LoRaWan Register a device on TTN

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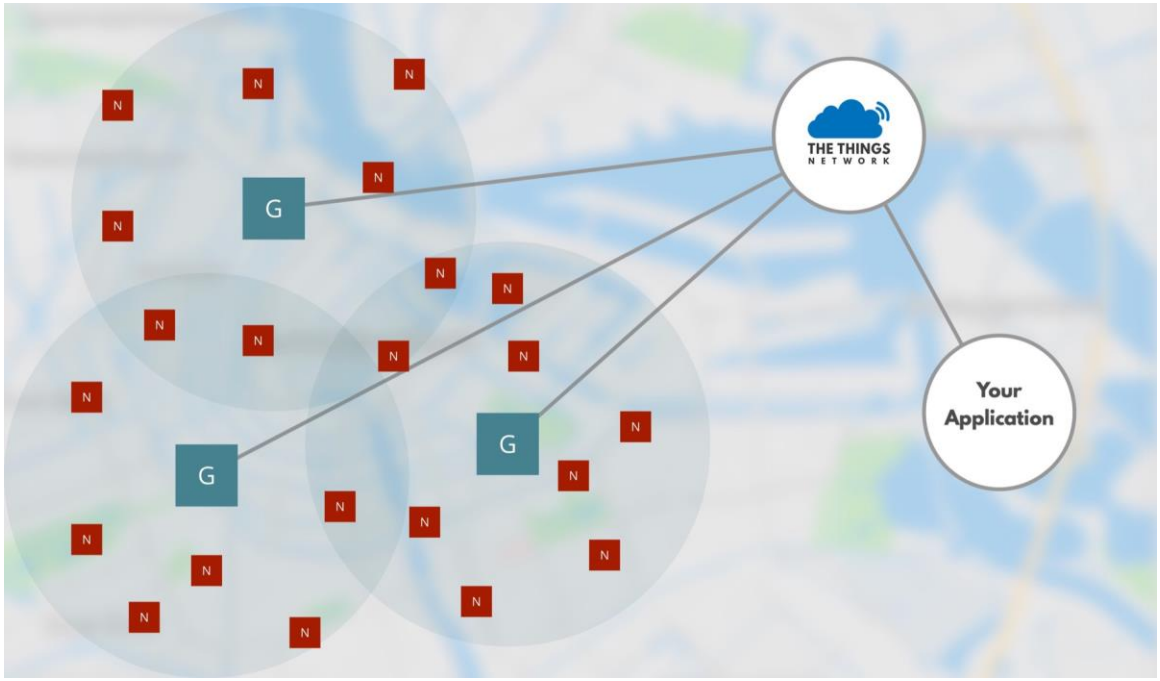
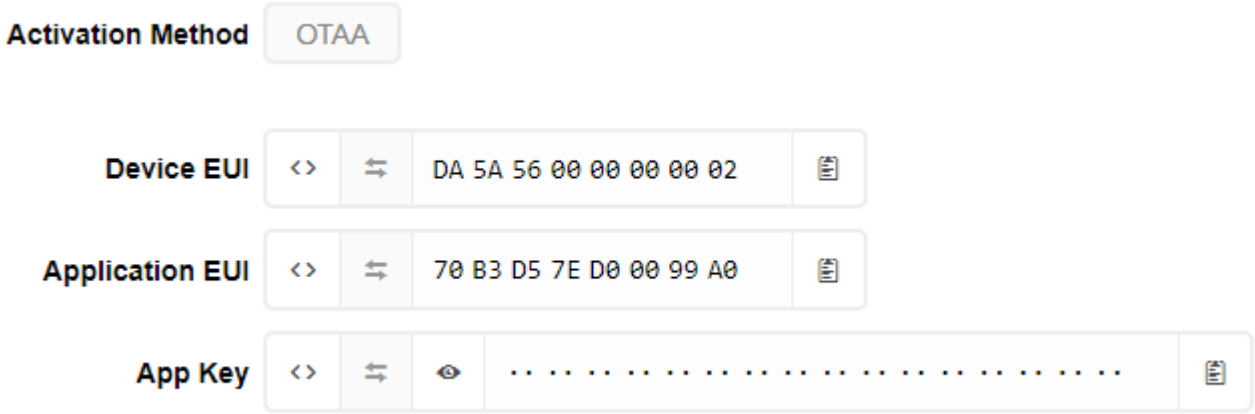
LoRaWan with The Thing Network

- The Things Network is a global, open, crowd-sourced Internet of Things data network.
- **The Things Network Backend** route messages from Nodes to the right Application, and back
- First, you have to register to https://www.thethingsnetwork.org/ , when it is done, tell me your ID, I will add you as a collaborator on the Polytech' application
- You can also join the Sophia Antipolis TTN community :



Adding a new device

- Go to « Projets Polytech »application and register device
- For ID and EUI, use the N° 50ff1a00000000XX and just incremant XX.
- To remember it : « 50ff1a » is for « SOPHIA »
- It will provide Device EUI, Application EUI and App Key



Activation by Personalization (ABP)

- Go to settings
- Select ABP and save
- Go back to Overview
- You have now the Device Address and the two 128 AES keys
- You can click on Hex-C Style to have the key in the right format

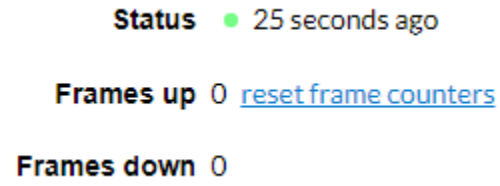
Activation by Personalization (ABP)

- Go to my Github : https://github.com/FabienFerrero/UCA_Board
- Download the archive (.zip) and extract the archive
- Copy the file from Arduino_Code/Libraries/ to /Document/Arduino/Libraries/
- Open the code Arduino_Code/LORAWAN/ABP/Basic/UCA-ABP_Basic.ino
- Copy/Paste NWKSKEY, APPSKEY and DEVADDR with your IDs from TTN

```
// LoRaWAN NwkSKey, network session key
// This is the default Semtech key, which is used by the early prototype TTN
// network.
static const PROGMEM u1_t NWKSKEY[16] = { 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00 };


// LoRaWAN AppSKey, application session key
// This is the default Semtech key, which is used by the early prototype TTN
// network.
static const u1_t PROGMEM APPSKEY[16] = { 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00 };


// LoRaWAN end-device address (DevAddr)

static const u4_t DEVADDR = 0x00000000;
```

Activation by Personalization (ABP)

- Compile and download the code on your board
- Look at the TTN device overview
- Frames up should increment each minutes as you board is sending an uplink each 60s.
- Have look on data
- For each uplink, you can look many details as RSSI, SNR, airtime, modulation, coding rate, GW ID, etc …



time	counter	port		
21:45:35	3	1		payload: 48 65 6C 6C 6F 2C 20 77 6F 72 6C 64 21
21:44:29	2	1		payload: 48 65 6C 6C 6F 2C 20 77 6F 72 6C 64 21
21:43:22	1	1		payload: 48 65 6C 6C 6F 2C 20 77 6F 72 6C 64 21
21:42:16	0	1	*retry*	payload: 48 65 6C 6C 6F 2C 20 77 6F 72 6C 64 21

Activation by Personalization (ABP)

Frame counter security

- Now reset you board (click on the red button on the Arduino mini pro)
- TTN is no more receiving the data
- Click on « reset frame counters » and reset you board again
- As you can see, frame counter is a security features to avoid replay attack (done by capturing and re-transmitting the messages)

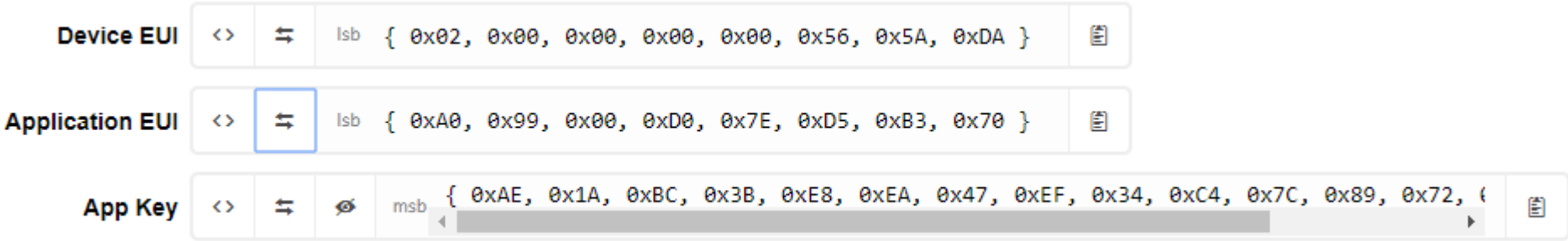
Downlink

- Open your serial monitor
- In TTN overview, go to downling, add a payload like « BABA » and click on send
- After the next uplink, you should see the number of byte received in downlink

```
16608545: EV_TXCOMPLETE (includes waiting for RX windows)
Received
2
 bytes of payload
```

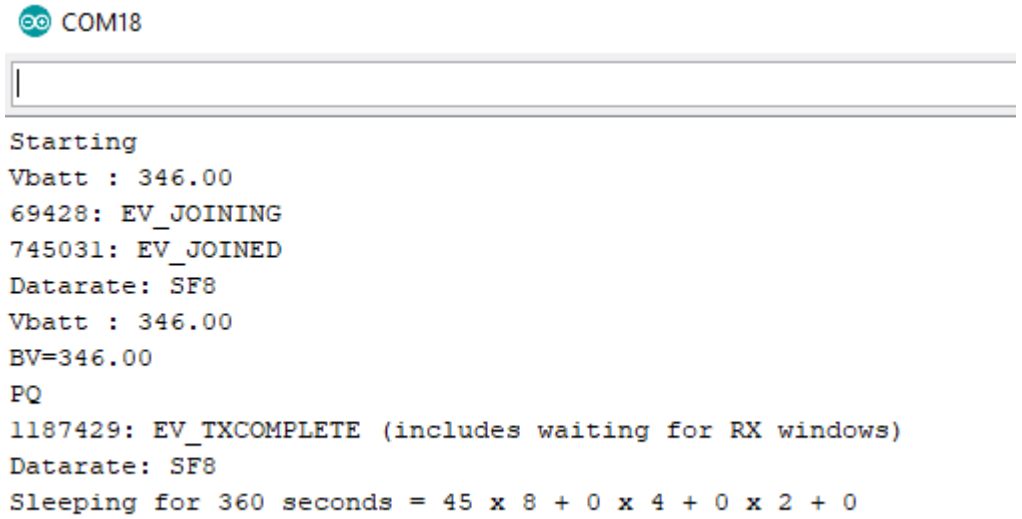
Over the Air Activation (OTAA)

- In TTN Settings of your device, select OTAA and save
- Open the code Arduino_Code/LORAWAN/OTAA/LP_Basic/UCA-OTAA_Basic.ino
- copy paste after clicking on hexa-style the DEV-EUI, APP-EUI and App Key
- Be carefull !!!
  - Device EUI and Application EUI are **lsb**
  - App Key is **msb**



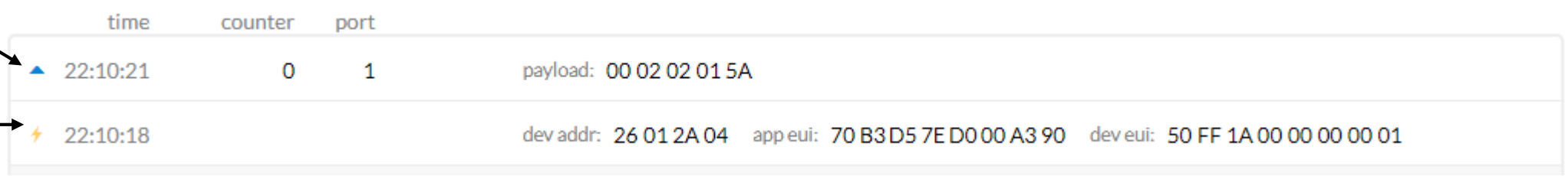
Over the Air Activation (OTAA)

- Look in data
- You should see a first uplink that request the connection
- And a second packet witht the first data
- On the serial monitor you can see the Joining process and then Joined and Tx.
- The device go to sleep after the Tx



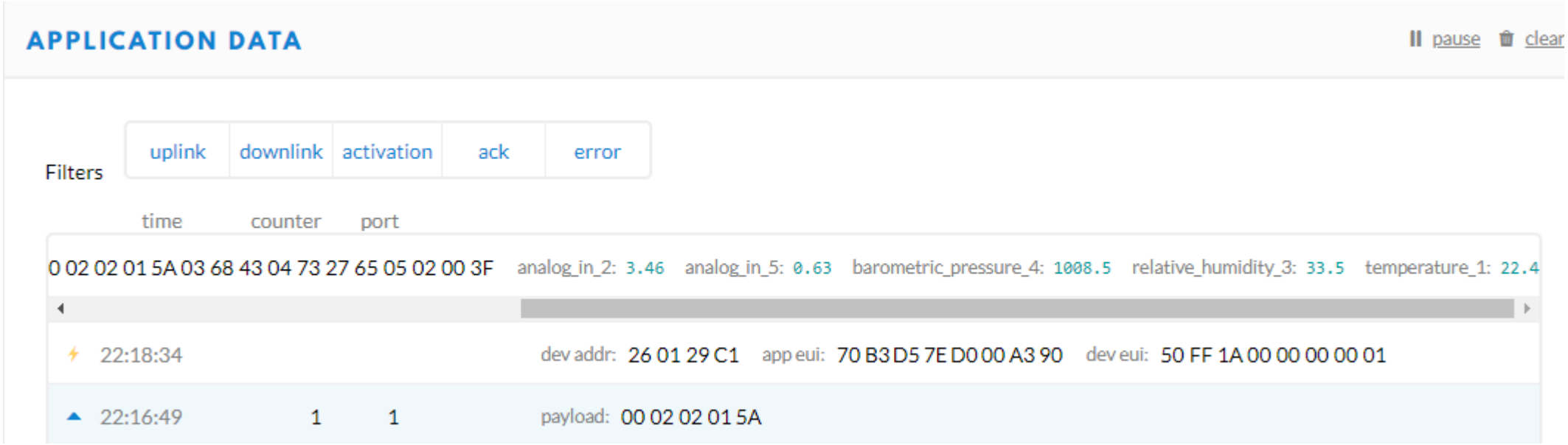
First packet with data

Board request for connection



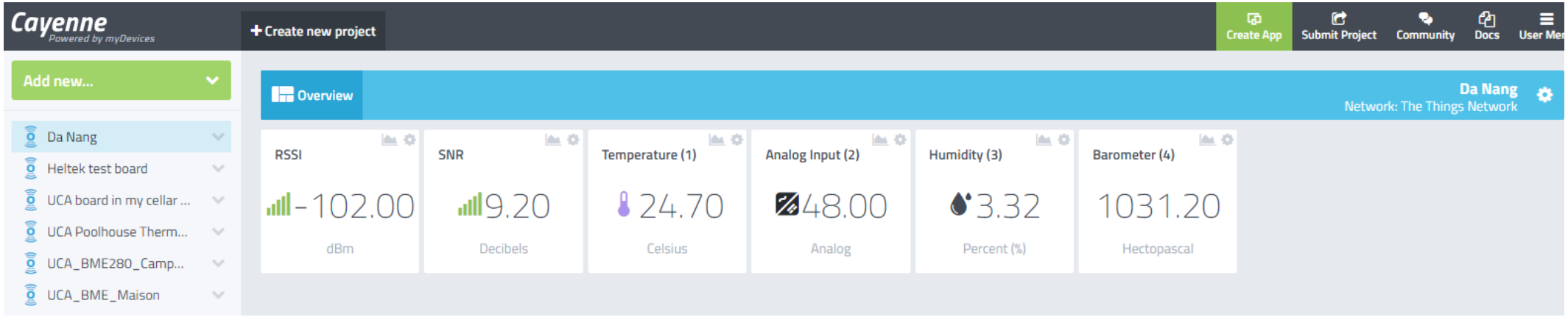
Over the Air Activation (OTAA) and data

- Try now the code Arduino_Code/LORAWAN/OTAA/LP_BME280/UCA-BME280.ino
- It use the sensor BME280 that measure T°c, Humidity and Pressure
- The code is using Cayenne LPP format
- Now you can see sensor data in the uplink packet



Using Cayenne to see you data

- Go to https://mydevices.com/ and create an account
- Add a device by selecting LoRa/TheThingNetwork and Cayenne LPP.
- Just add your device EUI
- You should see your data



Good luck for you projects !