

# ST Smart Parking Application based on Sigfox protocol

1



ST Smart  
Parking Demo

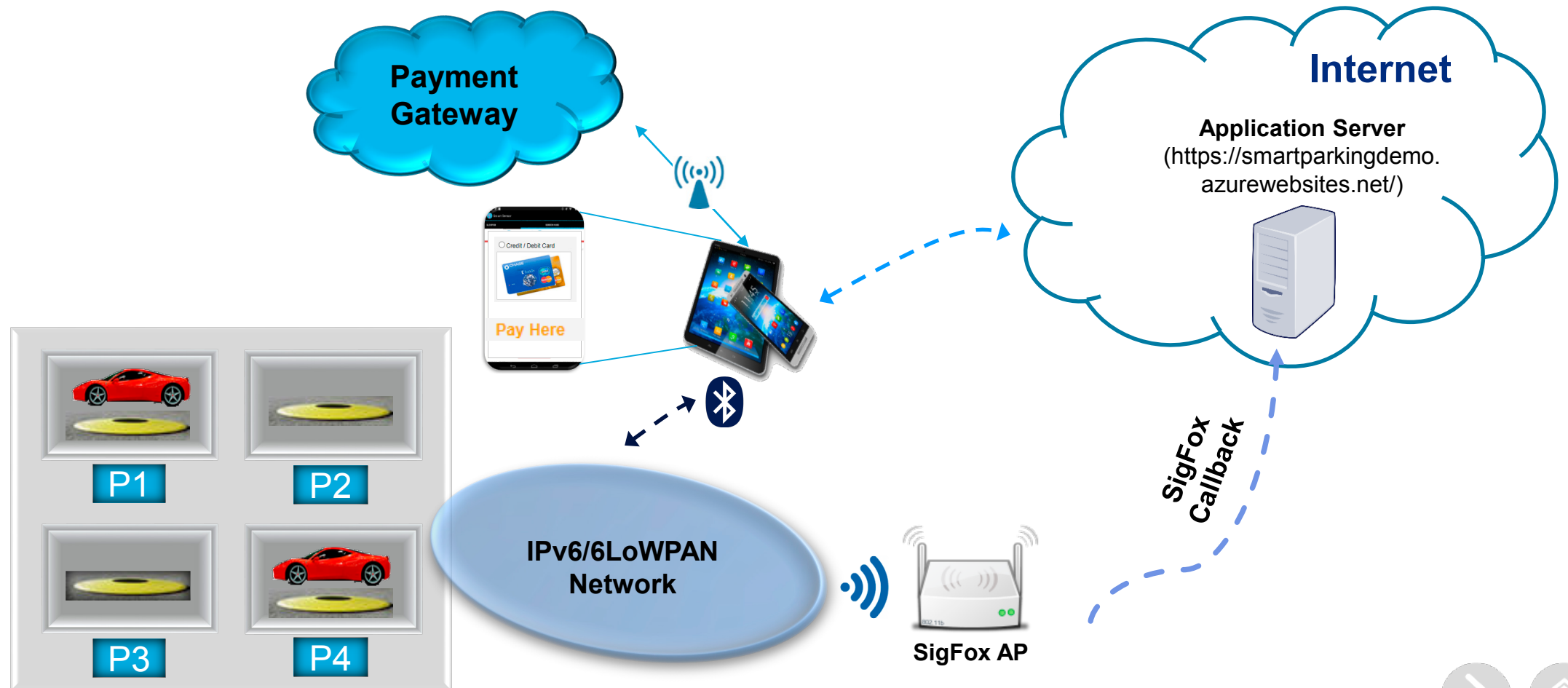
S2-LP & Eval Kit  
Overview

ST Sigfox  
compliant tools  
offering



# Communication Scenario

2

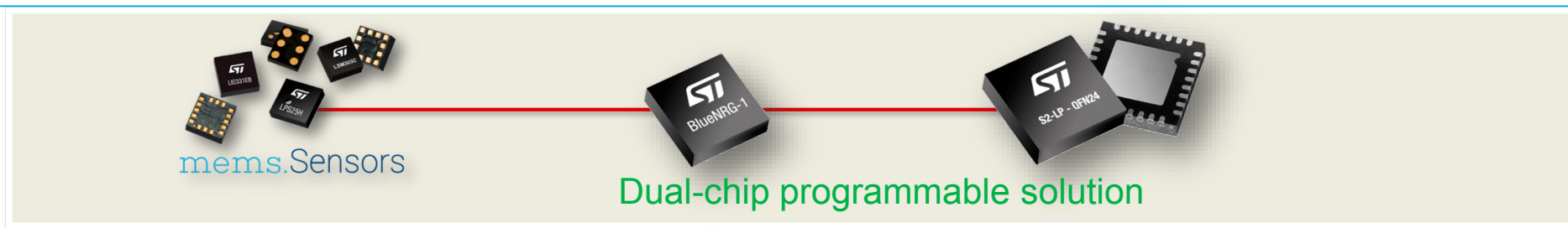
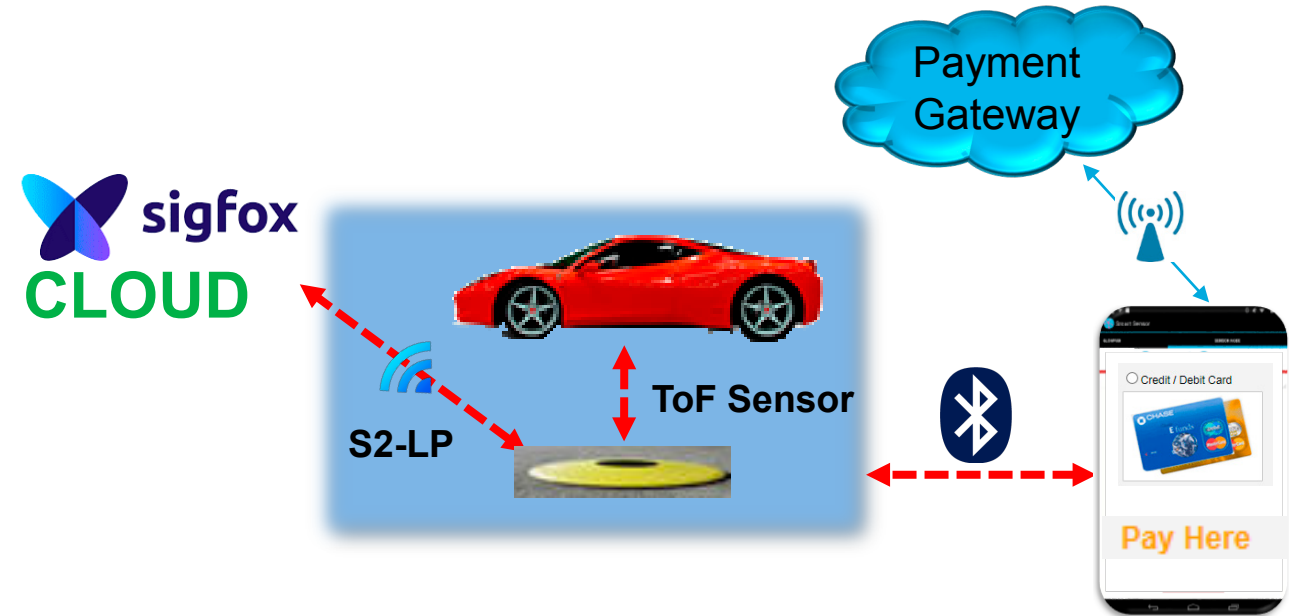


# Sub-1GHz / BLE IoT Node

3

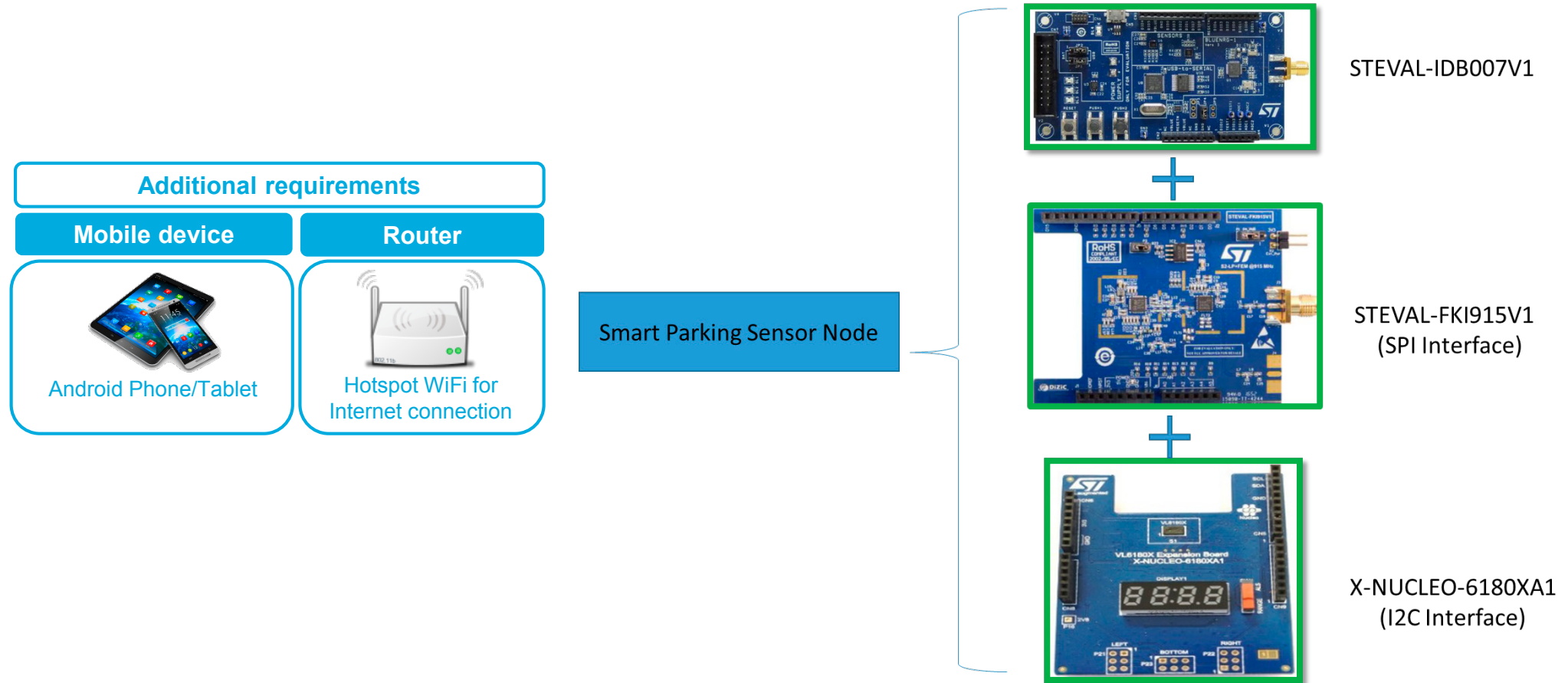
## Features Overview

- IoT Node with BLE/LPWAN Dual-Radio
- No need for a local gateway or access point
- IEEE 802.15.4g MAC
- Parking payment with mobile device over Bluetooth low energy connection
- Based on STM32 Nucleo board and proximity sensor to detect the car
- Designed for STM32ODE including stackable HW, Drivers, Middleware libraries and implementation examples



# SmartParking Demo – Hardware

5



## Sub-Ghz

### RF Features Overview

- Frequency bands: 430-470 MHz, 860-940MHz
- Modulation schemes: (2G) FSK, (4G) FSK, OOK and ASK
- Air data rate from 0.3 to 500 kbps
- Programmable output power: -30dBm to +16dBm
- RX sensitivity: -124dBm @1.2kbps / -130dBm @ 300bps
- **SigFox** modulation compliancy
- Built-in SMPS block for optimum current consumption

### MAC Features

- Embedded packet handler, LDC/Sniff mode, CSMA/CA...
- **Advanced** packet handler flexibility :
  - Bit granularity for preamble (up to 256Bytes) and sync (up to 64bytes)
  - **Configurable** pattern recognition down to bit granularity
  - Manchester encoding/decoding
- **IEEE 802.15.4g** MAC for Home Energy Management System

### Protocol Support

- **SIGFOX**
- **6LowPAN, Wireless M-BUS, SIGFOX and 802.15.4g**

### Top-Notch Low-Power figures

|                 |                |
|-----------------|----------------|
| RX Power (peak) | 6.7 mA         |
| Tx Power        | 10 mA @ +10dBm |
| Sleep/Shutdown  | 300 nA /2.5nA  |



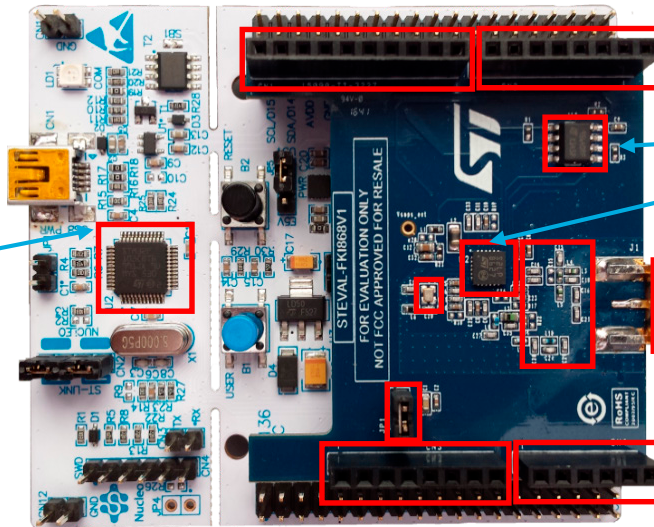
# Kits Hardware details

6

STEVAL-FKI868V1



Embedded ST-Link and  
USB2Serial conv



Arduino connectors

E2PROM w manufacturing data

S2-LP

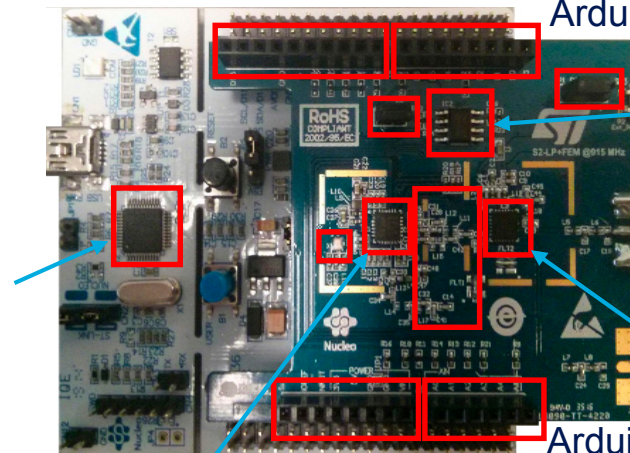
RF SMA connector

Arduino connectors

STEVAL-FKI915V1



Embedded ST-Link and  
USB2Serial conv



Arduino connectors

E2PROM w manufacturing data

RF SMA connector

External FEM  
Skyworks

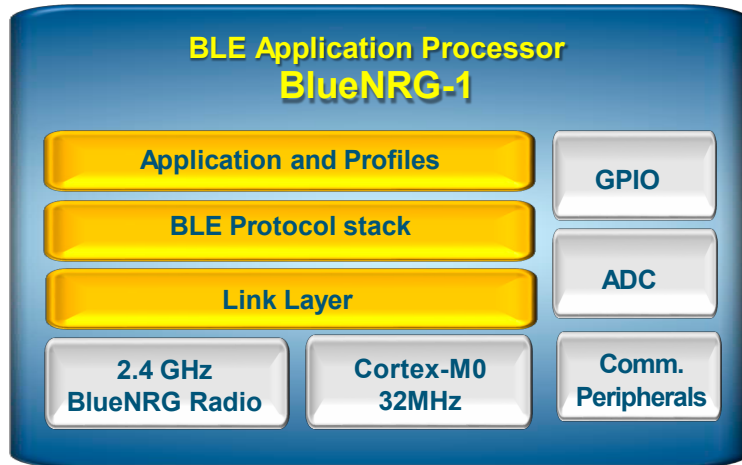
Arduino connectors

S2-LP

# BlueNRG-1

## Bluetooth® SMART 4.2 SoC

7



- Development kit:
  - STEVAL-IDB007V1

- Single mode Bluetooth® SMART 4.2 System on Chip
- ST Bluetooth Low Energy Stack, Profiles and Application
- SMART power management: DC-DC / Linear Voltage regulator Operating supply voltage from **1.7 up to 3.6V**
- Extended Temperature Range: **up to 105°C**
- 16MHz or 32MHz Crystal Oscillator
- Low Frequency Crystal Oscillator or Integrated Ring Oscillator Up to **32 MHz ARM Cortex M0** Core
- **24 kB Ultra Low Leakage**
- **160 kB Flash memory**
- SPI M/S, I2C M/S, UART, PDM Input I/F PWM GPIOs 15
- Package WCSP34 2.65x2.65mm, QFN32 5x5 mm.
  - QFN32 for Automotive Grade qualification
- **BlueNRG based radio**
  - ✓ **RX 7.7 mA**
  - ✓ **TX 8.3 mA @ 0 dBm**
  - ✓ **Sleep 1µA**
  - ✓ Best in Class Output Power Level: **+8dBm**
  - ✓ Receiver sensitivity -88dBm

# Sigfox certified tools

## STEVAL-FKI868V1 / FKI915V1

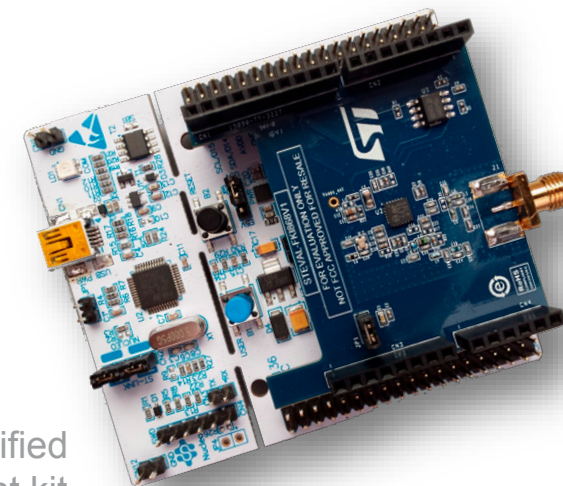
8

### Sigfox-ready sub-1GHz RF kits accelerate sensor-to-cloud IoT applications

- Development kit:
  - Region AME: [STEVAL-FKI915V1](#)
  - Region EMEA: [STEVAL-FKI868V1](#)
- Sigfox SDK:
  - [STSW-S2LP-SFX-DK](#)
- Based on STM32 Nucleo board
- no need for a local gateway or access point.
- [Read more](#)



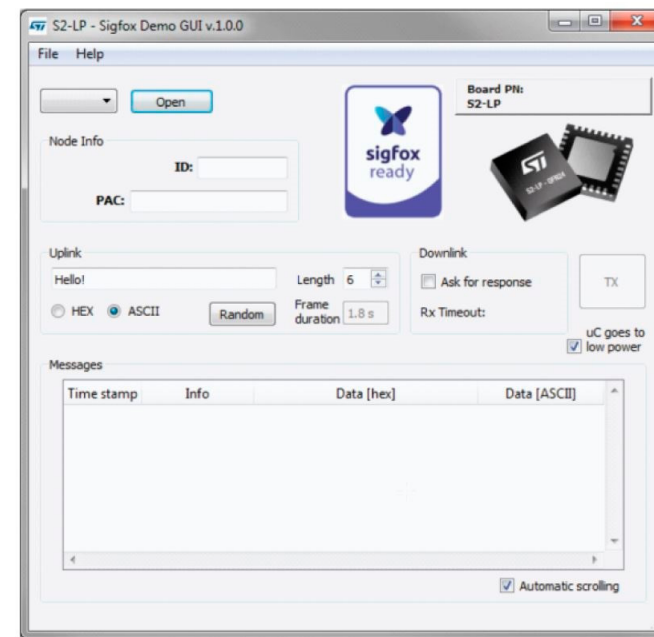
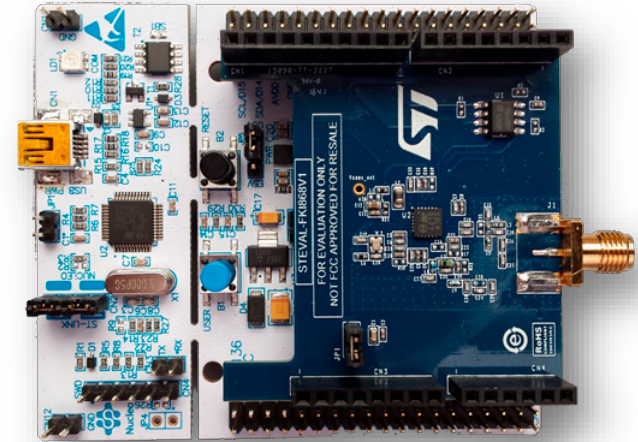
Development Kit for Out-of-the-box  
Sensor-to-Cloud Connectivity



# Ready-to-go Sigfox offering

9

- Evaluation kits for worldwide coverage
  - [STEVAL-FKI868V1](#) – 868MHz
    - RCZ1 (Europe)
  - [STEVAL-FKI915V1](#) - 915MHz + PA
    - RCZ2 (US, Canada, Mexico, Brazil)
    - RCZ4 (New Zealand, Colombia, Peru', Singapore)
- S2-LP [Sigfox SW package](#) for developers (STSW-S2LP-SFX-DK)
- Available SIGFOX SW libraries for:
  - ARM Cortex M0, M0+ and M3
- SDK for Dual-Radio BLE + SIGFOX upcoming
  - BlueNRG-1 + S2-LP evaluation kit



# Combo-radio IoT Node

10

Dual-Radio turn-key solution

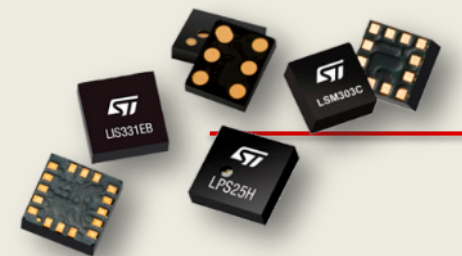
## SMARTPHONE

- User Interface
- Configurability
- Local monitoring
- Diagnostic
- Firmware upgrade



## CLOUD

- Remote monitoring
- Tracking and Positioning
- Notifications of events
- Data aggregation
- Diagnostic and assistance



mems.Sensors



Dual-chip programmable solution

## Application scenarios:

Wireless Sensor Nodes, Asset Trackers, Remote diagnostic, Finder/Tags, Smart Parking, Smart Objects

## Enforcing point-to-point security

### Security features

- STSAFE-A1SX is CC EAL5+ AVA\_VAN5 certified
- Data integrity over the Sigfox network:
  - Signature of payloads before uplink
  - Verification of downlink payloads
- *Optional* data confidentiality over the Sigfox network:
  - Encryption of payloads before uplink
  - Decryption of downlink
- *Optional* Secure channel using AES-128



UFDPFN 8 pitch 2x3  
SO8N

Availability: Sample in April,  
Production end Q2'17

