

Background Knowledge

- Linux
 - Ubuntu/Debian([Raspbian](#))
 - Basic bash commands (cd/ls/mkdir/cp/mv/rm ...) [Basic]
 - SSH ([Xshell](#) on Windows, terminal on Linux) [Basic]
 - FTP ([Xftp](#) on Windows, [Filezilla](#) on Linux) [Basic]
 - Vim or Emacs or Nano [Basic]
 - Git [Basic]
- Raspberry Pi
 - How to setup a Raspberry Pi?
- LoRa
 - Difference between LoRa and LoRaWAN [Basic]
 - Workflow of LoRa/LoRaWAN [Basic]
 - How to send/Receive message by LoRa?
- Other
 - C/C++
 - Makefile [Basic]
 - DHCP (Build sub-net with router and switch) [Basic]

LoRaWAN Setup Tutorial

Raspberry Pi Setup

1. `sudo apt-get update`
2. `sudo apt-get install vim git wiringpi`
3. `sudo vim /boot/config.txt`

```
disable_overscan=1  
hdmi_force_hotplug=1
```

4. update wifi config (by GUI or Bash)
5. update network config

```
# /etc/network/interfaces  
  
auto wlan0  
  
iface lo inet loopback  
iface eth0 inet dhcp  
  
allow-hotplug wlan0  
iface wlan0 inet static  
address 192.168.1.233 # Your IP  
netmask 255.255.255.0 # Your netmask  
gateway 192.168.1.1 # Your gateway  
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf  
iface default inet dhcp
```

6. `sudo apt-get upgrade`
7. `sudo rpi-update`
8. `sudo reboot`
9. enable spi: <https://www.raspberrypi.org/documentation/hardware/raspberrypi/spi/README.md>

Connect iC880A to Raspberry Pi 3 mod B (Ignore this part for node)

The TTN gateway GPIO config is not as same as official iC880A GPIO config!

The right connection of the Gateway is listed below:

iC880A	Raspberry Pi 3 mod B	Description
13	11	Reset
14	23	SCLK

15	21	MISO
16	19	MOSI
17	24	NSS
21	2	Supply 5V
22	6	GND
	4	Supply 5V (Power source)
	39	GND (Power source)

LoRa Node

1. `sudo vim /boot/config.txt`

```
#map mini-UART to internal bluetooth an free-up main UART to handle
CookingHacks modules
dtoverlay=pi3-miniuart-bt

#enable uart interface
enable_uart=1

#enable spi interface
dtparam=spi=on

#enable i2c interface
dtparam=i2c_arm=on
```

2. `sudo vim /boot/cmdline.txt`, remove "console=serial0,115200" (an example is available below)

```
dwc_otg.lpm_enable=0 console=serial0,115200 console=tty1 root=/dev/mmcblk0p2
rootfstype=ext4 elevator=deadline fsck.repair=yes rootwait
```

3. Get ardu-pi lib

```
wget http://www.cooking-
hacks.com/media/cooking/images/documentation/raspberry_arduino_shield/raspberr
ypi2.zip && unzip raspberrypi2.zip && cd cooking/arduPi && chmod +x
install_arduPi && ./install_arduPi && rm install_arduPi && cd ../..
```

4. Get LoRaWAN api

```
wget http://www.cooking-hacks.com/media/cooking/images/documentation/tutorial_kit_lorawan/arduPi_api_LoRaWAN_v1_2.zip && unzip -u arduPi_api_LoRaWAN_v1_2.zip && cd cooking/examples/LoRaWAN && chmod +x cook.sh && cd ../../..
```

5. Run demo cpp

```
cd cooking/examples/LoRaWAN/  
./cook.sh example.cpp
```

Reference

- <https://pinout.xyz/>
- https://wireless-solutions.de/images/stories/downloads/Radio%20Modules/iC880A/iC880A_Datasheet_V0_17.pdf
- https://wireless-solutions.de/images/stories/downloads/Radio%20Modules/iC880A/iC880A-SPI_QuickStartGuide.pdf
- <https://www.cooking-hacks.com/lorawan-shield-for-raspberry-pi-868-mhz-xbee-socket>
- <https://www.cooking-hacks.com/forum/viewtopic.php?f=19&t=8912>