

## Objective

This example demonstrates BLE Central and Client role operation using Immediate Alert Service (IAS).

## Overview

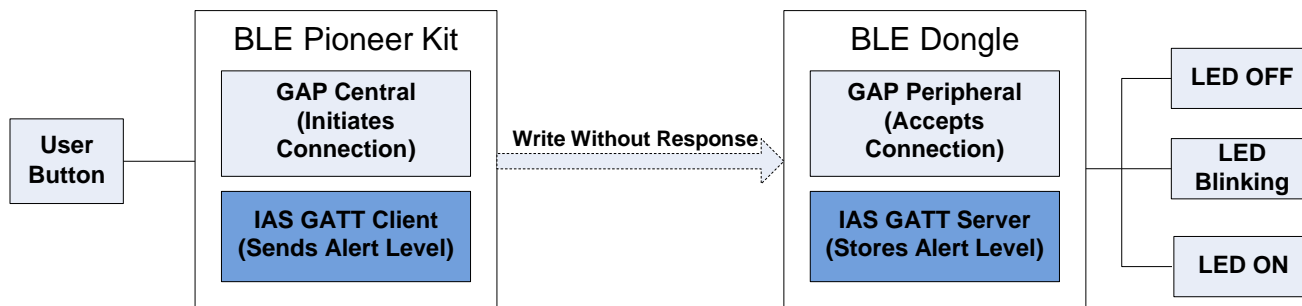
This example implements the BLE GAP Central and GATT Client role that initiates the connection with a GAP Peripheral device and sends data to it. Using [Immediate Alert Service \(IAS\)](#), the example sends alert levels to the connected device which is displayed as various LED blinking states. To aid in evaluation, another example is provided as part of the same workspace that implements the BLE GAP Peripheral and GATT Server role.

This example has two parts,

- PSoC\_4\_BLE\_Central\_IAS** that works on BLE Pioneer baseboard with PSoC 4 BLE module. This example has BLE configured for GAP Central and GATT Client role. It scans for GAP Peripheral device with a fixed Bluetooth Device (BD) address and initiates connection to it. After successful connection, an alert level is sent by User Button press on BLE Pioneer Baseboard.
- BLE\_Dongle\_Peripheral\_IAS** that works on BLE Dongle. This example has BLE configured for GAP Peripheral and GATT Server role. It advertises its presence and accepts connection from a GAP Central device. After connection, it receives the alert level, which it translates into one of the three LED states.

The baseboard, module and BLE dongle are part of the same [CY8CKIT-042-BLE Pioneer Kit](#).

**Figure 1. Central IAS project**



**Note** The project depends on fixed BD address for connection. In case of multiple BLE Pioneer Kits running same example project, there may be case of cross connection or connection failures.

## Requirements

**Tool:** [PSoC Creator 4.0 Update 1](#)

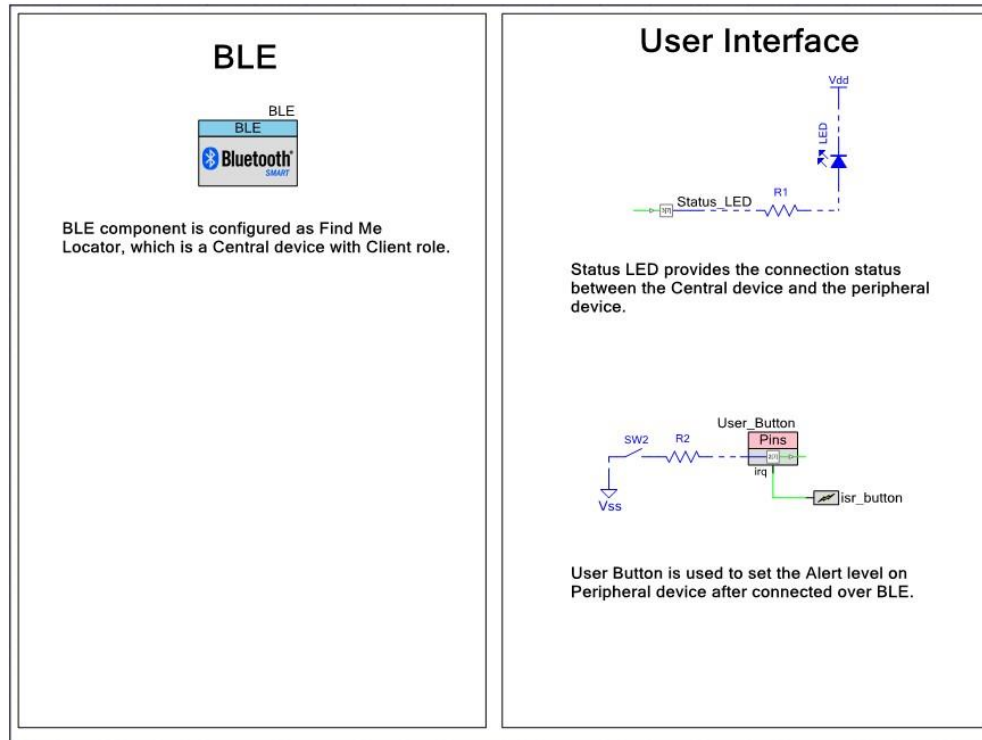
**Programming Language:** C (GCC 4.9 – included with PSoC Creator)

**Associated Parts:** All PSoC 4 BLE devices

**Related Hardware:** [CY8CKIT-042-BLE](#)

## PSoC Creator Schematic

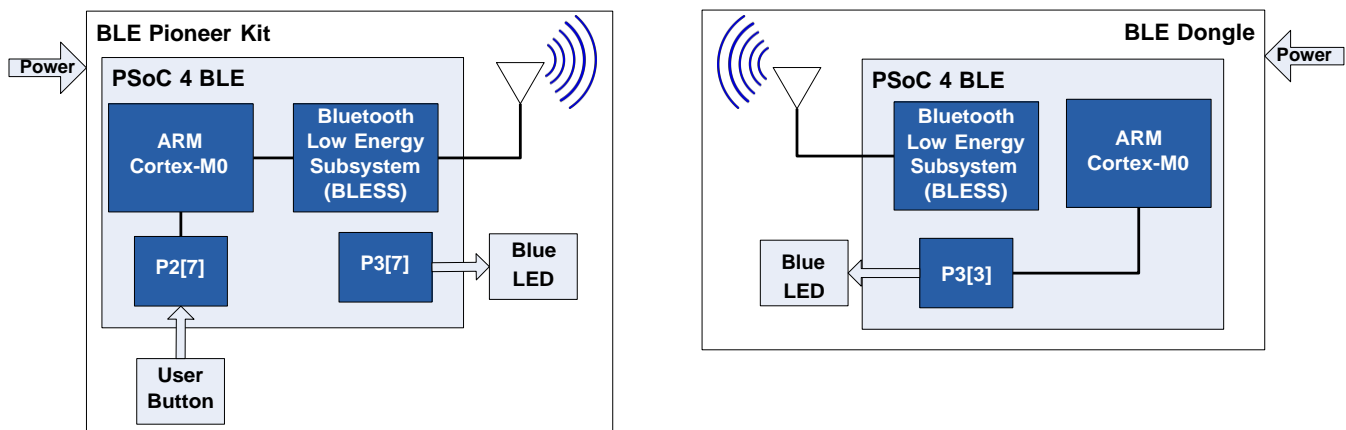
Figure 2. PSoC Creator Schematic (Central IAS)



## Hardware Setup

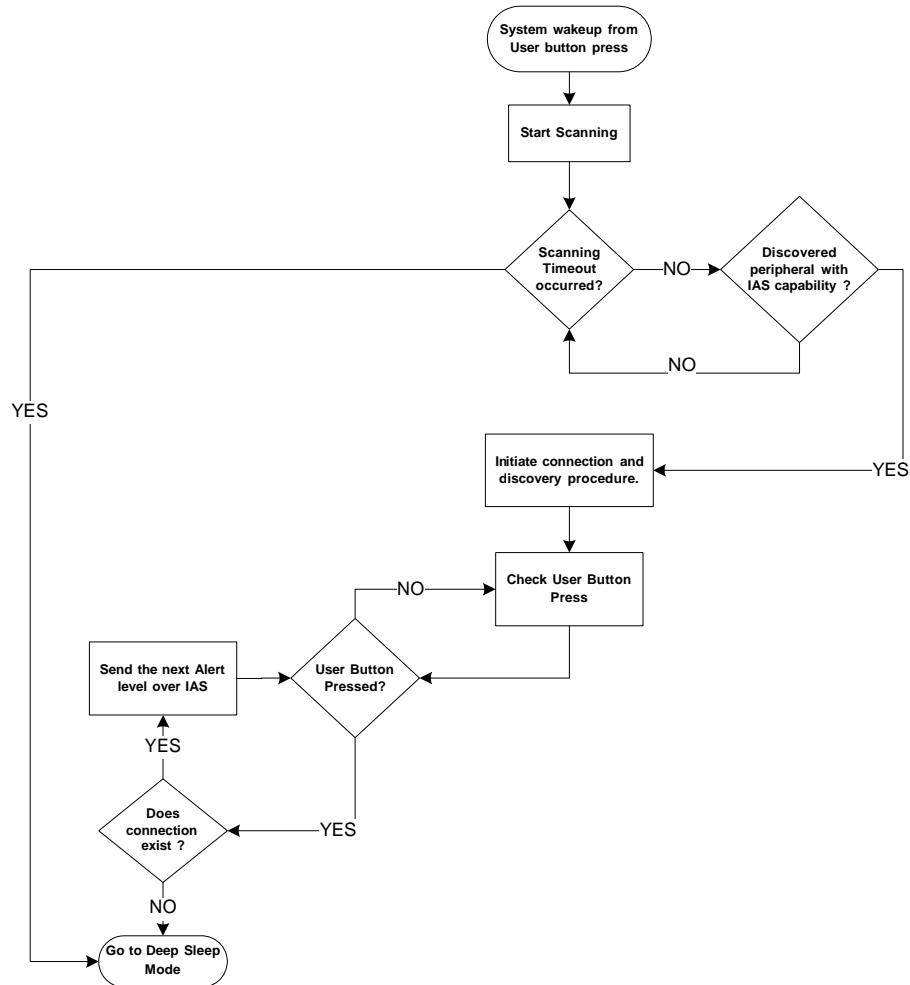
The BLE Pioneer Kit and the BLE Dongle have all the necessary hardware required for this lab. On BLE Pioneer Kit, the status LED is connected to pin P3.7 and the User button is connected to pin P2.7. On BLE Dongle, the status LED is connected to pin P3.3. No other hardware connections are required.

Figure 3. Hardware setup



## Firmware Flow

Figure 4. Firmware Flow



## Operation

To use this example, follow these steps:

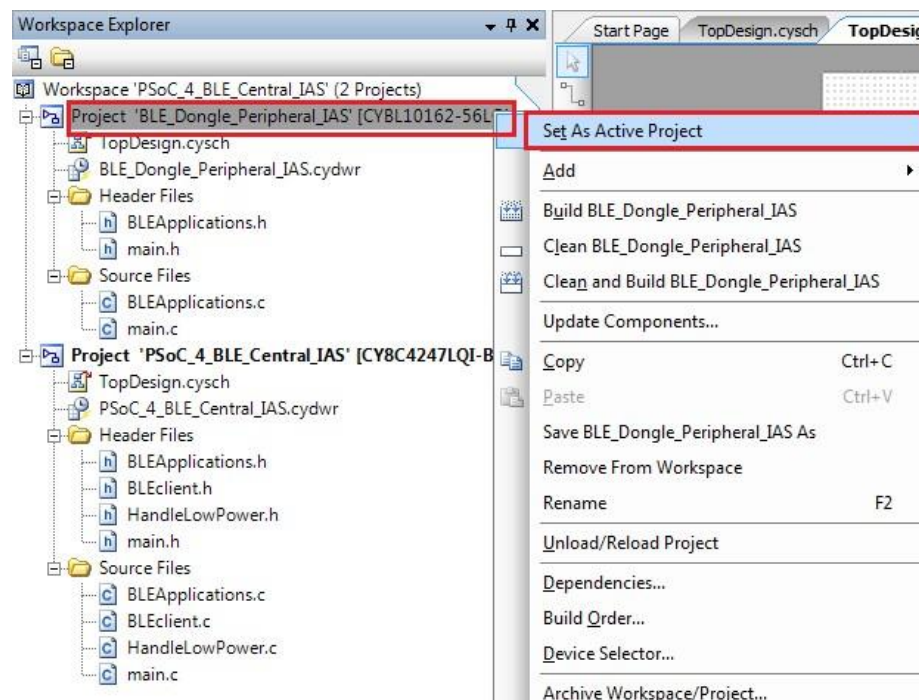
- 1) Connect the BLE Dongle to one of the USB Port. Allow USB enumeration to finish.

Figure 5. Connect BLE Dongle to PC



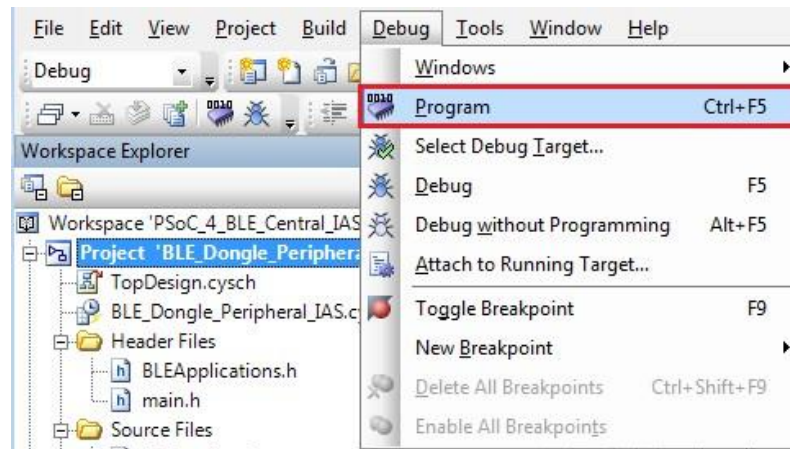
- 2) Open the attached example with PSoC Creator.
- 3) In the PSoC Creator Workspace Explorer, right-click on the **BLE\_Dongle\_Peripheral\_IAS** project and select **Set As Active Project**, as shown here:

Figure 6. Set As Active Project



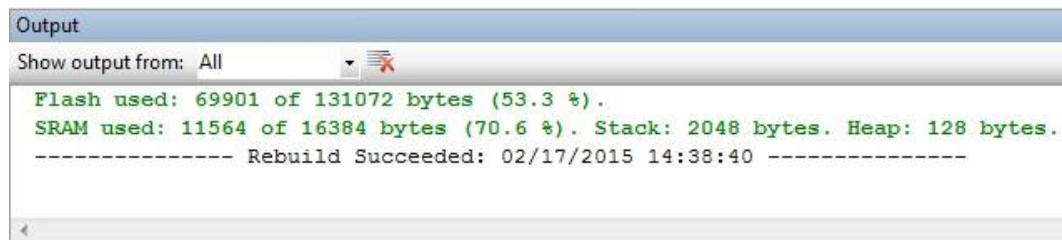
- 4) On Menu bar, go to **Debug -> Program** or press **[Ctrl] + [F5]** to program the BLE Dongle with the selected example. The project should build first and then program the BLE Dongle successfully.

Figure 7. Program the BLE Dongle



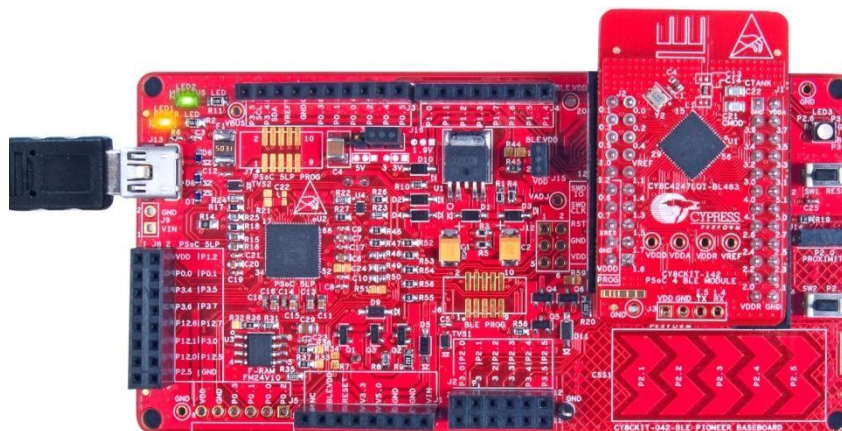
- 5) Successful build is represented by message in output window followed by programming.

Figure 8. Successful build of the project



- 6) Connect the BLE Pioneer kit with PSoC 4 BLE module (red module) to the PC using USB connector J13. Allow enumeration to complete.

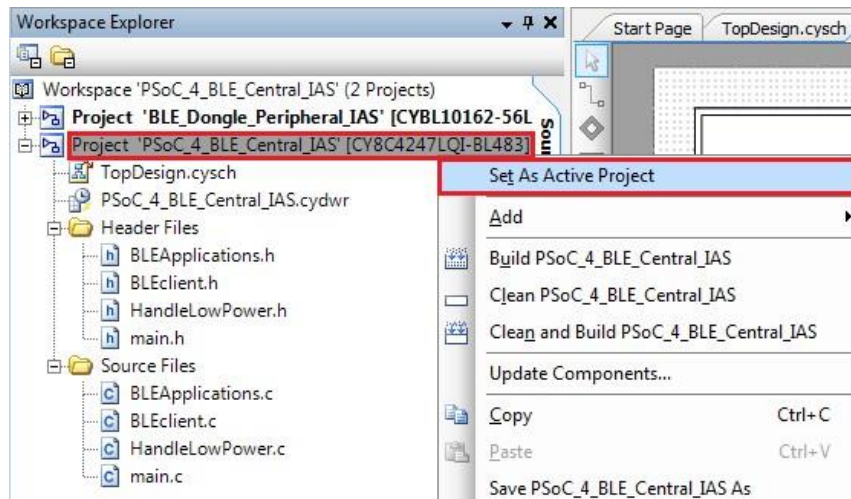
Figure 9. Connect BLE pioneer kit to PC



- 7) On the Workspace explorer, right click on the **PSoc\_4\_BLE\_Central\_IAS** project and select **Set As Active Project**.



Figure 10. Select Central IAS project as Active project.

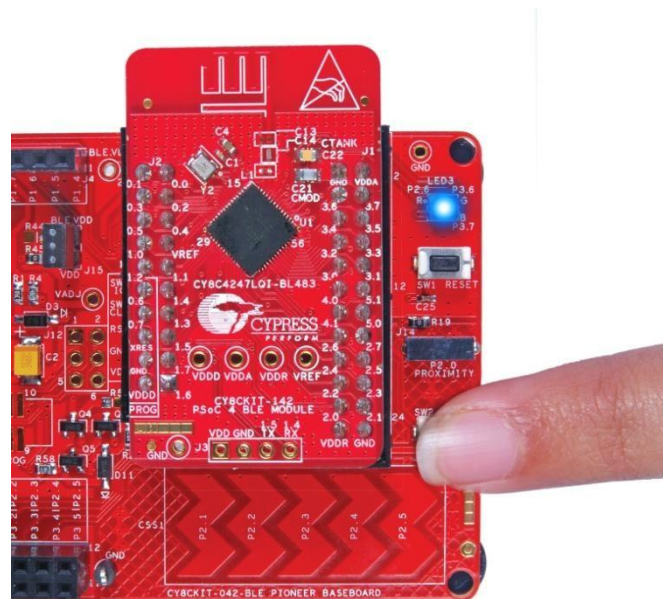


- 8) On Menu bar, go to **Debug -> Program** or press **[Ctrl] + [F5]** to program the BLE Pioneer Kit with the selected example. The project should build first and then program the BLE Pioneer Kit successfully.

## Testing

- 1) Ensure both the BLE Dongle and the BLE Pioneer Kit have been programmed successfully as per steps above.
- 2) Press the user switch SW2 on BLE pioneer kit to wake-up the system from deep sleep and start scanning for available devices. This is indicated by blinking blue LED on BLE Pioneer Kit.

Figure 11. Press user button SW2



- 3) As soon as the BLE Pioneer Kit finds the BLE Dongle advertising with the given BD address, it will stop scanning and issue a connect request. This happens automatically.
- 4) Connection is indicated by the blue LED always ON.

- 5) Press the user button SW2 to send the alert level to the connected BLE Dongle. Each time SW2 is pressed, a new Alert level is sent which is represented by different LED blinking state on BLE Dongle.

**Table 1. LED Alert Status**

Alert Level	LED state
No Alert	LED OFF
Mid Alert	LED Blinking
High Alert	LED ON

- 6) To disconnect, press reset button on the BLE Pioneer Kit.

## Related Documents

[Table 2](#) lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component / user module datasheets.

**Table 2. Related Documents**

Document	Title	Comment
<a href="#">AN91267</a>	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.
<a href="#">AN91445</a>	Antenna Design Guide	Provides guidelines on how to design an antenna for BLE applications.