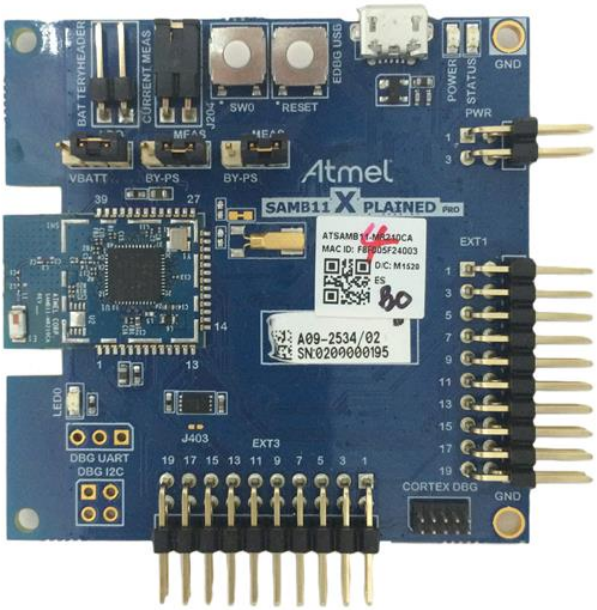
ATSAMB11 BluSDK SMART

Proximity Reporter - Getting Started Guide

USER GUIDE



Introduction

The Proximity Profile defined by the Bluetooth® SIG enables proximity monitoring between two devices. The Proximity Monitor (a GATT client) configures the behavior of a peer Proximity Reporter device (GATT server) based on link conditions. The Proximity Monitor configures desired behavior of the peer device through setting Alerts Levels on Link Loss and Path Loss. In addition, it also maintains the connection with the Proximity Reporter and monitors the link quality of the connection based on RSSI reporting from the peer device. The Proximity Reporter implements the Link Loss Service, Immediate Alert Service, and Transmit Power Service. The Proximity Reporter receives the alert level configuration from the Monitor and adapts behavior and provides notification accordingly.

The Proximity Reporter application example supports the following features:

- Advertisement
- Pairing/Bonding
- Services: Link Loss Service, Immediate Alert Service, and TX Power Service.

The Proximity Reporter application example supports the following characteristics:

- Alert Level
- Transmit Power Level

Table of Contents

1 Purpose

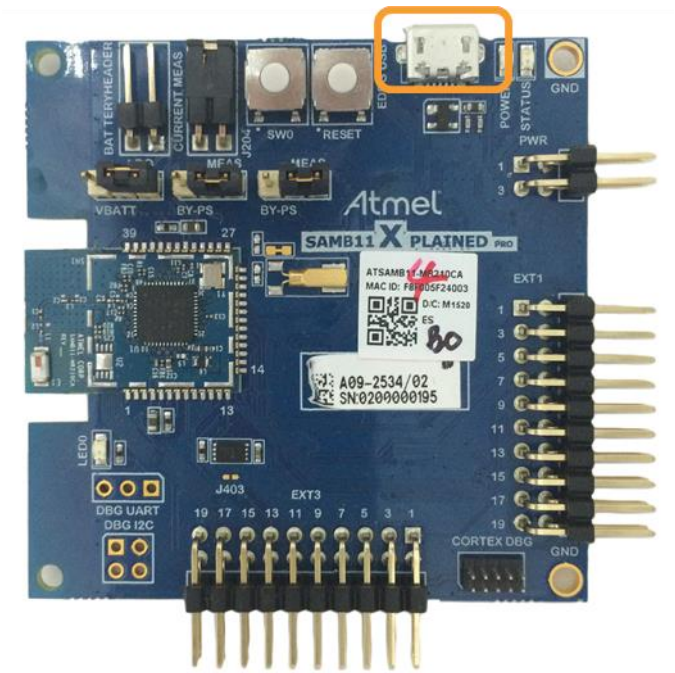
This getting started guide describes the setup of an Atmel® ATSAMB11 Xplained board and bringing up an example profile supplied as part of BluSDK SMART release. This document explains the bring-up of Proximity Reporter example application that is embedded as part of the software release package.

2 Demo Setup

3 Hardware Setup

Connect the ATSAMB11 board to the host PC using a Micro-USB cable.

Figure 3-1. EDBG USB Port



4 Software Setup

4.1 Installation Steps

1. Install the latest Atmel Studio **[Atmel Studio 7.0 (build 629 or later) web installer (recommended)]**
   http://www.atmel.com/tools/ATMELSTUDIO.aspx.
2. Install the latest Atmel Software Framework.

This package will install the following examples within the Atmel Studio environment:

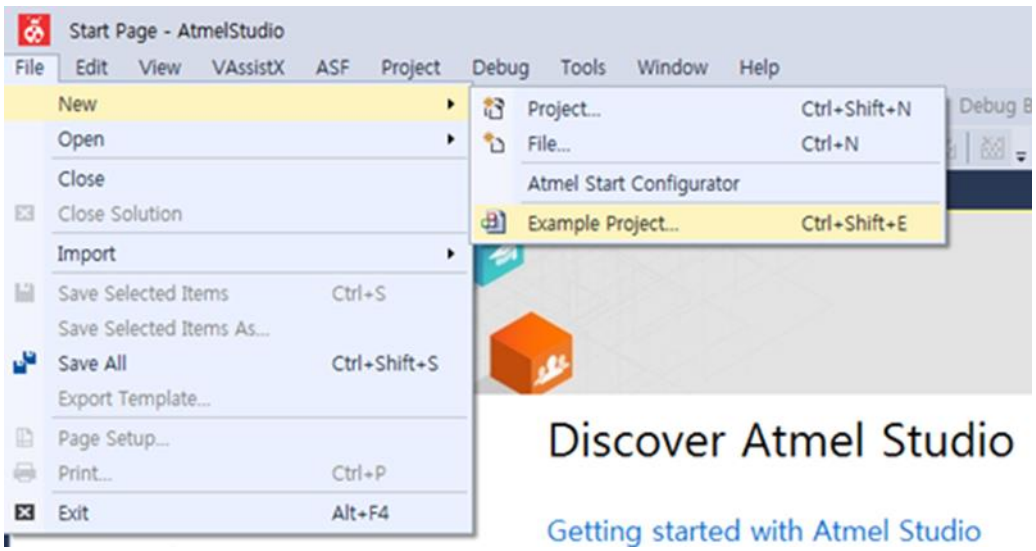
- Proximity Profile Reporter Application for ATSAMB11

4.2 Build Procedure

The following procedure is explained for ATSAMB11 application example.

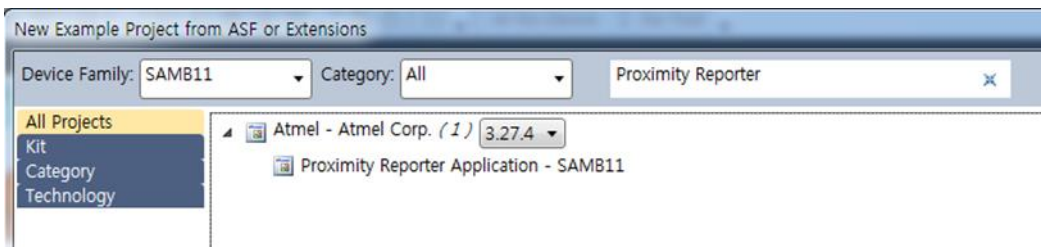
1. Select New Example Project.

Figure 4-1. Creating a New Example Project



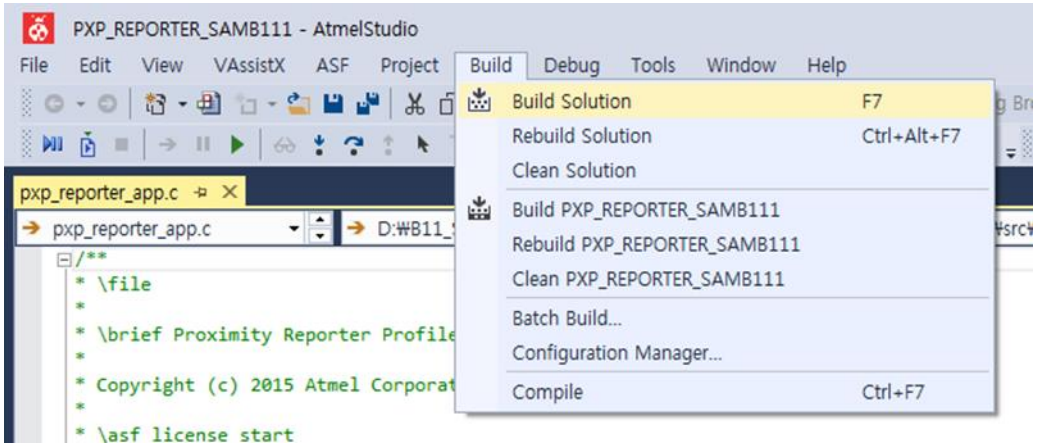
2. Select “SAMB11” in device family, enter “Proximity Reporter” in search window, and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click OK.

Figure 4-2. Selecting Proximity Reporter Application from Example Projects



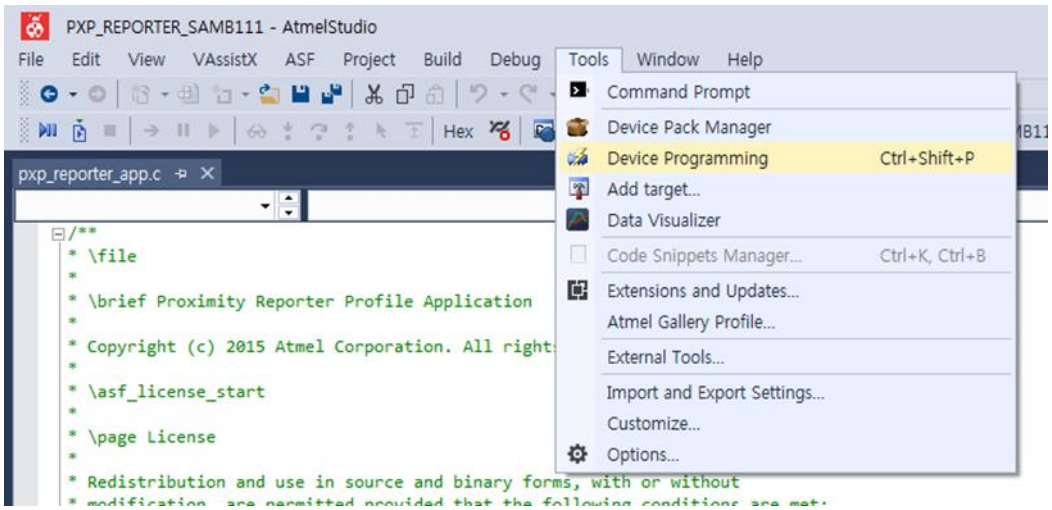
3. Accept the license Agreement. The studio will generate the Proximity Reporter Profile project for ATSAMB11.
4. Build the solution.

Figure 4-3. Building the Proximity Reporter Application



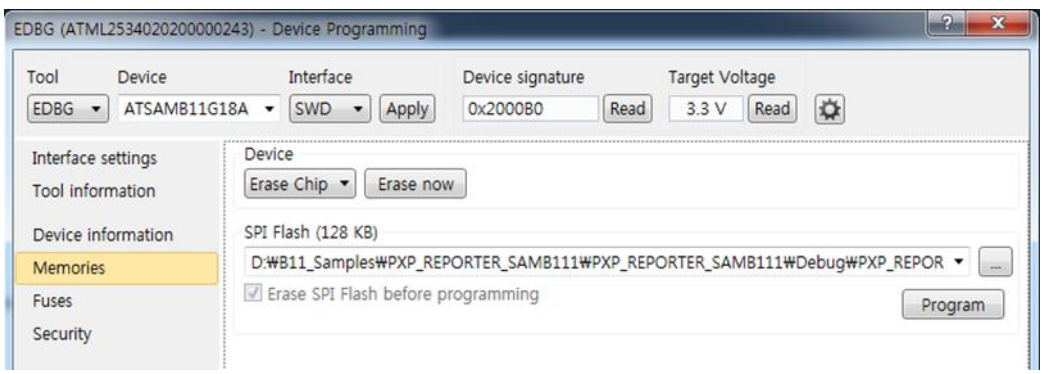
5. Download the application via the USB to the ATSAMB11 board by using the Device Programing option available in Tools as shown below.

Figure 4-4. Selecting Device Programming Option



6. Inside the device programming the user has to select the correct configuration for the device and finally program the device by using the program button.

Figure 4-5. Flash Programming



5 On-board LED Configuration

The on-board LED in ATSAMB11 is configured to notify the user about the alerts received. This chapter provides the default configuration of on-board LED for the Link Loss and Immediate Alert service.

5.1 Link Loss

On link loss the LED will blink according to the alert level set by the Proximity Monitor.

The Alert Levels are:

1. '0' for "No Alert"
2. '1' for "Mild Alert"
3. '2' for "High Alert"

The rate of the LED blinking depends on the alert level configured by the Proximity Monitor. If the link loss alert level is 'High Alert' then the LED blinking rate will be fast (one second interval) and if it is 'Mild Alert' then the blink rate is moderate (two seconds interval) and for 'No Alert' the LED is turned off.

5.2 Alert on Path Loss (Immediate Alert)

This alert is applicable when 'Immediate Alert Service' is implemented. The example application relies on path loss configuration done by the Proximity Monitor and will notify accordingly.

The Alert Levels are:

1. '0' for "No Alert"
2. '1' for "Mild Alert"
3. '2' for "High Alert"

The rate of LED blinking depends on the alert level sent by the Proximity Monitor. If the link loss alert level is 'High Alert' then LED blinking rate is configured for three seconds interval and if it is 'Mild Alert' it is configured for five seconds interval. For 'No Alert' the LED is turned off.

6 Console Logging

For the purpose of debugging, logging is made available through a serial console. The logging interface utilizes the same COM port that connects to ATSAMB11. A serial port monitor application (for example TeraTerm) shall be opened and attached to the appropriate COM port enumerated by the device on the PC.

7 Running the Demo

1. Power on the ATSAMB11 by connecting the USB cable.
2. On the PC, open any Terminal Application (e.g. TeraTerm). Select the appropriate COM Port (Settings: Baudrate 115200, None Parity, one Stop bit, one Start bit, no Hardware Handshake).
3. Press the Reset button on the ATSAMB11 board.
4. The device is now in advertising mode as shown below.

Figure 7-1. Proximity Reporter Device Initialization

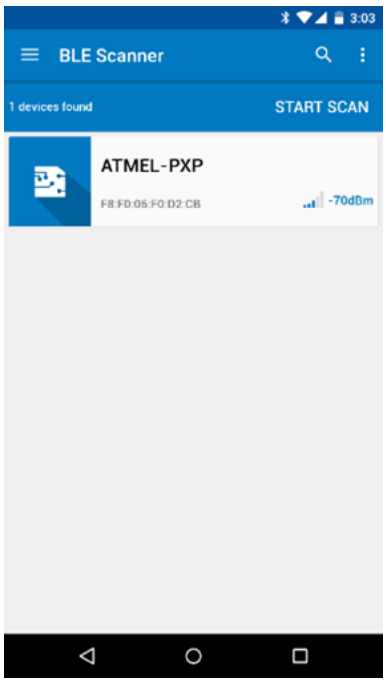
```
Initializing Proximity Reporter Application
Initializing SAMB11
BD Address:0xF8F005F24004, Address Type:0
The Supported Services in Proximity Reporter are:
  -> Link Loss Service
  -> Immediate Alert Service
  -> Tx Power Service
Bluetooth device is in Advertising Mode
Proximity Reporter Initializing Completed
```

5. On the mobile phone, start the Atmel SmartBLU application provided in the release package.

Figure 7-2. Scanning for Proximity Reporter

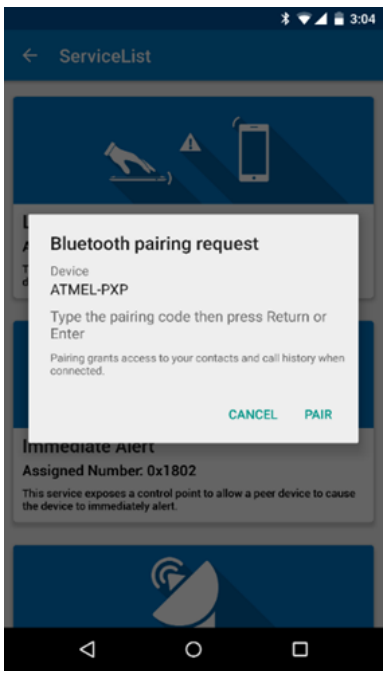
6. The Atmel Proximity Reporter device must be found and displayed in the scan screen as shown.

Figure 7-3. Proximity Reporter Devices Listed in Scan Results



7. Clicking on the Proximity Reporter device displayed in the scan results will initiate the pairing procedure.

Figure 7-4. Pairing Request



8. Click on ‘Pair’. A pop-up requesting the pass-key will appear. Enter the pass-key “123456” and click on OK as shown below. A pop-up will appear indicating a successful connection.

Figure 7-5. Pass-key Entry

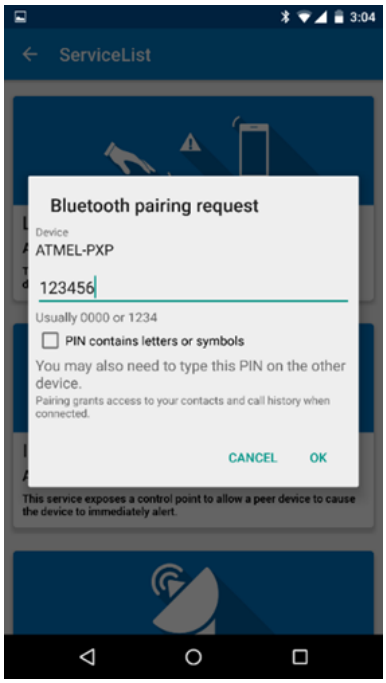


Figure 7-6. Connecting with PXP-reporter

9. On the Proximity Reporter side, the console log will display the successful completion of the pairing procedure.

Figure 7-7. Pass-key Entry

```
Initializing Proximity Reporter Application
Initializing SAMB11
BD Address:0xF8F005F24004, Address Type:0
The Supported Services in Proximity Reporter are:
  -> Link Loss Service
  -> Immediate Alert Service
  -> Tx Power Service
Bluetooth device is in Advertising Mode
Proximity Reporter Initializing Completed
Connected to peer device with address 0xf8f005f24002
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
Pairing procedure completed successfully
```

10. On the Atmel SmartBLU App, the supported services will be displayed for the Atmel Proximity Reporter Device.

Figure 7-8. Display of Services Supported by Proximity Reporter

11. Click on the desired service (Link Loss or Immediate Alert) for configuration of the alert level characteristics. Choose a value from a given set of three values viz High, Mild, and Low alert levels as shown.

Figure 7-9. Settings Screen for Configuring the Alert Level

12. After configuration of the desired alert levels, click on the ‘Immediate Alert Service’ and then move the mobile phone away from the Proximity reporter. Based on the distance of separation, path loss is plotted on the zone radar (using received RSSI values from the Proximity Reporter). Based on the zone, the Proximity Monitor sends the corresponding alert level. The console log on the Proximity Reporter will display the corresponding alerts.

Figure 7-10. Proximity Reporter Path Loss Plot Across Safe, Mild, and Danger Zone

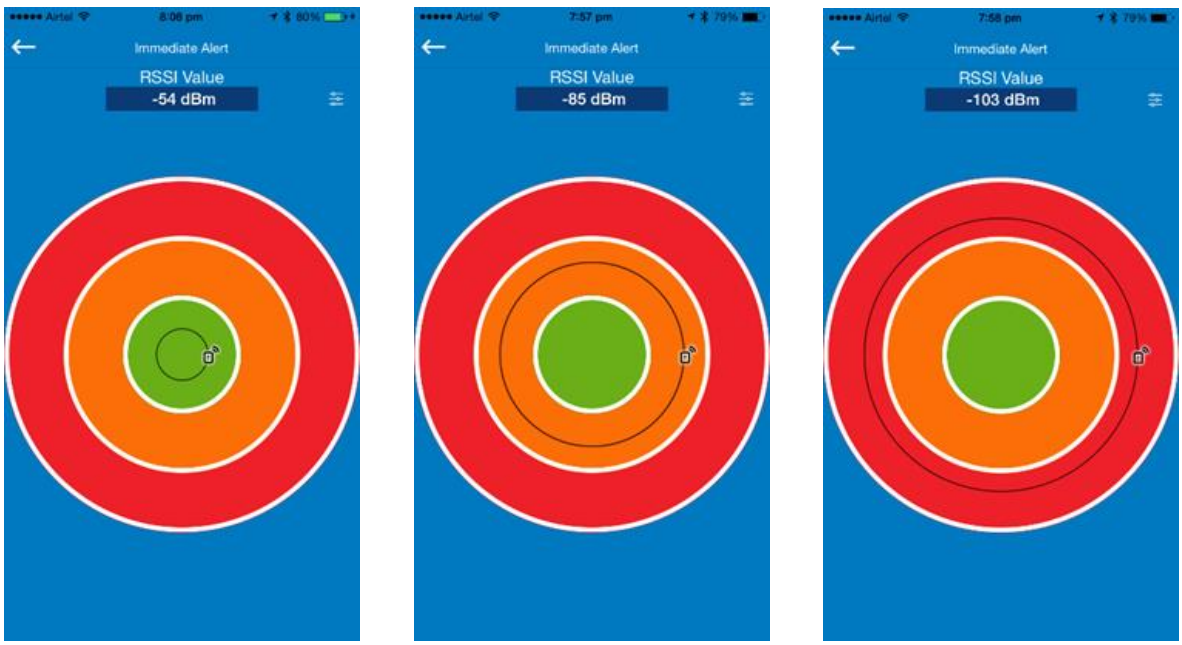


Figure 7-11. Proximity Reporter Path Loss Console-log Notifying Alerts

```
Initializing Proximity Reporter Application
Initializing SAMB11
BD Address:0xF8F005F24004, Address Type:0
The Supported Services in Proximity Reporter are:
  -> Link Loss Service
  -> Immediate Alert Service
  -> Tx Power Service
Bluetooth device is in Advertising Mode
Proximity Reporter Initializing Completed
Connected to peer device with address 0xf8f005f24002
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
The current alert level for linkloss is 2
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
```

13. After configuration of the desired alert levels, click on the ‘Link Loss Service’ and then move the mobile phone away from the reporter. Based on the distance of separation, path loss is plotted on the zone radar (using received RSSI values from the Proximity Reporter). Keep moving after you have entered the ‘Danger’ area of the zone radar until you observe the ‘Link Loss’ pop-up appear. The console log on the Proximity Reporter will display the corresponding alerts and when link loss happens, it will report disconnection.

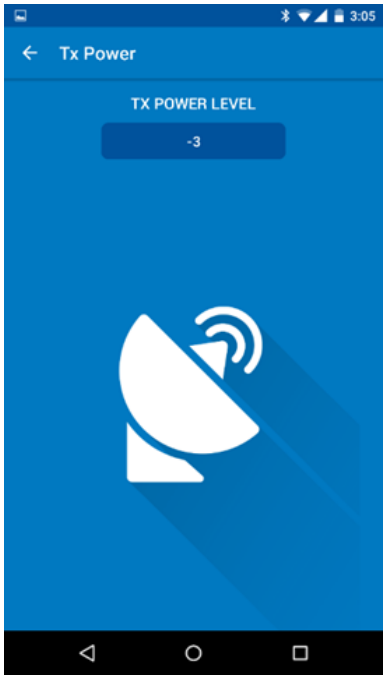
Figure 7-12. Link Loss Pop-up on Proximity Monitor

Figure 7-13. Proximity Reporter Console Log for Link Loss

```
Initializing Proximity Reporter Application
Initializing SAMB11
BD Address:0xF8F005F24004, Address Type:0
The Supported Services in Proximity Reporter are:
  -> Link Loss Service
  -> Immediate Alert Service
  -> Tx Power Service
Bluetooth device is in Advertising Mode
Proximity Reporter Initializing Completed
Connected to peer device with address 0xf8f005f24002
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
The current alert level for linkloss is 2
Pathloss : No Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Pathloss : No Alert
Pathloss : Mild Alert
Device disconnected Reason:0x13 Handle=0x0
Link loss : High Alert
Bluetooth Device is in Advertising Mode
```

14. The TX power service is used to retrieve the TX Power of the Proximity reporter. Click on the TX Power Service icon in the services screen. The Proximity Monitor reads the TX Power value from the Proximity reporter and displays it as shown below.

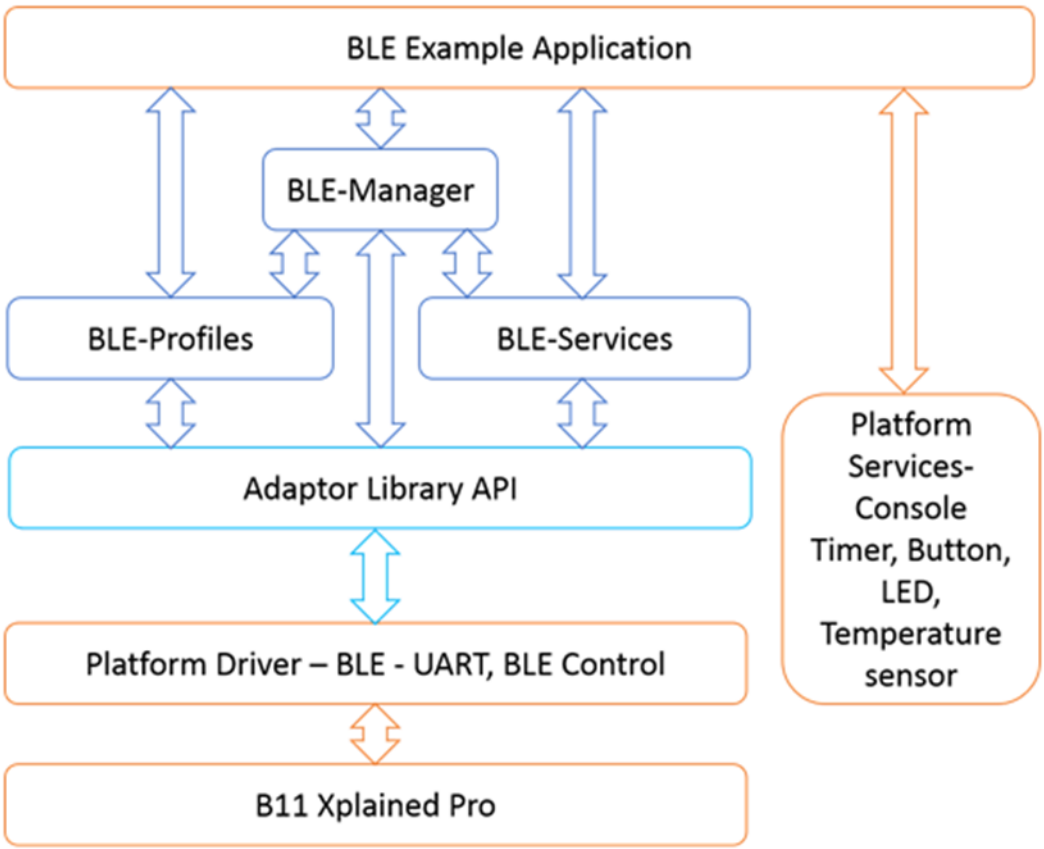
Figure 7-14. Proximity Monitor – Reading TX Power Service



8 BluSDK SMART Software Architecture

Figure 8-1 illustrates the top level diagram for the ATSAMB11 configuration.

Figure 8-1. ATSAMB11 Software Architecture



9 ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER

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10 Revision History

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