BLE HID Mouse

1.0

Features

- BLE HID over GATT Profile in HID Device Role operation
- Simulates mouse moving in square clockwise position
- Simulates battery charging
- DeepSleep mode demonstration
- Reporting workflow status through UART
- LED status indication

General Description

This project demonstrates the mouse movement and button click HID reports in the boot and protocol mode. The example also demonstrates handling the suspend event from the central device and enters the low power mode when suspended.

Development Kit Configuration

The device has the following configuration:

- The UART RX pin is connected to port 1 pin 4.
- The UART TX pin is connected to port 1 pin 5.
- A mechanical button (port 2 pin 7) is used for a mouse click, to wake up the device, start re-advertising.
- The green LED (port 3 pin 6) is used to indicate an advertising state.
- The red LED (port 2 pin 6) is used to indicate a BLE disconnection state.
- The blue LED (port 3 pin 7) is used to indicate simulation events.
- Connect the CY8CKIT-042 BLE Pioneer Kit board to the PC using a USB cable.
- Launch any of the RS-232 terminal applications on the PC and configure it to use the 'KitProg USB-UART' port with the speed of 115200 bps.
- Build the project and program the hex file into the CY8CKIT-042 BLE Pioneer Kit.
- Observe the results on the terminal application.

Project Configuration

The example project consists of the following components: BLE, UART, digital output pin, and digital input pin. ADC is not used by default. Battery voltage measurement could be enabled in bas.h header file. The UART is used for transmitting the debug information. The output pins are used to reflect the line signal output on the LED. The input pin is configured to the resistive pull up mode and is used as a mouse click button. The top design schematic is shown in **Figure 1**.

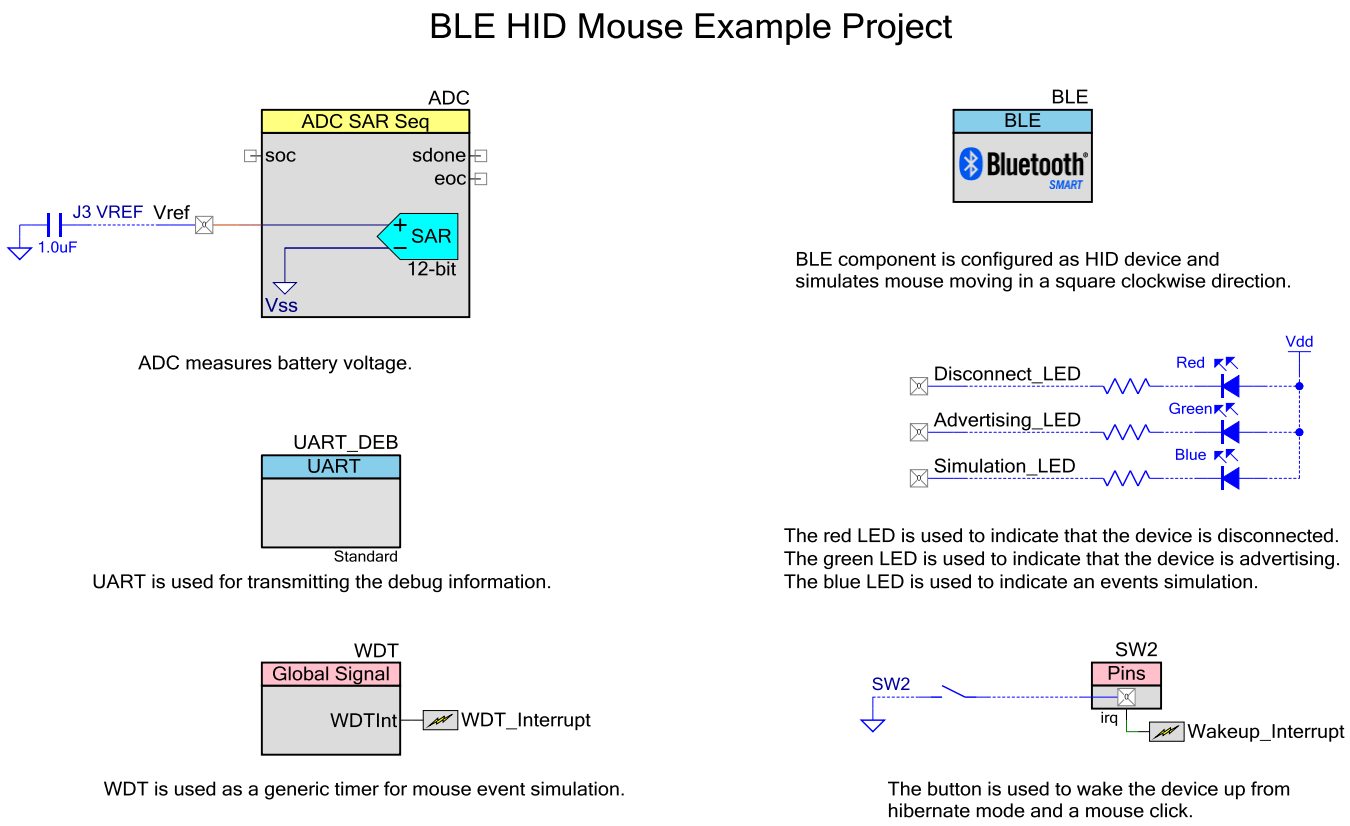

Figure 1. Top design schematic

The BLE component is configured as HID over the GATT Profile in the HID Device role (GATT Server). The HID Device has one instance of the HID Service, Battery Service, Device Information Service, and Scan Parameters Service.

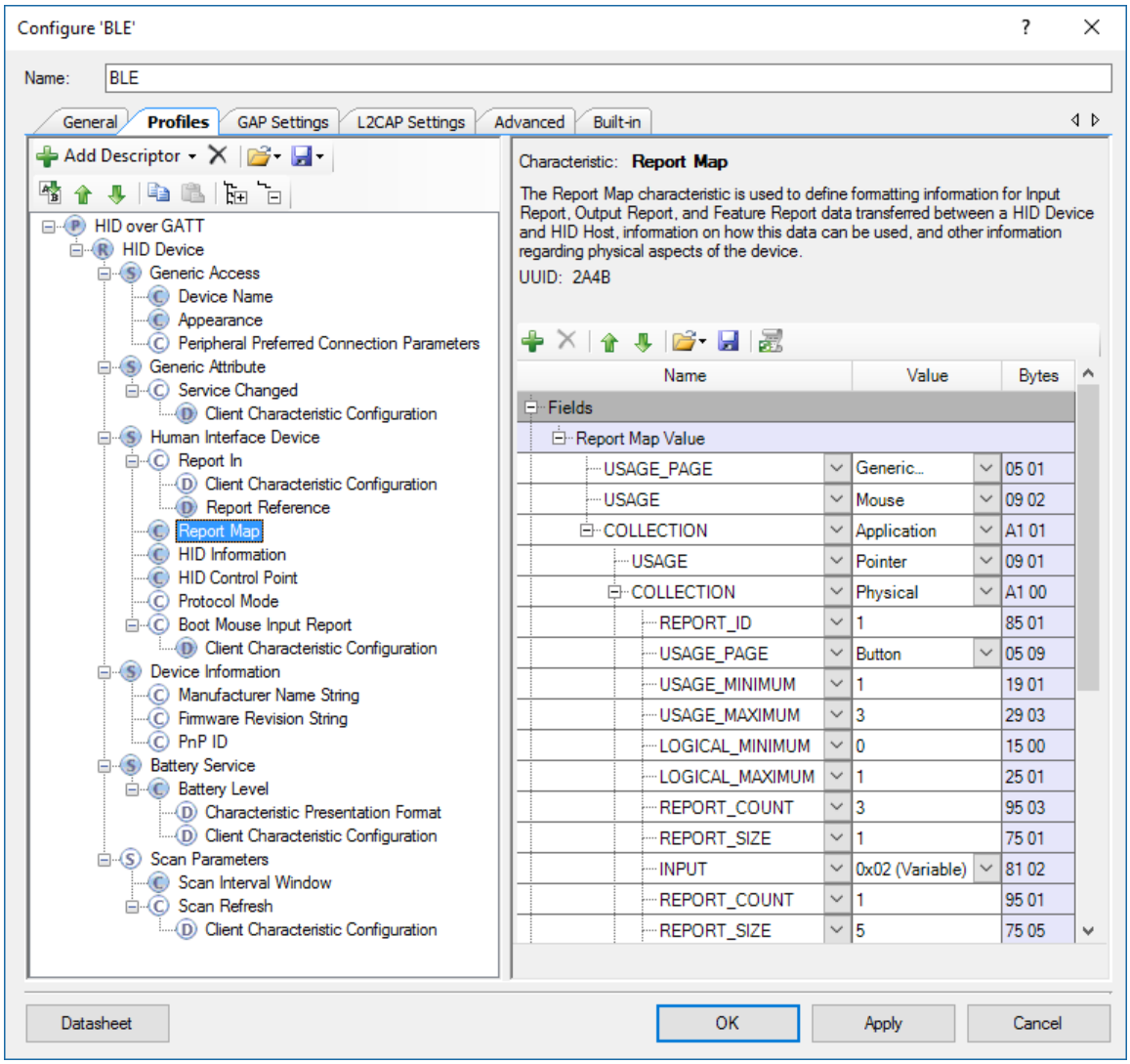

Figure 2. GATT settings

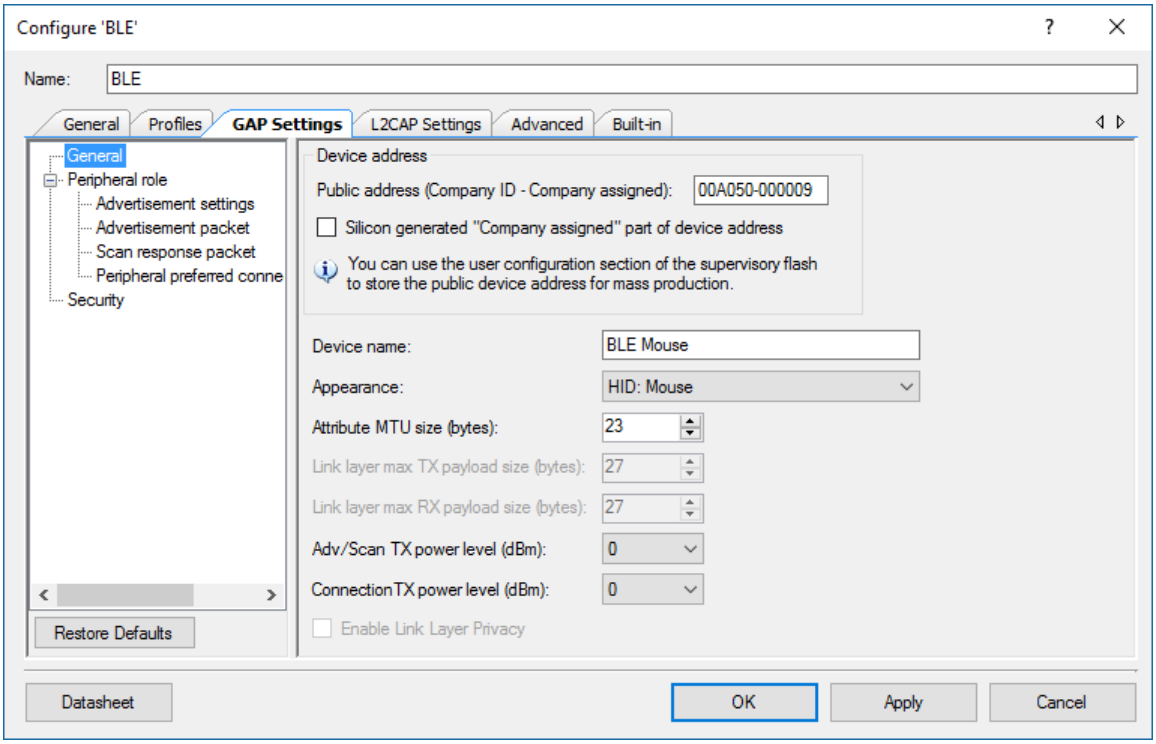

Figure 3. GAP settings

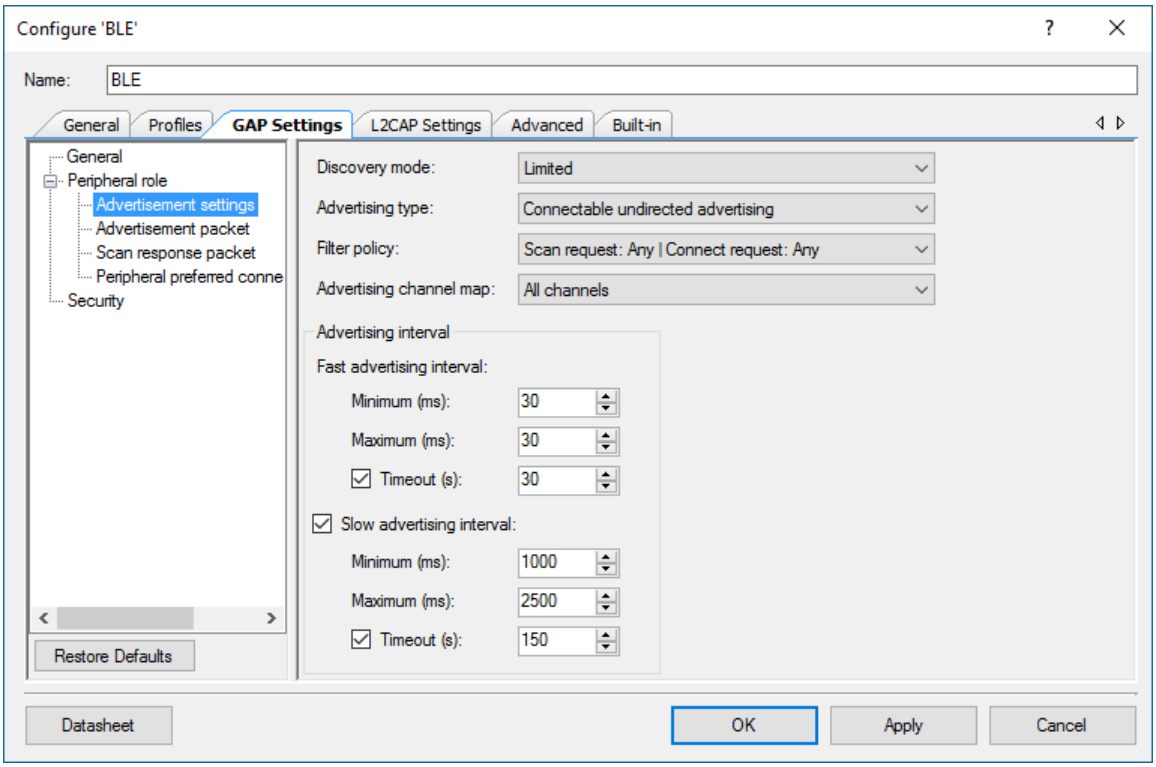

Figure 4. GAP settings -> Advertisement settings

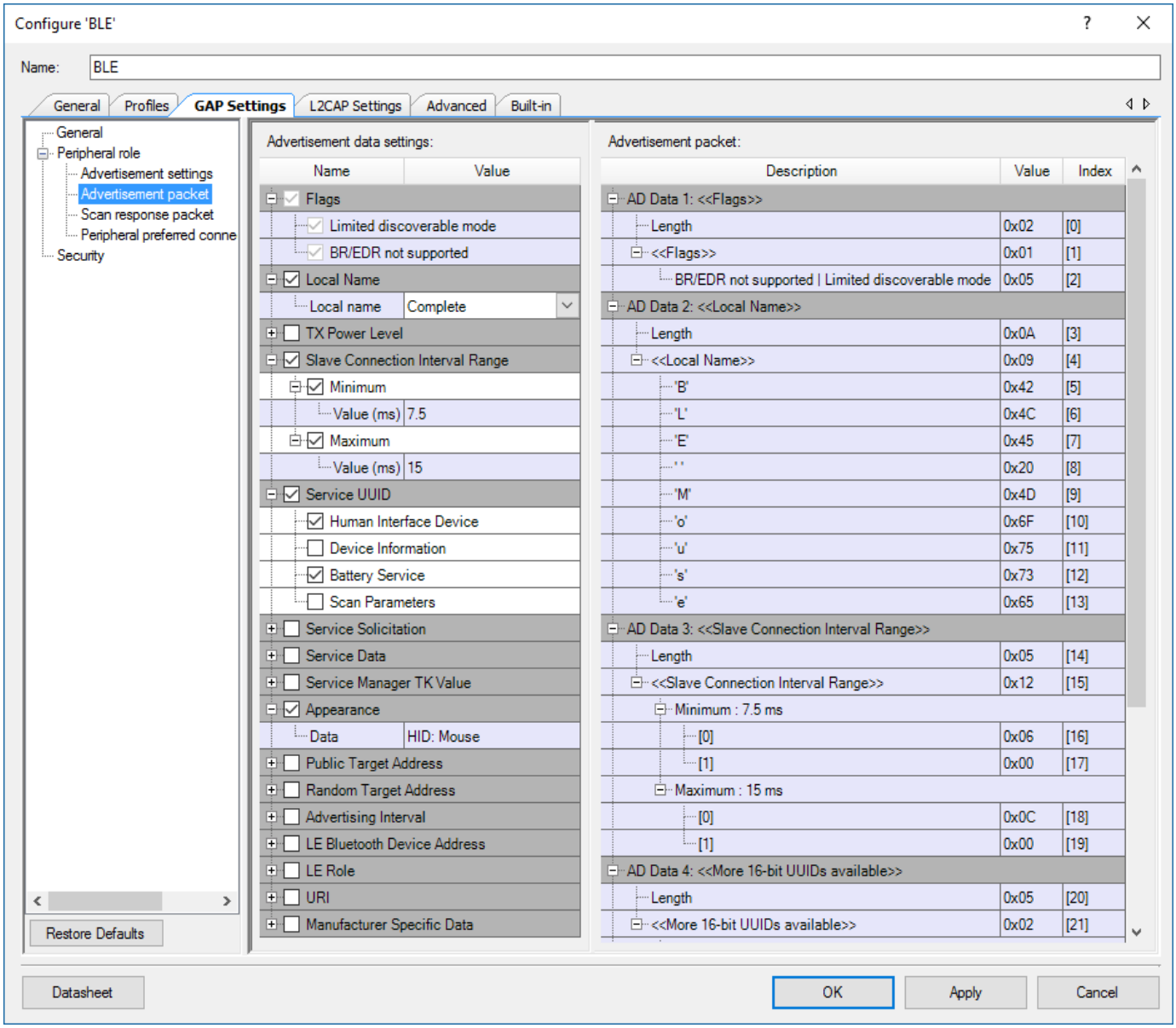

Figure 5. GAP settings -> Advertisement packet

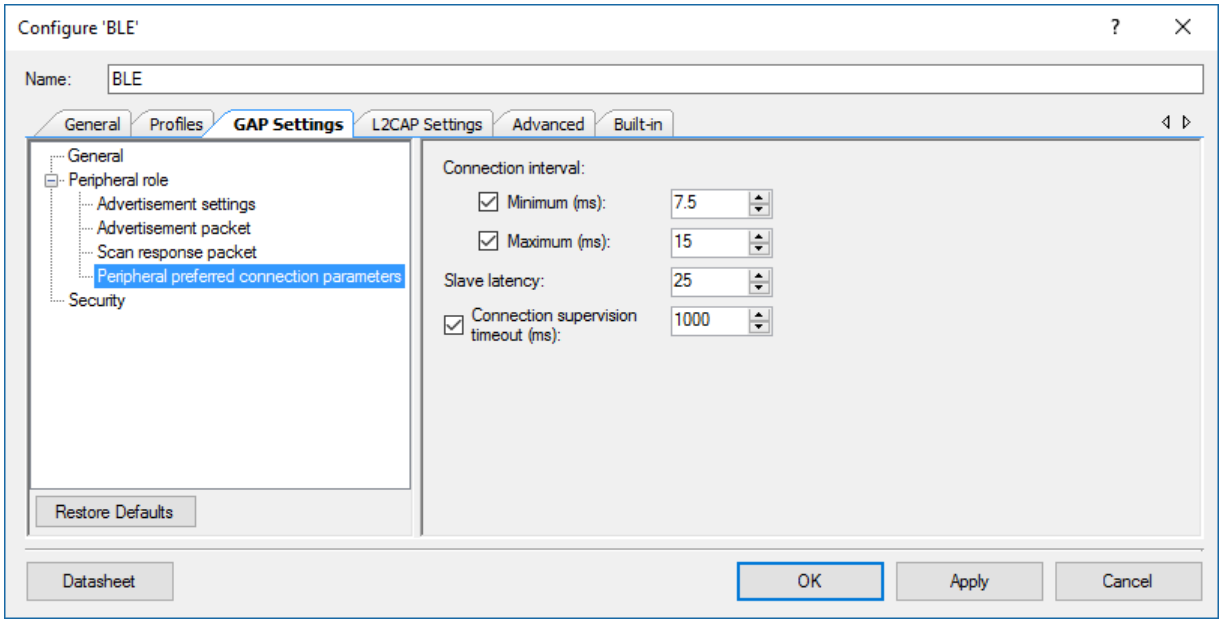

Figure 6. GAP Settings -> Peripheral preferred connection parameters

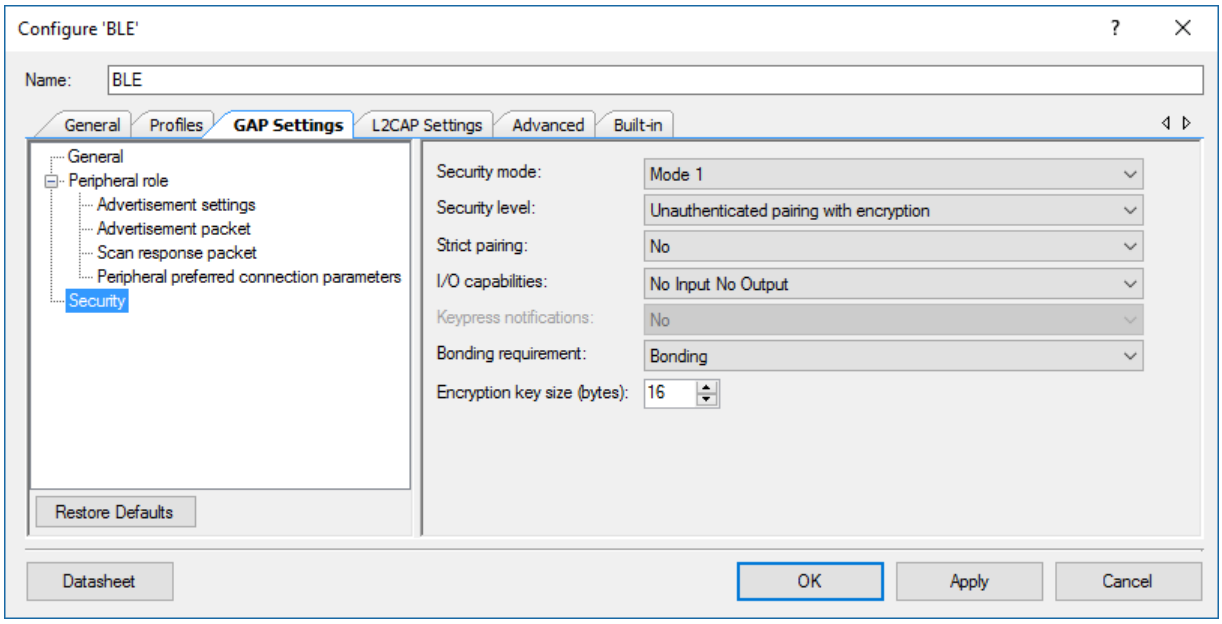

Figure 7. Security settings

Project Description

The project demonstrates the core functionality of the BLE component configured as a HID Device.

Right after the device is started it performs the BLE component initialization as well as initialization of the UART components. Four callback functions are required in this project for BLE operation. One callback function (AppCallBack()) is required to receive generic events from BLE Stack and the others (HidsCallBack(), BasCallBack(), ScpsCallBack()) are required for receiving events from the services. The component has also buried a call to CyBle_GappStartAdvertisement() on an execution of which the device will start advertising with the advertisement packet shown in **Figure 5**. On advertisement timeout, the system enters into the hibernate mode. Press the mechanical button on CY8CKIT-042 BLE (SW2) to wake up the system and start re-advertising. BLE subsystem and CPU enters into low power Deep-Sleep mode between connection and advertising intervals. BLE subsystem automatically wakes up to maintain connection and advertising data transfer.

To indicate that the device is advertising, the green LED is blinking. The red LED is turned on after disconnection to indicate that no Client is connected to the device. When a Client has connected successfully, both red and green LEDs are turned off. When a Client enables notifications, blinking of the blue LED indicates a simulated data transfer from the HID device to the Host.

You can connect the HID Device to Windows 8. Windows 7 and older OS don't have HOGP drivers. Make sure that a PC with Windows 8 has Bluetooth 4.0 installed. To connect to the HID Device, click on "Add a device" in the Devices and Printers window of the Control Panel. Select "BLE Mouse" device and click the Next button. Setup will automatically install the necessary files in the system and the mouse pointer will be moving in a square clockwise direction.

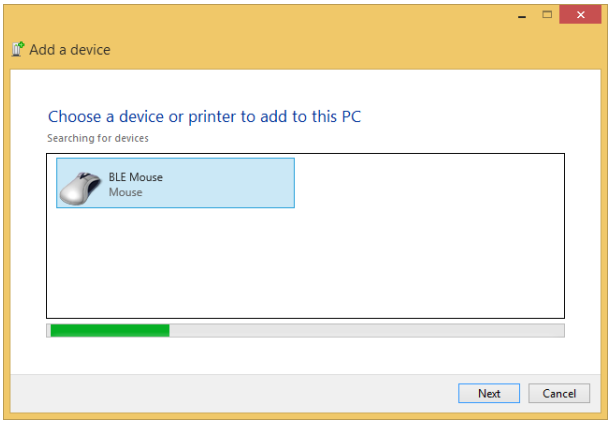

Figure 8. Windows 8 PC connecting to BLE Mouse

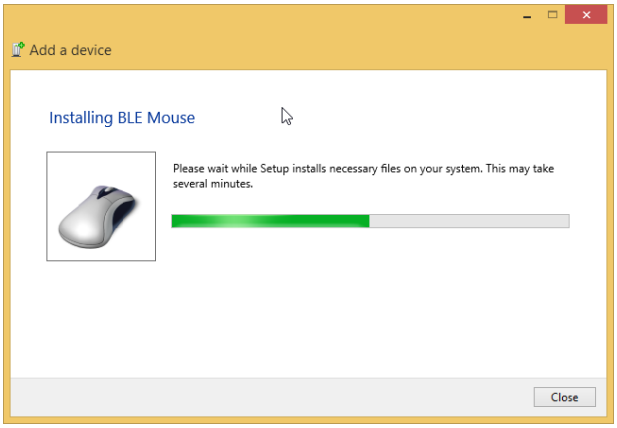

Figure 9. When device drivers are installed, mouse cursor starts moving

Also, you can connect the HID Device to the Android device with Bluetooth 4.0 support. To do this, go to your phone's Bluetooth settings and pair it with CY8CKIT-042 BLE device (it should be recognized as BLE Mouse).

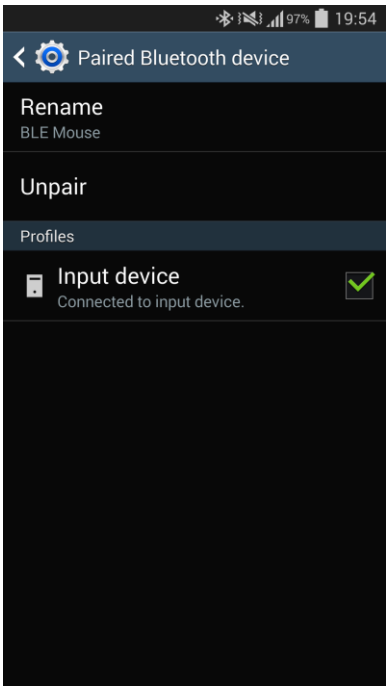

Figure 10. Android device recognizes BLE Mouse as input device

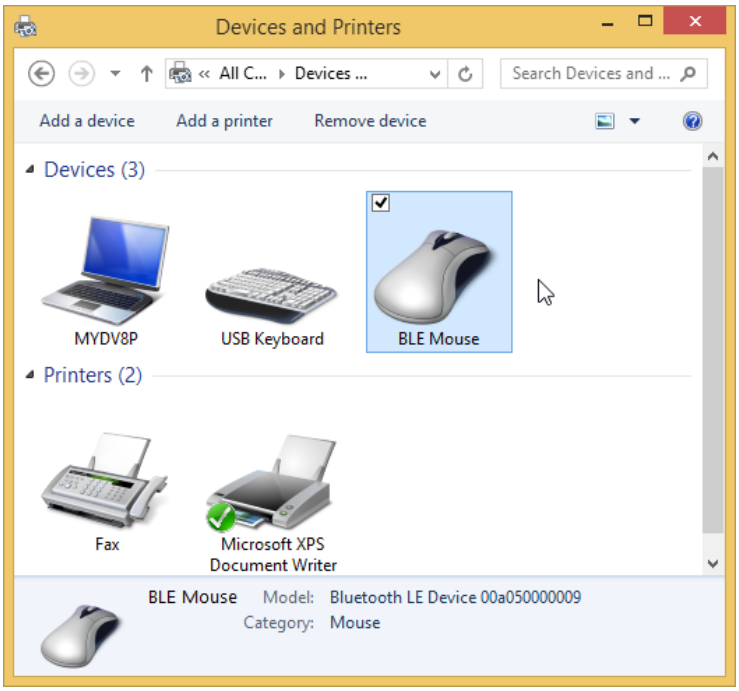

Figure 11. Windows 8 PC recognizes BLE mouse as input device

Additionally, this project implements Battery Level Service. By default, the battery level is simulated and is changed from 2 to 20 percent. To enable battery level measurement, set BAS_MEASURE_ENABLE to 1, BAS_SIMULATE_ENABLE to 0 and connect J2 pin P3[0] to J3 pin VREF. For instructions on how to use this service, refer to BLE_Battery_Level example project datasheet.

Expected Results

After pairing with peer device (Windows 8 PC, Android phone or tablet), the mouse pointer will be moving in a square clockwise direction.

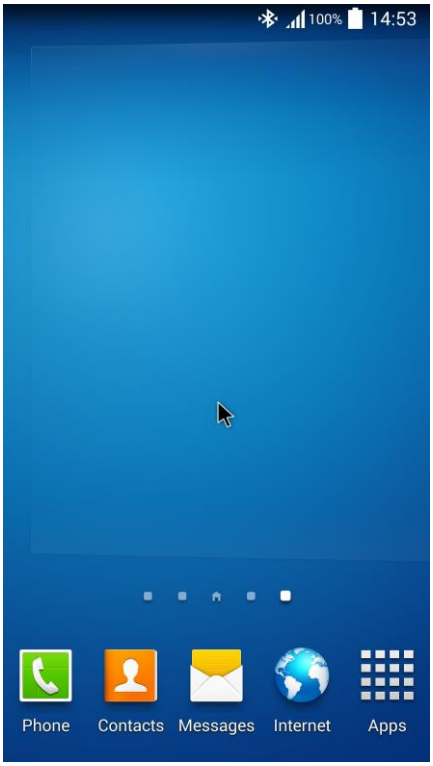

Figure 12. Initially, mouse cursor is placed at the center of the screen

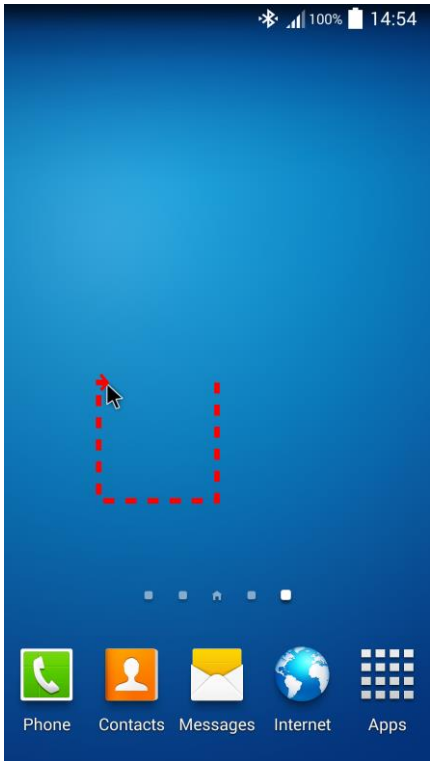

Figure 13. Mouse cursor is moving in a square clockwise direction