

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.

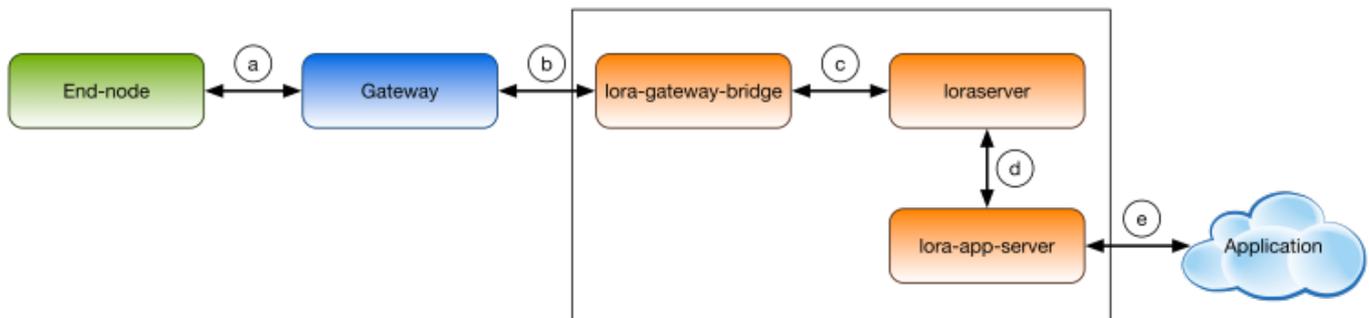


Figure 2. Architecture of the LoRaWAN Platform

- End-nodes

- Autonomo with LoRaBee

- Arduino with Dragino Shield

- Gateways

- Single Channel Gateway

The single channel gateway includes a LoRa transmission module (the Dragino Shield) connected to a Raspberry Pi (2 or 3). The connection pins are identified in Figures 2 and 3. Communication is done on an SPI communication interface.

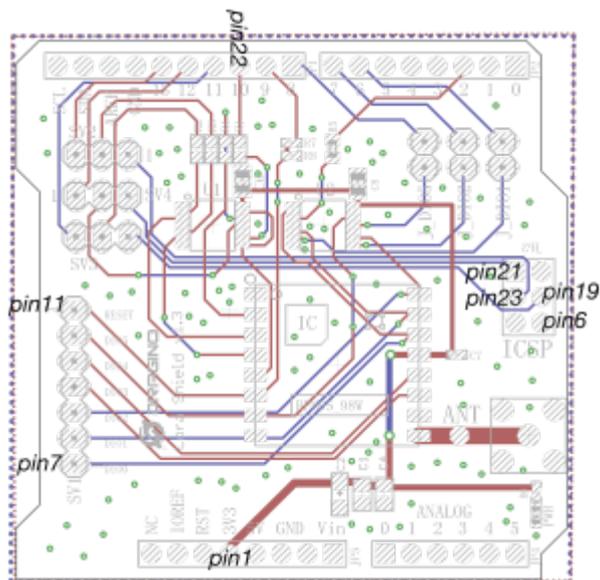


Figure 2. Dragino pin mapping

Raspberry Pi 3 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power	⬇	DC Power 5v	02
03	GPIO02 (SDA1 , I ² C)	⬇	DC Power 5v	04
05	GPIO03 (SCL1 , I ² C)	⬇	Ground	06
07	GPIO04 (GPIO_GCLK)	⬇	(TXD0) GPIO14	08
09	Ground	⬇	(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)	⬇	(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)	⬇	Ground	14
15	GPIO22 (GPIO_GEN3)	⬇	(GPIO_GEN4) GPIO23	16
17	3.3v DC Power	⬇	(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)	⬇	Ground	20
21	GPIO09 (SPI_MISO)	⬇	(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)	⬇	(SPI_CE0_N) GPIO08	24
25	Ground	⬇	(SPI_CE1_N) GPIO07	26
27	ID_SD (I ² C ID EEPROM)	⬇	(I ² C ID EEPROM) ID_SC	28
29	GPIO05	⬇	Ground	30
31	GPIO06	⬇	GPIO12	32
33	GPIO13	⬇	Ground	34
35	GPIO19	⬇	GPIO16	36
37	GPIO26	⬇	GPIO20	38
39	Ground	⬇	GPIO21	40

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Figure 3. Raspberry pi 3 pins

After making the correct connection, you need to install the packet forwarder software on the Raspberry Pi. The source code is available on: https://github.com/samerlahoud/single_chan_pkt_fwd. In order to proceed, 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/
```

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