



Techday

Taiwan | 2023

OUR TECHNOLOGY STARTS WITH YOU

**Sub-track III –
IoT & Connectivity Presentation**



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STM32 wireless & IoT solutions

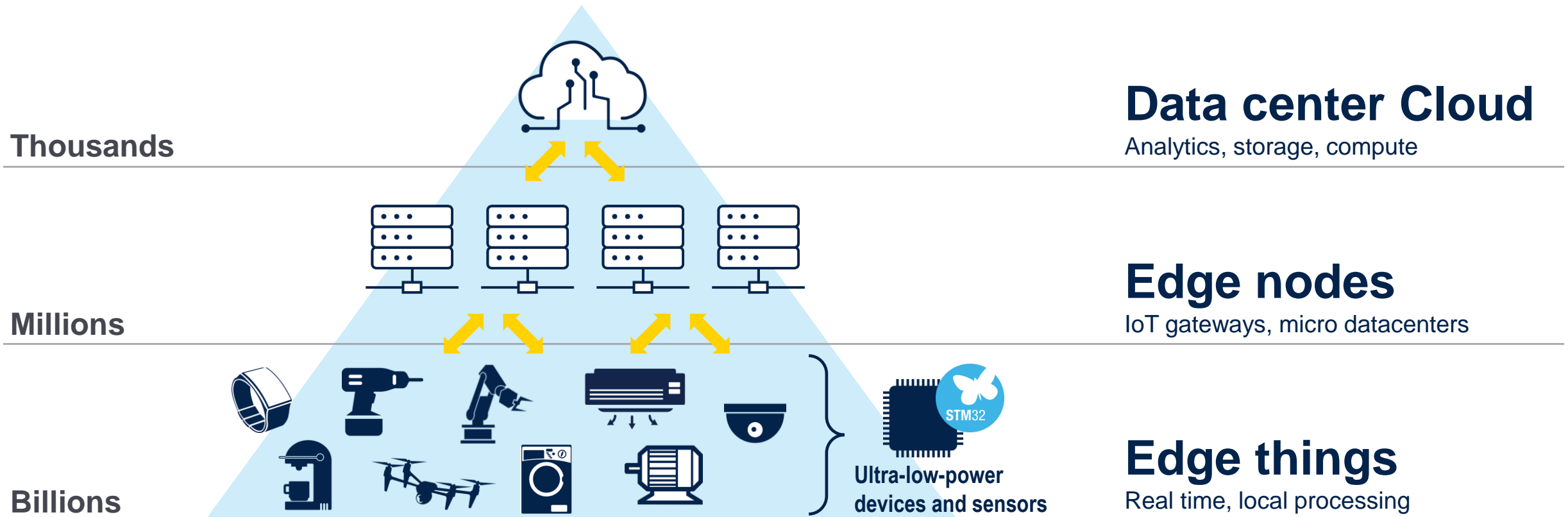
Watson Chang

Wireless Product Marketing, APAC

STMicroelectronics

Distributed artificial intelligence approach

Leverage billions of devices at the Edge!





The STM32 portfolio

Five product categories



Wireless
MCU

Short- and long-range connectivity



Ultra-low-power
MCU

32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score



Mainstream
MCU



High-performance
MCU



Embedded
MPU

32- and 64-bit microprocessors



Enabling edge AI solutions



Scalable security

ST solutions: Sub-1G, and 2.4G



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Sub-1 GHz markets

Smart industry



Smart city



Smart home



Smart agriculture



Asset tracking



Metering



Alarm system



Heat cost allocator



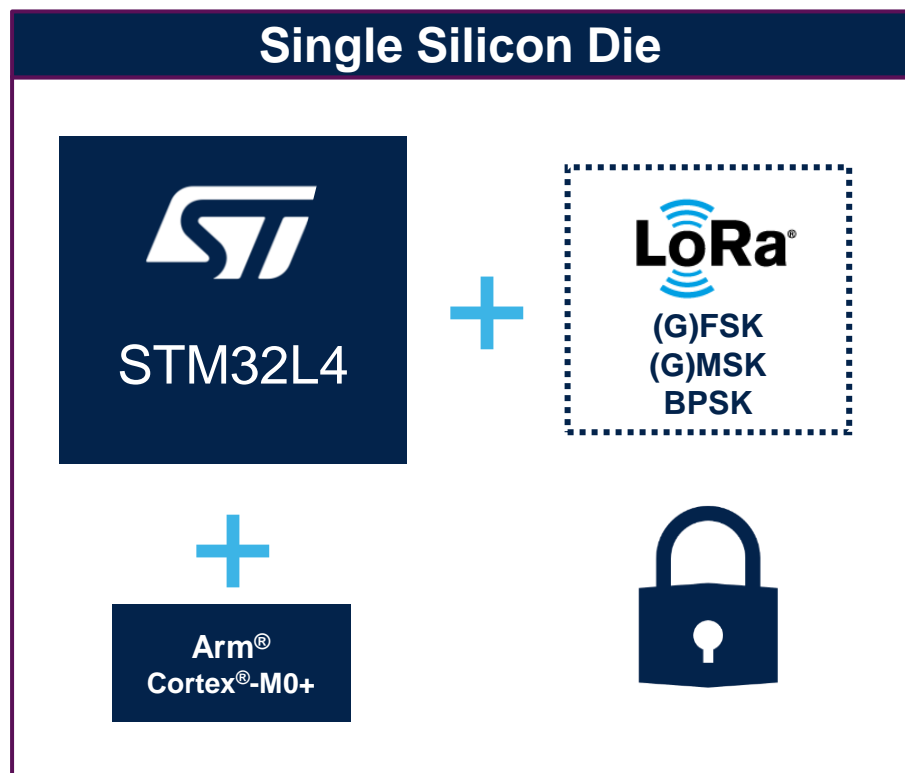
STMicroelectronics serves all markets



System-on-chip made for versatility

A long-range wireless microcontroller: one die, many IoT possibilities

World first!



=



The integration pyramid

STM32WL

Sole LoRa-enabled SoC in the world

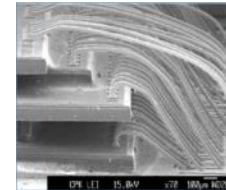


System-on-Chip (SoC)

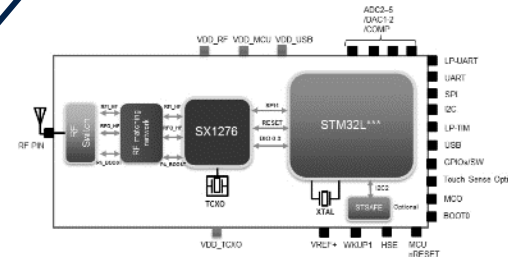
Only one **Silicon die** in one package

System-in-Package

*Different **silicon dice** inside the same package*



Source: PTI Blog



*Different **packages** on a very tiny piece of re-packaged PCB*

Module

PCB

*Different discrete **packages** on a BIG electronic board*



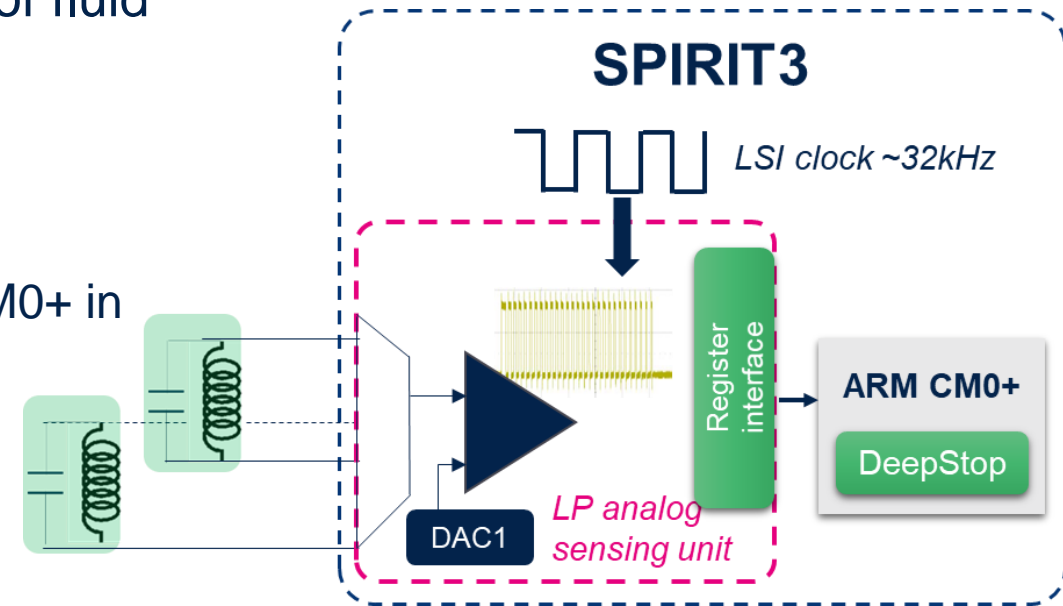
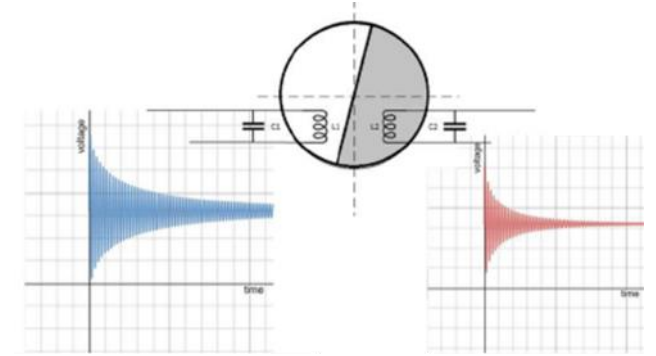


STM32WL

ultralow power LC sensor controller (LCSC)

Ultralow-power ANALOG SENSING UNIT L-C based measurement of fluid flow metering

- Designed for cost-effective mechanic-wheel fluid metering
 - Measuring of L-C network oscillations enable detection of fluid flow metering
- Feature is based on L-C network oscillation measurement
 - Supporting up to 3x L-C networks
 - Autonomous metering circuitry (no MPU intervention, Cortex M0+ in deepstop)
 - Very few μA average current for continuous L-C metering



Extended battery life: dedicated wake-up radio

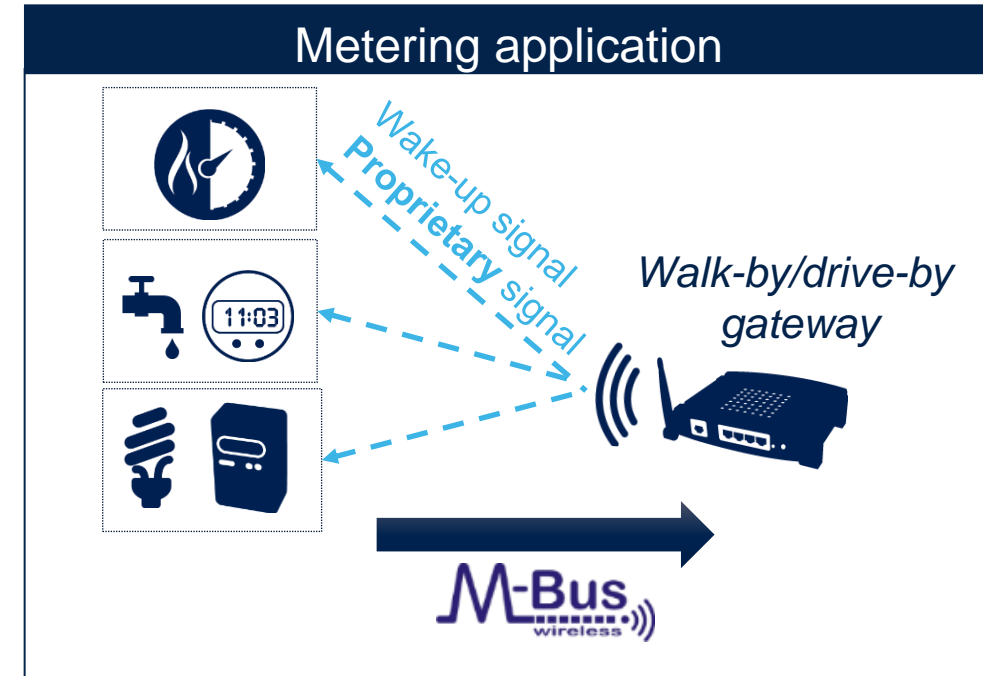
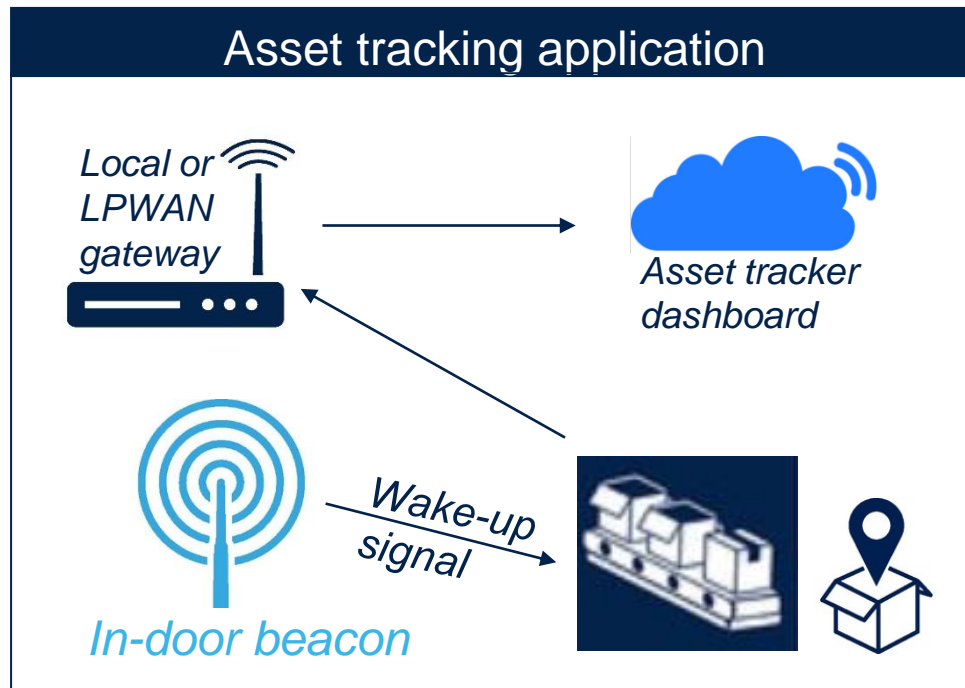
Ultralow-power wireless proximity detection and system wake-up

Wide band: 1 single BOM for worldwide ISM
(100MHz – 2.4GHz)

<5 μ A
Continuous RX

Dedicated to proximity detection
(tens of meters) \sim -50dBm sensitivity

OOK modulated packet detection



2.4G matter makes connected home simple



“Smart home devices should be secure, reliable, and seamless to use. And with Matter, they are.”

The Connectivity Standards Alliance

- **A great user experience**
Matter ensures connected objects from multiple brands can work together seamlessly
- **Wide adoption**
Matter is an application layer which addresses many applications in an open-source delivery and certification infrastructure
- **Release V1.0 Q4'2022**





STM32 MCU 2.4 GHz portfolio

STM32WB series

- Dual core & security (Arm® Cortex® -M4 / -M0+)
- Up to 1 Mbyte of flash memory / 256 Kbytes of RAM

MCUs

STM32WB55

STM32WB35

STM32WB15

STM32WB50

STM32WB30

STM32WB10

Modules

STM32WB5M

STM32WB1M



5.4 & Mesh



STM32WBA series

STM32WBA52



5.4

- Arm® Cortex® -M33 / TrustZone® 100 MHz
- 1 Mbyte of flash memory / 128 Kbytes of RAM
- Up to +10 dBm output power

BlueNRG series

- Arm® Cortex® -M0/M0+
- Up to 256 Kbytes of flash memory / 64 Kbytes of RAM

System on Chips

BlueNRG-1

BlueNRG-2/2N

BlueNRG-LP

BlueNRG-LPS

Module

BlueNRG-M2SP/SA



5.2 to 5.4
& Mesh

EVOLUTION



STM32WB0 series

STM32WB09

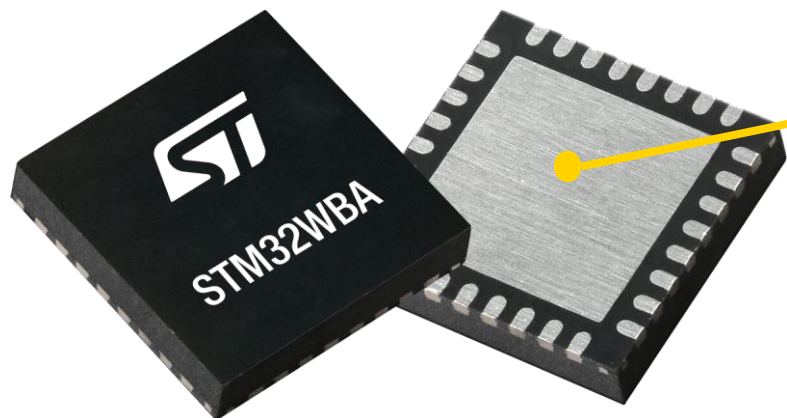


5.3

- Arm® Cortex® -M0+ at 64 MHz
- 512 Kbytes of flash memory / 64K bytes of RAM
- Bluetooth® Low Energy 5.3 (long range, 2 Mbps, Advertising ext, AoA/AoD, Isochronous channel)
- Up to +8 dBm of output power



Bluetooth Low Energy 5.4



Built using **40nm process technology**



An ultralow power Bluetooth® Low Energy 5.4 platform

Integrated 2.4GHz radio

Bluetooth® Low Energy 5.4 (long range, 2Msps, advertising extension)
+10 dBm output power

High performance

- Arm® Cortex®-M33 at 100MHz
- 407 CoreMark score
- 100 K cycles for 256 Kbytes of Flash

Enhanced security

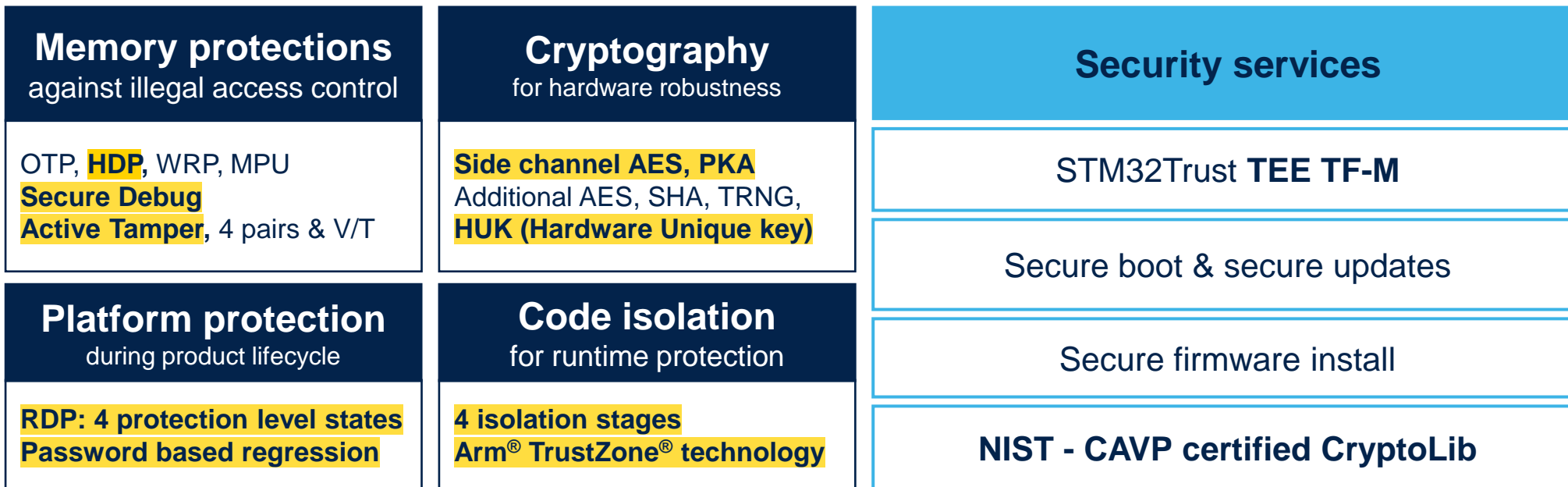
- TrustZone® technology, **target SESIP Level 3**

Leveraging STM32U5 ultra-low-power platform

- Low-power direct memory access (LP-DMA)
- Flexible power-saving states with fast wake-up times
- Same digital and analog peripherals

STM32WBA increases security in wireless devices

Extensive functionalities to protect your assets

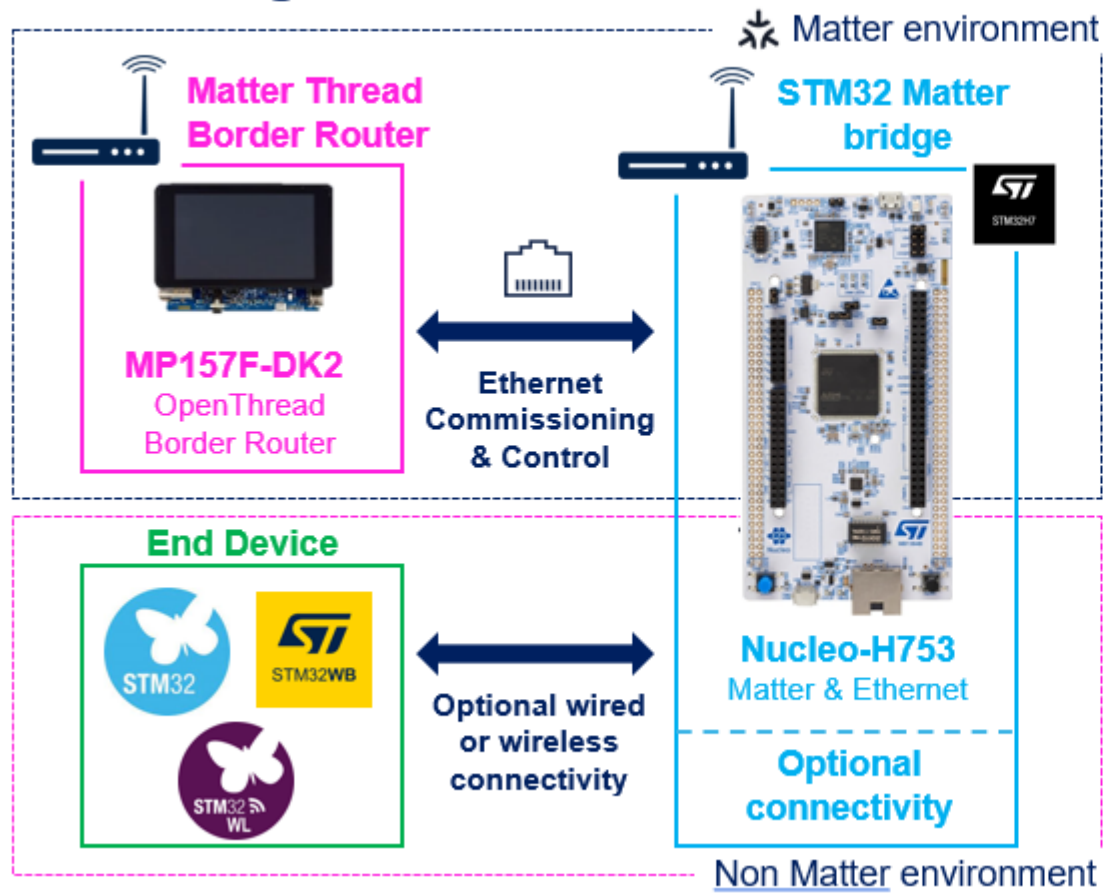


State-of-the-art security assurance level

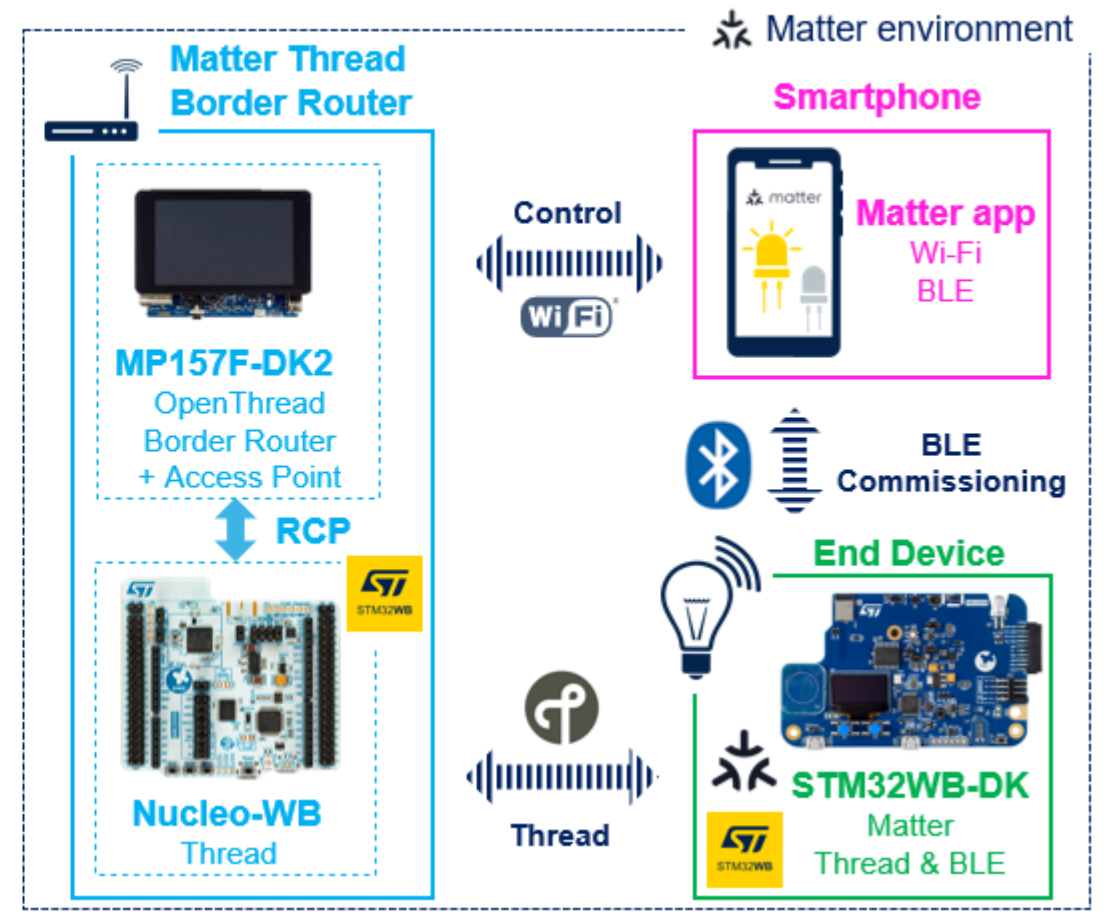


Matter over thread: ST available demonstration

Bridge device demonstration



End device demonstration

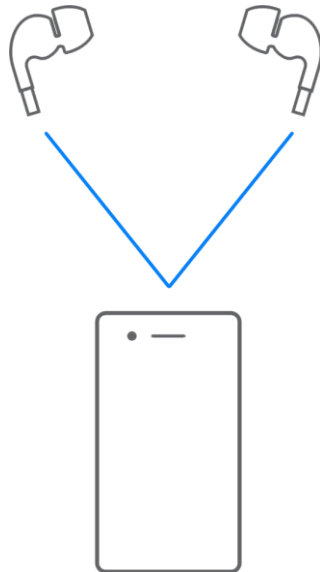


What's more.....

Le audio unicast / broadcast

- Connected Audio Stream
- One-to-One
- Bidirectional

Unicast



- Broadcasted Audio Stream
- One-to-many
- Unidirectional

Broadcast



Setup - many source many sink

Music Source
(Laptop or
Smartphone with
3.5mm jack output)



Jack 3.5mm

**Public
Broadcast
Source 1**



Music Source
(Laptop or
Smartphone with
3.5mm jack output)

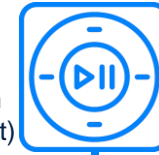


Jack 3.5mm

**Public
Broadcast
Source 2**



Music Source
(Laptop or
Smartphone with
3.5mm jack output)



Jack 3.5mm

**Public
Broadcast
Source 3**



Use joystick to
switch source

**Public
Broadcast
Sink**



Use joystick to
switch source

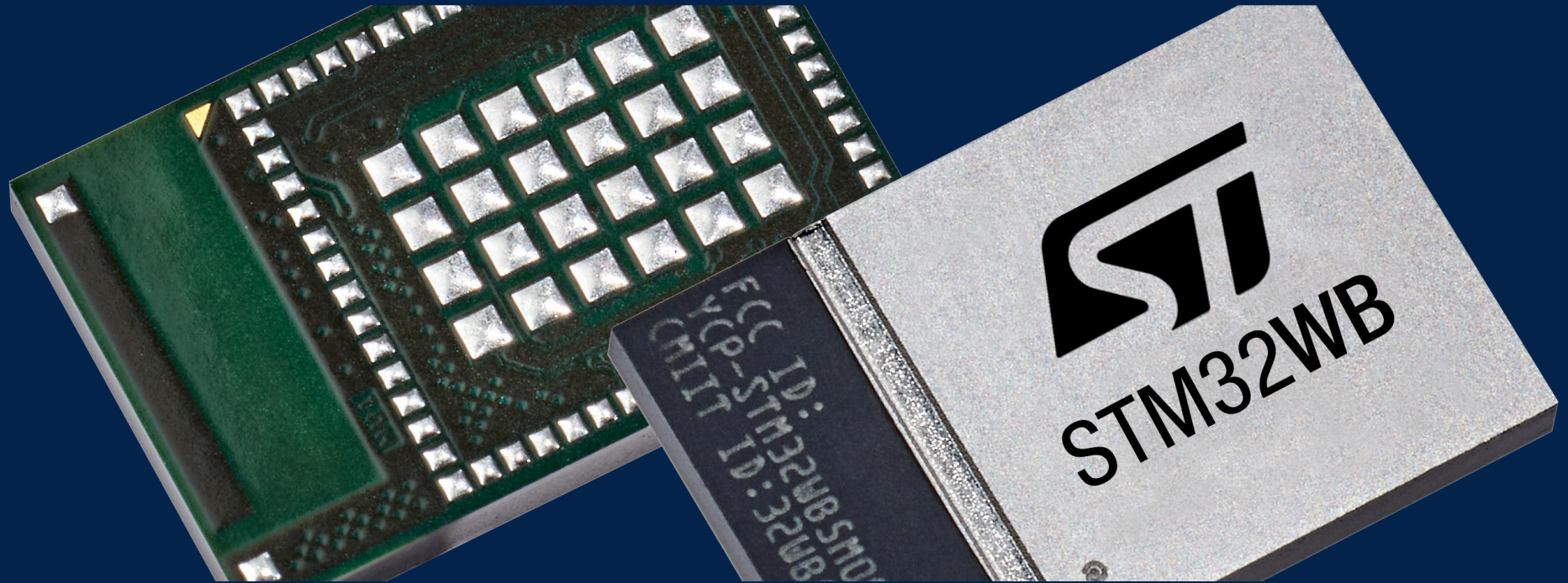
**Public
Broadcast
Sink**



Use joystick to
switch source

**Public
Broadcast
Sink**

**Available as a module
to reduce your time to market**



STM32WB5M - module

Easy to integrate - Light certification for customer

Key advantages

- WLCSP100 package integrated
- Maximum of features exposed
- Low-cost PCB for the mother board



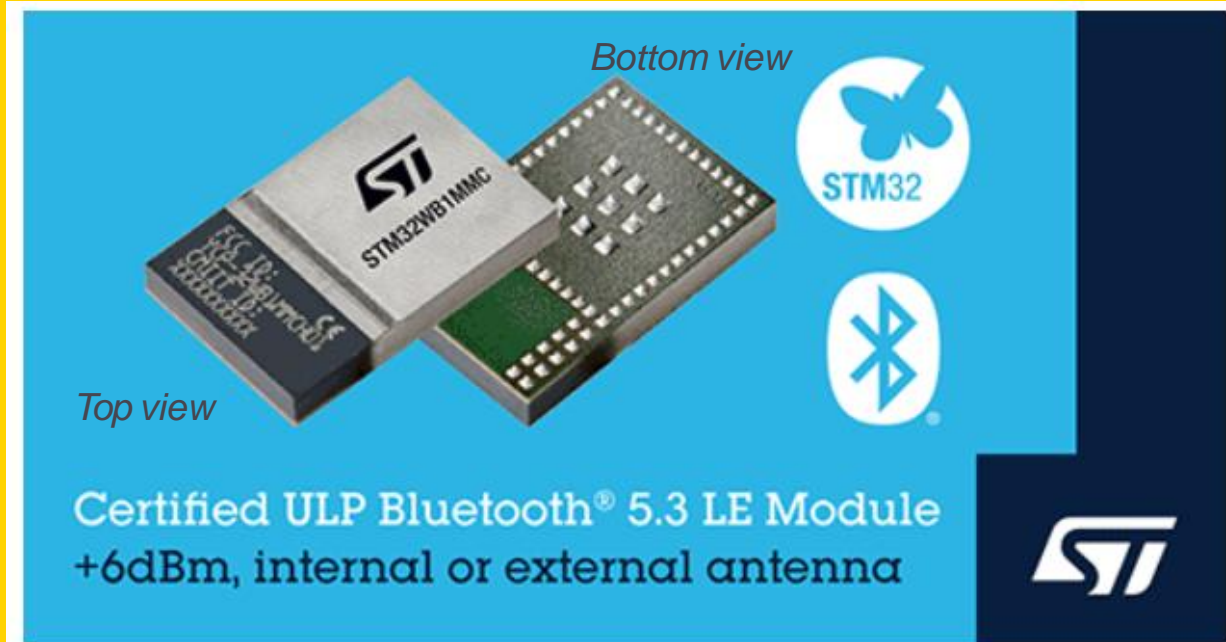
In production

STM32WB1M - module

Easy to integrate - Light certification for customer

Key advantages

- [STM32WB15 MCU](#) with 320KB flash and 48KB RAM
- Internal antenna, as well as pins for attaching an external antenna.
- [STM32CubeWB MCU package](#) provides resources including hardware abstraction layer (HAL) firmware, Low-Layer APIs, File system, and RTOS



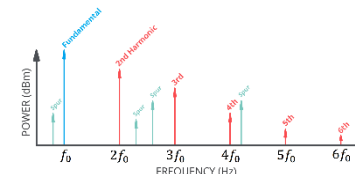
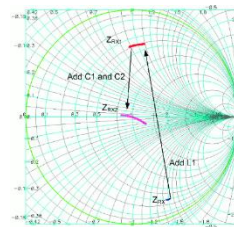
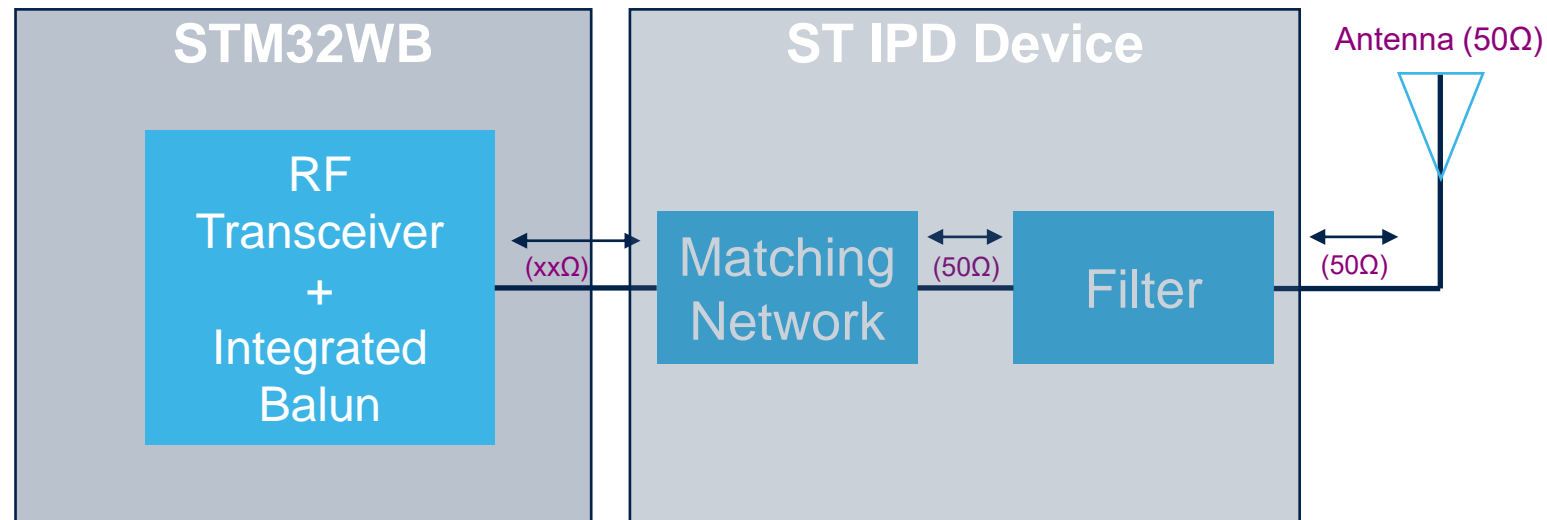
In production

IPD (integrated passive device)

IPD* - basic RF system

Two blocks required

- **Matching Network** – Transformation to $50\ \Omega$ impedance
- **Harmonic Filter** – Reduce out-of-band TX harmonic emissions and RX susceptibility

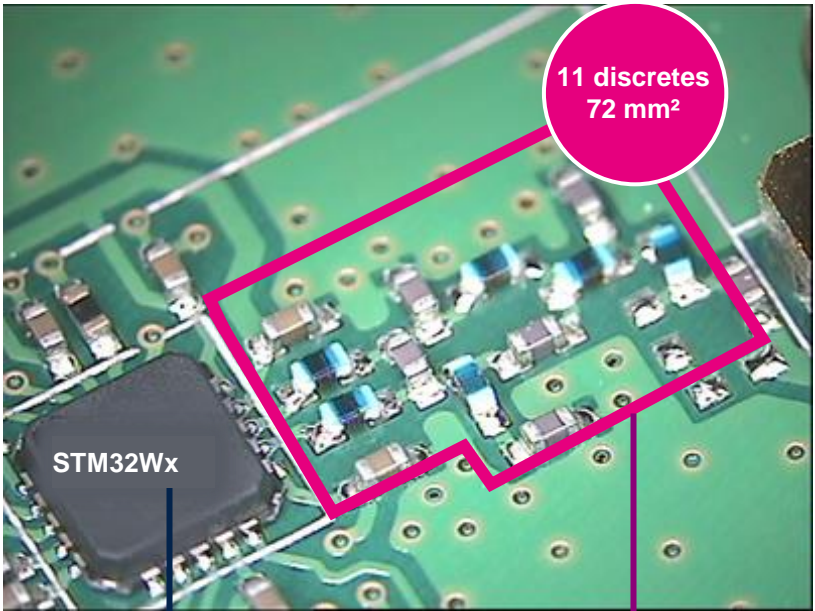




STM32 IPD integrated passive device

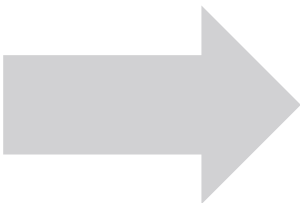
STM32WL RF Front end in a 1.2mm²

BEFORE

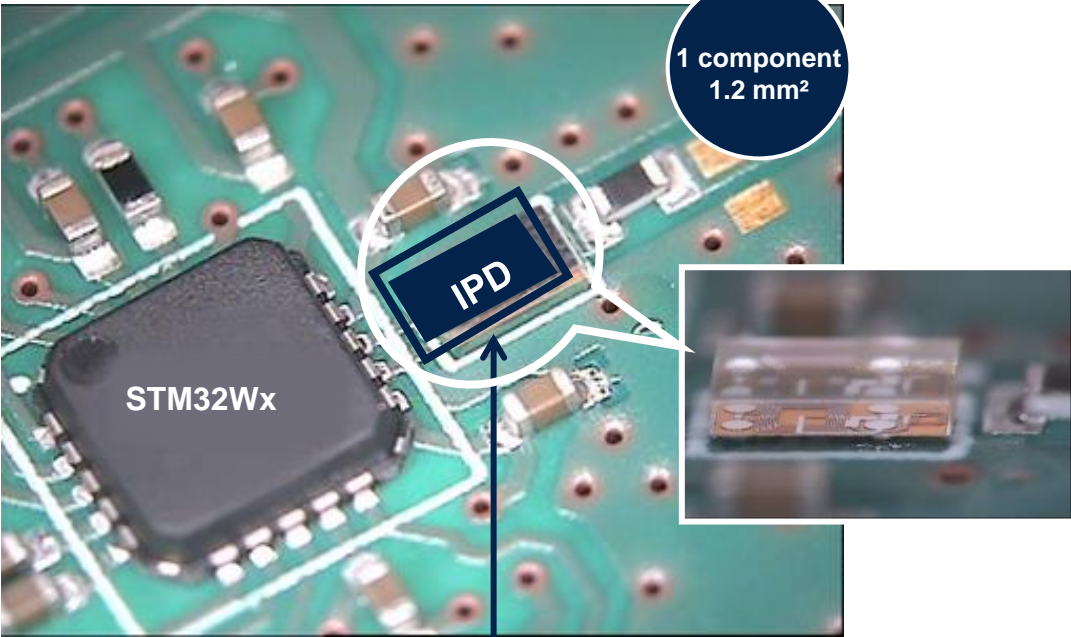


Wireless MCU

Discrete balun & matching network



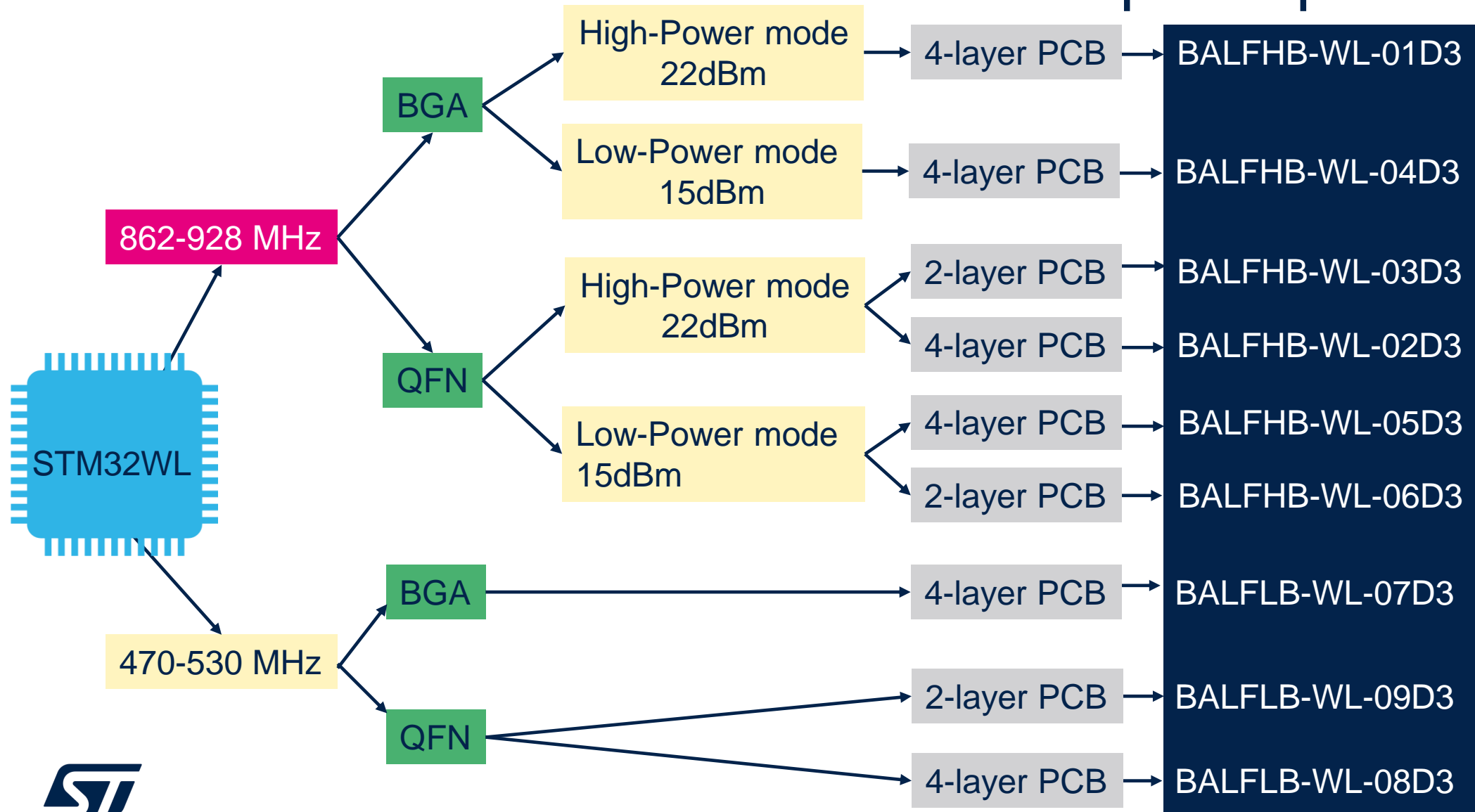
AFTER



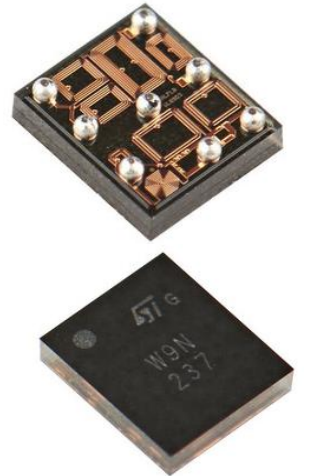
RF IPD balun & matching network

RF IPDs products companion chip to STM32WL

how to pick up the right one

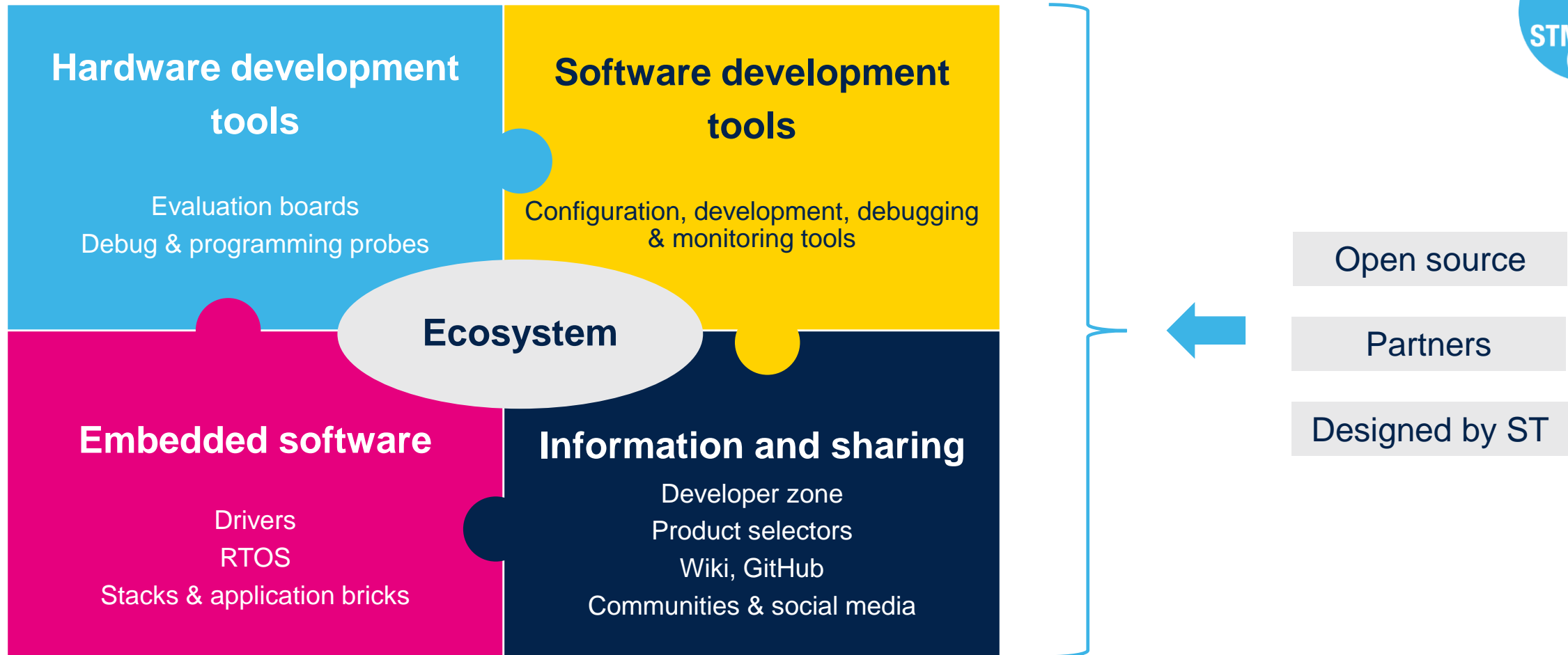


BAL=balun
F = Filter
HB = high-band
LB = Low-band
WL=STM32WL
D3= CSP package



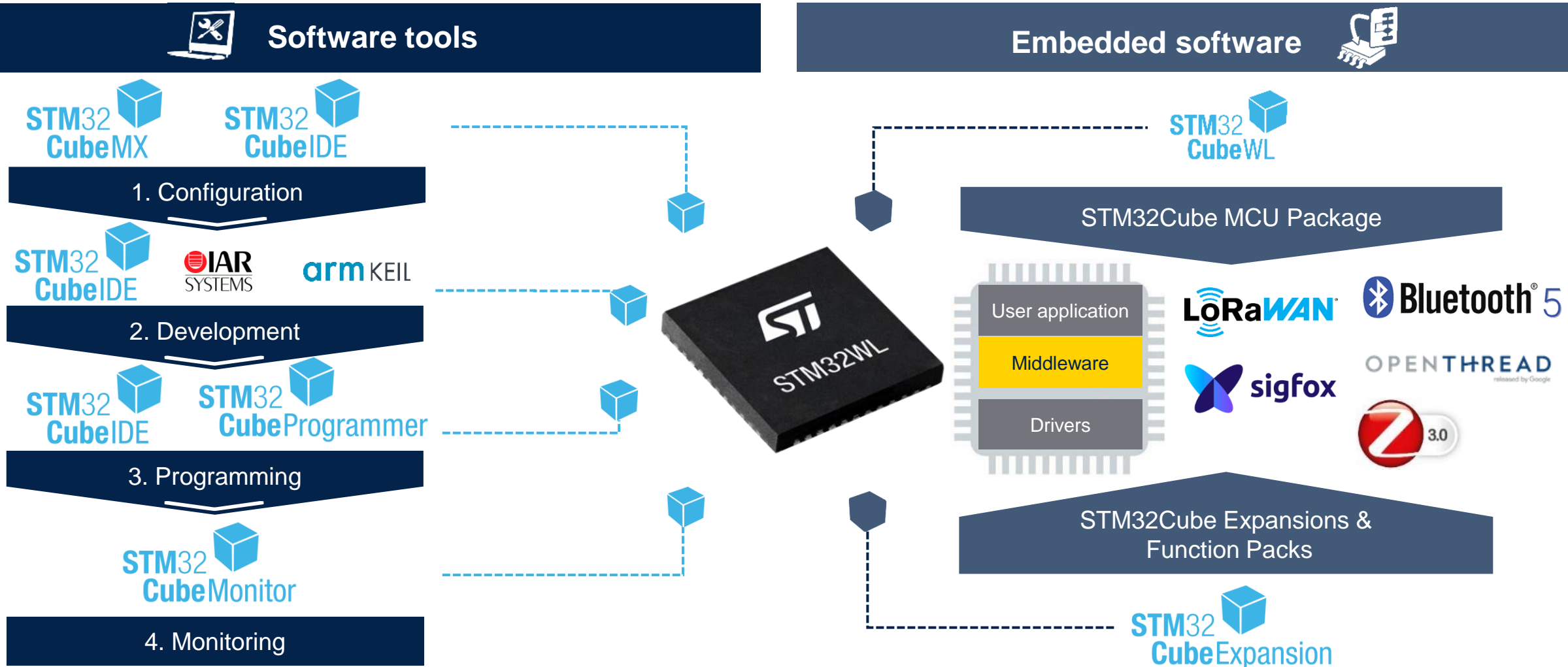
N: FE= Tours,
BE=Shenzhen
237: W37- 2022
G: ecopack2/Rohs

STM32 ecosystem for developers

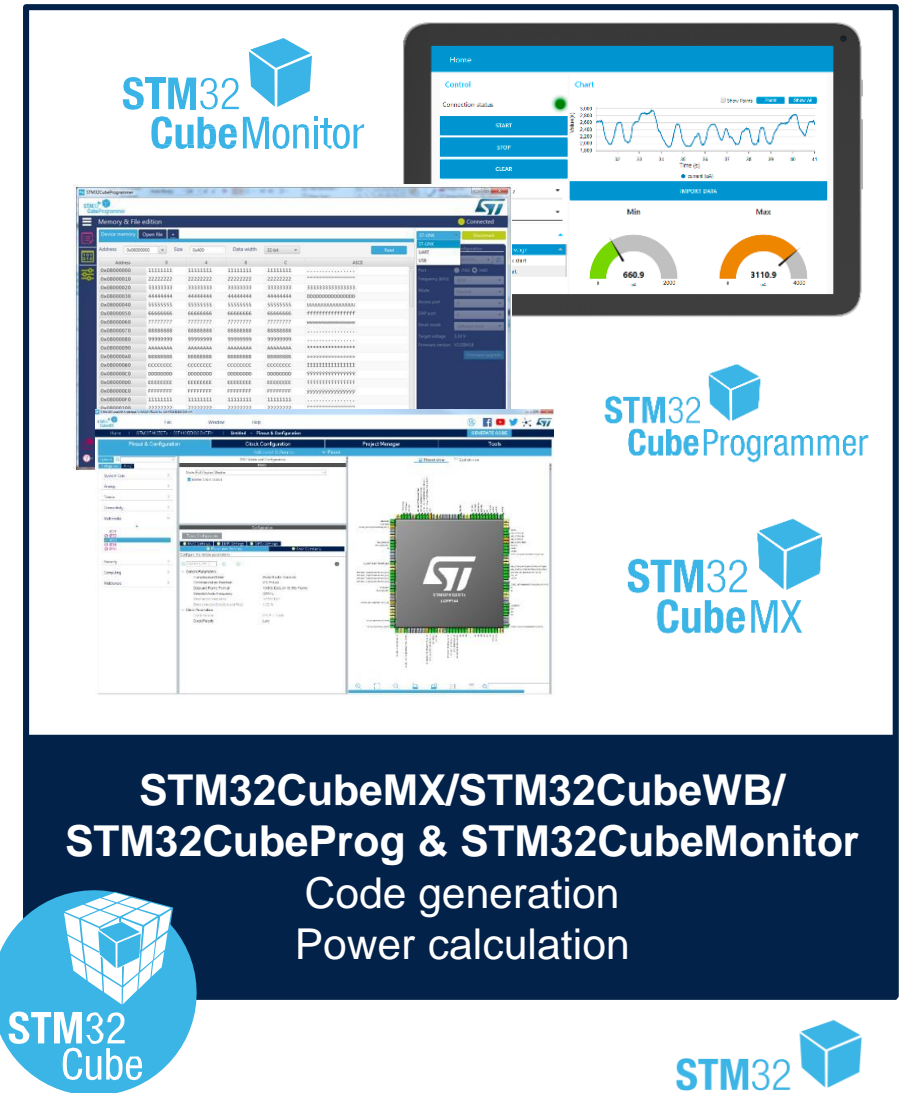
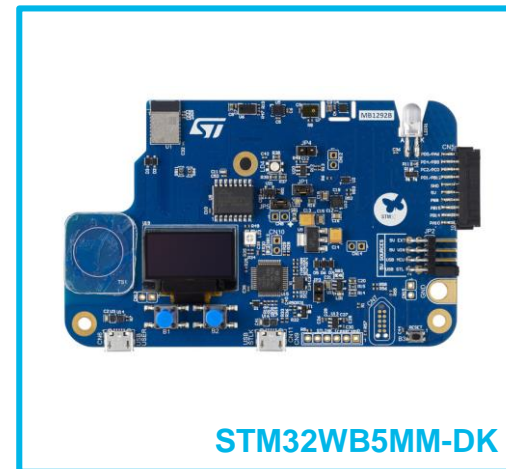
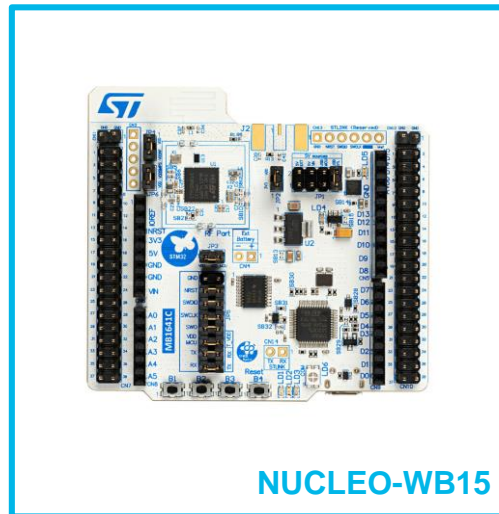
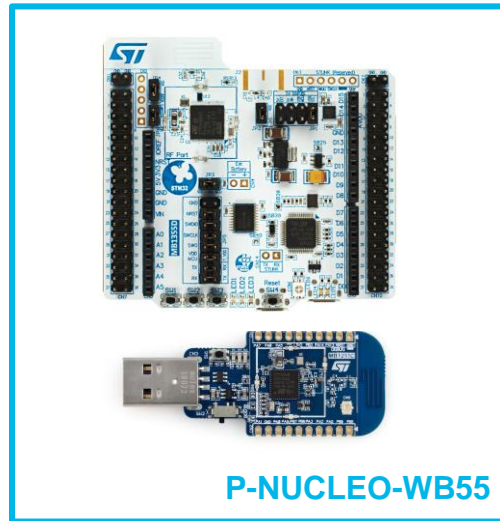




Key takeaway: end-to-end ecosystem



Prototyping made as easy as 1,2,3



STM32CubeMonitor

STM32CubeProgrammer

STM32CubeMX

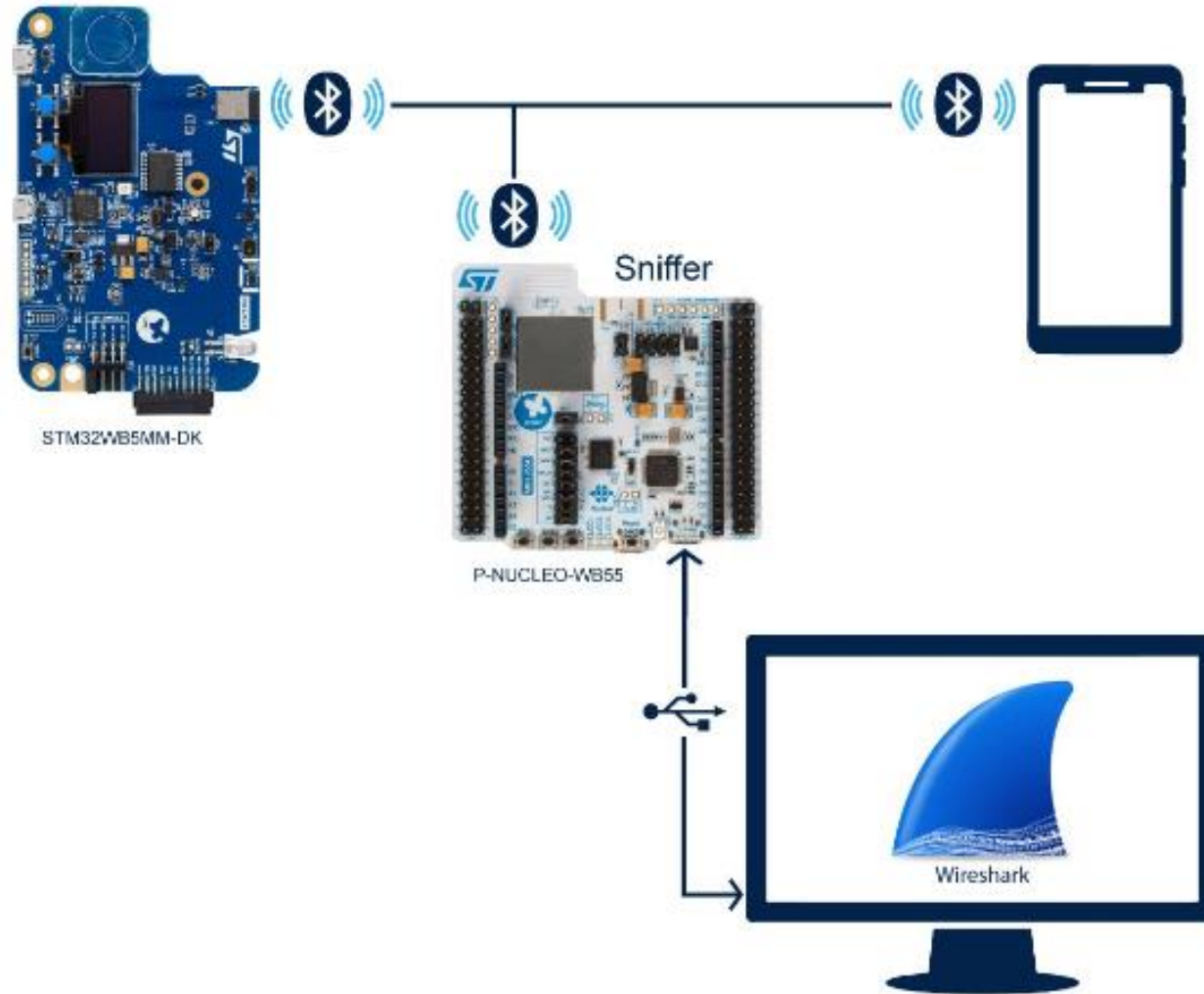
STM32Cube

STM32CubeMX/STM32CubeWB/
STM32CubeProg & STM32CubeMonitor

Code generation
Power calculation

What's more.....

BLE Sniffer by STM32WB55-Nucleo EVM



What ST offers (Today'2023)

Short Range



BLE Application
Processors



BLE Network
Co-Processors



Thread



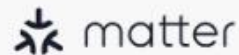
Zigbee



Ultra
Wideband



60 GHz
Contactless



matter

Long Range



LoRaWAN



Sigfox



Wireless M-Bus



KNX-RF



Wi-Sun



6LoWPAN



Proprietary
Sub-1GHz



Narrowband-IoT
(NB-IoT)

Our technology starts with You

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