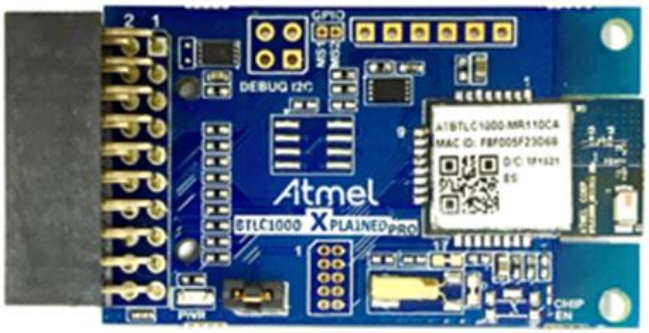
Multi-Role/Multi-Connect Application - Getting Started Guide

USER GUIDE



Introduction

This getting started guide describes the setup of Atmel® ATBTLC1000 with a supported platform (see Table 2-1) bringing up an example profile supplied as part of the BluSDK release. This document explains bring up of Bluetooth® Multi-Role/Multi-Connect example application that is embedded as part of the software release package.

The Multi-Role application demonstrates ATBTLC1000 as both GAP Central and GAP Peripheral at the same time. The Multi-Role application will initially scan (GAP Central) for the devices and initiate a connection to the peripheral device which is advertising using connectable advertisement packets. After the link establishment, ATBTLC1000 will be exchanging the data as a GAP Central. Then the Multi-Role application will start advertising using connectable advertisement packets as a GAP Peripheral and gets connected to the remote device, which has sent a connection request and exchanges the data on the new link established.

In the Multi-Role application the GAP Central is the Proximity Monitor (GATT Client in Proximity Profile) and GAP Peripheral is Battery Application (GATT Server containing Battery Service). As a GAP Central ATBTLC1000 will be scanning for the devices and connects to the proximity reporter to perform the link loss and path loss. As a GAP peripheral ATBTLC1000 will advertise with Battery Service UUID in the advertisement data and gets connected with remote GAP Central to send the changing battery level.

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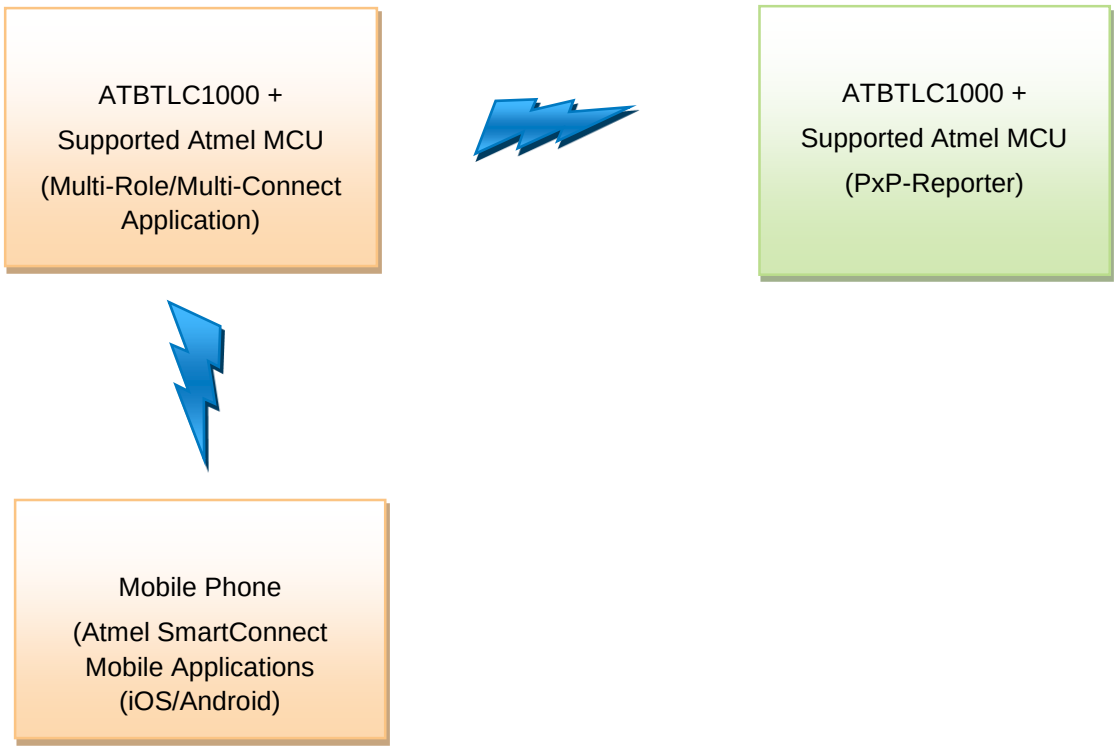
1 Demo Setup

Figure 1-1. Demo Setup of Multi Role Application on ATBTLC1000



2 Supported Hardware Platforms and IDEs

Table 2-1. BluSDK – Supported Hardware and IDEs

Platform	MCU	Supported BLE device	Supported evaluation kits	Supported IDEs
SAM L21 (MCU)	ATSAML21J18B	ATBTLC1000	ATBTLC1000-XSTK (ATSAML21-XPRO-B + ATBTLC1000 XPRO)	Atmel Studio v7.0
SAM L21 (MCU)	ATSAML21J18A	ATBTLC1000	ATSAML21 XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM D21 (MCU)	ATSAMD21J18A	ATBTLC1000	ATSAMD21-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM G55 (MCU)	ATSAMG55J19	ATBTLC1000	ATSAMG55-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0
SAM 4S (MCU)	ATSAM4SD32C	ATBTLC1000	ATSAM4S-XPRO + ATBTLC1000 XPRO	Atmel Studio v7.0

3 Hardware Setup

3.1 SAM L21 Xplained Pro Multi-Role Application Setup

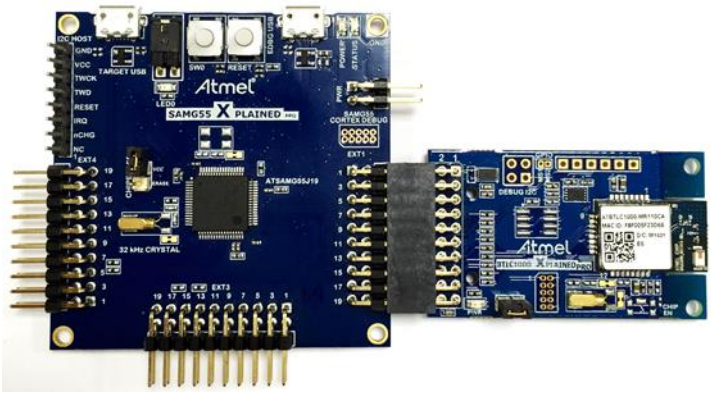
Figure 3-1. ATBTLC1000 Xplained Pro Extension Connected to a SAM L21 Xplained Pro

3.2 SAM D21 Xplained Pro Multi-Role Application Setup

Figure 3-2. ATBTLC1000 Xplained Pro Extension Connected to a SAM D21 Xplained Pro

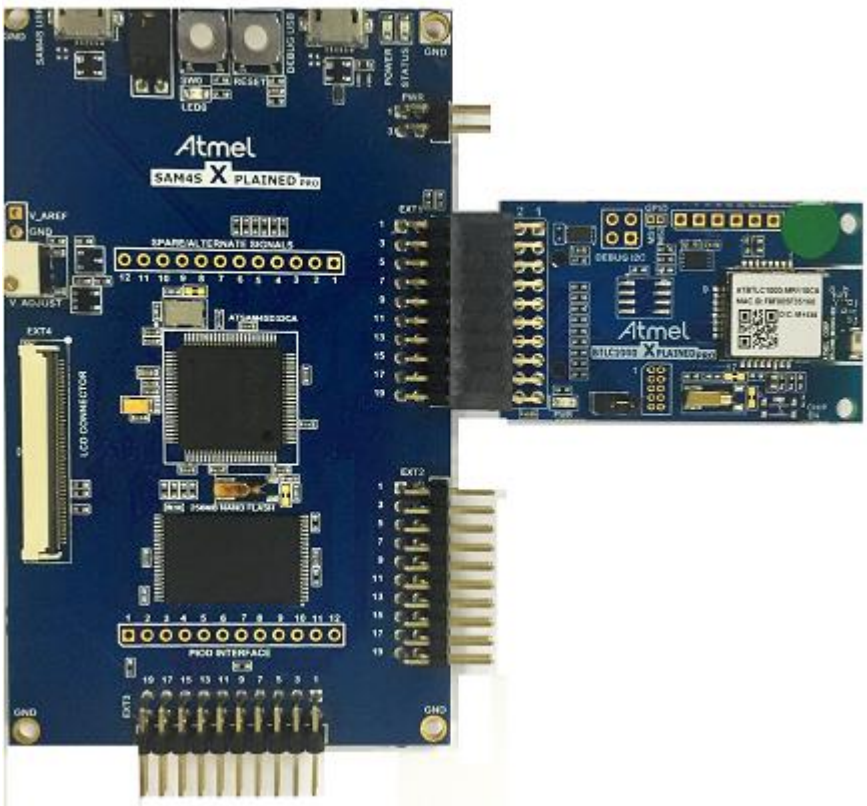
3.3 SAM G55 Xplained Pro Multi-Role Application Setup

Figure 3-3. ATBTLC1000 Xplained Pro Extension Connected to a SAM G55 Xplained Pro



3.4 SAM 4S Xplained Pro Multi-Role Application Setup

Figure 3-4. ATBTLC1000 Xplained Pro Extension Connected to a SAM 4S Xplained Pro



4 Software Setup

4.1 Installation Steps

1. Atmel Studio installation **[Atmel Studio 7.0 (build 594) Installer]**
   http://www.atmel.com/tools/atmelstudio.aspx
2. Install the standalone ASF package from
   http://www.atmel.com/tools/AVRSOFTWAREFRAMEWORK.aspx.

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

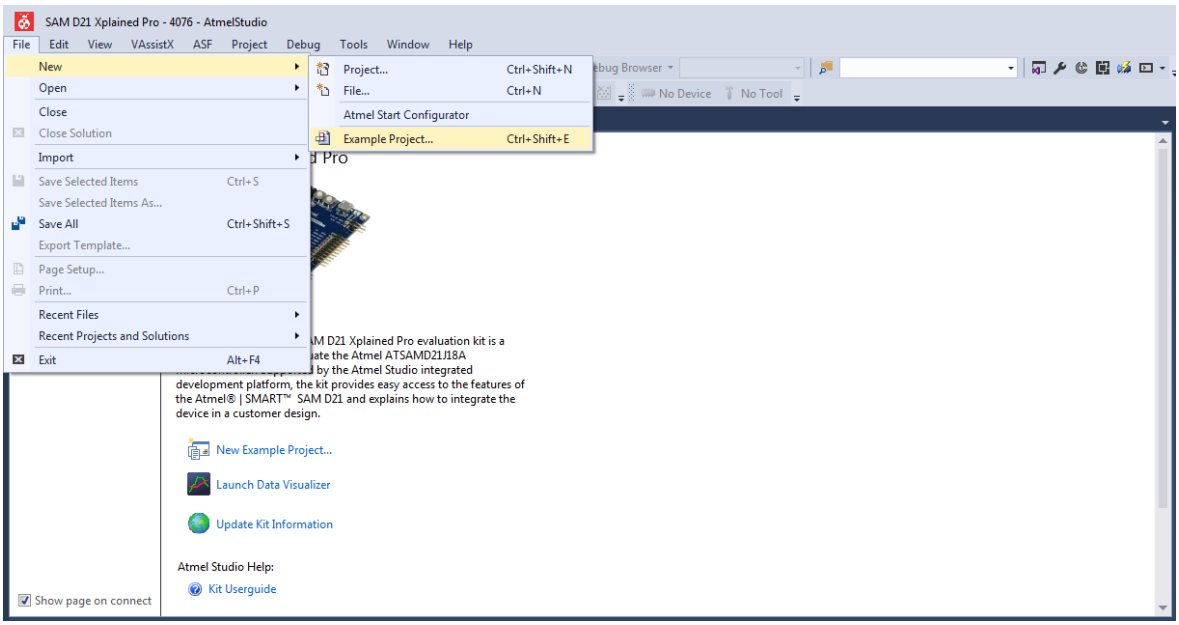
1. Multi Role Application for SAM D21.
2. Multi Role Application for SAM G55.
3. Multi Role Application for SAM L21.
4. Multi Role Application for SAM 4S.

5 Build Procedure

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

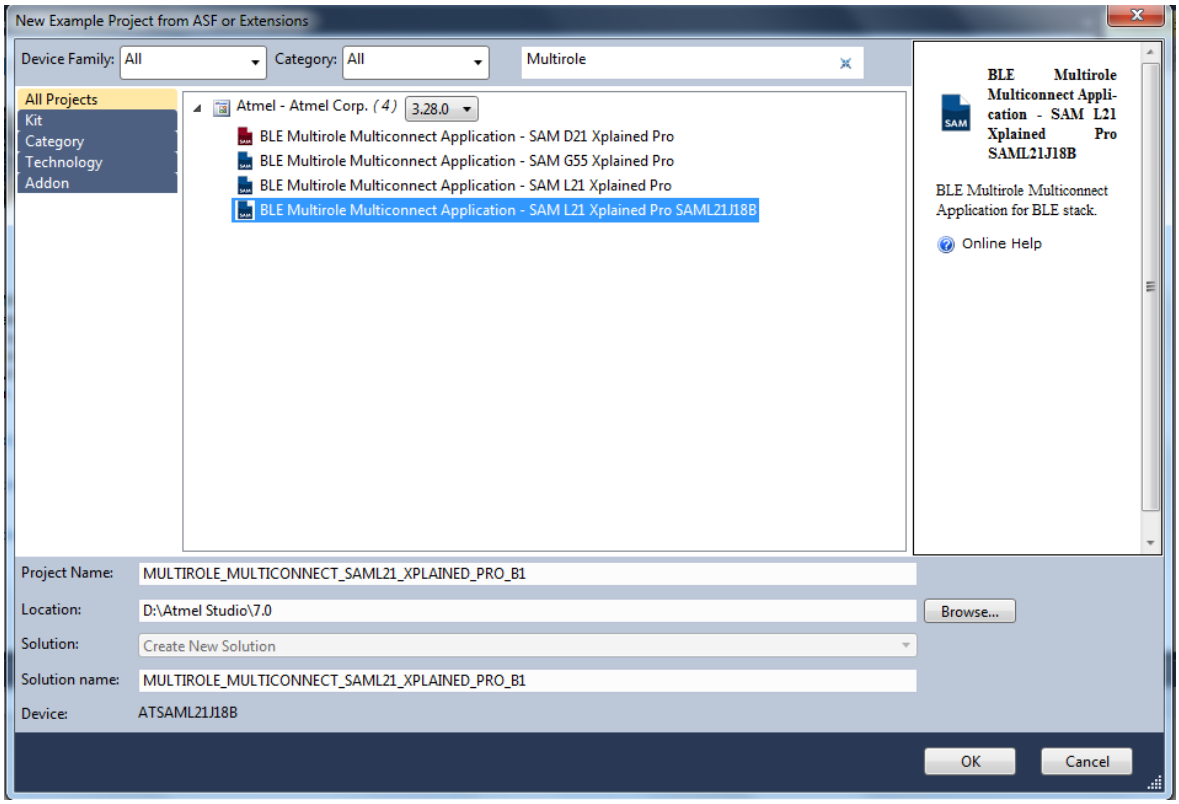
1. Select New Example Project.

Figure 5-1. Creating a New Project



2. Enter “Multi-Role/Multi-Connect” 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.

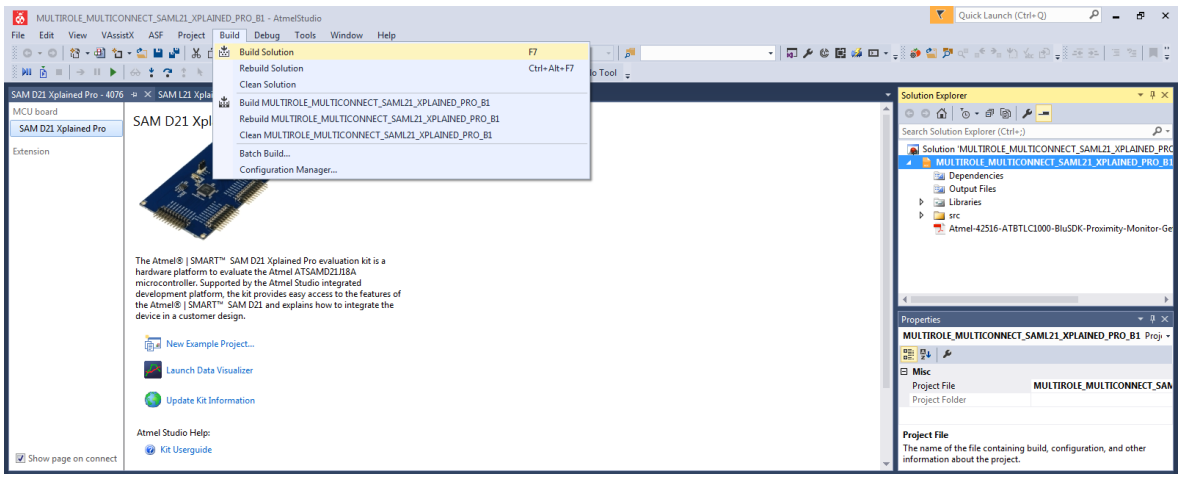
Figure 5-2. Selecting Multi-Role/Multi-Connect Profile Application from Example Projects



3. Accept the license agreement. The studio will generate the Multi-Role Multi-Connect project for SAM L21.

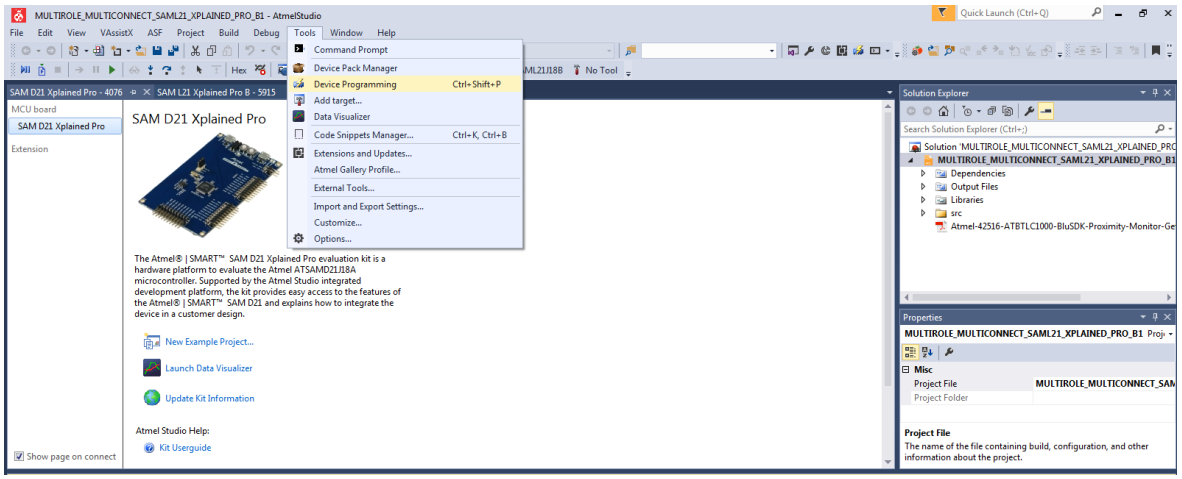
4. Build the solution.

Figure 5-3. Building the Multi-Role/Multi-Connect Application



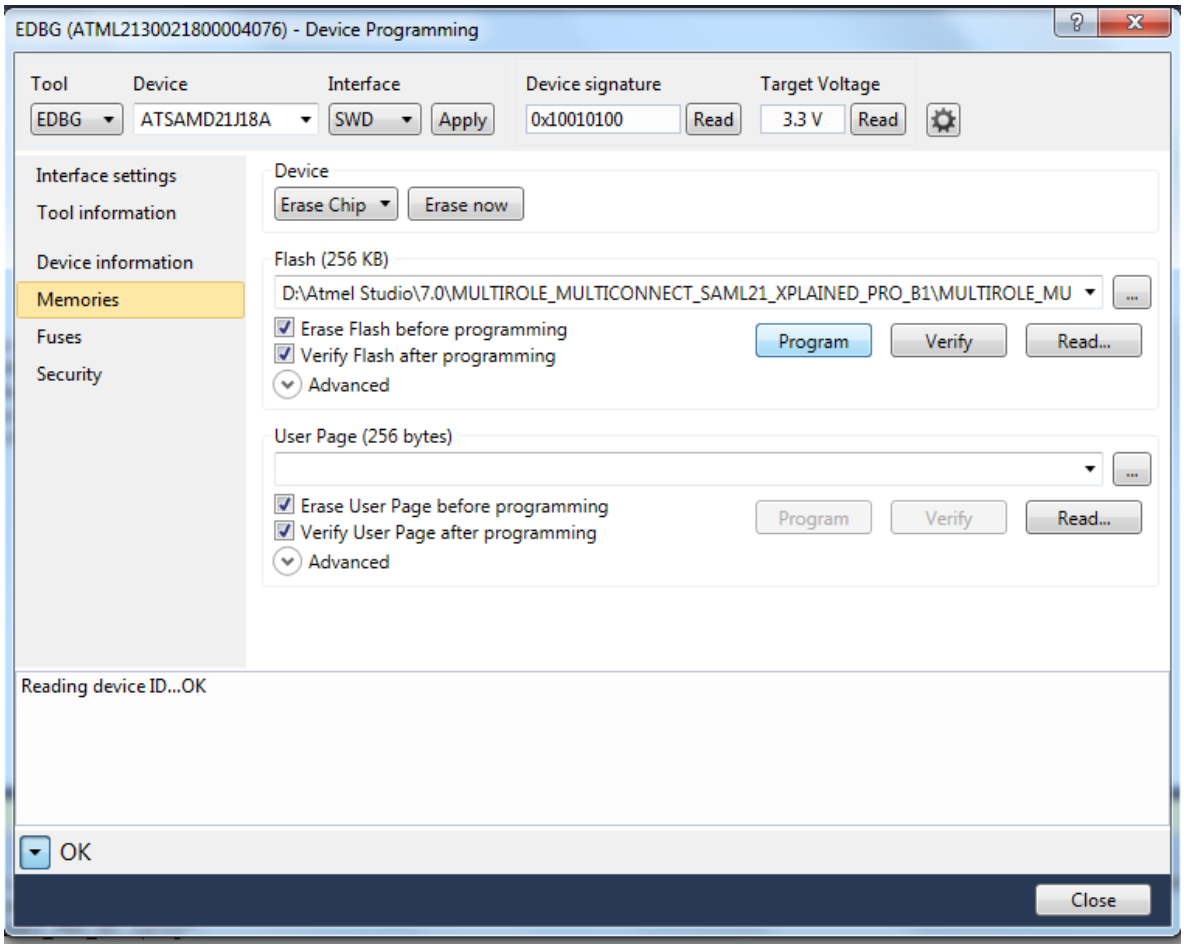
5. Download the application via the USB to the SAM L21 board using Device Programming option available in Tools as mentioned below.

Figure 5-4. Flashing the Application on Atmel MCU



6. Inside device programming, the user has to select the correct configuration for device and finally program the device by clicking on ‘Program’ button as shown below.

Figure 5-5. Flash Programming



7. Once the application is flashed, it is ready to be function as a Multi Role Device.

6 Console Logging

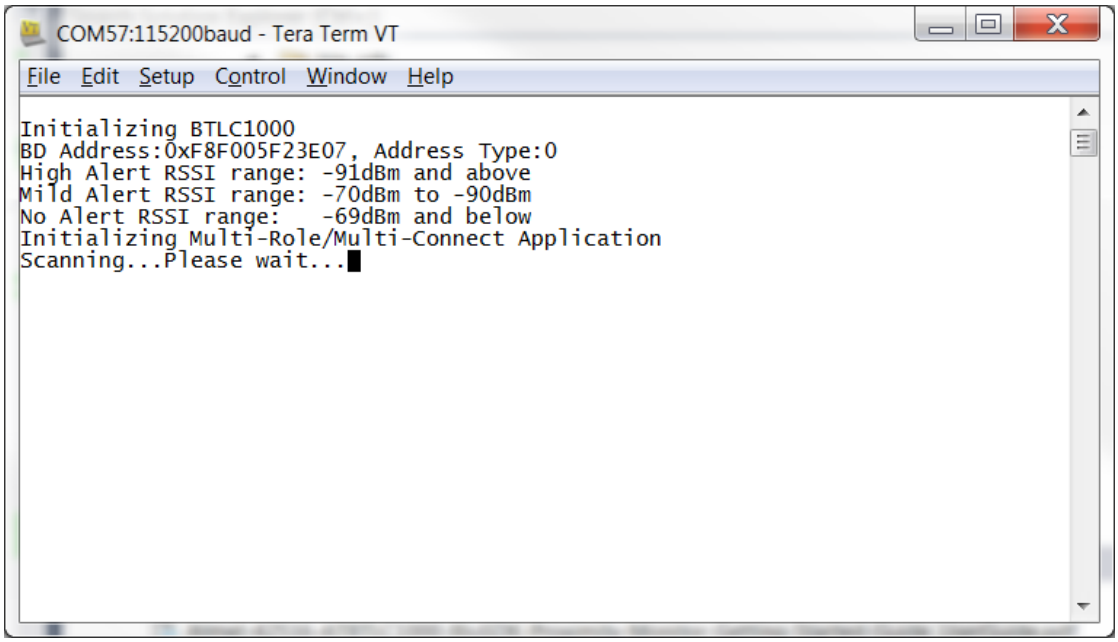
For the purpose of debugging, a logging interface had been implemented in the Multi-Role Application.

The logging interface utilizes the same EDBG port that connects to 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

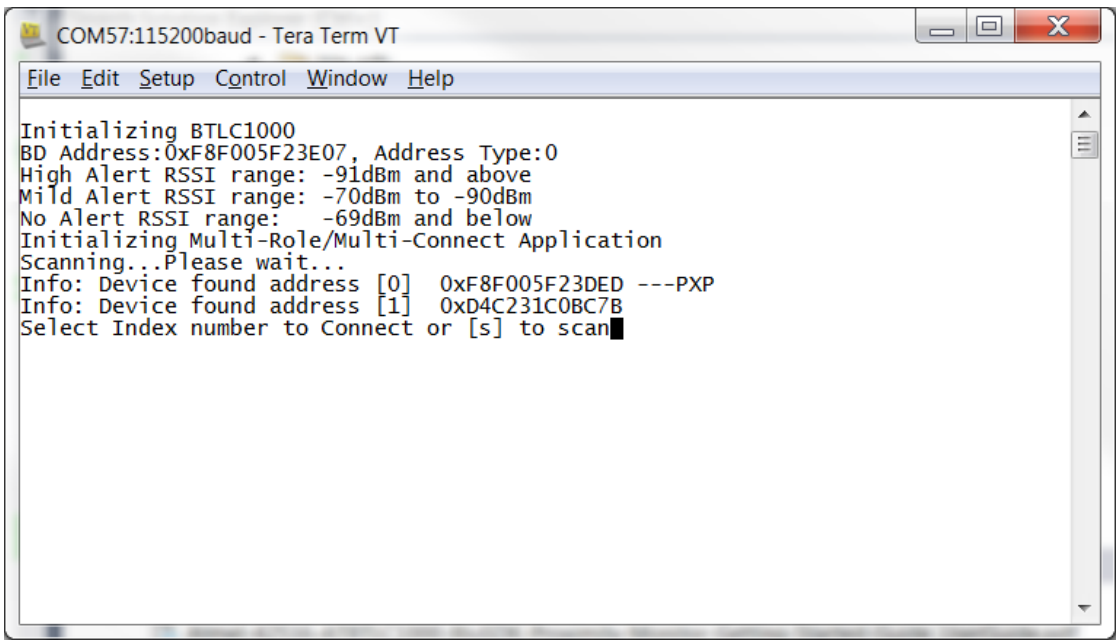
1. Power on the SAM L21 (see Figure 3-1) by connecting the USB Cable.
2. Open the console using Teraterm or any serial port monitor application and connect to the corresponding COM port enumerated by the device on the PC. (Settings: Baudrate 115200, Parity None, 1 Stop bit, 1 Start bit, No Hardware Handshake.)
3. Press the Reset button on the SAM L21 or supported platform board.
4. The device will initialize and start-up – as seen in the console log shown below.

Figure 7-1. Multi-Role/Multi-Connect Application Initialization



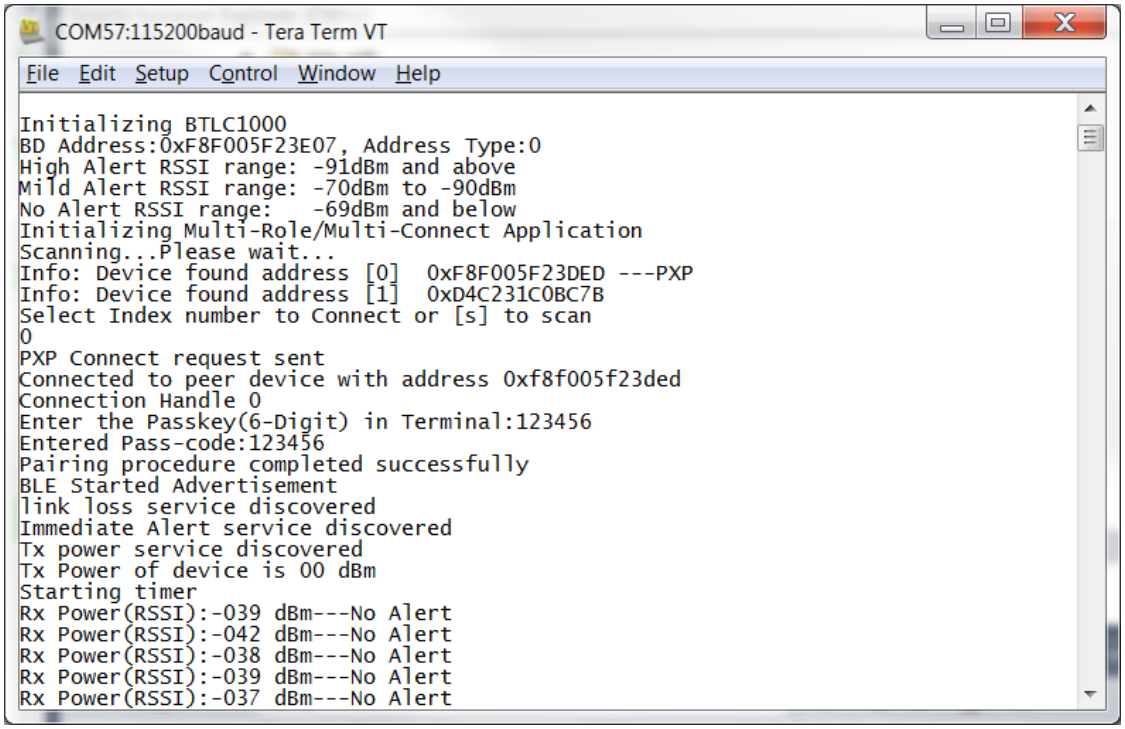
5. Device will then start scanning and will display devices found as shown below.

Figure 7-2. Multi-Role/Multi-Connect Application – Scanning Devices



6. The GAP Central (Proximity Monitor) scans and then displays the list of all BLE devices which are advertising. Proximity Reporter devices (GATT server role) are indicated with tag “---PXP”. Select the appropriate index number for the Proximity Reporter. The GAP Central (Proximity Monitor) will then connect to the selected peer device.

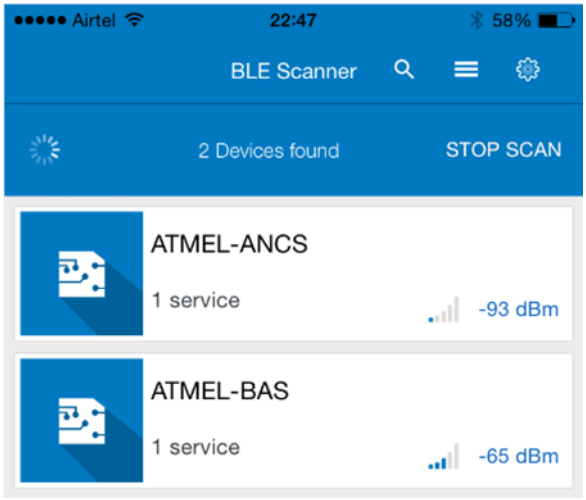
Figure 7-3. GAP Central (Proximity Monitor) Connection with a GAP Peripheral (Proximity Reporter)



7. ATBTLC1000 as a GAP Central pairs with the connected peripheral. Then ATBLC1000 acts as a GAP Peripheral by advertising with Battery Service UUID in the advertisement data. Now ATBTLC100 will send alert levels as a GAP Central and also starts advertising with Connectable advertisement packets.

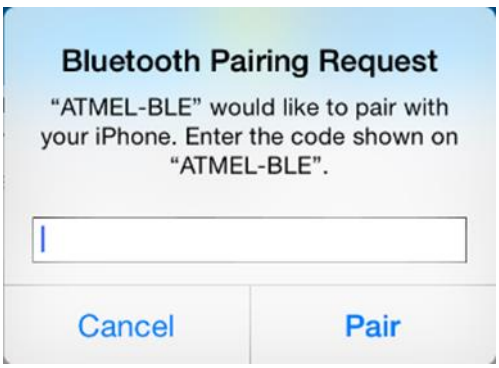
8. Enable Bluetooth® from the Settings page on a BLE compatible Android device or iPhone®. Use the Atmel SmartConnect application to scan for peripheral devices. A device with the name ‘ATMEL-BAS’ will appear in the list of scanned devices.

Figure 7-4. Atmel-BLE Device Discovered by Atmel SmartConnect Application



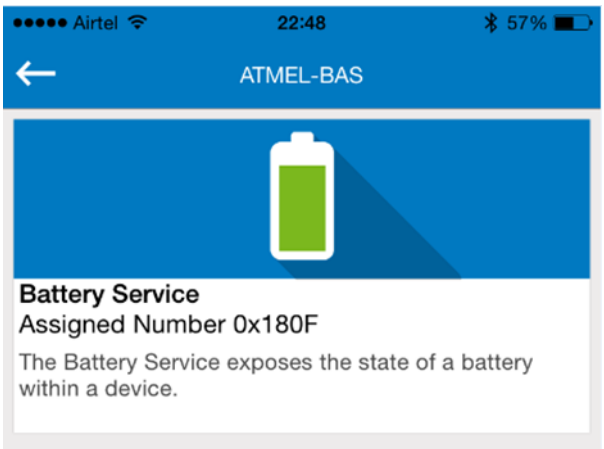
9. Click on the “ATMEL-BAS” device. A pop-up will appear requesting pass-key. Enter “123456” and click on ‘Pair’.

Figure 7-5. Pairing Pop-up Screen



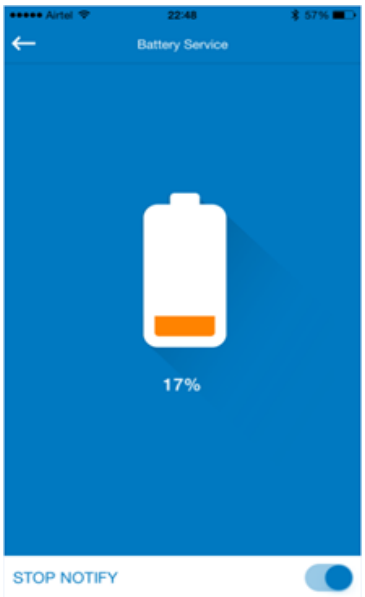
10. Once paired, the application displays the battery service as shown in Figure 7-6.

Figure 7-6. Display of Battery Service



11. Once the “Battery Service” is clicked the user gets notifications for battery level characteristic. The user can stop receiving the notifications by disabling notifications as shown in Figure 7-7.

Figure 7-7. Battery Level Characteristic Notification Options



12. ATBTLC1000 will now transfer the data on the second established link with the mobile application.

Figure 7-8. GAP Peripheral (ATBTLC1000) Connected to GAP Central(Mobile) and Transferring the Data

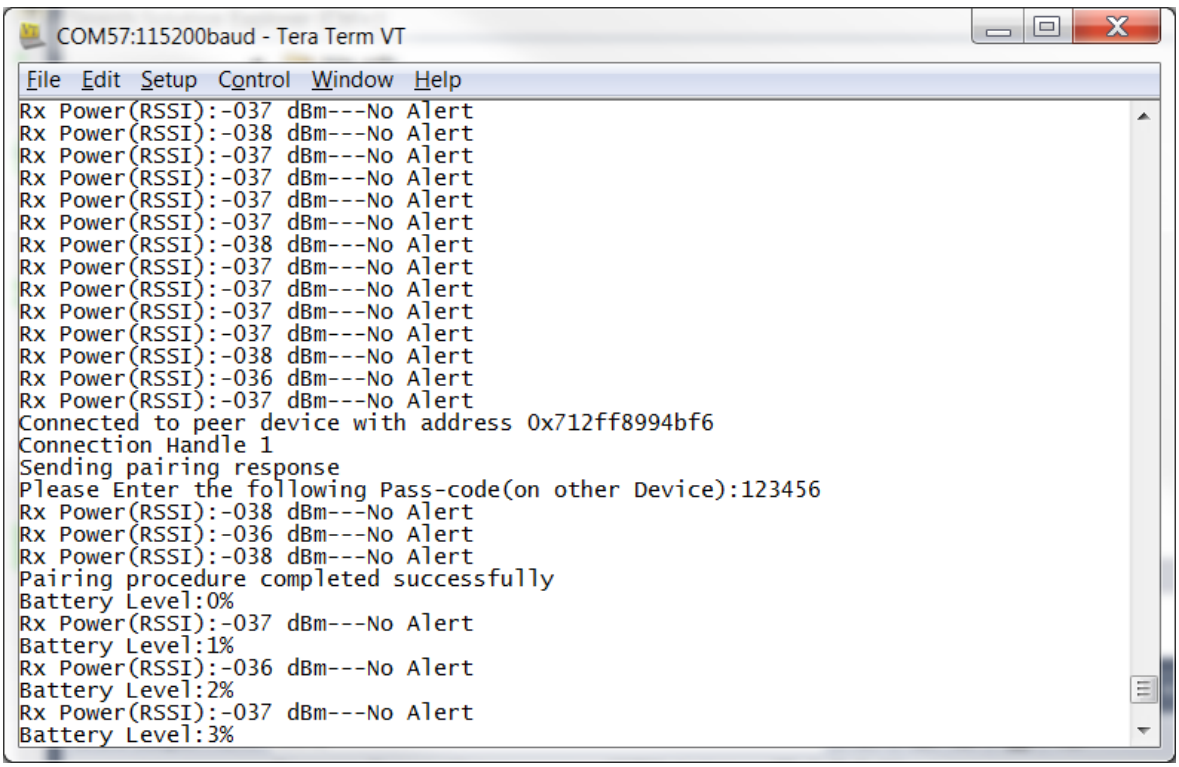


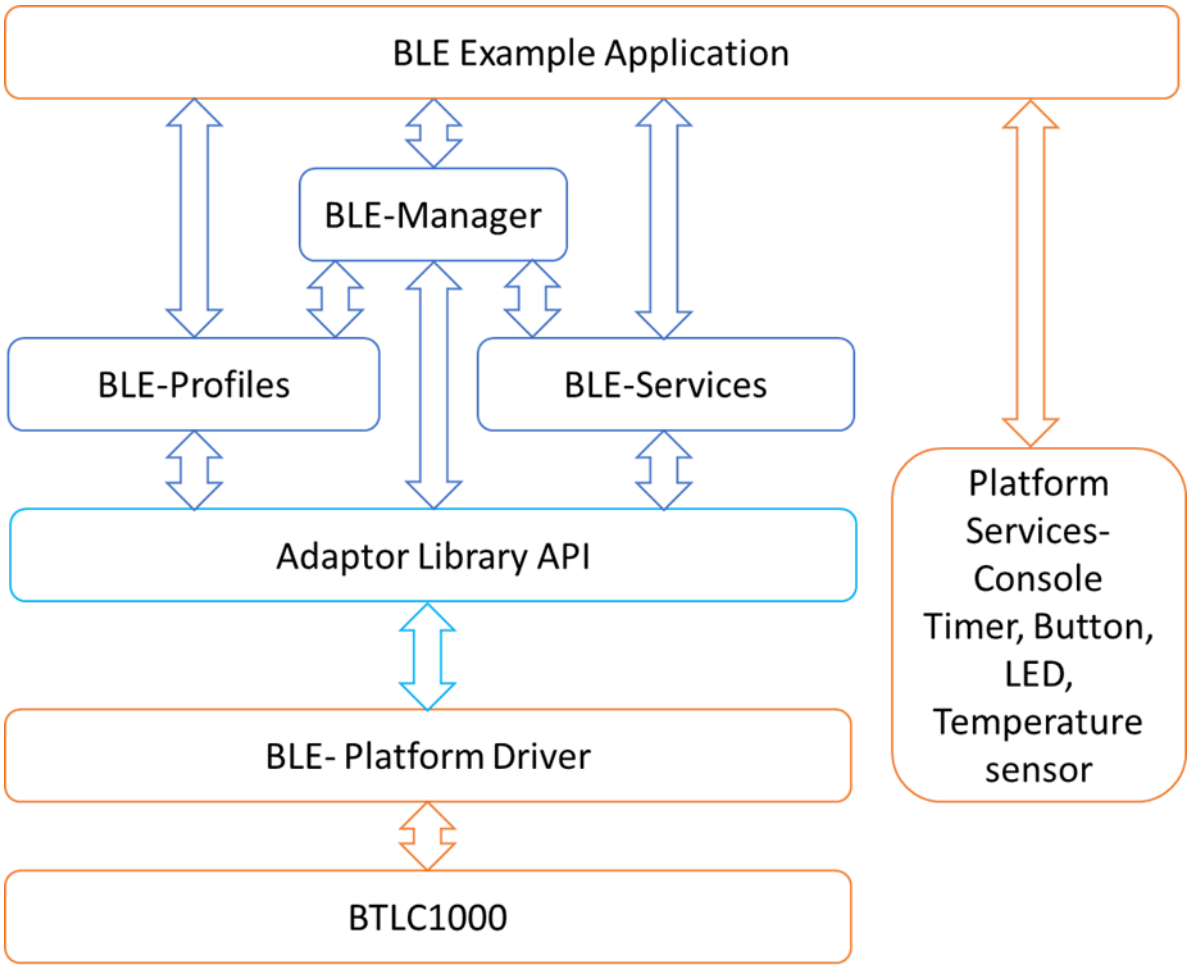
Figure 7-8 shows the ATBLC1000 transferring data both as a central and a peripheral simultaneously.

13. Now the ATBTLC1000 will continue to behave as Proximity Monitor (GAP Central) and Battery Service Application (GAP Peripheral) simultaneously with two connections. A continuous data transfer happens on both the links by the ATBLC1000 and even if one link gets disconnected the data transfer will happen on the other link.

8 BluSDK Software Architecture

The following diagram illustrates the various layers in the BluSDK Architecture. The External host can be supported platform. The application in this example is Proximity Monitor Profile.

Figure 8-1. BluSDK Software Architecture



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10 Revision History

Doc Rev.	Date	Comments
42635B	01/2016	Table 2.1 is updated with SAM4S hardware support. Figure 3.4 is updated with SAM4S Xplained Pro image. Section 4.1 Installation Steps are updated.
42635A	11/2015	Initial document release.

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