iBeacon Demo User's Guide

iBeacon_Application_Getting_Started_Guide

Contents

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1. Overview

This document explains how to setup an iBeacon demo using SAML21 Xplained Pro and BM71-XPro. This document briefly talks about setting up hardware, building application, programming the firmware, and running a demo.

The iBeacon-Demo application showcases a proof-of-concept example of using the **ble_host_sdk** to setup BM71-XPro modules as an iBeacon. The iBeacon-Demo application initializes the BM71-XPro module as a proximity beacon (iBeacon).

The iBeacon will be broadcasted for every 100 ms in all three advertising channels and it can be configured in application.h file. The proximity UUID, Major and Minor numbers can also be configured in application.h file.

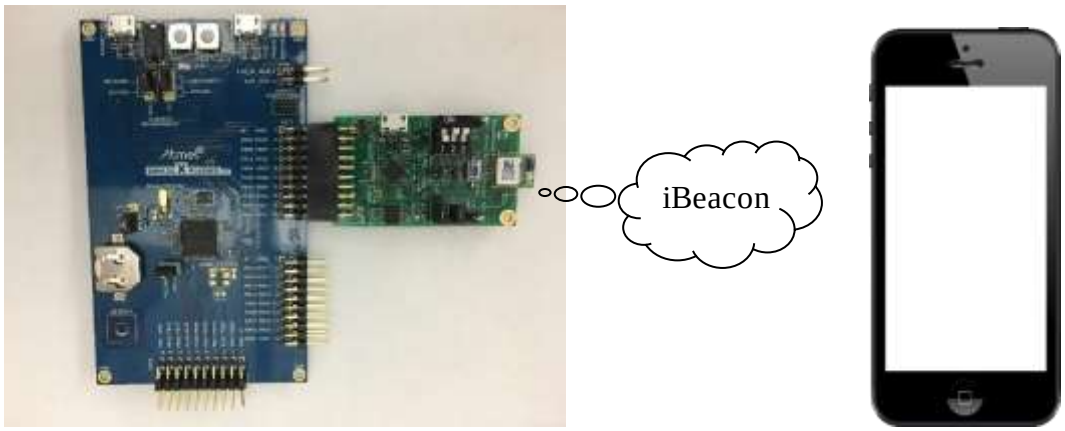


Figure 1: BM71-XPro sends iBeacon and SmartConnect APP scans iBeacon

The following table provides the iBeacon parameter in detail,

Parameter	Value
Company ID	0x4c, 0x00
Beacon Type: Proximity UUID	0x02, 0x15
Proximity UUID	0x21, 0x8a, 0xf6, 0x52, 0x73, 0xe3, 0x40, 0xb3, 0xb4, 0x1c, 0x19, 0x53, 0x24, 0x2c, 0x72, 0xf4
Major	0x00, 0xBB
Minor	0x00, 0x45
Measured Power	0xc5

Note: Details about the iBeacon can be found in Proximity Beacon Specification from Apple

2. Configuring the BM71 XPRO board

It is necessary to configure the BM71 XPRO board by making changes to the configuration file and flash the modified changes to BM71 XPRO board. The configuration changes demand the module to configure in Manual mode.

By default, the BM71 XPro board is configured to operate in Auto mode. The Microchip Studio project, however, requires the module to set up in Manual mode.

The following instructions show how to setup and configure the module to add configuration changes.

1. Connect the BM71 XPro directly to the PC using the MicroUSB on the board. The BM71 XPro board should enumerate a COM port. If not, check if the necessary MCP2200 drivers have been installed.

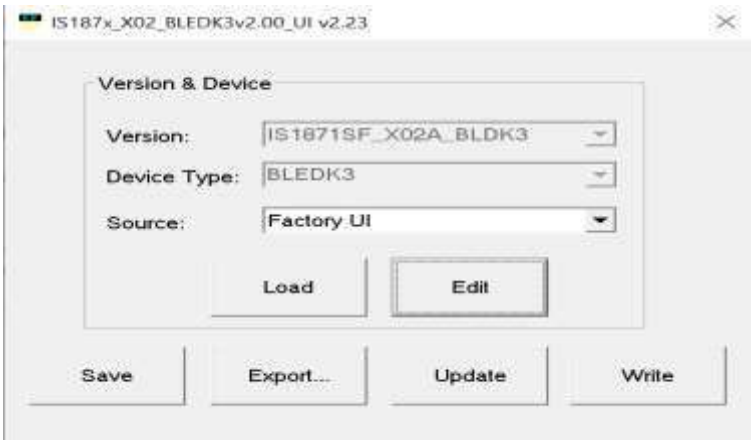
2. Set up the module to programming mode by configuring the Switch 1 in 3-pin DIP switch to ON state. The switch#1 sets the mode of operation on the module (between application mode and flash write mode). Refer to details on pin P2_0 in the BM70 datasheet for more details. The Blue LED (labeled BT_ACT, LD4) should be solid BLUE now. If not, check the following: a. Press 'Reset' button on the board.

   NOTE: Make sure the jumper on J2 is set to USB.

3. Make sure that the BM71 module does have the correct BM71 firmware installed. By def ault, they should be. However, if you have programmed the module to be RN4871, change the firmware back to BM71. If the module has RN871 firmware, the module will not operate as expected and the Studio project will fail.

4. Open the UI tool for the BM70/71 modules. This tool is available for download from the BM70/71 webpage under the 'Software libraries/firmware' section.

5. Open the UI tool:



a. In the example below, the 'BM71 default table' is being used as the base file. Click on 'Edit' to start editing the memory parameters.

b. The following changes are made in the first 'System Setup' tab:

i. Disable the low power operation.

ii. Change the operation mode to 'Manual pattern.'

3. Hardware Setup

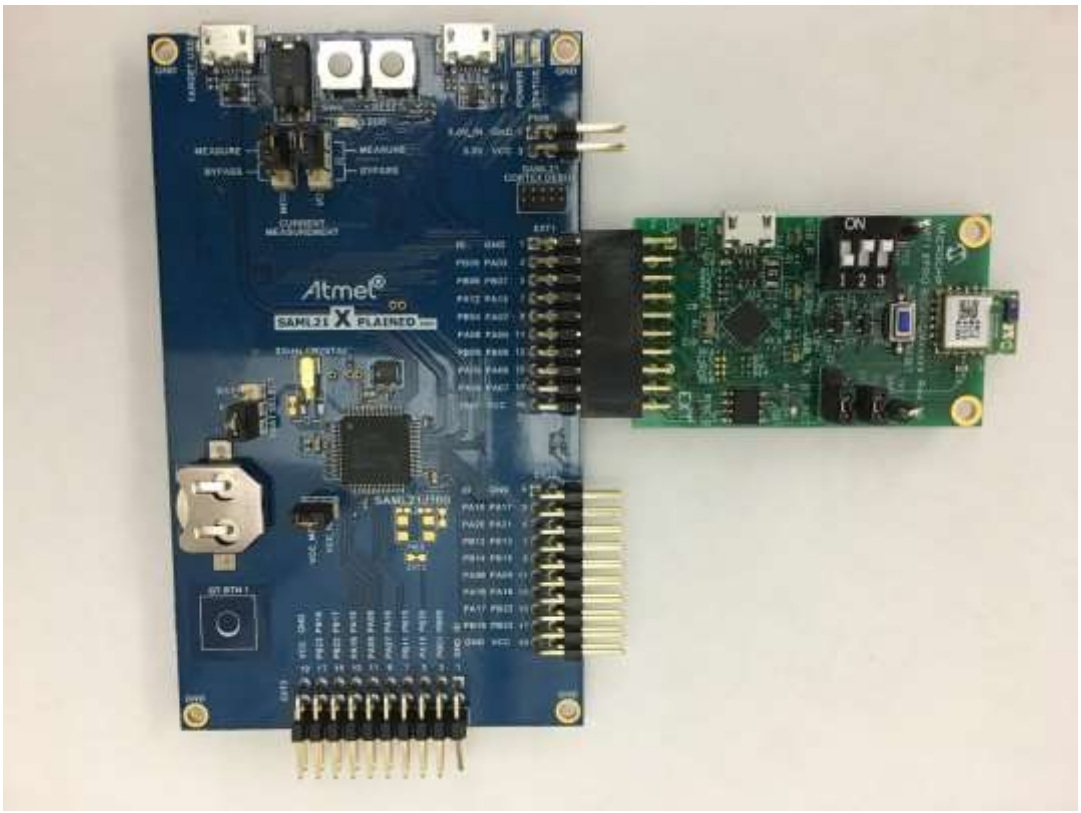


Figure 2: BM71-XPro connected on EXT1 of SAML21 Xplained Pro

1. Plugin the BM71-XPro board into EXT1 of SAML21 Xplained Pro board as shown in Figure 2.
2. Connect the SAML21 Xplained Pro board to the host PC using micro USB cable.

3.1 Console

The iBeacon application uses the Universal Asynchronous Receiver/Transmitter (UART) interface on SAML21 Xplained Pro board to send the status messages. Any serial application (ex: TeraTerm) can be used to interact with SAML21 Xplained Pro.

UART (COM port) settings.

Baud rate	115200
Data	8 bits
Parity	none
Stop	1 bit
Flow control	none

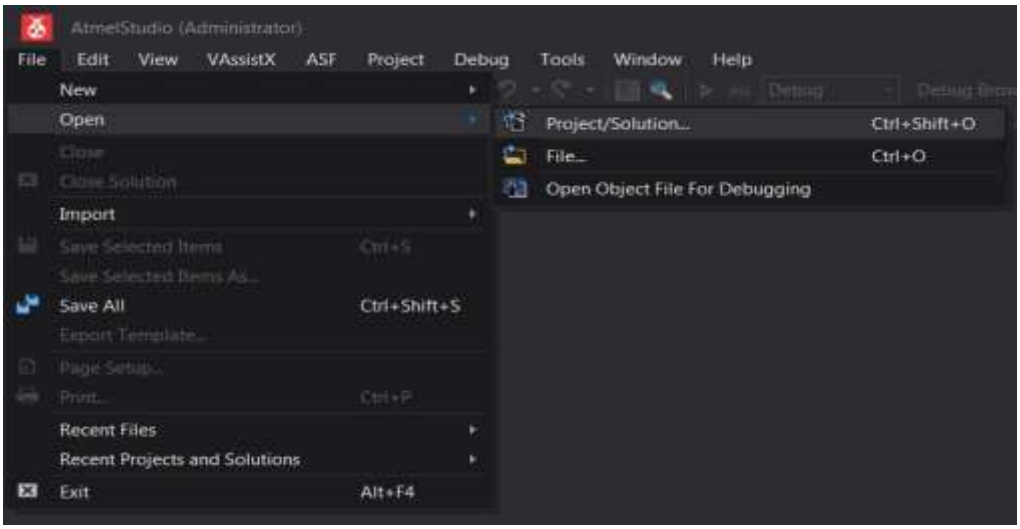
4. Build Procedure

This section describes the build procedure of iBeacon application on Atmel Studio 7.

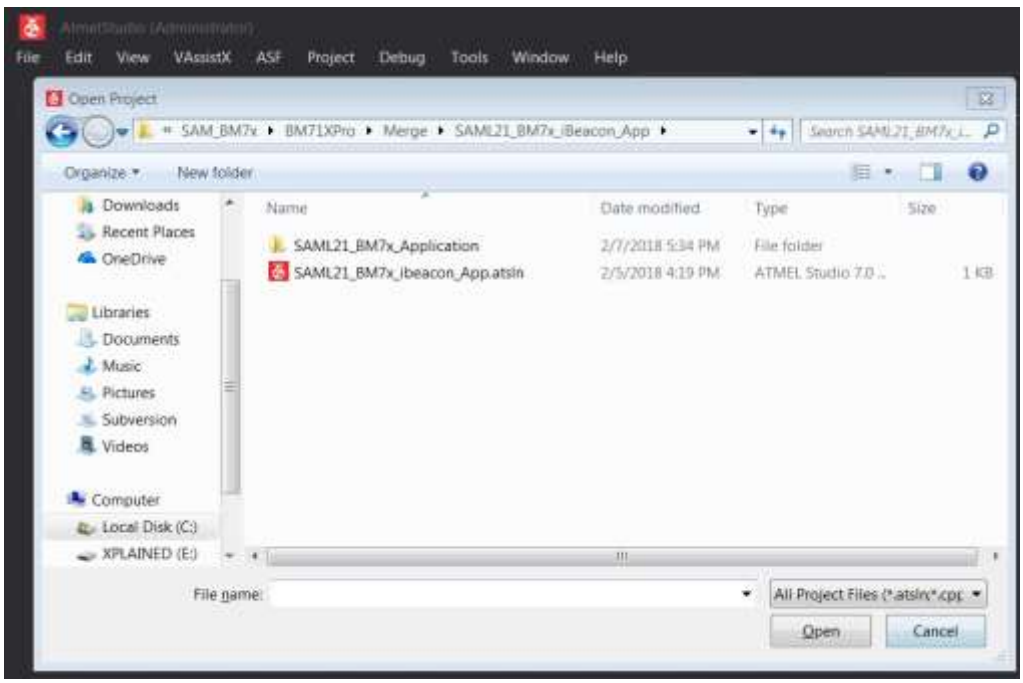
4.1. Open Atmel Studio 7

4.2. Open iBeacon Application

1. Go to menu **File → Open → Project/Solution**



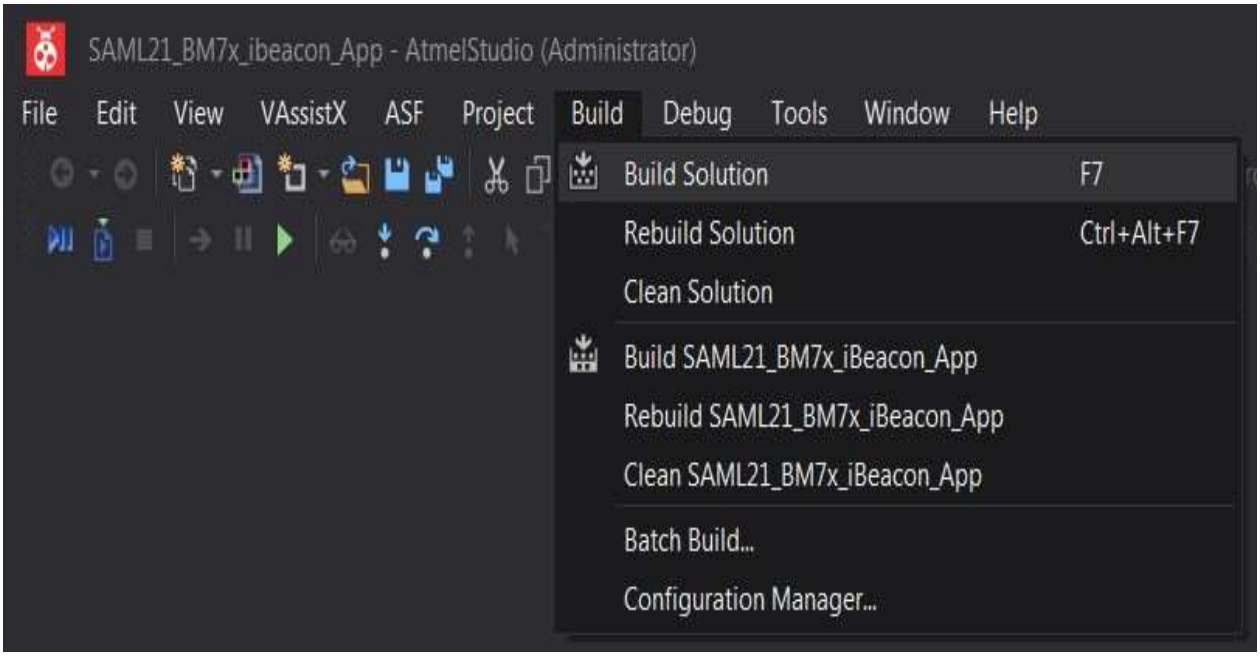
2. Select "SAML21_BM7x_ibeacon_App.atsln" and press **Open**.



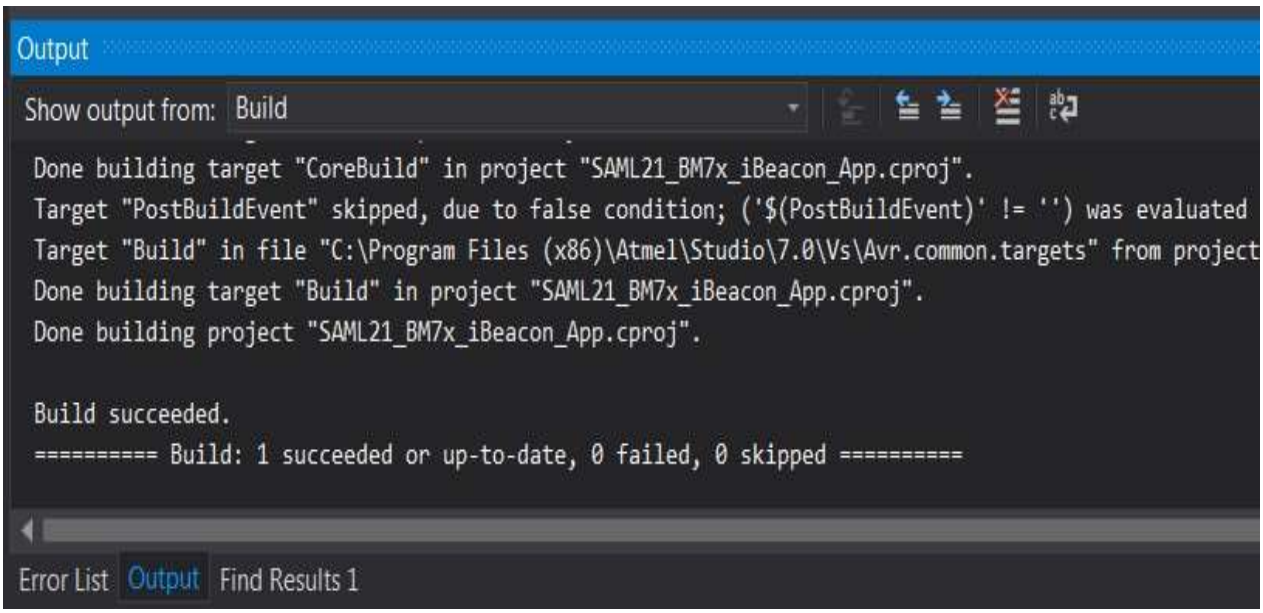
3. Once the project is opened, you can see the files attached to this project in Solution Explorer Window

4.3. Build iBeacon Application.

1. Go to menu Build → Build Solution or Press F7



2. Build status can be checked in "Output" window

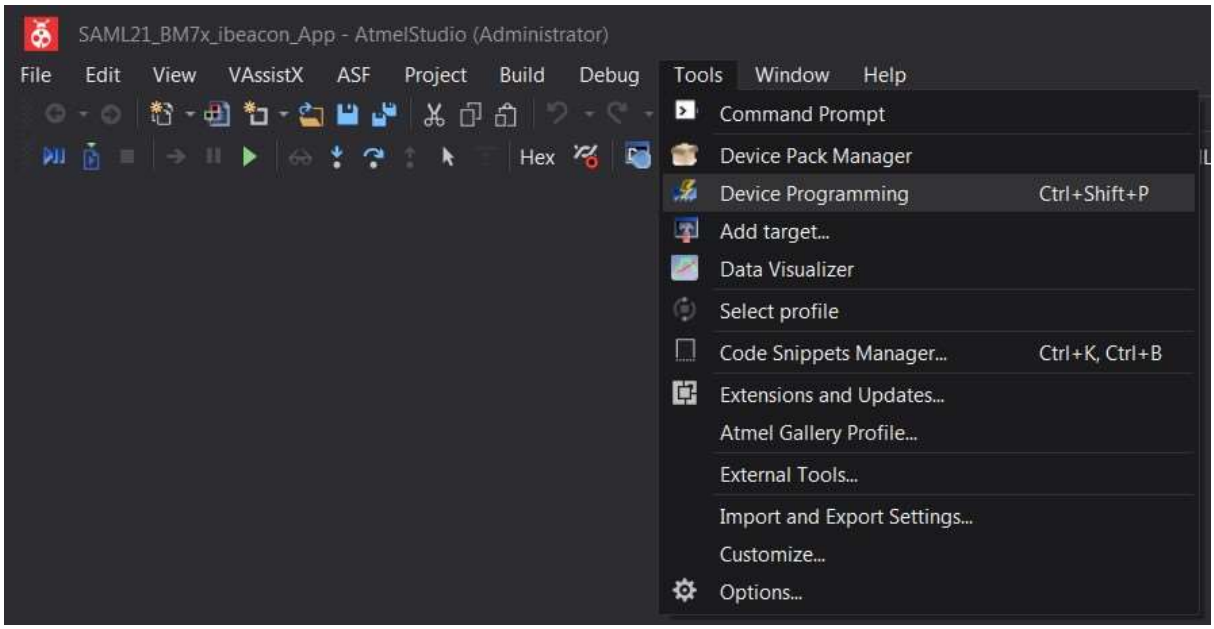


3. You can find the Hex images in "..\SAML21_BM7x_Application\Debug".

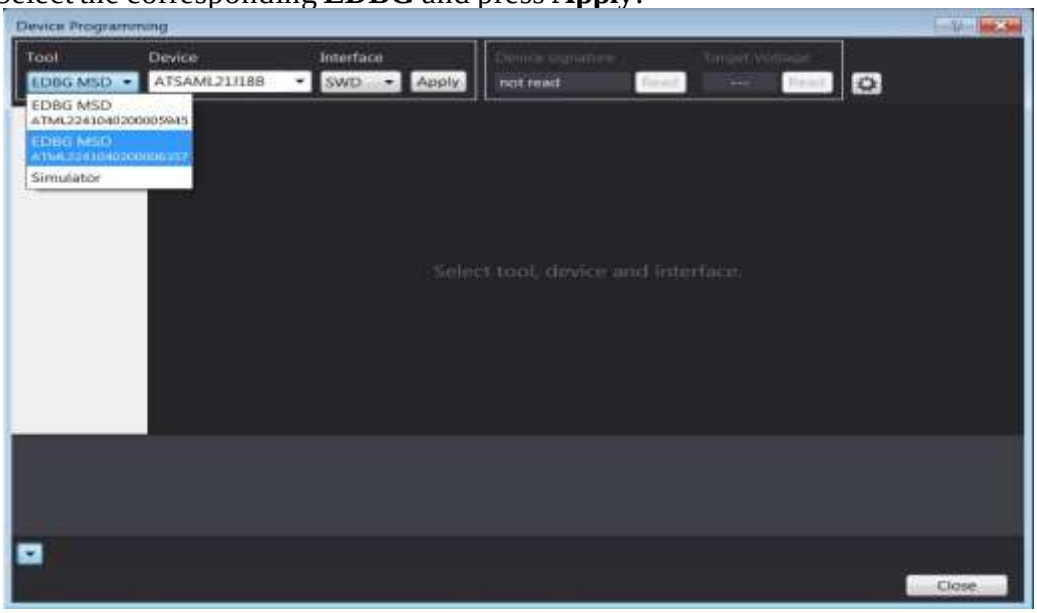
5. Programming Firmware

This section describes the procedure to program iBeacon firmware on SAML21 Xplained Pro board.

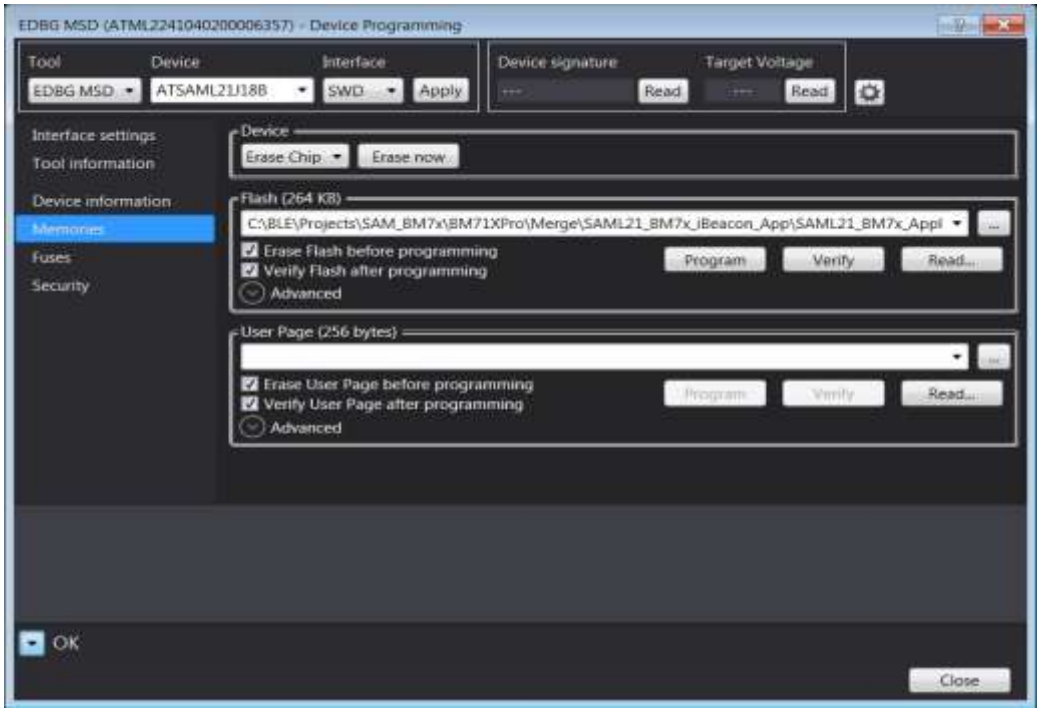
1. Connect the SAML21 Xplained Pro board to the host PC using micro USB cable. Perform the following steps:
    a. Verify that the virtual COM port is enumerated on the host PC.
    b. Make sure that POWER LED (green) is solid ON.
2. To program the HEX files into the SAML21, go to menu **Tools → Device Programming** or Press **Ctrl + Shift + P**.



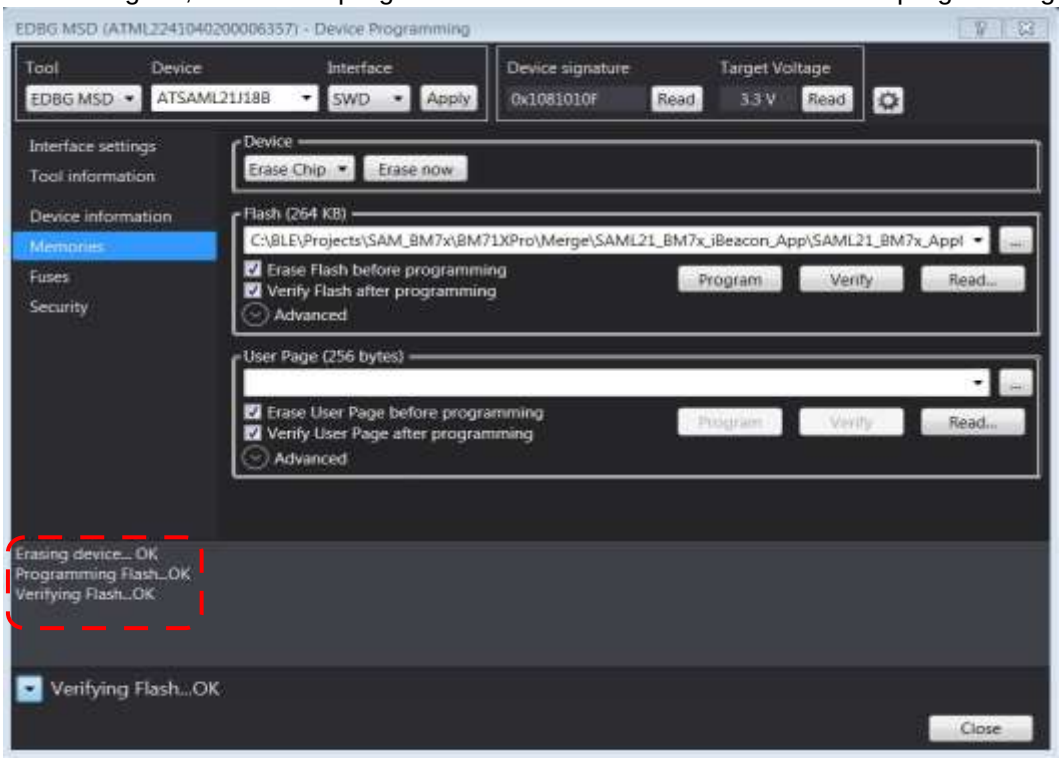
3. Select the corresponding **EDBG** and press **Apply**.



4. Go to Memories Tab and select Hex file.



5. Press Program, the tool will program SAML21. You can check the status of programming.



6. Once programming is done, close the Device Programming window.

6. Running iBeacon Demo

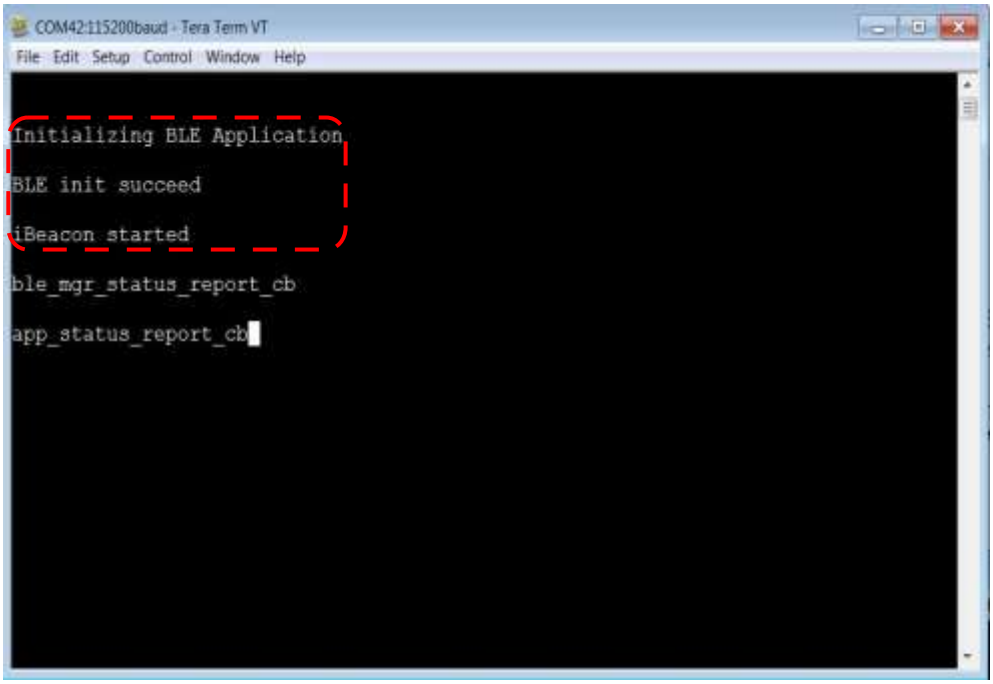
This section describes the iBeacon demo procedures.

1. Connect BM71-XPro on EXT1 of SAML21 Xplained Pro board.
2. Connect the SAML21 Xplained Pro board to the host PC using micro USB cable. Perform the following steps:
   a. Verify that the virtual COM port is enumerated on the host PC.
   b. Open the enumerated COM port on a serial terminal application like TeraTerm with the following settings:

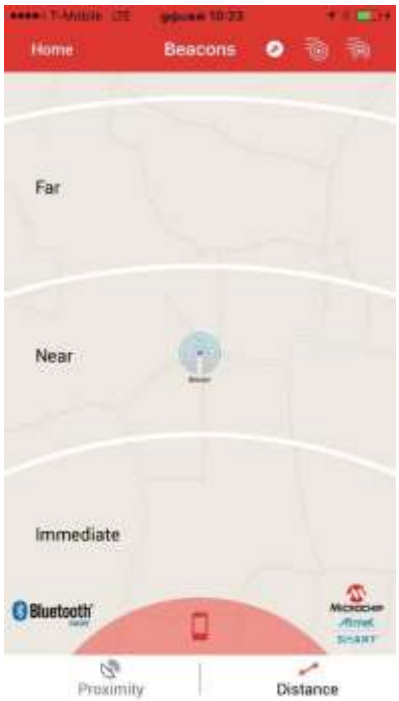
Baudrate	115200
Data	8 bits
Parity	none
Stop	1 bit
Flow control	none

   c. Make sure that POWER LED (green) is solid ON.
   d. Press Reset button and verify that LD4 (blue) on BM71-XPro is blinking at a regular interval.
3. Download and install the Microchip Bluetooth Data App on the smart phone.
4. Open the SmartConnect App to scan for the iBeacon

5. Select Beacon Ranging to scan for iBeacon.
6. Ensure that the iBeacon device is beaconing by checking the TeraTerm window for advertising status message.

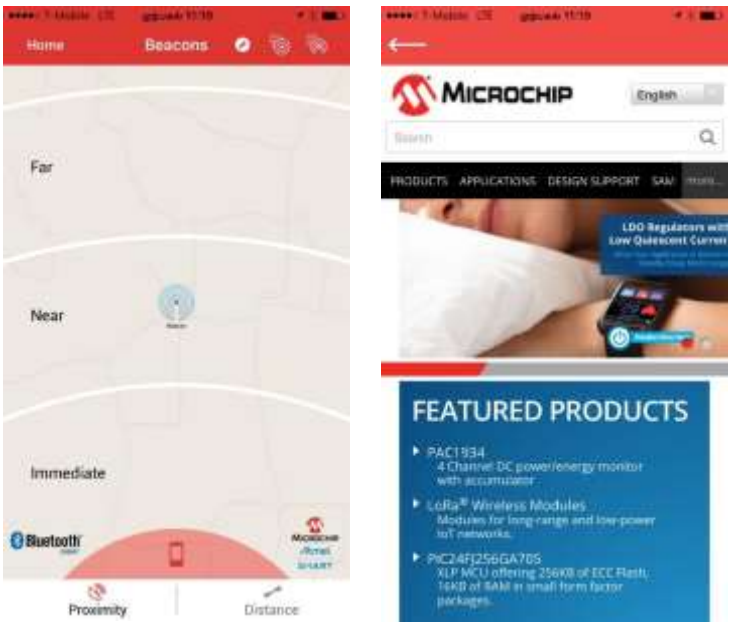


7. Press Beacon Ranging on SmartConnect App, it will open Beacon Radar and find the beacons in vicinity.



8. Click on the beacon will show the UUID, Major, Minor and RSSI details

9. If the SmartConnect APP finds beacon in Immediate zone when it is in Proximity mode, then it will reach out to Microchip website.



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