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Low Power RF Sub-1GHz products family





Sub-1 GHz markets

Smart Industry



Smart City



Smart Home



Smart Agriculture



Asset Tracking



Metering



Alarm System



Heat Cost Allocator



SPIRIT family: Performance, Flexibility, Scalability



Sub-1 GHz proprietary radio for the remote monitoring and control



150-174 MHz
300-348 MHz
387-470 MHz
779-956 MHz



SPIRIT1

- RX: **9.2 mA** / TX: **19.5 mA** @ +11 dBm
- Sleep/Stby: **850 nA** / **600 nA**
- Max.Out: **+16 dBm**
- Sensitivity: **-120dBm**
- Mod: 2(G)FSK, OOK
- QFN20 4x4



413-479 MHz ●
826-958 MHz ●
452-527 MHz ●
904-1055 MHz ●



S2-LP / S2-LPCB

- RX: **7 mA** / TX: **10 mA** @ +10 dBm
- Sleep/Stby: **700 nA** / **500 nA**
- Max.Out: **+16 dBm**
- Sensitivity: **-130 dBm**
- Mod: 2(G)FSK, 4(G)FSK, OOK/ASK
- QFN24 4x4

S2-LPTX

- S2-LP Based Radio Transmitter



Home and Building
automation

Smart Metering

Alarm Systems

Industrial Monitoring
and Control



S2-LP transceiver overview

Performance

Sub
1GHz

S2-LP / S2-LPCB

- 413-479MHz / 826-958MHz
- 452-527 MHz / 904-1055 MHz
- -40°C to +105°C
- QFN24 4x4x1



Radio performance

- 100bps to 500kbps
- -130dBm @ 0.3kbps
- +16dBm output power



Ultra low-power consumption

- Sleep / Shutdown: 700nA / 2.5nA
- Rx peak: 7mA
- Tx peak: 10mA @ +10dBm



Protocols



Markets



Remote metering



Smart living



Alarm & surveillance



Smart home



Smart utilities



Healthcare & assistance



Smart parking



Smart agriculture



S2-LPTX overview

S2-LP based radio transmitter

Sub
1GHz

S2-LPTX

- 413-479MHz / 826-958MHz
- **Pin to Pin compatible** with S2-LP
 - **No need for a new Sigfox certification!**
- QFN24 4x4x1



Applications

- Asset Tracking
- Alarm System
- Home and Building Automation
- Remote key entry
- Wireless Sensor Networks



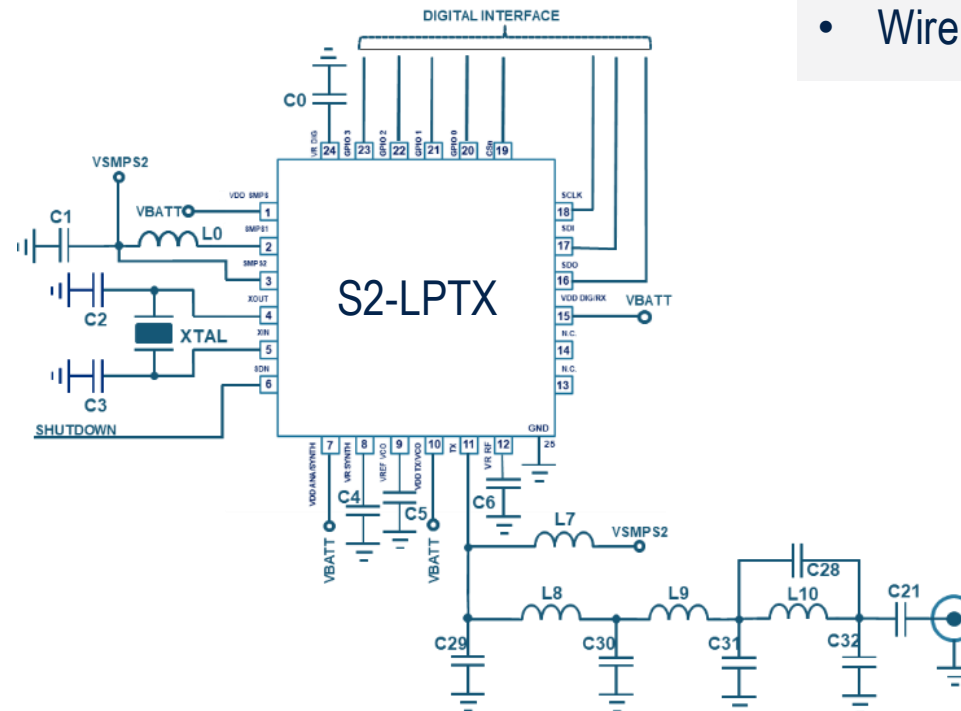
Radio performance

- 100bps to 500kbps
- **+16 dBm output power**



Ultra low-power consumption

- Sleep / Shutdown: 700 nA / 2.5 nA
- Tx peak current: **10 mA @ +10 dBm**





S2-LP enables Battery operated systems

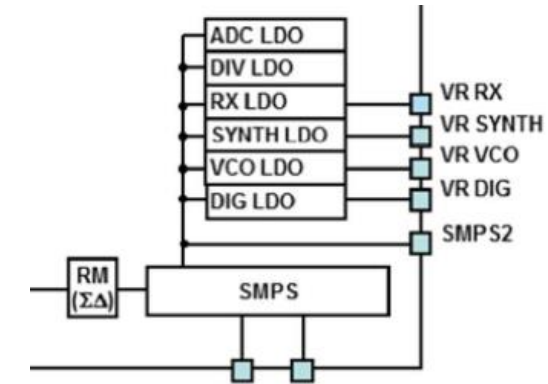
S2-LP doubles the battery life-time !

S2-LP is the best solution for battery operated system thanks to the **extremely low peak current consumption** values, the **ultra low power mode** and the ability to **transition quickly** between power-saving and active modes



SMPS highlights

- High-efficiency design / one single external coil required
- Used for both internal LDO's and PA bias voltage
- By-passable (external LDO needed)



Programmable V_{SMPS} : from 1.1 up to 1.8 V (by 0.1 V step)

Boost Mode

- $V_{SMPS} = 1,8\text{ V}$
- +16dBm output power
- 30mA in TX / 10mA in RX
- Excellent selectivity

High-Performance Mode

- $V_{SMPS} = 1,5\text{ V}$
- +14dBm output power
- 20mA in TX / 8,4mA in RX
- Excellent selectivity

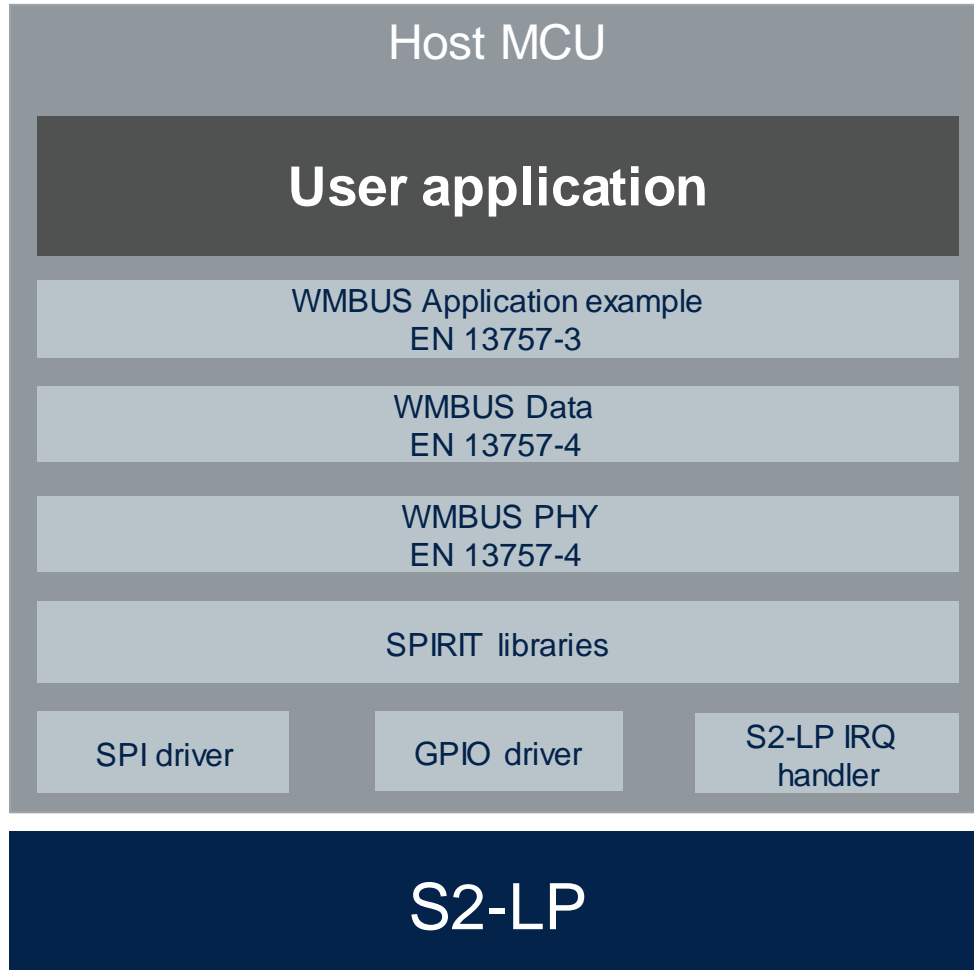
Low-Power Mode

- $V_{SMPS} = 1,2\text{ V}$
- +10dBm output power
- 10mA in TX / 7mA in RX
- Good selectivity

One PCB with same BOM → 3 modes possible!

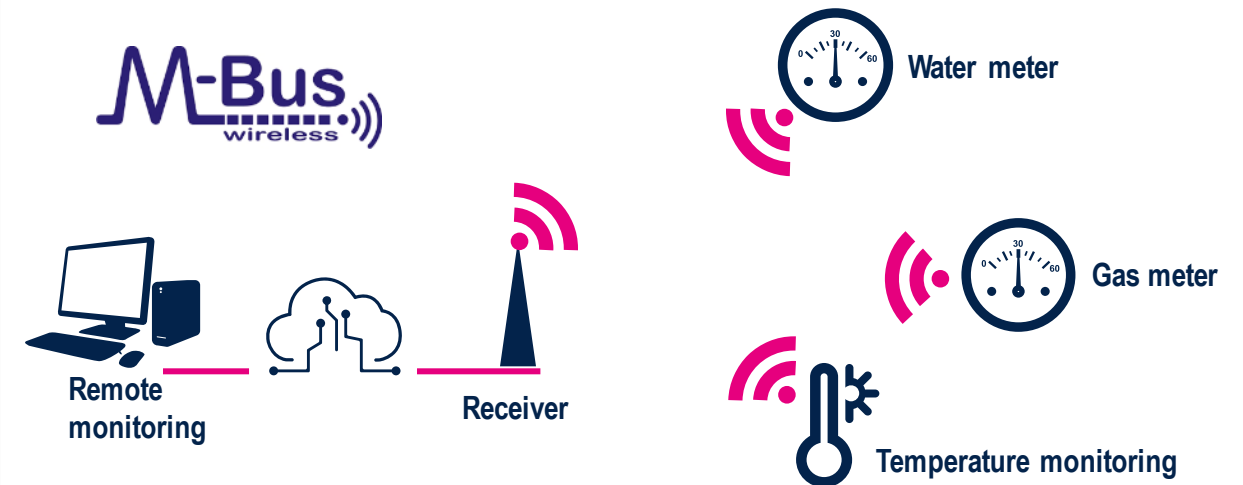


S2-LP for WMBUS metering stack



ST WMBUS Package

- WMBUS stack can be provided as Libs or source code
 - [EN 13757-4 Release 2013](#)
- EN 13757-3 WMBUS application examples
 - [OMS/DSMR](#)
- S2-LP sleep timer now up to 16 sec

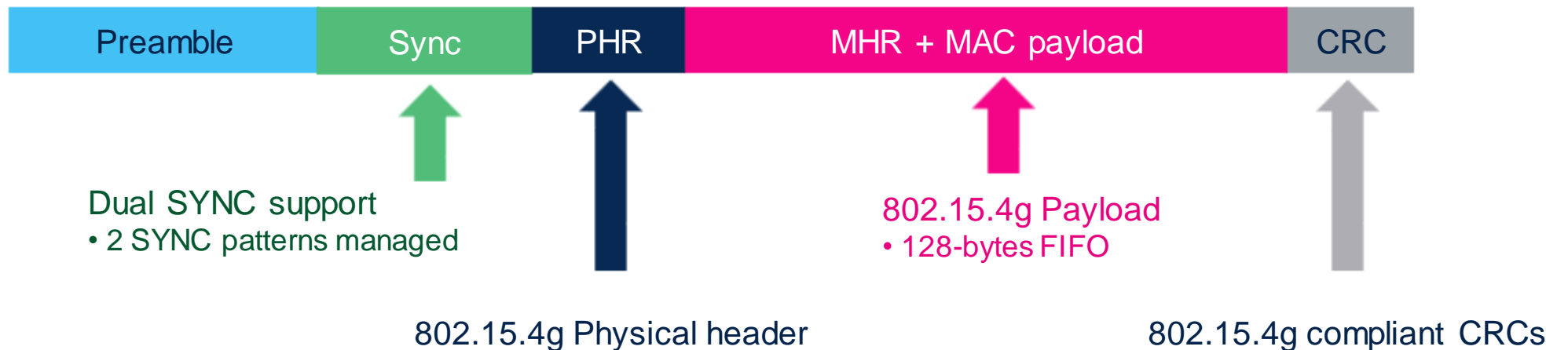




S2-LP: 802.15.4g WiSUN ready



Natively supports 802.15.4g packet format





S2-LP family evaluation kit

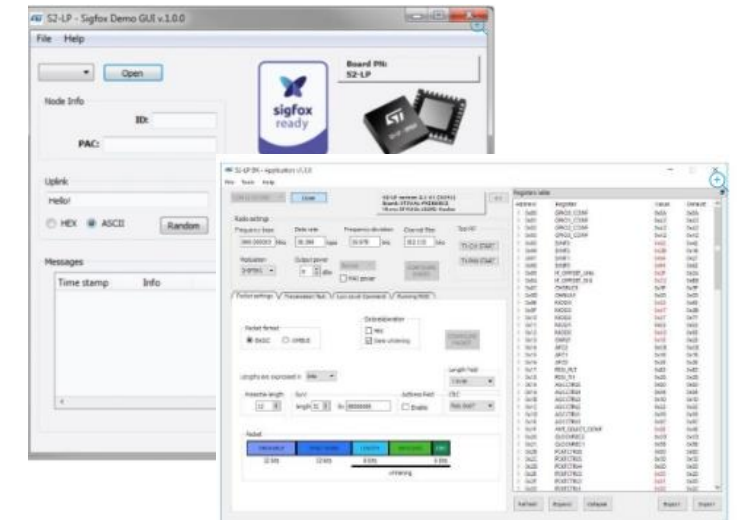
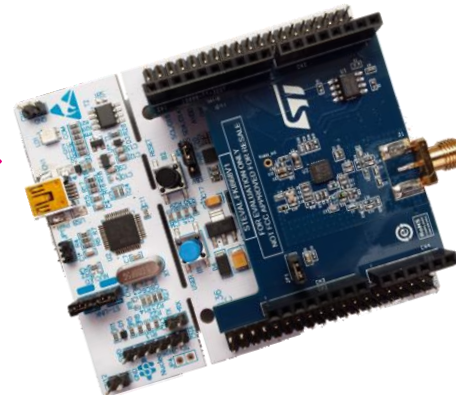
Sub-1GHz RF kits : Wireless M-BUS, Sigfox, 6LowPAN, LPWAN

Development kits based on the ultra-low-power Sub-1GHz S2-LP IC available

STEVAL-FKI868V2, STEVAL-FKI433V2, STEVAL-FKI512V1, STEVAL-FKI915V1

The kits come with a **full-featured SDK** and supports SIGFOX connectivity out-of-the-box. The bundle includes an STM32 Nucleo board to start prototyping Sensor-To-Cloud solutions with no need for a local gateway or access point.

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



Available SIGFOX software libraries for STM32 Cortex M0, M0+, M3 and M4

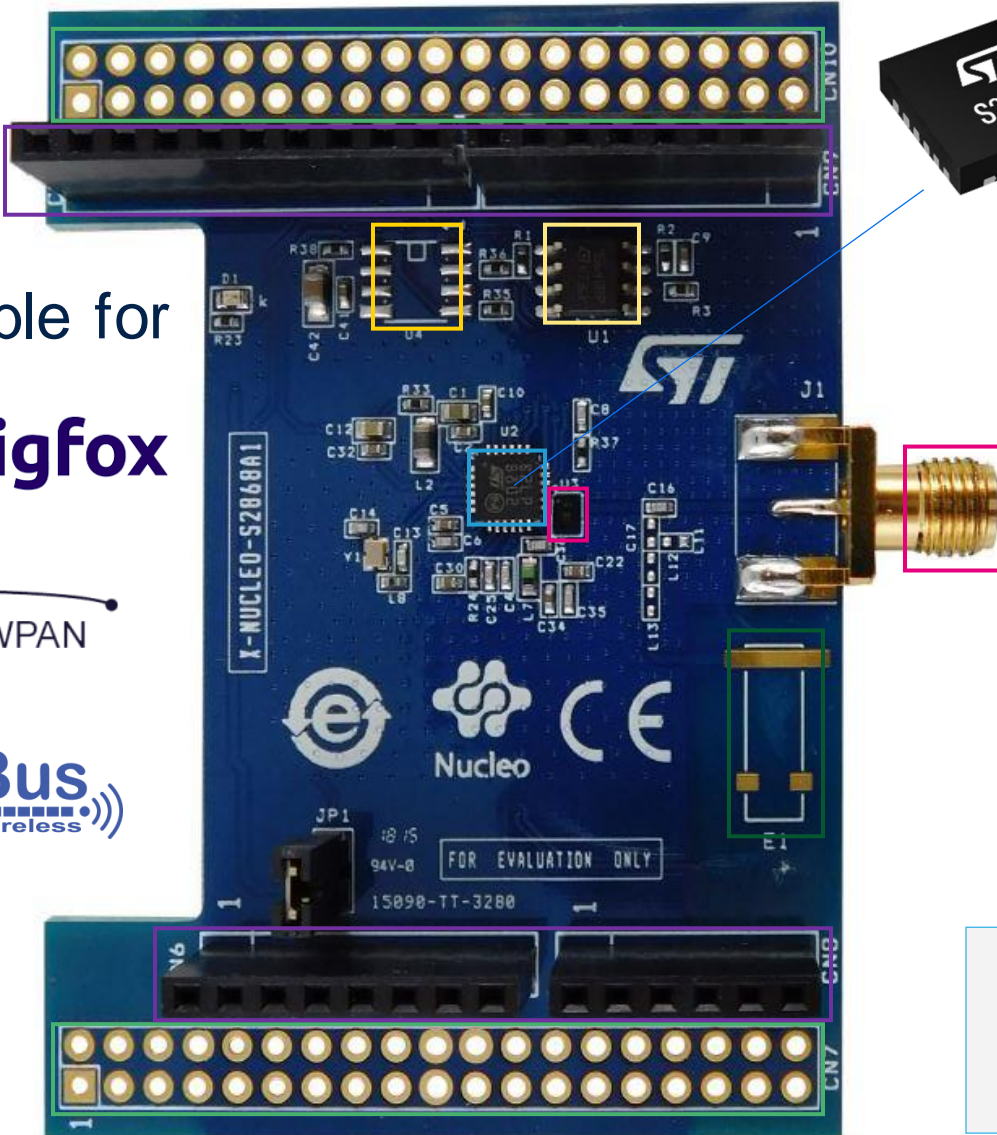
SOFTWARE PACKAGES:

- [STSW-S2LP-DK](#)
- [STSW-S2LP-SFX-DK](#)



S2-LP X-NUCLEO-S2868/915A1

Suitable for











X-NUCLEO HARDWARE:

- [X-NUCLEO-S2868A2](#) (868 MHz)
 - [X-NUCLEO-S2915A1](#) (915 MHz w/ PA)
- Sigfox's Monarch in HW

SOFTWARE PACKAGES:

- [X-CUBE-SUBG2](#)
- [X-CUBE-SFXS2LP1](#)
- [FP-ATR-SIGFOX1](#)

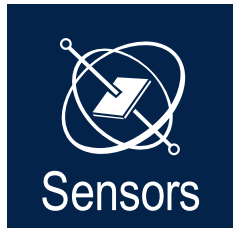


 S2-LPQTR	 M95640	 ST Morpho connector (opt)
 BALF-SPI2-01D3	 STSAFE-A100 (opt)	 Arduino UNO R3 connector
 SMA antenna	 SMD antenna (opt)	



S2-LP for Sigfox networking

Sensors cut-the-wire



Air Interface

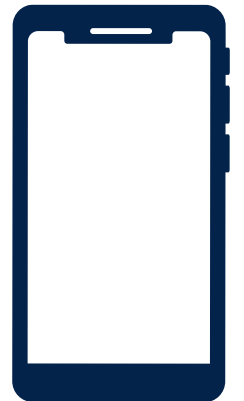
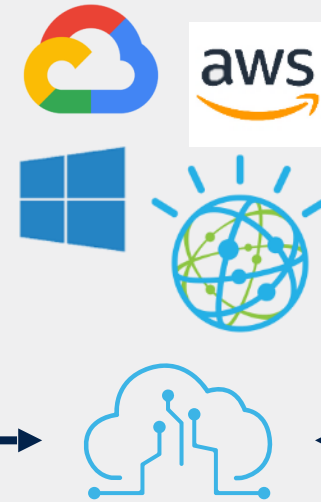
1 Sigfox Message
=
12 Bytes (UL)
8 bytes (DL)



Global
LPWAN
Network



Cloud



...unleashing the Sensor-to-Cloud connectivity



S2-LP for Sigfox networking

Industrial asset tracking in 3 simple steps

1

The Sigfox Tracker locate the 'asset'



Find Coordinates by GPS or Sigfox
Geolocation

2

The coordinates are sent to
Sigfox Basestations



(Longitude; Latitude) of the GPS, or Sigfox
Geolocation

3

...and send it directly to your IT
system interface



'Asset' #737 is located in the corridor 7,
middle side



S2-LP for Sigfox asset tracking

Pre-integrated solution for low power device location, tracking and recovery

Development environment combining hardware & software

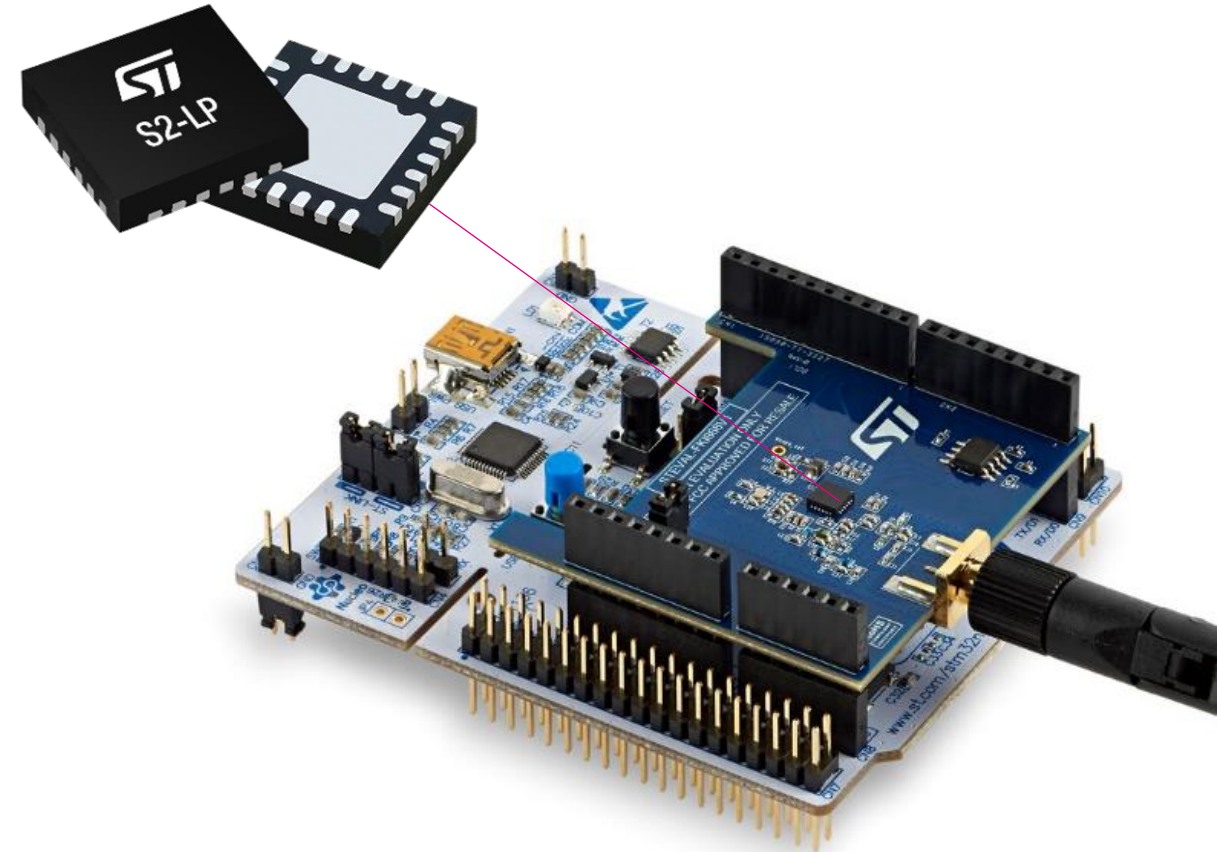


Sigfox gateway coverage
Sigfox cloud services
Sigfox geo-location



HARDWARE KIT (FUNCTION-PACK):

- Low Power Nucleo Board (NUCLEO-L0/L4)
- Connectivity (X-NUCLEO-S2868/915A1, X-NUCLEO-IDB05A1, X-NUCLEO-GNSS1A1)
- Sensing (X-NUCLEO-IKS01A2/3)



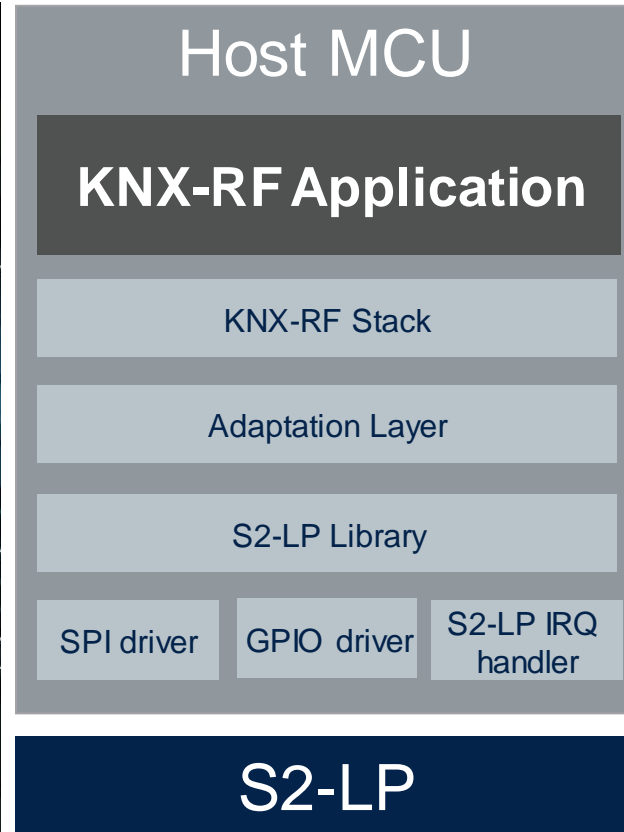
FP-ATR-SIGFOX1



KNX-RF standard support over S2-LP



Energy efficiency, Flexibility, Safety and Security: that's KNX-RF!





KNX ecosystem

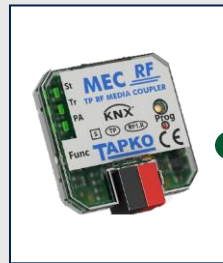
KNX-RF radio switch Settings using BLE



KNX-RF LED application



KNX RF & TP gateway

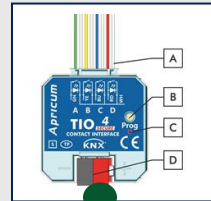


KNX bus

KNX USB
interface



KNX device LED control

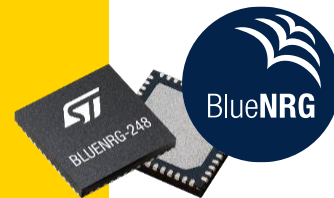
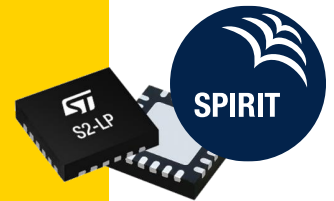


KNX setup ETS application



HIGHLIGHTS

- KNX-RF communication for Smart Building applications over S2-LP
- BLE communication for system setup over BlueNRG-2
- Interoperability with KNX-TP ecosystem





Combo-radio IoT node

Dual-radio turnkey programmable solution

Enables both local and remote monitoring and control

SMARTPHONE

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



IoT Node
BLE/LPWAN
Dual-Radio



CLOUD

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





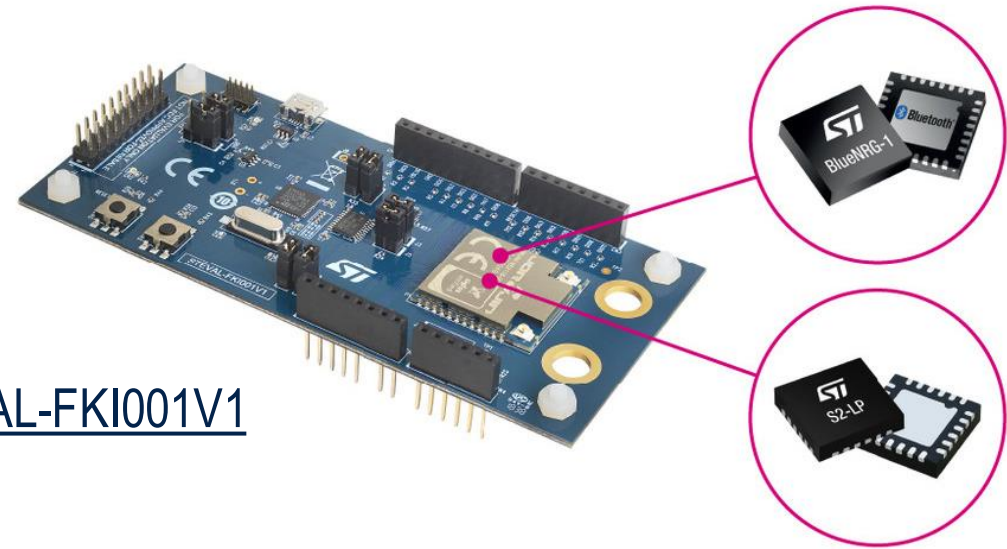
Dual-radio SDK: BLE + SIGFOX



STSW-BNRG-S2LP

Dual-Radio SDK based on BlueNRG-1 and S2-LP

STEVAL-FKI001V1



Software Development Kit

- STSW-S2LP-SFX-DK
- STSW-BNRG-S2LP-DK

Thank you

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