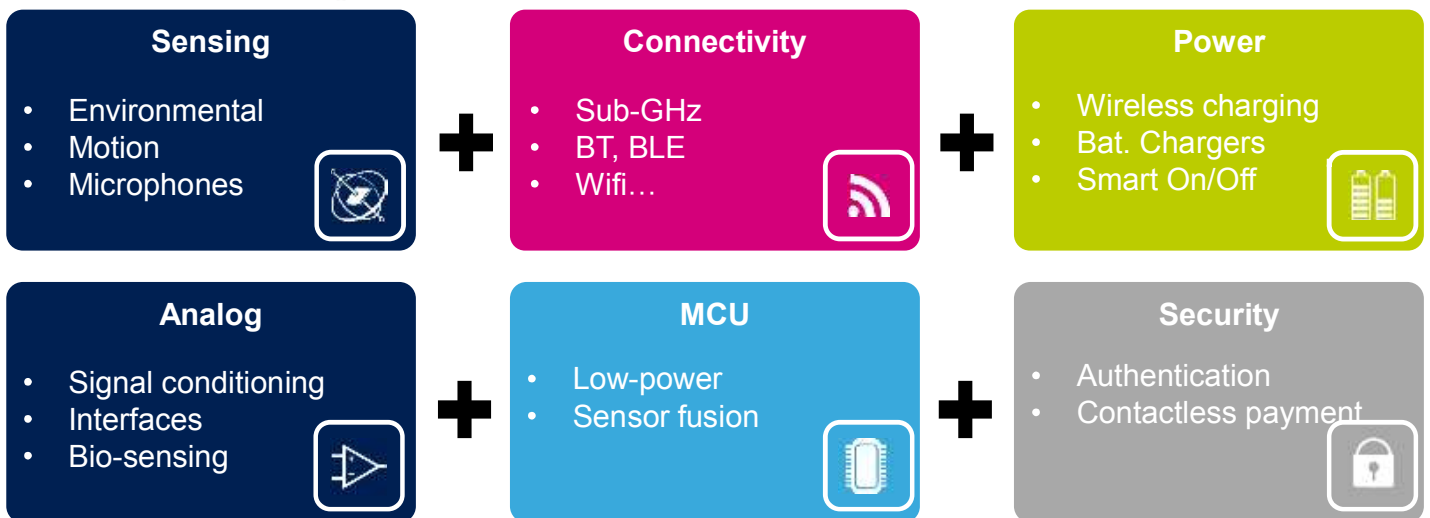




# ST Solutions for IoT

EMEA Marketing & Application  
September 2017

## Ultra-low power...



# Fast evaluation & prototyping

3

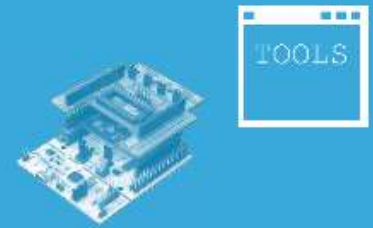
## Hardware Building Blocks



## Software Building Blocks



## Development & Prototyping Tools

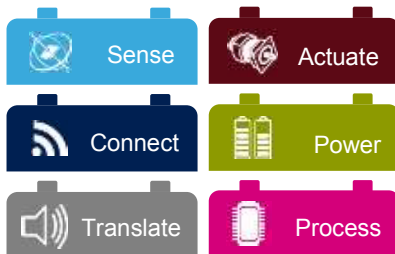


# ST Augmenting the IoT Development

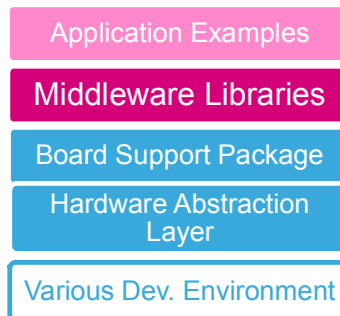
4



## Hardware bricks



## Software bricks



## Cloud services



# Wireless Sensor Nodes (WSN) Overview

5

Wireless Sensor Node is a node that is capable of performing some processing, gathering sensory information and communicating through a radio link



## • Sensors

- Produce a measurable response to a change in a physical condition like movement or pressure
- Signal is typically digitized in sensor device by an ADC and sent to controller for further processing
- Smart sensor device can do also data processing functionalities to save system power



## • Controller

- Performs tasks, processes data and controls the functionality of other components in the sensor node
- Controller is typically an MCU or wireless SoC



## • Wireless communication

- Uses ISM band which gives free radio spectrum allocation and global availability
- Communicating with host, gateway or wireless sensor network
- Transmitted data can be stored to local host to a cloud service



## • Power

- WSN is typically operated by rechargeable or non-rechargeable battery
- High energy efficiency is needed due to expected long autonomy times
- Energy harvesting can be used in low or no maintenance WSN devices



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# Wireless Sensor Nodes (WSN) Applications

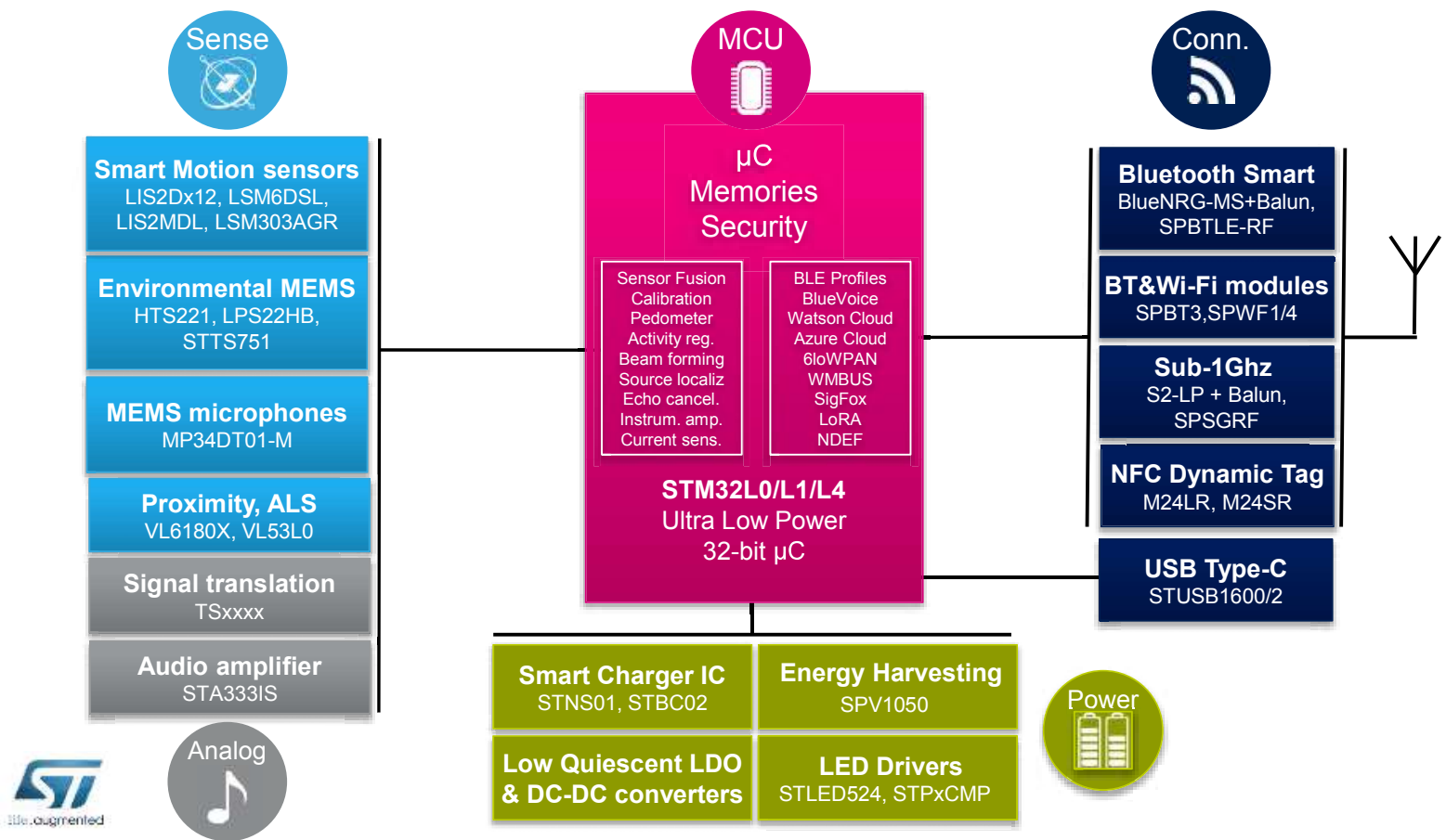


ST Metering and Alarm solutions are covered in a separate presentation

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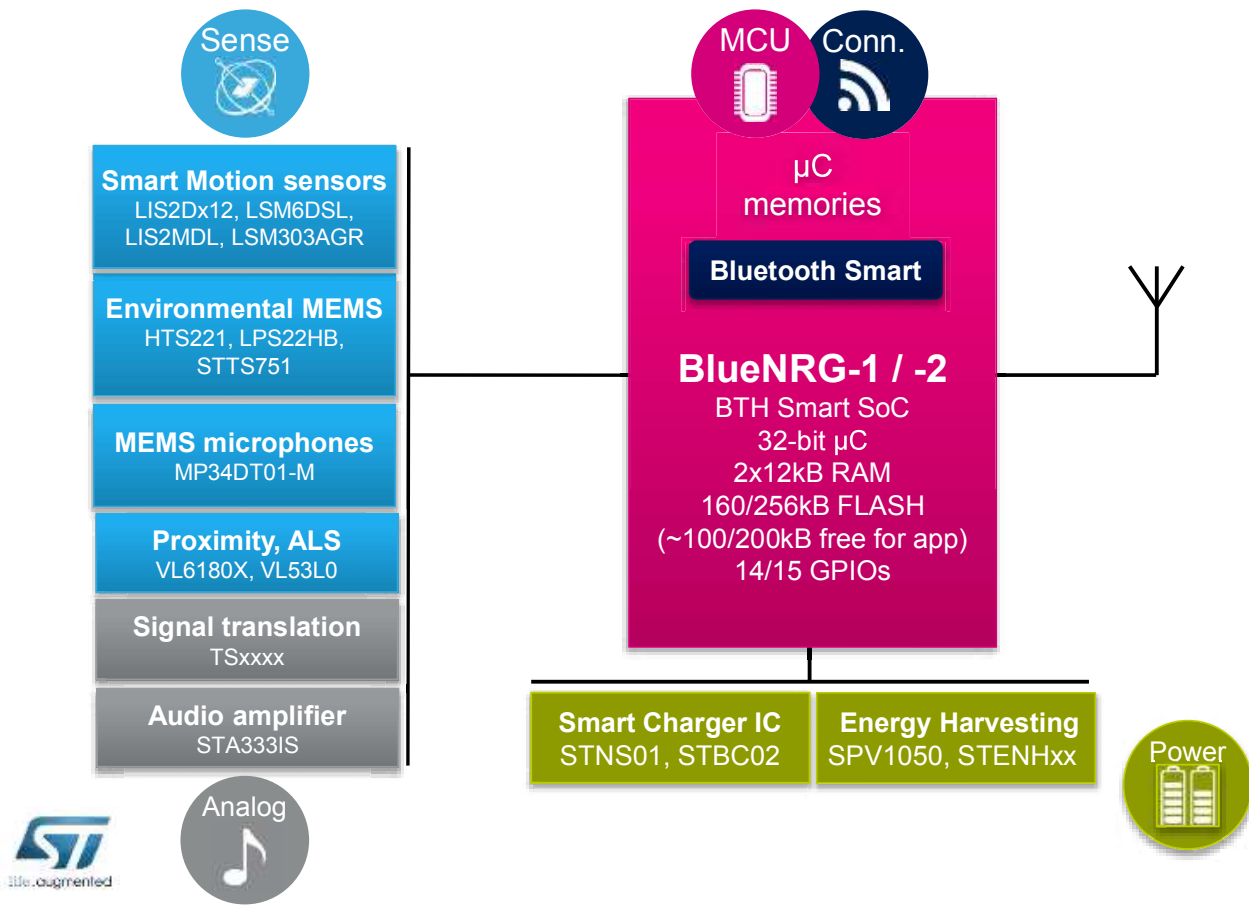
# Wireless Sensor Node Block Diagram

## Modular WSN solution



# Wireless Sensor Node Block Diagram

Optimized Bluetooth Smart WSN solution







### Smart Motion MEMS sensors

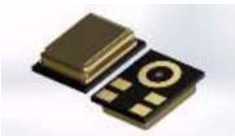
- [LSM6DSL](#) - ultra low-power (max 650 uA) always-on 6-axis inertial module: 3D accelerometer and 3D gyroscope
- [LIS2MDL\\*](#) - 3-axes magnetometer with high full scale and low noise
- [LSM303AGR](#) - Ultra-compact high-performance eCompass module: ultra-low-power 3D accelerometer and 3D magnetometer
- [LIS2DW12](#) - Ultra Low power/noise accelerometer for IOT and wearable
- [LIS2DS12](#) - 3-axes femto accelerometer with ultra long FIFO and pedometer
- [LIS2DH12](#) - ultra low-power high performance 3-axes femto accelerometer



### Environmental MEMS sensors

- [LPS22HB](#) - MEMS pressure sensor: 260-1260 hPa absolute digital output barometer
- [HTS221](#) - Capacitive digital sensor for relative humidity and temperature
- [STTS751](#) - 2.25 V low-voltage local digital temperature sensor
- [STLM20](#) - Ultra-low current 2.4 V precision analog temperature sensor

### Microphones



- [MP34DT01-M](#) / [MP34DB02](#) – Top / bottom port MEMS microphone, AOP of 120 dB SPL with a 61 / 62.2 dB SNR and -26 dBFS sensitivity
- [MP34DT04](#) – Top port MEMS microphone, AOP of 120 dB SPL with a 64 dB SNR and -26 dBFS sensitivity
- [MP23AB01DH](#) - Bottom Port, Analog Differential microphone, AOP of 135dB SPL with a 65dBV SNR.  $\pm 1$ dB SENS for better sound fidelity



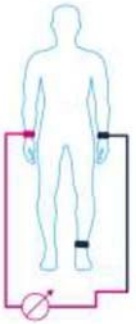
# WSN - Sensors

10



## Proximity and ambient light sensing

- **VL6180X** - Proximity sensor, gesture and ambient light sensing (ALS) module with 10-20cm range
- **VL53LOX** - Proximity sensor with up to 2m range



## Signal translation

- **ST's op amp portfolio** provides a unique choice of high performance, low power, precision op amps and tiny packages
- **TSZ12x / TSZ18x** – Zero drift ( $V_{io}$  5 $\mu$ V / 25 $\mu$ V, 400kHz / 3MHz) optimal for signal conditioning for bio sensing, low side current sensing, strain gauge applications
- **TSU111** - Nanopower (900 nA), high accuracy (150  $\mu$ V) optimal for high accuracy and ultra low power sensor applications like gas sensing
- **TSC10x** – High side current sensing amplifier with common-mode voltage up to 70 V
- **TS985** - Micropower low-voltage (14  $\mu$ A) rail-to-rail comparator for space constraint applications (CSP, 1.2 x 0.8 mm)

## Audio amplifier

- **STA333IS** – Digital audio processor providing full digital audio streaming to the speaker delivering up to 10 W + 10 W of power
- **STA350BW** - Sound Terminal 2.1-channel high-efficiency digital audio system delivering up to 2 x 18 W + 1 x 40 W of music output power



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## Sub-1GHz ICs and Modules

- **S2-LP** – very low-power RF transceiver IC for 433 & 868 and 920 MHz bands with very high sensitivity, also supporting SigFox
- **SPSGRF / SPSGRFC** - pre-certified RF Module based on SPIRIT1 IC for 868 and 915 MHz bands with chip antenna or ufl antenna connector



## Bluetooth Smart ICs and Modules, Bluetooth Modules

- **BlueNRG-1 / -2\*** - Bluetooth Smart v4.2 compliant single chip solution with ARM Cortex M0
- **BlueNRG-MS** – low power Bluetooth LE Network Processor supporting 4.1 core specification with multiple simultaneous role support (act as sensor and hub), for balun use **BALF-NRG-01D3**
- **SPBTLE-RF** – pre-certified Bluetooth LE module supporting 4.1 core specification based on BlueNRG-MS
- **SPBT3.0DP1 / 2** – pre-certified traditional Class1/Class2 Bluetooth 3.0 module for serial port replacement



## WIFI Modules

- **SPWF01** – pre-certified 802.11b/g/n WIFI module for serial port replacement (UART)
- **SPWF04** – pre-certified 802.11b/g/n WIFI module for serial port replacement (SPI and UART) and integrated micropython scripting engine for custom applications



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## USB Type-C

- [STUSB1600](#) – USB Type-C controller (with Vconn switch)
- [STUSB1602](#) – USB Type-C controller with TX/RX line driver and BMC



## RS-485, RS-422, RS-423 Interface

- [ST485AB](#) – 5V powered, >30 Mbps RS-485/RS-422 transceiver, temp range -40 to 85°C
- [ST485EX](#) - 5V powered, 5 Mbps RS-485/RS-422 transceiver, temp range -55 to 125°C, 15 kV ESD protected
- [ST4485EB](#) – 3.3 V powered, 20 Mbps RS-485/RS-422 transceiver, temp range -40 to 105°C, 15 kV ESD protected
- [STR485LV\\*](#) - 1.8/3.3 V powered, 20 Mbps RS-485 transceiver, temp range -40 to 125°C, 15 kV ESD protected



## Power Line Communication

- [ST7580](#) – FSK, PSK multi-mode power line networking system-on-chip up to 28.8 kbps



## NFC Dynamic Tags

- [M24SR](#) – short range ISO 14443 compatible RFID interface IC for simple pairing
- [M24LR](#) – long range ISO 15693 compatible RFID interface IC with energy harvesting



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MCU



# WSN - Controllers

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Explore ST's complete ecosystem to start developing with STM32 [Go.st.com](http://Go.st.com)

## • STM32 F4 Series

- High-performance MCUs with DSP and FPU instructions
- **STM32 F4** - Cortex M4 @ 180MHz ARM, ≤384kB RAM, 512-2048kB Flash, USB2.0 OTG FS/HS, SDIO, UART, SPI, I2C, I2S, 12-bit ADC, 12-bit DAC, 16 & 32 bit timers, ART Accelerator, external memory controller

## • STM32 L0, L1 and L4 Series

- Ultra Low power MCU series
- **STM32 L0** - Cortex-M0+ @ 32 MHz, ≤20kB SRAM, 16-192kB Flash, USB, LCD, Analog
- **STM32 L1** - Cortex-M3 @ 32 MHz, ≤80kB SRAM, 32-512kB Flash, USB, LCD, AES, Rich Analog, True EEPROM, Dual bank Flash (RWW)
- **STM32 L4** - Cortex-M4 w/ FPU @ 80 MHz, ≤128kB SRAM, 256-1024kB Flash, ADC 5 Msps, PGA, Compar., DAC, op amp, USB OTG, LCD, AES, PDM stream processor

## • BlueNRG SoC

- Bluetooth Smart compliant single chip solution
- **BlueNRG-1 / BlueNRG-2** – BLE 4.2 compliant, Cortex M0 @ 32MHz, 24kB RAM, 160kB/256kB Flash, UART, SPI, I2C, 12 bit ADC, Multifunctional timers, watchdog, RTC, DMA, PDM stream processor



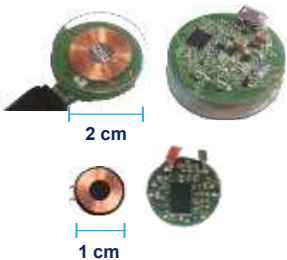
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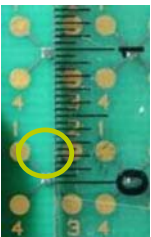
## Smart battery charging solutions

- **STBC02** – 450mA Ultra Low Quiescent Current Li-Ion Battery Charger with LDO, power path and battery protections
- **STNS01** - 200mA Li-Ion Linear Battery Charger with LDO, power path and battery protections
- **STBCFG01** - 1.2A Switch-mode Li-Ion Battery Charger with OTG Boost, Fuel Gauge and LDO
- **STWBC-WA** + **STWLC04** – Qi based 1 Watt wireless charger Tx + Rx solution for wearable appli.
- **STWBC** + **STWLC03** – Qi and PMA certified 5 Watt wireless charger Tx & Rx solution
- **SPV1050** - Ultra low power energy harvester and battery charger with embed. MPPT and LDOs



## DC-DC converters and LDOs

- **ST1S15** - 500mA 6MHz Synchronous Step Down converter
- **ST1PS01/02(\*)** - 400mA NanoQuiescent (Dual) Step Down converter
- **STBB2** / **STBB3** - 800mA / 2A, high efficiency single inductor buck-boost DC-DC converter
- **LDBL20** - 200mA World's smallest LDO (0.49x0.49 mm)
- **LD39020/130S** - 200/300mA very Low Iq High PSRR LDOs, (Green mode in 130S)
- **LDLN015/025** - 150/250mA ultra low noise (6.3/6.5  $\mu\text{VRMS}$ ) - high PSRR LDO



## LED power management

- **STLED524** - 5x24 Matrix LED Driver with Auto Calibration function
- **STP4CMP** – 4 channels current LED driver with charge pump



Scroll function

eDesignSuite available in [st.com](http://st.com)

[Go.st.com](http://Go.st.com)

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# WSN - Software and Vertical Applications

## Added value software applications with STM32 Nucleo

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2. Download SW packages
3. Experience with example projects and ST value add Open.MEMS, Open.Audio, Open.RF libraries and vertical applications
4. Get going just in minutes!



Software Package	Description	Nucleo	X-Nucleo	Core Products
<a href="#">X-CUBE-MEMS1</a>	Motion MEMS and environmental sensor software expansion for STM32Cube. <a href="#">Quick start guide</a>	F401RE, L053R8, L152RE, L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL, LSM303AGR, LPS22HB, HTS221
<a href="#">X-CUBE-MEMS-XT1</a>	Driver collection to support through DIL connector H3LIS331DL, HTS221, LIS2DH12, LIS3MDL, LPS22HB, LPS25HB, LSM303AGR, LSM6DS0, LSM6DS3 and LSM6DSL	F401RE, L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">X-NUCLEO-IKS01A1</a>	Multiple
+ <a href="#">osxMotionFX</a> (Open.MEMS)	9 or 6 axis sensor fusion library	F401RE, L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL, LSM303AGR,
+ <a href="#">osxMotionMC</a> (Open.MEMS)	Real-time magnetometer HI/SI calibration library	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM303AGR,
+ <a href="#">osxMotionAC</a> (Open.MEMS)	Real-time accelerometer gain and offset calibration library	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL, LSM303AGR,
+ <a href="#">osxMotionGC</a>	Real-time gyroscope calibration software for STM32Cube	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL,
+ <a href="#">osxMotionCP</a> (Open.MEMS)	Carrying position library for wearable: desk, in the hand, near the head, in a shirt pocket etc	F401RE	<a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DS0/3,
+ <a href="#">osxMotionAR</a> (Open.MEMS)	Activity recognition library for wearables: stationary, walking, fast walking, jogging and biking	F401RE	<a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DS0/3,
+ <a href="#">osxMotionAW</a> (Open.MEMS)	Activity recognition library for wrist devices: stationary, walking, fast walking, jogging and biking	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL, LSM303AGR,
+ <a href="#">osxMotionGR</a> (Open.MEMS)	Gesture recognition library for phones/wearables: wake up, glance and pick up	F401RE L476RG	<a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DS0/3,
+ <a href="#">osxMotionID</a> (Open.MEMS)	Movement intensity/calories measurement library for wearables	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL
+ <a href="#">osxMotionPE</a> (Open.MEMS)	Human pose estimation library for wearable: standing, sitting and lying down	F401RE L476RG	<a href="#">X-NUCLEO-IKS01A2</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DSL
+ <a href="#">osxMotionPM</a> (Open.MEMS)	Pedometer library to calculate steps for wearables	F401RE L476RG	<a href="#">(X-NUCLEO-IKS01A1)</a>	LSM6DS0/3







# WSN - Software and Vertical Applications

## Added value software applications with STM32 Nucleo

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4. Get going just in minutes!



Software Package	Description	Nucleo	X-Nucleo	Core Products
<a href="#">X-CUBE-MEMSMIC1</a>	Digital MEMS <b>microphones acquisition</b> and processing software expansion for STM32Cube. <a href="#">Quick start guide</a>	F401RE, F072RB, L053R8	<a href="#">X-NUCLEO-CCA02M1</a>	MP34DT01-M
<a href="#">+ osxAcousticBF</a> (Open.Audio)	Real-time <b>beam forming</b> software expansion for STM32Cube	F401RE	<a href="#">X-NUCLEO-CCA02M1</a>	MP34DT01-M
<a href="#">+ osxAcousticEC</a> (Open.Audio)	Real-time <b>acoustic echo cancellation</b> software expansion for STM32Cube	F407 Discovery	<a href="#">X-NUCLEO-CCA02M1</a>	MP34DT01-M
<a href="#">+ osxAcousticSL</a> (Open.Audio)	Real-time <b>sound source localization</b> software expansion for STM32Cube	F401RE	<a href="#">X-NUCLEO-CCA02M1</a>	MP34DT01-M
<a href="#">SmartAcoustic1</a>	Smart audio IN-OUT software includes middleware for audio DSP to perform <b>acoustic beam forming, echo cancellation, and source localization</b> .	F446RE	<a href="#">X-NUCLEO-CCA01M1</a> <a href="#">X-NUCLEO-CCA02M1</a>	STA350BW, MP34DT01-M
<a href="#">X-CUBE-6180XA1</a>	<b>Proximity</b> , gesture, ambient light sensor software expansion for STM32Cube	F401RE, L053R8	<a href="#">X-NUCLEO-6180XA1</a>	VL6180X
<a href="#">X-CUBE-53L0A1</a>	Long <b>2m range proximity</b> sensor software expansion for STM32Cube	F401RE, L476RG	<a href="#">X-NUCLEO-53L0A1</a>	VL53L0
<a href="#">X-CUBE-ANALOG1</a>	<b>Multifunctional</b> expansion board based on <b>operational amplifiers</b> . <a href="#">Quick start guide</a>	F401RE, F103RB, L053R8	<a href="#">X-NUCLEO-IKA01A1</a>	TSZ124, TSV734, TSU104







# WSN - Software and Vertical Applications

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Software Package	Description	Nucleo	X-Nucleo	Core Products
<a href="#">X-CUBE-BLE1</a> <a href="#">STSW-BLUENRG-DK</a>	BlueNRG expansion software for STM32Cube. Allow to easily prototype and build a BLE application. <a href="#">Quick start guide</a>	F401RE, F411RE, L476RG, L053R8	<a href="#">X-NUCLEO-IDB04A1</a> <a href="#">X-NUCLEO-IDS01A5</a>	BlueNRG-MS, SPBTLE-RF
<a href="#">+ OSXSmartConnPS</a> (Open.RF)	Bluetooth low energy profiles for the X-CUBE-BLE1 expansion for STM32Cube	F401RE, L053R8	<a href="#">X-NUCLEO-IDB04A1</a> <a href="#">X-NUCLEO-IDS01A5</a>	BlueNRG-MS, SPBTLE-RF
<a href="#">X-CUBE-SUBG1</a>	Spriti1 Sub-GHz RF communication software expansion for STM32Cube. <a href="#">Quick start guide</a>	F401RE, L053R8	<a href="#">X-NUCLEO-IDS01A4</a> <a href="#">X-NUCLEO-IDS01A5</a>	SPSGRF-868, SPSGRF-915, SPIRIT1
<a href="#">+ osxContiki6LP</a> (Open.RF)	Contiki 6LoWPAN on STM32 Nucleo plugged with Sub-1 GHz RF expansion board	L152RE	<a href="#">X-NUCLEO-IDS01A4</a> / <a href="#">X-NUCLEO-IDS01A5</a> <a href="#">X-NUCLEO-IKS01A1</a>	SPSGRF-868, SPSGRF-915, SPIRIT1 HTS221
<a href="#">STSW-S2LP-DK</a>	S2-LP Sub-GHz evaluation software package based on Nucleo platform	L152RE Included	<a href="#">(STEVAL-FKI433V1)</a> <a href="#">(STEVAL-FKI868V1)</a>	S2-LP
<a href="#">STSW-S2LP-SFX-DK</a>	S2-LP evaluation software package for SigFox networking running on Nucleo platform	L152RE Included	<a href="#">(STEVAL-FKI868V1)</a> <a href="#">(STEVAL-FKI915V1)</a>	S2-LP
<a href="#">I-CUBE-LRWAN1</a>	LORA networking stack running on Nucleo platform	STM32L0 Included	<a href="#">(P-NUCLEO-LRWAN1)</a>	STM32L0
<a href="#">X-CUBE-WIFI1</a>	Wi-Fi expansion board based on SPWF01SA / SPWF04SA module for STM32 Nucleo. <a href="#">Quick start guide</a> <a href="#">STSW-WIFI004</a> Firmware @ SPWF04Sx	F401RE, F103RB, L053R8	<a href="#">X-NUCLEO-IDW01M1</a> <a href="#">X-NUCLEO-IDW04A1</a>	SPWF01SA, SPWF04SA
<a href="#">FP-NET-BLESTAR1</a>	Application-layer bridging between a BLE network and a Wi-Fi network. Sensor data from a device in the BLE network can be transparently sent to the IBM Watson IoT cloud platform and visualized on a client connected to the cloud. <a href="#">Quick start guide</a>	F401RE	<a href="#">X-NUCLEO-IDB05A1</a> <a href="#">X-NUCLEO-IDW01M1</a> <a href="#">(X-NUCLEO-IKS01A1)</a>	BlueNRG-MS, SPBTLE-RF, SPWF01SA
<a href="#">X-CUBE-NFC1</a>	Complete middleware to build applications using M24SR dynamic NFC tag	L0, L1, F0, F3, F4	<a href="#">X-NUCLEO-NFC01A1</a>	M24SR





# WSN - Software and Vertical Applications

Added value software applications with STM32 Nucleo

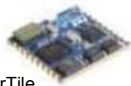
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### Other Nucleo SW available through ST sales & marketing

- Exact Angle/Tilt measurement with accelerometer
- Differential air pressure change notifications/alerts with pressure sensor
- 6-axis Accelerometer + Gyroscope LSM6DSL Sensor Hub examples with LIS2MDL magnetometer



SensorTile  
STEVAL-STLKT01V1



	Software Package	Description	Nucleo	X-Nucleo	Core Products
Vertical	<a href="#">BLUEMICROSYSTEM1</a> (Open.Framework)	Bluetooth low energy and sensors software expansion for STM32Cube running real-time <b>motion sensor data fusion and transmitting sensor data to a smartphone (Android or iOS based) via Bluetooth</b>	F401RE, L476RG, STEVAL-STLKT01V1	<a href="#">X-NUCLEO-IDB04A1</a> / <a href="#">X-NUCLEO-IDB01A5</a> / <a href="#">X-NUCLEO-IKS01A2</a> / <a href="#">X-NUCLEO-IKS01A1</a>	BlueNRG-MS SPBRLE-RF LSM6DSL, LSM303AGR, LPS22HB, HTS221
Vertical	<a href="#">BLUEMICROSYSTEM2</a> (Open.Framework)	Software lets you read and display real-time environmental <b>sensor data, digital microphone levels, battery level</b> (STEVAL-STLKT01V1 only), <b>voice communication over Bluetooth low energy</b> and <b>acoustic source localization</b> information with a dedicated BlueMS App for Android/iOS.	F401RE, L476RG, STEVAL-STLKT01V1	<a href="#">X-NUCLEO-CCA02M1</a> / <a href="#">X-NUCLEO-IKS01A2</a> / <a href="#">X-NUCLEO-IKS01A1</a> / <a href="#">X-NUCLEO-IDB01A5</a> / <a href="#">X-NUCLEO-IDB04A1</a>	MP34DT01-M, LSM6DSL, LSM303AGR, LPS22HB, HTS221 BlueNRG-MS SPBRLE-RF
Vertical	<a href="#">BLUEMICROSYSTEM3</a> (Open.Framework)	Software recognize the Bluetooth Low Energy, Dynamic NFC tag, <b>sensor devices</b> and <b>proximity and ambient light sensing</b> module. It uses the <b>NDEF</b> standard for writing the information for establishing a simple and <b>secure Bluetooth pairing</b> by storing the necessary information on the NFC tag.	F401RE, L476RG	<a href="#">X-NUCLEO-NFC01A1</a> / <a href="#">X-NUCLEO-6180XA1</a> / <a href="#">X-NUCLEO-IDB04A1</a> / <a href="#">X-NUCLEO-IDS01A5</a> / <a href="#">X-NUCLEO-IKS01A1</a>	M24SR, VL6180X, BlueNRG-MS SPBRLE-RF LSM6DS0, LSM6DS3, LIS3MDL, LPS25HB, HTS221
Vertical	<a href="#">FP-CLD-WATSON1</a>	Connecting sensors to <b>IBM Watson IoT Cloud</b> . Including special middleware for <b>MQTT</b> cloud communication and FFT vibration analysis for <b>Condition Monitoring/Preventive Maintenance</b> with accelerometer	F401RE	<a href="#">X-NUCLEO-IDW01M1</a> / <a href="#">X-NUCLEO-NFC01A1</a> / <a href="#">X-NUCLEO-IKS01A2</a> / <a href="#">X-NUCLEO-IKS01A1</a>	SPW01SA, M24SR LSM6DSL, LSM303AGR, LPS22HB, HTS221
Vertical	<a href="#">FP-CLD-AZURE1</a>	Connecting sensors to <b>Microsoft Azure IoT Cloud</b> . Running on FreeRTOS and using HTTP communication for bi-directional communication with the sensors.	F401RE	<a href="#">X-NUCLEO-IDW01M1</a> / <a href="#">X-NUCLEO-NFC01A1</a> / <a href="#">X-NUCLEO-IKS01A2</a> / <a href="#">X-NUCLEO-IKS01A1</a>	SPW01SA, M24SR LSM6DSL, LSM303AGR, LPS22HB, HTS221



# STEVAL-STLKT01V1

## SensorTile + Eval kit

STEVAL-STLCS01V1



13.5 x 13.5 mm



Miniaturized Tile that can be **soldered** or **plugged** on a host board

### Key products on board

**LSM6DSM:** MEMS 3D accelerometer ( $\pm 2/\pm 4/\pm 8/\pm 16$  g) + 3D gyroscope ( $\pm 245/\pm 500/\pm 2000$  dps) with OIS

**LSM303AGR:** MEMS 3D magnetometer ( $\pm 50$  gauss) + 3D accelerometer ( $\pm 2/\pm 4/\pm 8$  g /  $\pm 16$  g)

**LPS22HB:** MEMS pressure sensor, 260-1260 hPa absolute digital output barometer

**BLUENRG-MS:** BLE Network processor

**BALF-NRG-01D3 :** 50 Ohm / Conjugate match to BlueNRG Balun

**MP34DT04 :** Digital MEMS microphone

**STM32L476 :** Microcontroller

**100 mAh Li-Ion battery included**



OSX  
oper software

open.AUDIO

open.MEMS

open.RF

Latest info available at  
[STEVAL-STLKT01V1](#)

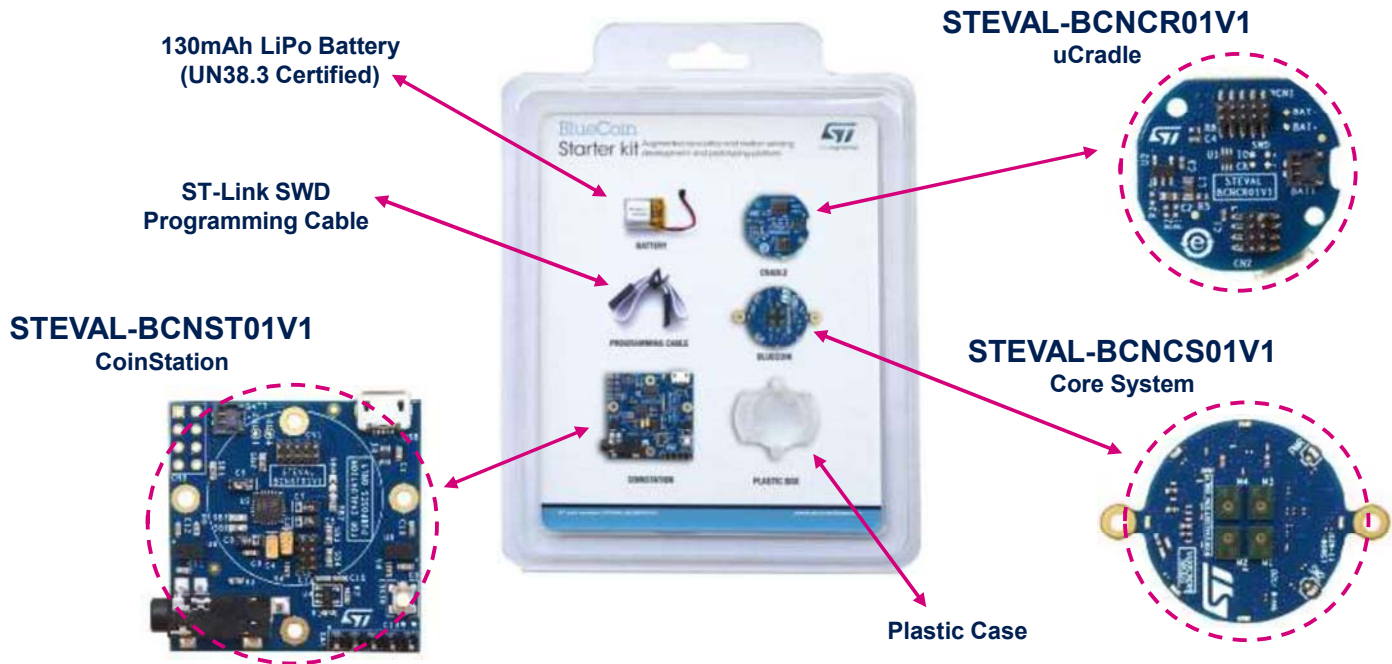
Order code: **STEVAL-STLKT01V1**  
Module only: **STEVAL-CS02V1** (available in Q2)



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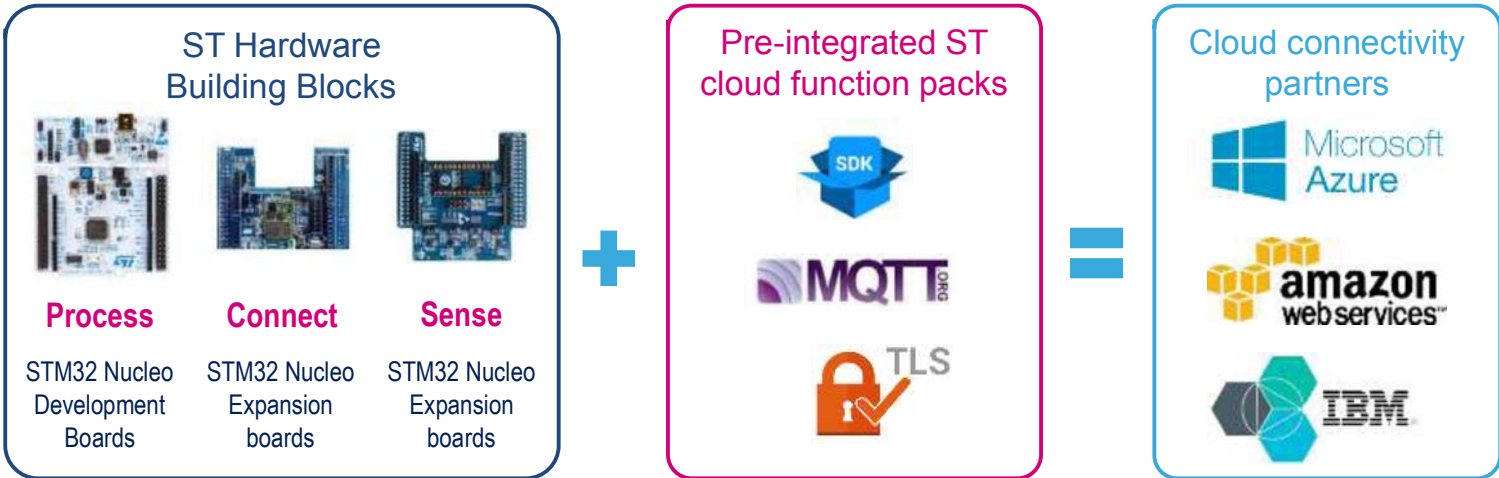


# STEVAL-BCNKT01V1 BlueCoin Starter Kit



# Cloud Connectivity Out of the Box












Rapid prototyping of **sensor-to-cloud** solutions

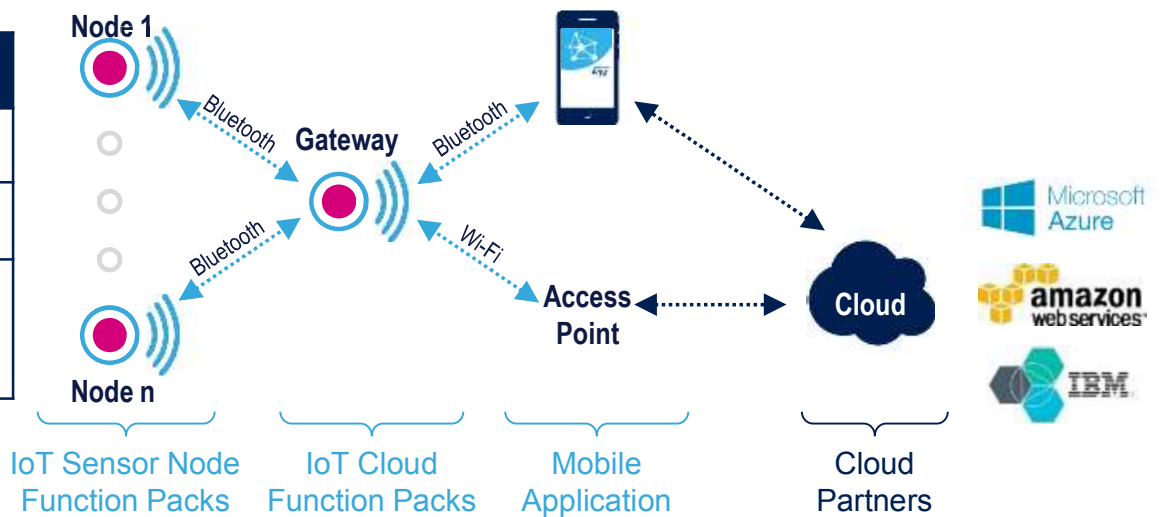


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# Cloud Connectivity Out of the Box

STM32 ODE Function Packs to access multiple cloud IoT suppliers

Network	Functionality
Gateway	 
	  
Nodes	   
	 



Life Augmented

# LoRa<sup>®</sup> Technology Powered by STM32



The broadest ecosystem ever available now!

Best-in-class in ultra low power  
and long range

Broadest hardware & software  
ecosystem

Easy to use

LoRa<sup>®</sup> Gateway STM32F7 based



LPWAN  
Discovery kit



LoRa<sup>®</sup> + Sensor  
expansion board



LoRa<sup>®</sup>  
Nucleo Pack



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# Secure Sigfox Ready™ Connectivity



Ultra-low-power Sensor-to-Cloud Connectivity out-of-the-box

**S2-LP**  
Ultra-low power, high performance  
Sub-1GHz RF transceiver

**STSAFE-A1SX**  
Plug and play certified security  
HW CC EAL5+

**STM32L**  
Ultra-low-power MCU portfolio



**S2-LP evaluation Kit**  
SIGFOX End Product certified



**STSAFE-A1SX evaluation Kit**  
Security for Sigfox Ready™



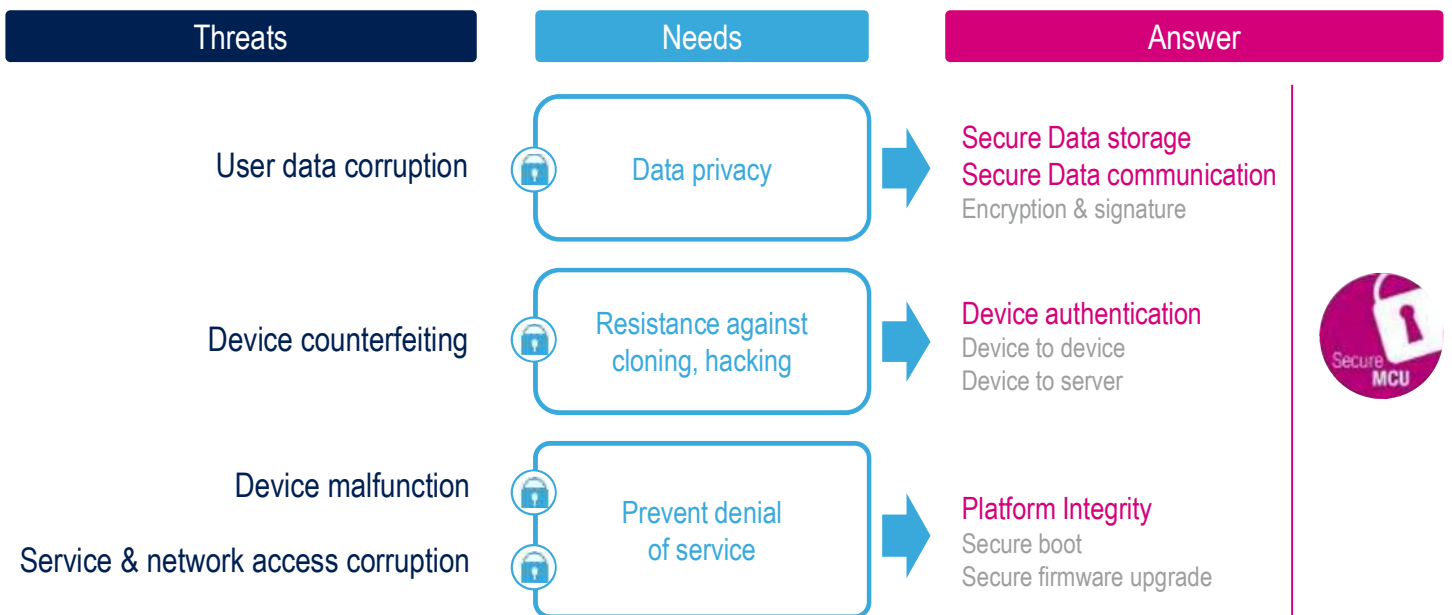
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# Securing IoT devices with STSAFE

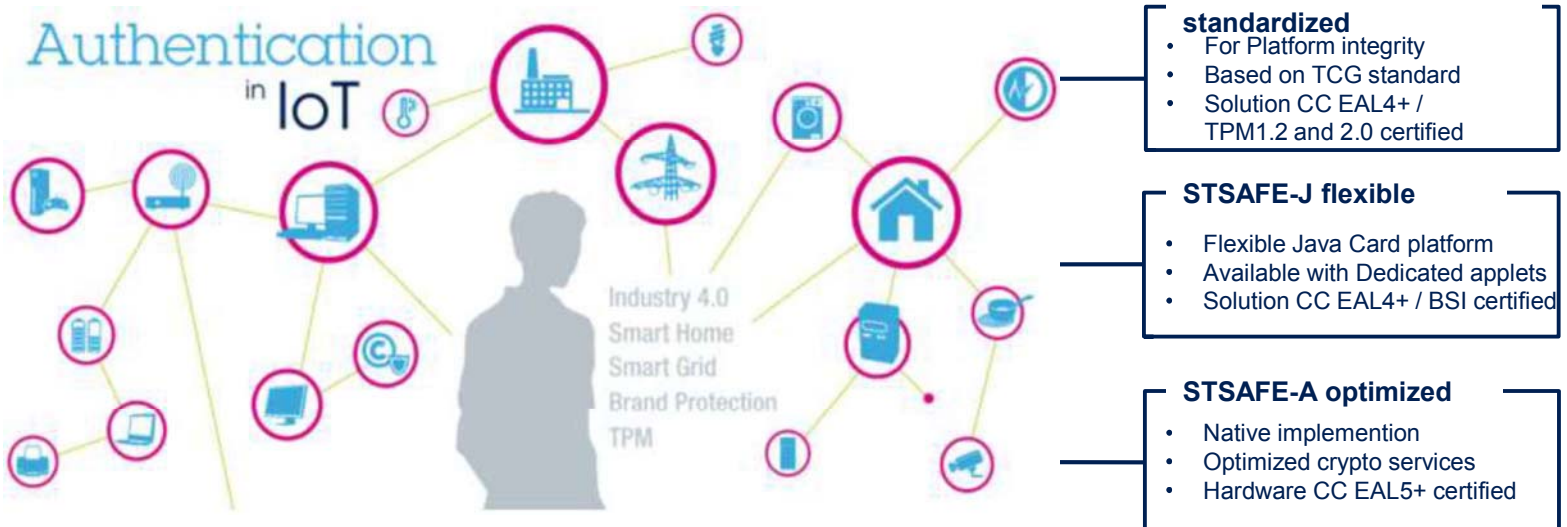


# Internet of Things - Threats and Needs



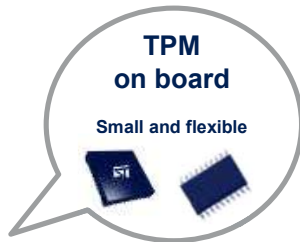
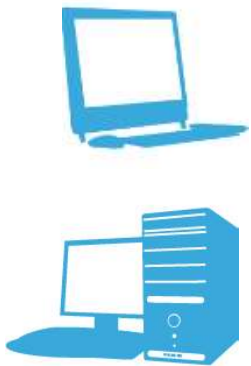
# STSAFE Family Range Overview

27



# STSAFE-TPM: Solution overview

## Trusted Platform Module solution for platform integrity



TPM 1.2 & 2.0  
Trust Computing Group  
certified



Platform integrity

Secure Boot

Secure Firmware upgrade

Secure Data storage & Secure communication

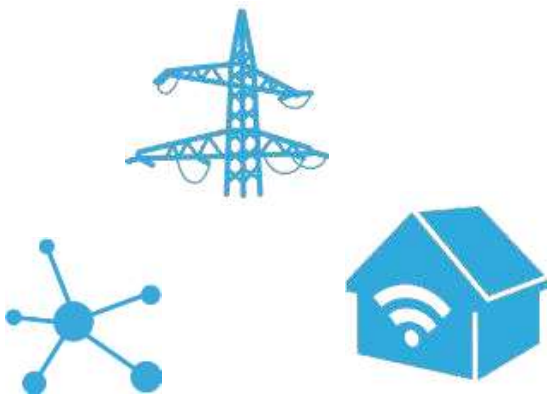
Trusted network access with Authentication



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# STSAFE-J: Solution Overview

## Flexible Java Card platform for Gateways



Solution  
Common Criteria EAL4+  
and BSI certified

Flexible Java Solution with dedicated applets

Secure Data storage & Secure communication

Trusted network access with Authentication

Personalization services

Ecosystem with expansion boards and middleware

# STSAFE-A100: Solution Overview

Highly secure & cost optimized solution for connected devices



EAL5+ Common Criteria certified chip

Authentication

Secure data communication

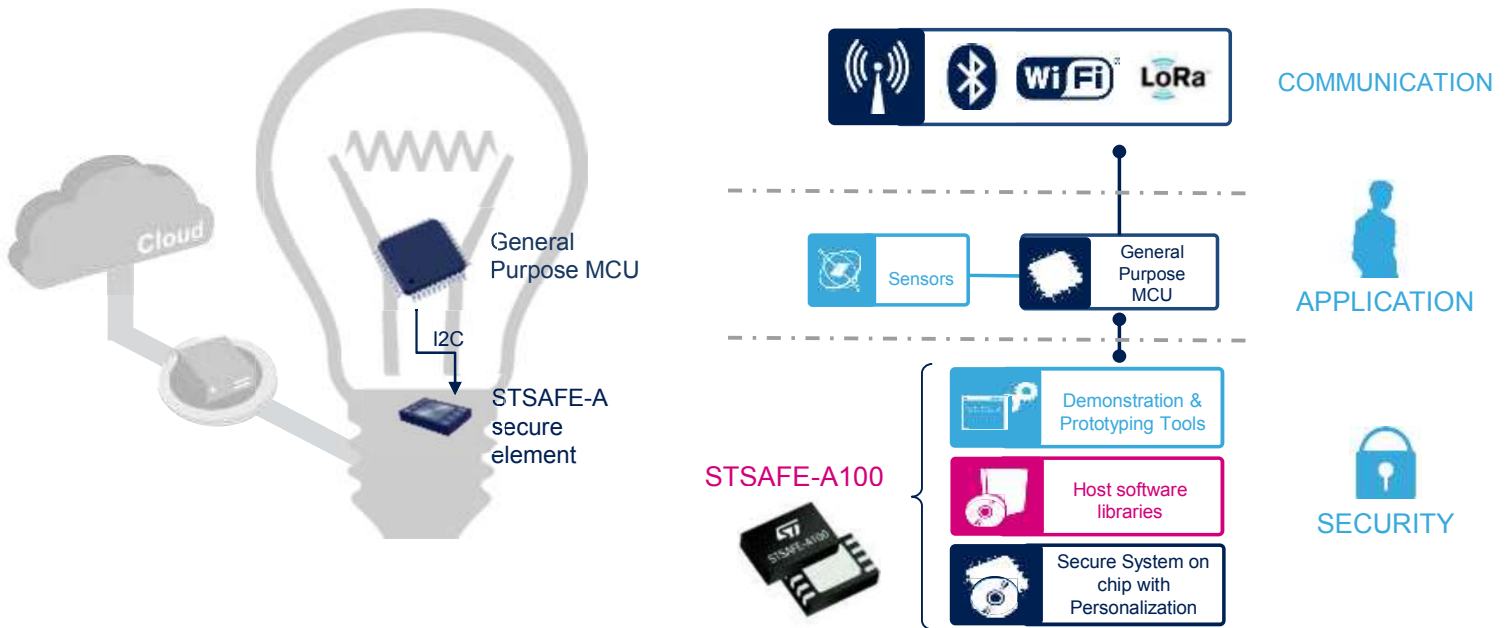
Secure Firmware upgrade

Secure key provisioning service

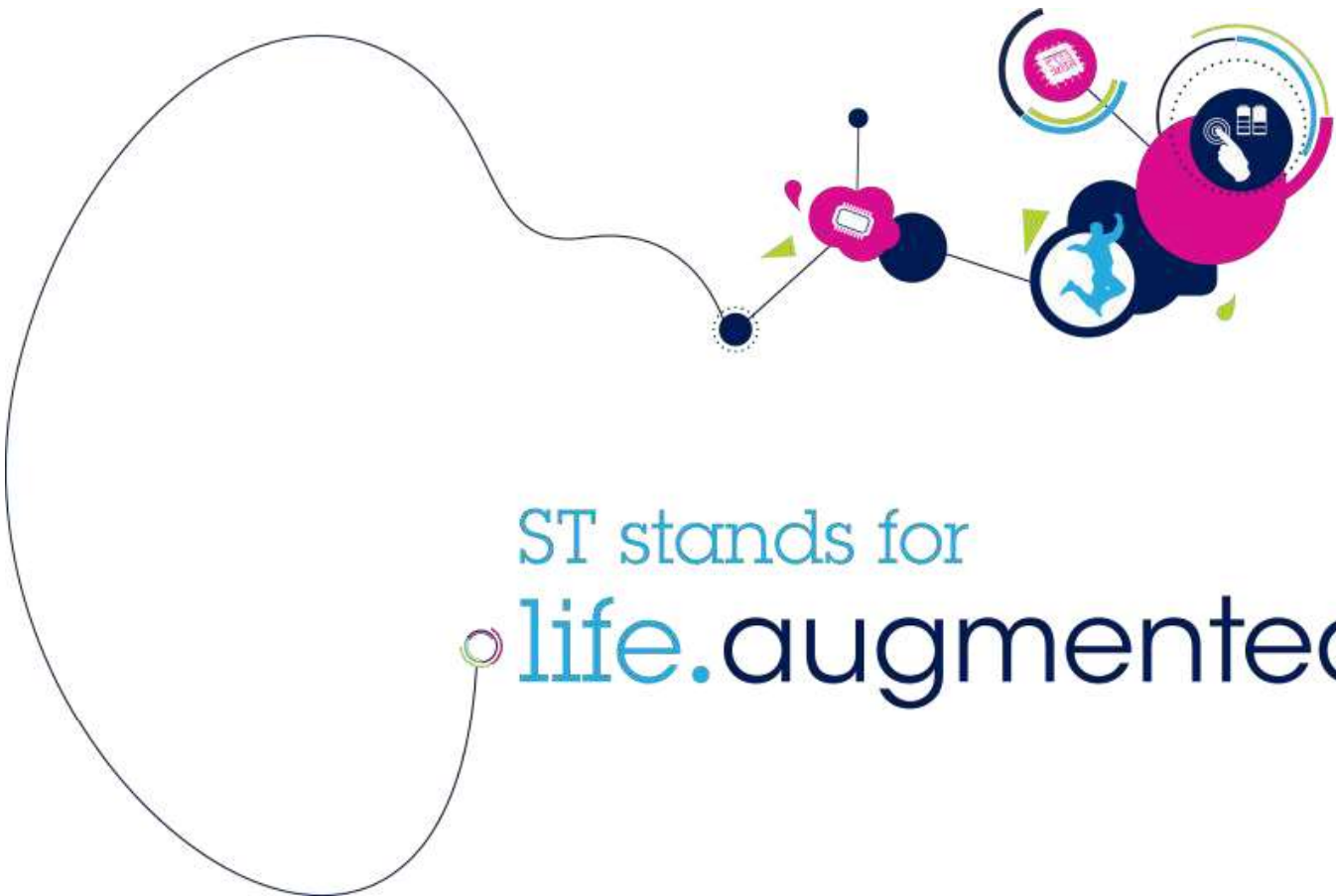
Seamless integration with GP MCU

# STSAFE-A100: Companion Secure Element

Enabling easy of use security services for IoT developers



Thank You



ST stands for  
**life.augmented**