



life.augmented

Welcome to **STM32WB0 workshop**

Workshop team

- The purpose of coming hands-on sessions is to demonstrate how to easily start the evaluation and development of a Bluetooth Low energy application on STM32WB0x devices thanks to associated STM32Cube ecosystem
- We will use different ST evaluation kits during this workshop:
 - NUCLEO-WB05KZ (low end Bluetooth Low energy SoC)
 - NUCLEO-WB09KE (mid end Bluetooth Low energy SoC)
 - X-NUCLEO-WB05KN1 (Bluetooth Low energy network processor)

Hands-On Agenda

1

20 min

Basic Beacon application
BLE Beacon concept & build

2

30 min

P2P server application
BLE profile concept & build

10:30 Break

15 min

3

20 min

STM32WB0 extended feature
Play with BLE 5.4 PAwR

4

15 min

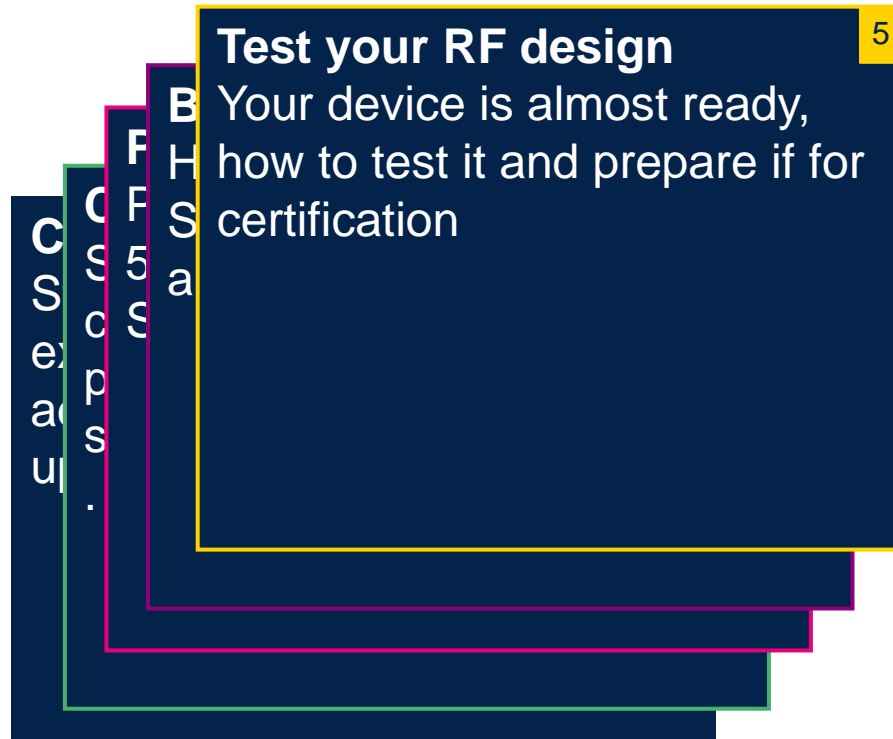
BLE add on
X-NUCLEO-WB05KN1 over Zephyr

5

20 min

Test and optimize RF perf
Prepare certification

Let's start enabling Bluetooth Low Energy applications with STM32WBx



Basic Beacon application concept & build

Let's start enabling Bluetooth Low Energy applications with STM32WBx

Basic Beacon application

Basic

1

Starting from from code
example understand
advertising concepts build and
update a **beacon application**

1

Basic
beacon

2

Create
BLE
Profile

3

PAwR
Advanced
feature

4

BLE Add
On

5

Test
your RF
design

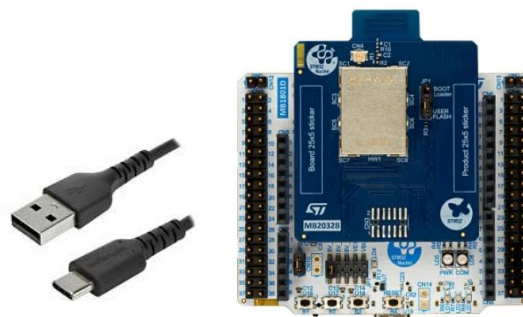


Purpose

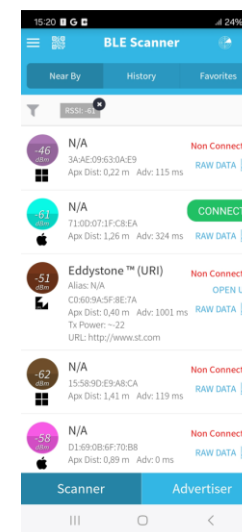
- In this part we will show following:
 - Advertising frame and beacon concepts
 - Start from STM32CubeIDE and import Beacon sample code
 - Modify the advertising beacon payload
 - Build and scan results using BLE Scan Bluetooth Low Energy debug App



1.16.0



NUCLEO-WB05KZ

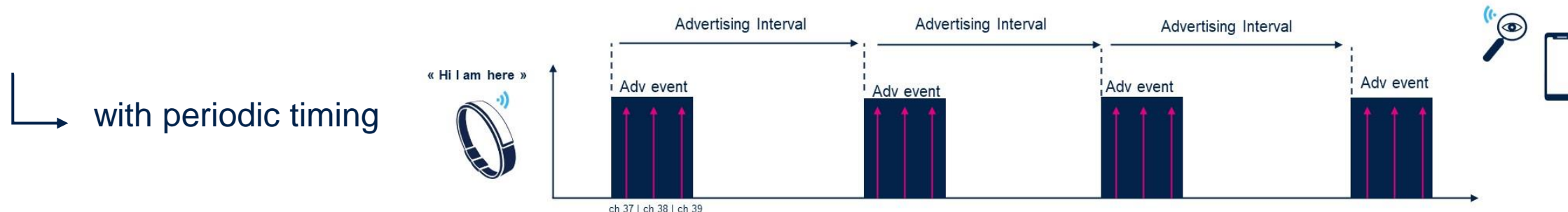


BLE Scanner

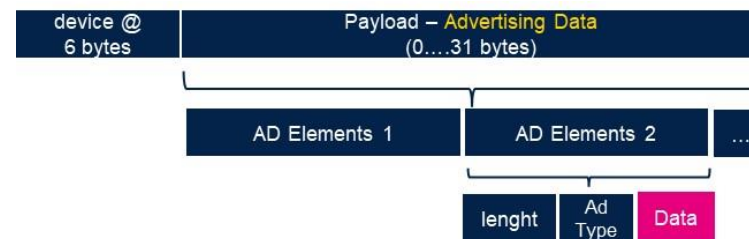


What is a Beacon

- BLE Beacons take advantage of the advertising Bluetooth Low Energy mode to broadcast data out

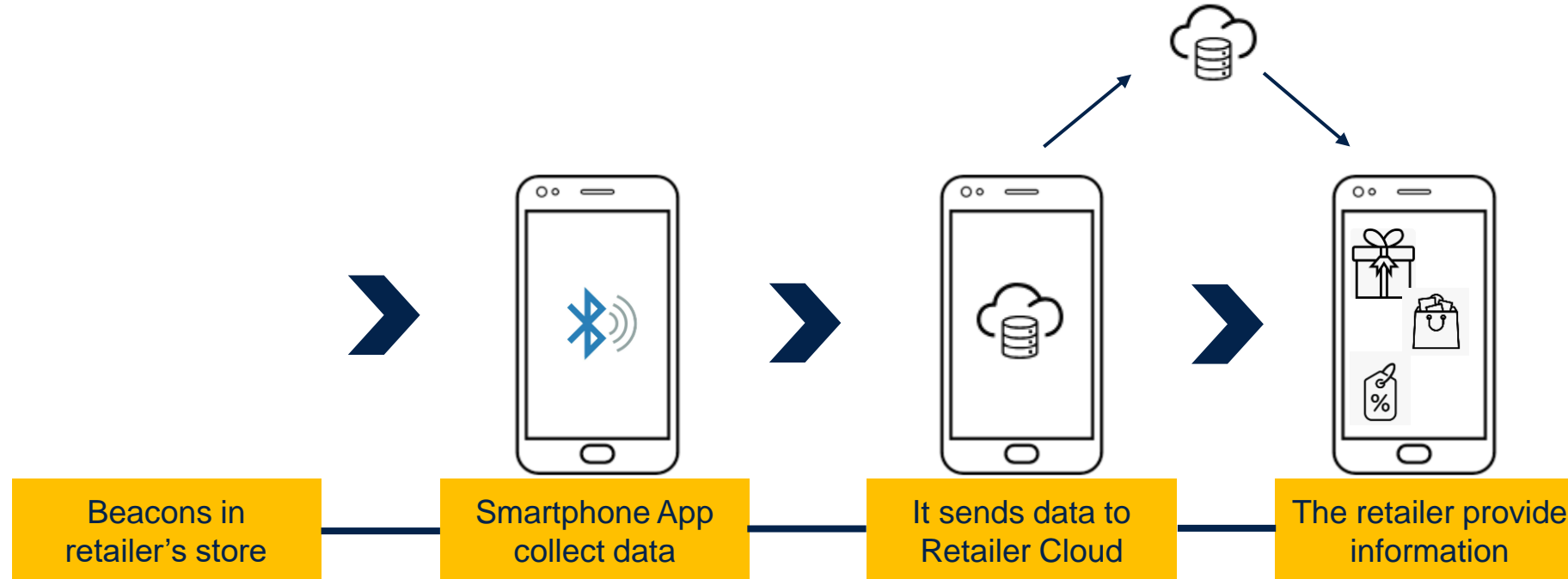


with formatted advertising packets.



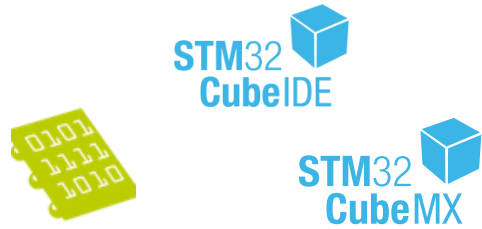
- Each **type of beacon (Eddystone, iBeacon)** uses a **custom advertising data** giving it meaning.

What is a Beacon





STM32Cube capabilities



1

Example application
complete application running over NUCLEO

2

Board level
all the hardware is already configured

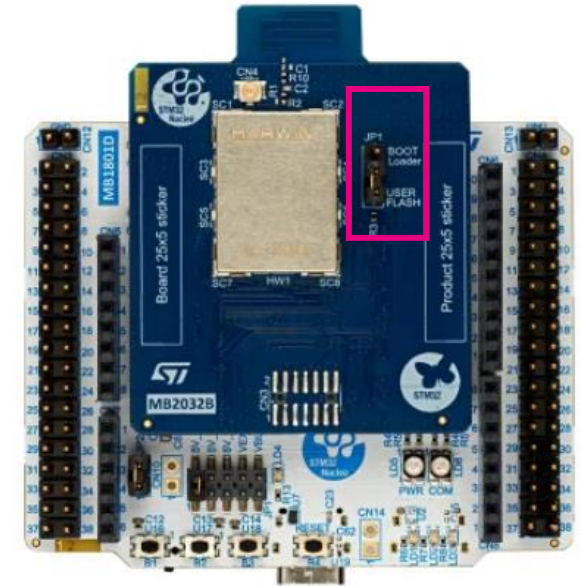
3

Chipset level
require to configure your HW (PCB) & your application

Low Power debug Tips

STM32WB0 Tips

- STM32WB0x application like BLE_Beacon configures the STM32WB0 series device to enter Deepstop mode when allowed.
- When the STM32WB0 series device is in Deepstop mode, the SWD port is disabled. Therefore, **SWD access is disabled, and the chip cannot be accessed.**
- In this context, the user can activate the device UART bootloader by setting the PA10 pin to a high value and perform a reset cycle of the device (keeping PA10 at a high value).



1. Set back JP1 in « bootloader position »
2. Press reset button
3. Flash & et JP1 « User Flash »



Build BLE Beacon from code example

workspace_1.16.0 - C:\Users\dofollez\STM32CubeIDE\workspace_1.16.0\BLE_Beacon\Core\Inc\app_conf.h - STM32CubeIDE

File Edit Source Refactor Navigate Search Project Run Window Help myST

Project Explorer

BLE_Beacon (in STM32CubeIDE)

Binaries

Includes

Application

User

Debug

Doc

Drivers

Middlewares

Utilities

BLE_Beacon.ioc

BLE_Beacon.Debug.cfg

BLE_Beacon.Debug.launch

STM32WB05KZVX_FLASH.ld

Ox100017e8

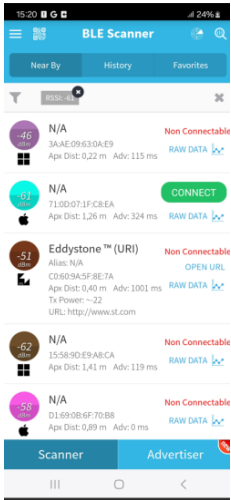
main.c app_entry.c app_ble.c *app_conf.h

eddytone_u... eddytone_u... eddytone_b... stm32wb0x_h... BLE_Beacon.ioc

```

89  /*
90  #define CFG_KEYPRESS_NOTIFICATION_SUPPORT    GAP_KEYPRESS_NOT_SUPPORTED
91
92  /**
93   * Appearance of device set into BLE GAP
94   */
95  #define CFG_GAP_APPEARANCE                    (GAP_APPEARANCE_UNKNOWN)
96
97  /* USER CODE BEGIN Generic_Parameters */
98
99  /* USER CODE END Generic_Parameters */
100
101  /**< specific parameters */
102  /*=====
103
104  /* USER CODE BEGIN Specific_Parameters */
105
106  /**
107   * Beacon selection
108   * Beacons are all exclusive
109   */
110  #define CFG_EDDYSTONE_UID_BEACON_TYPE        (1<<0)
111  #define CFG_EDDYSTONE_URL_BEACON_TYPE        (1<<1)
112  #define CFG_EDDYSTONE_TLM_BEACON_TYPE        (1<<2)
113  #define CFG_IBEACON                          (1<<3)
114
115  #define CFG_BEACON_TYPE                        (CFG_EDDYSTONE_URL_BEACON_TYPE)
116
117  /* USER CODE END Specific_Parameters */
118
119  /*=====
120   * BLE Stack initialization parameters
121   /*=====
122
123  /**
124   * Maximum number of simultaneous radio tasks. Radio controller supports up to
125   * 128 simultaneous radio tasks, but actual usable max value depends on the
126   * available RAM.
127   */
128  #define CFG_BLE_NUM_RADIO_TASKS                (CFG_BLE_NUM_RADIO_TASKS)

```



BLE scanner

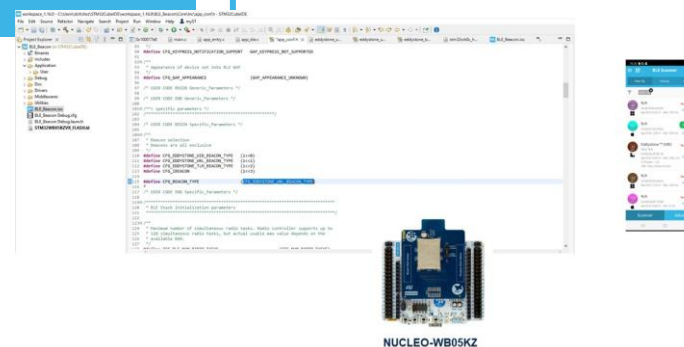


NUCLEO-WB05KZ

Takeaways

Easily build a beacon application over STM32WB05

Streamlined project development thanks to STM32Cube



STM32WB0 ideal for energy-sensitive wireless applications

Typical Beacon Power consumption figures over STM32WB05 : **5.1 μ A average** 28 bytes, every 3 secs, 3.3V, +0 dBm

Thank you