STM32WL5x/Ex
wireless MCU lines

Wireless MCUs System-on-Chip
Long-range communications

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

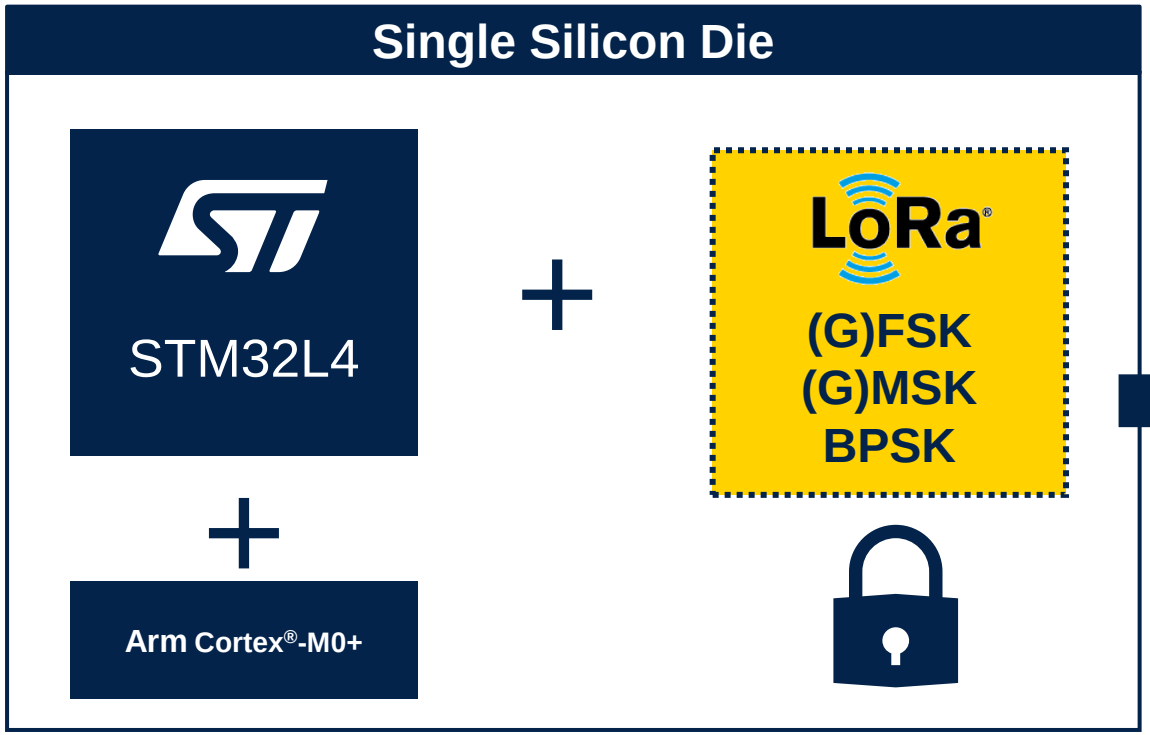
Scalable security

MPU portfolio

MCU portfolio

A long-range System-on-Chip solution

One die, many IoT possibilities



World first!

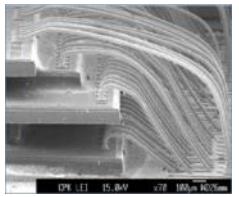
The integration pyramid

STM32WL5x/Ex
First LoRa-enabled SoC in the world

System-on-Chip (SoC)
Only one silicon die in one package

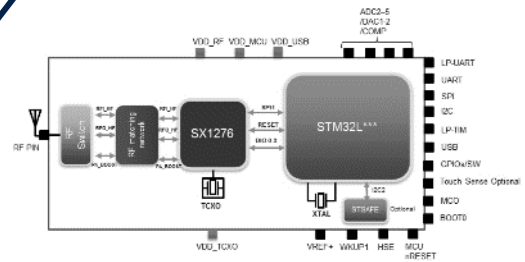
System-in-Package

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



Source: PTI Blog

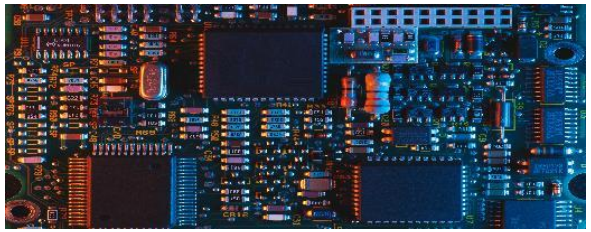
Module



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

PCB

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



Make the choice of the STM32WL5x/Ex

The 8 key points that make the difference

(G)FSK
(G)MSK
BPSK

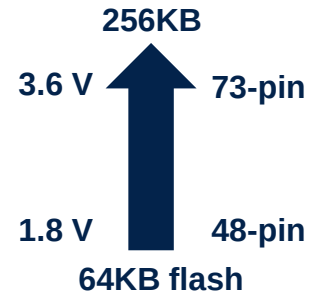
Multi-modulation

Massive integration
Cost saving

Open dual-core platform

Ultra-low-power

STM32 security



A large offer

End-to-end ecosystem
(advanced RF testing tool,
C code generation tool…)

No matter what!

Integration

Flexibility

Simplicity

The STM32WL5x/Ex ecosystem is growing

2019 — World-first LoRa-enabled SoC

LoRa®

(G)FSK
(G)MSK
BPSK

2020 — STM32WL5x/Ex dual-core version

UFQFPN48 package

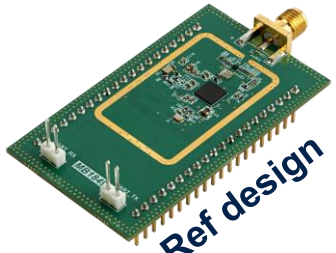
2021 — Long packet support

LoRaWAN® 1.0.4 certification

2022 — LR-FHSS support

Reference designs & IPD

LoRaWAN® 1.0.4



2023 — STM32WL5M certified module

STM32CubeWL 1.3.1 updates *

NEW

2024

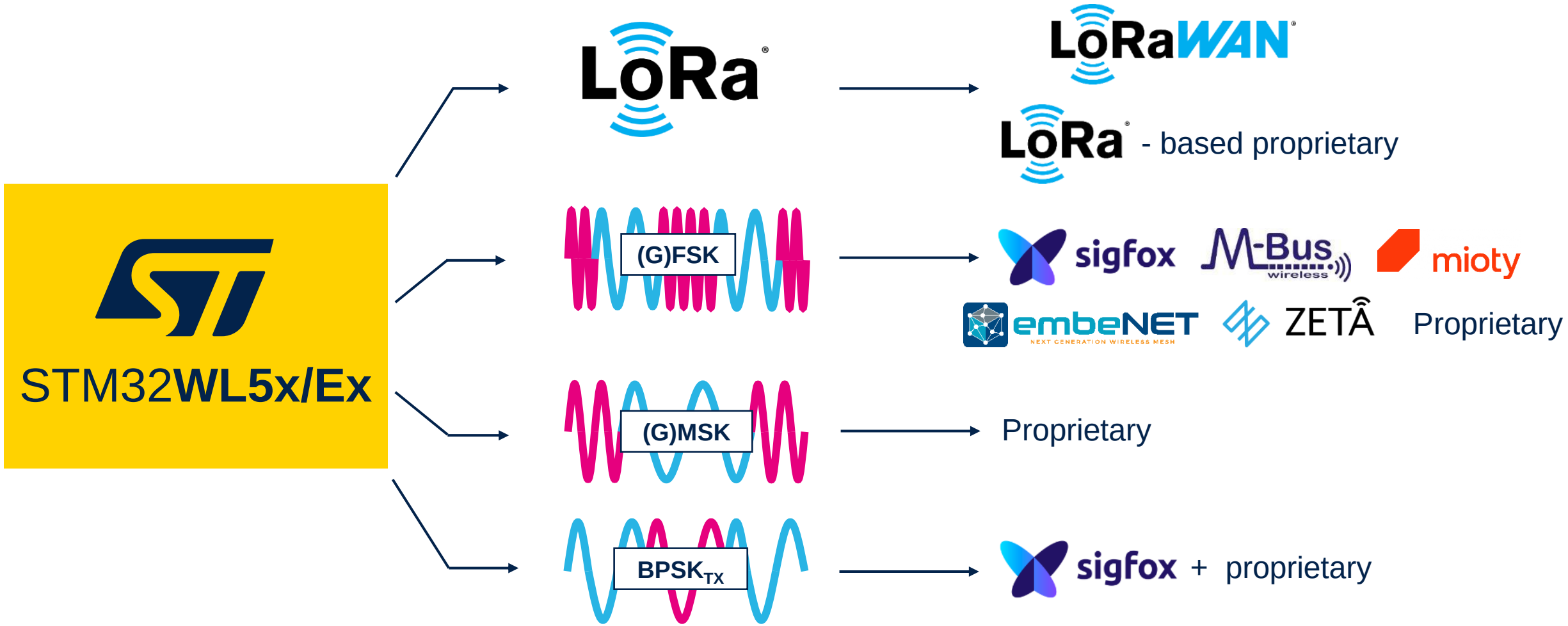
2025

STM32CubeWL1.3.1 updates

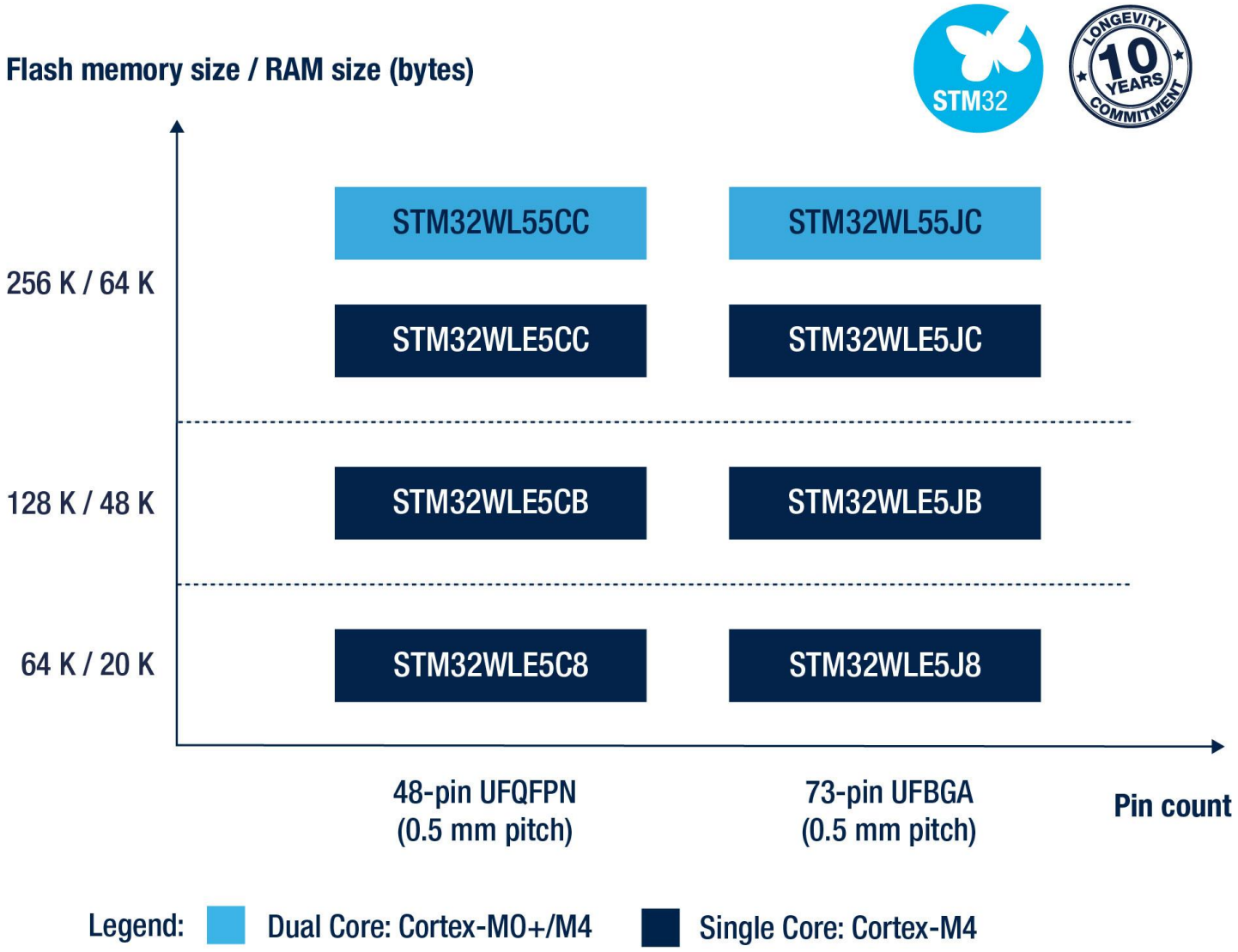
Integration of LoRaWAN Link Layer v1.0.4/v1.1 + Regional Parameters RP002-1.0.3

Deep integration for a wide range of applications

4 modulations - many protocols



A wide sub-GHz portfolio

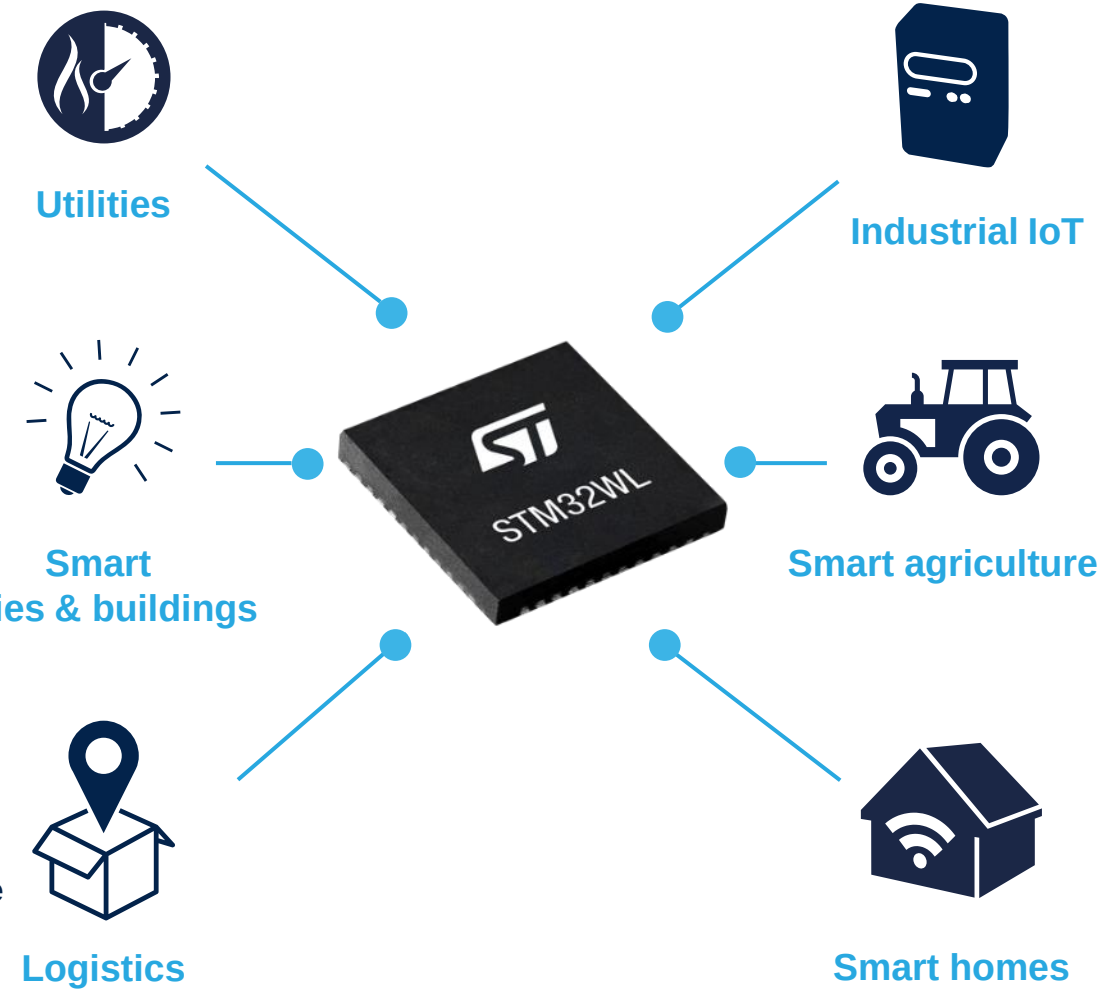


Ideal for multiple applications in the LPWAN market

- Worldwide compatibility **150 to 960 MHz** Linear Range
- Multiprotocol capable
- ST Longevity commitment program: continuous supply for **10 years**

- Up to +22 dBm output power for wide coverage
- **-148 dBm** sensitivity with LoRa: **Robust RF Link**
- **Reduced BOM cost**

- **Unique-IDs** for enhanced traceability
- Down to 390 nA mode with RTC and 32KB of RAM for extended Battery lifetime
- Small form factor with **UFBGA 5x5 package**



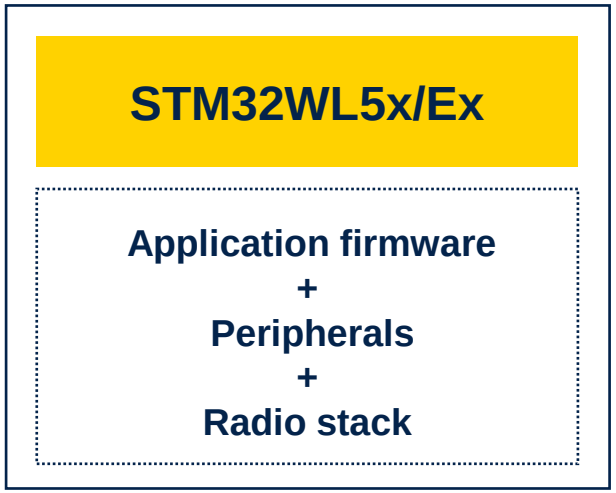
- Up to **105 °C** MCU capable
- **Only 5 µs wake up time** for best latencies
- Only 4.82 mA as LoRa Rx consumption for battery optimization

- Link budget > **160 dB** = Very long ranges
- Excellent battery lifetime: Only 15 mA for LoRa Tx consumption @ 10 dBm
- **PCROP**, **ECC**, TRNG, **PKA**, for best design robustness

- Down to 71 µA/MHz in run mode for efficient action
- < 1 µA stop mode with full RAM for **battery life** optimization
- 12-bit ADC & DAC for mixed applicative use cases

A higher level of integration

MCU + radio, a 2-in-1 solution



VS

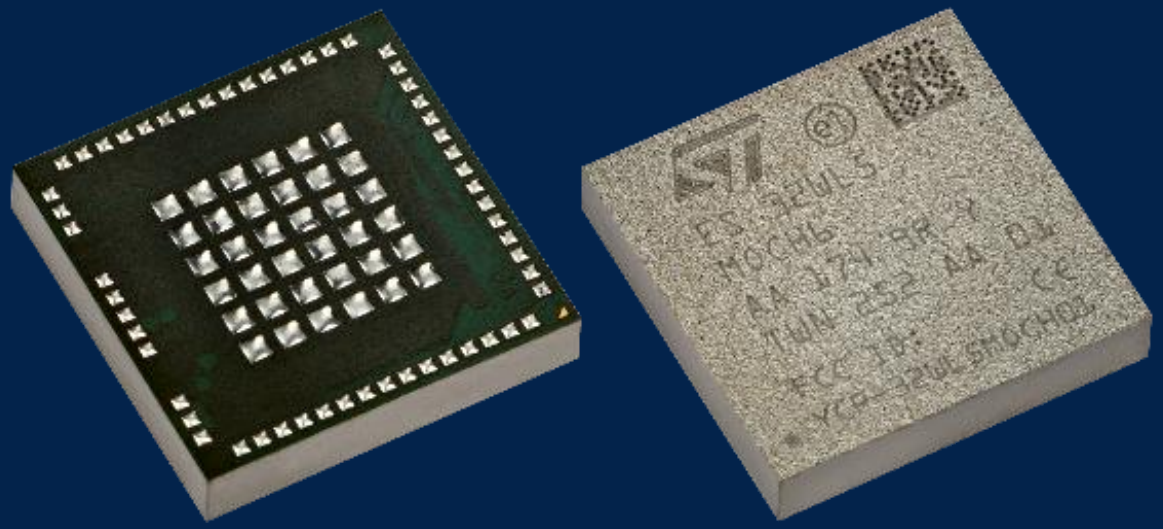
- SoC solution **(1 single die)**
- **All-in-1** solution - cost saving
- Simplified development helps speeding up time to market
- Mono-core or dual-core version for excellent security

- **2 standalone chips, or dice (SiP)**
- Bigger final PCB (increased cost)
- Wired communication more exposed

STM32WL5x/Ex block diagram

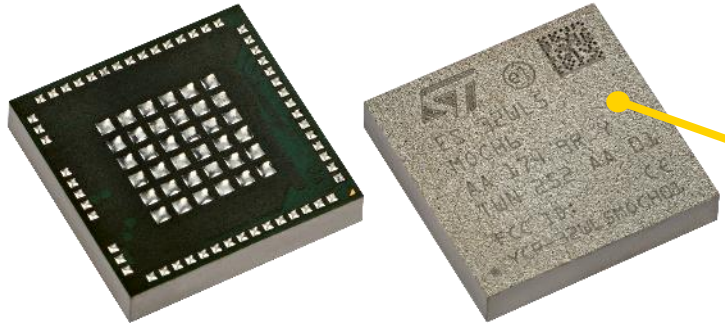
Available only for STM32WL5x

STM32WL5M module line



What the STM32WL5M module line offers

Faster development for power-efficient, long-range wireless devices



Dual-core Arm® Cortex®-M0 and Arm® Cortex®-M4 up to 48 MHz + sub-GHz radio transceiver

High integration, small footprint

- Embedded dual-core STM32WL55JC MCU
- 256 Kbytes of flash memory, 64 Kbytes of SRAM with sub-GHz radio transceiver
- Integrated 32 MHz radio TCXO and 32 kHz RTC crystals
- All RF components for transmission and reception matching network, incl. default antenna filter
- STSAFE-A110 secure element (optional)

Flexible wireless radio

- Certified for LoRaWAN® and Sigfox protocols
- Simple and ultra flexible platform with multiple modulation support: LoRa®, (G)FSK, (G)MSK and BPSK

Expanding battery life for IoT devices

- Low power consumption radio down to 4.82 mA (Rx) and 15 mA (Tx at 10 dBm) (radio only)

STM32WL5M: one step further in integration

All-in-one sub-Ghz SoC

STM32**WL55JC**

Dual-core MCU +
Multi-modulation RF

256KB FLASH
37 GPIOs

Integrated Crystals

Radio & RTC Crystals

32Mhz TCXO
32Khz XO

Integrated Passive device

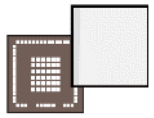
ST **IPD**

Matching network
Antenna filter

Integrated RF Switch

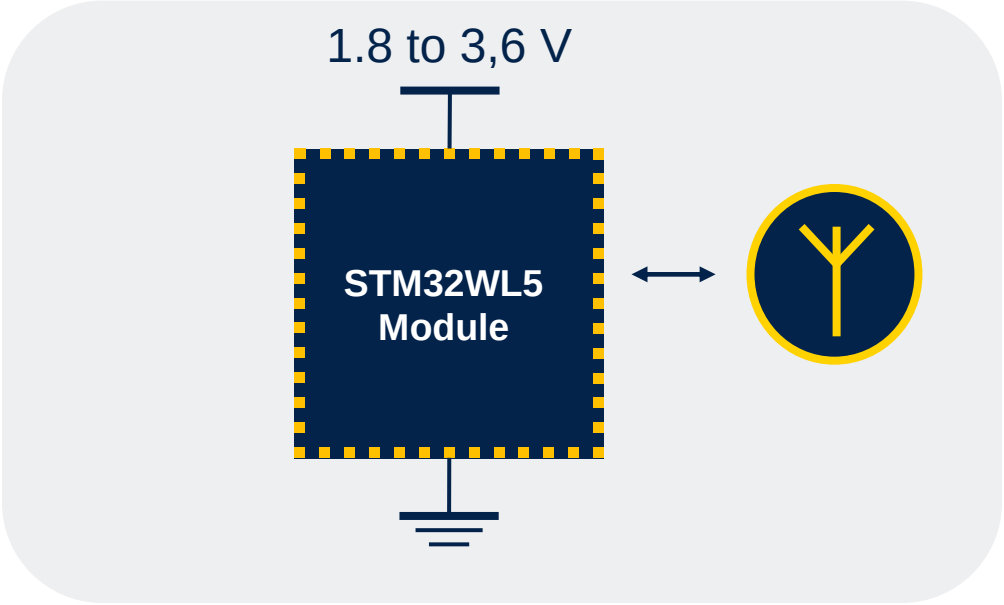
RX/TX
Switch

+ Optional STSAFE



Packed in a tiny
10 x 10 mm module

STM32WL5M: a simplified approach to lower BOM costs



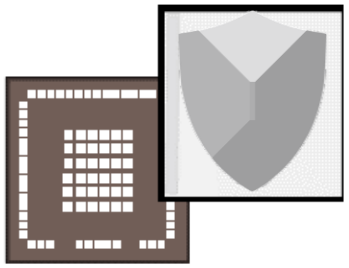
Simple PCB: no external components required

Easy to layout: enabling 2-layer PCBs

Internal antenna matching

Direct connection to VDD: internal SMPS components

STM32WL5M more robustness



EMC protected: molded module

Stable power supply: embedded power-supply filters

Robust RF Link: embedded default antenna filters

-40 to 85 °C temperature range

STM32WL5M offers a flexible radio configuration

High band frequency

From 868 to 928 MHz

Multimodulation

LoRa®, (G)FSK,
(G)MSK, and BPSK.

Adjustable output power

Up to 22 dBm

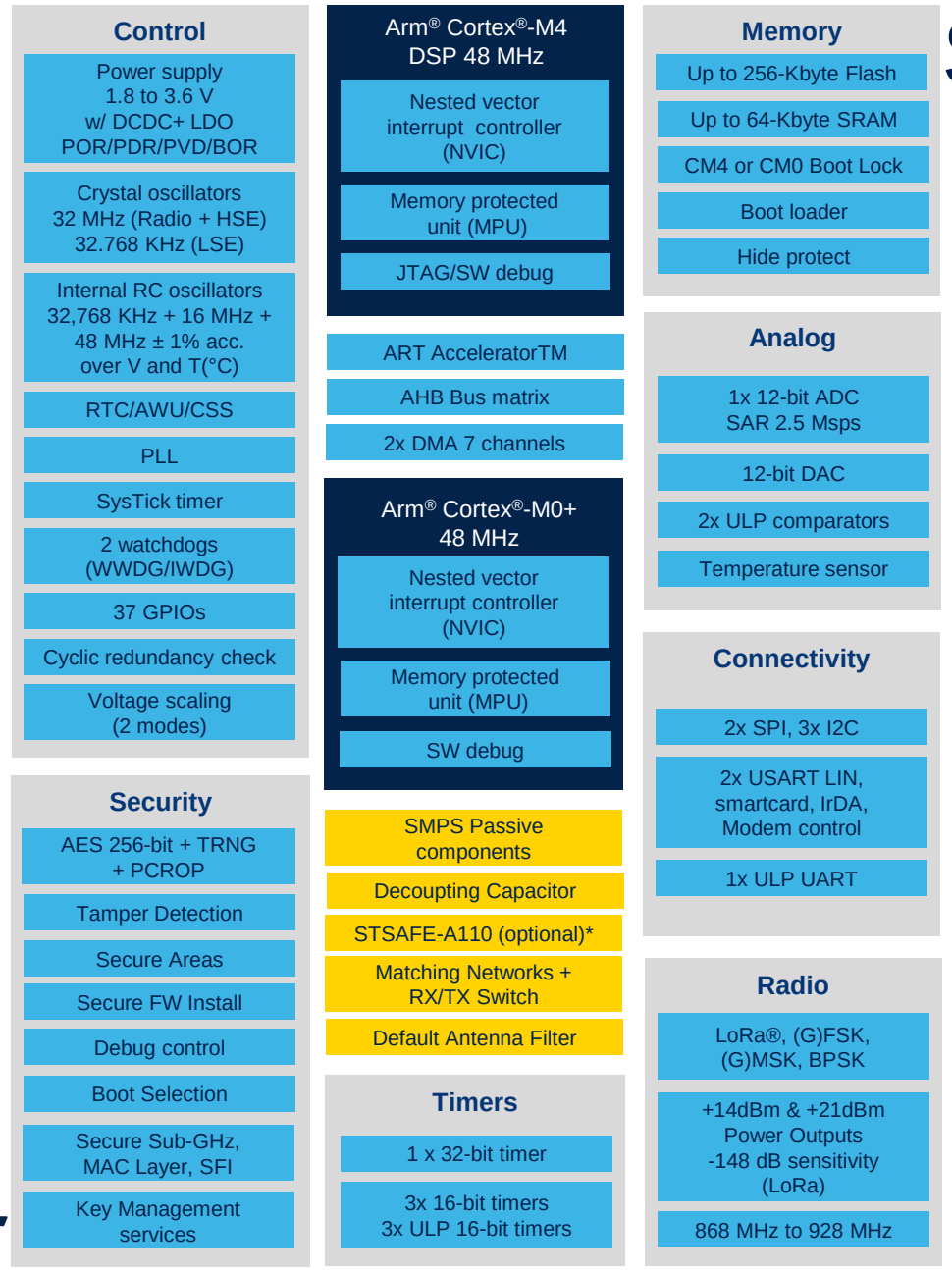
Dual output power

Selectable externally
by solder bridge or switch

Low power output
(up to 15 dBm)
Current consumption optimized

High power output
(up to 22 dBm)
long range optimized

STM32WL5MOC block diagram

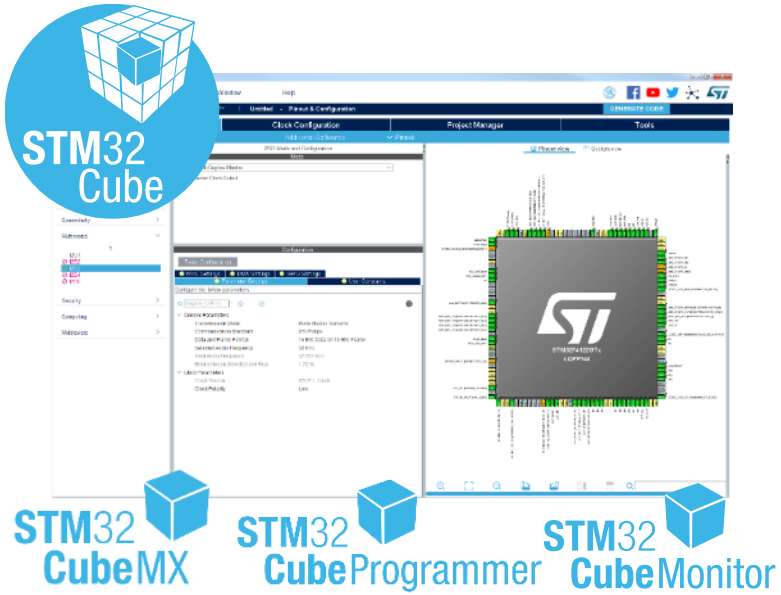


Dual cores: Arm® Cortex®-M0 and Arm® Cortex®-M4

- **Open module** (AT commands firmware available)
- **HF bands:** 864 to 928 MHz
- **Selectable PA**: low power (up 15 dBm) / high power (up 22 dBm)
- **External Antenna**
- **Full BOM integrated**: crystals, decoupling, matching, filters
- **Allows 2-layer PCB**
- **Tiny form factor: 10 x 10 mm** with 0.5 mm pitch
- Operating range: -40 to -85°C / 1.8 to 3.6V
- STSAFE secure element (unmounted component)

Accelerate your design journey using the STM32WL5M development ecosystem

Development



Available in STM32CubeMX
Straightforward firmware migration

Certification

Open stack and available from st.com/STM32CubeWL

LoRaWAN CERTIFIED

sigfox verified + Monarch

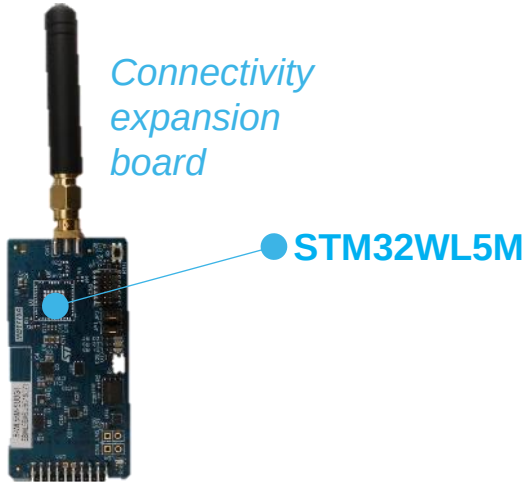
+ Stack available from partners

M-Bus wireless

CE FC IC RoHS

Open and certified module
Certification by similarity

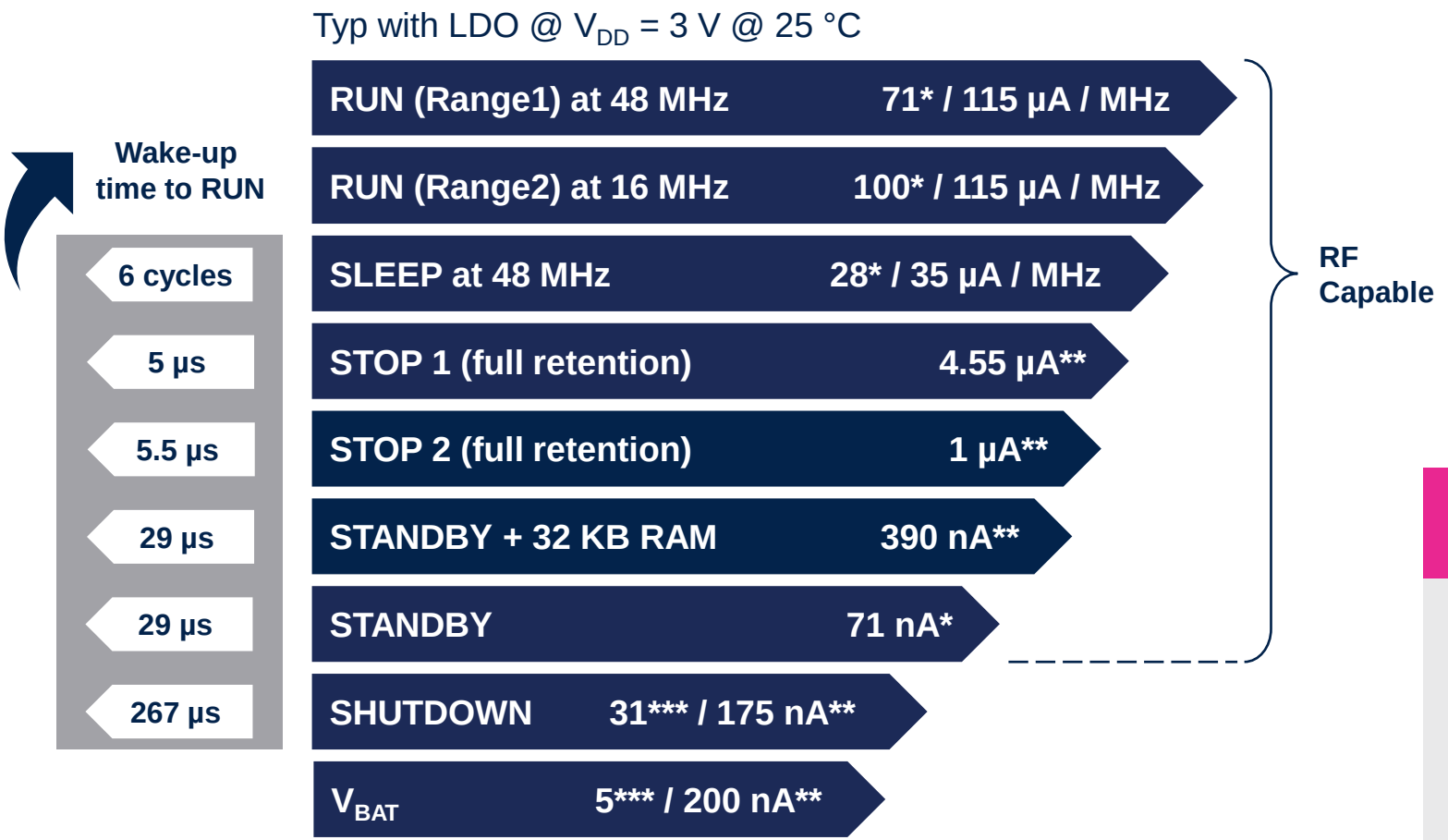
Prototyping



Evaluation board
with sensors & connectors

A flexible power scheme

Flexible power scheme FlexPowerControl



* Typical values with SMPS, **RF OFF**
** with RTC on LSE Bypass
*** All OFF

Benchmark scores

- High efficiency
  - ➔ CoreMark score = 162
- Ultralow power platform
  - ➔ ULP bench score ≈ 204

Flexible power scheme matching your application needs

LPWAN made easy through ultra-low-power trade-offs

Power mode	Arm® Cortex®-M4 and/or Cortex-M0+	Peripherals	RAM Retention	RF
Run	✓	✓	✓	✓
Sleep	✗	✓	✓	✓
Stop 0	✗	✓	✓	✓
Stop 1	✗	✓	✓	✓
Stop 2	✗	Subset	✓	✓
Standby	✗	✗	✓	✓
Shutdown	✗	✗	✗	✗

Seamless toolbox
(I²C, SPI, USART, ADC/DAC, Timers, comparators etc.)

RF available
In all power modes

Back-up registers are **always** available

Efficient power management stop mode comparison

Flexible peripherals: power mapping

		STOP0	STOP1	STOP2
Consumption (without real-time clock)		Typ, 25 °C, 3 V, LDO		
		400 µA	4.55 µA	1 µA
Wake up time to 48 MHz	**Flash**	2.2 µs	5 µs	5.5 µs
	RAM	2.2 µs	5.1 µs	5.5 µs
Wake up clock		≤ 48 MHz		
Regulator		Main or Low-Power regulator		Low-power regulator
Peripherals		All	All	CSS, RTC, 3 tamper pins, 1x LPUART, 1x I²C, VREFBUF, 2x COMP, 1x LPTIM, Dual-WDG, CRC, EXTI

No impact on wake up time from embedded DCDC

Ultralow power & IoT-ready for worldwide applications

Best LoRa-enabled IP on the market

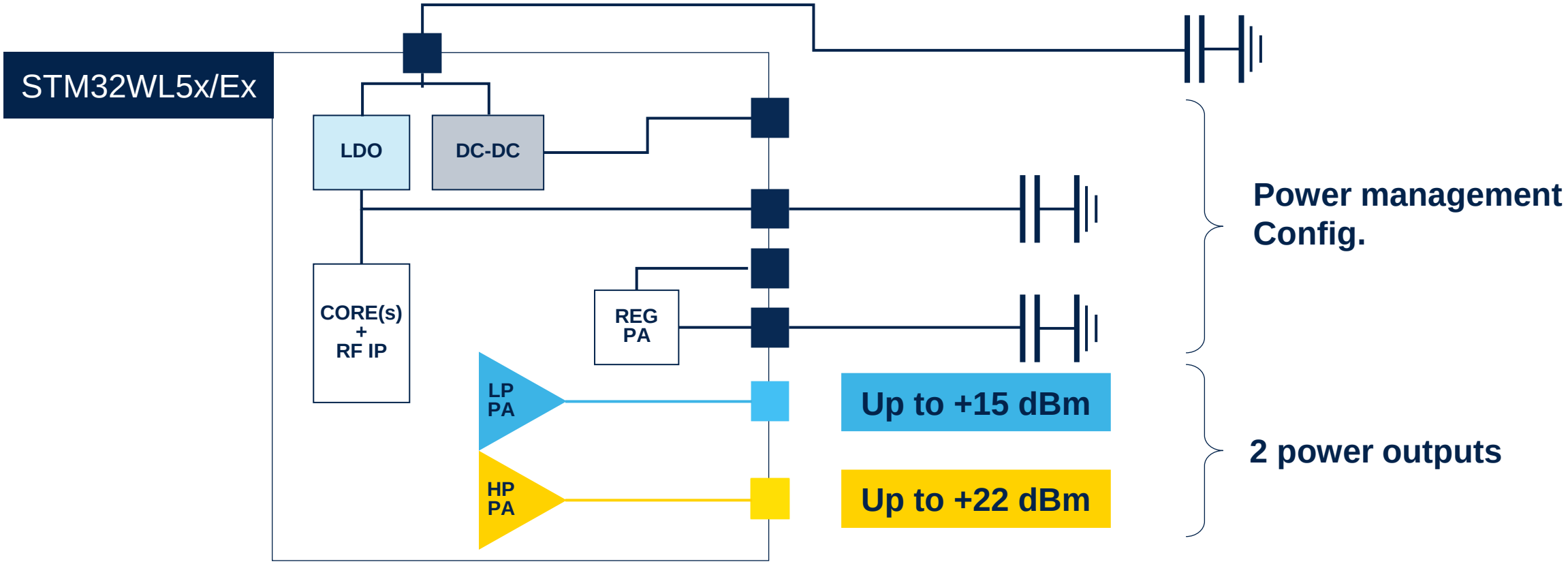
Transmission		
Parameter	Settings	Value
TX	+10 dBm 868/915 MHz	15 mA DCDC
TX	+20 dBm 868/915 MHz	87 mA DCDC

Worldwide compatibility

Reception		
Parameter	Settings	Value
LoRa sensitivity	BW_L = 10.4 kHz SF = 12	-148 dBm
2-FSK Sensitivity	BR_F = 0.6 kb/s FDA = 0.8 kHz BW_F = 4 kHz	-125 dBm
RX	FSK 4.8kb/s buck 100mA max	4.47 mA DCDC 8.18 mA LDO
RX	LoRa® 125 kHz	4.82 mA DCDC 8.9 mA LDO

Flexible power implementation

Configure your STM32WL5x/Ex to address IoT application requirements



STM32WL5x/Ex: no more TCXO!

Minimize your BOM costs, maximize your revenues

LoRaWAN®

AND / OR

sigfox

No need for TCXOs: a simple crystal (XO) is all you need

Advanced features, security, and stacks

Safety and security

Secure your application with embedded safety & security

Safety

- Back-up clock circuitry
- Supply monitoring
- Dual watchdog
- Flash memory with ECC (address status register)
- SRAM Parity check
- Cyclic Redundancy Check
- Brown-out reset in all modes
- Clock security system
- Backup byte registers

STM32**WL5x/Ex**

Security

- Tamper detection
- Read & Write protection
- Memory protection unit (MPU)
- Software IP Protection
- True random number generator
- AES and public key accelerator
- Unique IDs (64- and 96-bit)
- Boot-Lock in user flash memory

- **Secure hardware isolation between CM4 / CM0**
- **Boot selection**
- **Secure boot code protection**
- **Debug control**
- **Secure firmware install**
- **Secure Boot Secure Firmware Update***
- **Key Management Services***
- **Crypto Library***

Available on STM32WL5x/Ex dual-core versions

** Software downloadable on st.com*

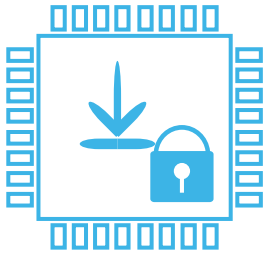
Extended security

Dual-core security features

Data encryption

Secure Key Management Services

- Store keys in a dedicated memory area
- Secure memory area size is programmable
- Any type of key or secure object can be stored



Secure download

Secure Firmware Install or Update

- Embedded Secure Firmware Install (SFI) to secure manufacturing from untrusted manufacturer
- Customizable In the-field update (SBSFU) to perform extremely secure upgrade of the platform

Firmware IP Protection

Secure Boot (Root of trust)

- Boot from the right secure memory location
- Each application firmware is authenticated before being executed

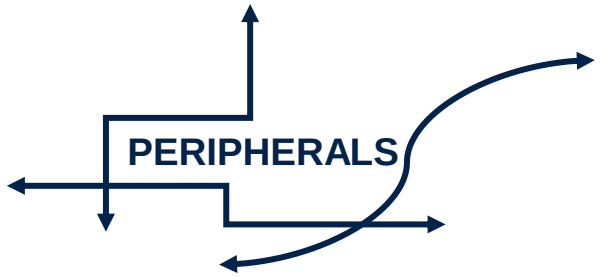
Authentication

Crypto

- Embedded HW crypto accelerators for high performances. Supports ECC signature generation and verification
- True Random Generator
- Software Crypto Library to support additionally DES/TDES, ARC4, HASH, Poly, CHACHA, MD5 etc.

A dual-core architecture with security in every corner

- Secure System Flash Area (SFI/RSS)
- Memory Privilege watermarking, controlled by Secure Areas for the Flash and SRAM areas + Hide Protected Area (HDPA)
- Cortex-M0+ SRAM execution prevention



- Secure Area-aware configurable peripherals :
  - AES, PKA, TRNG, SPI3
  - DMA/DMAMUX channels
- Security by Option Bytes

- Independent configurable debug access to CM4 and CM0+
- Customer Secure Boot can be protected against debug
- Cortex-M0+ debug:
  - Can be disabled by User Option.
  - Disabled when executing system Flash SFI/RSS services

Configurable Flash Interface

Secure Areas & Interrupt Controllers

Power Controller

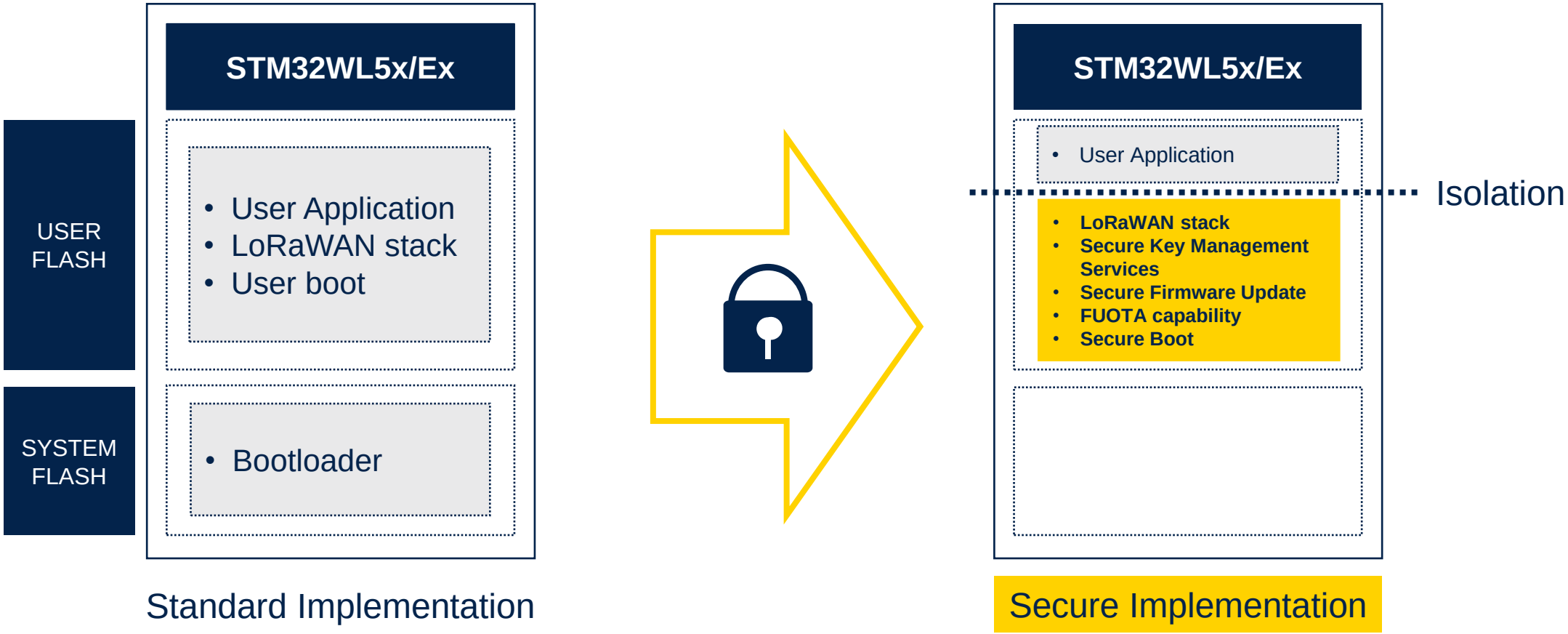
Secure boot and chain of trust

Firmware start and execution are always trusted

- A secure Boot, locked and protected against debug, is executed first at reset
- Next steps are authenticated and certified (RF stack & User Application)
- Next execution steps can then be started in a trusted way

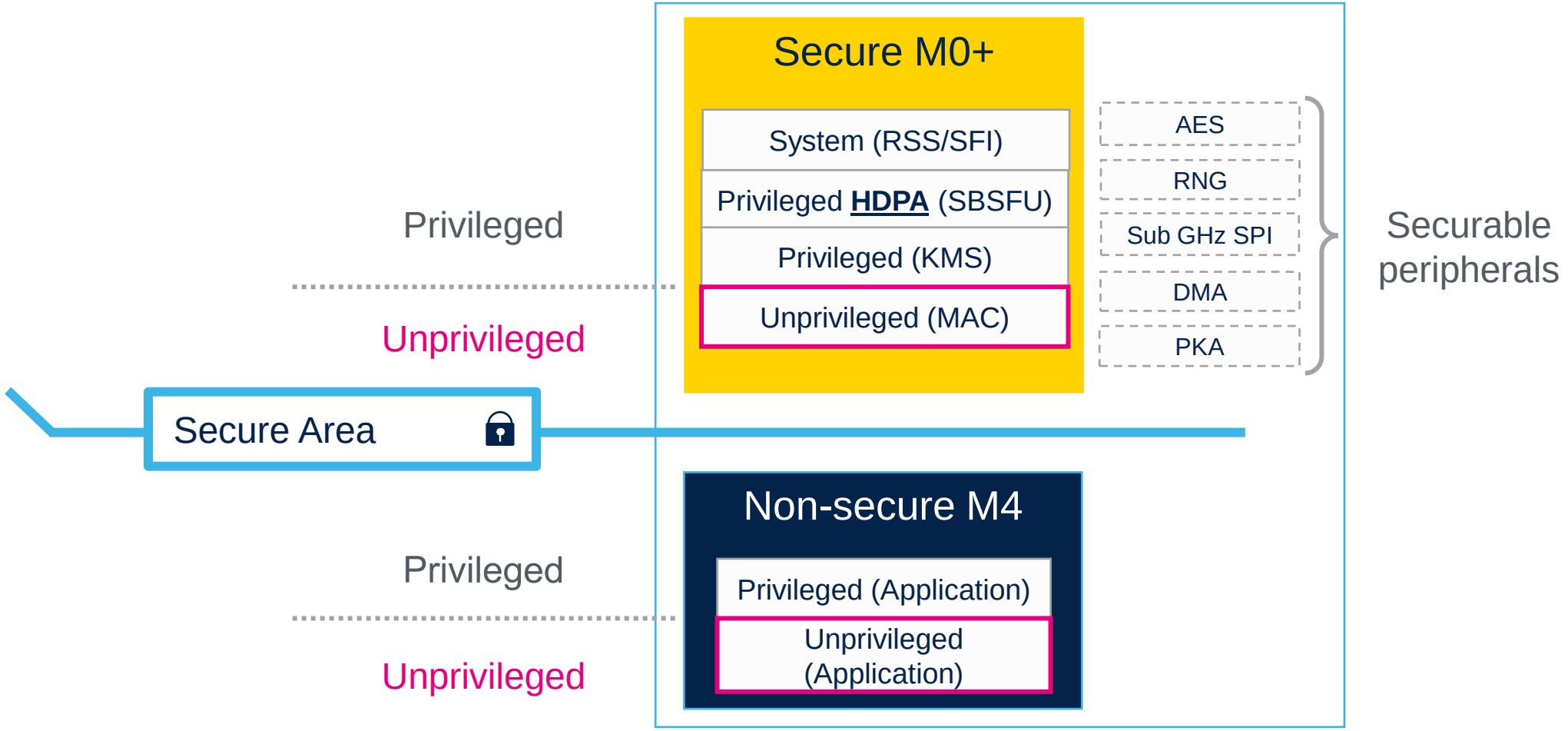
Bring more security to your LoRaWAN® apps

Your implementation, your choice



Security overview
dual-core secure implementation example

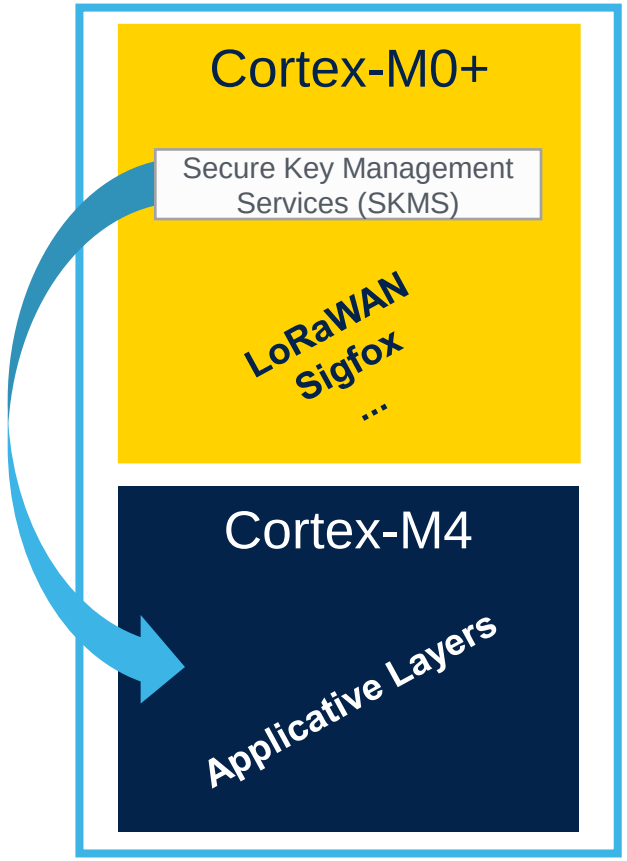
6 security domains for hardware + software isolation



Dual-core firmware isolation example

How to ensure devices are IoT-ready with radio certification in mind

- Cortex-M4 (non-secure)
  - Non-secure / Open debug
  - Intended for Application Code
- Cortex-M0+ (secure)
  - Secure code & data / Closed debug
  - Intended for radio stack isolated from Application
  - Secure FW Upgrade included (with ST keys)
  - Key Management Services for Application side (CM4) (Customers Key)



- Security is enabled.
- No need to pay for re-certification
- Update flow is never broken

Applicative development isolated from Radio stack.

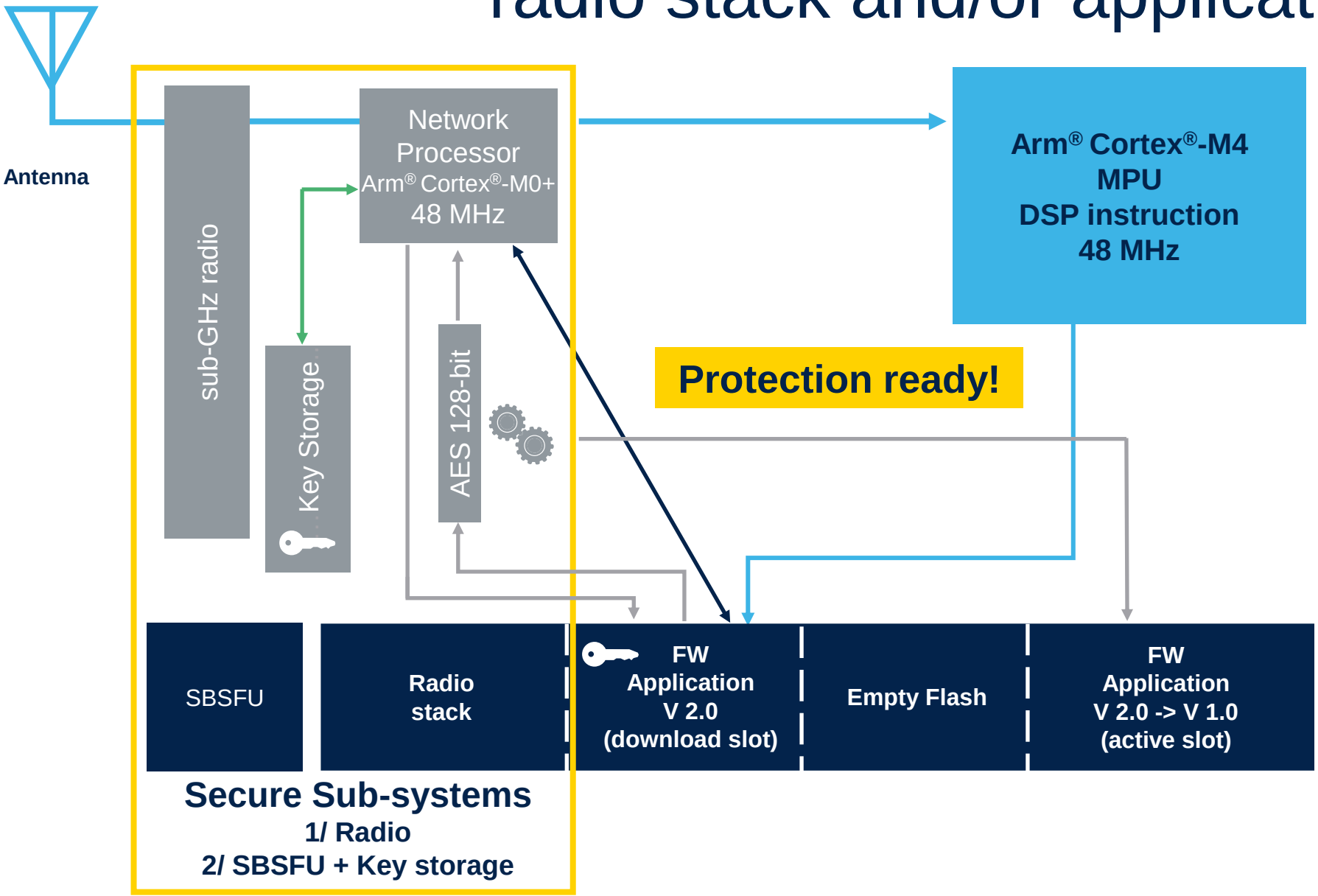
Memory security & privilege access

Secure firmware development

Memory Area \ Core / DMA			M0+ Hide Protection Secure	M0+ Secure	M0+ UNPRIVILEGED	M4 Non-Secure	M4 Non-Secure UNPRIVILEGED	DMA Secure	DMA Secure UNPRIVILEGED	DMA Non-Secure	DMA Non-Secure UNPRIVILEGED
Flash	X	Hide Protection Secure	✓	✗	✗	✗	✗	RW	✗	✗	✗
	SRAM	Secure	✓	✓	✗	✗	✗	RW	✗	✗	✗
	X	Secure UNPRIVILEGED	✓	✓	✓	✗	✗	RW	R	✗	✗
	SRAM	Secure UNPRIVILEGED	✓	✓	✓	✗	✗	RW	RW	✗	✗
		Non-Secure	RW	RW	✗	✓	✗	RW	✗	RW	✗
		Non-Secure UNPRIVILEGED	RW	RW	RW	✓	✓	RW	RW	RW	RW

Legend: Secure | Non-Secure | UNPRIVILEGED Unprivileged execution (privileged otherwise)

IoT protection ready (1/2)
radio stack and/or application FW update



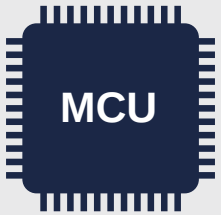
1. New FW package downloaded
2. New FW detected
   Update is launched
3. Authentication signature matches target signature.
   In case not, the process is aborted and device resets
4. New FW package is decrypted with proprietary Key. FW updates on going.

IoT protection ready (2/2)
STM32WL5x/Ex countermeasures against attacks

Advanced

Basic

Attacks	Forms of attacks	STM32WL 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
		• Watchdog
		• Memory ECC, Parity check
		• RTC alarm, Backup 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	• Key Storage (KS) • RNG, Crypto accelerator, CRC • Write memory protection (WRP) • Read Out memory protection (RDP) • Memory Protection Unit (MPU) • Secure Areas • Secure Boot (SB) • Secure Firmware Update (SFU) • Proprietary Code Read-Out Protection (PCROP) • 96-bit ID

Security takeaways

2 independent cores for maximum flexibility

Application benefits

- ST Secure Firmware Install (SFI/RSS)
- Secure Boot (SB)
- Secure Firmware Update (SFU)
- Secure Key Management Services (KMS)
- Secure radio MAC layer communication
- Up to 6 Security domains
- Chain of trust

Customer benefits

➔ Flexible Security implementation
➔ IP protection
➔ Non cloneable device
➔ Trustability of the device, anti-hacking
➔ Trustable fleet maintenance

LoRaWAN - Chips & stacks delivery model

Open chips, takeaway stacks

STM32WLE5

Arm Cortex-M4

Application Firmware
+
Radio stack

STM32WL55

Arm Cortex-M4

Application Firmware

Arm Cortex-M0+

Radio stack
+
Advanced security services

LoRaWAN®

Certified LoRaWAN stack

- *Open stack*
- *Available from st.com/STM32CubeWL*

Open platform

Enjoy Sigfox wherever you are

An open SoC for a global network

sigfox

STM32WLE5

Arm Cortex-M4

Application Firmware
+
Radio stack

STM32WL55

Arm Cortex-M4

Application Firmware

Arm Cortex-M0+

Radio stack
+
Advanced security services

Certified stack from RC1 to RC7
+ Monarch certified!

- *Open stack*
- *Available from st.com/STM32CubeWL*

Open platform

STM32WL5x/Ex and W-MBUS

STM32WL5x/Ex is ideal for smart metering applications

STACKFORCE
embedded.connectivity.solutions

STM32 Partner

Partner Program
life.augmented

STM32WL5x/Ex

M-Bus wireless

LoRaWAN

Please contact Stackforce Sales Office to get W-MBUS stack for STM32WL

STM32WL5x/Ex – W-MBUS Modes

STM32WL5x/Ex is ideal for smart metering applications

- **Mode S**: Stationary — 868 MHz
  - *Meters send data few times a day*
- **Mode T**: Frequent Transmit — 868 MHz
  - *Meters send data several times a day*
- **Mode C**: Compact — 868 MHz
  - *Higher data rate version of mode T*
- **Mode N**: Narrowband — 169 MHz
  - *Long range, narrow band system*

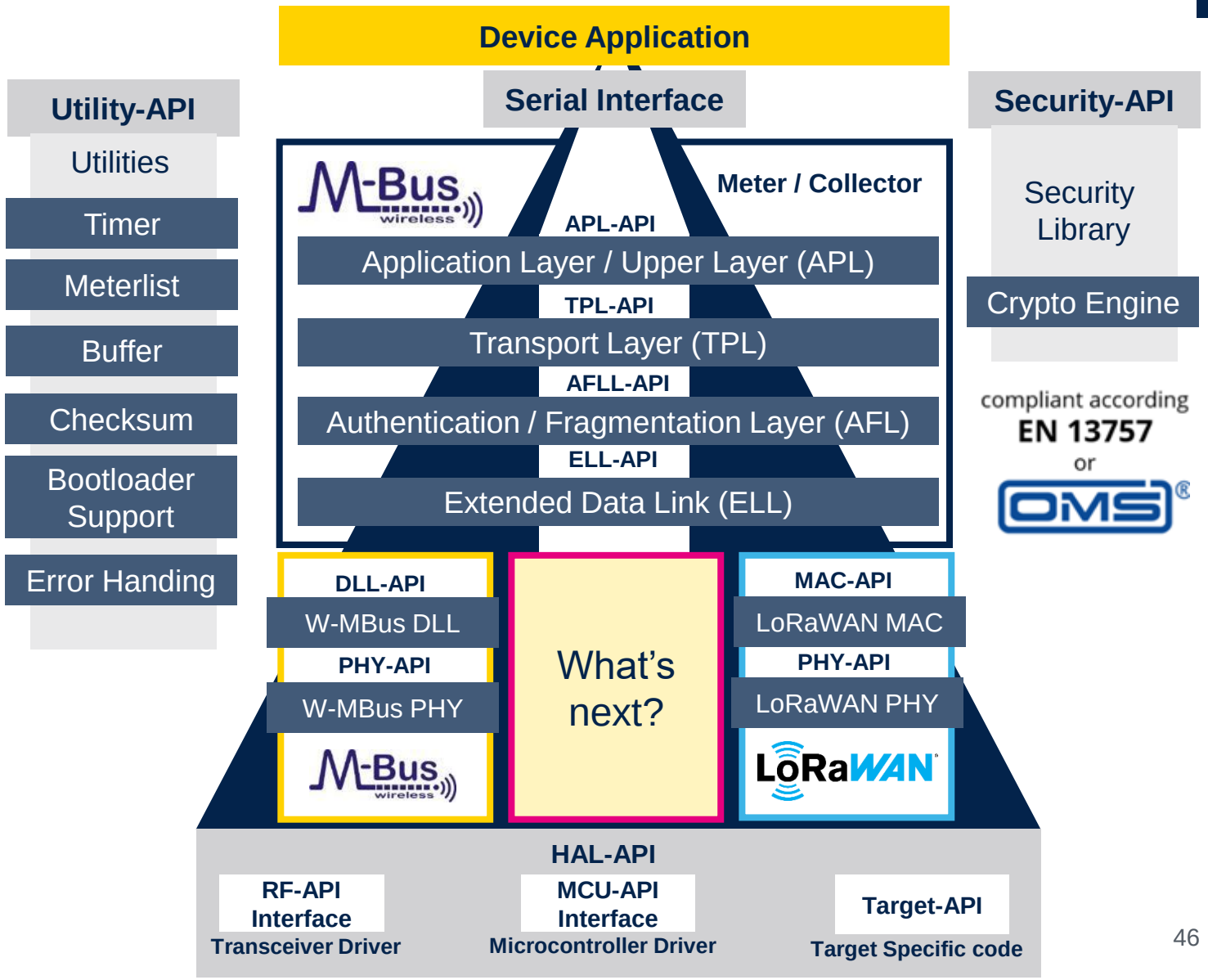
Note: 915MHz modes available on demand

From W-MBUS to W-MBUS-over-LoRaWAN

STM32WL5x/Ex for smart metering

STACKFORCE
embedded.connectivity.solutions

- W-MBUS MAC and PHY can be replaced by LoRaWAN Mac and PHY
- W-MBUS benefits from LoRaWAN long-range capabilities and flexibility
- Mioty stack offer also available

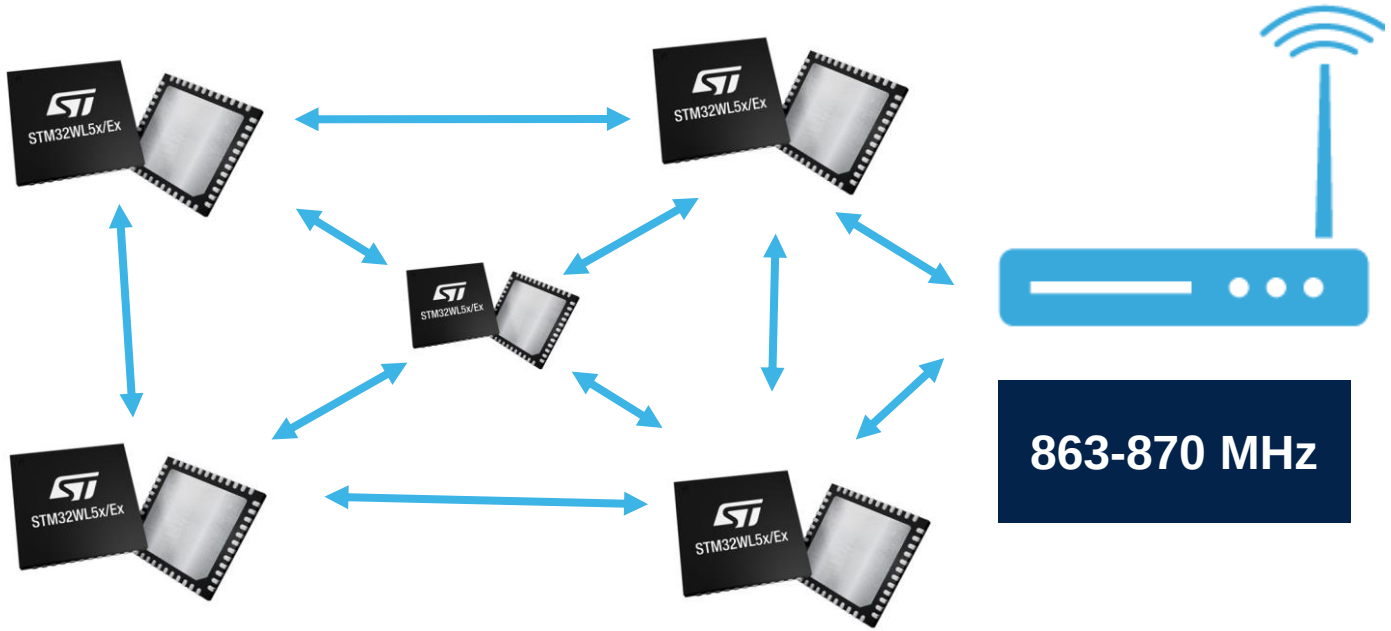


STM32WL5x/Ex and Mesh

Large-scale mesh networking with EmbeTECH

embeNET
NEXT GENERATION WIRELESS MESH

Demo version available
for Nucleo boards!



863-870 MHz

Large scale deployments
(1000+ nodes)

Deterministic behavior
(simulator available)

Reliable IPv6 /UDP
networking

STM32WL5x/Ex and W-MBUS

STM32WL5x/Ex is ideal for smart metering applications

Authorized Partner

STACKFORCE
embedded.connectivity.solutions

STM32 Partner

life.augmented

STM32WL5x/Ex

M-Bus wireless

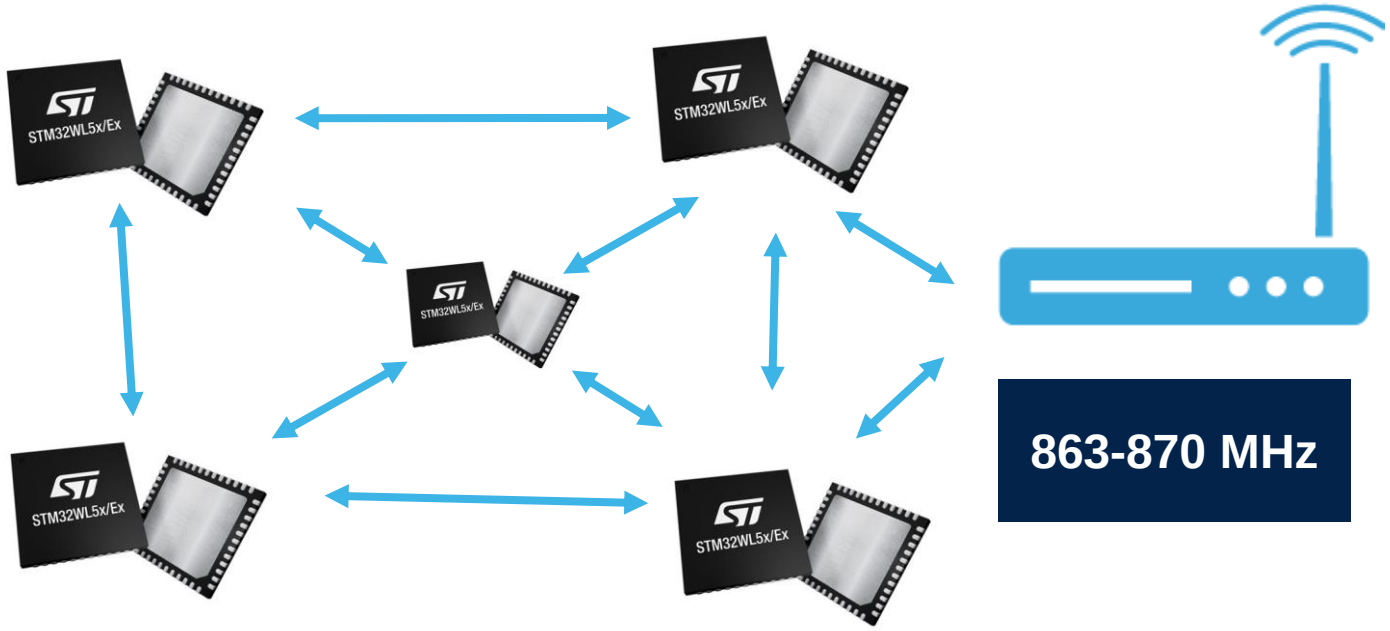
LoRaWAN

Please contact Stackforce Sales Office to get W-MBUS stack for STM32WL5x/Ex

STM32WL5x/Ex and Mesh by embetech

Large-scale mesh network with embeNET

Authorized Partner



- **Large scale Deployment (1000+ nodes)**
- **Deterministic behavior (simulator available)**
- **Reliable IPv6/UDP networking**

Demo version available for Nucleo Boards

Please contact embetech Sales Office to get EmbeNET stack for STM32WL5x/Ex

contact@embe.tech

STM32WL5x/Ex and FUOTA

Firmware update over the air

FUOTA libraries available in STM32CubeWL

Suitable for massive STM32WL5x/Ex fleets updates

LoRaWAN Network Server agnostic*

Secure Firmware Update

** If Network Server is fully interoperable with LoRaWAN*

STM32WL5x/Ex ecosystem

STM32WL5x/Ex reference designs best performance for your country regulation

Security services
Radio Stacks
RTOS

LoRaWAN 1.0.4

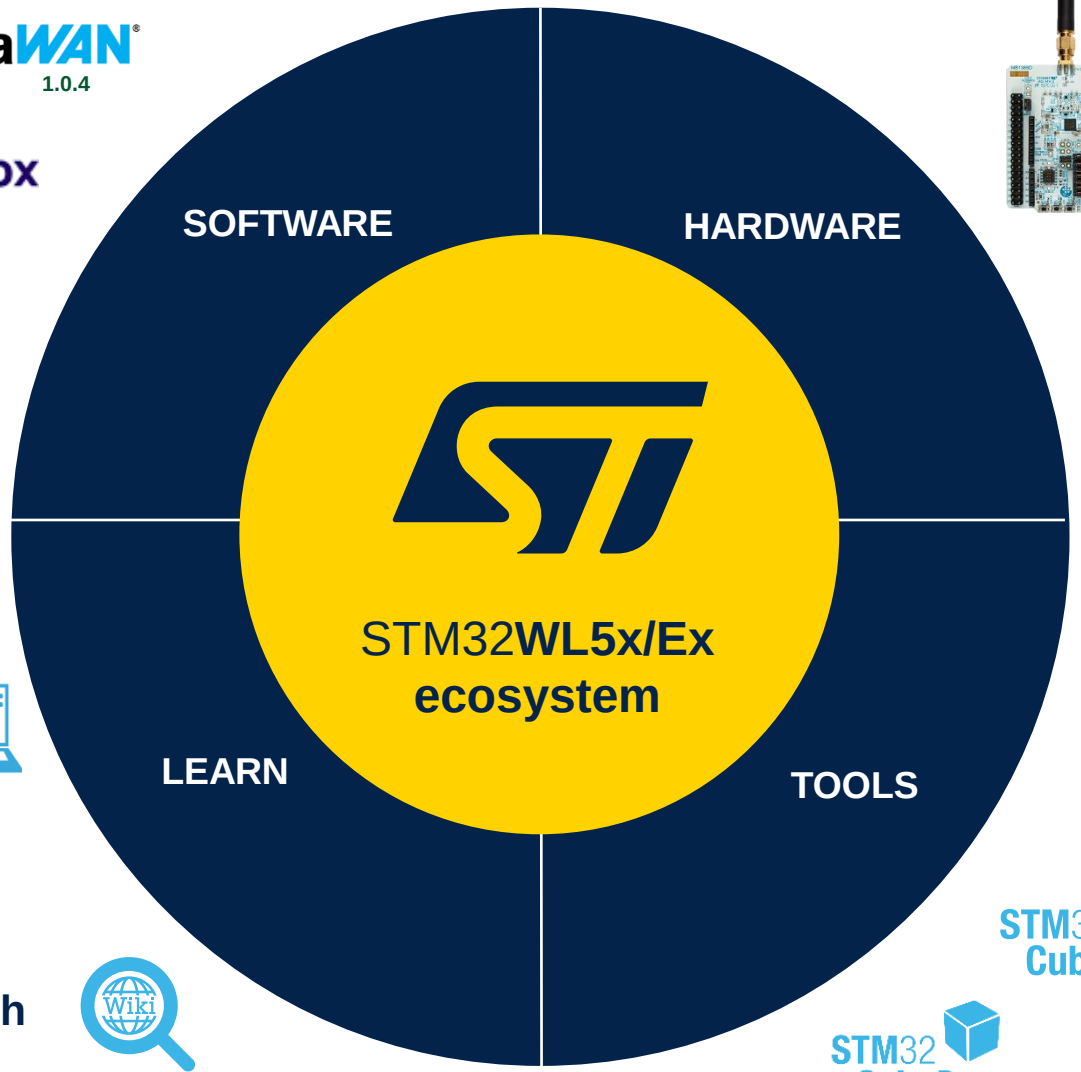
sigfox

STM32 CubeWL

LoRaWAN CERTIFIED

embeNET NEXT GENERATION WIRELESS MESH

SiP Module
Demo board
Nucleo boards
Reference designs



Online trainings
35 application notes

Wiki.st.com
Getting started with LoRaWAN®

STM32 CubeIDE

STM32 CubeMX

STM32 CubeMonitor

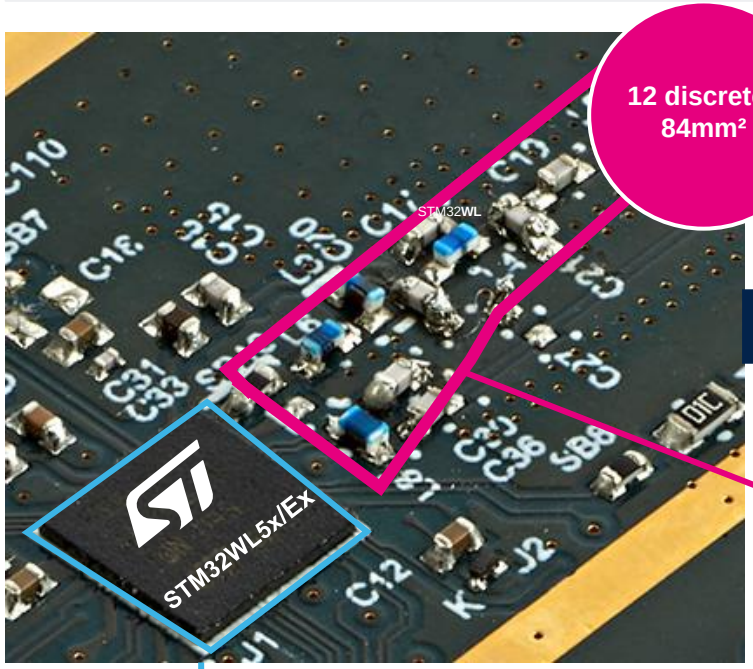
STM32 CubeProgrammer

Complete suite of development tools

RF integrated passive device (IPD) for STM32WL5x/Ex

Placed between the STM32WL5x/Ex and the antenna, from discrete components to RF IPD

BEFORE



Discrete balun, filter & matching network

Wireless MCU

AFTER

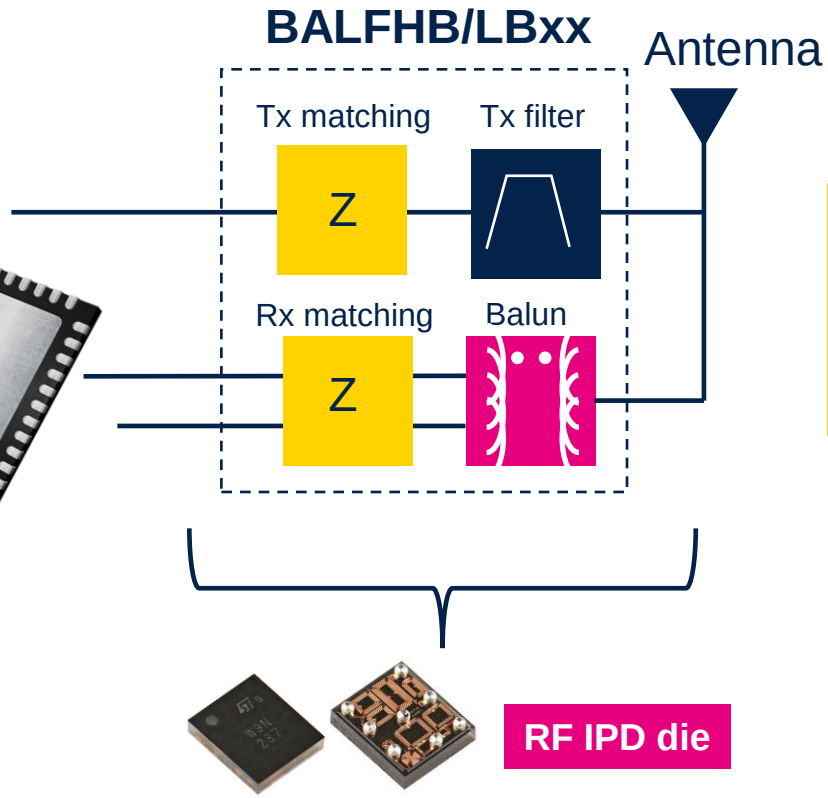
RF IPD balun, filter & matching network

Wireless MCU

RF IPD for STM32WL5x/Ex

Ready-to-use, between the STM32WL5x/Ex and the antenna

- Design simplification
- Performance optimization
- System integration
- Reliability improvement
- BOM reduction



Tx and Rx matching,
Rx Balun,
Tx Filtering
All in 1.8 x 2.13 mm

STM32WL5x/Ex IPD tailored for your needs

Pick-up your own IPD and start your wireless design

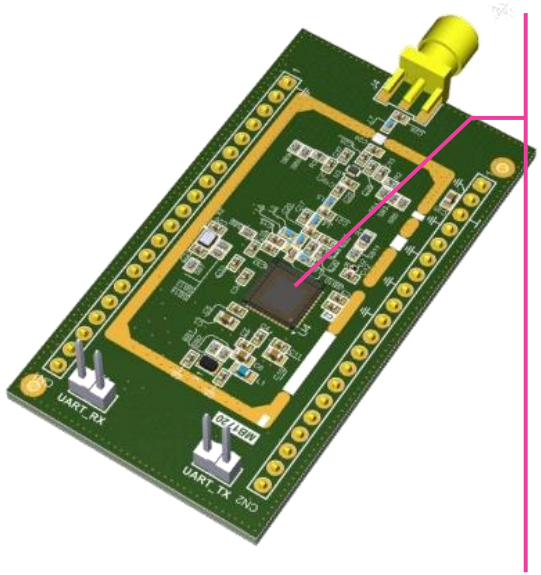
Select your IPD fine-tuned for your application

Power Frequency	22 dBm 864-928 MHz			15 dBm 864-928 MHz		
#PCB Layers	4	4	2	4	4	2
STM32WL BGA	BALFHB-WL-01D3			BALFHB-WL-04D3		
STM32WL QFN		BALFHB-WL-02D3	BALFHB-WL-03D3		BALFHB-WL-05D3	BALFHB-WL-06D3

Power Frequency	17 dBm 470-530 MHz		
#PCB Layers	4	4	2
STM32WL BGA	BALFLB-WL-07D3		
STM32WL QFN		BALFLB-WL-08D3	BALFLB-WL-09D3

STM32WL BGA	STM32WL5xJx|x STM32WLExJx|x
STM32WL QFN	STM32WL5xCxUx STM32WLExCxUx

Download schematics and layout

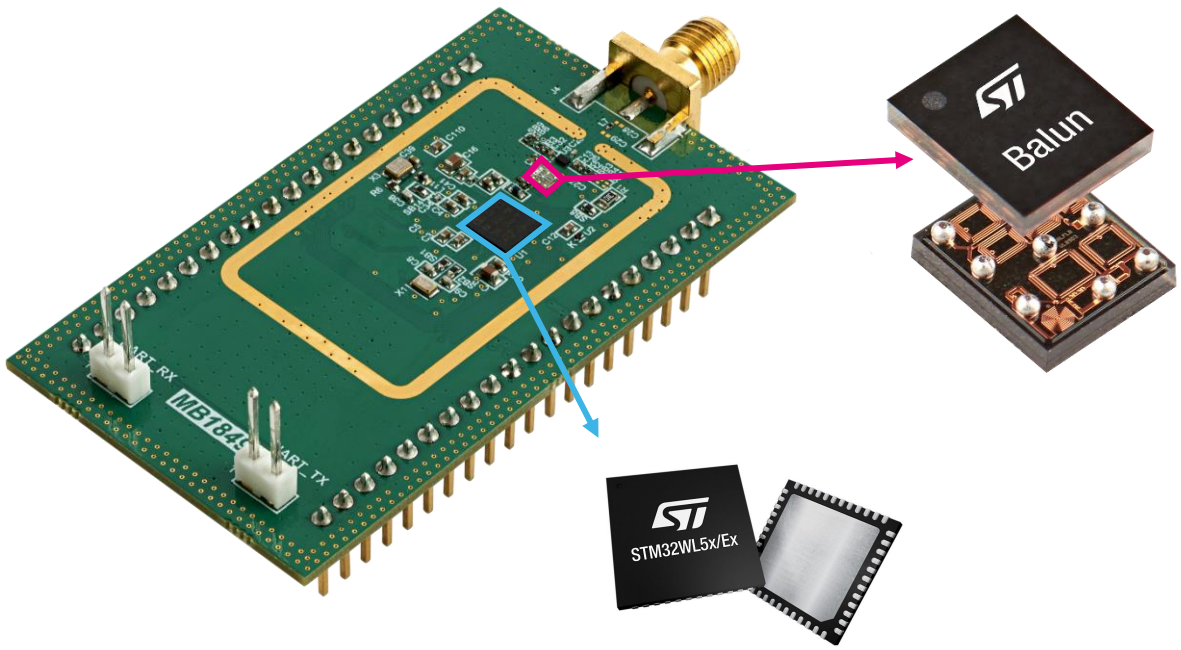


STM32WL5x/Ex REFERENCE DESIGN

- **Fast time to market**
  FCC/CE certified open hardware
- **Worldwide support:**
  Optimized for frequency regulation
- **Material available:**
  Schematics & Layout

STM32WL5x/Ex reference designs

Get ready to start your LoRaWAN® application



Fast time to market
FCC/CE certified open hardware

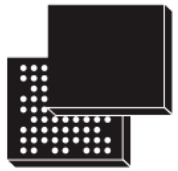
Worldwide support
- Optimized for frequency regulation

Material available
- Supply and SMPS circuit
- RF matching circuit
- RF filtering circuit
- Discrete and IPD solution

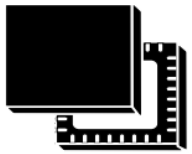
STM32**WL**
RF IPD
inside

Download free schematics, layout, bill of materials & firmware

STM32WL5x/Ex reference designs best performance for your country regulation



UFBGA73
(5 x 5 mm)



UFQFPN48
(7 x 7 mm)

Frequency & Output Power	[470:530 MHz] 17 dBm	[864:928 MHz] 15 dBm	[864:928 MHz] 22dBm
UFBGA73	STDES-WL5I4SBB		
UFQFPN48	STDES-WL5U4SBB		

+169Mhz reference design : **STDES-WL5U4SHW**

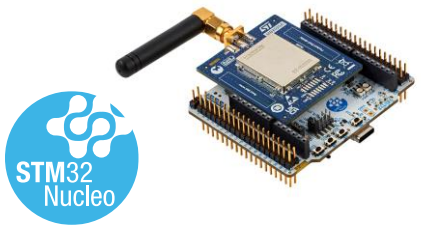
STM32WL5x/Ex reference designs optimized to reduce your BOM cost

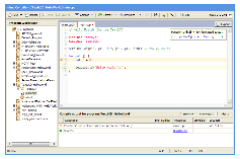
Save RX-TX Switch Cost Direct Tie Design	
[433 MHz]/15 dBm	STDES-WL5U4DLB
[864:928 MHz]/15 dBm	
[470:530 MHz]/17 dBm	STDES-WL5U4DHB
[864:928 MHz]/22 dBm	

Save PCB cost: 2-LAYER PCB Design	
[470:530 MHz]/17 dBm	STDES-WL5U2SBB
[864:928 MHz]/15 dBm	
[864:928 MHz]/22 dBm	

Ecosystem overview for STM32WL5x/Ex

Complete support for STM32WL & Arm Cortex®-M cores architecture





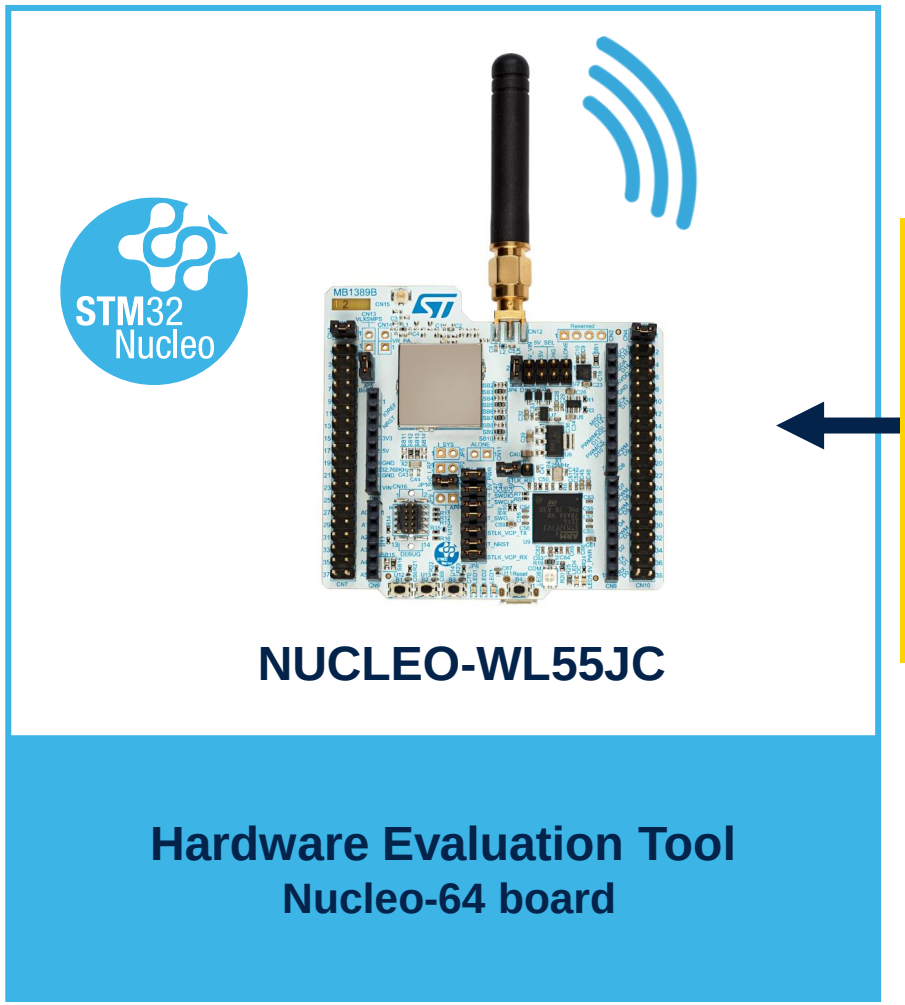
iar
arm KEIL
STM32 CubeIDE
eclipse
WiSE Studio

STM32 CubeProgrammer
STM32 CubeMonitor

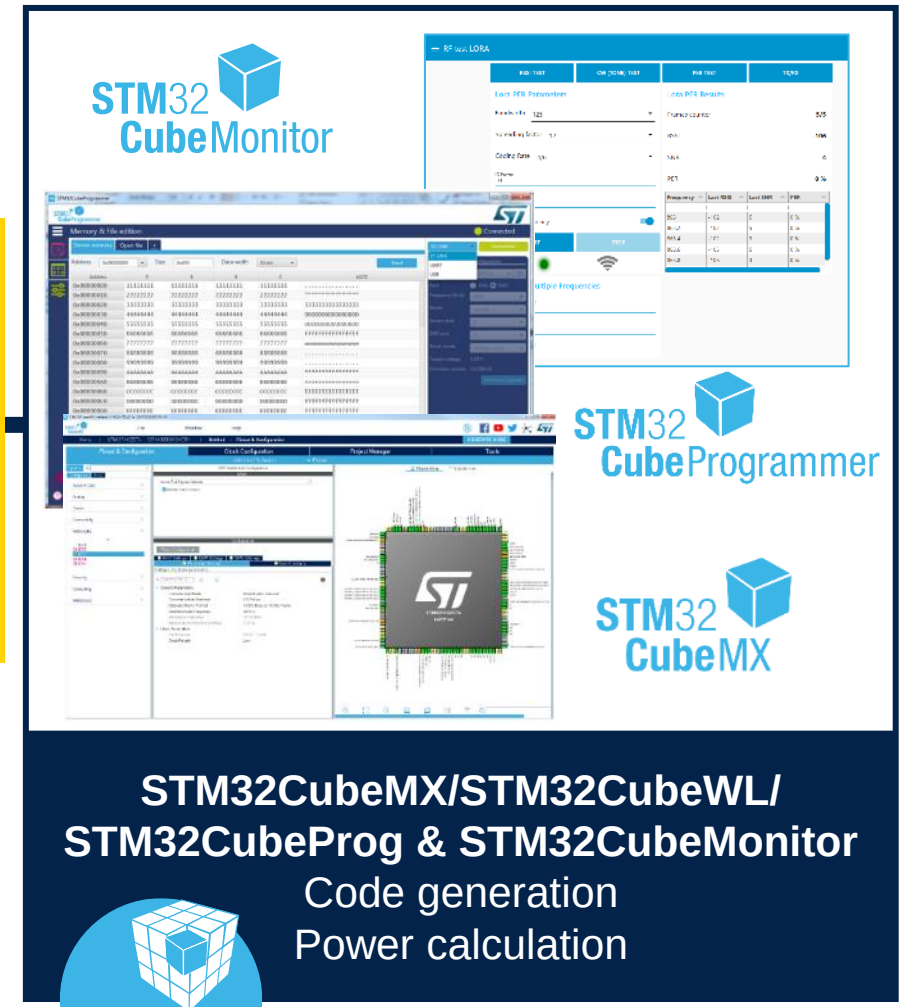
mioty
LoRaWAN
sigfox
embeNET
M-Bus wireless
ZETA Alliance

STM32 Nucleo-64	STM32CubeMX	IDEs Compile and debug	STM32 programming & monitoring tools	Stacks
Flexible prototyping	**Graphical tool for easy configuration** • Configure and generate code • Peripherals and middleware configuration	**Simple, powerful solutions** • Partners IDE (Arm® Keil®) FREE • IDE FREE (based on Eclipse) • RTOS aware debug	**STM32CubeProg** **STM32CubeMonitor** • Device and memory configuration • Program the application • Monitor variables at runtime	**LoRaWAN (ST)** **Sigfox (ST)** **Wireless-MBUS / Mioty (Stackforce)** **ZETA (Zifisense)** **EmbeNET (embetech)**

Prototyping made as easy as 1,2,3



STM32**WL5x/Ex**



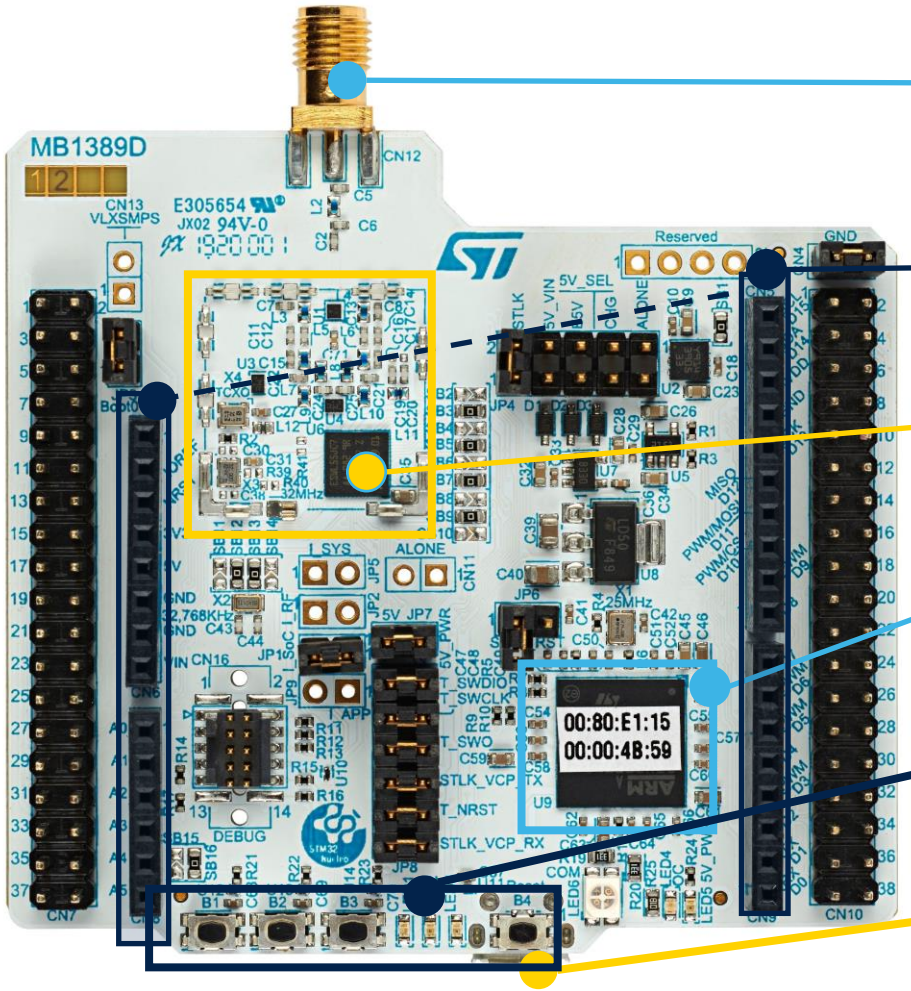
The STM32WL5x/Ex Nucleo-64 at a glance

NUCLEO-WL55JC1

868/915/923 MHz

NUCLEO-WL55JC2

433/470 MHz



SMA Antenna connector

Arduino™ extension connectors :
easy access to add-ons

STM32WL5x/Ex
(under a metallic shield)

Integrated ST-LINK/V3: mass storage
device flash programming

4 push buttons, 3 color LEDs,
Jumper settings

Flexible board power supply :
through USB or external source

STM32WL5x/Ex - certifications overview

Protocol and commercial certifications

LoRaWAN

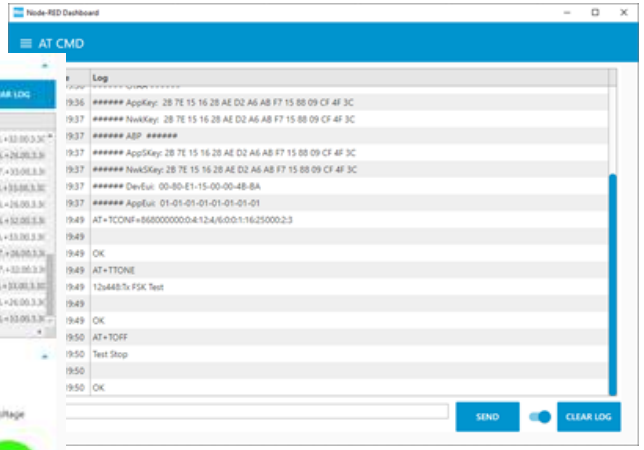
sigfox verified

CE FC IC

RoHS COMPLIANT

STM32CubeMonitor

- Wireless features of STM32WL55
  - Multi-Modulation commands
  - sub-GHz RF tests
  - Send Protocols commands
  - Perform LoRaWAN/Sigfox tests
- Suitable for STM32 Nucleo, or custom boards
- USB or UART to Virtual Com Port



STM32 CubeMonitor

Key takeaway: end-to-end ecosystem

Software Tools

STM32 CubeMX

STM32 CubeIDE

1. Configuration

STM32 CubeIDE

iar

arm KEIL

2. Development

STM32 CubeIDE

STM32 CubeProgrammer

3. Programming

STM32 CubeMonitor

4. Monitoring

Embedded Software

STM32 CubeWL

STM32Cube MCU Package

LoRaWAN

sigfox

STM32Cube Expansions & Function Packs

STM32 CubeExpansion

Save on your application cost

Integrated functionalities helps you drop the BOM down

Optimization of the silicon cost

- Deep integration factor
- System-on-chip avoids to use a second radio
- Less external components
- Single 32 MHz crystal for CPU & embedded radio
- 32 kHz master clock output available
- Possibility to use a 32 MHz crystal (XO) instead of a temperature compensated crystal (TCXO)
- 2-layer PCB enablement with QFN package

Free ecosystem

- LoRaWAN® stack
- Sigfox stack
- STM32CubeMX
- STM32CubeMonitor
- STM32CubeProg

STM32 rolling longevity commitment

Longevity commitment is renewed every year

Starting in 2021

- **STM32F1** (launched in **2007**) — **22 years** of commitment
- **STM32L1** (launched in **2009**) — **20 years** of commitment
- **STM32F2** (launched in **2010**) — **19 years** of commitment
- **…**
- **STM32WB** (launched in **2018**) — **11 years** of commitment
- **STM32G0** (launched in **2018**) — **11 years** of commitment
- **STM32G4** (launched in **2019**) — **10 years** of commitment
- **STM32WL** (launched in **2020)** — **10 years** of commitment

Releasing your creativity

- @STM32
- @ST_World
- community.st.com
- wiki.st.com/stm32mcu
- github.com/STMicroelectronics
- STM32 Wireless – Video Playlist
- STM32WL Online Training

Our technology starts with You

Find out more at www.st.com/STM32WL5x/Ex