WBZ451 을 이용한 쉬운 BLE 디자인

A Leading Provider of Smart, Connected and Secure Embedded Control Solutions

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July 18, 2024

목차

- WBZ451 모듈의 특징
- WBZ451 Curiosity Board 의 특징
- WBZ451 코드 살펴보기
- MIT App Inventor 개요
- WBZ451 제어하기 데모

WBZ451 모듈의 특징

WBZ451 모듈 살펴보기

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WBZ451 (PIC32CX-BZ2 SoC) Wireless Family

- **Microchip 의 강력한 MPLAB® Harmony ecosystem 을 활용할 수 있는 Bluetooth® Low Energy 와 802.15.4 를 동시 지원하는 최초의 ARM-Cortex M4F MCU**
  - **저전력 블루투스 5.2** 및 **Zigbee 3.0** 소프트웨어 스택
  - 사용하기 쉬운 **인증 완료된 독립형 모듈**
  - 강력한 소프트웨어 및 하드웨어 **개발 도구**

WBZ451 (PIC32CX-BZ2 Family)

- **Long range Bluetooth®**
  - +12 dBm 의 TX 출력과, Coded PHY 를 활용한 장거리 BLE 통신
  - WBZ451H 의 경우 +20 dBm TX power 를 지원
- **ZigBee® MESH 솔루션을 활용한 통신범위 확장**
  - Microchip 의 검증된 ZigBee 스택 사용
- **H/W 및 S/W 중재를 통한 동시 다중 Protocol 운영**
- **풍부한 Interface 를 지원**
  - I2C/SPI/UART 로 사용이 가능한 4개의 직렬통신 인터페이스 (SERCOM)
  - 12-bit ADC SAR 모듈
  - 최대 27개의 programmable I/O pins
- **MPLAB® Harmony 3 를 활용한 쉬운 설계**
  - 어플리케이션의 유연성을 위해, BLE 전용, ZigBee 전용 또는 BLE & ZigBee 동시사용 등을 쉽게 선택

BLE & 15.4 Roadmap

Development
Engineering Samples
Production

RNBD451
Linux® HCI to BLE
48 QFN, Module
FW 110 and later
Plug and Play

RNBD451
UART to BLE
48 QFN, Module
Long-Range BLE
Plug and Play

RNBD350
UART to BLE
32 QFN, Module
Plug and Play

MCU/MPU attach

- Best for external MCU/MPU applications
- RN4xxx/BM7x migration path
- Plug and Play simplicity

WBZ451H
CM4F 64MHz
1MB Flash/128kB RAM
+20dBm TX power

WBZ45x/PIC32CX-BZ2
M4F 64MHz
1MB Flash/128kB RAM
ADC, Serials, PWMs
32/48 QFN, PCB & u.FL Module

WBZ35x/PIC32CX-BZ3
M4F 64MHz
512kB Flash/96kB RAM
Secure boot, ADC, Serials,
CVD Touch, LP Rx/Tx
32/48 QFN, PCB & u.FL Module

MCUs with integrated BLE / 15.4

- MPLAB Harmony ecosystem
- General purpose use cases
- Generous peripherals
- Protocol Bridging

Attach | **Standalone MCU**

Product Family

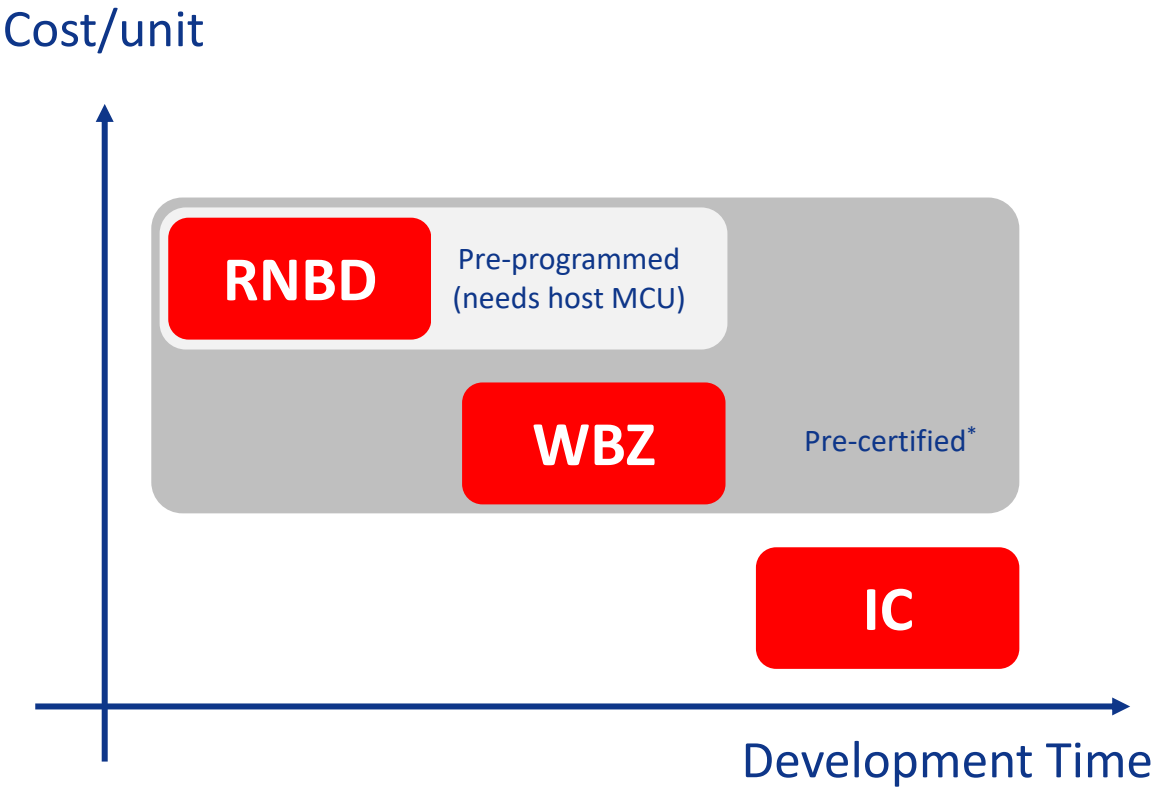
IC

PIC32CX1012BZ25048	Bluetooth® and 802.15.4 IC with Long Range Radio (up to +12 dBm)	48-pin 7 x 7 mm QFN

Modules (pre-certified*)

WBZ451	Bluetooth and 802.15.4 module with PCB or u.FL antenna, long range, and shield.	39-pad 21 x 16 mm LGA
RNBD451PE	Bluetooth network processor (pre-programmed) with PCB antenna, long range, and shield. ASCII command interface.	39-pad 21 x 16 mm LGA

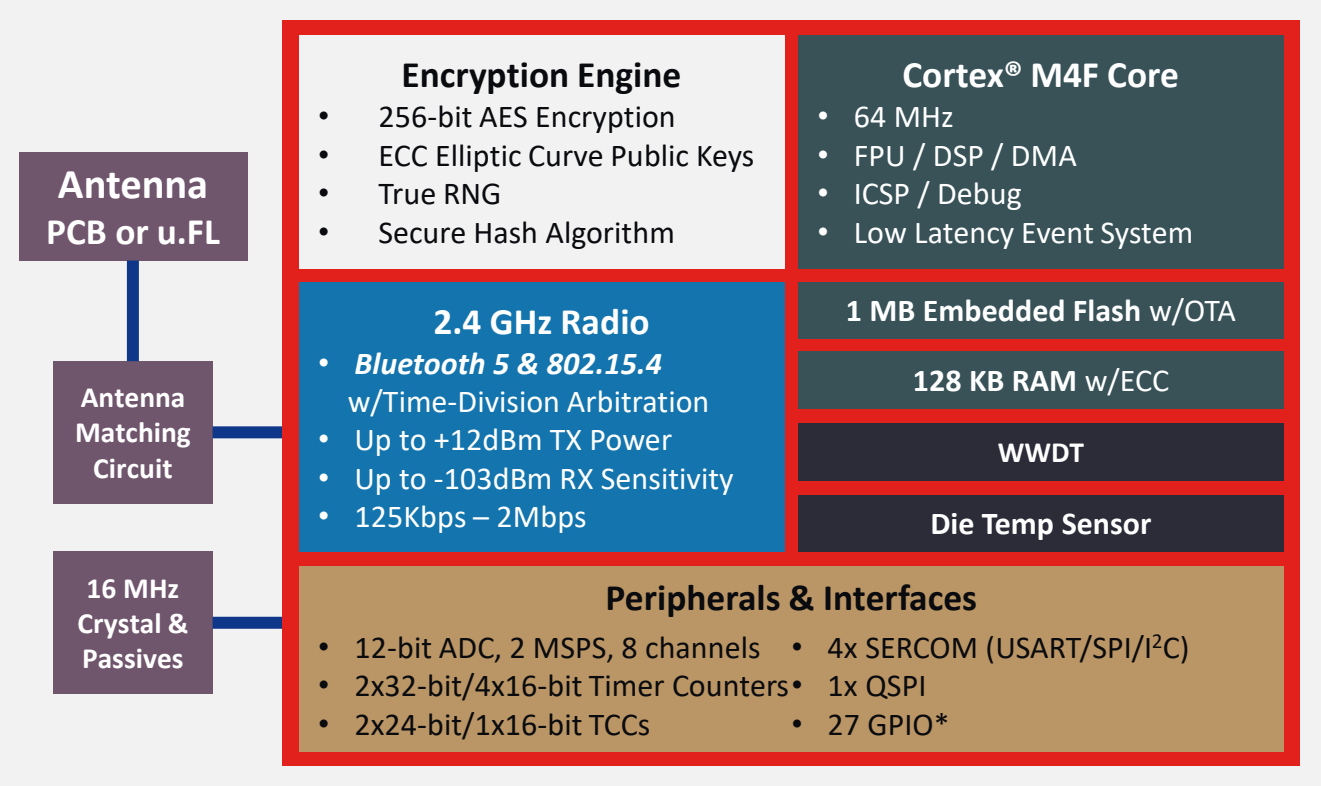
*Pre-certified in U.S., Canada, EU.



WBZ451 Module

Block Diagram for 39-Pad Module

- **Highly integrated, regulatory (FCC, ISED, CE) certified, multi-protocol wireless module, powered by the PIC32CX-BZ2 MCU**
- **On-board PCB antenna or u.FL connector for external antenna**
- **Compact size: 15.5 x 20.7 x 2.8 mm**



*All GPIO is brought out to pads on the module

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WBZ451 Curiosity Board Features

Description of WBZ451 Curiosity Board

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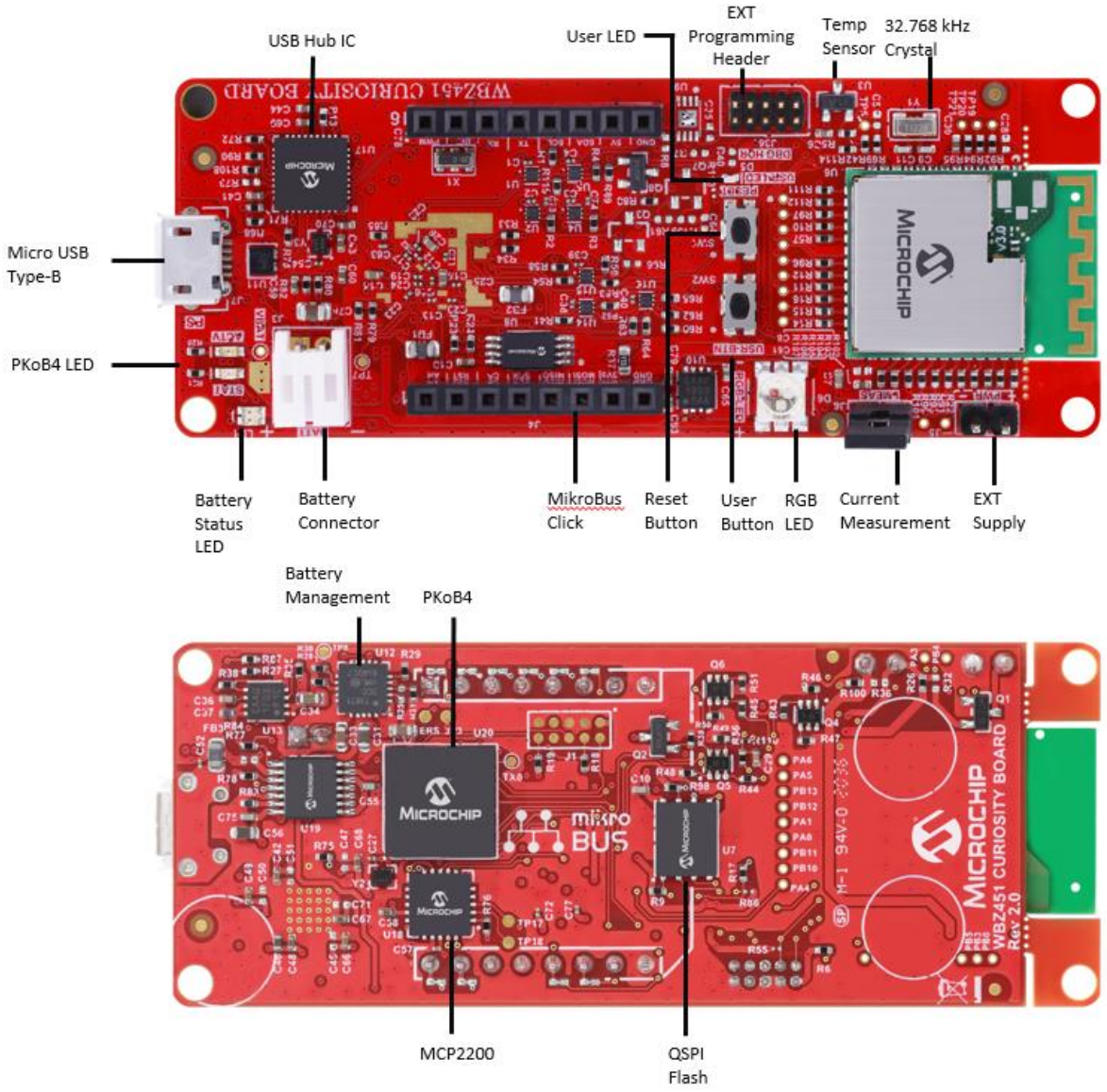
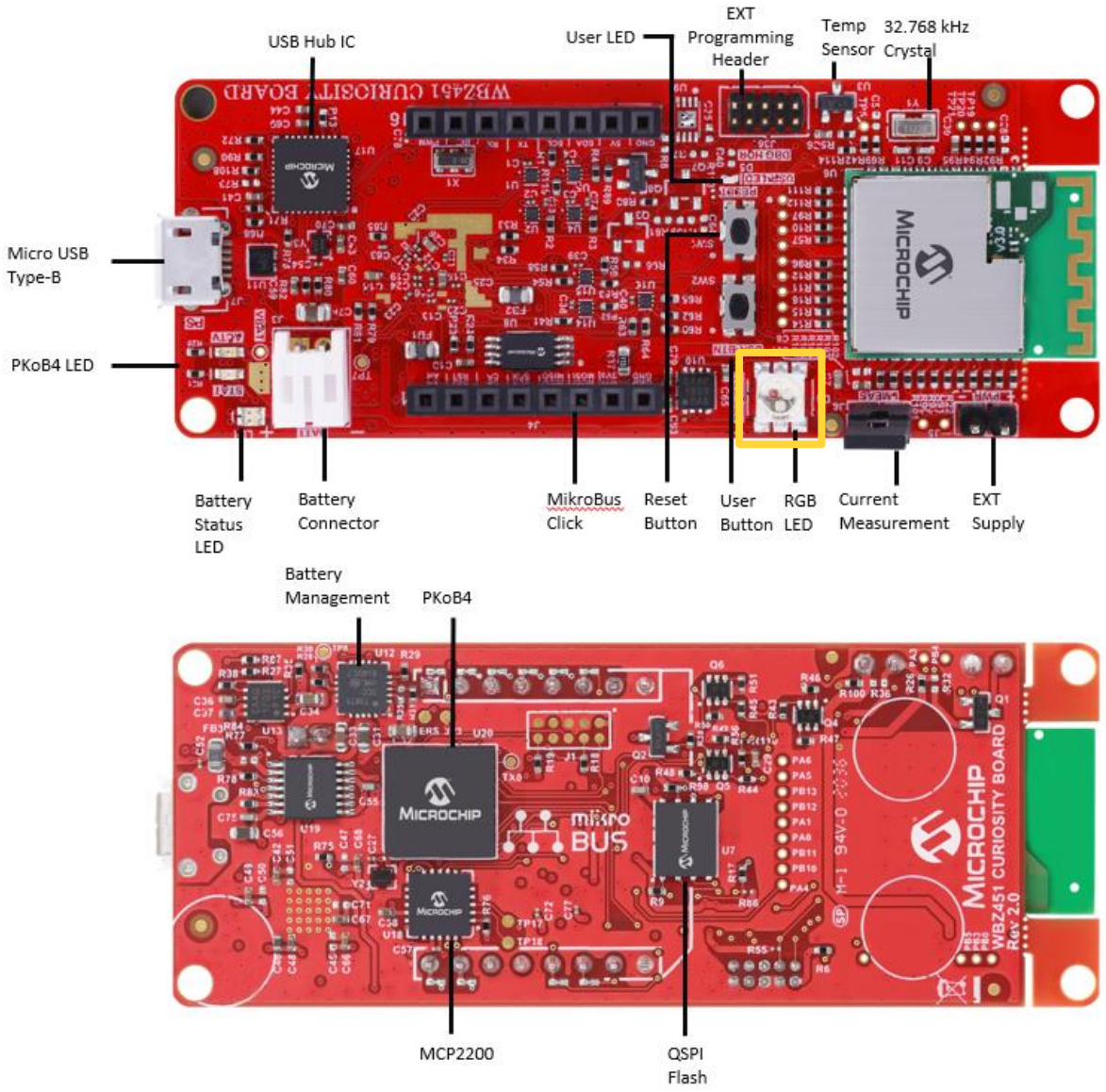
WBZ451 Curiosity Board

- **Mikroe click board™ interface** to add-on different sensors and user interfaces
- **Evaluate power consumption** with breakout current measurement pins directly tied to module
- **Built-in programmer/debugger** with USB interface



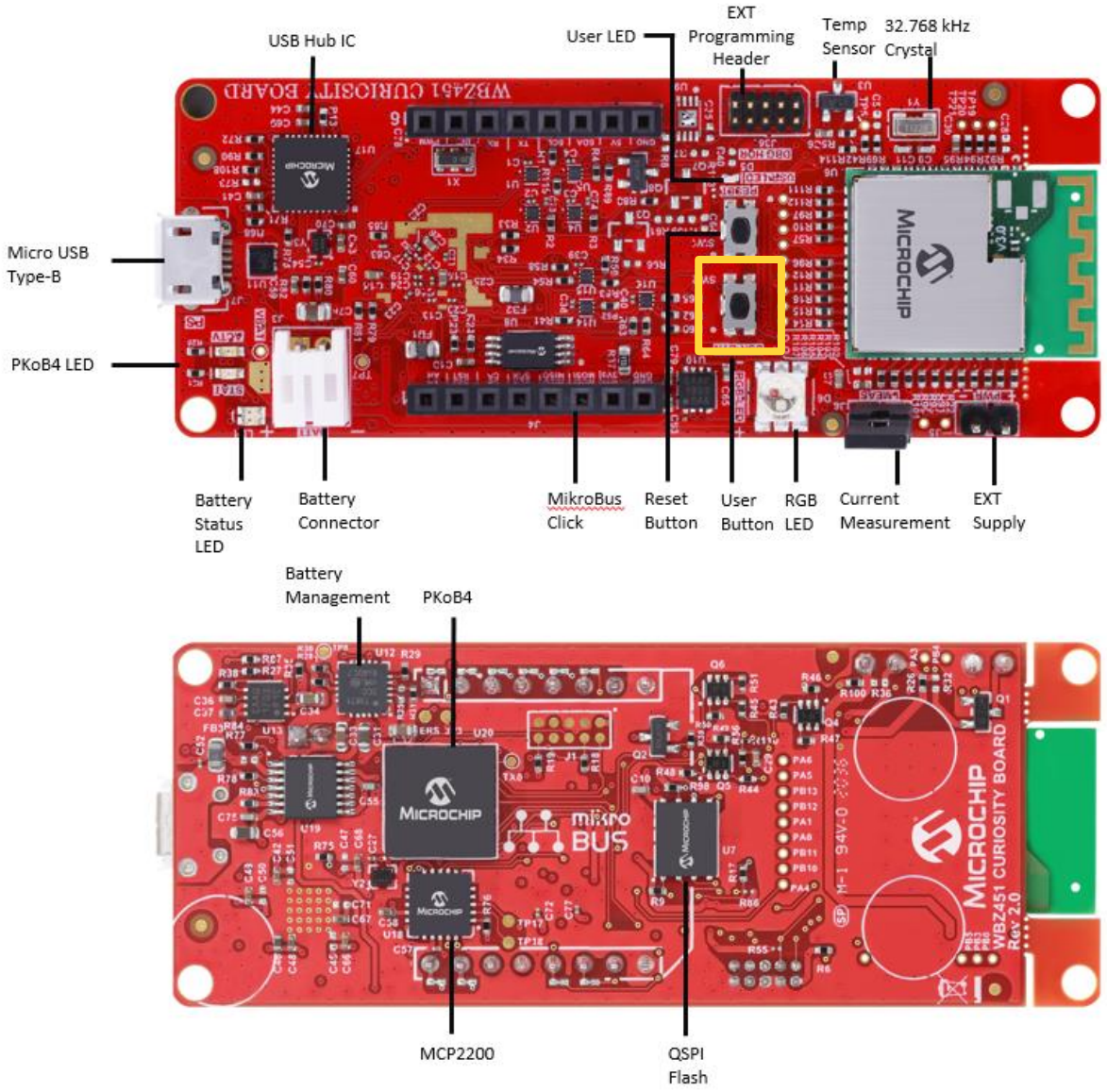
WBZ451 Curiosity Board

- **RGB LED**
  - The Android™ App will control this LED allowing the LED to be either red, green or blue



WBZ451 Curiosity Board

- **User Button**
  - The Android ™ App will show the status of this pushbutton



WBZ451 Code Overview

Basic Overview of the WBZ451 Firmware

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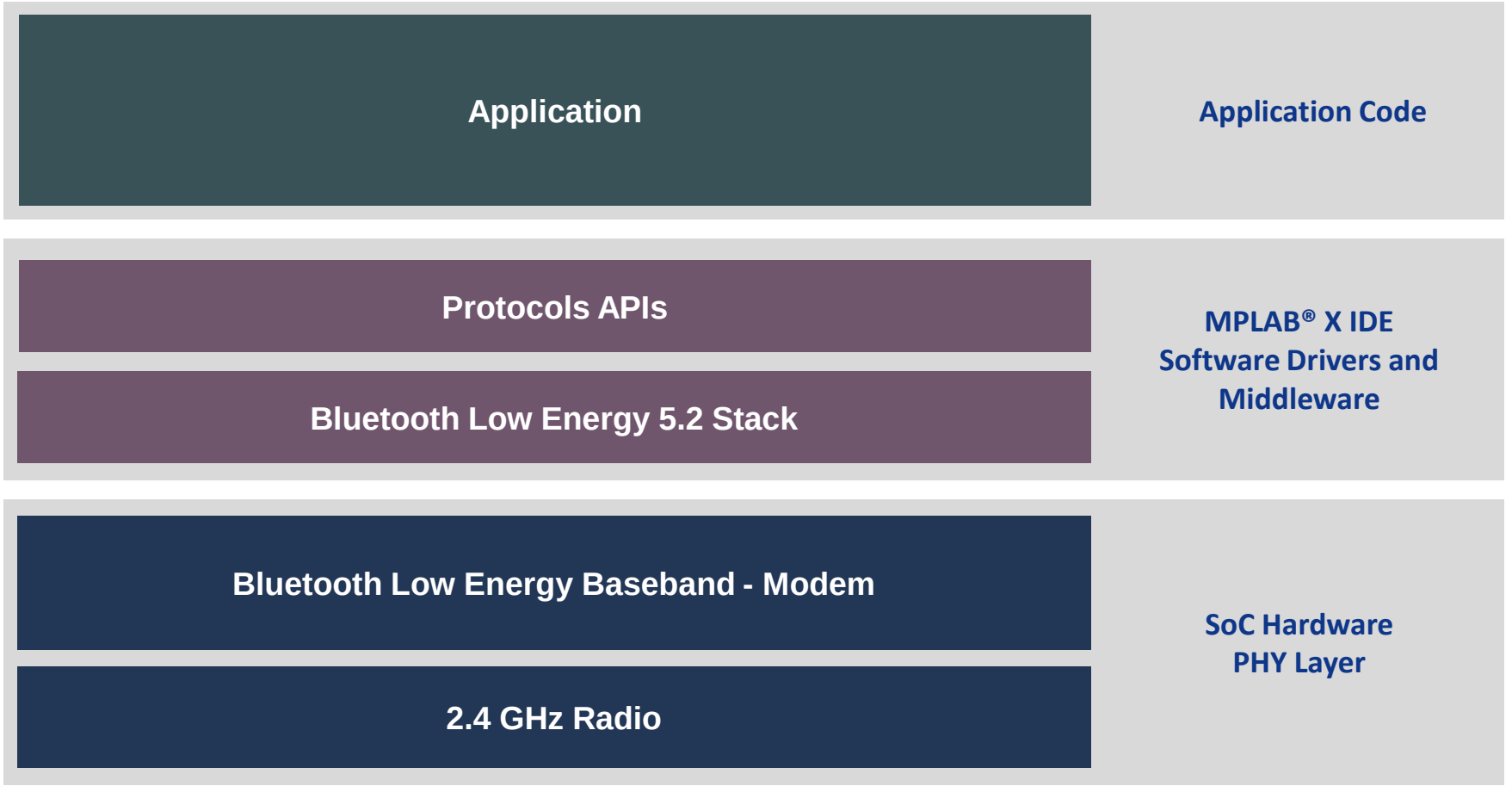
Software Architecture – Bluetooth® Low Energy



MPLAB® Harmony 3 Transparent USART Project

- **MPLAB® Harmony 3 는 Bluetooth® Low Energy 기능에 대해 API 를 호출하고 FreeRTOS™ 환경내에서 동작함**
- **이 Application Code 는 FreeRTOS 대기열을 사용하여 안정적인 타이밍과 작업을 보장함**
- **이 Code 는 Transparent USART Project 를 기반으로 생성됨**
  - 본 Demo project 는 MPLAB® Harmony directory 의 하위 경로에 위치함
    - (Harmony3)\wireless_apps_pic32cxbz2_wbz45\apps\ble\building_blocks\peripheral\profiles_services\peripheral_trp_uart
- **아래의 4개 File 에 대한 수정이 필요함**
  - app_ble_handler.c, app_trsps_handler.c, app.c, app.h
- **모든 Application Code 는 app.c 와 app.h File 내에 위치함**

Thank You

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