Deploying an End-to-End LoRaWAN Platform

Starting from September 2016, Saint-Joseph University of Beirut (USJ) will be deploying the first academic LoRa network in Lebanon. The network will support monitoring of micro-climate conditions in vineyards. Here below you can find a detailed description of the experimental platform implementing an end-to-end LoRaWAN solution.

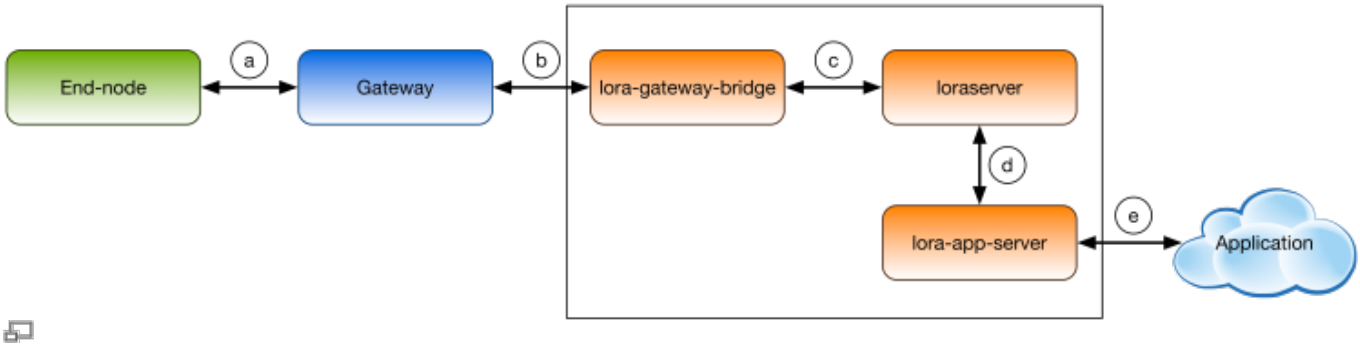

Figure 2. Architecture of the LoRaWAN Platform

-. End-nodes

-. Autonomo with LoRaBee

-. Arduino with Dragino Shield

-. Gateways

-. Single Channel Gateway

The single channel gateway includes a LoRa transmission module (Dragino Shield) connected to a Raspberry Pi (2 or 3). Communication is done over an SPI interface.

Start by making the correction connection between the modules: the connection pins are identified in Figures 2 and 3.

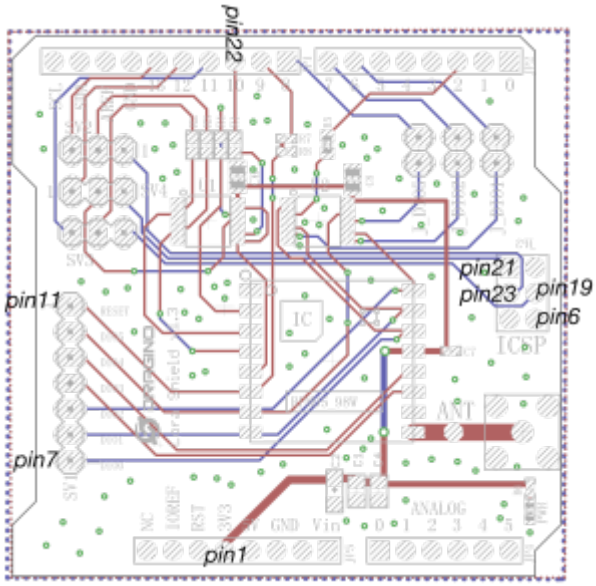

Figure 2. Dragino pin mapping

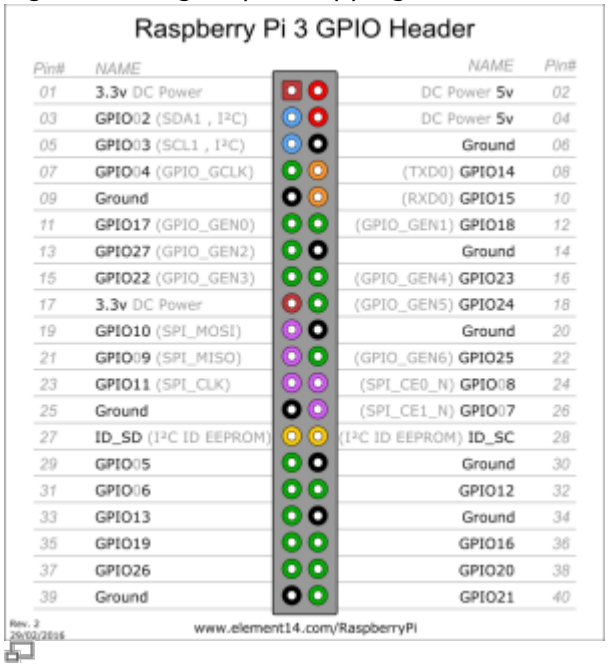

Figure 3. Raspberry pi 3 pins

Now you can connect the Raspberry Pi to the Internet and install the packet forwarding software. The source code of the single channel packet forwarder is available on: https://github.com/samerlahoud/single_chan_pkt_fwd. In order to install it, you need to:

- Enable SPI on the Raspberry Pi using raspi-config
- Download and unzip the source code:

```
wget https://github.com/hallard/single_chan_pkt_fwd/archive/master.zip
unzip master.zip
```

- Install the wiring library:

```
apt-get update
apt-get install wiring
```

- Compile and run the packet forwarder as root.

```
gcc version 4.6.3
unrecognized command line option '-std=c++11'
CFLAGS = -std=c++0x -c -Wall -I include/
```

-. Kerlink IoT Station

```
# activates eth0 at startup
ETHERNET=yes
# claims dhcp request on eth0
ETHDHCP=yes

# Selector operator APN
GPRSAPN=gprs.touch.com.lb
# Enter pin code if activated
GPRSPIN=0000
# Update /etc/resolv.conf to get dns facilities
GPRSDNS=yes
# PAP authentication
GPRSUSER=
GPRSPASSWORD=

# Bearers priority order
#BEARERS_PRIORITY="eth0,ppp0,eth1"
BEARERS_PRIORITY="ppp0,eth0,eth1"
```

```
./gps-pkt-fwd.sh > /dev/null &
```

```
 3270 root      2548 S    /bin/sh ./gps-pkt-fwd.sh
 3288 root     34908 S    ./gps_pkt_fwd
```

```
/etc/init.d/gprs start

[root@Wirgrid_0b03008c demo_gps_loramote]# /etc/init.d/gprs  status
pppd (pid 5273) is running...
Session: Rx=58, Tx=163
Globals: Rx=1130457, Tx=1195592
Sum:     Rx=1130515, Tx=1195755
[root@Wirgrid_0b03008c demo_gps_loramote]#
```

-. Backend

-. Loraserver

-. The Things Network

-. Applications

-. MQTT spy

-. Emoncms