New **STM32WB Series MCU**
with Built-in **BLE 5 and IEEE 802.15.4**

PUBLIC

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FUTURE ELECTRONICS

Make the Choice of STM32WB Series

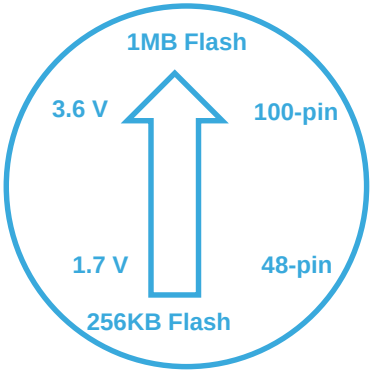
The 7 keys points to make the difference

Open 2.4 GHz radio
Multi-protocol

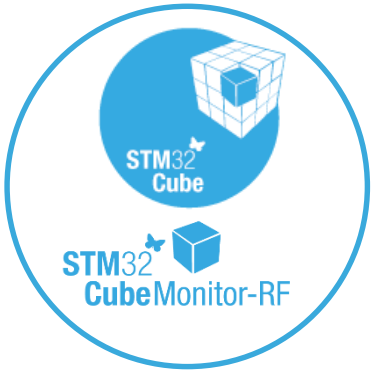
Dual-core / Full control
Ultra-low-power

IoT Protection ready

Massive integration
Cost saving



A large offer



Advanced RF tool, Energy control
with C code generation

No matter what!

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Multiprotocol and Open radio

Bluetooth 5

- Fully certified BLE 5.0 radio
- 2x faster speed with 2Mbps capable mode
- Extend network coverage with BLE Mesh

THREAD ZigBee

- Last IEEE 802.15.4 standard ready
- OpenThread certified
- BLE and OpenThread in Static and Dynamic concurrent mode

2.4 GHz
Open

- Proprietary protocol capable (BLE like or 802.15.4)
- Best-in-class RF with up to +6dBm output power and 102 dB link budget
- Energy sensitive application with only 3.8mA in RX and 5.5mA in TX (@0dBm)
- BOM cost reduction thanks to Integrated balun

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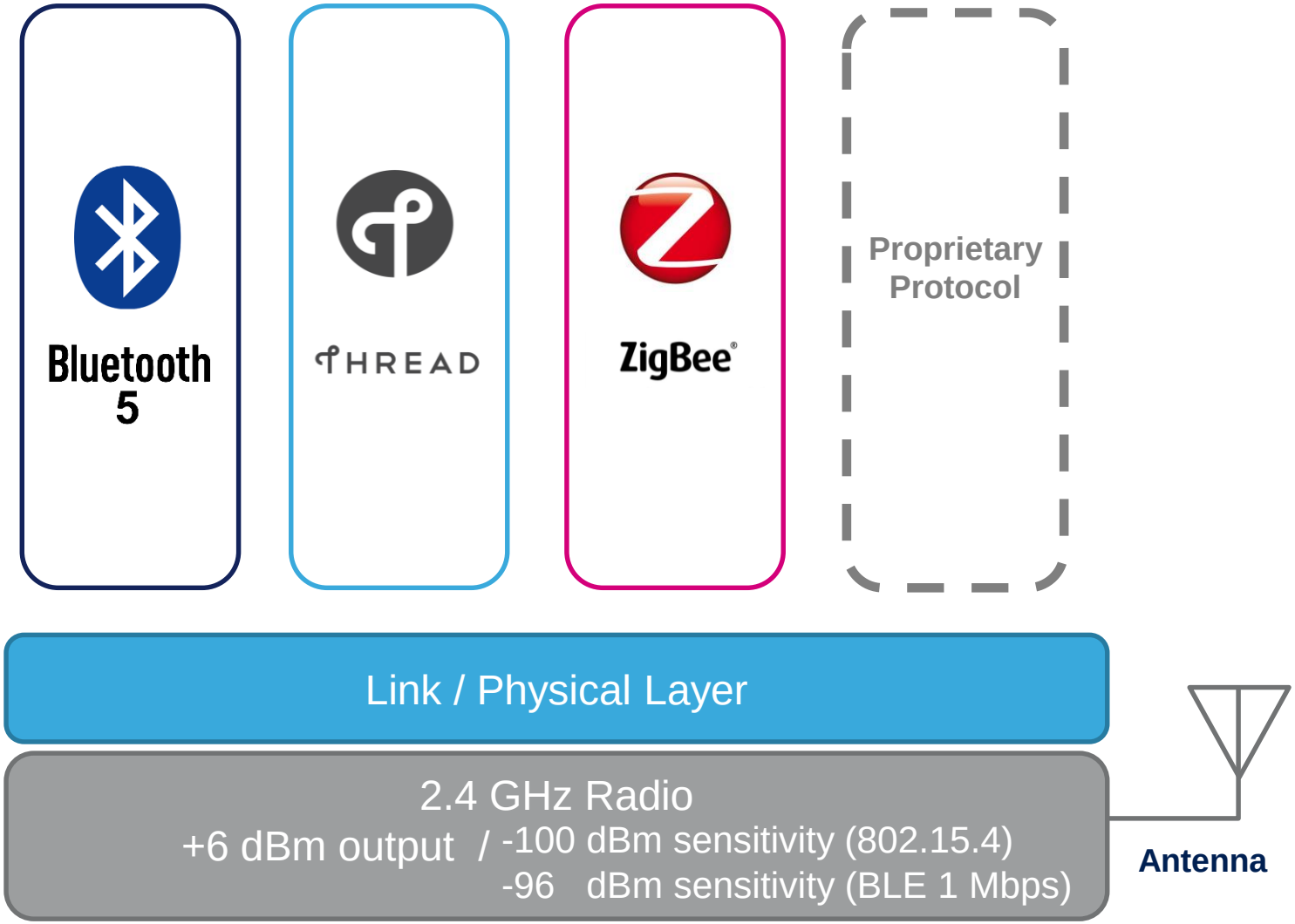
Make It Yours



Make It Yours

2 independent cores for real-time execution

Mono-core

CPU -x

Application Firmware
+
Peripherals
+
Radio stack

STM32WB

Arm Cortex-M4

Application Firmware + Peripherals

Arm Cortex-M0+

Radio Stack

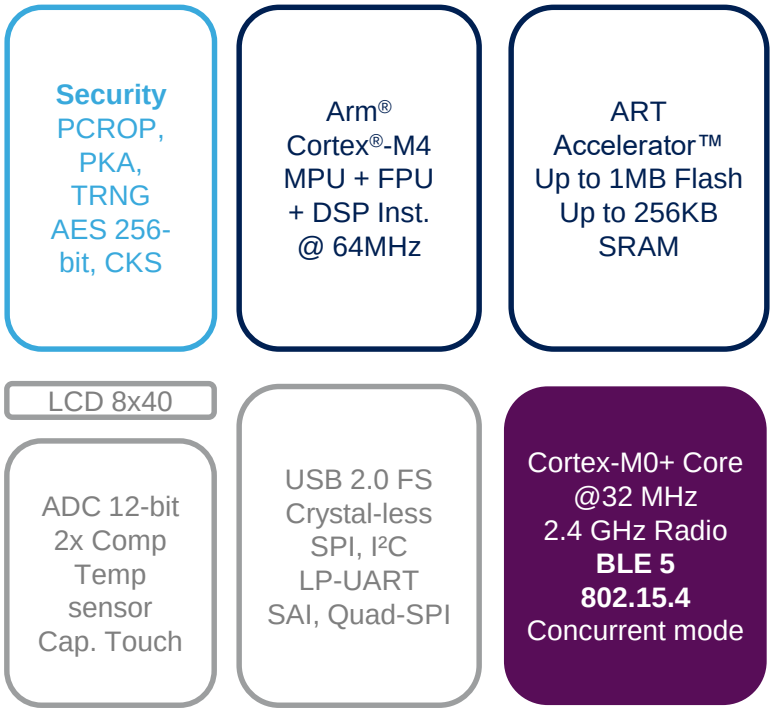
- **Drawbacks**
  - Time sharing
  - Longer processing time – Greedy current consumption
  - Need companion MCU (increased cost)

- **Benefits**
  - SOC solution (1 single die)
  - Full flexibility - Easy development – User experience
  - Increase battery life
  - All-in-1 solution - cost saving
  - Speed up time to market

Rich feature set

KEY FEATURES

- **2 independent core for real time execution**
- **Ultra-low-power consumption**
  - 50 µA/MHz Active mode (at 3.0V)
  - 1.8 µA Stop mode (Radio in standby + 256KB RAM)
  - < 50 nA Shutdown mode
- **Peripherals**
  - 2xI²C, 1xUSART, 1xLP-UART, 2xSPI, 1x USB 2.0 FS device supporting Battery Charging Detection, 1xSAI, Quad-SPI (XIP), 6x 16-bit timer (including LPWM and low-power one)
- **1.71V to 3.6V voltage range (DC/DC, LDO)**
- **- 40°C to + 105°C temperature range**



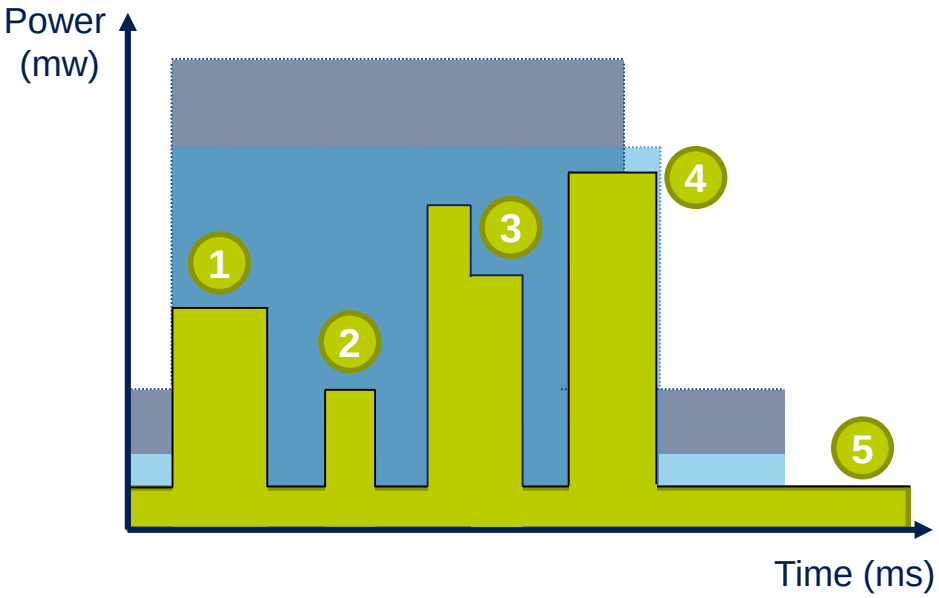
Benefit of Dual Cores processing

1 Independent Radio activity:

- Uploading data to mesh network or smartphone
- OTA of Radio protocol stack or application FW
- Running on Arm CM0+

2 Energy saving mode

- RAM + RTC running@ 1.8µA
- Fast wake up @ 5µs



3 Main application activity:

- Computing data (sensor fusion …)
- Flexible arm CM4 CPU speed up to 64 MHz
- Batch Acquisition Mode (BAM) with CPU and Flash turned off

5 Super saving mode

- Shutdown < 50 nA
- Battery energy saving

Competitor A

Competitor B

4 Dual CPU activity

- 50µA/MHz only!
- Both Radio and Application running independently

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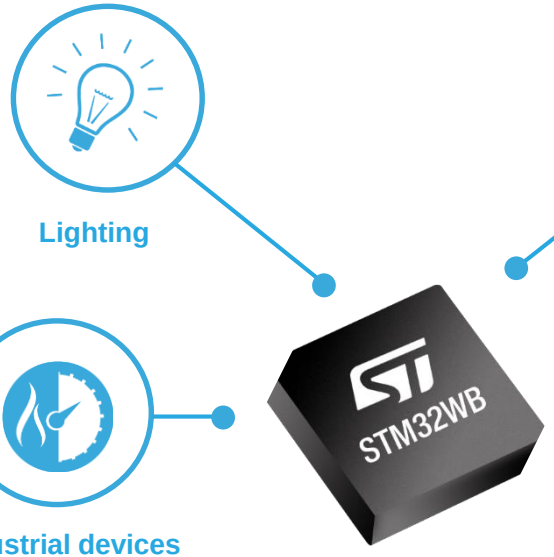
All in one MCU - Full flexibility control



Lighting

- Robust RF link **-100dBm** sensitivity with 802.15.4 and **+6 dBm** output power
- Upgrade legacy 802.15.4 device to **BLE 5**
- **Update** securely Radio and stack firmware with build-in RSS
- BLE 5 and 802.15.4 protocols **Mesh capable** to extend network range

Fleet maintenance

- Retrofit legacy product to **BLE 5** and concurrency mode
- Remotely upgrade device with **OTA capability**
- **Brand protection** with Authenticated **FW upgrade** system

Industrial devices

- **Up to 105°C** radio capable
- Down to **600 nA mode with RTC** and 32KB of RAM
- Only **5µs wakeup** time over 16 wakeup lines
- PCROP, **ECC**, TRNG, **PKA**, for best design robustness
- Reduce BOM cost with **built-in LCD booster**

Fitness/ Healthcare

- **Multipoint** BLE 5 connections (sensors / smartphone)
- Small form factor design with tiny **100 pins package**
- Battery life time care with **< 50 nA** Shutdown mode
- Dynamic Efficient **50 µA/MHz**
- Extend memory storage with **Quad-SPI supporting XIP***
- Handle advanced algorithm with **1 Mbyte** of Flash memory
- Cost optimized product with USB 2.0 **crystal-less** device

** Execution in place*

Beaconing

- **Beacon** profile available among a huge list
- **Embedded balun** to minimize design cost
- Only **5.5mA Radio TX** current to extend beacon life time
- **Up to +6 dBm** output power to get best beacon range
- < 1.8 µA Stop mode with full RAM for **battery life** optimization
- Down to 1.71 full feature capable

Home security and Audio

- -**100 dBm** sensitivity to increase area coverage
- **Customer Key Storage (CKS)** for trustable Application update
- Manage full duplex **audio** with embedded SAI
- USB FS 2.0 with Battery **Charging Detection** for remote device

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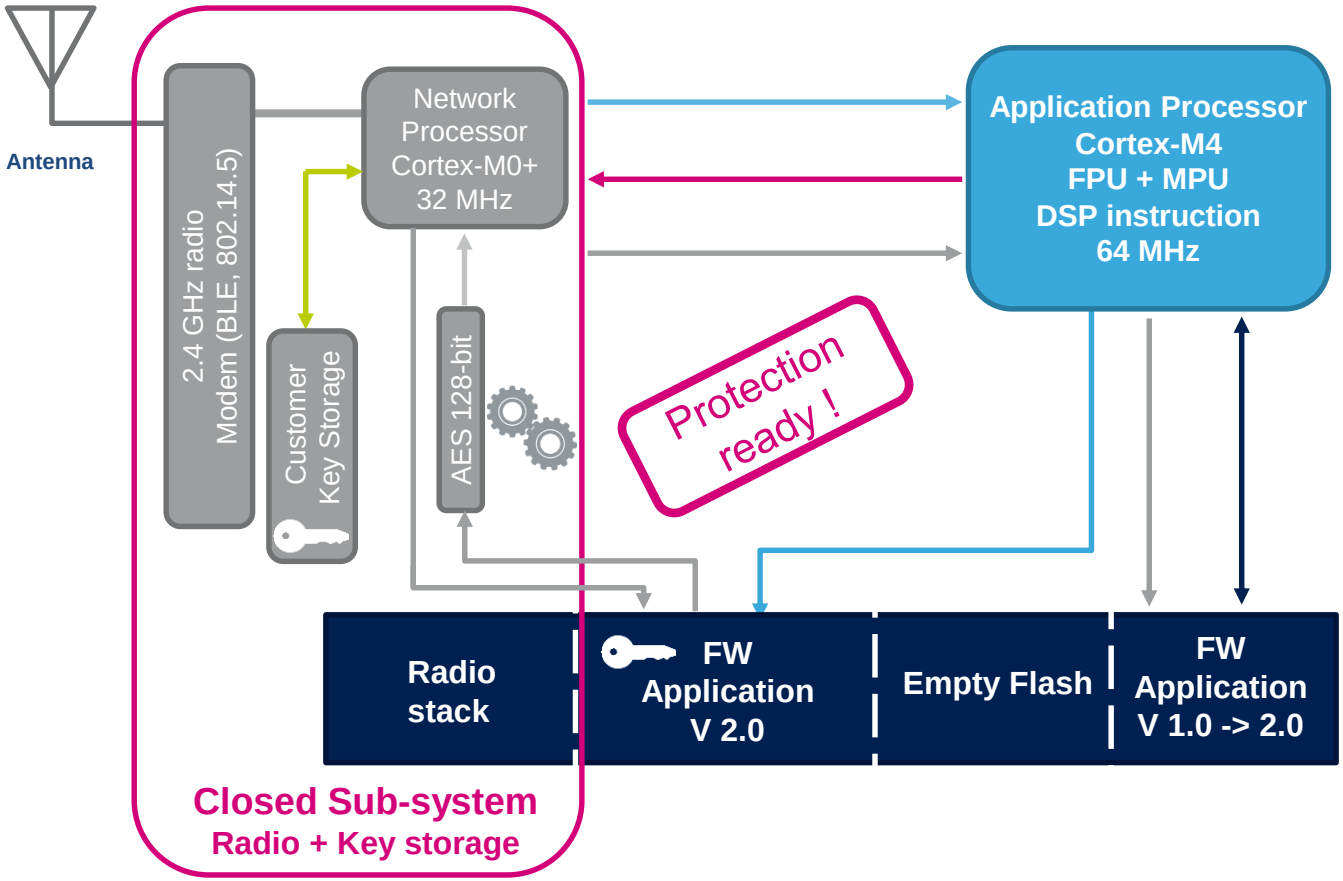
IoT Protection Ready (1/2)

Radio stack and/or Application FW update



1. New FW package received
2. New FW detected
   Update is launched
3. App Processor send New FW package signature and encryption key for authentication
4. Authentication signature matches preprogrammed key
   Case not, the process is aborted and device resets
5. New FW package is decrypted with proprietary Key. Device upload on going. Once done the device restarts
   1.0 removed

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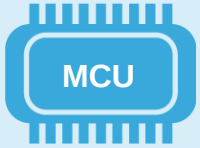
IoT Protection Ready (2/2)

STM32WB counter measure against attacks

Advanced

Basic

Attacks	Attacks description	STM32WB Countermeasures

Non Invasive Attacks 	• Environment modification
	  • Temperature
	  • Voltage
	  • Clock ….
	• Fault injection (glitches….)
	• Exploit debug features
	• Side channel, power Analysis, …
		• Temperature sensor
		• Power supply integrity monitor
		• Clock security system
		• Tamper pads
		• Memory ECC, Parity check
		• RTC alarm, registers, SRAM mass erase
		• JTAG Read out protection
		• BOOT from Flash only

Software Attacks 	• Low Authentication / Encryption • Extract keys • Exploitation of applicative test features • Malware / Virus • Replay, privilege escalation	• Customer Key Storage (CKS) • RNG, Crypto accelerator, CRC • Write memory protection • Read Out memory protection • Memory Protection Unit (MPU) • Root Secure Service (RSS) • Secure Firmware Update (SFU) • Proprietary Code Read-Out Protection (PCROP) • 96-bit ID

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Massive cost saving

The more feature integration, the more the BOM drops down !

Silicon side

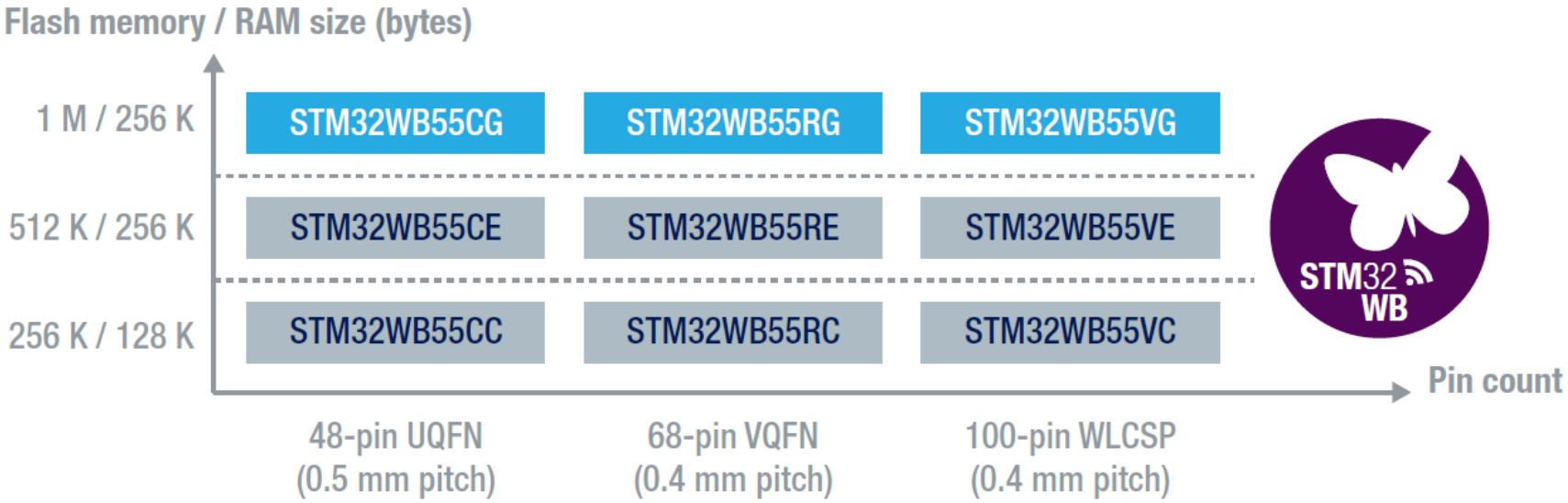
- RF balun cost: Embedded
- External components: 6 (including crystal)
- Single crystal operation
- 32 kHz Master clock output available
- Crystal for USB 2.0 FS operation: embedded
- LCD display booster: embedded (only single glass)
- Capacitive touch controller: embedded
- PCB cost: 2 layers PCB only

Ecosystem side

- BLE 5 stack : Free of charge
- OpenThread stack: Free of charge
- Generic 802.14.5 MAC: Free of charge
- Generic HCI drivers: Free of charge
- STM32CubeMX: Free of charge
- STM32CubeMonitor-RF: Free of charge
- IDE (Atollic, AC6: SW4STM32): Free of charge
- BLE and 802.15.4 concurrency avoids to use a second radio MCU

STM32WB - A large offer

Bluetooth 5, Thread, ZigBee 3.0 and proprietary protocol capable



From 1.71 to 3.6V and from -40°C to +105°C !

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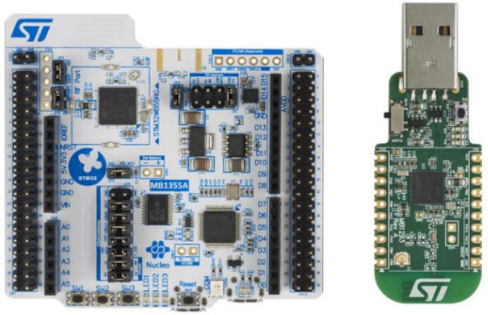
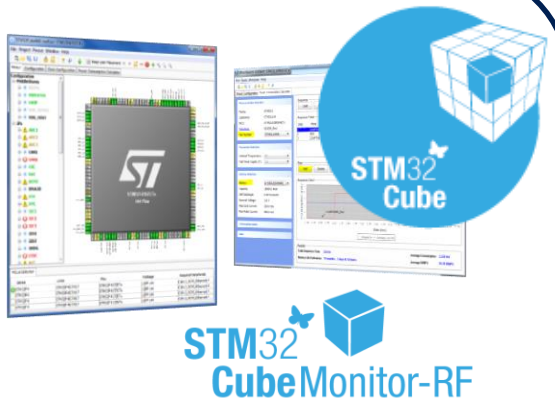
Prototyping made as easy as 1,2,3



Hardware
Evaluation Pack



STM32CubeMX
Code generation
Power calculation
STM32CubeMonRF

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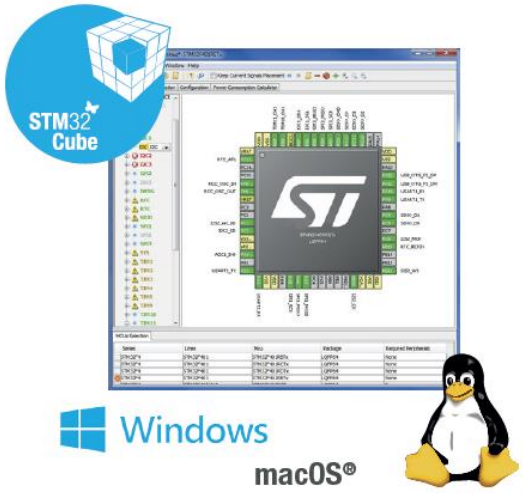
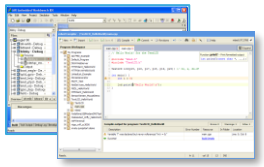
Software Development Tools

A complete flow, from configuration up to monitoring



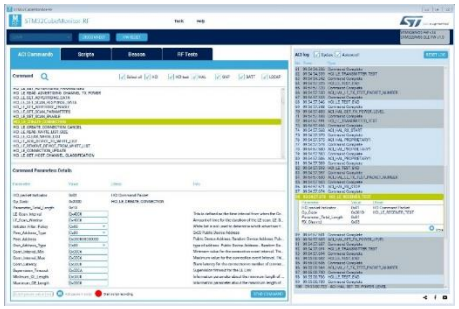
FREE IDE's



IAR SYSTEMS
arm KEIL
arm MBED
ac6 Assistance Conseil Systèmes
atollic

More to come after mass market launch

STM32 CubeMonitor-RF



STM32CubeMX
Configure & Generate Code

Partners IDEs
Compile and Debug

STM32CubeMonRF
Monitor

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