BLE Add On
STM32U5 (Zephyr) + STM32WB05N

Let's start enabling Bluetooth Low Energy applications with STM32WBx

BLE add On 4
How to quicky add STM32WB05N to an existing application. Play with Zephyr

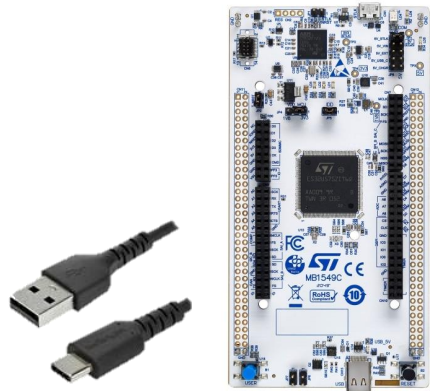| 1 Basic Beacon	2 Create BLE Profile	3 PAwR Advanced feature	4 BLE Add On	5 Test your RF design

Purpose

- In this part we will show :
  - What is a network processor ?
    - Network processor – Full stack vs Controller only
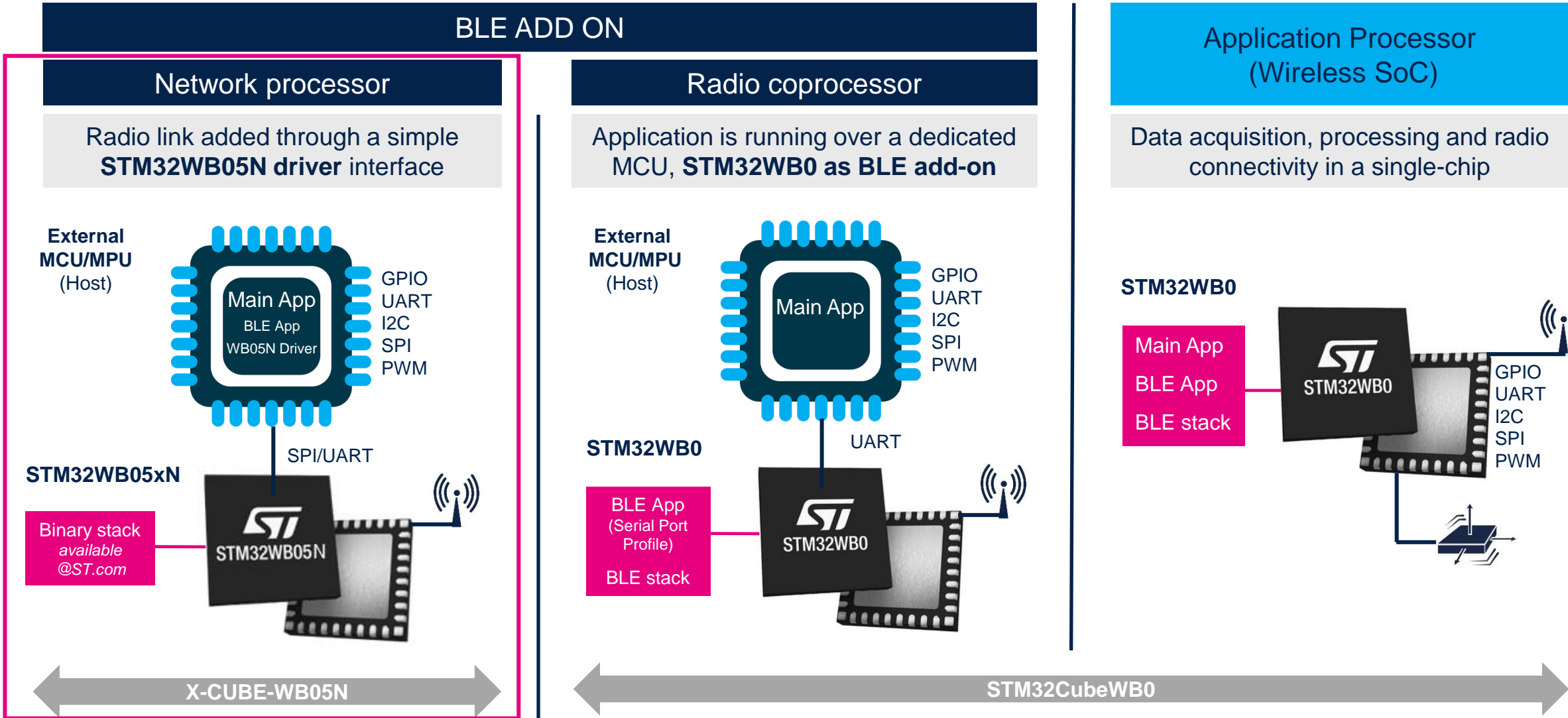 - Demonstrate usage of STM32WB05N network processor with 3rd party BLE stack (Zephyr)

Zephyr®

NUCLEO-U575
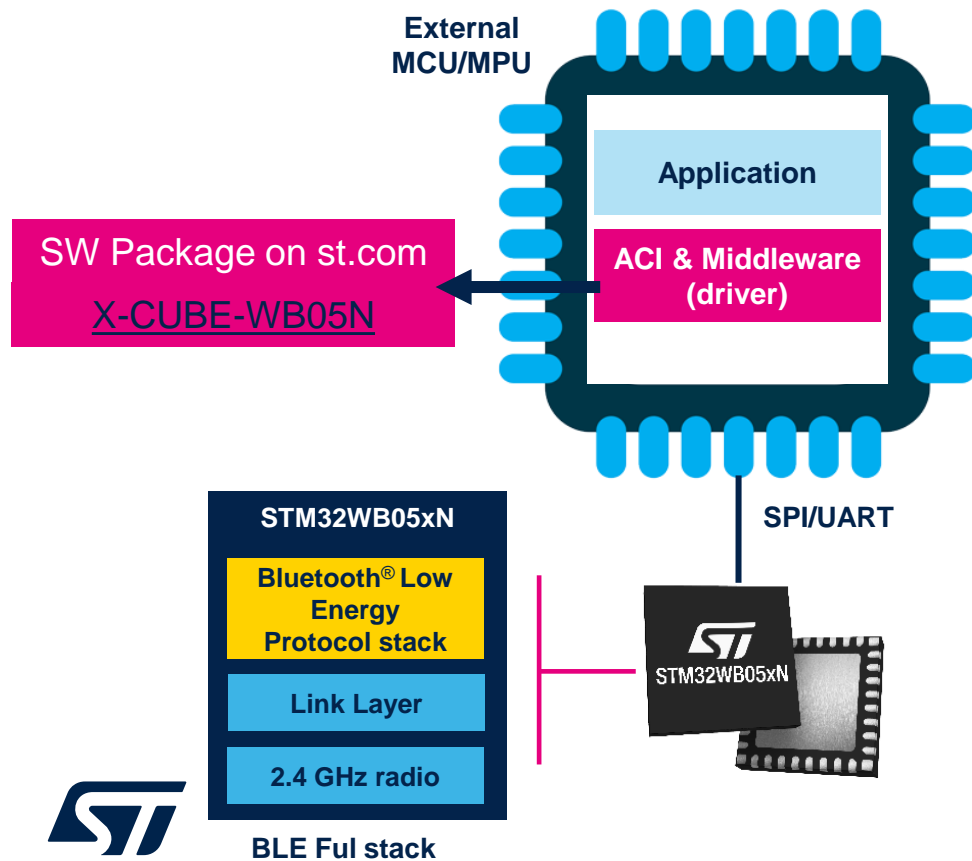
+

X-NUCLEO-WB05KN1

ST BLE Toolbox

Download on the App Store   GET IT ON Google Play

STM32WB0 Applicative Topologies

BLE ADD ON

Network processor

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

External MCU/MPU (Host)

Main App
BLE App
WB05N Driver

GPIO
UART
I2C
SPI
PWM

SPI/UART

STM32WB05xN

Binary stack *available @ST.com*

STM32WB05N

X-CUBE-WB05N

Radio coprocessor

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

External MCU/MPU (Host)

Main App

GPIO
UART
I2C
SPI
PWM

UART

STM32WB0

BLE App (Serial Port Profile)

BLE stack

STM32WB0

Application Processor (Wireless SoC)

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

STM32WB0

Main App

BLE App

BLE stack
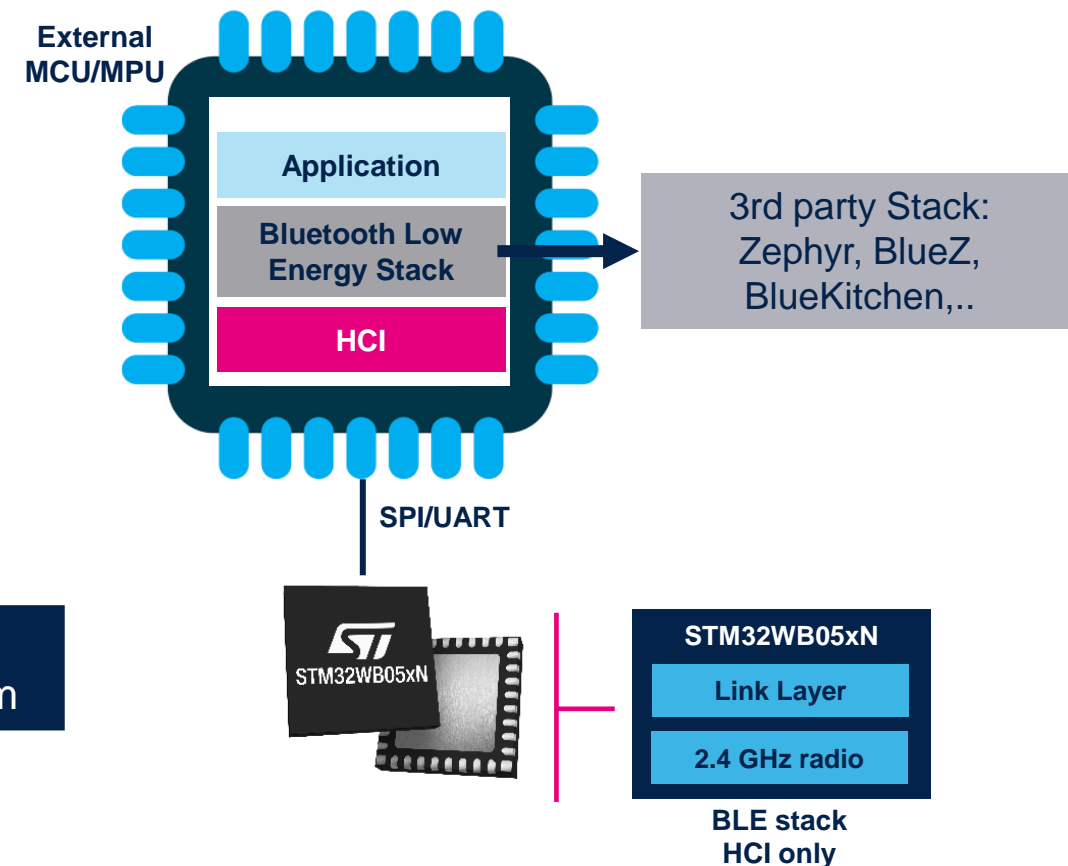
STM32WB0

GPIO
UART
I2C
SPI
PWM

STM32CubeWB0

STM32WB05N
Network Processor architecture

STM32WB05xN is suitable for applications where Bluetooth® Low Energy needs to be added to existing products

STM32WB05N FULL Stack

External MCU/MPU

Application

ACI & Middleware (driver)

SW Package on st.com
X-CUBE-WB05N

SPI/UART

STM32WB05xN
- Bluetooth® Low Energy Protocol stack
- Link Layer
- 2.4 GHz radio

BLE Ful stack

STM32WB05N Controller Only

External MCU/MPU

Application

Bluetooth Low Energy Stack

HCI

3rd party Stack: Zephyr, BlueZ, BlueKitchen,..

SPI/UART

STM32WB05xN
- Link Layer
- 2.4 GHz radio

BLE stack HCI only

STM32WB05N images @st.com

STM32WB05xN

X-CUBE-WB05N - Bluetooth low energy software expansion for STM32Cube

life.augmented

STM32WB05N with Zephyr - Demo

X-NUCLEO-WB05KN1 shield officially supported under Zephyr

2 options : SPI or UART interface

X-NUCLEO-WB05KN1: BLE expansion board

Overview

The X-NUCLEO-WB05KN1 is a Bluetooth Low Energy evaluation board which allows the expansion of the Nucleo boards. The RF module is FCC (FCC ID: YCP-MB203202) and IC certified (IC: 8976A-MB203202).

The X-NUCLEO-WB05KN1 is compatible out of the box with the Arduino UNO R3 connector. The board with the host microcontroller via UART (default) or SPI peripheral.

More information about the board can be found at the X-NUCLEO-WB05KN1 website[1].

Configurations

X-NUCLEO-WB05KN1 can be utilized as a Bluetooth Low-Energy controller shield with a UART or SPI host controller interface (HCI-UART/HCI-SPI).

The UART default settings are:

- Baudrate: 921600 bps
- 8 bits, no parity, 1 stop bit

UART Pin	Arduino Connector Pin
RX	D0
TX	D1

NUCLEO-U575
(can be any host)

+

X-NUCLEO-WB05KN1
(Controller_ONLY_SPI or
Controller_ONLY_UART image)

```
# From the root of the zephyr repository
west build -b your_board_name --shield x_nucleo_wb05kn1_uart your_app
```
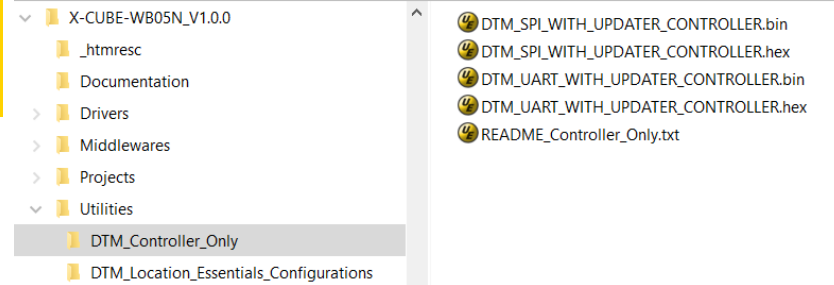
or

```
# From the root of the zephyr repository
west build -b your_board_name --shield x_nucleo_wb05kn1_spi your_app
```

Zephyr Project doc : https://docs.zephyrproject.org/latest/boards/shields/x_nucleo_wb05kn1/doc/index.html

Zephyr Peripheral_HR

STM32WB05N must be flashed using "**DTM_SPI_WITH_UPDATER_CONTROLLER**"

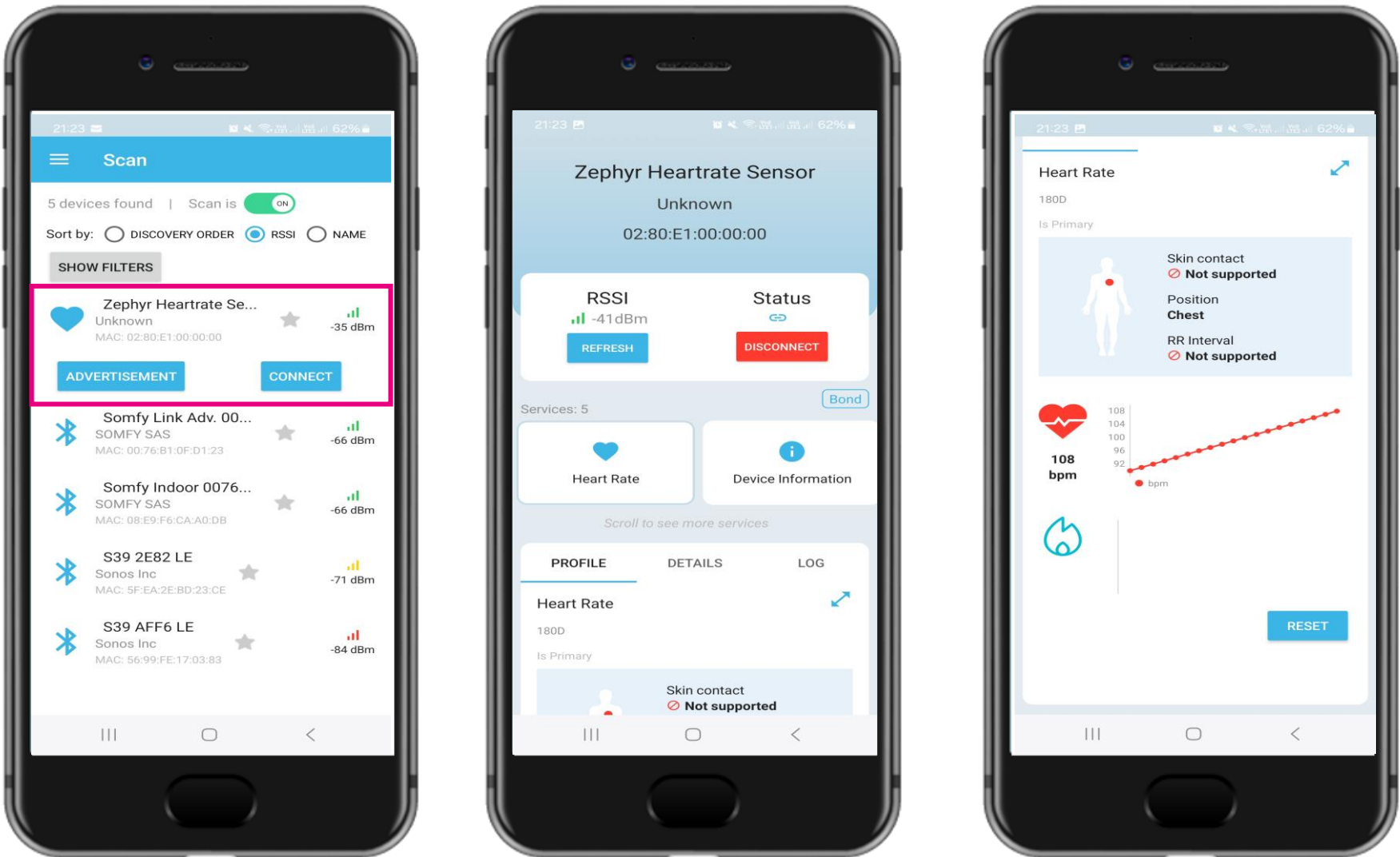STM32WB05N image available within X-CUBE-WB05N SW package

```
X-CUBE-WB05N_V1.0.0
    _htmresc
    Documentation
  > Drivers
  > Middlewares
  > Projects
  v Utilities
      DTM_Controller_Only
      DTM_Location_Essentials_Configurations
```

```
DTM_SPI_WITH_UPDATER_CONTROLLER.bin
DTM_SPI_WITH_UPDATER_CONTROLLER.hex
DTM_UART_WITH_UPDATER_CONTROLLER.bin
DTM_UART_WITH_UPDATER_CONTROLLER.hex
README_Controller_Only.txt
```

Build "peripheral_hr" Zephyr sample code

```
west build --pristine -b nucleo_u575zi_q --shield x_nucleo_wb05kn1_spi .\samples\bluetooth\peripheral_hr\
```

Flash NUCLEO-STM32U5

```
west flash
```

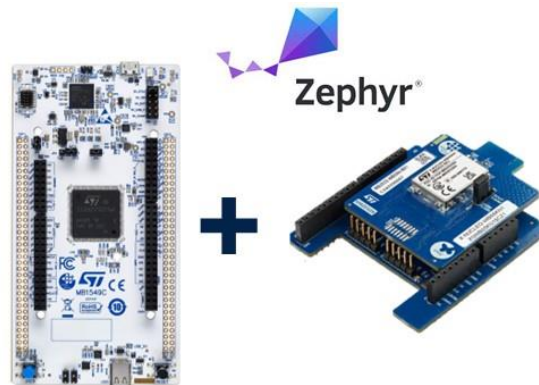# Open « ST BLE Toolbox » and connect

Takeaways

STM32WB05N fully supported by Zephyr®

STM32WB05KN1 shield officially supported under Zephyr.

STM32WB05N : Add Bluetooth® Low Energy connectivity to your application

Thanks to **X-NUCLEO-WB05N** SW package available on st.com you can easily integrate STM32WB05N network processor.

Thank you

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Zephyr Peripheral_HR

NUCLEO-U575
+
NUCLEO-WB05KN1

ST BLE Toolbox

Zephyr Peripheral_HR

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NUCLEO-U575
+
NUCLEO-WB05KN1

ST BLE Toolbox