



## Introduction

This document describes how to establish a setup to Test the Direct test mode between two Atmel® ATSAMB11 Xplained boards. A PC based tool will be used at both ends. The PC tool communicates to the ATSAMB11 using a serial bridge application.

## Features

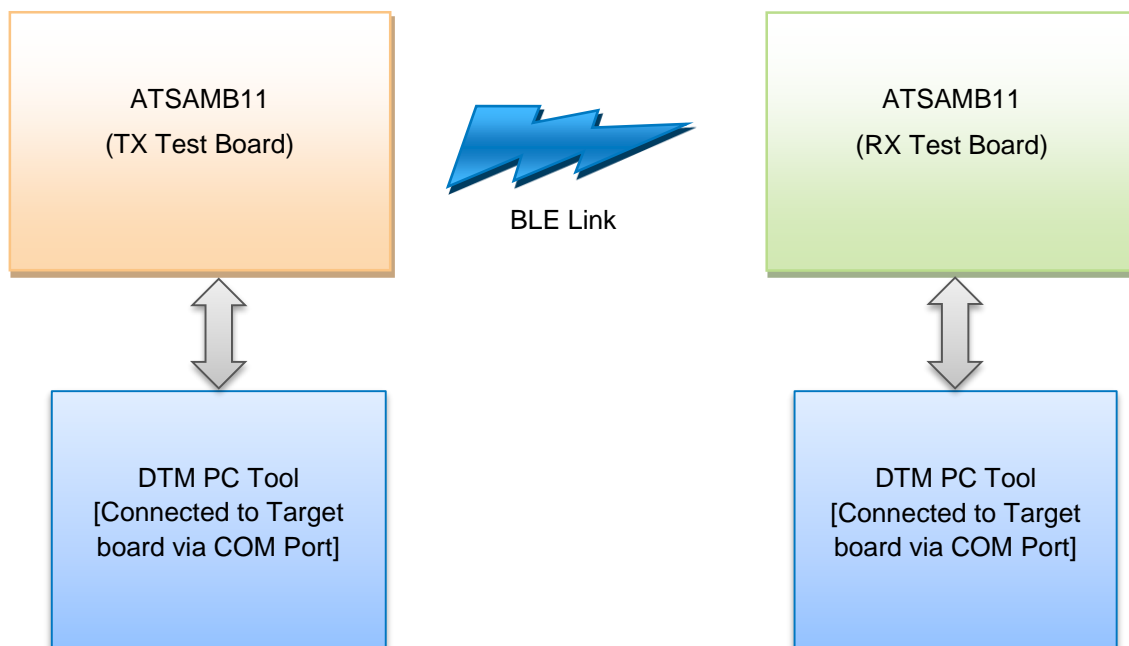
- DTM setup procedure
- Downloading DTM Firmware
- Running the setup

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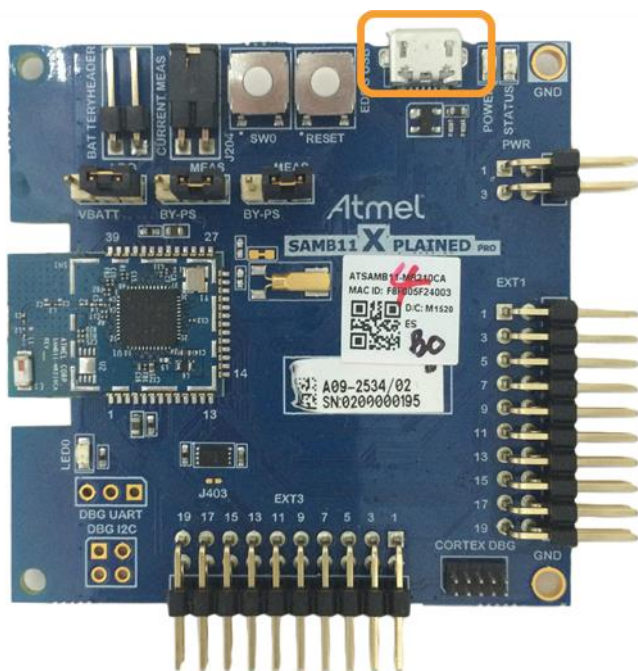
## 1 Demo Setup



## 2 Hardware Setup

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

Figure 2-1. EDBG USB Port



## 3 Software Setup

### 3.1 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:

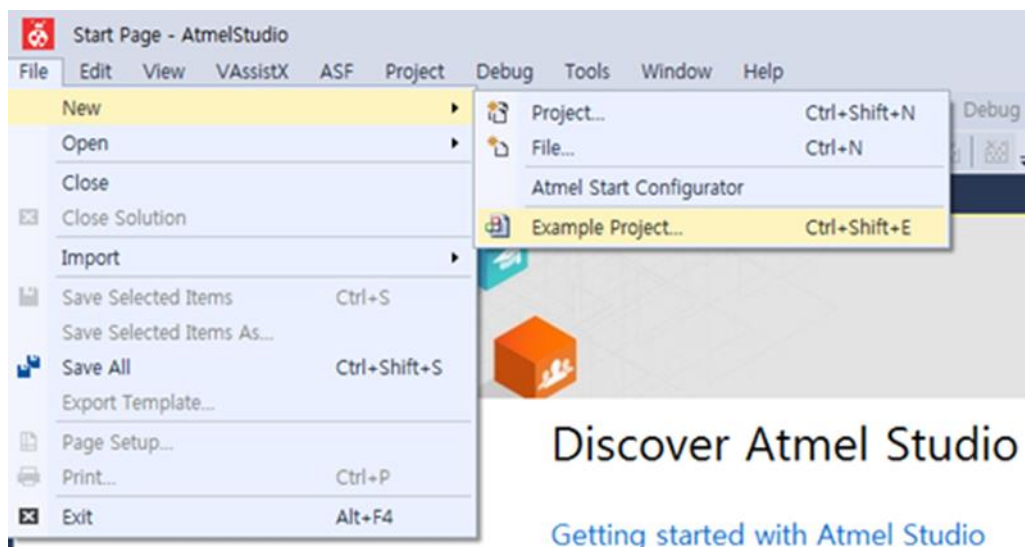
- Direct Test Mode application for ATSAMB11

### 3.2 Build Procedure

The following procedure is explained for ATSAMB11 application example.

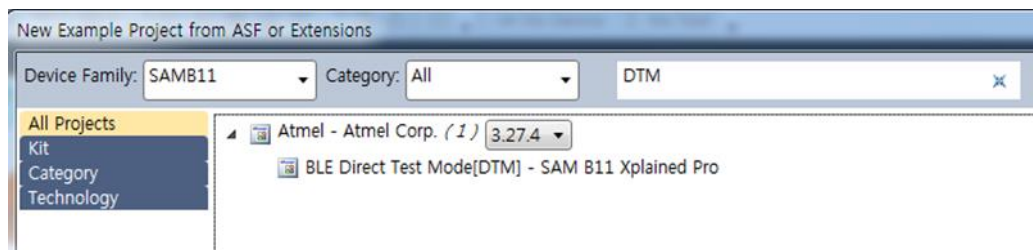
1. Select New Example Project.

Figure 3-1. Creating a New Example Project



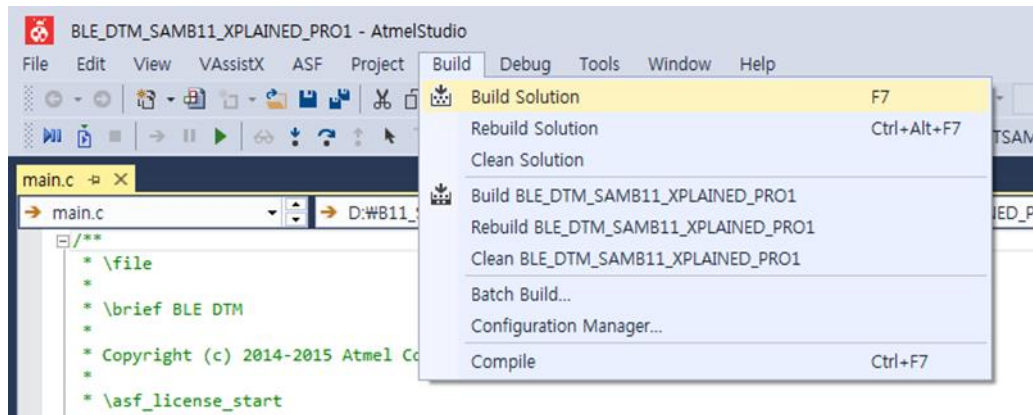
2. Select "SAMB11" in device family, enter "DTM" in search window, and expand Atmel Corp Projects. The location and the name of the project can be selected in the respective fields. Click OK.

Figure 3-2. Selecting DTM Application from Example Projects



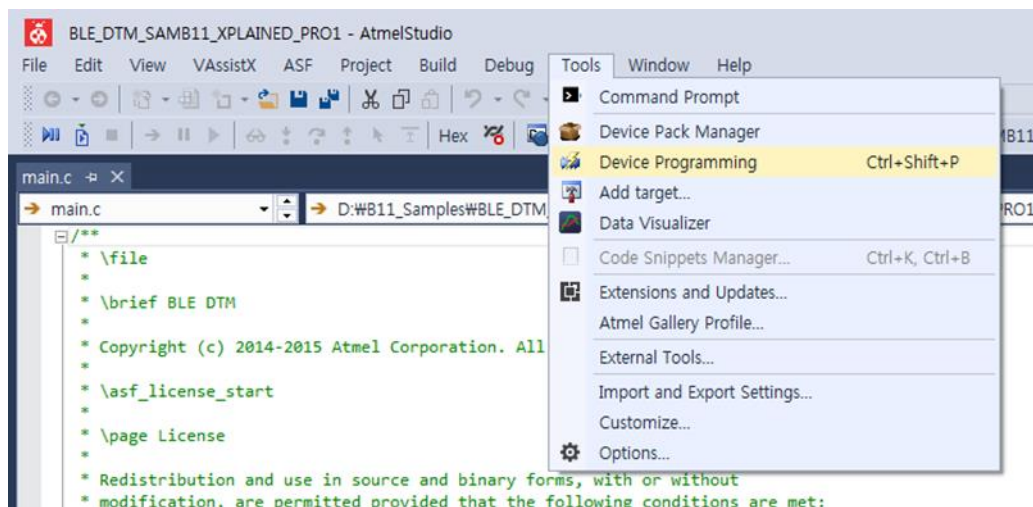
3. Accept the license Agreement. The Atmel studio will generate the Direct Test Mode Example project for ATSAMB11.
4. Build the solution.

**Figure 3-3. Building the DTM Application**



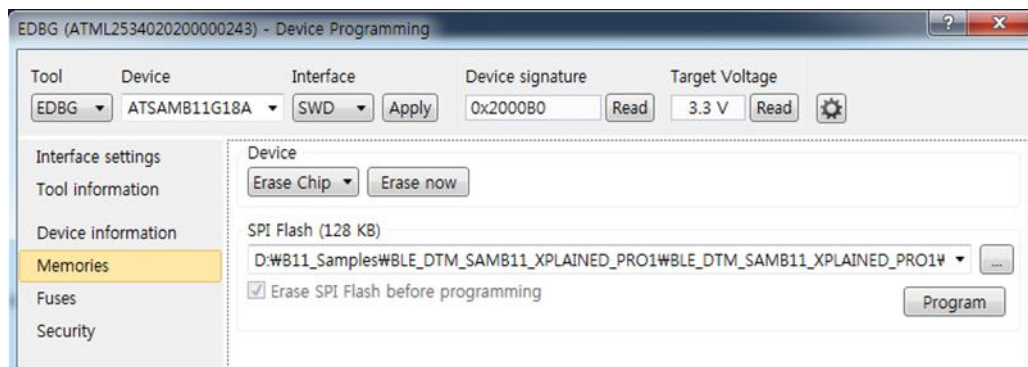
5. Download the application via the USB to the ATSAMB11 board by using the Device Programming option available in Tools as shown below.

**Figure 3-4. Select Device Programming**



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 3-5. Flashing Programming**



7. Once the application is flashed, the Direct Test Mode application is ready for use.

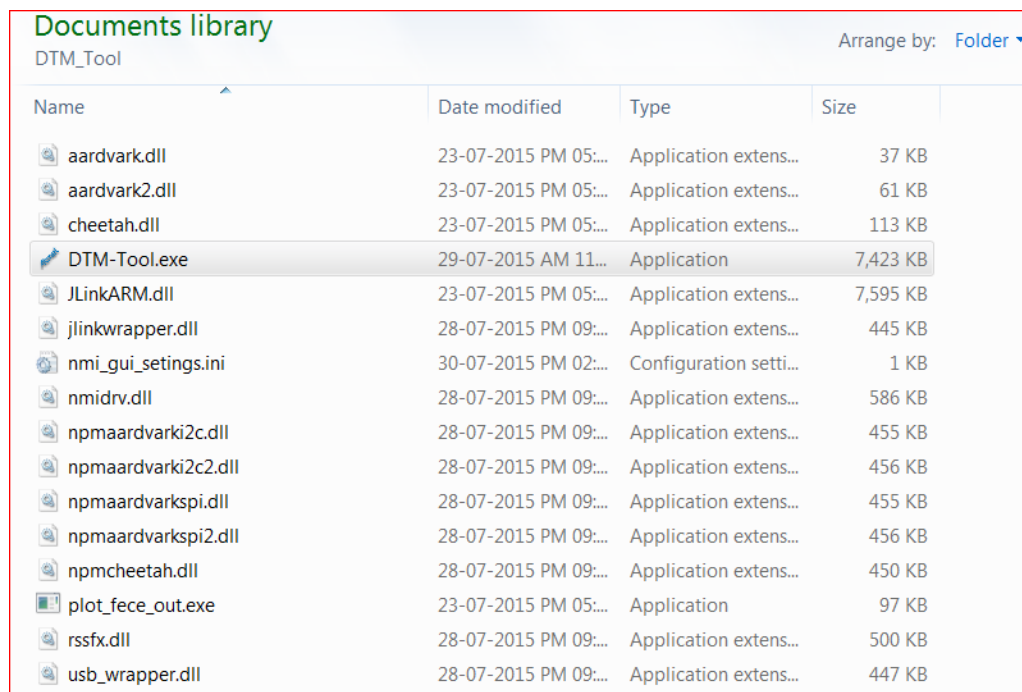
## 4 Serial Bridge Application

In order to allow the DTM PC Application send the DTM commands to ATSAMB11, the ATSAMB11 will act as serial bridge between the ATSAMB11 and DTM Tool. As soon as the ATSAMB11 is powered on or reset, it initializes the Wakeup, completes the Initialization procedure of the BLE module, and then the initialization application will initialize the serial bridge and the ATSAMB11 will be acting as a serial bridge.

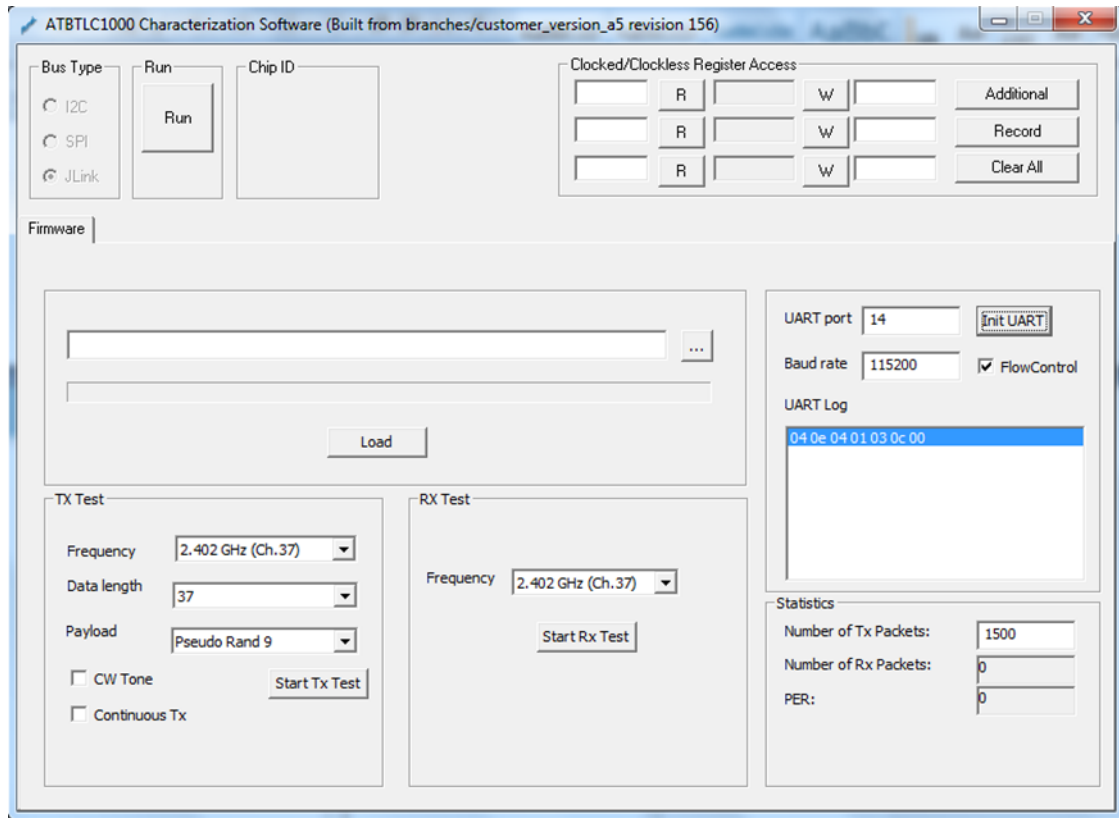
## 5 DTM PC Tool

1. Start The DTM Tool by clicking “DTM-Tool.exe.

**Figure 5-1. Selecting the DTM PC Tool**



**Figure 5-2. DTM PC Tool Window**





2. Next, initialize UART. Enter the COM port number and press “Init UART”. A successful initialization is indicated by receiving a chip response as shown below.

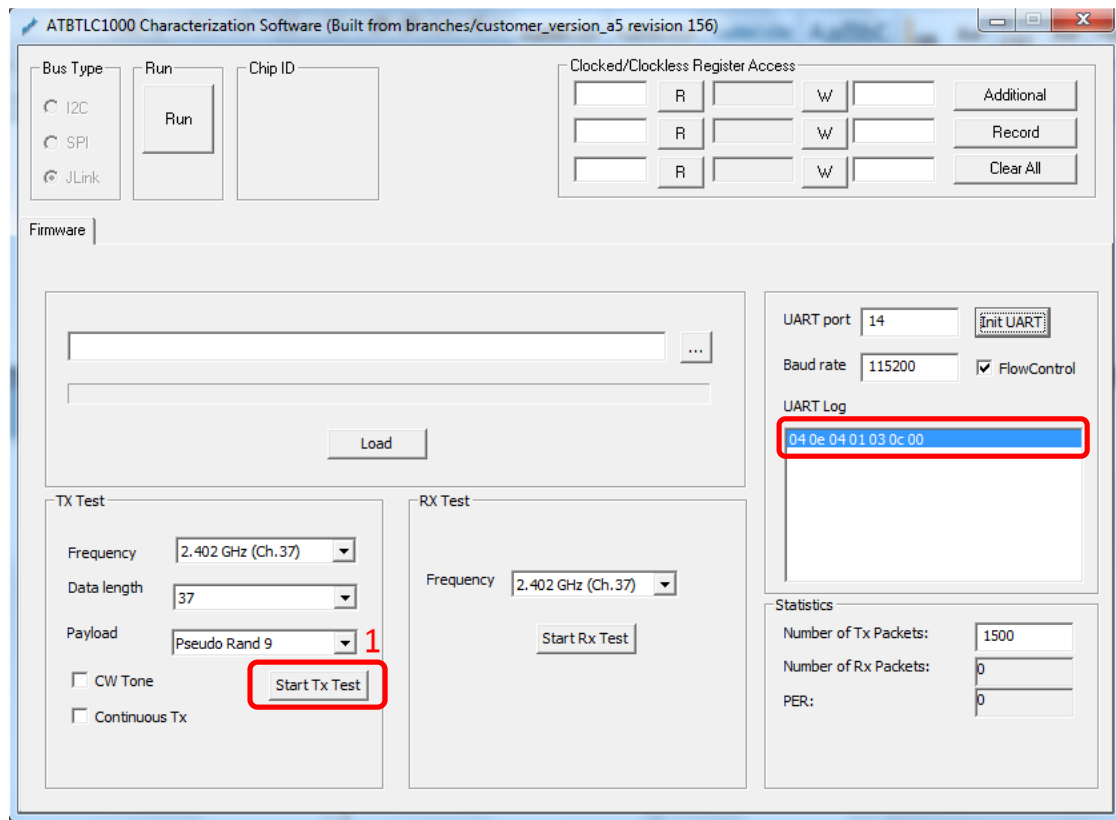
**Figure 5-3. Init UART**

The screenshot shows a software interface for initializing UART. It includes fields for 'UART port' (set to 14) and 'Baud rate' (set to 115200), with a checked 'FlowControl' option. An 'Init UART' button is present. Below these is a 'UART Log' section containing a text box with the hexadecimal string '04 0e 04 01 03 0c 00'. At the bottom is a 'Statistics' section with input fields for 'Number of Tx Packets' (1500), 'Number of Rx Packets' (0), and 'PER' (0). Red annotations are present: a '1' points to the 'UART port' field, a '2' points to the 'Init UART' button, and a '3' points to the 'UART Log' text box.

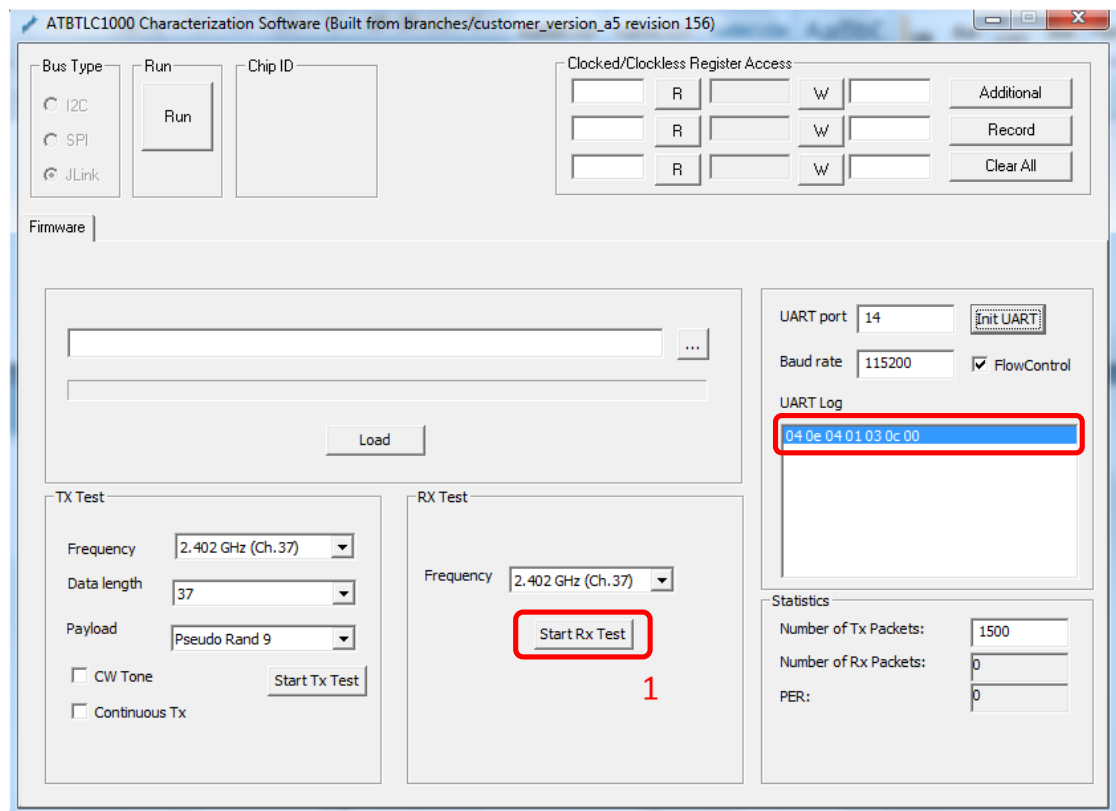
3. Start the Direct Test Mode, configuring one board as TX and the other one as RX. Note that any side can be replaced by a standard compliant test equipment. Make sure to select the same RF Channel for both during the Test and to start the RX test before the TX Test in order not to miss any packets. You should see the chip response after each Start/Stop to make sure that the UART communication is still working fine.



**Figure 5-4. TX Side Test Start**

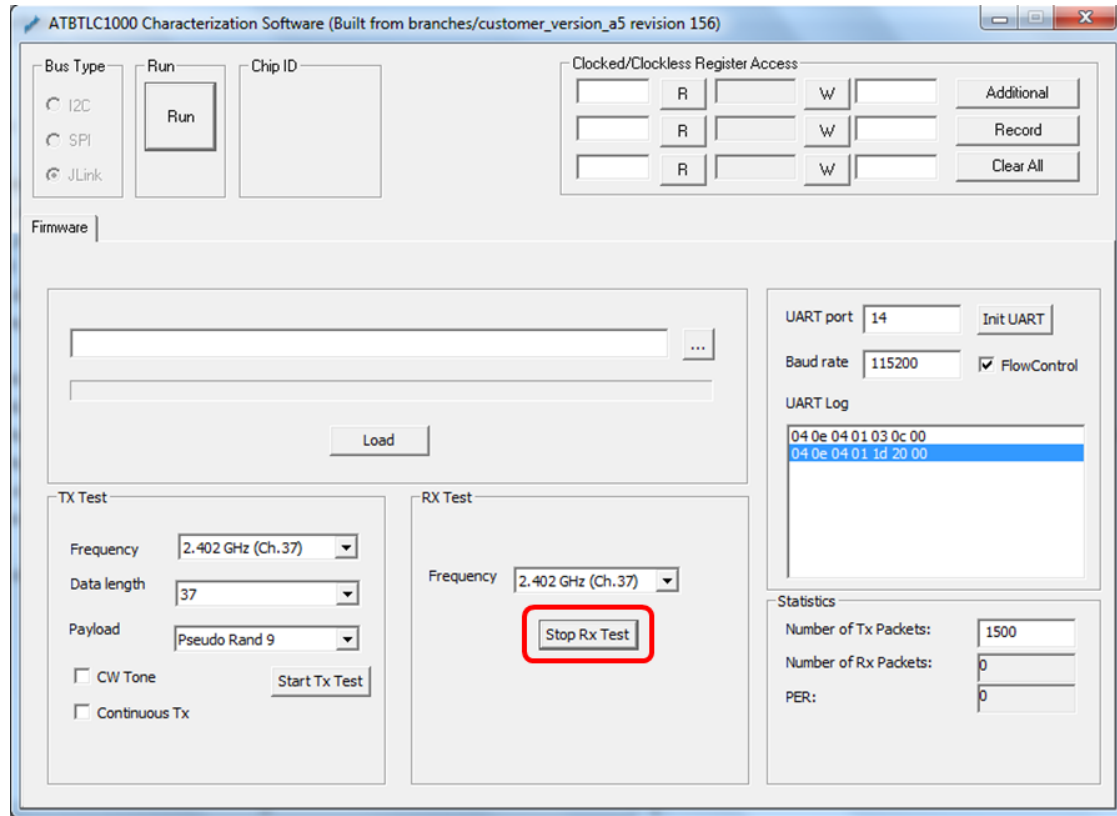


**Figure 5-5. RX Side Test Start**



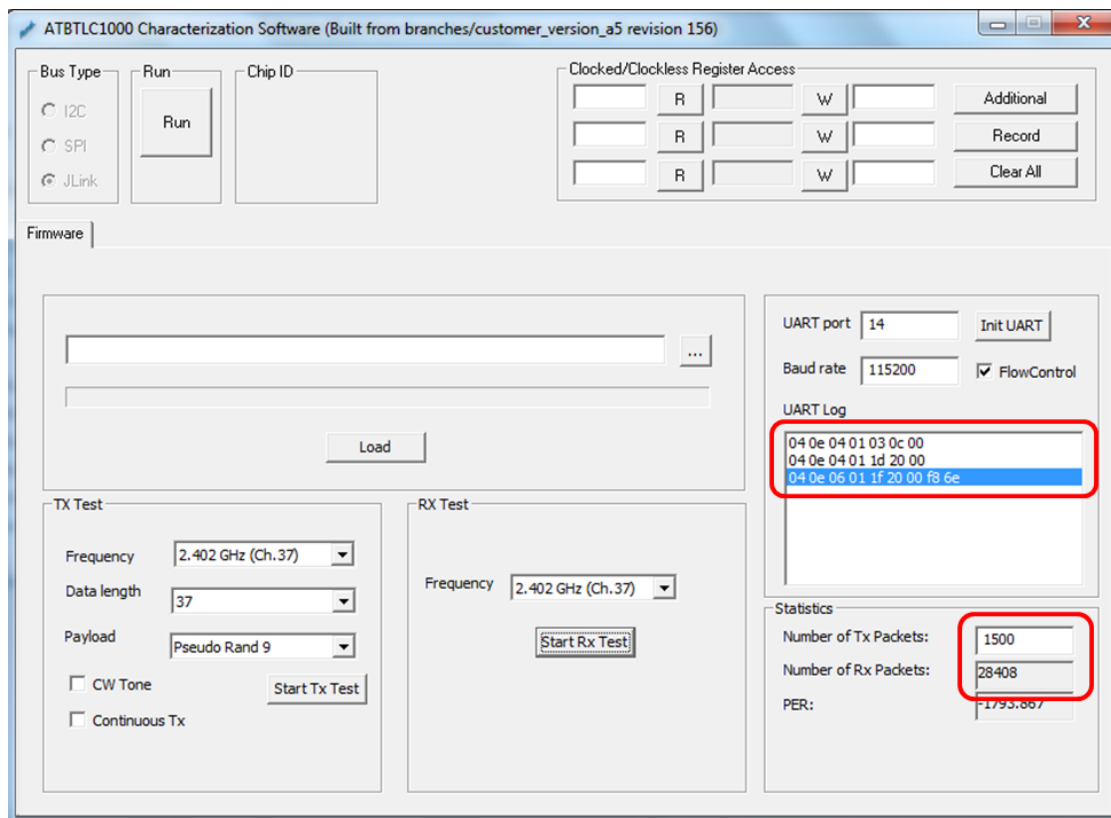
4. On the RX board, press Stop RX Test button. The number of successful received packets is displayed after pressing “Stop Rx”.

**Figure 5-6. RX Side Test Stop**



- After pressing Stop RX Test button, the user can see the total number of received packets. The number of successful received packets is displayed after pressing “Stop Rx”.

**Figure 5-7. Number of Packets Received**



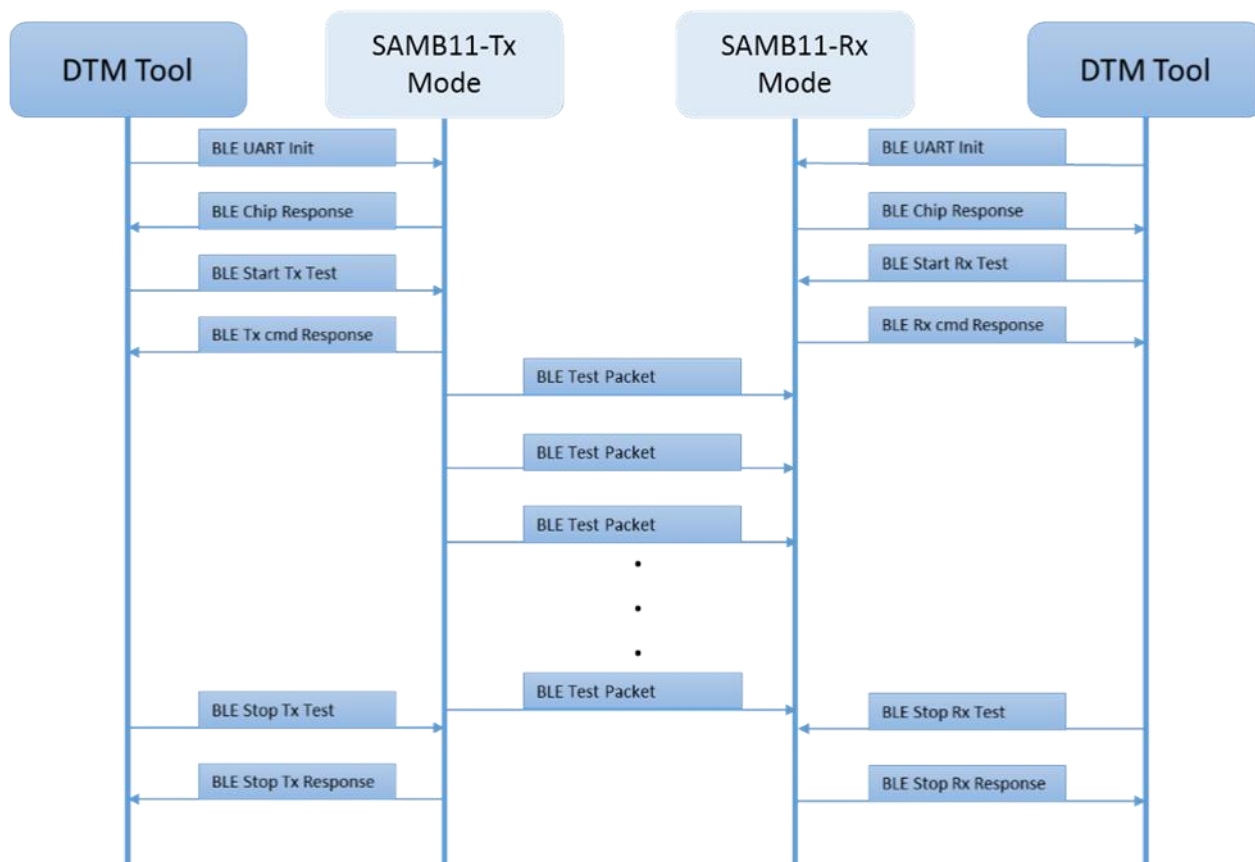
The PER is calculated assuming that the transmitter side sends 1500 packets for testing using R&S CBT equipment. For Peer testing, ignore the PER reading.

Some part of the UI buttons and options are left for later implementation. Using these options will lead to undetermined behavior of the DTM-Tool.

## 6 DTM Test Sequence

Figure 6-1 depicts the Direct Test Mode between the two ATSAMB11 devices. The DTM commands are initiated from DTM Tool. To create the below test setup, open the two instances of the DTM PC Tool. Enter the COM Port of each ATSAMB11 device and then the first command from the tool is UART Init, which will receive the response from the ATSAMB11.

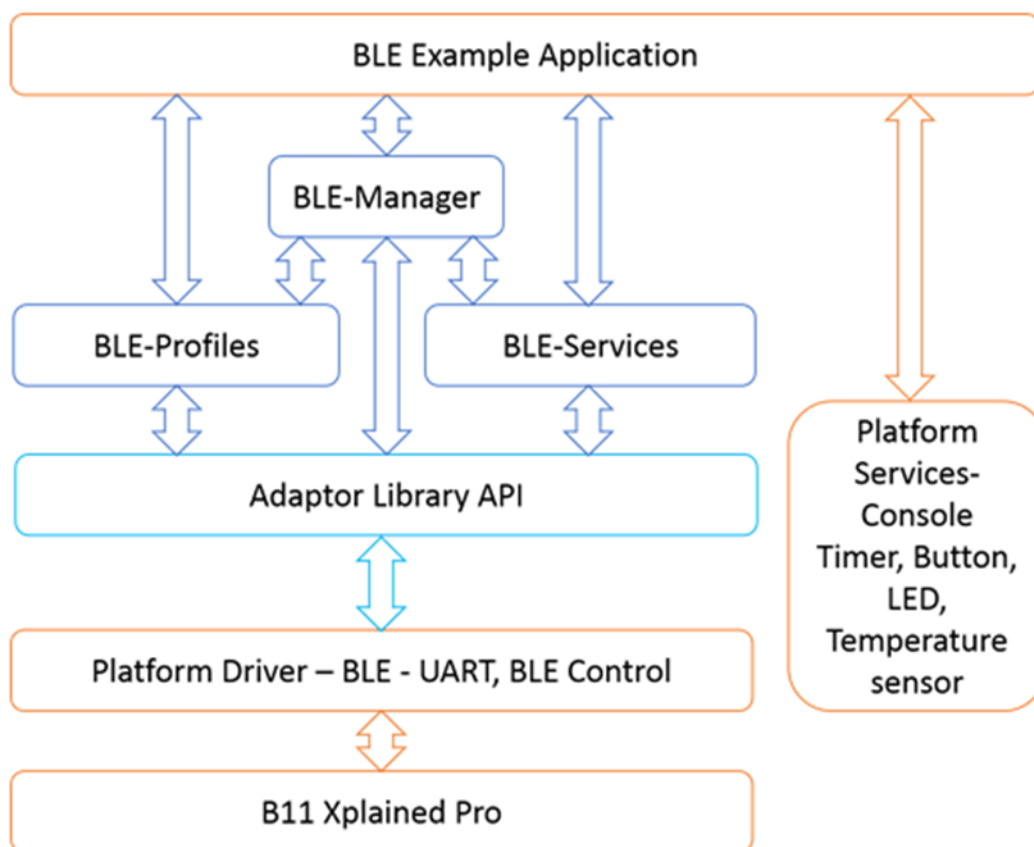
Figure 6-1. DTM RX/TX Test Sequence



## 7 BluSDK SMART Software Architecture

Figure 7-1 illustrates the top level diagram for the ATSAMB11 configuration.

Figure 7-1. ATSAMB11 Software Architecture



## 8 **ATMEL EVALUATION BOARD/KIT IMPORTANT NOTICE AND DISCLAIMER**

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ATMEL CORPORATION  
1600 Technology Drive  
San Jose, CA 95110  
USA

## 9 Revision History

Doc Rev.	Date	Comments
42615A	11/2015	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](http://www.atmel.com)

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