



Introduction

The Blood Pressure Profile (BLP) enables a device to connect and interact with a Blood Pressure Sensor device for use in consumer and professional health care applications.

The Blood Pressure Profile is used to enable a device to obtain blood pressure measurement and other data from a non-invasive blood pressure sensor that exposes the Blood Pressure Service. For example, a nurse or doctor could use a non-invasive blood pressure sensor on a patient that sends blood pressure measurements to a laptop or other hand held device.

This example demonstrates a Blood Pressure sensor application (GATT Server role).

Features

- Device Discovery and Disconnection
- Pairing/Bonding
- Blood Pressure Measurements
- Console Display

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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 the BluSDK SMART release. The Bluetooth® Blood Pressure Profile is an example application that is embedded as part of the software release package.

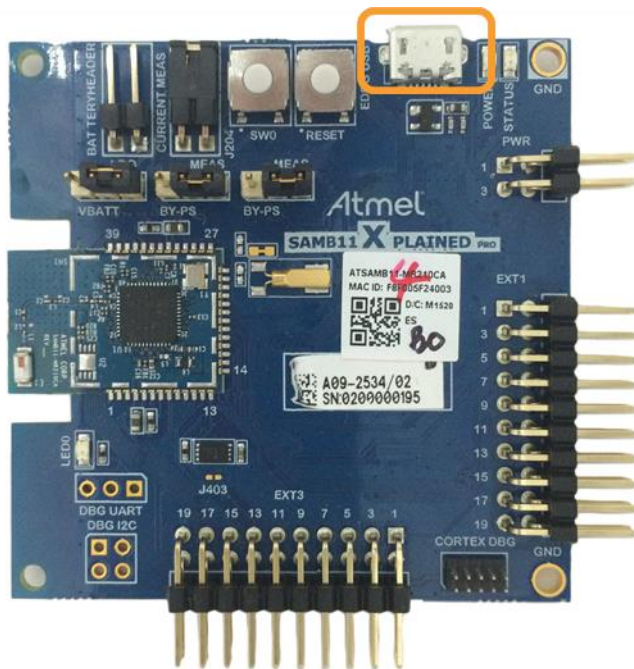
2 Demo Setup



3 Hardware Setup

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

Figure 3-1. EDBG USB Port



4 Blood Pressure Measurements

The Blood Pressure Measurement characteristic shall be used to send blood pressure measurements. Included in the characteristic there is a Flags field (containing units of blood pressure and used to show presence of optional fields), the Blood Pressure Measurement Compound Value field and, depending upon the contents of the Flags field, Time Stamp (time of the measurement), Pulse Rate, User ID, and Measurement Status fields.

The Intermediate Cuff Pressure characteristic may be notified frequently during the course of a measurement so that a receiving device can effectively update the display on its user interface during the measurement process.

When the Client Characteristic Configuration descriptor is configured for indications and a blood pressure measurement is available, this characteristic shall be indicated while in a connection.

The Blood Pressure Measurement Application, which is the GATT server, will hold the characteristics and will send the measurement values to the Blood Pressure Monitor.

- The Blood Pressure Measurement characteristic shall be used to send blood pressure measurements
- The Intermediate Cuff Pressure characteristic, which is used to send Current Cuff Pressure values to a device for display purposes while the measurement is in progress
- The Blood Pressure Feature characteristic shall be used to describe the supported features of the Blood Pressure Sensor

ATSAMB11 simulates a Blood Pressure Sensor (GATT Server Role) and sends simulated values to the Blood Pressure Monitor (SmartConnect mobile application).

5 Software Setup

5.1 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:

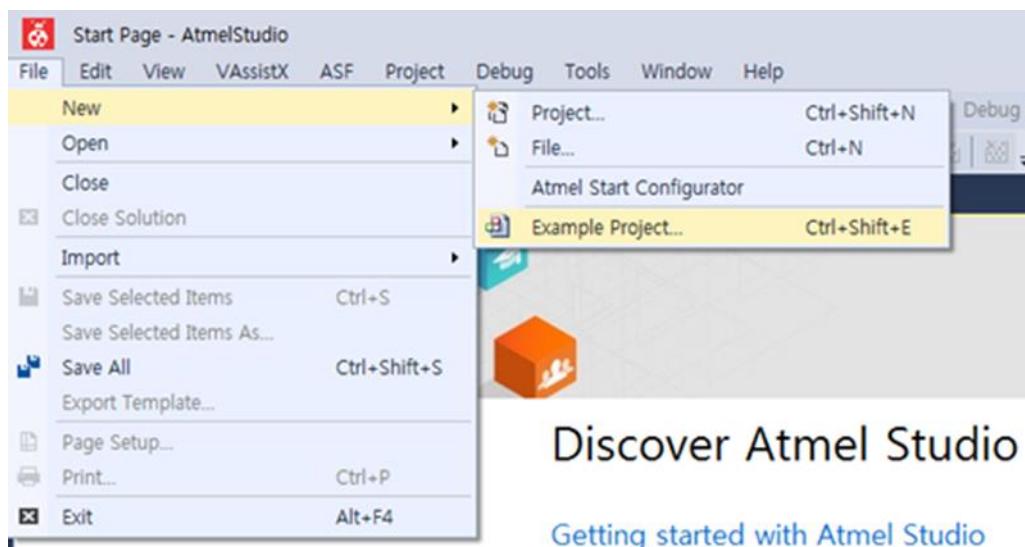
- Blood Pressure application for ATSAMB11

5.2 Build Procedure

The following procedure is explained for ATSAMB11 application example.

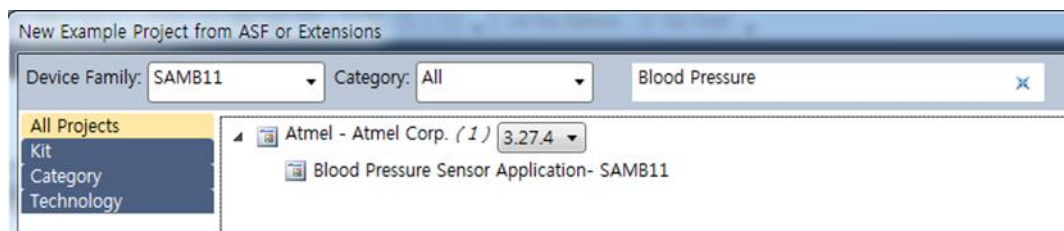
1. Select New Example Project.

Figure 5-1. Creating a New Example Project



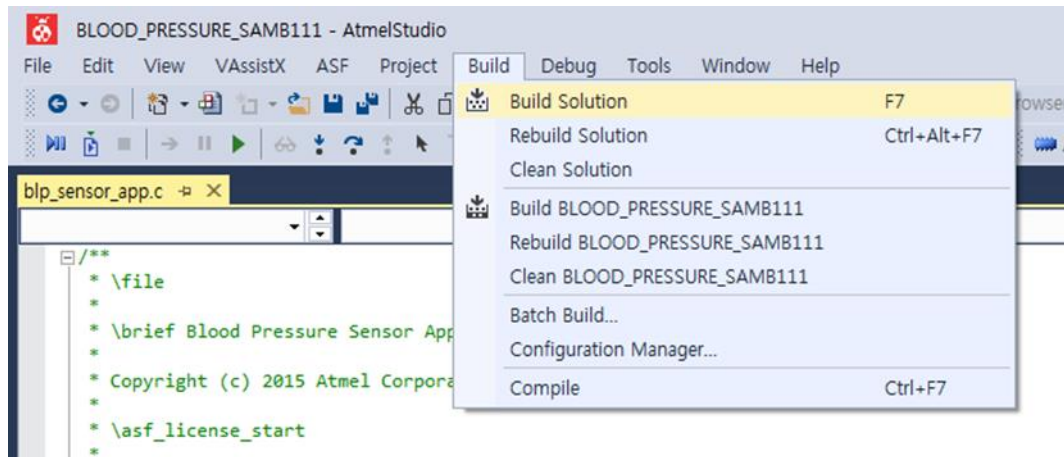
2. Select "SAMB11" in device family, enter "Blood Pressure" in search window, and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click OK.

Figure 5-2. Selecting Blood Pressure Application from Example Projects



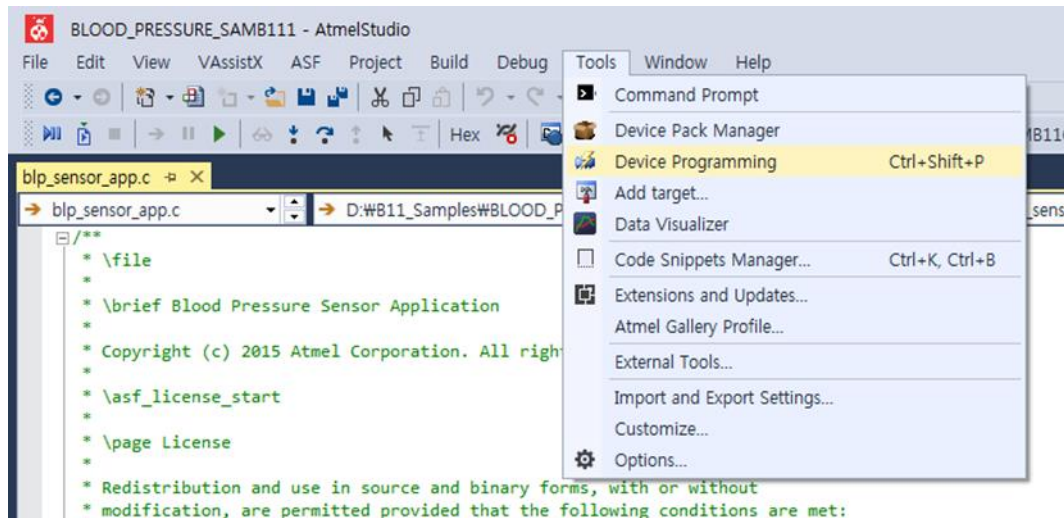
3. Accept the license Agreement. The Atmel studio will generate the Blood Pressure Profile project for ATSAMB11.
4. Build the solution.

Figure 5-3. Building the Blood Pressure Application



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

Figure 5-4. Programming the Blood Pressure Application



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 5-5. Flash the Blood Pressure Application



7. Once the application is flashed, the Blood Pressure application is ready for usage.

6 Console Logging

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

The logging interface utilizes the same EDBG port that connects to ATSAMB11. A serial port monitor application (for example TeraTerm) shall be opened and attached to the corresponding COM port enumerated on the PC by the device. Baud rate should be set at 115200.

7 Running the Demo

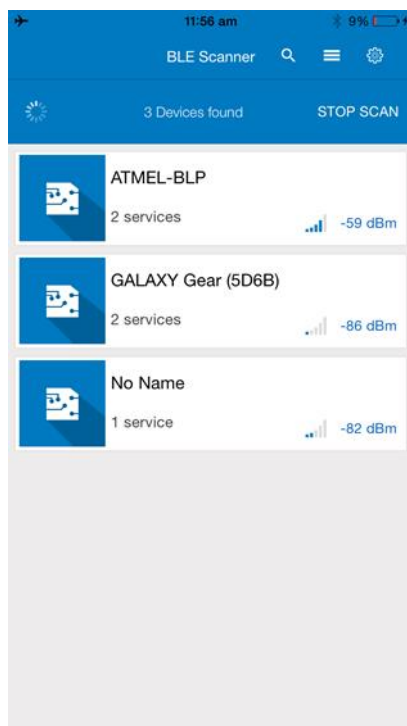
1. Power on the ATSAMB11 by connecting the USB cable.
2. Open a console window using TeraTerm or any equivalent serial port monitor application and connect to the corresponding COM port enumerated on the PC. Configure the COM Port with the following settings: Baudrate 115200, Parity None, one Stop bit, one Start bit, no Hardware Handshake.
3. Press the Reset button on the ATSAMB11 board.
4. The device is now in advertising mode.

Figure 7-1. Console Display for Advertising Mode

```
Initializing Blood Pressure Sensor Application
Initializing SAMB11
BD Address:0xF8F005F23FFF, Address Type:0
Device is in Advertising Mode
```

5. On the iPhone, enable Bluetooth in the Settings page. Use the Atmel SmartConnect mobile app and scan for devices. ATMEL-BLP will be appear amongst the devices scanned. Click on ATMEL-BLP to connect to the ATSAMB11 device.

Figure 7-2. Atmel BLP Device Discovery on iPhone



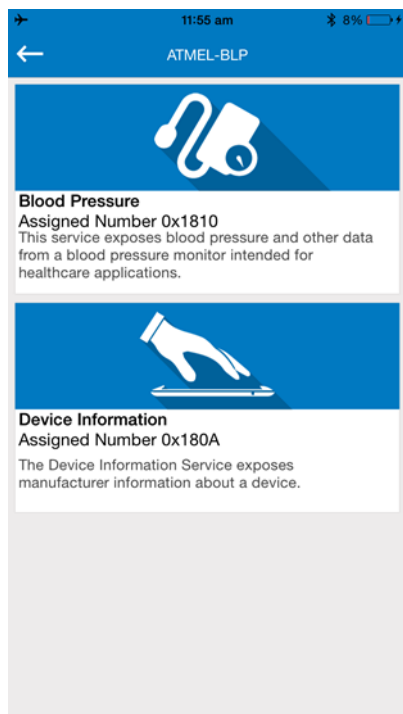
6. Once connected, on the client side will request for pairing procedure with iPhone. The console log provides a guidance to the user to enter the pass-key on iPhone.

Figure 7-3. Console Log for Pairing Procedure

```
Initializing Blood Pressure Sensor Application
Initializing SAMB11
BD Address:0xF8F005F23FFF, Address Type:0
Device is in Advertising Mode
Connected to peer device with address 0xccfa00710852
Connection Handle 0
Peer device request pairing
Sending pairing response
Please Enter the following Pass-code(on other Device):123456
Pairing procedure completed successfully
```

7. Once the device is connected, the following services shall be displayed on the mobile app.

Figure 7-4. Discovery of Services for BLP Application



8. Since the service level connection is now established, the user will see the notifications of the Blood Pressure measurements as shown.

Figure 7-5. Console Log for Blood Pressure Measurements

```
Please Enter the following Pass-code(on other Device):123456
Pairing procedure completed successfully
Notifications enabled by the remote device for interim cuff pressure
Indications enabled by the remote device for blood pressure

Systolic      10 kpa
Diastolic     07 kpa
Map           08 kpa
Pulse rate    60 bpm

Press the button to receive the blood pressure parameters

Started sending Interim Cuff Pressure Values
Cuff pressure  80 mmhg
Cuff pressure  81 mmhg
Cuff pressure  82 mmhg
Cuff pressure  83 mmhg
Cuff pressure  84 mmhg
Cuff pressure  85 mmhg
Cuff pressure  86 mmhg
Cuff pressure  87 mmhg
Cuff pressure  88 mmhg

The Blood Pressure Values are:
Systolic      81 mmhg
Diastolic     61 mmhg
Map           71 mmhg
Pulserate     61 bpm

Press the button to receive the blood pressure parameters
```

Figure 7-6. Mobile Application Blood Pressure Measurements

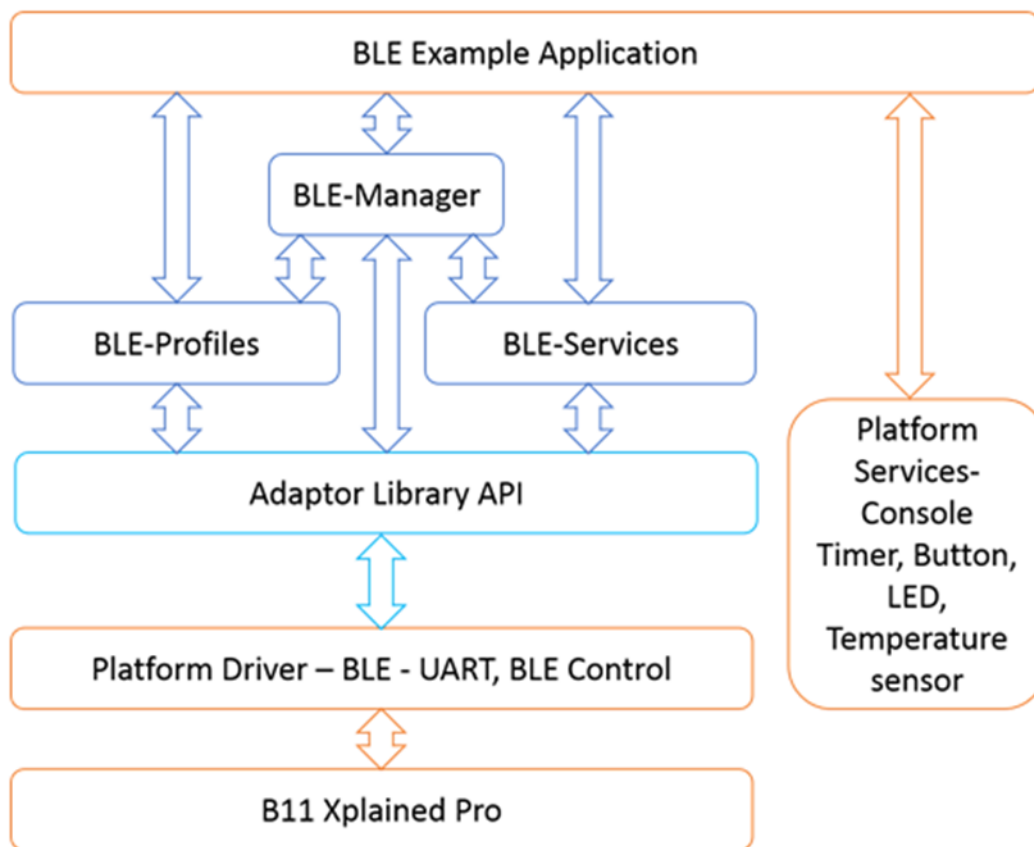


Note: The Atmel SmartConnect mobile App for Android also implements the same features and provides the same look and feel. Henceforth incase a BLE compatible Android phone is used, the demo instructions from the mobile app perspective remain the same as above.

8 BluSDK SMART Software Architecture

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

Figure 8-1. ATSAMB11 Software Architecture



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10 Revision History

Doc Rev.	Date	Comments
42613A	11/2015	Initial document release.



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