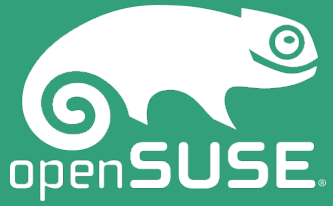

Collecting data from IoT devices using Sigfox network

Making data collection easier

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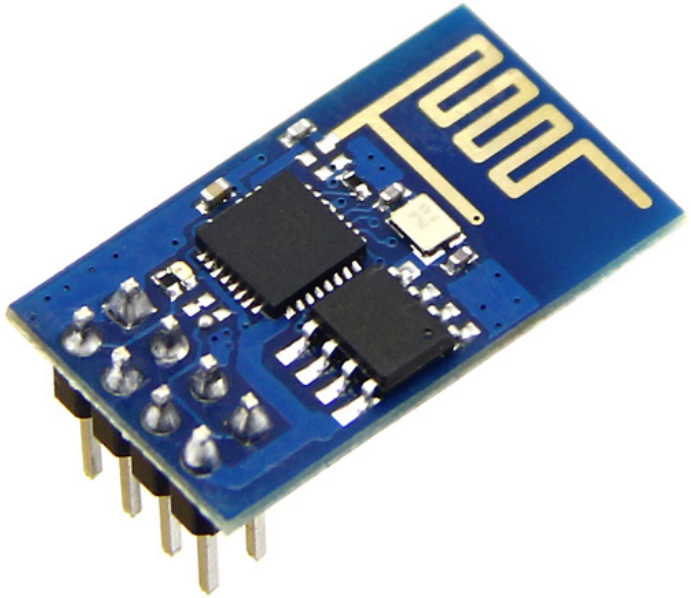
About me

IoT networks




GSM™


3G


Lte™


sigfox


LoRa™


Lte™

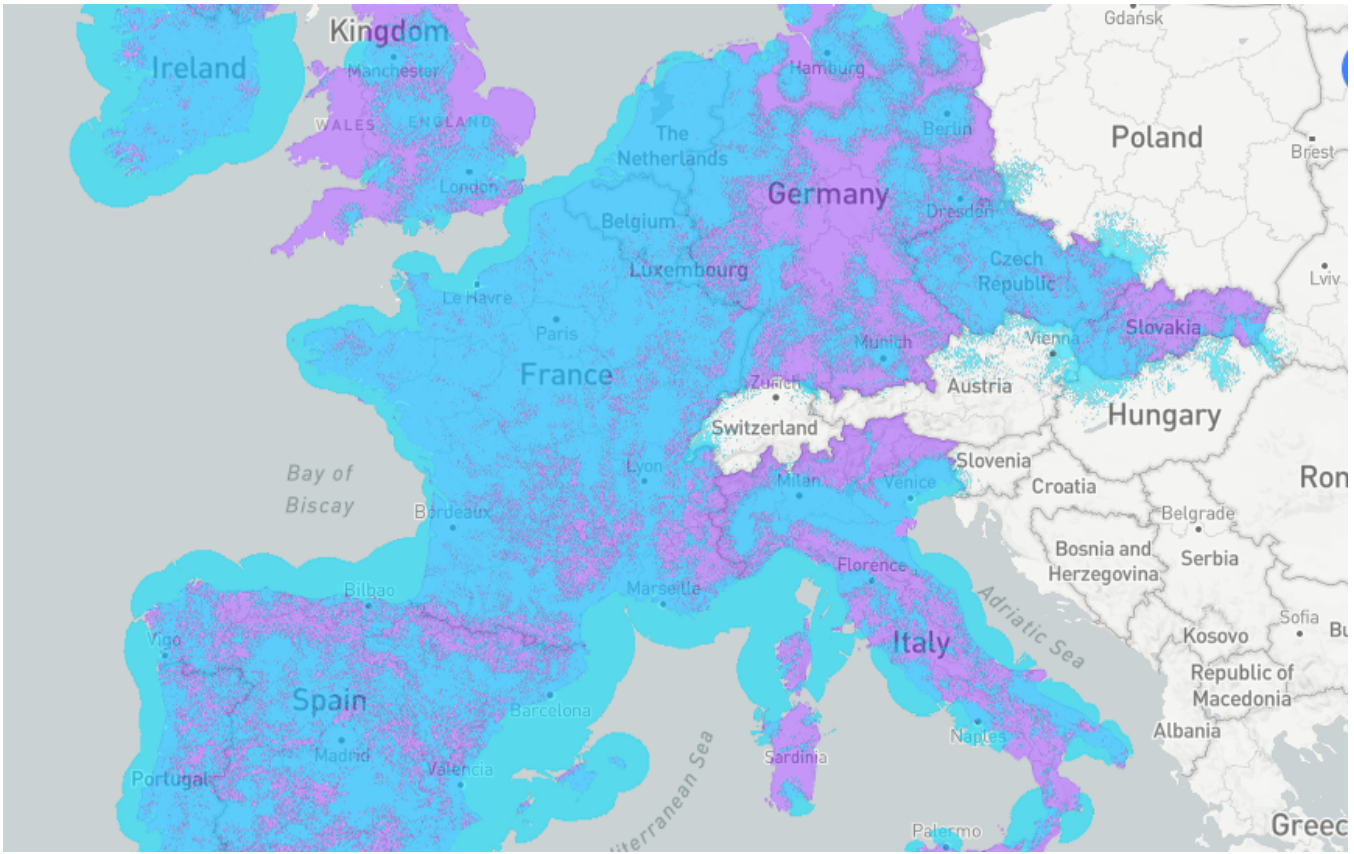
	SIGFOX	LoRa	clean slate cIoT	NB LTE-M Rel. 13	LTE-M Rel. 12/13	EC-GSM Rel. 13	5G (targets)
Range (outdoor) MCL	<13km 160 dB	<11km 157 dB	<15km 164 dB	<15km 164 dB	<11km 156 dB	<15km 164 dB	<15km 164 dB
Spectrum Bandwidth	Unlicensed 900MHz 100Hz	Unlicensed 900MHz <500kHz	Licensed 7-900MHz 200kHz or dedicated	Licensed 7-900MHz 200kHz or shared	Licensed 7-900MHz 1.4 MHz or shared	Licensed 8-900MHz 2.4 MHz or shared	Licensed 7-900MHz shared
Data rate	<100bps	<10 kbps	<50kbps	<150kbps	<1 Mbps	10kbps	<1 Mbps
Battery life	>10 years	>10 years	>10 years	>10 years	>10 years	>10 years	>10 years
Availability	Today	Today	2016	2016	2016	2016	beyond 2020

Sigfox network

What is Sigfox

"Sigfox employs a proprietary technology that enables communication using the Industrial, Scientific and Medical ISM radio band which uses **868MHz in Europe** and **902MHz in the US**. It utilizes a wide-reaching signal that passes freely through solid objects, called "ultra narrowband" and requires little energy, being termed "Low-power Wide-area network (LPWAN)". The network is based on one-hop star topology and requires a mobile operator to carry the generated traffic. The signal can also be used to easily cover large areas and to reach underground objects."

Sigfox coverage



What I can transfer

- uplink message limit is 12 bytes (140 per day)
- downlink message limit is 8 bytes (4 per day)

- 140 messages per day = 1 message per 10 minutes

Pricing

- One year free subscription with the hardware
- After that €0.50 - €1.00 per month

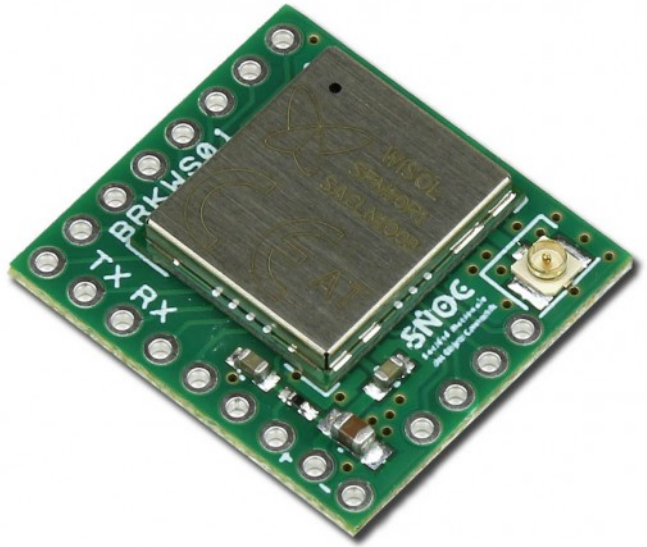
  (depending on country, local provider and amount of transferred data)

Roaming

- Roaming is included in the monthly fee and is free of charge

Sigfox hardware

Sigfox BRKWS01 (Wisol SFM10R1)



- Easily connectable to Arduino
- Price: €4
- Price including breakout board and antenna: €24

Pycom SiPy – overview

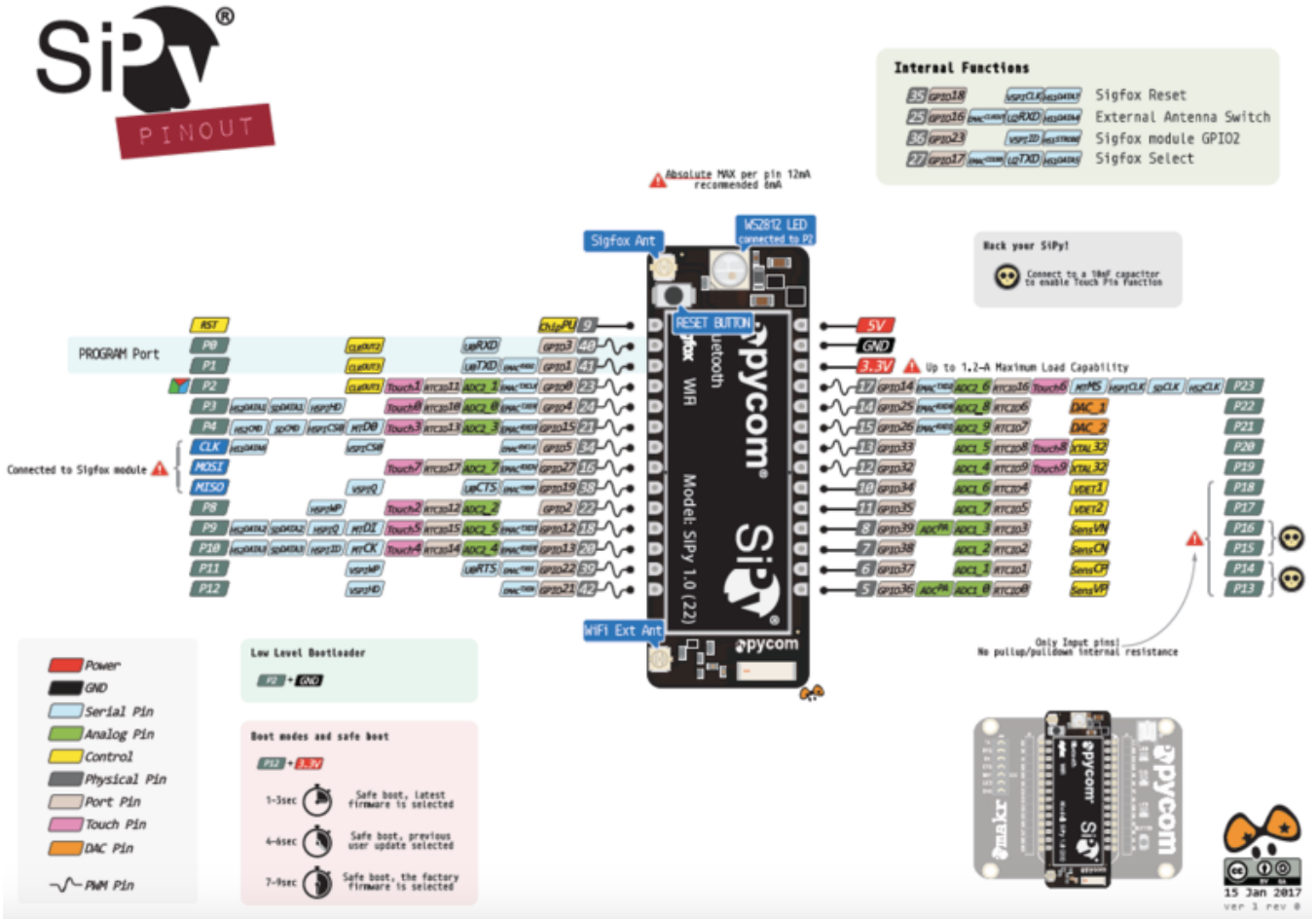
- Espressif ESP32 chipset
- Dual processor + WiFi and Bluetooth radio System on Chip.
- Network processor handles the WiFi connectivity and the IPv6 stack
- Price: €30

Pycom SiPy – hardware

- RAM: 512kb
- Flash Memory: 4MB
- GPIO: up to 24
- Python multi-threading

Pycom SiPy – interfaces

- 2 x UART, 2 x SPI, I2C, I2S, micro SD card
- Analog channels: 8x12 bit ADCs
- DMA on all peripherals
- GPIO: up to 24

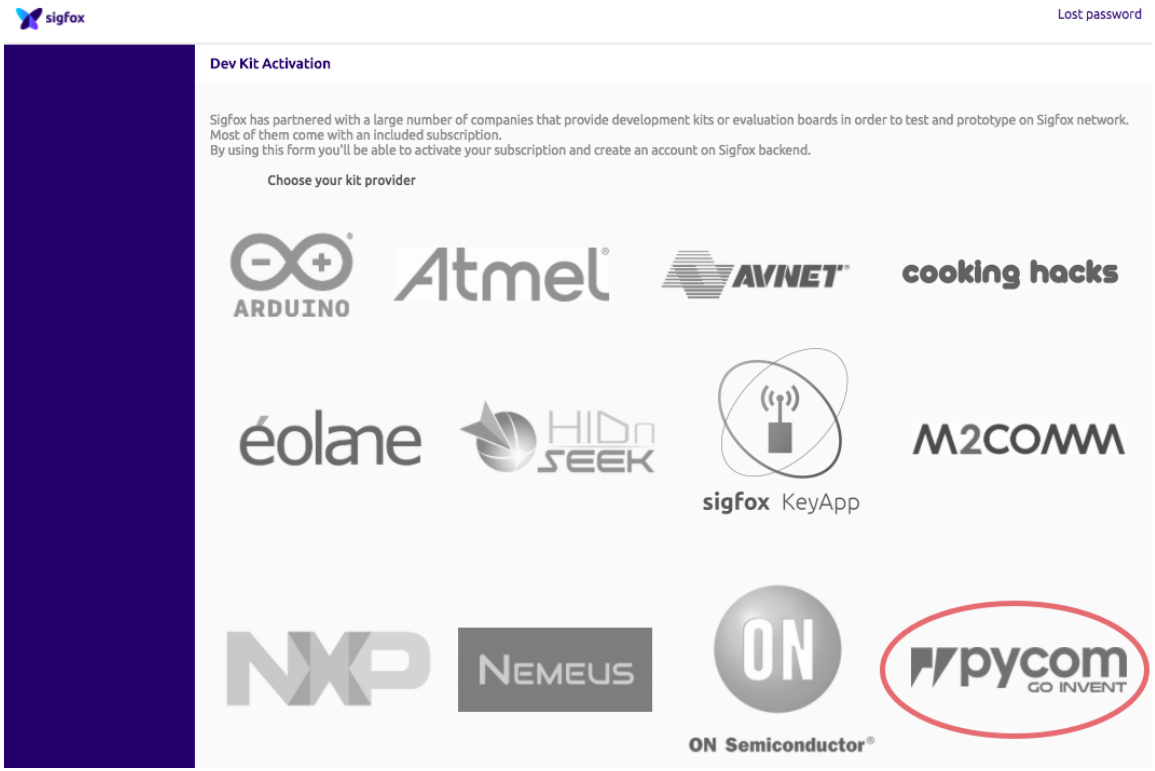

SiPy
PINOUT
Internal Functions
Sigfox Reset
External Antenna Switch
Sigfox module GPIO2
Sigfox Select
Absolute MAX per pin 12mA
recommended 6mA
Sigfox Ant
WS2812 LED
connected to P2
RESET BUTTON
Bluetooth
WiFi
Model: SiPy 1.0 (22)
WiFi Ext Ant
Rock your SiPy!
Connect to a 10nF capacitor
to enable Touch Pin function
PROGRAM Port
Connected to Sigfox module
Up to 1.2-A Maximum Load Capability
Only Input pins!
No pullup/pulldown internal resistance
Power
GND
Serial Pin
Analog Pin
Control
Physical Pin
Port Pin
Touch Pin
DAC Pin
PWM Pin
Low Level Bootloader
Boot modes and safe boot
1-3sec
Safe boot, latest firmware is selected
4-6sec
Safe boot, previous user update selected
7-9sec
Safe boot, the factory firmware is selected
15 Jan 2017
ver 1 rev 0

How to use it

Registering to Sigfox network

```
>>> from network import Sigfox
>>> import binascii
>>> sigfox = Sigfox(mode=Sigfox.SIGFOX, rcz=Sigfox.RCZ1)
>>> print(binascii.hexlify(sigfox.id()))
b'12345678'
>>> print(binascii.hexlify(sigfox.pac()))
b'1234567890123456'
```

Registering to Sigfox network



Connect via USB

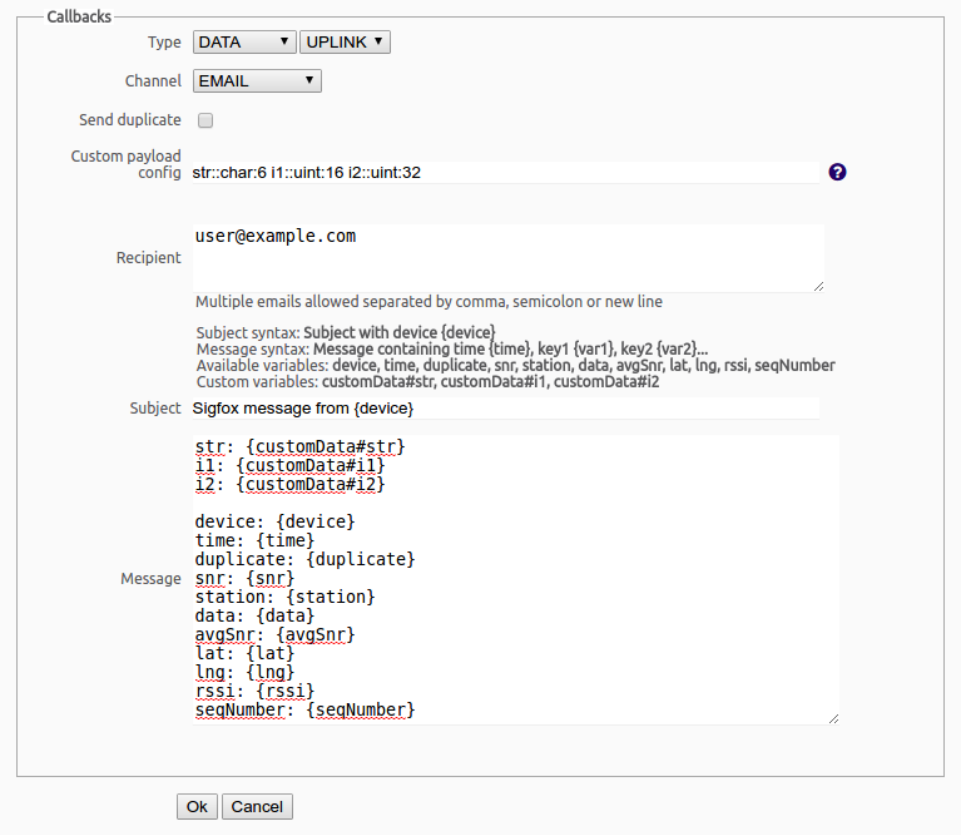
- Virtual serial port

Connect via WiFi

- Telnet
- FTP

```
$ telnet 192.168.4.1
Trying 192.168.4.1...
Connected to 192.168.4.1.
Escape character is '^]'.
MicroPython v1.8.6-556-g989d5ac9 on 2017-03-30; SiPy with ESP32
Login as: micro
Password:
Login succeeded!
Type "help()" for more information.
>>>
```

Configuring callbacks



Direct communication between devices

- You can also communicate directly between Pycom SiPy modules without using Sigfox network
- This is a feature of this particular module, not a Sigfox network feature

Live demo

Sending the first message

```
import socket
from network import Sigfox
sigfox = Sigfox(mode=Sigfox.SIGFOX, rcz=Sigfox.RCZ1)
s = socket.socket(socket.AF_SIGFOX, socket.SOCK_RAW)
s.setblocking(True)
s.setsockopt(socket.SOL_SIGFOX, socket.SO_RX, False)
s.send('test12345678')
```

Sigfox portal email callback

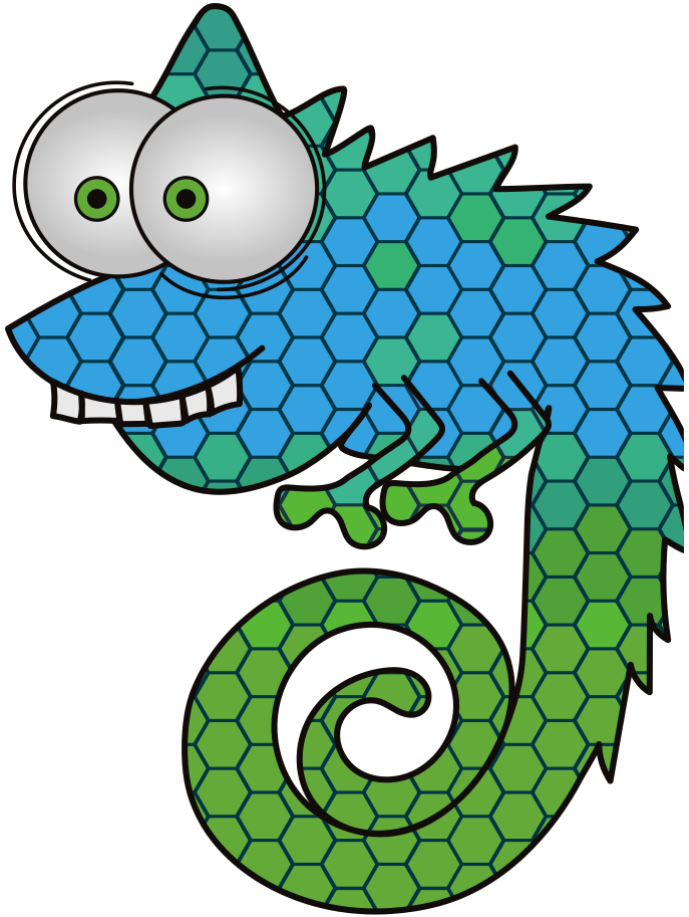
```
Date: Mon, 17 Apr 2017 14:00:00 +0200 (CEST)
From: SIGFOX <backend-noreply@sigfox.com>
To: user@example.com

string: test12345678
```

Questions?

You can find more information on my blog:
https://jankrupa.com/

Thank you!



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