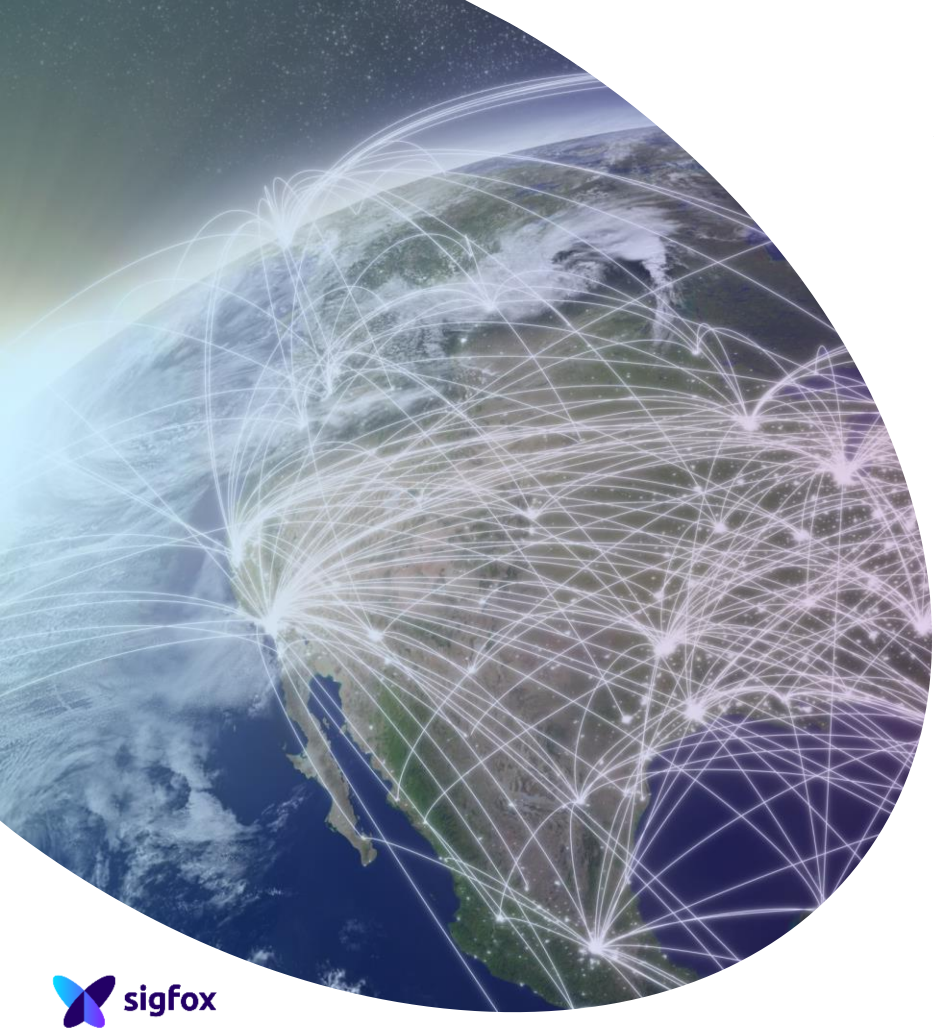
Hack & Shop - Casino

aurelien.lequertier@sigfox.com
@aureleq



Sigfox: Global LPWA network

Low power,
to provide autonomy

Global,
to be used everywhere

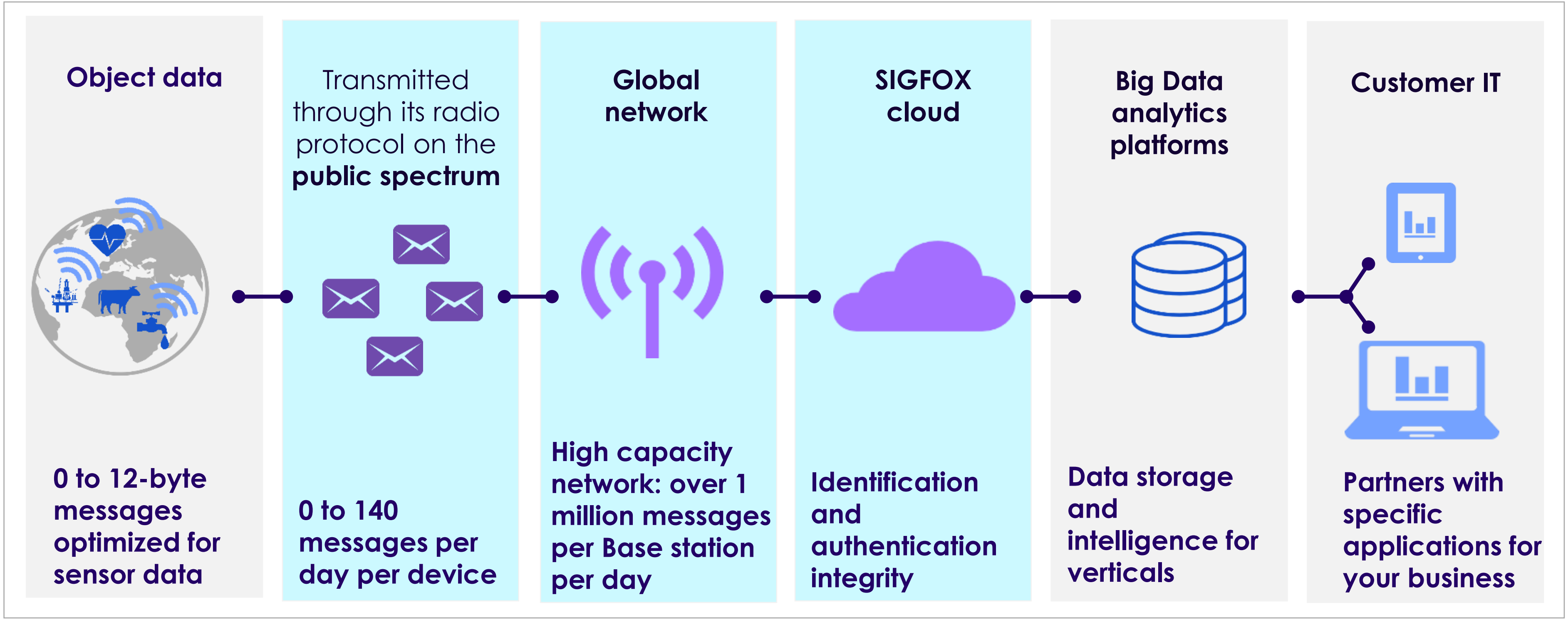
Low cost,
to address everything

Easy to use,
and adopted quickly

sigfox

WHAT DO WE PROVIDE?

A network for connected objects transporting the data from your device to your IT systems



Object data

0 to 12-byte messages optimized for sensor data

Transmitted through its radio protocol on the **public spectrum**

0 to 140 messages per day per device

Global network

High capacity network: over 1 million messages per Base station per day

SIGFOX cloud

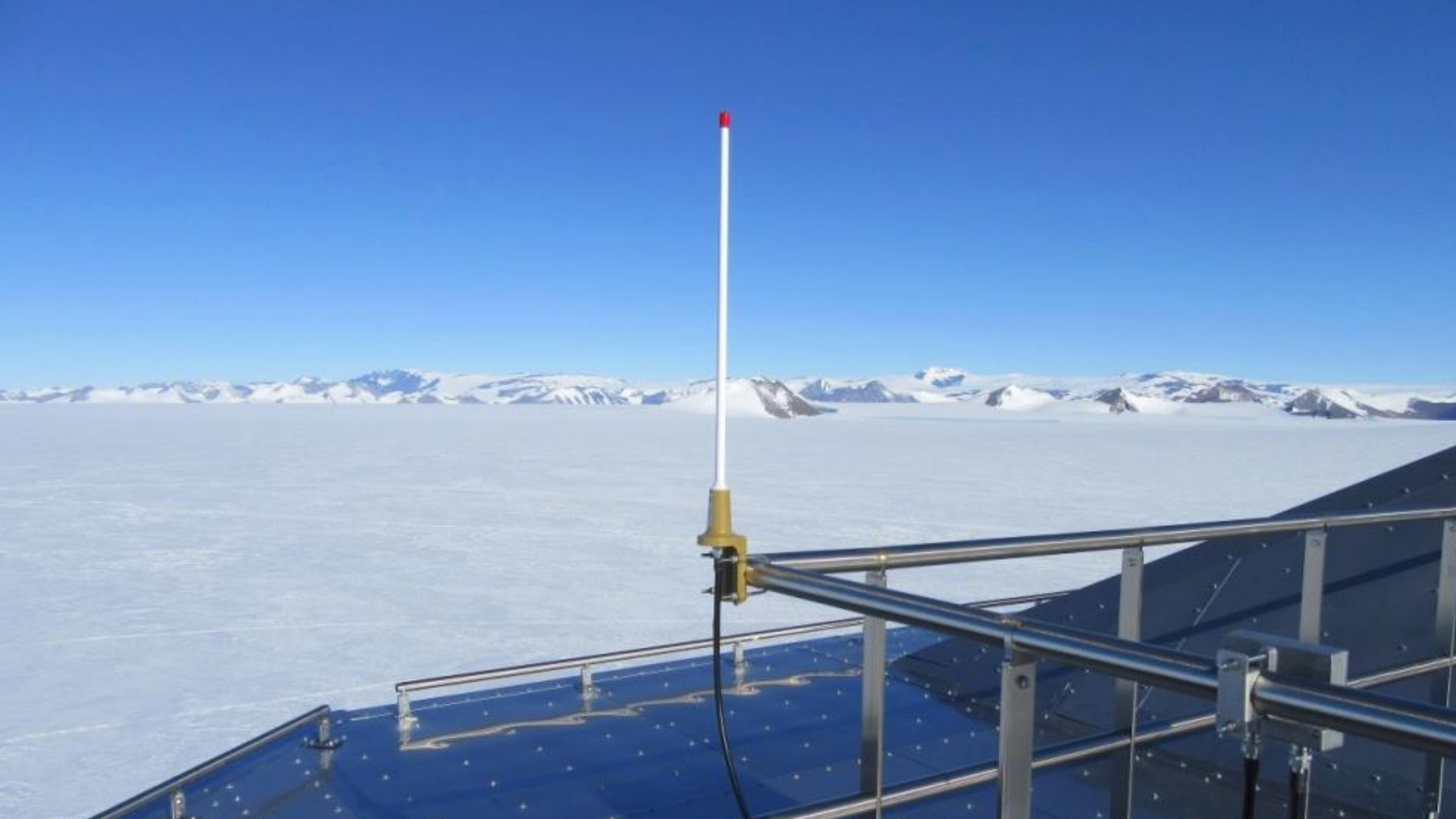
Identification and authentication integrity

Big Data analytics platforms

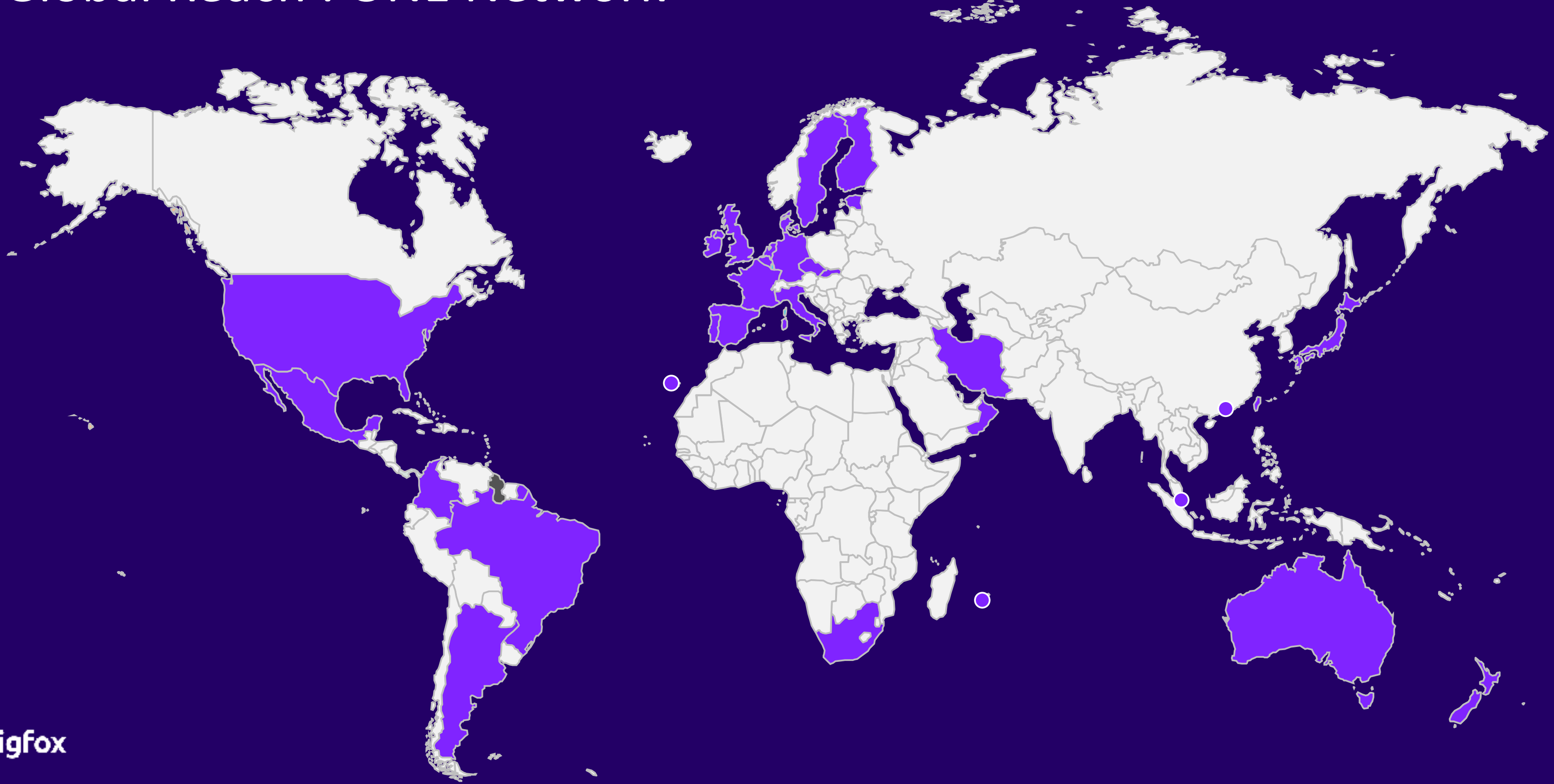
Data storage and intelligence for verticals

Customer IT

Partners with specific applications for your business



Global Reach : ONE Network



sigfox

Home Alarm System

Challenge

Alarms are traditionally connected through GSM to central system and burglar intrusion can be facilitated by GSM jammers. There is a need for effective backup connectivity to ensure more robust alarm transmissions.

Solution

Sigfox has upgraded Securitas Direct’s alarm systems to provide a back-up connectivity in case jamming is detected.

The upgrade was possible over the air as a Sub-GHz chip was already inside.

Benefits

- Robustness of solution is a commercial differentiator
- Continuity of service
- Soft deployment via over the air update - no HW swap. No user impact
- Network available to handle millions of devices

sigfox

Connected Defibrillators

PYRES.COM

AIVIA

IMPROVE YOUR UPTIME

Challenge

Defibrillators are often located in remote areas where it is hard to regularly perform auto tests of equipment to ensure they are functioning correctly. Customers who own several defibrillators (e.g. industry) want central supervision. Previously connected boxes were expensive (GSM) and needed to be wired.

Solution

A wall mounted box compatible with Philips HS1 defibrillator, sending monitoring information :

- Door status (open / close)
- Defibrillator's status (OK / NOK)
- Daily Auto test & Battery test

Benefits

- Working defibrillator guaranteed
- Easy installation
- Added value services: notifications, central supervision
- Fully wireless: no mains power
- Low power: 4 year autonomy (LR)
- Plug & Play customer installation

Alternative partners for this application

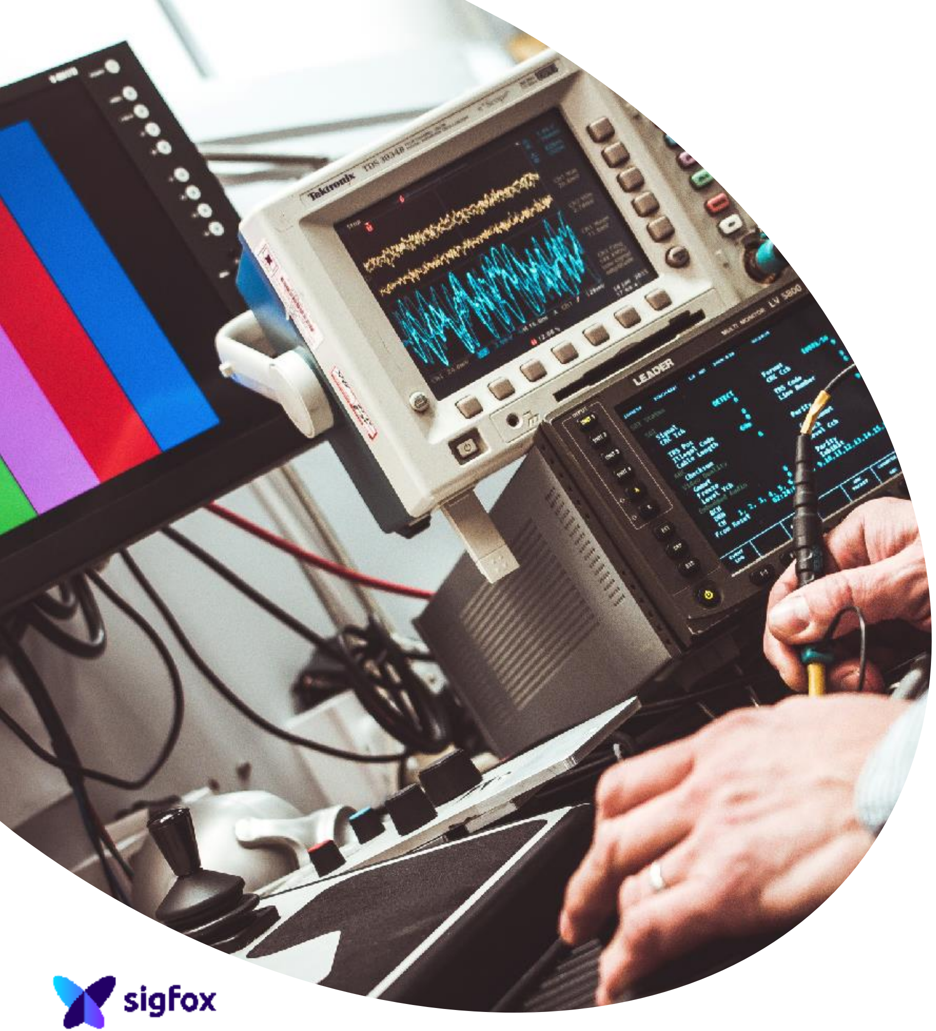
Laerdal helping save lives

AED MAP

sigfox

Connected bee hives

Technology Concepts

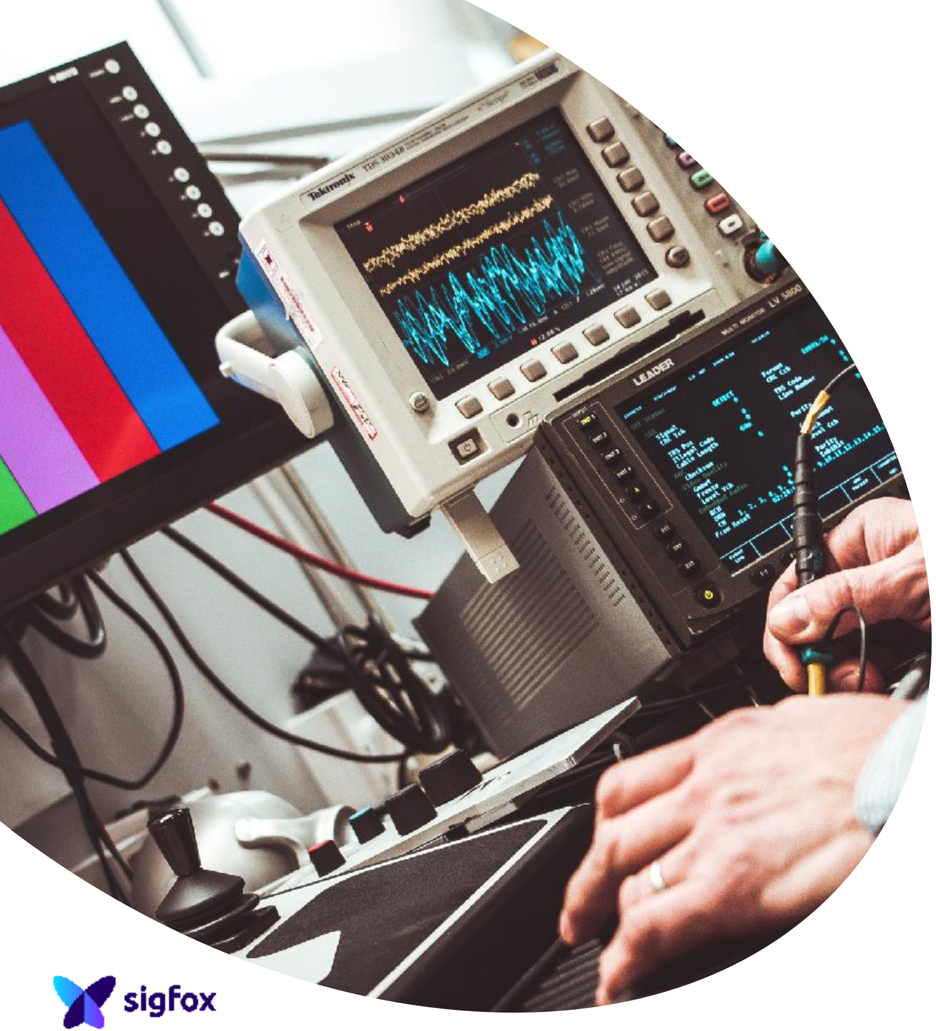


Complex ?

You send an AT command to your module

You receive the answer on your server

sigfox



No SIM (ID/PAC)

Every device has its own ID number embedded in the module or SoC.

The PAC code is a security code to give you the ownership of the device.

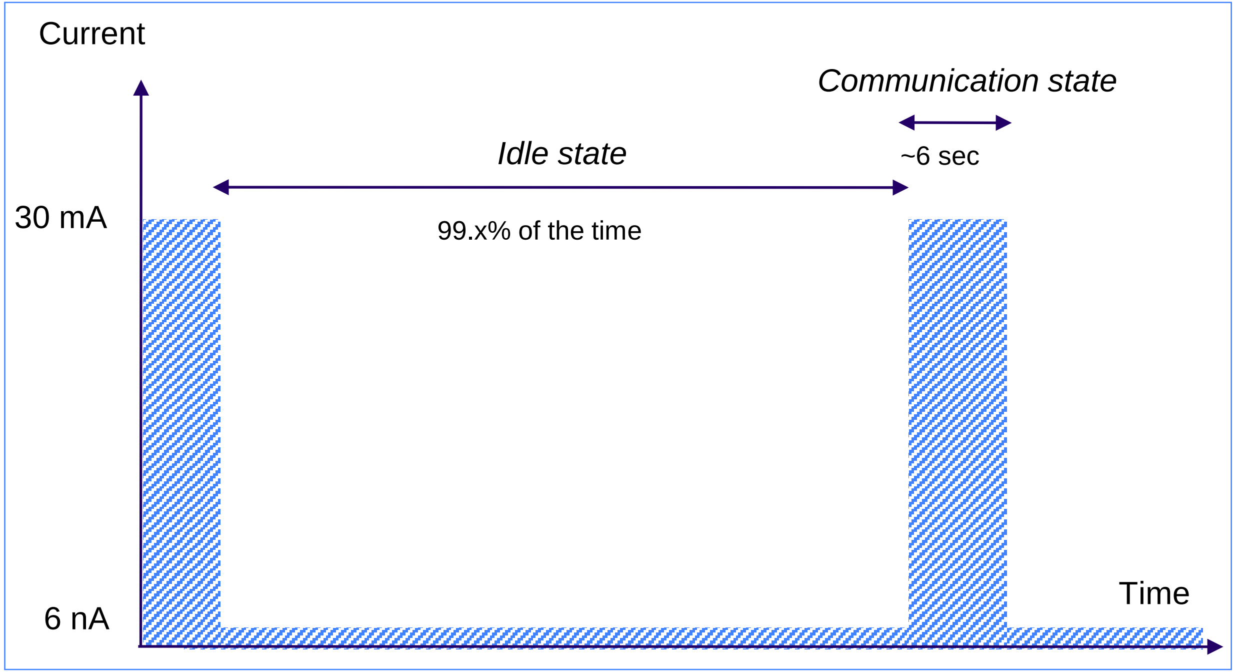
Changes every time you change the owner

sigfox

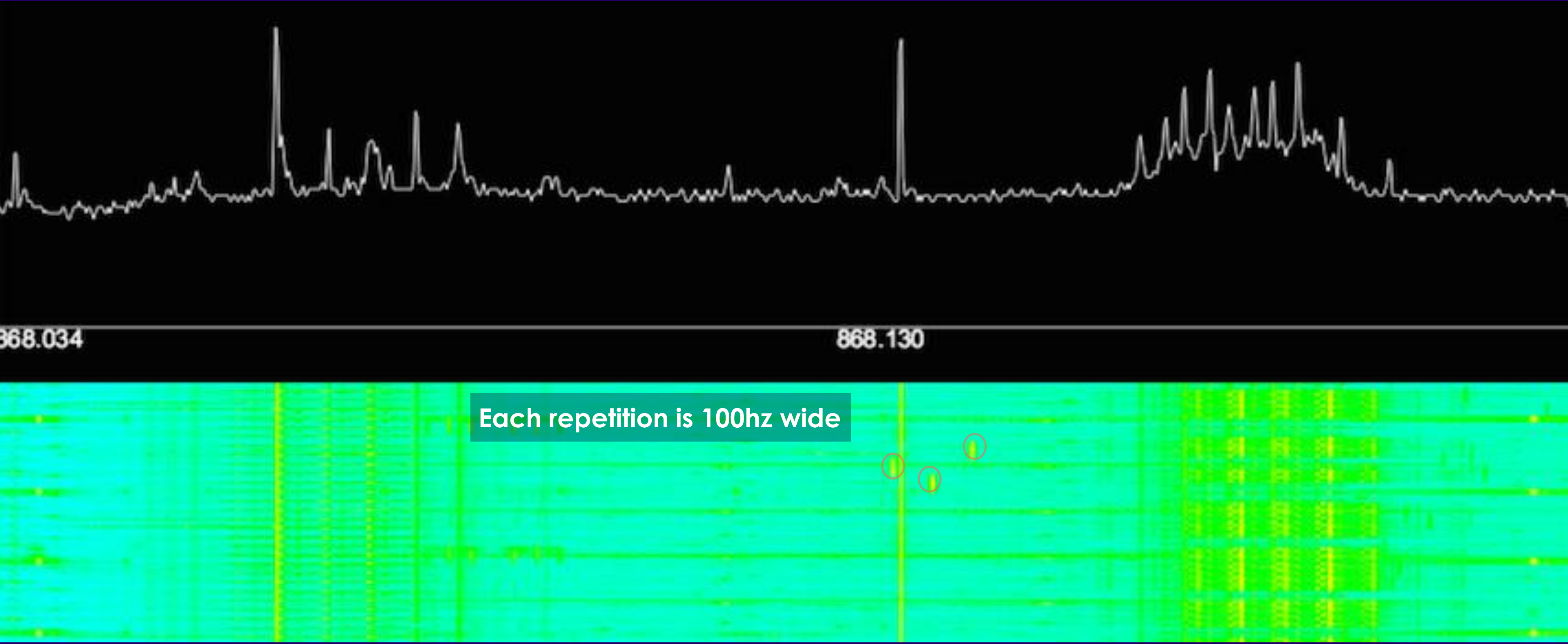
HIGH ENERGY EFFICIENCY

to offer maximum autonomy to remote objects

- ✓ Designed to maximize energy efficiency
- ✓ No Pairing
- ✓ 15 to 45 mA during a few seconds (25mW; 14dBm) depending on the chip and the size of the payload
- ✓ Idle consumption: negligible



Radio spectrum



Each repetition is 100hz wide

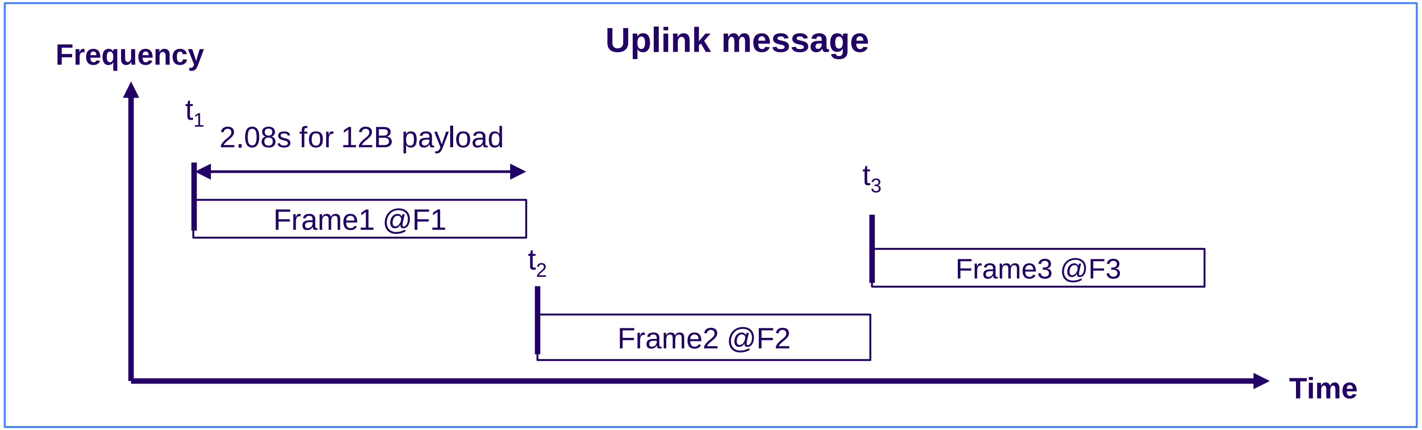
RANDOM ACCESS

☑ Unsynchronized transmission between the network and the device

☑ The device transfers a small amount of energy on a random frequency with no protocol overhead (frequency hopping)

☑ SIGFOX Base stations permanently listen to the spectrum and interpret received UNB signals

☑ The same frame is sent 3 times enabling time and frequency diversity

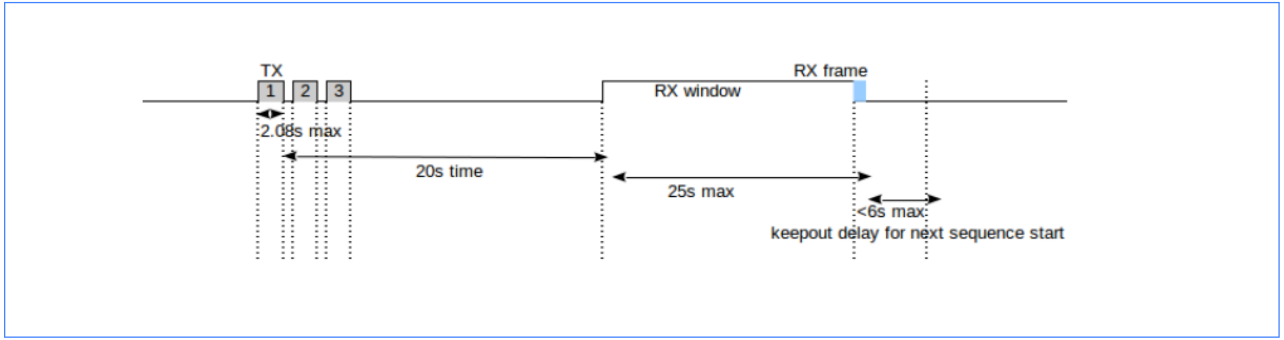


sigfox

⇄ BI-DIRECTIONAL

for critical cases requiring ACK or device management

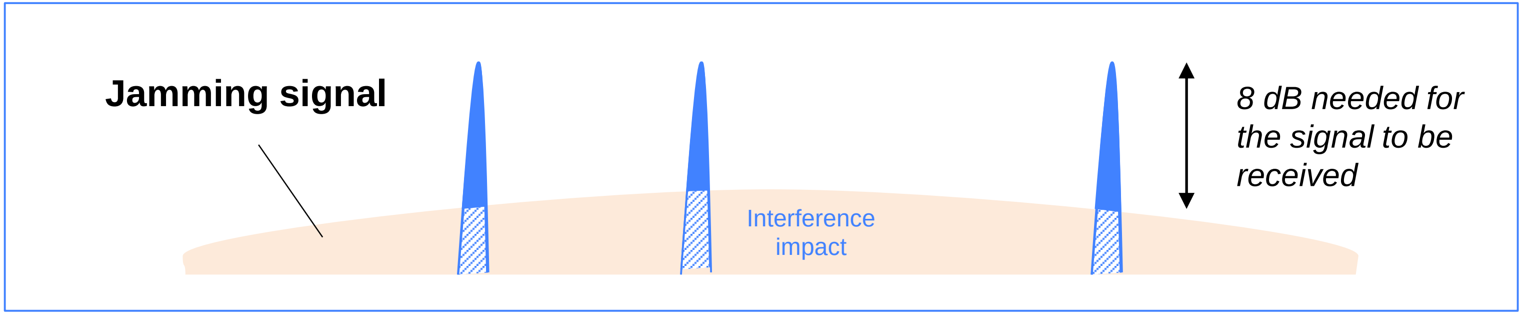
- ☑ Requested by the device to the network
- ☑ Delay of 20 seconds between the first uplink message and the downlink window. Downlink window of 25 seconds max.
- ☑ Static downlink message size of 8 bytes
- ☑ Agreed frequency of downlink



HIGH RESILIENCE TO INTERFERERS

robust to operate in the public ism band

☑ **Anti-jamming** capabilities due to UNB intrinsic ruggedness coupled with spatial diversity of the base stations (+20dB)



Jamming signal

8 dB needed for the signal to be received

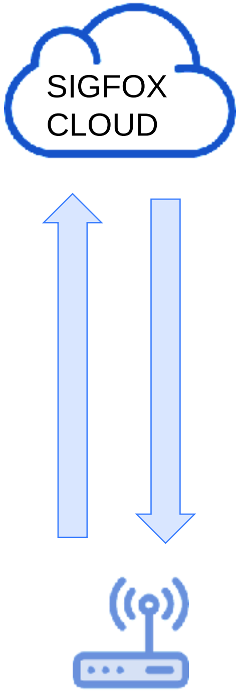
Interference impact

☑ For the same technical reasons as above, UNB is extremely robust in an environment with other spread spectrum signals. However, Spread spectrum networks are affected by UNB signals. **Ultra Narrow Band is therefore the best choice to operate in the public ISM band**

SMALL MESSAGES

Payload size examples

- □ 6 bytes: GPS coordinates
- □ 2 bytes: temperature reporting
- □ 1 byte: speed reporting
- □ 1 byte: object state reporting
- □ 0 byte: heartbeat (demonstrate when an object is alive)



UPLINK
12-Byte payload

- Sensor data
- Event status
- GPS fix
- Application data

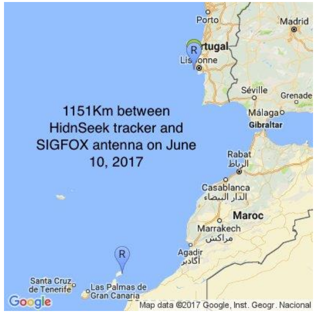
1 % duty cycle for Objects
Up to 6 messages/hour

DOWNLINK
8-Byte payload

- Action / actuator trigger
- Device management
- Application parameter setting

10 % duty cycle for Base Stations
4 guaranteed downlink msg/day

Long range



1151Km between HidnSeek tracker and SIGFOX antenna on June 10, 2017

Ideal cases

+200 kms(record at 1151km) ~ Free Space

Reality

City: 2-10 km (Longley-Rice model)

Rural: up to 100km

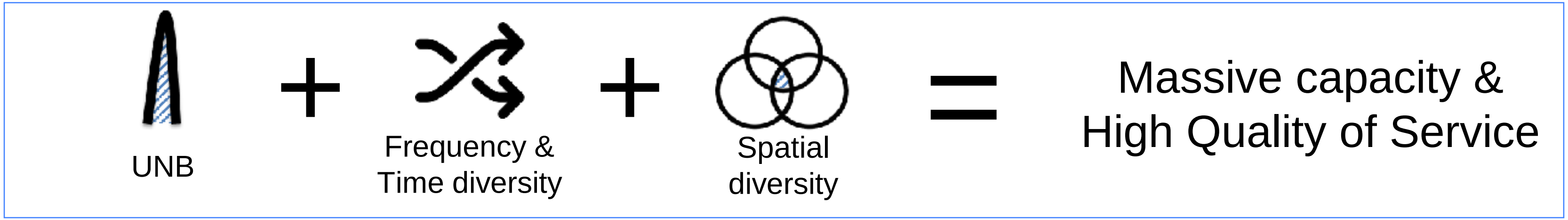
= Network cheaper to deploy

OUTBOUND INTERFACES

1. Web application (aka the Sigfox backend)
    - Technical interface : devices, device types, groups, users management…
    - Raw payload view : No analytics, BI or business application.
2. HTTP REST API
    - Same features as the backend, but scriptable,
    - Customer applications pulls messages from the backend,
3. Callbacks
    - Push messages to a specified URL / email
    - Multiple callbacks are possible.

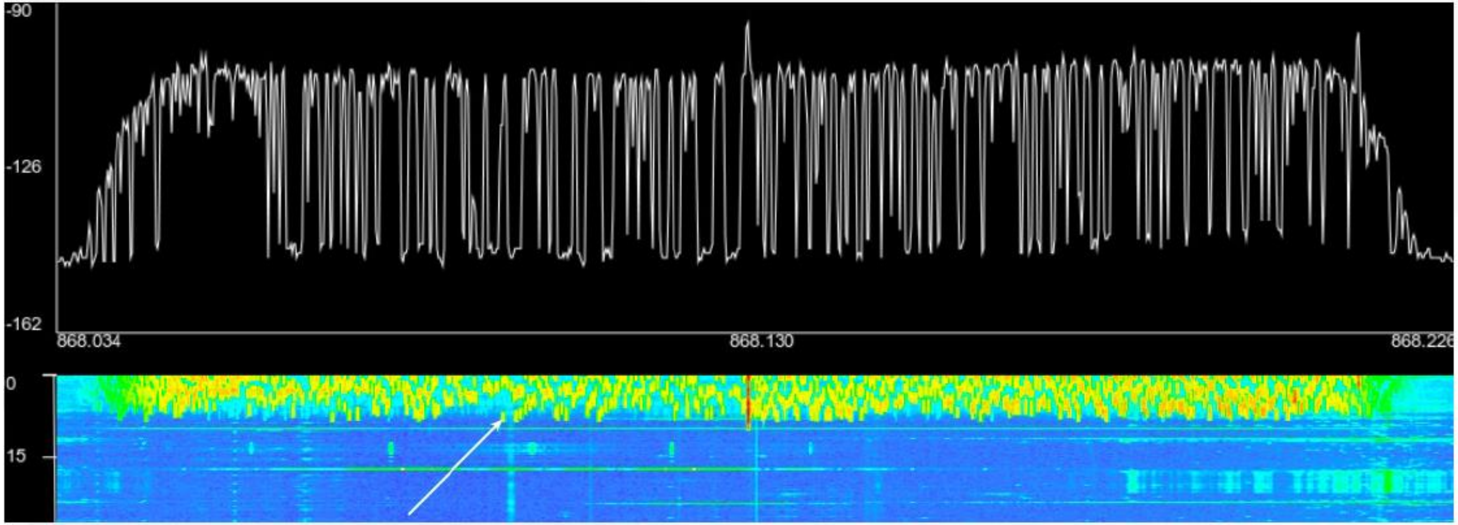
HIGH NETWORK CAPACITY

ability to scale to the billions of objects to come



UNB + Frequency & Time diversity + Spatial diversity = Massive capacity & High Quality of Service

CAPACITY: SPECTRUM VIEW



Fieldtest spectrum waterfall with 200 simultaneous users

=

4M+ messages per day per base station !

SILICON SOLUTIONS CLUSTERING

Different silicon solutions for different design approaches

Dev Kits / Evaluation Board

- First steps with sigfox technology
- Evaluation of Transceiver, SoC, modules

Modules (Sigfox only or Multi-connectivity)

GPS Wi Fi

- Complete modem Sigfox certified and type approved

Transceiver / SoC

- Standalone chipset(s) used for reference designs, modules and/or combos

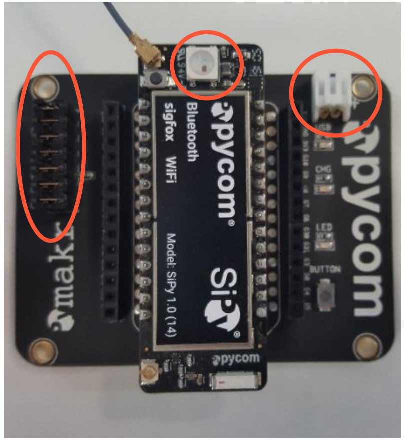
Getting started with Sigfox and Pycom board

Requirements

- SiPy board
- Extension board
- Antenna with u.FL connector
- Micro-USB cable (not provided)
- Atom IDE (atom.io) with pymakr plugin
  - Instructions: https://docs.pycom.io/pycom_esp32/pycom_esp32/pymakr.html
- Source code examples
  - https://github.com/aureleq/hackathon-casino

sigfox

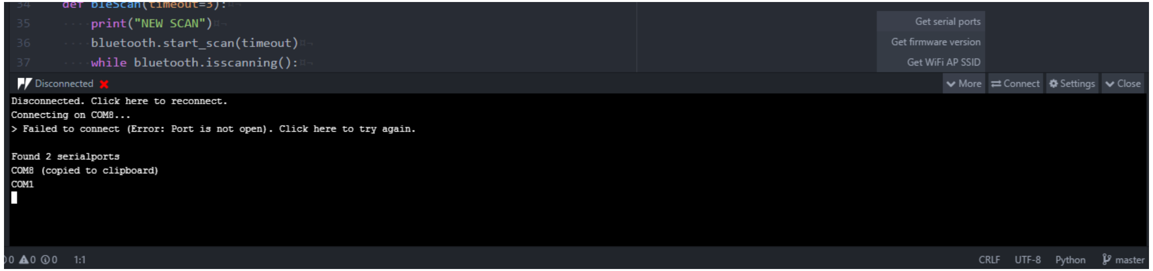
First steps



- Connect SiPy to extension board
  - Check the pinout (LED on same side as USB connector)
  - Check jumpers on the left are all in place
- Connect antenna cable to the u.FL connector near the LED
- Connect the micro-USB to your PC/Mac and launch atom

First steps

- Retrieve serial port and set it in pymakr global settings

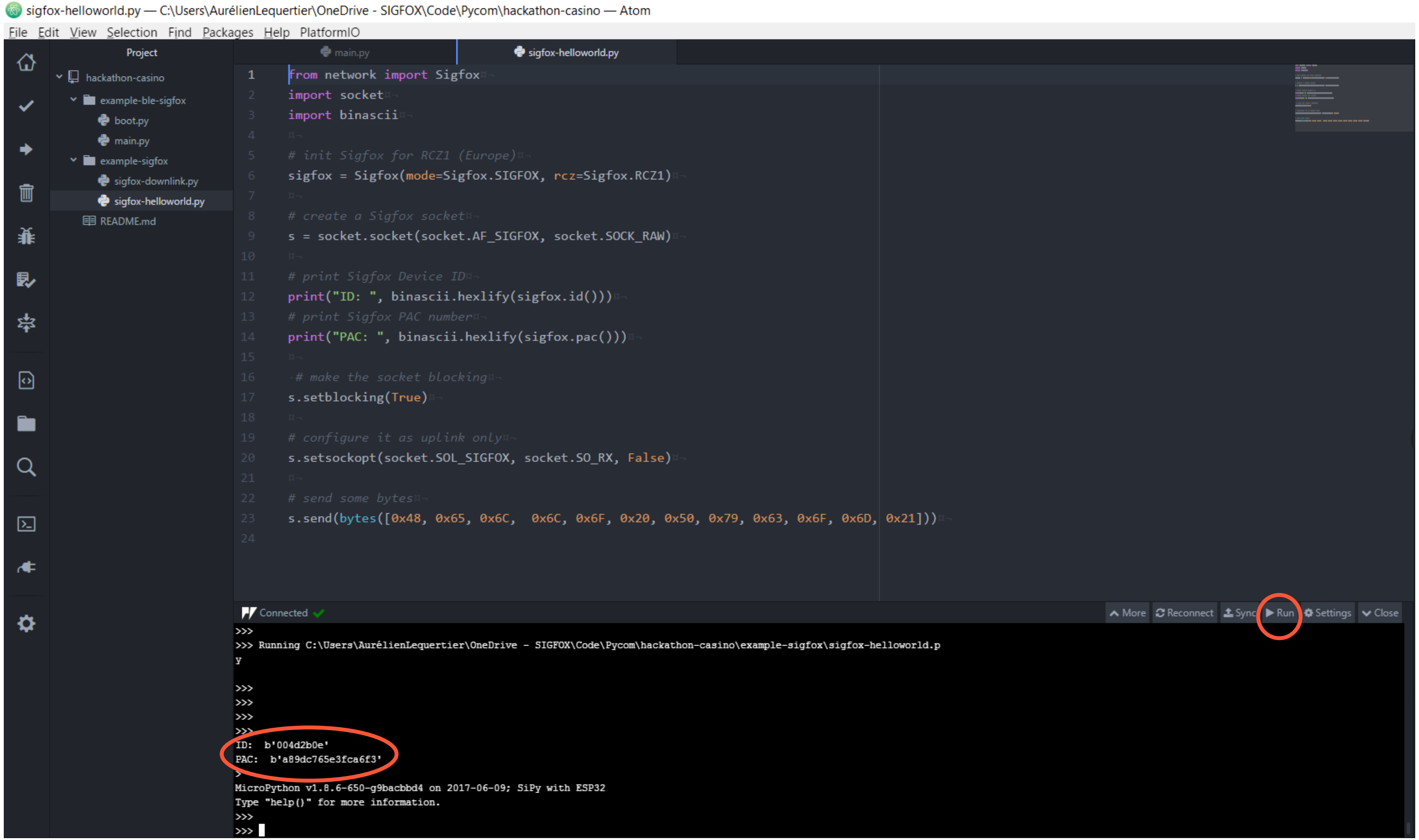


```
def bleScan(timeout=3):
    print("NEW SCAN")
    bluetooth.start_scan(timeout)
    while bluetooth.isscanning():
```

```
Disconnected. Click here to reconnect.
Connecting on COM8...
> Failed to connect (Error: Port is not open). Click here to try again.

Found 2 serialports
COM8 (copied to clipboard)
COM1
```

- Click Connect to get the prompt

Hello World example

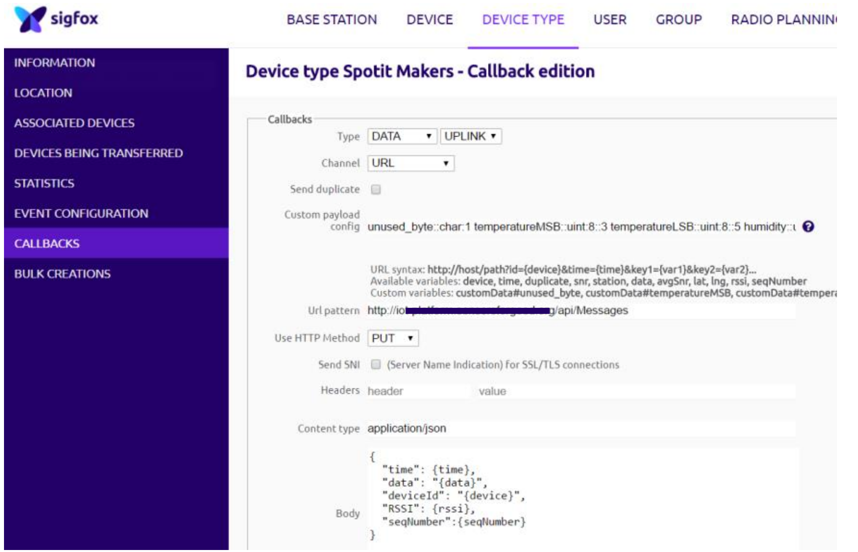


```python
from network import Sigfox
import socket
import binascii

# init Sigfox for RCZ1 (Europe)
sigfox = Sigfox(mode=Sigfox.SIGFOX, rcz=Sigfox.RCZ1)

# create a Sigfox socket
s = socket.socket(socket.AF_SIGFOX, socket.SOCK_RAW)

# print Sigfox Device ID
print("ID: ", binascii.hexlify(sigfox.id()))
# print Sigfox PAC number
print("PAC: ", binascii.hexlify(sigfox.pac()))

 # make the socket blocking
s.setblocking(True)

# configure it as uplink only
s.setsockopt(socket.SOL_SIGFOX, socket.SO_RX, False)

# send some bytes
s.send(bytes([0x48, 0x65, 0x6C,  0x6C, 0x6F, 0x20, 0x50, 0x79, 0x63, 0x6F, 0x6D, 0x21]))
```

```
>>>
>>> Running C:\Users\AurélienLequertier\OneDrive - SIGFOX\Code\Pycom\hackathon-casino\example-sigfox\sigfox-helloworld.p
y

>>>
>>>
>>>
>>>
ID:  b'004d2b0e'
PAC:  b'a89dc765e3fca6f3'
>
MicroPython v1.8.6-650-g9bacbbd4 on 2017-06-09; SiPy with ESP32
Type "help()" for more information.
>>>
>>> 
```

First steps

- Go to https://backend.sigfox.com/activate/ to register your board
  - Enter the ID and PAC values given by the previous example
- Select your device type to configure the callback to your application server



Device type Spotit Makers - Callback edition

Callbacks

Type: DATA ▾ UPLINK ▾

Channel: URL ▾

Send duplicate: □

Custom payload config: unused_byte::char:1 temperatureMSB::uint:8::3 temperatureLSB::uint:8::5 humidity::u

URL syntax: http://host/path?id={device}&time={time}&key1={var1}&key2={var2}...
Available variables: device, time, duplicate, snr, station, data, avgSnr, lat, lng, rssi, seqNumber
Custom variables: customData#unused_byte, customData#temperatureMSB, customData#tempera

Url pattern: http://io[redacted]g/api/Messages

Use HTTP Method: PUT ▾

Send SNI: □ (Server Name Indication) for SSL/TLS connections

Headers: header value

Content type: application/json

Body:

```
{
  "time": {time},
  "data": "{data}",
  "deviceId": "{device}",
  "RSSI": {rssi},
  "seqNumber":{seqNumber}
}
```

Next

- https://github.com/aureleq/hackathon-casino to read about other examples
  - example-ble-sigfox

- Check online documentation
  - Pycom: https://docs.pycom.io/pycom_esp32/index.html
  - Callbacks: https://backend.sigfox.com/apidocs/callback
  - Sigfox geolocation: https://github.com/luisomoreau/iot-platform#add-sigfox-geolocalisation-service

sigfox

Thank you!

devrelations@sigfox.com