ATBTLC1000 BluSDK

Proximity Reporter – Getting Started Guide

USER GUIDE

Introduction

This getting started guide describes the setup of ATBTLC1000 with Atmel supported platform and bringing-up an example profile supplied as part of BluSDK. This document explains the bring-up of Proximity Reporter example application that is embedded as part of the software release package.

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.

This document explains the details about:

1. Getting started with the setup of Atmel supported platform with ATBTLC1000 Xplained Pro.
2. Demonstration of Proximity Reporter functionality using Atmel SmartBLU mobile application for Android and iOS included in the BluSDK release package.

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

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1 Demo Setup

Figure 1-1. Demo Setup of Proximity Reporter Application on ATBTLC1000

2 Supported Hardware Platforms and IDEs

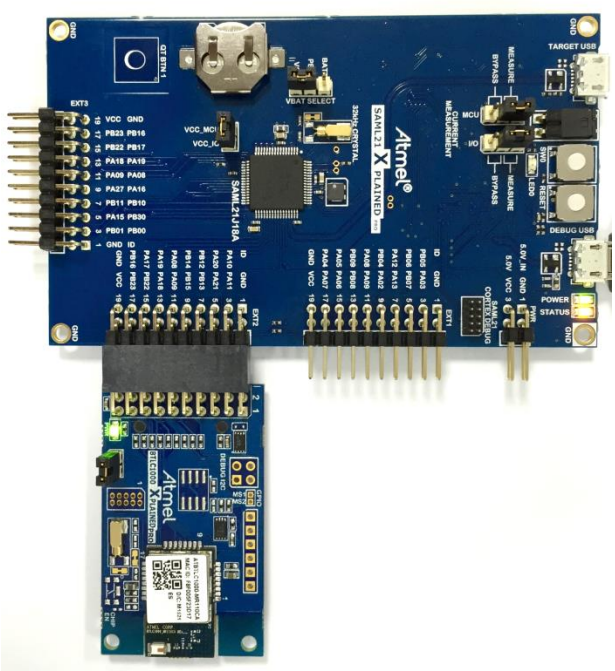
Table 2-1. BluSDK – supported hardware and IDEs

Platform	MCU	Supported BLE Module	Supported evaluation kits	Supported IDEs
SAM-L21 (MCU)	ATSAML21J18A	ATBTLC1000	ATBTLC1000-XSTK	Atmel Studio v6.2
SAM-D21 (MCU)	ATSAMD21J18A	ATBTLC1000	SAMD21-XPRO + ATBTLC1000	Atmel Studio v6.2
SAM-G55 (MCU)	ATSAMG55J19	ATBTLC1000	SAMG55-XPRO + ATBTLC1000	Atmel Studio v6.2

3 Hardware Setup

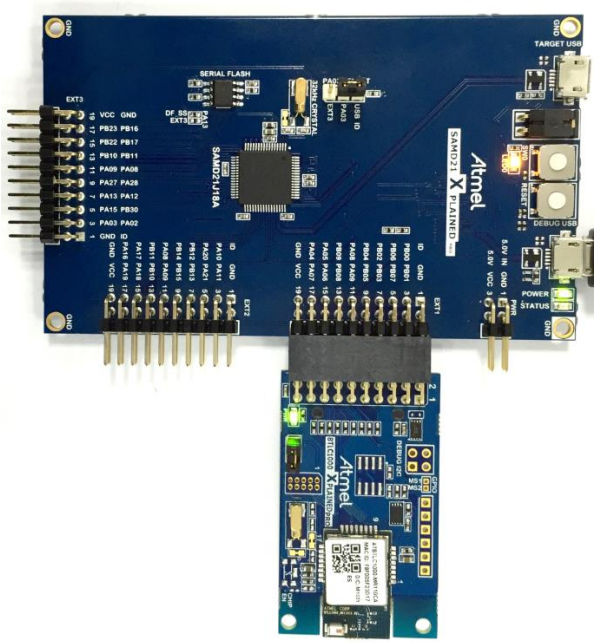
SAM L21 Xplained Pro Proximity Reporter setup

Figure 3-1. ATBTLC1000 Xplained Pro extension connected to a SAM L21 Xplained Pro



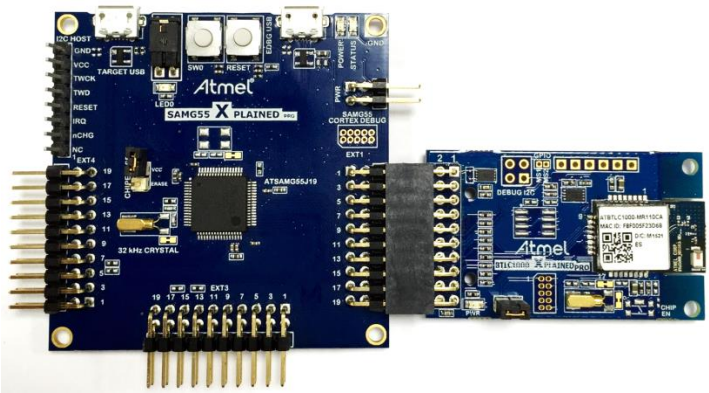
SAM D21 Xplained Pro Proximity Reporter setup

Figure 3-2. ATBTLC1000 Xplained Pro extension connected to a SAM D21 Xplained Pro



SAM G55 Xplained Pro Proximity Reporter setup

Figure 3-3. ATBTLC1000 Xplained Pro extension connected to a SAM G55 Xplained Pro



4 Software Setup

4.1 Installation Steps

1. Atmel Studio installation [Atmel Studio 6.2 sp2 (build 1563) Installer – with .NET] http://www.atmel.com/tools/atmelstudio.aspx

   (Note: SAM D21/SAM L21 part pack is built-in as part of Atmel Studio 6.2 sp2)
2. Install SAM G55 Part pack http://www.atmel.com/images/as-partpack-ATSAMG55-6.2.13.zip
   (Note: This installer is needed only if the bring-up is being done on the SAMG55 platform)
3. Atmel USB Driver Installer 7.0.712 http://www.atmel.com/tools/atmelstudio.aspx
4. Install the standalone ASF package from
   http://www.atmel.com/tools/AVRSOFTWAREFRAMEWORK.aspx .

Note: Refer to the BluSDK release notes for updates to version numbers of the components mentioned above.

This ASF msi package will install the following examples within the Atmel Studio environment.

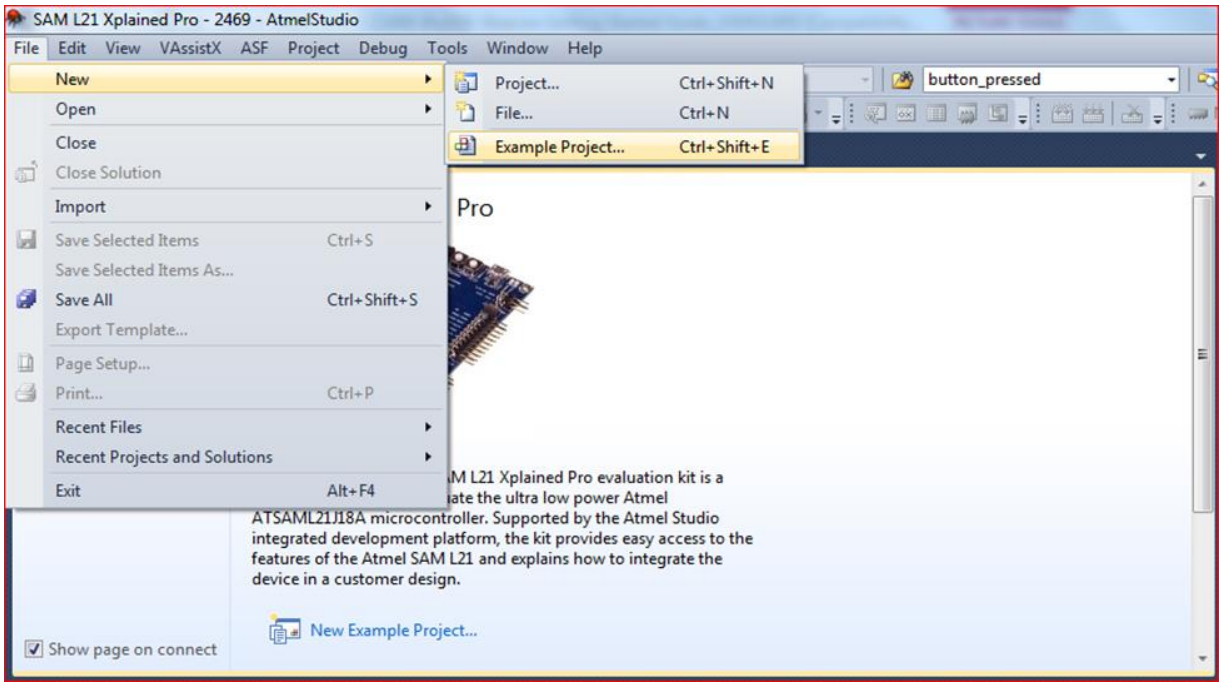
1. Proximity Profile Reporter Application for SAM D21
2. Proximity Profile Reporter Application for SAM L21
3. Proximity Profile Reporter Application for SAM G55

4.2 Build Procedure

The following procedure is explained for SAM L21 application example. The same procedure is valid for the case of other Atmel supported platform as well.

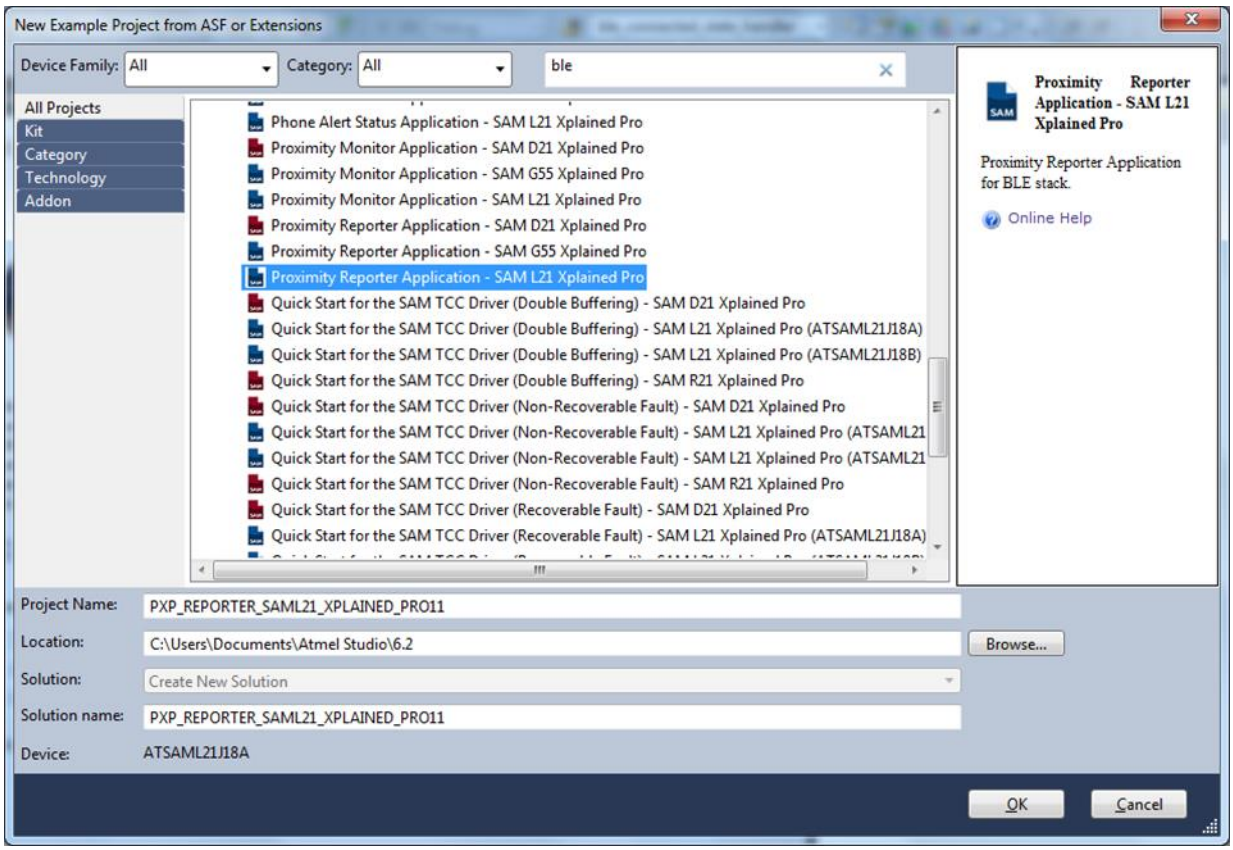
1. Select New Example Project

Figure 4-1. Creating a New Project



2. 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**.

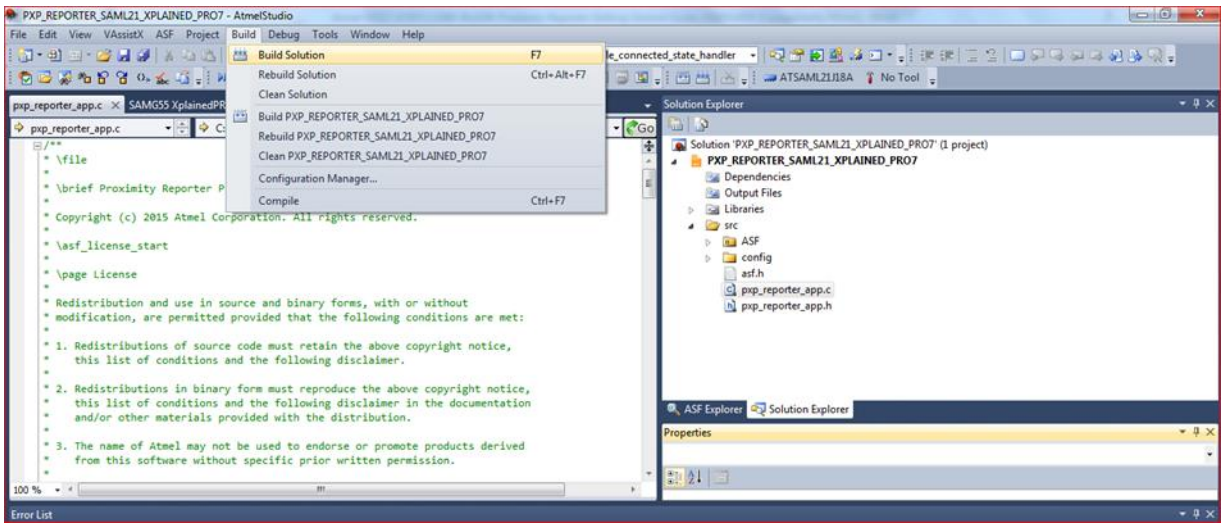
Figure 4-2. Selecting Proximity Reporter Application from Example Projects



3. Accept the license Agreement. The studio will generate the Proximity Profile Reporter project for SAM L21.

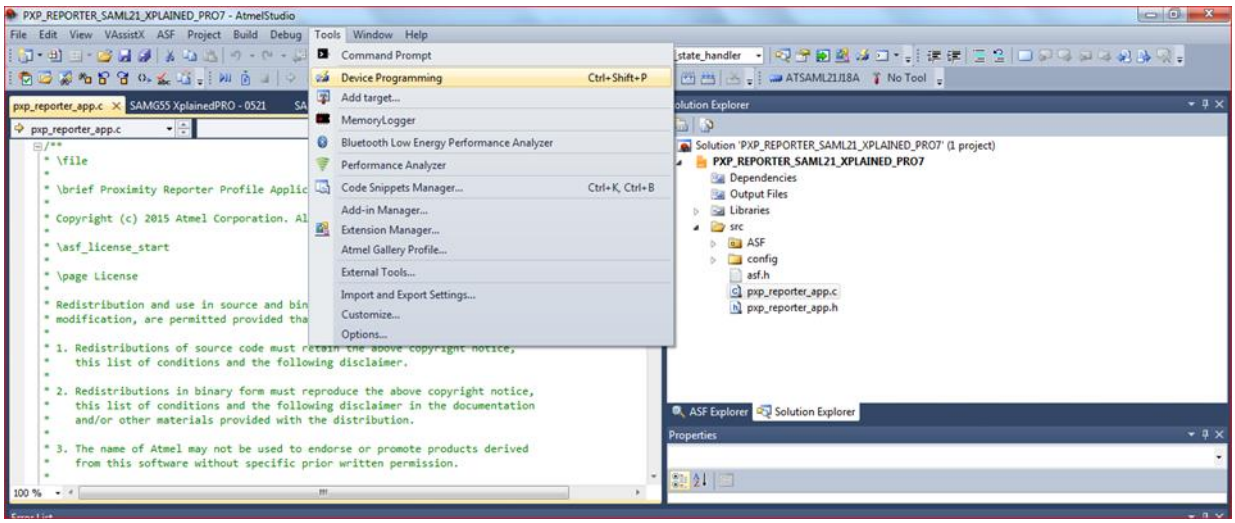
4. Building the solution.

Figure 4-3. Building the Proximity Reporter Application



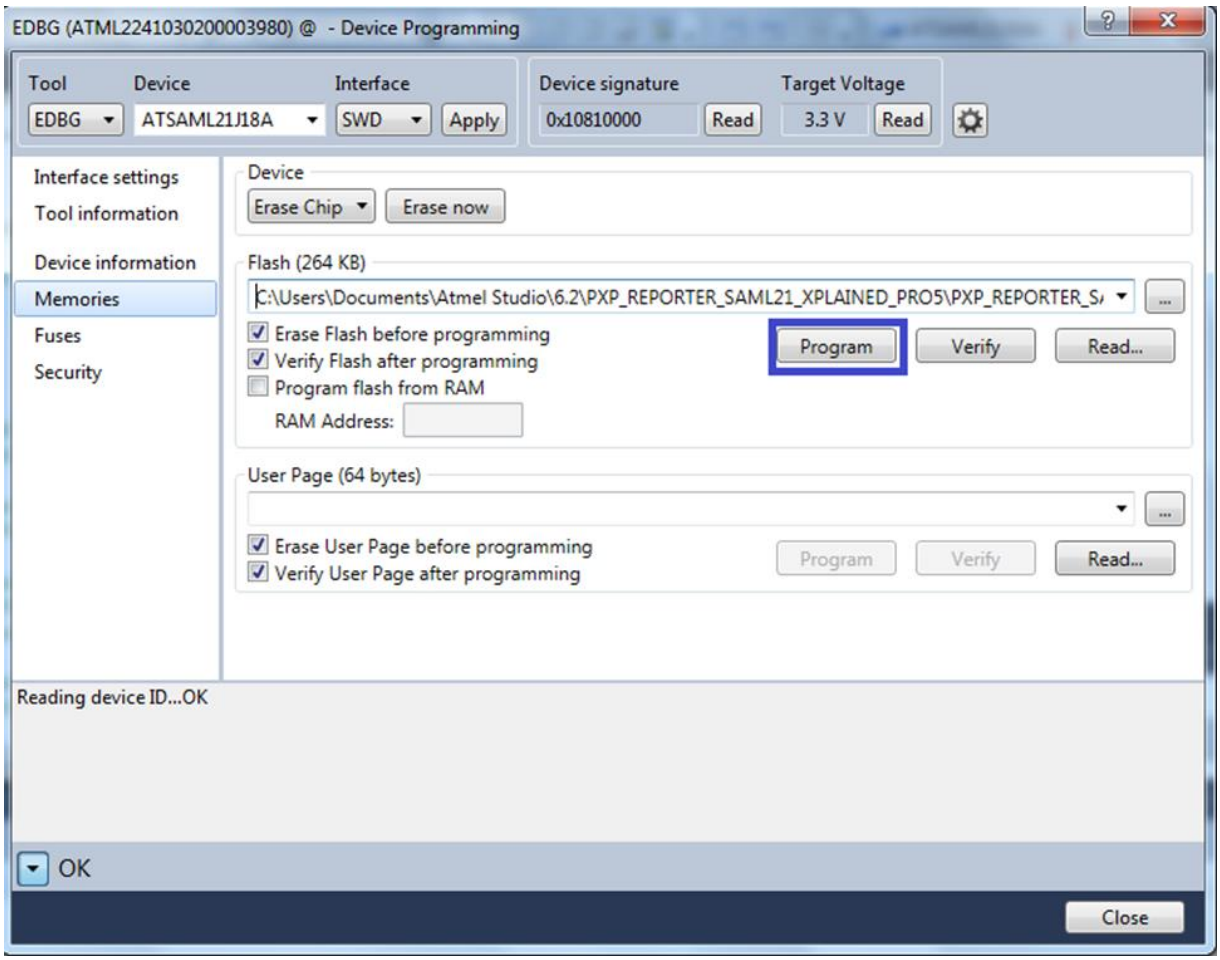
5. Download the application via the DEBUG USB to the SAM L21 board using Device Programing option available in Tools as shown below

Figure 4-4. Selecting Device Programming Option



6. Program the device to download the Proximity Reporter application as shown below.

Figure 4-5. Figure 1: Flashing the Application on Atmel MCU



5 On-board LED configuration

The on-board LED in supported platform is configured to notify the user about the alerts received. This section 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 LED blinking depends on the alert level configured by the Proximity Monitor. If the link loss alert level is 'High Alert' then LED blinking rate will be fast (1 second interval) and if it is 'Mild Alert' then the blink rate is moderate (2 second 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 3-second interval and if it is 'Mild Alert' then it is configured for 5-second interval and for 'No Alert' the LED is turned off.

B

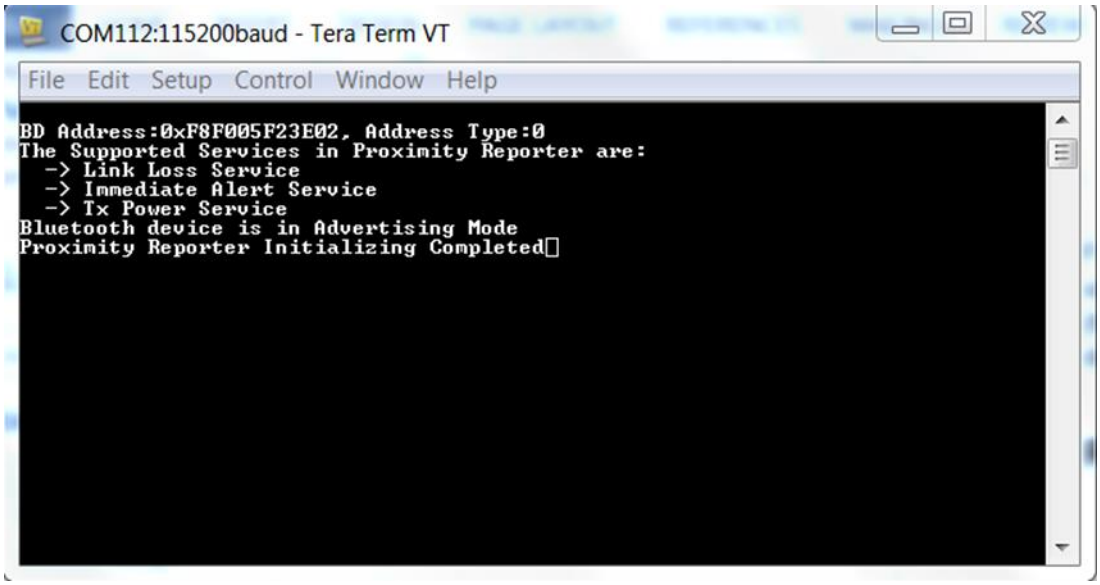
6 Console Display

For the purpose of debugging, logging is made available through a serial console. The logging interface utilizes the same COM port that connects to Atmel supported platform. 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. Connect the BTLC1000 Xplained Pro Board to SAML21 Xplained Pro EXT2 as indicated in Figure 2.
2. Power on the SAML21 by connecting the USB Cable.
3. On the PC, open any Terminal Application (e.g. TeraTerm). Select the appropriate COM Port (Settings: Baudrate 115200, None Parity, 1 Stop bit, 1 Start bit, No Hardware Handshake).
4. Press the Reset button on the SAML21 board.
5. The device is now in advertising mode as shown below.

Figure 7-1. Proximity Reporter Device Initialization

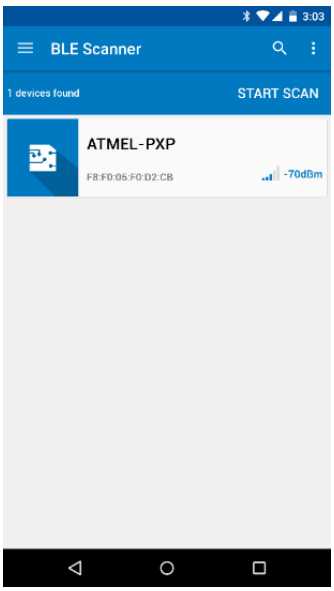


1. On the mobile phone, start the Atmel Smart Connect mobile application provided with the release package.

Figure 7-2. Scanning for Proximity Reporter

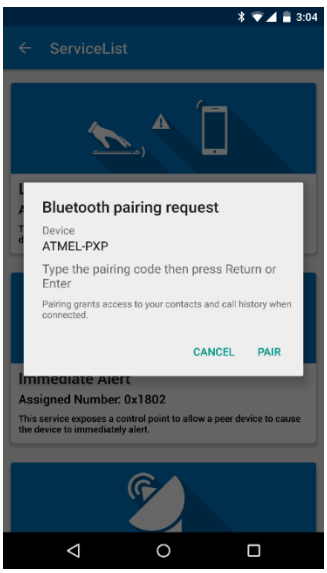
2. The Atmel Proximity reporter device will be discovered and displayed in the scan screen as shown.

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



3. Click on the Proximity Reporter device displayed in the scan results and this will initiate the pairing procedure

Figure 7-4. Pairing Request



4. 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 indicative successful connection.

Figure 7-5. Pass-Key Entry

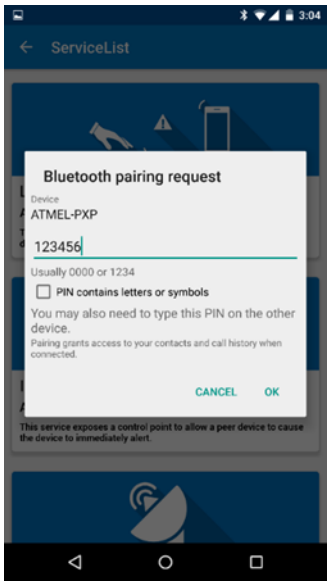
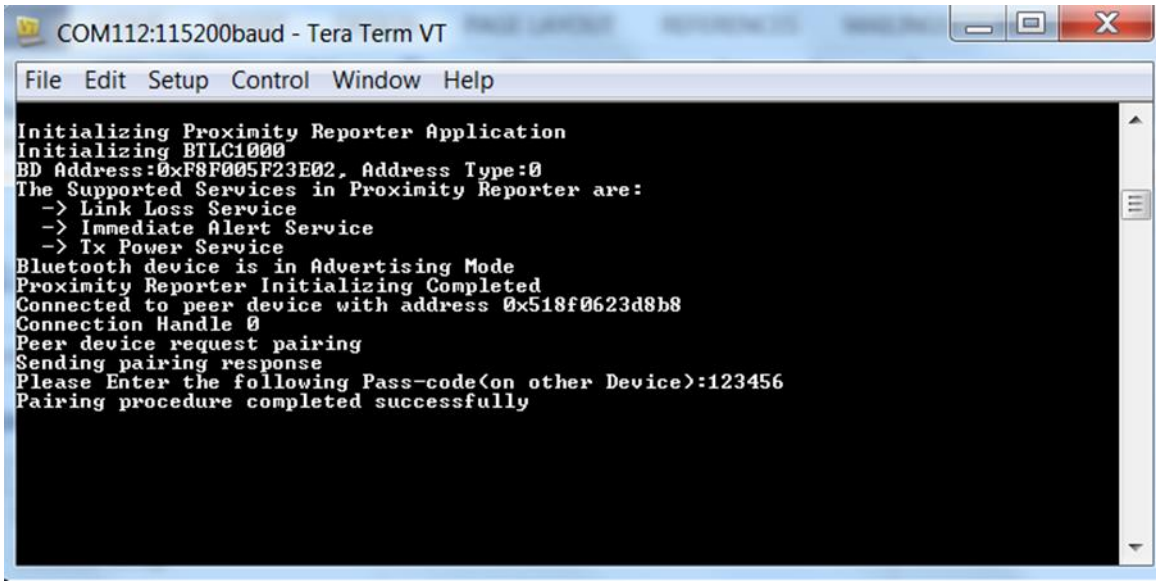


Figure 7-6. Connecting with PXP-Reporter

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

Figure 7-7. Pass-Key Entry

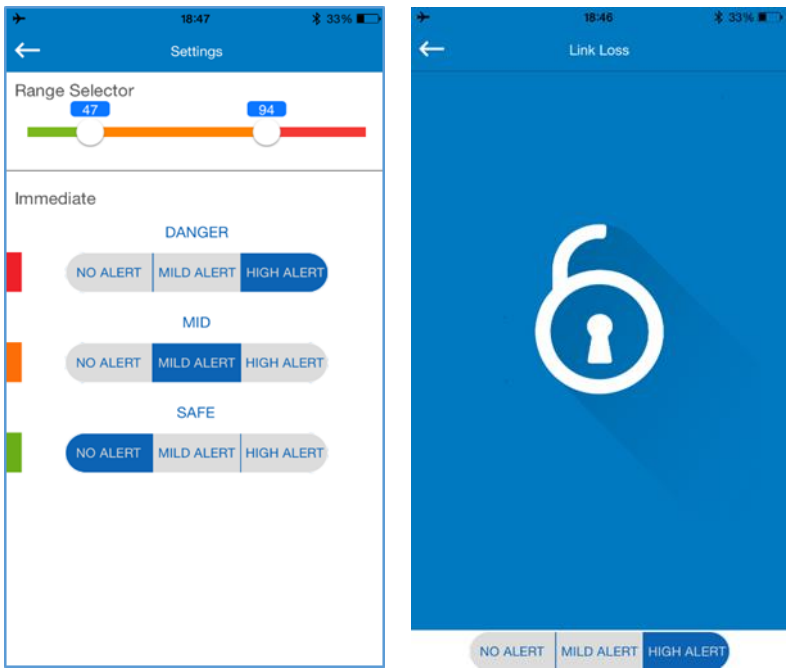


6. On the Atmel Smart Connect App, the supported services will be displayed for the Atmel Proximity Reporter Device

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

7. 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



8. After configuration of 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 and on-board LED behavior will be as specified in Chapter 6.2.

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

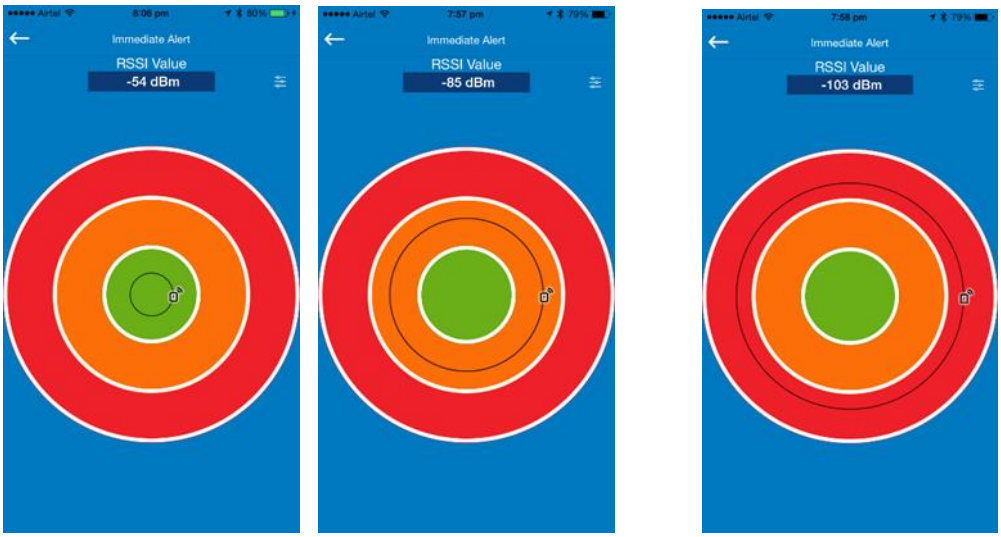
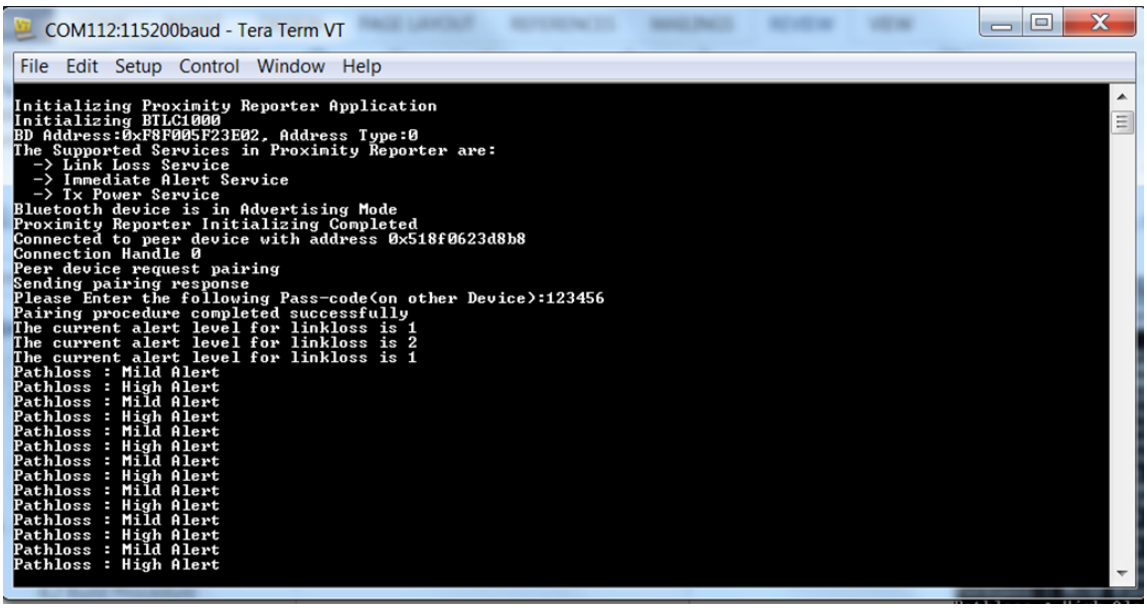


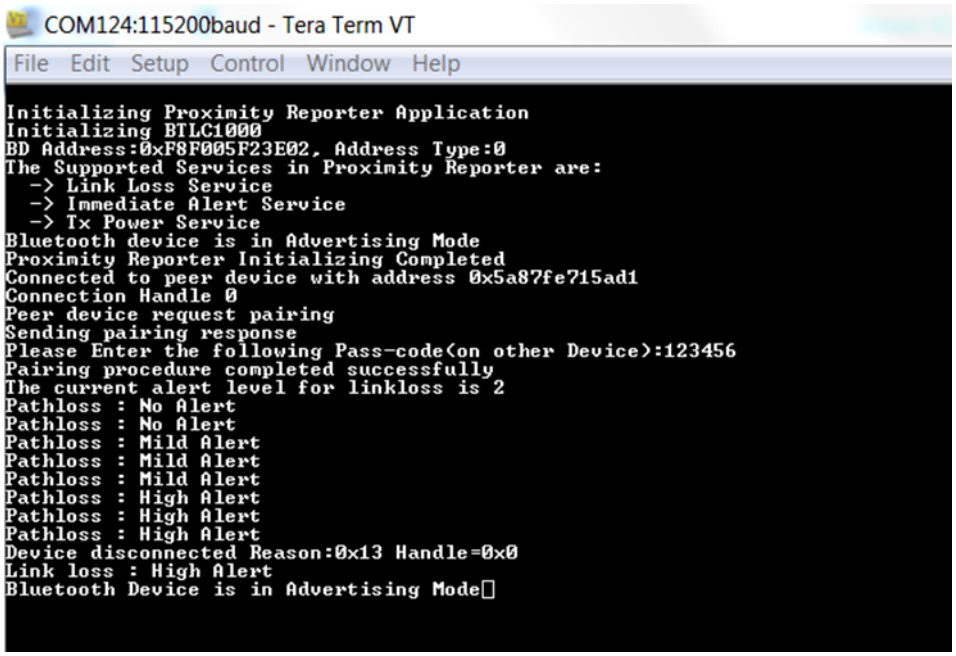
Figure 7-11. Proximity Reporter Path-Loss Console-Log Notifying Alerts



9. After configuration of 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, the Proximity reporter will receive the path loss notifications based on alert settings. Keep moving after 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, will report disconnection. The on-board LED behavior will be as specified in Chapter 6.1. The lock screen is used to emulate a common use-case application where this Link Loss service could be used (For e.g.: Key Fob). When the user is in close proximity, the lock remains open. Subsequently the user moving out of range can be trigger to close the lock.

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

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



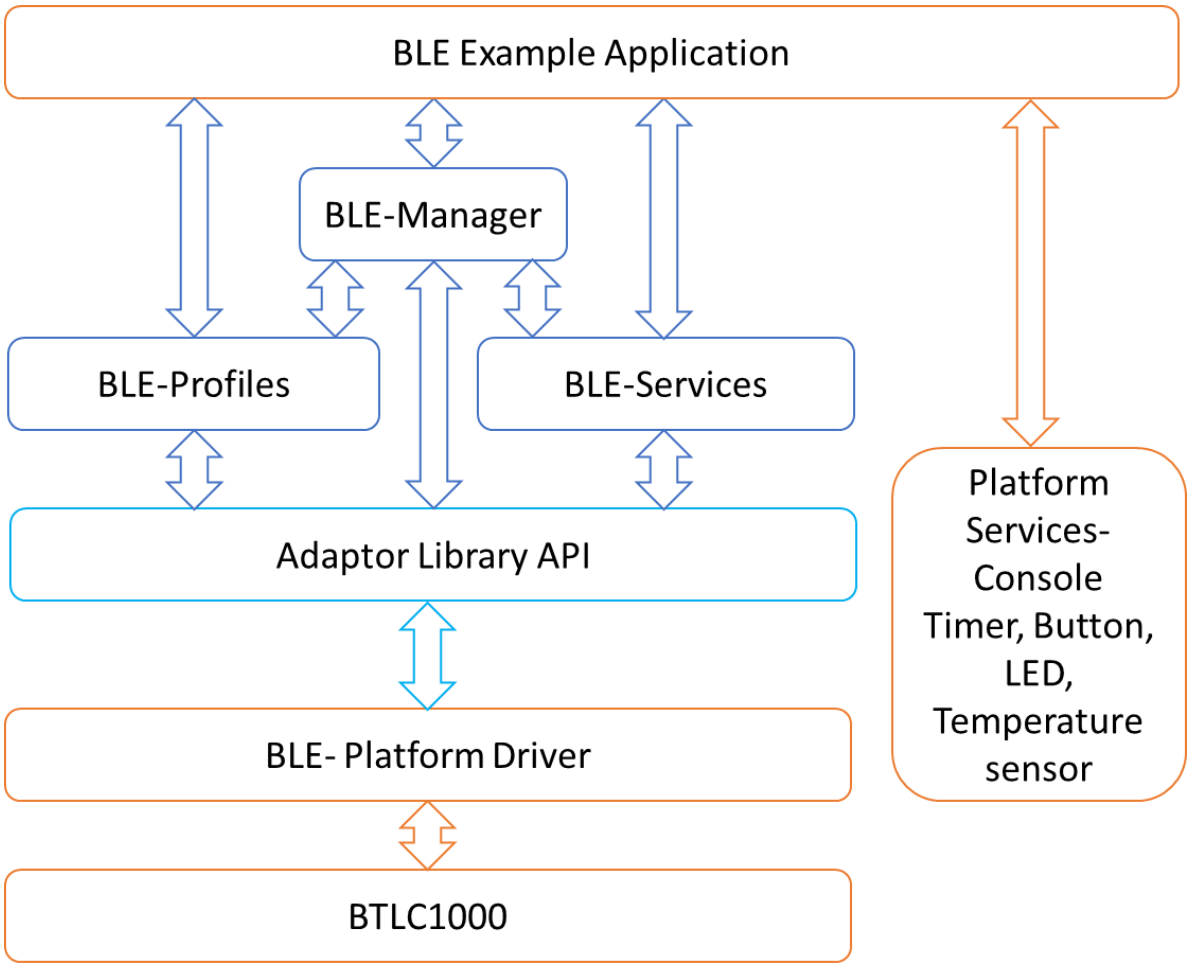
10. After link loss the mobile application will attempt to reconnect to the PXP Reporter. On moving the mobile device closer to the reporter, the connection is re-established.
11. The TX power service is used to retrieve the TX Power of the Proximity reporter. Click on the TX Power Service icon in the 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 Software Architecture

The following diagram illustrates the various layers in the BLE subsystem for the BTLC1000 configuration. The External host can be Atmel supported platform.

Figure 8-1. BluSDK Software Architecture



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10 Revision History

Doc Rev.	Date	Comments
42517A	09/2015	Initial document release.

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