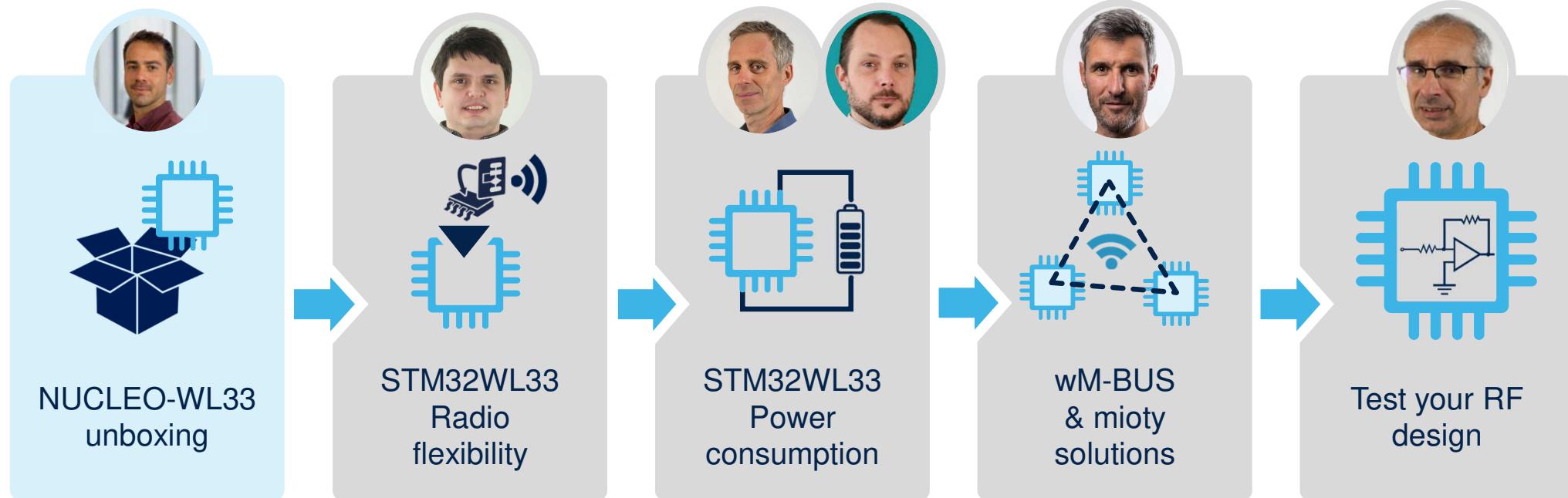


NUCLEO-WL33 unboxing and first steps

TOMAS RF Team

STM32WL33 in action

Use-cases and ecosystem demo lab tour





Demo: NUCLEO-WL33 unboxing

Introduction

1

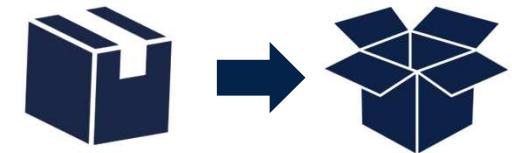
NUCLEO-WL33CC1 unboxing

2

Full STM32 Cube Ecosystem

3

Generate your first RF application from STM32CubeMX



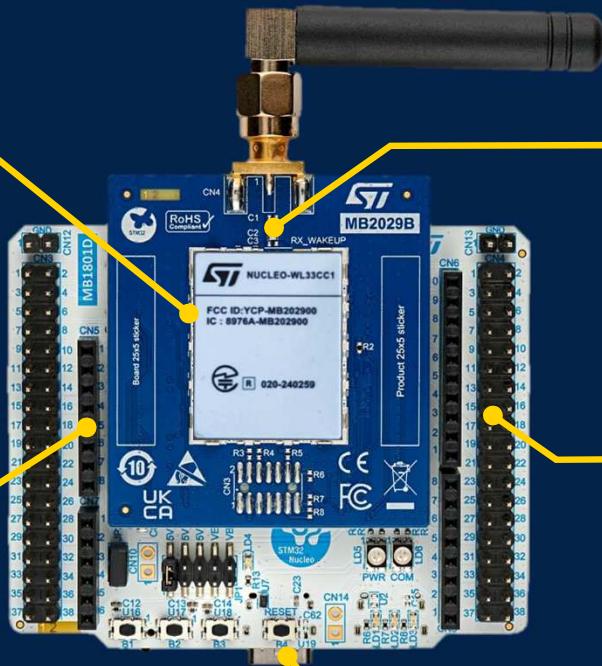
NUCLEO-WL33CCx unboxing



Unbox NUCLEO-WL33CCx

RF shield covering
STM32WL33 MCU

Arduino I/Os access



Antenna path and
SMA connector

ST morpho Easy
add-ons

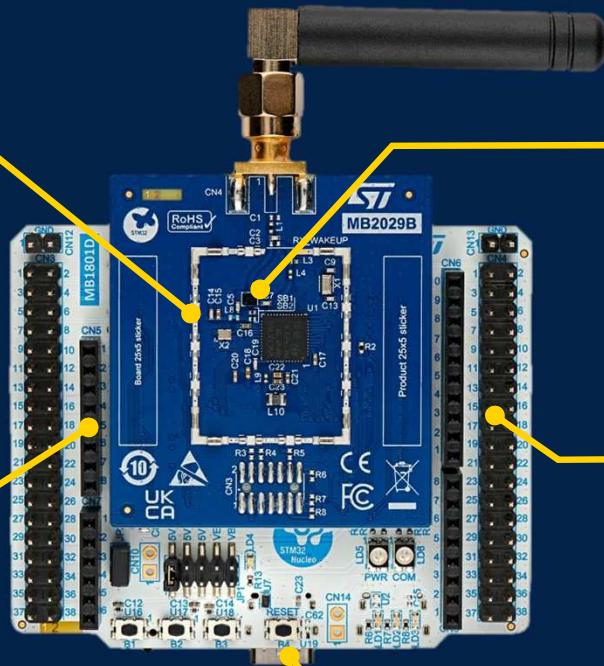
ST-Link V3 connector

*NUCLEO-WL33CC1 : 868 Mhz band
NUCLEO-WL33CC2 : 433 Mhz band*

Unbox NUCLEO-WL33CCx

RF shield covering
STM32WL33 MCU

Arduino I/Os access



RF matching with
MPLF and SMA
connector

ST morpho Easy
add-ons

*NUCLEO-WL33CC1 : 868 Mhz band
NUCLEO-WL33CC2 : 433 Mhz band*

ST-Link V3 connector

WL33
unboxing

WL33 radio
flexibility

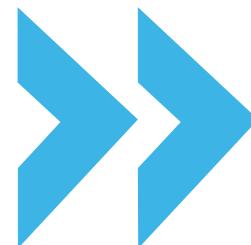
Power
consumption

wM-BUS
& mioty

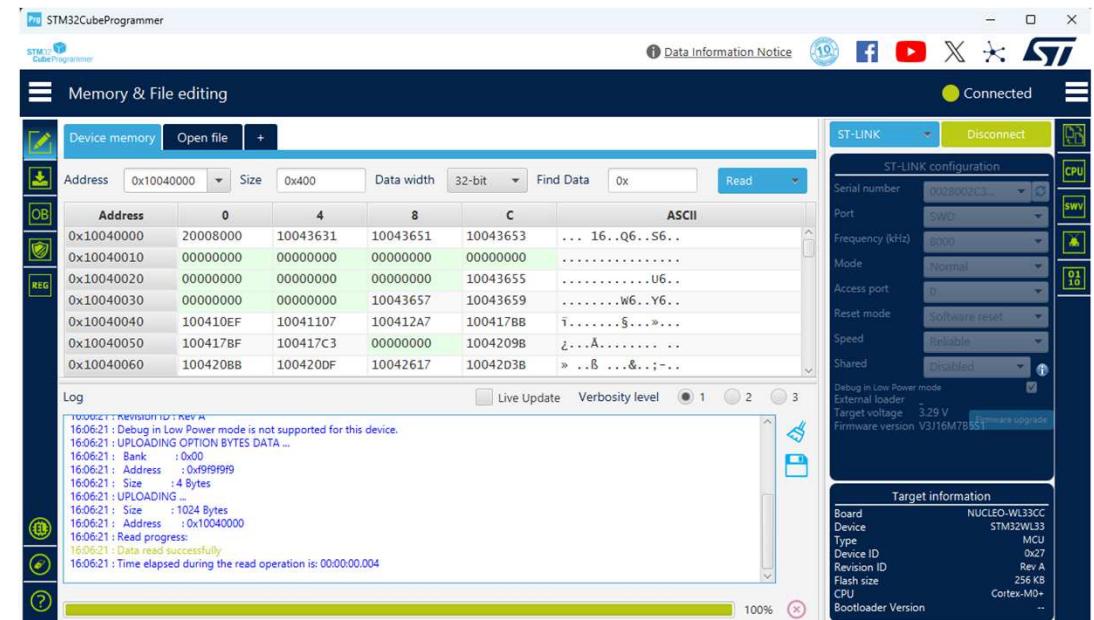
Test your
RF design



STM32
CubeProgrammer



Connect to STM32WL33 with STM32CubeProgrammer



WL33
unboxing WL33 radio
flexibility Power
consumption wM-BUS
& mioty Test your
RF design

STM32WL3x ST Webpage



www.st.com/en/microcontrollers-microprocessors/stm32wl3x.html

Or type « STM32WL3x » on st.com

The screenshot shows the STM32WL3x - PDF Documentation page. The URL in the address bar is www.st.com/en/microcontrollers-microprocessors/stm32wl3x/documentation.html. The page features the ST logo and navigation links for Products, Tools & software, Applications, Solutions, and ST Developer Zone. A sidebar on the left lists categories like Microcontrollers & coprocessors, STM32 32-bit Arm Cortex MCUs, STM32 High Performance MCUs, STM32 Mainstream MCUs, STM32 Ultra Low Power MCUs, and STM32 Wireless MCUs. The main content area is titled "STM32WL3x - PDF Documentation" and includes tabs for Overview, Product selector, Documentation (which is selected), CAD Resources, and Tools & Software. Below the tabs, there are sections for All documents, Technical Literature, Flyers and Brochures, and Presentations.



WL33
unboxing WL33 radio
flexibility Power
consumption wM-BUS
& mioty Test your
RF design



STM32WL3x wiki pages



https://wiki.st.com/stm32mcu/wiki/Connectivity:Introduction_to_sub-1GHz

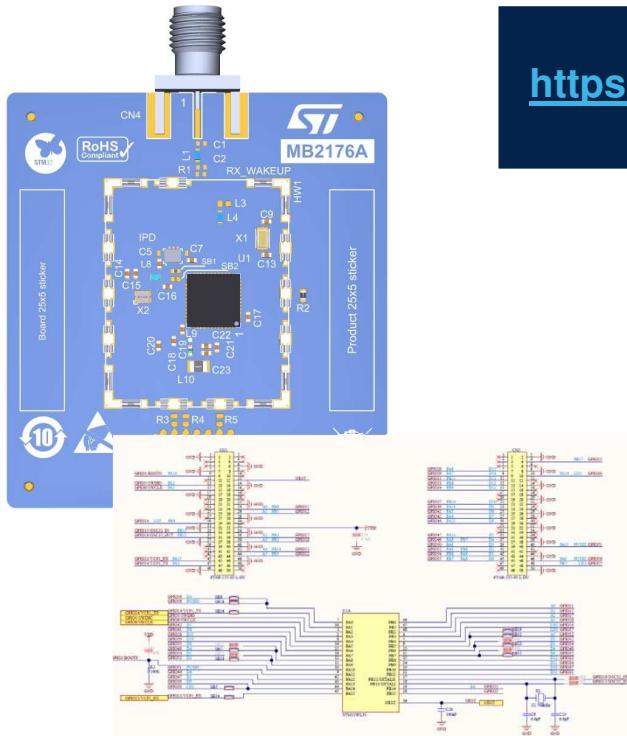


Or type « STM32WL3x » on st.com

The screenshot shows the STM32MCU website's navigation bar with links for Main page, Artificial Intelligence, ISP, Connectivity, Bluetooth Low Energy, Cellular, LoRaWAN, Matter, and Sub-1GHz. Below this is a sidebar with links for Introduction to sub-1GHz, NUCLEO-WL33CC Out Of Box Demonstration, NUCLEO-WL33CC Hardware setup, Getting started with LC sensing controller (LCSC), STM32WL3x Hardware BoM flexibility, Getting started with STM32CubeWISE-RadioExplorer, STM32WL3x HSE tuning flexibility, and Thread. The main content area displays the "NUCLEO-WL33CC Out Of Box Demonstration" page, which includes an introduction, setup instructions, and a "NUCLEO-WL33CC box contents" section showing the physical hardware components.



Reference design : STDES-WL3xxxxx



<https://www.st.com/en/evaluation-tools/connectivity/products.html>



Or type « STDES-WL3... » on st.com

Part Number	Marketing Status	Tool Type	Core Product
STDES-WL3C2ILL	ACTIVE	Reference Design	STM32WL33Cx
STDES-WL3C2IMH	ACTIVE	Reference Design	STM32WL33Cx
STDES-WL3C2IML	ACTIVE	Reference Design	STM32WL33Cx
STDES-WL3C2SLH	ACTIVE	Reference Design	STM32WL33Cx



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STM32CubeWL3 ST Webpage



<https://www.st.com/en/embedded-software/stm32cubewl3.html>

Or type « STM32CubeWL3 » on st.com

STM32CubeWL3 ACTIVE

STM32Cube MCU Package for STM32WL3 series
(HAL, Low-Layer APIs and CMSIS, File system, RTOS,
LPWAN stack - and examples running on ST boards)

[Get Software](#) [Download databrief](#)

[Overview](#) [Documentation](#)

Product overview

[Description](#) [All features](#) [Get Software](#)

Description



WL33
unboxing

WL33 radio
flexibility

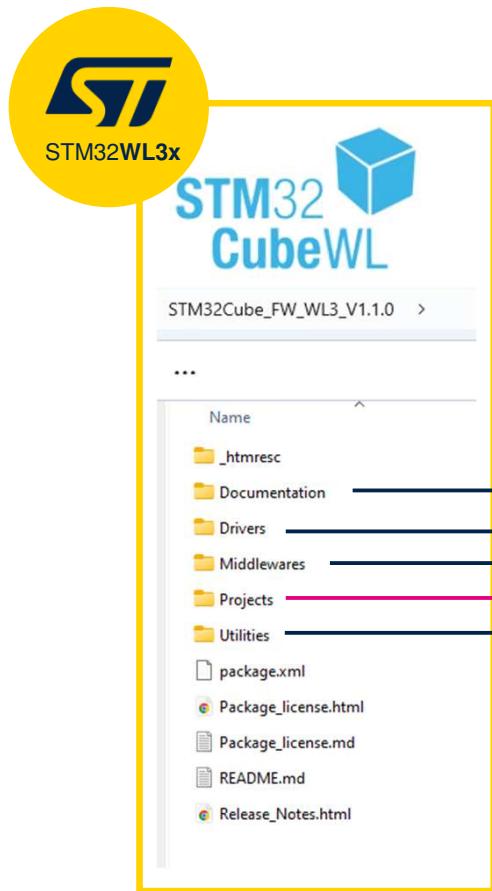
Power
consumption

wM-BUS
& mioty

Test your
RF design



STM32CubeWL package presentation



Documentation: Getting started with STM32CubeWL3 software package

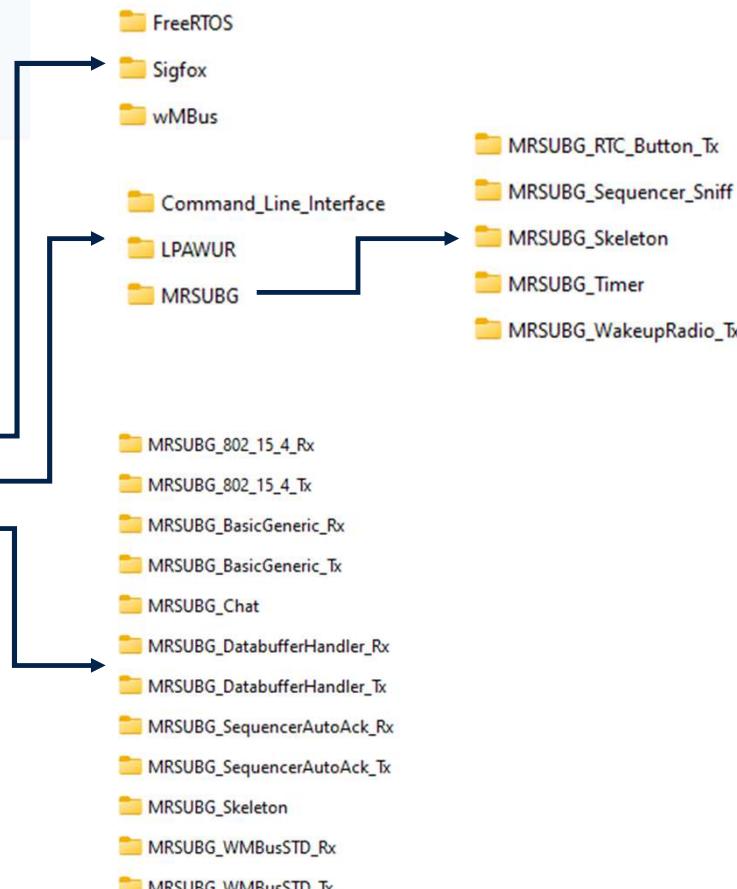
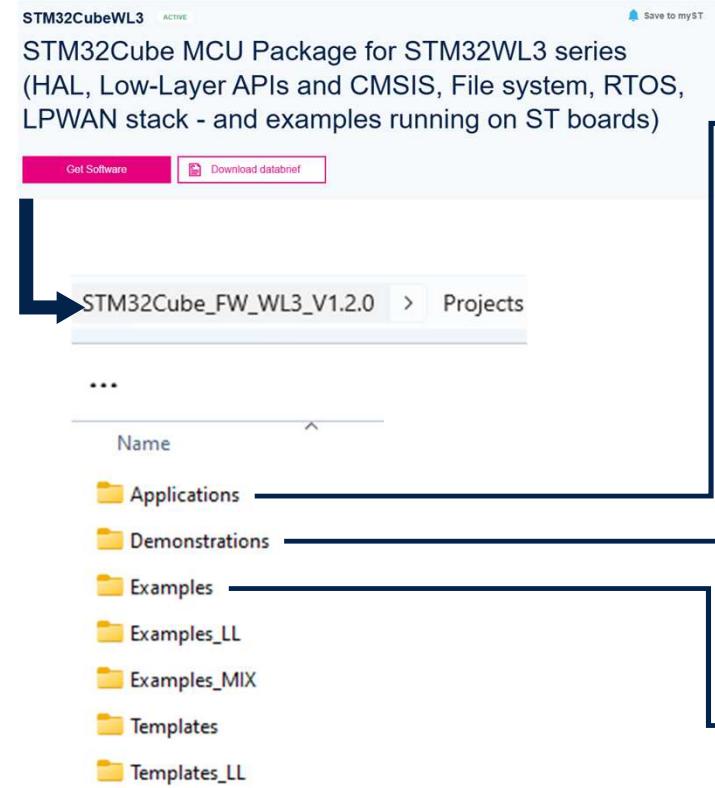
Drivers: All drivers available in source code (BSP, CMSIS, HAL & LL)

Middlewares: All third-part middleware (FatFs, Sigfox, FreeRTOS)

Projects: All application examples (for each peripheral and RF), based on HAL, LL or MIX. Skeleton project also available to start from scratch

Utilities: PC software to install STM32WL3x device for KEIL & IAR





Many app example available!

Extensive list of examples code with documentation

From basic peripheral examples to sub-1Ghz radio communication

Available over STM32CubeIDE, IAR & Keil

STM32CubeMX demonstration



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



Build your first STM32WL33 radio communication

- **Based on available application examples :**

\STM32Cube_FW_WL3_V1.2.0\Projects\NUCLEO-WL33CC\Examples\MRSUBG\ ...

...\\ MRSUBG_BasicGeneric_Tx

```
COM89 - Tera Term VT
File Edit Setup Control Window Help
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 101 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 102 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 103 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 104 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 105 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 106 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 107 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 108 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 109 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 110 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 111 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 112 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 113 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 114 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 115 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 116 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 117 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 118 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 119 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 120 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 121 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 122 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 123 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 124 ]
```

*LED toggling after each transmission



RF



...\\ MRSUBG_BasicGeneric_Rx

```
COM72 - Tera Term VT
File Edit Setup Control Window Help
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 102 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 103 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 104 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 105 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 106 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 107 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 108 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 109 ]  
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RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 112 ]  
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RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 114 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 115 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 116 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 117 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 118 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 119 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 120 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 121 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 122 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 123 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 124 ]
```

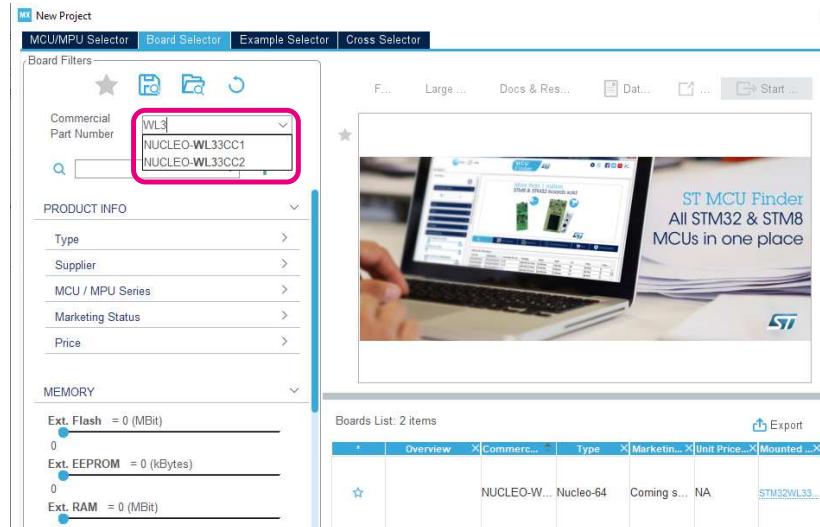
*LED toggling after each reception





Pre-requisites for WL3 in Cube

- Open a latest version of STM32CubeMX.
- From “Board Selector”, choose “NUCLEO-WL33CC1” evaluation board.



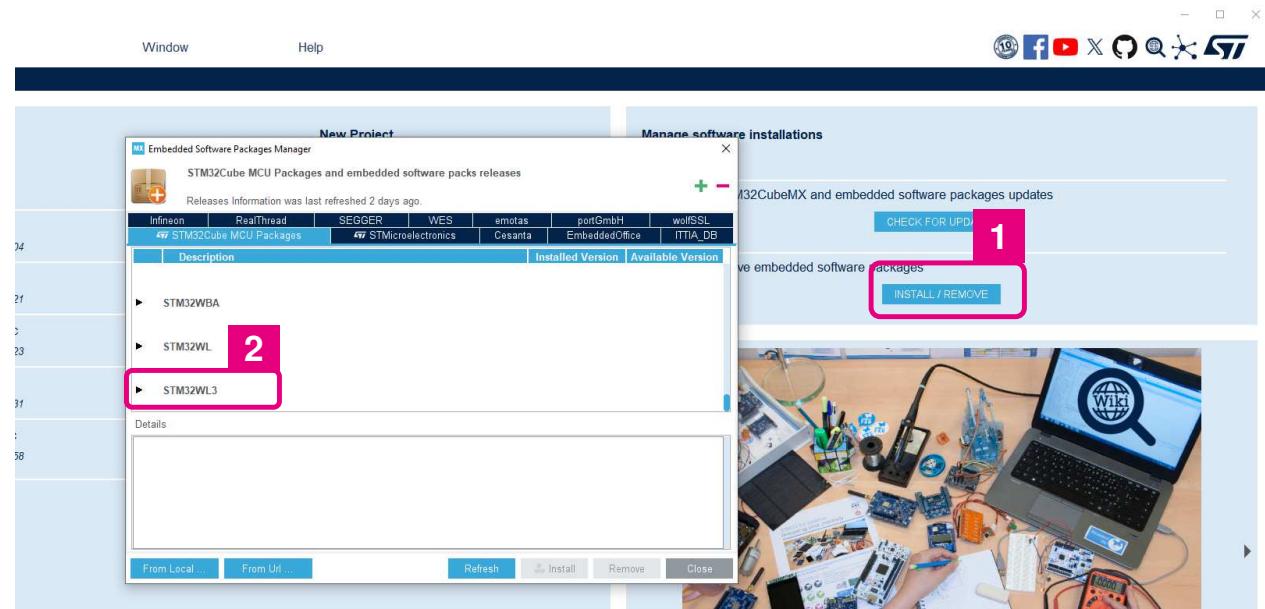
- If you don't see “NUCLEO-WL33CC1” :
 - Do “Alt+R” binding, to refresh Cube finder database ...





- In STM32CubeMX main window
- Update & refresh the packages :

Pre-requisites for WL3 in Cube



- Do “Alt+R” binding, to refresh Cube finder database ...
- STM32WL3 packages should appear



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design

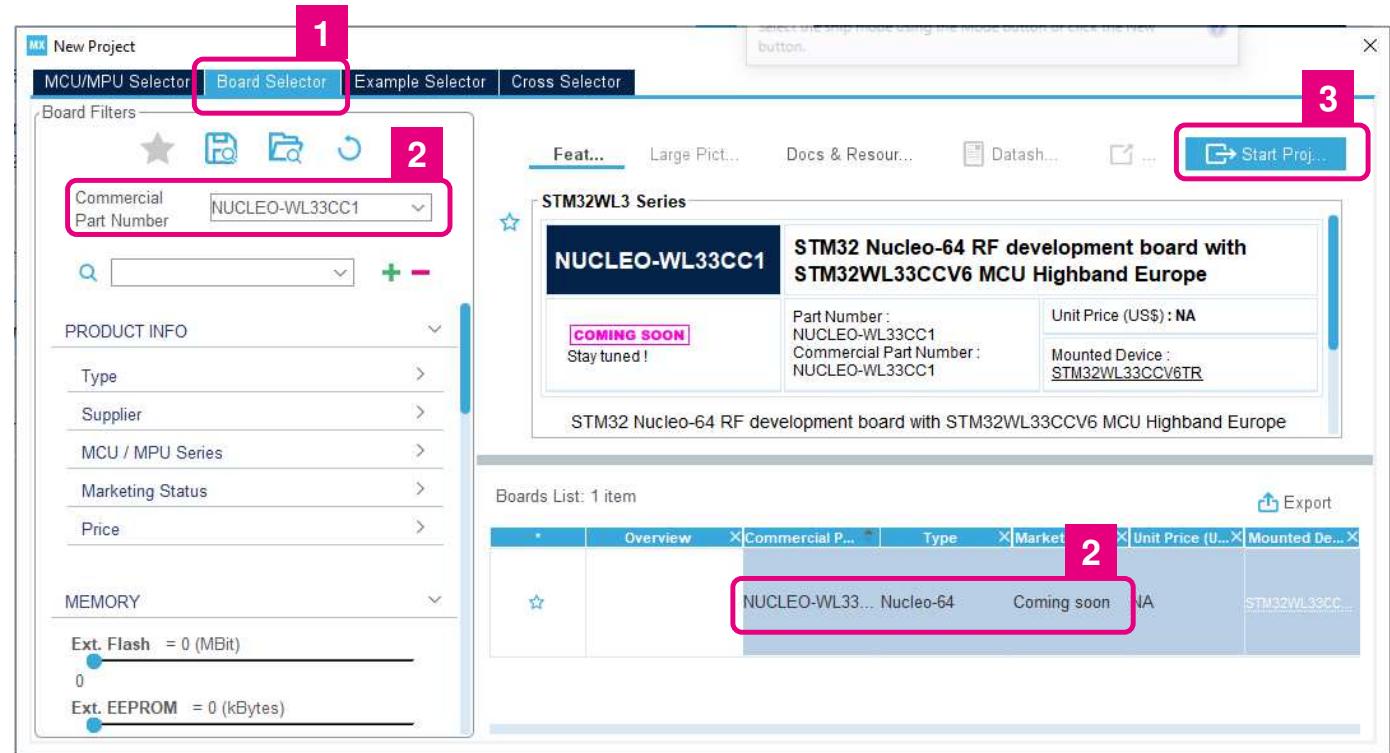


1. Start a new project,
from “Board
selector”

2. Search for “NUCLEO-WL33CC1” & select it.

3. Click on “Start
project”

Start a New project in STM32CubeMX



WL33
unboxing

WL33 radio
flexibility

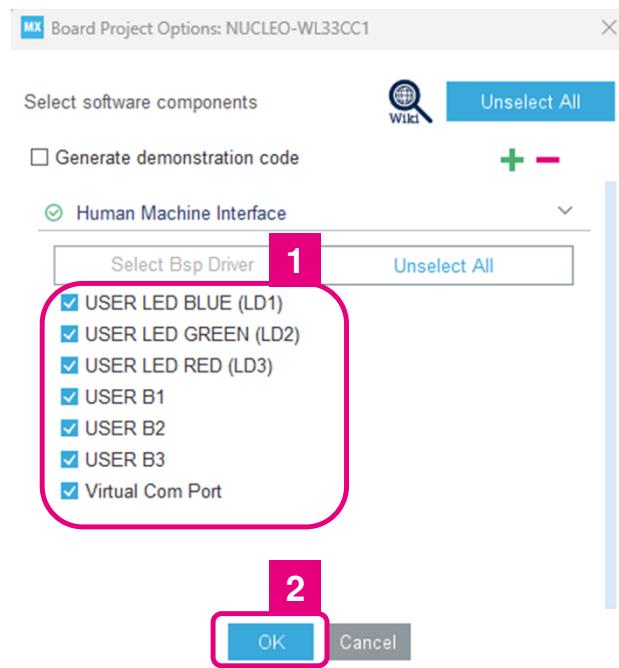
Power
consumption

wM-BUS
& mioty

Test your
RF design



Start a New project in STM32CubeMX



In Board project options: NUCLEO-WL33CC1 :

1. Configure the **HMI interfaces** according your needs
2. Click "**OK**"



- Enabling **MRSUBG** peripheral :

1. Go in “System Core” categorie
2. In “RCC” peripheral

Enable HSE (& LSE if needed) :

Pinout & Configuration

Clock Configuration

Project Ma

RCC Mode and Configuration

Mode

Software Packs

Pinout

High Speed Clock (HSE)

Low Speed Clock (LSE) Crystal/Ceramic Resonator

Master Clock Output

LCO Clock Output

1

2

3

- 3. **MRSUBG** peripheral is now available

Activate it!

Pinout & Configuration

Clock Configuration

Software Packs

MRSUBG Mode and Co

Mode

Activated

External LNA control

External amplifier control

Receive Clock control

Transmit Clock control

Receive Data control

Transmit Data control

ANTENNA SWITCH control

1

2

3



* **MRSUBG:** Multi Rate Sub-1GHz

MRSUBG configuration

Radio & Packet configuration

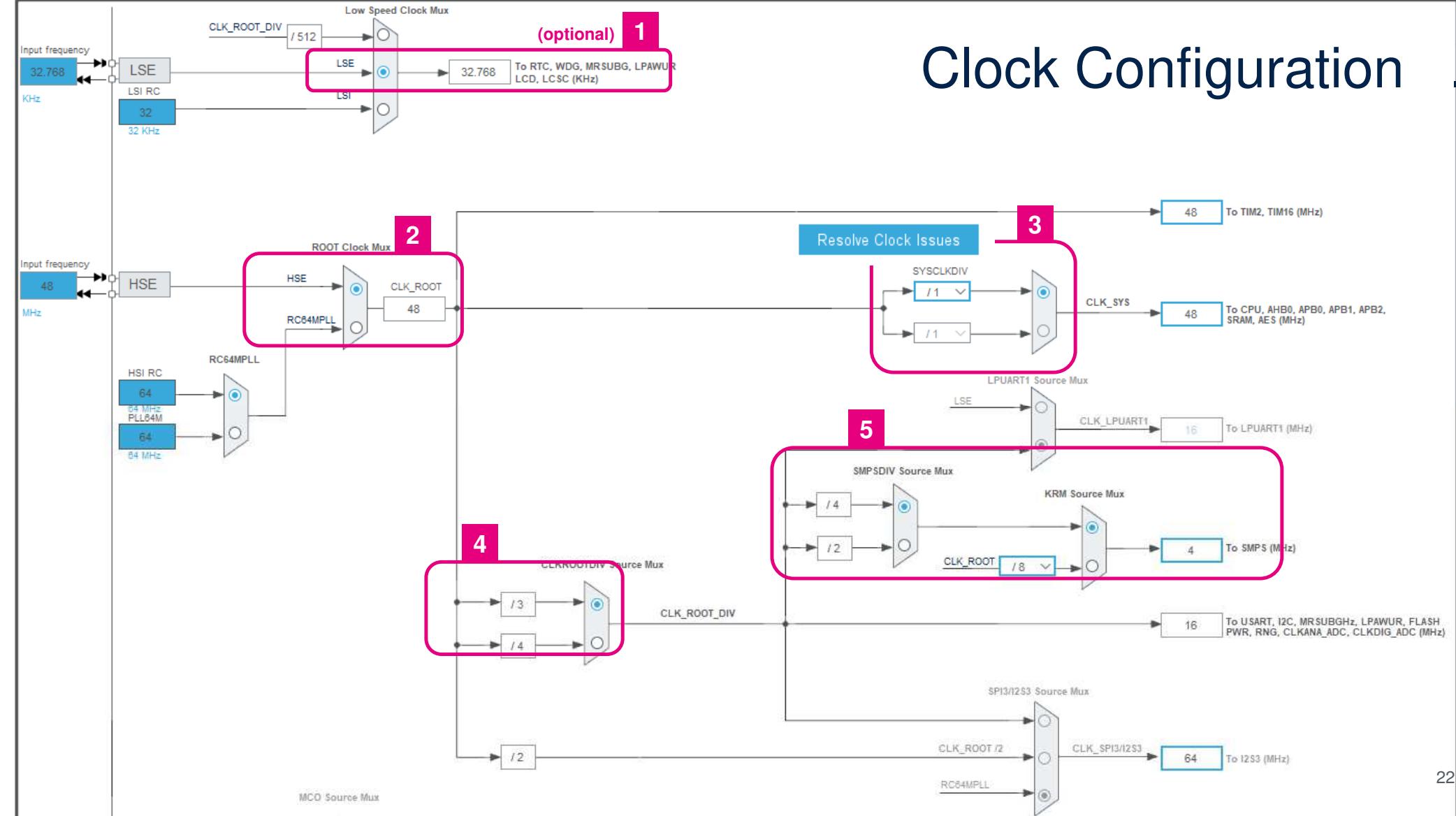
The screenshot shows the STM32WL33CCVx software interface with the following navigation path:

- Home > STM32WL33CCVx > MRSUBG_BasicGeneric_Tx.ioc - Pinout & Configuration >
- Pinout & Configuration
- Clock Configuration
- Software Packs
- MRSUBG Mode and Configuration
- Mode

The left sidebar lists various hardware components, with **MRSUBG** selected. The main configuration window shows the **Configuration** tab for the Radio section, with the following parameters listed:

Parameter	Value
IFrequencyBase	868000000
xModulationSelect	MOD_2FSK
IDatarate	38400
IFreqDev	20000
IBandwidth	100000
dsssExp	0
outputPower	14
PADrvMode	PA_DRV_TX_HP
Packet Format	Basic Packet
PreambleLength	16
PostambleLength	0
SyncLength	31
SyncWord	0x88888888
FixVarLength	VARIABLE
PreambleSequence	PRE_SEQ_0101
PostambleSequence	POST_SEQ_0101
CrcMode	PKT_CRC_MODE_8BITS
Coding	CODING_NONE
DataWhitening	Enable
LengthWidth	BYTE_LEN_1
SyncPresent	Enable

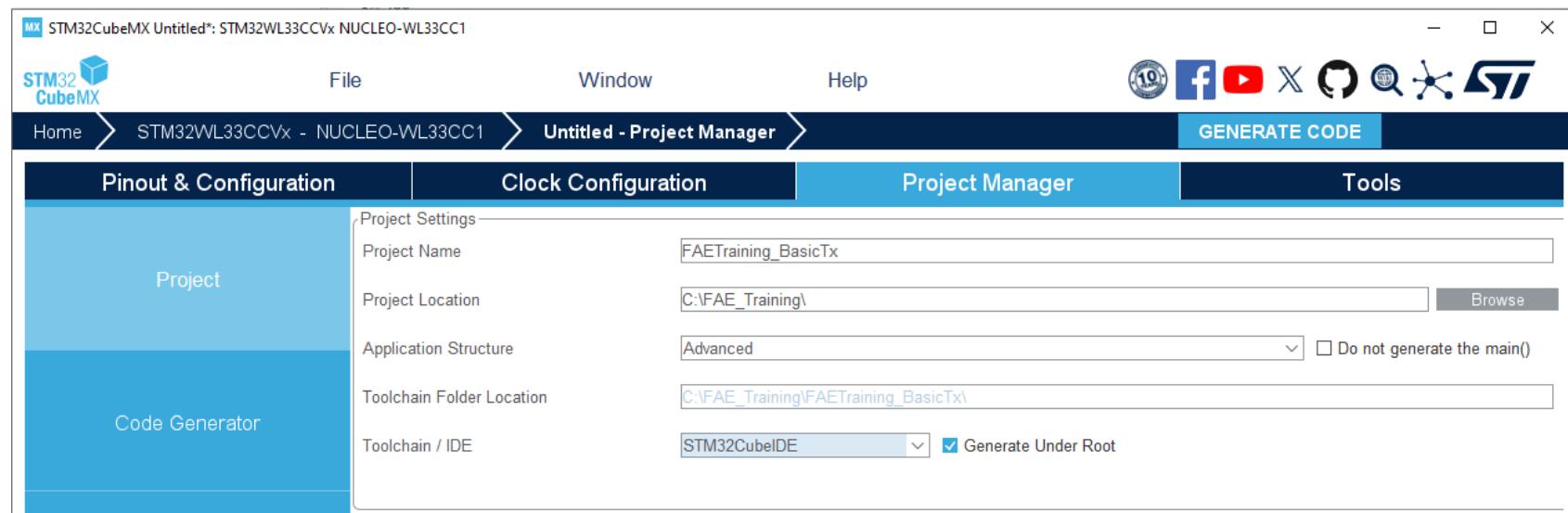
Clock Configuration





1. Name your project & define Project location
2. Choose STM32CubeIDE as Toolchain/IDE
3. Generate your code

Generate your code



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



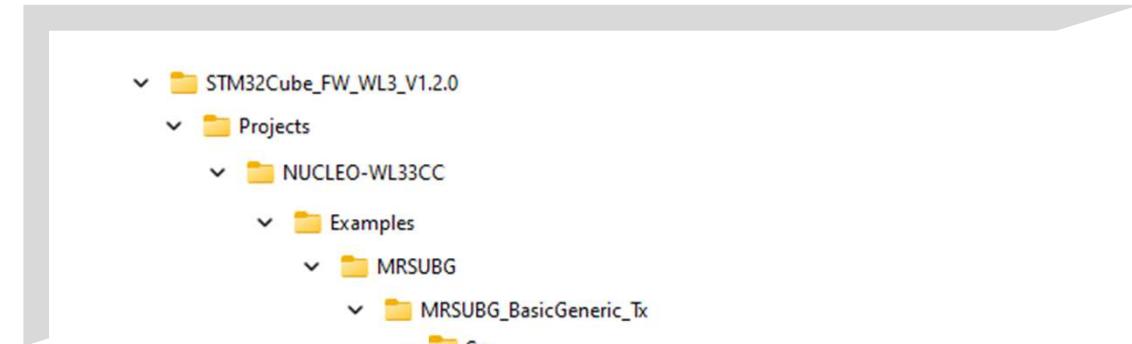
Use application example from “**MRSUBG_BasicGeneric_Tx**”

MRSUBG_BasicGeneric_Tx

*LED toggling after each transmission



Your NUCLEO-WL33CC is now transmitting every 500ms !



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



Build your first STM32WL33 radio communication

- Based on available application examples :

\STM32Cube_FW_WL3_V1.2.0\Projects\NUCLEO-WL33CC\Examples\MRSUBG\ ...

- Connect to VCOM terminal (baudrate 115,2kbps)

...\\ MRSUBG_BasicGeneric_Tx

```
File Edit Setup Control Window Help
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 101 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 102 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 103 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 104 ]  
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TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 106 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 107 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 108 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 109 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 110 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 111 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 112 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 113 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 114 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 115 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 116 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 117 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 118 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 119 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 120 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 121 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 122 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 123 ]  
TX - Data to transmit: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 124 ]
```

*LED toggling after each transmission



RF

...\\ MRSUBG_BasicGeneric_Rx

```
File Edit Setup Control Window Help
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 102 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 103 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 105 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 106 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 107 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 108 ]  
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RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 110 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 111 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 112 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 113 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 114 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 115 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 116 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 117 ]  
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RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 120 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 121 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 123 ]  
RX - Data received: [ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 124 ]
```

*LED toggling after each reception





Takeaways

STM32WL3x key documentation

Application note, Wiki pages and STDES reference design to ease your development.

NUCLEO-WL33 is now ready to be used

Compliant with full STM32Cube ecosystem. You can now program and flash the device

Build your first RF Sub-1GHz application

Develop your first RF application from scratch, configuring any peripheral on any IDE (VSC, CubeIDE, IAR, Keil)

Our technology starts with You



Find out more at www.st.com

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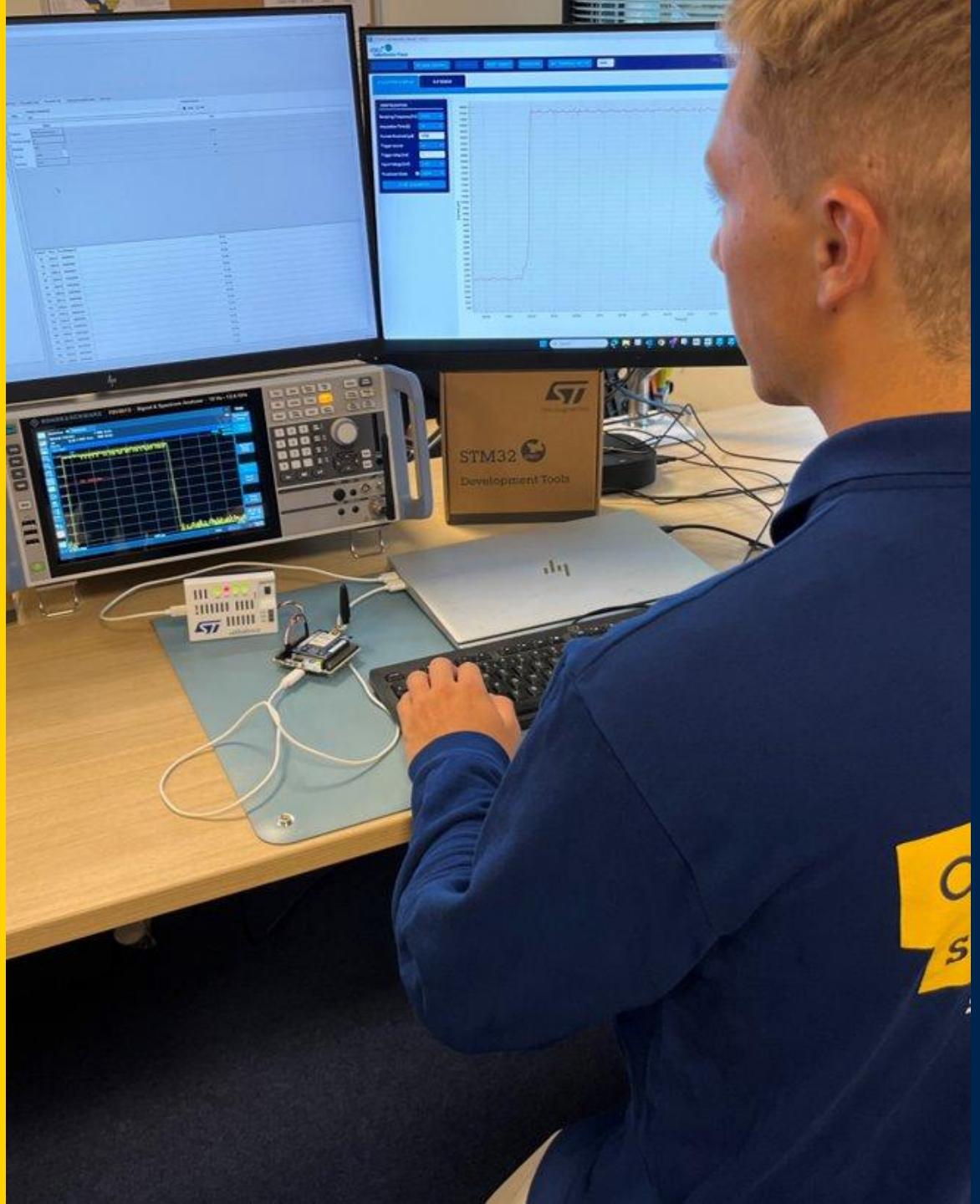


For further support in creating a PowerPoint presentation, including graphic assets, formatting tools and additional information on the ST brand

you can visit the ST Brand Portal

<https://brandportal.st.com>





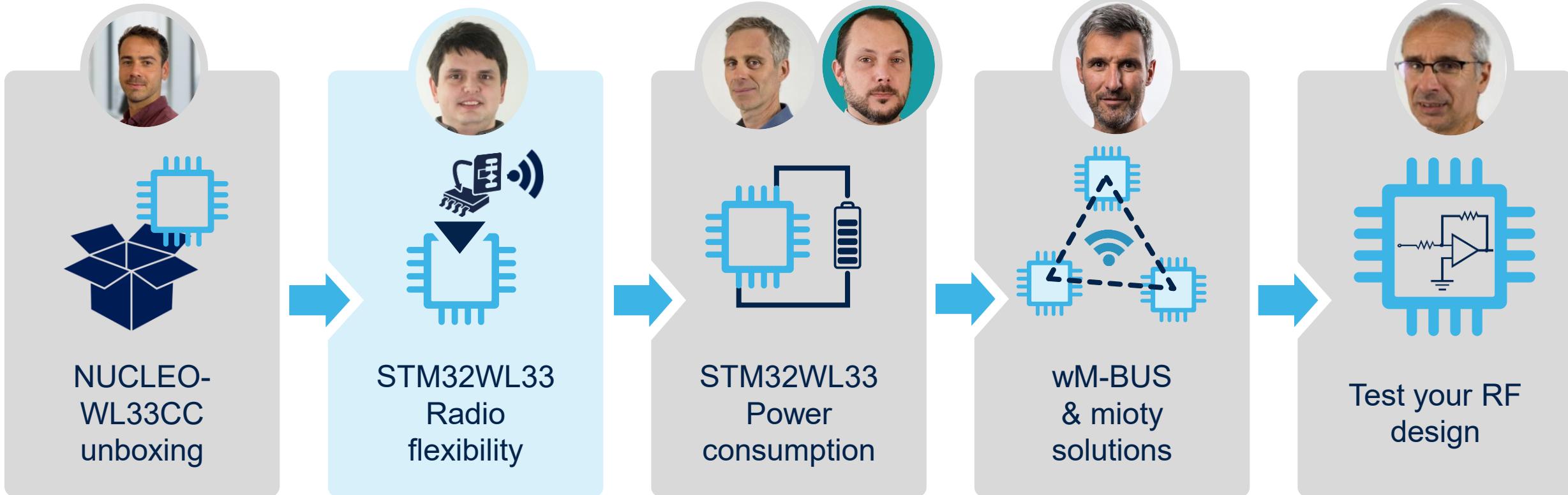
STM32WL3x radio flexibility

TOMAS RF Team



STM32WL33 in action

Use-cases and ecosystem demo lab tour



STM32WL3x suits any proprietary protocol

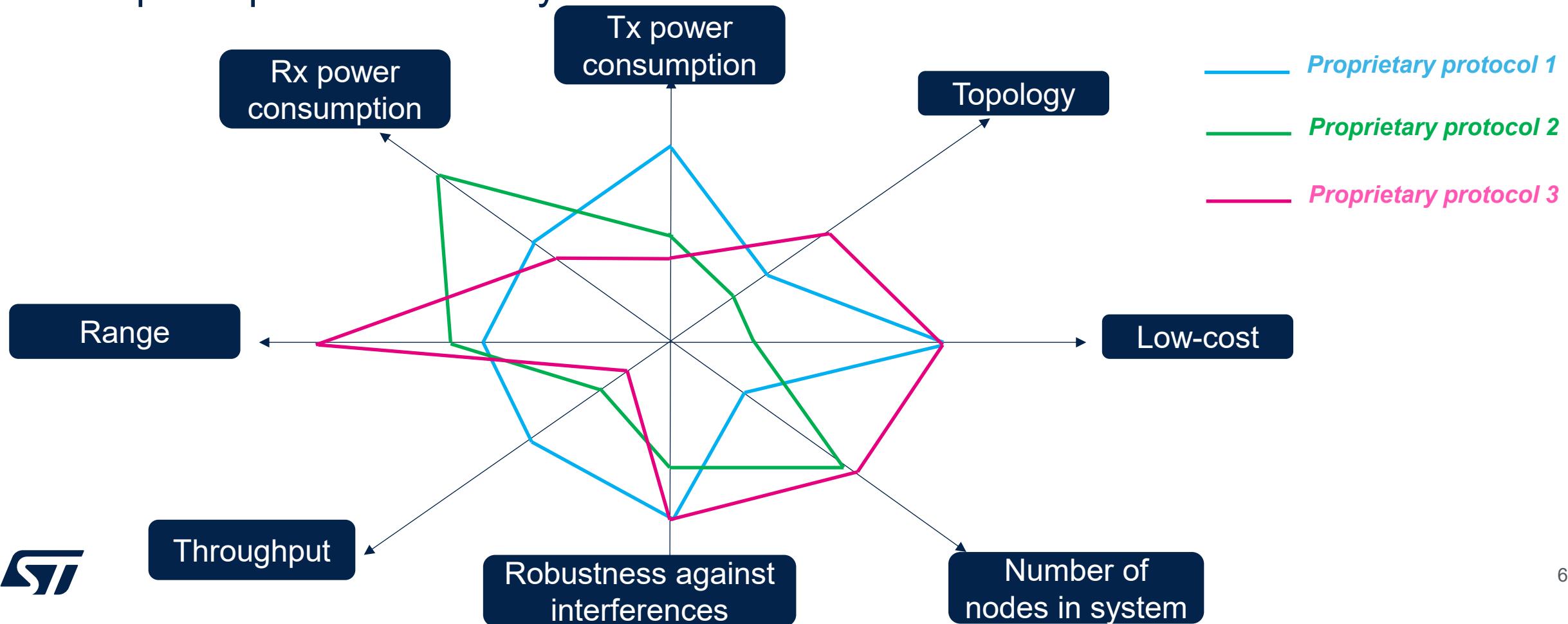


Sub-1Ghz proprietary protocol objectives

Tx power consumption		<ul style="list-style-type: none">Reducing packet size + high data rate
Range		<ul style="list-style-type: none">Low data rate + accurate clock source
Network Topology		<ul style="list-style-type: none">Nb of nodes+ Mesh/Star network ? Addressing ?
Rx Power consumption		<ul style="list-style-type: none">Rx Low-duty cycle
Cost optimization		<ul style="list-style-type: none">Basic modulation (OOK) low cost Xtal
Robustness against interferences		<ul style="list-style-type: none">Frequency hopping
Stack size		<ul style="list-style-type: none">Tx-Only / HW RF IP (packet handler/CSMA/..)

Proprietary protocol objectives always different !

- If all proprietary protocols would have same performances
⇒ Customer would choose standard protocols !
- Example of protocol diversity chart :

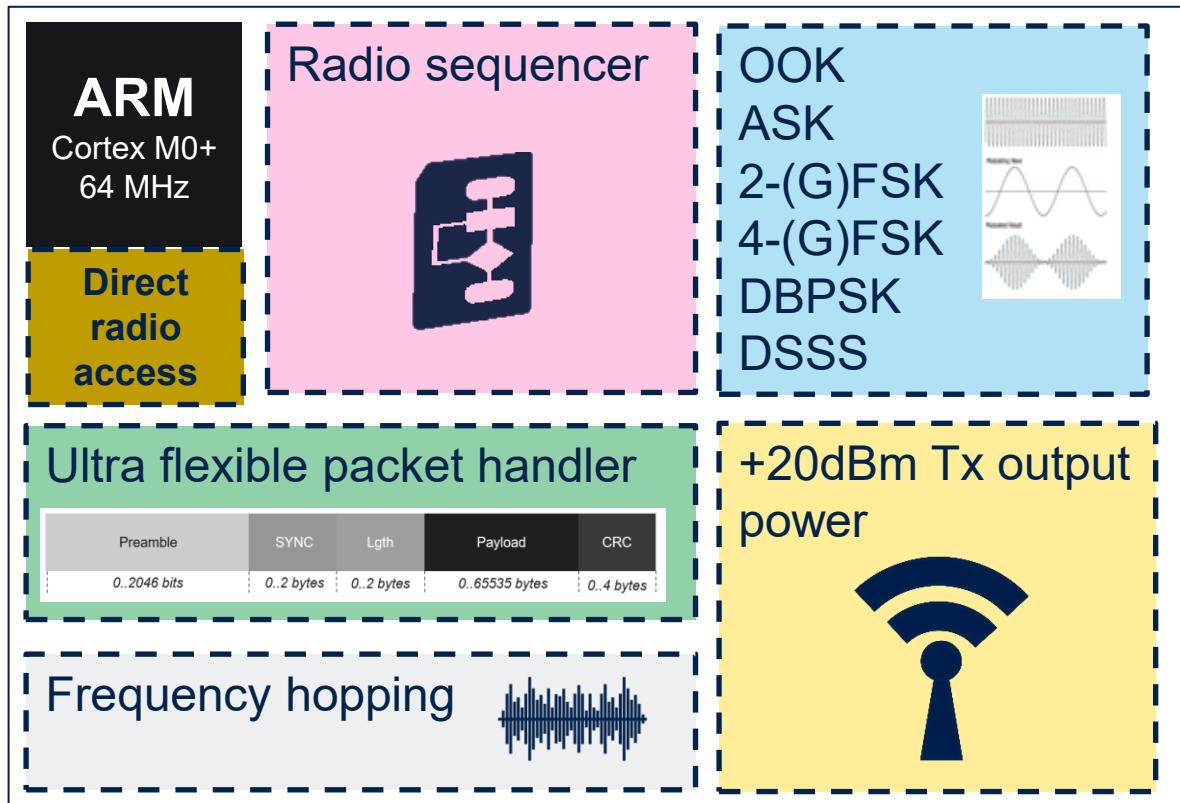


Why addressing proprietary protocols with STM32WL3x ?





STM32WL3x radio features



Flexible packet handler

Packet encoding available

Flexible modulations

Direct radio access

Radio sequencer

Frequency hopping

High Tx power

Using STM32WL3x flexibility without any code development



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



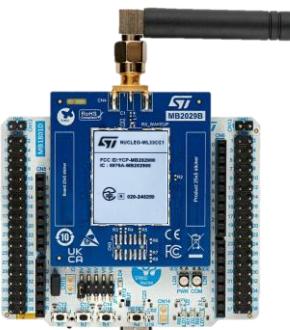
STM32CubeWiSE-RadioExplorer



<https://www.st.com/en/development-tools/STM32CubeWISERe.html>



Or type « STM32CubeWISERe » on st.com



Get Software

Part Number	General Description	Download	All versions
+ STM32WiSE-REWin	STM32CubeWiSE-RadioExplorer Windows version	Get latest	Select version

STM32CubeWiSE-RadioExplorer

File Settings View Help

Summary

Device	System	Radio	Data Coding	Packet
Port = N/A	TX mode = N/A	f _r = nan MHz	Whitening = N/A	
Baud rate = 0 bps	DR = nan kbps	f _{dev} = nan kHz	Coding = N/A	
Device = N/A	XTAL_freq = N/A Hz	mod = Unknown	Coding_order = N/A	
Cut = N/A	SMPS config = N/A	CHF = nan kHz		
		radio state = Unknown		
		TX bit order = N/A		

System settings Radio settings Data coding Packet settings Wakeup

SMPS configuration

Symbol	Value	Unit
SMPS	1400	mV

XTAL speed

Symbol	Value	Unit
f _{XTAL}	48.0	MHz

XTAL offset

Symbol	Value	Unit
XTAL_offset	0	Hz

TX path

Symbol	Value	Unit
TX_path	TX + TX HP	

Packets transmitted

Symbol	Value	Unit
Payload	STMicroelectronics	
Payload length	18	bytes

Packets

Symbol	Value	Unit
Packets	0	

TX rate

Symbol	Value	Unit
TX rate	200	ms

Duration

Symbol	Value	Unit
Duration	Not available	ms

Packet # Time Timestamp[us] Status

2025-10-07





STM32CubeWiSE-RadioExplorer

Introduction



Graphical User Interface (GUI) to control STM32WL33 without any code development

MCU configuration

Configure any part of the STM32WL33 radio IP :

- Radio configuration and packet configuration
- System parameters

Real Time Control

Control the STM32WL33 radio and manage any mode (TX, RX) and

- Perform RF power consumption test
- Real-time radio packet capture and decoding
- Output power, test mode ..

Simplify RF tests

Simplify your test process with STM32WL33 :

- Radio test performances
- RSSI live plot
- Low Power Wake up Radio (LPAWuR) configuration
- Save & restore your configuration



Demo : Discover STM32CubeWiSE-RadioExplorer



One NUCLEO-WL33CC1 flashed with Tx example binary

- Based on “**MRSUBG_BasicGeneric_Tx**” binary (or any other example with known parameters)
- Path : ..\Projects\NUCLEO-WL33CC\Examples\MRSUBG\MRSUBG_BasicGeneric_Tx

RF Settings	Value
Modulation	2-FSK
Frequency	868 Mhz
Data rate	38.4 kbps
Deviation	20 kHz
Bandwidth	100 kHz

One NUCLEO-WL33CC1 connected to STM32CubeWiSE-RadioExplorer

- Flashed with “**Command Line interface**” (CLI) demonstration example
- Path : ..\Projects\NUCLEO-WL33CC\Demonstrations\Command_Line_Interface\CLI

Packet settings	Value
Preamble	2 bytes
SYNC Word	0x88888888 (4 bytes)
CRC	8 bits
Whitening	Enable
Packet length	1 Byte
Coding	None



MRSUBG_BasicGeneric_Tx
(Sending a RF packet every 500ms)

**CLI binary connected to
STM32CubeWiSE-RadioExplorer**
(In RX mode)

STM32WiSE RadioExplorer panels

Radio settings panel

Configure your radio settings

System settings Radio settings Data coding Packet settings Wakeup

	Symbol	Value	Unit
Frequency base	f_c	868.0	MHz
Data rate	DR	38.4	ksp/s
Frequency deviation	f_{dev}	20.0	kHz
Channel filter	CHF	100.0	kHz
Modulation	mod	2FSK	
Spread Factor	spread	0	
Output power	P_{out}	0.0	dBm
Buffer size	Buf	1024	bytes

Radio channel settings (Frequency, over-the-air Data Rate, frequency deviation)
KEY INFORMATION of CUSTOMER RF CONFIGURATION

Full set of radio modulations

Tx output power at kit antenna connector

RAM allocation for Radio buffers

Click on “Config” button to confirm settings

STM32WiSE RadioExplorer panels

Data coding panel

Configure your data encoding

The screenshot shows the 'Data coding' tab of the STM32WiSE RadioExplorer configuration interface. The interface includes tabs for System settings, Radio settings, Data coding (selected), Packet settings, and Wakeup. Below the tabs is a table with columns for 'Value' and various configuration options:

	Value
Whitening	<input type="checkbox"/>
Coding	None
Coding order	FEC then whitening
TX Byte bit order	MSB first

Annotations explain specific settings:

- A pink box highlights the 'Whitening' checkbox, with a callout pointing to "Data Whitening for basic packets".
- A pink box highlights the 'Coding' dropdown set to "None", with a callout pointing to "Additional registers available for whitening algorithm initialization".
- A green box highlights the 'Coding order' dropdown set to "FEC then whitening", with a callout pointing to "Data encoding/decoding options" and a list of available orders: None, FEC, 3 out of 6, Manchester (1->10, 0->01), Manchester (1->01, 0->10).
- A green box highlights the 'TX Byte bit order' dropdown set to "MSB first", with a callout pointing to "Set orders of encoding to give more flexibility" and a list of options: FEC then whitening, Whitening then FEC.
- A blue box highlights the 'MSB first' button in the 'TX Byte bit order' row, with a callout pointing to "Order of transmission/reception of bits".
- A large pink arrow at the bottom points to the 'Config' button, with the text "Click on config button to confirm configuration panel!".

STM32WiSE RadioExplorer panels

Basic packet panel

Configure your packet structure

The screenshot shows the 'Packet settings' tab of the STM32WiSE RadioExplorer interface. The 'Basic format' radio button is selected. The 'Value' column contains the following settings:

Setting	Value
Preamble sequence	0101...
Sync word length	32
Sync word	88888888
Length size	1
Payload length	20
CRC mode	CRC 8-bit
Postamble length	0
Postamble sequence	0101...

Annotations explain specific settings:

- Preamble size and pattern (Tx case)**: Shows binary values 0101..., 1010..., 0011..., 1100... in a blue box.
- Synchronization pattern**: Points to the Sync word length and Sync word fields.
- Dynamic/fixed length**: Describes Length size (1 byte) and Payload length (20 bytes).
 - If fixed : defines length of packet
 - If dynamic : defines number of bytes allocated for length field
- HW CRCs available**: Points to the CRC mode dropdown, listing options: CRC 8-bit, CRC 16-bit 0x8005, CRC 16-bit 0x1021 802.15.4g, CRC 24-bit 0x864CFB, CRC 32-bit 0x04C11DB7 802.15.4.
- Additional registers available for CRC algorithm initialization**: Points to the CRC mode dropdown.
- Postamble pattern (useful for Wm-Bus packets)**: Points to the Postamble sequence field.
- Update length size (1 byte) and CRC (CRC 8-bit)**: A summary box at the bottom.

ST logo



Demo: Interoperability with another device (STM32WL55)

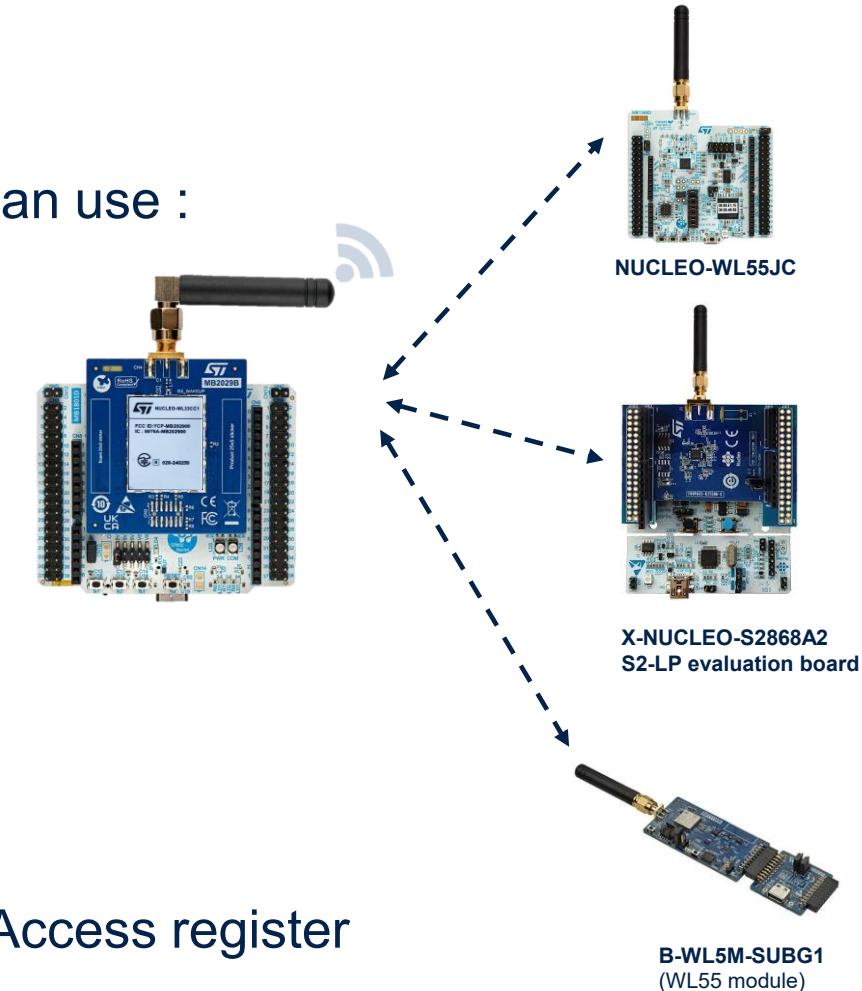
Communicate with any other RF device

Everything is possible when using Sub-1Ghz technology, you can use :

- Different protocols
- Different devices

Simplify your legacy device interoperability

- No code development using Command Line Interface
- Extract JSON file config file
- Change your RF Configuration Dynamically thanks to Direct Access register



NUCLEO-
WL33CCNUCLEO-
WL55JC

Demo : Discover Interoperability with STM32WL55

One NUCLEO-WL33CC1 connected to STM32CubeWiSE-RadioExplorer

- Flashed with “**Command Line interface**” (CLI) demonstration example
- Path : ..\Projects\NUCLEO-WL33CC\Demonstrations\Command_Line_Interface\CLI

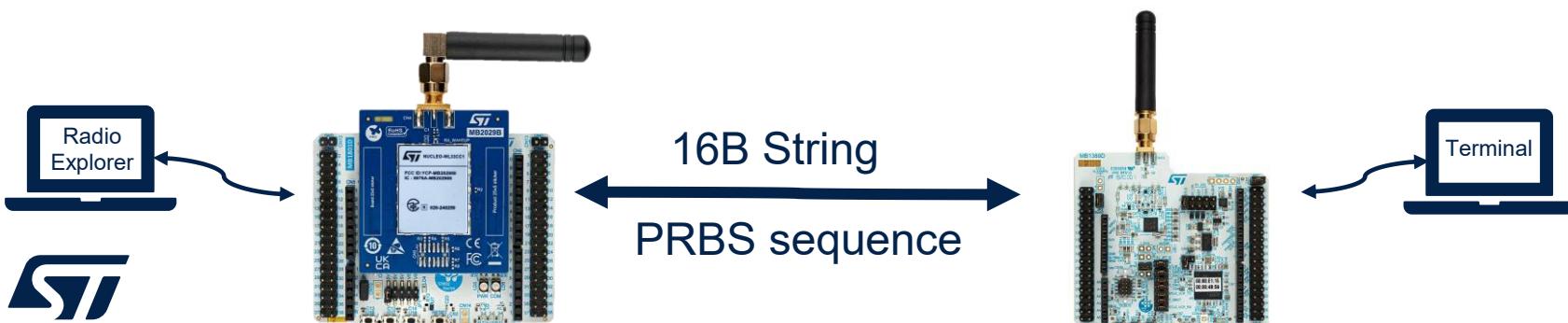
One NUCLEO-WL55JC board flashed with “AT Slave” and connected to UART terminal

- Using [STM32CubeWL](#) package (different package than STM32CubeWL3)
- Modification in test_rf.c to disable CRC instead of CCIT
 - > *RADIO_FSK_CRC_OFF*
- Using example configuration:
 - > *AT+TCONF=868000000:14:50000:50000:4/5:0:0:0:16:25000:2:3 /*FSK*/*

AT Slave FW example available here :
..\STM32Cube_FW_WL_V1.3.1\Projects\NUCLEO-WL55JC\Applications\LoRaWAN\LoRaWAN_AT_Slave

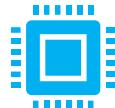
RF Settings	Value
Modulation	2-FSK
Frequency	868 Mhz
Data rate	50 kbps
Deviation	25 kHz
Bandwidth	50 kHz

Packet settings	Value
Preamble	4 bytes
SYNC Word	0x88888888 (4 bytes)
CRC	8 bits
Whitening	Enable
Packet length	1 Byte
Coding	None





Takeaways



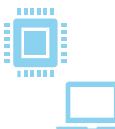
STM32WL3 addresses proprietary protocols with:

Flexible modulations, High Tx power, Flexible packet handler, Direct radio access, Frequency hopping, Radio sequencer



STM32CubeWiSE Radio Explorer adds:

Graphical interface to adjust RF parameters without programming, Full access to the STM32WL3, Packet capture, Radio performance tests & tuning

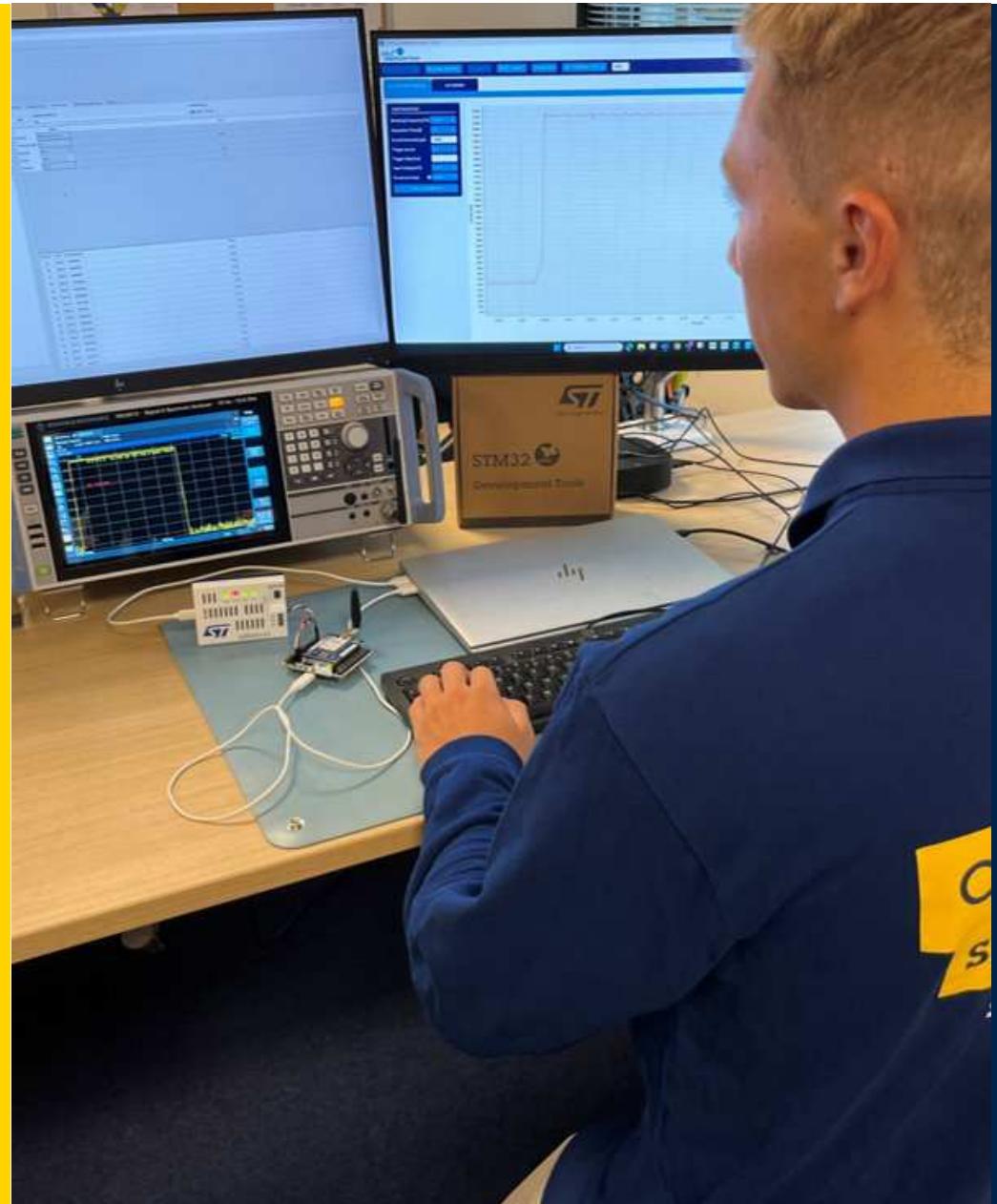


STM32WL3 with Radio Explorer

Easy way to setup interoperability test with different SubGHz radios

Radio development tools

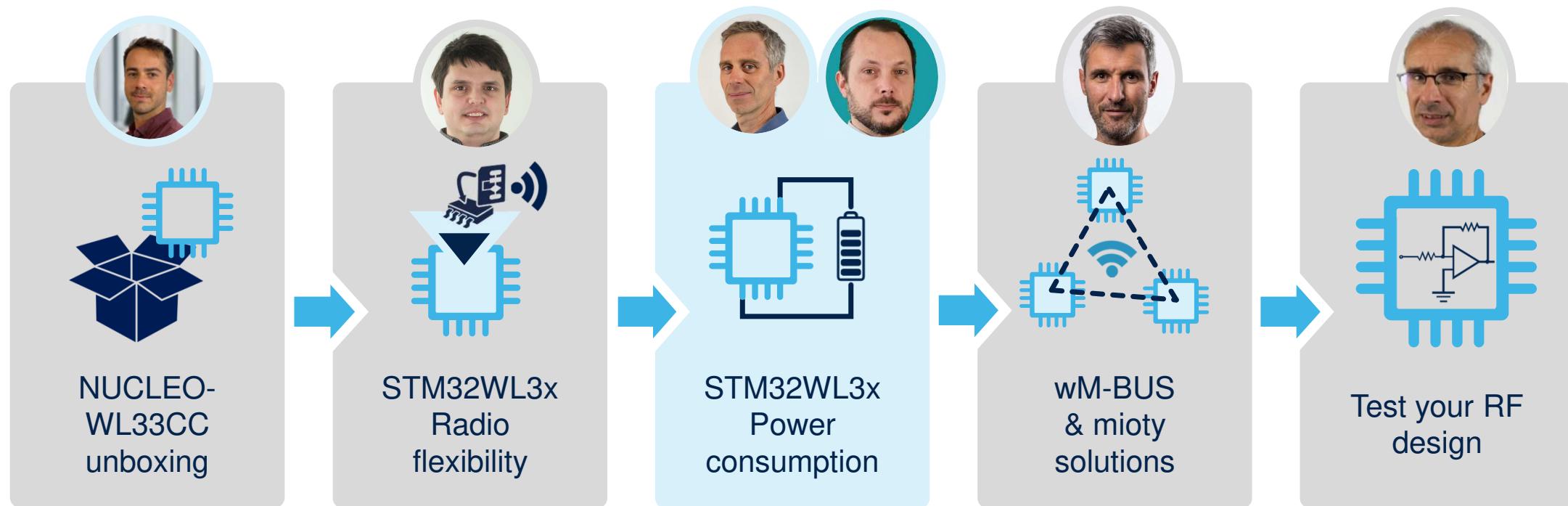




Demonstrate “state of the art’ current consumption of STM32WL3x

STM32WL3x in action

Use-cases and ecosystem demo lab tour





Purpose

- The STM32WL3x offers state-of-the-art current performance both in active mode (transmission) and in low power modes (deep stop).
- The purpose of this session is to show you how to accurately measure the current consumption of the STM32WL3x in 3 different operating modes:

Table 21. Current consumption in transmission mode, fc = 868 MHz

Parameter	Test condition	HPM	Unit
1 Supply current	Measurements TX @ CW 10 dBm TX pin connected, TX Mode PA_LEVEL7 = 78	10	mA
	Measurements TX @ CW 14 dBm TXHP pin connected, TXHP mode	22	mA
	Measurements TX @ CW 16 dBm TXHP pin connected, TXHP mode, VSMPS = 1.5 V, PA_DEGEN_ON	30.5	mA
	Measurements TX @ CW 20 dBm TX + TXHP pins connected VSMPS = 2 V, PA_DEGEN_ON	80	mA

Table 13. Current consumption in Deepstop mode

Symbol	Parameter	Test condition	Typ. VDD = 3.3 V	Unit
2 I _{CORE}	Deepstop current ⁽¹⁾	No timer, only wake-up GPIO enabled, RAM0 retained	910	nA
		No timer, only wake-up GPIO enabled, all RAM retained	980	nA
		(32 kHz LSI), RAM0 retained	1460	nA
		(32 kHz LSI), all RAM retained	1540	nA
		(32 kHz LSE), RAM0 retained	1163	nA
		(32 kHz LSE), all RAM retained	1240	nA
		Timer source LSI RTC ON	1710	nA
		Timer source LSI IWDG ON	1558	nA
		Timer source LSI, RTC and IWDG ON	1748	nA
		Timer source LSE RTC ON	1430	nA

- 3 We will measure the current consumption in a specific mission profile “Wireless Sensor node”



Power consumption demos

Introduction

- # How to setup STLINKV3-PWR tool ?
- # How to setup STM32WiSE-RadioExplorer tool ?
- 1 1st measurement: RF Transmission mode with RadioExplorer tool
- 2 2nd measurement: Low-power mode: Deepstop + RTC mode
- 3 3rd measurement: “Wireless Sensor Node” mission profile
- # Conclusion & Takeaways

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flexibility

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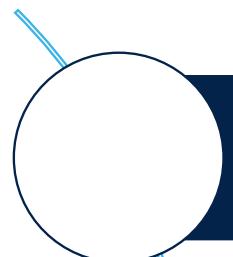
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Test your
RF design



STM32WL3x HW prerequisites

Hardware prerequisites



STM32 Nucleo-64 development board for
STM32WL33CC: **NUCLEO-WL3CC1**

<https://www.st.com/en/evaluation-tools/nucleo-wl3cc1.html>



USB typeC



STLINK-V3 compact in-circuit debugger and
programmer for STM32

<https://www.st.com/en/development-tools/stlink-v3pwr.html>



USB typeC



Cables, 2x USB type C



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STM32WL3x SW prerequisites

SW packages prerequisites



STM32Cube MCU Package for STM32WL3x series

<https://www.st.com/en/embedded-software/stm32cubewl3.html>



GUI to evaluate STM32WL3x radio capabilities
WiSE radio explorer

<https://www.st.com/en/development-tools/stm32cubewisere.html>



GUI displaying on PC power data coming from STLink-V3PWR

<https://www.st.com/en/development-tools/stm32cubemonpwr.html>



How to setup STLINKV3-PWR tool ?



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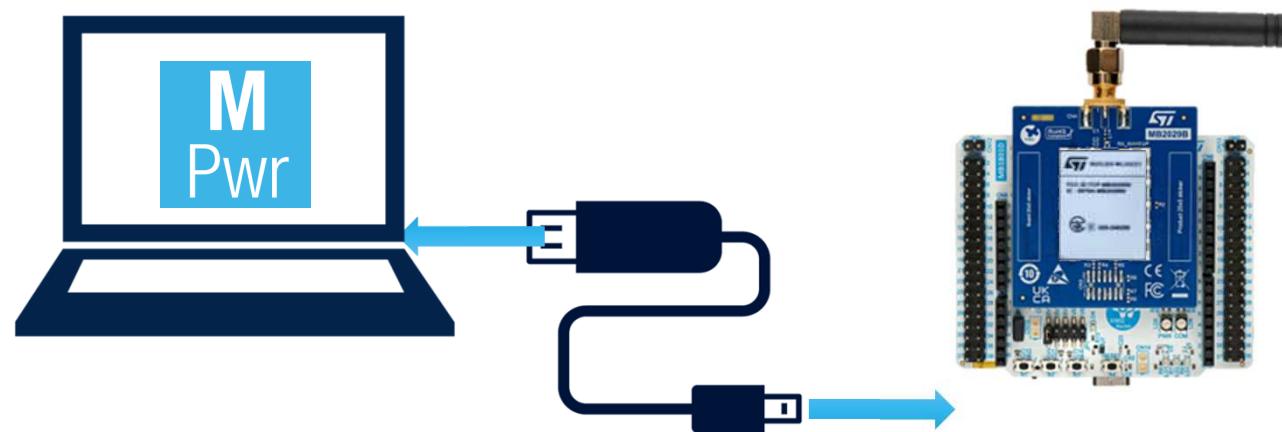
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Test your
RF design



Setup with STLINK-V3PWR

- By default, you can connect Nucleo-WL33Cx to USB Com Port to deliver 3.3V to STM32WL3x



- However, we recommend using **STLINK-V3 PWR tool** to do accurate current consumption measurements in TX or Low power modes.



Setup with STLINK-V3PWR

How to connect easily STLINK-V3PWR tool to Nucleo board ?

- We can easily complete the setup in 5 steps (UM3418)**

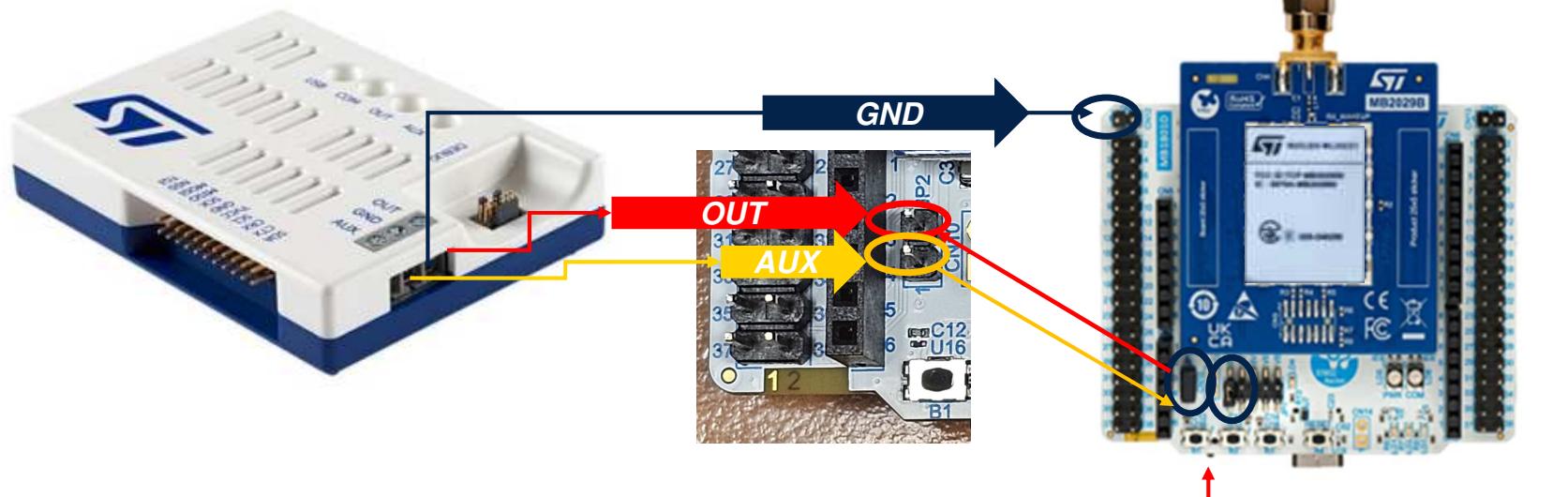


UM3418

User manual

STM32WL33 Nucleo-64 boards (MB1801 and MB2029)

1. JP2 & JP1 removed, GND from CN12 connector.
2. OUT of STLINK-V3PWR to be connected to JP2-2 as external power source of RF SoC
3. AUX of STLINK-V3PWR to be connected to JP2-1 as external power source for the STLINK
4. GND of STLINK-V3PWR to be connected to GND connector CN12



5. Change SW1 to left (not the default position)



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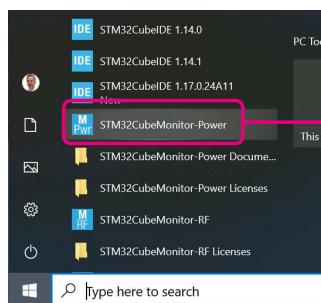
Test your
RF design



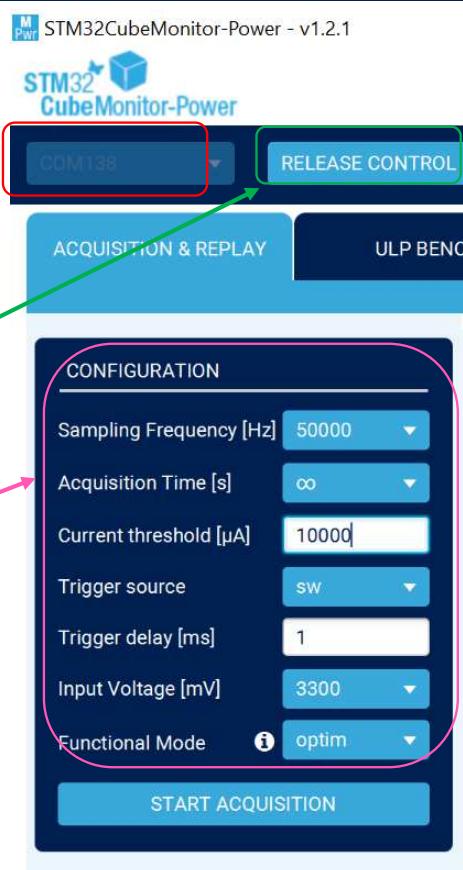
Setup with STLINK-V3PWR

How to launch STM32CubeMonitor-Power tool ?

- **Connect USB cable to the STLINK-V3PWR box & use the tool in 3 easy steps:**



- Select COM PORT
- Take CONTROL
- Configuration:
 - Sampling frequency: 5000Hz
 - Acquisition Time [s]: ∞
 - Current Threshold: 10000 μ A
 - Input Voltage: 3300mV
 - Start Acquisition



Ready for Measurements



How to setup STM32WiSE-RadioExplorer ?



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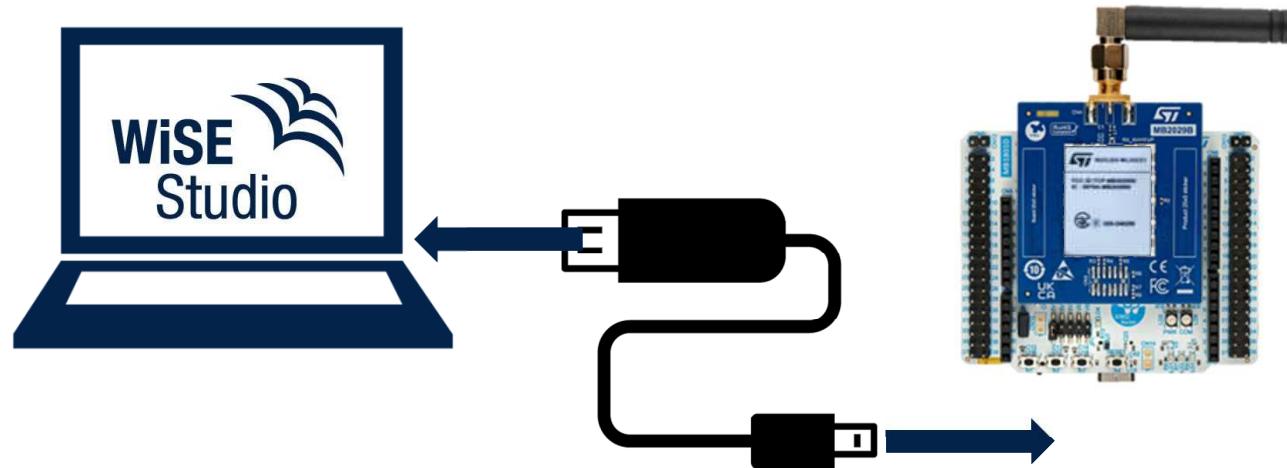
Test your
RF design



RadioExplorer setup

1) connect Nucleo kit to PC

- Connect Nucleo-WL33C1 to USB Com Port
 - Using USB type-C to type-A cable



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Test your
RF design

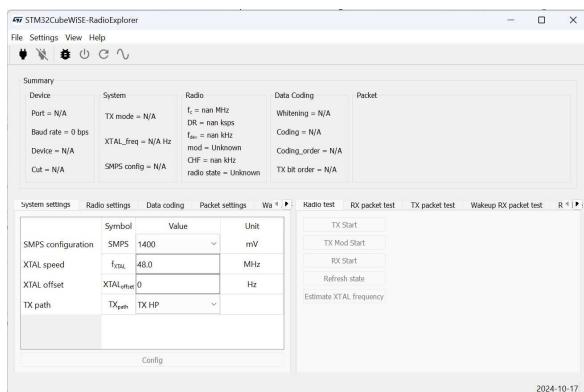


RadioExplorer setup

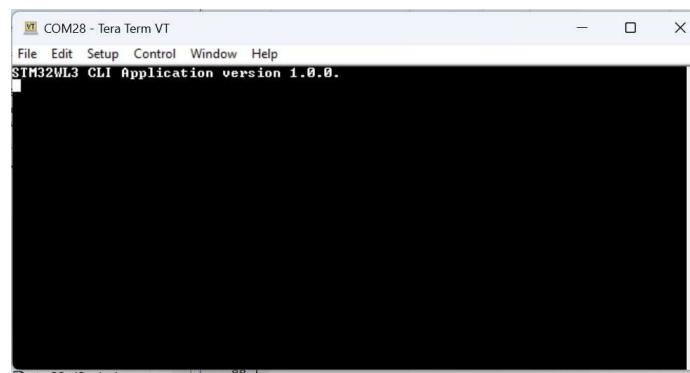
2) CLI firmware



The tool requires the CLI firmware to be flashed on the device.



STM32WiSE-RadioExplorer



CLI



NUCLEO-WL33CC



USB Type-C connector





RadioExplorer setup

3) CLI downloading

CLI FW example is available in STM32CUBE_FW_WL3 package:

- For Nucleo-WL33CC board, it is available in this specific folder:
 - [STM32Cube_FW_WL3\Projects\NUCLEO-WL33CC\Demonstrations\Command_Line_Interface\CLI](#)
- Choose one of the three IDEs:

EWARM	File folder
MDK-ARM	File folder
STM32CubeIDE	File folder

- Compile the project and download to the board

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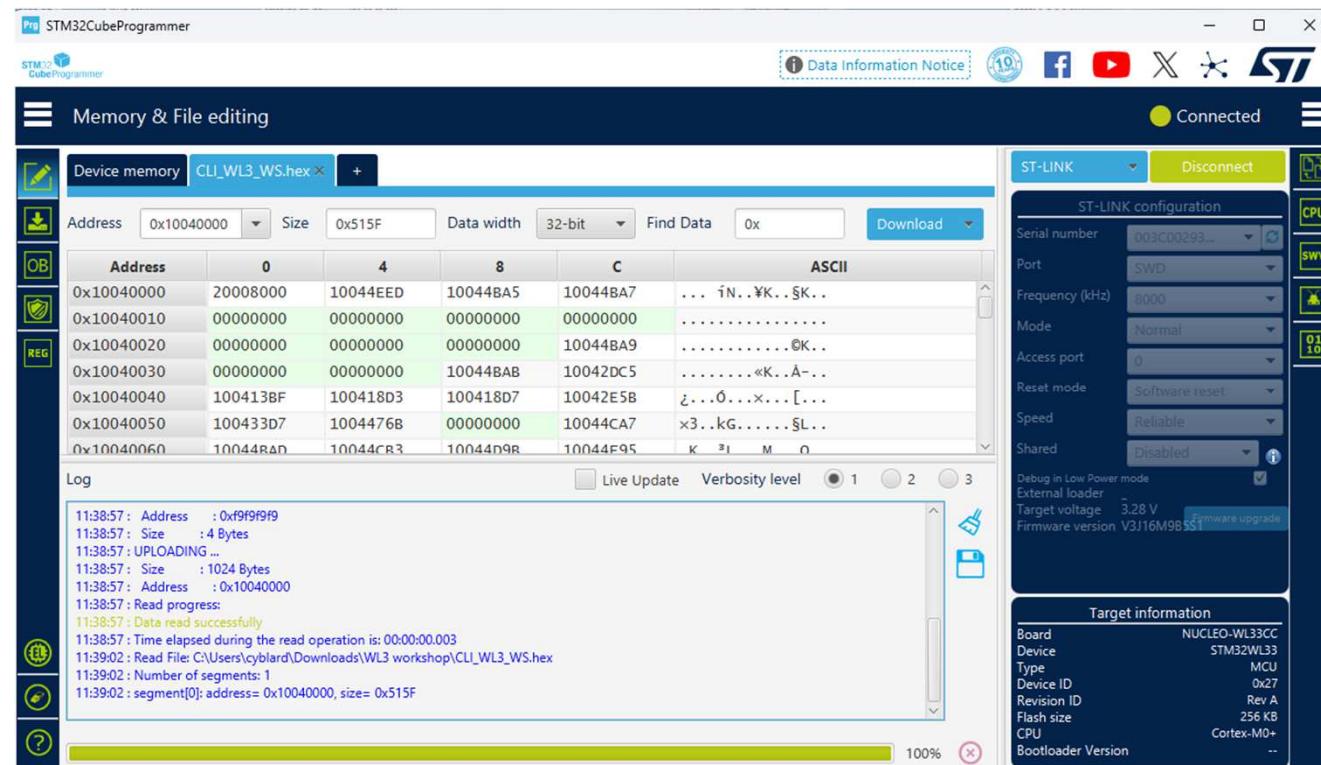


RadioExplorer setup

3) CLI downloading

Use the binary CLI.hex:

1. The binary can be loaded using STM32CubeProgrammer.



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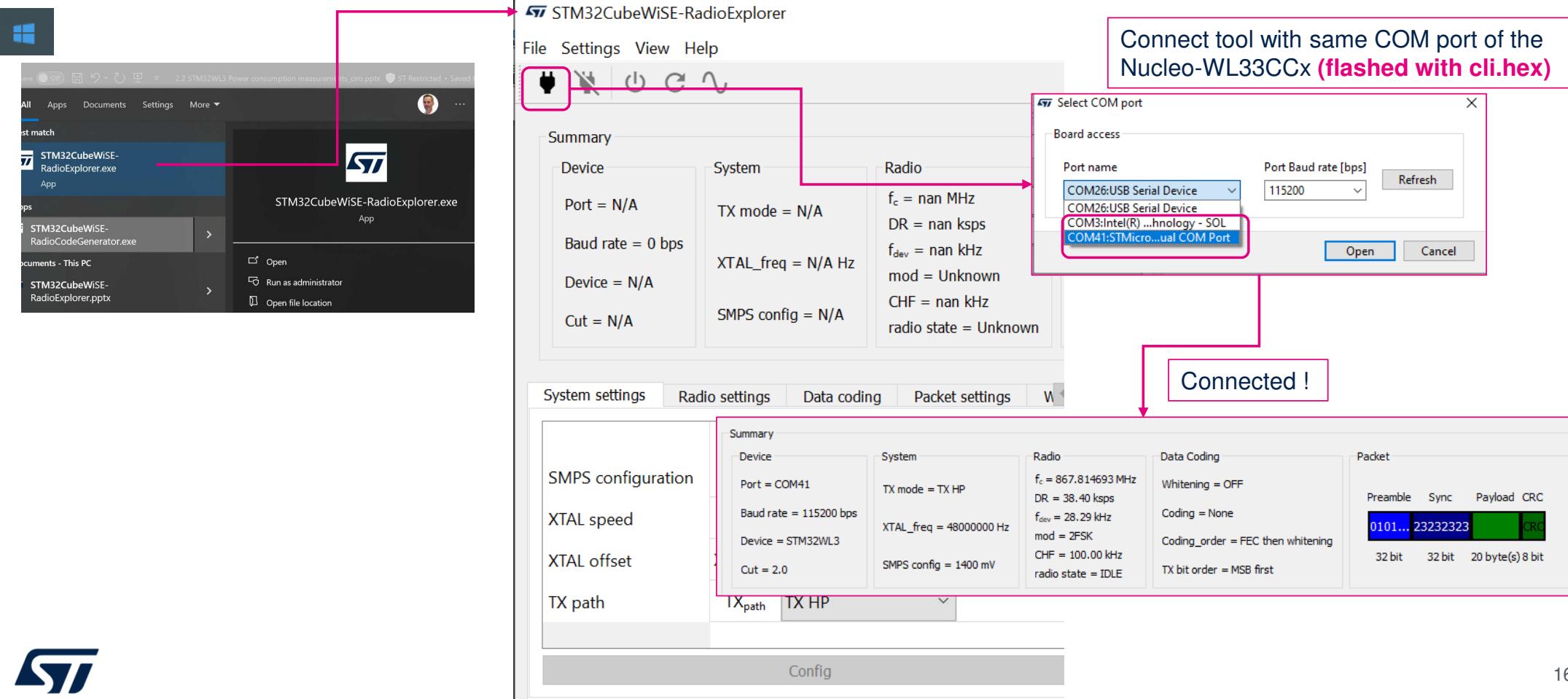
wM-BUS
& mioty

Test your
RF design

RadioExplorer setup

4) run & connect “STM32WiSE RadioExplorer”

- Launch STM32CubeWiSE-RadioExplorer



Connect tool with same COM port of the
Nucleo-WL33CCx (**flashed with cli.hex**)

Connected !



First measurement- RF Transmission current consumption



► RF Transmission current consumption

Purpose

- Purpose of our next activity is to measure current consumption in transmission mode & compare with Datasheet values.

Table 21. Current consumption in transmission mode, fc = 868 MHz

Parameter	Test condition	HPM	Unit
Supply current	Measurements TX @ CW 10 dBm TX pin connected, TX Mode PA_LEVEL7 = 78	10	mA
	Measurements TX @ CW 14 dBm TXHP pin connected, TXHP mode	22	mA
	Measurements TX @ CW 16 dBm TXHP pin connected, TXHP mode, VSMPS = 1.5 V, PA_DEGEN_ON	30.5	mA
	Measurements TX @ CW 20 dBm TX + TXHP pins connected VSMPS = 2 V, PA_DEGEN_ON	80	mA

RF Transmission current consumption

Radio Explorer configuration

- Few panels to configure even with default configuration
 - Click always on ‘Config’ button to confirm System & Radio setting configurations
 - Nucleo-WL33CC1 board is optimized for 14-16dBm, so TX_HP pin configuration to be used.

	Symbol	Value	Unit
SMPS configuration	SMPS	1400	mV
XTAL speed	f_{XTAL}	48.0	MHz
XTAL offset	$XTAL_{offset}$	0	Hz
TX path	TX_path	TX HP	

System settings Radio settings Data coding Packet settings Wakeup

Config

	Symbol	Value	Unit
Frequency base	f_c	867.0	MHz
Data rate	DR	38.4	ksp/s
Frequency deviation	f_{dev}	20.0	kHz
Channel filter	CHF	10.0	kHz
Modulation	mod	2FSK	
Spread Factor	spread	0	
Output power	P_{out}	14.0	dBm

System settings Radio settings Data coding Packet settings

Config

Radio test RX packet test

TX Start

TX Mod S

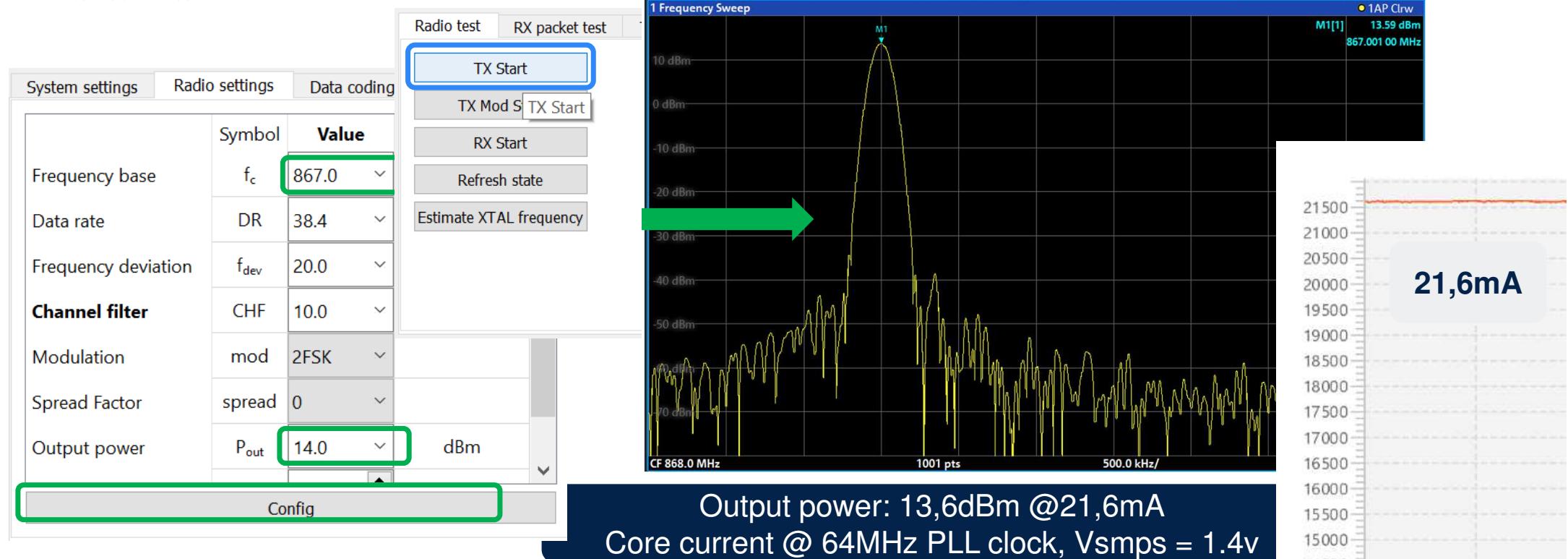
RX Start

Refresh state

Estimate XTAL frequency

► RF Transmission current consumption Measurements

- First measurements will be performed in conducted mode to measure the output power, not with antenna.



2nd measurement- Low-power current consumption (Deepstop + RTC mode)





Low power current measurement

Purpose

- Purpose of our next activities is to measure Deepstop current consumption & compare with Datasheet values

Table 13. Current consumption in Deepstop mode

Symbol	Parameter	Test condition	Typ. $VDD = 3.3\text{ V}$	Unit
I _{CORE}	Deepstop current ⁽¹⁾	No timer, only wake-up GPIO enabled, RAM0 retained	910	nA
		No timer, only wake-up GPIO enabled, all RAM retained	980	nA
		(32 kHz LSI), RAM0 retained	1460	nA
		(32 kHz LSI), all RAM retained	1540	nA
		(32 kHz LSE), RAM0 retained	1163	nA
		(32 kHz LSE), all RAM retained	1240	nA
		Timer source LSI RTC ON	1710	nA
		Timer source LSI IWDG ON	1558	nA
		Timer source LSI, RTC and IWDG ON	1748	nA
		Timer source LSE RTC ON	1430	nA



Low power current measurement

FW examples

All Low power FW code examples are available in STM32Cube_FW_WL3 package:

- For Nucleo WL3CC1 board, they are localized in the following folder:
 - [STM32Cube_FW_WL3xxx\Projects\NUCLEO-WL33CC\Examples\PWR](#)

PWR_DEEPSTOP	File folder
PWR_DEEPSTOP_RTC	File folder
PWR_PVD	File folder

- Choose one of the three IDEs:

EWARM	File folder
MDK-ARM	File folder
STM32CubelDE	File folder

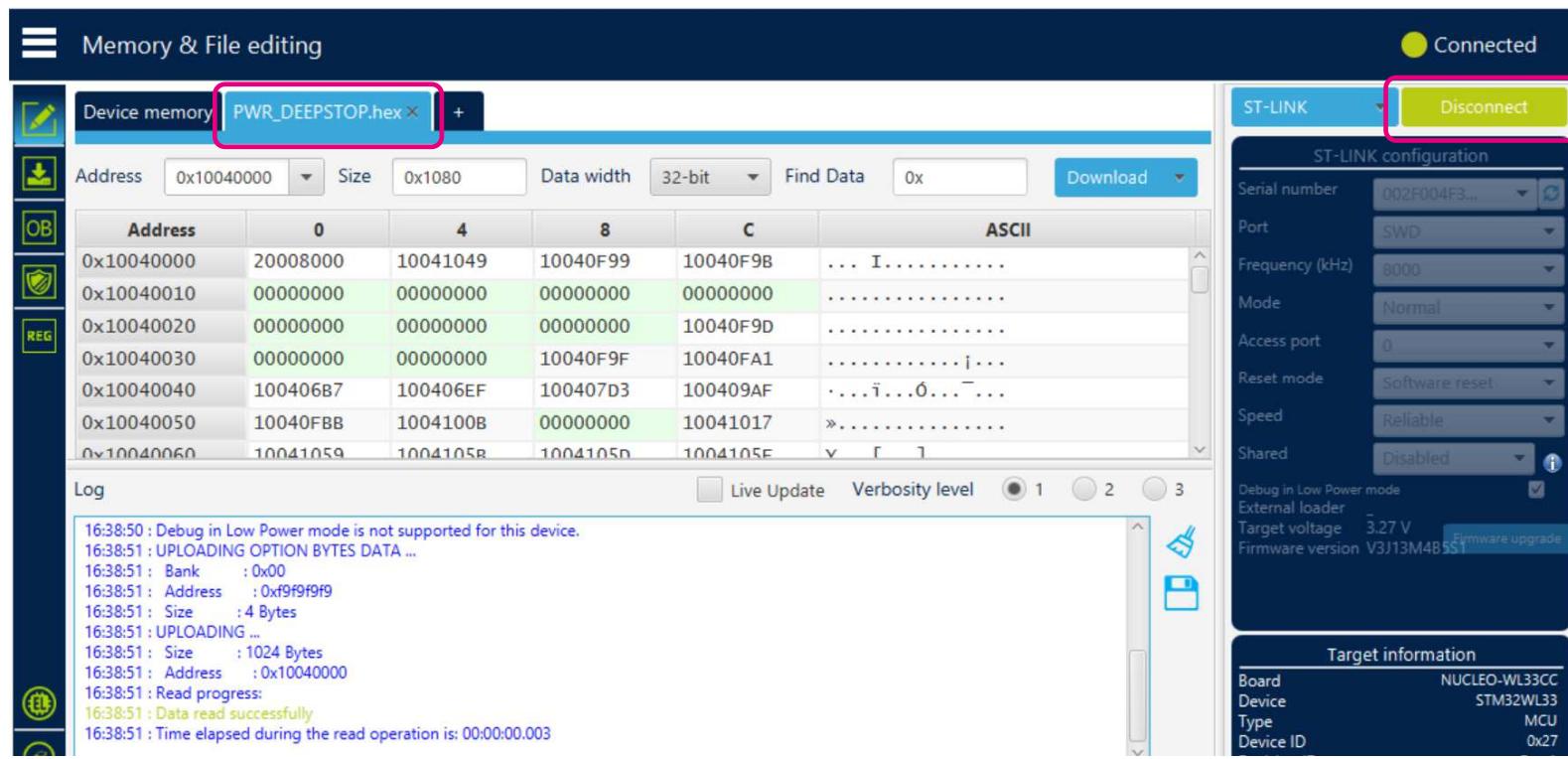
- Compile the project and download to the board.



Low power current measurement

Deepstop_RTC example

- We will use DEEPSTOP_RTC example to measure Low Power current consumption:
 - After having generated the binary file, you will use STM32CubeProgrammer tool to download the binary.
 - Once FW downloaded, disconnect the USB cable.



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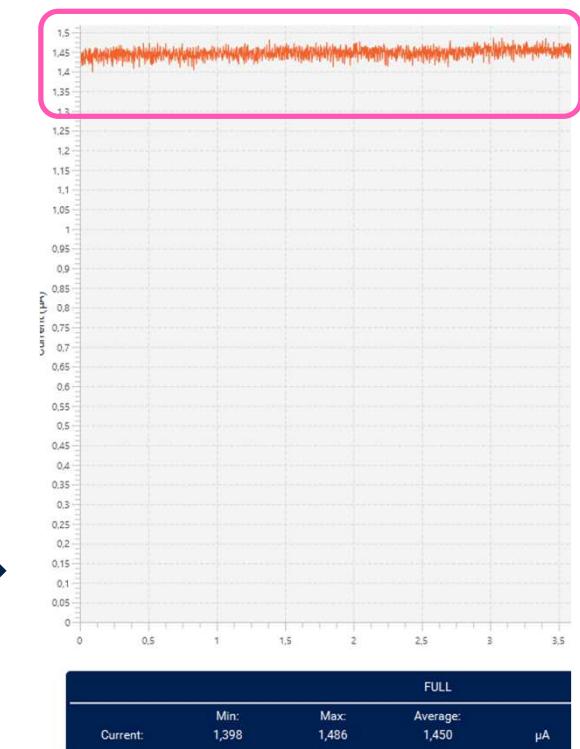
Test your
RF design



Low power current measurement

Measurements

- The FW example will wake up the Nucleo WL33CC1 every 35s, then the STM32WL32 will go back in Deepstop mode:



Current consumption in Deepstop_RTC: 1,45µA



3rd measurement

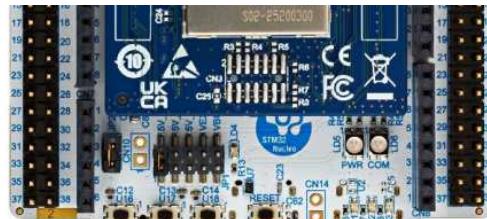
“Wireless Sensor Node” profile mission profile current consumption



“Wireless Sensor Node” profile

Purpose

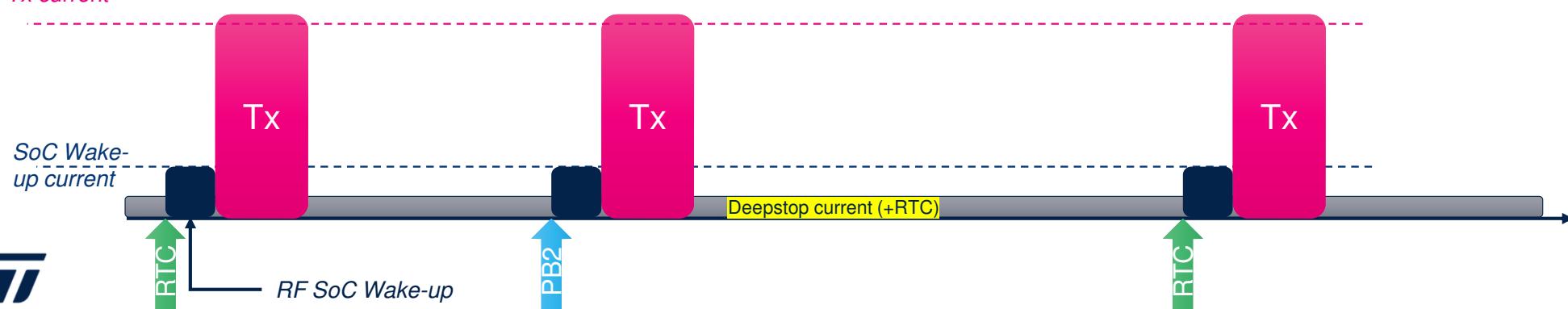
- Purpose of this session it to show the overall current consumption in 1 specific mission profile:
 - DeepStop mode with RTC running
 - RF Transmission at each RTC wake up (10 seconds)
 - Asynchronous transmission using Push Button 2
 - Tx datas displayed via VCOM



Button 2

Transmitting: 8 [8, 9, a, b, c, d, e, f, 10, 11, 12, 13, 14, 15, 16,]
STM32WL3 - Transmitter example.
A packet is sent after pressing PUSH Button 2 or after the RTC timeout.
Transmitting: 1 [1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f,]
Transmitting: 2 [2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, 10,]
Transmitting: 3 [3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, 10, 11,]
Transmitting: 4 [4, 5, 6, 7, 8, 9, a, b, c, d, e, f, 10, 11, 12,]

Tx current





“Wireless Sensor Node” profile

RTC_Button_Tx FW example

- We will use a FW code example localized in the following folder:
 - *STM32Cube_FW_WL3_Vx.x.x\Projects\NUCLEO-WL33CC\Demonstrations\MRSUBG\MRSUBG_RTC_Button_Tx*

Name	Type
MRSUBG_RTC_Button_Tx	File folder
MRSUBG_Sequencer_Sniff	File folder
MRSUBG_Skeleton	File folder
MRSUBG_Timer	File folder
MRSUBG_WakeupRadio_Tx	File folder

- Choose one of the three IDEs:

EWARM	File folder
MDK-ARM	File folder
STM32CubeIDE	File folder

- Compile the project and download to the board.





“Wireless Sensor Node” profile

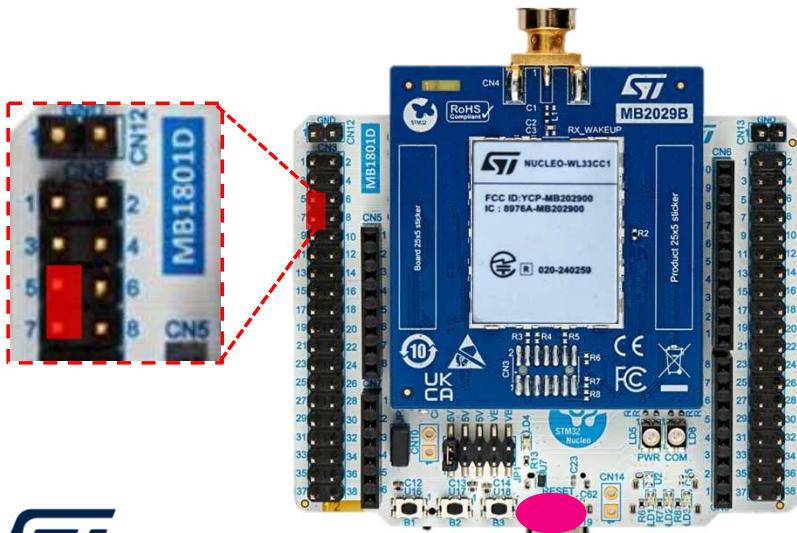
How to download FW when STM32WL3x is in Low power mode ?

- To download FW when STM32WL3x is in Low power mode, you need to put the STM32WL3x in bootloader mode.
- **We can easily complete the setup in 2 steps (AN2606)**

- To enter in Bootloader mode, put PA10 IO to VDD:
use a jumper between pin5 & 7 of CN12

- Click on Reset button & connect USB cable

The STM32WL3 is in bootloader mode & ready to be connected to STM32CubeProgrammer tool.



AN2606
Application note

Introduction to system memory boot mode on STM32 MCUs

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



“Wireless Sensor Node” profile

RTC_Button_Tx FW example

We will use MRSUBG_RTC_Button_TX FW example & measure current consumption:

The screenshot shows the STM32Cube Programmer interface. On the left, a Tera Term VT window displays the output of the STM32WL3 Transmitter example, showing transmitted data frames. In the center, a device memory dump for the file 'MRSUBG_RTC_Button_Tx_pprech_WL3_WS_Oct.hex' is shown, with the address range from 0x10040000 to 0x10040050. On the right, the ST-Link configuration panel is visible, showing settings for the serial number (003C00293...), port (SWD), frequency (8000 kHz), mode (Normal), access port (0), reset mode (Software reset), speed (Reliable), and shared (Disabled). The target information panel indicates the board is NUCLEO-WL33CC, device is STM32WL33, type is MCU, device ID is 0x27, revision ID is Rev A, flash size is 256 kB, CPU is Cortex-M0+, and bootloader version is V3J16M9B5I.

Open Teraterm windows to see the transmitted datas.

“Wireless Sensor Node” profile

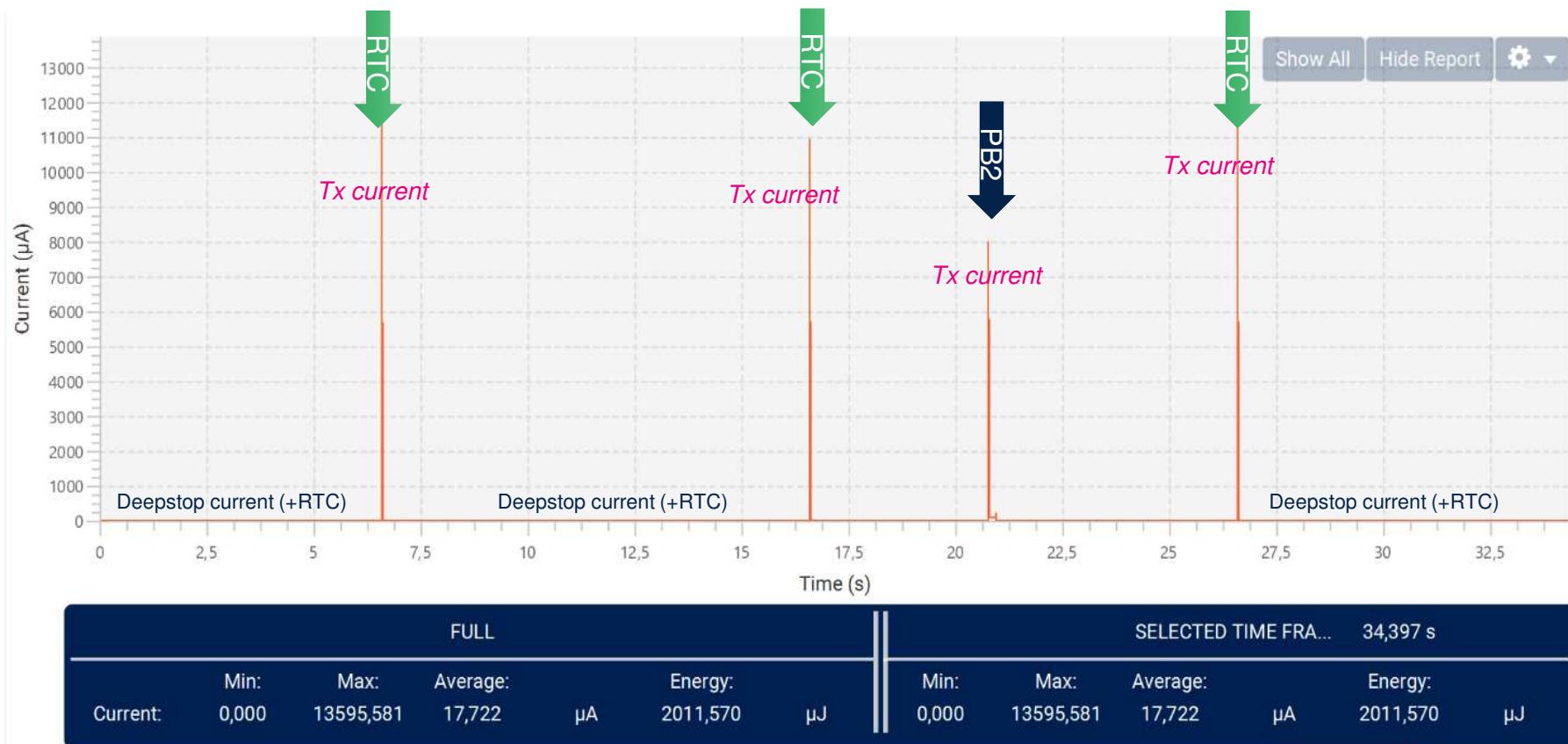
Receiver configuration

- To check that the transmission is effective, we can set the 2nd board with STM32WiSE Radio_Explore in Rx mode.

System settings			Radio settings			Data coding			Packet settings			Wakeup																																																														
SMPS configuration	Symbol	Value	Frequency base	Symbol	Value	Whitening	Coding	Coding order	TX Byte bit order	Value	Unit	Unit	Unit																																																													
	SMPS	1400		f _c	868.0									MHz																																																												
XTAL speed	f _{XTAL}	48.0	Data rate	DR	38.4	ksp/s	Data Coding settings : ⇒ Active whitening (press button Config)	Packet settings	Wakeup	System settings	Radio settings	Data coding	Packet settings																																																													
XTAL offset	X _{TAL_offset}	0	Frequency deviation	f _{dev}	20.0	kHz																																																																				
TX path	TX _{path}	TX	Channel filter	CHF	100.0	kHz																																																																				
		TX HP1 (test mode)	Modulation	mod	2FSK																																																																					
		TX HP	Spread Factor	spread	0																																																																					
		TX + TX HP	Output power	P _{out}	0.0	dBm																																																																				
			Buffer size	Buf	1024	bytes																																																																				
System settings : ⇒ Default is ok (press button Config)			Radio settings : ⇒ Default is ok (press button Config)			Data Coding settings : ⇒ Active whitening (press button Config)			Packet settings			Wakeup																																																														
<table border="1"> <thead> <tr> <th colspan="2">Radio test</th> <th colspan="2">RX packet test</th> <th colspan="2">TX packet test</th> <th colspan="2">Wakeup RX packet test</th> <th colspan="2">RSSI test</th> <th colspan="2">RX modes test</th> <th colspan="3"></th> </tr> </thead> <tbody> <tr> <td colspan="2">Start</td> <td colspan="2">RX packet test</td> <td colspan="2">TX packet test</td> <td colspan="2">Wakeup RX packet test</td> <td colspan="2">RSSI test</td> <td colspan="2">RX modes test</td> <td colspan="3"></td> </tr> <tr> <td colspan="2">Press “Start” (in Rx packet test panel)</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="3"></td> </tr> <tr> <td colspan="2">Rx packets</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="3"></td> </tr> </tbody> </table>															Radio test		RX packet test		TX packet test		Wakeup RX packet test		RSSI test		RX modes test					Start		RX packet test		TX packet test		Wakeup RX packet test		RSSI test		RX modes test					Press “Start” (in Rx packet test panel)															Rx packets														
Radio test		RX packet test		TX packet test		Wakeup RX packet test		RSSI test		RX modes test																																																																
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“Wireless Sensor Node” profile Measurements

- See the current measurement performed with the STLINK_Power V3 tool

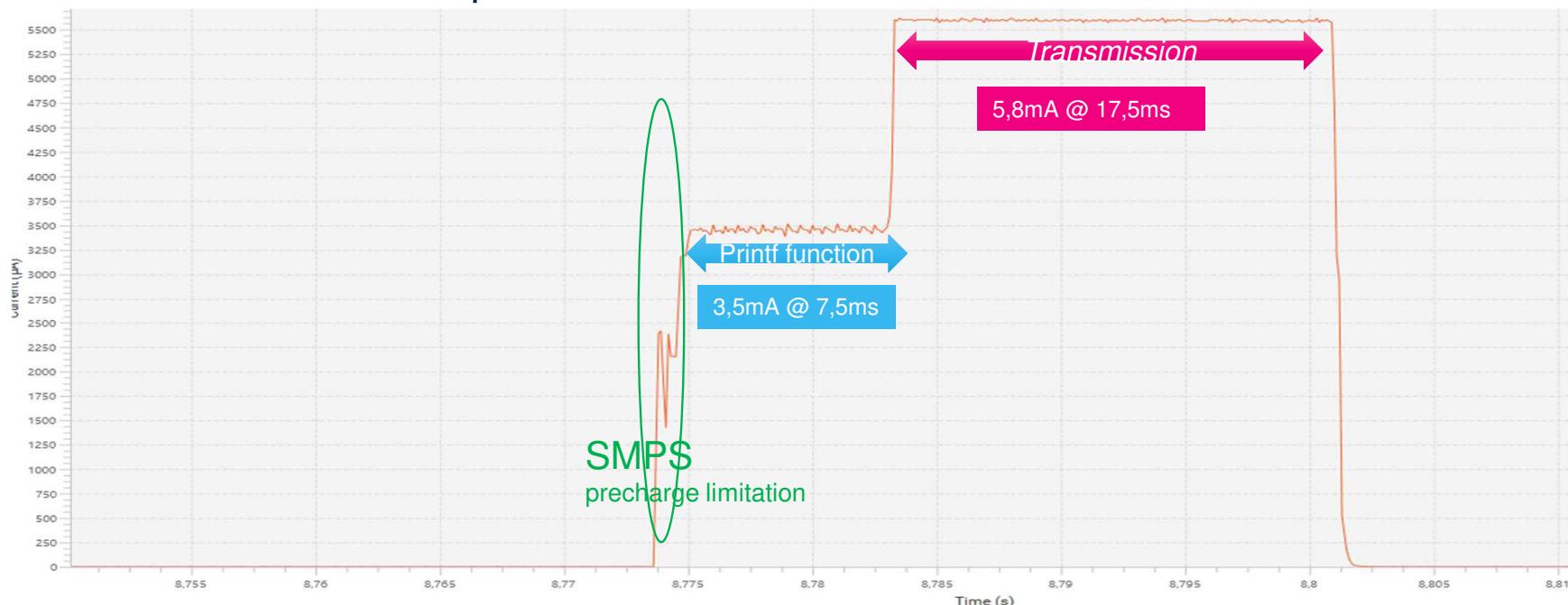




“Wireless Sensor Node” profile

default dynamic power consumption measurements

- Let's zoom on the active phase / transmission:



- Depending on your use case, some improvements can be applied:
 - Reduce SMPS pre charge as done in this FW example, or increase it if you need to shorten RF wake up
 - Remove Printf function.

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



“Wireless Sensor Node” profile default dynamic power consumption measurements

- Let's measure the overall current consumption over 100seconds (10 transmissions)



Conclusion & Takeaways





Takeaways

Easy tools to demonstrate STM32WL3x performances

STM32Cube V3 power tool & STM32Cube Wise Radio Explorer

“State of the Art” current consumption

Active RF & Low power modes current consumption

STM32WL3x flexibility

Wake up peripherals (RTC, Radio Timer..) & IOs.

Our technology starts with You



Find out more at www.st.com

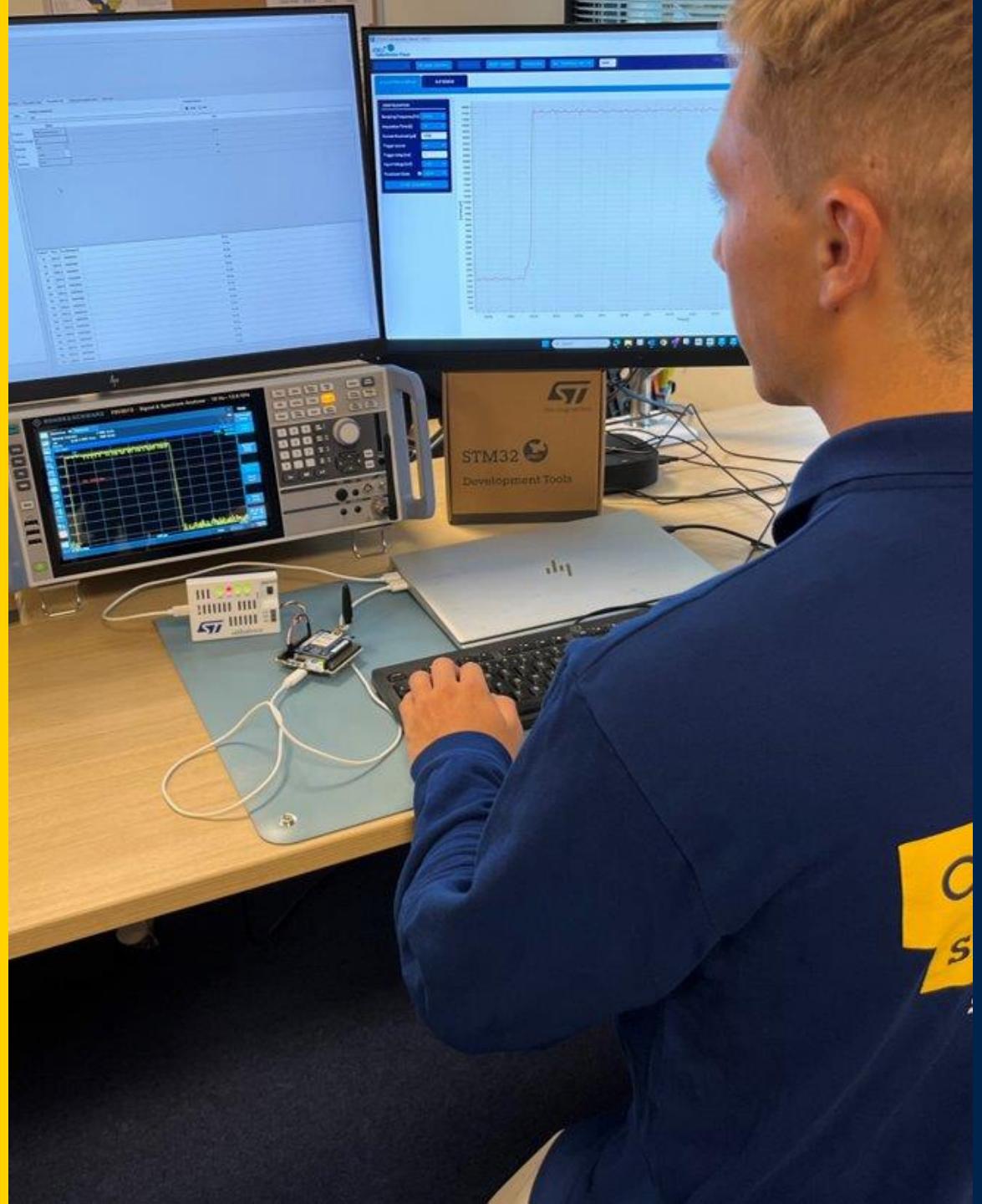
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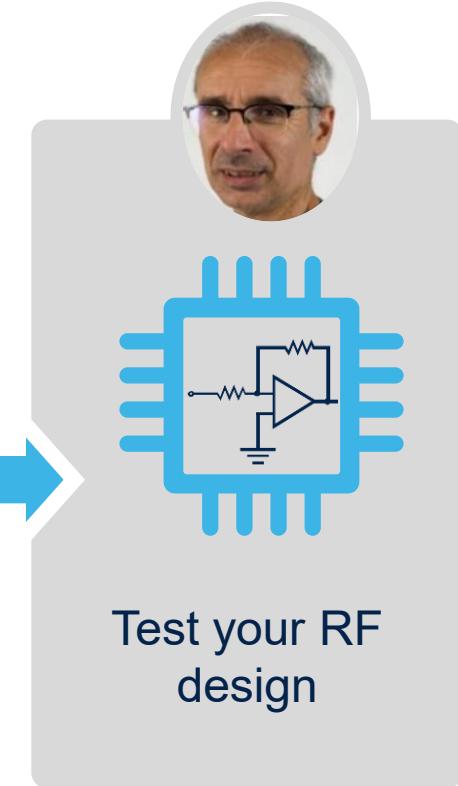
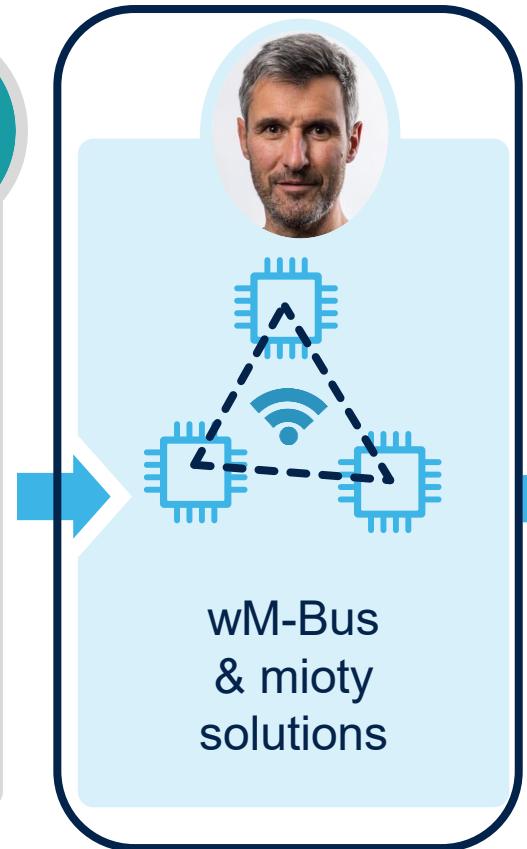
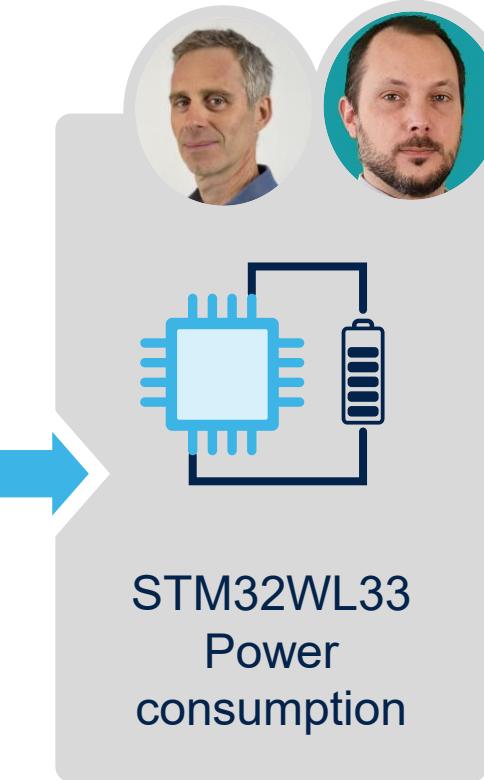


wM-Bus solutions for STM32WL3x

TOMAS RF Team

STM32WL33 in action

Use-cases and ecosystem demo lab tour



Demo : wM-Bus solution STM32WL3x Introduction

1 wM-Bus connectivity introduction

2 wM-Bus PHY layer with STM32CubeWL3



3 wM-Bus / OMS stack with Stackforce



Takeaways



STM32WL3x HW prerequisites



2 x STM32 Nucleo-64 development
board with STM32WL33CC MCU
NUCLEO-WL3CC1

<https://www.st.com/en/evaluation-tools/nucleo-wl33cc1.html>



USB-C cable

USB-C cable

STM32WL3x SW prerequisites



STM32Cube MCU Package for STM32WL3x series

<https://www.st.com/en/embedded-software/stm32cubewl3.html>



STM32CubeIDE / integrated Development
Environment for STM32

<https://www.st.com/en/development-tools/stm32cubeide.html>

wM-Bus connectivity introduction





Wm-Bus standard introduction for what ?



STM32CubeWL3 wM-Bus PHY library



wM-Bus in STM32CubeWL3 package

Enabling wM-Bus PHY layer

STM32CubeWL3 for wM-Bus application

- Delivery wM-Bus PHY layer
- For customer having their own wM-Bus/OMS stack



Available in
STM32CubeWL3 latest version

Release Notes for
STM32CubeWL3 Firmware Package

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Update History

V1.2.0 / 04-June-2025

Main Changes

Release of **STM32CubeWL3** (STM32Cube for STM32WL3x lines)

- Overall improvements and updates in wM-Bus Middleware
- Added new wM-Bus applications
- Updated MRSUBG and LF-AWFR HAL/LL driver and examples
- Updated CMSIS renaming some IRQ
- Fixed configuration error in BSP
- Fixed TX frequency error in Sigfox applications in case of 600bps

⇒ Updated for wM-Bus applications

STM32CubeWL3 content



Sample code for Wm-Bus
packet transmission /
reception



wM-Bus HAL/PHY driver

Sub-Ghz HAL driver



- wM-Bus T/C/S modes evaluation with Nucleo-WL33CC1 kits

wM-Bus features	Meter application	Gateway application
wM-Bus modes	T/C/S modes	T/C/S and T+C modes
Frame format	A or B	A or B / A+B in C-mode



Application simulating wM-Bus Meter

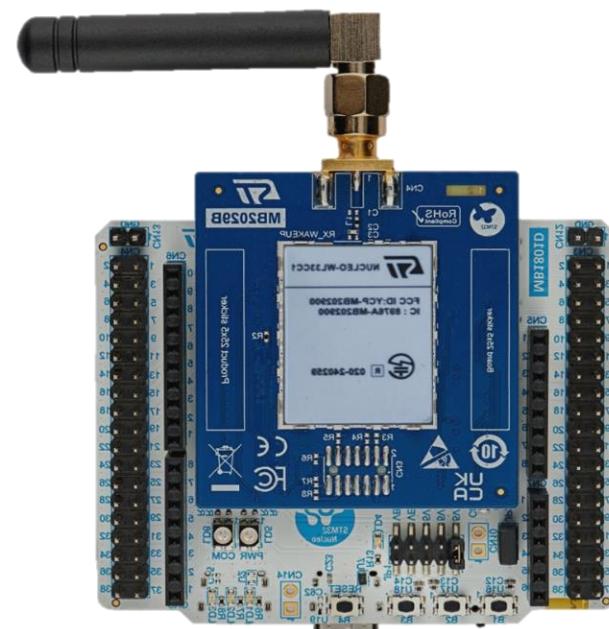
STM32CubeWL3 package

wM-Bus T/C/S modes (868MHz)

Table 15 — Mode C, Transmitter

Characteristic	Mode	Sym	Min	Typ	Max.	Unit	Note
Centre frequency (Meter to Other Device)	C1, C2		868,928	868,950	868,972	MHz	± 25 ppm
Centre frequency (Other Device to Meter)	C2		869,503	869,525	869,547	MHz	± 25 ppm
FSK Deviation ^a (Meter to Other Device)	C1, C2		± 33,75	± 45	± 56,25	KHz	
GFSK Deviation ^a (Other Device to Meter)	C2		± 18,75	± 25	± 31,25	KHz	
GFSK relative bandwidth	C2	BT		0,5			
Chip rate (Meter to Other Device)	C1, C2	f_{chip}		100		kcps	
Chip rate (Other Device to Meter)	C2	f_{chip}		50		kcps	
Chip rate tolerance	C1, C2				± 100	ppm	
Data rate ^b	C1, C2			f_{chip}		bps	
Preamble length	C1, C2	PL	32		32	chips	
Synchronization length	C1, C2	SL	32		32	chips	
Fast response delay (default) ^{c d e}	C2	t_{FO}	99,5	100	100,5,	ms	

Extract of wM-Bus EN13757-4 specification

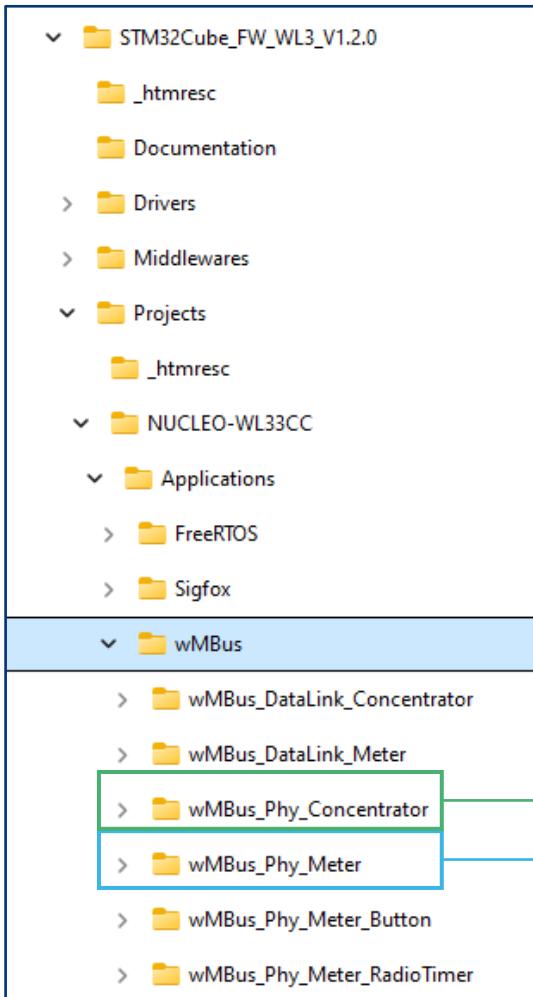


Application simulating wM-Bus Gateway

STM32CubeWL3 package

wM-Bus PHY package examples

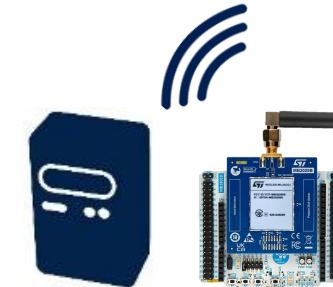
- Start with simple wM-Bus PHY code examples



wM-Bus Gateway application example

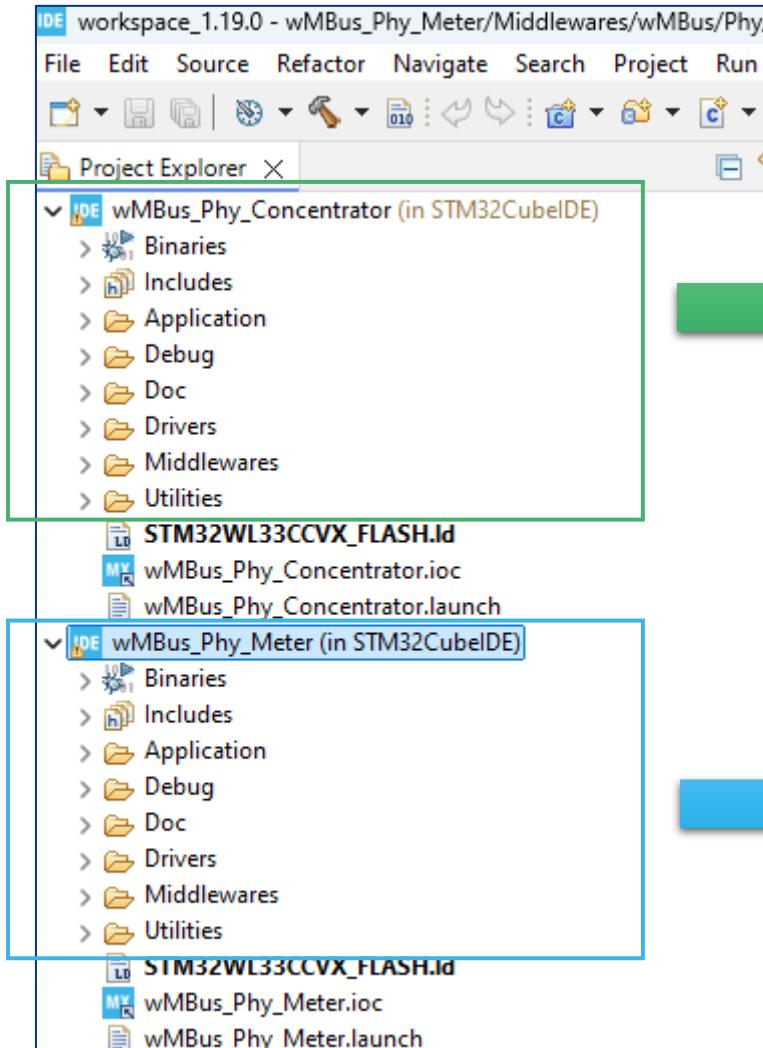


M-Bus
wireless



wM-Bus Meter application example

- Start CubeIDE projects / wM-Bus PHY



STM32CubeWL3 package

wM-Bus PHY CubeIDE projects

Gateway project

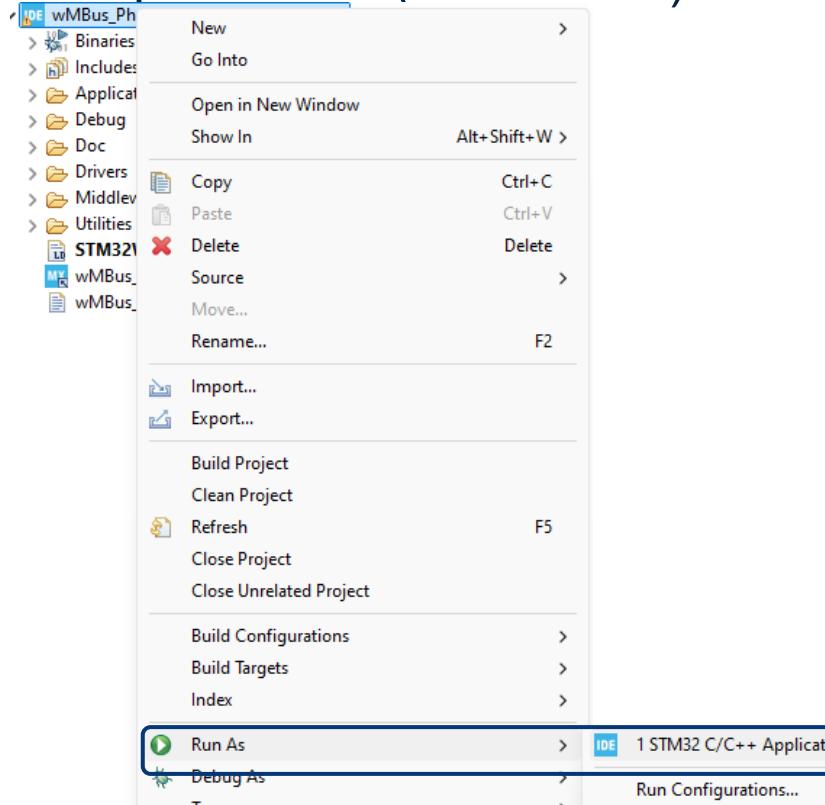


Meter project



- Setup Meter Application example

- Connect Nucleo-WL33C1 kit to PC (USB-C)
- Run project (from CubeIDE)
- Setup Terminal (115kbauds)

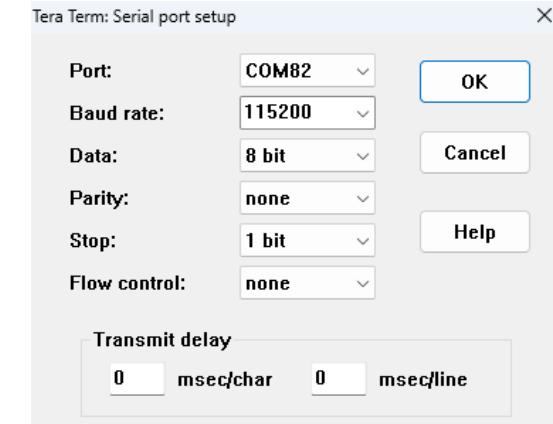


STM32CubeWL3 package

setup Meter Application example



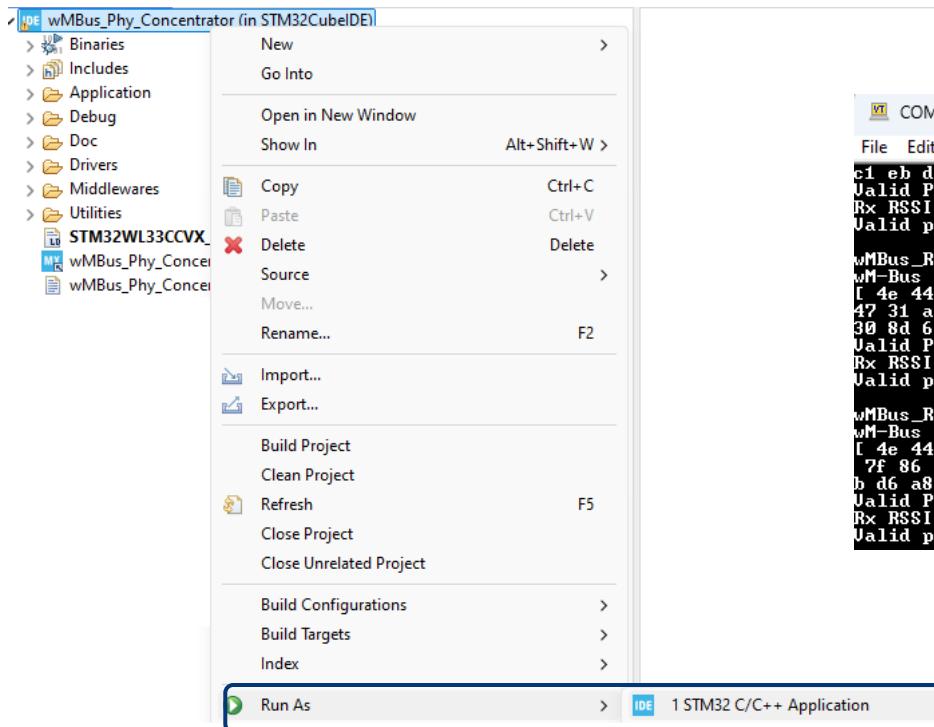
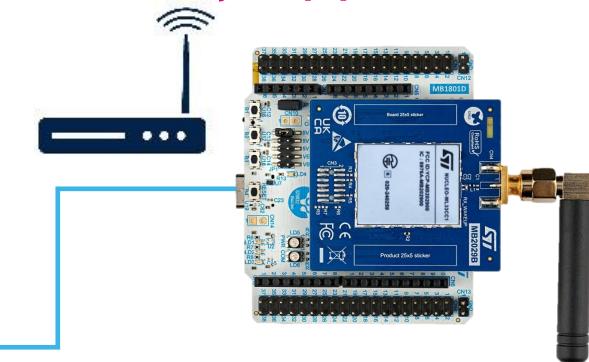
```
File Edit Setup Control Window Help
VT COM82 - Tera Term VT
Rx RSSI level: -104 dBm
Rx RSSI level: -103 dBm
Rx RSSI level: -102 dBm
Rx RSSI level: -106 dBm
Rx RSSI level: -104 dBm
Rx RSSI level: -105 dBm
Rx RSSI level: -106 dBm
Rx RSSI level: -105 dBm
Rx RSSI level: -105 dBm
Rx RSSI level: -108 dBm
Rx RSSI level: -106 dBm
Rx RSSI level: -106 dBm
```



- Setup Gateway Application example
 - Connect Nucleo-WL33C1 kit to PC (USB-C)
 - Run project (from CubeIDE)
 - Setup Terminal (460kbauds)

STM32CubeWL3 package

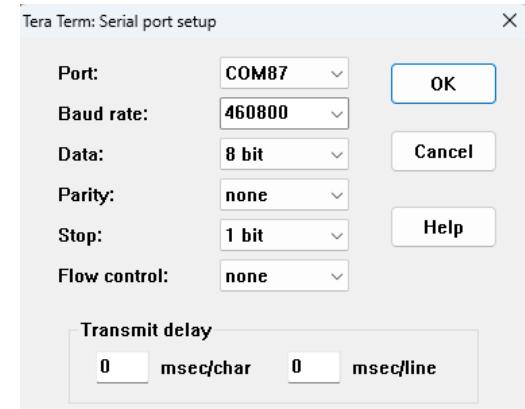
setup Gateway Application example



```
File Edit Setup Control Window Help
c1 eb d3 90 a8 1c 19 f5 2d 97 c b6 82 2f 5f 71 e0 f
Valid Packet Received
Rx RSSI level: -95
Valid packet count: 44

wMBus_RxBuffer_length: 79
wMBus buffer - CRCs checked - received
[ 4e 44 24 34 10 37 4 24 50 7 7a f2 20 40 25 d9 a7
47 31 a5 4a 62 2b 17 29 58 71 61 be 33 e8 b4 bd ab
30 8d 69 af c7 5e 8c d0 39 c8 91 af 14 a2 ea 5f 7f
Valid Packet Received
Rx RSSI level: -100
Valid packet count: 45

wMBus_RxBuffer_length: 79
wMBus buffer - CRCs checked - received
[ 4e 44 24 34 3 94 1 24 50 6 7a b7 20 40 25 f0 eb 8
7f 86 e3 d0 4d 2a 53 e6 39 28 a7 15 ab 74 69 de af
b d6 a8 ac 78 e7 9f 99 c2 17 54 d9 4c ae 5a 9 33 ea
Valid Packet Received
Rx RSSI level: -88
Valid packet count: 46
```



STM32WL3x OMS stack by Stackforce



wM-Bus in STM32CubeWL3 package

Enabling wM-Bus PHY layer

STACKFORCE OMS End device

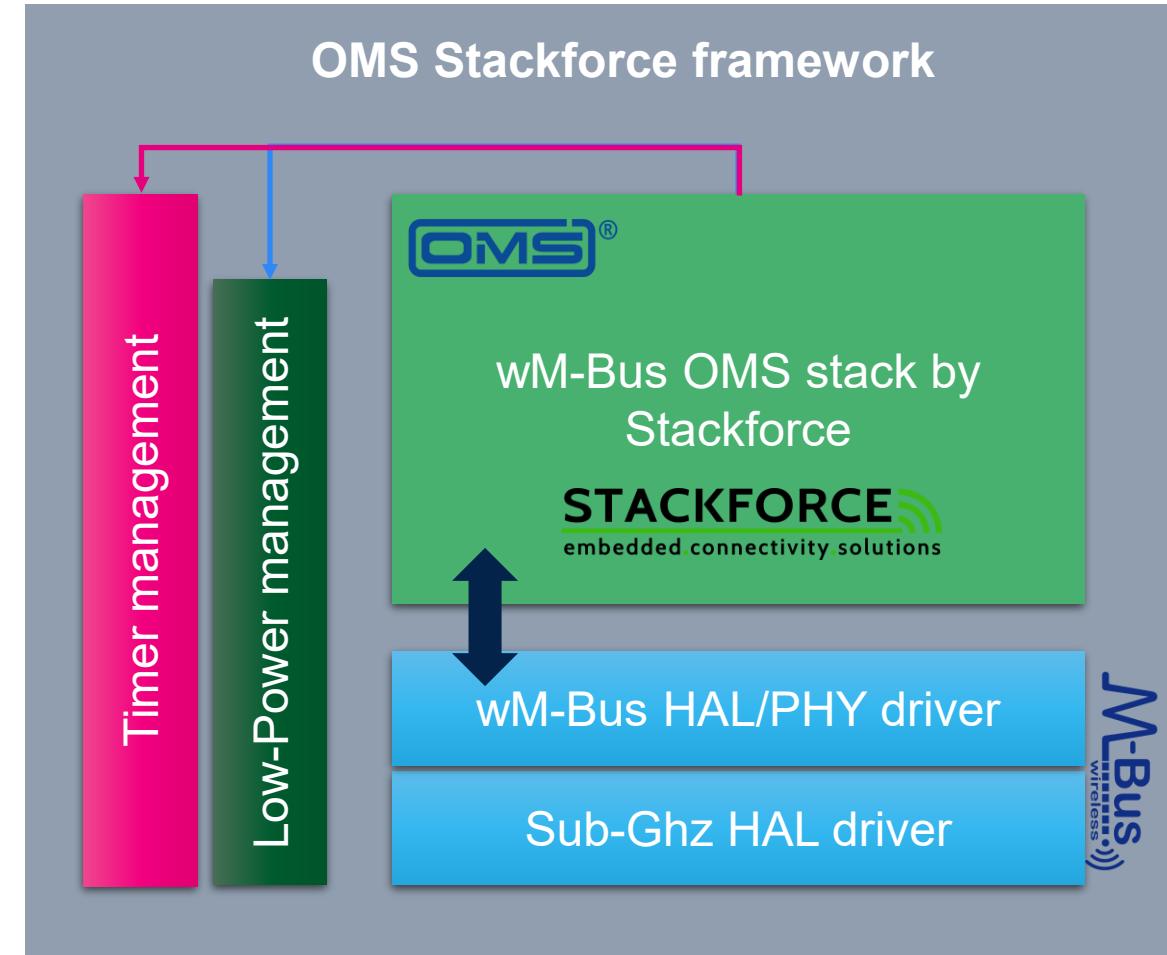
- validated/certified wM-Bus OMS stack

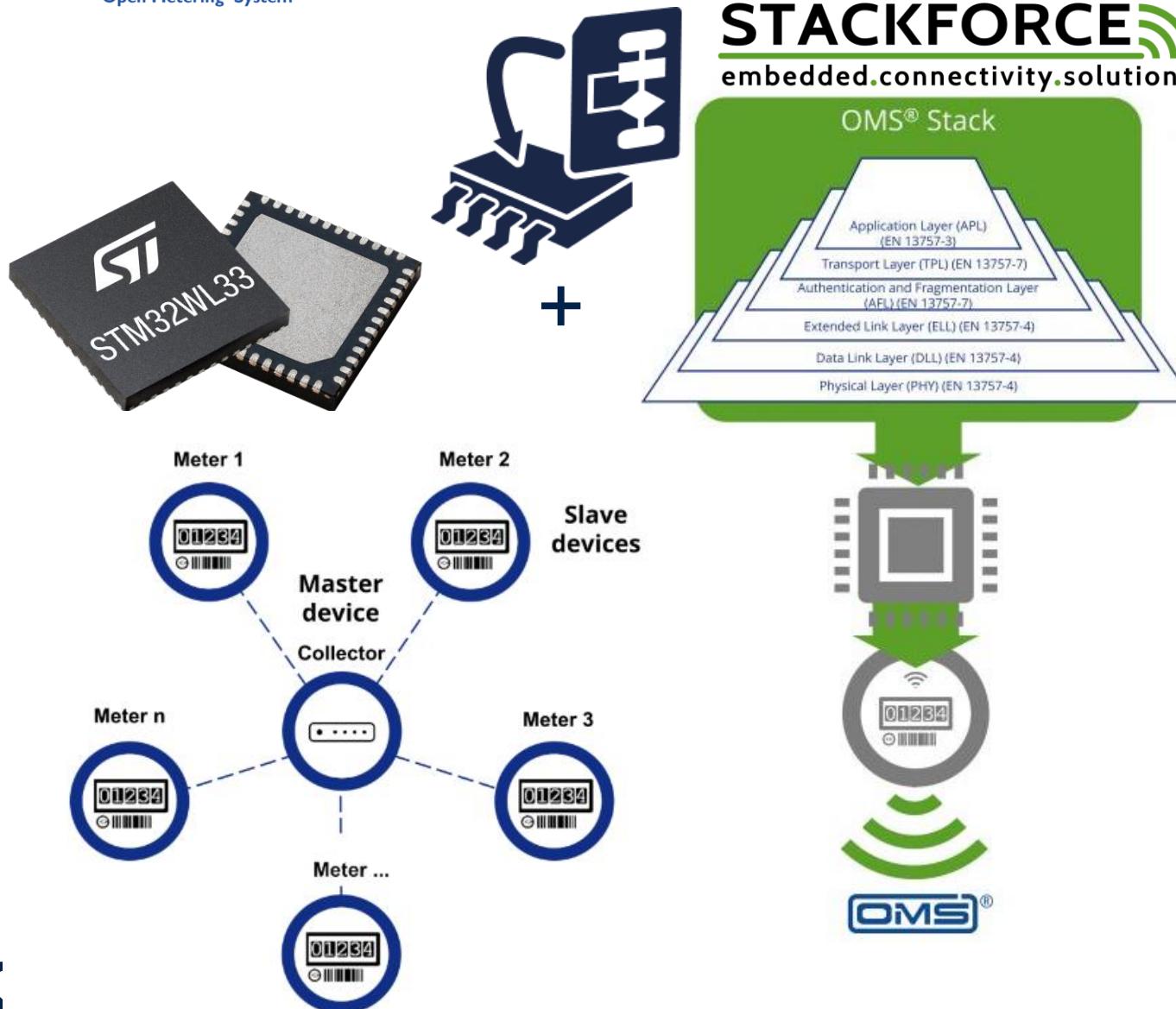


Available in
[Stackforce website](#)

The screenshot shows the Stackforce website homepage. At the top, there's a navigation bar with links for Portfolio, Products, Services, About Us, and Contact. Below the navigation, a banner reads "OMS® v4.5.1 and STM32WL3: unlock new possibilities in Smart Metering and IoT". A date "29 Nov 2024" and a name "Bianca Schäffer" are also present. On the right side of the banner, there's a small image of a green stack of components labeled "OMS® v4.5.1 for STM32WL3". The bottom part of the screenshot shows a dark background with some text and icons.

OMS Stackforce framework





STM32WL3x OMS support

Stackforce OMS stack

- Developed & Pre-Certified OMS stack by **STACKFORCE GmbH**
- Bidirectional wM-Bus S, T, and C modes

KEY APPLICATIONS

- OMS® v4.5.1 certification
- End Devices applications
- Gateway applications
- Secure interface to Smart Meter Gateway
- Smart Metering

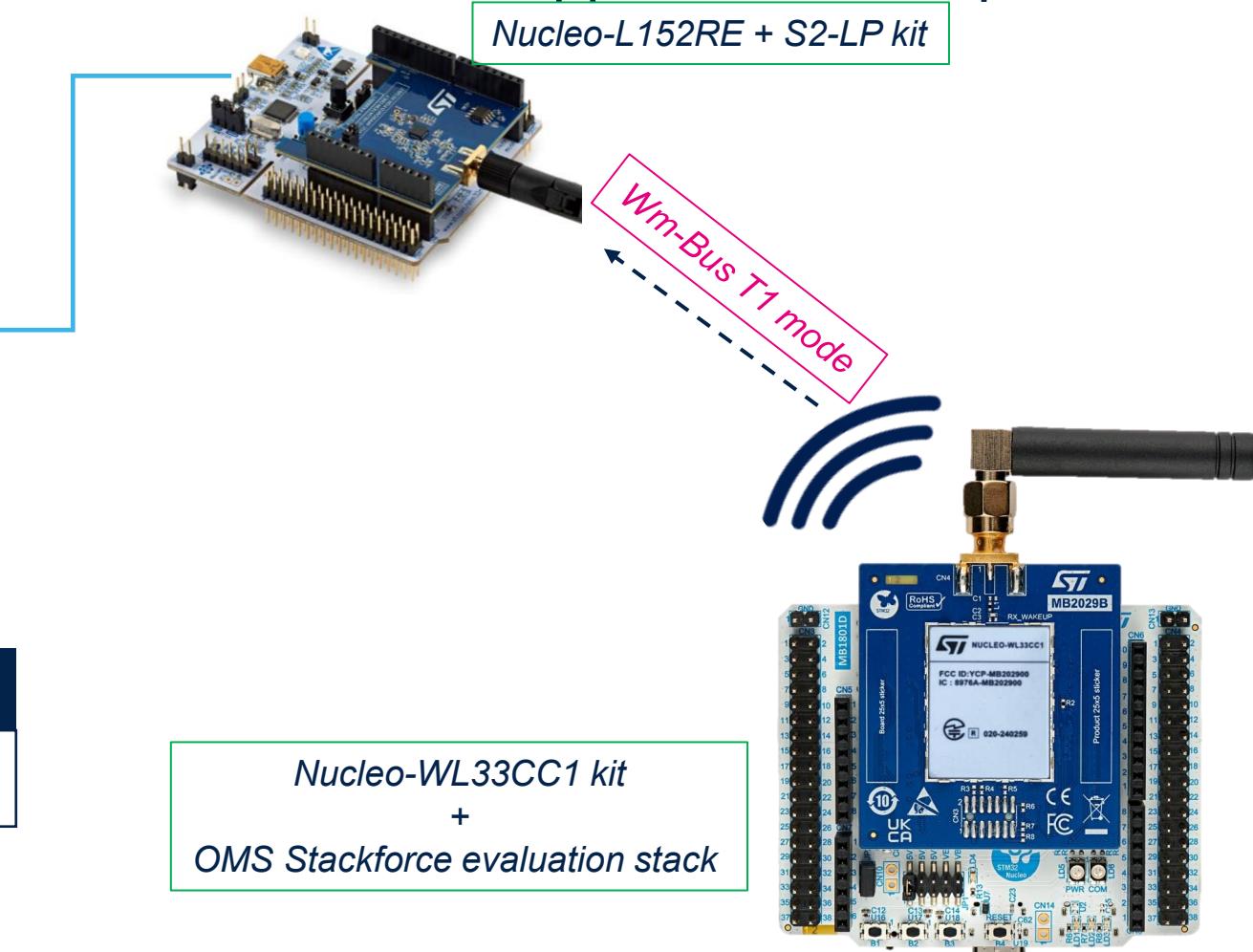


STM32WL33 Wm-Bus/OMS

in front of wM-Bus gateway

- Demo setup to demonstrate wM-Bus/OMS node application example

ST Web interface available
Connect to <https://mbus-95f00.web.app>



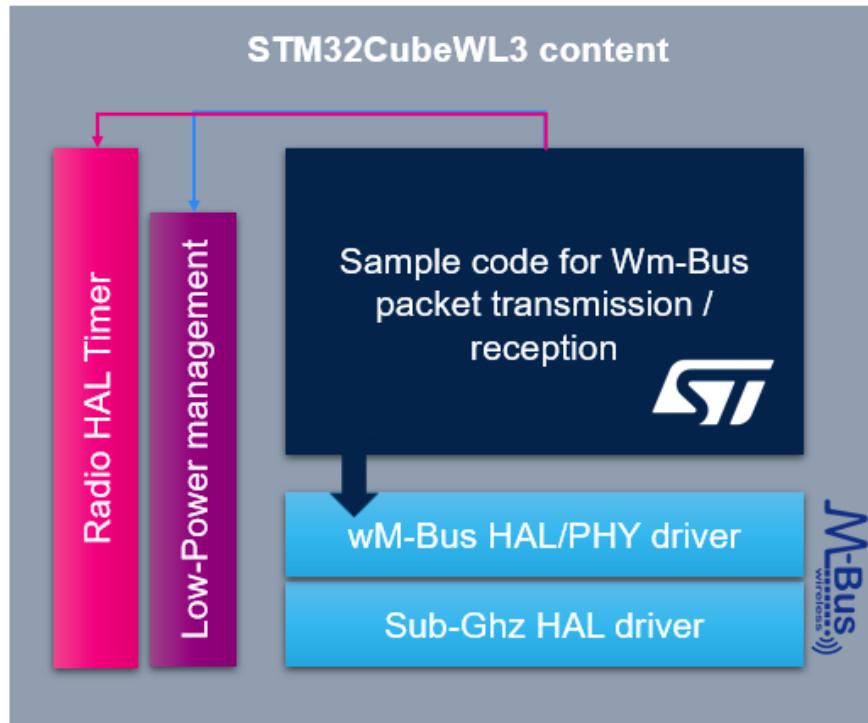
STM32WL3x wM-Bus takeaways



STM32WL3x wM-Bus solutions

1

Legacy wM-Bus stack available

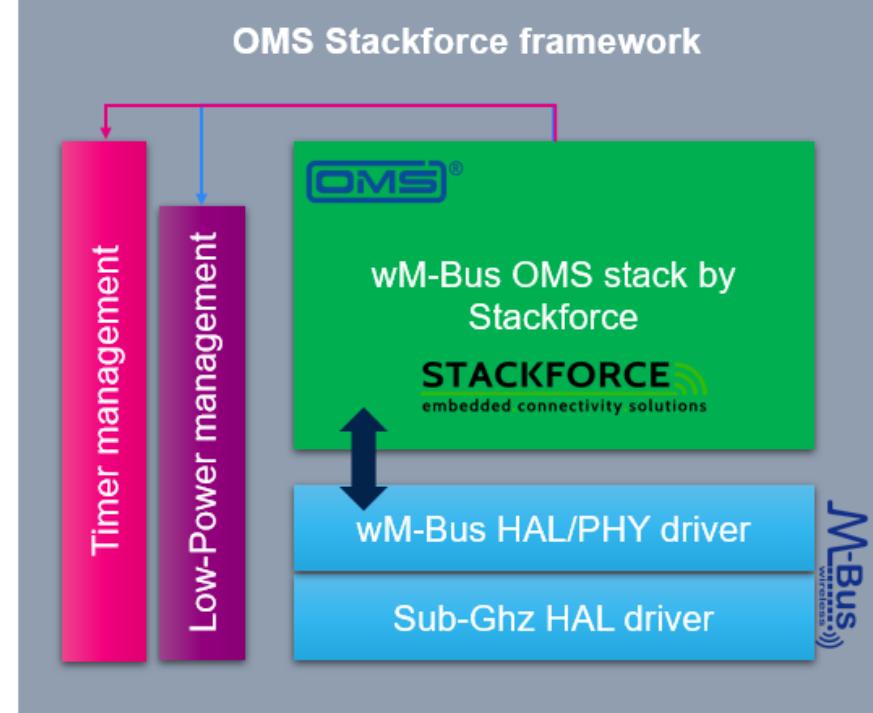


Provided by ST and
ready to be integrated

STM32
CubeWL3

2

need turn-key solution (integration/certified)



Go to Stackforce solution
Evaluation stack available

OMS®

STACKFORCE
embedded.connectivity.solutions





Takeaways

STM32WL3x wM-Bus PHY & Data Link Layers in CubeWL3

Smoothly migrate your wM-Bus application on STM32WL3x



Stackforce OMS stack ported available on
STM32WL3x

[Protocol Stack Evaluation Licenses](#)

sales@stackforce.de

OMS® v4.5.1 Turn-key solutions for Meter and Gateway applications – by **STACKFORCE**
embedded.connectivity.solutions

Evaluation on **Nucleo-WL33CC1** kits

Nucleo-WL33CC1 ready to use for wM-Bus evaluation without restrictions



Our technology starts with You



Find out more at www.st.com

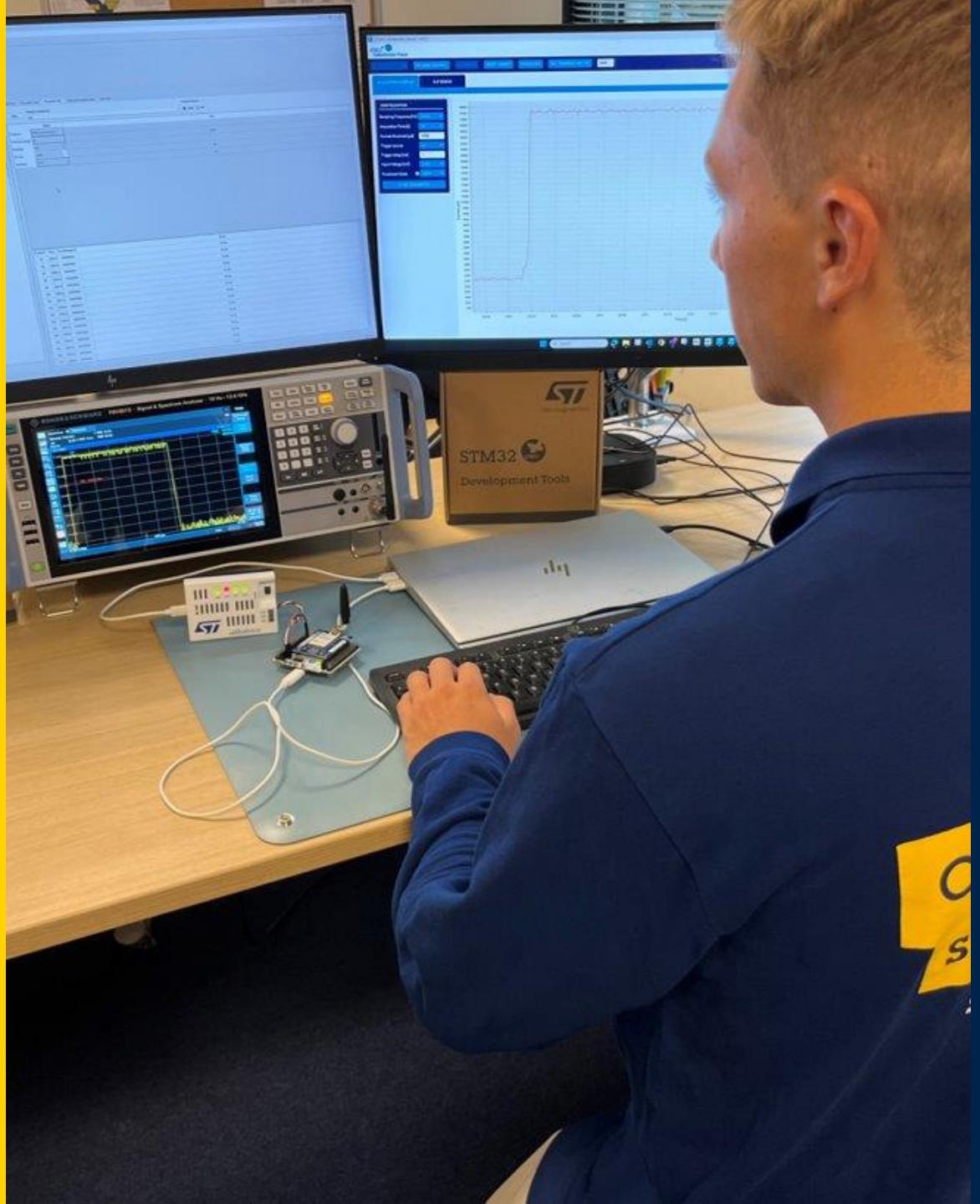
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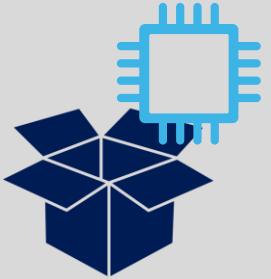


mioty solutions for STM32WL3x

TOMAS RF Team

STM32WL33 in action

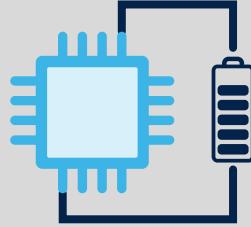
Use-cases and ecosystem demo lab tour

 mioty

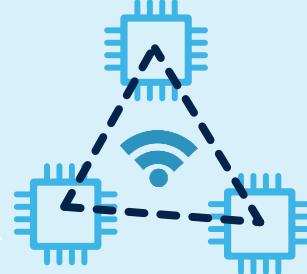
NUCLEO-
WL33CC
unboxing



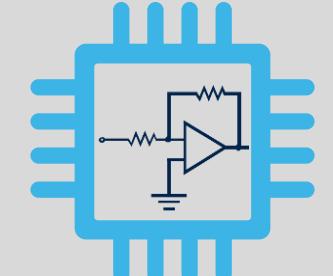
STM32WL33
Radio
flexibility



STM32WL33
Power
consumption



wM-Bus
& mioty
solutions



Test your RF
design

Demo 8: mioty solution on STM32WL3x

Introduction

1 mioty technology awareness

2 mioty demo with Nucleo-WL33CC1
By Fraunhofer

Takeaways





STM32WL3x HW prerequisites

mioty



STM32 Nucleo-64 development board
with STM32WL33CC MCU **NUCLEO-WL3CC1**

<https://www.st.com/en/evaluation-tools/nucleo-wl33cc1.html>



USB-C cable

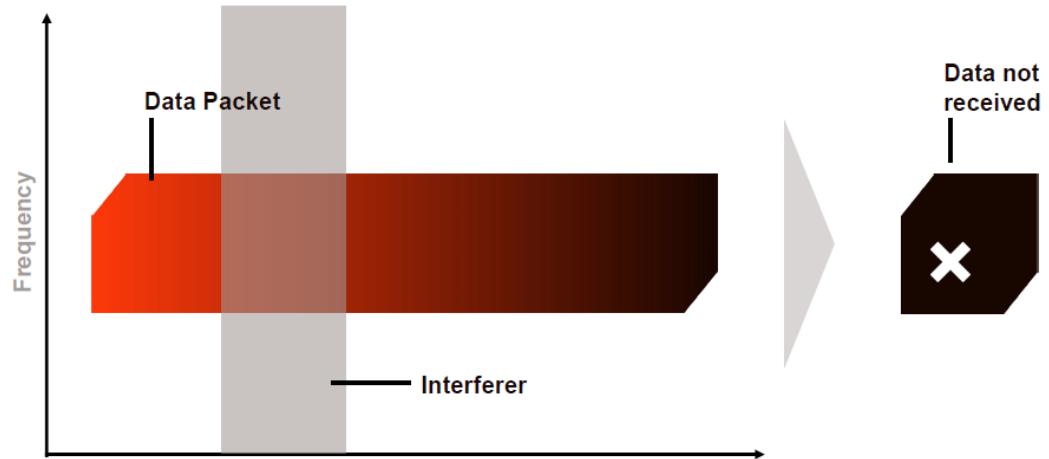
mioty technology awareness





Traditional LPWAN-solutions

Transmission of the whole data packet



Better interferer
management

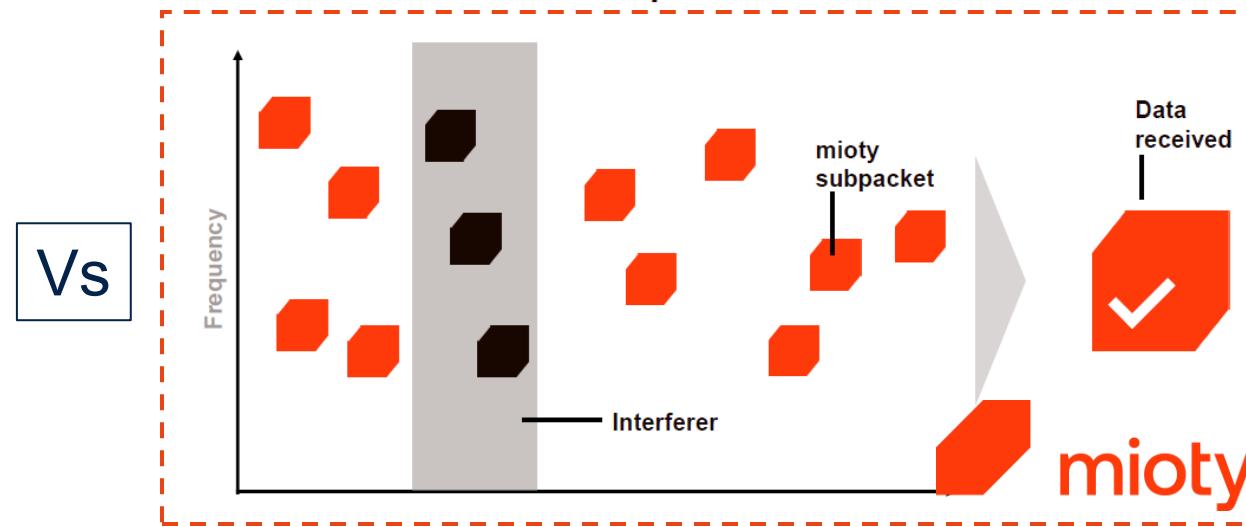


Based on simple
modulation (GMSK)

mioty standard introduction

telegram splitting approach

The mioty technology: telegram splitting
Transmission of data subpackets



Low-power approach

STM32WL3x mioty demo

by Fraunhofer





mioty end-node demo Fraunhofer PHY layer



KEY FEATURES



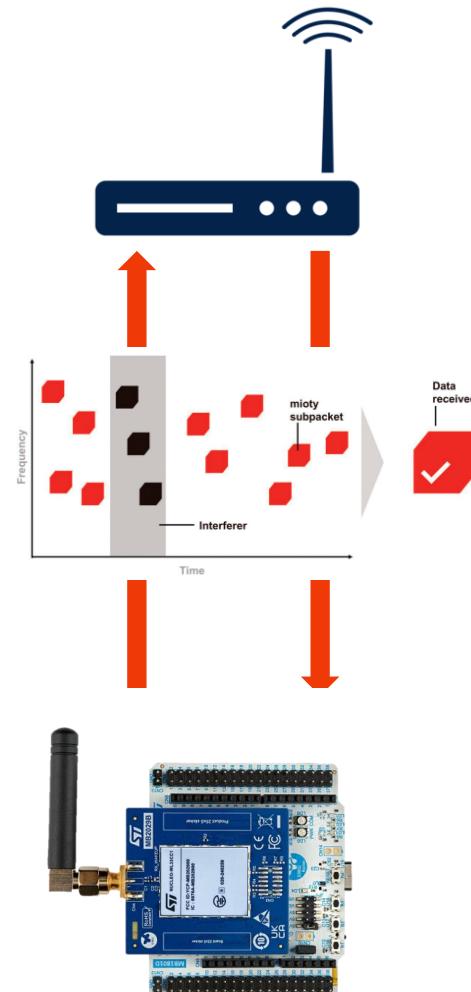
- MIOTY PHY libraries by **Fraunhofer**
- MIOTY Class Z & Class A support
 - **STM32WL33** Sub-1Ghz RF SoC
 - **150dB** RF link budget (Tx & Rx)



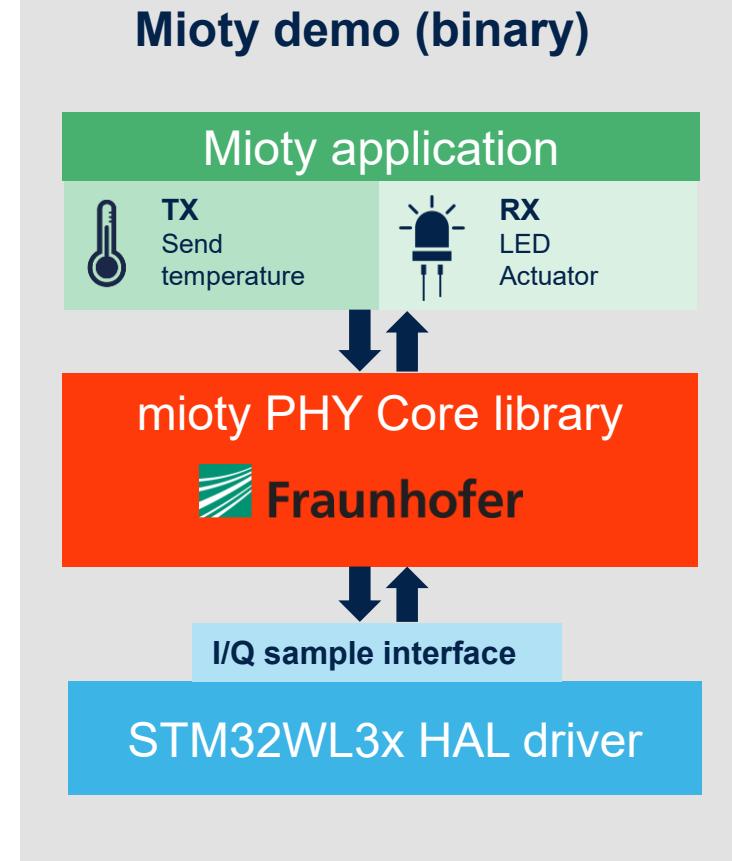
- Ultra Low Power **LPWAN** Cortex-M0+
- 22mA Tx @ +14dBm / 5.6mA Rx
 - 1.4 μ A Deepstop mode with RTC

KEY APPLICATIONS

- MIOTY end-node applications
- Wireless sensors
- Smart Metering & IoT
- Asset Tracking



Mioty demo (binary)



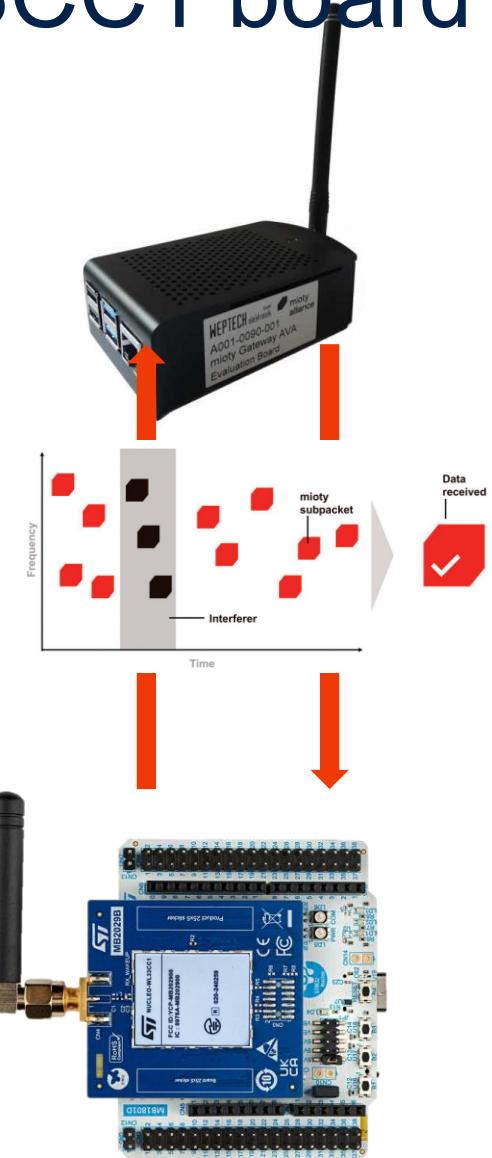
Hardware setup

mioty Gateway & Nucleo-WL33CC1 board

- Weptech AVA mioty gateway
 - [mioty® Gateway AVA - WEPTECH elektronik GmbH](#)
 - Connected to local dashboard
 - Any mioty gateway can be also connected to a router



- Nucleo-WL33CC1 mioty node
 - Bidirectional mioty end-node





Mioty end node demo

bidirectional communication setup

Button 1 (left button) for **uplink** data only (**Class Z mioty**)

Button 2 (middle button) for **uplink & downlink** data (**Class A mioty**)

The screenshot shows the "Uplink" tab selected in the top navigation bar. The main area displays "Received Uplink Data" with a single entry:

EUI	Cnt	Time	RSSI	SNR	eqSNR	Profile	Mode	Type	Data	Format
57-4c-33-33-43-43-00-01	38	2022-12-14 13:31:16	-51.0	25.0	19.8	eu868	ulp	b1	Temperature: 36 °C	0

The screenshot shows the "Downlink" tab selected in the top navigation bar. The main area includes sections for "Auto Acknowledgment" (set to "Off") and "Demo Application". In the "Demo Application" section, there are two "End Point EUI" fields:

- 42-42-42-42-42-42-42-00
- 57-4c-33-33-43-43-00-01

Below these, under "LED Color", are two sets of three colored squares (red, green, blue) corresponding to the two end points.

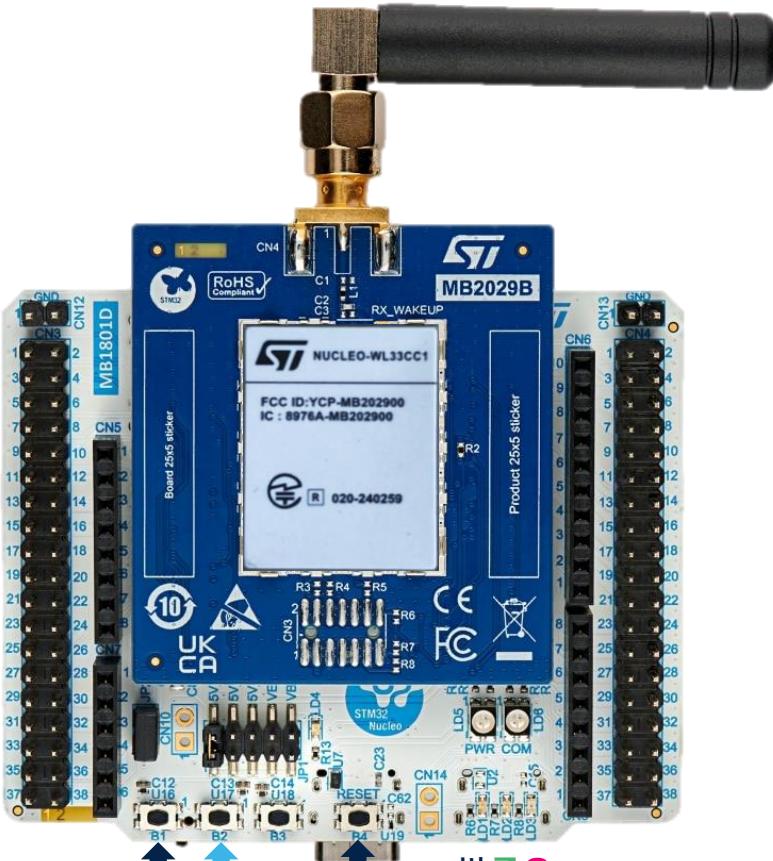
At the bottom, a green bar indicates: "Downlink data scheduled."

UPLINK

DOWNLINK

B1: UPLINK
B2 : DOWNLINK
RESET

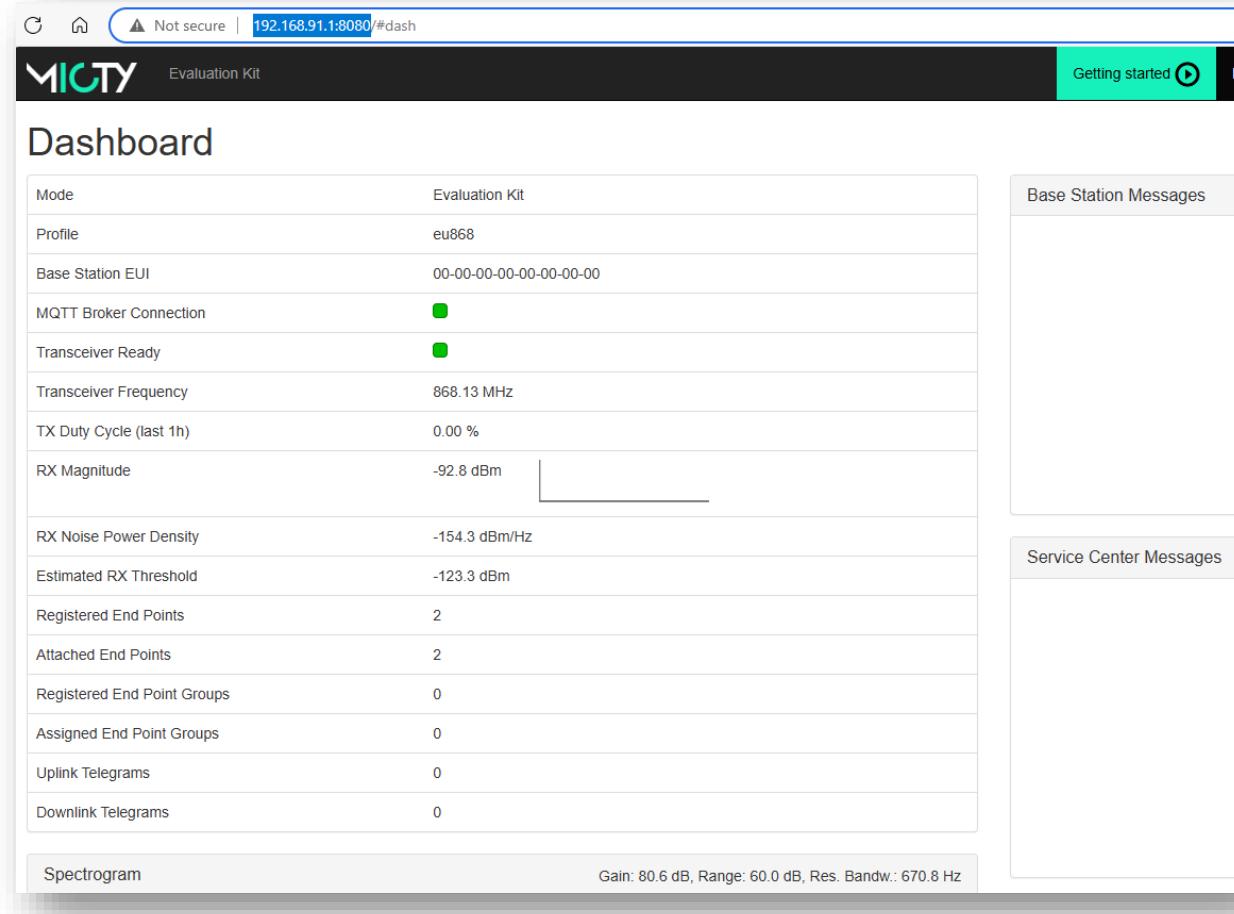
LED BLUE
LED GREEN
LED RED



 mioty

- Local mioty dashboard access with web browser

- Type <http://192.168.91.1:8080/> in web browser
- Access to main page :

 http://192.168.91.1:8080/

 mioty

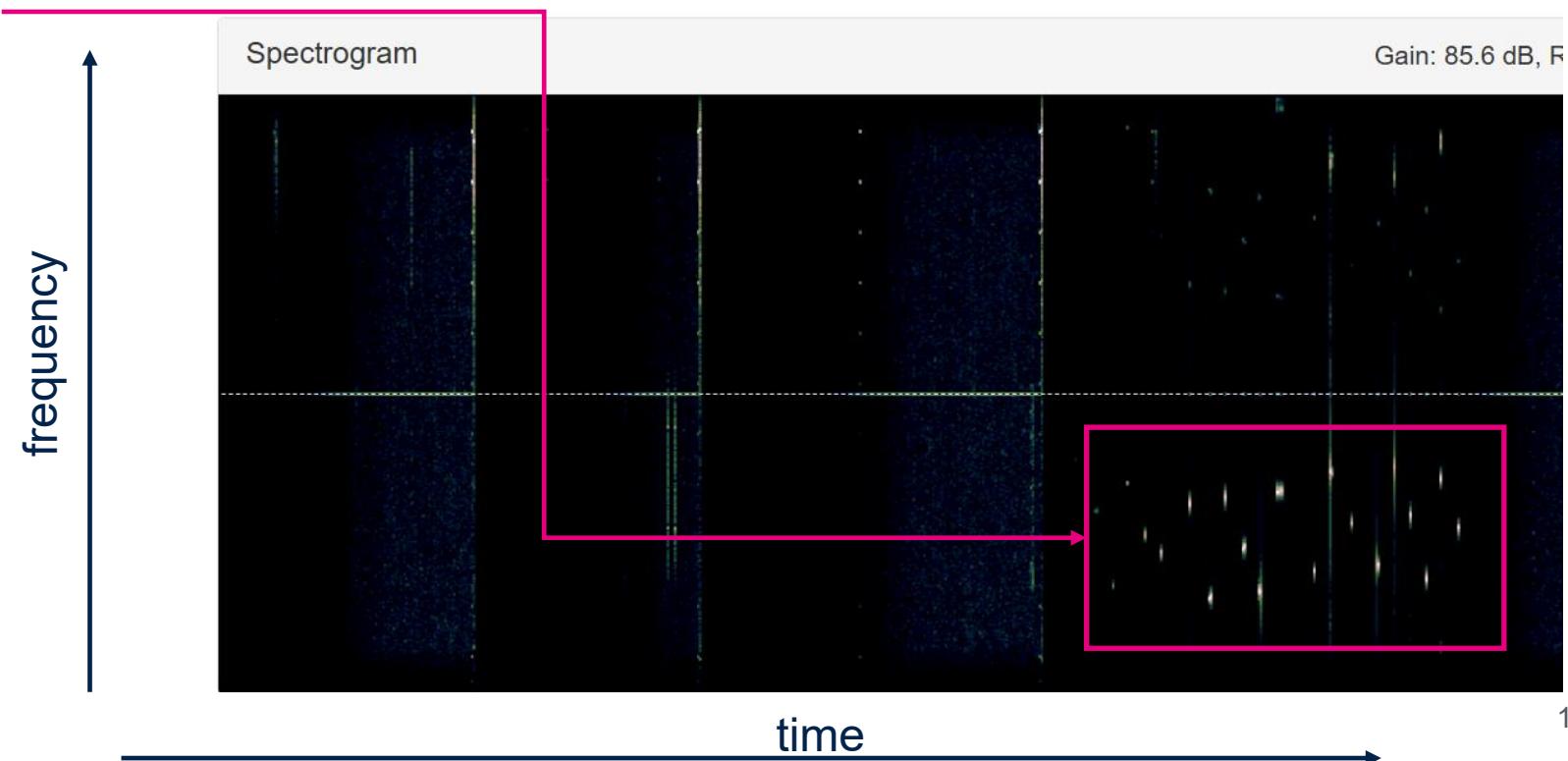
Number of telegrams (Uplink & Downlink)

- Each time Tx : increment Uplink count
- Each time Rx : increment downlink count

Assigned End Point Groups	
Uplink Telegrams	37
Downlink Telegrams	8

Visual representation of telegram splitting technology (mioty core technology)

- Time & frequency splitting (Tx part)





Gateway setup

local gateway dashboard



Uplink information

- EUI identifier based – identify end-node
- “Cnt” incremented each time transmission is done (Button#1 or Button#2)
- Temperature information displayed

The screenshot shows the MICTY Evaluation Kit interface. The top navigation bar includes links for Getting started, Dashboard, Mode, Base Station, Uplink (which is highlighted in black), Downlink, End Points, Blueprints, and Info. The main content area is titled "Received Uplink Data" and displays a table with the following data:

EUI	Cnt	Time	RSSI	SNR	eqSNR	Profile	Mode	Type	Data	Format
57-4c-33-33-43-43-00-01	38	2022-12-14 13:31:16	-51.0	25.0	19.8	eu868	ulp	70-b3-d5-67-70-0f-00-b1	Temperature: 36 °C	0



Gateway setup

local gateway dashboard

downlink information

- Selection of user LED to turn On depending end-device
- Scheduling of LED selection : to be done before pressing user button 2
- LED selection on specific end point (EUI dependent)

The screenshot shows a web-based dashboard with a dark header bar containing navigation links: Getting started (highlighted in green), Dashboard, Mode, Base Station, Uplink, Downlink (highlighted in blue), and End Points.

The main content area has a light gray background. It displays a section titled "Demo Application" with a table-like structure:

End Point EUI	LED Color
42-42-42-42-42-42-42-00	<input type="checkbox"/> Red <input type="checkbox"/> Green <input type="checkbox"/> Blue
57-4c-33-33-43-43-00-01	<input checked="" type="checkbox"/> Red <input type="checkbox"/> Green <input type="checkbox"/> Blue

A pink box highlights the "57-4c-33-33-43-43-00-01" row, and a pink arrow points from the text "Node ID registered for NUCLEO (and gateway)" to this row. A blue arrow points from the text "For downlink select right buttons" to the "Blue" checkbox in the second row's "LED Color" column.

At the bottom of the table, a green bar contains the text "Downlink data scheduled." with a checkmark icon.

Mioly takeaways





Takeaways

Mioty is new LPWAN standard popping up

Deployment ramp-up in Germany and other countries
Can be combined with wM-Bus and LoRaWAN

STM32WL3x is fully supporting mioty

Outstanding power consumption and RF performances
level

Fraunhofer to provide evaluation libraries

<https://www.iis.fraunhofer.de/en/ff/lv/net/telemetrie.html>
Link to ST evaluation Sw to be published soon



Our technology starts with You



Find out more at www.st.com

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STM32WL3x ST RF Lab capabilities & services

Workshop team



WL33
unboxing

WL33 radio
flexibility

Power
consumption

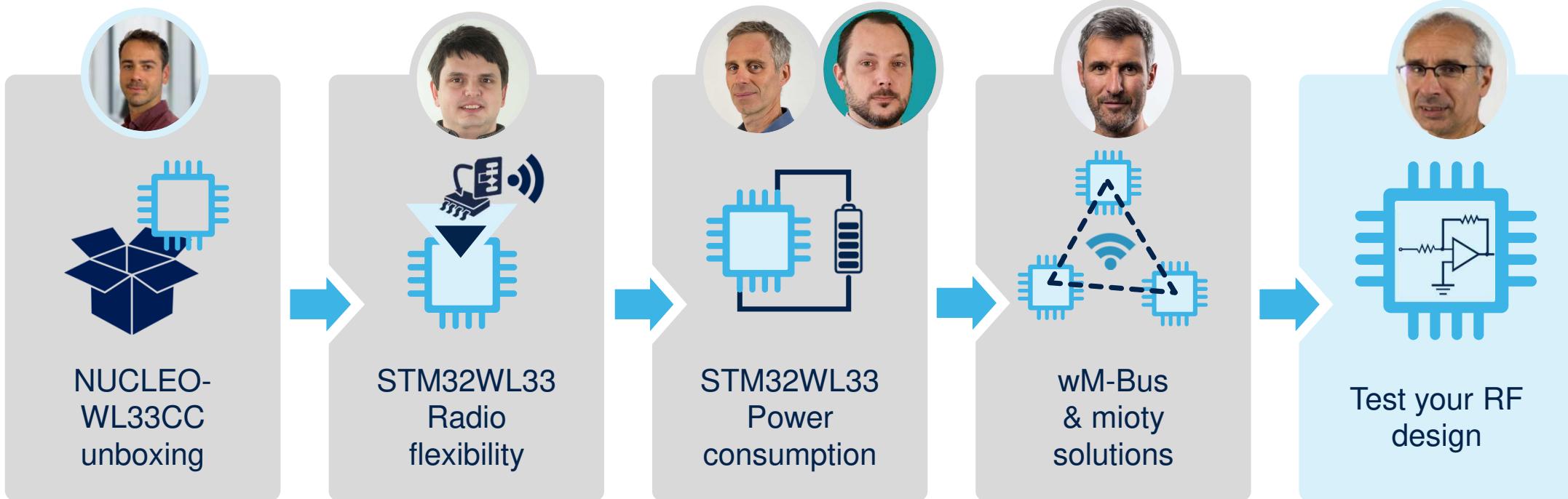
wM-BUS
& mioty

Test your
RF design



STM32WL33 in action

Use-cases and ecosystem demo lab tour



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



Laboratory tour

Spectrum analyzers

RF signal generators

Wireless communication testers

High speed oscilloscopes

DC power analyzers

Climatic chamber

Soldering bench

All RF measurements, not only sub-GHz
Including automatic bench



Digital signals and current measurements



Extreme conditions tests (-40°C → +105°C)



RF tuning / optimization

#1 ST MCU STM32WL3x series

Design schematics and layout

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

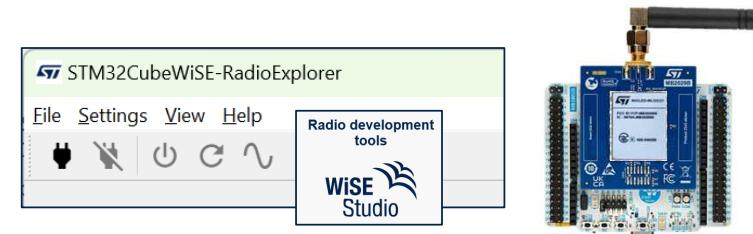
Test your
RF design

HW design process with STM32WL3x

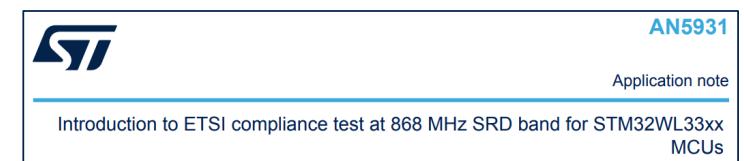
Complete set of documentation
#1 Design schematics and layout



A complete tool set
#2 Test & tune your PCB



A complete support service
#3 pre-certify your product



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



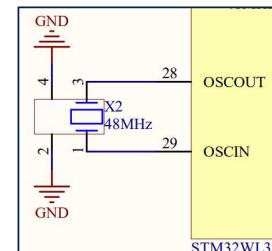
HW design with STM32WL3x key points

Start from reference design and pay attention to below key points

HSE 48/50MHz XTAL

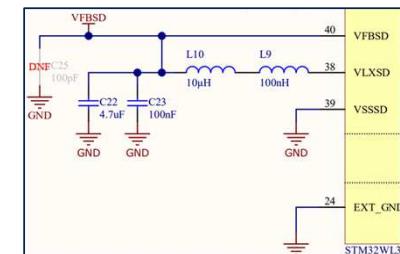
STM32WL3x includes internal programmable capacitances to trim the crystal frequency

- No external load capacitances needed.
- Use 48/50MHz, 8pF load cap crystal.
- Up to +/-25ppm of frequency compensation possible.
- High accuracy needed → TCXO implementation



SMPS

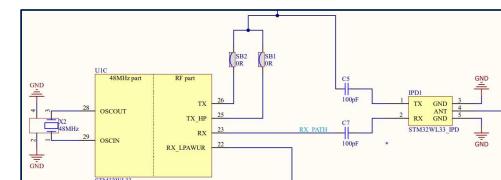
Use SMPS or not? Trade off between saving 10uH coil and RF power consumption
Simply #define to select SMPS or not



RF matching & filtering

Two possibilities : use MLPF filters or use a discrete solution

- MLPF demonstrated with our Nucleo kits.
- For SMD solution, please refer STM32WL3x for updated STDES list



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design

Reference schematics & layout (1/2)

Start from our extensive ref design list (STDES)

3 STM32WL3x microcontroller reference designs and codification

Table 1. STM32WL3x microcontroller reference designs

Web reference	Board reference	MCU order code	MCU package	Number of layers	SMD, IPD, or external PA	HSE crystal frequency	Optimized BOM target
STDES-WL3C2ILL	MB2176	STM32WL33CCV6	VFQFPN48	2	IPD	50 MHz	433 MHz/10 dBm
STDES-WL3C2IMH	MB2176	STM32WL33CCV6	VFQFPN48	2	IPD	48 MHz	868 MHz/14-16 dBm
STDES-WL3C2IML	MB2176	STM32WL33CCV6A	VFQFPN48	2	IPD	50 MHz	433 MHz/14-16 dBm
STDES-WL3C2SLH	MB2168	STM32WL33CCV6	VFQFPN48	2	SMD	48 MHz	868 MHz/10 dBm 915 MHz/10 dBm
STDES-WL3C2SLL	MB2168	STM32WL33CCV6	VFQFPN48	2	SMD	50 MHz	433 MHz/10 dBm
STDES-WL3C2SMH	MB2168	STM32WL33CCV6	VFQFPN48	2	SMD	48 MHz	868 MHz/14-16 dBm
STDES-WL3C2SML	MB2168	STM32WL33CCV6	VFQFPN48	2	SMD	50 MHz	433 MHz/14 dBm
STDES-WL3C4EEW	MB2158	STM32WL33CCV6A	VFQFPN48	4	SMD, external PA	48 MHz	169 MHz/27 dBm
STDES-WL3C4SHH	MB2218	STM32WL33CCV6	VFQFPN48	4	SMD	48 MHz	915 MHz/20 dBm
STDES-WL3C4SLH	MB2218	STM32WL33CCV6	VFQFPN48	4	SMD	48 MHz	868 MHz/10 dBm
STDES-WL3C4SLL	MB2218	STM32WL33CCV6	VFQFPN48	4	SMD	50 MHz	433 MHz/10 dBm
STDES-WL3C4SMH	MB2218	STM32WL33CCV6	VFQFPN48	4	SMD	48 MHz	868 MHz/14-16 dBm
STDES-WL3C4SML	MB2218	STM32WL33CCV6	VFQFPN48	4	SMD	50 MHz	433 MHz/14-16 dBm



Application circuits examples for each product and package available on ST.com

Lots of possible combinations

- Output power range
- Frequency bands
- PCB stack-up (2 or 4 layers)
- SMD or IPD designs

Simply copy/paste what we have already validated for you

WL33
unboxing

WL33 radio
flexibility

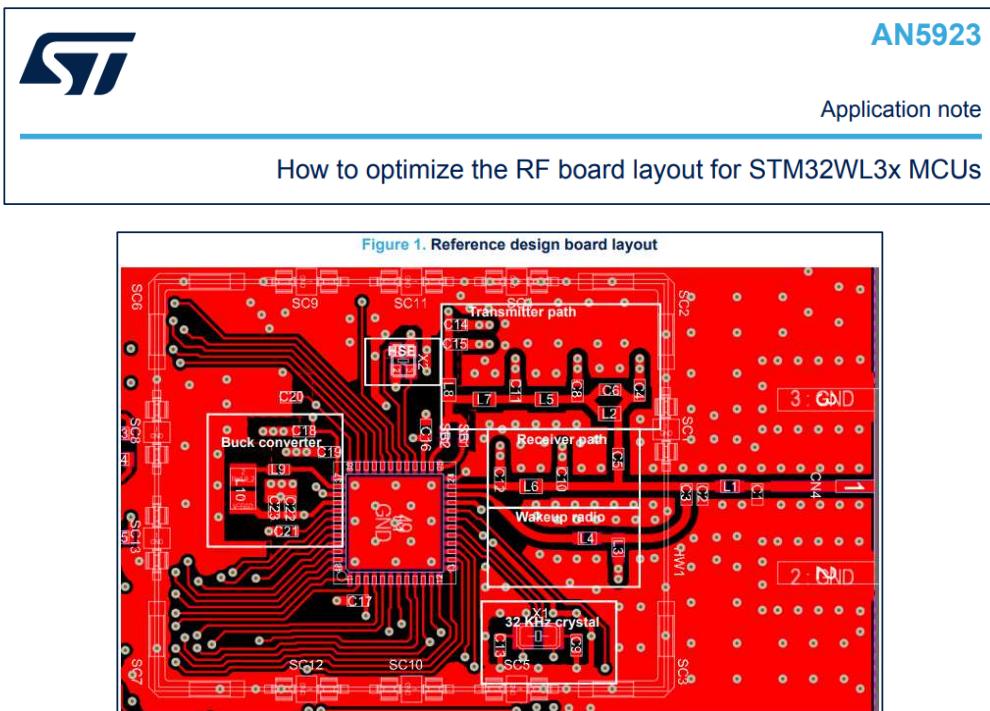
Power
consumption

wM-BUS
& mioty

Test your
RF design

Reference schematics & layout (2/2)

Customize your own PCB based on AN5923



- PCB stack-up described
- Component placement explained
- RF matching network clarified
- Tips given for sensitive blocks such a SMPS and HSE
- Final check-list presented, to recap all requirements for an optimum design

[an5923-how-to-optimize-the-rf-board-layout-for-stm32wl3x-mcus](#)

#2 ST MCU STM32WL3x series

How to test & tune your PCB

WL33
unboxing

WL33 radio
flexibility

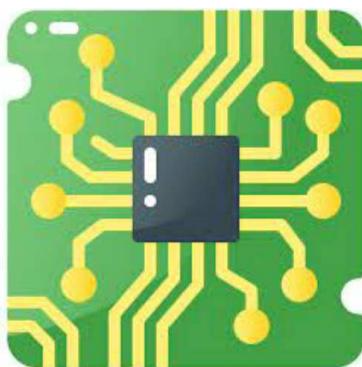
Power
consumption

wM-BUS
& mioty

Test your
RF design

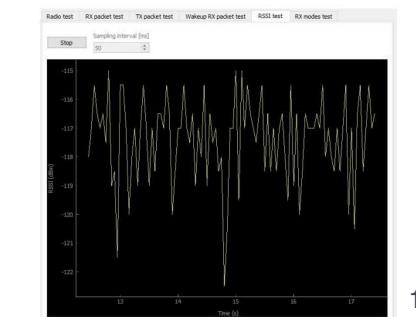
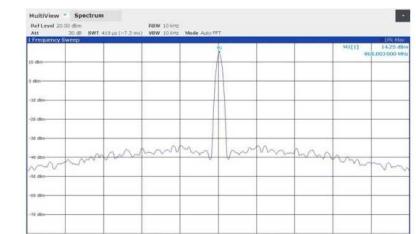
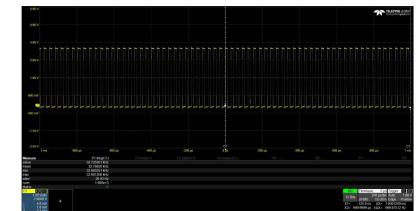
Bring up of your STM32WL3x design

PCB in your hands : Let's test and tune. Refer AN5973



HSE 48/50MHz frequency tuning

Check RF performances & optimize
RF matching if needed.



https://wiki.st.com/stm32mcu/wiki/Connectivity:STM32WL3x_HSE_tuning_flexibility

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



STM32WL3x : Pre-certification

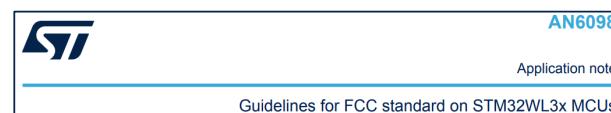
STM32WL3x is compliant in regards of regional certification (CE, FCC etc.)

ST is providing complete set of documentation and tools to demonstrate and achieve compliancy with regional standards on reference designs



RED / CE capable

[an5931- etsi-compliance](#)



FCC capable

[an6098-guidelines-for-fcc-standard](#)



Easy-to-use RF tool

But what if you don't feel comfortable in RF design and tests ?

3# A complete support service to pre-certify your product

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

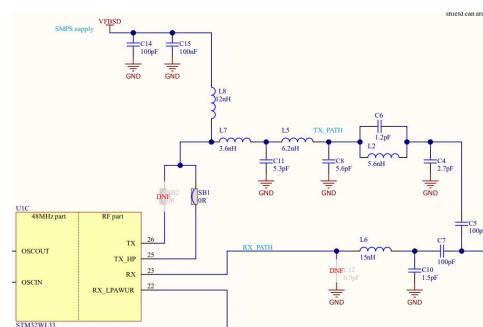
Test your
RF design



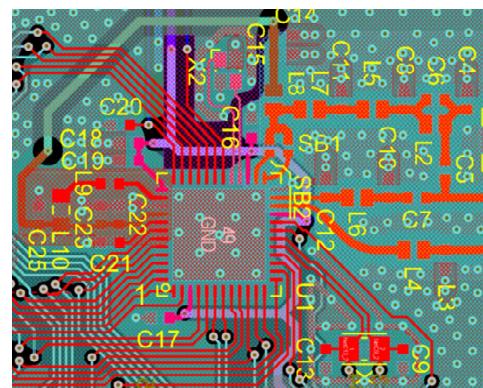
Design phase = RF reviews

ST offers free full HW assistance at each phase of your design

Schematics review



Layout review



Ensure correct BOM is used,
and optimized for your
specific application



Secure your
1st PCB

Ensure correct placement,
routing and grounding have
been implemented on your
final form-factor PCB

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

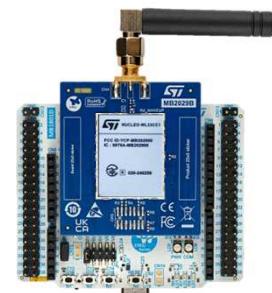
Test your
RF design



PCB phase = RF bring_up

Your PCB in ST hands : Complete RF sanity check

Radio development
tools

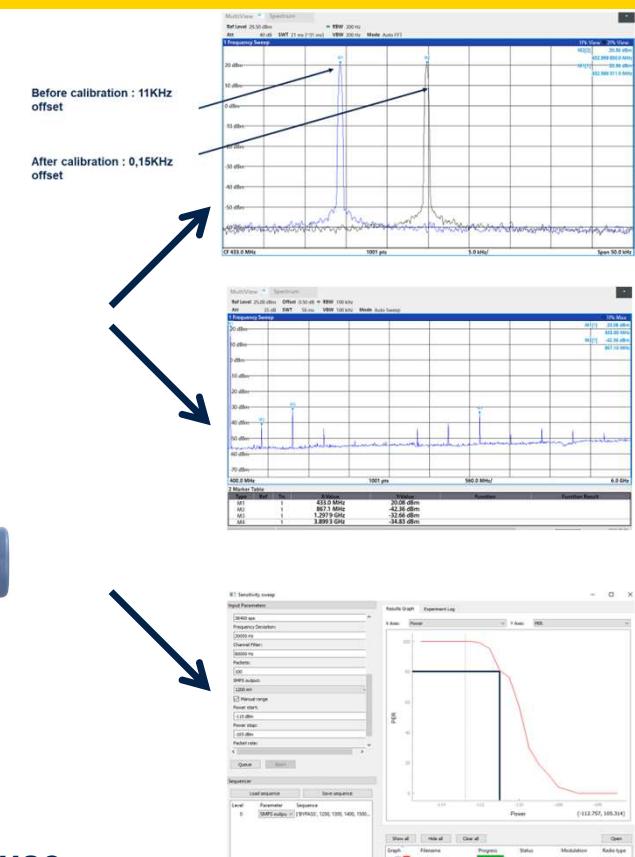


NUCLEO-WL33CC1/2
Or customer's PCB

TX



RX



→ Gain full RF confidence prior to going to official test-house

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design

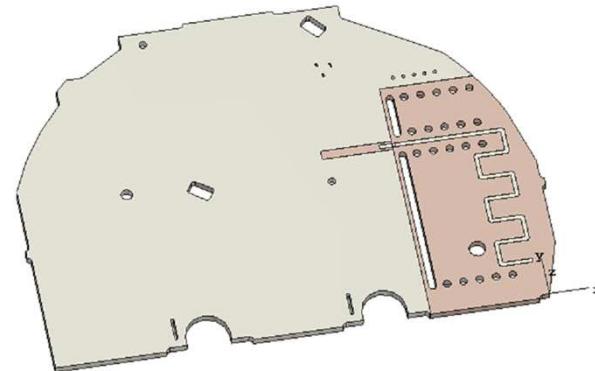


Typical antenna matching/design

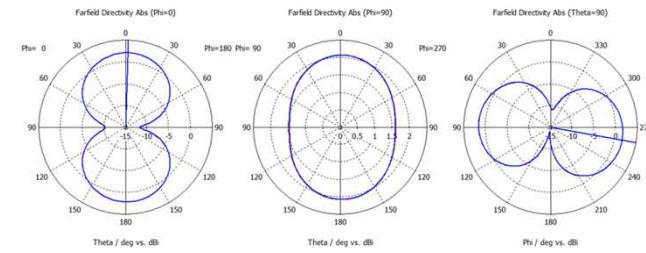
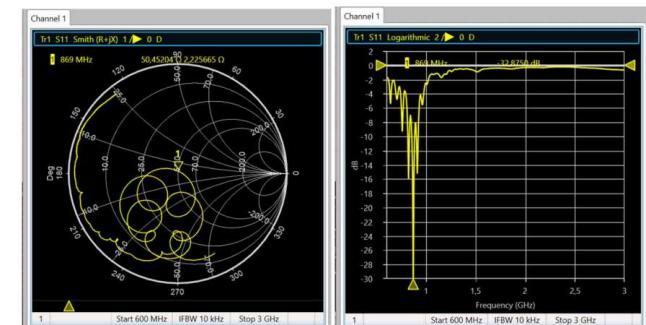
ST offers antenna matching and possibly antenna design

1st PCB with mechanical part

Ensure antenna is well resonating on the wanted frequency



EM simulations



WL33
unboxing

WL33 radio
flexibility

Power
consumption

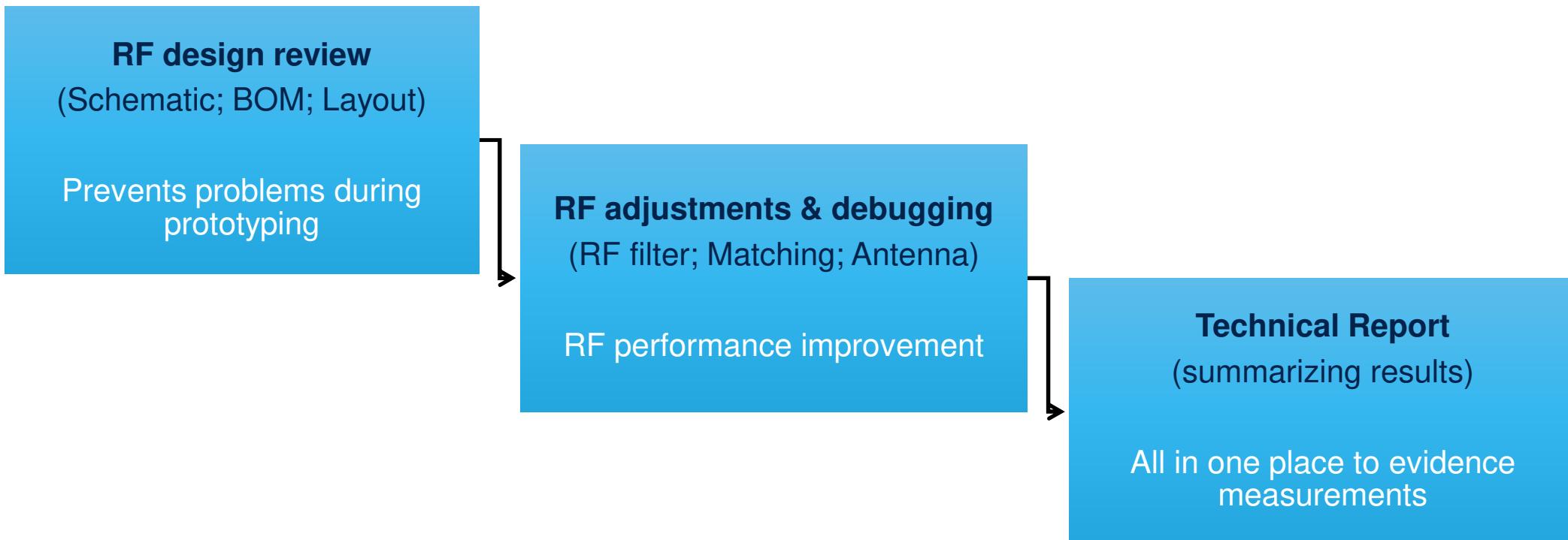
wM-BUS
& mioty

Test your
RF design



RF Lab Journey

3 steps for full RF support along your project



WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



How to contact us ?

On-Line Support

<https://my.st.com/ols>

The screenshot shows the 'Online Support' section of the ST website. At the top, there's a search bar and navigation links for Home, ST Community, and st.com. Below that is a dark header with the 'Online Support' title. A 'New Case' button is highlighted in blue. Underneath, there are tabs for 'My Cases' and 'New Case'. The main area is titled 'Contact Customer Support' with a note: 'Tell us how we can help. Your information will stay confidential.' It contains several input fields: 'Contact Name' (with a dropdown for 'Search Contacts...'), 'Priority' (set to 'Medium'), 'Project Name' (containing 'Amazing new BLE application'), 'Category' (set to 'Product / Application'), 'Product Category/Part Number' (containing 'STM32WB62MO'), 'Production Forecast (in units)' (set to '10k to 50k'), 'Subject' (containing 'Design review request'), and 'Case Description (max length 65K chars.)' (with a rich text editor toolbar). At the bottom, there's a file upload field ('Upload File') and a 'Submit' button.

Or your local ST
representative

https://www.st.com/content/st_com/en/contact-us.html

WL33
unboxing

WL33 radio
flexibility

Power
consumption

wM-BUS
& mioty

Test your
RF design



Takeaways

STM32WL3x documentation library

Datasheet, Reference Manual, application notes

STM32WL3x is a pre-certified solution

Wiki pages and dedicated support to ease your certification process journey

Full ST support service

From design to PCB test/optimization

Thank you

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