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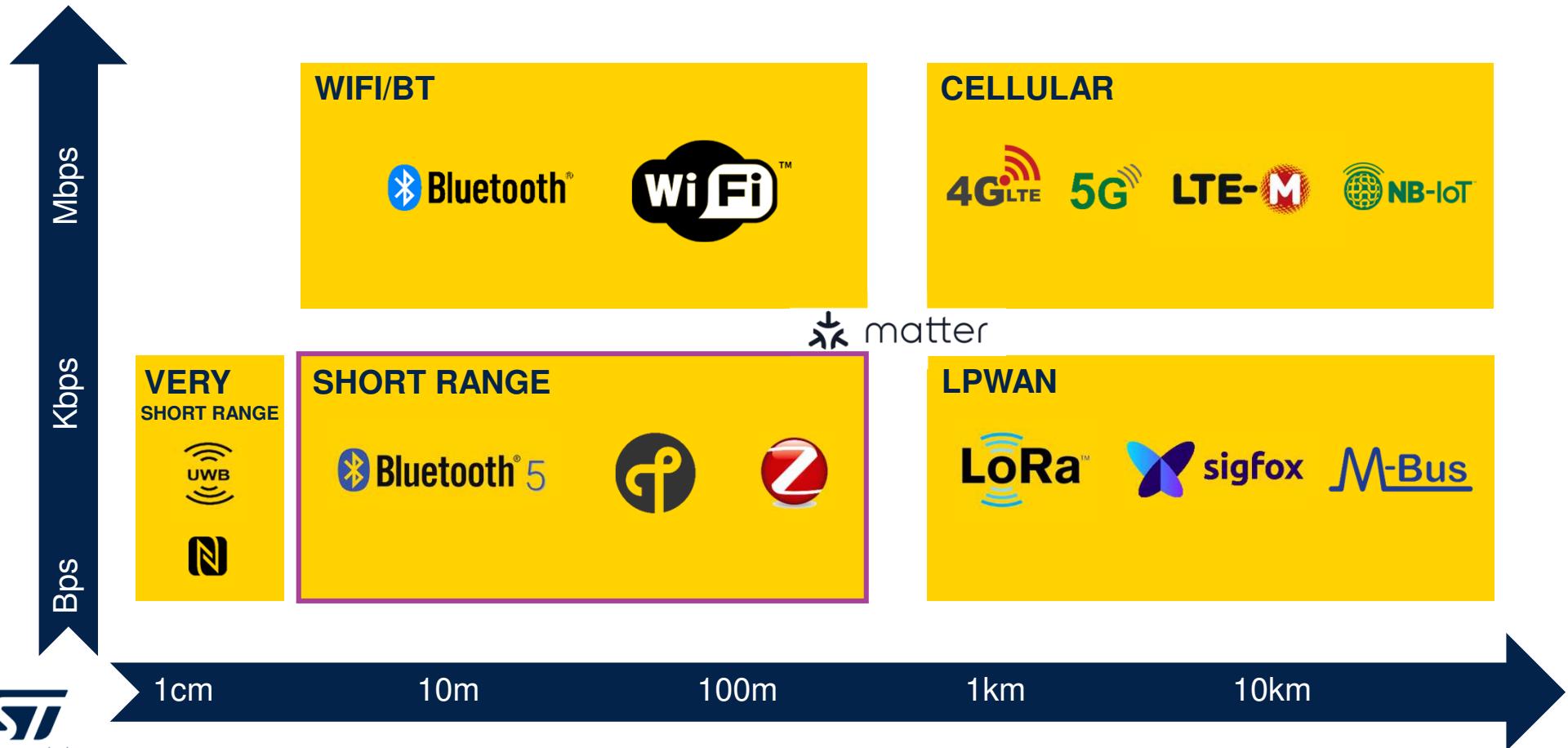
Why is STM32WBA tailored for your application ?

Product Offering

WBA Workshop Team



Communication technologies





STM32 MCU and MPU portfolio

	MPU		More than 60,000 customers Over 10 billion STM32 shipped since 2007					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
	Mainstream MCUs						STM32F2 Up to 398 CoreMark 120 MHz Cortex-M3	STM32F4 Up to 608 CoreMark 180 MHz Cortex-M4
				STM32F3 245 CoreMark 72 MHz Cortex-M4	STM32G4 569 CoreMark 170 MHz Cortex-M4	STM32H5 Up to 1023 CoreMark 250 MHz Cortex-M33		
		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			
				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
				BlueNRG-x	STM32WB 216 CoreMark 64 MHz Cortex-M4 32 MHz Cortex-M0+	STM32WBA 407 CoreMark 100 MHz Cortex-M33	Spirit1 150-956MHz / 2(G)FSK, GMSK	S2-LP (Spirit2) 413-1055MHz / 2/4(G)FSK, OOK, ASK, 802.15.4g
								STM32WL 162 CoreMark 48 MHz Cortex-M4 48 MHz Cortex-M0+
								

2.4GHz System-on-Chip (BLE & Multiprotocol SoC)

STM32WB

Dual core Arm® Cortex® M4 / M0+ & security

- Bluetooth® Low Energy 5.4 (2Mbps), Zigbee, Thread, Proprietary
- Multiprotocol, Matter

STM32WB55

STM32WB50

- Up to 1Mbytes flash
- Up to 256Kbytes RAM
- USB, LCD Driver, Quad-SPI

STM32WB35

STM32WB30

- 512KB flash
- 96KB RAM
- USB, LCD Driver, Quad-SPI

STM32WB15

STM32WB10

- 320 Kbytes flash
- 48Kbytes RAM
- *excluding 802.15.4*

STM32WBA

Arm® Cortex® M33 w/ TrustZone® @100MHz

- Bluetooth® Low Energy 5.4 (long-range, 2Mbps, advertising extension), Zigbee, Thread, Proprietary
- Multiprotocol, Matter (gateway)

- Up to 1Mbytes flash
- Up to 128Kbytes RAM
- Up to +10dBm output power
- Enhanced security
- SMPS/ LDO

BlueNRG

Single core Arm® Cortex® M0 @32MHz or M0+ @64MHz

- Bluetooth® Low Energy

BlueNRG-1*

- 160Kbytes flash
- 24Kbytes RAM
- Bluetooth® Low Energy 5.2

BlueNRG-2*

- 256Kbytes flash
- 24Kbytes RAM
- Bluetooth® Low Energy 5.2

BlueNRG-LP

- 256Kbytes flash
- 64Kbytes RAM
- Bluetooth® Low Energy 5.3, (long-range, 2Mbps, adv. ext.)

BlueNRG-LPS

- 192Kbytes flash
- 24Kbytes RAM
- Bluetooth® Low Energy 5.3 (long-range, 2Mbps, adv. ext., AoA/AoD, Isochronous Ch.)

STM32WB09

- 512Kbytes flash
- 64Kbytes RAM
- Bluetooth® Low Energy 5.3 (long-range, 2Mbps, adv. ext., AoA/AoD, Isochronous Ch.)
- up to 8dBm output power

*: Arm® Cortex® M0



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Addressing the full 2.4 GHz market

ST Wireless Value proposition

Bluetooth®5



Wearable, healthcare, smart appliances

- Security
- Interoperability
- BT SIG Standard

Bluetooth Mesh



Sensor networks, home appliances, industrial

- Mesh topology
- Large scale
- BT SIG Standard

2.4 GHz proprietary



Toys, gaming, remote controllers

- Open radio
- Low latency
- High throughput



Sensor networks, home appliances, industrial

- Mesh topology
- Large scale
- Open Standard

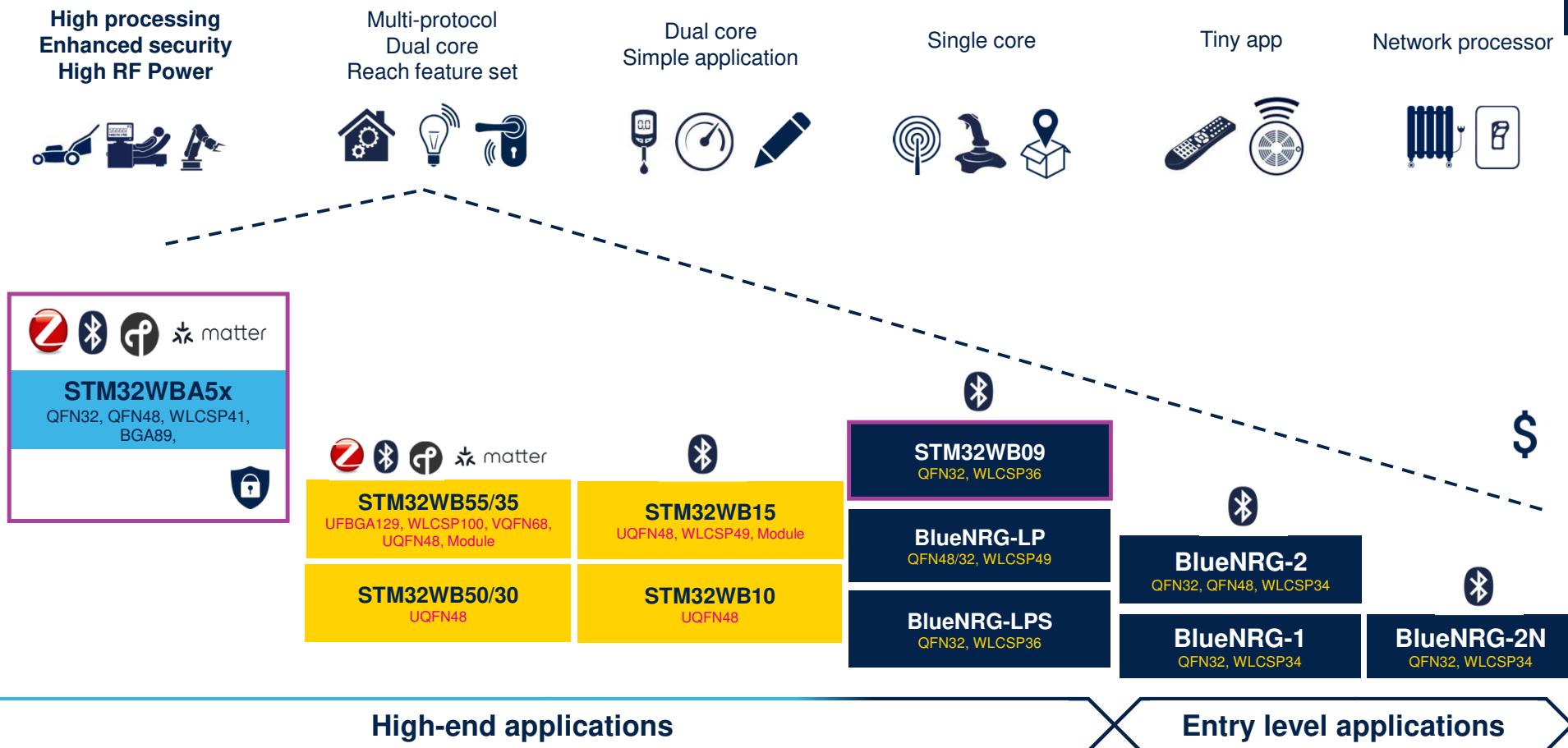


Sensor networks, industrial, home automation

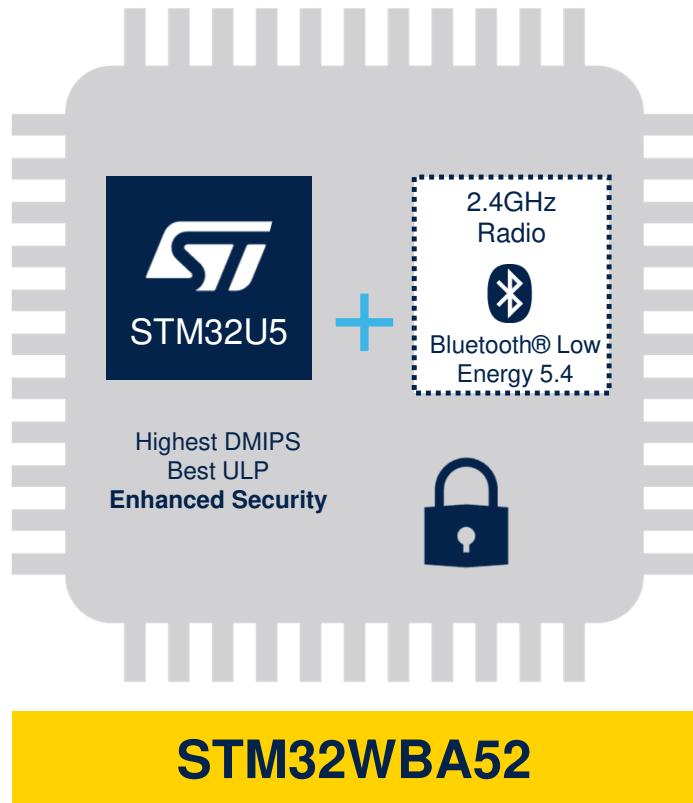
- Mesh topology
- Large scale
- Zigbee Compliant

Product positioning

PERFORMANCE



An ultralow power Bluetooth® Low Energy 5.4 platform



- **Bluetooth® Low Energy 5.4**
- Based on **Arm® Cortex®-M33** at 100MHz
- TrustZone® technology, **SESIP Level 3**
- **407 CoreMark score**
- Leveraging **STM32U5 ultra-low-power platform**
 - flexible power-saving states with fast wake-up times
 - GP-DMA and BAM support
 - same digital and analog peripherals
- Built using **40nm process technology**
- Supported by full **ecosystem**

STM32WBA52, a versatile product

Lighting

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



Industrial devices

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



Beaconing and sensors

- **Beacon** profile available
- **Bluetooth® Low Energy, long-range** capable
- **Embedded balun + matching** to minimize cost
- Up to **+10 dBm** output power
- 1.25µA Standby mode with RAM (SMPS ON)
- Down to 1.71V power supply (full feature)



Home automation

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



Fleet maintenance

- Retrofit legacy product to **Bluetooth 5.4**
- Remotely upgrade device with **OTA capability**
- **Brand protection** with authenticated FW upgrade
- **IoT protection ready**



Fitness / healthcare

- **Multipoint** Bluetooth® Low Energy, Battery lifetime care with **< 140 nA** standby mode
- Dynamic efficient **28µA/MHz** (SMPS)
- Support **BAM acquisition mode**
- Handle advanced algorithm with **1 Mbyte** flash

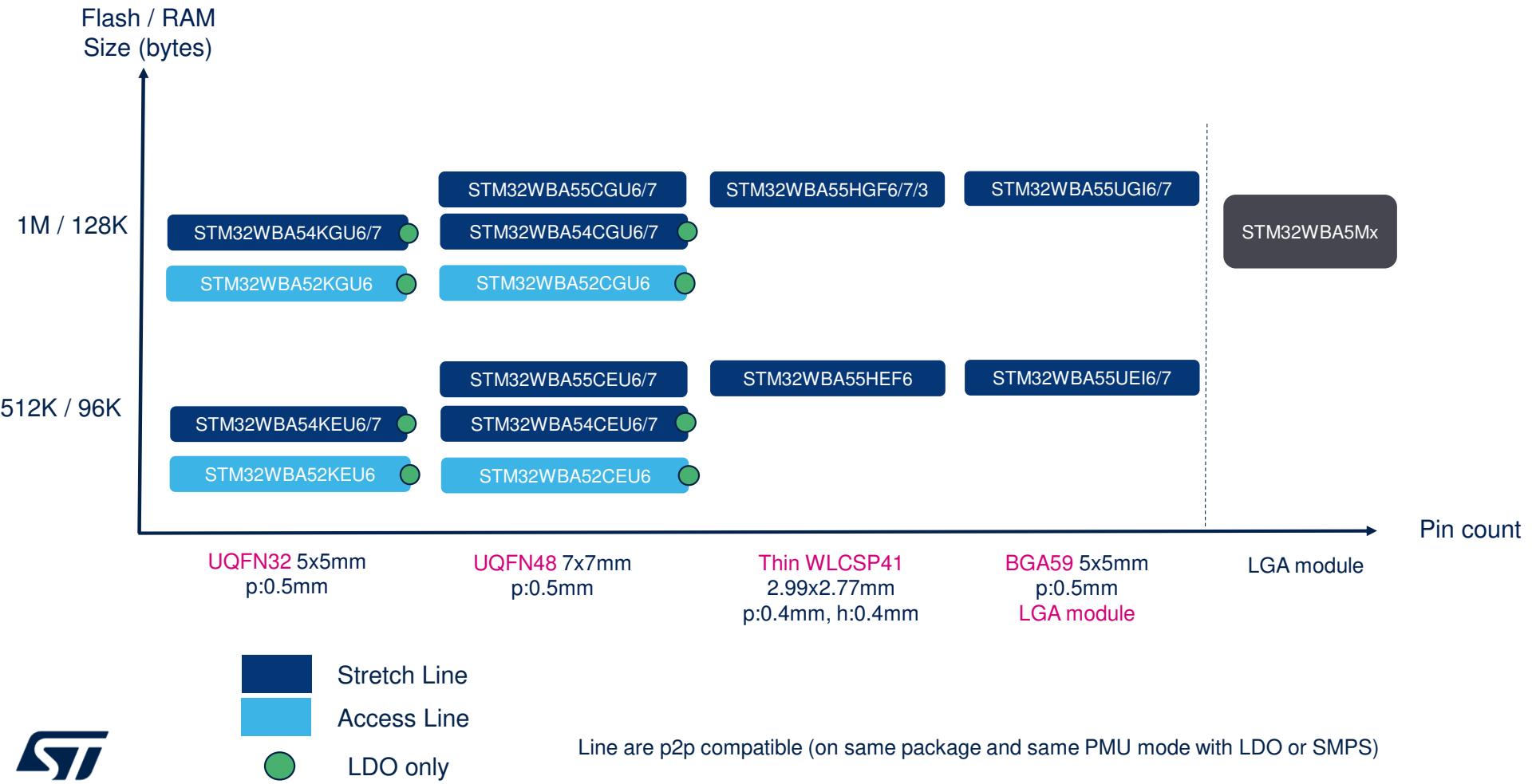
STM32WBA5x Product lines

ARM Cortex-M33 (DSP + MPU + TZ) - 100 MHz		Product line	Flash (KB)	RAM (KB)	Connectivity					Security	RF perf	PMU
					BLE	Zigbee	Thread	2.4GHz Proprietary	Other			
					STM32WBAX							
<ul style="list-style-type: none"> ARM Cortex – M33 CPU max 100MHz ART Accelerator Integrated Balun Adaptative Antenna Matching Max output power: +10dBm 16-bit Motor Control timer 32-bit timer 1x ADC 12-bit Capacitive touch 2x Comparator 4-in-1 Temperature sensor Low voltage 1.7 to 3.6V LDO or DC/DC Internal RC +/- 1% <p>Feature support depending on Lines</p>		STM32WBA55 <i>Stretch Line</i>	Up to 1024K	Up to 128K	BLE 5.4	▪	▪	▪	2x USART 2x SPI 2x I2C 1x SAI [-40; 105]°C	Trust Zone AES 256-bit SHA2-256 PKA, SKS, PCK HUK, TRNG, SFI, SBSFU Unique ID	+10dBm	SMPS + LDO
		STM32WBA54 <i>Stretch Line</i>	Up to 1024K	Up to 128K	BLE 5.4	▪	▪	▪	2x USART 2x SPI 2x I2C [-40; -105]°C	Trust Zone AES 256-bit SHA2-256 PKA, SKS, PCK HUK, TRNG, SFI, SBSFU Unique ID	+10dBm	LDO (+4 GPIO)
		STM32WBA52 <i>Access Line</i>	Up to 1024K	Up to 128K	BLE 5.4				2x USART 2x SPI 2x I2C [-40; 85]°C	Trust Zone AES 256-bit SHA2-256 PKA, SKS, PCK HUK, TRNG, SFI, SBSFU Unique ID	+10dBm	LDO

STM32WBA55 will support Isochronous Audio Channels (Q1-24)

SAI: Serial Audio Interface

STM32WBA5x Portfolio



STM32WBA5x ID Card

Architecture

- Up to 1MB Flash / 128KB RAM
- Single Core M33 TZ 100MHz
- 28µA/MHz (active mode @ 3.0V SMPS)
- 1.25µA ULP mode w/ 64KB RAM, RTC, Radio operation
- [-40; +105]°C full spec; [-40; +125]°C reduced spec

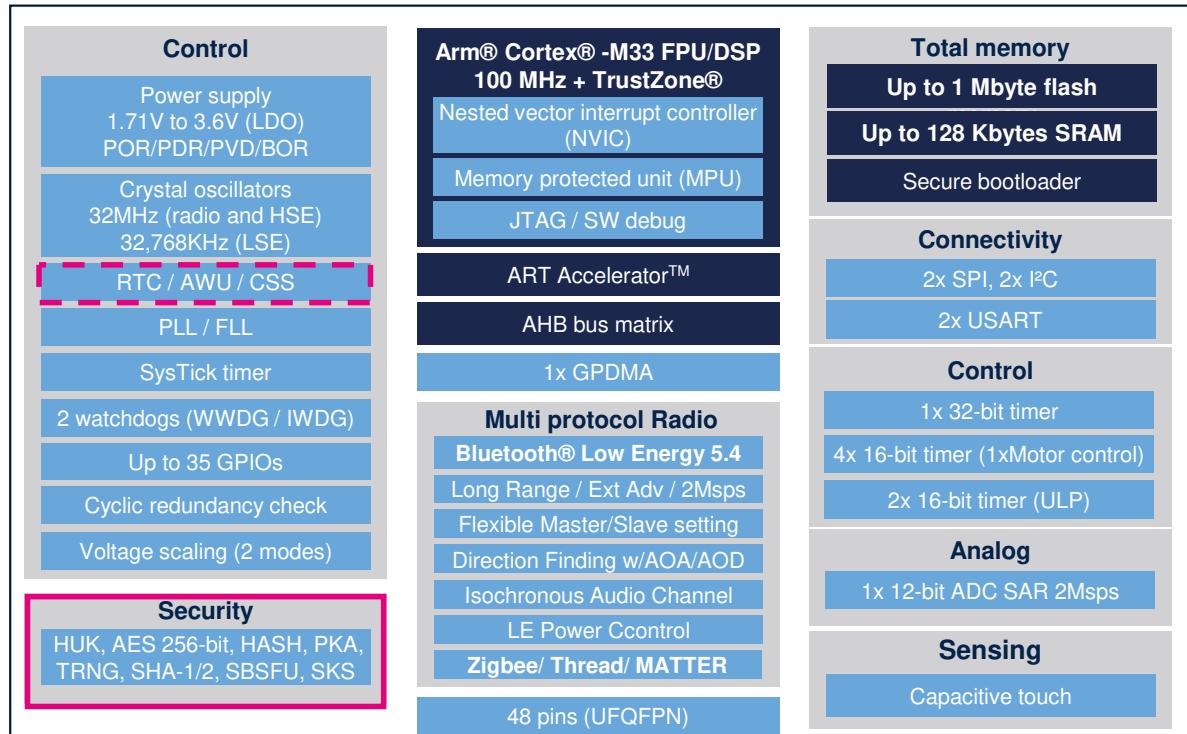
Radio key features

- **+10dBm** max output power + ext PA support
- **TX=5.4mA** (0dBm) / **RX = 3.9mA** (3.3V SMPS)
- Bluetooth LE 5.4, Mesh, up to 20 connections
- Zigbee (3.0, Zigbee Direct, SE, GP)
- Thread (OT 1.3)
- MATTER
- Proprietary 2.4GHz
- Concurrent mode (BLE/ZB, BLE/OT, BLE/MAC)

Packages

Packages	GPIOs
QFN32	20
QFN48	35 / 31 (SMPS)
WLCSP41	20
BGA59	35

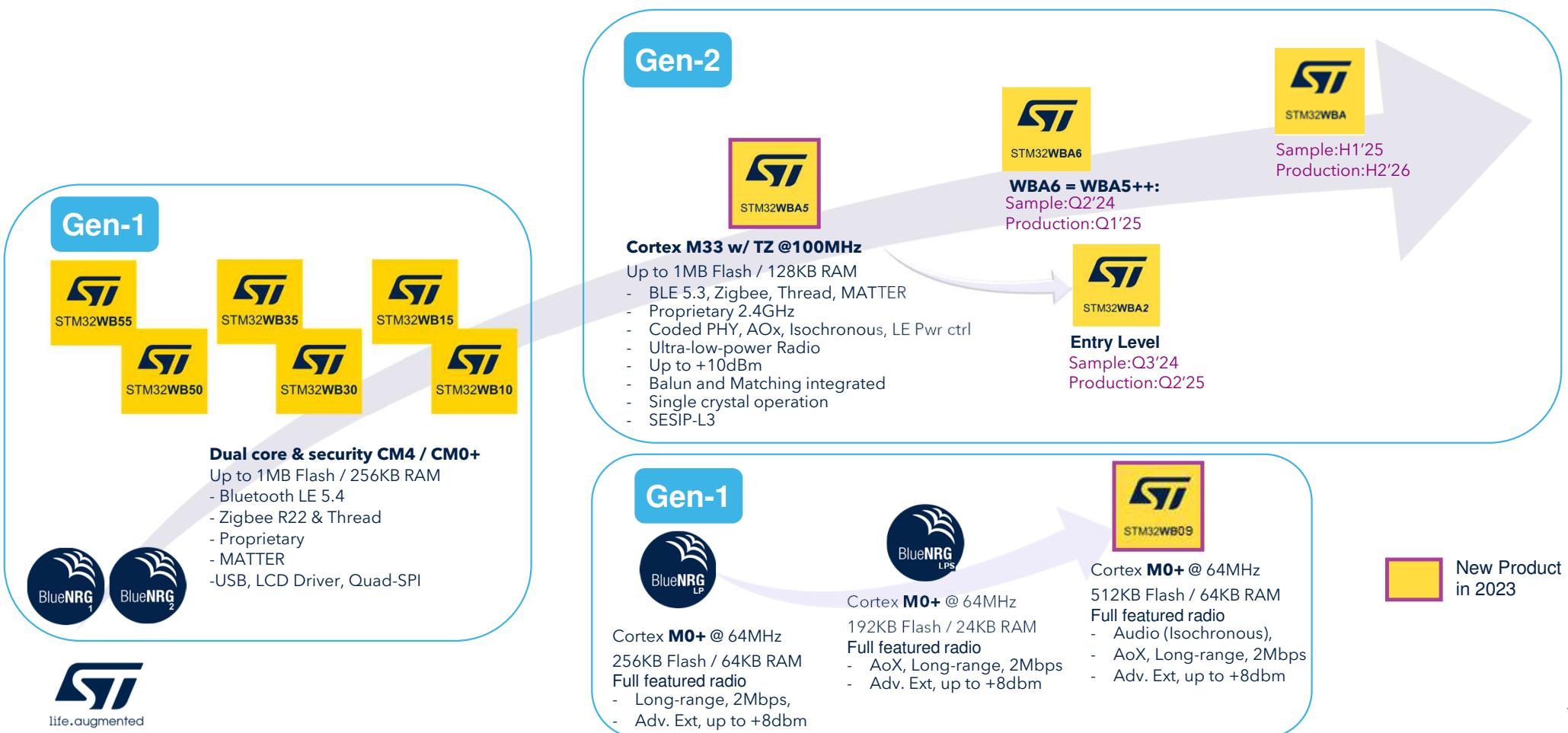
STM32WBA52 / STM32WBA54 / STM32WBA55 / STM32WBA5M



— Side channel attack
- - - Active antitamper



STM32 wireless 2.4GHz roadmap





Stronger security

Extensive functionality to protect your assets

Memory protections against illegal access control

OTP, HDP, WRP, MPU
Secure Debug
Active Tamper, 4 pairs & V/T

Cryptography for hardware robustness

Side channel AES, PKA
Additional AES, SHA, TRNG,
HUK (Hardware Unique key)

Platform protection during product lifecycle

RDP: 4 protection level states
Password based regression

Code isolation for runtime protection

4 isolation stages
Arm® TrustZone® technology

Security services

STM32Trust **TEE TF-M**

Secure boot & secure updates

Secure firmware install

NIST - CAVP certified **CryptoLib**



target certifications

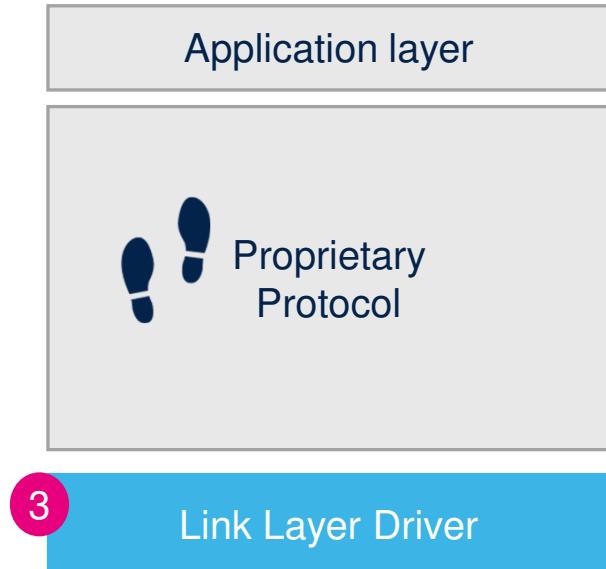
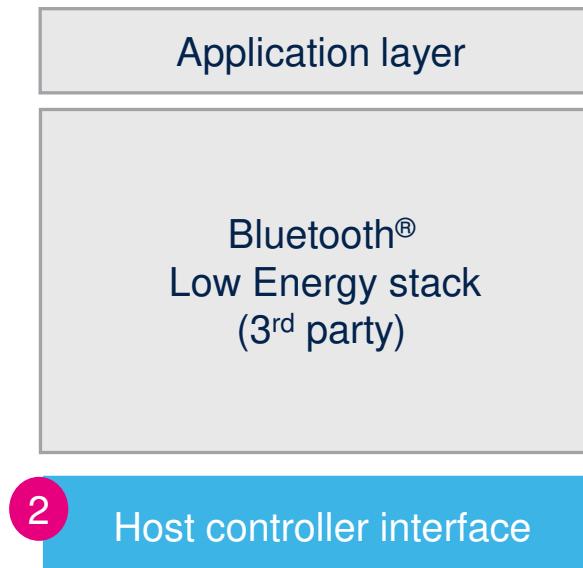
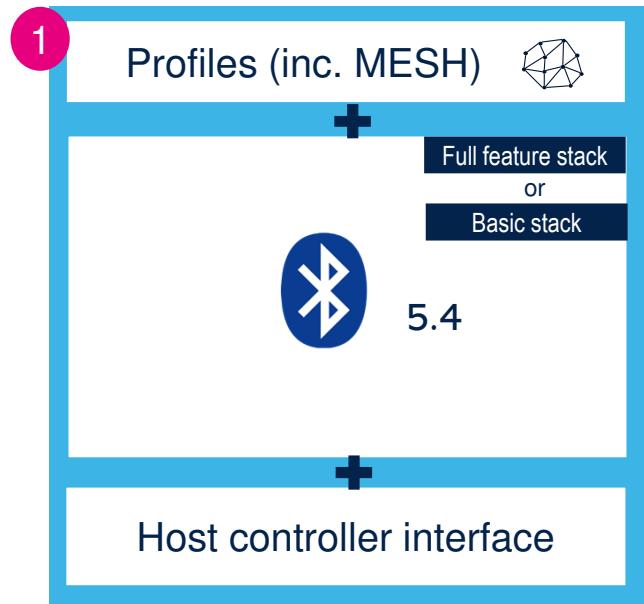
State-of-the-art security assurance level



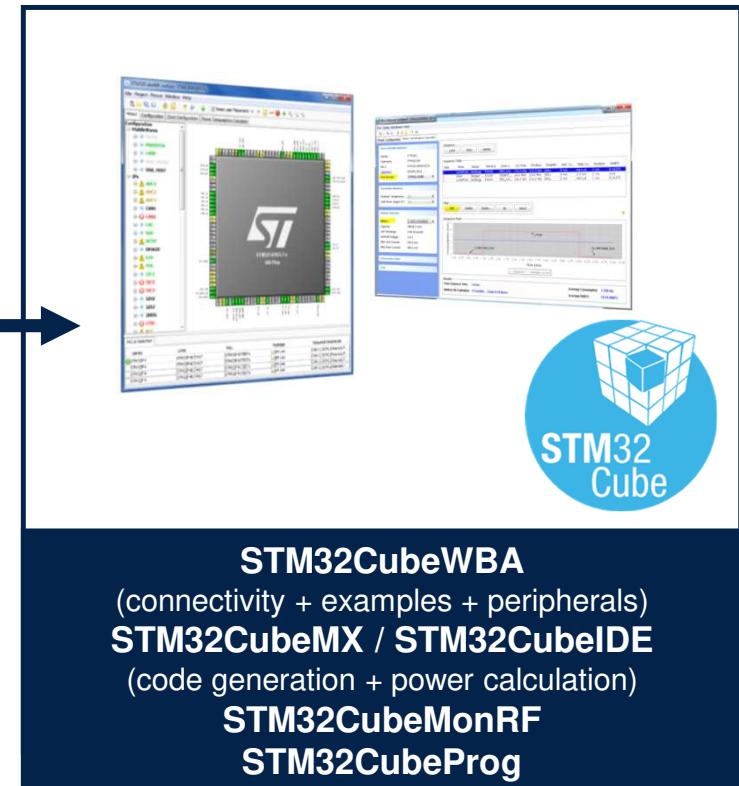
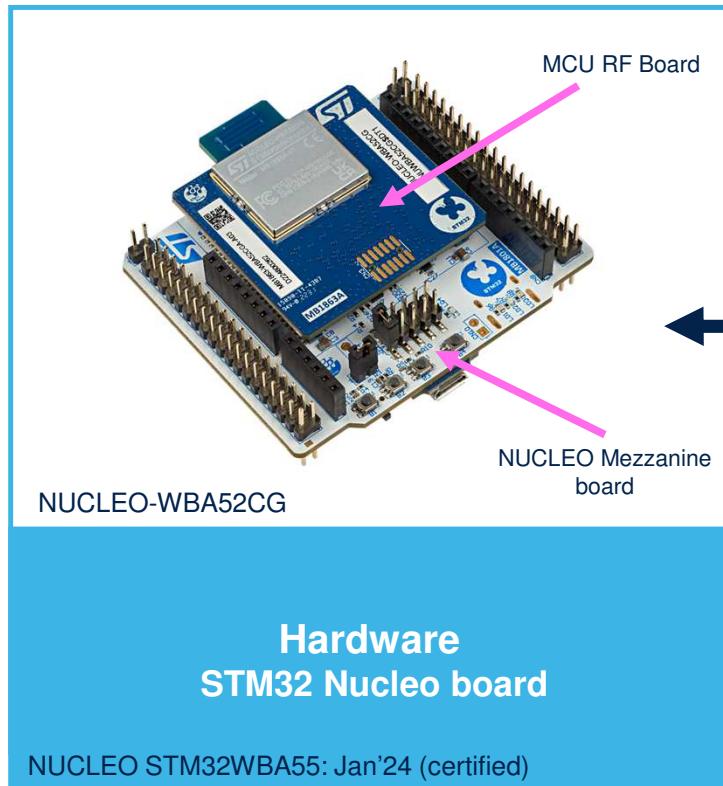
Note: New features for STM32WBA are highlighted in **bold**

Bluetooth LE stack offerings, not just one

Different levels of integration so you can customize your solution



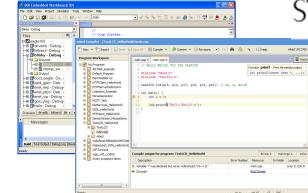
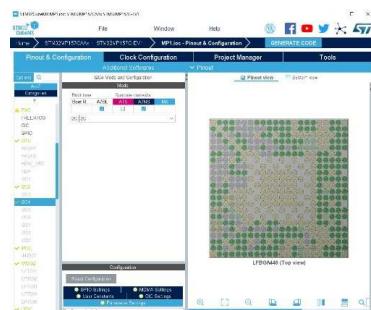
STM32WBA ecosystem simplifies the design journey





Software tools for STM32WBA

Complete support of Arm® Cortex®-M33 architecture



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®)
- IDE based on Eclipse
- RTOS aware debug

STM32 programming & monitoring tools

STM32CubeProg
STM32CubeMonitor-RF

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

2.4GHz Module Offering

BlueNRG-M0L BlueNRG-M0A



Based on **BlueNRG-MS**

- BLE4.2 certification
- 64KB Flash / 12KB RAM
- DCDC
- +8dBm
- 2 layers PCB
- Size: 11.5 x 13.5mm
- CE, FCC, IC , TYPE, BQE, WPC

STM32WB5M



Based on **STM32WB55VGY**

- **World 1st STM32 2.4 GHz SIP**
- Dual-Core
- All-in-one BLE 5.4, Zigbee 3.0, OpenThread 1.3
- MATTER Ready
- 1MB Flash / 256KB SRAM
- 2 layers PCB, crystal included
- Size: 11x7.3mm
- FCC, CE, NCC, JRF, KC, SRRC, ISED, GOST

BlueNRG-M2SA BlueNRG-M2SP



Based on **BlueNRG-2**

- BLE5.2 certification
- 256KB Flash / 24KB RAM
- DCDC
- +8dBm
- Up to 14 GPIOs
- CE, FCC,IC ,TYPE, BQE, WPC, SRRC, KCC

STM32WB1M



Based on **STM32WB15CCY**

- Tiny SIP form factor - Cost affordable
- Dual-Core
- BLE 5.4, Built-in FUS
- 320KB Flash, 48KB SRAM
- 2 layers PCB, crystal included
- Size: 10x6.5mm
- Possibility to connect to external antenna
- FCC, CE, NCC, JRF, KC, SRRC, ISED, GOST

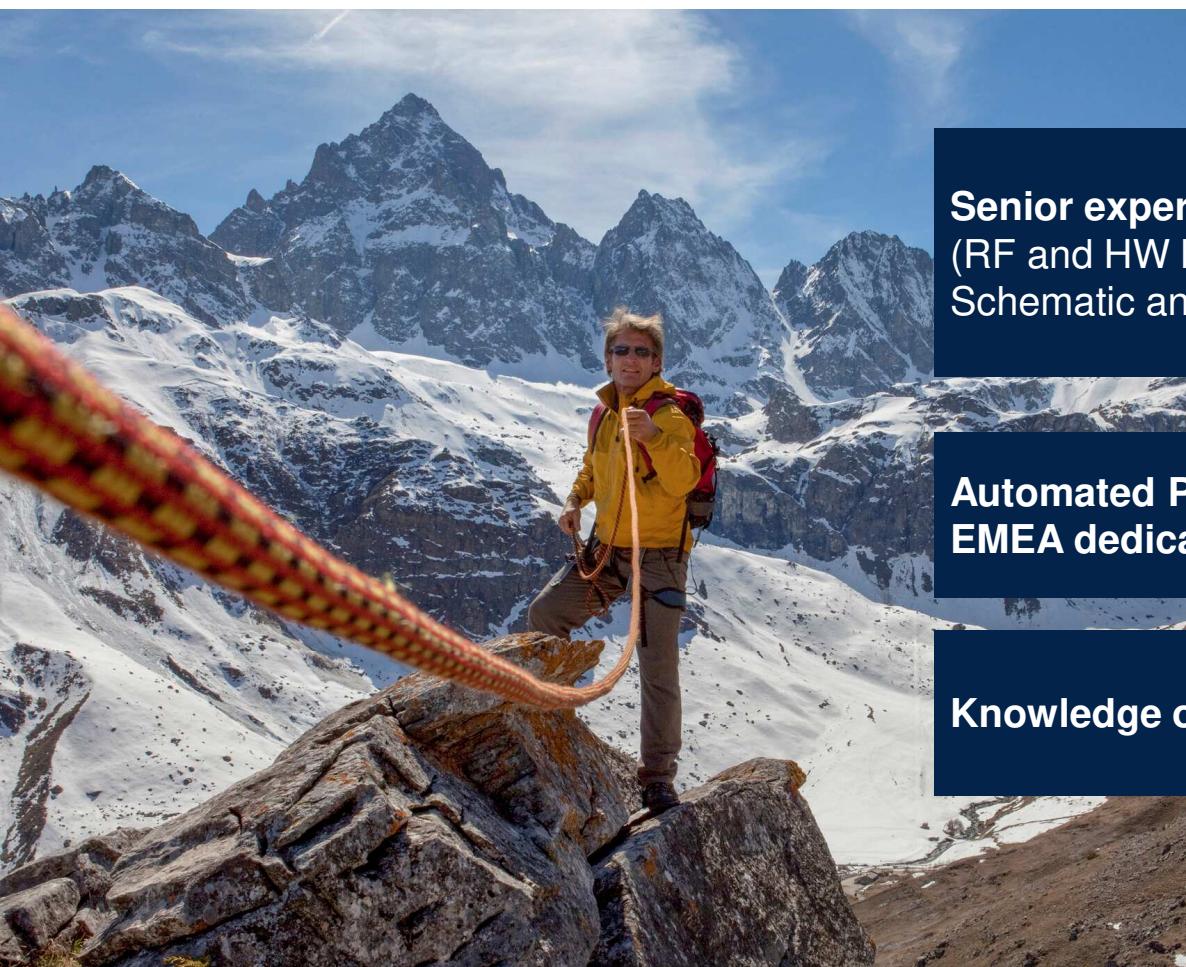
STM32WBA5Mx Module with STM32WBA is under preparation (june'24)

STM32WBA ecosystem takeaways



- Dedicated Nucleo board for prototyping
- Full support & integration of Bluetooth® Low Energy stacks
- Advanced RF stacks integration with STM32CubeMX
- Advanced QoL features for STM32CubeMon-RF
- Mobile applications to address applicative use cases
- Supporting resources on GitHub, including STM32 Hotspot

What you can expect from our wireless support team



Senior expertise in wireless communication
(RF and HW bring-up services, SW and HW debugging,
Schematic and layout review)

Automated Pre-certification capabilities
EMEA dedicated application labs

Knowledge on your application

... in a fast and agile way

Free of Charge

Your wireless journey and how We can help

Support you to make the right choice

Make sure your choice was the right one

ST Product selection

- Training
- Benchmark
- Datasheet review

ST Product evaluation

- Eval kit bring-up
- Performance review

SW and HW Development

- Schematic review
- Layout review
- Software porting
- 1st PCB bring-up
- 1st RF test report
- Debugging

Testing and certification

- Regional RF test report
- Protocol RF tests
- Corner case debugging
- Certification process guidance

Industrialization

- RF Production tooling
- Ramp-up support

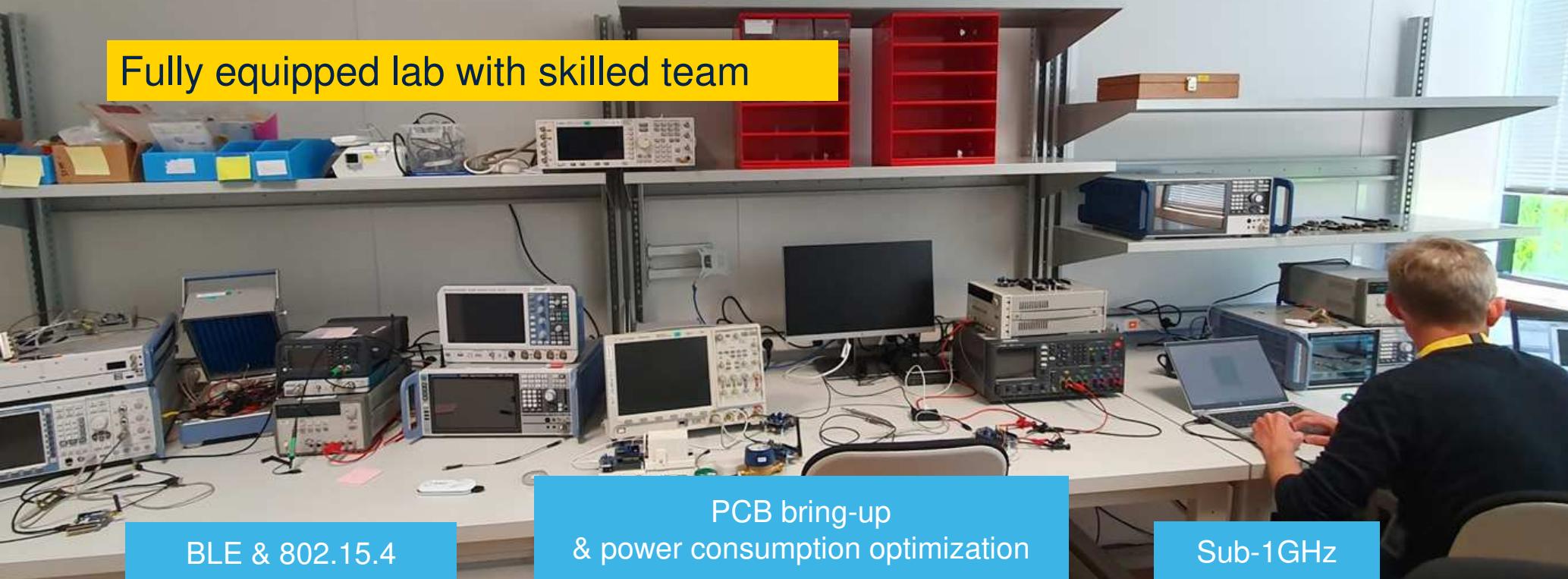
Don't wait too long to ask for any support.

The sooner the better!!

Please contact: ST MCU Marketing or FAE to get in touch with our RF lab services

We look forward to receive your PCB !

Fully equipped lab with skilled team



BLE & 802.15.4

PCB bring-up
& power consumption optimization

Sub-1GHz



matter

Bluetooth®

zigbee

THREAD



LoRa™

NFC

M-Bus
wireless

STM32WBA52 takeaways



Wireless	Bluetooth® Low Energy 5.4 certified (long range, 2 Msps, advertising extension)
Performance	Arm® Cortex®-M33 @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 & RF support	Faster time to market Enhanced design journey

STM32WBA Workshop Demos

On top of BLE, ST is addressing the full 2.4 GHz market

Multi fabric Matter

STM32WB5MM-DK

- Matter over Thread network
- Commissioning



Bluetooth LE audio

STM32WBA55-DK1

- Audio broadcast with Bluetooth LE low latency
- 2x Audio sources, 1 sink



Market launch: March'24

Power Consumption & OTA

NUCLEO-WBA55

- Power consumption with STM32Cube power monitor
- OTA demo



Our technology starts with You



Find out more at www.st.com/STM32WBA

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