PSoC 4 BLE – Dynamic Broadcaster

Objective

This example demonstrates how to dynamically change the BLE broadcaster payload in firmware.

Overview

The project instantiates a BLE GAP broadcaster that advertises manufacturer-specific data in non-connectable ADV mode. The manufacturer specific data is continuously updated in firmware to demonstrate dynamic advertisement payload update feature. The project also showcases low power mode configuration during and between consecutive BLE broadcast events. BLE interface configuration details are:

- GAP mode – Broadcaster

- Advertisement interval – 100ms

- Advertisement timeout – 1 hour. Device is configured in hibernate mode after this timeout

- Advertisement payload – Device name and dynamically changing manufacturer specific data

- Device HFCLK – 16MHz, CPU clock turned down to 3MHz while BLE interface is active (device can't enter DeepSleep mode while BLE RF activity is in progress)

Requirements

Design Tool: PSoC Creator 3.1 CP1, CySmart 1.0

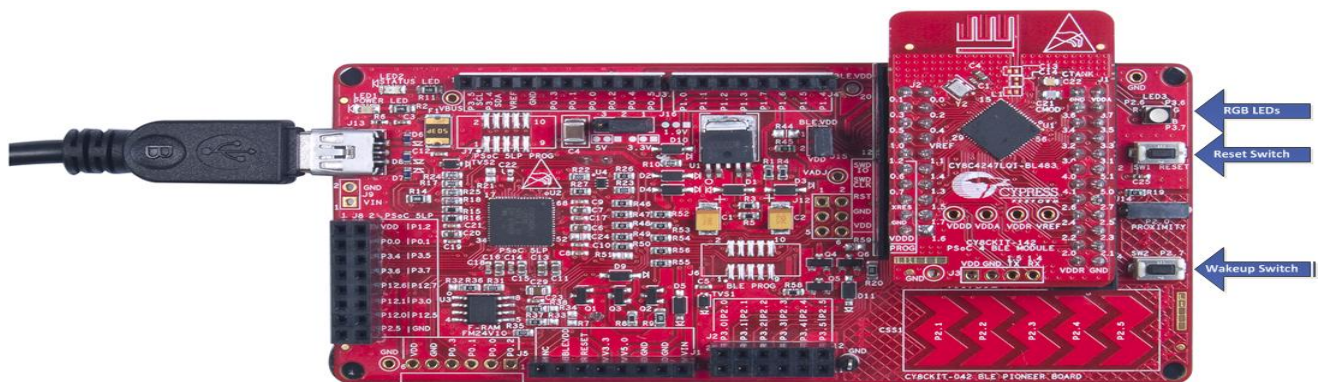**Programming Language:** C (GCC 4.8.4 – included with PSoC Creator)

Associated Devices: All PSoC 4 BLE devices

Required Hardware: CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit

Hardware Setup

The BLE Pioneer Kit has all of the necessary hardware required for this example. Figure 1 shows the hardware setup for this example.
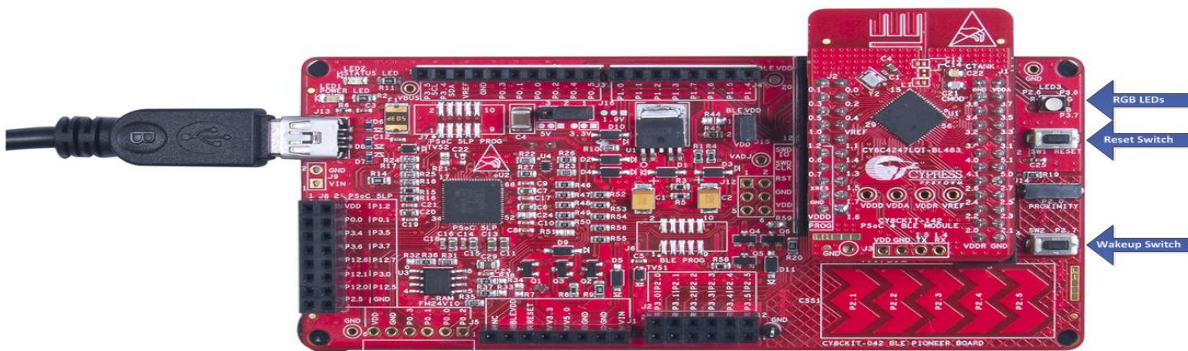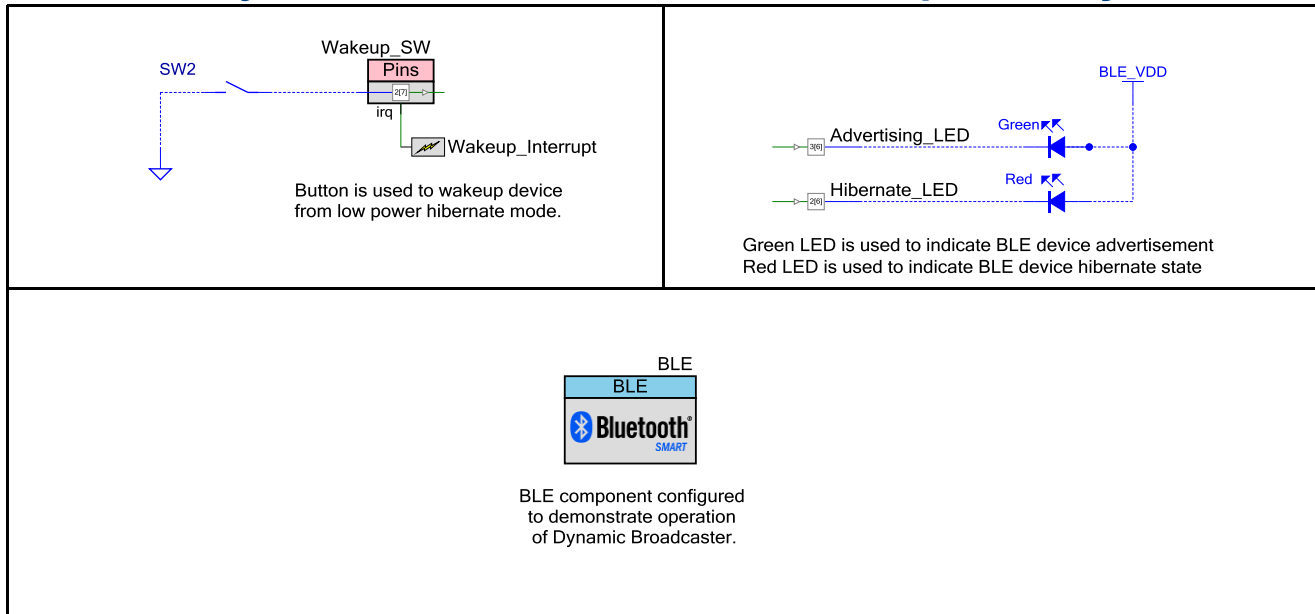
Figure 1: Kit Setup

PSoC Creator Schematic

Figure 2. PSoC Creator Schematic

BLE Dynamic Broadcaster Example Project

Wakeup_SW

SW2

Pins
2[7]

irq

Wakeup_Interrupt

Button is used to wakeup device
from low power hibernate mode.

BLE_VDD

Advertising_LED
3[6]

Green

Hibernate_LED
2[6]

Red

Green LED is used to indicate BLE device advertisement
Red LED is used to indicate BLE device hibernate state

BLE

BLE

Bluetooth®
SMART

BLE component configured
to demonstrate operation
of Dynamic Broadcaster.

Operation

Figure 3 shows the operation flow of this example.

Figure 3: Operation Flow
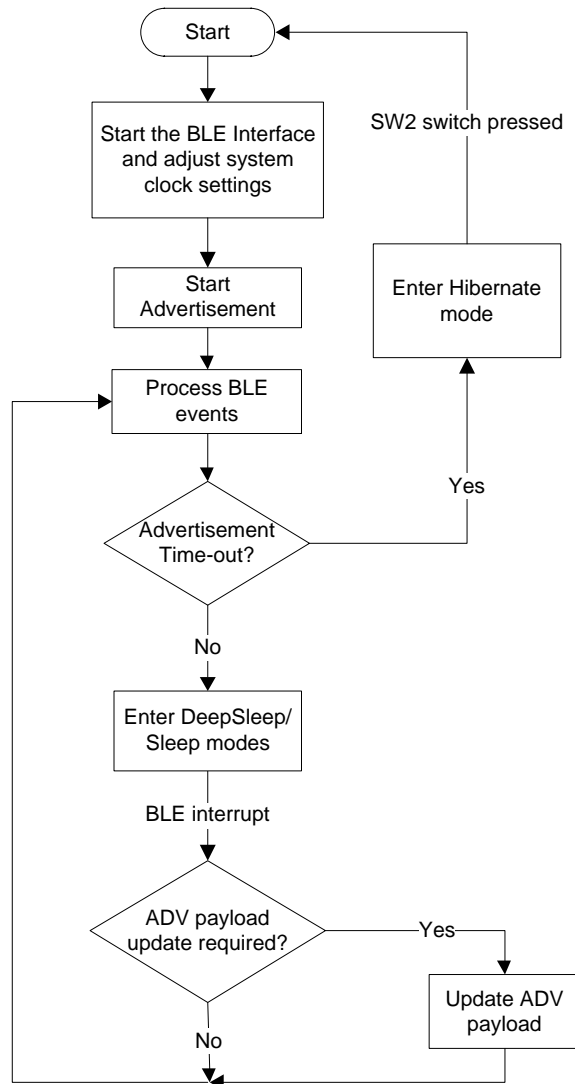
Testing with CySmart PC Tool and Mobile Apps

1. Program the hex file for this design onto a BLE Pioneer Baseboard connected with PSoC 4 BLE module (red board)
2. Power the BLE Pioneer Baseboard and observe that it is broadcasting data (Green LED turned on)
3. Use a smart phone app (Bluetooth LE Scanner app on Android for example) or CySmart PC tool that can display changing advertisement payload and see the manufacturer specific data field continuously changing (See Figure 4).
4. The design will advertise for 1 hour and enter low power hibernate mode (Red LED on) after 1 hour.
5. Press SW2 on BLE Pioneer Baseboard to exit hibernate mode and restart broadcasting mode.
6. Modify the project to vary the duration at which the advertisement payload is updated by changing the value of "LOOP_DELAY" in firmware or change the advertisement payload or interval as per your design requirement.

Figure 4: CySmart PC Tool – Dynamic Broadcaster Data
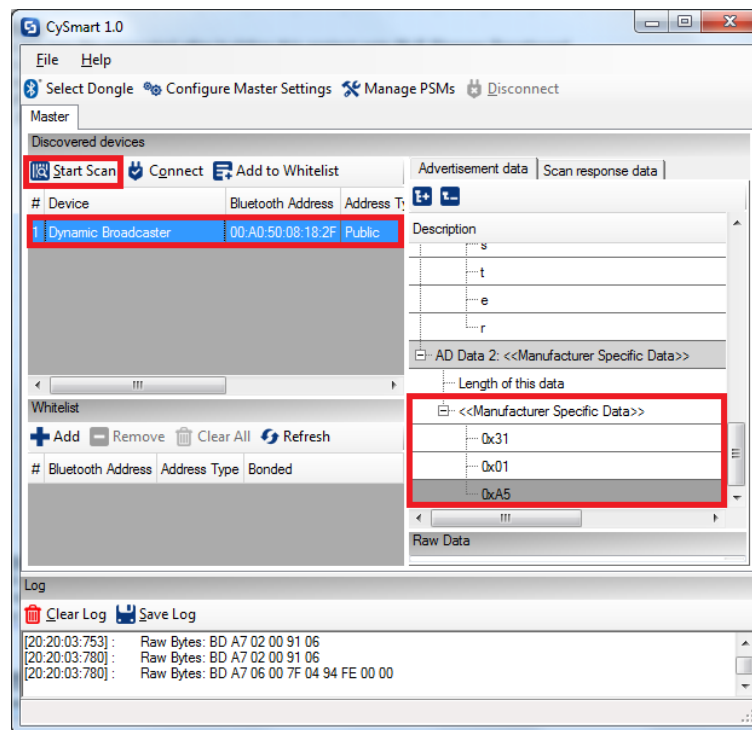
Related Documents

Table 1 lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component datasheets.

Table 1. Related Documents

Document	Title	Comment
AN91267	Getting Started with PSoC 4 BLE	Provides an introduction to PSoC 4 BLE device that integrates a Bluetooth Low Energy radio system along with programmable analog and digital resources.
AN91445	Antenna Design Guide	Provides guidelines on how to design an antenna for BLE applications.