INDUSTRIAL SUMMIT 2024
POWERING YOUR SUSTAINABLE INNOVATION

ST Wireless in industrial applications

Gang WU

Agenda

1 ST wireless
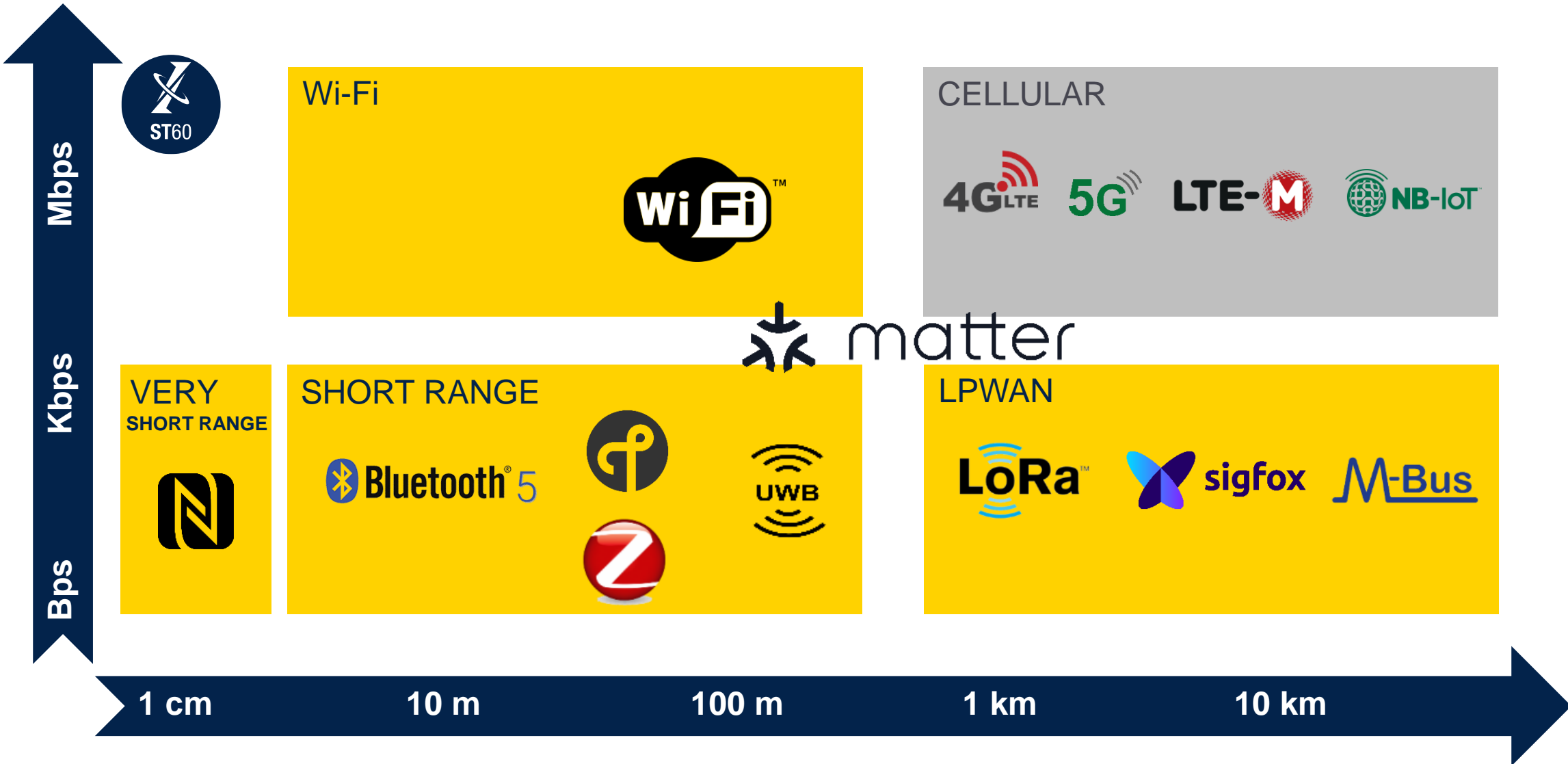
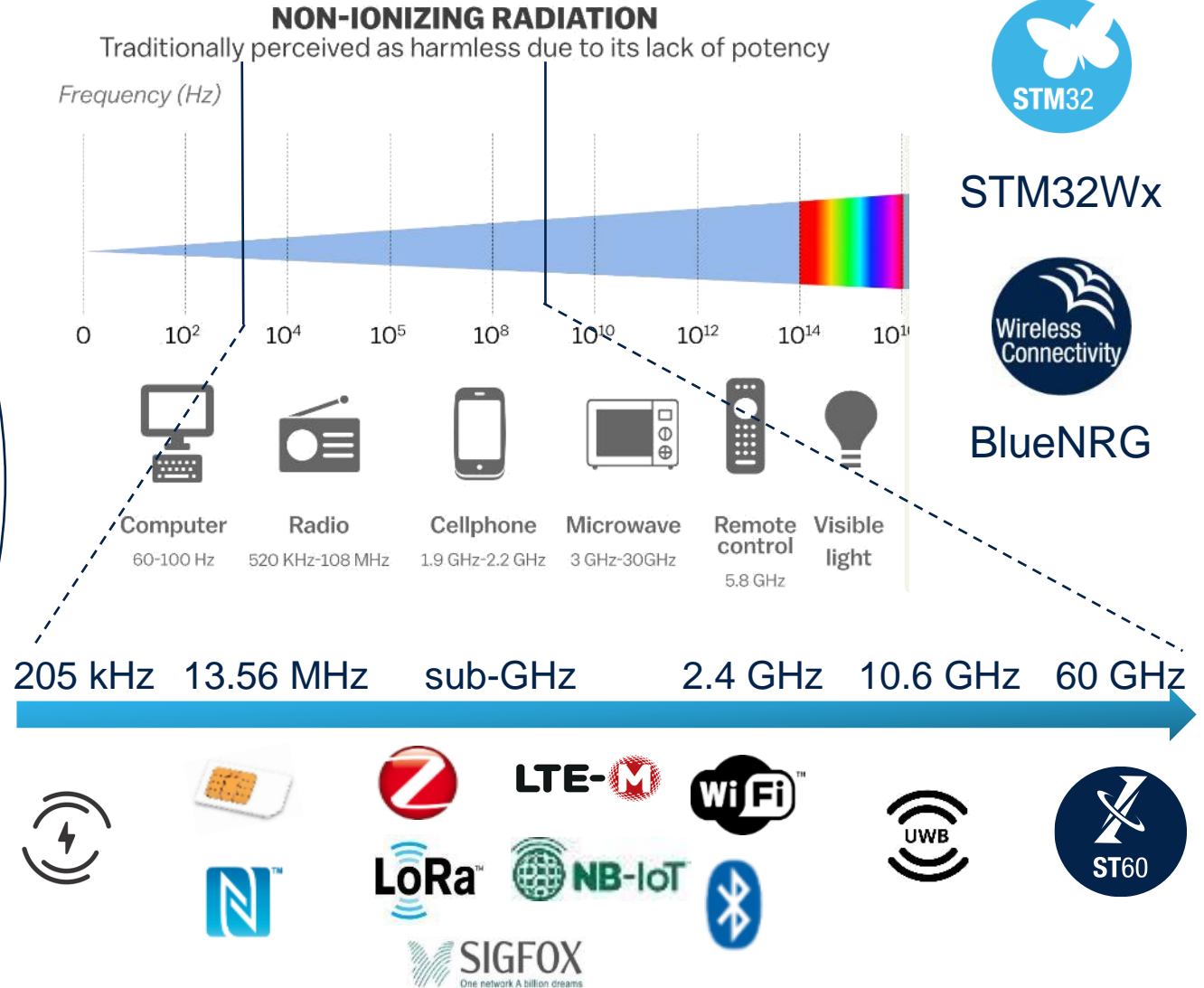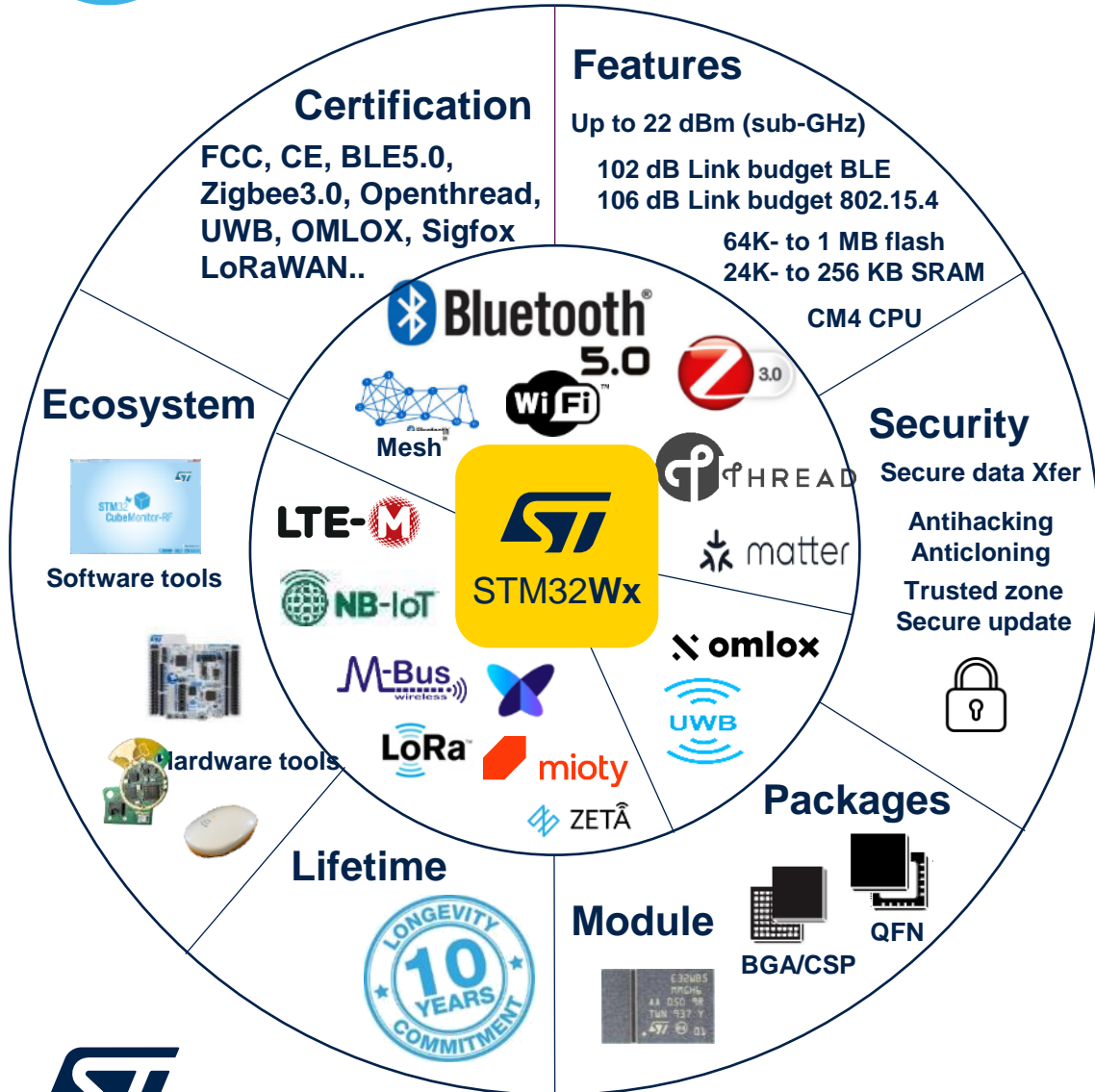**2** Smart industrial applications

ST Wireless

Communication technologies overview

Wi-Fi

CELLULAR

VERY SHORT RANGE

SHORT RANGE

LPWAN

matter

1 cm   10 m   100 m   1 km   10 km

Mbps   Kbps   Bps

STM32 wireless offer

Certification
FCC, CE, BLE5.0, Zigbee3.0, Openthread, UWB, OMLOX, Sigfox LoRaWAN..

Features
Up to 22 dBm (sub-GHz)

102 dB Link budget BLE
106 dB Link budget 802.15.4

64K- to 1 MB flash
24K- to 256 KB SRAM

CM4 CPU

Ecosystem
Software tools

Hardware tools

Security
Secure data Xfer

Antihacking
Anticloning

Trusted zone
Secure update

Lifetime
LONGEVITY 10 YEARS COMMITMENT

Module

Packages
QFN

BGA/CSP

Bluetooth® 5.0
WiFi
Mesh
Zigbee 3.0
THREAD
matter
LTE-M
NB-IoT
M-Bus wireless
LoRa
mioty
ZETA
omlox
UWB

STM32Wx

NON-IONIZING RADIATION
Traditionally perceived as harmless due to its lack of potency

Frequency (Hz)

0 10^2 10^4 10^5 10^8 10^{10} 10^{12} 10^{14} 10^{16}

Computer	Radio	Cellphone	Microwave	Remote control	Visible light
60-100 Hz	520 KHz-108 MHz	1.9 GHz-2.2 GHz	3 GHz-30GHz	5.8 GHz	

STM32Wx

Wireless Connectivity

BlueNRG

205 kHz   13.56 MHz   sub-GHz   2.4 GHz   10.6 GHz   60 GHz

NFC
Zigbee
LTE-M
WiFi
LoRa
NB-IoT
Bluetooth
SIGFOX
One network A billion dreams
UWB
ST60

sub-GHz takes Industrial IoT a step further

Consumer IoT
Rely on Bluetooth® Low Energy, Wi-Fi, and 4G/5G

Industrial IoT
Extend the range of connected objects with sub-GHz

Services
- Health tracking
- Food lifestyle
- Weight control
- Firmware update …

Wi-Fi *

3G/4G
Wi-Fi *

Bluetooth® Low Energy

53.2

Network server

Ethernet

Application server
Admin control

3G/4G
Ethernet

Gateway

LoRa

11:03

11:03
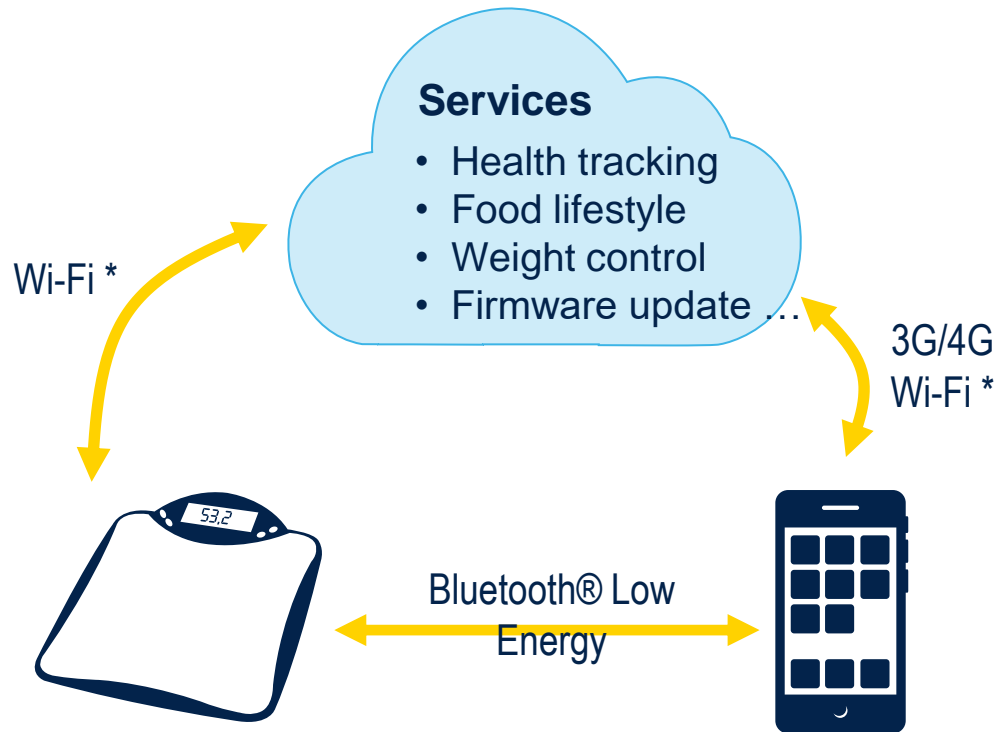
* Wi-Fi to Cloud connection via a Gateway
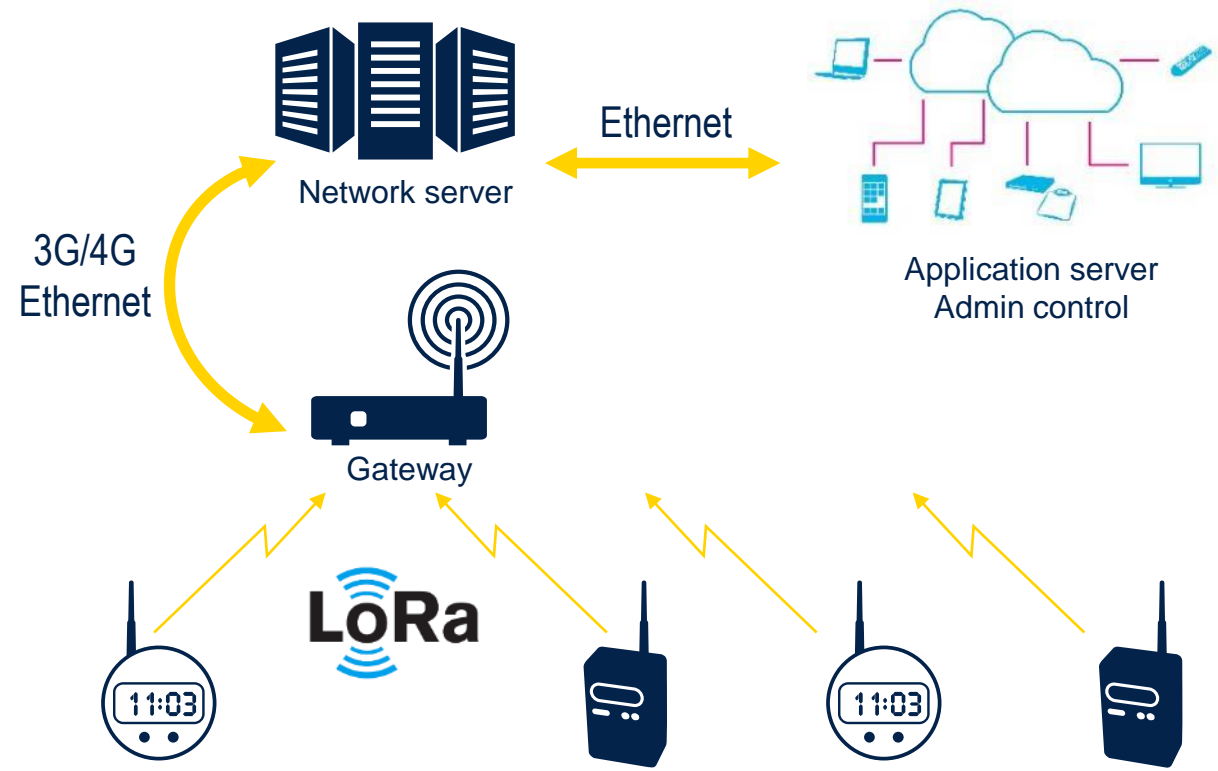
STM32 sub-GHz product families

sub-GHz MCU dual core			STM32WL55
sub-GHz MCU single core		STM32WL3x (*)	STM32WLE5
sub-GHz transceiver	1st generation **SPIRIT1**	2nd generation **S2-LP**	
	General-purpose sub-GHz radio	Ultra-low-power sub-GHz radio	

Supported modulation	2 (G)FSK	2/4 (G)FSK	2 (G)FSK
	(G)MSK	(G)MSK	(G)MSK
	-	BPSK (Sigfox)	BPSK (Sigfox)
	OOK	OOK	-
	ASK	ASK	-
	-	DSSS + IQ I/F (STM32WL3 only)	LoRa ®

Supported protocols

SPIRIT1: M-Bus wireless, 6LoWPAN

S2-LP: M-Bus wireless, 6LoWPAN, KNX, sigfox, Wi-SUN, mioty

STM32WLE5: M-Bus wireless, 6LoWPAN, KNX, sigfox, Wi-SUN, mioty, LoRaWAN

A Sub-1GHz wireless MCU supporting long range wireless protocols

Single silicon die

Best-in-class ultra-low-power MCU

Multiprotocol radio

STM32L4

+

LoRa®

(G)FSK
(G)MSK
BPSK

+

Arm Cortex®-M0+

Built-in security features

=

STM32**WL**

LoRaWAN

sigfox

mioty

M-Bus wireless

ZETA

Proprietary

8
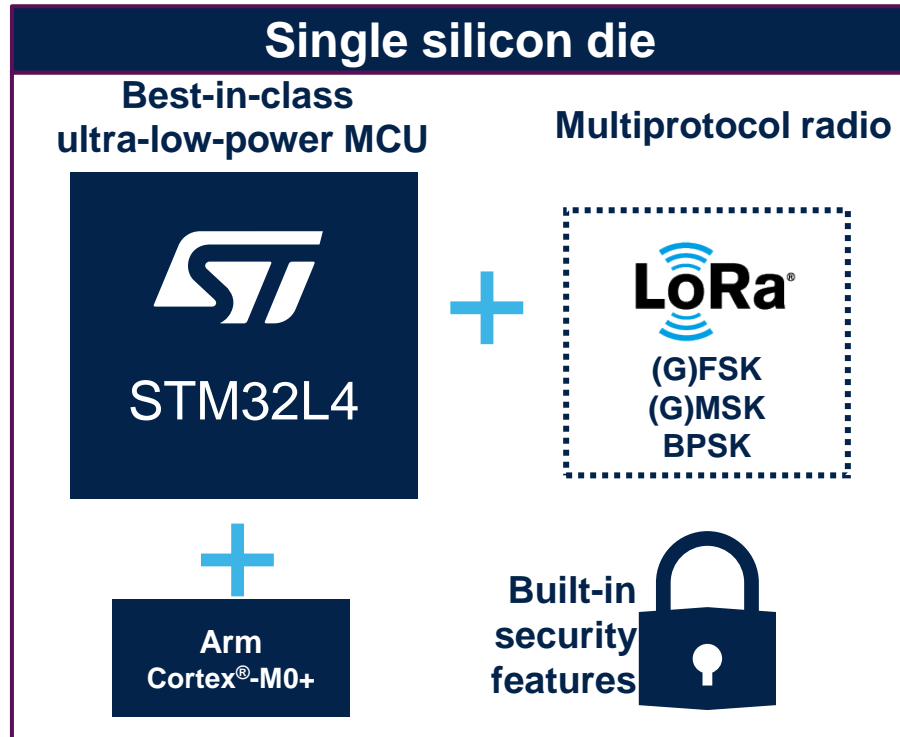
Small form factor, reduced BOM, simple PCB design

Single silicon die

STM32 MCU
Cortex®-M0+

+

Multi-modulation radio

Dedicated Wake-up on radio

Sensing peripherals

Segment LCD driver

STM32WL3

sub-GHz proprietary

sigfox

mioty

M-Bus wireless

LoWPAN

Wi-SUN

KNX RF
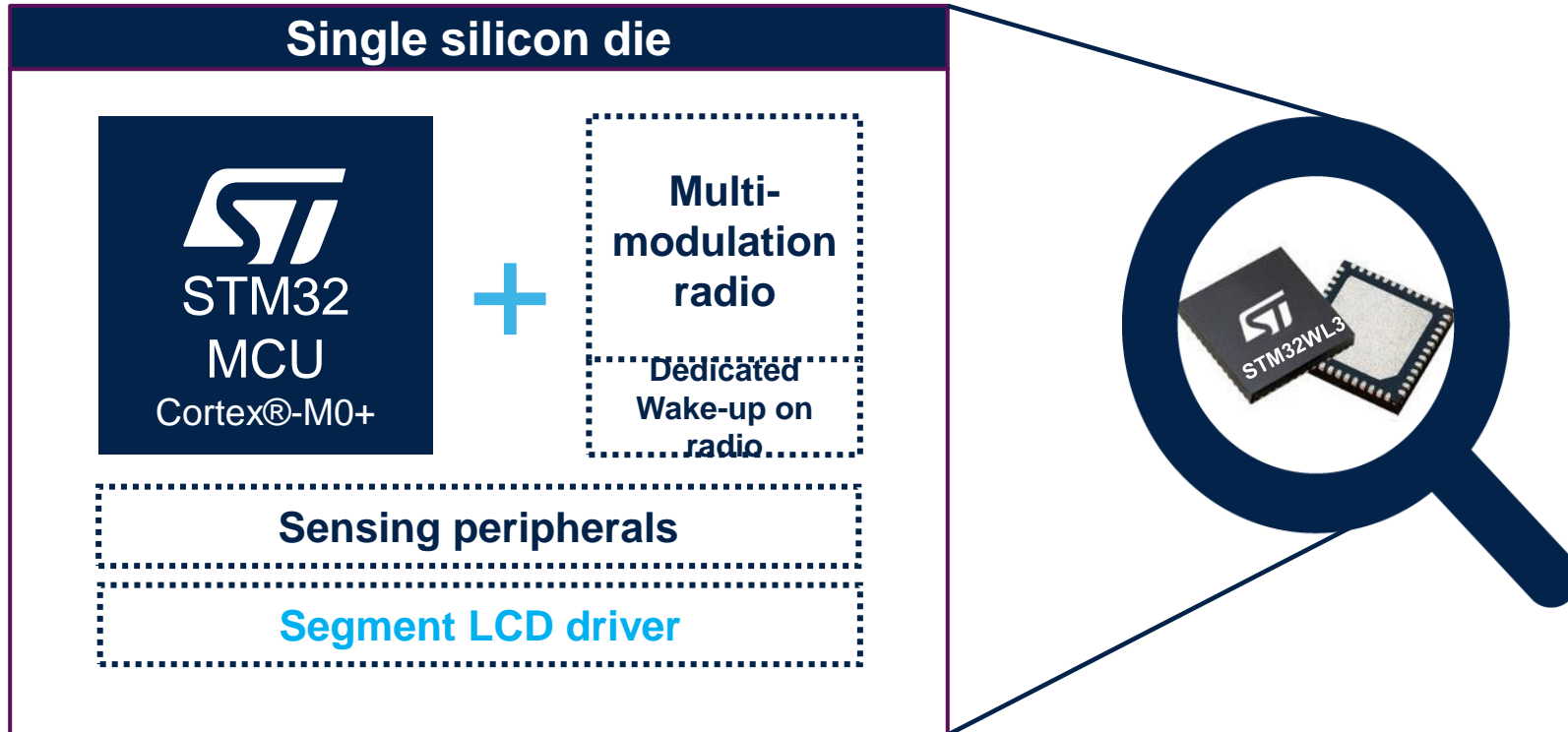
802.15.4g

PLC-RF Hybrid

A wide 2.4 GHz portfolio

5.4 & Mesh

STM32WBx

STM32WB55	STM32WB35	STM32WB15
	STM32WB50	STM32WB30	STM32WB10

- **Dual core** & security (Arm® Cortex® M4 / M0+)
- Up to 1 Mbytes flash/ 256 Kbytes RAM
- Bluetooth® Low Energy 5.4 & Mesh, 2 Mbps,
- **Zigbee R22** & Thread, proprietary, Matter

STM32WBAX NEW

STM32WBA52	STM32WBA54/55

- **Arm® Cortex® -M33** w/ **TrustZone®** @100MHz
- 1 Mbyte flash / 128 Kbytes RAM
- Up to +10 dBm output power; LDO/SMPS
- Bluetooth® Low Energy 5.4 (long-range, **Zigbee R22/R23** & Thread, proprietary, 2 Mbps, adverting extension)
- SESIP Level 3

  *Matter Thread RCP mode only

BlueNRG System-on-Chip

5.4

BlueNRG-1	**BlueNRG-2**

- Arm Cortex®-M0
- 160 Kbytes flash/ 24 Kbytes RAM
- Bluetooth® Low Energy 5.2

- Arm Cortex®-M0
- 256 Kbytes flash/ 24 Kbytes RAM
- Bluetooth® Low Energy 5.2

STM32WB0 series NEW

STM32WB06/07	STM32WB05	**STM32WB09**

- Arm Cortex®-M0+
- **256 Kbytes** flash/ **64 Kbytes** RAM
- Bluetooth® Low Energy 5.4, long-range, 2 Mbps, advertising Ext

- Arm Cortex®-M0+
- **192 Kbytes** flash memory / **24 Kbytes** RAM
- Bluetooth® Low Energy 5.4 (Long-range, 2 Mbps, adverting extension, AoA/AoD)

- Arm® Cortex® -M0+ at 64 MHz
- **512 Kbytes** of flash memory / **64 Kbytes** of RAM
- Bluetooth® Low Energy 5.4 (long range, 2 Mbps, advertising ext, **AoA/AoD, isochronous channel**)
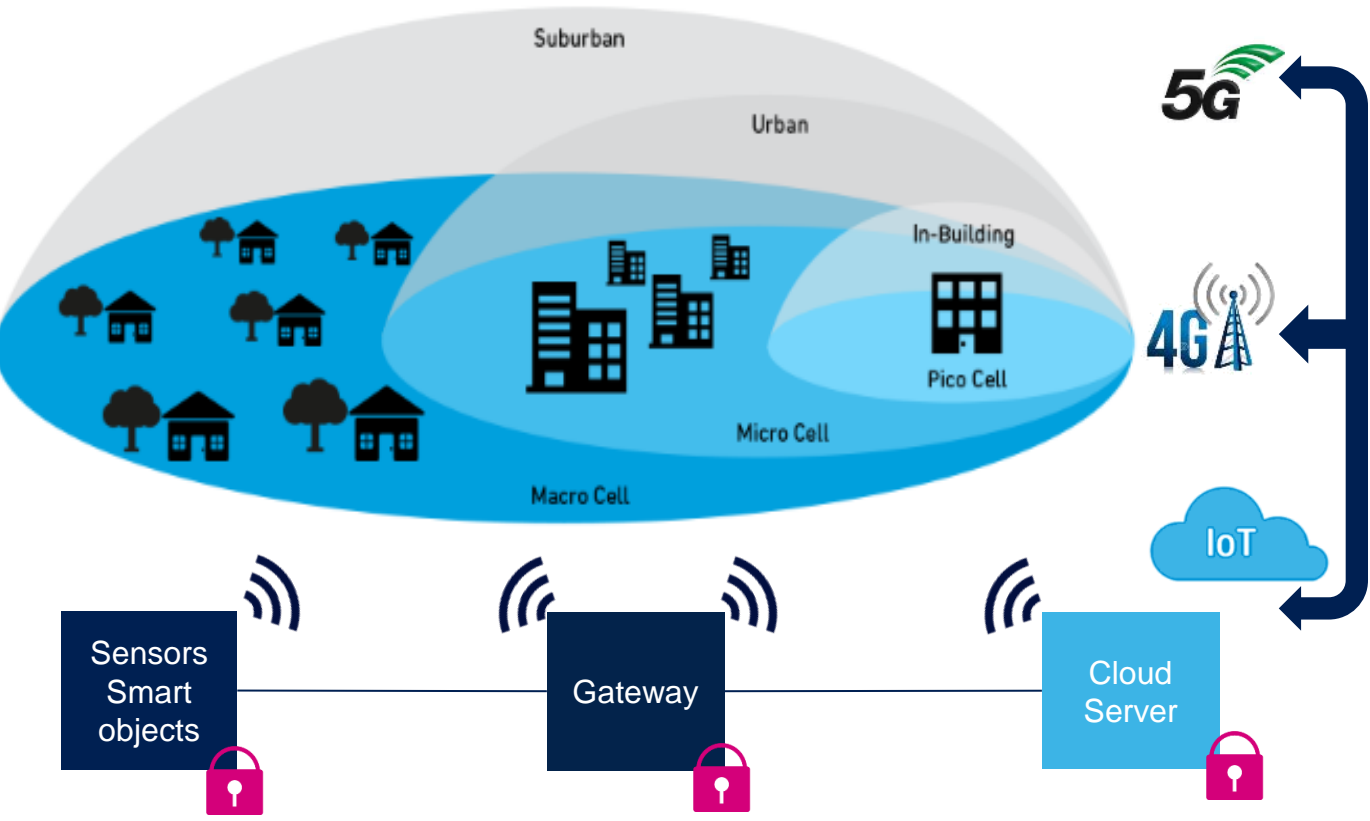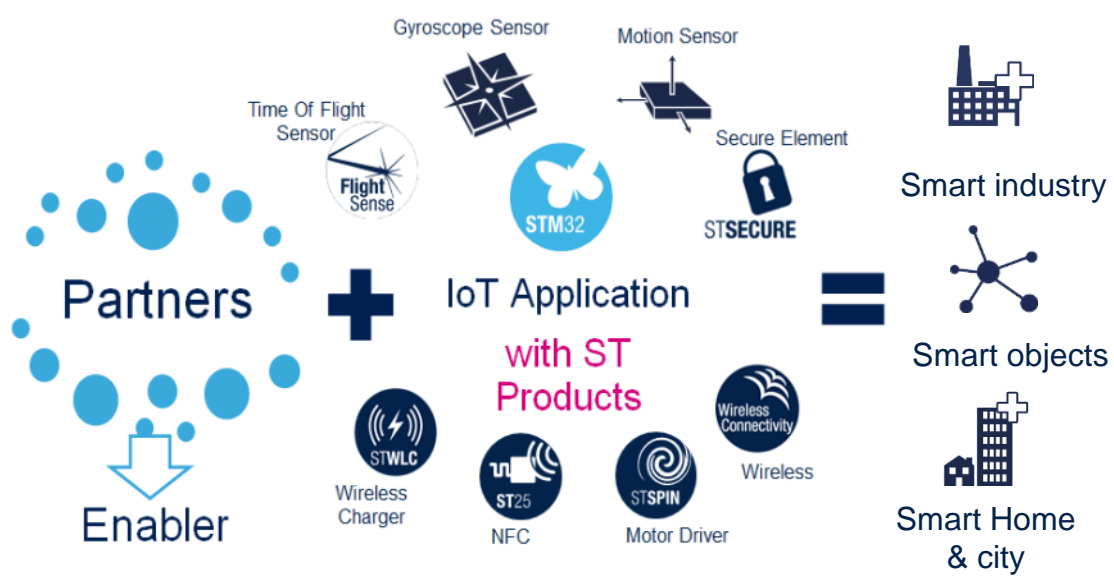- Up to **+8 dBm** of output power

Module available

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Smart Industrial Applications

IoT system solutions

Suburban
Urban
In-Building
Pico Cell
Micro Cell
Macro Cell

5G
4G
IoT

Sensors Smart objects
Gateway
Cloud Server

Partners + IoT Application with ST Products = Smart industry / Smart objects / Smart Home & city
Enabler

Time Of Flight Sensor — Flight Sense
Gyroscope Sensor
Motion Sensor
Secure Element — STSECURE
STM32
Wireless Charger — STWLC
NFC — ST25
Motor Driver — STSPIN
Wireless Connectivity — Wireless

End-to-end solutions to ensure network security & trusted systems

With a rich product portfolio, ST can provide a complete IoT system solution.

Condition monitoring with STEVAL-PROTEUS1

Zigbee to make different nodes communicate within the same ecosystem, thanks to the strength of its mesh network

Gateway

Cloud

IoT Central

Advertising

Settings

Monitoring

Alerting

Connection

Bluetooth to allow a direct connection with a smartphone and thus facilitate its **configuration**, local **monitoring equipment status** and firmware upgrade over the air (**FUOTA**)
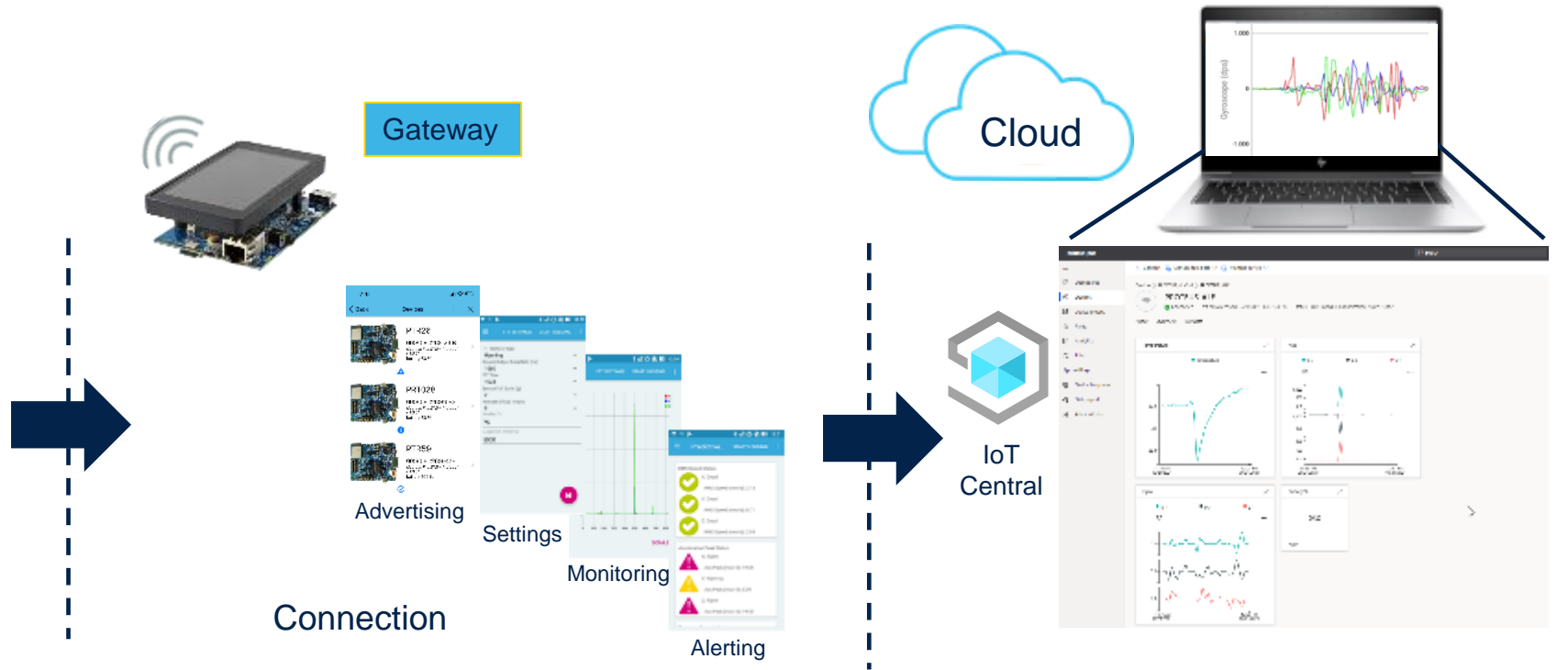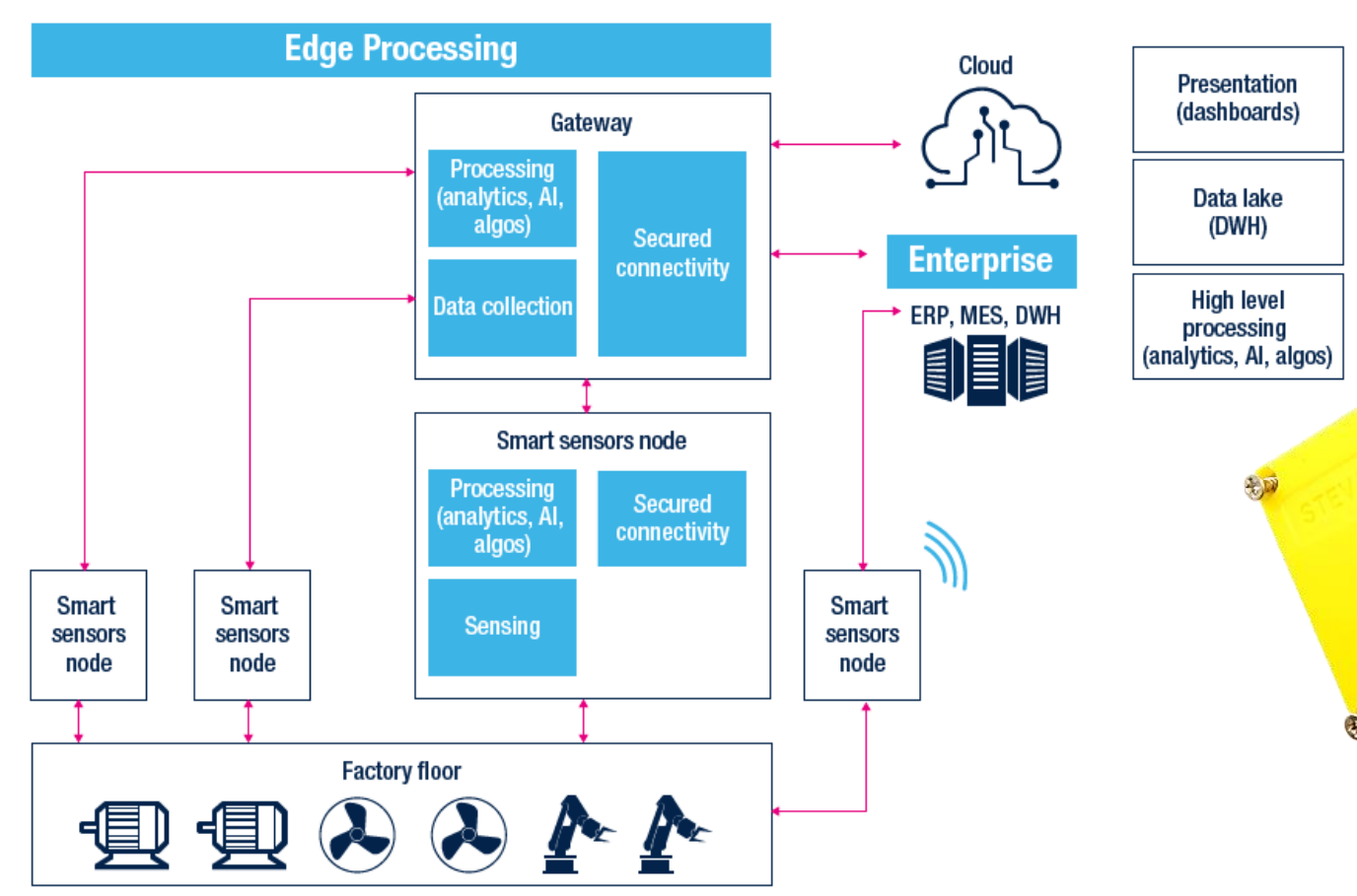
Thanks to **embedded preprocessing** only meaningful **KPI** are sent to Cloud.

Machine **trends**, **statistics reports** and **alarm events** boost maintenance process.

Every Industry 4.0 or industry 5.0 application at field level is built around smart sensors
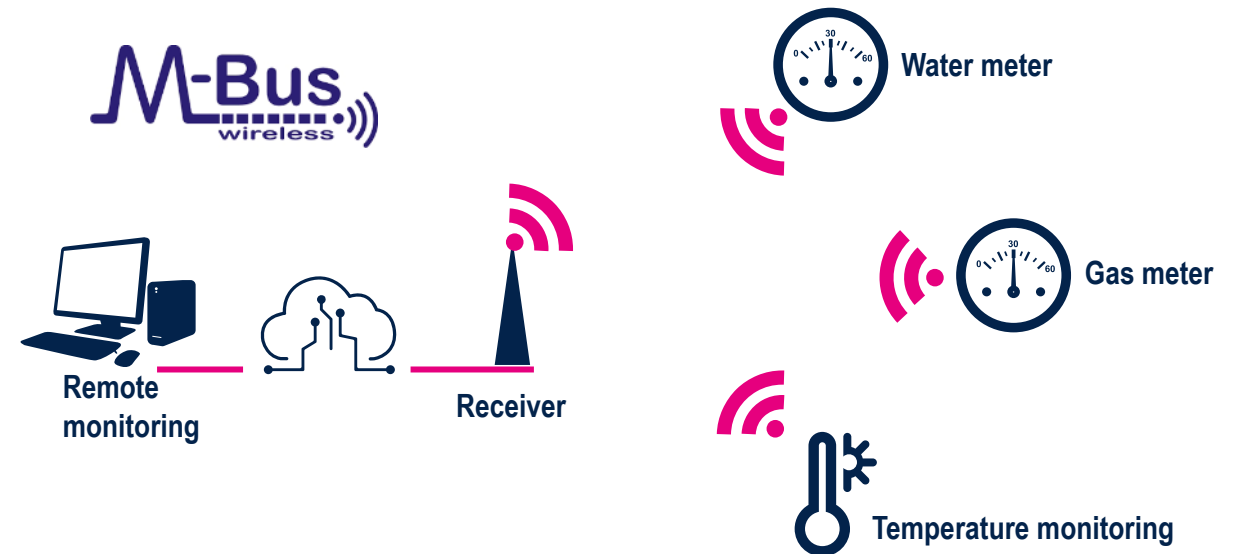

STEVAL-PROTEUS1
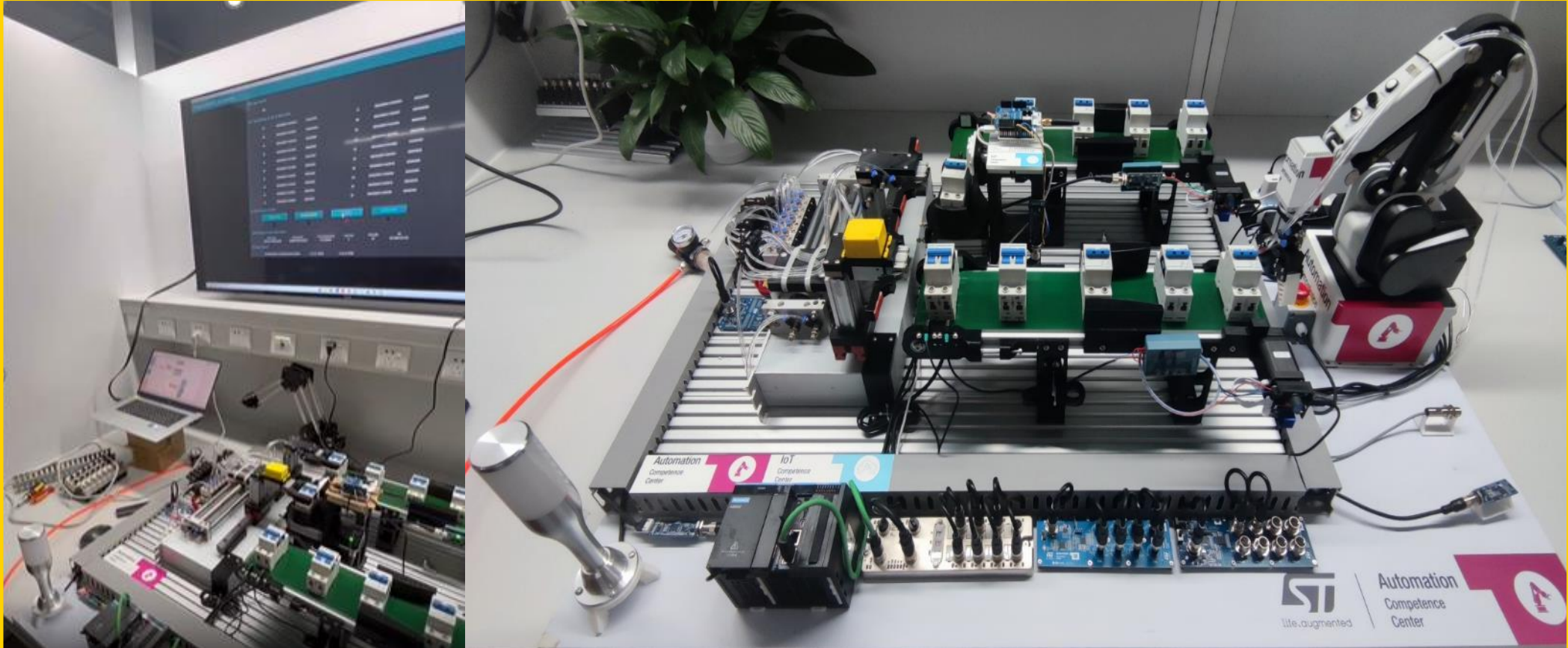
ST WMBUS package

- WMBUS stack can be provided as libs or source code
  - EN 13757-4 Release 2013
- EN 13757-3 WMBUS application examples
  - OMS/DSMR

M-Bus wireless

Water meter

Gas meter

Temperature monitoring

Remote monitoring

Receiver

Asset tracking applications

Evaluation board	Mobile app	Web-based dashboard
STEVAL-ASTRA1B	STAssetTracking	DSH-ASSETRACKING

NFC

Bluetooth

LoRa

LoRa network server

Schematics, Gerber, … available online

Certified solution (CE, RoHS, FSC)

Firmware package
FP-ATR-ASTRA1

Firmware source code available

https://dsh-assetracking.st.com
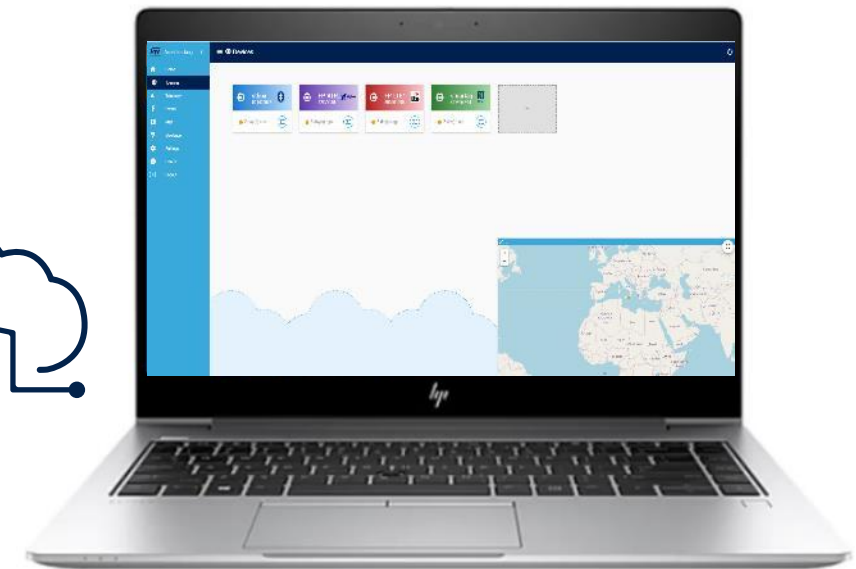
STEVAL-ASTRA1B hardware overview

Processing & security	Long- & short-range connectivity	Power management & protections	Environmental & motion sensors
STM32WB		ST1PS02 (*)	STTS22H
216 CoreMark 64 MHz	Bluetooth	STBC03	LPS22HH
STM32WL		TCPP01	LIS2DTW12
162 CoreMark 48 MHz	LoRa		LSM6DSO32X
STSAFE-A110	ST25DV		
	Teseo-LIV3F GNSS		
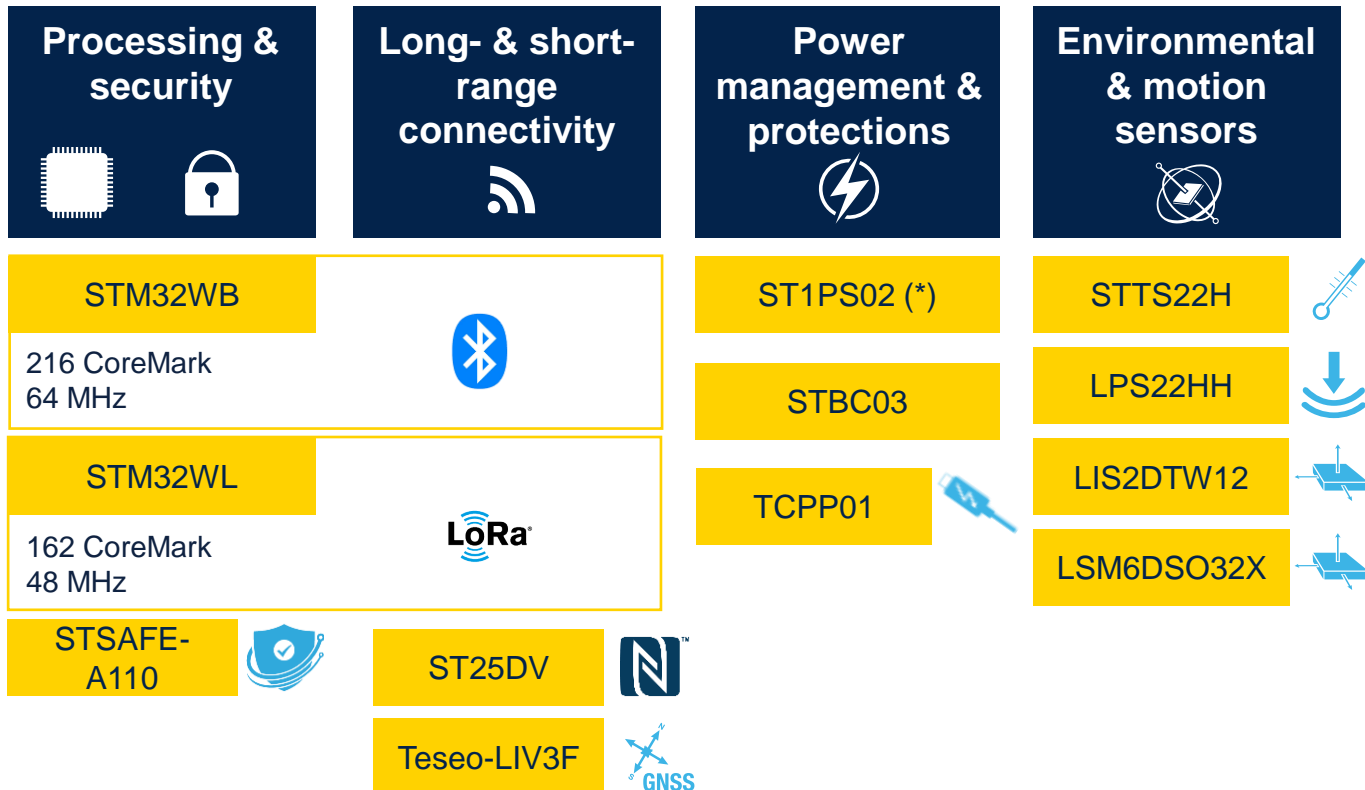
* One ST1PS02 is embedded on SoB. Another one (optional) is hosted in the main

**Industrial Summit
download center**

**ST Power & SPIN
microsite (CN Only)**

Our technology starts with You

🌐 Find out more at www.st.com

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