Get start with RAK7201

Notice: at present, RAK7201 only supports the EU868/US915 band

Where is the latest firmware binary?

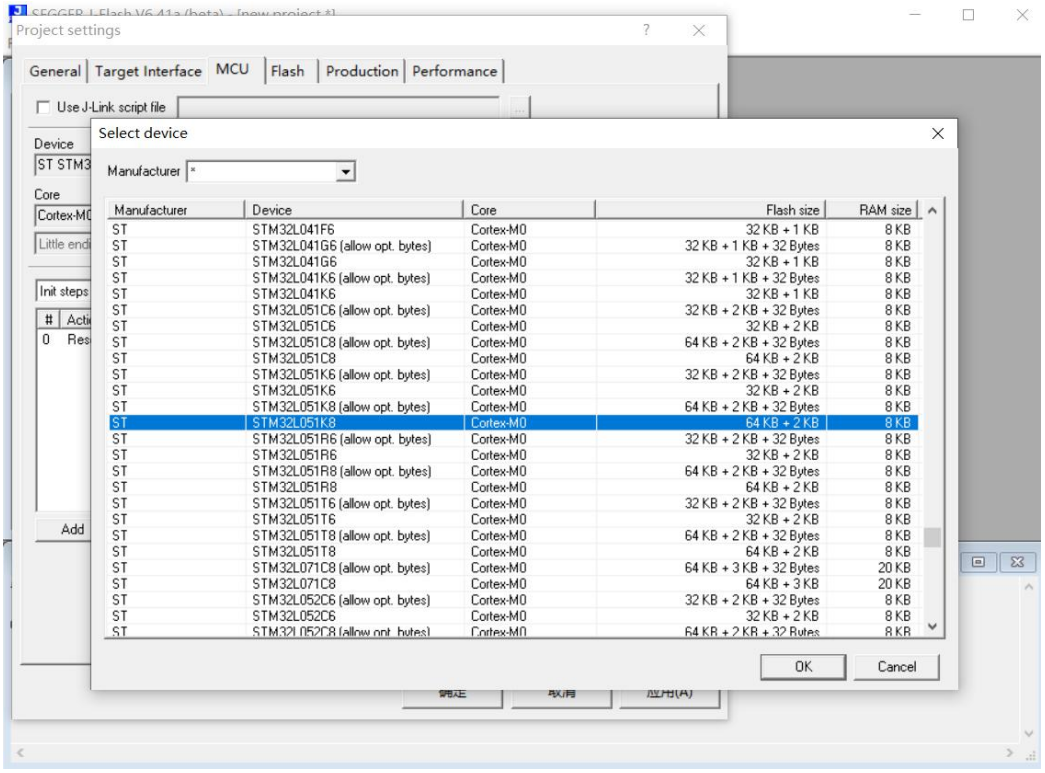
If you want to get a pre-compiled firmware instead of compiling the source code by yourself, you can find the latest firmware on Github repository.

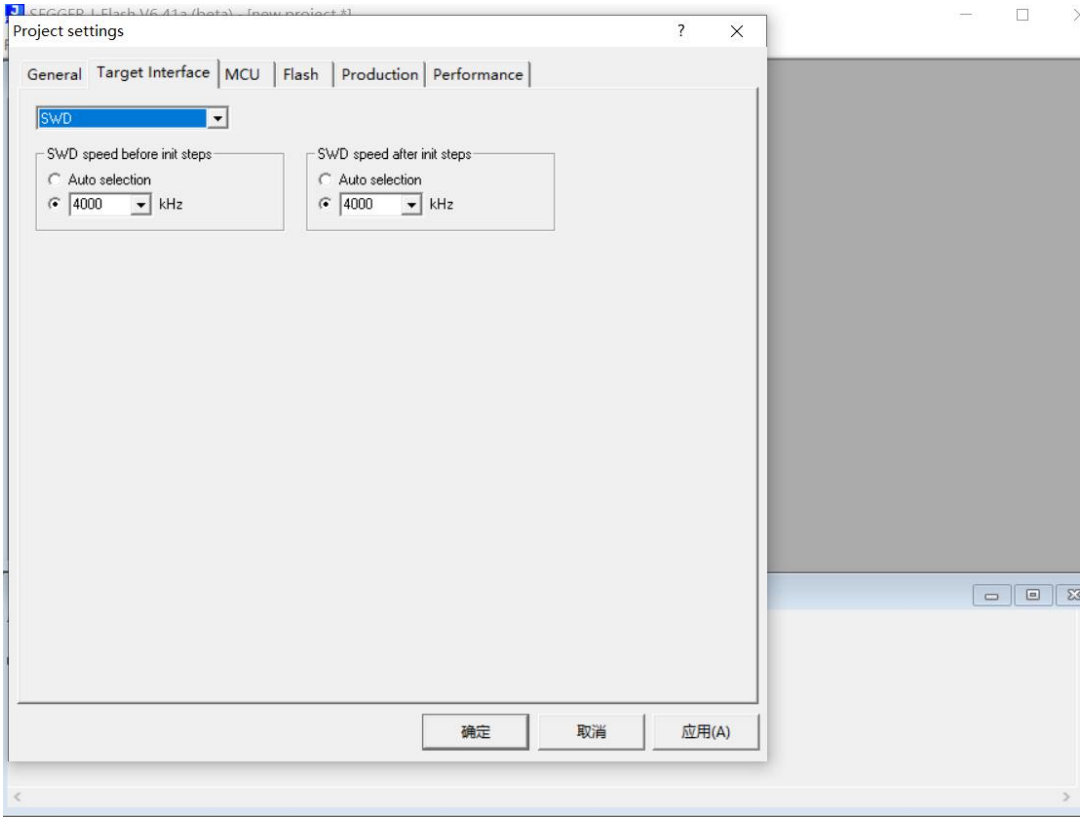
https://github.com/RAKWireless/Get-start-with-RAK7201/blob/master/868-22dbButton_051.bin
https://github.com/RAKWireless/Get-start-with-RAK7201/blob/master/915-22dbButton_051.bin

How to flash the bootloader into RAK7201?

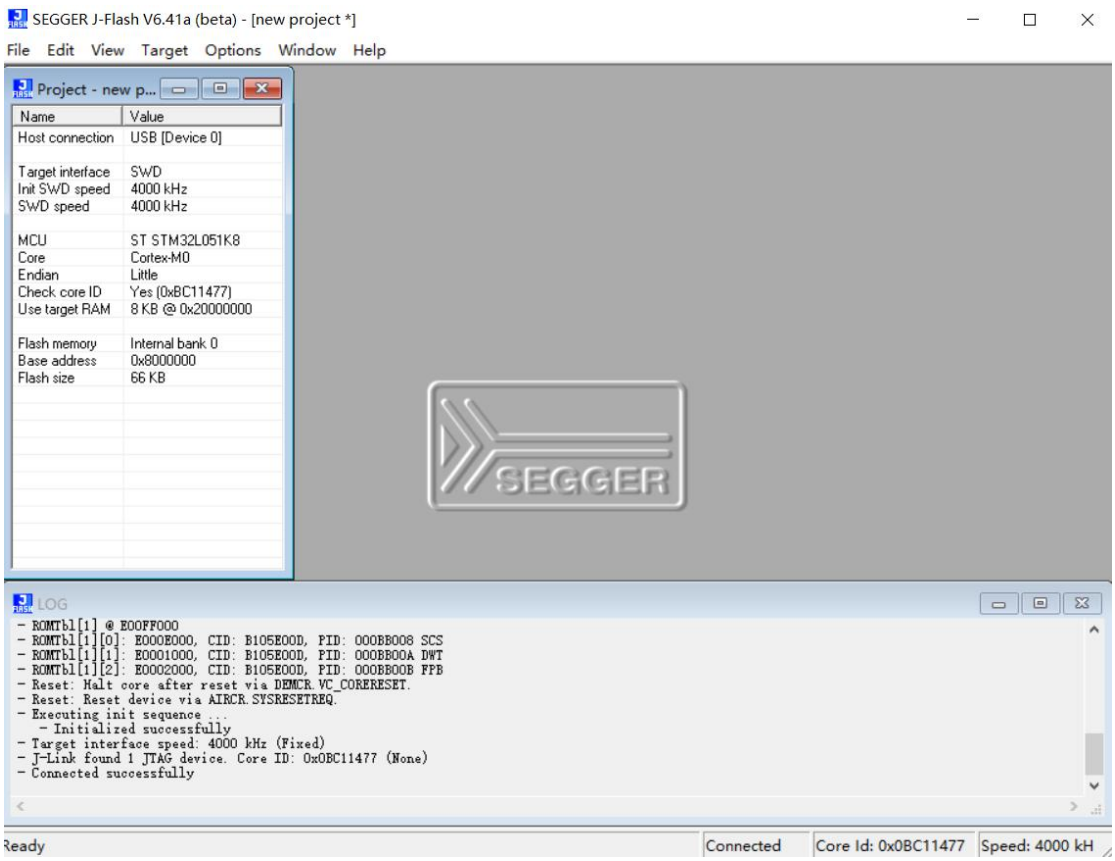
You can flash the bootloader for RAK7201 using J-Flash of J-Link as follow:

Open J-Flash and choose the correct MCU and SWD as the following pictures show:

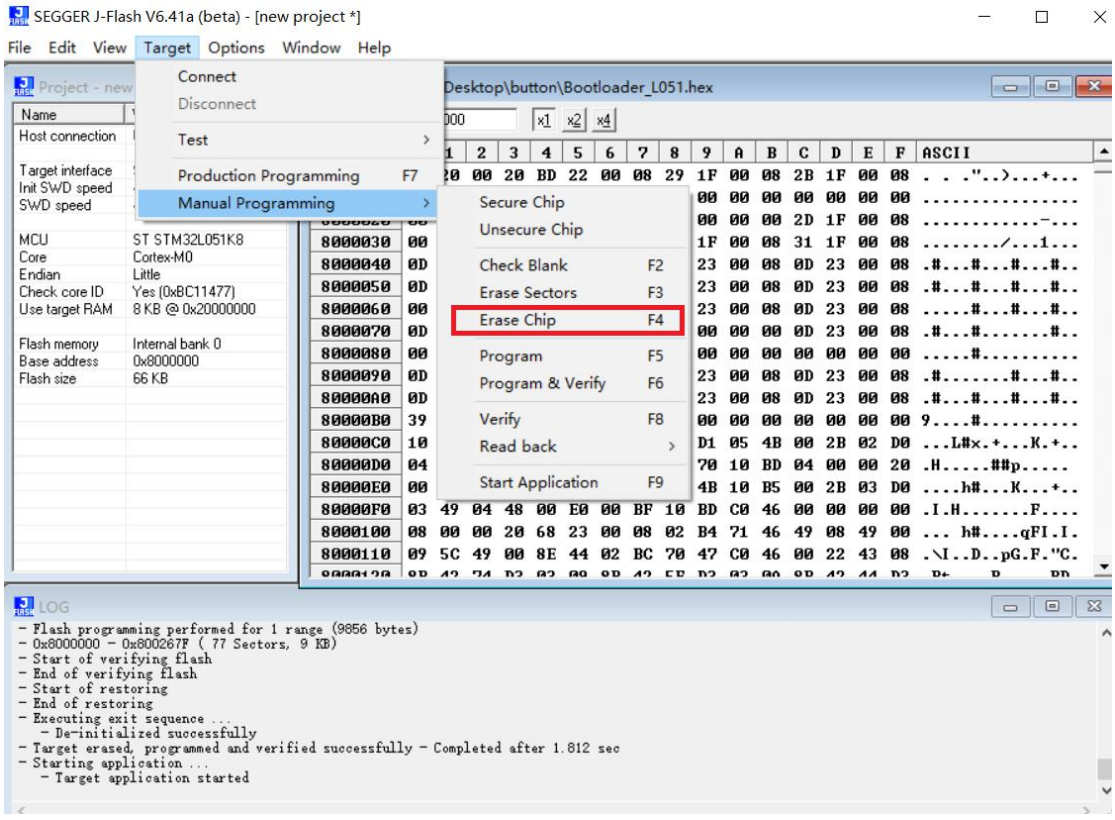




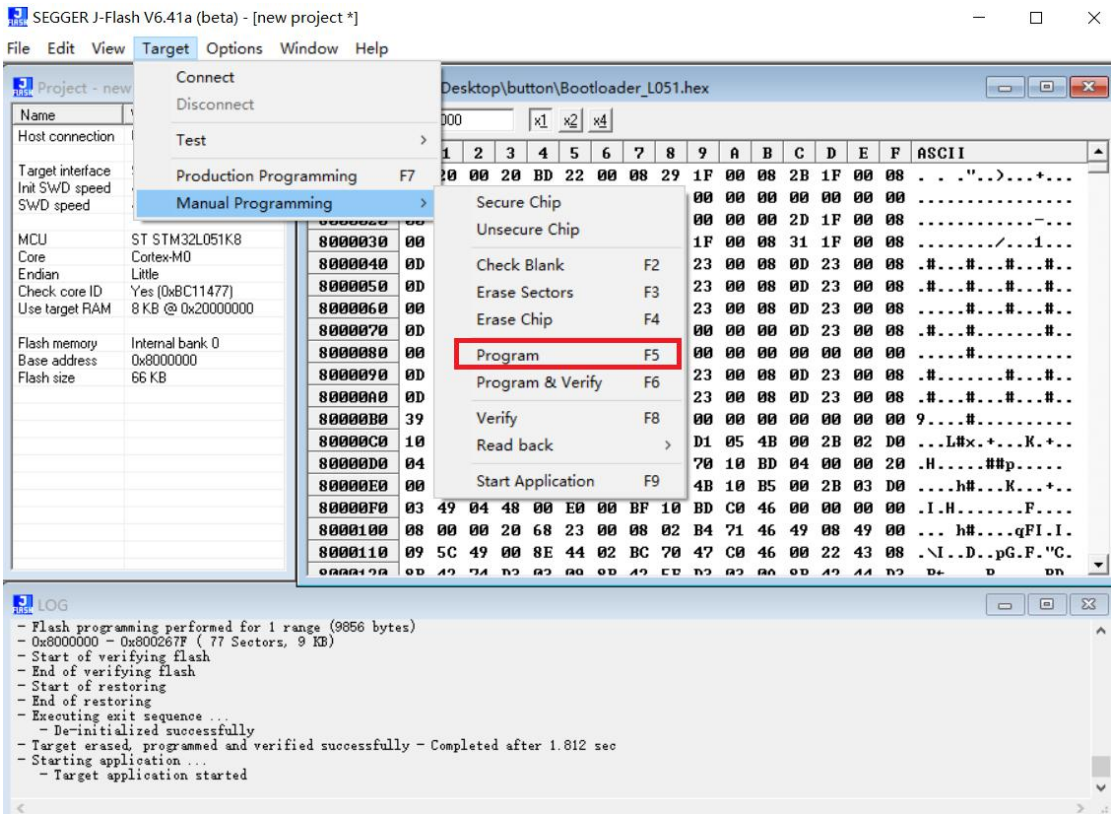
After "Connect" successfully, drag the bootloader file to the space of the following page:



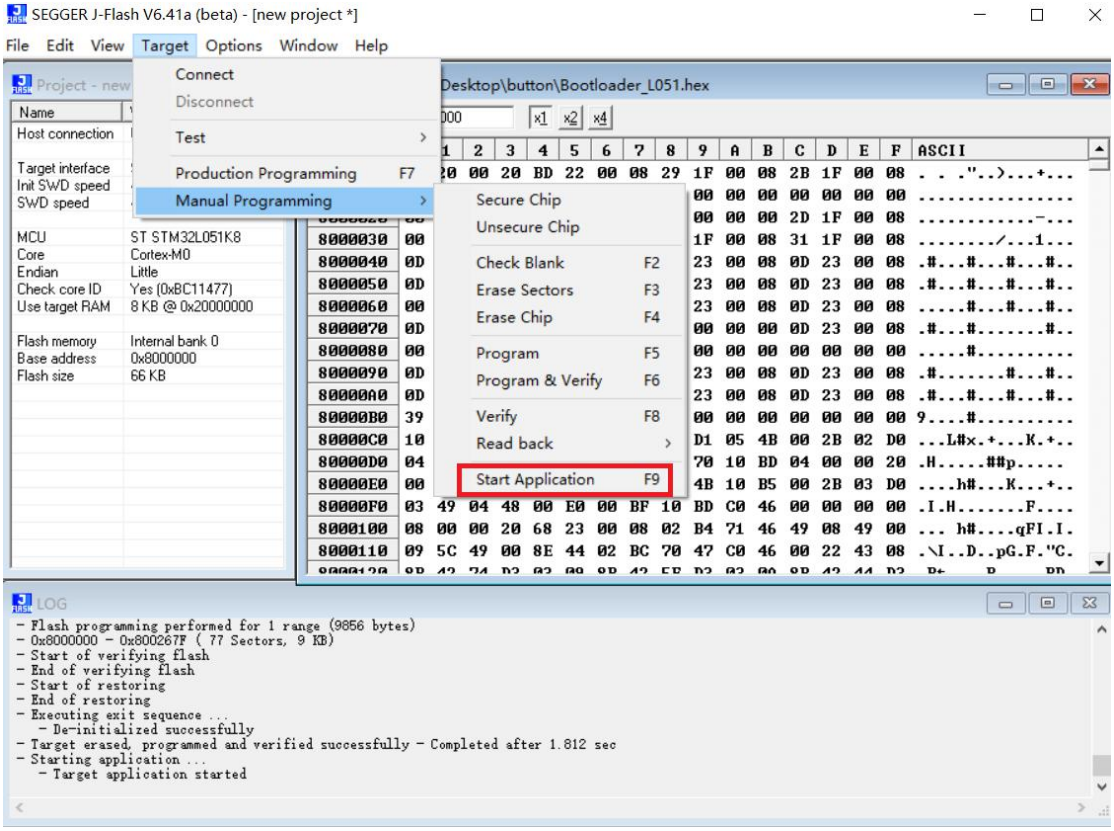
Now, “Erase Chip” firstly:



Secondly, “Program”:



Then "Start Application":



OK! We've flashed the bootloader for RAK7201 successfully!

How to burn the update firmware into RAK7201?

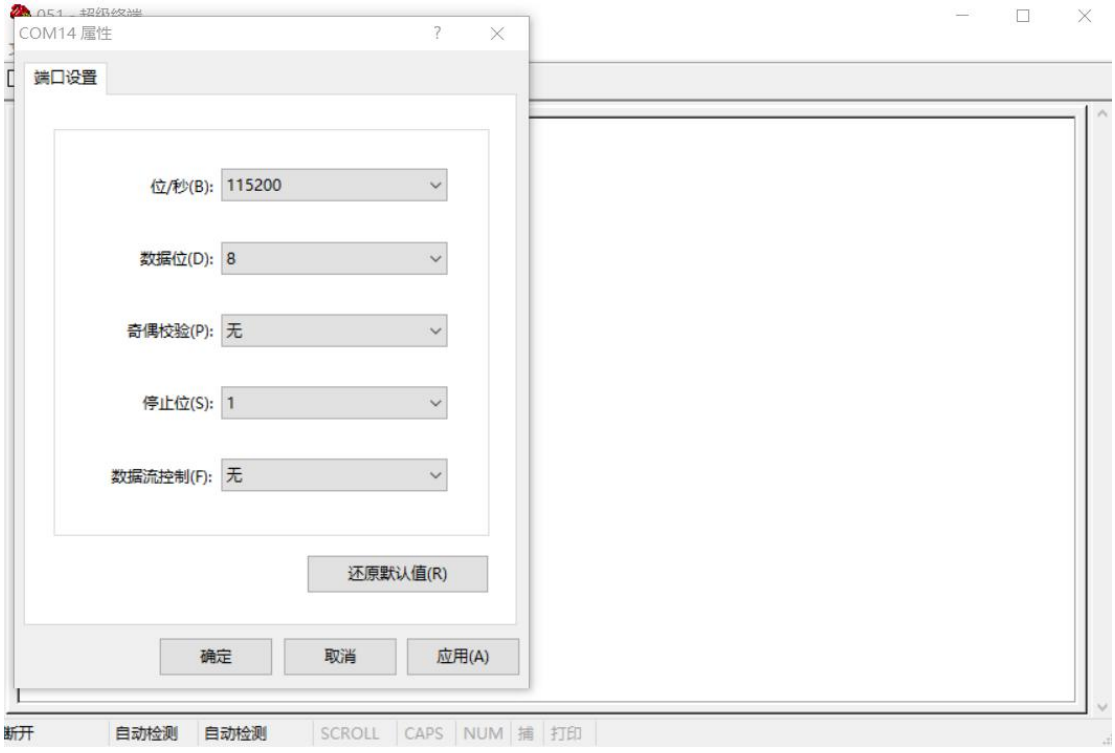
If you have just burned the bootloader into RAK7201 according to the Burning Bootloader into the Device section, proceed to Step 2.

1.In case you have not just burned the bootloader, as instructed in the previous section you need to manually go into boot mode.

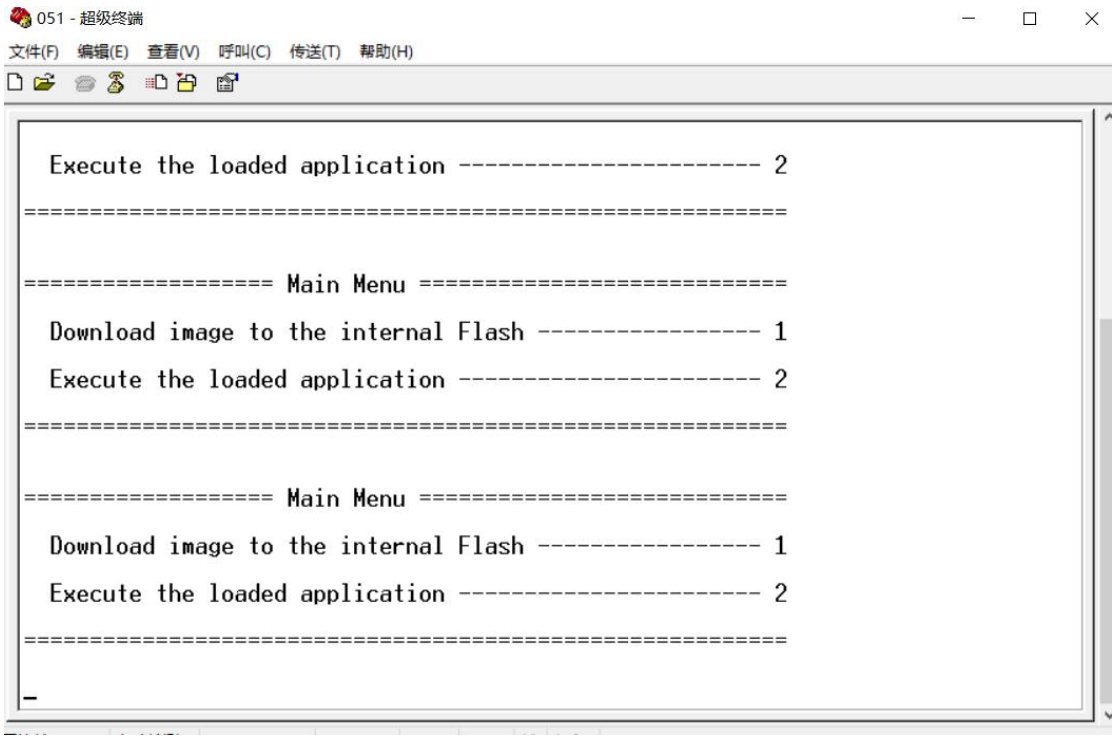
```
[15:08:32.926]发→◇at+boot
□
[15:08:32.938]收←◆Enter bootloader ......

==================== Main Menu ============================

  Download image to the internal Flash ------------------ 1

  Execute the loaded application ------------------------ 2

============================================================
```

2. Open the tool "Hyper Terminal" and configure as follow:

Tool：
https://github.com/RAKWireless/Get-start-with-RAK7201/blob/master/super_terminal_v1.01.zip

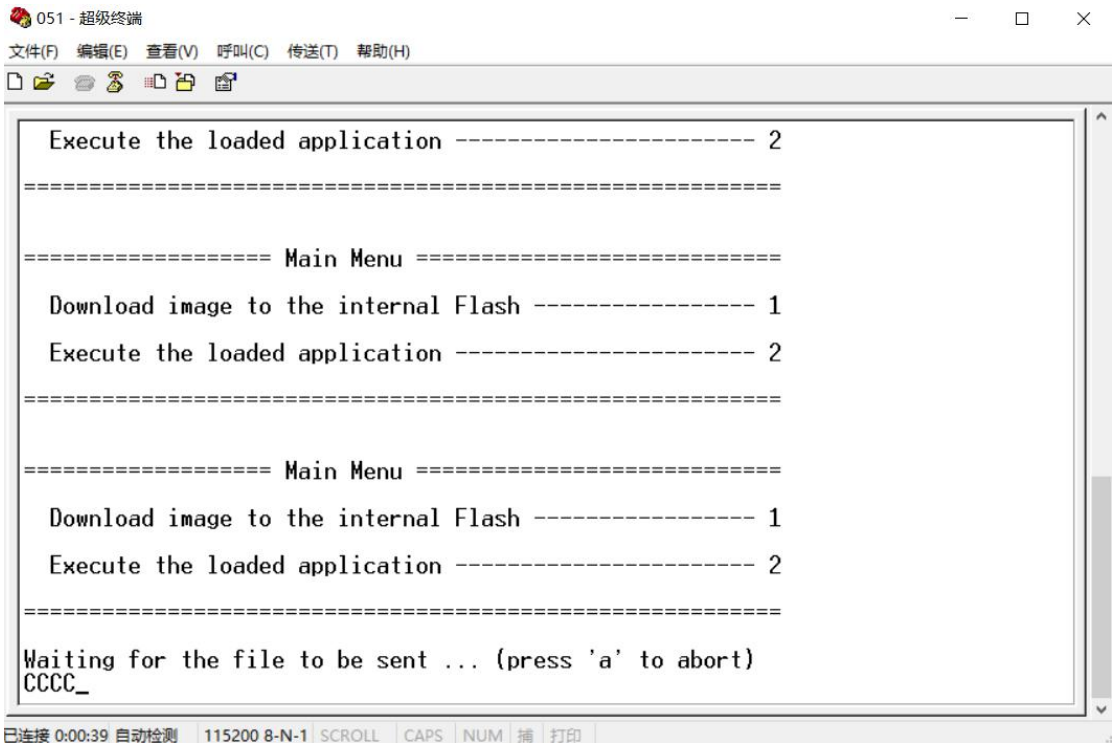


3.If it connects successfully, you can see the following information in the Hyper Terminal page:

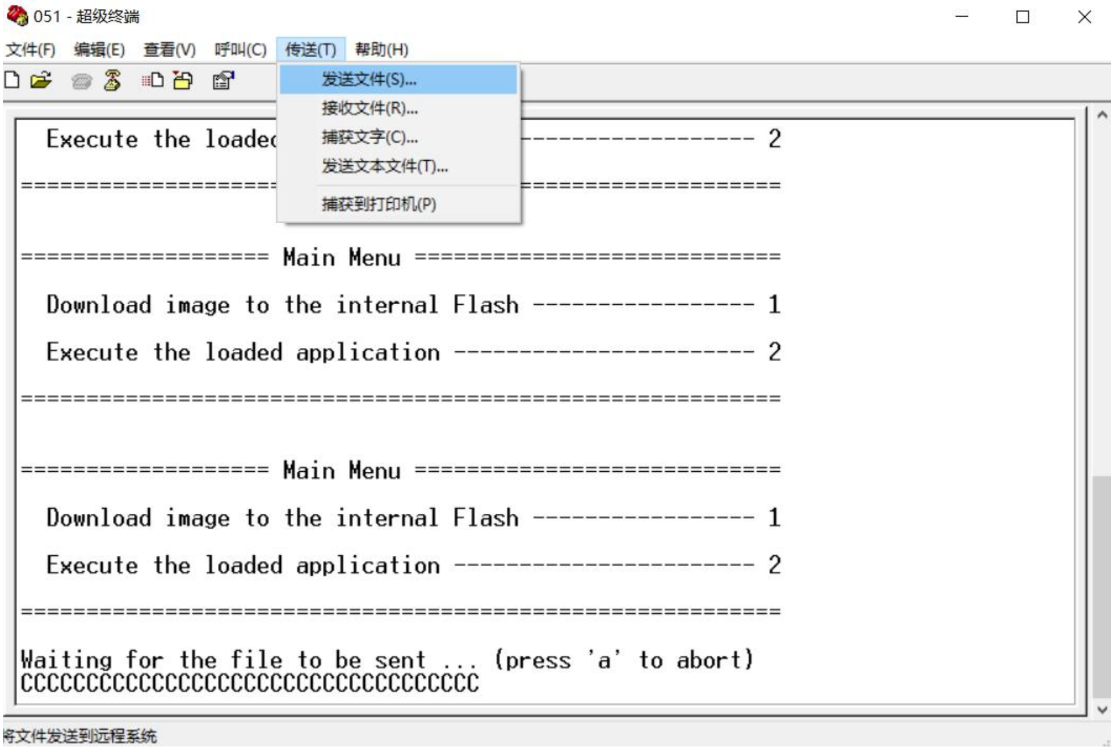


4.As you see, “1” means upgrading a firmware for RAK7201, and “2” means executing the firmware.

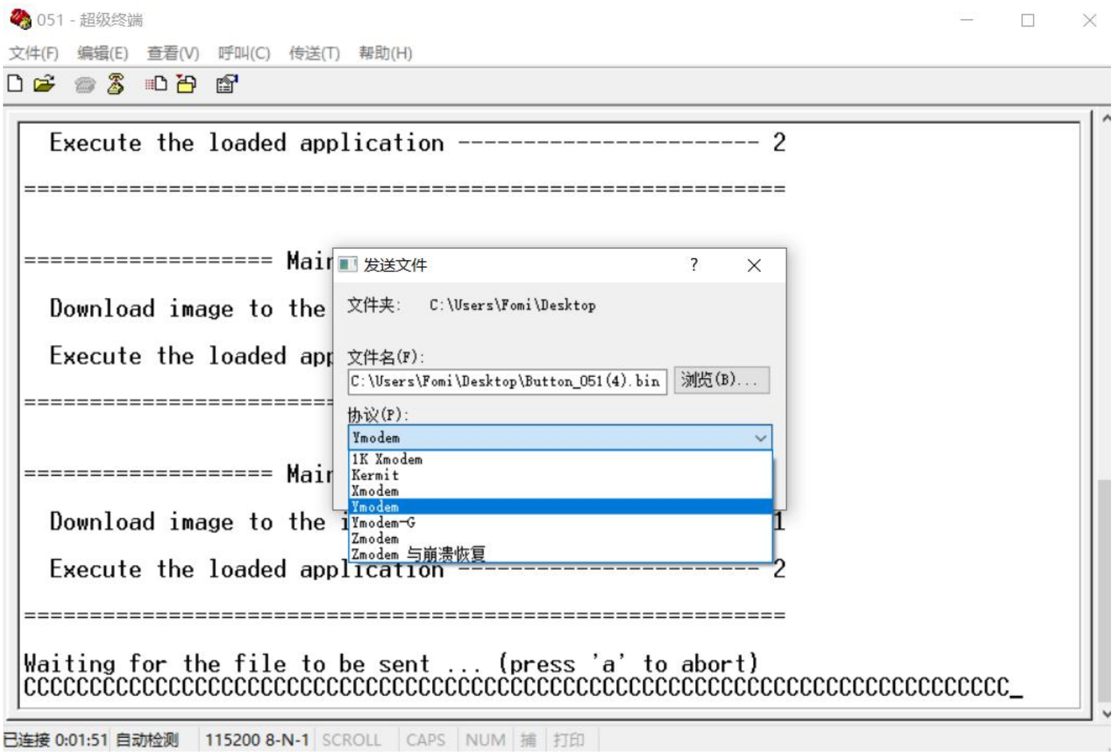
5.Now, type “1” to upgrade the firmware for RAK7201:



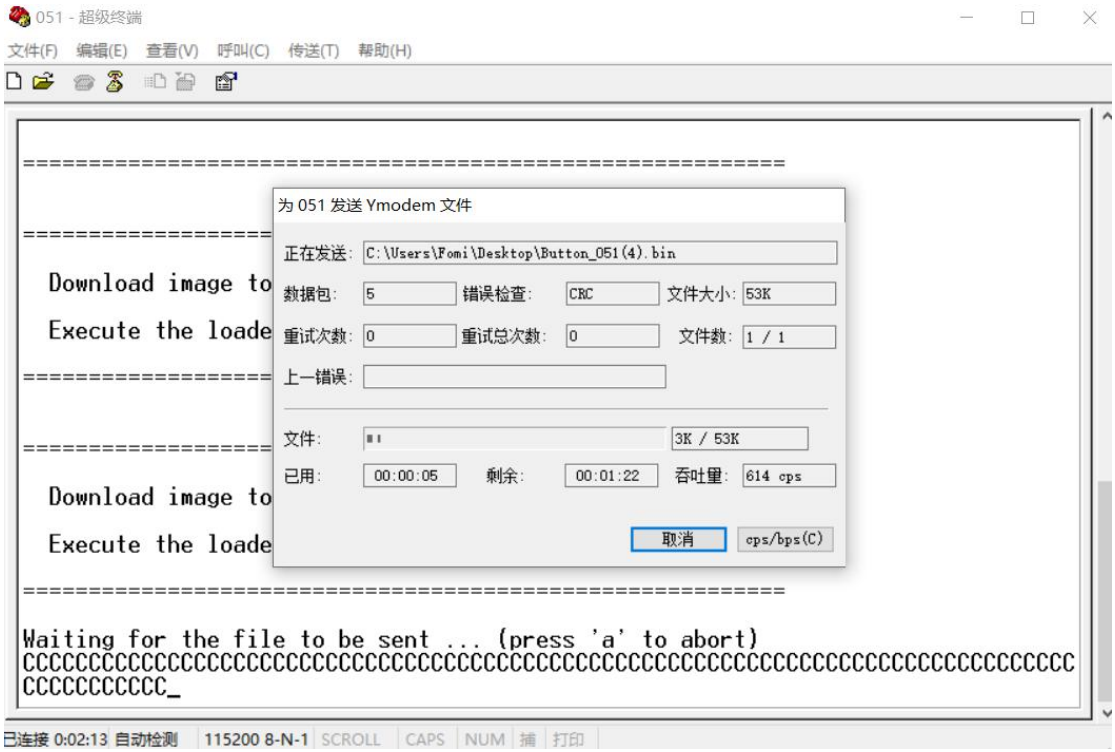
Choose the firmware file:



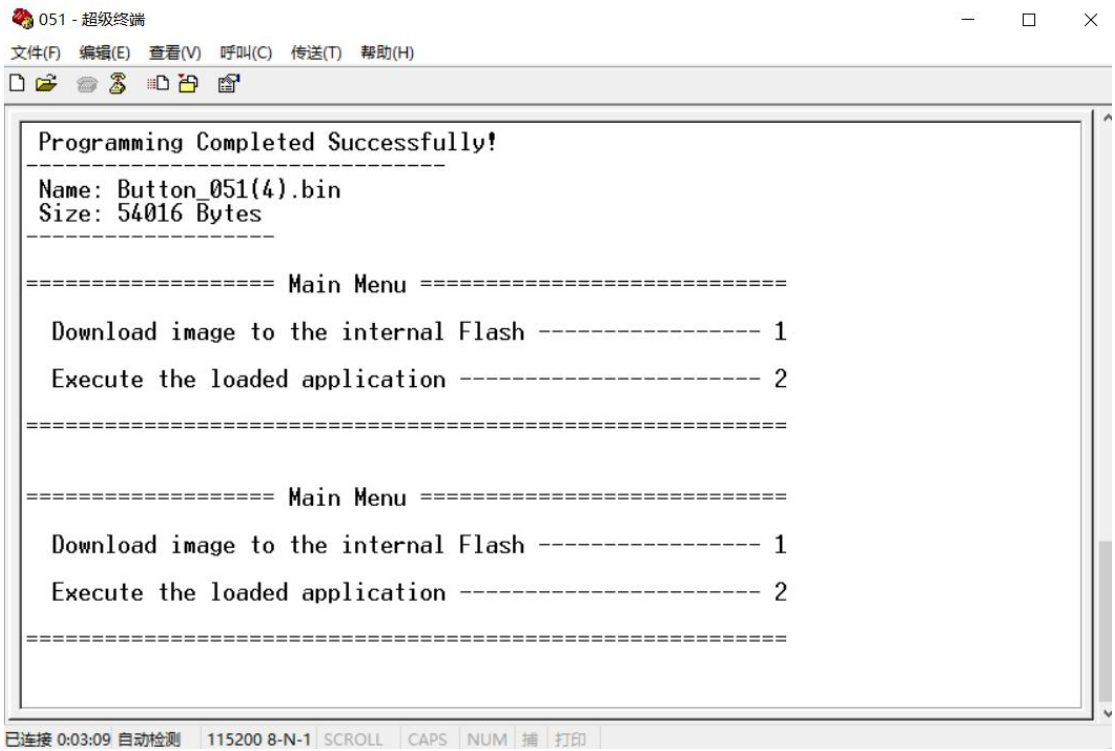
Please note that you should choose “Ymodem” as the following picture shows:



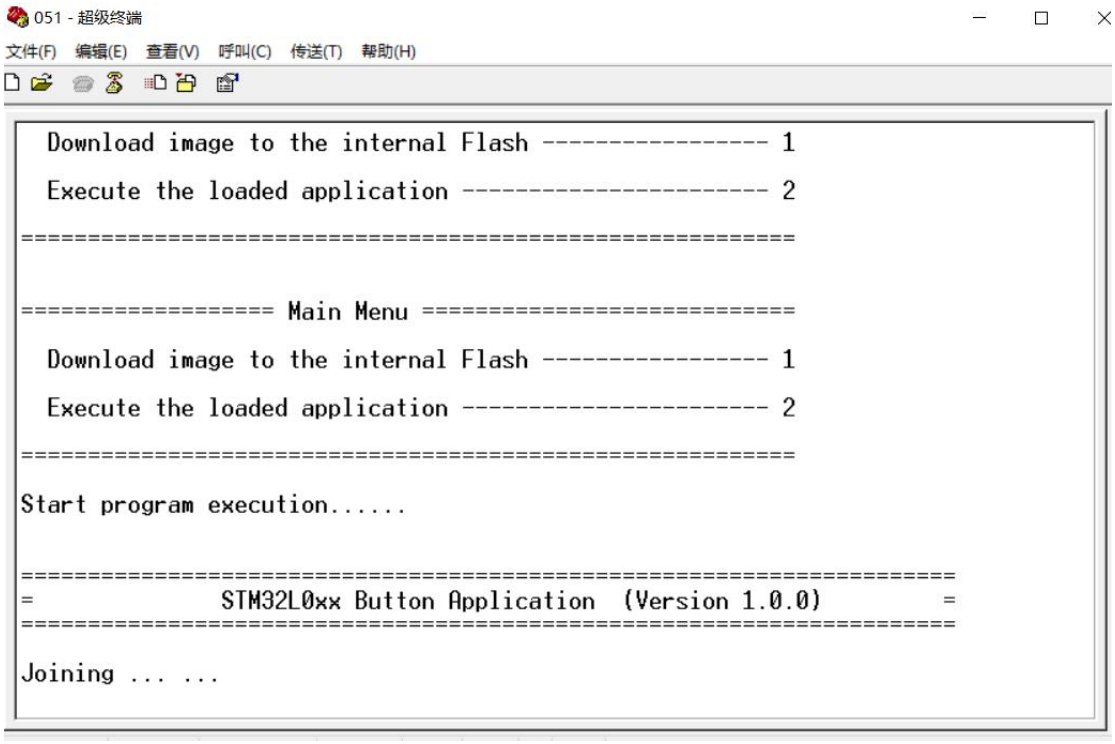
OK! Let's start to upgrade:



If we upgrade the firmware for RAK7201 successfully, you can see the following information:



Now, type “2” to execute the firmware we just upgraded:



Great! As you see, it works.

Now, disconnect with Hyper Terminal, then connect with a serial port tool.

How to configure RAK7201?

You can configure RAK7201 by sending AT commands into it from a serial port tool running on your PC.

Please notice that the UART of RAK7201 is disable by default because of power consumption.

If you want to configure RAK7201 through UART, you can do as follow:

Press the key 1 for several seconds until you see the led of the key 4 lights up which means RAK7201 is working in configuration mode now, and you can configure it through UART.

After RAK7201 joins successfully, you can press any key to send message as the following picture shows:

```
[14:54:23.354]收←◆Lower_Power mode 0
[14:54:25.705]发→◇at+set_config=lora:app_key:00000000000004740000000000000474
□
[14:54:25.818]收←◆ok
[14:54:26.448]发→◇at+set_config=lora:app_eui:0000000000000474
□
[14:54:26.557]收←◆ok
[14:54:27.040]发→◇at+set_config=lora:dev_eui:0000000000000474
□
[14:54:27.150]收←◆ok
```

The following list shows the AT commands:

AT Command	Description
at+boot	Let the device work in boot mode immediately.
at+reset	After set, the device will restart.
at+join	Start to join LoRa network.
at+get_config=lora:dev_eui	Get the device EUI for OTAA.
at+get_config=lora:app_eui	Get the application EUI for OTAA.
at+get_config=lora:app_key	Get the application key for OTAA.
at+get_config=lora:apps_key	Get the application session key for ABP.
at+get_config=lora:nwks_key	Get the network session key for ABP.
at+get_config=lora:dev_addr	Get the device address for ABP.
at+set_config=lora:join_mode:X	Set the join mode for LoRaWAN. X definition: 0: OTAA, 1: ABP
at+set_config=lora:dev_eui:XXXX	Set the device EUI for OTAA. XXXX definition: the device EUI, for example, 3534353165375300
at+set_config=lora:app_eui:XXXX	Set the application EUI for OTAA. XXXX definition: the application EUI, for example, 70B3D57ED001A1E2
at+set_config=lora:app_key:XXXX	Set the application key for OTAA. XXXX definition: the application key, for example, D9988A5F02D80FAB8BA5F453C4A2CD2B

at+set_config=lora:apps_key:XXXX	Set the application session key for ABP. XXXX definition: the application session key, for example, 573BD4DEC56BA4A9C462DF29E54B9BCE
at+set_config=lora:nwks_key:XXXX	Set the network session key for ABP. XXXX definition: the network session key, for example, C2AA51E61BA45F57045BF48249BC36F6
at+set_config=lora:dev_addr:XXXX	Set the device address for ABP. XXXX definition: the device address, for example, 2601116D

More information, please have a look at the next section <How to Connect with TTN?>.

How to connect with TTN?

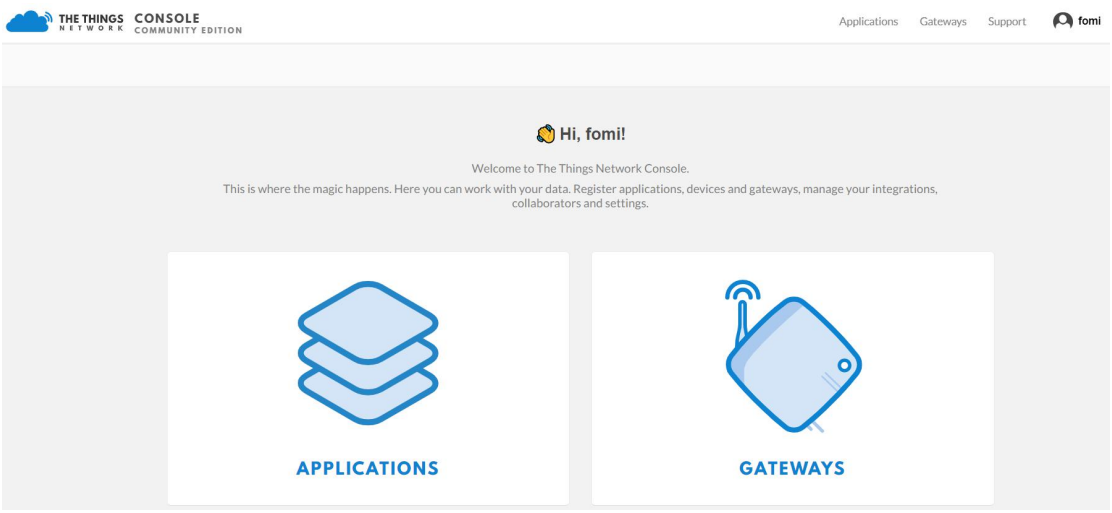
In this section, we'll do some practice to show how to connect RAK7201 with TTN.

Firstly, open a serial port tool on your PC. I recommend you to use RAK serial port too:

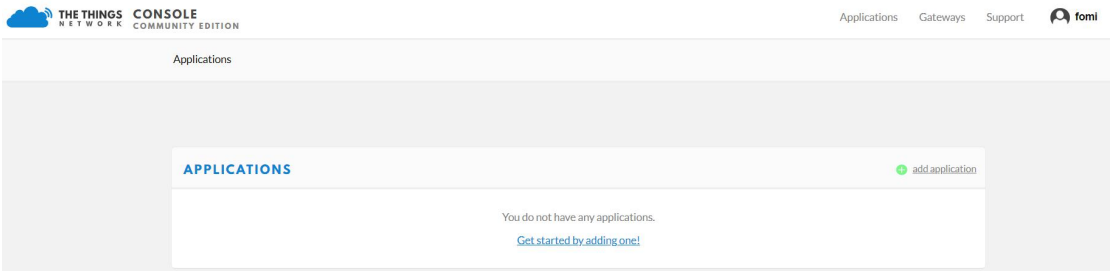
http://docs.rakwireless.com/en/LoRa/RAK811/Tools/RAK_SERIAL_PORT_TOOL_V1.2.1.zip

Open the serial port as the following picture shows:

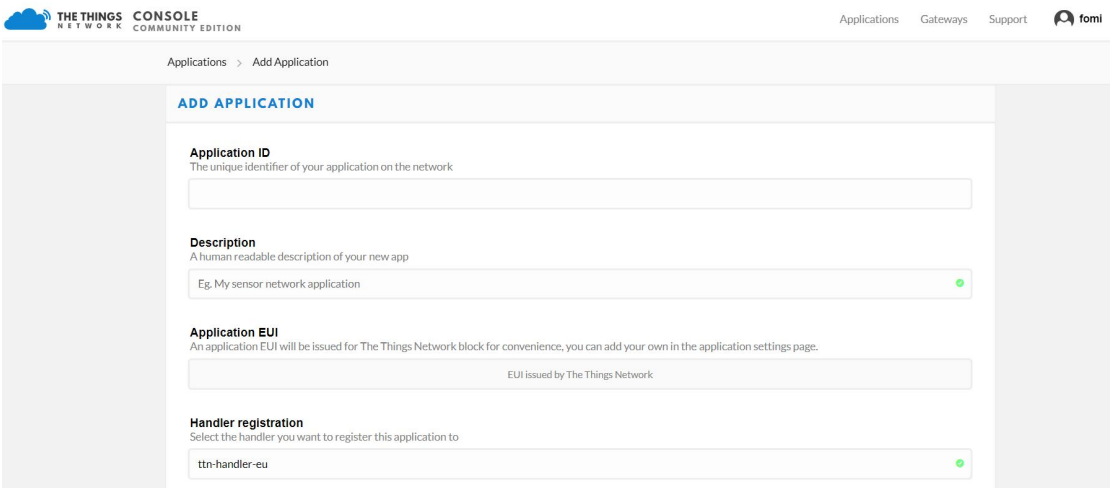
Open the link https://www.thethingsnetwork.org/ and login, then open the “Console” page from the right corner at the top:



Press “APPLICATIONS”:

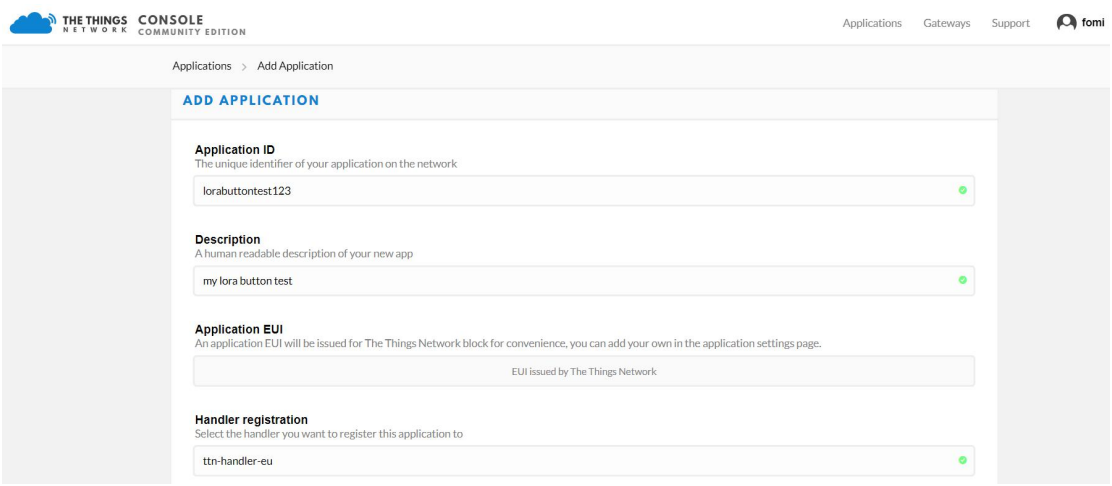


“add application”:

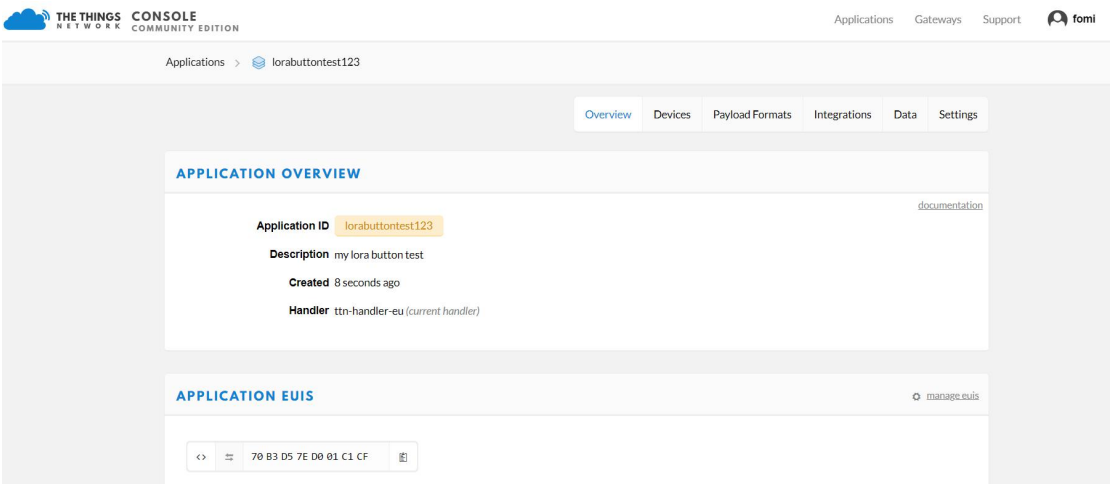


Fill in the correct contents.

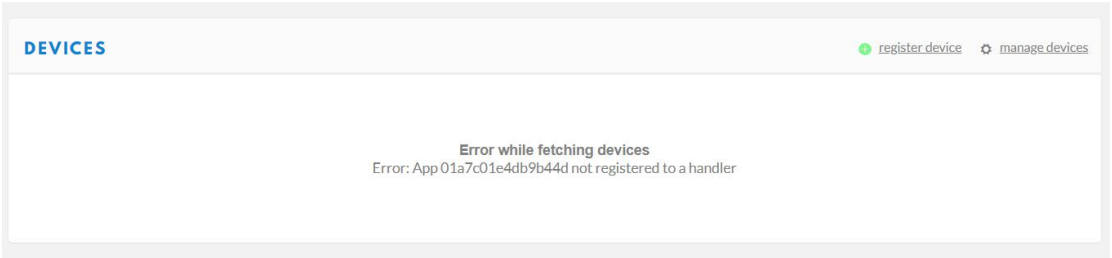
Please note that the content you fill in “Application ID” item should be in low case, and it must be the unique ID on TTN network.



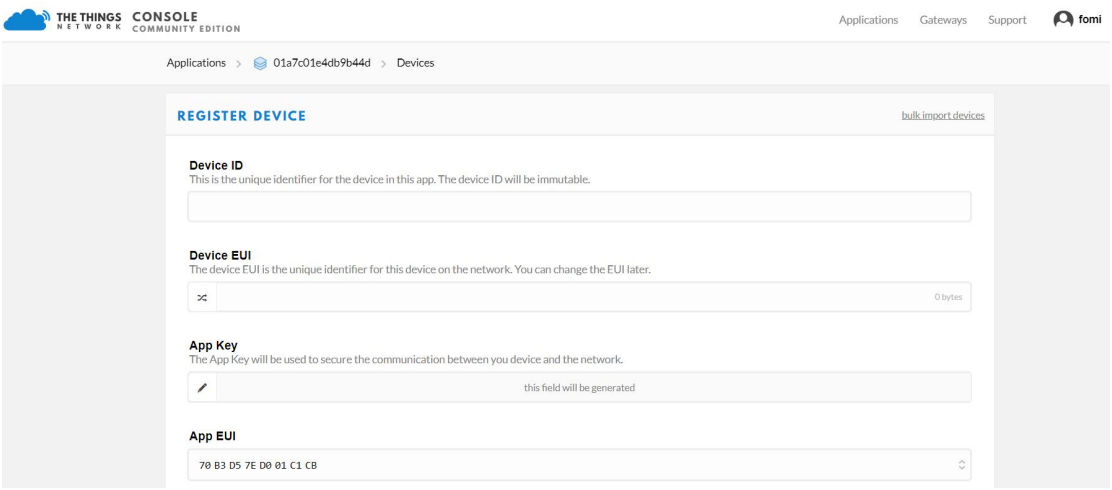
Then press the “Add application” button at the bottom of this page, and you can see the following page:



At the middle of this page, you can find the box named “DEVICES”:

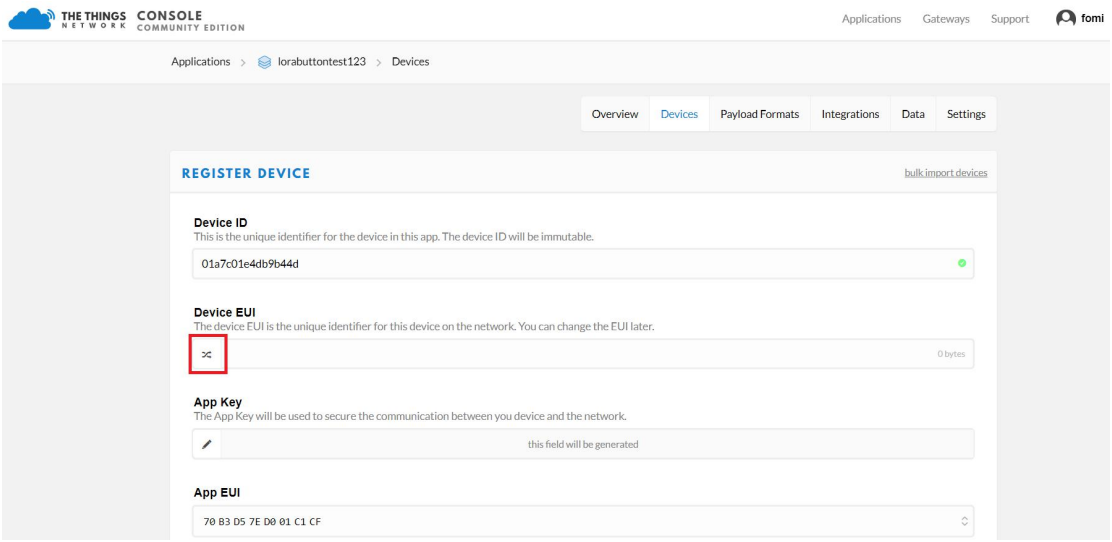


Just “register device”:

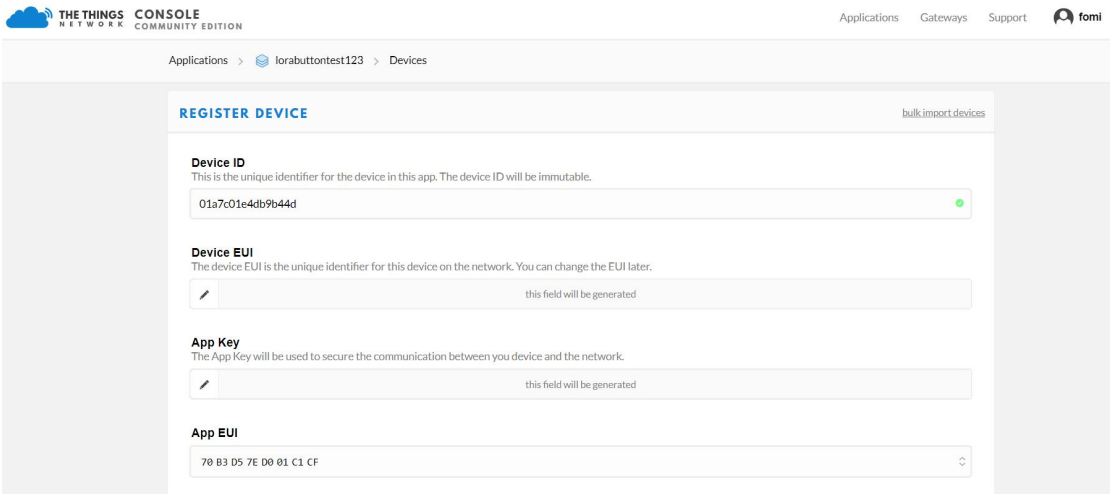


Please note that when you fill this value in “Device ID”, it must be in low case.

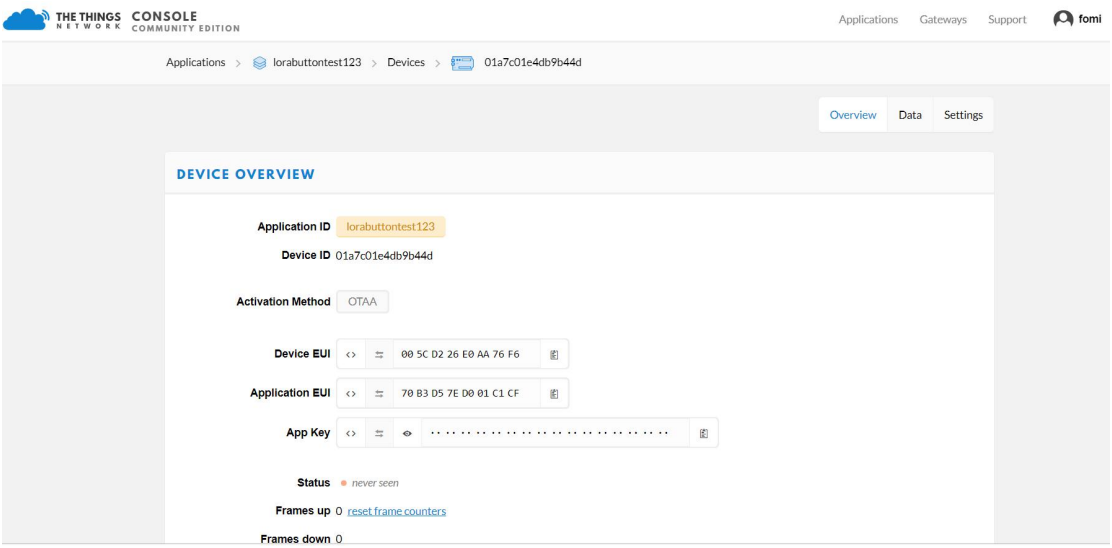
Also, you can click the following icon and “Device EUI” will be generated automatically in the next step:



The following picture shows the final page:



Then press the “Register” button at the bottom of this page to finish.



As you see, the default activation method is OTAA.

OK! Now, let’s join in OTAA mode and EU868 frequency for example!

Set the join mode to OTAA:

Set the Device EUI:

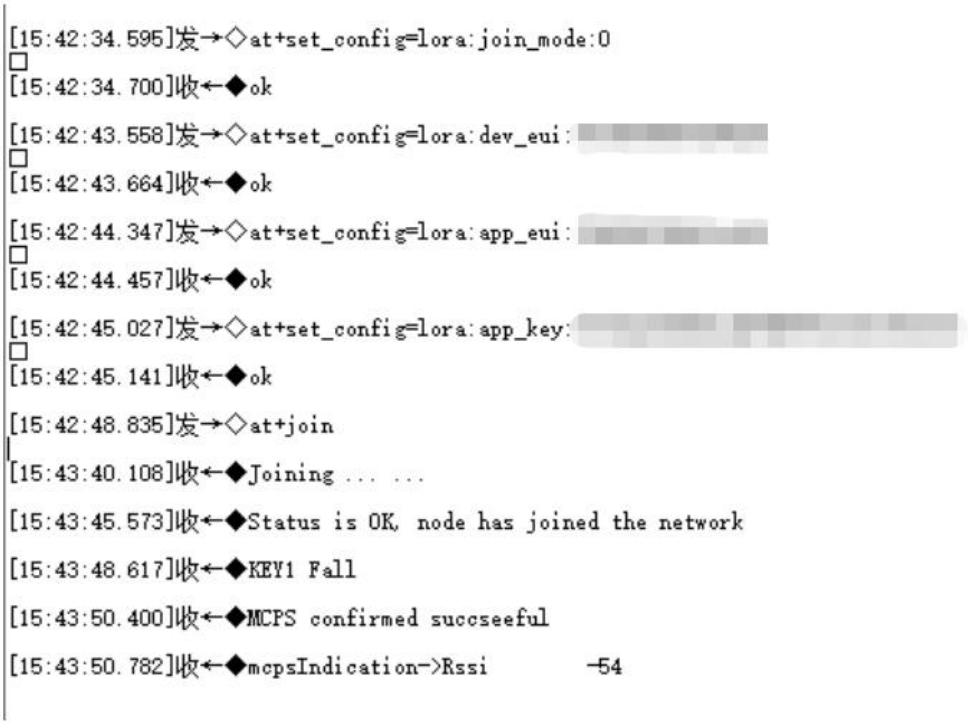
Set the Application EUI:

Set the Application Key:

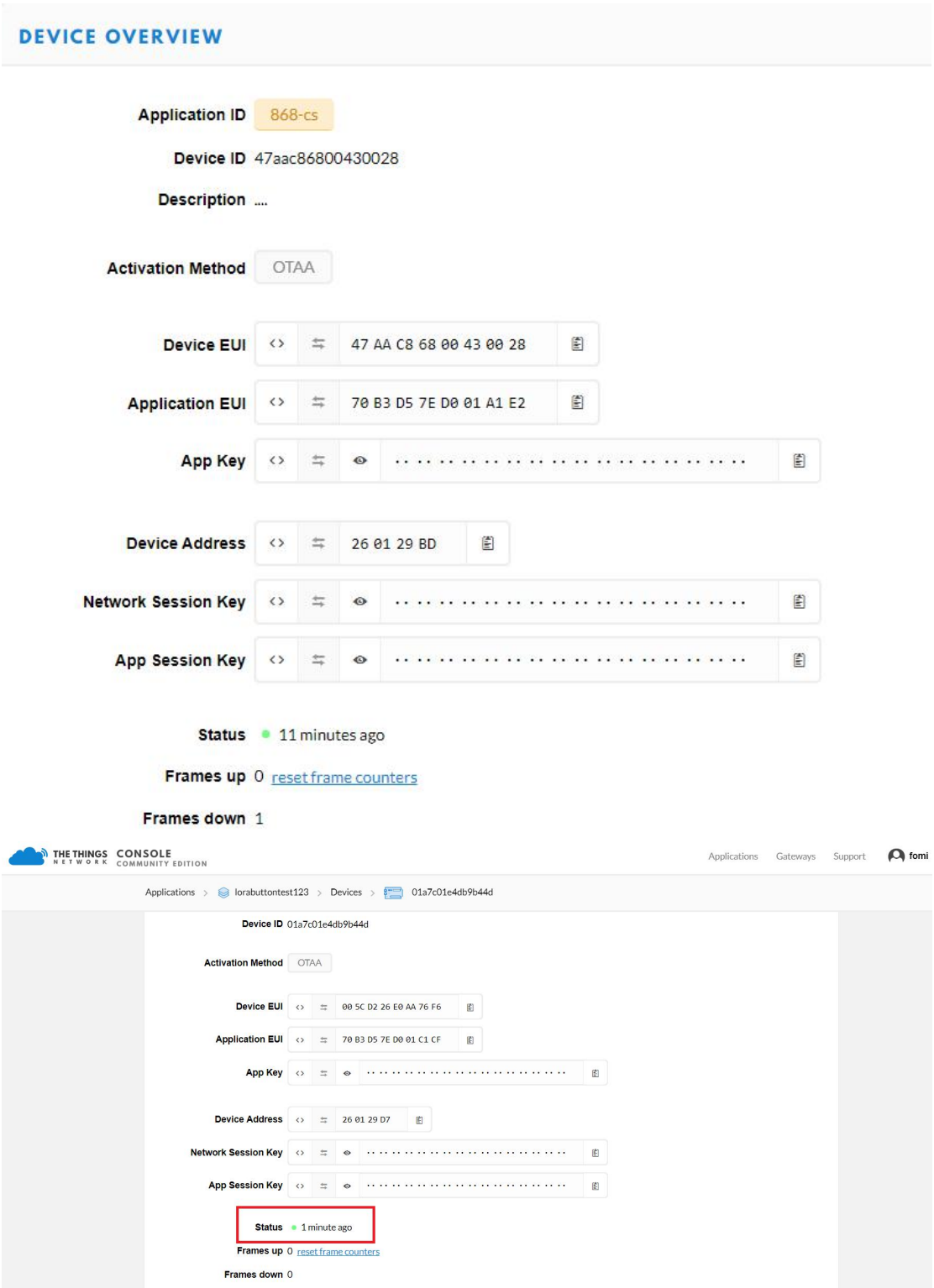
Join in OTAA mode:

Join successfully!

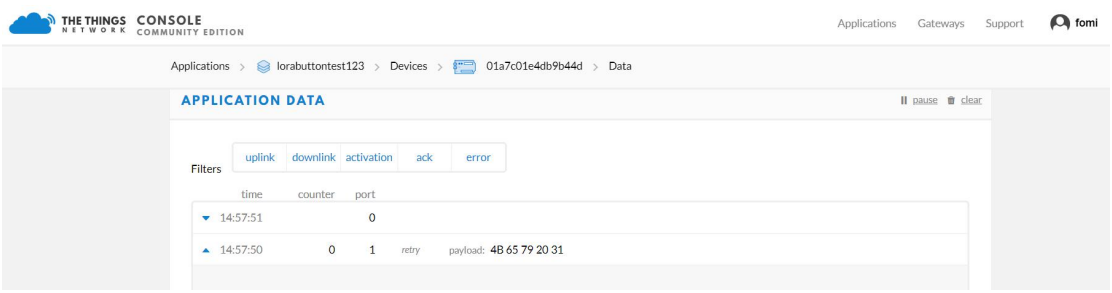
Let’s press key 1 on RAK7201:



Now, you can see the status on TTN is active.



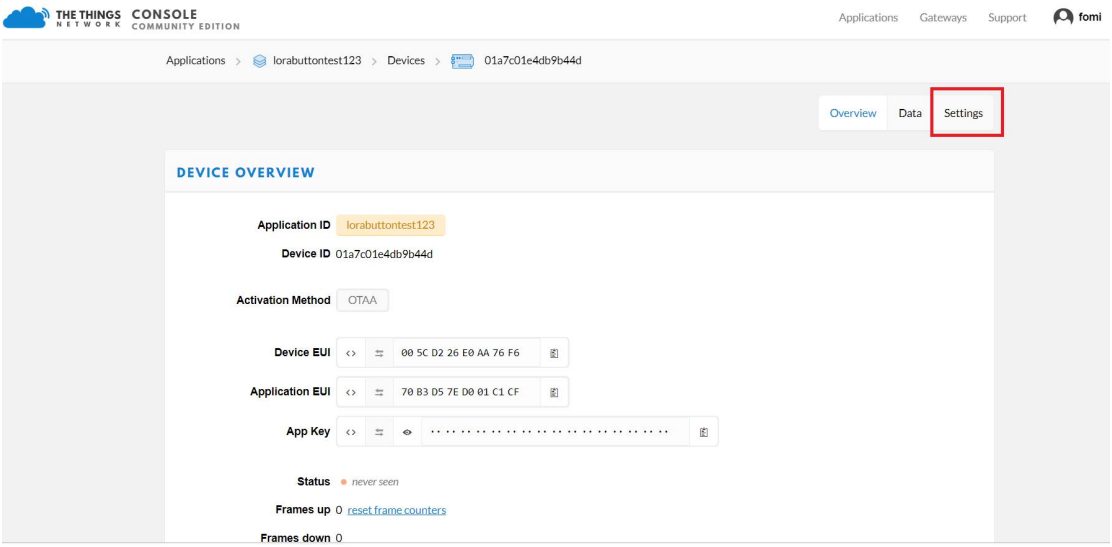
It will send some data to TTN automatically:



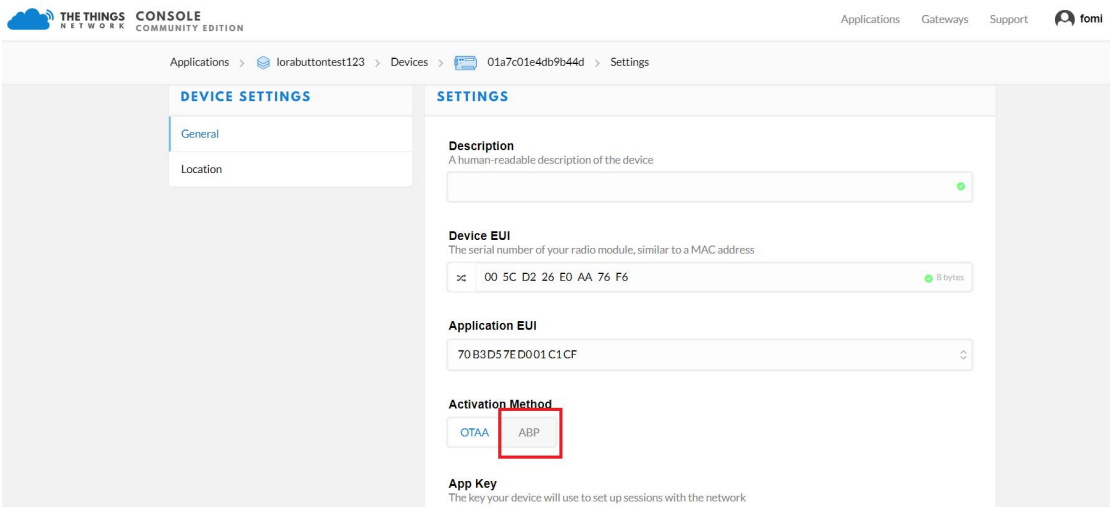
That's all about OTAA.

Now, let's try to join with TTN in ABP mode:

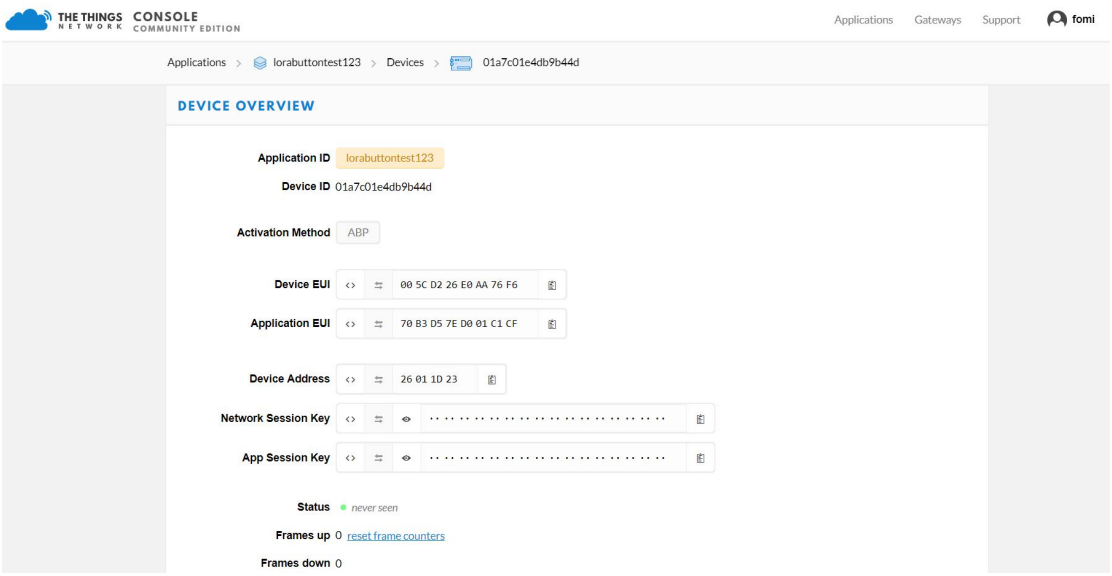
Firstly, click the "Settings" item as follow:



Click "ABP":

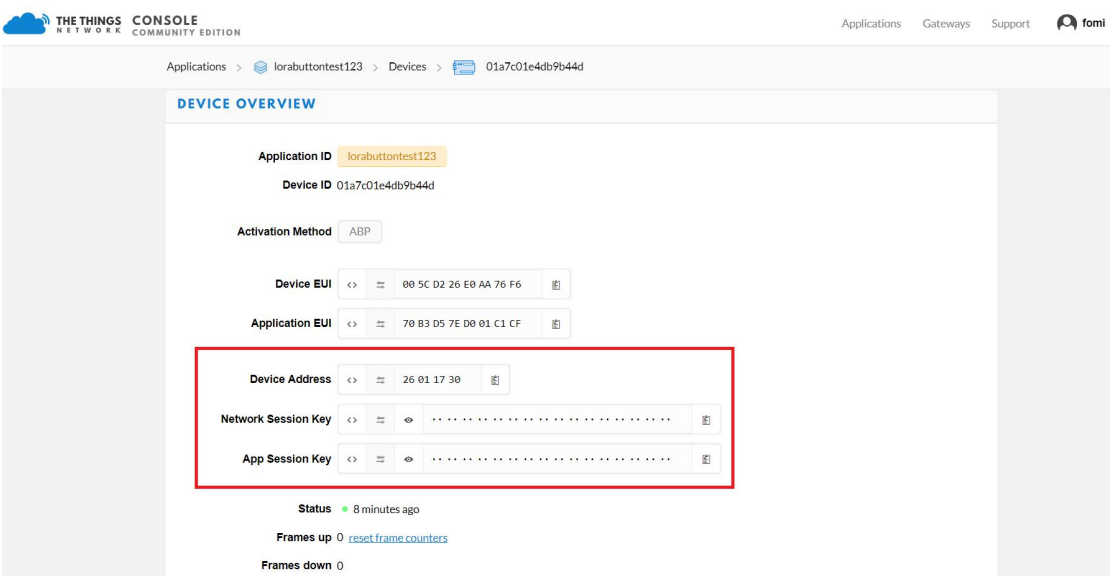


Then press the “Save” button at the bottom of this page, then you can see the following page:



Now, the activation method is ABP.

Then, let’s configure RAK7201 using the following contents:



At first, set the join mode to ABP:

Set the device address:

Set the APP session key:

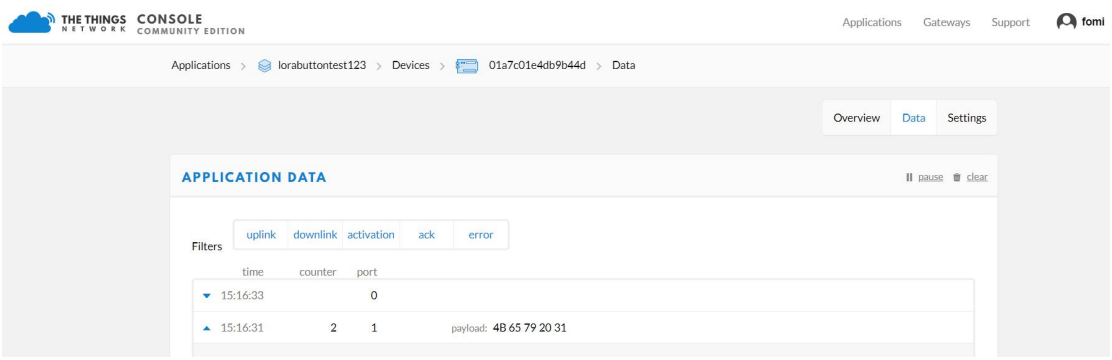
Set the network session key:

Join in ABP mode:

That's OK. Now, let's press key 3 on RAK7201:

```
[15:40:03.444]发→◇at+set_config=lora:join_mode:1
□
[15:40:03.552]收←◆ok

[15:40:10.155]发→◇at+set_config=lora:dev_addr:
□
[15:40:10.265]收←◆ok

[15:40:10.732]发→◇at+set_config=lora:apps_key:
□
[15:40:10.843]收←◆ok

[15:40:11.364]发→◇at+set_config=lora:nwks_key:
□
[15:40:11.475]收←◆ok

[15:40:14.780]发→◇at+join
□
[15:40:14.782]收←◆ok

[15:40:17.704]收←◆KEY3 Fall

[15:40:19.224]收←◆MCPS confirmed succseeful

[15:40:19.684]收←◆mcpsIndication->Rssi        -52
```

You can see the data on TTN:



That's all about ABP mode.

Button additional function description

1. Long press key 1: the red light is on at 4 keys, and the configuration mode is on.
2. Long press key 2: 4 blue lights flash twice and the board is restarted.