Qualcomm Technologies, Inc.

Qualcomm IQ-X Series Evaluation Kit- Ubuntu

Bringup guide

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Revision history

Revision	Date	Description
AA	March 6, 2026	Initial release
AB	March 11, 2026	Updated chapter 4: Dowload and flash software

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1 Introduction

The IQ-X series evaluation kit (EVK) includes a carrier board and a module. This bringup guide helps you set up the IQ-X series EVK and understand the peripheral interface on the carrier board. Additionally, this guide provides step-by-step instructions to set up the IQ-X Series Evaluation Kit (EVK), establish communication with host systems and software flashing procedures.

NOTE: This is a preview (beta) version of the document. The production version will be released at a later time.

For information about IQ-X series module, see the documents listed in Related documents.

1.1 Conventions

Function declarations, function names, type declarations, attributes, and code samples appear in a different font, for example, `cp armcc armcpp`.

Code variables appear in angle brackets, for example, `<number>`.

Commands to be entered appear in a different font, for example, **copy a:*.* b:**. Button and key names appear in bold font, for example, click **Save** or press **Enter**.

1.2 Technical assistance

For assistance or clarification on information in this document, go to www.qualcomm.com/support

2 IQ-X series carrier board–peripheral interface connectors

The following figure shows the location of various peripheral interface connectors from the top view of the IQ-X series carrier board.

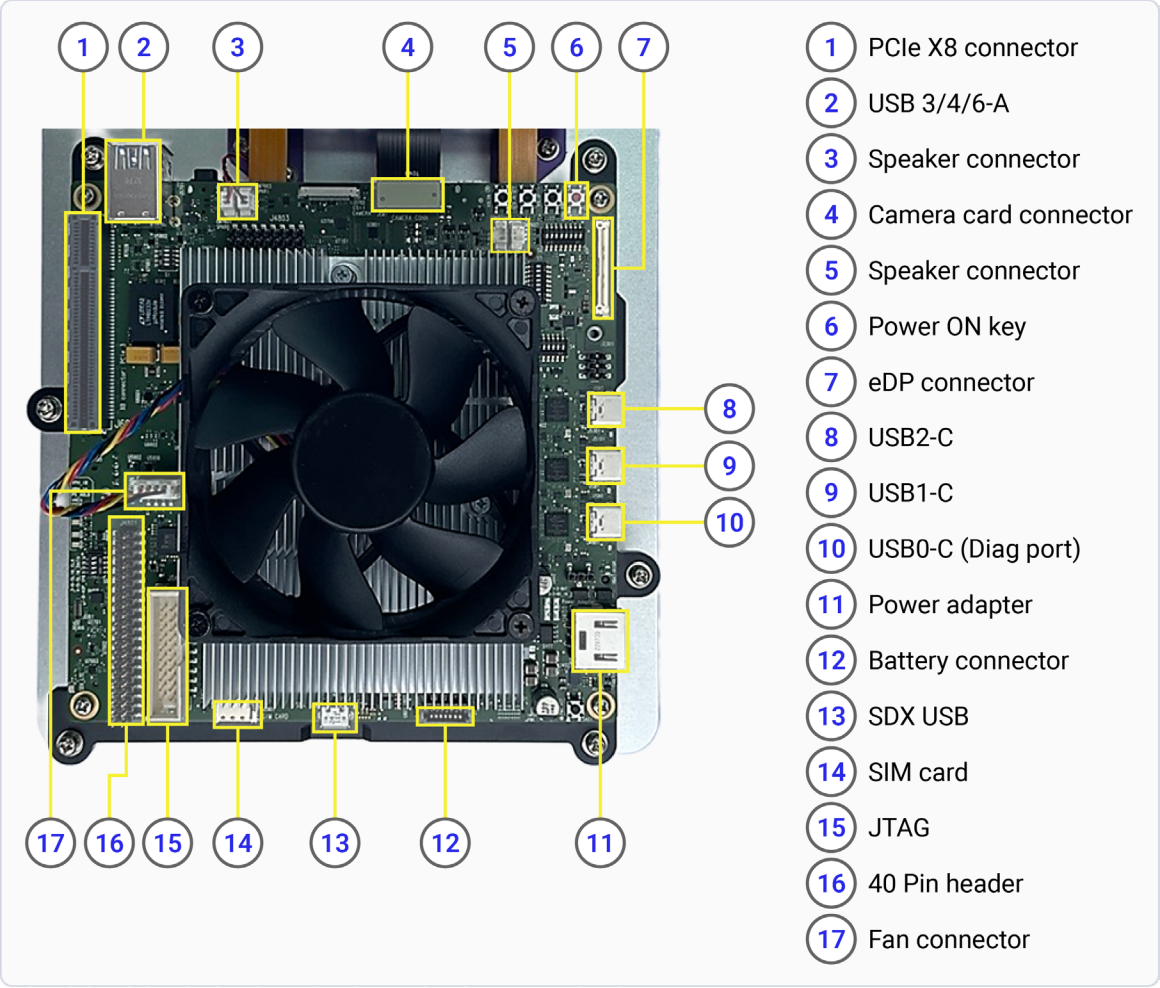


Figure 2-1 Top view of IQ-X series carrier board

The following figure shows the location of various peripheral interface connectors from the bottom view of the IQ-X series carrier board.

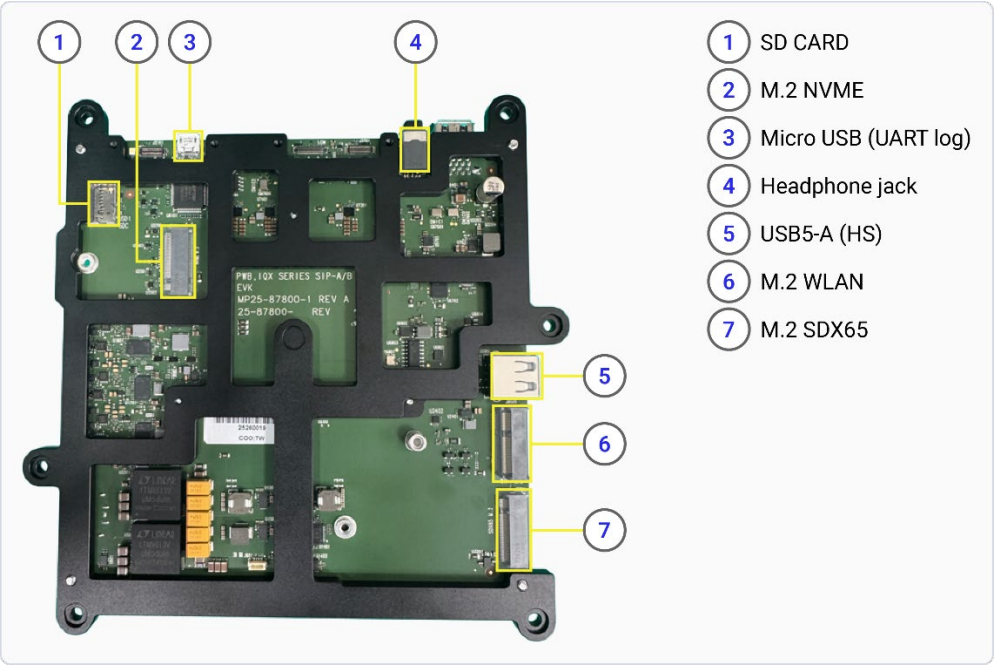


Figure 2-2 Bottom view of IQ-X series carrier board

3 Configure DIP switch settings

The following figure shows the dual in-line package (DIP) switch settings to set up the default SPINOR and universal flash storage (UFS) mode on the IQ-X series carrier board.

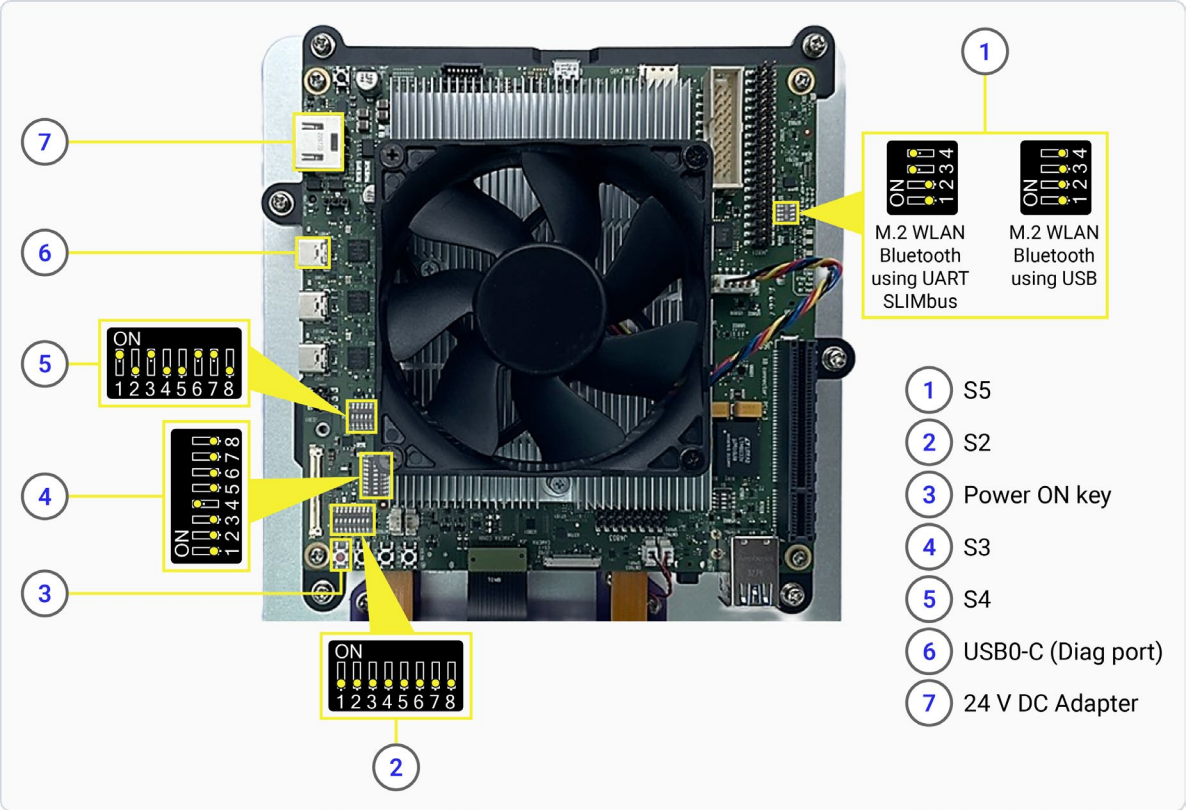


Figure 3-1 DIP switch settings for default SPINOR + UFS and Bluetooth setup

The following table describes the ON and OFF positions of the DIP switches for the SPINOR and UFS mode.

Table 3-1 DIP switch settings

Switch	Description	
	ON	OFF
S2-4	Emergency download (EDL) mode	Normal mode
S3-4	FAST BOOT [0] → 1	FAST BOOT [0] → 0
S4-1	FAST BOOT [2] → 1	FAST BOOT [2] → 0
S4-3	FAST BOOT [1] → 1	FAST BOOT [1] → 0

Switch	Description	
	ON	OFF
S4-2	FAST BOOT [3] → 1	FAST BOOT [3] → 0
S4-5	Enables BAT_THERM resistor on board	Uses BAT_THERM resistor in battery
S4-6	Enables BAT_ID resistor on board	Uses BAT_ID resistor in battery
S4-7		
S5-3	Bluetooth using UART and SLIMbus	Bluetooth using USB
S5-4	Bluetooth using UART and SLIMbus	Bluetooth using USB

The following table lists the description of the S2, S3, and S4 DIP switches:

Table 3-2 S2, S3, and S4 DIP switches

Pins	Function
DIP switch S2	
8-9	VXT2_3P3_DIS
7-10	EUD_ENABLE
6-11	ELDO_3P3_EN
5-12	BOOT_SPEED1
4-13	FORCE USB BOOT
3-14	BOOT_SPEED0
2-15	SYSTEM_THROTTLE
1-16	SDX_FORCE_USB
DIP switch S3	
8-9	DDR3_CH_SEL
7-10	SDX_PCIE_INIT
6-11	SDX_FB2
5-12	WDOG_DISABLE
4-13	FBO
3-14	FORCE_PS_HOLD
2-15	VBATT_HIGH
1-16	AUTO_PWR_EN
DIP switch S4	
8-9	UART_SEL
7-10	BATT_ID
6-11	BATT_ID
5-12	BATT_THERM
4-13	DEAD_BATT_CHG
3-14	FB1
2-15	FB3
1-16	FB2

4 Download and flash software

This chapter describes how to download and flash the software on the IQ-X series carrier board.

4.1 Power up and power cycle

The IQ-X series carrier board is preloaded with software to set up the device. If no image is loaded, the device enters EDL mode when powered on. The following figure shows the location of the interfaces used to power up the device:

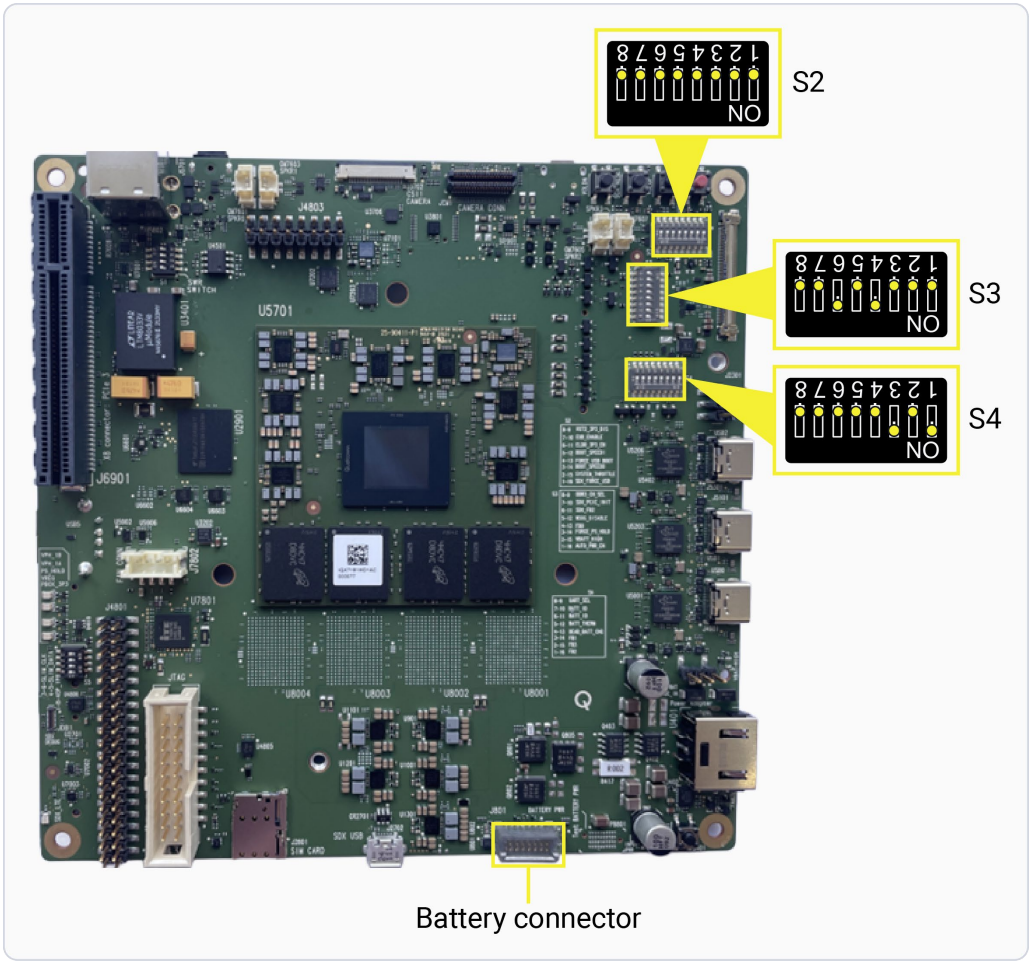


Figure 4-1 Power up options on IQ-X series carrier board

Table 4-1 DIP switch settings

Switch	Description	
	ON	OFF
S2-4	EDL mode	Normal mode
S3-4	FAST BOOT [0] → 1	FAST BOOT [0] → 0
S4-1	FAST BOOT [2] → 1	FAST BOOT [2] → 0
S4-3	FAST BOOT [1] → 1	FAST BOOT [1] → 0
S4-2	FAST BOOT [3] → 1	FAST BOOT [3] → 0
S4-6	Enables BAT_ID resistor on board	Uses BAT_ID resistor in battery
S4-7		

4.1.1 Power up the IQ-X series EVK

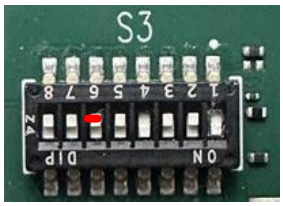
The IQ-X series EVK carrier board supports three power source options with specific DIP switch settings for each power source option.

CAUTION: Don't use the DC power adapter simultaneously with the battery.

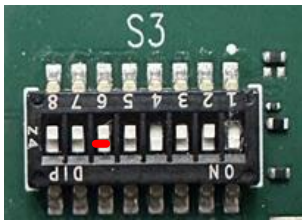
NOTE: The current EVK carrier board does not support USB Type-C Power Delivery (PD) for power input or battery charging. Support for this feature will be introduced in later EVK versions.

Set up power source

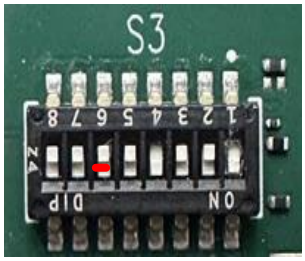
1. DC power adapter: To power up the EVK using DC power adapter (24 V/20 V, 180 W), turn OFF the S3-6 DIP switch.



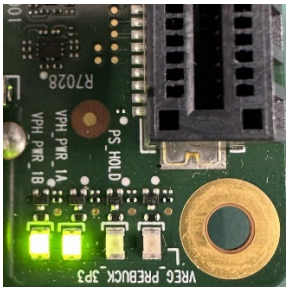
2. Battery (3S battery or fake battery):
   - To power up the EVK using 3S battery, turn ON the S3-6 DIP switch and turn OFF the S4-5, S4-6, and S4-7 DIP switches.



   - To power up the EVK using fake battery, turn ON the S3-6, S4-5, S4-6, and S4-7 DIP switches.



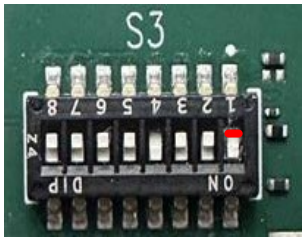
If the power source is ready, the VPH_PWR_1A and VPH_PWR_1B LEDs should illuminate.



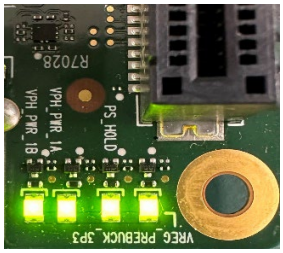
Trigger power up

Use Power ON key or Auto Power ON option to power up the EVK.

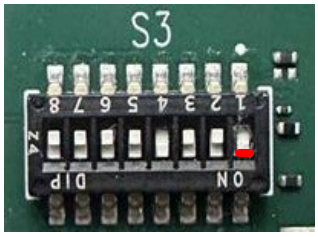
3. To power up the EVK using the Power ON key, press the Power ON key. (Turn OFF the S3-1 DIP switch.)



After power up, ensure that the VREG_PREBUCK_3P3 and PS_HOLD LEDs illuminate.



4. To power up the EVK using Auto Power ON, turn ON the S3-1 DIP switch before connecting the power source.



After plugging in the power source, the VREG_PREBUCK_3P3 and PS_HOLD LEDs illuminate.

4.1.2 Configure boot mode

Boot mode configuration of the S2-4 DIP switch: For the EDL mode, turn ON S2-4 and for Normal mode, turn OFF S2-4.

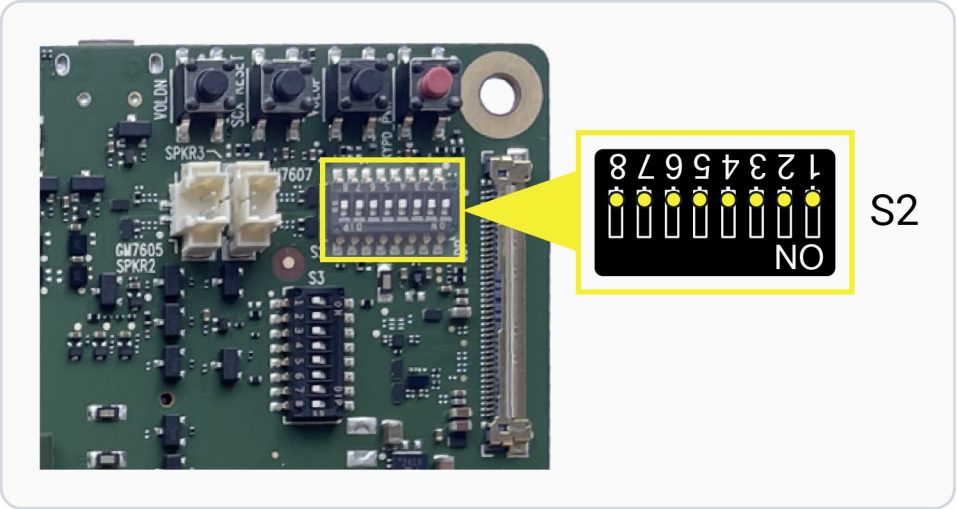


Table 4-2 DIP switch setting for Boot mode configuration

Switch	Description	
	ON	OFF
S2-4	EDL mode	Normal mode

4.1.3 Power cycle the EVK

To power cycle the EVK, do the following:

1. Disconnect the power source (DC adapter, battery, Type C PD).
2. Disconnect the USB Type-C cable (USB0-C, USB1-C, USB2-C) (if connected).
3. Follow the power up procedure.

4.2 Flash the software images to the Dragonwing IQ-X EVK

Download and integrate the software images, and flash them onto the Dragonwing IQ-X EVK.

4.2.1 Prerequisites

Ensure that you have the following required hardware and peripherals ready:

Requirement	Description
Host Computer OS	Ubuntu or Windows OS

Requirement	Description
Development kit	Dragonwing IQ-X EVK
USB cable	One USB Type-C to USB Type-A cable for flashing the image to the Dragonwing IQ-X EVK
Serial Cable	One Micro-USB to USB Type-A cable for the UART debug port

Follow the setup steps based on your host computer's operating system (OS).

4.2.2 Set up the Ubuntu host

To set up the environment in the Ubuntu OS, set up the debug UART. Don't log in to the console at this stage.

1. Connect one end of a Micro-USB cable to the Micro-USB port on the Dragonwing IQ-X EVK.

Figure 4-2 Connecting the IQ-X board to the host computer

2. Connect the other end of the Micro-USB cable to the host computer.
3. Install the `Screen` application on the Ubuntu host computer:
```
$ sudo apt update
$ sudo apt install screen
```
4. Verify the USB port:
```
$ ls /dev/ttyUSB*
```
Sample output
```
$ /dev/ttyUSB0
```
5. Open the debug UART:
```
$ sudo screen <serial_port> <baud_rate>
```
Example command:
```
$ sudo screen /dev/ttyUSB0 115200
```

4.2.2.1 Download the Ubuntu OS image and boot firmware

To download the prebuilt Ubuntu Server or Desktop OS image and the boot firmware, do the following:

1. Go to the Canonical® Ubuntu on Qualcomm IoT site.
2. On the landing page, locate the Choose a board panel. From the list of platforms, select "Qualcomm Dragonwing IQ-X7181 Evaluation Kit (EVK)" After selecting the board, the

page displays the available Ubuntu images for this platform.Choose one of the following based on your requirement:

a. Ubuntu Desktop or

b. Ubuntu Server

3. Download the below files onto the host computer and the section 4.2.2.2 explains how to download each of the images and prepare the final flashable folder .

Filename	Description
rawprogram0.xml	Raw program
<ubuntu_image>.img.xz	Ubuntu desktop image
<boot_firmware>.tar.gz	Boot firmware

NOTE: Download the rawprogram0.xml file corresponding to the same Ubuntu variant you selected. Use Desktop files for Ubuntu Desktop and Server files for Ubuntu Server.

4.2.2.2 Prepare the flashable folder on Ubuntu host

Follow these steps to prepare the flashable folder:

1. Create a folder for the flashable images. As an example, the following command creates the iqx_ubuntu_images directory.
```
$ cd <workspace_dir>
$ mkdir iqx_ubuntu_images
```

NOTE: <workspace_dir> indicates the directory where the Ubuntu OS image, boot firmware, and relevant files are downloaded.

2. From the Canonical website

   i Download the boot firmware and copy the contents of unzipped folder of boot firmware into the iqx_ubuntu_images folder.

   ii Download the <ubuntu_image>.xz and unzip the package to get a raw image file
```
$ unxz ubuntu_image
```
   Example:
```
$ unxz iot-qualcomm-dragonwing-classic-server-2510-x01-20260227.4096b.img.xz.
```

   iii Copy the Ubuntu raw <ubuntu_image> file to the iqx_ubuntu_images folder.
```
$ cp <ubuntu_image> ./ iqx_ubuntu_images
```
   Example
```
$ cp iot-qualcomm-dragonwing-classic-server-2510-x01-20260227.4096b.img ./iqx_ubuntu_images.
```

   iv Download rawprogram0.xml from Ubuntu server/Ubuntu desktop and copy to the iqx_ubuntu_images folder.

4.2.2.3 Flash Dragonwing IQ-X EVK integrated image on Ubuntu host

To flash the Dragonwing IQ-X EVK integrated image using Ubuntu host, do the following:

1. Move the Dragonwing IQ-X EVK into the Emergency Download (EDL) mode.

a. .Connect the Dragonwing IQ-X EVK to a 12 V wall power supply.

b. Connect the Dragonwing IQ-X EVK to the host computer through the USB Type-C connector.

c. Verify whether the Dragonwing IQ-X EVK has entered the EDL mode by running the following command on the host computer:
```
$ lsusb
```
Sample output
```
Bus 002 Device 014: ID 05c6:9008 Qualcomm, Inc. Gobi Wireless Modem
(QDL mode).
```

2. Update the udev rules.

a. Go to the udev configuration directory:
```
$ cd /etc/udev/rules.d
```

b. List the contents of the directory:
```
$ ls
```

i If the `51-qcom-usb.rules` file isn't present, run the following command to create it.
```
$ sudo vi 51-qcom-usb.rules
```

ii Add the following content to the file `51-qcom-usb`.rules:
```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="05c6", ATTRS
{idProduct}=="9008", MODE="0664", GROUP="plugdev"
```

iii If the file exists, check for the earlier content. Run the following command to view the content:
```
$ cat 51-qcom-usb.rules
```

c. Restart udev:
```
$ sudo systemctl restart udev
```

If the USB cable is already connected to the host computer, disconnect and reconnect it to apply the updated rules.

3. Use the **QDL** tool to flash the software onto the Dragonwing IQ-X EVK:

NOTE: Use QDL version 2.4.0 or later to flash the Dragonwing IQ-X EVK.

a. Download the QDL tool and unzip the contents of the downloaded folder.

b. Provide executable permission by running the following command:
```
$ chmod +x ./qdl
```

NOTE: For more information about QDL tool usage, see the **QDL_User_Guide** in your unzipped `qdl` directory.

c. Perform configuration data table (CDT) flashing

d. Perform universal flash storage (UFS) provisioning

e. Flash the Ubuntu software images

NOTE: To perform UFS flashing, switch on SW4-1.

i Go to `iqx_ubuntu_images/<boot_firmware>/partition_spinor` and flash the boot binaries by running the following commands:
```
$ <qdl_tool_path>/qdl --storage spinor xbl_s_devprg_ns.melf
rawprogram0.xml patch0.xml
```

ii Go to `iqx_ubuntu_images`

iii Navigate to `<boot_firmware>/partition_spinor`, copy the `xbl_s_devprg_ns.melf` file to `iqx_ubuntu_images`.

```
$ cd iqx_ubuntu_images
$ cp <boot_firmware>/partition_spinor/xbl_s_devprg_ns.melf ./
```

Example

```
cp IQ-X.1.3-Ver.1.1-ubuntu-X1E80100-nhlos-
bins/partition_spionr/xbl_s_devprg_ns.melf
```

iv Flash the ubuntu images by running the following command from the `iqx_ubuntu_images` folder:

```
<qdl_tool_path>/ qdl --storage ufs /xbl_s_devprg_ns.melf
rawprogram0.xml
```

NOTE: Turn off the SW2-4 DIP switch after flashing the software

4.2.3 Set up the Windows host

1. Set up debug UART. **Don't** log in to the console at this stage.
   a. Connect one end of a Micro-USB cable to the Micro-USB port on the Dragonwing IQ-X EVK.

   b. Connect the other end of the Micro-USB cable to the host computer.
   c. Download PuTTY for your Windows host computer. Choose the correct version for your Windows (32-bit or 64-bit).
   d. Run the installation wizard and follow the on-screen instructions.
   e. After installation, open PuTTY. You can either find it from *Start* > *Installed apps*, or locate it using the taskbar search.
   f. In the PuTTY Configuration dialog, do the following:
      i Select *Serial*.

ii Specify a *Serial line* based on the UART port detected on the *Windows Device Manager*.

NOTE: If the UART port isn't detected, do the following:
1. On x86: Go to the USB-to-UART serial driver page. The driver auto-downloads. Update it through the Device Manager.
2. On Arm: Go to the FTDI USB to serial drivers page. In the Drivers section, select FTDI CDM VCP Drivers. The driver download starts. Update it through the Device Manager.

iii Set the baud rate to **115200**.

iv Select *Open* to start a PuTTY session.

Result: You have installed PuTTY and configured the debug UART.

4.2.3.1 Download the Ubuntu OS image and boot firmware

To download the prebuilt Ubuntu Server or Desktop OS image and the boot firmware, do the following:

1. Go to the Canonical® Ubuntu on Qualcomm IoT site.
2. On the landing page, locate the Choose a board panel. From the list of platforms, select " Qualcomm Dragonwing IQ-X7181 Evaluation Kit (EVK)" After selecting the board, the page displays the available Ubuntu images for this platform.Choose one of the following based on your requirement:
   a. Ubuntu Desktop or
   b. Ubuntu Server
3. Download the below files onto the host computer and the section 4.2.3.2 explains how to download each of the images and prepare the final flashable folder.

Filename	Description
`rawprogram0.xml`	Raw program
`<ubuntu-image>.img.xz`	Ubuntu image
`<boot-firmware>.tar.gz`	Boot firmware

NOTE: Download the `rawprogram0.xml` file corresponding to the same Ubuntu variant you selected. Use Desktop files for Ubuntu Desktop and Server files for Ubuntu Server.

4.2.3.2 Prepare the flashable folder on Windows host

Follow these steps to prepare the flashable folder :

1. Create a directory for the flashable images. For example, `iqx_windows_images`.
2. From the Canonical website
   a. Download the boot firmware and copy the contents of unzipped folder of boot firmware into the `iqx_windows_images` folder.

b. Download <`ubuntu_image`> and unzip the package to get a raw image file.

c. Copy the extracted ubuntu image to the `iqx_windows_images` folder.

d. Download `rawprogram0.xml` from Ubuntu server/Ubuntu desktop and copy to the `iqx_ubuntu_images` folder

4.2.3.3 Flash Dragonwing IQ-X EVK integrated image on Windows host

1. Move the Dragonwing IQ-X EVK into the EDL mode.
   a. Connect the Dragonwing IQ-X EVK to a 12 V wall power supply.
   b. Connect the Dragonwing IQ-X EVK to the host computer through the USB Type-C connector.
   c. Verify whether the Dragonwing IQ-X EVK has entered the EDL mode by running the following command on the host computer:
   ```
   $ lsusb
   ```
   Sample output
   ```
   Bus 002 Device 014: ID 05c6:9008 Qualcomm, Inc. Gobi Wireless Modem (QDL mode)
   ```
2. Download the QDL tool and unzip the contents of the downloaded folder.

NOTE: Rename the unzipped file to `xbl_s_devprg_ns.melf`.

3. Uninstall any other drivers for the device. Ensure that drivers like Qualcomm USB driver aren't installed. The device shouldn't appear under **COM Ports** in the **Device Manager**.
4. Run the `install_driver.bat` file extracted from the unzipped downloaded folder.
5. Perform CDT flashing on the Dragonwing IQ-X EVK
6. Perform UFS provisioning on the Dragonwing IQ-X EVK
7. Flash the Ubuntu software images

NOTE: To perform UFS provisioning, switch on SW4-1

a. Go to `iqx_windows_images /<boot_firmware>/ partition_spinor` and flash the boot binaries by running the following commands:
```
$ <qdl_tool_path>/qdl --storage spinor xbl_s_devprg_ns.melf rawprogram0.xml patch0.xml
```

b. Go to `iqx_windows_images`

c. Navigate to `<boot_firmware>/partition_spinor`, and copy the `xbl_s_devprg_ns.melf` file to the `iqx_windows_images`.

d. Flash the boot binaries by running the following commands
```
$ <qdl_tool_path>/ qdl --storage ufs /xbl_s_devprg_ns.melf rawprogram0.xml
```

NOTE: Turn off the SW2-4 DIP switch after flashing the software

5 FAQs

5.1 How do you perform configuration data table (CDT) flashing?

CDT is a set of platform-specific configuration files used during flashing to configure hardware parameters on the Dragonwing IQ-X EVK.

To perform CDT flashing, do the following:

1. Download the IQ-X.1.2-EVK-CDT.tar.gz files from Jfrog.
2. Unzip the boot binaries.
3. Put the device in EDL mode.
4. Verify whether the Dragonwing IQ-X EVK has entered the EDL mode by running the following command on the host computer:
   ```
   $ lsusb
   ```
   Sample output
   ```
   Bus 002 Device 014: ID 05c6:9008 Qualcomm, Inc. Gobi Wireless Modem (QDL mode)
   ```
5. Navigate to SPINOR directory
   ```
   $ cd IQ-X.1.2-EVK-CDT/spinor
   ```
6. Run QDL using command:
   ```
   $ <qdl_tool_path>/qdl xbl_s_devprg_ns.melf rawprogram0.xml patch0.xml
   ```

5.2 How do you provision universal flash storage (UFS)?

UFS provisioning helps divide the storage into several logical unit numbers (LUNs), allowing you to store different types of data separately. This improves access efficiency and system organization.

To provision the UFS, do the following:

1. Download the provisioning.zip file from Jfrog and unzip it.
2. Put the device in EDL mode.
3. Navigate to provisioning directory
   ```
   $ cd provisioning
   ```
4. To provision UFS, run the following commands
   ```
   $ <qdl_tool_path>/qdl --storage ufs xbl_s_devprg_ns.melf provision.xml
   ```

5.3 Further support

Ask your questions on the Qualcomm support forum.

A References

A.1 Related documents

Title	Number
Qualcomm Technologies, Inc.	
IQ-X Series Module Data Sheet	80-77181-1
IQ-X Series Module Pin Assignment and GPIO Configuration Specification Spreadsheet	80-77181-1A
IQ-X Series Module Technical Reference Manual	80-77181-5

A.2 Acronyms and terms

Acronym or term	Definition
DIP	Dual in-line package
EVK	Evaluation kit
NVMe	Non-Volatile Memory Express
UFS	Universal flash storage
UART	Universal asynchronous receiver/transmitter
UEFI	Unified extensible firmware interface
QDL	Qualcomm Downloader
EDL	Emergency Download
CDT	Configuration data table
UFS	Universal flash storage

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