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QN908x Quick Start

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User manual

Document information

Info	Content
Keywords	QN908x, Quick Start, Development Kit, QN9080 DK, QN9080 Development Kit
Abstract	This Quick Start document provides an overview about the QN9080DK board and its software tools and lists the steps to install the hardware and the software.



Revision history

Rev	Date	Description
1.0	20180131	Initial release
2.0	20180321	Updated steps of QN908x SDK/PC installation. Added directory of USB Dongle firmware and corrected the jumper for QN9080DK firmware update.

Contact information

For additional information, please visit: <http://www.nxp.com>

1. Introduction

QN9080 Development Kit (DK) is designed for evaluating and developing Bluetooth Low Energy (BLE) solutions based on QN908x. The module features GPIO, USB, PMod, and SWD interface. J-Link and J-Trace functions are both supported for debugging. ISP download function is also supported with the QN9080 DK board.

This Quick Start document provides an overview about the QN9080DK board and its software tools and lists the steps to install the hardware and the software. The document also describes how to run the demo example and create a new application project.

2. Kit contents

The QN9080 DK is composed of three parts.

- **QN9080 DK board:** A hardware board-based QN9080 for BLE application development.

It comprises onboard RF matching circuit and antenna, power supply, GPIO connector, buttons, and LEDs. The LPC4322 OnBoard (OB) debugger is used to bridge QN9080 SWD and UART interface to PC, download program, and debug from PC.

For detailed information, refer to **QN9080 DK User Guide**.

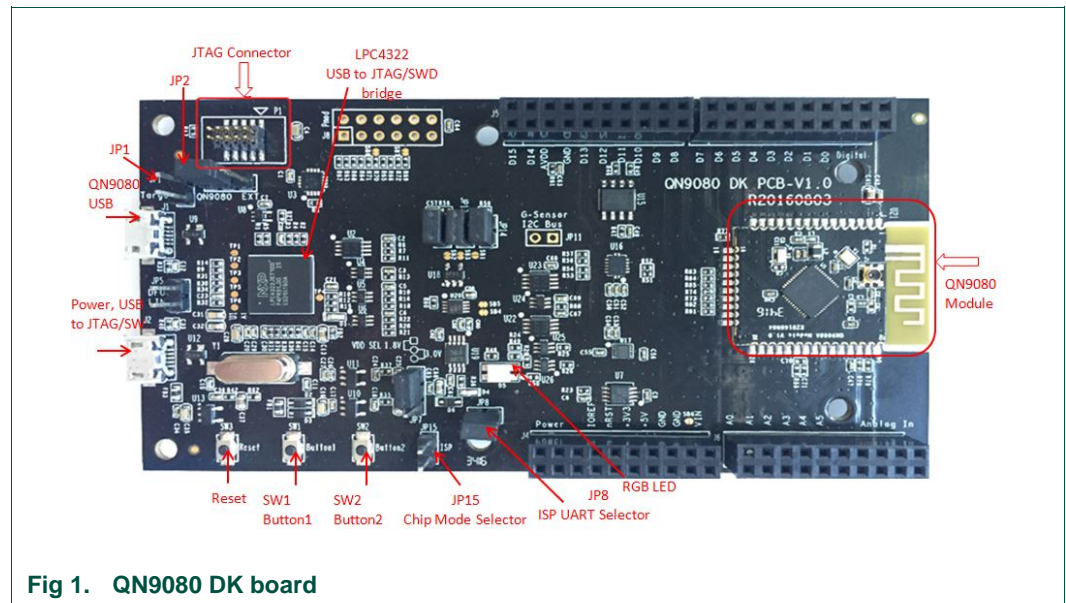


Fig 1. QN9080 DK board

- **BLE Dongle:** A BLE device controlled by the Connectivity QTool running on a PC.

It works with the QN9080 DK board as a pair for BLE evaluation and debugging. It is connected to PC via USB.

- **USB Cable:** A cable to connect the QN9080 DK board with the PC via Micro USB interface.

3. Download and install software

Before connecting the QN9080-DK Board to PC, install/download the following software tools on PC:

- Connectivity QTool
- QN908x Programming Tool
- QN908x Image Editor
- Keil MDK-Arm v5.18*, IAR Embedded Workbench for Arm v8.11 1 or MCUXpresso IDE v10.1.1*
- MCUXpresso SDK
- LPCScript v1.8.2
- SEGGER J-Link v6.10 (or higher)
- User can choose any one of these IDEs for the development on QN9080DK. Higher versions of those IDEs are also supported.

3.1 System requirements

The development on the QN9080-DK has the following minimum system requirements:

- PC running with Microsoft® Windows® 7/8/10 (32-bit or 64-bit)
- 2 GB RAM and 8 GB hard-disk space
- Minimum of two USB ports

3.2 QN908x SDK/PC tool installation

QN908x SDK is a package containing source code and documents necessary for application firmware development. Some PC tools are also available to ease debug and development.

Refer to the following steps to download the SDK:

1. Click the link below and navigate to the SDK building page:
<https://www.nxp.com/support/developer-resources/software-development-tools/mcuxpresso-software-and-tools/mcuxpresso-software-development-kit-sdk:MCUXpresso-SDK?fsrch=1&sr=2&pageNum=1>.
2. Click the button **Build your SDK** to start the SDK builder.
3. Click **Select Development Board** and log-in to start building the QN908x SDK and download it into a folder on your PC.

Note: The SDK can also be found by the link: Use the direct URL for QN9080:
<https://mcuxpresso.nxp.com/en/select?device=QN908XCDK>.

4. Navigate to the folder specified in Step 3 to open the SDK project.

Refer to the following steps to download the PC tools:

1. Click the link below to download PC Tools.
 - **Connectivity QTool:**
<https://www.nxp.com/webapp/sps/download/license.jsp?colCode=Connectivity-QTool-Setup>

- **QN908x Programming Tool:**
<https://www.nxp.com/webapp/sps/download/license.jsp?colCode=QN908x-Programming-Tool-Setup>
 - **Image Editor:**
<https://www.nxp.com/webapp/sps/download/license.jsp?colCode=QN908x-Image-Editor>
2. Navigate to the folder where you downloaded the PC tools.
 3. Click the *.exe files to start the installation.

3.2.1 PC software tool introduction

1. Connectivity QTool is a software tool that runs on a PC and talks with the USB Dongle to act as a peripheral/central device. It provides ease in the debugging and development of a QN908x-based device.
2. QN908x Programming Tool is a software tool that runs on a PC and talks with the QN908x DK for firmware uploading and non-volatile parameters setting via UART/SWD interface.

Note: Only J-Link is supported when updating firmware via SWD interface by the QN908x Programming Tool. Update the firmware of QN908x DK debugger by LPCScript to support J-Link. The procedure is elaborated at Chapter 4.

3. Image Editor is a command-line tool used to convert binary file to the required format, check the help content for details.

3.3 Install MCUXpresso IDE

MCUXpresso IDE provides comprehensive compiler supporting QN, Kinetis, and LPC Microcontrollers.

You can download it from the following URL:

<https://www.nxp.com/support/developer-resources/software-development-tools/mcuxpresso-software-and-tools/mcuxpresso-integrated-development-environment-ide:MCUXpresso-IDE>.

Double-click the file to run and complete the installation.

3.4 Install LPC-Link2 software

LPCScript is a command-line based, fast flash, EEPROM, OTP and security programming tool that supports LPC-Link2 Debug Firmware Programming.

You can download it from the following URL:

https://www.nxp.com/support/developer-resources/software-development-tools/lpc-developer-resources-/lpc-microcontroller-utilities/lpcscript-v1.8.2:LPCSCRIPT?tab=Design_Tools_Tab.

Double-click the file to run and complete the installation.

3.5 CMSIS-DAP or J-Link

QN9080 DK is shipping out with CMSIS-DAP enabled by default as debugger. All SDK projects are configured as CMSIS-DAP as debugger.

To use the PC tools contained in the SDK package you may need to enable J-Link. The tool LPCScript is used to update firmware of the debugger chip LPC4322 on QN9080 DK.

3.6 Install J-Link software

For the cases of J-Link needed, J-Link software must be installed as J-Link driver resides in the package.

The J-Link software and documentation package is available for download from <https://www.segger.com/downloads/jlink>.

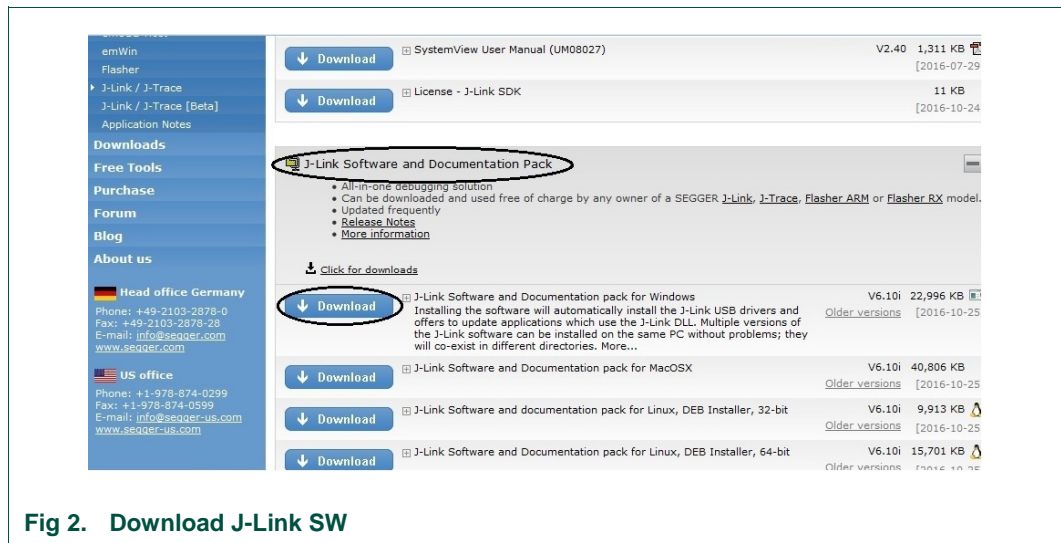


Fig 2. Download J-Link SW

4. Connect hardware and install drivers

Figure 3 shows the hardware connections of QN9080 DK board, BLE dongle, and PC. QN9080 DK board is attached to PC by a USB cable via J2 port. The BLE dongle is plugged into another USB port on PC.

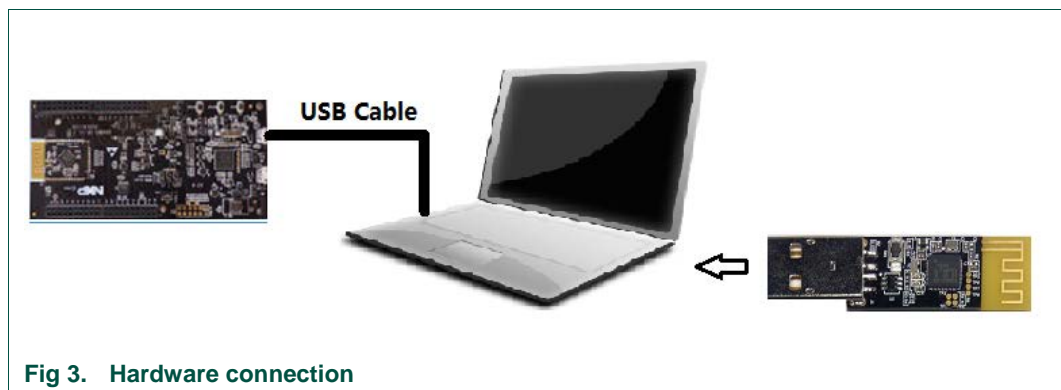


Fig 3. Hardware connection

4.1 Connect QN9080 DK board and install driver

Connect the QN9080DK board to a PC with a microB USB cable. Use connector J2 on the QN9080DK.

Once connected to the PC, Windows will detect the new hardware. Run the driver installation tool `lpc_driver_installer.exe`, found inside of the LPCScript installation direct at

C:\NXP\LPCScript\Drivers. This will install the drivers for both the virtual COM port and CMSIS-DAP debugger.

After drivers are installed correctly, the device is shown in Device Manager as [Figure 4](#).

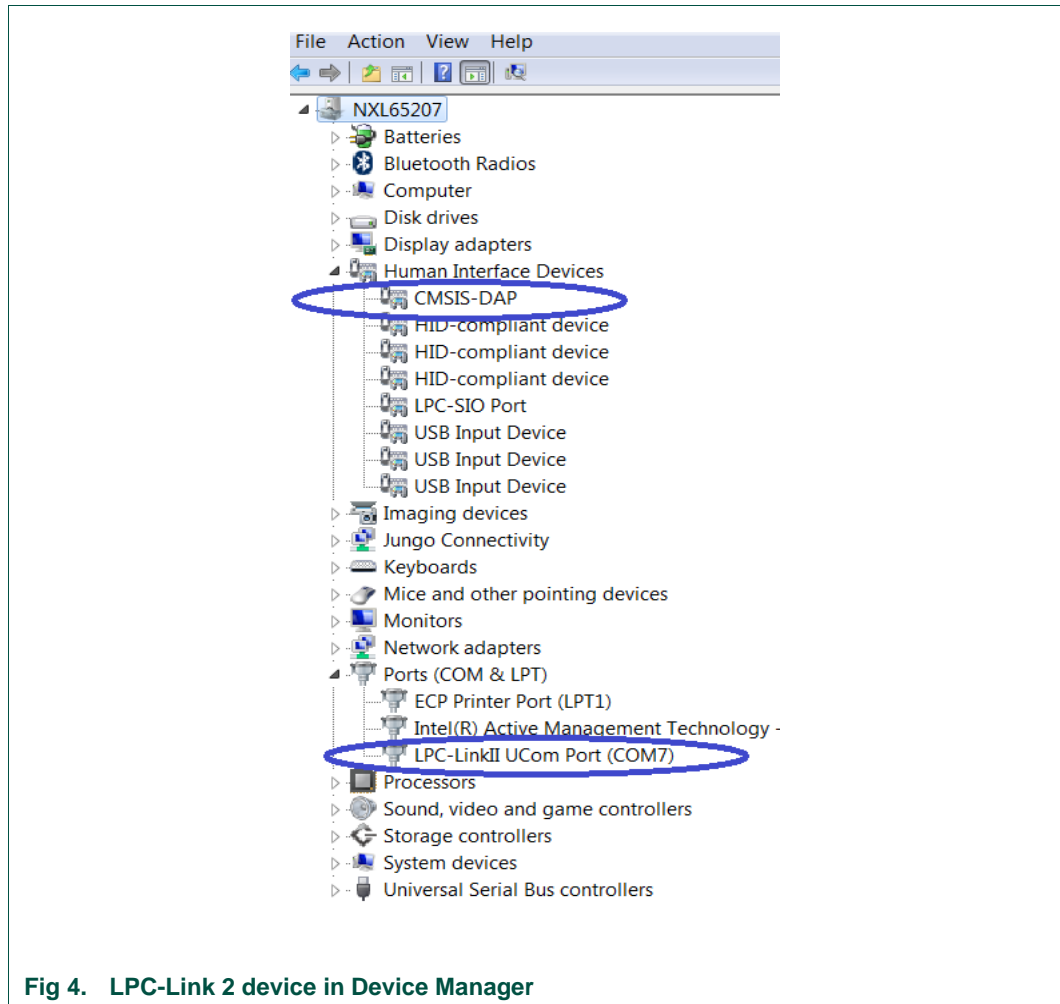


Fig 4. LPC-Link 2 device in Device Manager

4.2 Connect BLE dongle and install driver

Connect the device to a USB port on PC. A driver must be installed before Connectivity QTool can access it.

Following the procedure below to install the driver:

1. Right-click Computer and choose Manage, the Computer Management window appears.
2. Click Device Manager, navigate to MCU VIRTUAL COM DEMO on the right side, refer to Figure 5 for details.
3. Right-click the device MCU VIRTUAL COM DEMO and choose Update Driver Software
4. Click the item Browse my computer for driver software in the window.
5. Click Browse button to go to the folder C:/NXP/Connectivity QTool/.
6. Click the Next button at the bottom.

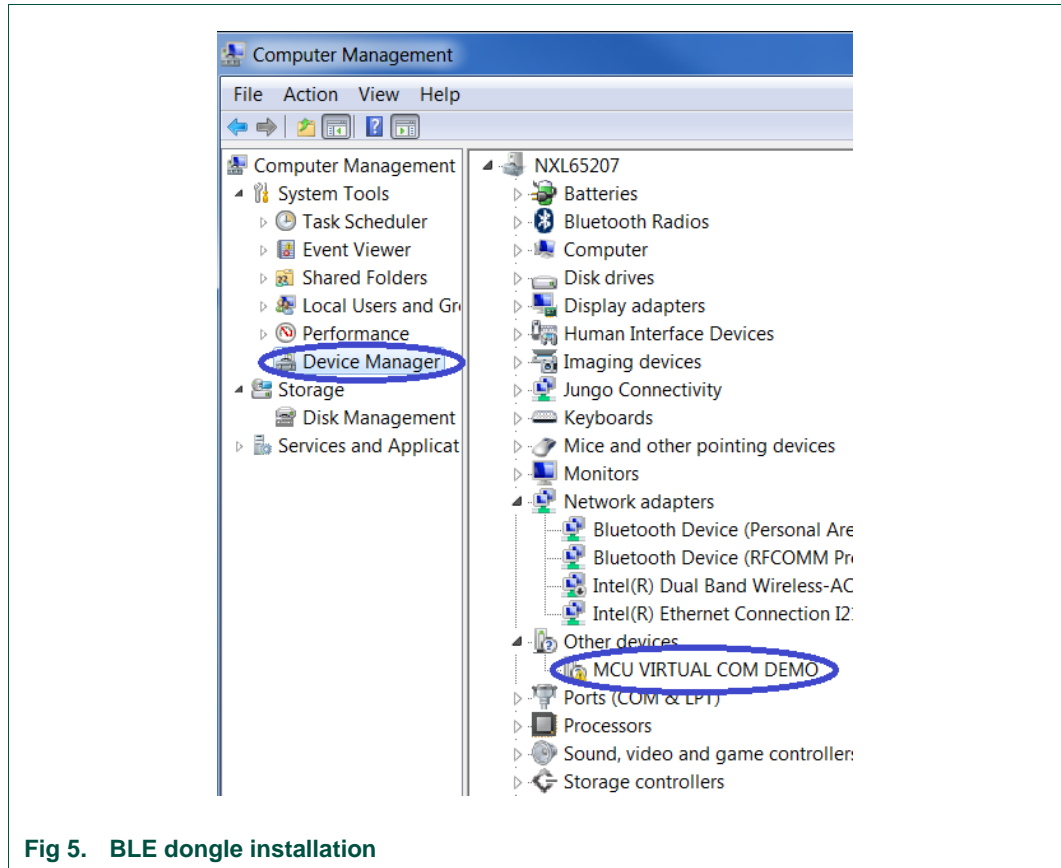


Fig 5. BLE dongle installation

After the driver is successfully installed, the device appears as a new COM port in Device Manager.

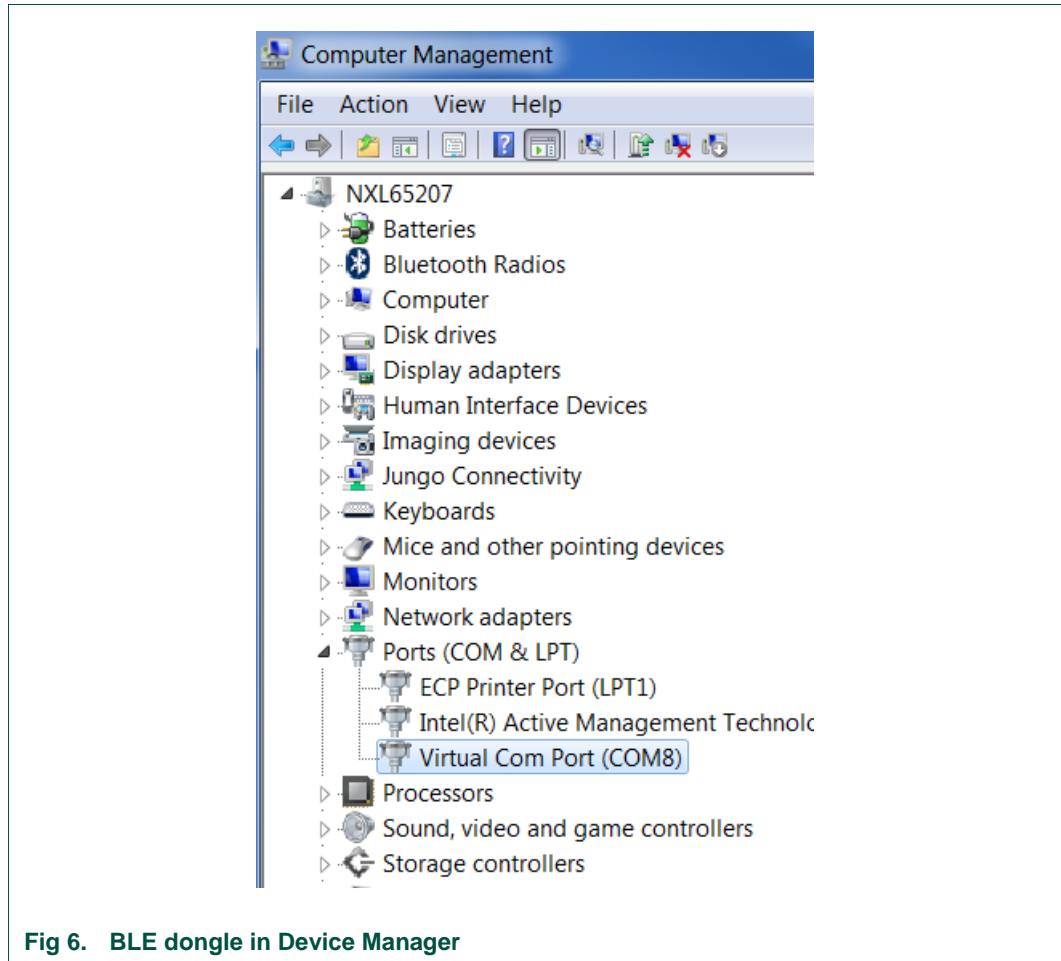


Fig 6. BLE dongle in Device Manager

4.3 Update BLE dongle firmware

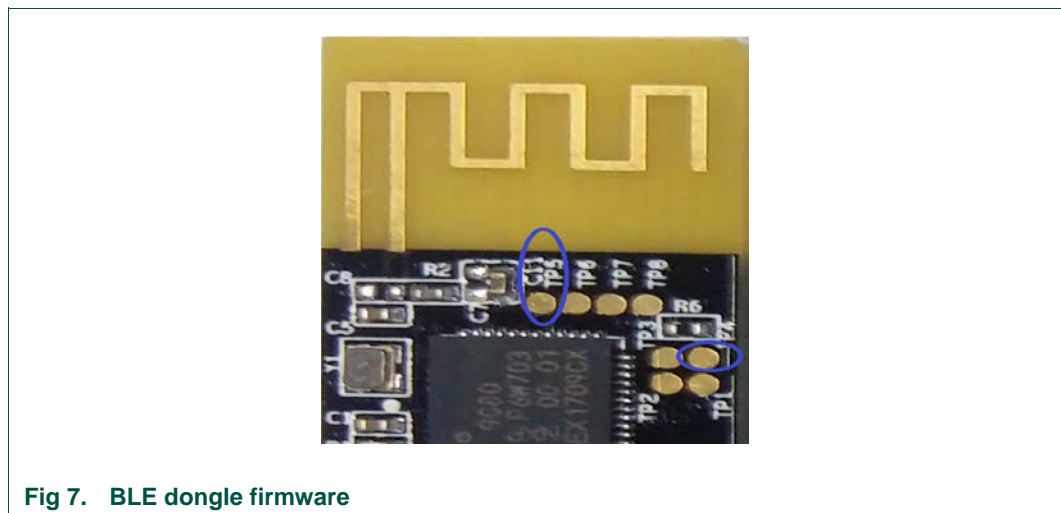


Fig 7. BLE dongle firmware

QN908x BLE Dongle is shipped with the default firmware burned. It is necessary to update firmware when Connectivity QTool cannot establish a communication with the corresponding COM port.

The following procedure is used to update the firmware:

1. Plug dongle into USB port of PC.
2. Short test point TP5 to ground TP4 or USB shield.
3. Press the reset button while TP5 shorted to ground.
4. There should be a new disk, named "CRP DISBLD", showed in Windows Explorer.
5. Delete the firmware.bin on the disk.
6. Copy new firmware firmware.bin residing in the Connectivity QTool installation directory C:\nxp\Connectivity QTool\bin to the Dongle.
7. Firmware is updated successfully after firmware copy complete.
8. Reset or power cycle the USB dongle with TP5 not shorted. The USB dongle works again.

4.4 Update debugger firmware to support J-Link/CMSIS-DAP

LPC-Link 2 is integrated on the QN908x DK by the chip LPC4322, CMSIS-DAP is supported by default. J-Link is also supported by LPC-Link 2 by changing firmware inside the LPC4322.

Currently, only J-Link is supported on the SWD firmware updating function of QN908x Programming Tool.

LPCScript is used to update the firmware for the LPC4322 on the QN9080 DK. The procedure below is about how to update firmware to support J-Link, and vice versa.

1. Short JP5 and power cycle the QN9080 DK.
2. Go to **Start Menu** of Windows.
3. Click the option, "*Program LPC-Link2 with SEGGER J-Link*" under LPCScript.

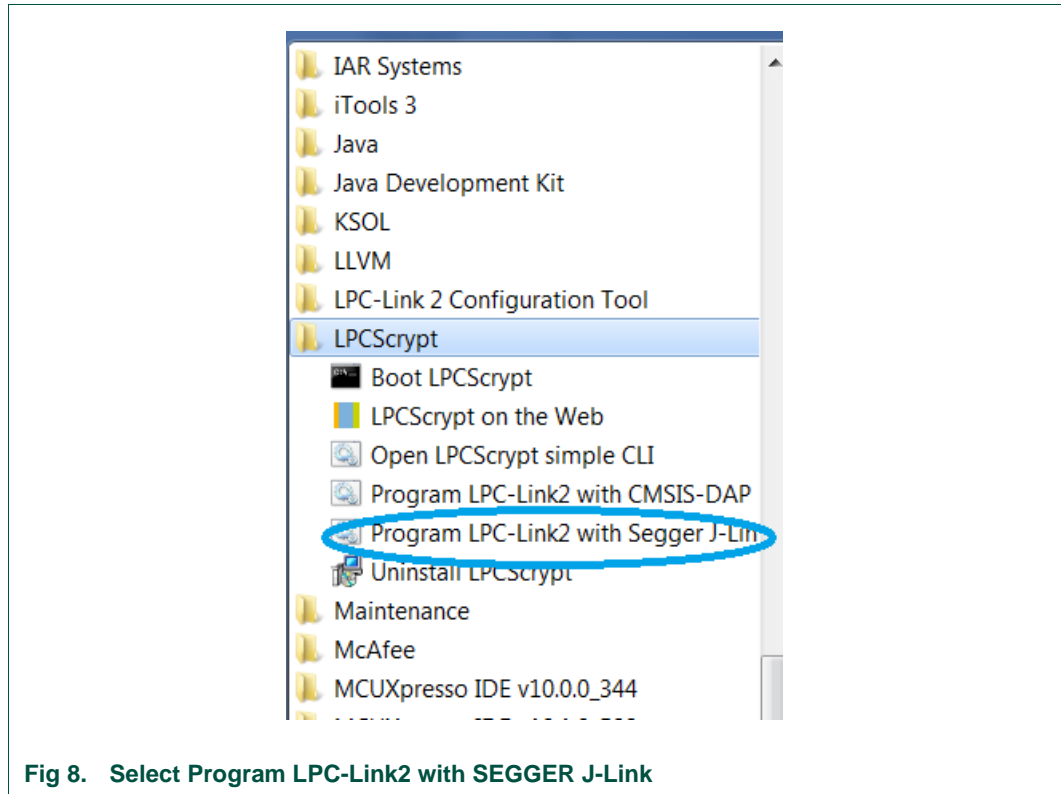


Fig 8. Select Program LPC-Link2 with SEGGER J-Link

4. Press any key in the Window “Program LPC-Link2 with SEGGER J-Link”, and the firmware update starts.

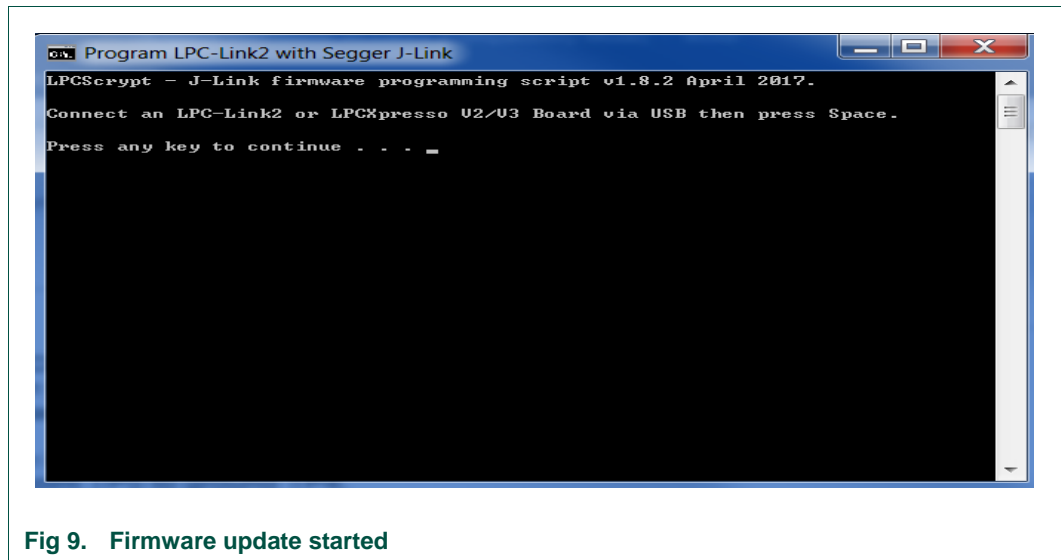


Fig 9. Firmware update started

5. The content in the Window when firmware updating complete is shown in the figure below.

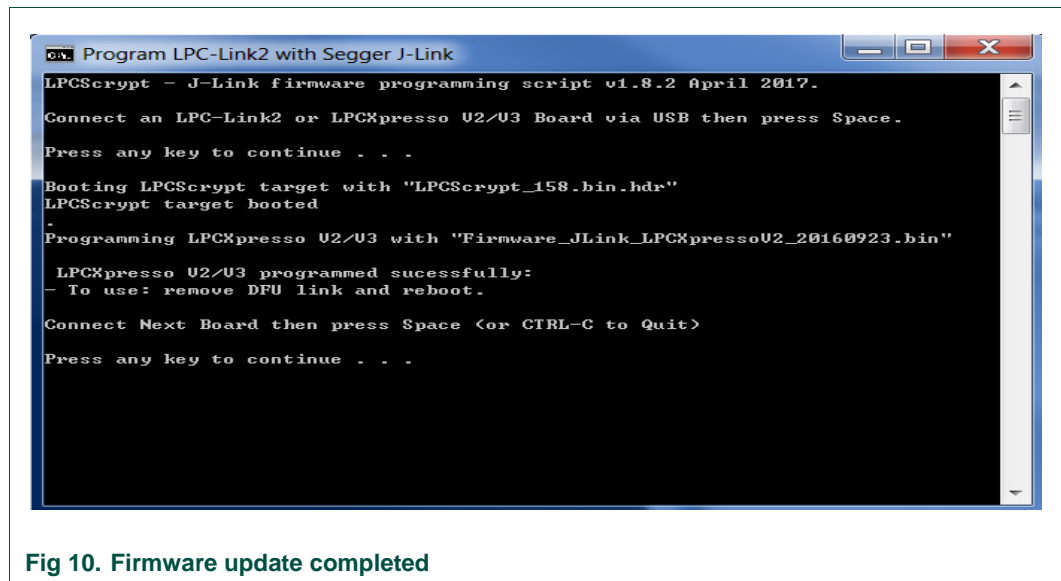


Fig 10. Firmware update completed

6. Unplug JP5 and power cycle the board, J-Link is being used now
7. Click the option "Program LPC-Link2 with CMSIS-DAP" in step 2 when CMSIS-DAP needs to be supported, other step is same as J-Link firmware updating.

5. Develop advanced application

Three IDEs, Keil, IAR, and MCUXpresso are supported in the QN908x SDK. For more information, refer to the document BLE Quick Start Guide.pdf in the folder ...docs\wireless\Bluetooth elaborated how to open/compile a project and run a BLE or other demo project.

6. Binary update by QN908x programming tool

QN908x Programming Tool supports both UART and SWD hardware interface to update firmware for QN908x DK. The corresponding options in the tool are ISP Download and SWD Download. NVDS Configurator is used to update the non-volatile parameters on QN908x, such as MAC Address, Device Name, etc.

Only J-Link is supported currently to update firmware by SWD interface. Refer to chapter [4.4](#) on how to change the firmware of LPC-Link2 to support J-Link.

6.1 Update firmware of QN9080 DK by ISP download

QN908x bootloader supports firmware updating by ISP mode. Refer to the procedures below on how to update firmware in ISP mode by QN908x Programming Tool.

1. Navigate to the **Startup** menu of Windows.
2. Open the tool under the folder **Start menu > NXP > QN908x Programming Tool**.
3. Short JP15 to enable the ISP function of QN908x bootloader.
4. Click ISP Download on QN908x Programming Tool.
5. Choose crystal clock, QN908x DK uses 32 MHz crystal by default.

6. Choose QN908x COM port.
7. Click the **Clock Connect** button.
8. Click the **Reset** button (SW3) to reset QN908x.
9. Click the **Open File** button to choose binary built-in chapter [5](#).
10. Click the **Start** button to start firmware updating.
11. Wait for firmware updating complete.
12. Remove the jumper on JP15 and press Reset button(SW3), the new firmware will now be running on the QN9080 DK.

7. Run Connectivity QTool and talk with QN9080 DK

Connectivity QTool is a PC tool that works with BLE dongle to ease the development of a BLE project in SDK. Refer to the procedure below on how to run Connectivity QTool to talk with QN9080 DK.

1. Connect BLE Dongle to the USB port of a PC.
2. Go to the **Startup** menu of Windows, open the tool under the folder **Start menu > NXP > Connectivity QTool**.
3. Choose the COM port of BLE Dongle and click **Open**.
4. Click the **Start Scanning** button to find the BLE device.
5. Click the **Stop Scanning** button when found desirable BLE device by Mac address.
6. Click the device found in the **Device** window at left side.
7. Click **Connect** button on the **Settings** window to connect *QN9080 DK*.
8. The status changes to *Connected at Device* window at left side.

Note: By default, the profile inside QN9080 DK is a proximity reporter.

8. Abbreviations

The following abbreviations are used in the document.

Table 1. Abbreviations

Name	Description
DK	Development Kit
SoC	System on Chip
BLE	Bluetooth Low Energy
GPIO	General Purpose Input Output
NVDS	Nonvolatile Data Storage
OB	On Board
ISP	In System Program
SPI	Serial Port Interface
SWD	Serial Wire Debug
UART	Universal Asynchronous Receiver/Transmitter
MDK	Microcontroller Development Kit

9. References

- BLE Host Stack FSCI Reference Manual
- UM11085 Connectivity QTool User Manual
- QN908x Programming Tool User Manual
- UM11086 QN908x Image Editor User Manual
- BLE Demo Applications User's Guide
- BLE Application Developer's Guide
- QN908x DK User's Guide

Learn more at:

<http://www.nxp.com/products/microcontrollers-and-processors/more-processors/application-specific-mcus-mpus/bluetooth-low-energy-ble/ultra-low-power-ble-system-on-chip-solution:QN9080>.

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