

Introduction

This Beacon guide describes the setup of Atmel® ATBTLC1000 to be used in conjunction with either an Atmel SAM L21 or other Atmel supported platform. The document also explains bringing up an example profile supplied as part of BluSDK release. The Bluetooth iBeacon Profile is an example profile application that is embedded as part of the software release package.

Features

- Device Discovery
- RSSI Sampling
- Beacon Advertising
- iBeacon Demo App for iOS/Android

Table of Contents

1	Description.....	3
2	Demo Setup	3
3	Supported Hardware Platforms and IDEs	4
4	Hardware Setup	5
4.1	SAM L21 Xplained Pro Beacon Setup.....	5
4.2	SAM D21 Xplained Pro Beacon Setup	5
4.3	SAM G55 Xplained Pro Beacon Setup.....	6
4.4	SAM 4S Xplained Pro Beacon Setup	6
5	Software Setup	7
5.1	Installation Steps	7
5.2	Build Procedure.....	8
6	Running the demo	12
7	Software Architecture	17
8	Console Logging	18
9	ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER.....	19
10	Revision History	20

1 Description

The Beacon Application advertises iBeacon specific packets that includes UUID, Major and Minor numbers. Any beacon scanner application should be able to find the beacon device. The supplied iOS demo app can be used to find the beacon devices in the vicinity.

The profile defines two roles:

- Monitor: The iOS/Android device that searches for beacon packets.
- Reporter: This device that continuously advertises the beacon packet as part of advertisement data.

This document explains the details about:

1. Getting started with the setting up the ATBTLC1000 Wing board using [supported platform](#) (see Chapter 3).
2. Getting the Beacon Profile Application working on the above mentioned setup.

2 Demo Setup



3 Supported Hardware Platforms and IDEs

Table 3-1. 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

4 Hardware Setup

4.1 SAM L21 Xplained Pro Beacon Setup

Figure 4-1. ATBTLC1000 Xplained Pro Extension Connected to a SAM L21 Xplained Pro



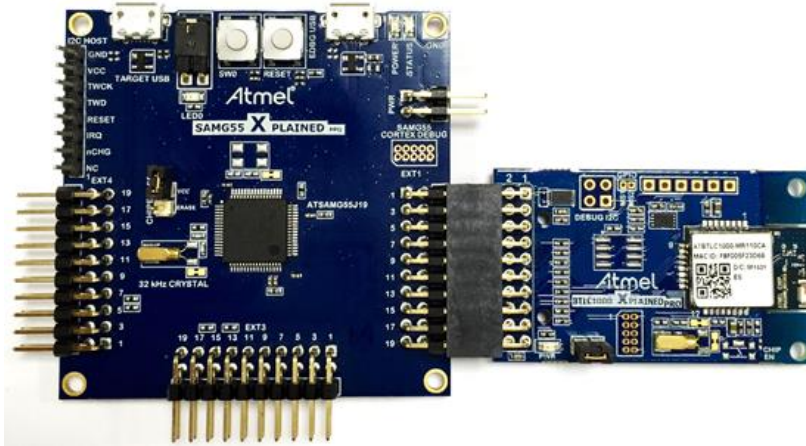
4.2 SAM D21 Xplained Pro Beacon Setup

Figure 4-2. ATBTLC1000 Xplained Pro Extension Connected to a SAM D21 Xplained Pro



4.3 SAM G55 Xplained Pro Beacon Setup

Figure 4-3. ATBTLC1000 Xplained Pro Extension Connected to a SAM G55 Xplained Pro



4.4 SAM 4S Xplained Pro Beacon Setup

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



5 Software Setup

5.1 Installation Steps

1. Atmel Studio installation [**Atmel Studio 7.0 (build 594) Installer – with .NET**]
<http://www.atmel.com/tools/atmelstudio.aspx>
(Note: SAM L21 Rev B/SAM D21/SAM G55/SAM 4S part pack is built-in as part of Atmel Studio 7.0)
2. Atmel USB Driver Installer from <http://www.atmel.com/tools/atmelstudio.aspx>.
3. 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 package will install the following examples within the Atmel Studio environment.

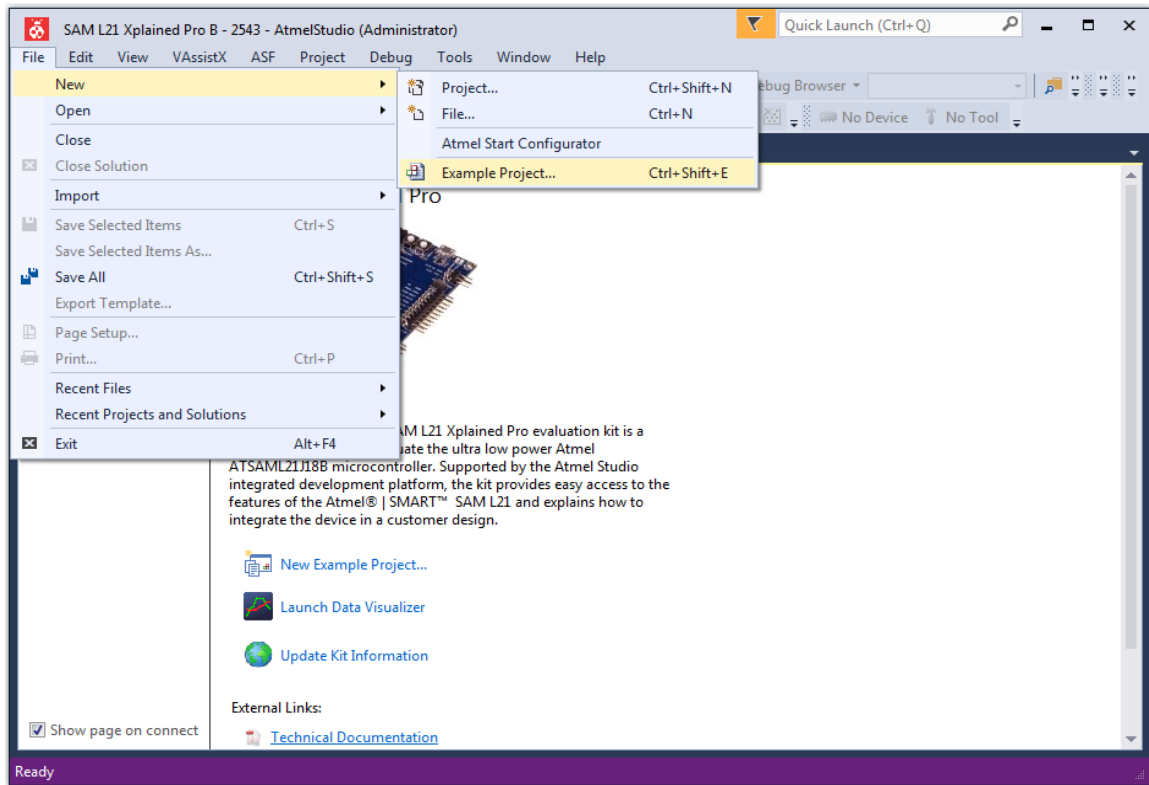
1. Beacon Application for SAM L21
2. Beacon Application for SAM D21
3. Beacon Application for SAM G55
4. Beacon Application for SAM 4S

5.2 Build Procedure

The following procedure is explained for SAM L21 application example. The same procedure is valid for Atmel [supported platform](#) (see Chapter 3) as well.

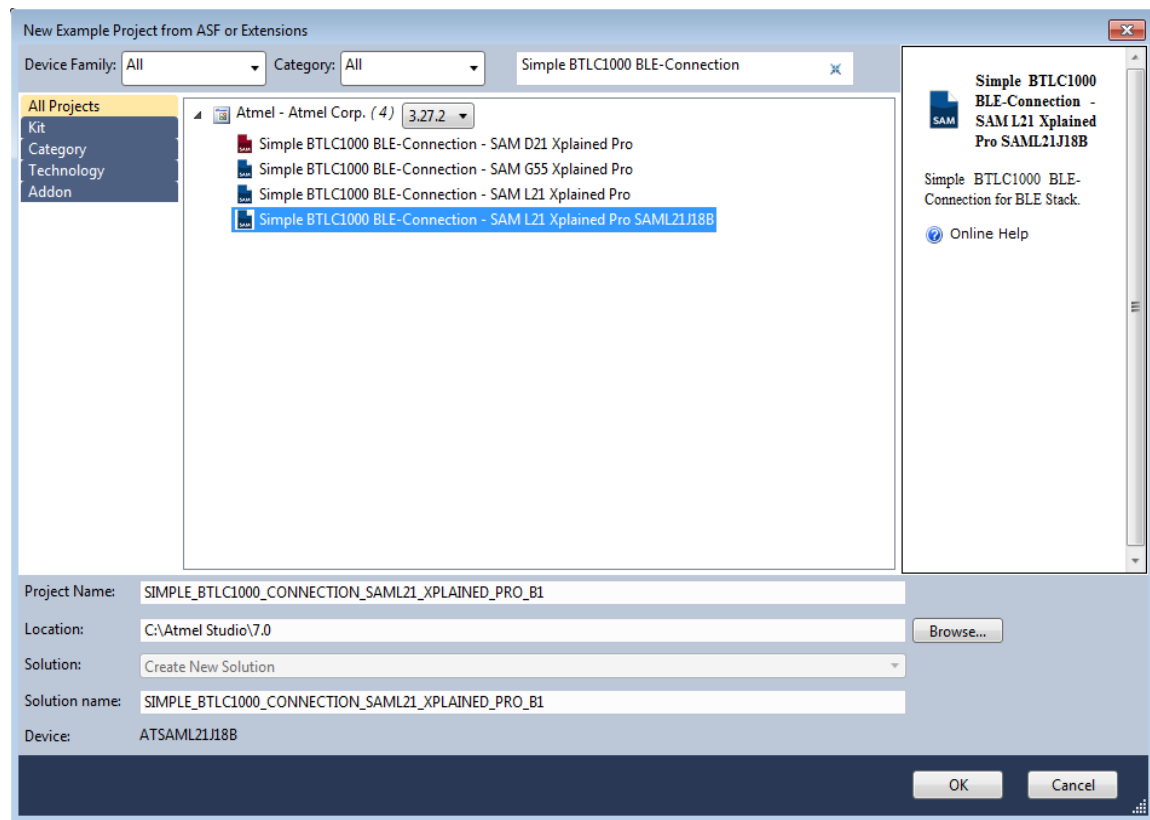
1. Select New Example Project

Figure 5-1. Creating a New Project



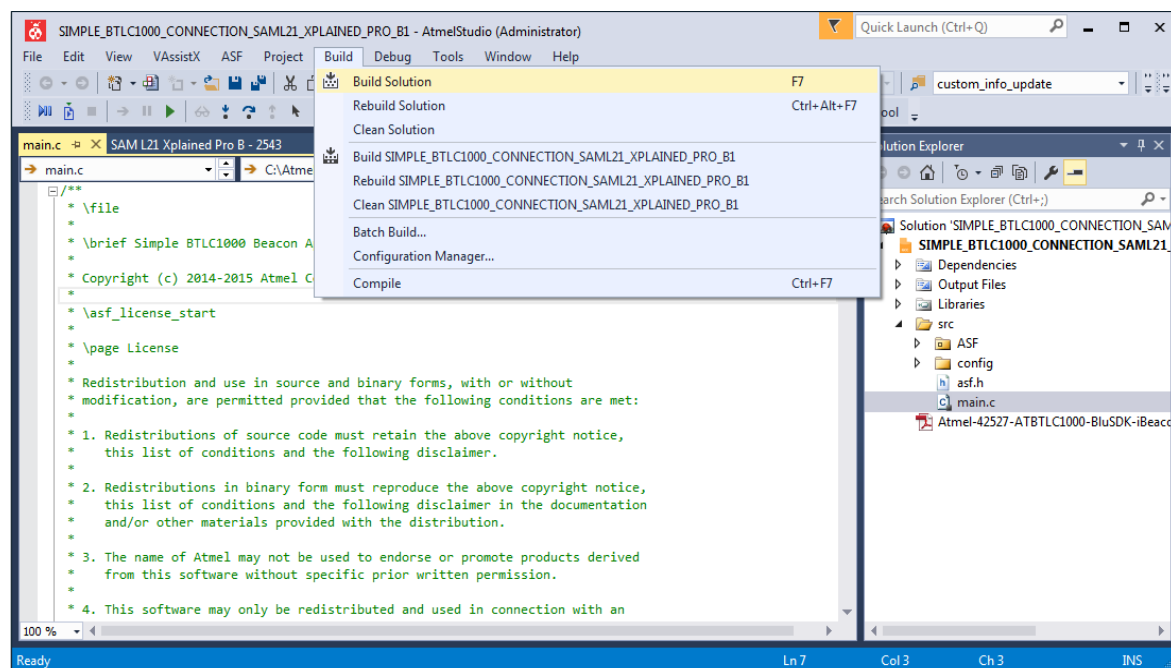
1. Select "SAML,32-bit" in device family, enter "Simple BTLC1000 BLE-Connection" in search window and expand Atmel Corp. Projects. The location and the name of the project can be selected in the respective fields. Click **OK**

Figure 5-2. Selecting Beacon Application from Example Projects



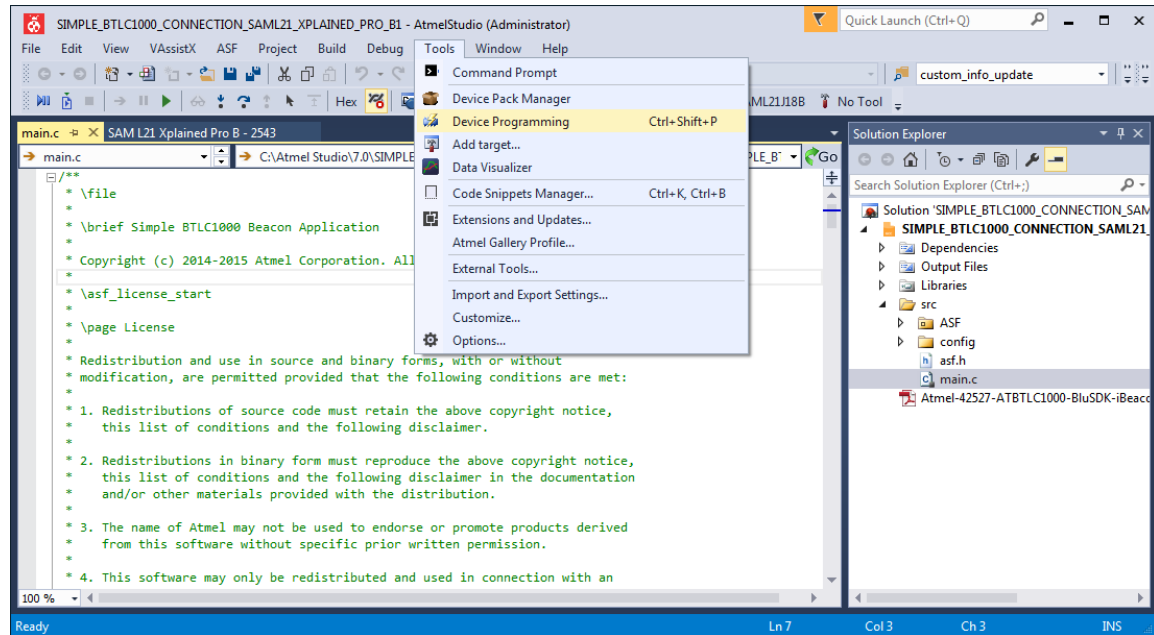
2. Accept the license Agreement. The studio will generate the Beacon Profile project for SAM L21.
3. Build the solution.

Figure 5-3. Building the Beacon Application



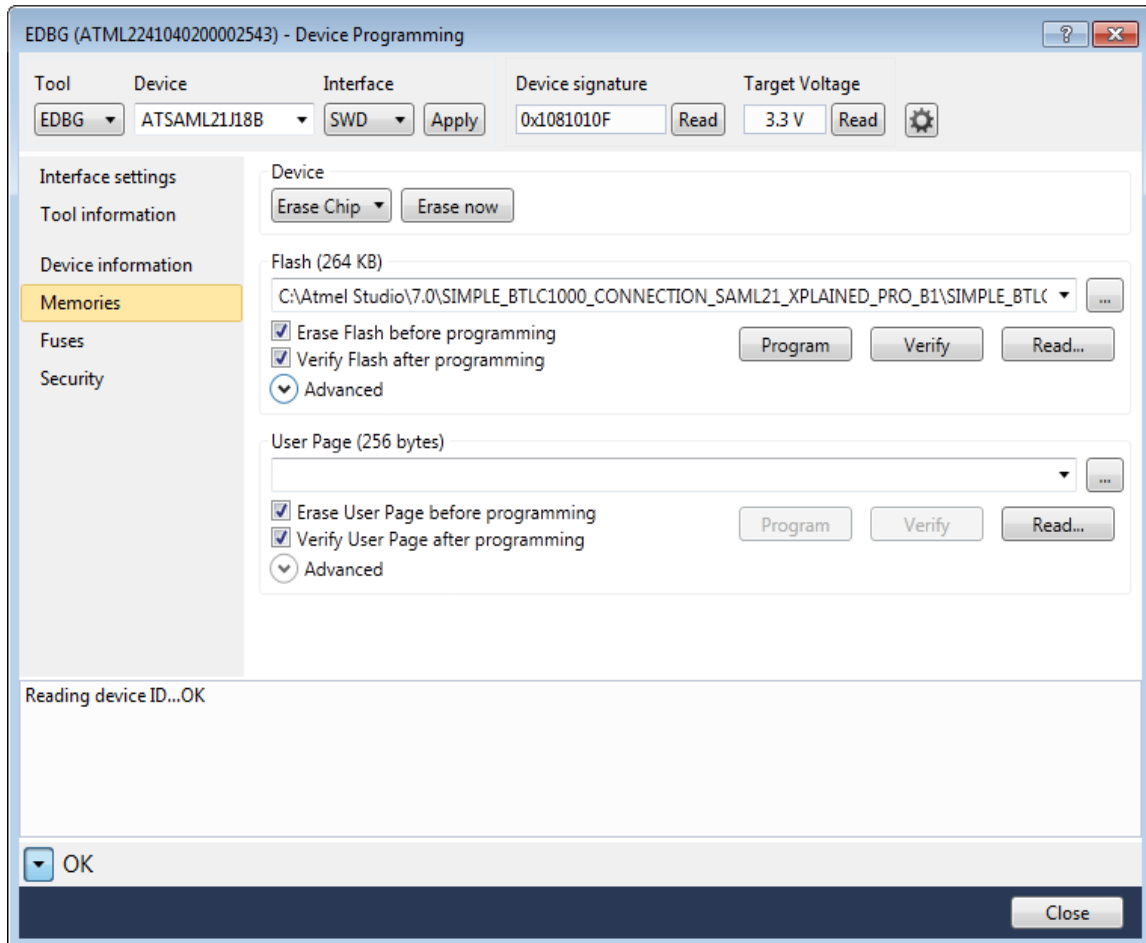
4. Download the application via the DEBUG-USB to the SAM L21 board using Device Programming option available in Tools as shown in [Figure 5-4](#).

Figure 5-4. Selecting Device Programming



5. Inside device programming user have to select the correct configuration for device and finally program the device using program button.

Figure 5-5. Flash Programming

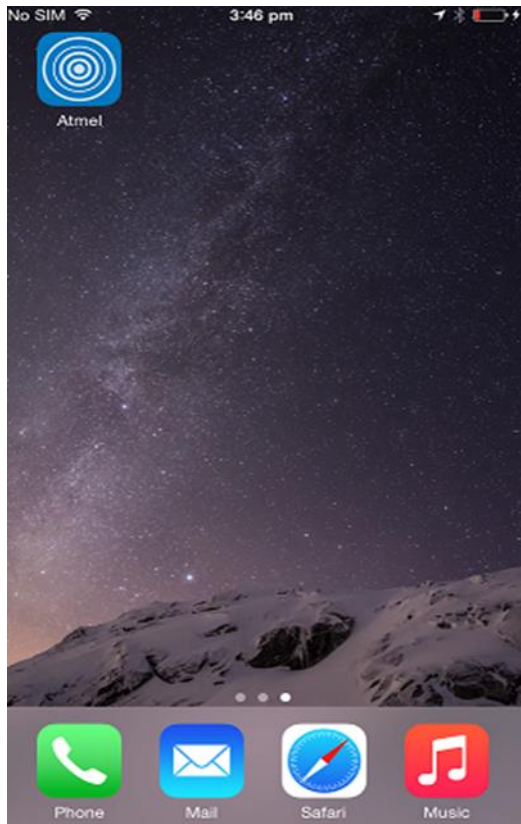


6. Once the application is flashed, it is ready to be advertise beacon packets.

6 Running the demo

1. Connect the BTLC1000 Wing Board to SAM L21 or [supported platform](#) (see Chapter 3) as indicated in [Figure 4-1](#).
2. Power on the SAM L21 by connecting the USB Cable.
3. Press the Reset button on the SAM L21 board.
4. Wait for around 10 seconds for the patches to be downloaded from SAM L21 to ATBTLC1000 board.
5. Start the Atmel Beacon application on the iPhone/Android. The illustrations below are from the app running on iPhone. The Android version has same functionality, look and feel. Hence the same steps described below can be followed for users using BLE compatible Android phones.

Figure 6-1. Atmel Beacon Radar Profile App Launch Screen



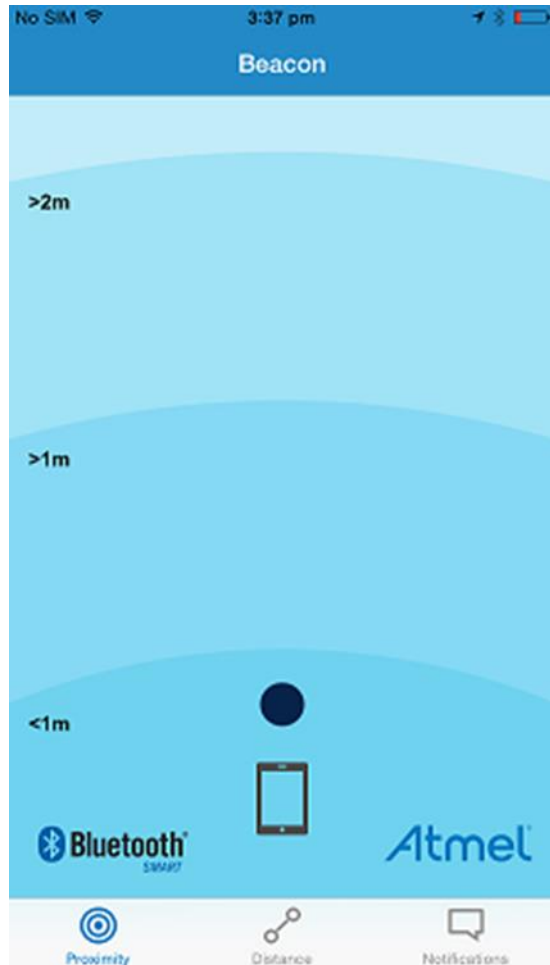
6. As soon as beacon application is launched it will show the positioning of beacon device with respect to mobile device. It also represent three modes as mentioned below.

Proximity: This mode is used to display beacon specific information when the mobile device comes in close proximity to a given beacon. The mode then shows the corresponding product related information that is configured for this particular beacon device.

Distance: To indicate the distance between beacon device and the Mobile.

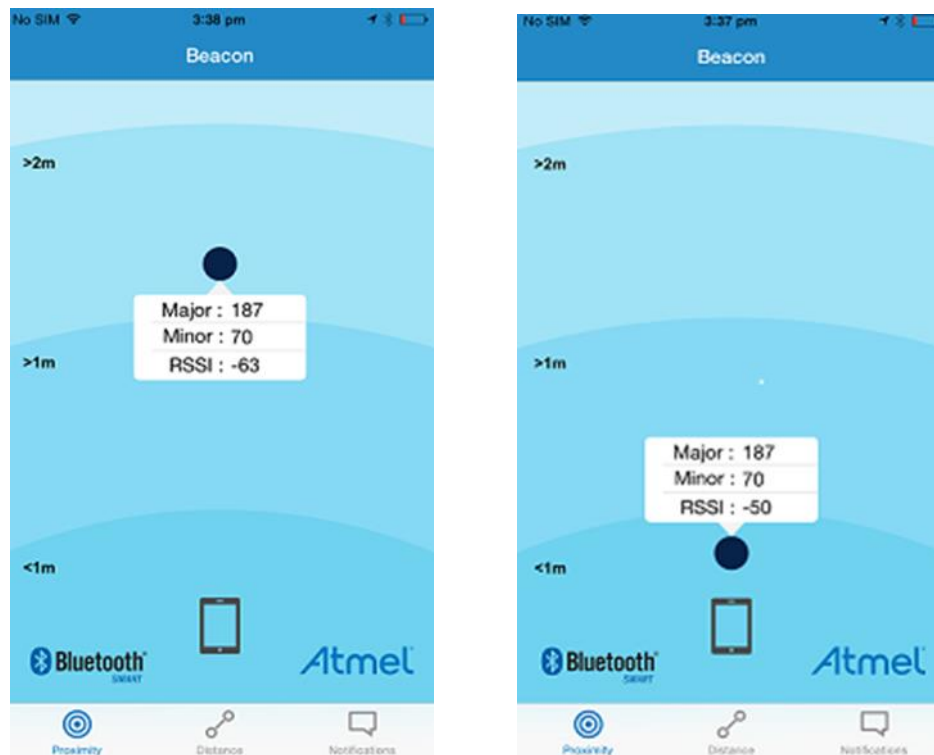
Notification: This mode is used to demonstrate the ranging capabilities of a given beacon. The notification messages change appropriately based on the proximity to a given beacon.

Figure 6-2. Beacon Radar Application Initial Screen



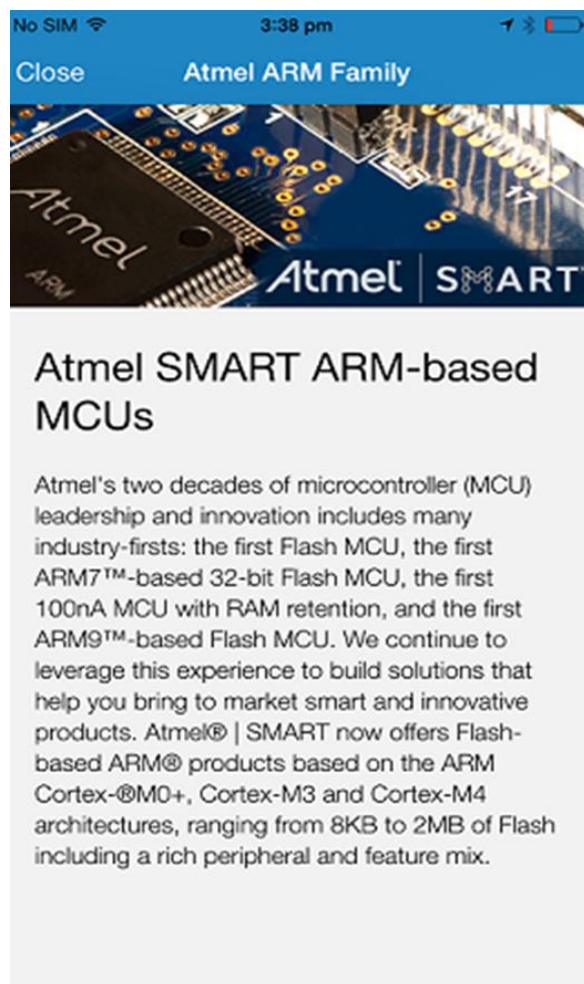
7. Click on dark blue circle to check the Major, Minor and RSSI Value. The RSSI values get automatically updated based on the movement of the scanner device.

Figure 6-3. Beacon Radar Application in Distance Mode



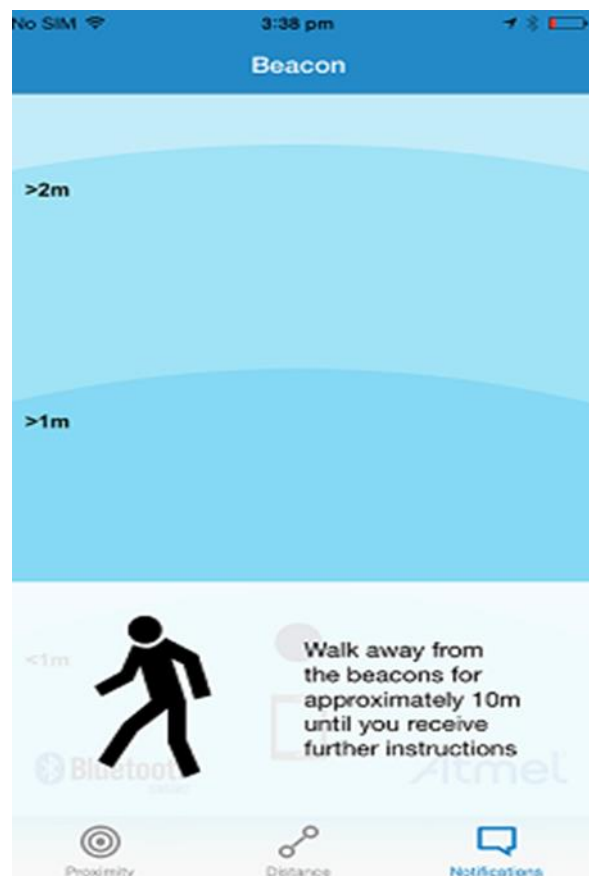
8. Inside the proximity mode if the scanner device is very near to beacon, User will see the product information when user is in close proximity to a given beacon device. When the user moves away from beacon device information content will not be shown any more. It is just an indication that user moved away from beacon device. User can optionally close the message by clicking on close.

Figure 6-4. Beacon Radar Application in Proximity Mode



9. User can select the notification mode and follow the instructions on the screen to check the range of a given beacon device.

Figure 6-5. Beacon Radar Application in Notification Mode

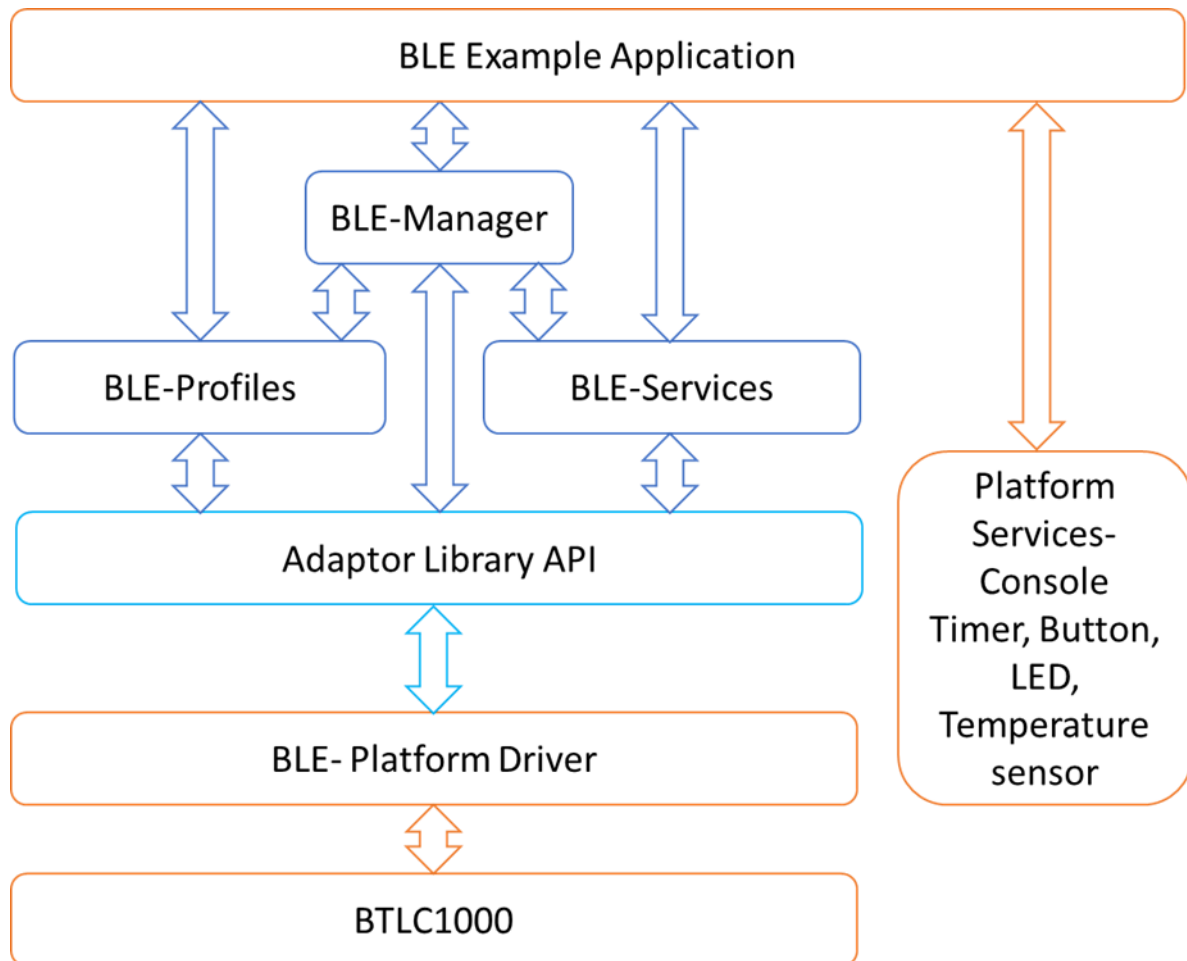


7 Software Architecture

The following diagram illustrates the various layers in the BLE subsystem for the ATBTLC1000 configuration. The External host can be Atmel [supported platform](#) (see Chapter 3).

The beacon example does not require a profile and services. The application directly interfaces with the Adaptor API.

Figure 7-1. BluSDK Software Architecture



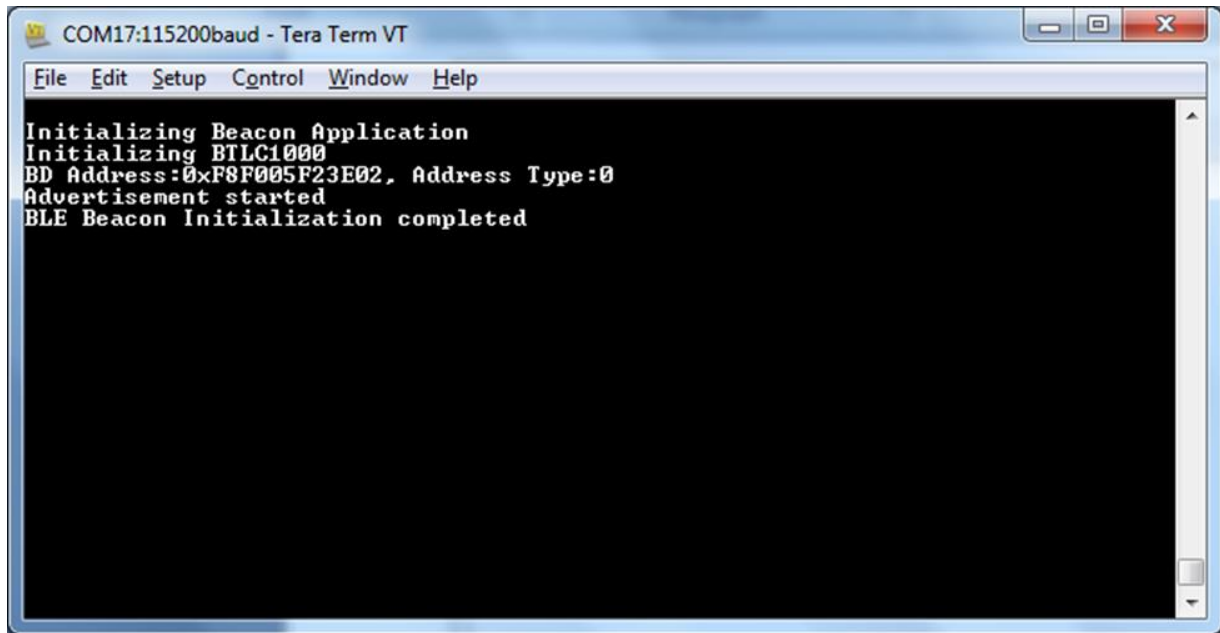
8 Console Logging

For the purpose of debugging, a logging interface had been implemented in the iBeacon Application.

The logging interface utilizes the same EDBG port that connects to [supported platform](#) (see Chapter 3). A serial port monitor application (for example TeraTerm) shall be opened and attached to the EDBG COM port.

The below screenshot shows the information about BLE initialization and iBeacon advertisement.

Figure 8-1. Beacon Application Console when Advertisement Starts



9 ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER

This evaluation board/kit is intended for user's internal development and evaluation purposes only. It is not a finished product and may not comply with technical or legal requirements that are applicable to finished products, including, without limitation, directives or regulations relating to electromagnetic compatibility, recycling (WEE), FCC, CE or UL. Atmel is providing this evaluation board/kit "AS IS" without any warranties or indemnities. The user assumes all responsibility and liability for handling and use of the evaluation board/kit including, without limitation, the responsibility to take any and all appropriate precautions with regard to electrostatic discharge and other technical issues. User indemnifies Atmel from any claim arising from user's handling or use of this evaluation board/kit. Except for the limited purpose of internal development and evaluation as specified above, no license, express or implied, by estoppel or otherwise, to any Atmel intellectual property right is granted hereunder. ATMEL SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RELATING TO USE OF THIS EVALUATION BOARD/KIT.

ATMEL CORPORATION
1600 Technology Drive
San Jose, CA 95110
USA

10 Revision History

Doc Rev.	Date	Comments
42527C	02/2016	Table 3.1 is updated with SAM4S support. Figure 4.4 is updated with SAM4S Xplained Pro Image. Section 5.1 Installation Steps are updated.
42527B	11/2015	Figure 4-1 is updated. The screenshots in Chapter 5 are updated.
42527A	09/2015	Initial document release.



Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T:** (+1)(408) 441.0311 **F:** (+1)(408) 436.4200 | **www.atmel.com**

© 2016 Atmel Corporation. / Rev.: Atmel-42527C-ATBTLC1000-BluSDK-iBeacon-Getting-Started-Guide_USERGUIDE_022016

Atmel®, Atmel logo and combinations thereof, Enabling Unlimited Possibilities®, and others are registered trademarks or trademarks of Atmel Corporation in U.S. and other countries. ARM®, ARM Connected® logo, and others are the registered trademarks or trademarks of ARM Ltd. Other terms and product names may be trademarks of others.

DISCLAIMER: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and products descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

SAFETY-CRITICAL, MILITARY, AND AUTOMOTIVE APPLICATIONS DISCLAIMER: Atmel products are not designed for and will not be used in connection with any applications where the failure of such products would reasonably be expected to result in significant personal injury or death ("Safety-Critical Applications") without an Atmel officer's specific written consent. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Atmel products are not designed nor intended for use in military or aerospace applications or environments unless specifically designated by Atmel as military-grade. Atmel products are not designed nor intended for use in automotive applications unless specifically designated by Atmel as automotive-grade.