

Get Start with RAK2245 Pi HAT

This document is used for getting start with RAK2245 Pi HAT or RAK7243 without LTE, and it also can be used for getting start with RAK831 + RPi or Pilot gateway.

About RAK2245

RAK2245 Series
STAMP Edition
96Boards IoT Edition
Pi HAT Edition

Compact size and better performance

NEW

With new features such as a stabilize sensitivity of -139dBm and added Heatsink for thermal dissipation efficiency the NEW **RAK2245** engineered for better performance.



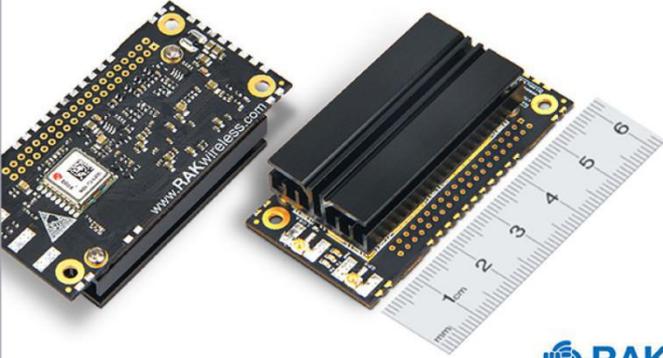
Stabilize Sensitivity



Added Thermal Solution

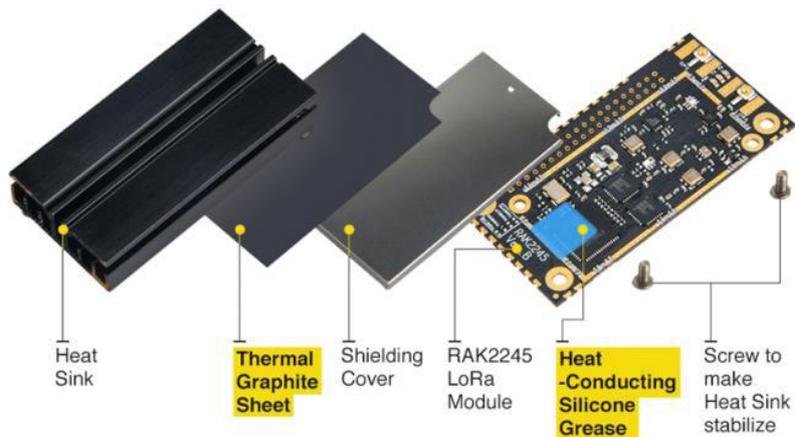


Prototype to Commercial





High Efficiency Heat Dissipation Flow



About RAK2245 Pi HAT

Compatible with Raspberry Pi 3 Model B+ edition.

Integrated the heat sink.

SX1301 base band processor emulates 49 x LoRa demodulators 10 parallel demodulation paths, support 8 uplinks channel, 1 downlink channel.

2 x SX125x Tx/Rx front-ends high/ low frequency.

Supports 5V power supply.

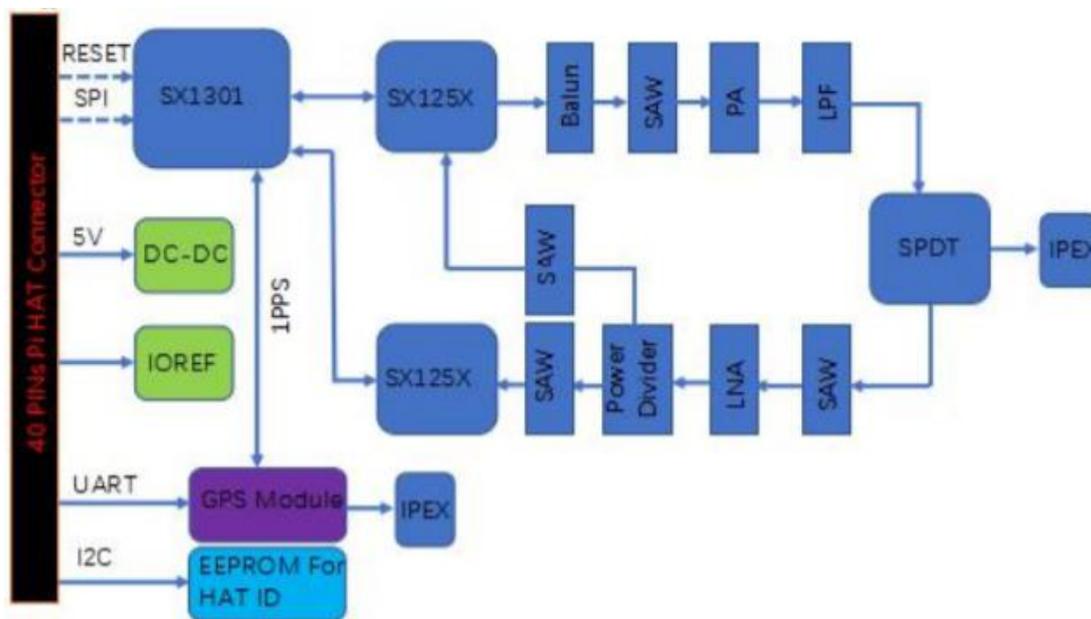
TX power up to 27dBm, RX sensitivity down to - 139dBm@SF12, BW 125KHz.

Supports latest LoRaWAN 1.0.2 protocol.

Supports global license-free frequency band (EU433, CN470, EU868, US915, AS923, AU915, KR920, IN865).

Supports SPI, UART, GPIOs interface.

Integrated the Ublox MAX-7Q GPS Module.



What do you need to prepare?

1 x RAK2245 Pi HAT or 1 x RAK7243 without LTE or 1 x RAK831 or Pilot gateway with 16G SD card:
https://www.aliexpress.com/store/product/RAK2245-Pi-HAT-Raspberry-Pi-3B-WisTrio-LoRa-Tracker-16-G-TF-Card-with-software-image-to/2805180_32973600006.html?spm=a2g1y.12024536.productList_11466926.pic_5

1 x PC or Virtual Machine with Linux OS

A software for recording. Etcher is good, and you can download it from here:

<https://www.balena.io/etcher/>

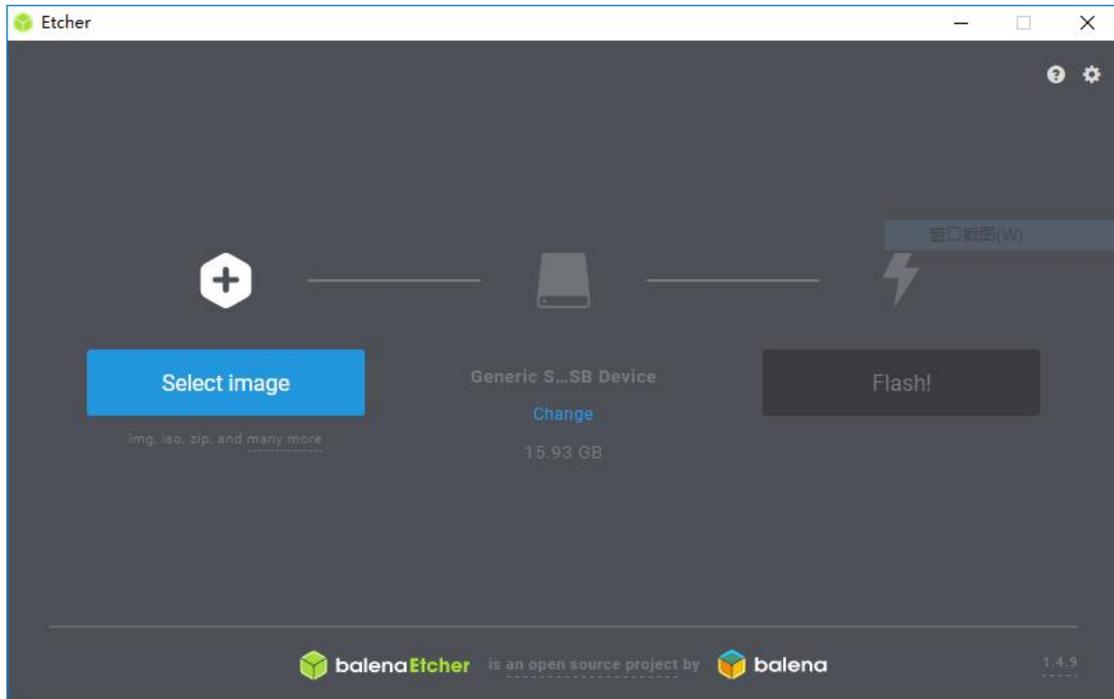
The latest firmware image for RAK2245/RAK831/RAK7243 without LTE. You can download it from RAK website:

<https://www.rakwireless.com/en/download/LoRa/RAK2245-Pi-HAT#Firmware>

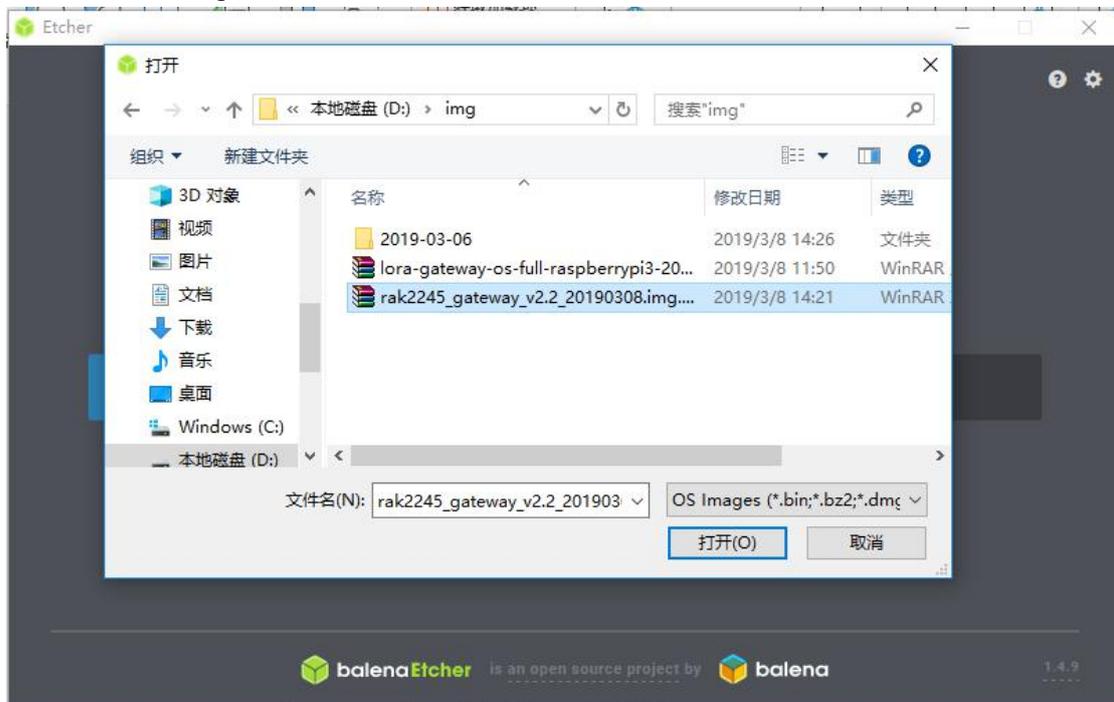
Burn the firmware image into SD card

Now, let's burn the firmware image into SD card.

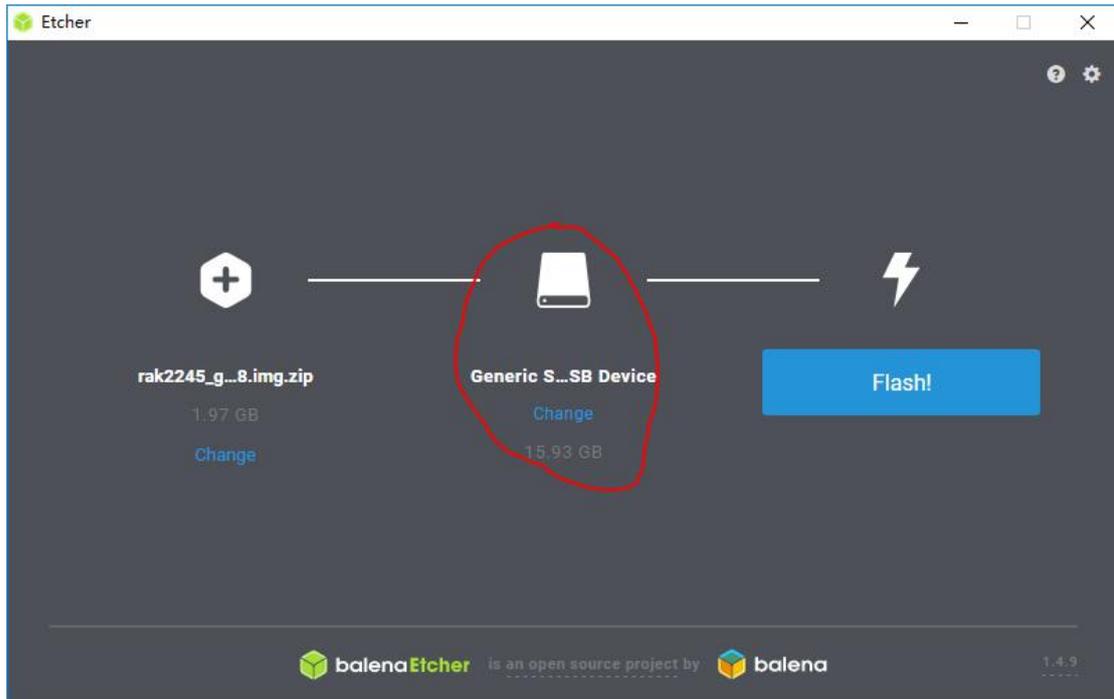
1. Open the tool.



2. Select the correct image



3. If you see the information as follow:



4. Press the “Flash!” button to start burning. It may take 5~10 minutes.

Connect to the network

Insert the SD card into your Linux PC, and you will see the following two folders:



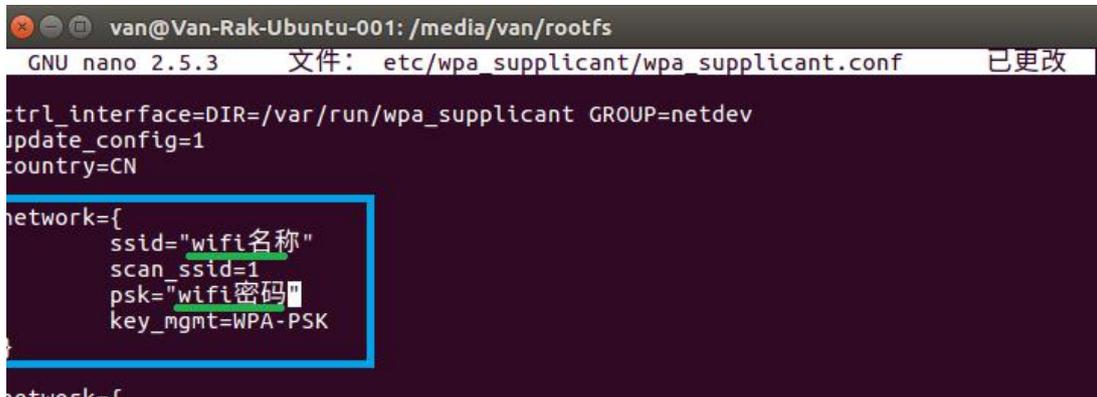
Enter the <rootfs> folder, and open the command terminal. Then type the command “`sudo nano etc/dhcpd.conf`” and add some contents in the end of this file as follow:

```
#static domain_name_servers=192.168.1.1
# fallback to static profile on eth0
#interface eth0
#fallback static_eth0
static ip_address=192.168.6.77/24
static routers=192.168.6.1
static domain_name_servers=8.8.8.8 223.5.5.5
```

Note: the values in the above picture is just for demo, you should fill the correct value as your network configuration.

If you connect the LoRa gateway through Ethernet, you can insert SD card into RPi now, and login the gateway through SSH.

If you connect the LoRa gateway through Wi-Fi, you need to open the terminal in the “rootfs” folder, and type a command “**sudo nano etc/wpa_supplicant/wpa_supplicant.conf**” to edit the configuration of Wi-Fi as the following picture shows:



```

van@Van-Rak-Ubuntu-001: /media/van/rootfs
GNU nano 2.5.3 文件: etc/wpa_supplicant/wpa_supplicant.conf 已更改

ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=CN

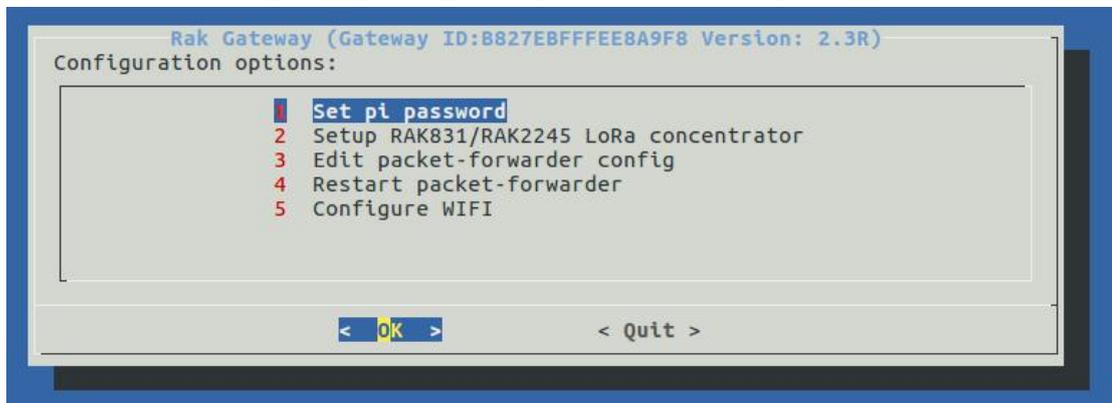
network={
  ssid="wifi名称"
  scan_ssid=1
  psk="wifi密码"
  key_mgmt=WPA-PSK
}
network=f
  
```

“ssid” is the Wi-Fi network name which you want to connect, and “psk” is the password of this network. After configuration, remember to type “CTRL+X” to save the configuration.

Configure your LoRa gateway

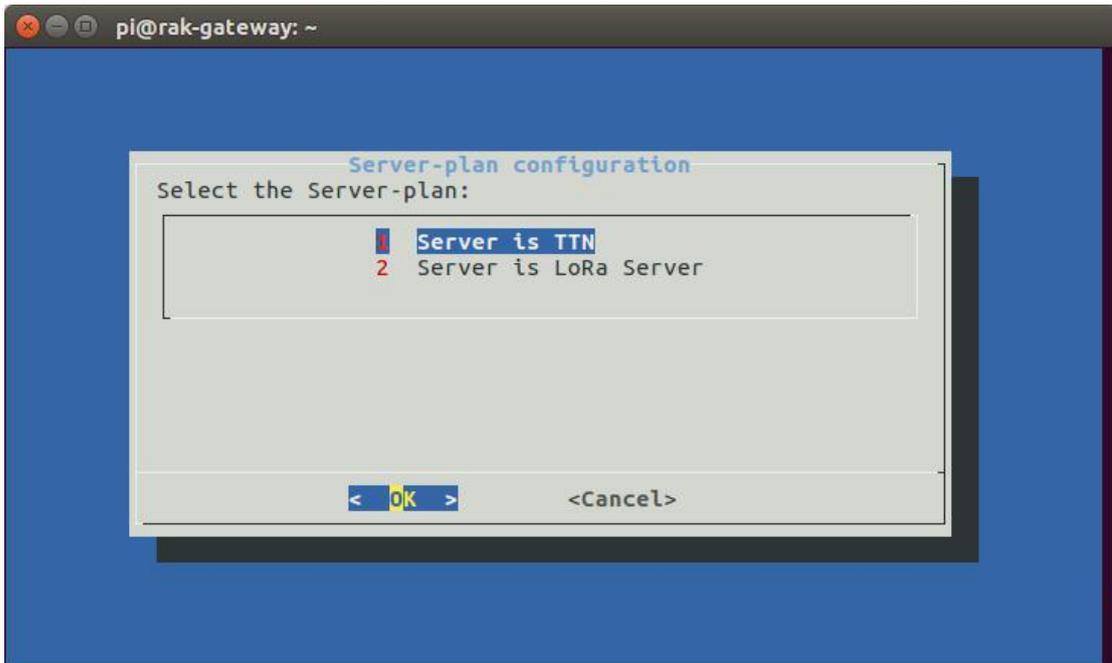
Now, let’s get start to configure LoRaWAN parameters for your LoRa Gateway as the following steps:

1. Login through SSH. The default username is “pi” and the default password is “raspberrypi”.
2. Type the command “sudo gateway-config” then you will see a configuration UI like this:



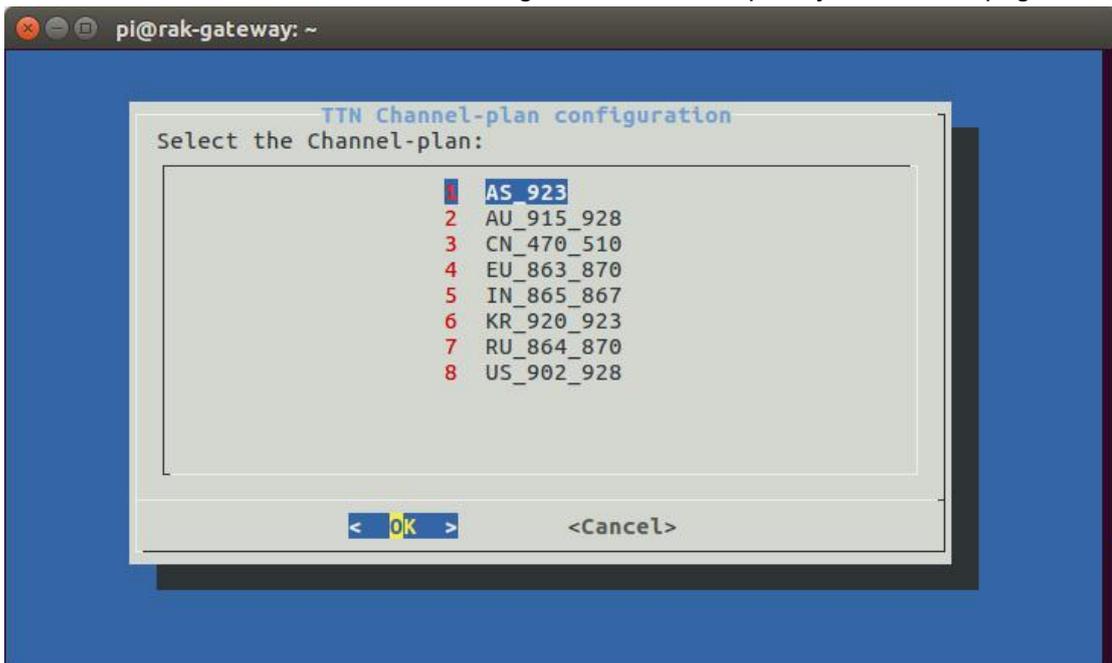
- 1) The first item “1 Set pi password” is used to reset the password of this device/RPi, we recommend you to reset it, because the default password is not security when you use it.
- 2) The second item “2 Setup RAK831/RAK2245 LoRa concentrator” is used to configure which LoRa server and Frequency you want your LoRa gateway works with. The default LoRa server is the built-in lorasever and the default frequency is EU868. You can use it directly without any configuration if you want it to work on the default configurations, and you just need to configure your LoRa node by using the default parameters:
devEUI: 00000000000000666
appKey: 000000000000000000000000000000666
appeui: 2222222222222222

- 3) The third item "3 Edit packet-forwarder config" is used to check or edit the global_conf.json file which includes all of LoRa parameters.
 - 4) The fourth item "4 Restart packet-forwarder" is used to restart the LoRa progress.
 - 5) The last item "5 Configure WIFI" is used to connect to a WiFi network, but you can only add a new SSID by this way, if you want to edit an exist SSID, please use the normal method of RPi to edit /etc/wpa_supplicant/wpa_supplicant.conf.
3. If you want the gateway to work on another frequency or another LoRa server like TTN, you need to select the second item on the configuration UI. Then you can see the following page:



Now, there are two kinds of LoRa server you can choose, one is TTN and the other is loraserver.io.

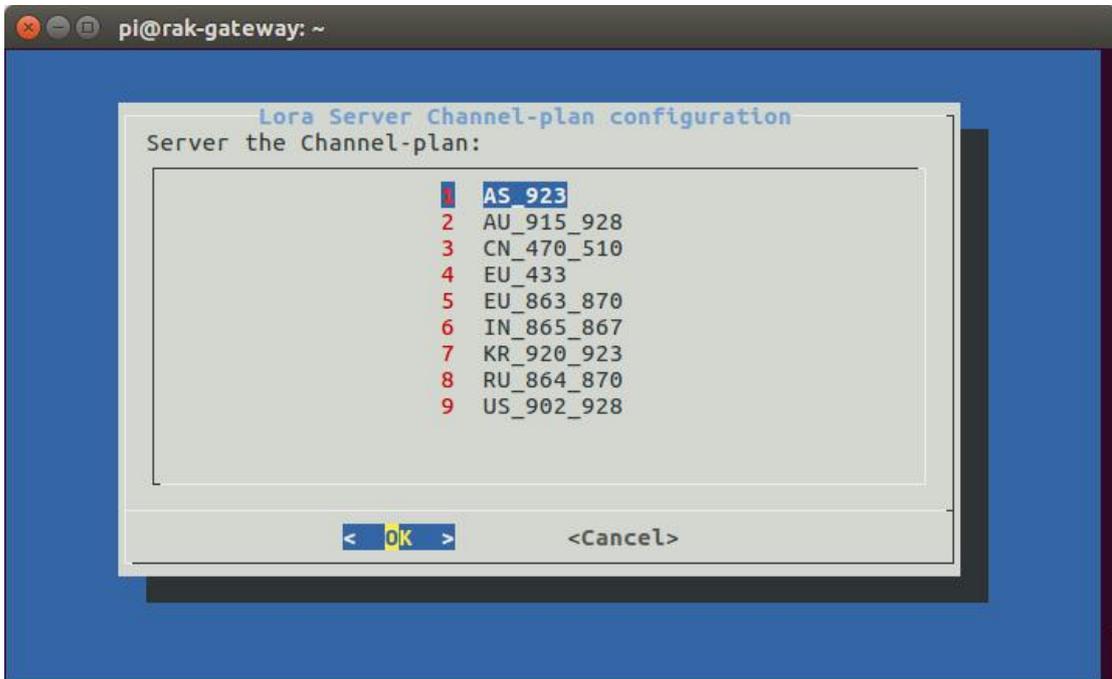
4. If you select TTN as LoRa server, the next thing is to select a frequency on the next page:



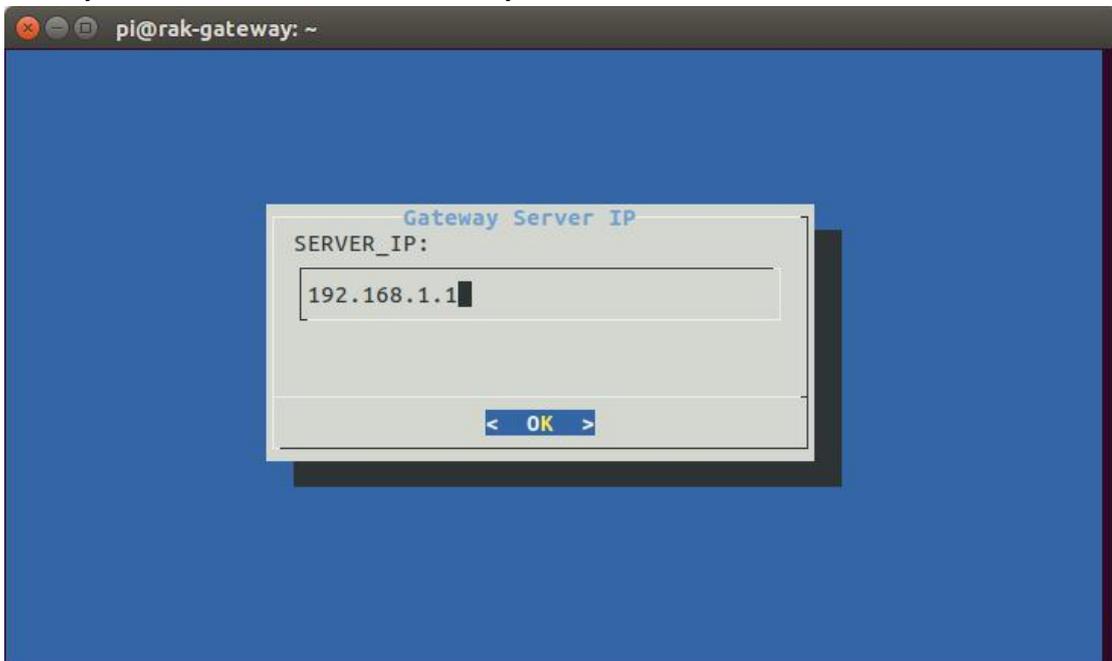
Note: TTN haven't supported EU433 by now.

Then, that's OK! You only need to get the gateway ID and use it on TTN web console to add your LoRa gateway device.

5. If you select loraserver.io as your LoRa Server, the next step is to select the frequency as follow:



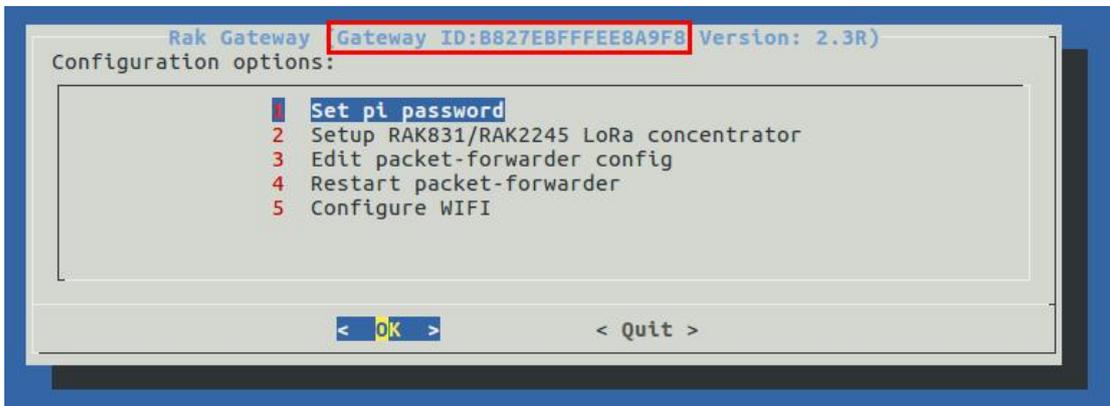
Then, you need to set the IP address of your loraserver.io as follow:



“127.0.0.1” indicates that you want to use the internal built-in loraserver.io, and other IP addresses indicate that you want to use a external independent loraserver.io device as your LoRa Server.

Where is the gateway ID?

When the gateway start, it will generate a unique gateway ID automatically and you can get it from here:



or by this way:

```
pi@rak-gateway:~ $ rak-version
Gateway ID:B827EBFFFEE8A9F8
rakwireless gateway 2245 version 2.3R
```

Where is the source code of this firmware?

You can also check the source code of this firmware for more details:

<https://github.com/RAKWireless/RAK2245-RAK831-LoRaGateway-RPi-Raspbian-OS>