



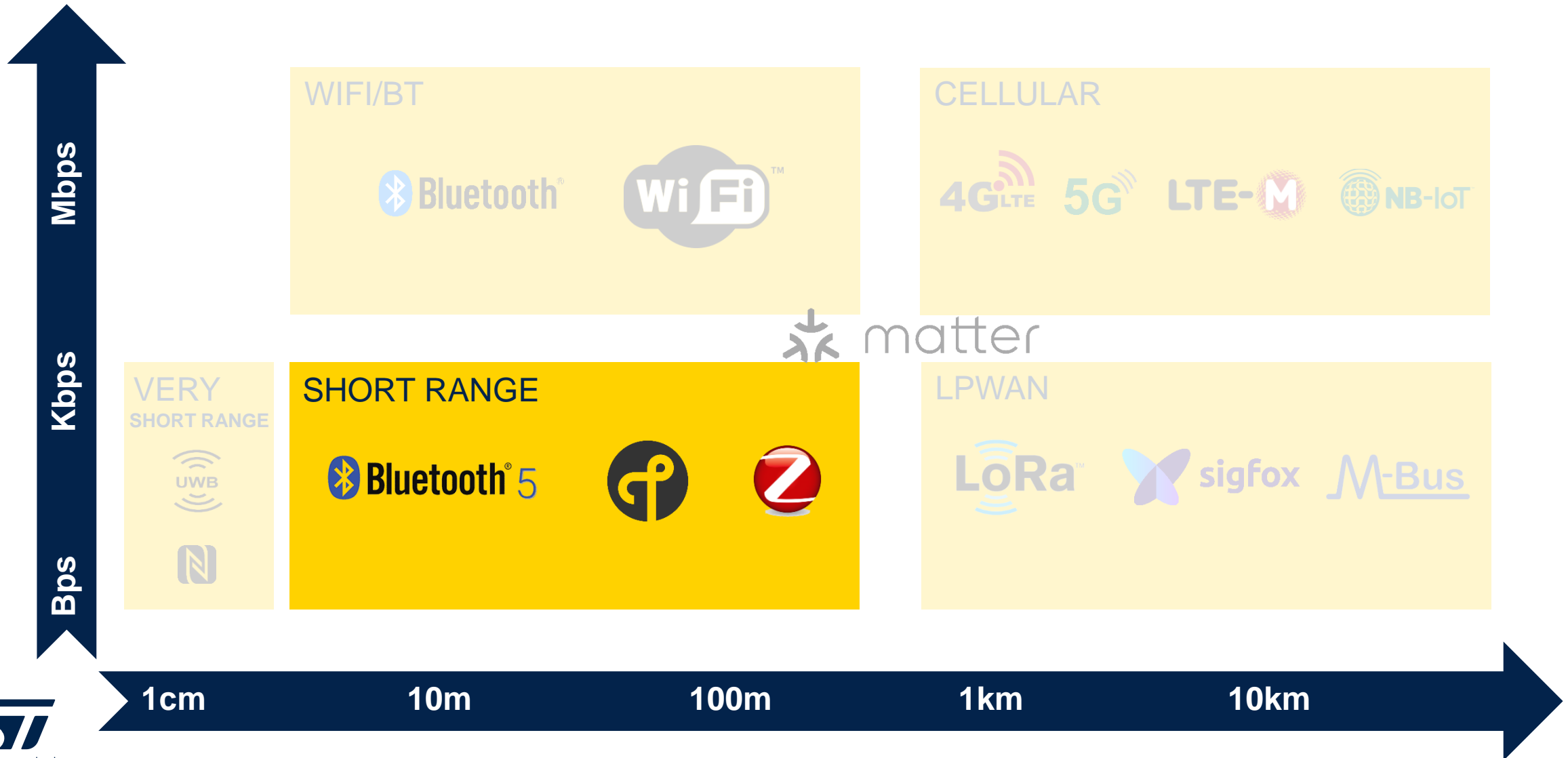
life.augmented

STM32WBA wireless MCU series

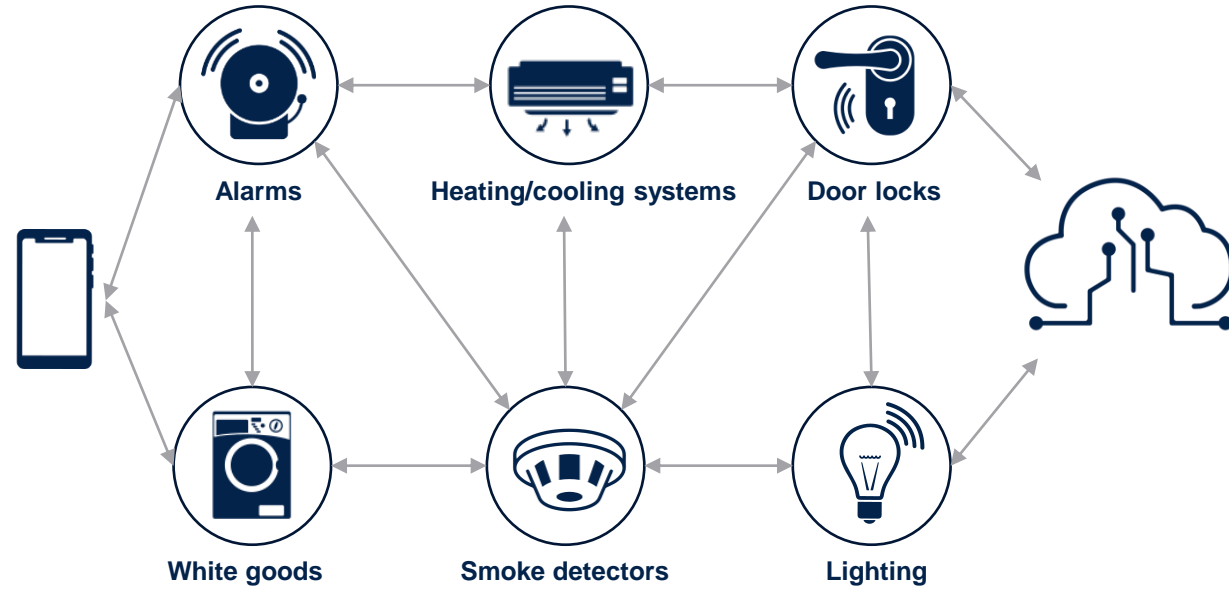
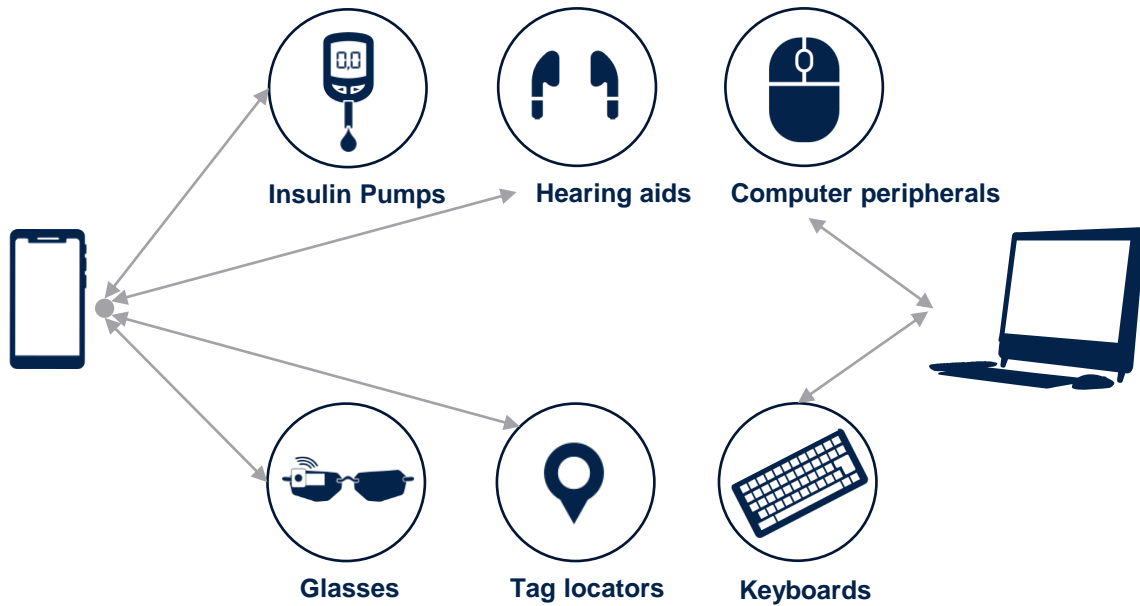
Low-power, secure Bluetooth® Low
Energy 5.3 communications



Communication technologies



Bluetooth® technology is all around us



P2Point or P2Multi-Comm. devices

Connected to smartphones, laptops...
Mostly battery powered



Mesh communication devices

Home automation, Industry 4.0, consumer
power supply and/or battery powered



Wireless design requirements are increasing

Wellness, fitness, medical

Home automation

Industrial



More autonomy

More integration

More security



STM32 MCU and MPU portfolio



 MPU

STM32MP1
Up to 1 GHz Cortex-A7
209 MHz Cortex-M4

 High Perf MCUs

STM32F7
1082 CoreMark
216 MHz Cortex-M7

STM32H7
Up to 3224 CoreMark
Up to 550 MHz Cortex -M7
240 MHz Cortex -M4

STM32F2
Up to 398 CoreMark
120 MHz Cortex-M3

STM32F4
Up to 608 CoreMark
180 MHz Cortex-M4

STM32H5
Up to 1023 CoreMark
250 MHz Cortex-M33

 Mainstream MCUs

STM32F3
245 CoreMark
72 MHz Cortex-M4

STM32G4
569 CoreMark
170 MHz Cortex-M4

STM32C0
114 CoreMark
48MHz Cortex M0+

STM32F0
106 CoreMark
48 MHz Cortex-M0

STM32G0
142 CoreMark
64 MHz Cortex-M0+

STM32F1
177 CoreMark
72 MHz Cortex-M3

Mixed-signal MCUs

 Ultra-low Power MCUs

STM32L0
75 CoreMark
32 MHz Cortex-M0+

STM32L4
273 CoreMark
80 MHz Cortex-M4

STM32L4+
409 CoreMark
120 MHz Cortex-M4

STM32L5
443 CoreMark
110 MHz Cortex-M33

STM32U5
651 CoreMark
160 MHz Cortex-M33

 Wireless MCUs

STM32WL
162 CoreMark
48 MHz Cortex-M4
48 MHz Cortex-M0+

STM32WB
216 CoreMark
64 MHz Cortex-M4
32 MHz Cortex-M0+

STM32WBA
407 CoreMark
100 MHz Cortex-M33

 Latest product generation

 Radio co-processor only

More than 60,000 customers
Over 10 billion STM32 shipped since 2007

STM32 MCU 2.4GHz portfolio

STM32WB MCU

STM32WB55

STM32WB35

STM32WB15

STM32WB50

STM32WB30

STM32WB10

- **Dual core** & security (Arm® Cortex® -M4 /-M0+)
- Up to **1Mbytes** flash/ **256Kbytes** RAM
- Bluetooth® Low Energy 5.3, Zigbee R22 & Thread, proprietary, Matter H1'23



STM32WBA MCU

STM32WBA52

- Arm® Cortex® -M33 w/ **TrustZone®** @100MHz
- **1Mbyte** flash memory / **128Kbytes** RAM
- Bluetooth® Low Energy 5.3 (long-range, 2Mbps, advertising extension)
- Up to **+10dBm** output power
- Enhanced security

BlueNRG System-on-Chip

BlueNRG-1

BlueNRG-2

BlueNRG-LP

- Arm® Cortex®-M0+
- 256Kbytes flash/ 64Kbytes RAM
- Bluetooth® Low Energy 5.3, long-range, 2Mbps, Advertising Ext

BlueNRG-LPS

- Arm® Cortex®-M0+
- 192Kbytes flash memory / 24Kbytes RAM
- Bluetooth® Low Energy 5.3 (long-range, 2Mbps, advertising extension, **AoA/AoD**)

The building blocks to reach final application

Applications



Fitness



Medical



Lighting



Home automation



Wireless connectivity



Security



Anti cloning



App Radio
Isolation
Trusted environment



Anti roll back SW
Secure bootloader
Data corruption check



Hardware, software & tools



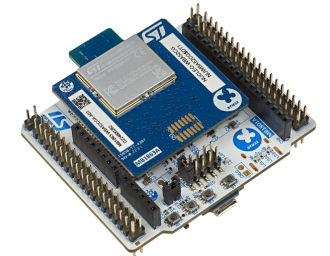
Mobile applications



ST BLE Toolbox ST BLE StarNet

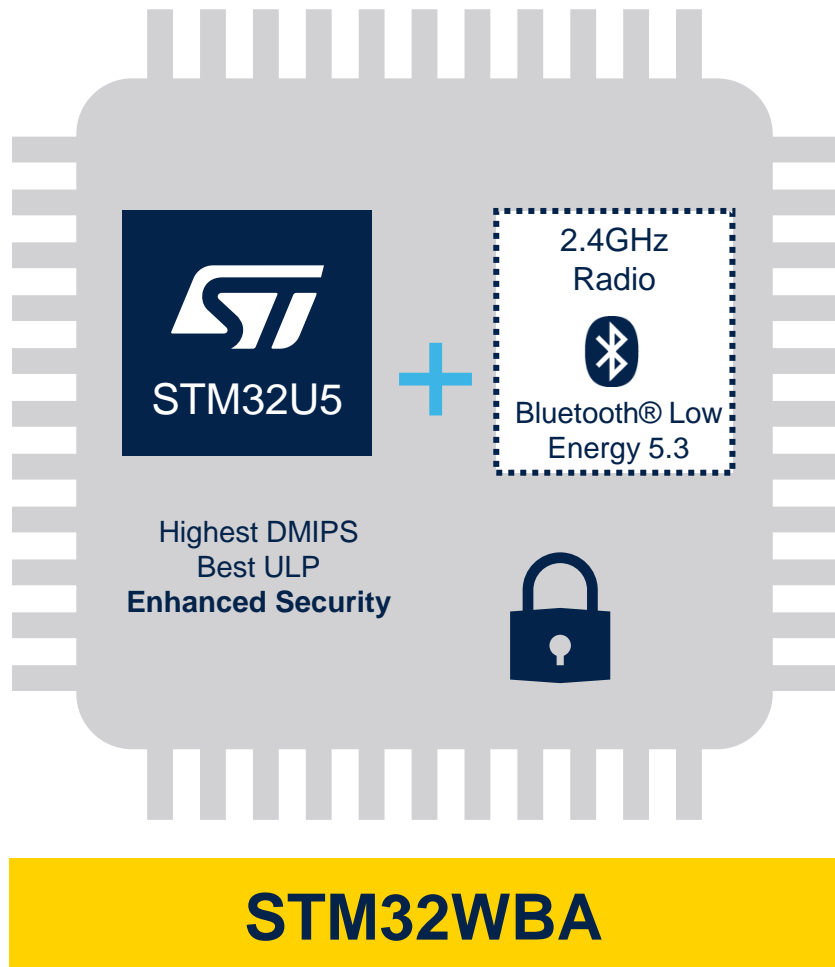


Best in-class solution



NUCLEO-WBA52CG

An ultralow power Bluetooth® Low Energy 5.3 platform



- **Bluetooth® Low Energy 5.3**
- Based on **Arm® Cortex®-M33** at 100MHz
- TrustZone® technology, **target SESIP Level 3**
- **407 CoreMark score**
- 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
- Built using **40nm process technology**
- Supported by full **ecosystem**

Key features for embedded developers



STM32WBA5

Supports latest protocol

Bluetooth® Low Energy 5.3
(long range, 2Msps, advertising extension)

Enhanced security

AES and PKA, side attack resistant
Active RTC tamper

Low-power consumption

Ultra-low power radio
GPDMA and IP autonomous in low-power mode

Improved data storage

100 K cycles for 256 Kbytes of flash memory

BOM reduction

Integrated matching



A versatile product



Lighting

- Robust RF link **106dBm** with **Bluetooth® Low Energy** and **+10 dBm** output power
- **Update securely** radio and stack firmware with SBSFU
- Bluetooth 5.3 **multi-connections** to extend network range



Fleet maintenance

- Retrofit legacy product to **Bluetooth® Low Energy 5.3**
- Remotely upgrade device with **OTA capability**
- **Brand protection** with authenticated **FW upgrade** system
- **IoT protection ready**



Industrial devices

- Down to **2.4µA mode with RTC** and 64KB of RAM
- **Security:** AES, PKA side attack resistant
- **Security:** RTC active tampers enabled
- **Robustness:** 100KB cycle flash memory cycle capable



Fitness/healthcare

- **Multipoint** Bluetooth® Low Energy connections, up to 20 links
- Battery lifetime care with **< 140 nA** standby mode
- Dynamic efficient **45µA/MHz**
- Battery care thanks top **GPDMA acquisition** mode
- Handle advanced algorithm with **1 Mbyte** of flash memory



Beaconing and sensors

- **Beacon** profile available among a huge list
- **Bluetooth® Low Energy, long-range** capable
- **Embedded balun + matching** to minimize design cost
- **Advertising extension** for increased beacon lifetime
- **Up to +10 dBm** output power to get best beacon range
- 2.4µA ULP-mode with full RAM for **battery life** optimization
- Down to 1.71V power supply full feature capable



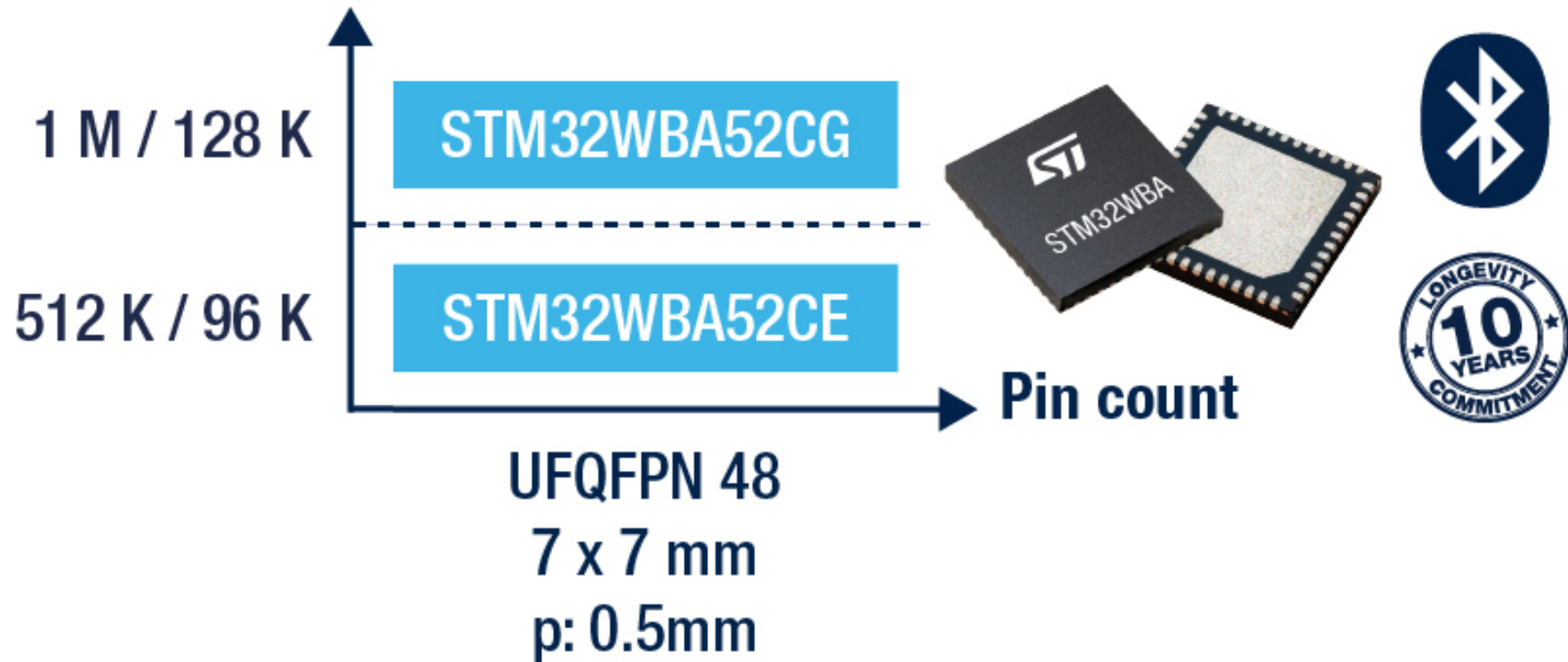
Home automation

- **10 years lifetime**
- High output power **+10dBm**
- **Capacitive Touch**
- **Fast wake-up**
- High MCU efficiency for advanced features
- **407 CoreMark**



STM32WBA products

Flash memory size / RAM size (bytes)



STM32WBA52x

Product ID card & block diagram

STM32WBA52CxU6

Architecture

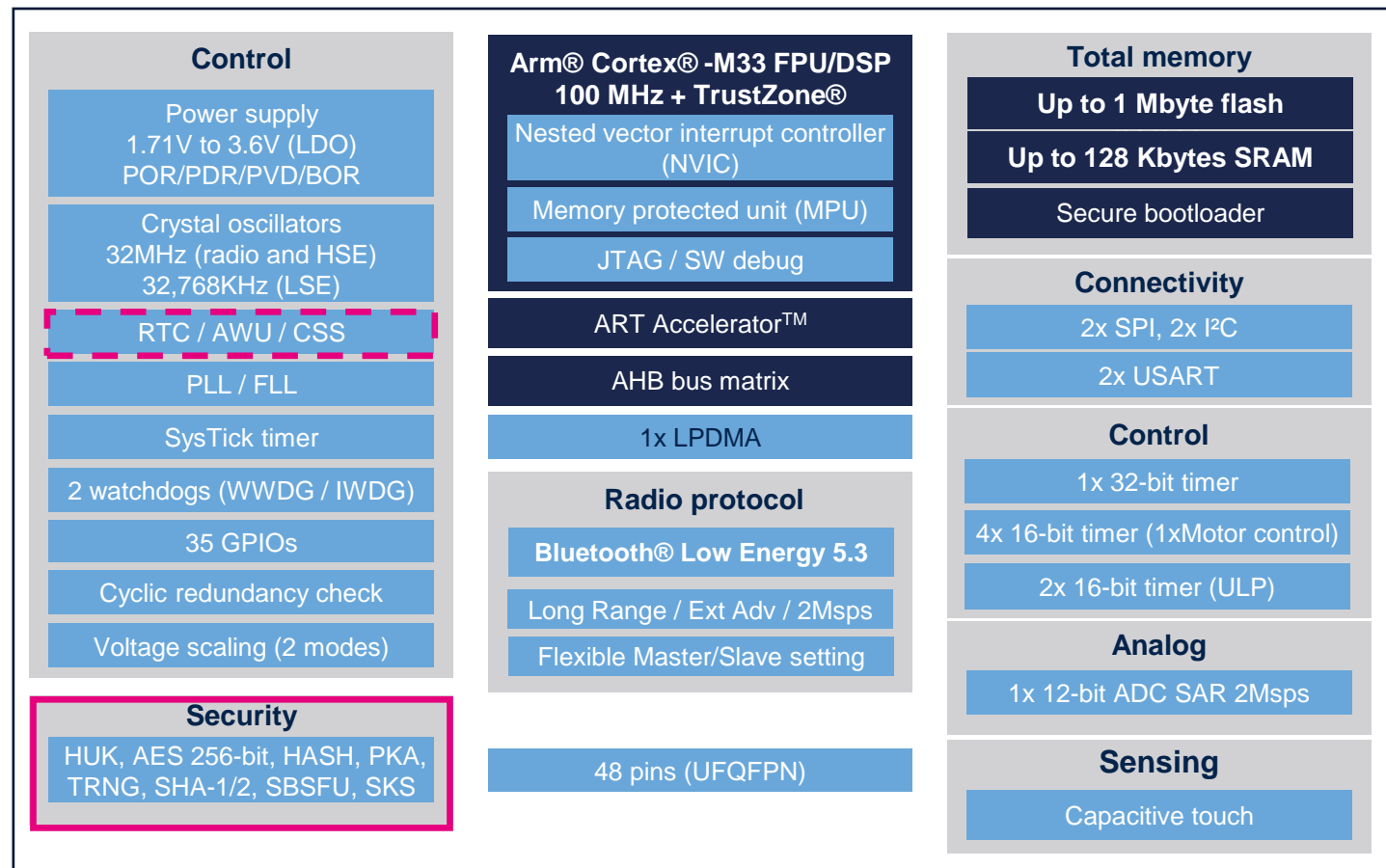
- 1 Mbyte of flash memory / 128Kbytes RAM
- Single Arm® Cortex®-M33 @ 100MHz

Key features

- +10dBm max output power, integrated balun
- Bluetooth® Low Energy 5.3 certified with advertising extension, 2Mbps, long range
- up to 20 connections
- TX: 10.6mA @ 0dBm, Rx: 7.4mA
- -40 to +85°C

Peripherals: touch sensor, LPDMA, ADC 12-bit, 3x UART, 2x SPI, 2x I²C

Package: UFQFN48 7 x 7 mm, 35 GPIOs



— Side attack resistant
 - - Active antitamper

STM32WBA52 power performances



High performance

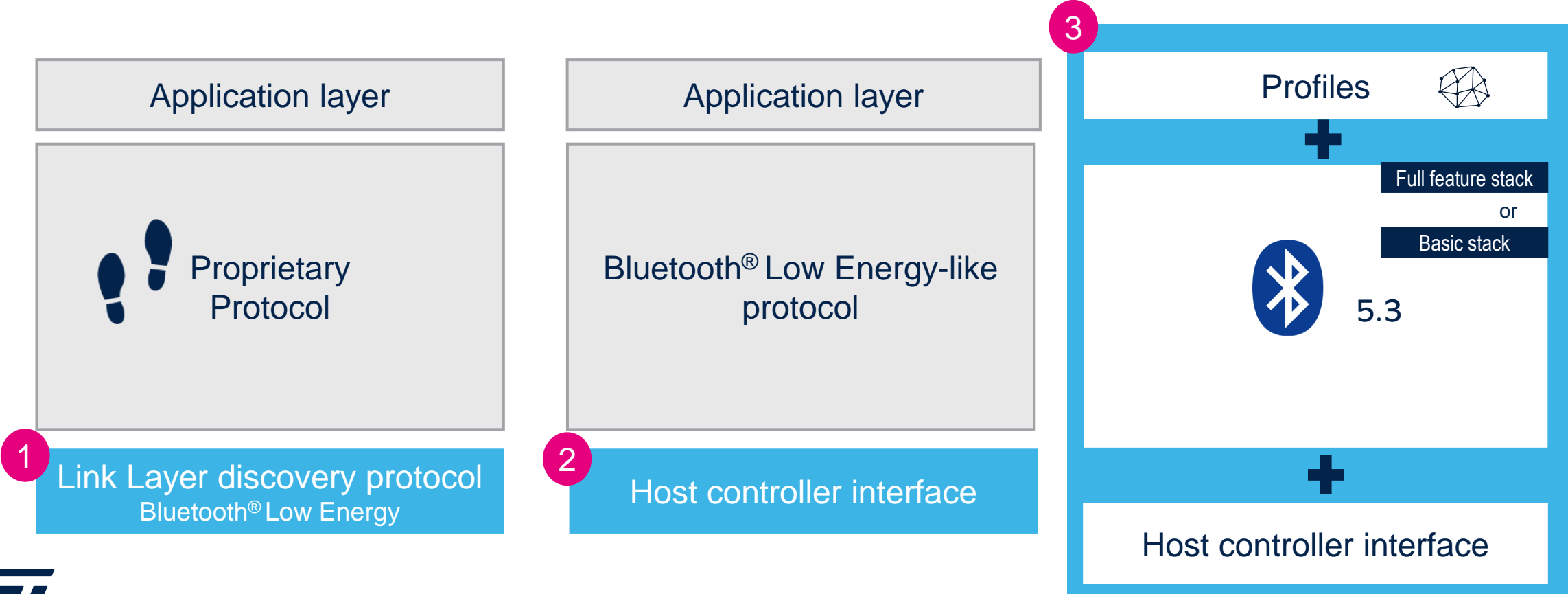
- CoreMark score: 407
- 45 $\mu\text{A}/\text{MHz}$ from M33

Typ @ LDO ON 1.8V @ 25 °C

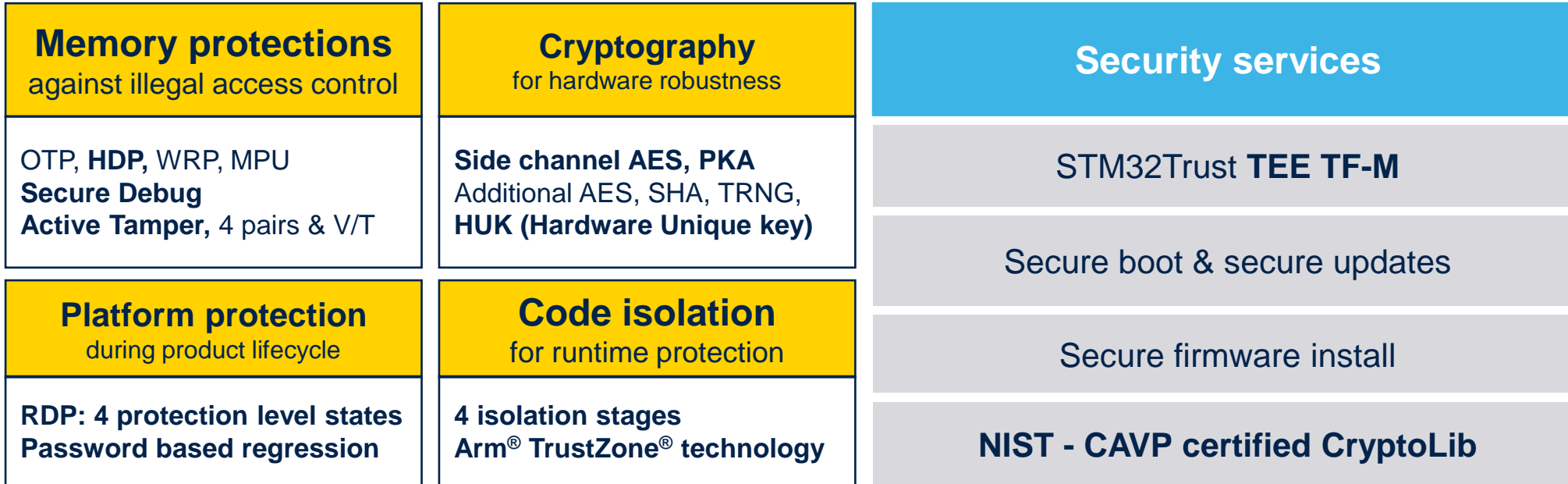
* with RTC

Make it yours

Different levels of integration so you can customize your solution



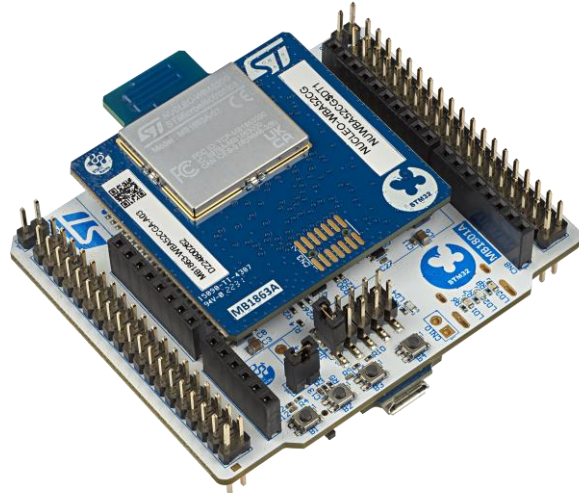
Extensive functionality to protect your assets



State-of-the-art security assurance level

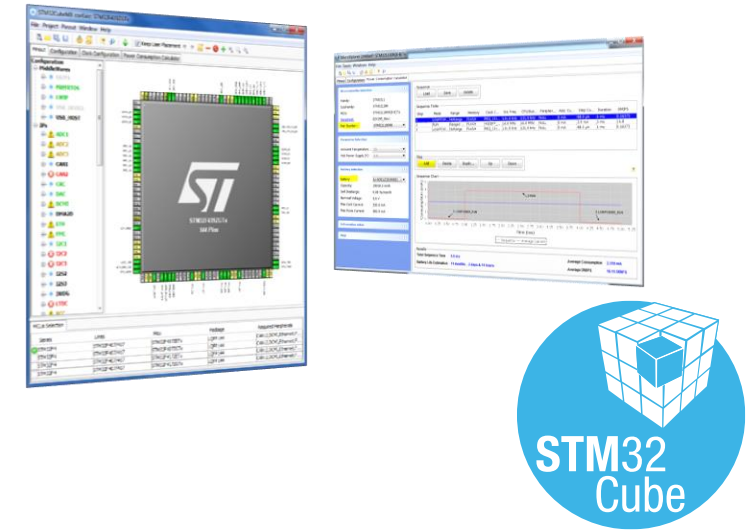


STM32WBA ecosystem simplifies your design journey



NUCLEO-WBA52CG

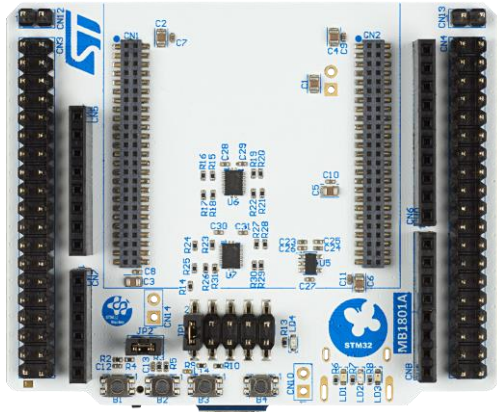
Hardware
STM32 Nucleo board



STM32CubeWBA
(connectivity + examples + peripherals)
STM32CubeMX (code generation +
power calculation)
STM32CubeMonRF
STM32CubeProg

STM32 Nucleo-64 board

Many use cases with the STM32WBA through Arduino connectivity and maximized I/O exposition



+

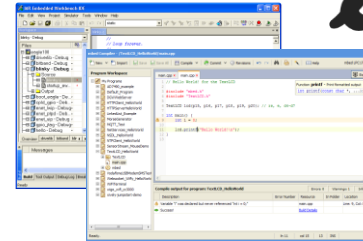
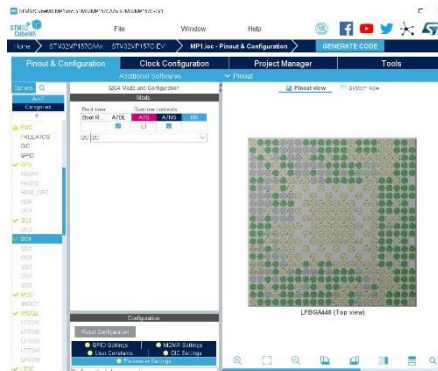


- New concept: daughter board with STM32WBA
 - UFQFN48 package, PCB antenna
- Arduino connector
- Morpho connector
- RF-certified
- RPN/CPN: NUCLEO-WBA52CG



Software tools for STM32WBA

Complete support of Arm® Cortex®-M33 architecture in Q1 2023



STM32CubeMX

Graphical tool for easy configuration

- Configure and generate code
- Peripherals and middleware configuration

IDEs Compile and debug

Simple, powerful solutions

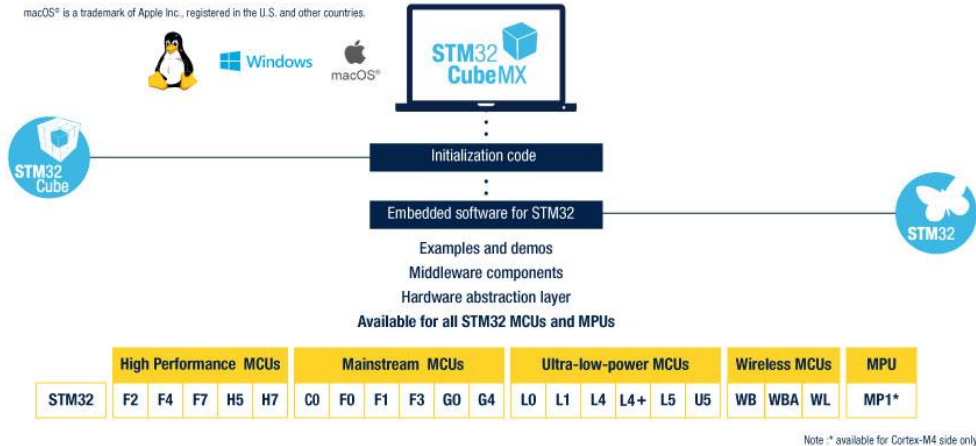
- Partners IDE (Arm® Keil®) **FREE**
- IDE based on Eclipse **FREE**
- RTOS aware debug

STM32 programming & monitoring tools

**STM32CubeProg
STM32CubeMonitor**

- Device and memory configuration
- Program the application
- Monitor variables at runtime

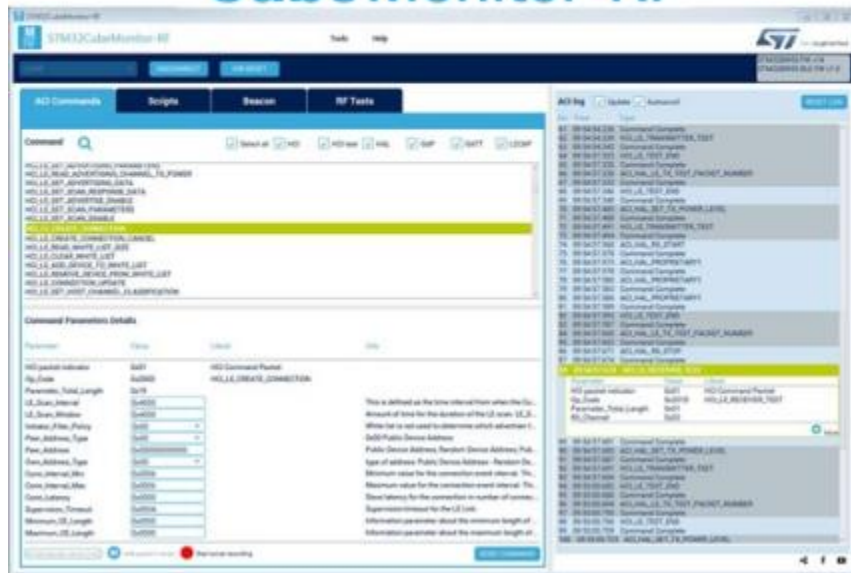
Better and more extensive radio stack support



- Enablement of the STM32_WPAN
- Integration of RTOS and radio use cases
- Configuration GUI for Bluetooth® Low Energy
- Examples generated with STM32CubeMX
- Bluetooth® Low Energy standardized and custom profiles

STM32CubeMonitor-RF

Making the lives of developers easier



- Performance monitoring
- Radio testing
- Advanced scripting capabilities
- Data logging and report generation

ST Bluetooth® Low Energy smartphone apps



ST BLE Sensor



ST BLE StarNet

ST BLE Sensor – Used with our OOB demo

Read the data exported by a Bluetooth® Low Energy device using the BlueST protocol.

ST BLE StarNet (Star topology)

View the data exported by a Bluetooth® Low Energy gateway connected to a network of devices.

ST BLE ToolBox

Discover peripherals, services, and characteristics, and perform R&W. Users can collect cloud-based analytics on the Azure App Center, bond devices, test throughput, log messages.



ST BLE Toolbox

new

STM32WBA ecosystem takeaways



- Dedicated Nucleo board for prototyping
- Full support & integration of Bluetooth® Low Energy 5.3 stacks
- Advanced RF stacks integration with STM32CubeMX
- Advanced QoL features for STM32CubeMonRF
- Mobile applications to address applicative use cases
- Resources on GitHub, including STM32 hotspot

STM32WBA takeaways



Wireless	Bluetooth® Low Energy 5.3 certified (long range, 2 Msp/s, advertising extension)
Performance	Arm® Cortex®-M33 at 100 MHz Fast wake-up time
Power efficiency	Extended battery lifetime Autonomous low-power mode
Security	TrustZone® DPA resistant
Integration	1 Mbyte of flash memory, 128 Kbytes RAM Reduced BOM
Free ecosystem	Faster time to market Enhanced design journey

Releasing your creativity



[/STM32](#)



[@ST_World](#)



[community.st.com](#)



[www.st.com/STM32WBA](#)



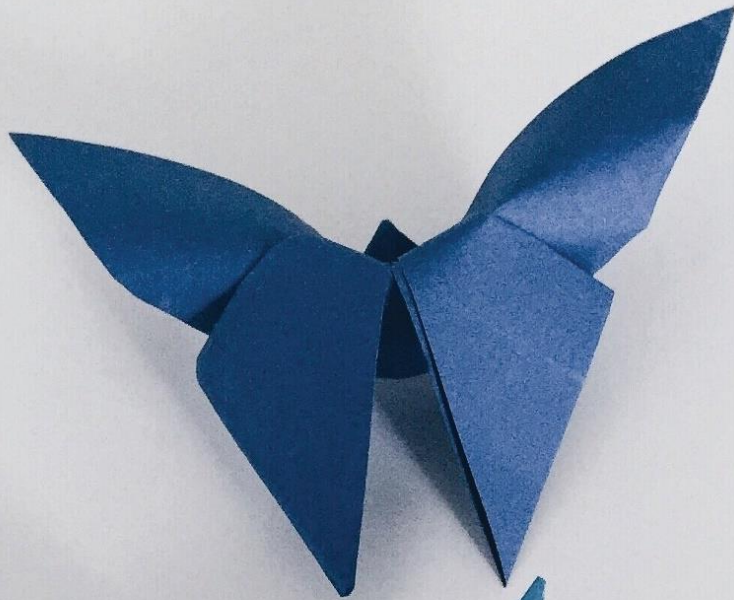
[wiki.st.com/stm32mcu](#)



[github.com/stm32-hotspot](#)



[www.st.com/stm32-mcu-developer-zone](#)



Our technology starts with You



Find out more at www.st.com/STM32WBA

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