

### Firmware Update Procedure for WINC1500 Wi-Fi Module using SAM D21 Xplained Pro

AN-004

#### Prerequisites

- **Hardware Prerequisites**
  - Atmel SAMD21 Xplained Pro Evaluation Kit
  - Atmel WINC1500 extension
  - USB Micro Cable (TypeA / MicroB)
- **Software Prerequisites**
  - Atmel Studio 6.2
  - Firmware update project

#### Introduction

This application note provides useful information to perform firmware update for the WINC1500 Wi-Fi module.

The following topics will be covered:

- Firmware update procedure.



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## Icon Key Identifiers

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Icons are used to identify different assignment sections and reduce complexity. These icons are:

	<b>INFO</b>	Delivers contextual information about a specific topic
	<b>TIPS</b>	Highlights useful tips and techniques
	<b>TO DO</b>	Highlights objectives to be completed
	<b>RESULT</b>	Highlights the expected result of an assignment step
	<b>WARNING</b>	Indicates important information
	<b>EXECUTE</b>	Highlights actions to be executed out of the target when necessary

## 1. Firmware Update Project

The WINC1500 Wi-Fi module firmware update project can be retrieved through the following Atmel delivery:

- As an Atmel Studio Extension (.vsix file), which can be found on the Atmel Gallery web site (<http://gallery.atmel.com/>) or using the Atmel Studio Extension manager

A firmware update project is included in any Atmel Studio Extension related to the WINC1500 Wi-Fi module. The corresponding version number is printed in the project name as well as in the project description.

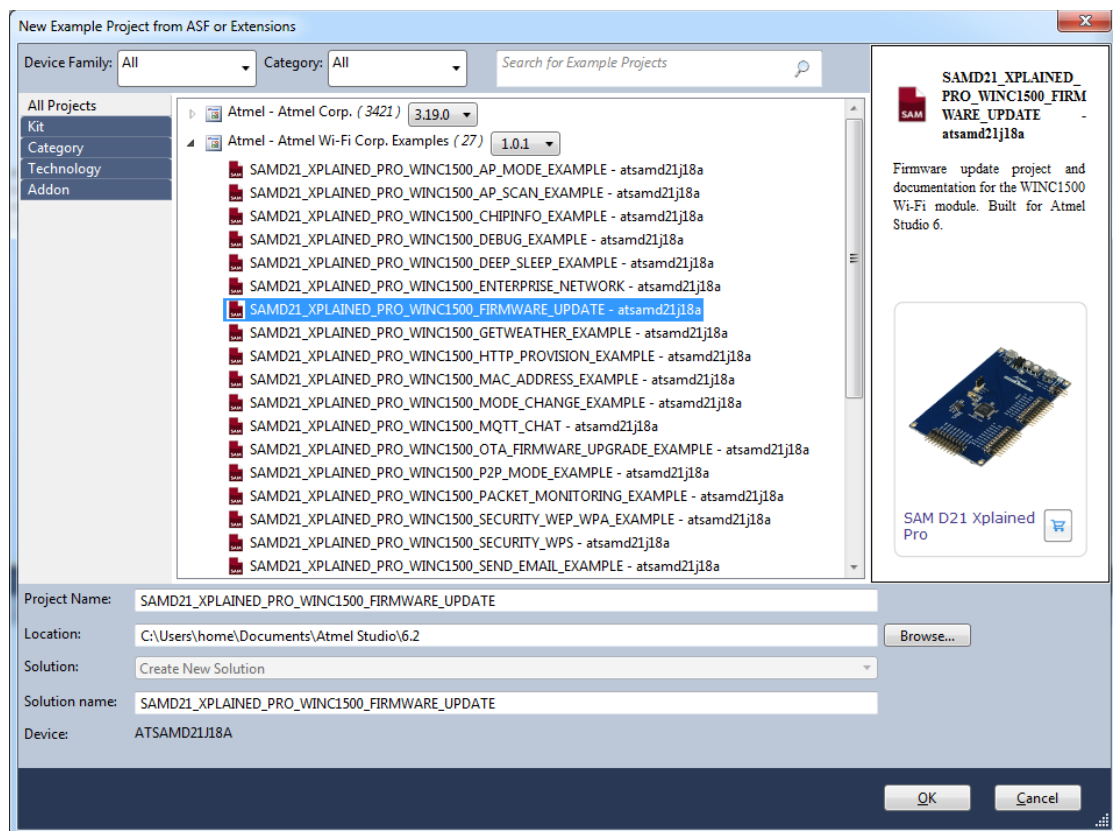
### 1.1 Atmel Studio Extension (.vsix)

Once a WINC1500 Wi-Fi module extension has been installed, you can open and create the Firmware Update project from the “New Example Project from ASF...” menu in Atmel Studio.



#### INFO

The WINC1500 Wi-Fi module related projects installed through an extension are usually under “Atmel > Atmel Wi-Fi Corp. Extension Name”.

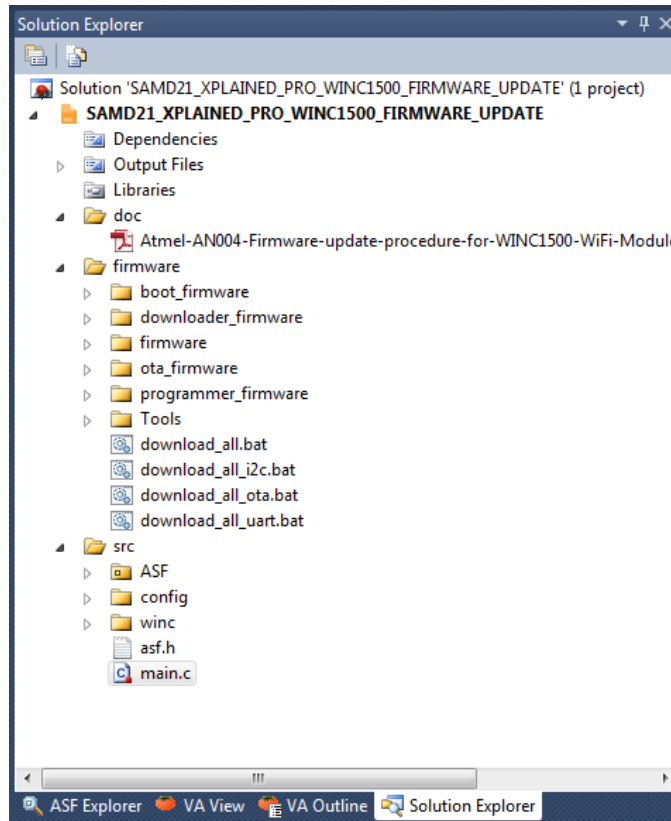


#### TO DO

Select project “SAMD21\_XPLAINED\_PRO\_WINC1500\_FIRMWARE\_UPDATE” project and then press OK button to import firmware update project and related documentation.

## 1.2 Project Structure

The firmware update project appears as a regular Atmel Studio 6 project for the SAMD21 host processor:



- **/doc folder** – List the available documentation regarding firmware update.
- **/firmware folder** – Contains actual WINC1500 firmware:
  - One update script per serial update mode (only UART mode will be covered here).
  - Provisioning webpage can be found and customized in the following path:  
/firmware/firmware/wifi\_v111/src/nmi\_m2m/source/http/Server/config
  - TLS/SSL certificates can be found and changed in the following path:  
/firmware/Tools/root\_certificate\_downloader
  - A version.txt file contains the firmware update version number.
- **/src folder** – Contains the source of the intermediate firmware update project.



### INFO

The following update procedure takes care of updating the WINC1500 internal firmware, provisioning webpage and TLS/SSL certificates.

## 2. Firmware Update Procedure

The firmware update process can be described as a 2-stage update procedure:

- A first step is to program an application on the host MCU to let the WINC1500 Wi-Fi module enter the update mode.
- A second step is to run a batch script to trigger the firmware update.

### 2.1 Enter Update Mode

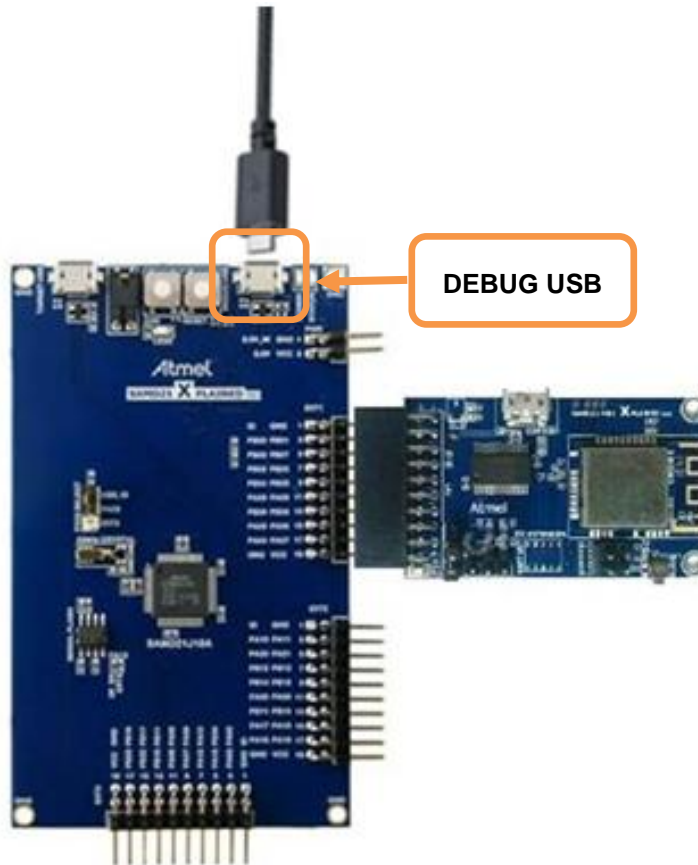
To let the WINC1500 Wi-Fi module enter the update mode, open the “*SAMD21\_XPLAINED\_PRO\_WINC1500\_FIRMWARE\_UPDATE*” project and proceed as following:

Build the solution (F7) and ensure you get no errors:



**TO DO** Program the SAM D21 Xplained Pro

- Connect the WINC1500 Wi-Fi module on EXT1 of the SAM D21 Xplained Pro, and plug a micro USB cable into the debug USB port as displayed below:

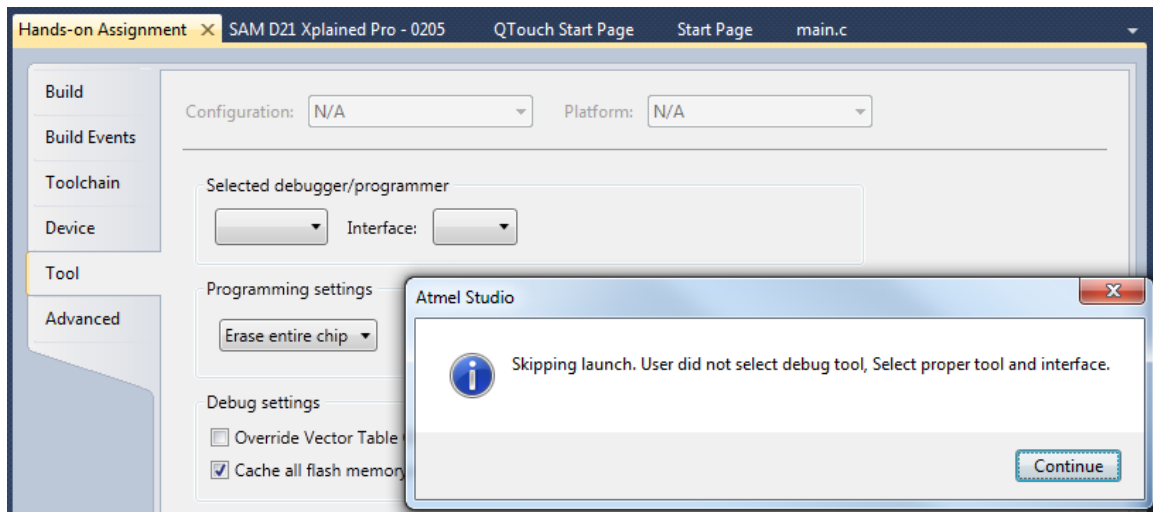


- Connect the SAM D21 Xplained Pro board to your PC (using DEBUG USB connector).

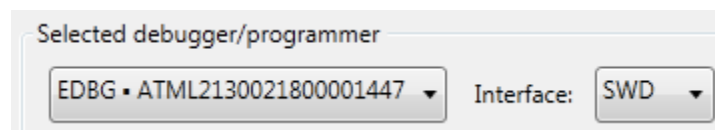
- Program the application by clicking on the Start Debugging and Break icon:



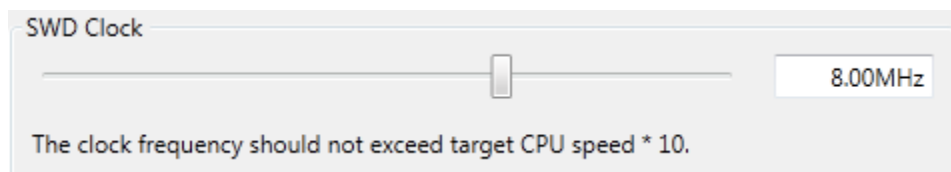
- You will be asked to select your debug tool:



- Select EDBG and SWD (Serial Wire Debug) as Interface:



- Set SWD clock to 8 MHz to speed up programming:



- Click again on the Start Debugging and Break icon:



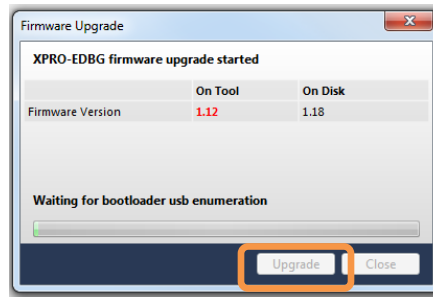
- The application will be programmed in the SAM D21 embedded flash and breaks at main function.

Click on Continue to execute the application:



## INFO

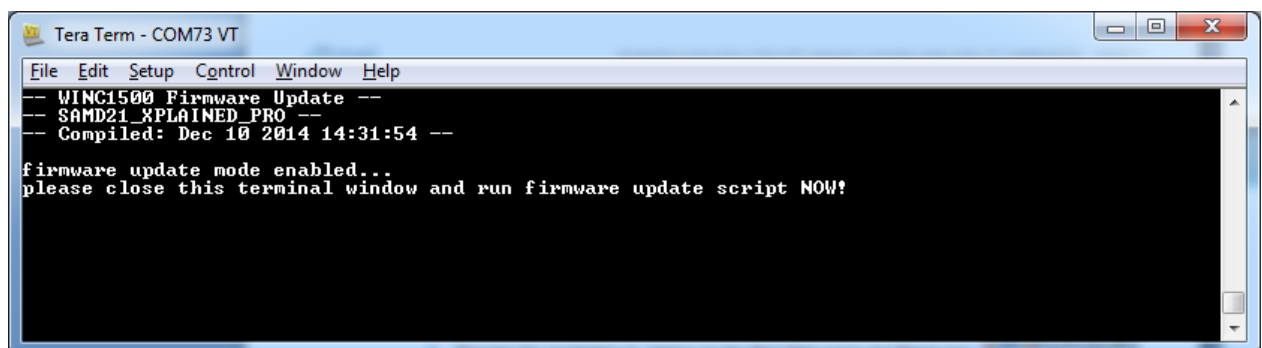
You may be asked to upgrade your EDBG firmware. If so, click on Upgrade:



**WARNING** Upgrade operation may take a few minutes, please wait for the operation to complete.

**RESULT** The firmware update project is now programmed and running.

Open the EDBG DEBUG USB serial COM port, with the following settings: 115200 bauds, 8 bit data, no parity, one stop bit and no flow control. The following output should appear:



**RESULT** The WINC1500 Wi-Fi module is now in update mode and ready to perform the actual firmware update. Before moving to the next step, you must close the terminal window to release the access to the USB virtual COM port. Once closed, leave the SAMD21 Xplained Pro in this state and go on to the next step.



## 2.2 Run Batch Script

In the firmware folder of the “*SAMD21\_XPLAINED\_PRO\_WINC1500\_FIRMWARE\_UPDATE*” you will find a list of batch (.bat) script files used to trigger a firmware update. This document will only cover the UART serial update.

- Ensure that the SAMD21 Xplained Pro is programmed with the firmware update project and that the board is connected to your laptop via the debug USB port. The underlying virtual COM port should remain available for the batch script to work.



### WARNING

Do not attempt to open the virtual COM port of the SAMD21 Xplained Pro debug USB with a terminal application as it would prevent the batch script to perform the firmware update.

If the WINC1500 module features a USB port, it is recommended to leave it unconnected while performing this update procedure.



- Run the *download\_all\_uart.bat* script and ensure that the COM port is detected successfully.

```
C:\windows\system32\cmd.exe
*****
* >Programmer for WINC1500 SPI Flash< *
* Owner: Atmel Corporation *
*****
BOOT Firmware ADDR 000 SZ 004
Control sec ADDR 004 SZ 008
Prog Firmware ADDR 012 SZ 002
Main Firmware ADDR 014 SZ 182
PLL sector ADDR 196 SZ 004
Certificate ADDR 200 SZ 004
HTTP Spi Flash ADDR 204 SZ 008
Ps Firmware ADDR 212 SZ 012
Connection Parm ADDR 224 SZ 004
Scratch ADDR 228 SZ 004
Cortus app ADDR 232 SZ 024
FLASH CONTENT 256K
>>Init Programmer
Detecting ports
<APP><INFO>WINC1500 Serial Bridge Found
Avail port COM22
1 of ports found
Chip id 1502b1
Waiting for chip permission...
OK.
----- Input Firmware File Version-----
```

After several seconds the following message should appear, meaning that the WINC1500 Wi-Fi module update procedure is complete:

```
C:\windows\system32\cmd.exe
1F C9 D6 B8 7D 36 56 DB 7C BE 5D F2 1A E3 B1 C4
37 4B 21 80 D6 B9 EF 77 B9 24 54 14 3F 99 07 58
=====
>Start erasing...
Done
#Erase time = 0.047000 sec
>Start programming..
Done
#Programming time =0.094000 sec
>>This task finished after 1.22 sec
OK
#####
##                                     ##
##          #####          ##          ##
##          ##  ##  ##  ##          ##          ##
##          ##  ##  ##  ##          ##          ##
##          #####          ##          ##
##          ##  ##  ##  ##          ##          ##
##          ##  ##  ##  ##          ##          ##
##          ##  ##  ##  ##          ##          ##
#####
Downloading ends successfully
Press any key to continue . . .
```



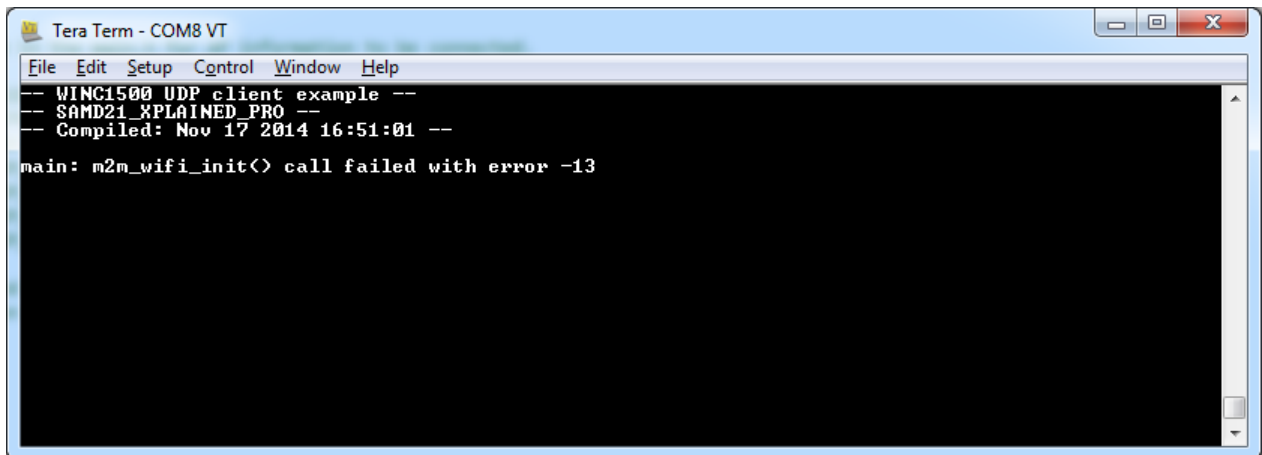
## RESULT

The WINC1500 Wi-Fi module firmware has been updated successfully.

### 3. Frequently Asked Questions

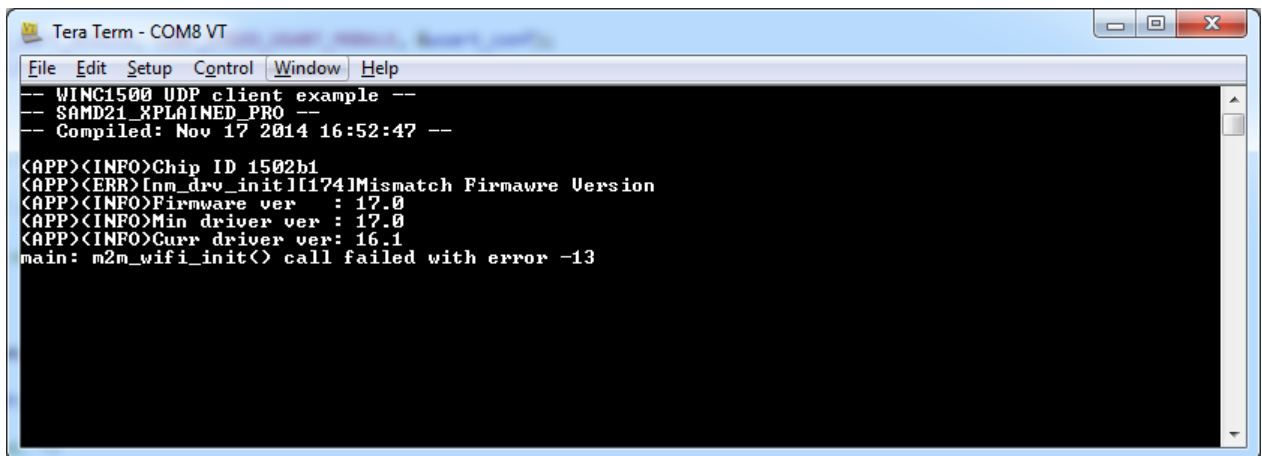
#### 3.1 When do I need to update the WINC1500 firmware?

Atmel provides frequent updates of the Wi-Fi software API (host MCU) for the WINC1500 Wi-Fi module. The integrity of the solution is guaranteed using a major/minor version number. When a major version mismatch occurs between the host MCU and the WINC1500 Wi-Fi module, the Wi-Fi software API initialization will fail and a `m2m_wifi_init()` function call will return an error value:



```
Tera Term - COM8 VT
File Edit Setup Control Window Help
-- WINC1500 UDP client example --
-- SAMD21_XPLAINED_PRO --
-- Compiled: Nov 17 2014 16:51:01 --
main: m2m_wifi_init() call failed with error -13
```

Setting the `CONF_WIFI_M2M_DEBUG` to 1 in the `conf_winc.h` configuration file will provide more information about the version mismatch error:



```
Tera Term - COM8 VT
File Edit Setup Control Window Help
-- WINC1500 UDP client example --
-- SAMD21_XPLAINED_PRO --
-- Compiled: Nov 17 2014 16:52:47 --
<APP><INFO>Chip ID 1502b1
<APP><ERR>[m_drv_init][174]Mismatch Firmware Version
<APP><INFO>Firmware ver : 17.0
<APP><INFO>Min driver ver : 17.0
<APP><INFO>Curr driver ver: 16.1
main: m2m_wifi_init() call failed with error -13
```

In this scenario a firmware update with the appropriate firmware version number is expected.

#### 3.2 Why is the update batch script failing?

While performing the second stage of the update procedure, the following error can happen:

```
C:\windows\system32\cmd.exe
Main Firmware      ADDR 014 SZ 182
PLL sector         ADDR 196 SZ 004
Certificate         ADDR 200 SZ 004
HTTP Spi Flash     ADDR 204 SZ 008
ps Firmware        ADDR 212 SZ 020
Connection Parm    ADDR 232 SZ 004
SCRATCH            ADDR 236 SZ 004
Cortus app         ADDR 240 SZ 016
FLASH CONTENT 256K
>>Init Programmer
Detecting ports...
(ERR)Failed To intilize programmer
Fail
#####
##                                     ##
##          #####      ##      #####      ##
##          ##      ##      ##      ##
##          ##      ##      ##      ##
##          #####      ##      ##
##          ##      ##      ##      ##
##          ##      ##      ##      ##
##          ##      ##      ##      ##
##          ##      ##      ##      ##
#####
Press any key to continue . . . _
```

Possible reasons for such a failure include:

- The SAMD21 Xplained Pro debug USB port is not connected to your PC USB port.
- The SAMD21 Xplained Pro debug USB virtual COM port is already opened by another application and preventing the batch script to work (terminal application for instance).
- The host MCU is not programmed or running with the appropriate project:  
"SAMD21\_XPLAINED\_PRO\_WINC1500\_FIRMWARE\_UPDATE"

#### 4. Revision History

Doc. Rev.	Date	Comments
XXXXXB	12/2014	Updated firmware update procedure (serial bridge)
XXXXXA	11/2014	Initial document release



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