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Welcome to

STM32WB0 series workshop

Introduction of STM32WB0 a flexible and cost-effective Bluetooth® Low Energy 5.4 connectivity

Workshop team

The STM32 portfolio

Five product categories

Wireless MCU

Short- and long-range connectivity

Ultra-low-power MCU | **Mainstream MCU** | **High-performance MCU**

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

Embedded MPU

32- and 64-bit microprocessors





Enabling edge AI solutions

Scalable security

MPU portfolio

MCU portfolio

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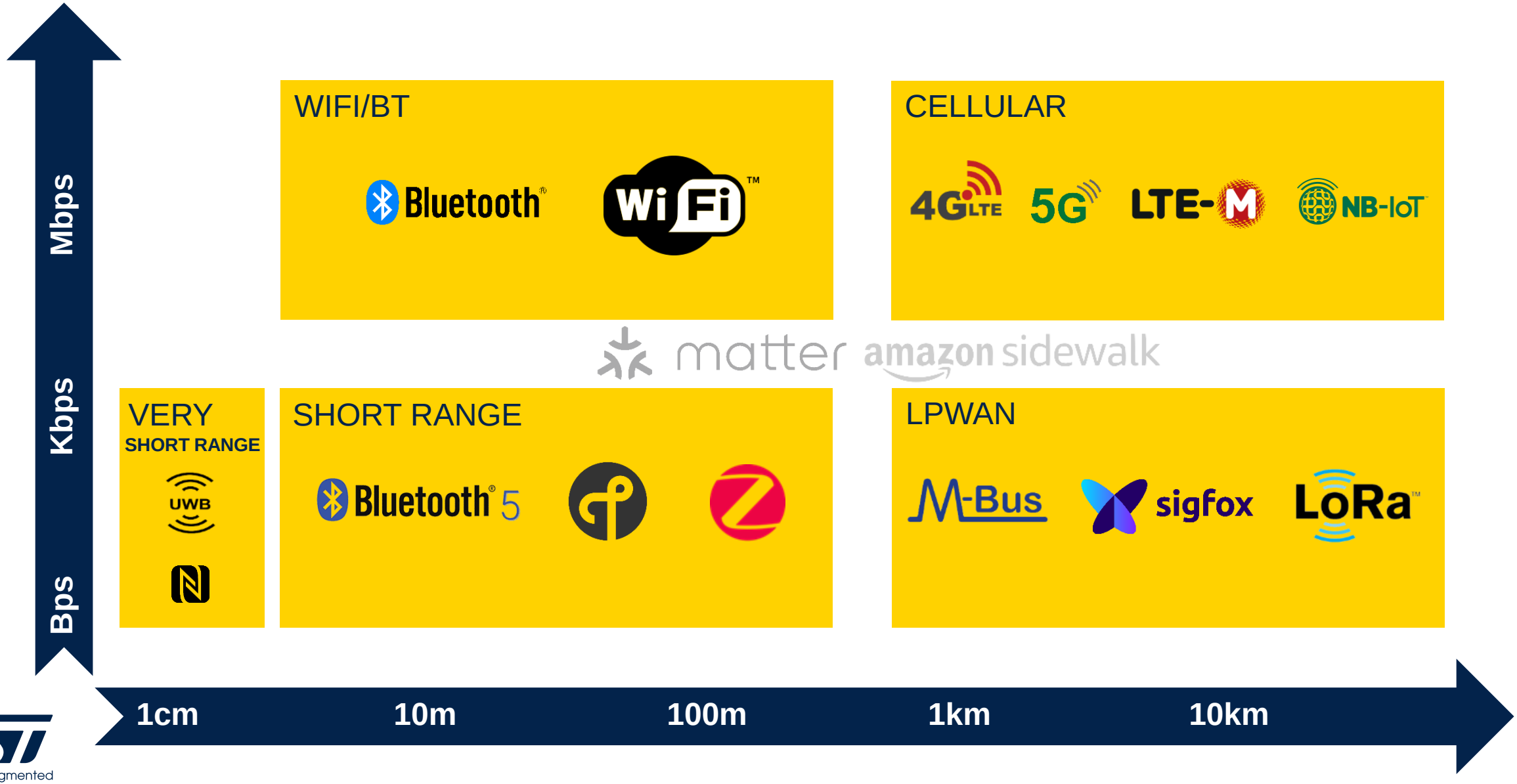
Communication technologies



Bluetooth® Low Energy enables new applications

Smart home
Lights, thermostats, sensors

Fitness tracking
Smartwatches

Electronic shelf labeling
Pricing and product details

Digital key
Smartphone as secure key

Item finding
Personal property tags

Audio
Broadcast, hearing aids

PoI information
Proximity marketing

Indoor positioning
Wayfinding

RTLS
Asset tracking

Networked lighting control

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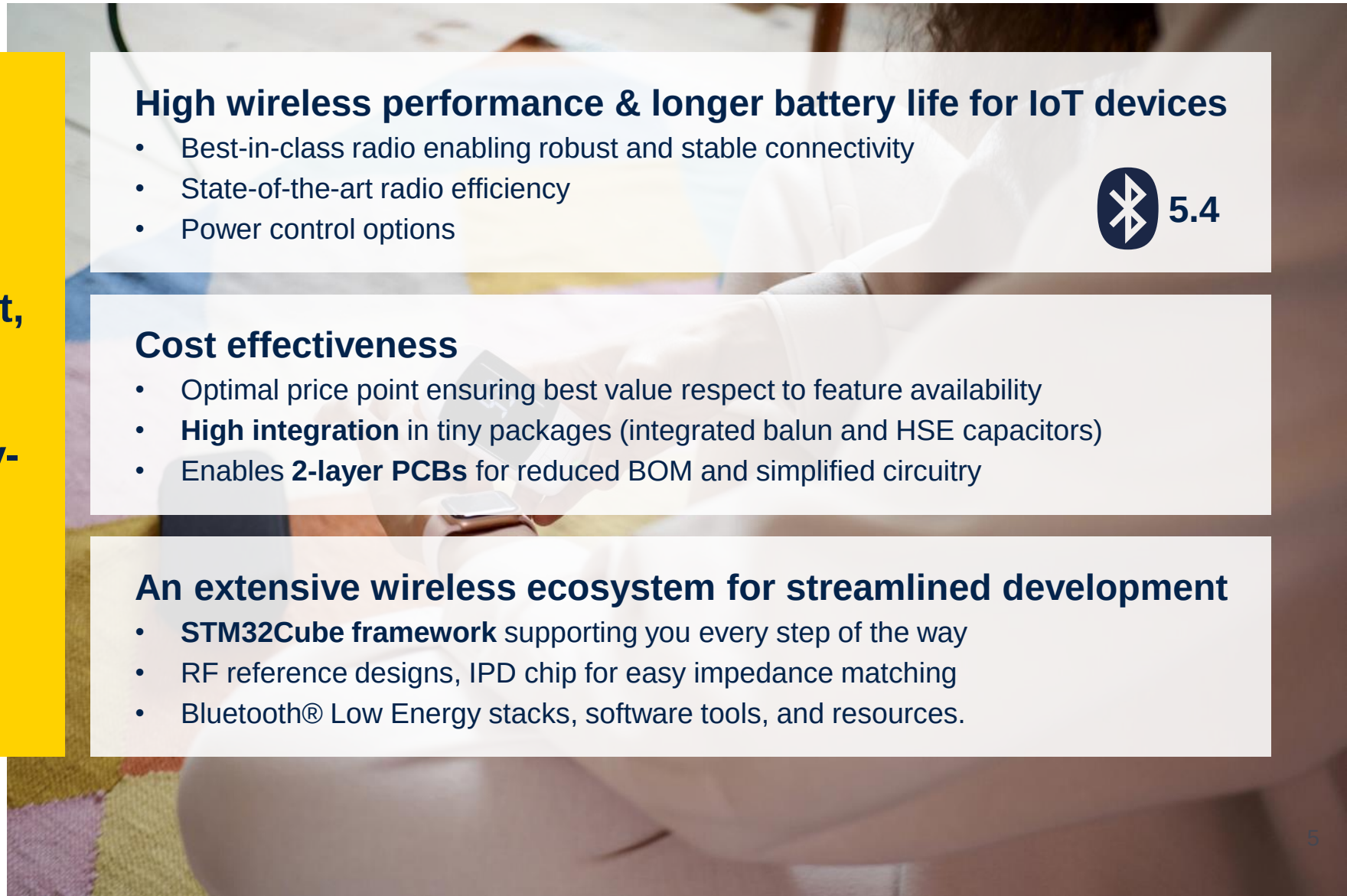
What the STM32WB0 series offers

Reliable wireless performance in a compact, energy-efficient design.

Ideal for cost- and energy-sensitive wireless applications.



High wireless performance & longer battery life for IoT devices

- Best-in-class radio enabling robust and stable connectivity
- State-of-the-art radio efficiency
- Power control options

Bluetooth 5.4

Cost effectiveness

- Optimal price point ensuring best value respect to feature availability
- **High integration** in tiny packages (integrated balun and HSE capacitors)
- Enables **2-layer PCBs** for reduced BOM and simplified circuitry

An extensive wireless ecosystem for streamlined development

- **STM32Cube framework** supporting you every step of the way
- RF reference designs, IPD chip for easy impedance matching
- Bluetooth® Low Energy stacks, software tools, and resources.

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STM32 portfolio for 2.4 GHz connectivity

STM32WB series

5.4

MCUs

- STM32WB55
- STM32WB35
- STM32WB15
- STM32WB50
- STM32WB30
- STM32WB10

Modules

- STM32WB5M
- STM32WB1M

STM32WBA series

5.4

amazon sidewalk

MCUs

- STM32WBA54/55
- STM32WBA52

Module coming soon

BlueNRG series

5.2 to 5.4

MCUs

- BlueNRG-1
- BlueNRG-2/2N

Module

- BlueNRG-M2SP/SA

STM32WB0 series

5.4

from $0.79* today

MCUs

- BlueNRG-LPS » STM32WB05
- BlueNRG-LP » STM32WB06 / STM32WB07, STM32WB09

Network coprocessor

- STM32WB05xN

(*) Suggested Resale Price (USD) of STM32WB0 per 10,000 units, for BUDGETARY USE ONLY. For quotes, please contact your local ST Sales office or our distributors

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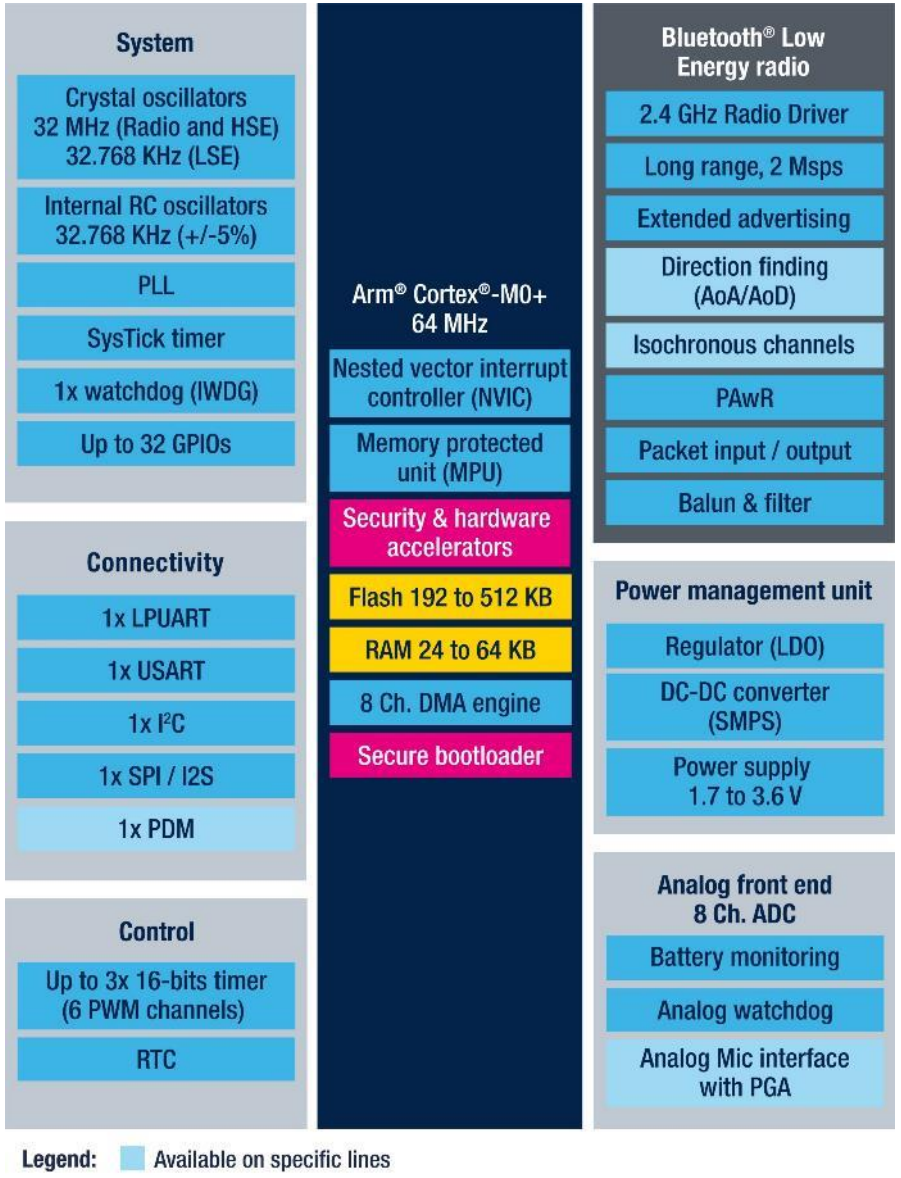
STM32WB0 Application Processor block diagram



Reliable wireless performance

Security & hardware accelerators

Flexible memory

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STM32WB0 security features

The security essentials for enabling Bluetooth® Low Energy connectivity

Code & data protection

Arm Cortex-M0+ with memory protection unit
8 unified protection regions
NVM R/W protection

Platform protection
incl. product lifecycle

Serial wire debug (SWD) disabling
Secure bootloader

Cryptography for hardware robustness

AES Accelerator
128-bit
Random number generator (RNG)

Public key accelerator
RSA, DH, ECC

Security services

Secure boot

Secure firmware update

STM32 Cryptolib (planned)

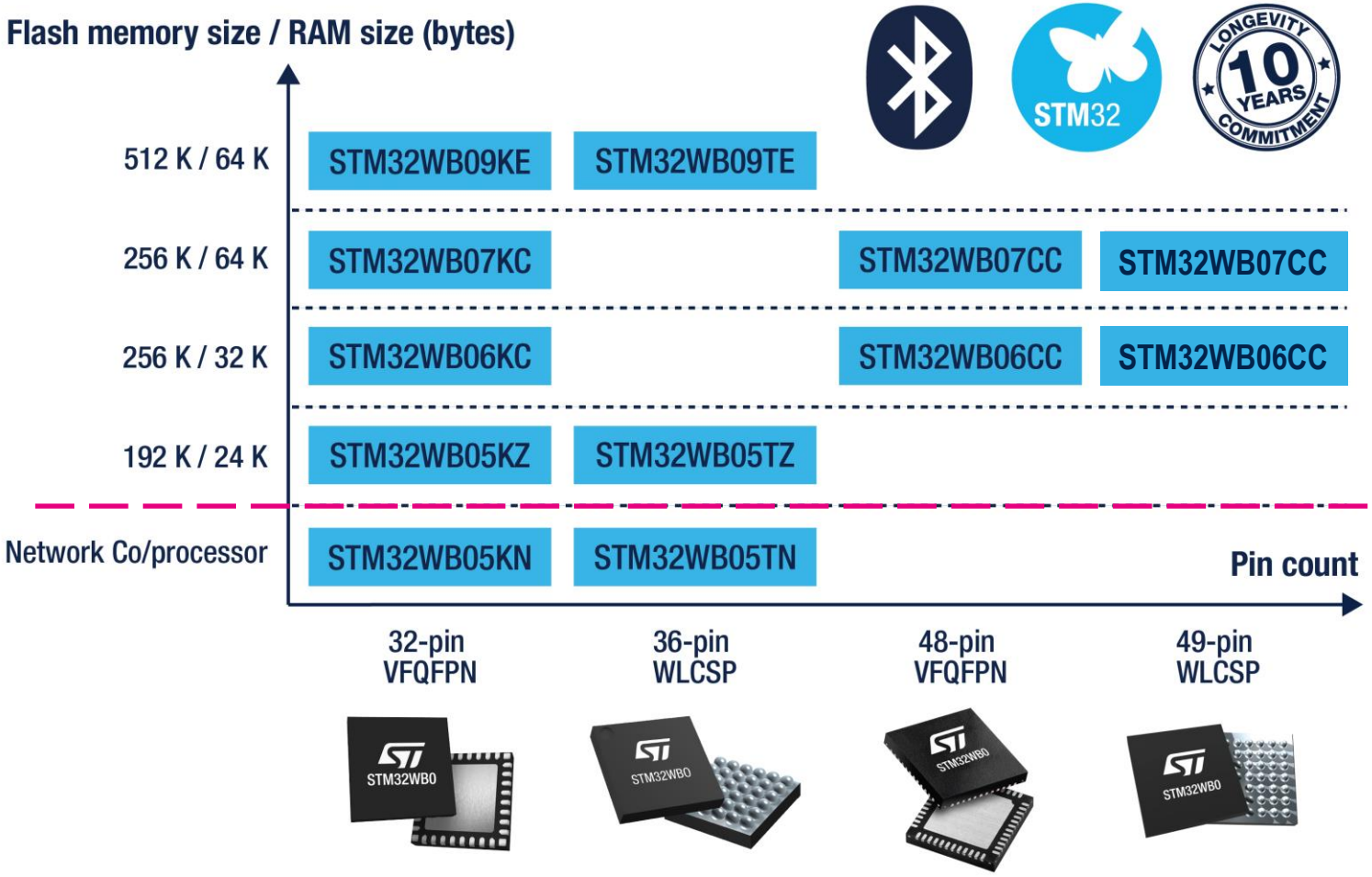
Entry-level security platform

target certifications

EU RED & CRA

psacertified™ level one

STM32WB0 series portfolio



Application Processor - SoC

STM32WB09

Cortex-M0+, 64MHz
512KB/64KB

BLE5.4 certified
Long Range, 2Mbps,
AoA/AoD, **PAwR**, Adv ext

STM32WB07

STM32WB06

STM32WB05

Network Coprocessor

STM32WB05xN

Cortex-M0+, 64MHz

BLE5.4 certified
Long Range, 2Mbps,
Adv ext

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Many application possibilities

INDUSTRIAL

- **Long range capabilities, up to 1+ km**
- Up to **105°C** extended temperature range
- **Low Latency** support for proprietary protocol support
- 19 nA in shutdown mode
- 20 I/Os with wake-up capabilities
- Security features
- 10-year commitment program

FITNESS

- **8 dBm output power**
- Multipoint Bluetooth® Low Energy 5.4
- **WLCSP36 2.83 x 2.99 mm** (pitch 0.4)
- **Ultra low power consumption** (Down to 19 nA in shutdown mode)
- Seamless integration with sensors
- Bluetooth® Low Energy advertisement extension & GATT caching

HEALTHCARE

- 8 dBm output power
- **Ultra low power consumption down to 750 nA in sleep mode**
- **2Mbps PHY at -94 dBm sensitivity**
- **Periodic Advertisement (PAwR)**
- Security features (PKA, AES, ECC, TRNG, Secure boot …)

STM32**WB0**

BEACONS / RETAIL

- **Periodic Advertisement (PAwR)**
- Embedded balun and capacitor less crystal
- **Ultra low power consumption**
  - 3.6 mA Rx Current @ sensitivity Level
  - 4.9 mA Tx current @ 0dBm
  - 19 nA in shutdown mode
- Down to 1.7V operating voltage
- **2-Layer PCB design**

FINDERS / TRACKING

- Arm® Cortex® -M0+, 64 MHz, 512 KB flash, 64 KB SRAM
- AoA / AoD capabilities
- Dynamic power consumption: 14.5 uA/MHz
- Long Range capabilities, up to 1+ km
- Embedded balun and capacitor-less crystal
- Ultra low power consumption

HOME AUTOMATION / LIGHTING

- **-104 dBm** Rx sensitivity @ 125kbps
- **8 dBm output power**
- Security features (PKA, AES, ECC, TRNG, Secure boot …)
- Support large number of connections (depends on available RAM)
- Long Range up to 1+ km

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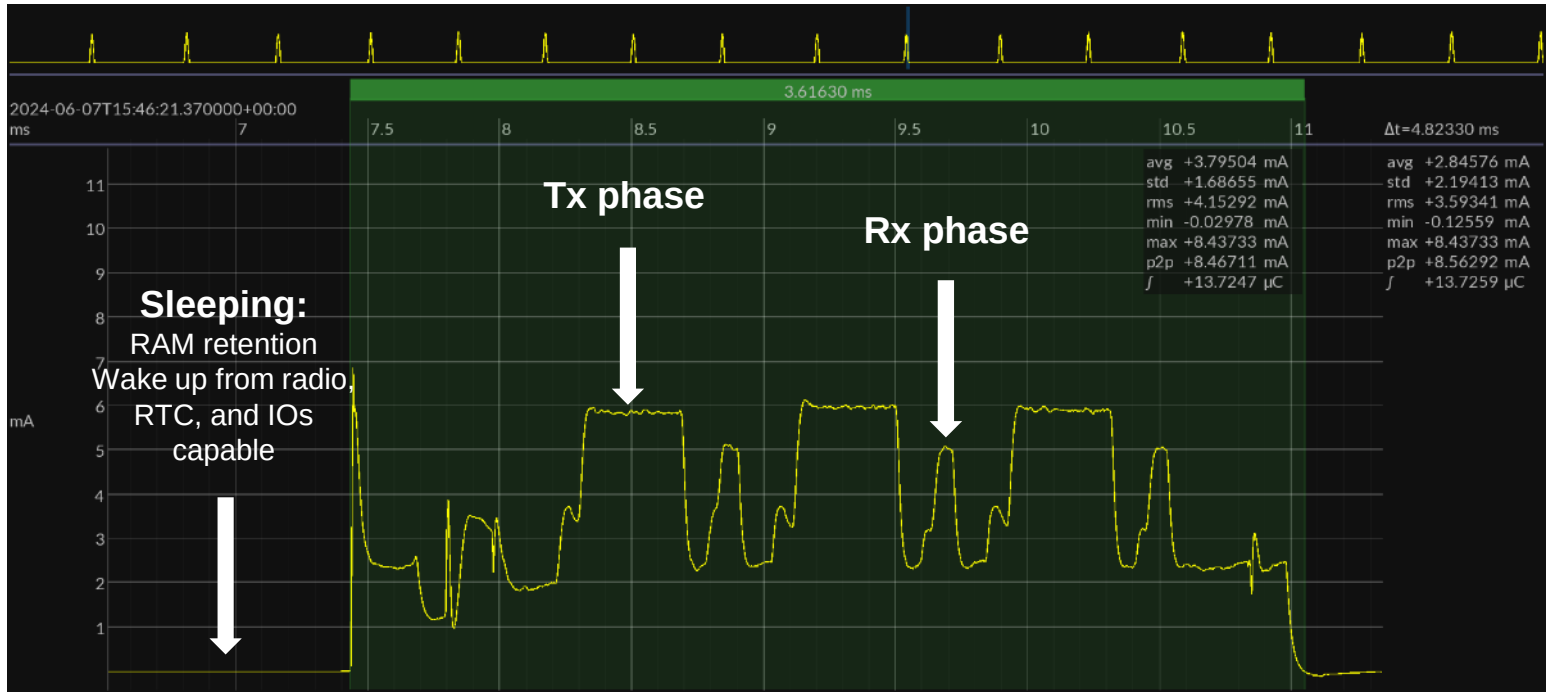
STM32WB0 offers best-in-class power consumption

STM32WB09 average power consumption during advertising



5.9 uA average power consumption (advertising 31 bytes, every 3 seconds, 3.3 V, +0 dBm)
Radio-only peak Tx: 4.9 mA
Radio-only peak Rx: 3.6 mA

Maximize battery lifetime

- **Sleep current** down to 0.94µA
  with STM32WB05, RF capable and all RAM retained
- **Outstanding active Rx and Tx current**
  Rx (3.6mA) and Tx (4.9mA @0dbm) radio peak current
- **Optimize average power consumption** with STM32WB09**:** 5.9 µA
  advertising 31 bytes, every 3 secs, 3.3V, +0 dBm

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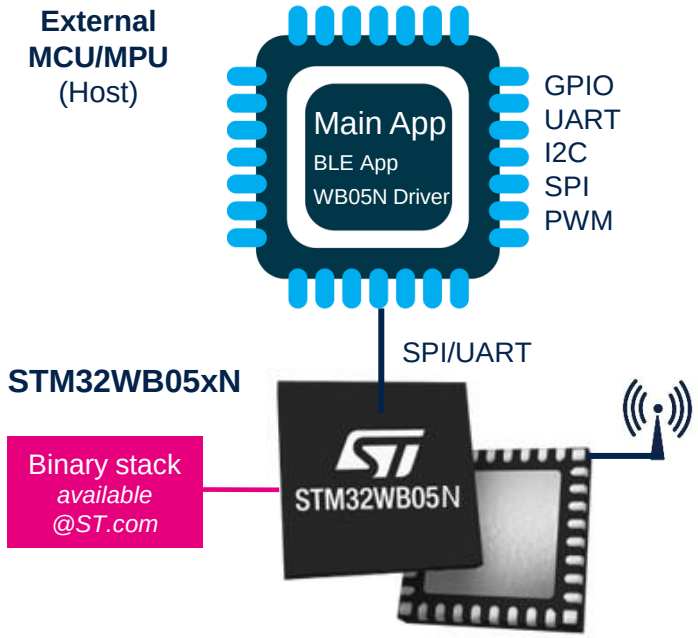
STM32WB05xN network coprocessor

STM32WB0 Applicative Topologies

BLE ADD ON

Network processor

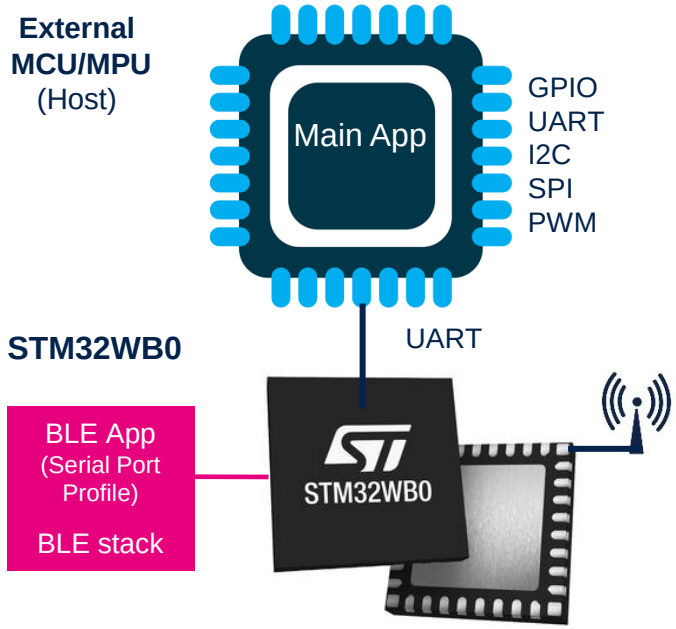
Radio link added through a simple **STM32WB05N driver** interface



X-CUBE-WB05N

Radio coprocessor

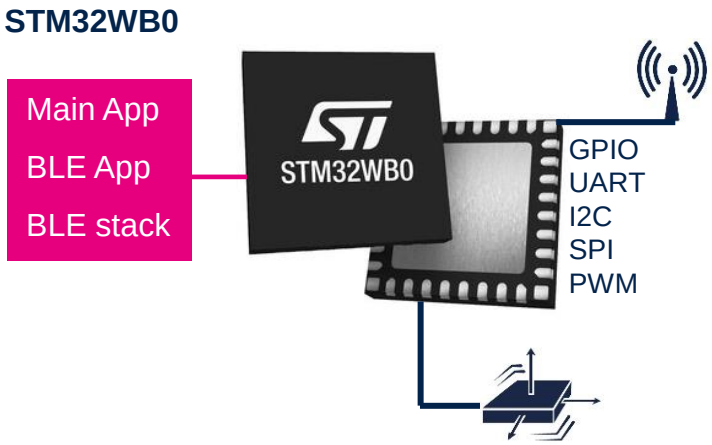
Application is running over a dedicated MCU, **STM32WB0 as BLE add-on**



STM32CubeWB0

Application Processor (Wireless SoC)

Data acquisition, processing and radio connectivity in a single-chip



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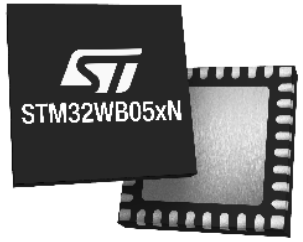
STM32WB05xN line offering

Most affordable STM32 device for adding wireless connectivity to existing applications.

From $0.79
for 10k units



Bluetooth® Low Energy 5.4 certified network processor

Plug-in solution: reduced software development effort and minimized lifecycle risks

- Precompiled binary libraries available from ST
- Simple host MCU/MPU serial driver and dedicated middleware with **X-CUBE-WB05N**

Flexibility

- Hardware scalability and software design flexibility based on the Host capabilities

Ultra-low current consumption

- DEEPSTOP current consumption **down to 800 nA**
- Tx current consumption **4.3 mA** (@ 0 dBm)
- Rx current consumption **3.4 mA** (@ sensitivity level, 3.3 V)

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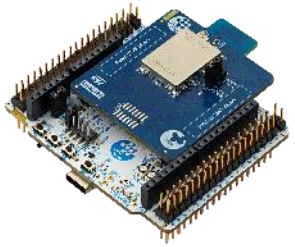
STM32WB0 development ecosystem

STM32WB0 ecosystem simplifies your design journey

NUCLEO-WB07CC

NUCLEO-WB09KE



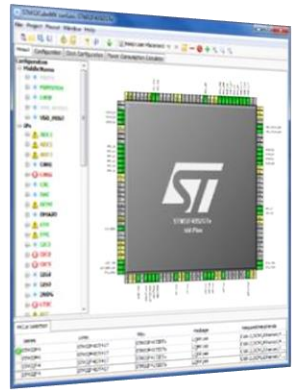
NUCLEO-WB05KN1

NUCLEO-WB05KZ

Hardware

Nucleo board &
Nucleo expansion board

STM32**WB0**



STM32 Cube

Software

STM32CubeWB0
(connectivity + examples + peripherals)
STM32CubeMX
(code generation + power calculation)
X-CUBE-WB05xN
(Bluetooth® Low Energy dedicated drivers + examples)
STM32IDE
STM32CubeMonRF
STM32CubeProg

STM32WB0 development boards

NUCLEO-WB05KZ

- VFQFPN32 package
  5 x 5 mm 0.5 mm pitch
- 20 GPIOs
- Arduino and Morpho connectors
- RF certified for protocols & regulations

Use in hands-on #3
“Click and Go” Beacon

NUCLEO-WB09KE

- VFQFPN32 package
  5 x 5 mm 0.5 mm pitch
- 20 GPIOs
- Arduino and Morpho connectors
- RF certified for protocols & regulations

Use in hands-on #4 and #5
P2P server and PAwR

NUCLEO-WB07CC

- VFQFPN48 package
  6 x 6 mm 0.4 mm pitch
- 32 GPIOs
- Arduino and Morpho connectors
- RF certified for protocols & regulations

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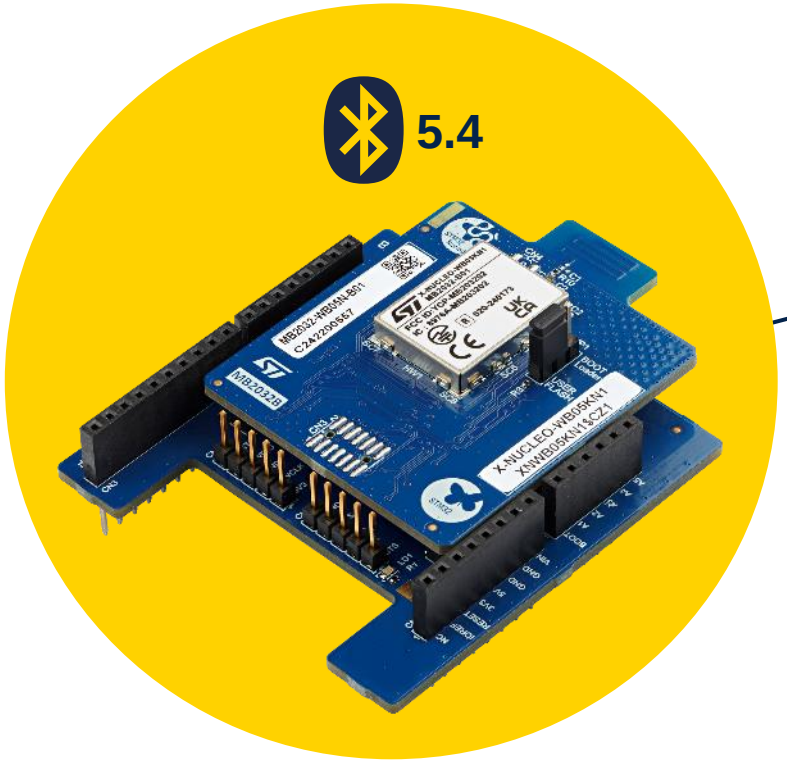
STM32WB05xN Nucleo expansion board

Discover many use cases powered by STM32WB05xN



X-NUCLEO-WB05KN1

Nucleo Expansion daughter board

- STM32WB05KN, IPD (MLPF-NRG-01D3)
- 32MHz oscillator
- Arduino® UNO R3 connector

Use in hands-on #7 *with NUCLEO-U5*
BLE add-on over Zephyr

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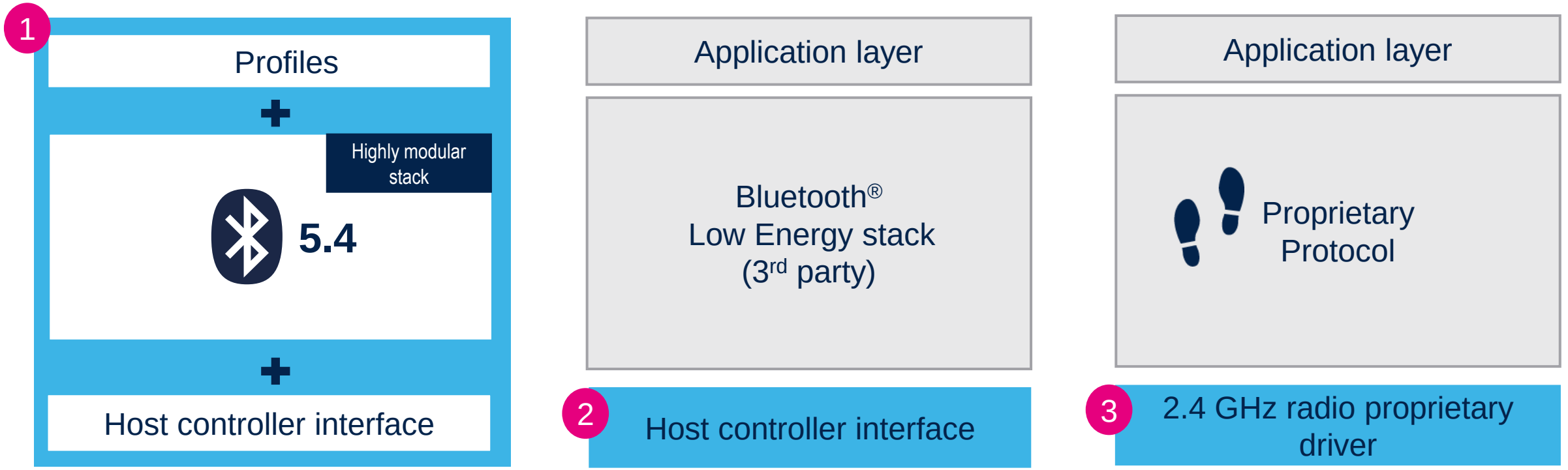
STM32WB0 Stack offering

Different levels of integration so you can customize your solution

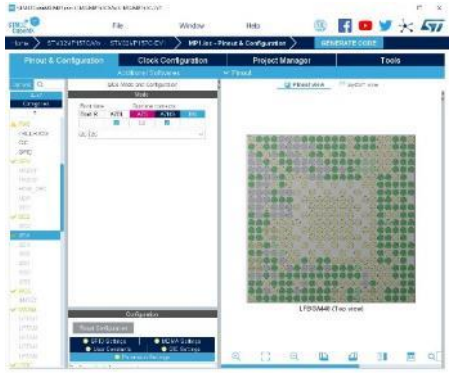


Available in STM32CubeWB0 MCU package

Software tools for STM32WB0

Complete support of STM32WB0 & Arm® Cortex®-M0+ architecture

STM32 CubeMX

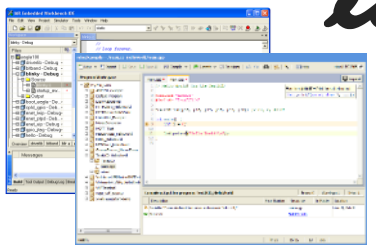


STM32 CubeIDE

arm KEIL

iar

eclipse



STM32 CubeProgrammer

STM32 CubeMonitor

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

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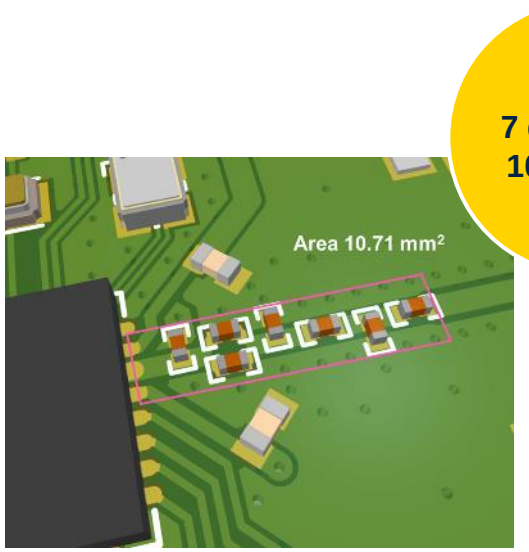
RF integrated passive devices (IPD) companion chip

Designed for the STM32WB0 MCUs,
the IPD replaces the components between the MCU and the antenna

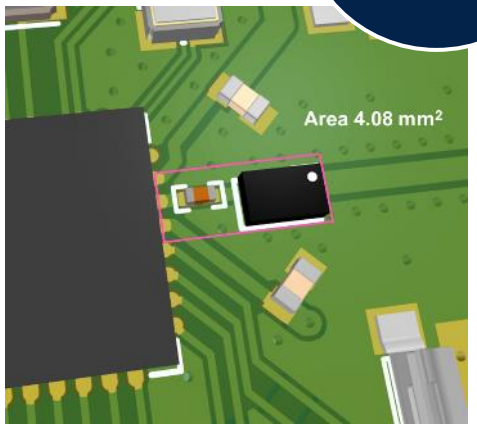
Chip scale package on glass 6 bumps



7 discretes
10.71 mm²

Integration

MLPF-NRG-01D3
1 component
1.6 x 1 mm²



Simpler integration

- Impedance matching, harmonics filtering and antenna protection
- Designed to simplify the RF path between all STM32WB0 devices and antenna

Efficiency

- Optimizes wireless performance

Cost effective

- BOM reduction
- Reliability improvement

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How ST could help in your wireless journey ?

ST RF Support

Senior expertise in wireless communication

Knowledge on your application

Pre-certification capabilities with dedicated application labs

ST support you to make the right choice

ST technical support for wireless connectivity project

ST Product **Selection**	ST Product **Evaluation**	SW and HW **Development**	**Testing and certification**	**Industrialization**
• Training • Benchmark • Datasheet review	• Eval kit bring-up • Performance review	• Schematic review • Layout review • Software porting • 1st PCB bring-up • 1st RF test report • Debugging	• Regional RF test report • Protocol RF tests • Corner case debugging • Certification process guidance	• RF Production tooling • Ramp-up support

Please contact ST sales representative and get in touch with our RF expert team

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STM32 wireless 2.4GHz Roadmap

Gen-1

STM32**WB55** STM32**WB35** STM32**WB15**

Bluetooth 5 · Zigbee 3.0 · matter · OPENTHREAD

Dual core CM4 @64MHz **and CM0+** @32MHz & **Security**
Up to 1MB Flash / 256KB RAM
- Bluetooth LE 5.4
- **Zigbee R22** & Thread, Proprietary
- MATTER ready H1-24
-USB, LCD Driver, Quad-SPI

Bluetooth 5

STM32**WB07** STM32**WB05** STM32**WB09**

Cortex **M0+** @64MHz
Up to 512kB Flash / 64KB RAM
Full featured radio, up to +8dBm
- WB07: Long-range, 2Mbps, Adverting Ext.
- WB05: +Direction Finding **AoA/AoD**
- WB09: +Audio (Isochronous), PawR

STM32**WB05N**
Network Processor

Gen-2

STM32**WBA6** — Sample: now, MM: Q1'25

Bluetooth 5 · Zigbee 3.0 · matter · OPENTHREAD

WBA6 = WBA5++:
Up **to 2MB Flash / 512KB RAM**
- USB HS

Bluetooth 5 · Zigbee 3.0 · matter RCP · OPENTHREAD

STM32**WBA5x**

Cortex **M33 w/ TZ @100MHz**
Up to **1MB Flash / 128KB RAM**
- BLE 5.4
- **Zigbee R23**, OThread, MATTER, Proprietary
- Coded PHY, AOx, Isochron., LE Pwr ctrl
- Up to +10dBm
- Balun and Matching integrated
- Single crystal operation
- SESIP-L3

entry level

STM32**WBAxx** — Sample:H1'25, MM: 2025

Bluetooth 5 · Zigbee 3.0 · matter RCP · OPENTHREAD

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STM32WB0 takeaways

Wireless	Bluetooth® Low Energy 5.4 +8 dBm output power
Performance	Arm® Cortex®-M0+ at 64 MHz Higher flexibility for entry-level applications
Power efficiency	Extended battery lifetime Autonomous low-power mode
Cost-efficiency	Best value for cost-sensitive applications
Integration	Up to 512/64 Kbytes Flash/RAM memory Reduced BOM
Free ecosystem	Faster time to market Enhanced project design journey

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Thank you

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Q&A

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