BLE Phone Alert

1.0

Features

- BLE PASS Service GATT Client in GAP Peripheral role
- Alert State & Ringer Setting LED indication
- Control the Ringer Setting (normal, silent) & Alert Status (mute once) by the push-button
- Reporting the workflow status through UART (optionally)

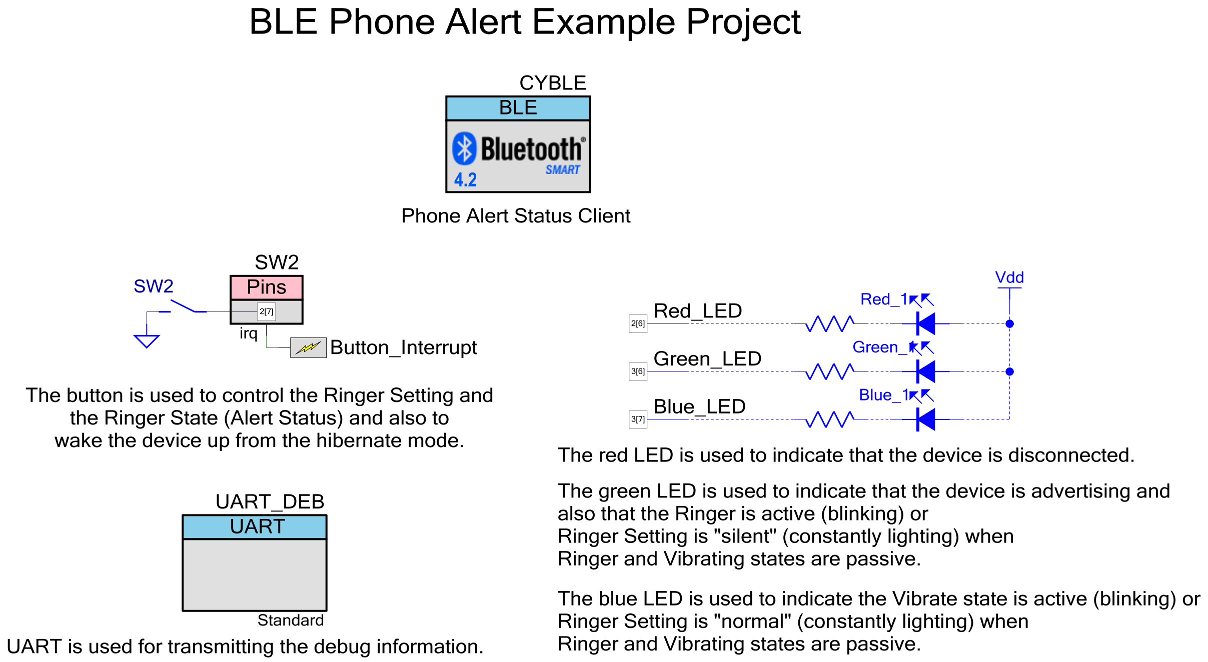
General Description

This example project demonstrates the BLE Phone Alert Handler application workflow. The Phone Alert Handler application uses the BLE Phone Alert Status Profile to monitor and control Alert State and Ringer Setting of the Server (phone).

Development Kit Configuration

Default CY8CKIT-042 BLE Pioneer Kit configuration.

Project Configuration



The button is used to control the Ringer Setting and the Ringer State (Alert Status) and also to wake the device up from the hibernate mode.

UART is used for transmitting the debug information.

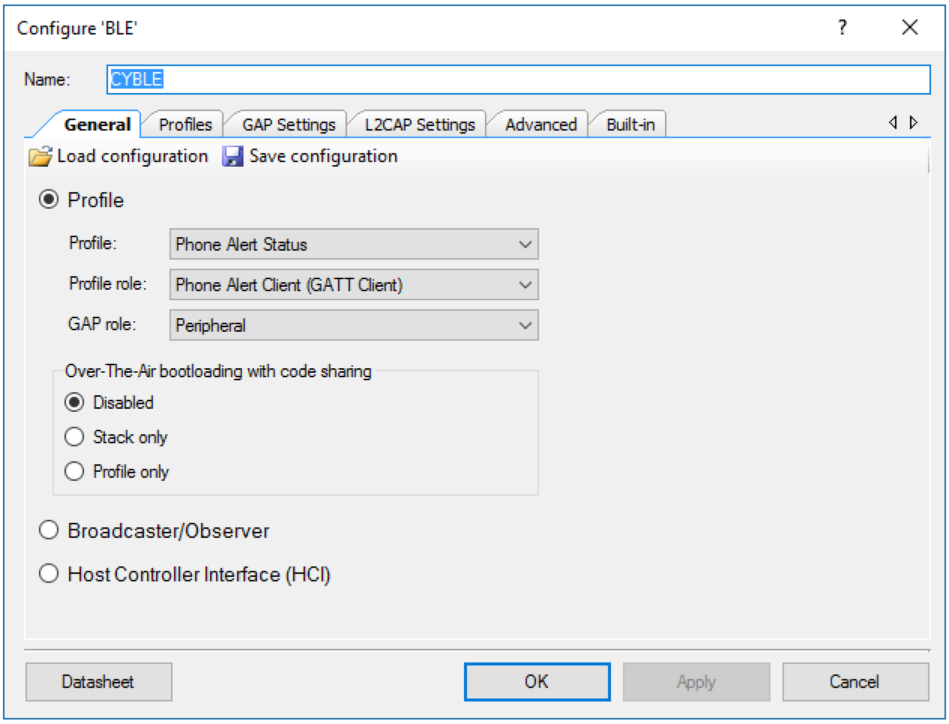
The red LED is used to indicate that the device is disconnected.

The green LED is used to indicate that the device is advertising and also that the Ringer is active (blinking) or Ringer Setting is "silent" (constantly lighting) when Ringer and Vibrating states are passive.

The blue LED is used to indicate the Vibrate state is active (blinking) or Ringer Setting is "normal" (constantly lighting) when Ringer and Vibrating states are passive.

Figure 1. Top design schematic

The BLE component is configured as Phone Alert Status Client in the GAP Peripheral role.



Name: CYBLE

● Profile

Profile: Phone Alert Status

Profile role: Phone Alert Client (GATT Client)

GAP role: Peripheral

Over-The-Air bootloading with code sharing

● Disabled

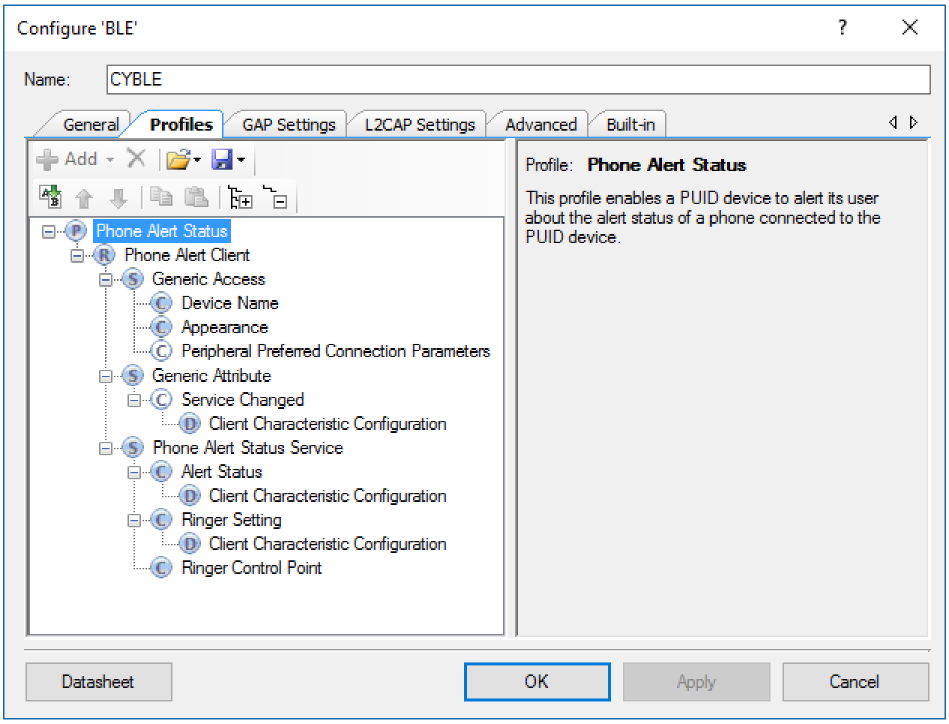
○ Stack only

○ Profile only

○ Broadcaster/Observer

○ Host Controller Interface (HCI)

Figure 2. General settings



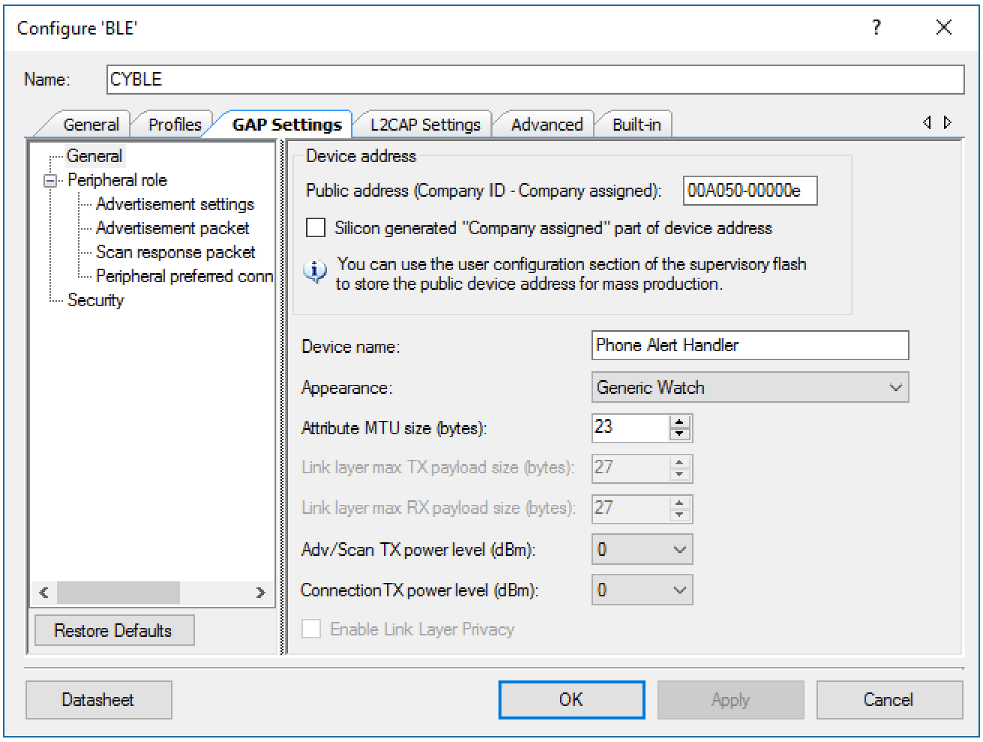
Name: CYBLE

- P Phone Alert Status
  - R Phone Alert Client
    - S Generic Access
      - C Device Name
      - C Appearance
      - C Peripheral Preferred Connection Parameters
    - S Generic Attribute
      - C Service Changed
        - D Client Characteristic Configuration
    - S Phone Alert Status Service
      - C Alert Status
        - D Client Characteristic Configuration
      - C Ringer Setting
        - D Client Characteristic Configuration
      - C Ringer Control Point

Profile: **Phone Alert Status**

This profile enables a PUID device to alert its user about the alert status of a phone connected to the PUID device.

Figure 3. GATT settings



Name: CYBLE

Device address

Public address (Company ID - Company assigned): 00A050-00000e

□ Silicon generated "Company assigned" part of device address

You can use the user configuration section of the supervisory flash to store the public device address for mass production.

Device name: Phone Alert Handler

Appearance: Generic Watch

Attribute MTU size (bytes): 23

Link layer max TX payload size (bytes): 27

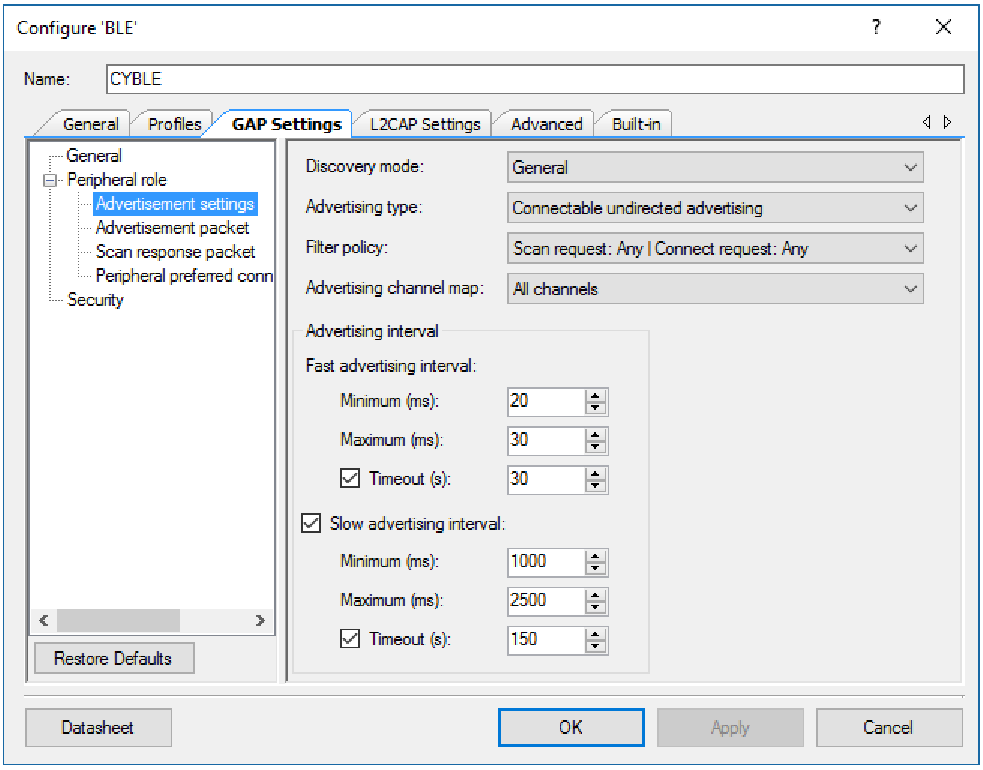
Link layer max RX payload size (bytes): 27

Adv/Scan TX power level (dBm): 0

Connection TX power level (dBm): 0

□ Enable Link Layer Privacy

Figure 4. GAP settings



Name: CYBLE

Discovery mode: General

Advertising type: Connectable undirected advertising

Filter policy: Scan request: Any | Connect request: Any

Advertising channel map: All channels

Advertising interval

Fast advertising interval:

Minimum (ms): 20

Maximum (ms): 30

☑ Timeout (s): 30

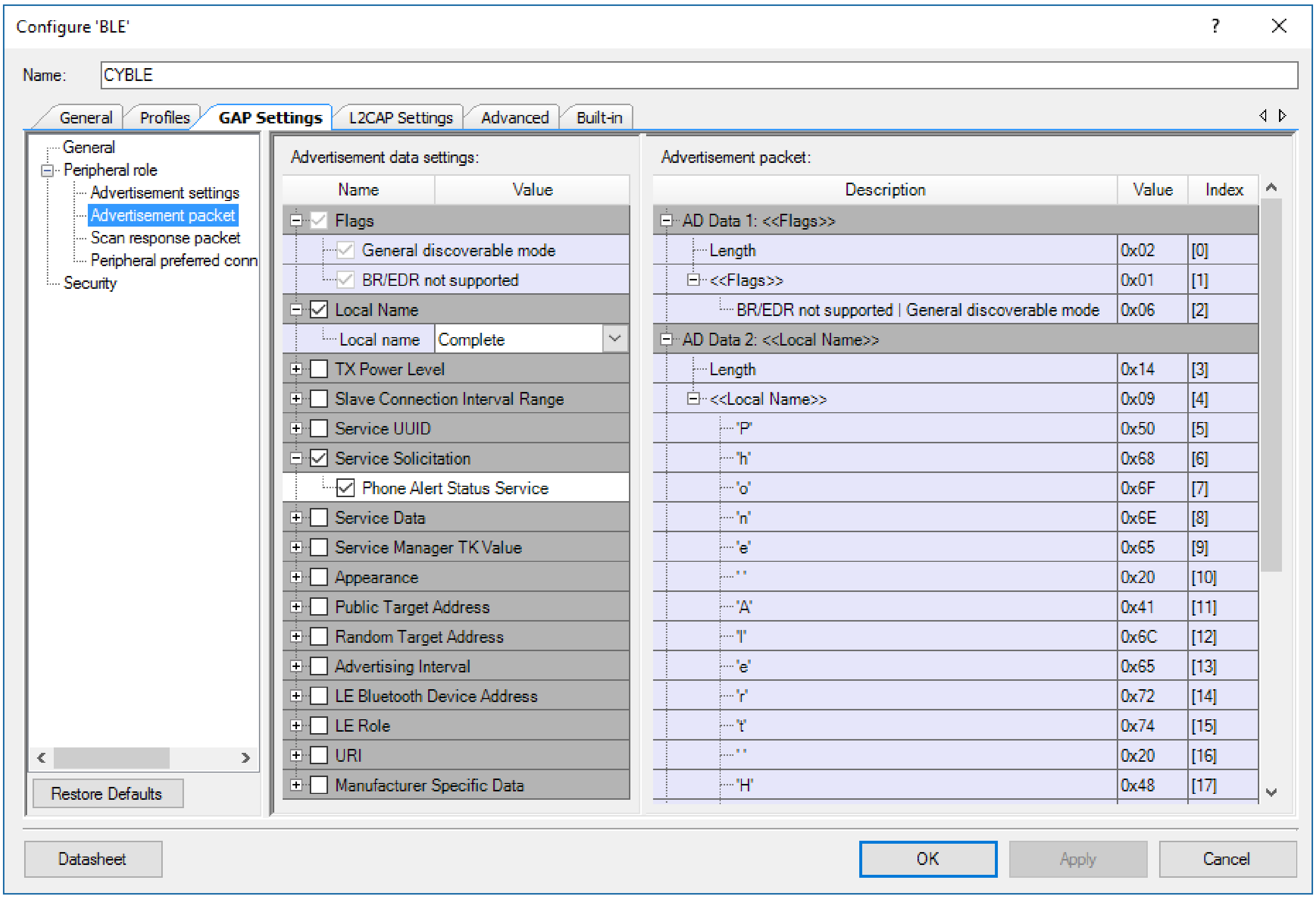
☑ Slow advertising interval:

Minimum (ms): 1000

Maximum (ms): 2500

☑ Timeout (s): 150

Figure 5. GAP settings -> Advertisement settings



Name: CYBLE

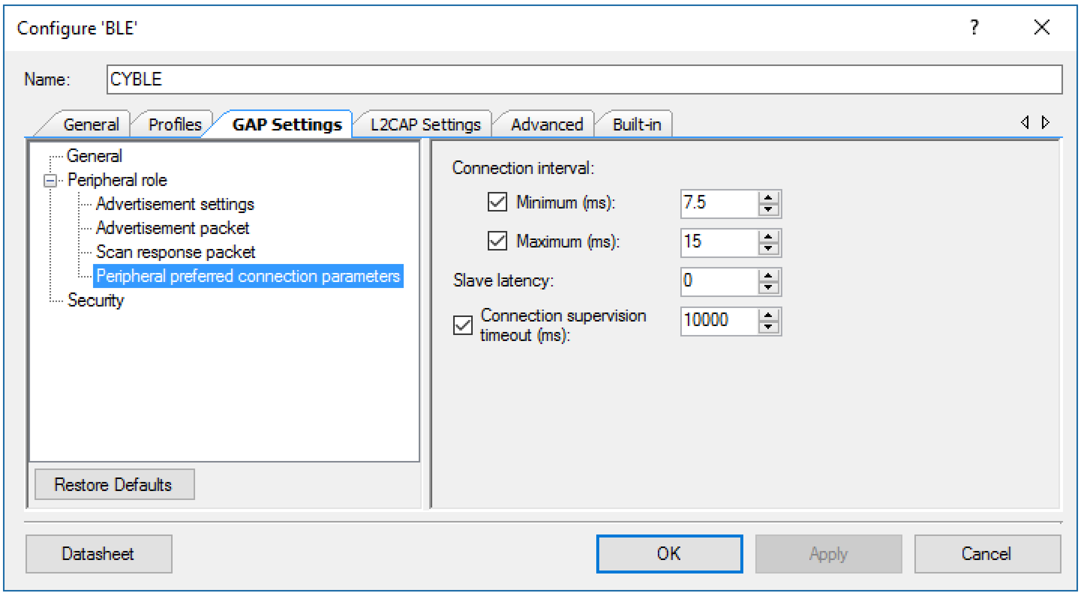
Advertisement data settings:

Name	Value
☑ Flags	
☑ General discoverable mode	
☑ BR/EDR not supported	
☑ Local Name	
Local name	Complete
□ TX Power Level	
□ Slave Connection Interval Range	
□ Service UUID	
☑ Service Solicitation	
☑ Phone Alert Status Service	
□ Service Data	
□ Service Manager TK Value	
□ Appearance	
□ Public Target Address	
□ Random Target Address	
□ Advertising Interval	
□ LE Bluetooth Device Address	
□ LE Role	
□ URI	
□ Manufacturer Specific Data	

Advertisement packet:

Description	Value	Index
AD Data 1: <<Flags>>		
Length	0x02	[0]
<<Flags>>	0x01	[1]
BR/EDR not supported | General discoverable mode	0x06	[2]
AD Data 2: <<Local Name>>		
Length	0x14	[3]
<<Local Name>>	0x09	[4]
'P'	0x50	[5]
'h'	0x68	[6]
'o'	0x6F	[7]
'n'	0x6E	[8]
'e'	0x65	[9]
' '	0x20	[10]
'A'	0x41	[11]
'l'	0x6C	[12]
'e'	0x65	[13]
'r'	0x72	[14]
't'	0x74	[15]
' '	0x20	[16]
'H'	0x48	[17]

Figure 6. GAP Settings -> Advertisement packet



Name: CYBLE

Connection interval:

☑ Minimum (ms): 7.5

☑ Maximum (ms): 15

Slave latency: 0

☑ Connection supervision timeout (ms): 10000

Figure 7. GAP Settings -> Peripheral preferred connection parameters

Project Description

The project demonstrates the functionality of the BLE component configured as a Phone Alert Status Client.

Right after startup the device performs BLE component initialization. In this project two callback functions are required for the BLE operation. One callback function (AppCallBack()) is required to receive generic events from BLE Stack and the service-specific callback PassCallBack() for Phone Alert Status service-specific events. The CYBLE_EVT_STACK_ON event indicates a successful initialization of BLE Stack. After this event is received, the component starts advertising with the packet structure as described above (see **Figure 6**). The BLE component stops advertising as soon as 180 seconds advertising period expires.

The Phone Alert Handler device can be connected with any BLE (4.0 or later) compatible device configured as GAP Central role and GATT Server which exposes Phone Alert Status Service. To connect to the Phone Alert Handler device, send a connection request to the device while the device is advertising. The green LED is blinking while the device is advertising. The red LED is turned on after disconnection to indicate that no Client is connected to the device. When the Central device connects successfully, both red and green LEDs are turned off, and device is waiting for an authorization request from the Server. When the authorization is done, the Phone Alert Handler discovers Server's GATT database (including Phone Alert Status Server's characteristics and descriptors). After the discovery process device reads Alert Status and Ringer Setting characteristic, it indicates their state and also configures their descriptors to notifications. If either ringer or vibrating is (are) active (incoming call), the green or (and) blue LED is (are) blinking. If ringer is active (green LED is blinking), the SW2 button performs a "mute once" function – so it mutes the ringer (clears "ringer" bit field of the Alert Status characteristic), but does not affect the Ringer Setting characteristic. If there is no incoming call (ringer and vibrating are passive), the green and blue LEDs represent a Ringer Setting value: blue LED lights for "Normal" and green LED lights for "Silent". The SW2 button performs a Ringer Setting toggling from "Normal" to "Silent" and vice-versa. The WDT is used to LED blinking.

Expected Results

This project is intended to work in pair with any phone with Bluetooth Low Energy support, which exposes BLE PASS Server in the GAP Central role. Currently neither iOS nor Android exposes BLE PASS Server in the GAP Central mode by default. The support of BLE PASS Server in the GAP Central role on iOS can be added by installing the third party apps (eg. Light Blue) that simulate virtual peripheral BLE device on your mobile device. Currently there are no apps that expose support BLE PASS Server in the GAP Central role on Android devices. Future PSoC Creator releases will introduce an example project exposing the BLE PASS Server in the GAP Central mode that can be run in pair with current example project.

The Phone Alert Handler device connected to the Phone (exposing the PASS server via BLE) should represent the Ringer Setting (by green and blue LEDs as described in the previous section) of the Phone in idle state (no incoming call performing). Pressing SW2 button should cause toggling Ringer Setting on the Phone.

When a Phone is ringing, the green LED should blink, and pressing SW2 should mute the ringer.
When a Phone is vibrating, the blue LED should blink, and pressing SW2 should not affect anything.

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