

BLE Regulation Test in Linux

Application Note

v1.0

INTRODUCTION

For legacy Bluetooth, you can set a Bluetooth module in test mode and control it using Bluetooth test equipment such as an Anritsu 8852B or R&S CBT Bluetooth tester. However, for BLE, there is no such test mode. You can only set TX power manually by HCI command for a specific channel, data length, and packet type.

LINUX SETUP

To set up your Linux system for the BLE regulation test, follow these steps:

1. Load the firmware to chipset.
 - For the Sterling-LWB or Sterling-LWB5, you must patch the firmware into the chipset prior to bring up the HCI interface.
Use the following command to load the firmware:

```
$brcm_patchram_plus --patchram{path to .hcd file} --enable_hci --no2bytes --tosleep 1000 {path to /dev/ UART interface} &
```
 - For 60 series modules, the firmware is the same one of Wi-Fi firmware; once you load the Wi-Fi driver, the firmware is loaded already.
2. Open the HCI interface.
3. Use the **hciconfig** command to enable the HCI interface and to ensure that hci0 is in the list.

```
$hciconfig hci0 up
$hciconfig
[root@imx6s-puck-ms5763:~] $ hciconfig
hci0:   Type: BR/EDR  Bus: UART
        BD Address: 00:25:CA:08:4F:4A  ACL MTU: 1021:8  SCO MTU: 64:1
        UP RUNNING
        RX bytes:1385 acl:0 sco:0 events:75 errors:0
        TX bytes:1190 acl:0 sco:0 commands:75 errors:0
```

HCI COMMAND FOR A BLE TRANSMITTER TEST

To use the HCI command for a BLE transmitter test, follow these steps:

1. Use the **hcidtool** command to reset the module. This HCI command is integrated in the BlueZ package.

```
$hcidtool cmd 0x03 0x03
```

This results in the following HCI event:

```
HCI Command: ogf 0x03, ocf 0x0003, plen 0
HCI Event: 0x0e plen 4
01 03 0C 00
```

2. Use the applicable HCI command to set the BLE transmitter test.
You must set the following parameters in this command: frequency index, data length, and packet payload type.

- Frequency index – k= 0~39
Frequency 2402+2k (MHz)
- Data length
- Packet payload type – Payload length in the range of 0 to 37
 - 0x0: PRBS9
 - 0x1: 11110000
 - 0x2: 10101010
 - 0x3: PRBS15
 - 0x4: 11111111
 - 0x5: 00000000
 - 0x6: 00001111
 - 0x7: 01010101

HCI command format:

```
$hcitool cmd 0x08 0x1e Frequency_index Data_length Payload_type
```

Such as:

```
$hcitool cmd 0x08 0x1e 0x1 0x10 0x0
```

If you send the correct HCI command, the following HCI event displays:

```
HCI Command: ogf 0x08, ocf 0x001e, plen 3  
01 10 00  
HCI Event: 0x0e plen 4  
01 1E 20 00
```

In the spectrum analyzer, you should have the following BLE signal (Figure 1).

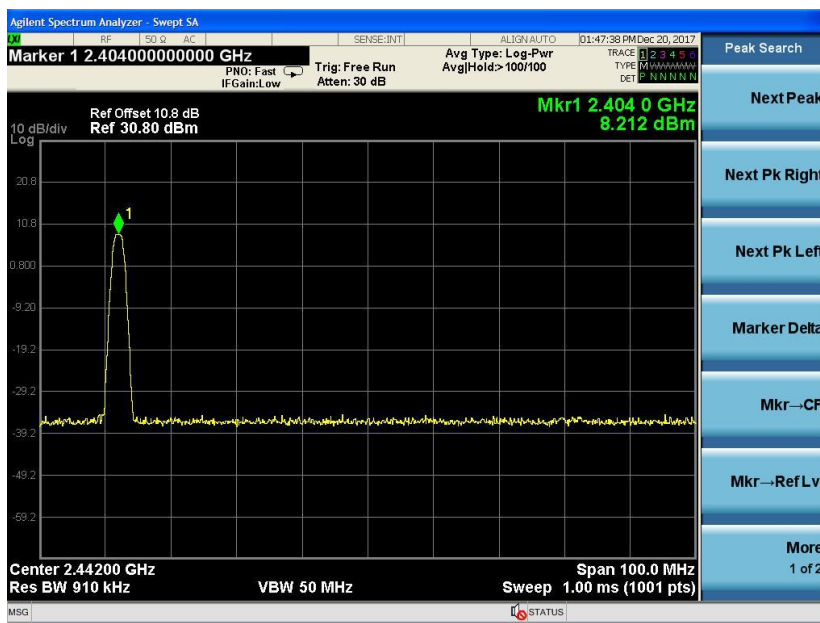


Figure 1: Spectrum analyzer - BLE signal

3. Set the BLE test end command to stop BLE transmitter test.

```
$hcitool cmd 0x08 0x1f
```

If you send the correct HCI command, the following HCI event displays:

```
HCI Command: ogf 0x08, ocf 0x001f, plen 0
HCI Event: 0x0e plen 6
01 1F 20 00 00 00
```

HCI COMMAND FOR BLE RECEIVER TEST

To use the HCI command for a BLE receiver test, follow these steps:

1. Use the hcitool command to reset the module. This HCI command is integrated in the BlueZ package.

```
$hcitool cmd 0x03 0x03
```

This results in the following HCI event:

```
HCI Command: ogf 0x03, ocf 0x0003, plen 0
HCI Event: 0x0e plen 4
01 03 0C 00
```

2. Use the applicable HCI command to set the BLE receiver test.

You must only set the frequency index parameter in this command.

- Frequency index: k= 0~39
Frequency 2402+2k (MHz)

HCI command format:

```
$hcitool cmd 0x08 0x1e Frequency_index
```

Such as:

```
$hcitool cmd 0x08 0x1e 0x1
```

If you send the correct HCI command, the following HCI event displays:

```
HCI Command: ogf 0x03, ocf 0x0003, plen 0
HCI Event: 0x0e plen 4
01 03 0C 00
```

3. Set the BLE test end command to stop BLE receiver test.

```
$hcitool cmd 0x08 0x1f
```

If you send the correct HCI command, the following HCI event displays:

```
HCI Command: ogf 0x08, ocf 0x001f, plen 0
HCI Event: 0x0e plen 6
01 1F 20 00 00 00
```

REVISION HISTORY

Version	Date	Notes	Contributor(s)	Approver
1.0	31 Jan 2018	Initial version	Miles Chung	Jonathan Kaye