

Introduction

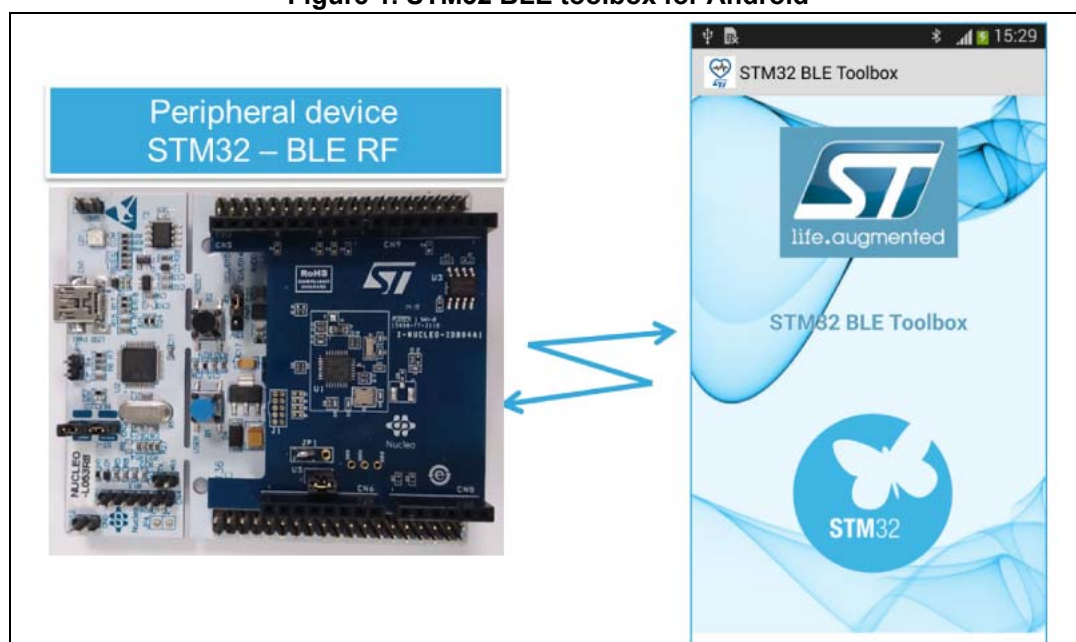
The application note describes the STM32 Bluetooth low energy (BLE) toolbox Android application (STSW-STM32153) to be used with an Android 4.3 with BLE mobile phone and an STM32 Nucleo board.

The STM32 BLE toolbox Android application manages the BLE central device and the services provided by the STM32 Bluetooth low energy system solution.

This STM32 BLE toolbox Android application is used for the following:

- Scanning of Bluetooth low energy peripheral devices
- Management of BLE peripheral GATT services
 - Heart rate monitoring (HRM) service
 - Health thermometer service (HTS)
 - LEDs & buttons services (proprietary)
- Connect/disconnect validation procedure

Figure 1. STM32 BLE toolbox for Android



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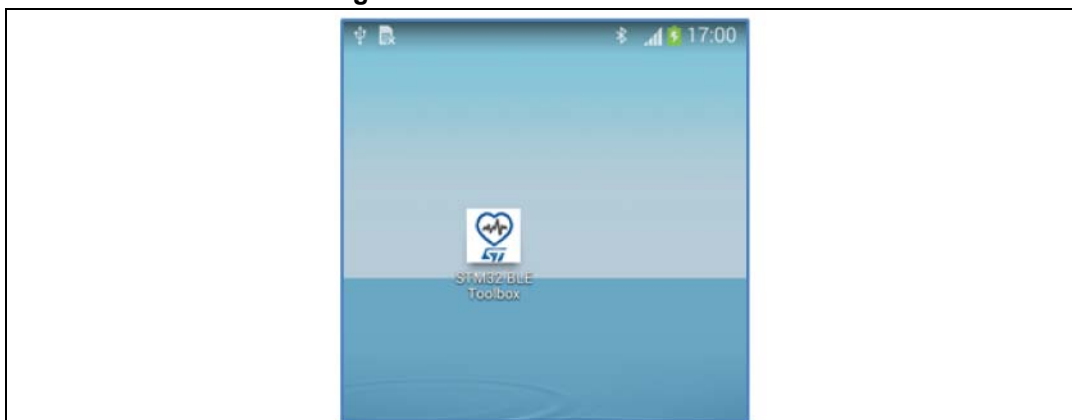
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1 Getting started

1.1 Android application installation

Copy STM32_BLE_Toolbox.apk to the SD card of your Android 4.3 mobile phone, by using a file explorer. Once the application is installed, the STM32 BLE toolbox icon is available on the application page.

Figure 2. STM32 BLE toolbox icon



1.2 Starting STM32 BLE toolbox

The application displays the following welcome page. Click on the butterfly to start scanning of the BLE peripheral devices.

Figure 3. Welcome page



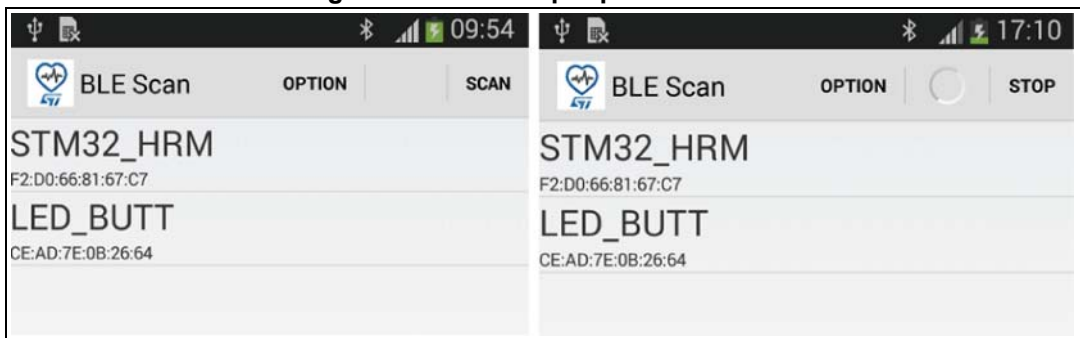
2 STM32 BLE toolbox Android features

2.1 Scanning

The scanning procedure starts automatically after clicking the butterfly on the welcome page. Subsequently, scanning can be started or stopped by clicking the “STOP”/“SCAN” button.

All the BLE scan peripheral devices are listed.

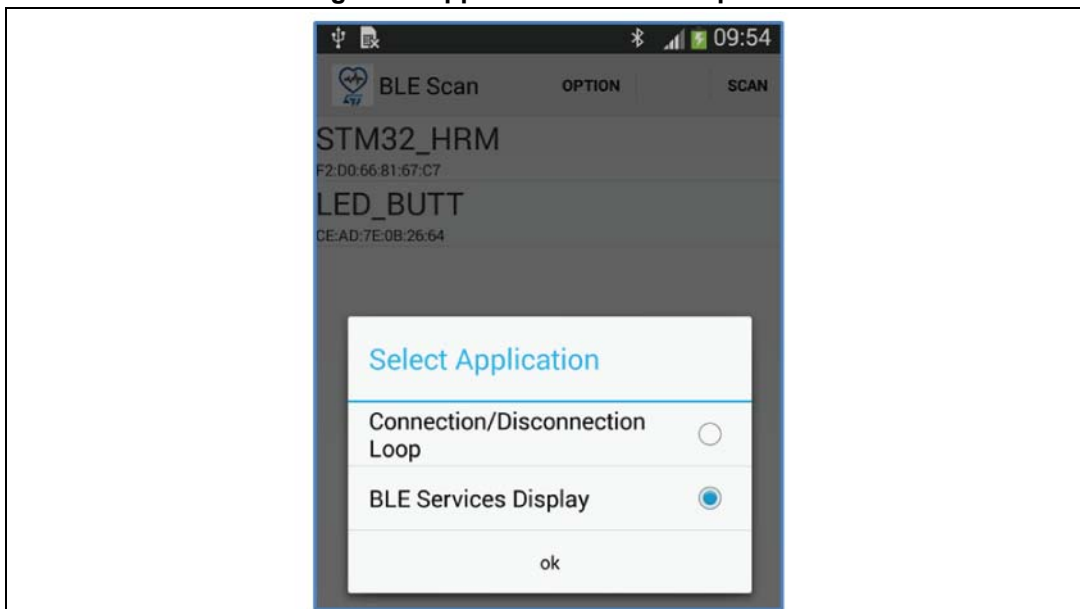
Figure 4. BLE scan peripheral devices



Select the peripheral device. Click the “OPTION” button to select the application on the device.

- “Connection/disconnection loop” is a test procedure used to stress the peripheral device by doing several BLE link connections disconnections.
- “BLE Services Display” is used to manage the peripheral device GATT services.

Figure 5. Application selection option



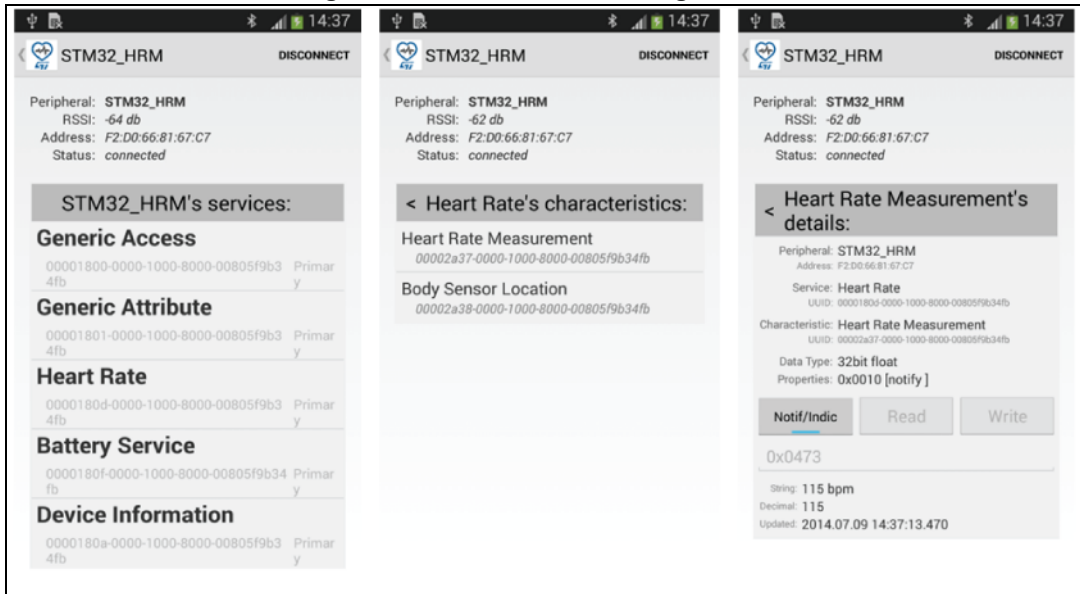
Select the application. The connection is done by clicking the peripheral device name.

2.2 BLE standard GATT services

2.2.1 Heart rate monitoring service

The peripheral device with the name “STM32_HRM” provides the heart rate monitoring service. Select “STM32_HRM”. All the services are displayed and the heart rate measurement recorded by the peripheral device can be retrieved by enabling the notification. (Notif/Indic button)

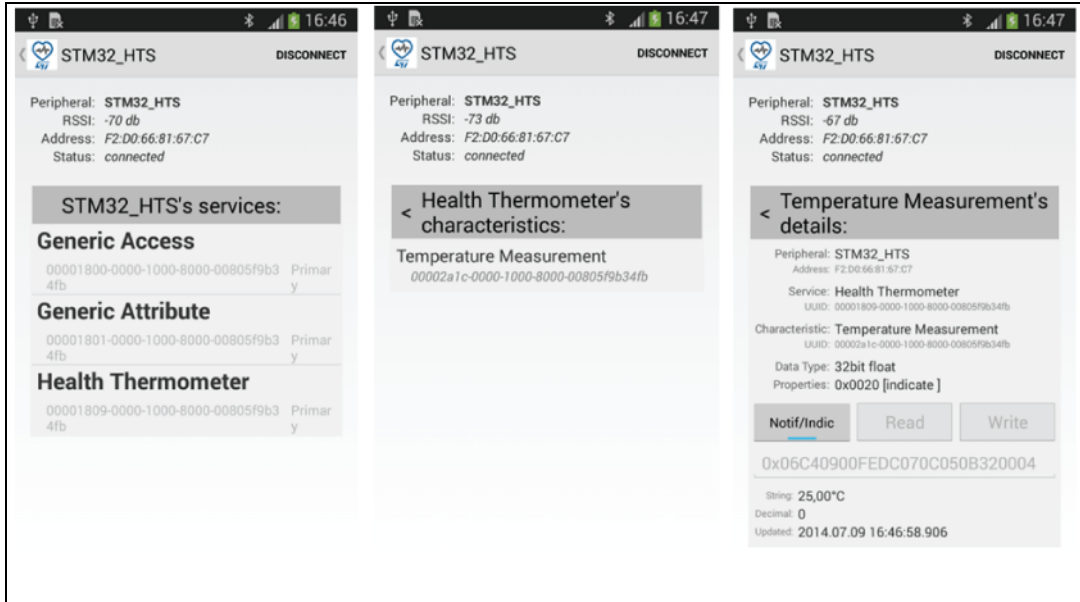
Figure 6. Heart rate monitoring service



2.2.2 Health thermometer service

The peripheral device with the name “STM32_HTS” provides the health thermometer service. Select “STM32_HTS”. All the services are displayed and the health temperature value recorded by the peripheral device can be retrieved by enabling the indication. (Notif/Indic button)

Figure 7. Heath thermometer service



The health thermometer service requires a bonding procedure which is launched automatically at the time connection. Before the connection, it is recommended to erase the existing paired devices via the Android standard Bluetooth settings parameter utility.

2.3 Proprietary GATT services

2.3.1 Button services

The button service concept is used to transfer information from the peripheral device to the central device (mobile phone) each time one of the three buttons is pushed.

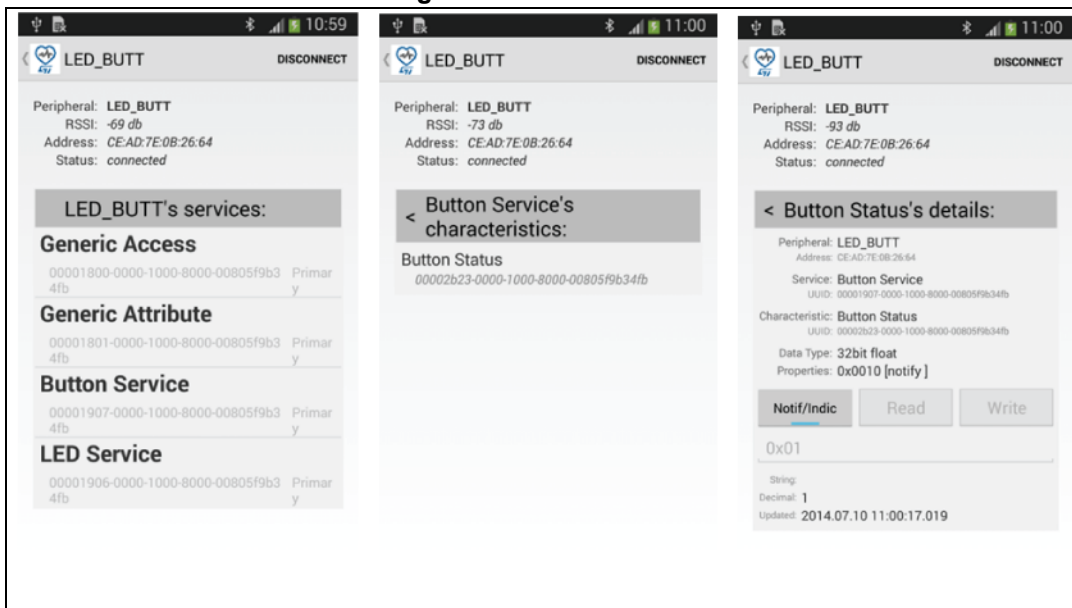
The peripheral device with the name “LED_BUTT” is used for the button service. Select “LED_BUTT”. All the services are displayed and the button update value recorded by the peripheral device can be retrieved by enabling the notification. (Notif/Indic button)

Button1 sends the information “0x01”

Button2 sends the information “0x02”

Button3 sends the information “0x03”

Figure 8. Button service

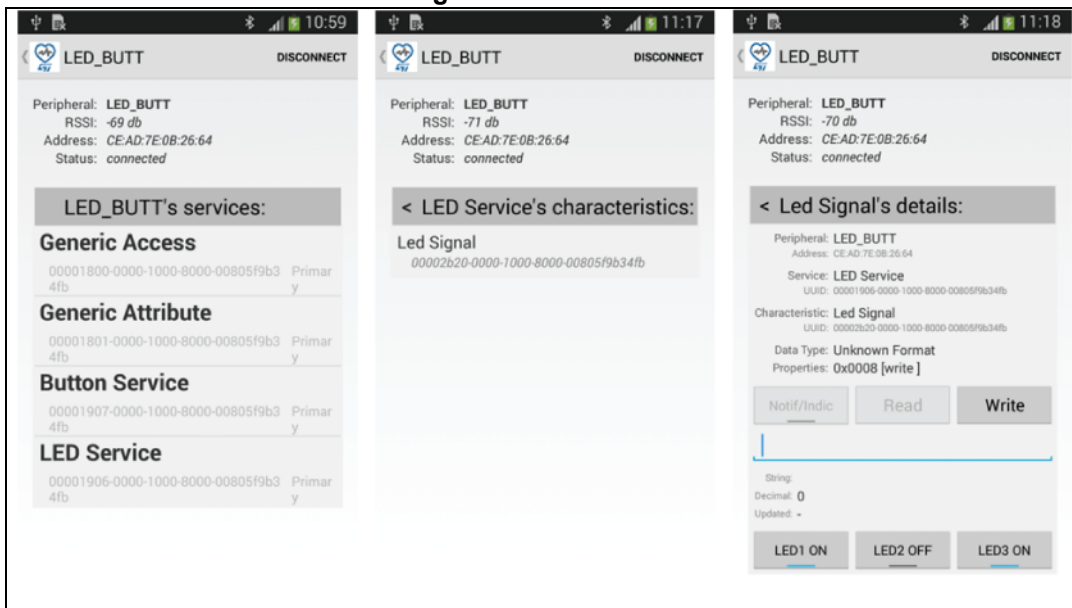


2.3.2 LED service

The LED service concept is used to transfer information from the central device (mobile phone) to the peripheral device. The information transferred is used to switch ON/OFF one of the three LEDs available on the peripheral device.

The peripheral device with the name “LED_BUTT” provides the led service. Select “LED_BUTT”. All the services are displayed and the led status from the mobile phone device can be provided either by writing the hex value LED1 = bit[0], LED2 = bit[1], LED3 = bit[2], or by pushing individual ON/OFF led buttons.

Figure 9. LED service



2.4 Connect/disconnect validation procedure

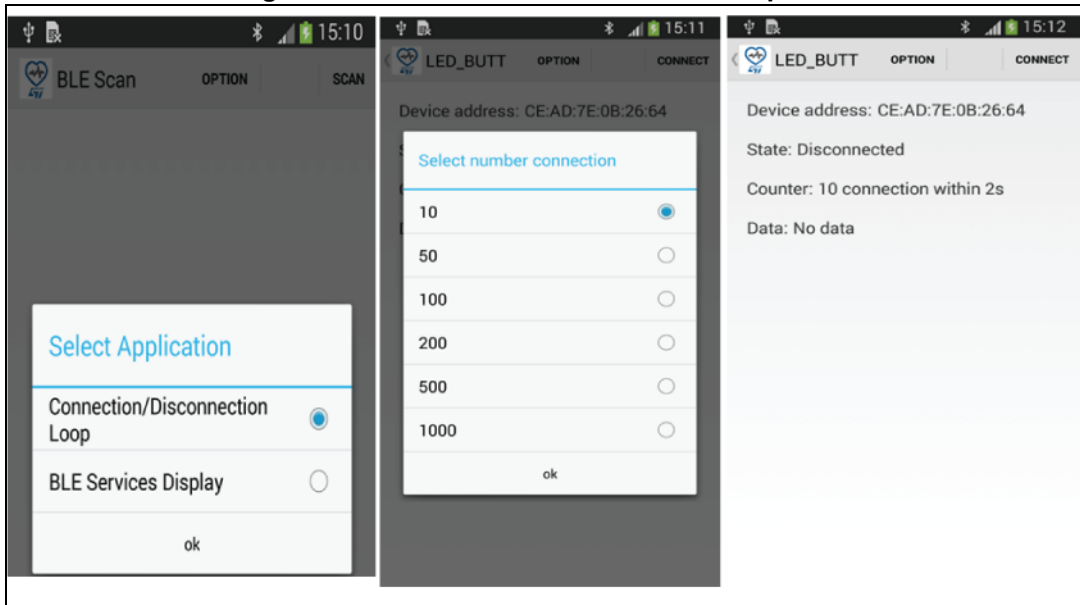
The connection/disconnection concept is used to verify and stress the consecutive fast connection and disconnection from the mobile phone side. This test gives a good indication on the robustness of the system.

Select the “Connection/disconnection loop” option. The STM32 BLE toolbox enters the test mode procedure. Select the number of preferred consecutive connection/disconnection by pushing the button “OPTION”.

The test starts after the pushing the button “CONNECT”.

When the test ends, the test execution time is provided.

Figure 10. ”Connection/disconnection loop” test



3 Revision history

Table 1. Document revision history

Date	Revision	Changes
05-Nov-2014	1	initial release.

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