PSoC 4 BLE Whitelist

Objective

This example demonstrates the Whitelist functionality of the PSoC BLE Component.

Overview

Whitelist functionality in Bluetooth allows a device to filter out other devices trying to scan or connect with the device. Only the devices added to the whitelist will be given the privilege of scanning or connection or both (based on the filter policy selected). In this example, the BLE Component is programmed as a Peripheral and a Server, which has the whitelist setting as **Scan Request Whitelist; Connect Request Whitelist**. This means that only the Central devices that are added to the Peripheral's whitelist will be able to receive the scan response packet and establish a connection with it.

Requirements

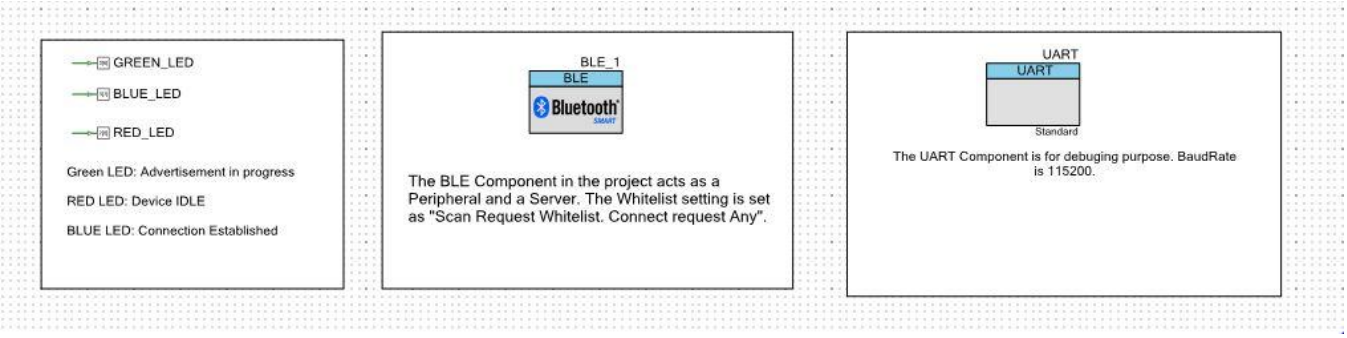
Design Tool: PSoC Creator 3.1 CP1, CySmart 1.0

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

Associated Devices: All PSoC 4 BLE devices

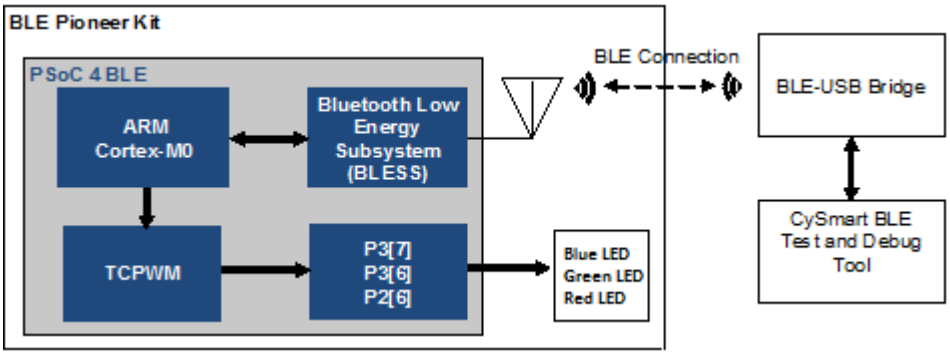
Required Hardware: CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit

PSoC Creator Schematic

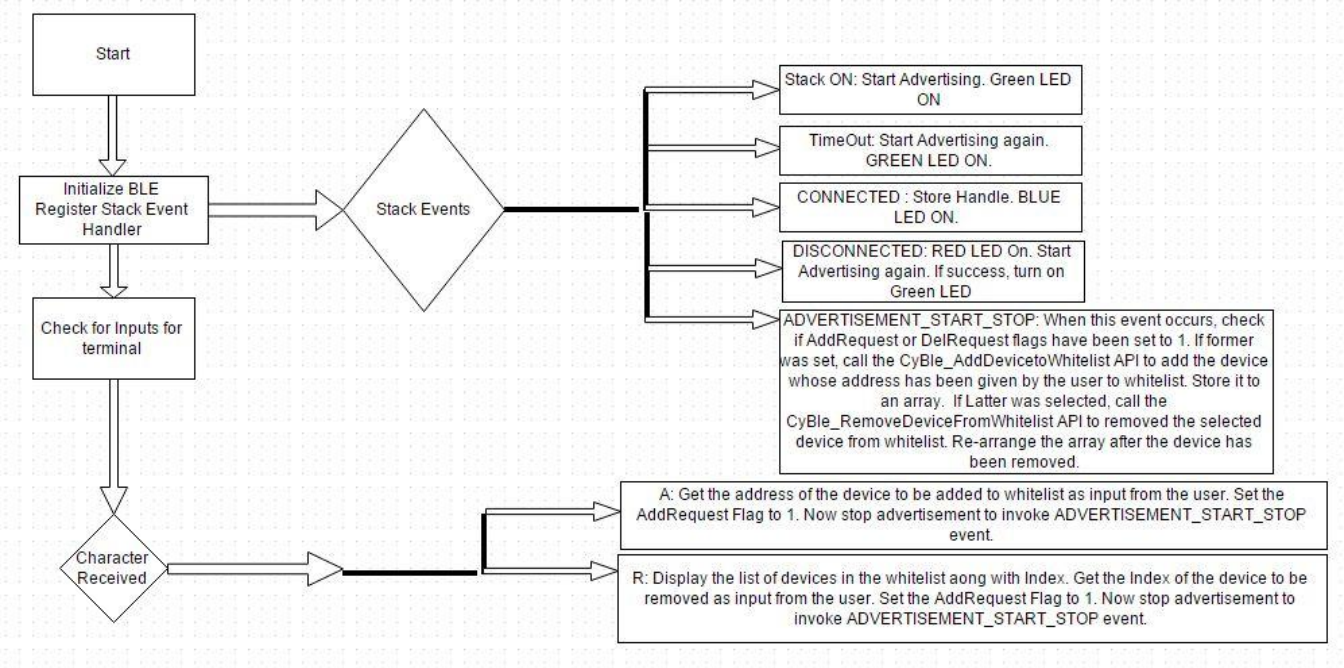


Hardware Setup

The BLE Component in a CY8CKIT-042-BLE Kit acts as a Peripheral. The BLE Dongle acts as a BLE Central.



Firmware Flow:



Build and Program

This section shows how to build the project and program the PSoC 4 BLE device using the CY8CKIT-042-BLE.

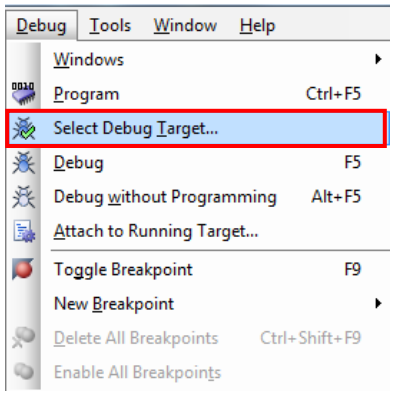
On PSoC Creator, select Build > Clean and Build **BLE_Whitelist.**

1. Open PSoC creator 3.1. Go to **File -> Open -> Project / Workspace**. Browse for the folder containing the project files and select **BLE_Whitelist.cyprj**.
2. Go to **Build -> Build BLE_Whitelist**
3. On a successful build, the total flash and SRAM usage is reported as shown below

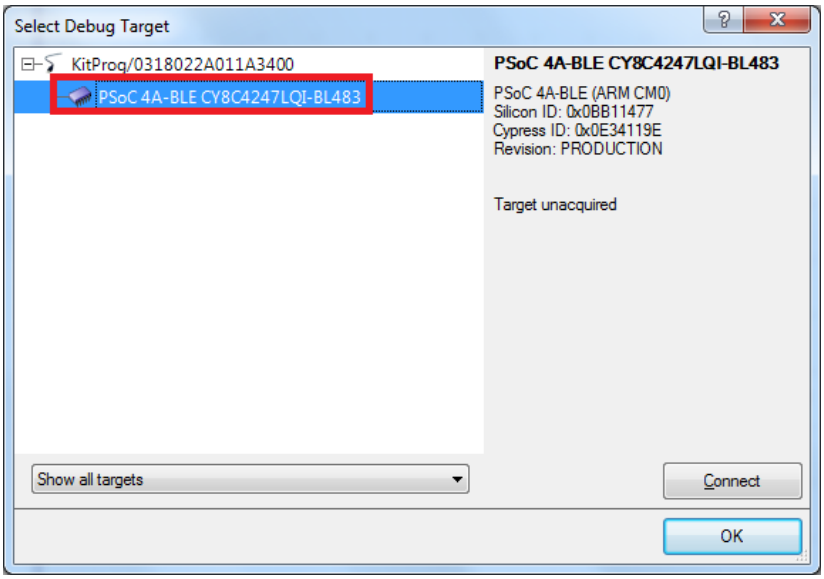
```
Flash used: 77431 of 131072 bytes (59.1 %).
SRAM used: 12676 of 16384 bytes (77.4 %). Stack: 2048 bytes. Heap: 1024 bytes.
--------------- Build Succeeded: 02/23/2015 12:47:39 ---------------
```

4. Select **Debug** > **Select Debug Target**, as shown below.

Selecting Debug Target

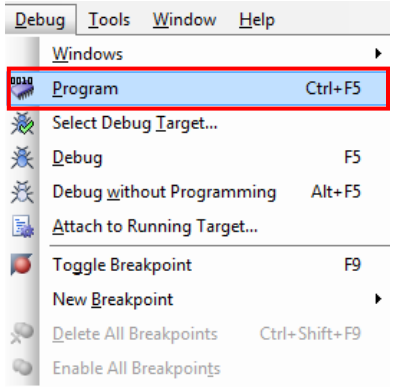


5. In the **Select Debug Target** dialog box, click **Port Acquire**, and then click **Connect** as shown in **Error! Reference source not found.**. Click **OK** to close the dialog box.

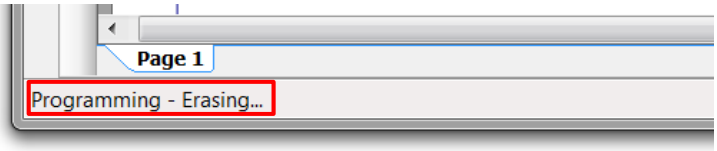


If you are using your own hardware, make sure the Port Setting configuration under Select Debug Target window for your programming hardware is configured as per your setup.

6. Select **Debug** > **Program** to program the device with the project, as shown below.



You can view the programming status on the PSoC Creator status bar (lower-left corner of the window), as shown below.

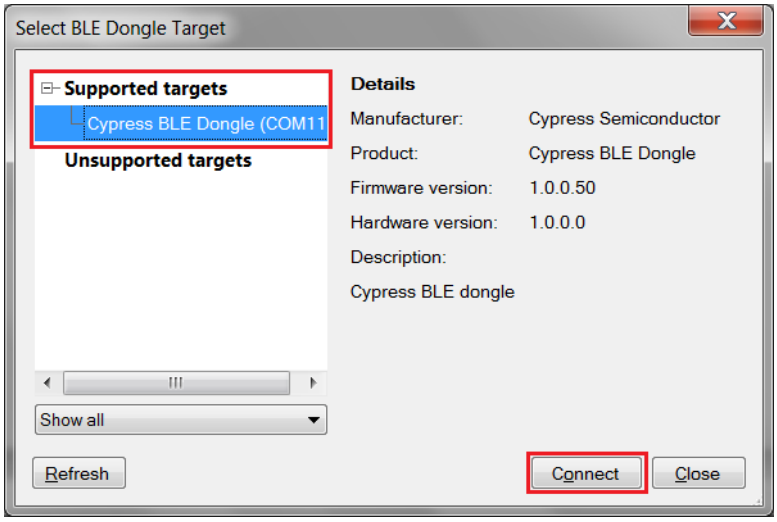


Operation and Testing

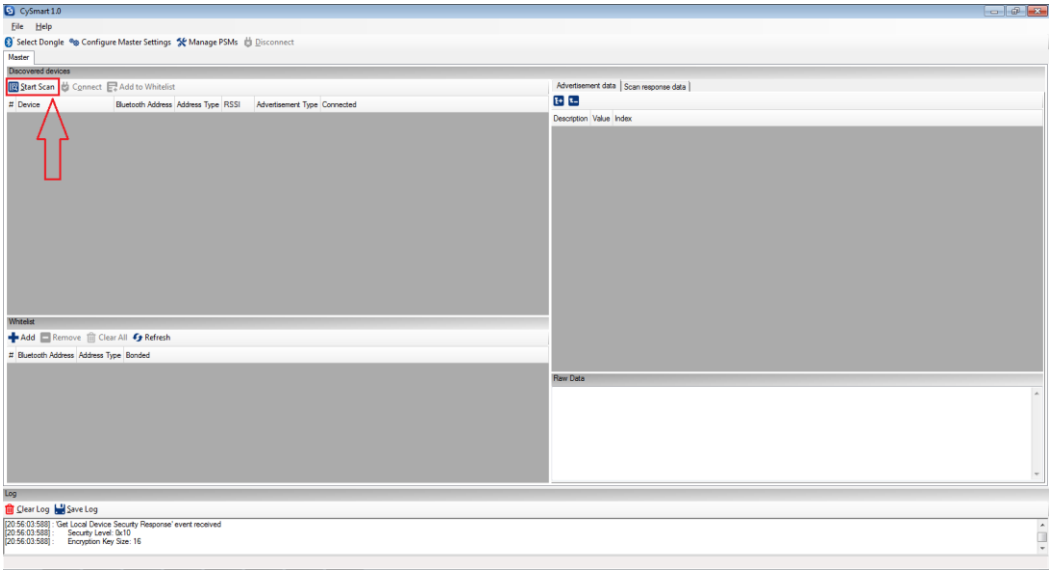
1) Having the kit connected and programmed, open a Serial terminal and have the BaudRate as 115200. Press SW1 in the Kit. You can see the "**BLE WhiteList Example. Press A to add a Device to WhiteList. R to remove the Device from Whitelist"** message to confirm if the terminal works.

2) On your computer, launch **CySmart 1.0**. It is located in the **All Programs -> Cypress -> CySmart** folder in the Windows start menu. The tool opens up and asks you to **Select BLE Dongle Target**. Select the **Cypress BLE Dongle (COMxx)** and click **Connect**, as shown in below.

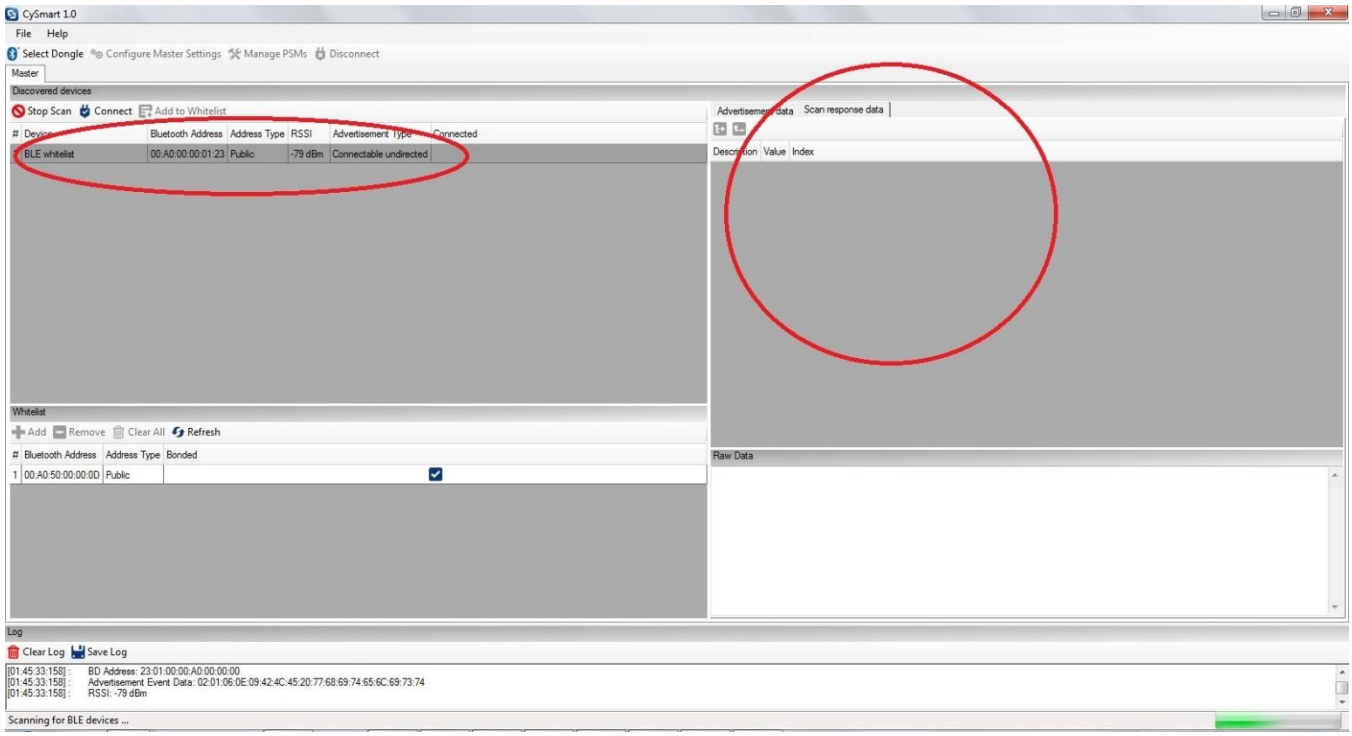
CySmart: Select BLE Dongle Target



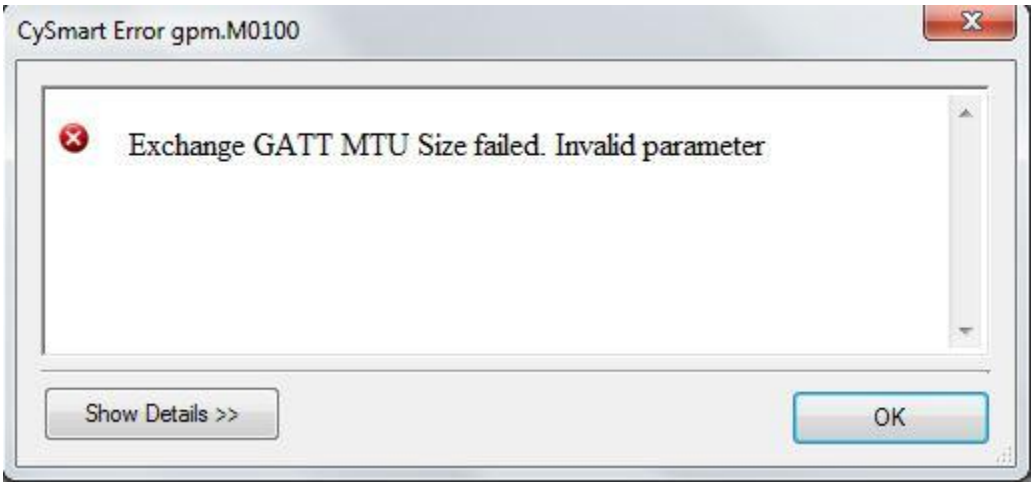
3) When the BLE-USB Bridge is connected, click on **Start Scan** to find your BLE device as shown below.



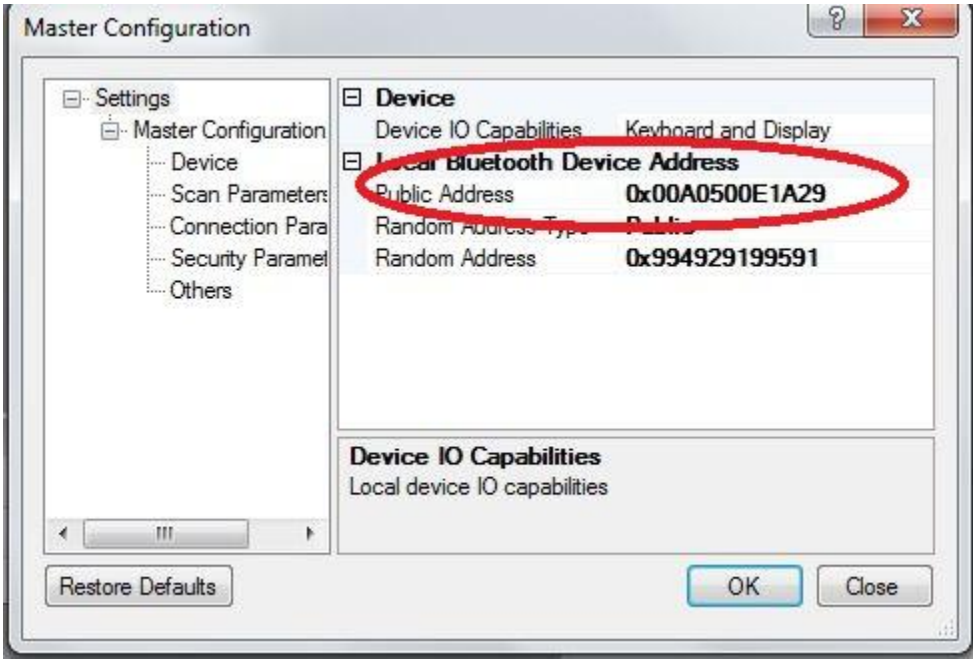
4) You can see the "**BLE_Whitelist**" device detected, but the **Scan response Data** is not obtained by CySmart as the BLE Dongle has not yet been added to the device's Whitelist. See figure below.



5) Also, when you press the **Connect** button, you will see that the operation had failed with an error message as shown below. Scanning and Connection will not be possible until the BLE Dongle is added to our BLE Component's whitelist.

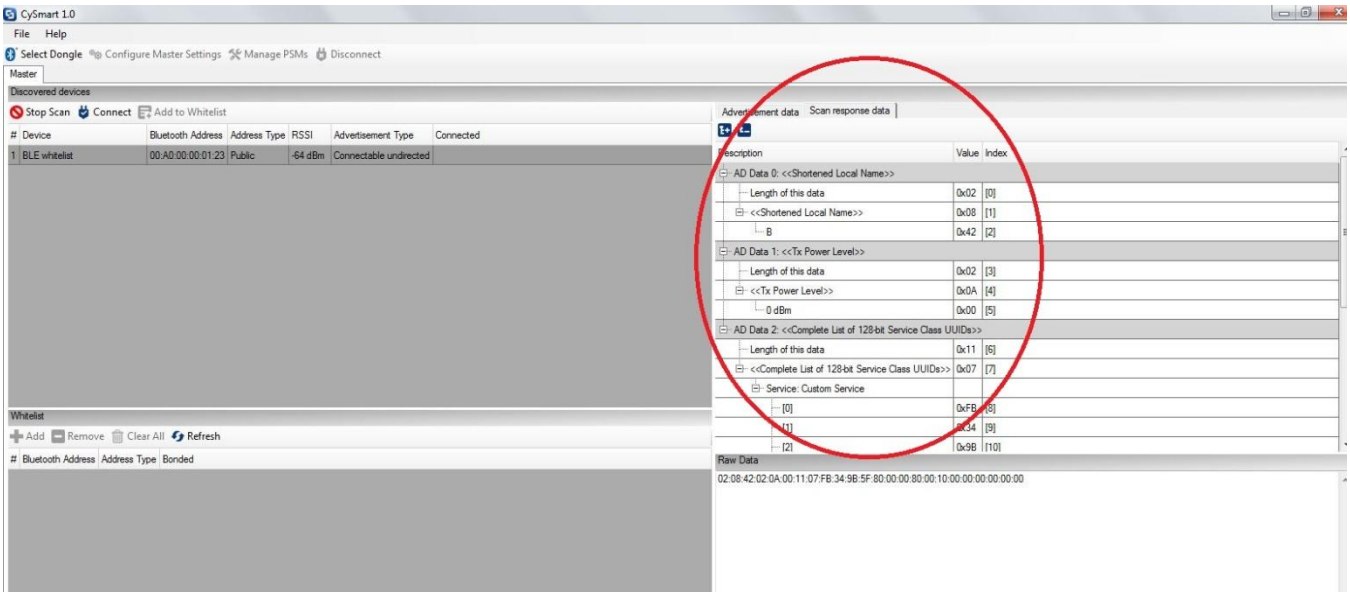


6) Now we will add the BLE Dongle to the Whitelist of our device. To do so, we need to know the address of the BLE Dongle. Click **Stop Scan** and select **Configure Master Settings** on the top of CySmart. The address will be shown as below:

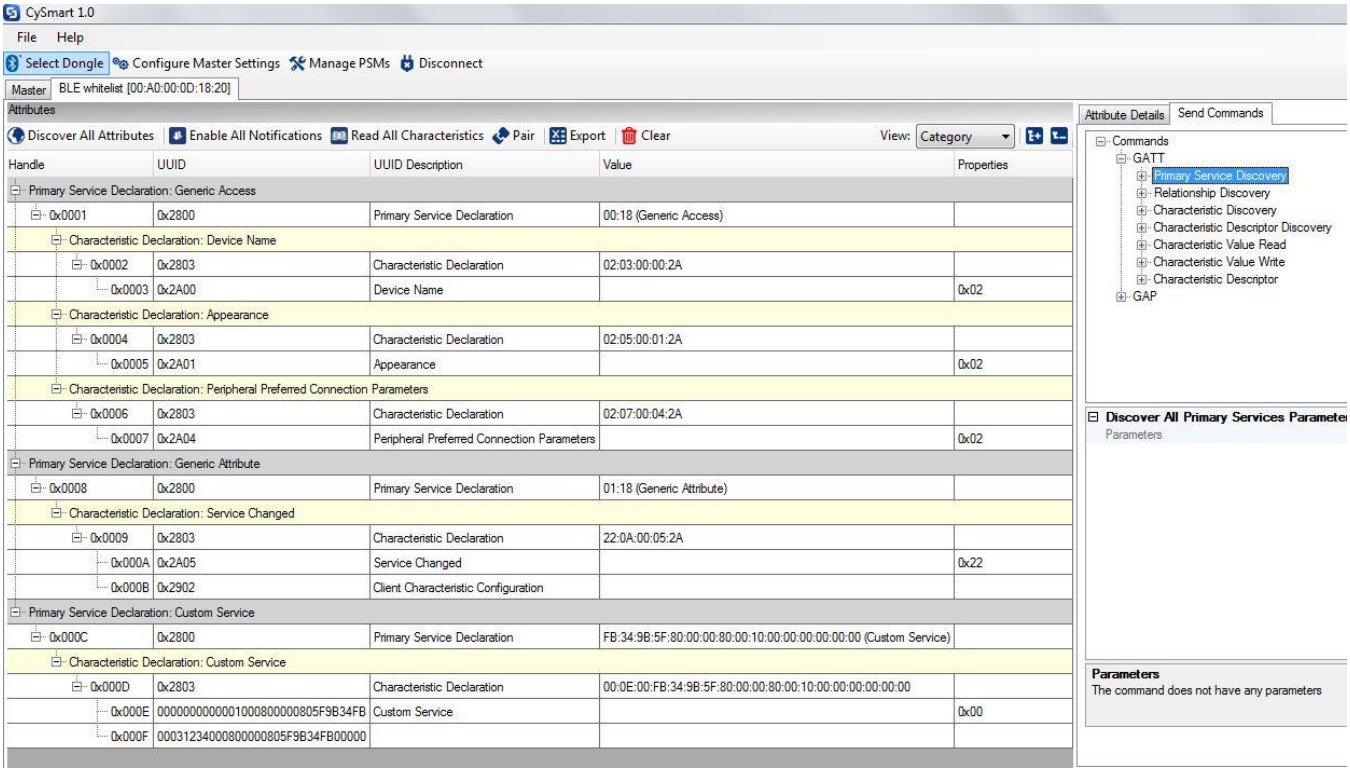


7) Now, in the terminal, Press 'A' followed by the address of the device to be added to Whitelist. Press 'Z' if you entered the address wrongly middle way, to add again.

8) After the **Device Added to Whitelist** message appears, Click **Start Scan** in CySmart again. Now you will be able to see the Scan response data as:

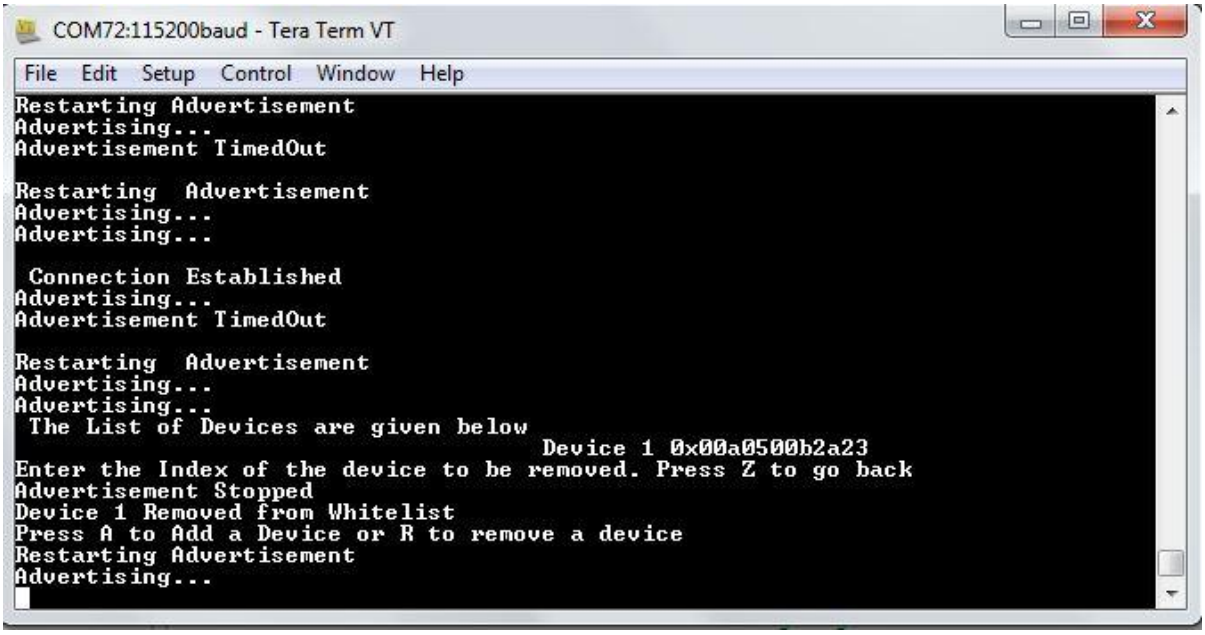


9) Also, pressing the **Connect** button this time would lead to establishment of a successful connection. After clicking **Connect** button, press the **Discover Attributes** button, to see the following details.

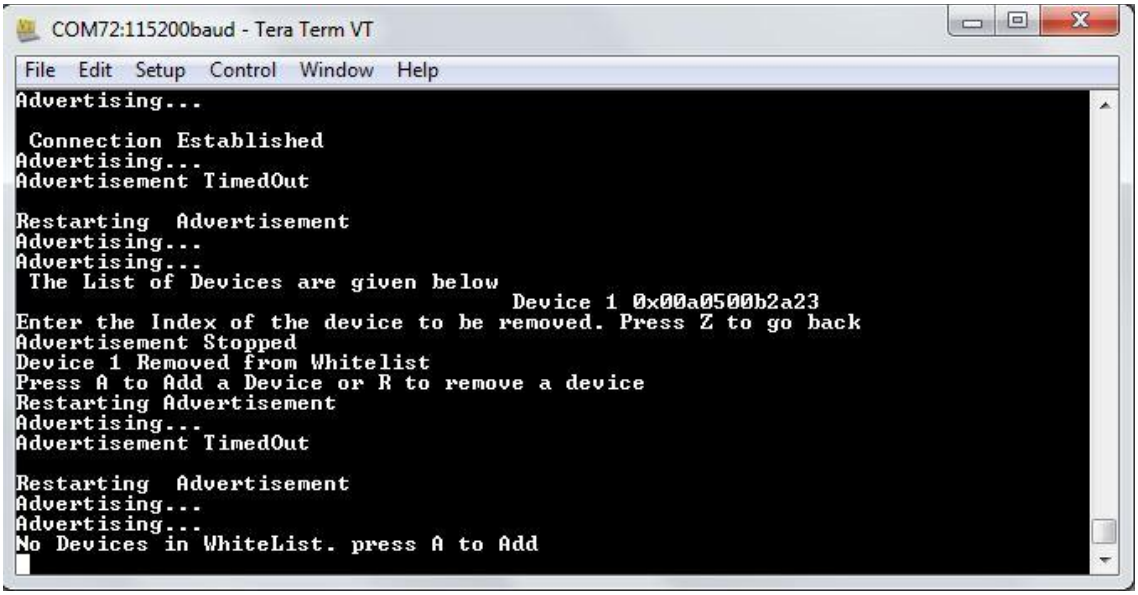


10) Now we will remove the BLE Dongle from the Whitelist and repeat the above steps. Press **Disconnect** Button in the CySmart.

11) Press 'R' to display the list of devices present to Whitelist, along with an index. You can see the BLE Dongle's address displayed along with the Index **1** as shown below. Enter **1** to remove the Dongle.



12) Pressing 'R' again will display a message telling that no more devices can be removed from the Whitelist as only device we added to the device was removed.



13) Now, if you click Start Scan in the CySmart, you will be able to detect **BLE_Whitelist** Peripheral, but obtaining Scan response packet and establishing connection will not be possible now (The observation will be same as mentioned in points 4 and 5 above).

State of LEDs:

GREEN LED	Indicates that the BLE Component is currently advertising
RED LED	Indicates that the BLE Component is Idle (neither advertising nor connected)
BLUE LED	Indicates that the BLE Component is Connected

Related Documents

The table below lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component / user module datasheets.

Related Documents

Document	Title	Comment
AN91267	Getting Started with PSoC® 4 BLE	A guide for beginners on PSoC 4 BLE
001-90479	Programmable System-on-Chip (PSoC®)	PSoC® 4: PSoC 4XX7_BLE Family Datasheet