Programming BL6xx and RM1xx Modules with the QPK-NRF5x-01

Application Note *v1.0*

INTRODUCTION

This document provides a step-by-step guide for upgrading the Laird BL6XX and RM1xx modules using the QPK-NRF5x-01 programming board and the ARM mbed drag-and-drop method.

When the QPK-NRF5x-01 is plugged into a desktop PC, it appears as a flash drive labelled *MBEDv###,* where ### are three decimal digits. Saving a file in that flash drive loads the firmware into the target module. You can expedite the process by either dropping the file in a graphical user interface (such as Windows Explorer) or by using the copy command in a console terminal.

This guide has been tested on a Window 7 PC.

REQUIREMENTS

The following are required for this process:

- Laird QPK-NRF5x-01 programing board
- 1X USB-A to USB-Micro cables (included with QPK-NRF5x-01)
- UwTerminalX – Available from Laird from the following URL: https://github.com/LairdCP/UwTerminalX/releases
- Applicable firmware package (including a .hex file) – Available from the Laird Software Download tabs:
  - Bluetooth modules
  - RM1xx modules
- A 10-pin flexi cable (included with QPK-NRF5x-01)

OVERVIEW

This guide uses the Laird RM186 to demonstrate the firmware upgrade process, but the same steps are applicable for programing any of the Laird BL6xx or RM1xx modules containing a Nordic Semiconductor nRF51 or nRF52832 microcontroller.

To upgrade the module, you need a Laird DVK board or your own equivalent implementation to provide JTAG/SWD access to the module.

If you are working with your own board, please refer to Table 1 for mapping JP1 on the programmer board (QPK-NRF5X) to your module pinout.

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Initial Setup Using a DVK-RM186Development Kit

To perform the initial set-up, follow these steps:

1. Configure the RM186 development kit to the following settings:
   - DC/USB power source switch (SW4) – USB
   - VCC_1V8/VCC_3V3 switch (SW5) – VCC_3V3
2. Connect USB1 of the DVK-RM186 to your PC via the included USB-A to USB Micro cable.

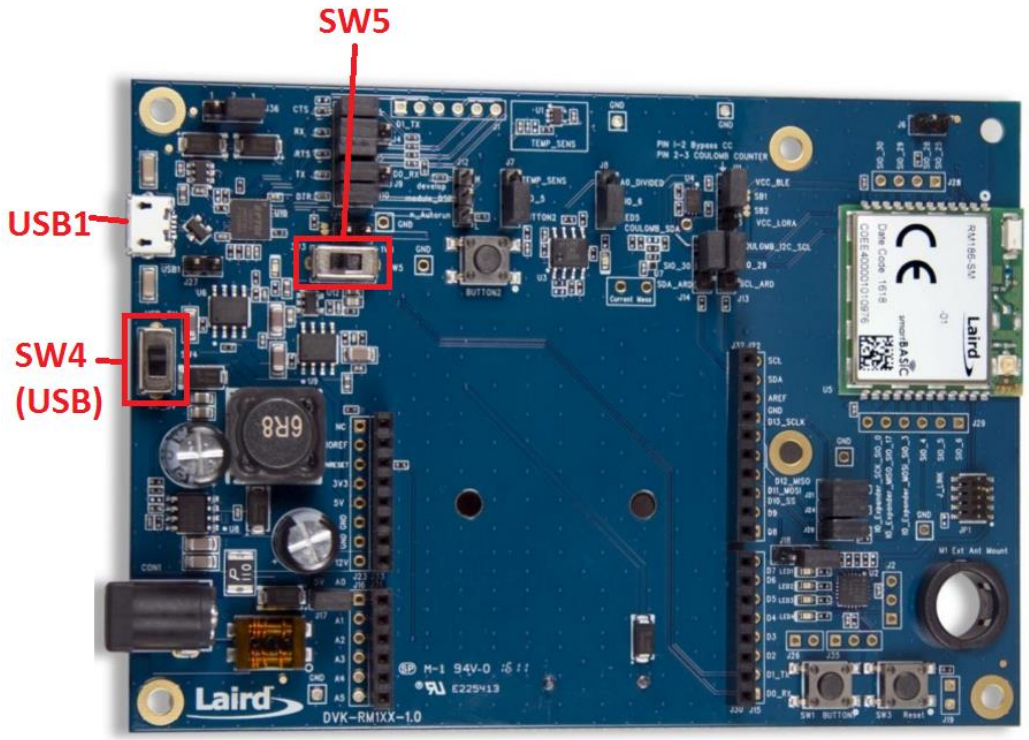

Figure 1: RM186 development board

3. Install the FTDI USB to Serial driver (http://www.ftdichip.com/FTDrivers.htm).
4. Ensure that the Windows Device Manager displays a new virtual COM port for the USB to Serial adapter.
5. Launch UwTerminalX (https://github.com/LairdCP/UwTerminalX/releases).
6. From the Update tab in UwTerminalX, click **Check for Updates** to ensure you're using the latest version of UwTerminalX with support for the RM186.
7. From the Config tab in the Device drop-down menu, select **RM186/RM191** to populate the baud, parity, stop bits, data bits, and handshaking settings.
   If **RM186/RM191** is not a selectable device because you have an older version of UwTerminalX, set the following:
   - Baudrate: 115200
   - Parity: None
   - Stop Bits: 1
   - Data Bits: 8
   - Handshaking: CTS/RTS

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8. In the Port drop-down menu, select the COM port associated with your DVK-RM186.
9. At the top of the screen, click **OK.**

Checking Firmware Version

Once the module has been connected, type ***AT I 0*** to confirm you are connected to an RM186.

Type ***AT I 3*** to display the firmware version (Figure 2).

If your development board is pre-programmed with an autorun application, you must manually place the RM186 module into interactive mode. To do this, follow these steps:

1. Ensure that on J12 jumper is not fitted on pins 1-2.
2. Ensure that jumper J10 is closed.
3. Ensure that the DTR checkbox on the terminal tab is unchecked.
4. Press the reset button on the module (or on UwTerminalX, check and uncheck the BREAK checkbox which results in a reset of the module).

Your module should now be in interactive mode. You can confirm this by typing ***AT*** and hitting Enter. The *00* response should display.

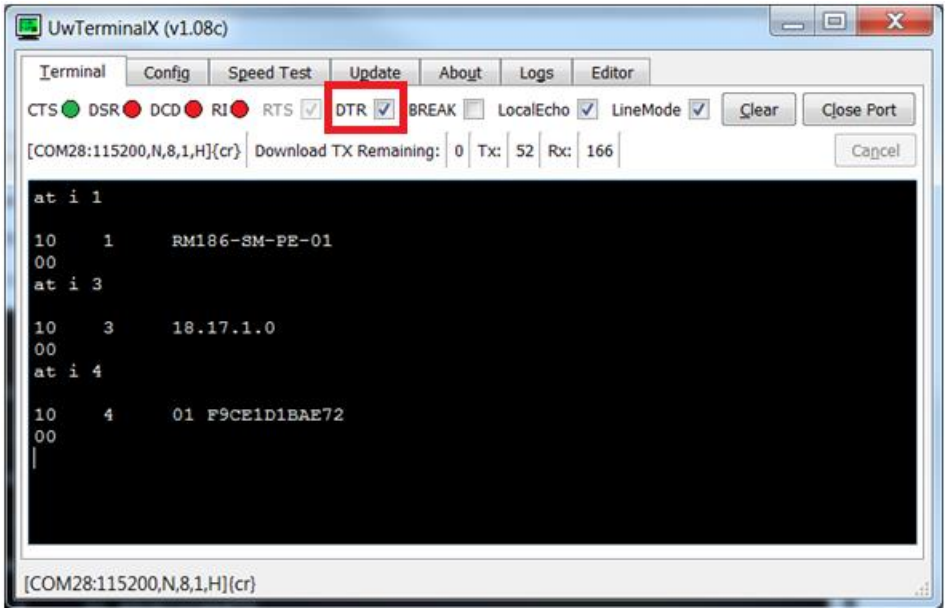

Figure 2: AT I 3 command returning the firmware version number

WARNING! Upgrading the firmware clears any programs, configuration keys, or data stored on the module.

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Connecting QPK-NRF5X to DVK-RM186

To connect the QPK-NRF5X to the RM186 development kit, follow these steps:

1. Configure the QPK-NRF5X (the programmer board) as shown in Figure 3.

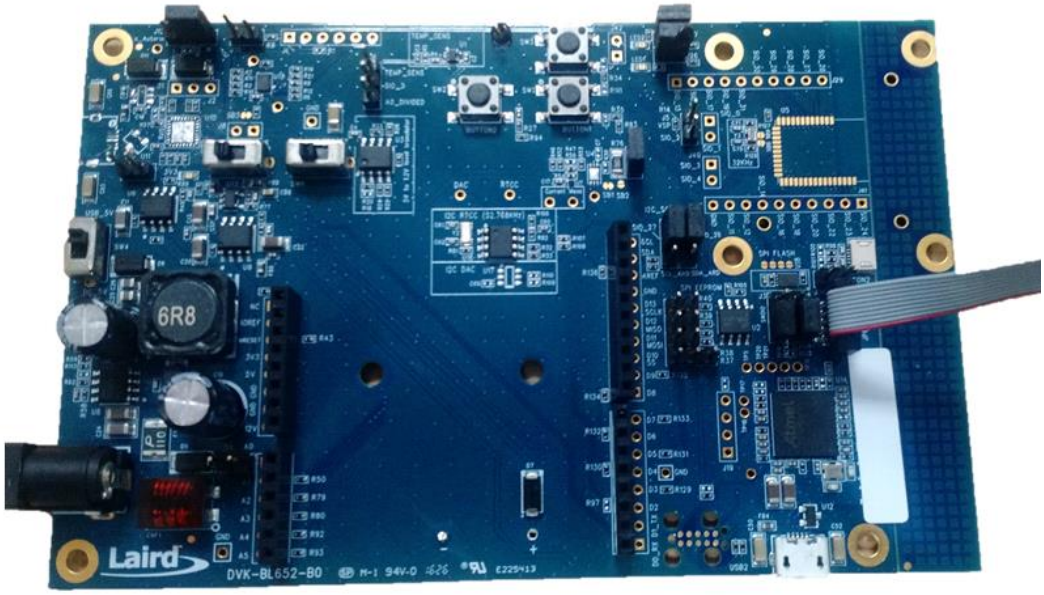

Figure 3: QPK-NRF5X programming board

2. Using the supplied ribbon cable, connect the QPK-NRF5X (the programmer board) to the DVK-RM186 development board as shown in Figure 4.

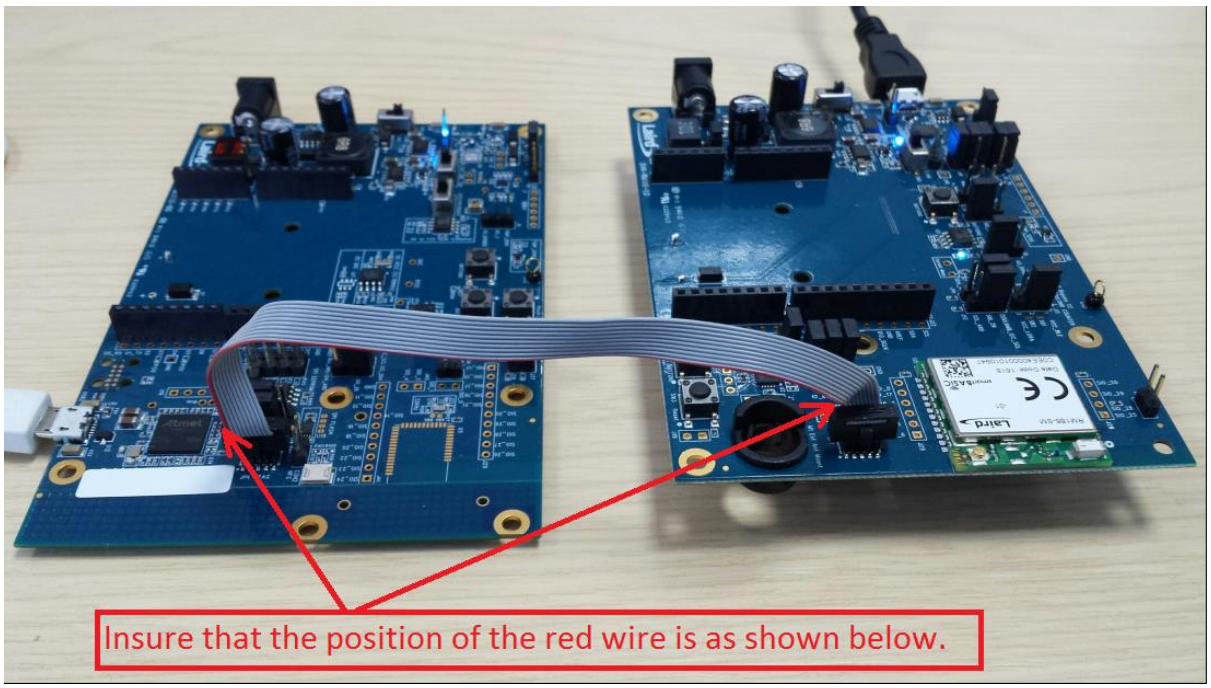

Figure 4: Connecting the programmer board to an RM186 development board

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3. Connect USB2 of the QPK programmer board to your PC via the included USB-A to USB Micro cable.

Note: There are two USB ports on the QPK board; ensure you connect to **USB2**.

The programmer board now appears as a flash drive on your PC (labeled as MBEDvXXX); **XXX** is the QPK-NRF5X firmware version number (Figure 5).

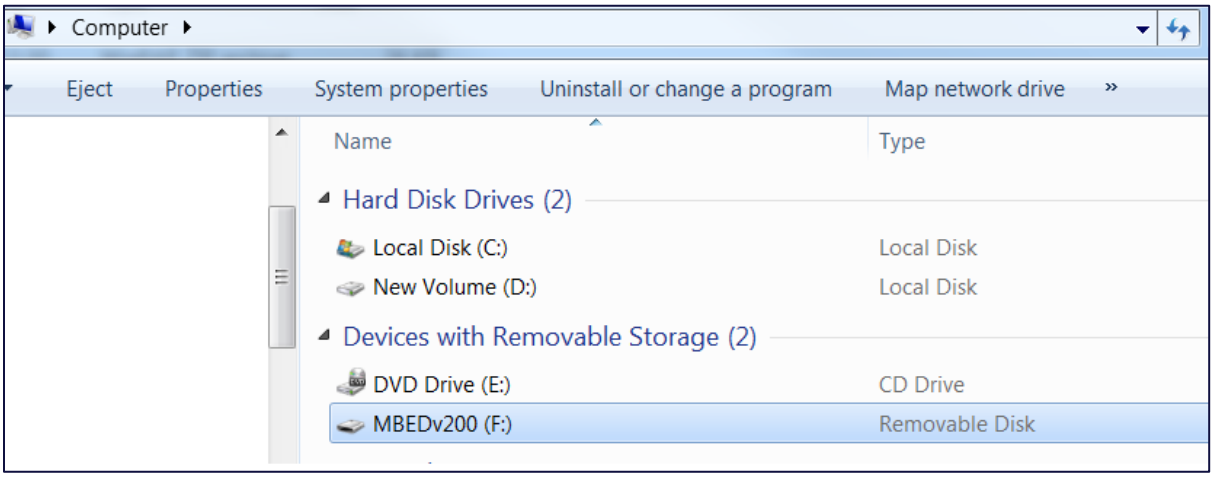

Figure 5: The programmer board displays as a flash drive

4. Download the firmware from Laird website and extract it to your PC (Figure 6).

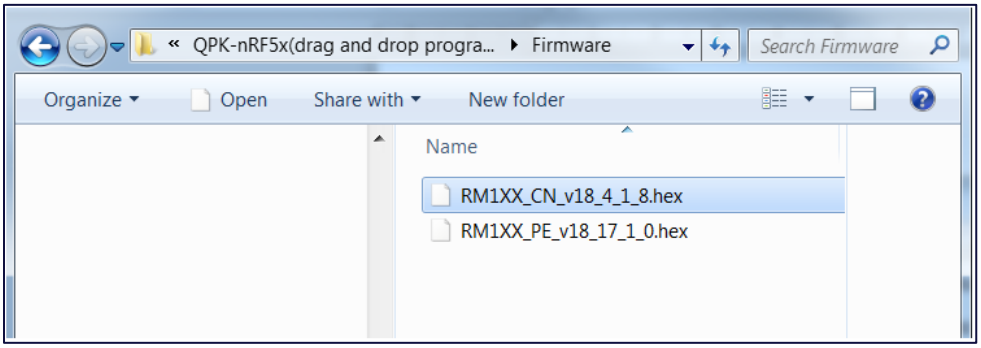

Figure 6: Download and extract the firmware on to your PC

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Firmware Upgrade Procedure

To upgrade the firmware, select the **firmware .hex** file and drag-and-drop it onto the new flash drive.

Once the firmware upgrade is completed, the new firmware version can be verified in UwTerminalX by issuing the **AT I 3** command (Figure 7).

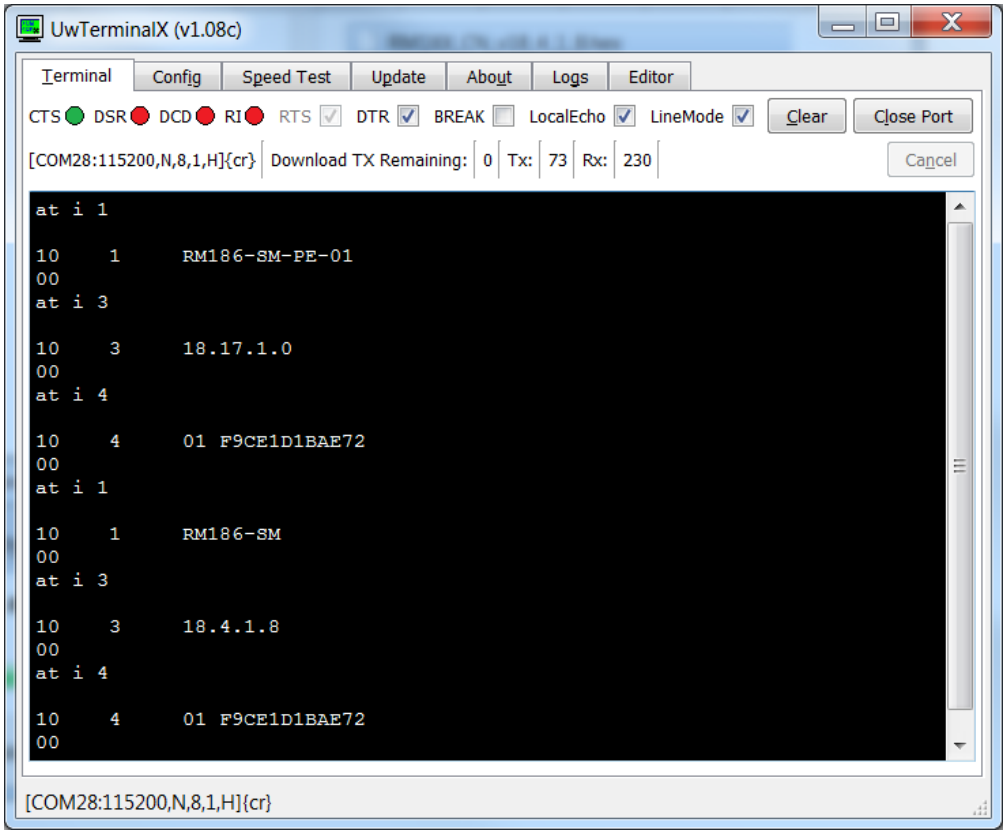

Figure 7: Verifying the new firmware version with AT I 3 command

Using the QPK-NRF5X to Program the Target Board

To upgrade the firmware of your module, you must bring out the following signals from the Laird RM1XX or BL6XX module:

- SWDCLK
- nRESET/SWDIO
- GND

Table 1 shows how to map the JP1 on the programmer board (QPK-NRF5X) to your module pinout.

Table 1: Mapping the JP1 to your module pinout

JP1 on QPK-NRF5X	Signal Name	BL600/ BL620	BL652	RM186/RM191
1	VCC_IO	NC	NC	NC
2	nRESET/SWDIO	22	5	22
3	GND	28 *	1 *	21 *

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JP1 on QPK-NRF5X	Signal Name	BL600/ BL620	BL652	RM186/RM191
4	SWDCLK	23	6	23
5	GND	NC	NC	NC
6	NC	NC	NC	NC
7	NC	NC	NC	NC
8	NC	NC	NC	NC
9	GND	NC	NC	NC
10	NC	NC	NC	NC

* Any GDN signal on the module.

Note: We only tested the programing interface over a 15 cm cable. Try to keep the wiring of these signals at 15 cm or less.

LOCATING THE CORRECT FIRMWARE FOR BLXX

To locate the correct firmware for drag and drop upgrade, follow the following steps:

1. Go to the product page on our website.
2. Under the Software Downloads tab, select the applicable firmware version.

Figure 8: Software Download tab

3. Extract the .zip file in to a folder.
4. Locate the .hex file. This is the file you need to drag and drop.

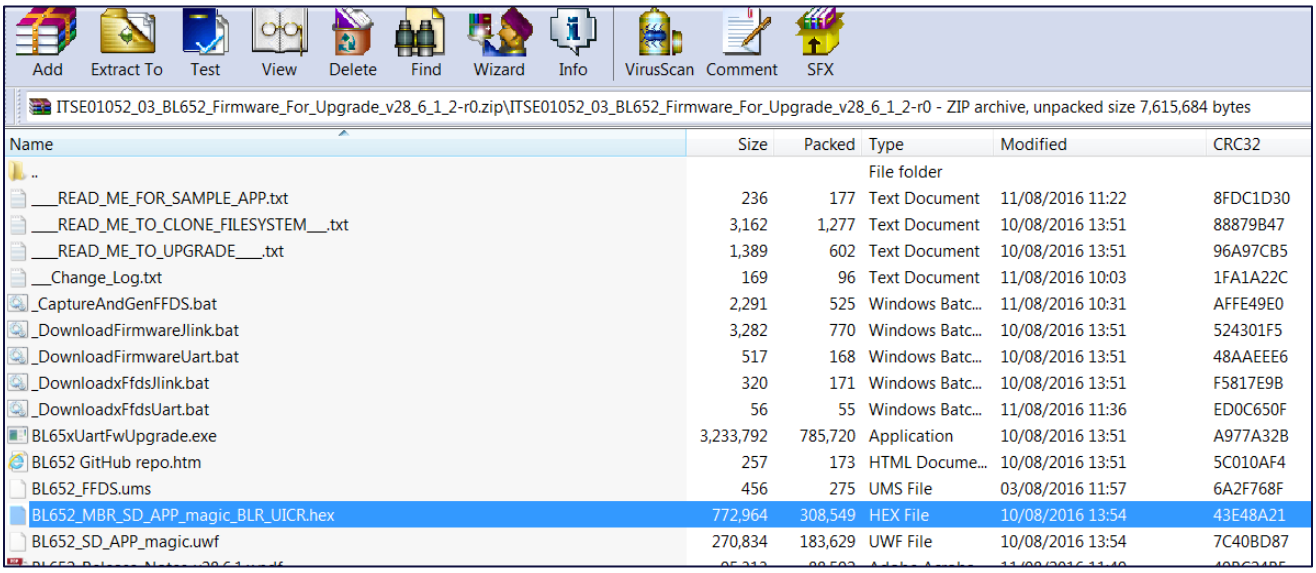

Figure 9: BL652 firmware release pack with the required HEX file highlighted

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Further Information

Further information relating to the BL6xx or RM1xx modules that are supported by the QPK-NRF5xx programming board are available from the Laird website product pages:

https://www.lairdtech.com/products/rm1xx-lora-modules

https://www.lairdtech.com/products/bl600-series

https://www.lairdtech.com/products/bl652-ble-module

Revision History

Version	Date	Notes	Approver
1.0	27 Mar 2017	Initial Release	Jonathan Kaye

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