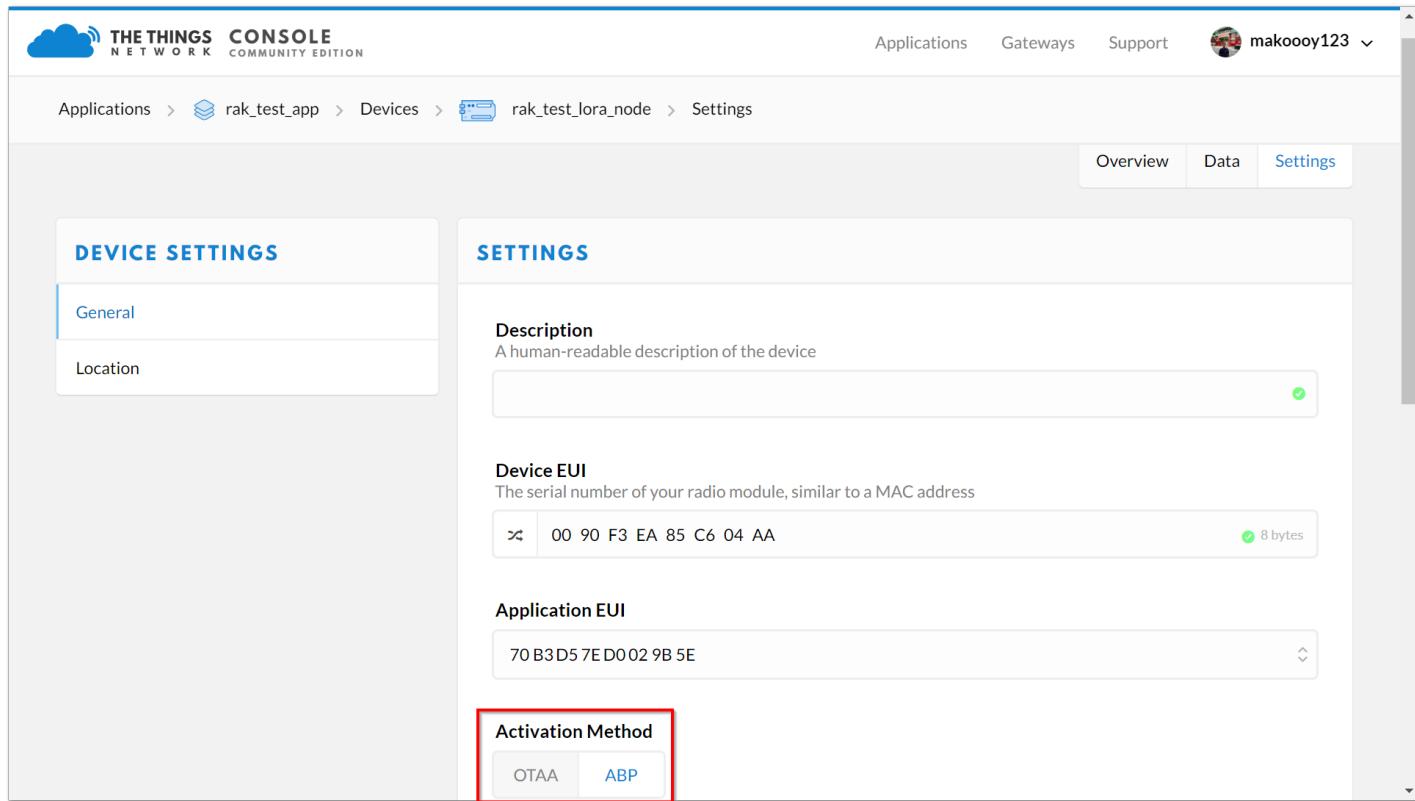


Figure 23: ABP Activation in The Things Network

2. Three parameters will be used to setup RAK4200 Evaluation Board on ABP mode: **Device Address**, **Network Session Key**, and **App Session Key**.

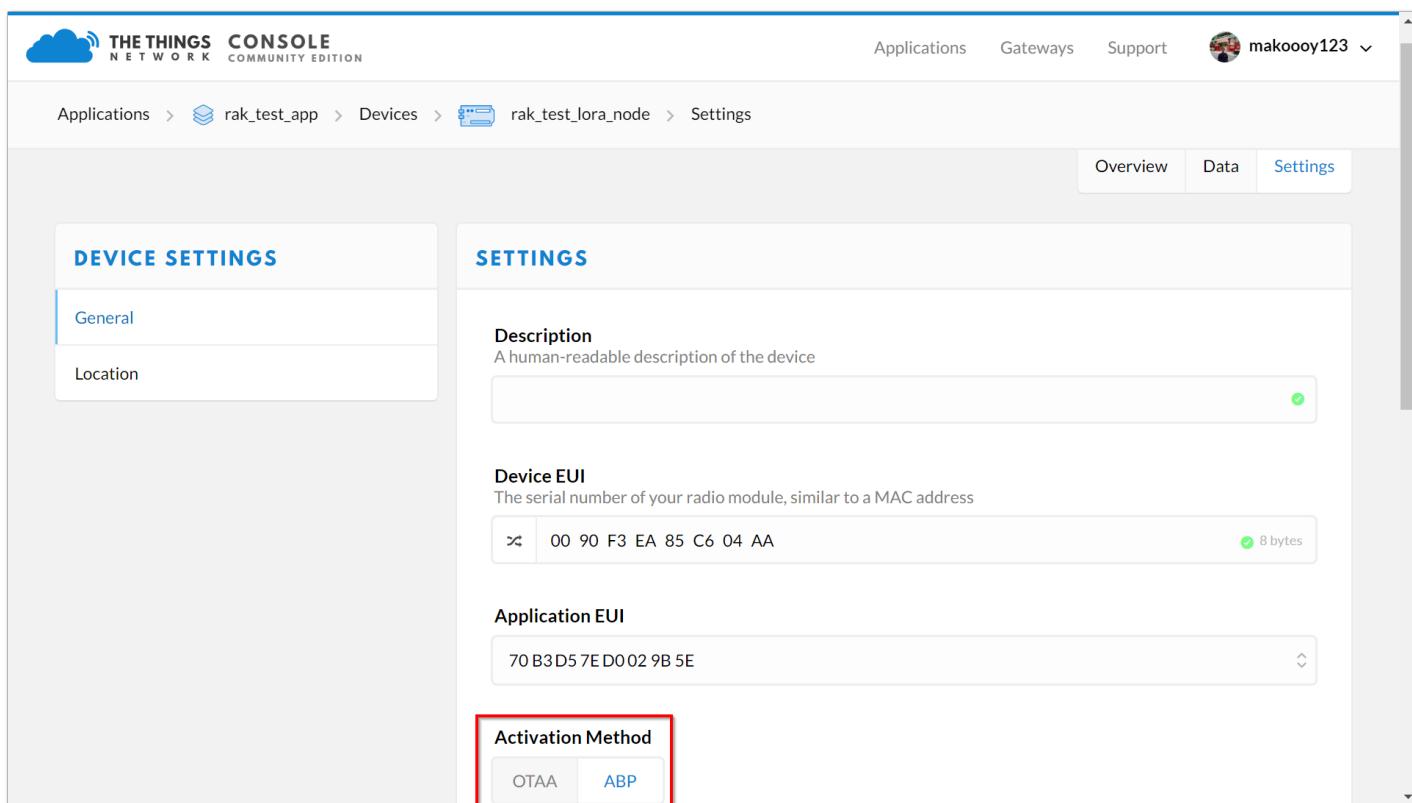


Figure 24: ABP Parameters in The Things Network

NOTE

As an example, join in ABP mode, EU868 frequency, and LoRa class A.

3. If the join mode is not ABP Mode, just set the LoRa join mode to **ABP** as follows:

```
at+set_config=lora:join_mode:1
```



Figure 25: ABP Parameters in The Things Network

4. Set the LoRa class to **Class A**:

```
at+set_config=lora:class:0
```

sh



Figure 26: AT Command for ABP LoRa Class via RAK Serial Port Tool

5. Set the frequency/region to **EU868**:

```
at+set_config=lora:region:EU868
```

sh



Figure 27: AT Command for ABP LoRa Class via RAK Serial Port Tool

6. Set the Device Address:

```
at+set_config=lora:dev_addr:XXXX
```

sh



Figure 28: AT Command for ABP LoRa Device Address via RAK Serial Port Tool

7. Set the Network Session Key:

```
at+set_config=lora:nwks_key:XXXX
```

sh

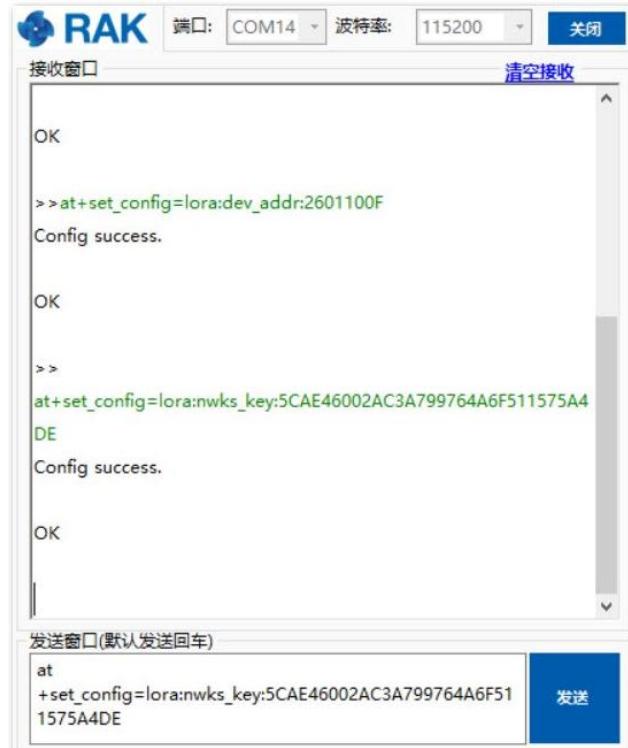


Figure 29: AT Command for ABP LoRa Network Session Key via RAK Serial Port Tool

8. Set the Application Session Key:

```
at+set_config=lora:apps_key:XXXX
```

sh

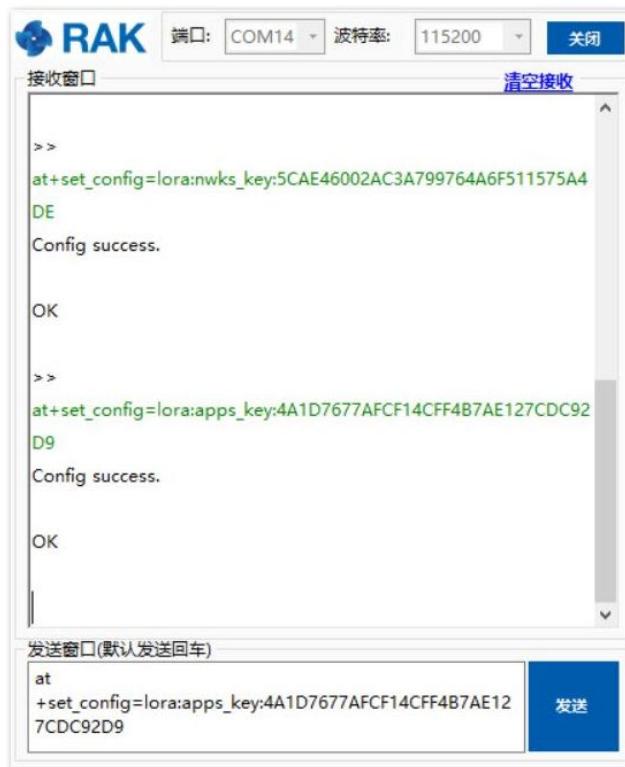


Figure 30: AT Command for ABP LoRa Application Session Key via RAK Serial Port Tool

NOTE

After configuring all parameters, you need to reset RAK4200 Evaluation Board to save the parameters.

9. After resetting your RAK4200 Evaluation Board, join in **ABP mode**:

```
at+join
```

sh



Figure 31: AT Command for ABP LoRa Join via RAK Serial Port Tool

 NOTE

There is no need to join in ABP mode; but, you still need to set this AT command to validate the parameters which you just set for ABP mode

Try to send data from the RAK4200 Evaluation Board to TTN in ABP mode.



Figure 32: OTAA Test Sample Data Sent via RAK Serial Port Tool

Connecting with Chirpstack

The **ChirpStack** or previously known as LoRaServer project provides open-source components for building LoRaWAN networks. For more details, refer to [ChirpStack website](#).

 NOTE

In this document, it is assumed that you are using a LoRa gateway with the ChirpStack configured successfully. If not, have a look at RAK documents for more details: [RAK LPWAN Gateway](#).

1. Open the web page of the ChirpStack which you want to connect with, and login.

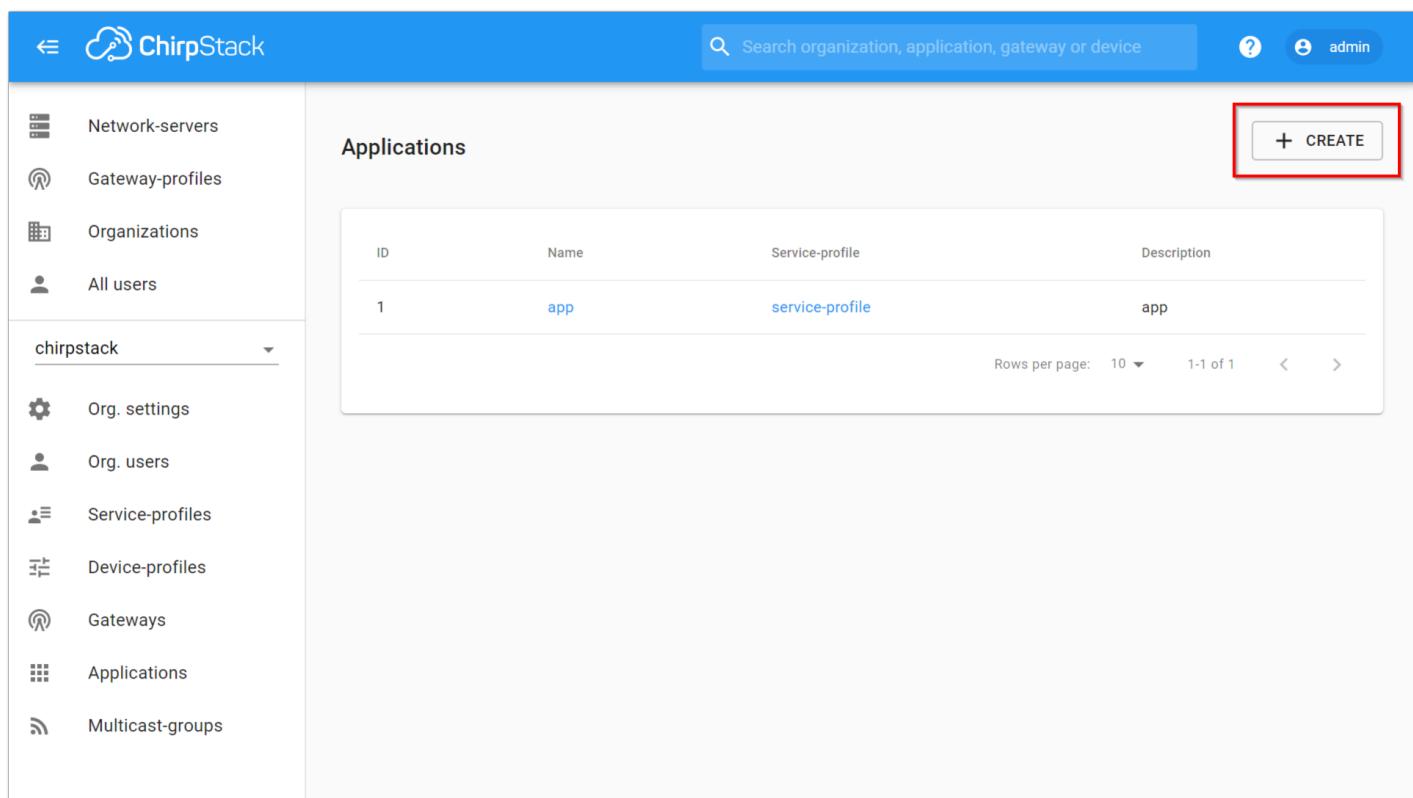


Figure 33: Chirpstack Default Window

NOTE

By default, there is already one or more items in this page. You can either use it or create a new item.

2. Create a new item by clicking the “CREATE” button, and fill up the necessary items.

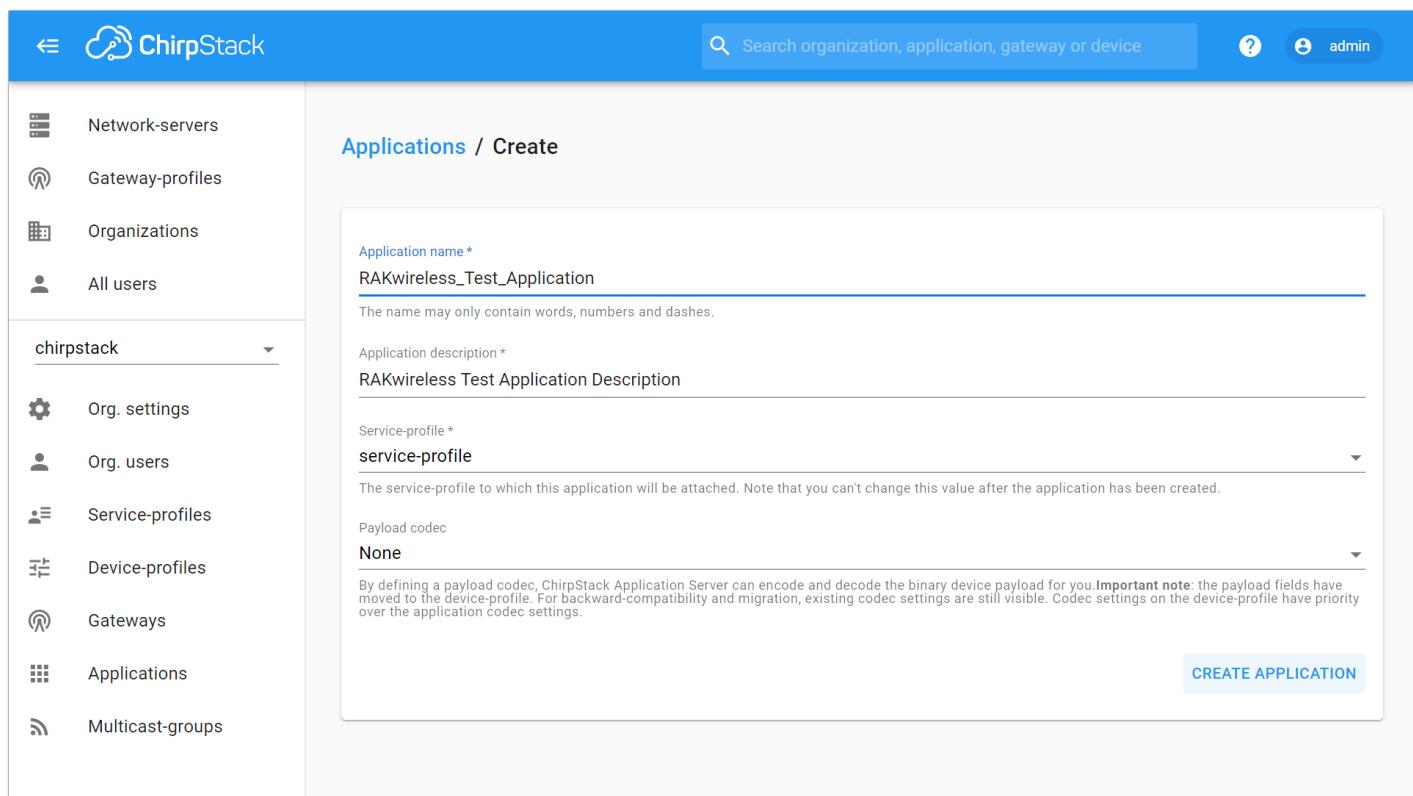
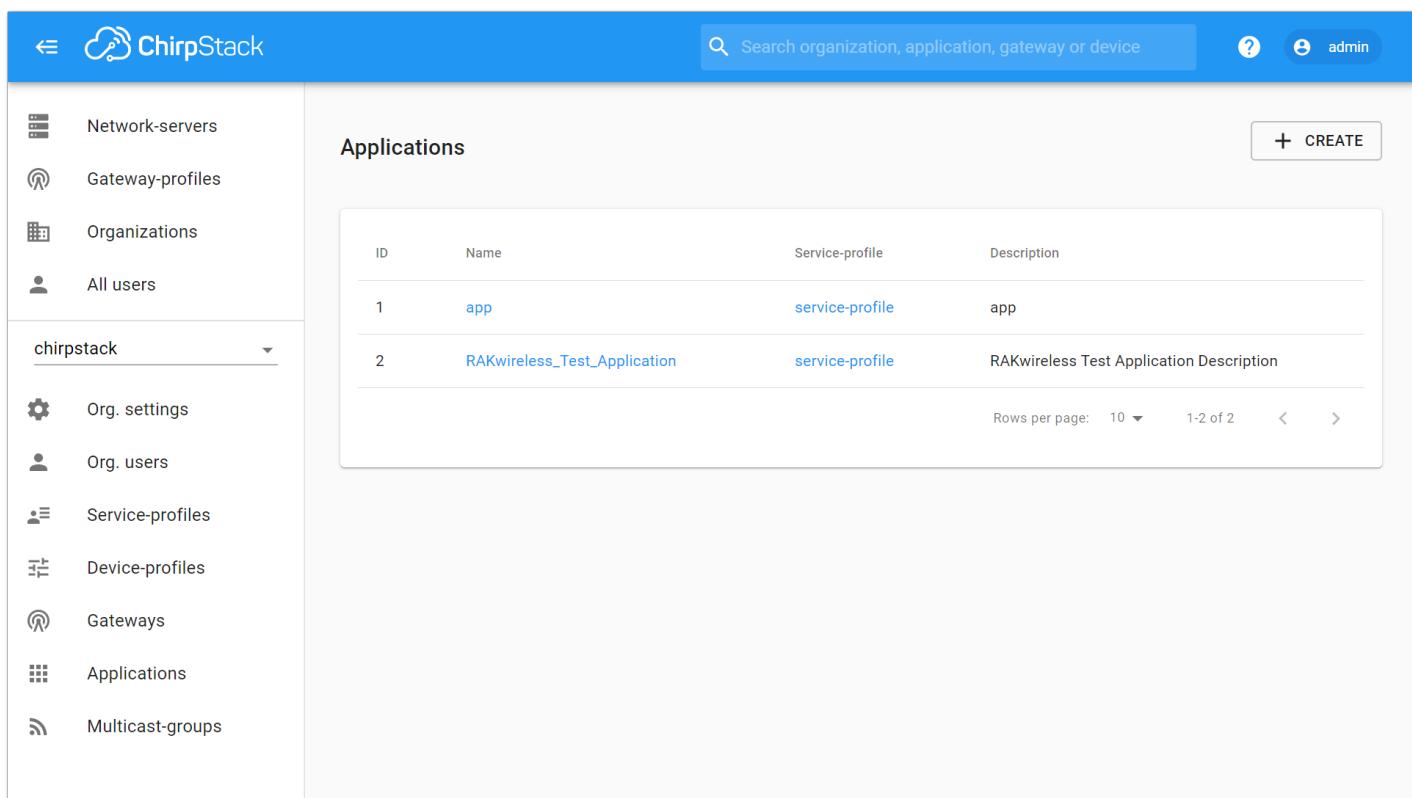


Figure 34: Chirpstack Creating Application

3. Once done, click on “CREATE APPLICATION”.



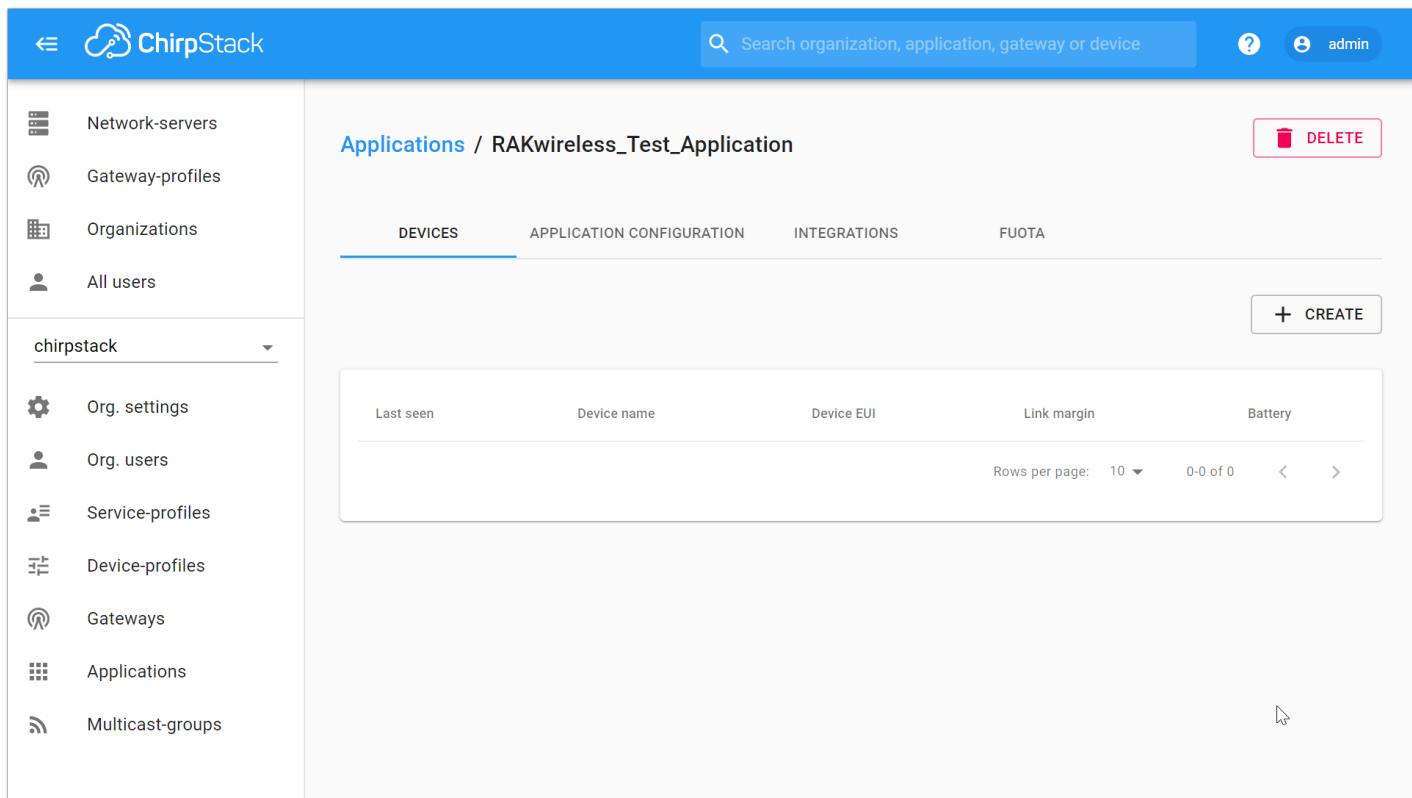
The screenshot shows the ChirpStack Documentation Center interface. The left sidebar is titled "chirpstack" and includes options like Network-servers, Gateway-profiles, Organizations, All users, Org. settings, Org. users, Service-profiles, Device-profiles, Gateways, Applications, and Multicast-groups. The main content area is titled "Applications" and lists two entries:

ID	Name	Service-profile	Description
1	app	service-profile	app
2	RAKwireless_Test_Application	service-profile	RAKwireless Test Application Description

At the bottom right of the table, there are buttons for "Rows per page: 10", "1-2 of 2", and navigation arrows.

Figure 35: Chirpstack Applications Available

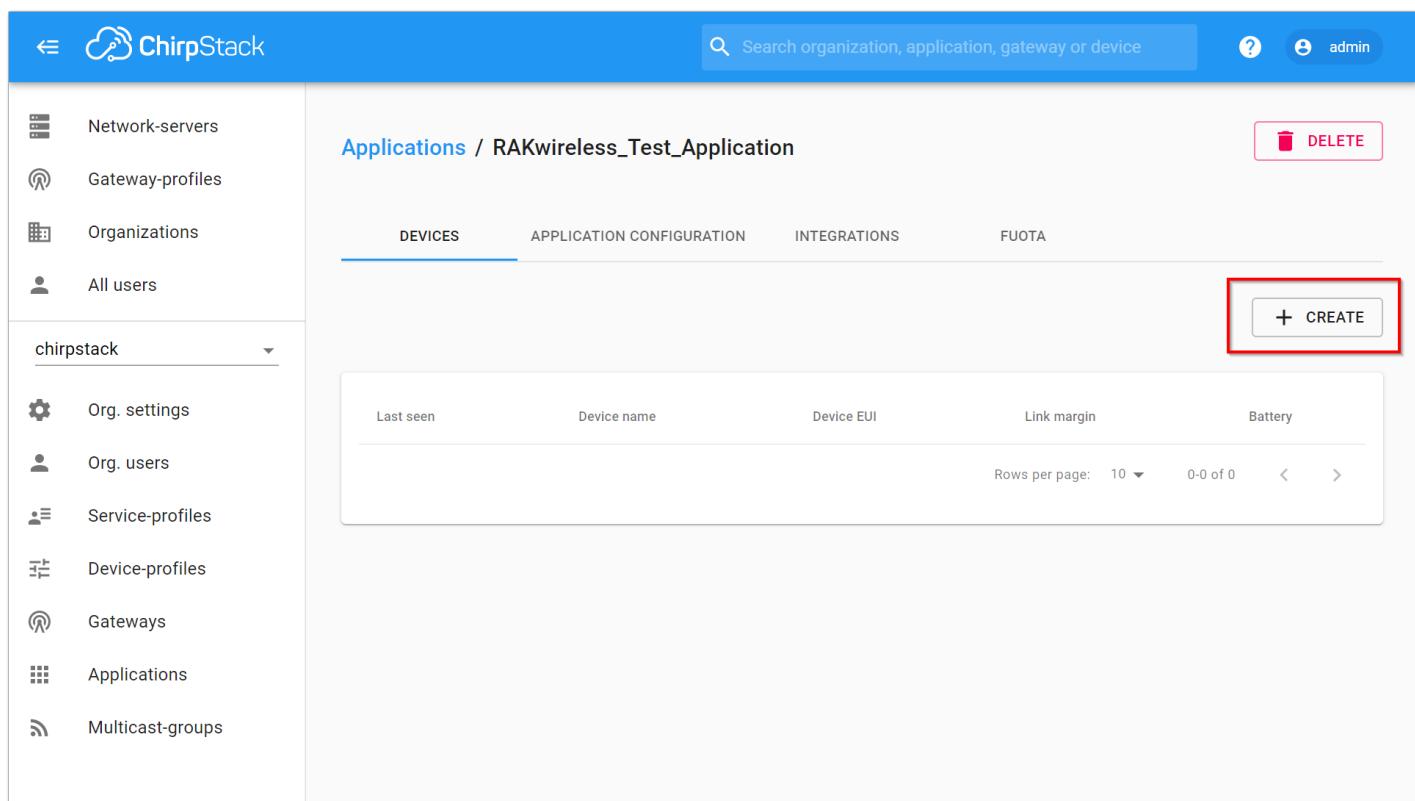
4. The list of items are then provided the same with Figure 35. Click on the new item created.



This screenshot shows the "Applications / RAKwireless_Test_Application" page. The left sidebar is identical to Figure 35. The main content area has a header "Applications / RAKwireless_Test_Application" with a "DELETE" button. Below it, there are tabs: DEVICES (which is selected), APPLICATION CONFIGURATION, INTEGRATIONS, and FUOTA. A "CREATE" button is located at the top right of the content area. The table below has columns: Last seen, Device name, Device EUI, Link margin, and Battery. At the bottom right of the table, there are buttons for "Rows per page: 10", "0-0 of 0", and navigation arrows. A cursor arrow is visible on the right side of the table.

Figure 36: Applications Page in Chirpstack

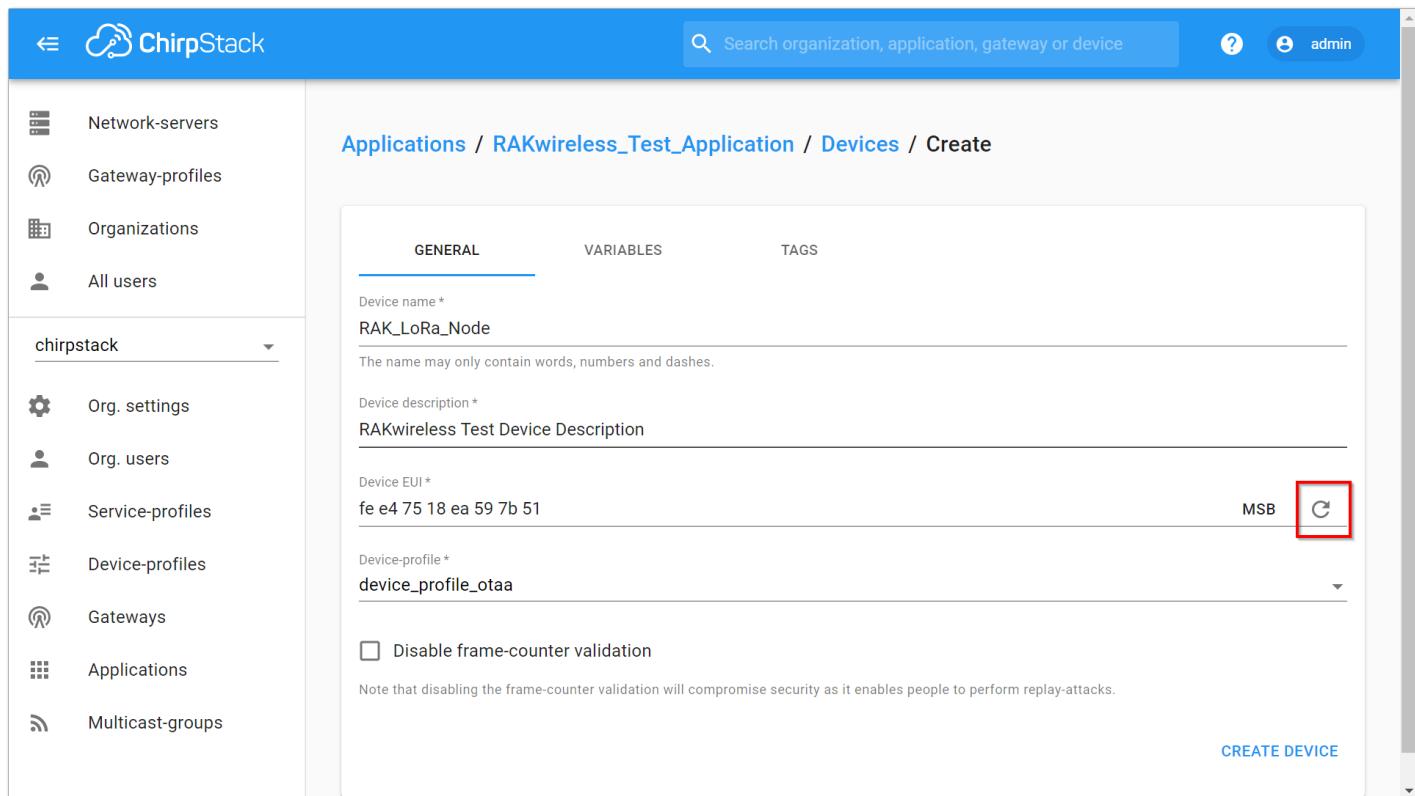
5. Add a node device into ChirpStack by clicking the “CREATE” button.



The screenshot shows the ChirpStack Documentation Center interface. On the left, there's a sidebar with various navigation options like Network-servers, Gateway-profiles, Organizations, All users, and a dropdown for 'chirpstack'. The main content area is titled 'Applications / RAKwireless_Test_Application'. Below the title, there are tabs for DEVICES (which is active), APPLICATION CONFIGURATION, INTEGRATIONS, and FUOTA. In the top right of the main area, there are 'DELETE' and '+ CREATE' buttons. A red box highlights the '+ CREATE' button. The main content area displays a table with columns: Last seen, Device name, Device EUI, Link margin, and Battery. At the bottom of the table, it says 'Rows per page: 10 ▾ 0-0 of 0 < >'.

Figure 37: Chirpstack Adding Node into the RAK4200 Evaluation Board

- Once the node is created, fill-in the necessary data. You can generate a Device EUI automatically by clicking the following icon, or you can write a correct Device EUI in the edit box.

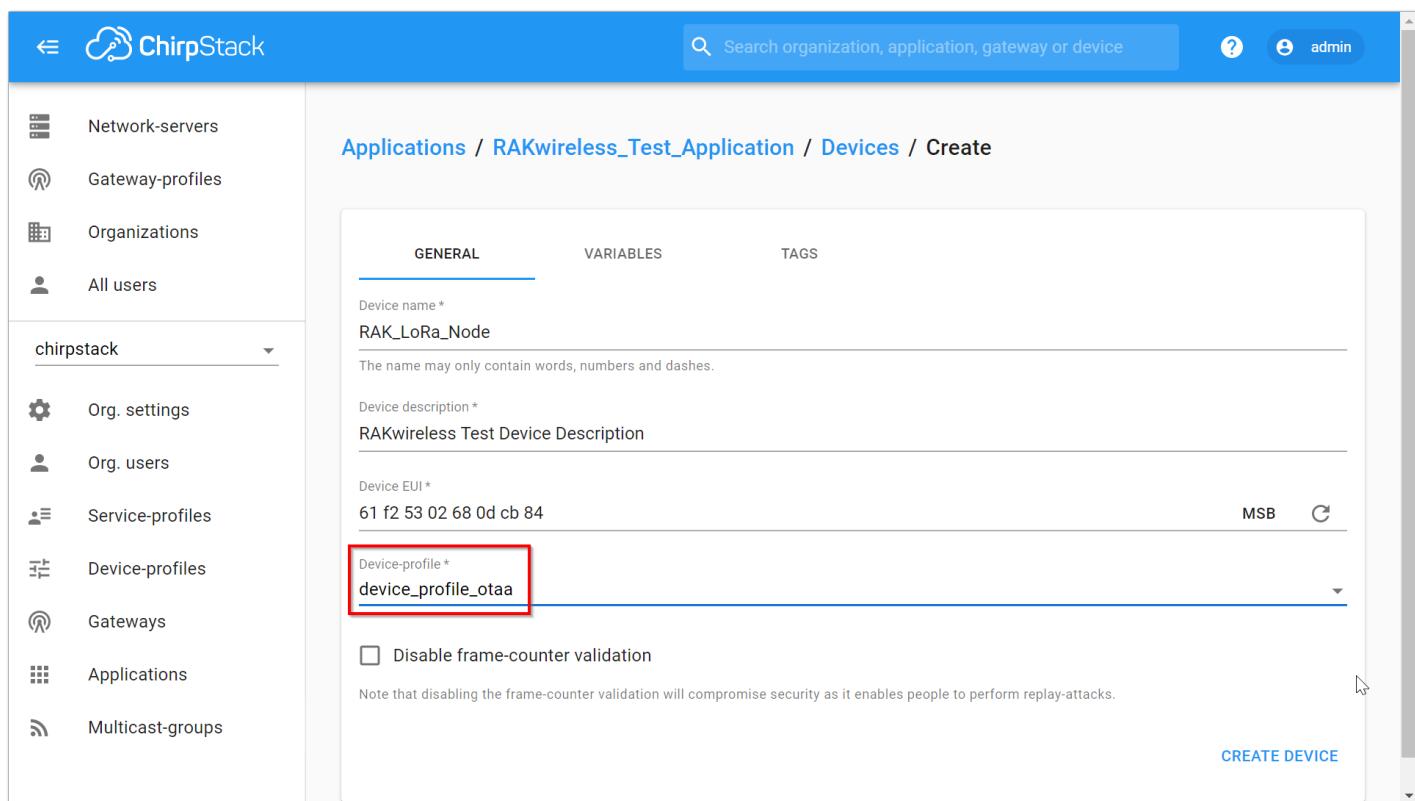


The screenshot shows the 'Create Device' form. The 'GENERAL' tab is selected. The 'Device name *' field contains 'RAK_LoRa_Node'. The 'Device description *' field contains 'RAKwireless Test Device Description'. The 'Device EUI *' field contains 'fe e4 75 18 ea 59 7b 51'. To the right of this field, there are 'MSB' and a 'C' icon (copy). The 'Device-profile *' field contains 'device_profile_otaa'. There's a checkbox for 'Disable frame-counter validation' with a note below stating 'Note that disabling the frame-counter validation will compromise security as it enables people to perform replay-attacks.' At the bottom right, there's a 'CREATE DEVICE' button.

Figure 38: Chirpstack Adding Parameters in the Node

OTAA Mode

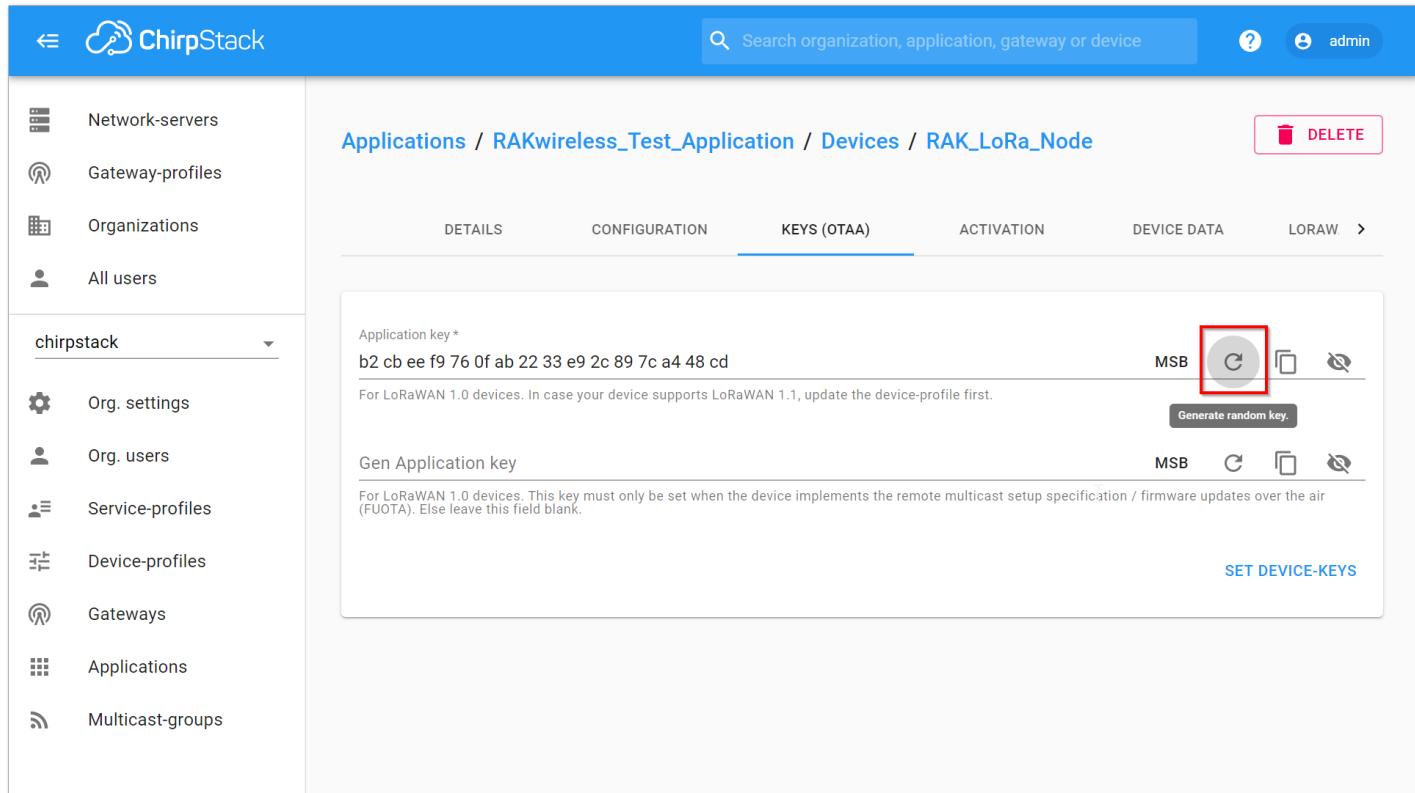
- If you select “**device_profile_otaa**”, it means you want to join ChirpStack in **OTAA mode**.



The screenshot shows the ChirpStack Documentation Center interface. On the left, there's a sidebar with various navigation options like Network-servers, Gateway-profiles, Organizations, All users, and a dropdown for 'chirpstack'. The main area is titled 'Applications / RAKwireless_Test_Application / Devices / Create'. It has tabs for GENERAL, VARIABLES, and TAGS, with GENERAL selected. Under GENERAL, there are fields for 'Device name *' (RAK_LoRa_Node), 'Device description *' (RAKwireless Test Device Description), and 'Device EUI *' (61 f2 53 02 68 0d cb 84). A dropdown for 'Device-profile *' is shown with 'device_profile_otaa' selected, which is highlighted with a red box. There's also a checkbox for 'Disable frame-counter validation' with a note about replay-attacks. At the bottom right is a 'CREATE DEVICE' button.

Figure 39: Chirpstack OTAA Activation

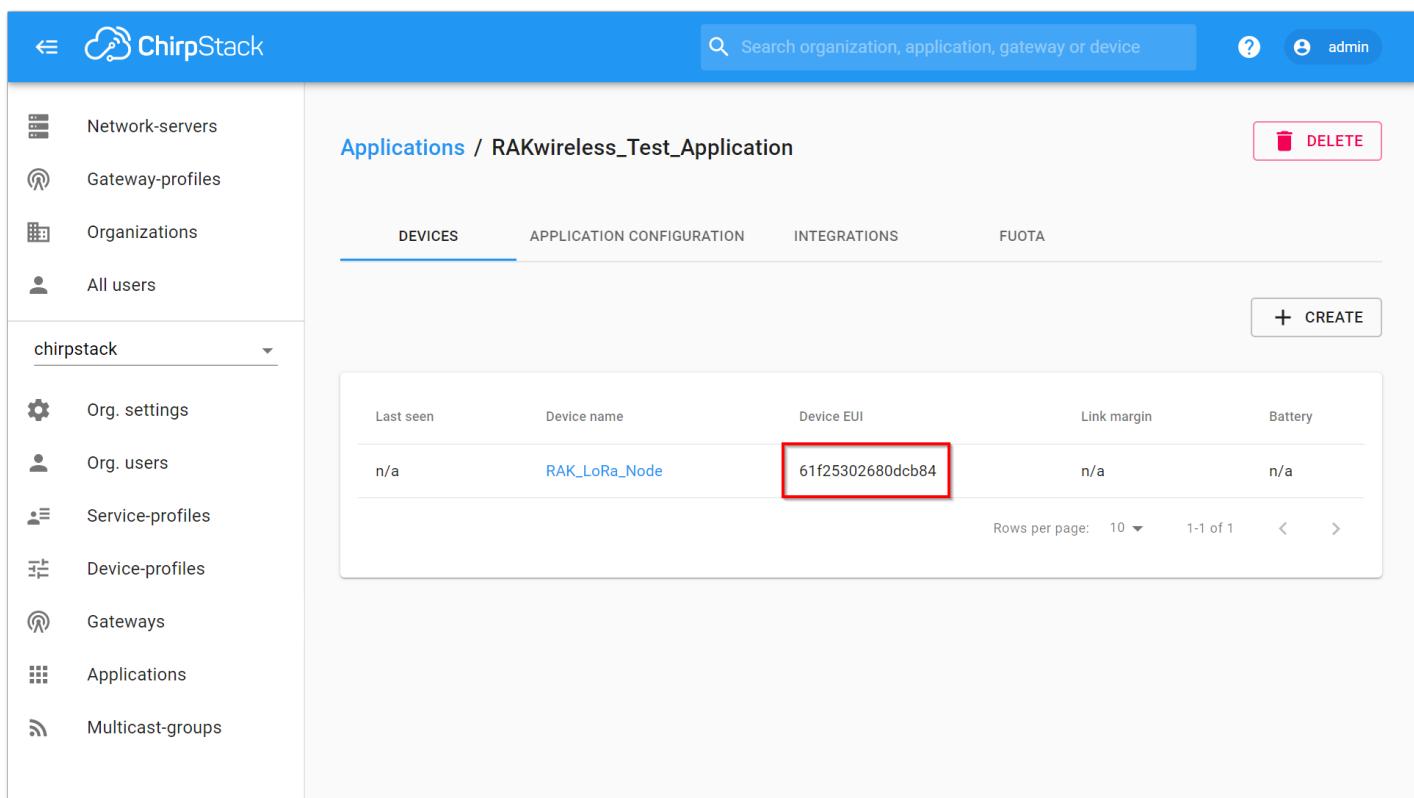
- Click “**CREATE DEVICE**” then generate the application key in this page. You can write it by yourself or generate it automatically by clicking the following icon and press “**SET DEVICE-KEYS**”.



The screenshot shows the ChirpStack Documentation Center interface for the 'RAK_LoRa_Node' device. The sidebar is the same as Figure 39. The main area has tabs for DETAILS, CONFIGURATION, KEYS (OTAA), ACTIVATION, DEVICE DATA, and LORAWAN. The KEYS (OTAA) tab is selected. It shows an 'Application key *' field containing 'b2 cb ee f9 76 0f ab 22 33 e9 2c 89 7c a4 48 cd' with an 'MSB' and 'Generate random key' button. Below it is a 'Gen Application key' field with a note for LoRaWAN 1.0 devices. At the bottom right is a 'SET DEVICE-KEYS' button. A red box highlights the 'Generate random key' button.

Figure 40: Chirpstack OTAA Set Device Keys

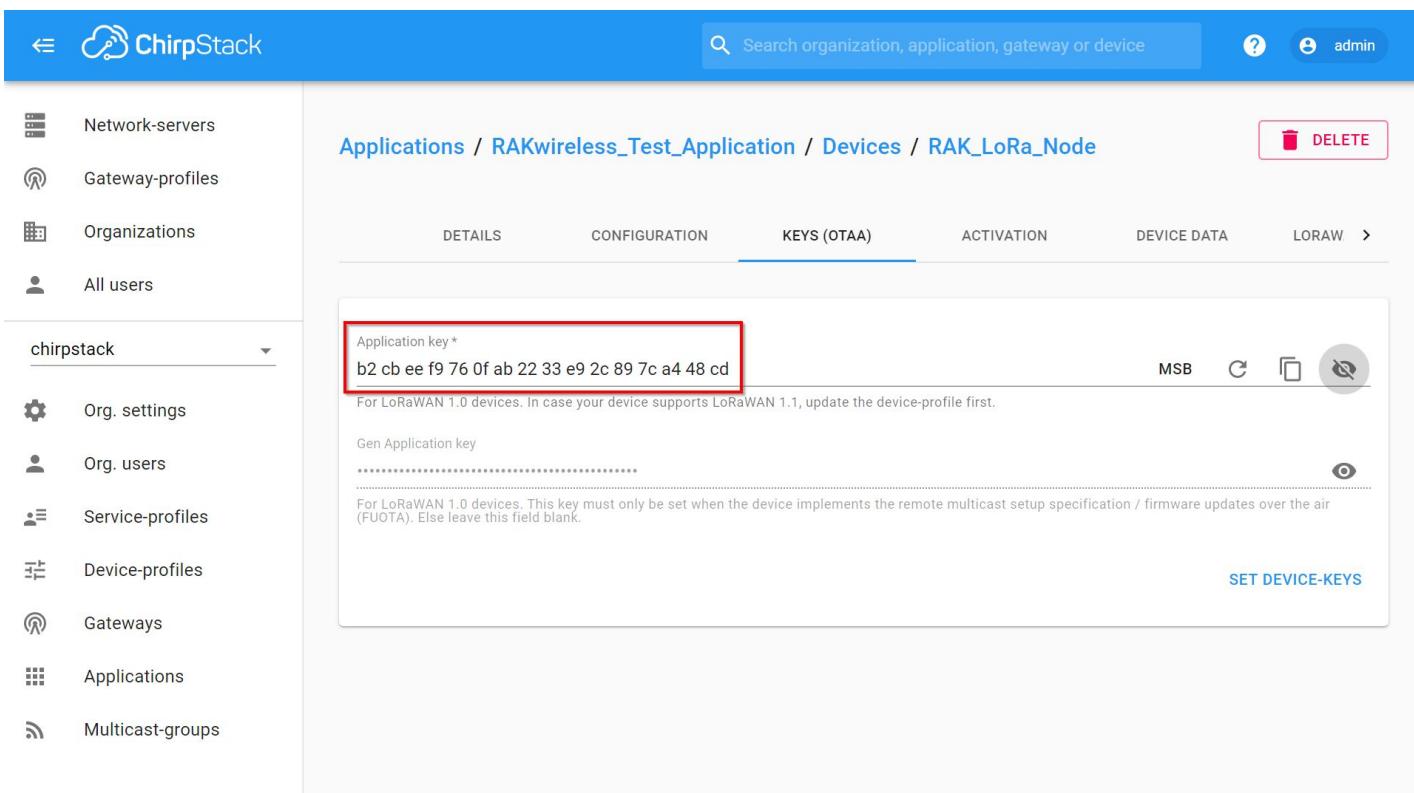
- Set the **Device EUI** for the RAK4200 Evaluation Board using the "**dev_eui**".



The screenshot shows the ChirpStack Documentation Center interface. On the left, there's a sidebar with various management options like Network-servers, Gateway-profiles, Organizations, and Applications. The main area is titled "Applications / RAKwireless_Test_Application". Below it, there are tabs for DEVICES, APPLICATION CONFIGURATION, INTEGRATIONS, and FUOTA. The DEVICES tab is selected. It lists a single device: "RAK_LoRa_Node". The table columns include Last seen, Device name, Device EUI, Link margin, and Battery. The Device EUI column for the RAK_LoRa_Node entry is highlighted with a red box and contains the value "61f25302680dcb84". At the bottom right of the table, there are pagination controls showing "Rows per page: 10" and "1-1 of 1".

Figure 41: Chirpstack OTAA Set Device EUI

4. Set the Application Key for the RAK4200 Evaluation Board using the "app_key".



The screenshot shows the ChirpStack Documentation Center interface. The left sidebar is identical to Figure 41. The main area is titled "Applications / RAKwireless_Test_Application / Devices / RAK_LoRa_Node". Below it, there are tabs for DETAILS, CONFIGURATION, KEYS (OTAA), ACTIVATION, DEVICE DATA, and LORAWAN. The KEYS (OTAA) tab is selected. In the "Application key" field, the value "b2 cb ee f9 76 0f ab 22 33 e9 2c 89 7c a4 48 cd" is entered and highlighted with a red box. There are also sections for "Gen Application key" and "For LoRaWAN 1.0 devices. In case your device supports LoRaWAN 1.1, update the device-profile first." At the bottom right, there are icons for MSB, C, and a copy button, along with a "SET DEVICE-KEYS" button.

Figure 42: Chirpstack OTAA Set Application Key

NOTE

The Application EUI which will be set into RAK4200 Evaluation Board as "app_eui" is not necessary for ChirpStack, and you can set it to any value with a correct format.

5. Configure RAK4200 Evaluation Board by using the available commands found in the [AT Commands for RAK4200 Evaluation Board](#). Connect the RAK4200 Evaluation Board to your Windows PC.
6. Power it **ON** and open **RAK Serial Port Tool** on your Windows PC as instructed in the [Interfacing with RAK4200 Evaluation Board](#) section.

 NOTE

The default join mode is **OTAA**, the default class is **Class A** and the default region is **EU868**.

7. If the **join mode** is not in OTAA, just set the LoRa join mode to **OTAA** as follows:

```
at+set_config=lora:join_mode:0
```



Figure 43: Chirpstack OTAA Join Mode via RAK Serial Port Tool

8. Set the LoRa class to **Class A**:

```
at+set_config-lora:class:0
```



Figure 44: Chirpstack OTAA Set Class via RAK Serial Port Tool

9. Set the frequency/region to **EU868**:

```
at+set_config=lora:region:EU868
```

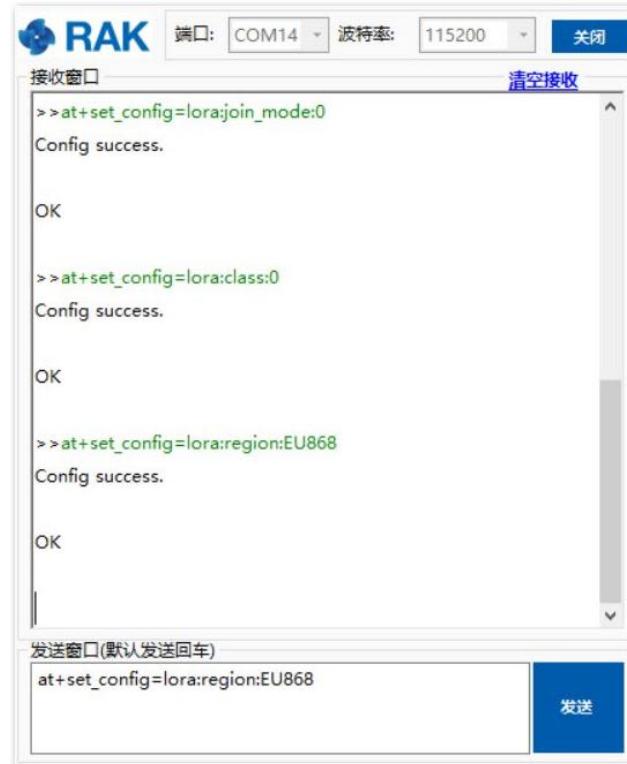


Figure 45: Chirpstack OTAA Set Region/Frequency via RAK Serial Port Tool

10. Set the Device EUI:

```
at+set_config=lora:dev_eui:XXXX
```

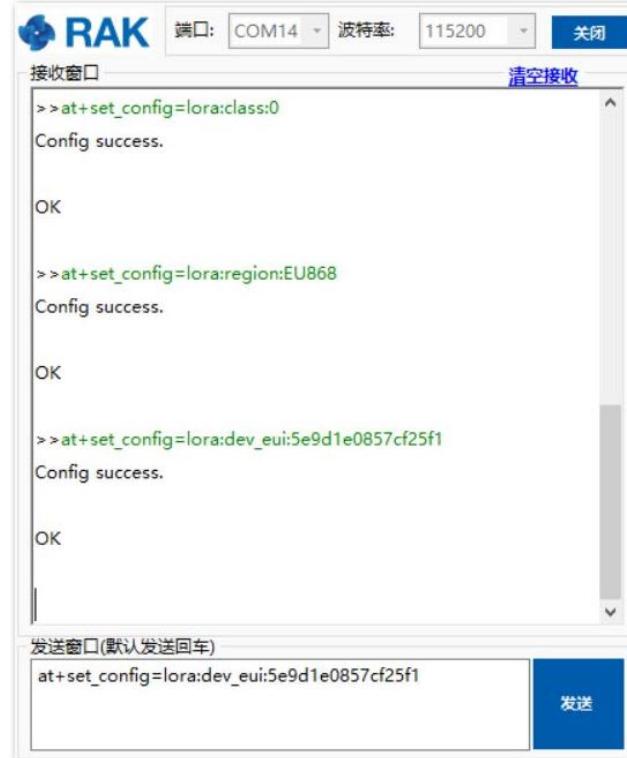


Figure 46: Chirpstack OTAA Set Application EUI via RAK Serial Port Tool

11. Set the Application EUI:

at+set_config=lora:app_eui:XXXX

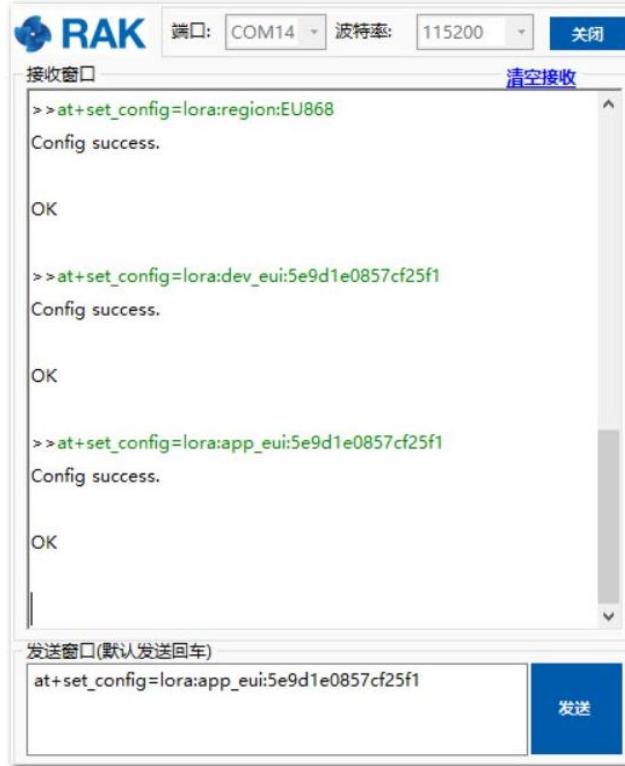


Figure 47: Chirpstack OTAA Set Application EUI via RAK Serial Port Tool

12. Set the Application Key:

at+set_config=lora:app_key:XXXXX



Figure 48: Chirpstack OTAA Set Application Key via RAK Serial Port Tool

NOTE

After configuring all parameters, you need to reset RAK4200 Evaluation Board to save the parameters.

13. After reset, send join command:

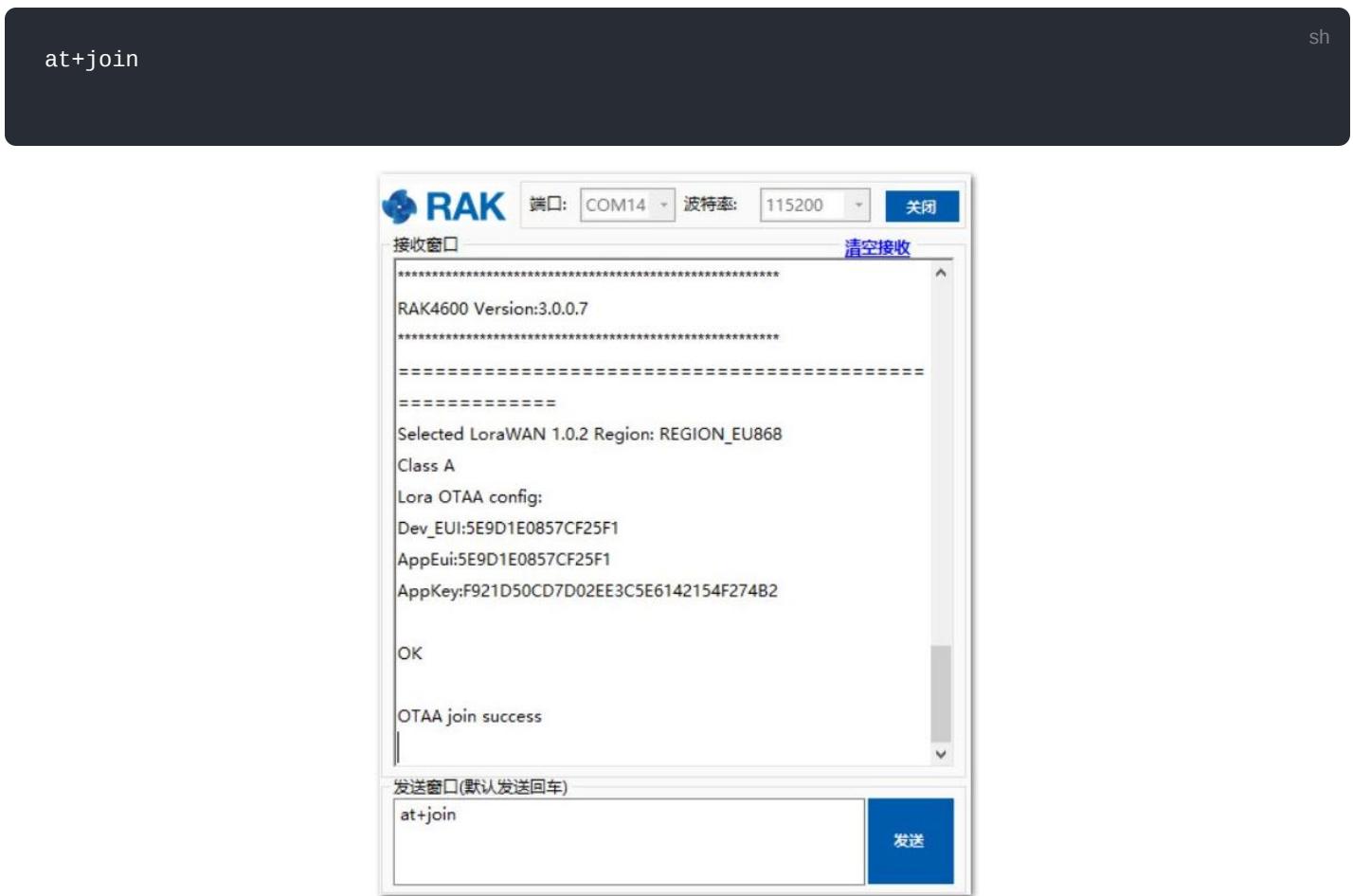


Figure 49: Chirpstack OTAA Join via RAK Serial Port Tool

14. You can see the **JoinRequest** and **JoinAccept** on ChirpStack page:

Event	Time	Type	Associated Key
Downlink	5:42:29 PM	JoinAccept	5e9d1e0857cf25f1
Uplink	5:42:29 PM	JoinRequest	5e9d1e0857cf25f1

Figure 50: Chirpstack OTAA JoinRequest and JoinAccept

15. Try to send data from RAK4200 Evaluation Board to ChirpStack:



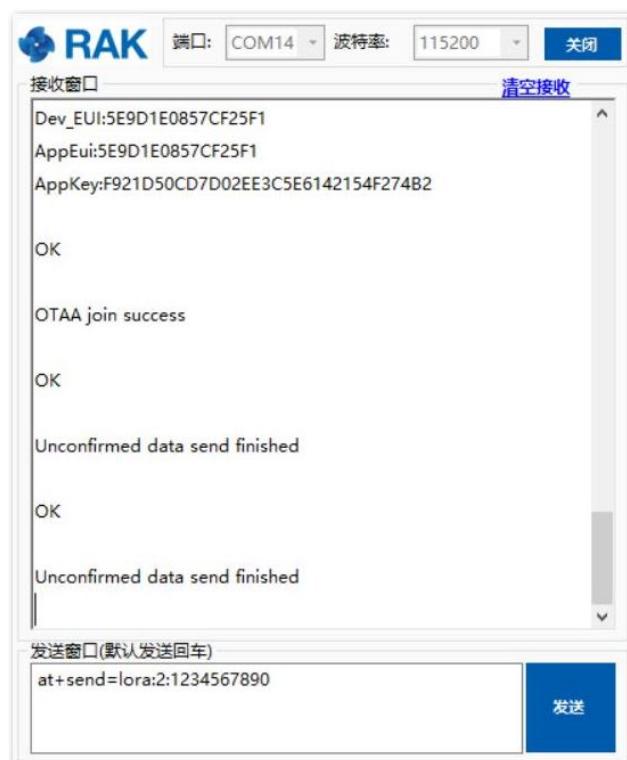


Figure 51: Chirpstack OTAA Sample Data Sent via RAK Serial Port Tool

- You can then see the message on ChirpStack page the same as shown in Figure 52.

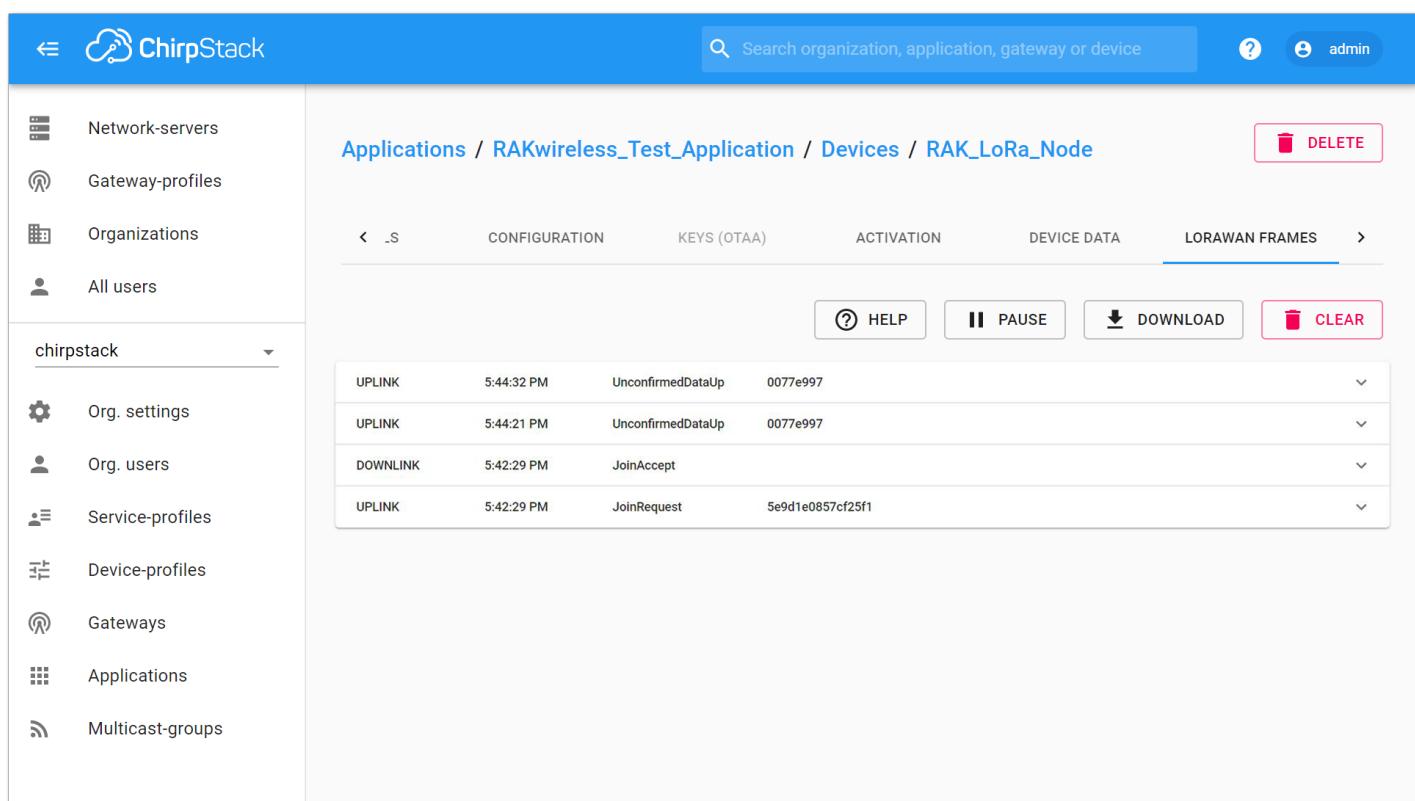


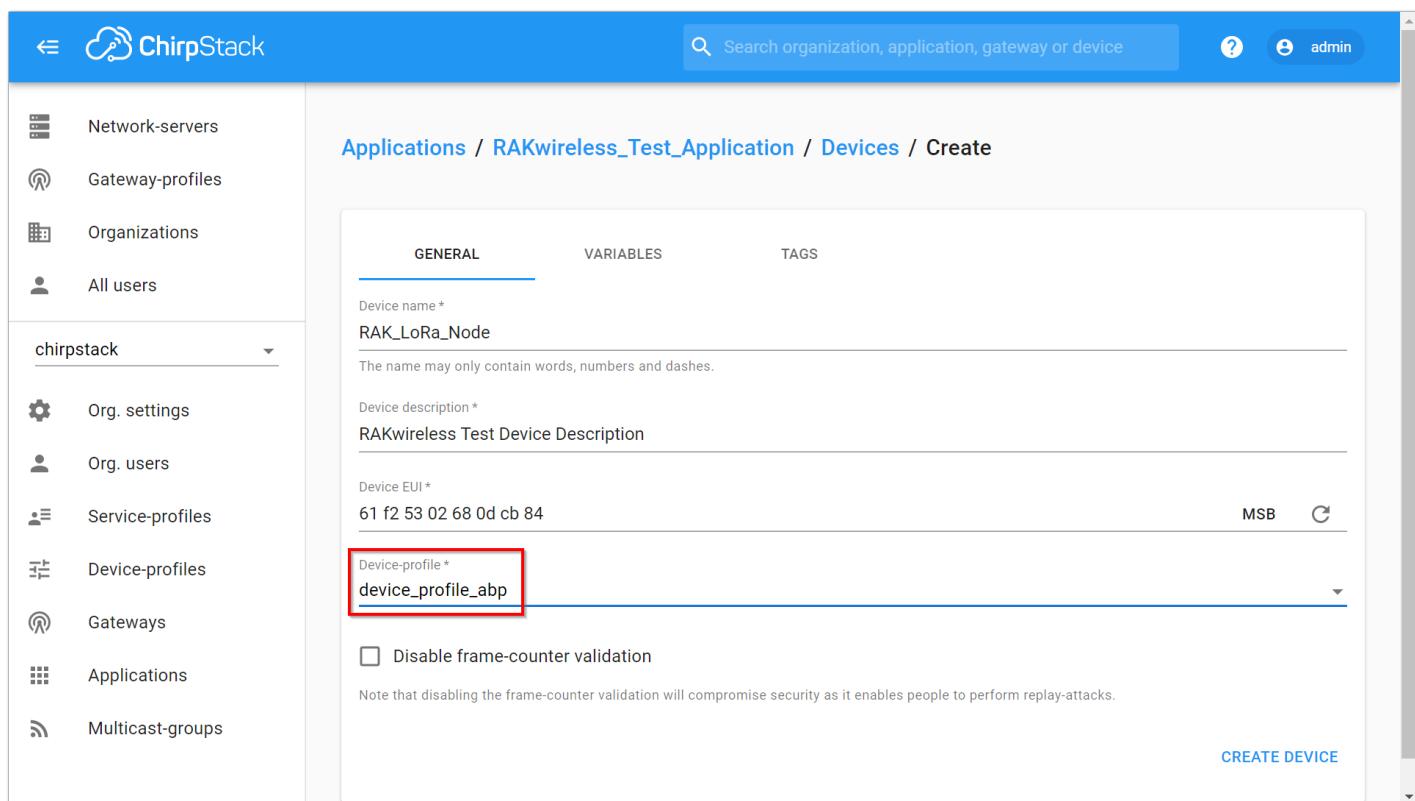
Figure 52: Chirpstack Data Received Preview

ABP Mode

1. If you select “DeviceProfile_ABP” or “DeviceProfile_ABP_CN470”, it means you want to join ChirpStack in **ABP mode**.

WARNING

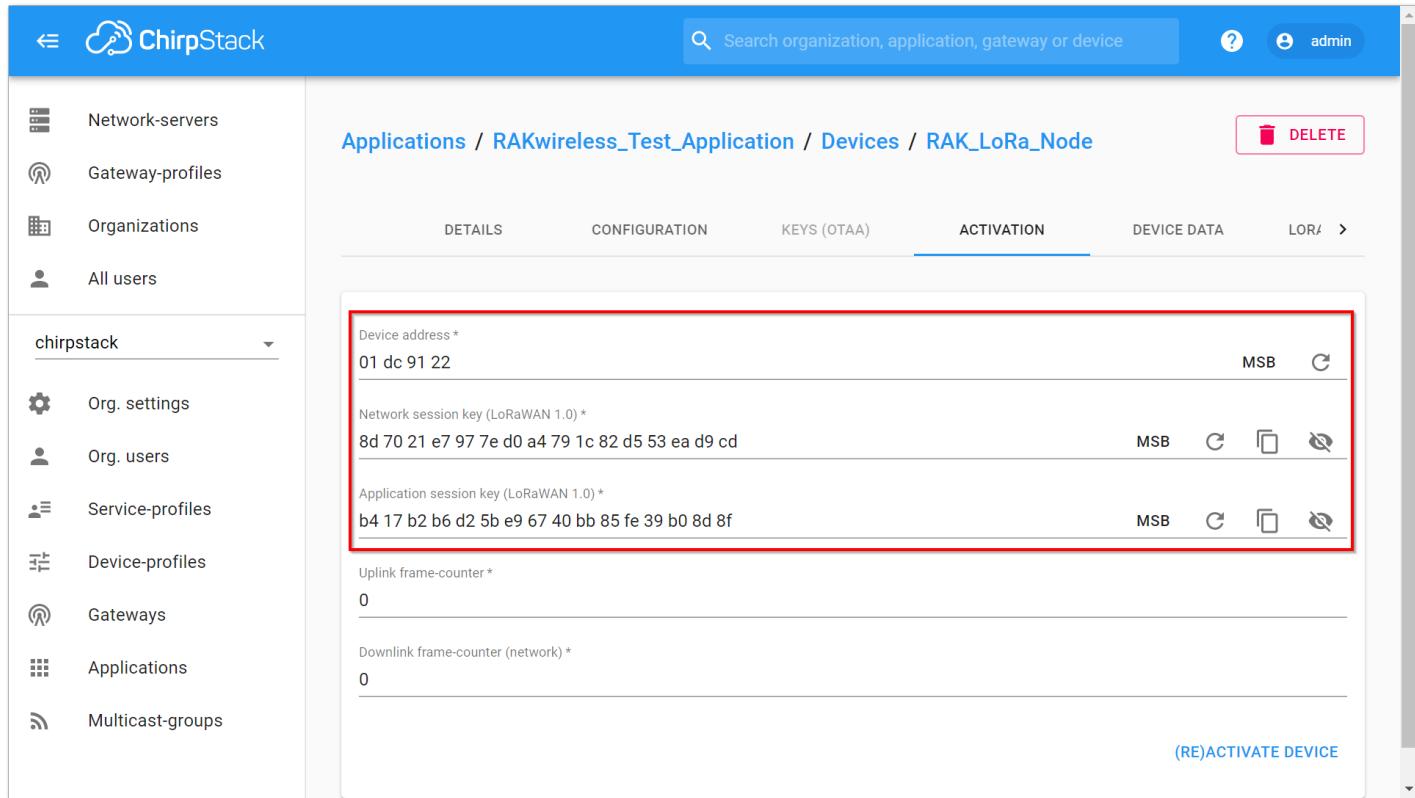
The frequency AS923 in ABP Mode is not supported in Chirpstack.



The screenshot shows the ChirpStack Documentation Center interface. On the left, there's a sidebar with various navigation options like Network-servers, Gateway-profiles, Organizations, All users, and a dropdown for 'chirpstack' which includes Org. settings, Org. users, Service-profiles, Device-profiles, Gateways, Applications, and Multicast-groups. The main area is titled 'Applications / RAKwireless_Test_Application / Devices / Create'. It has tabs for GENERAL, VARIABLES, and TAGS, with GENERAL selected. Under GENERAL, there are fields for 'Device name *' (RAK_LoRa_Node), 'Device description *' (RAKwireless Test Device Description), and 'Device EUI *' (61 f2 53 02 68 0d cb 84). A dropdown for 'Device-profile *' has 'device_profile_abp' selected and is highlighted with a red box. There's also a checkbox for 'Disable frame-counter validation' with a note below it about replay-attacks. At the bottom right is a 'CREATE DEVICE' button.

Figure 53: Chirpstack ABP Activation

2. As highlighted in Figure 54, you can see the ABP parameters in the “**ACTIVATION**” item:



The screenshot shows the ChirpStack Documentation Center interface for the 'RAK_LoRa_Node' device. The sidebar is identical to Figure 53. The main area shows the device details with tabs for DETAILS, CONFIGURATION, KEYS (OTAA), ACTIVATION (which is selected and highlighted with a red box), and DEVICE DATA. In the ACTIVATION tab, there are fields for 'Device address *' (01 dc 91 22), 'Network session key (LoRaWAN 1.0) *' (8d 70 21 e7 97 7e d0 a4 79 1c 82 d5 53 ea d9 cd), and 'Application session key (LoRaWAN 1.0) *' (b4 17 b2 b6 d2 5b e9 67 40 bb 85 fe 39 b0 8d 8f). These three fields are all highlighted with a red box. Below them are fields for 'Uplink frame-counter *' (0) and 'Downlink frame-counter (network) *' (0). At the bottom right is a '(RE)ACTIVATE DEVICE' button.

Figure 54: Chirpstack ABP Activation Parameters Needed

3. Use these parameters to set RAK4200 Evaluation Board by using AT command. Set **LoRa join** mode to **ABP**:

```
at+set_config=lora:join_mode:1
```

sh



Figure 55: Chirpstack ABP Join Mode via RAK Serial Port Tool

4. Set LoRa class to Class A:

```
at+set_config=lora:class:0
```



Figure 56: Chirpstack ABP Set Class via RAK Serial Port Tool

5. Set the frequency/region to EU868:

```
at+set_config=lora:region:EU868
```



Figure 57: Chirpstack ABP Set Region/Frequency via RAK Serial Port Tool

6. Set the Device Address:

```
at+set_config=lora:dev_addr:XXXX
```

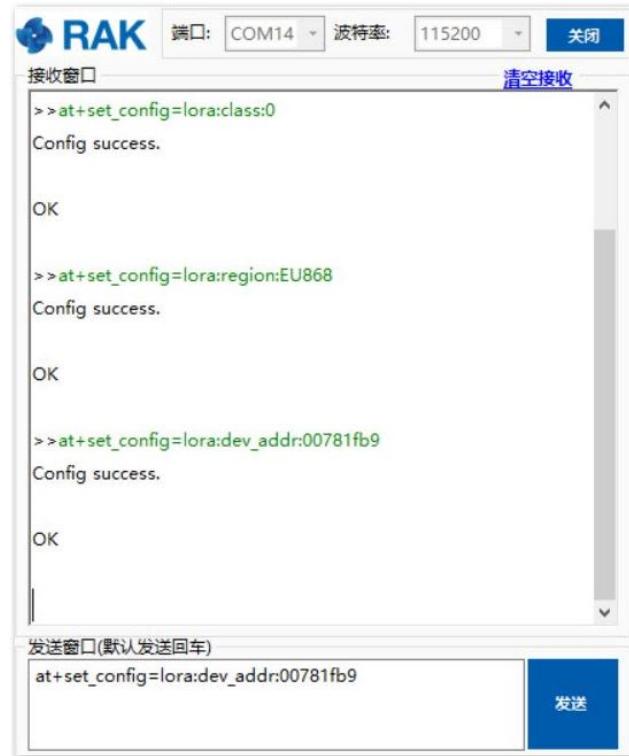


Figure 58: Chirpstack ABP Set Device Address via RAK Serial Port Tool

7. Set the Network Session Key:

```
at+set_config=lora:nwks_key:XXXX
```



Figure 59: Chirpstack ABP Set Network Session Key via RAK Serial Port Tool

8. Set the Application Session Key:

```
at+set_config=lora:apps_key:XXXX
```



Figure 60: Chirpstack ABP Set Application Session Key via RAK Serial Port Tool

NOTE

After configuring all parameters, you need to reset RAK4200 Evaluation Board to save the parameters!

9. After resetting RAK4200 Evaluation Board, join in ABP mode:

```
at+join
```



Figure 61: Chirpstack ABP Join via RAK Serial Port Tool

NOTE

It is not needed to join in ABP mode; but, you still need to set this AT command to validate the parameters which you just set for ABP mode.

10. Try to send data from RAK4200 Evaluation Board to ChirpStack:

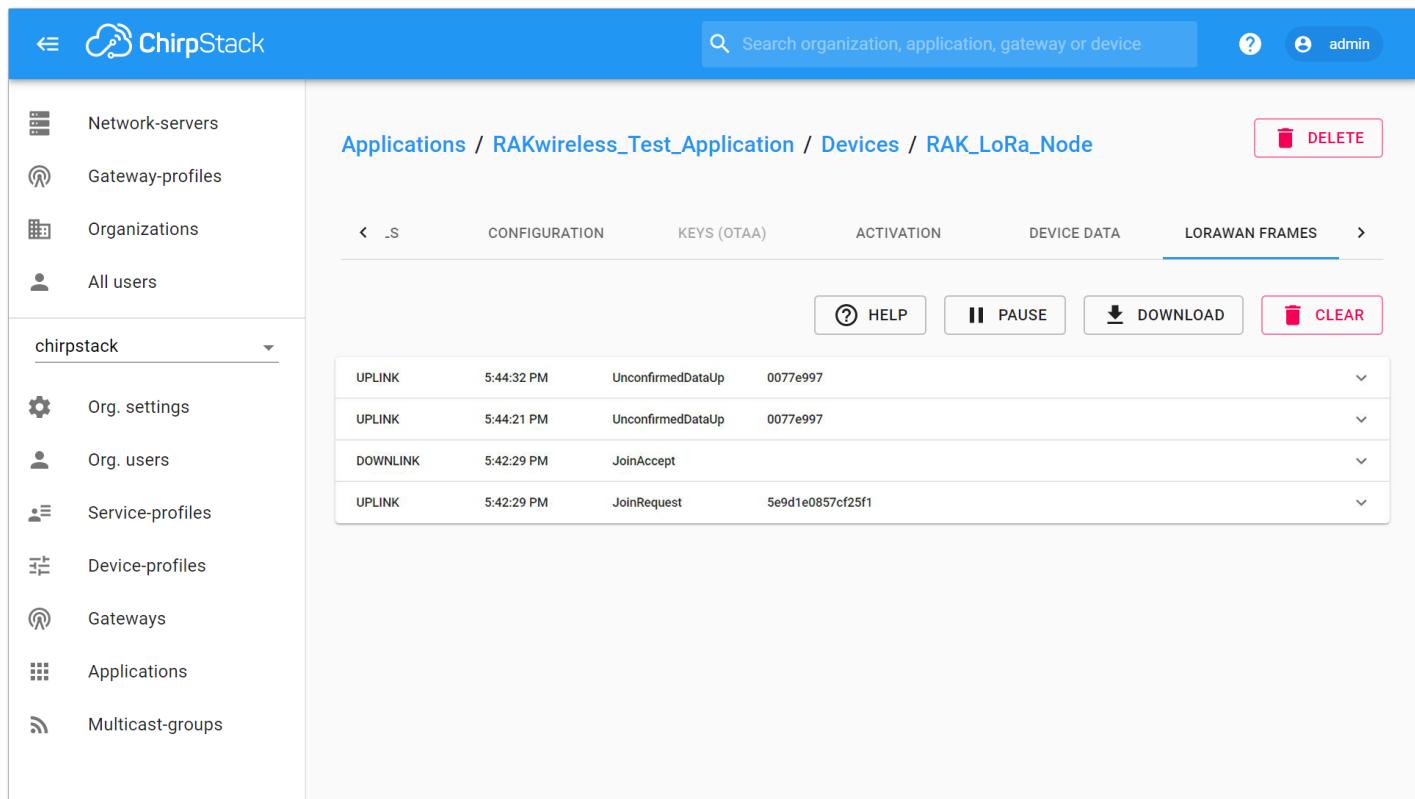
```
at+send=lora:2:123456789
```

sh



Figure 62: Chirpstack Sample Data Sent via RAK Serial Port Tool

- You can see the data which is just sent from RAK4200 Evaluation Board on ChirpStack page:



The screenshot shows the ChirpStack web interface. On the left is a sidebar with navigation links: Network-servers, Gateway-profiles, Organizations, All users, and a dropdown menu for 'chirpstack' which contains: Org. settings, Org. users, Service-profiles, Device-profiles, Gateways, Applications, and Multicast-groups. The main content area has a breadcrumb navigation: Applications / RAKwireless_Test_Application / Devices / RAK_LoRa_Node. There is a search bar at the top right and a user account icon for 'admin'. Below the breadcrumb, there are tabs: CONFIGURATION, KEYS (OTAA), ACTIVATION, DEVICE DATA, and LORAWAN FRAMES, with LORAWAN FRAMES being the active tab. At the bottom of the main content area are several buttons: HELP, PAUSE, DOWNLOAD, and CLEAR. The LORAWAN FRAMES table lists the following data:

Type	Time	Content	
UPLINK	5:44:32 PM	UnconfirmedDataUp	0077e997
UPLINK	5:44:21 PM	UnconfirmedDataUp	0077e997
DOWNLINK	5:42:29 PM	JoinAccept	
UPLINK	5:42:29 PM	JoinRequest	5e9d1e0857cf25f1

Figure 63: Chirpstack Data Received Preview

LoRa P2P Mode

In this section, using P2P on the RAK4200 will be discussed. You will be using EU868 as the frequency; although, it is applicable also to other standard bands.

1. First, find two RAK4200 Evaluation Board which can work on EU868 frequency, and make sure their firmware version is not less than V3.0.0.1.
2. Next, connect these two RAK4200 Evaluation Board with your Windows PC through UART, and open two serial port tool.
3. Now, configure them to both work in LoRa P2P mode as follow:

```
at+set_config=lora:work_mode:1
```

sh



Figure 64: P2P Initialization

4. Then configure LoRa P2P parameters for both of them as follow for example:

```
at+set_config=lorap2p:XXX:Y:Z:A:B:C
```

sh

Refer to the [AT Command Manual](#) to learn about the definition of the parameters used.

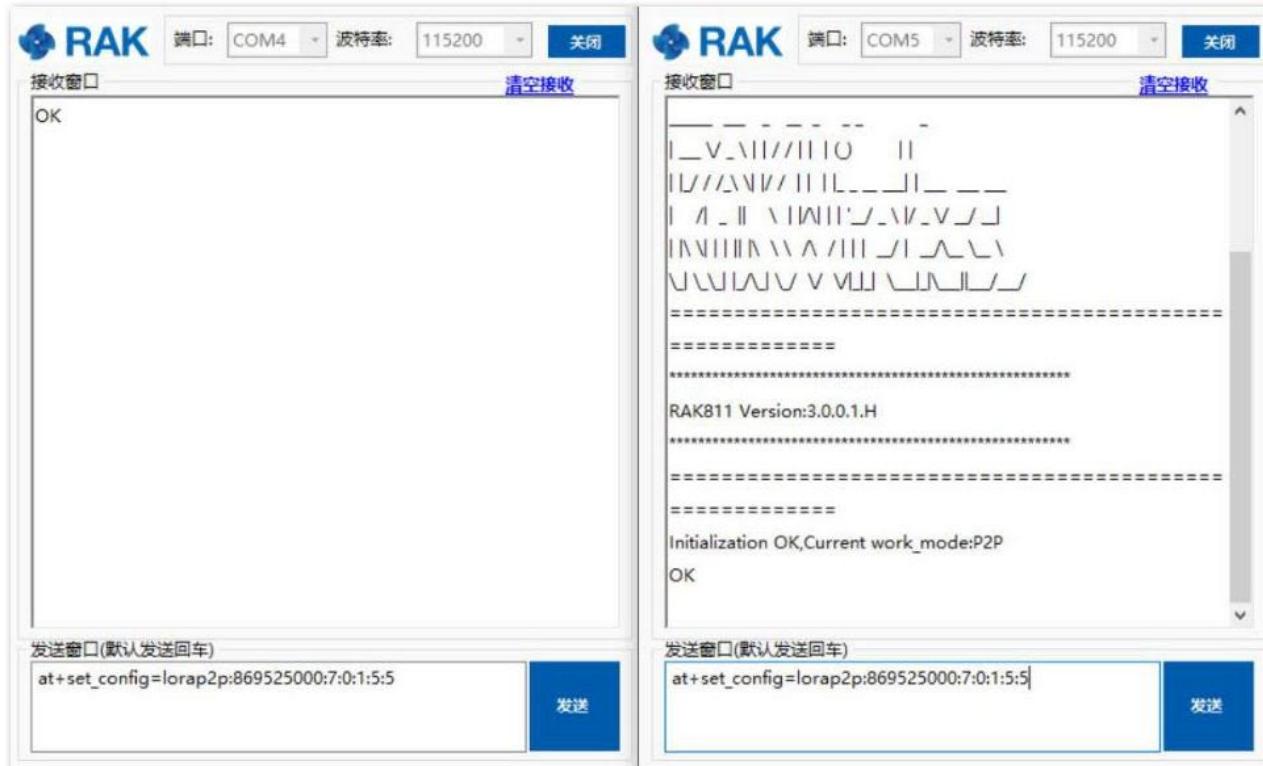


Figure 65: Configuring P2P in both RAK4200 Nodes

5. Try to send a message from the first RAK4200 Evaluation Board to the second RAK4200 Evaluation Board.

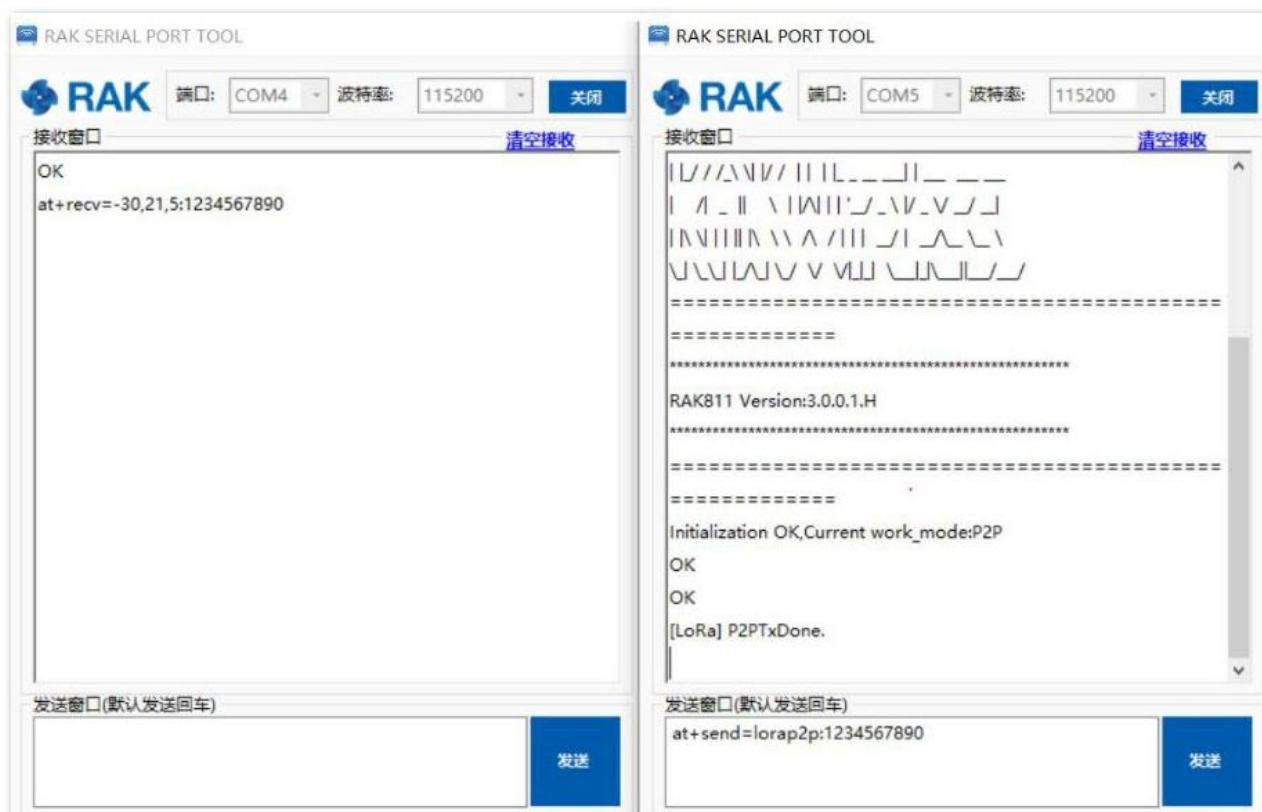


Figure 66: Message sent and received status in the two nodes

6. Success! Now, you can send more messages.

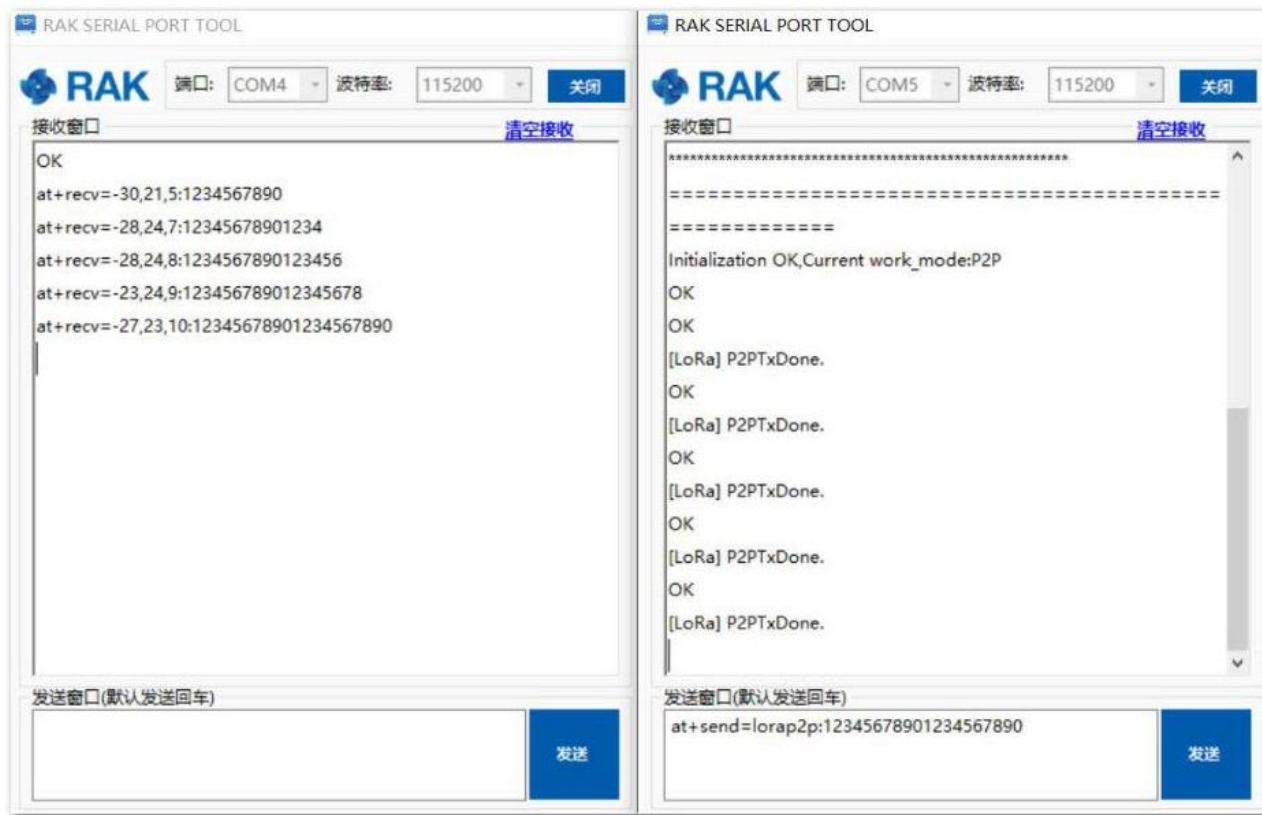


Figure 67: Succeeding Messages sent to the other node

Miscellaneous

Burning the bootloader into the Device

The RAK4200 Evaluation Board bootloader is already pre-installed upon manufacturing, so this bootloader upgrade steps are not necessary. If you find that the bootloader of your RAK4200 Evaluation Board is damaged, contact our support though our [RAKwireless forum](#).

Upgrading the Firmware

The following steps show you how to update the firmware for RAK4200 WisDuo LPWAN Module connected to the Baseboard:

1. Download and install the software needed in your PC.

- [RAK Serial Port Tool](#)
- [RAK4200 Firmware](#)
- [RAK Device Firmware Upgrade \(DFU\) Tool](#)

2. Connect your RAK4200 Evaluation Board in your Windows PC as instructed in the [Interfacing with RAK4200 Evaluation Board](#) section.

3. Open the RAK Serial Port Tool you have just installed and let RAK4200 work in boot mode by sending an AT command through serial port as follows:

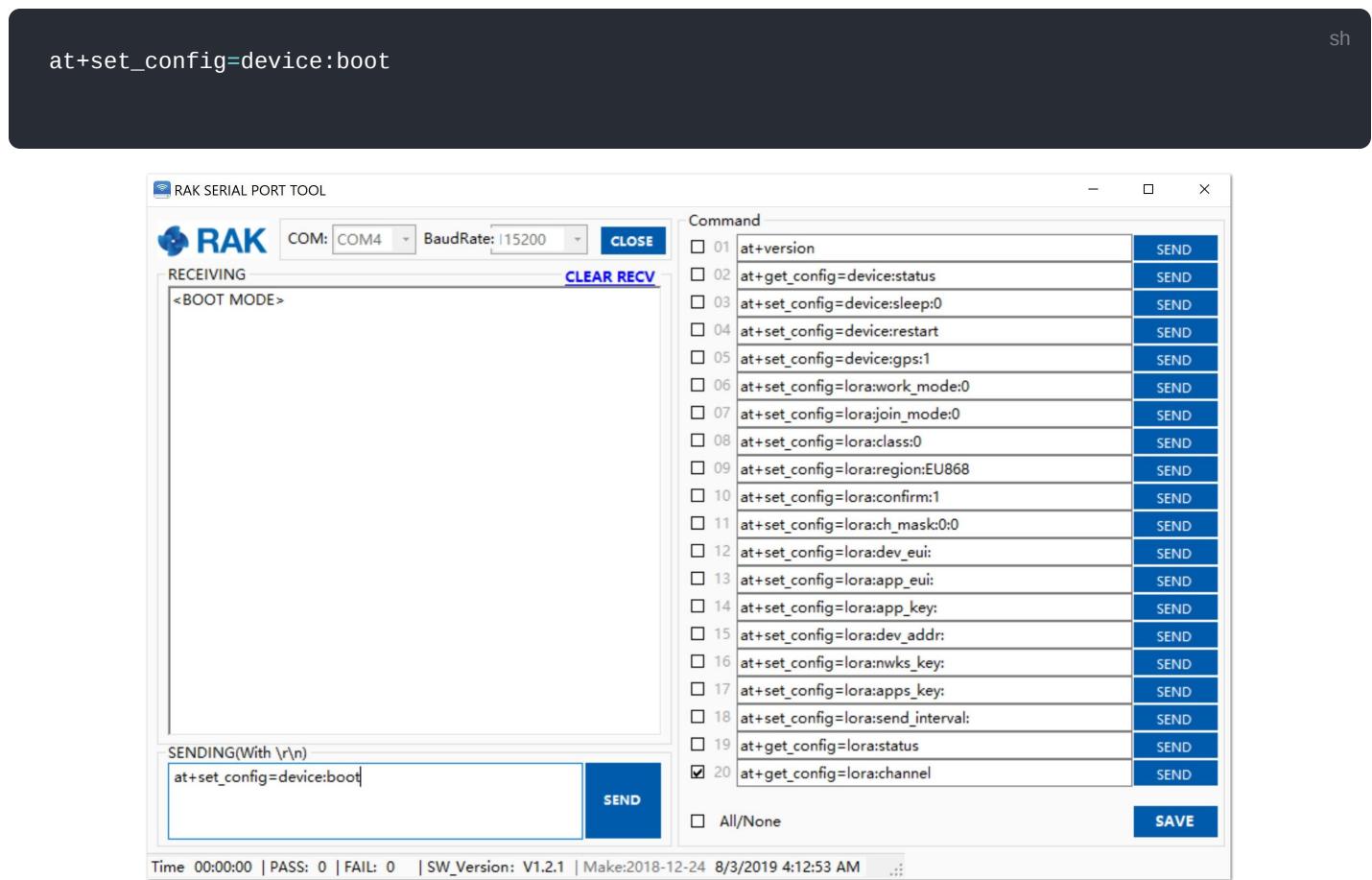


Figure 68: Entering Boot Mode

4. Close RAK serial port tool, and open RAK firmware upgrade tool on your Windows PC. Make sure to choose the correct COM Port.

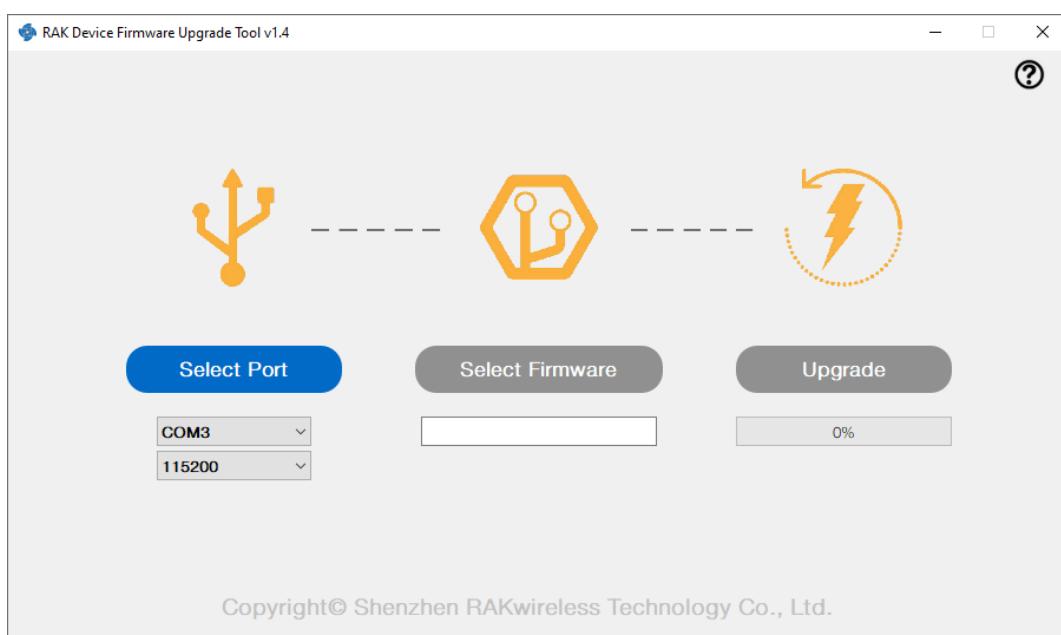


Figure 69: RAK Firmware Upgrade Tool

5. Click on “**Select Firmware**” button to choose the correct upgrade file:

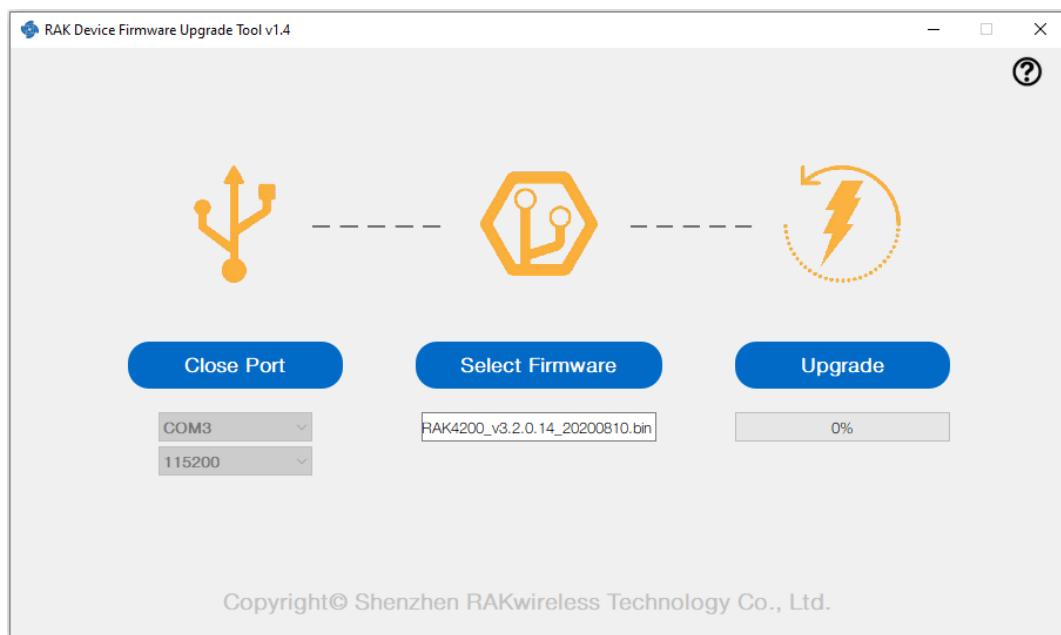


Figure 70: Choosing the Correct Upgrade file

6. Click on “**Upgrade**” to upgrade. This may take a minute:

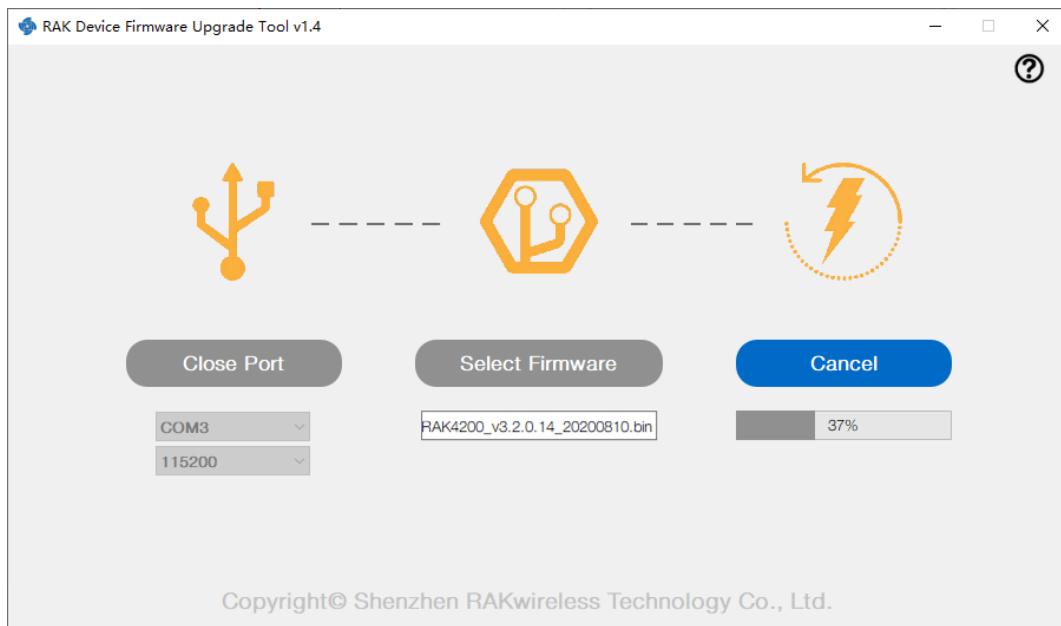


Figure 71: Firmware Upgrading in Process

7. If everything went well, you should see the same window as shown in Figure 72.

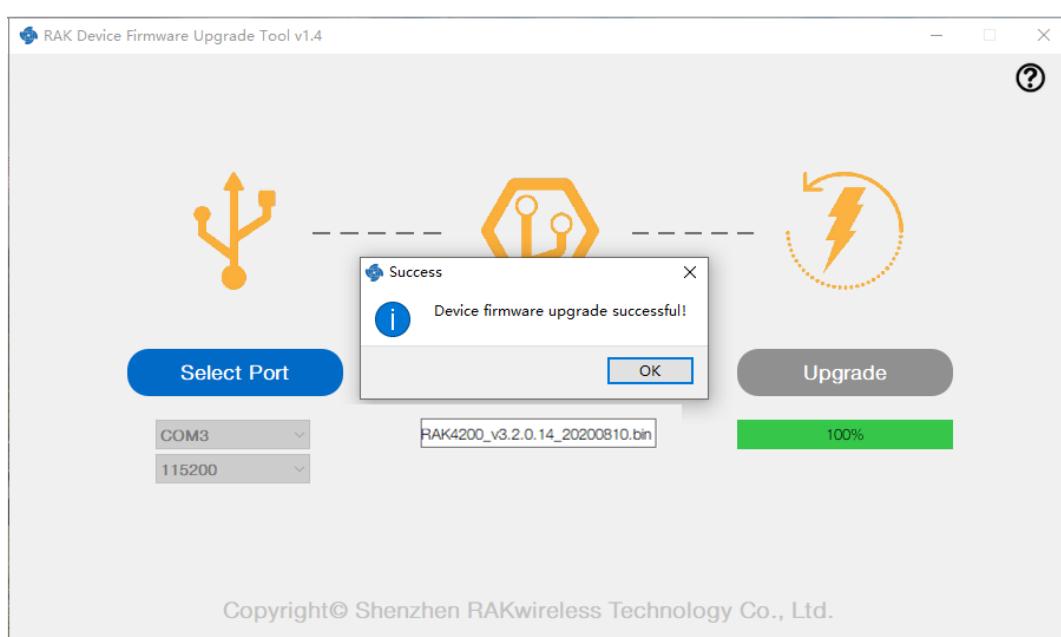


Figure 72: Successfully Upgraded Firmware

8. Close the Firmware Upgrade Tool, and open the RAK Serial Port Tool again.
9. Choose the correct **COM port** and set the baud rate to **115200**. Then open the serial port and enter the AT command shown below to restart.

```
at+set_config=device:restart
```



Figure 73: Restarting your Device

This information means that you have uploaded the Firmware successfully!

Firmware Upgrade Through DAPLink

Refer to [RAKDAP1 Flash and Debug Tool](#)

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