RI53 Radio Networks , Spring 2022

Internet of Things (IoT)
Adafruit LoRA board

Dr. Mohamed KAS

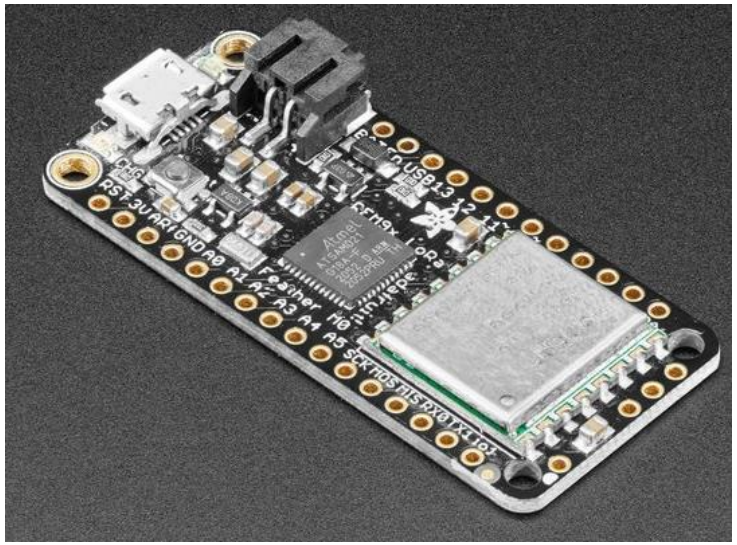
mohamed.kas@utbm.fr

Belfort, 14-06-2022

Adafruit Board

The Adafruit Feather M0 RFM95 LoRa Radio (900MHz) has a microcontroller with a "Long Range (LoRa)" packet radio transceiver with built in USB and battery charging.

It’s a great for making wireless networks that are more flexible than Bluetooth LE and without the high power requirements of WiFi.



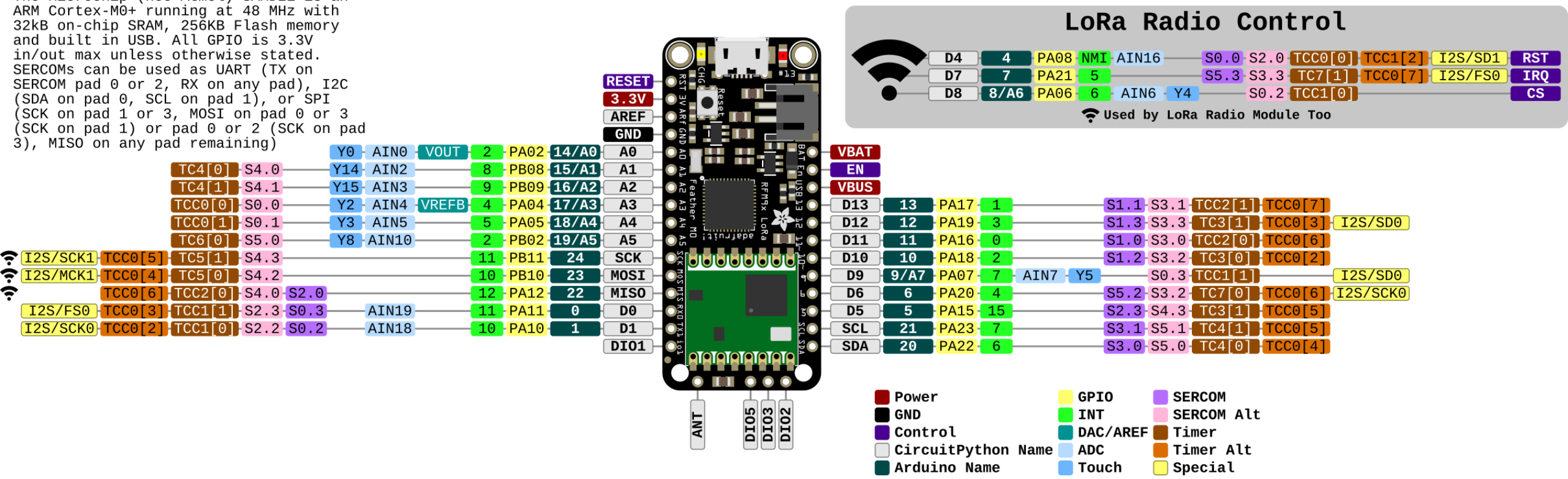
Adafruit Board

- ATmega32u4 @ 8MHz with 3.3V logic/power
- 3.3V regulator with 500mA peak current output
- USB native support, comes with USB bootloader and serial port debugging
- You also get tons of pins - 20 GPIO pins
- Hardware Serial, hardware I2C, hardware SPI support
- 7 x PWM pins
- 10 x analog inputs
- Built in 100mA lipoly charger with charging status indicator LED
- Pin #13 red LED for general purpose blinking
- Power/enable pin
- 4 mounting holes
- Reset button

Adafruit Feather M0 RFM9x LoRa

https://www.adafruit.com/products/3178

The Microchip (nee Atmel) SAMD21 is an ARM Cortex-M0+ running at 48 MHz with 32kB on-chip SRAM, 256KB Flash memory and built in USB. All GPIO is 3.3V in/out max unless otherwise stated. SERCOMs can be used as UART (TX on SERCOM pad 0 or 2, RX on any pad), I2C (SDA on pad 0, SCL on pad 1), or SPI (SCK on pad 1 or 3, MOSI on pad 0 or 3 (SCK on pad 1) or pad 0 or 2 (SCK on pad 3), MISO on any pad remaining)



Adafruit Board

The open-source Arduino Software (IDE) makes it easy to write code, compile, and upload it to the board. This software can be used with any Arduino board.

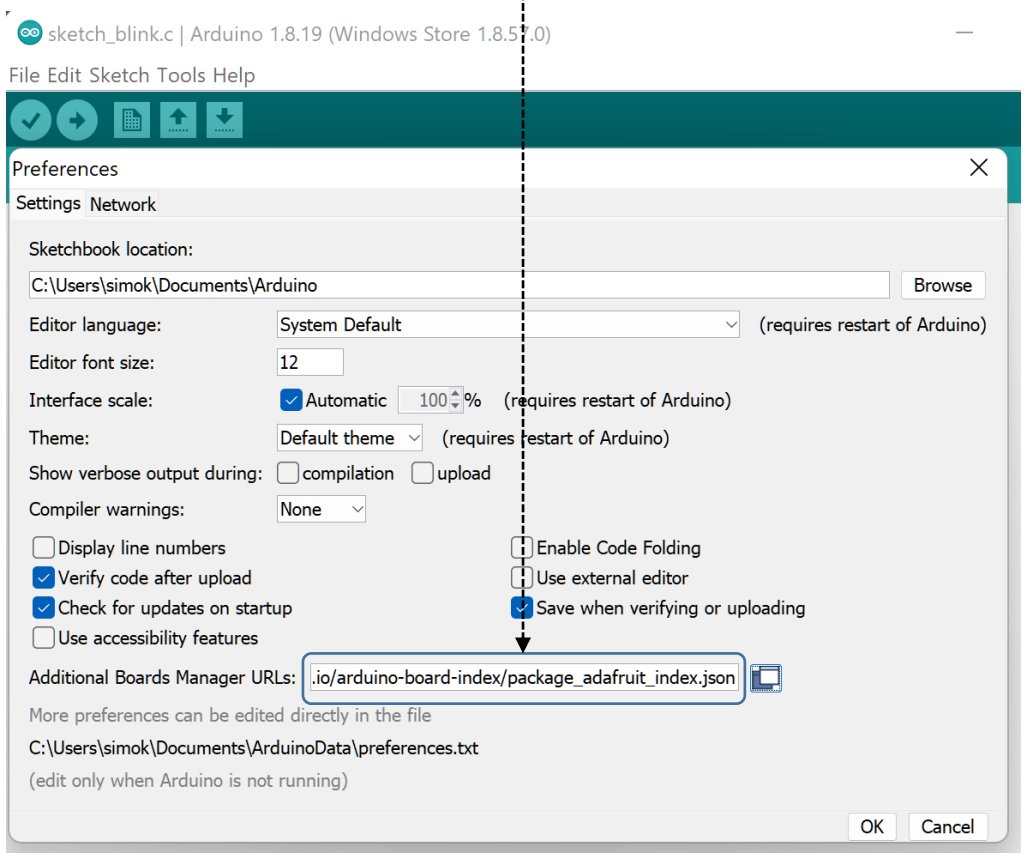
https://www.arduino.cc/en/software

Adafruit Board

The libraries for manipulating the Adafruit board are not installed in the Arduino IDE.

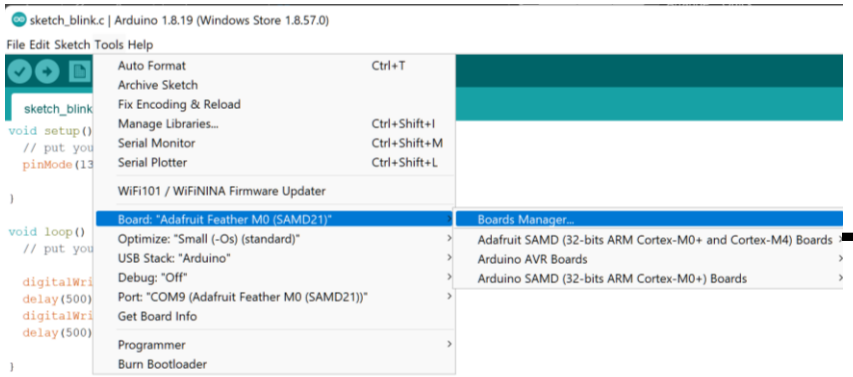
To do so, we need to add the link of the board manager of Adafruit

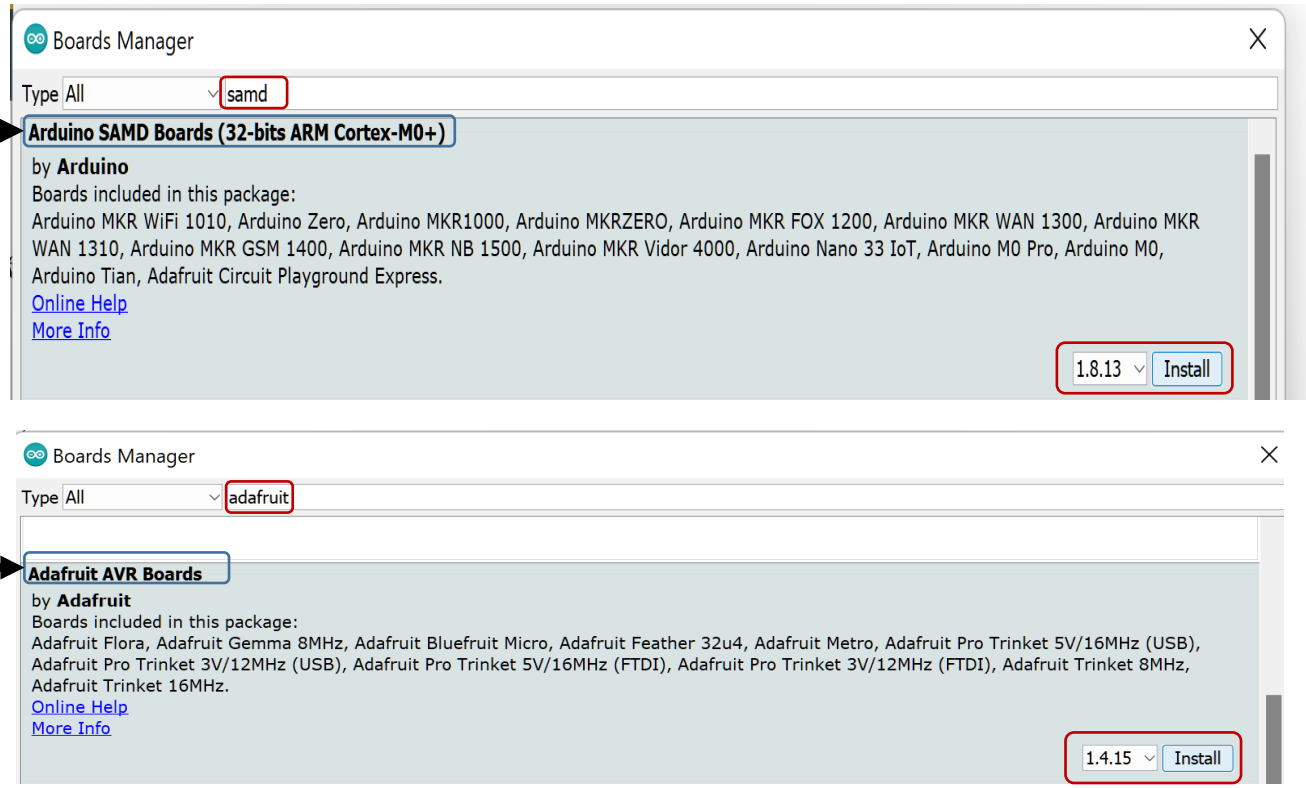
```
https://adafruit.github.io/arduino-board-index/package_adafruit_index.json
```



Adafruit Board

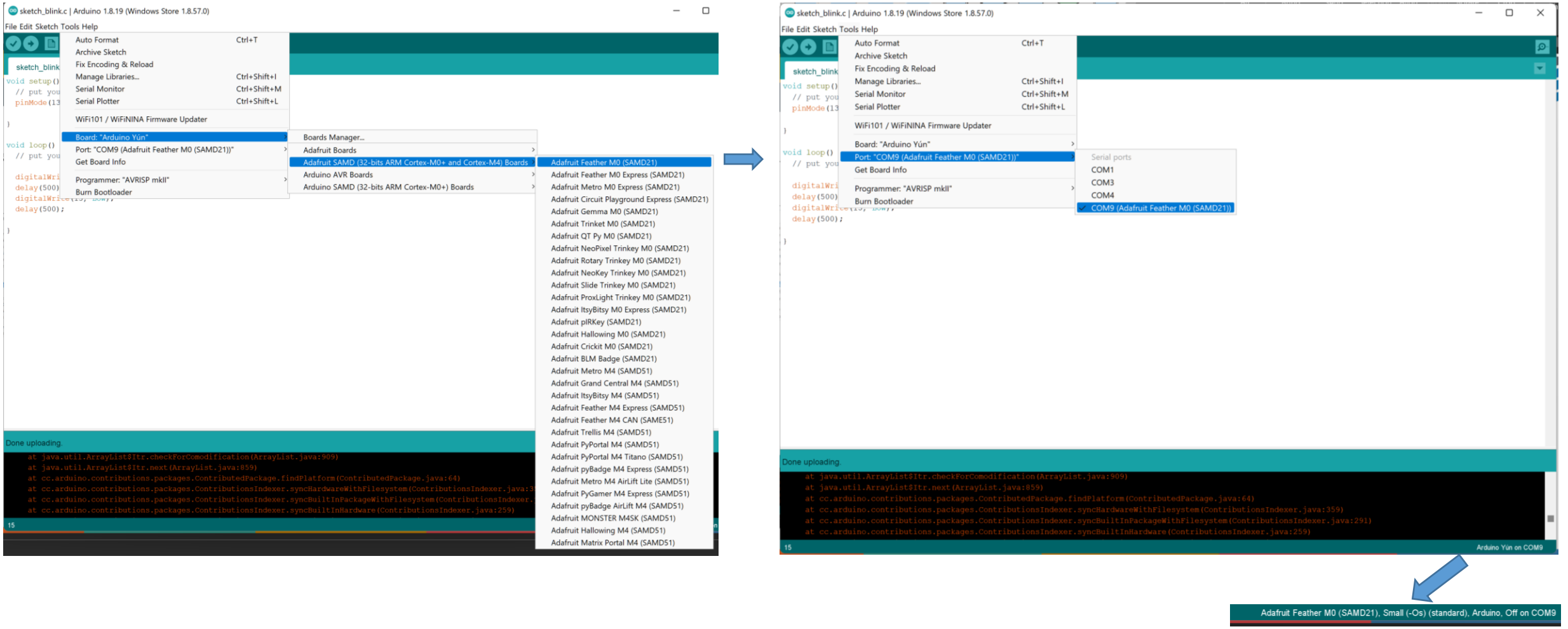
The next step is to install two Adafruit related boards manager from LM (Tools/Bords/ Libraries):





Adafruit Board

Now, we can select the Adafruit board as the target for deployment:



Adafruit Board

To check the setup, we will run a blinking program on the Built-in LED (PIN13):

https://filesender.renater.fr/?s=download&token=6aa16673-c73d-4265-b6a1-beaab17efbc1

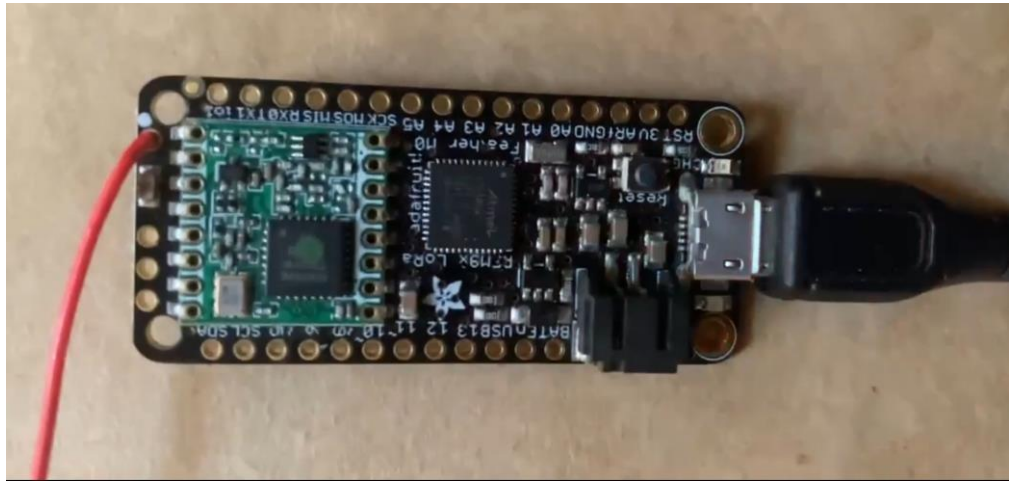
sketch_blink.c | Arduino 1.8.19 (Windows Store 1.8.57.0)

File Edit Sketch Tools Help

Upload

sketch_blink.c

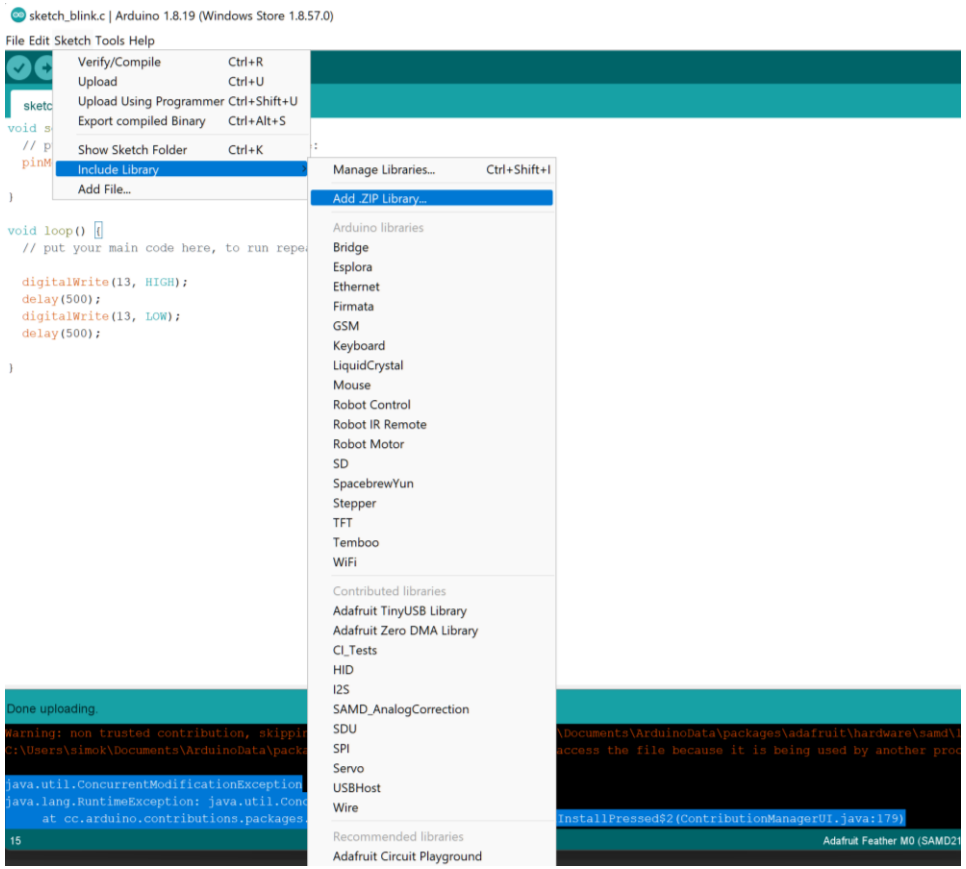
```
void setup() {
  // put your setup code here, to run once:
  pinMode(13, OUTPUT);

}

void loop() {
  // put your main code here, to run repeatedly:

  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);

}
```

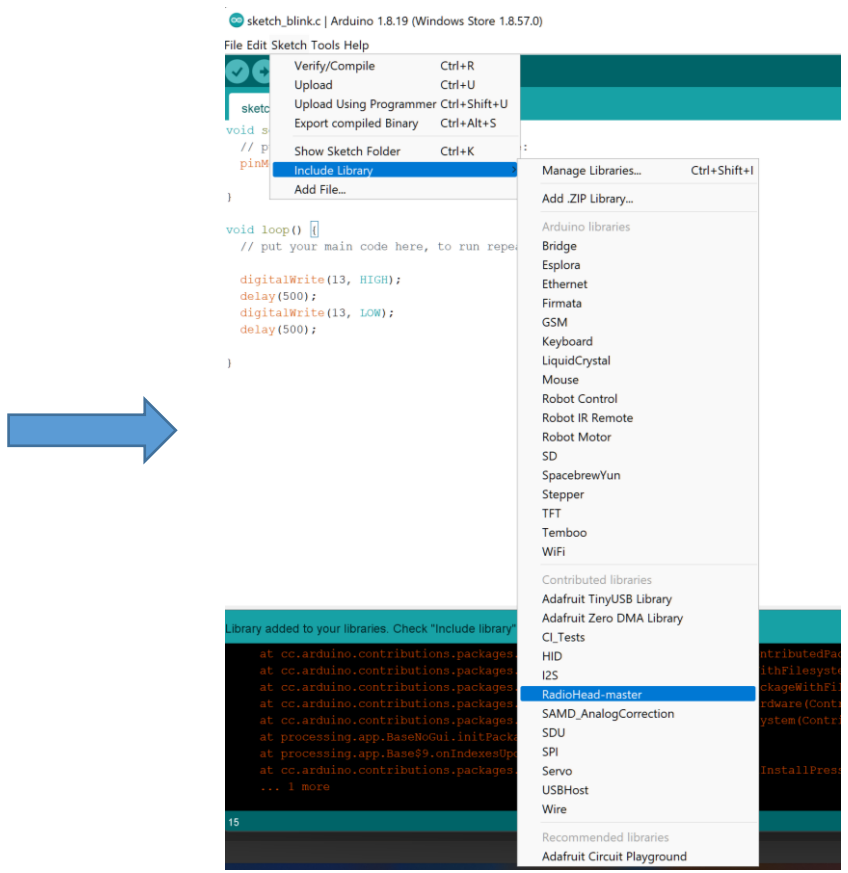


LoRA Client Server Com

To handle all the LoRA-based communications, we need to include the *RadioHead* that provides functions and methods to do so.

Arduino IDE allows the installation of custom libraries :

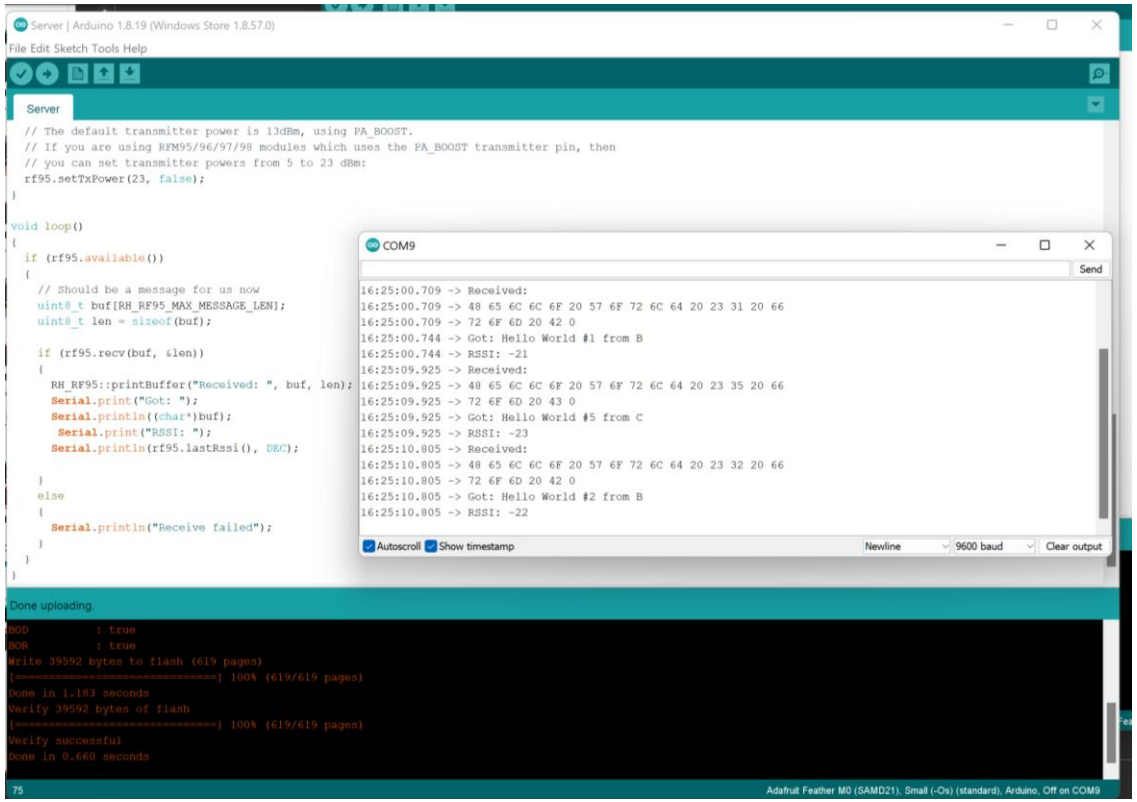


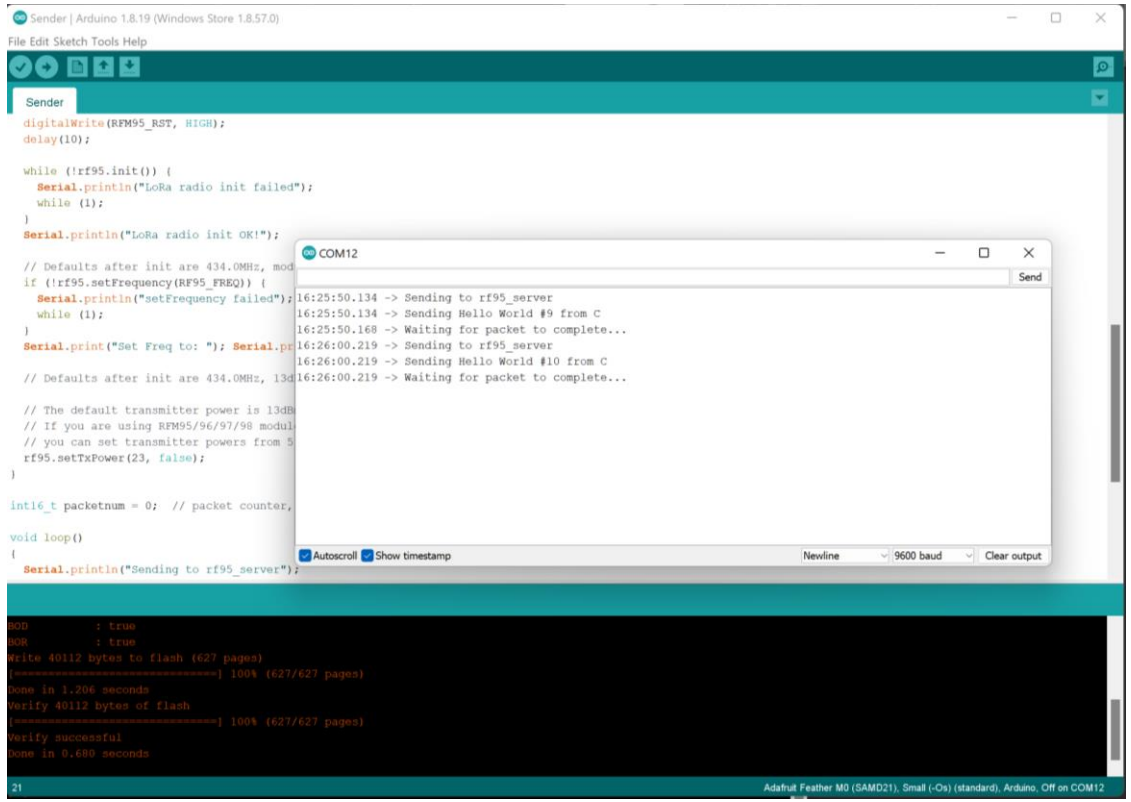


LoRA Client Server Com

We will establish a client server communication using LoRA network:

Download both sketches and change the messages to send.
A group will upload the sender file, another group will use the server side

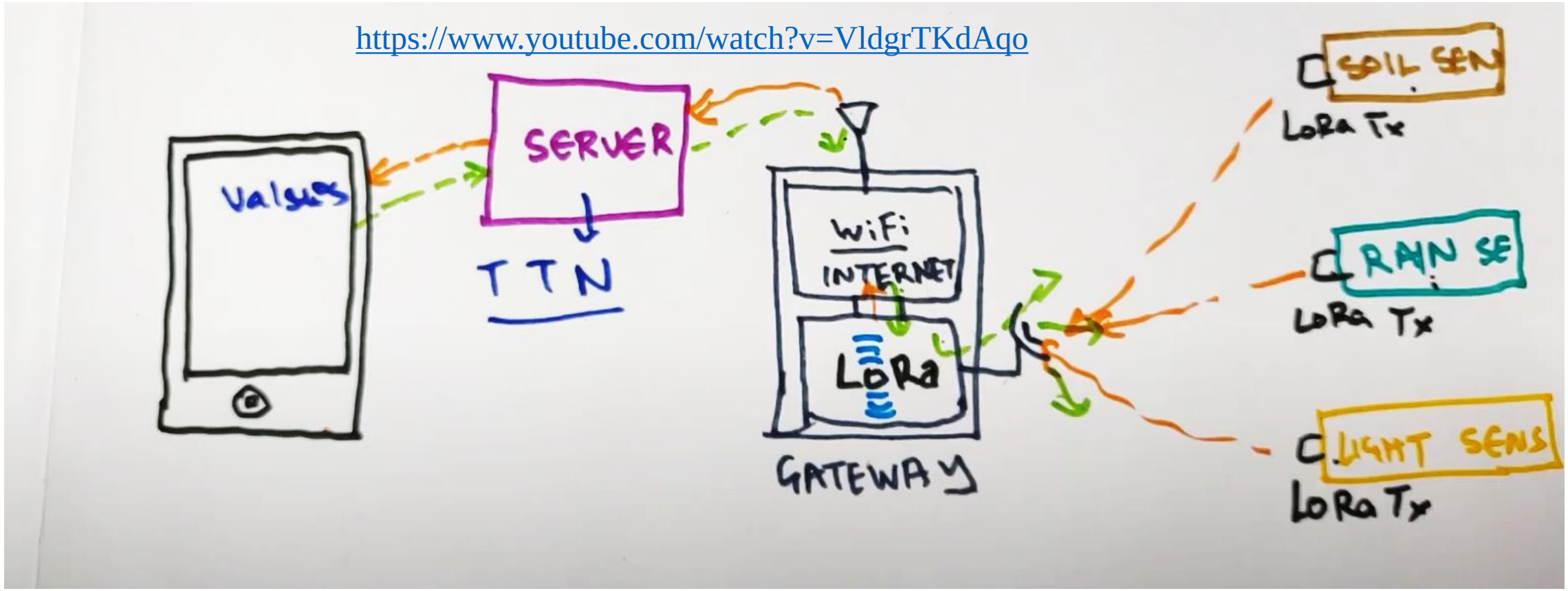




LoRA Dragino GateWay

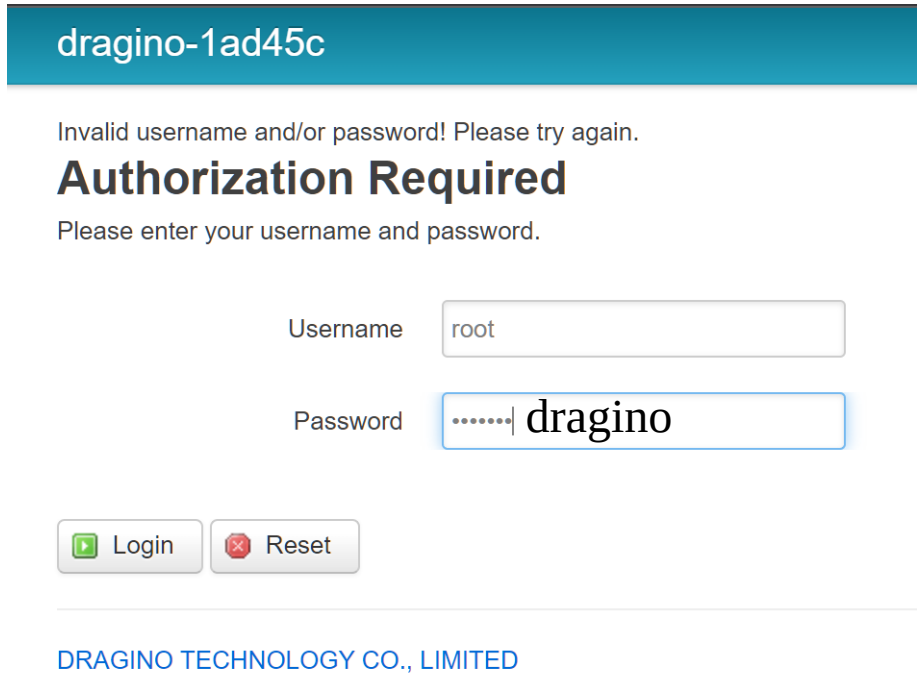
- LG01-N is an open source single channel LoRa Gateway. It lets us bridge LoRa wireless network to an IP network via WiFi, Ethernet, Or 3G/4G cellular via optional LTE module.
- LoRa wireless allows users to send data and reach extremely long ranges at low data-rates. It provides ultra-long range spread spectrum communication and high interference immunity.

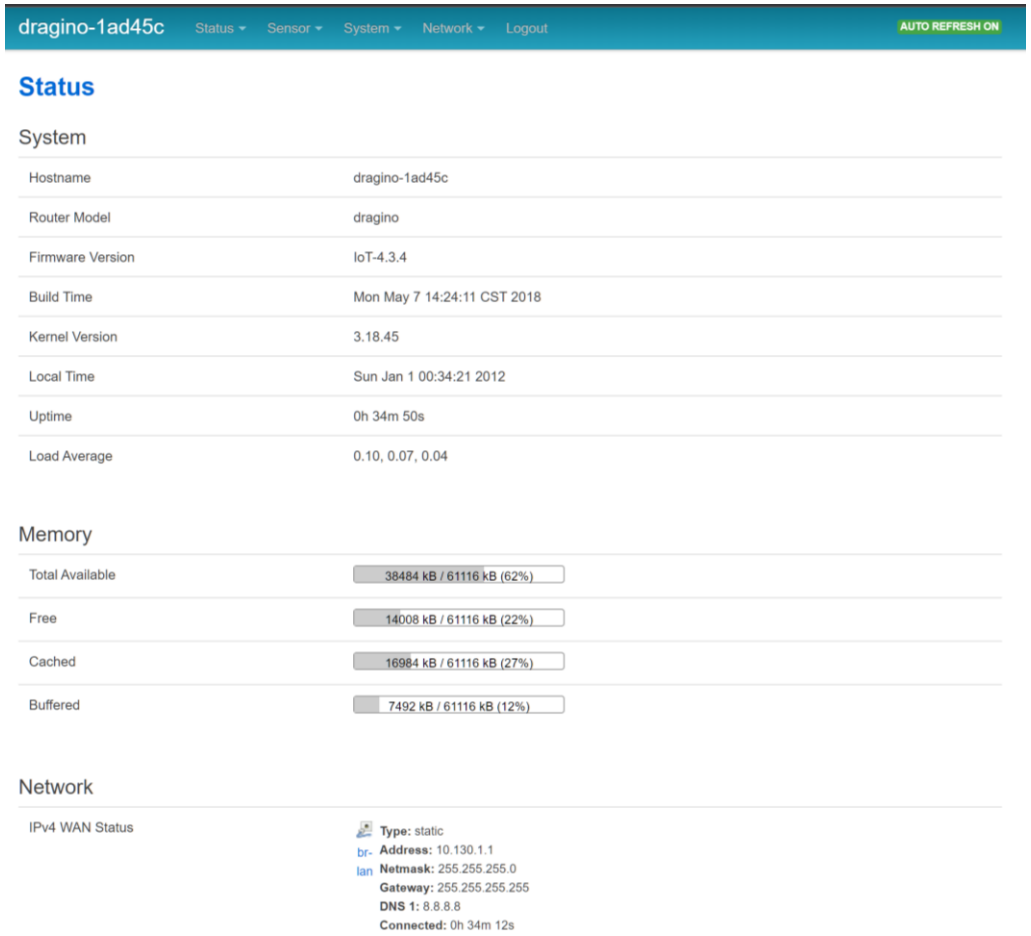
https://www.youtube.com/watch?v=VldgrTKdAqo



LoRA Dragino GateWay

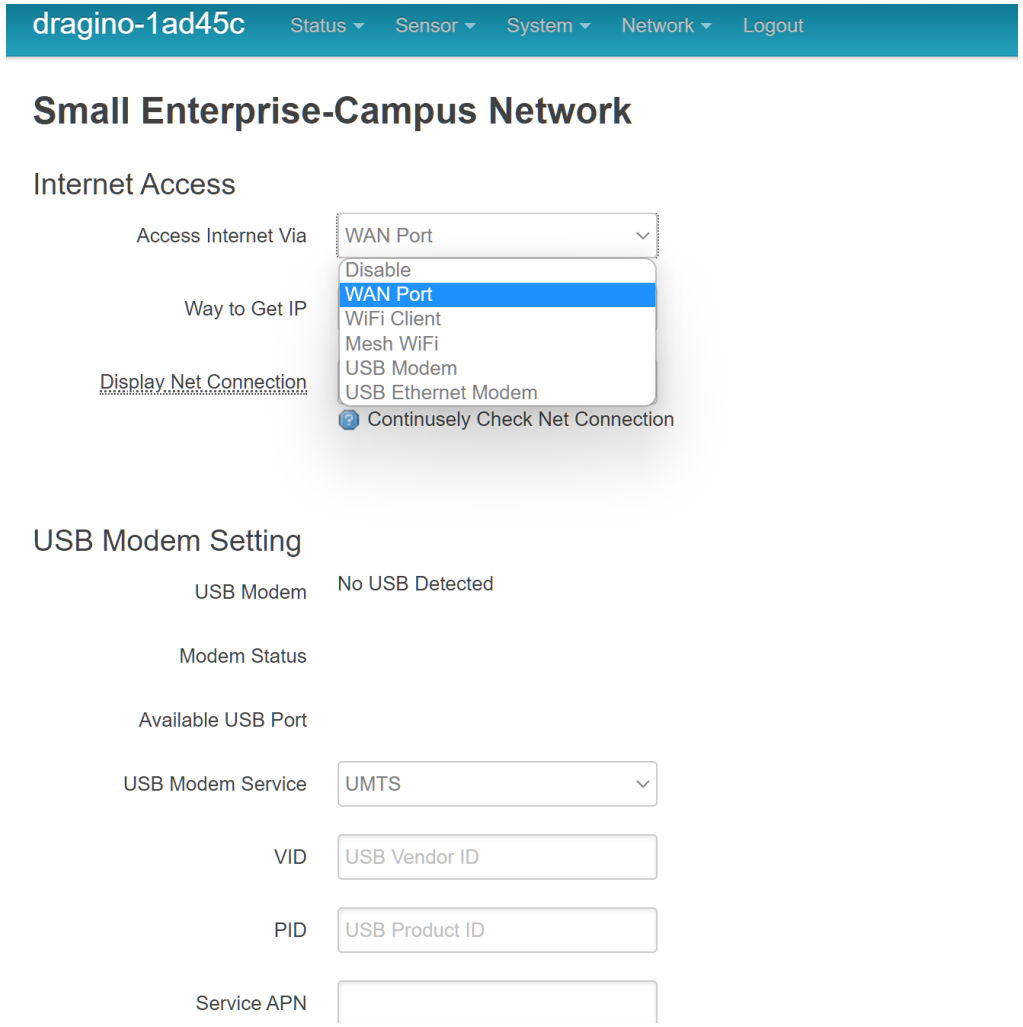
The Dragino GateWay should be configured to establish the communication to the backbone

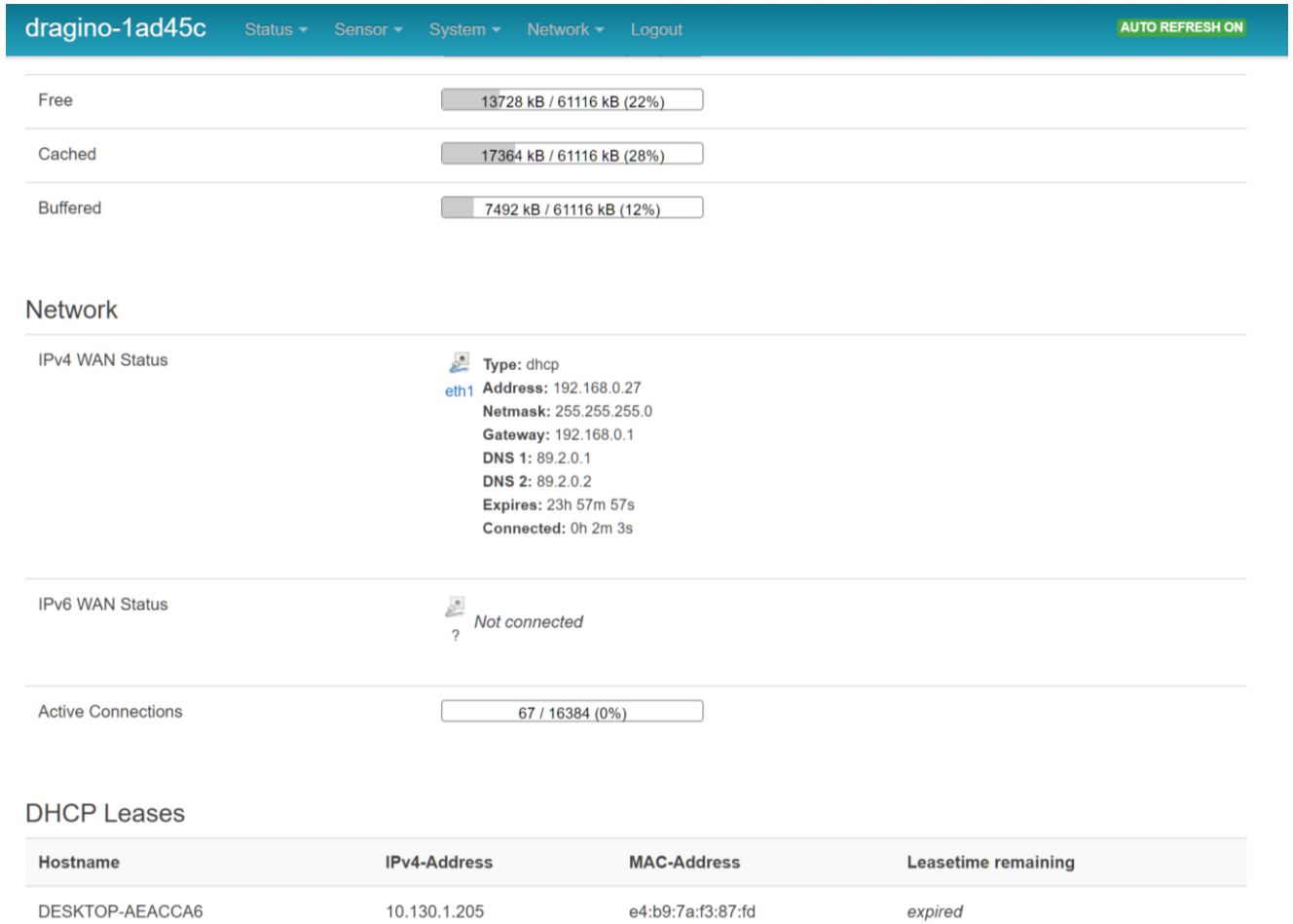




LoRA Dragino GateWay

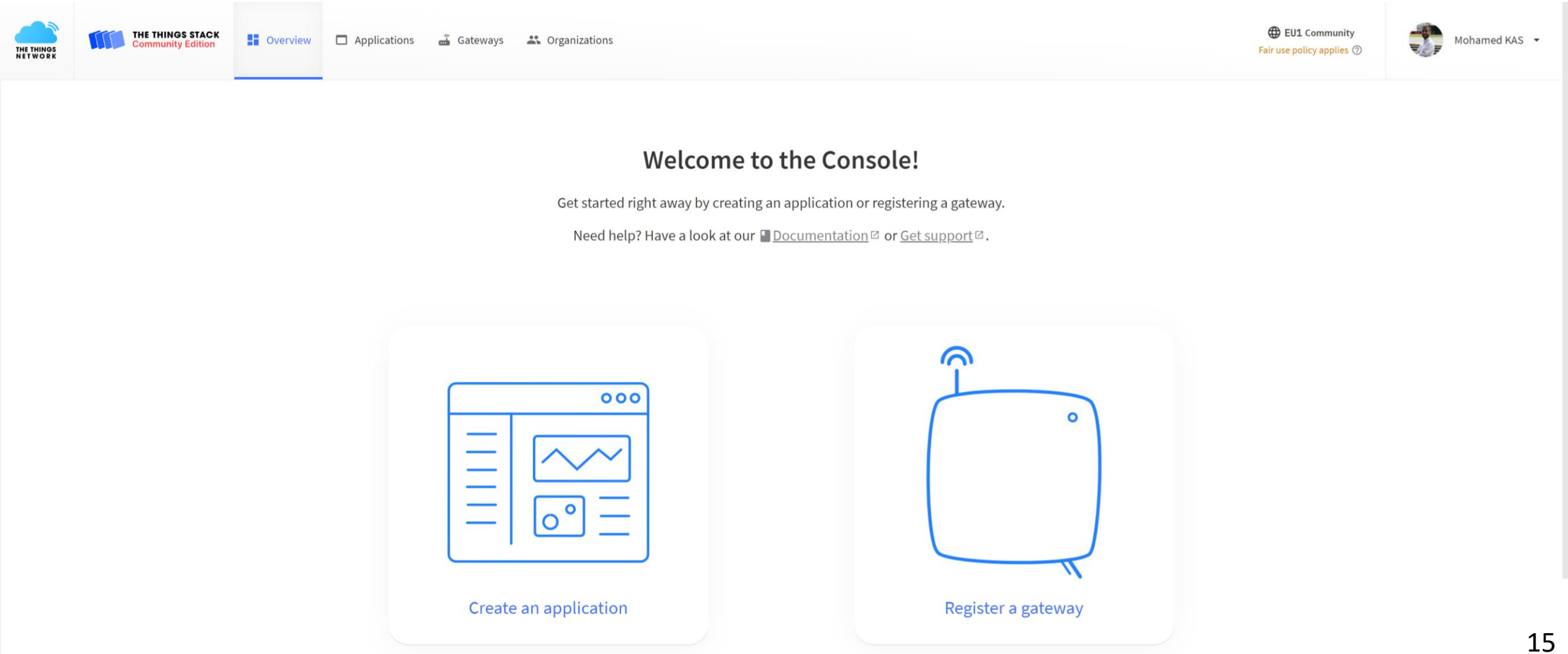
We set up the WAN access



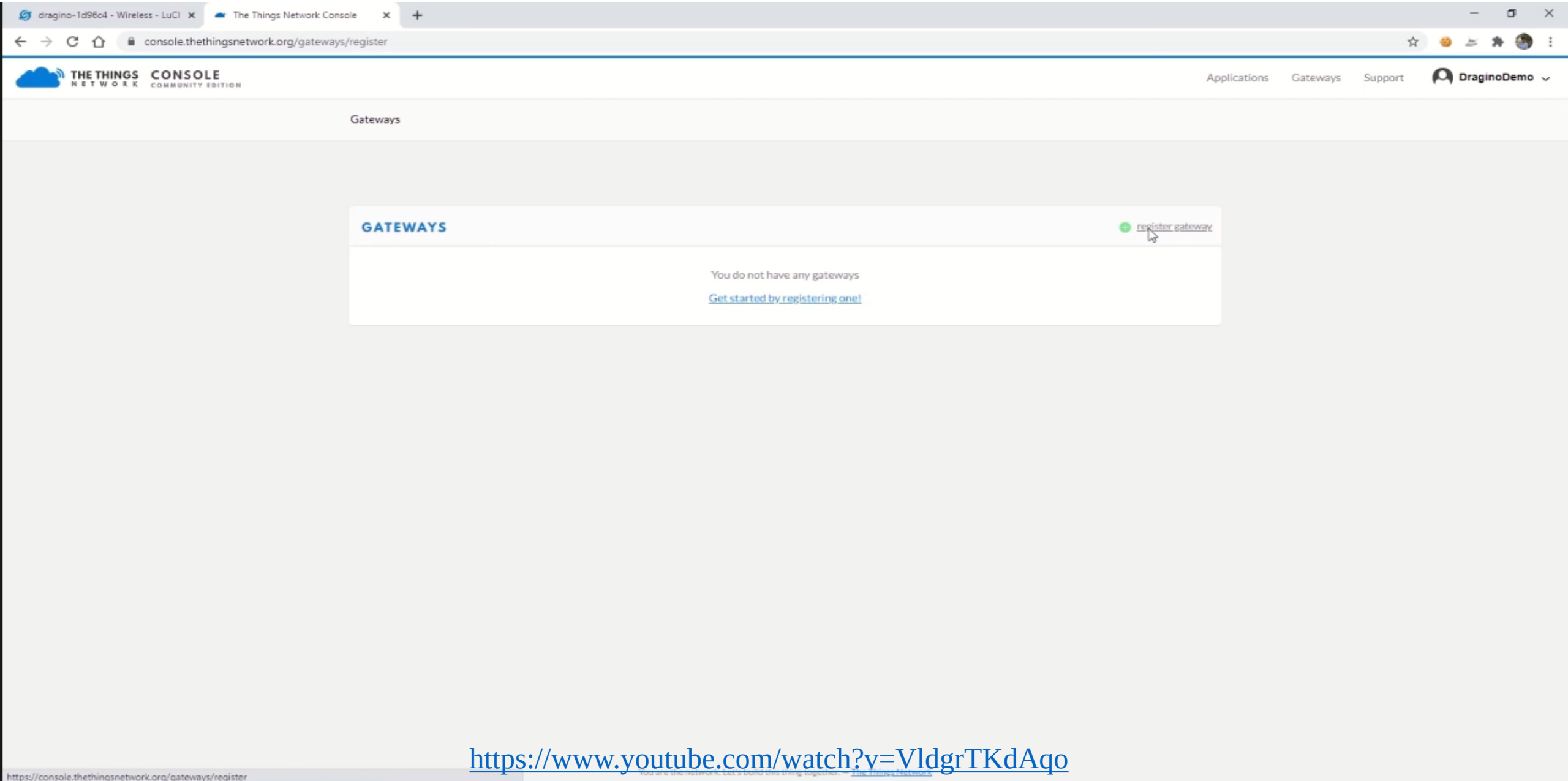


LoRA Dragino GateWay

On the backbone side, we need to register our GateWay



LoRA Dragino GateWay



https://www.youtube.com/watch?v=VldgrTKdAqo


[QUESTIONS]
[ANSWERS]
DARIUS FOROUX