GT-202 MQX PDK

Quick Start, Installation and Configuration Guide

September 1, 2014

Revision history

Revision	Date	Description
A	September 2014	Initial release

Contents

1 GT202 Development Kit Contents

The GT202 development kit contains:

- GT202 Kit
  - Gt202 Wi-Fi Module (Soldered on Freedom Adaptor)
  - Freedom Adaptor
- Freescale K22F120M Freedom Development Platform
- USB cable

OpenSDA USB port

GT202 Wi-Fi Module

Freedom Adaptor

Freescale K22F120M Freedom Development Platform
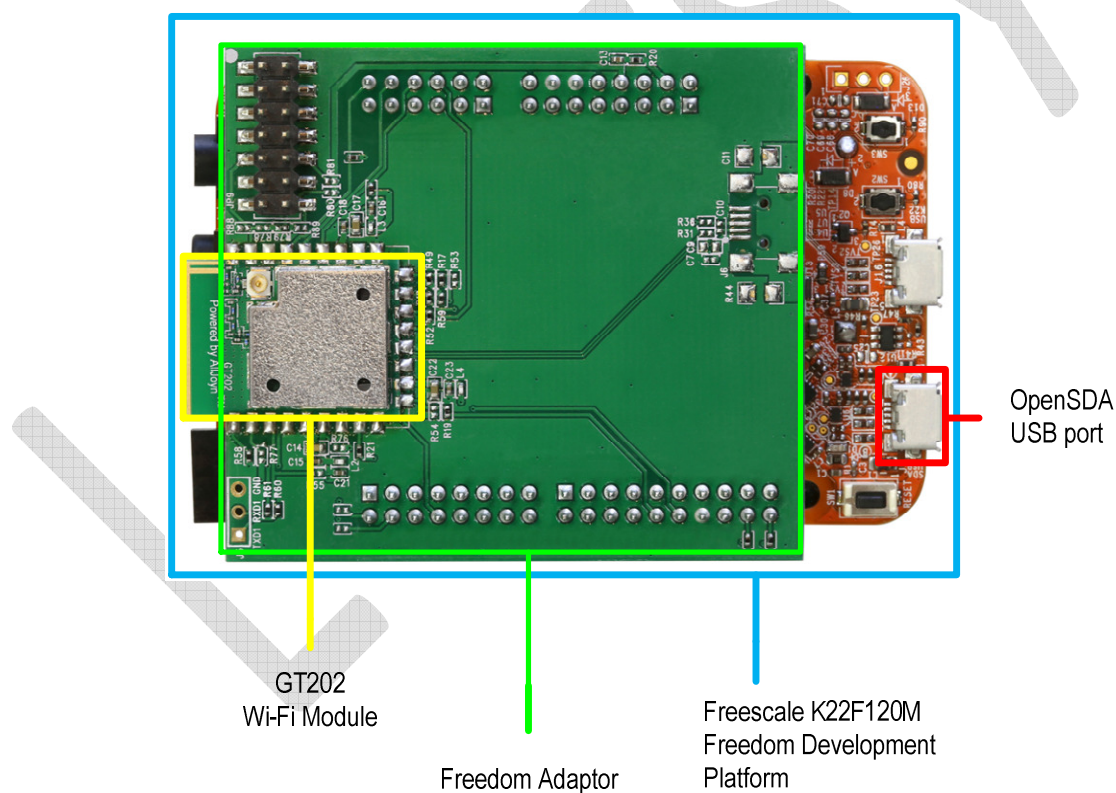
GT202 development kit

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2 Quick Setup

This chapter describes the procedures to setup the GT202 development platform. Once the setup is complete, the GT202 development platform is ready to be installed with demo applications that can be run to evaluate the functionality and performance of the GT202 Wi-Fi module.

2.1 Download and install the mbedOpenSDAv2.1 USB driver

FRDM-K22F comes with the mass-storage device (MSD) Flash Programmer OpenSDAv2.1 Application preinstalled. The MSD Flash Programmer is a composite USB application that provides a virtual serial port and an easy and convenient way to program applications into the K22F MCU. It emulates a FAT file system, appearing as a removable drive in the host file system with a volume label of MBED. Raw binary or Motorola S-record files that are copied to the drive are programmed directly into the flash of the K22F and executed automatically. The virtual serial port enumerates as a standard serial port device that can be opened with standard serial terminal applications.

1. Download and install the mbedOpenSDAv2.1 USB drivers found at:
   http://mbed.org/handbook/Windows-serial-configuration

2. Put together the GT202-kit with the FRDM-K22F120M through the freedom connector.
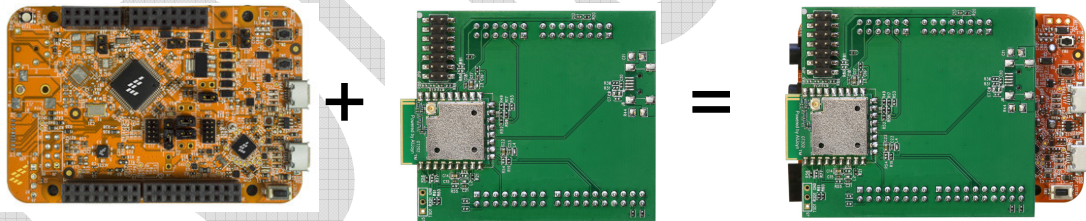

3. Plug in a USB cable from a USB host (PC) to the OpenSDAv2.1 Micro-AB USB connector (J5). The FRDM-K22F will be powered by this USB connection.
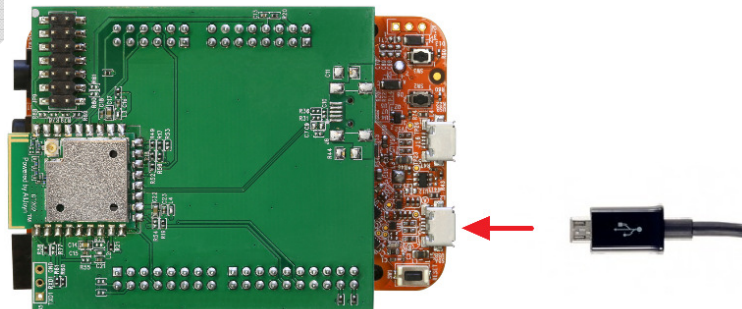
4. USB host (PC) will start initializing the OpenSDA USB driver. After the driver is initialized and installed, a removable drive in the USB host file system will appear with a volume label of MBED.
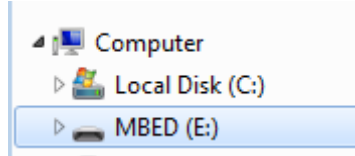
5. Download throughput_demo.bin from http://download.arrow.com:
   - GT202 MQX (3.0.2) Throughput Demo - IoE GT202 Wi-Fi Module MQX Throughput Demo for FRDM-K22F120M

6. Unzip the throughput_demo.bin from the downloaded zip package.

7. Copy throughput_demo.bin to the removable drive with a volume label of MBED. OpenSDA MSD flash programmer will flash the .bin file onto the flash on FRDM-K22F
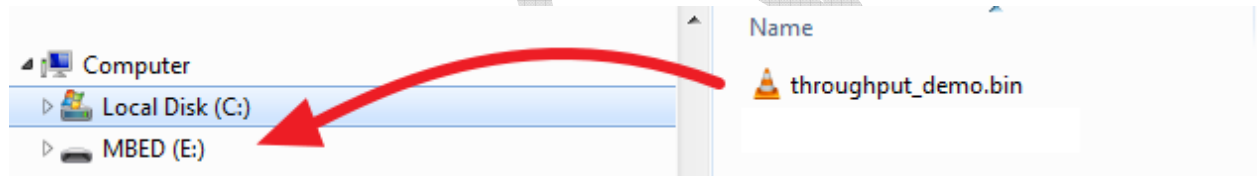
8. Reset the FRDM-K22F by removing the USB cable and re-insert.

9. The Throughput demo is now running on the FRDM-K22F.

2.2 Connect to Throughput Demo Console

Determine the symbolic name assigned to the FRDM-K22F virtual serial port. To do this in Windows, open Device Manager and look for the COM port named "mbed Serial Port".
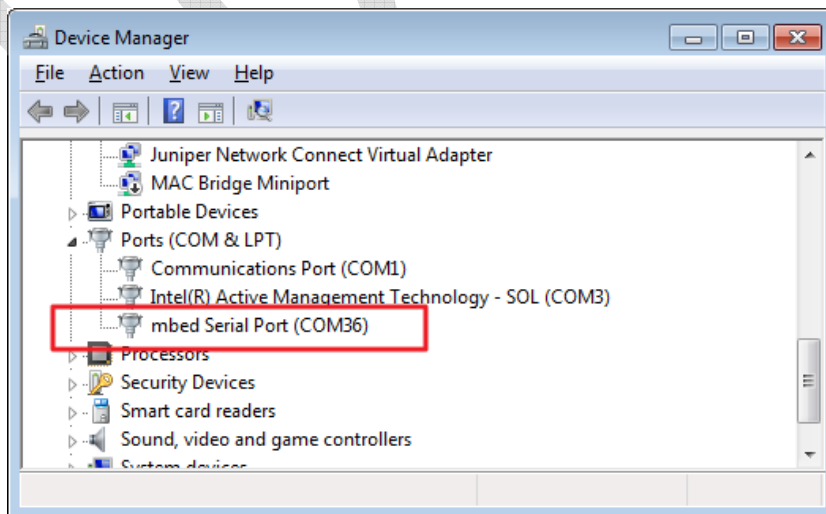
1. Start a terminal application from the PC and select the COM port (named "mbed Serial Port") to connect using the port setting **115200, 8, n, 1, no flow control**.

2. The serial terminal application displays:

```
shell >
```

3. The console connection is established. Type the following command at the terminal to view the version information. The driver and the firmware versions can be different.

```
wmiconfig --version
```

4. To connect to a Wi-Fi access point

```
wmiconfig --p passcode
```
(please change to the password accordingly)

```
wmiconfig --wpa 2 TKIP TKIP
```
(assuming WPA2 is used, with TKIP)

```
wmiconfig --connect AP-SSID
```
(please change to the SSID of the AP accordingly

```
Setting SSID to BLACK-WIDOW
Connected
4 way handshake success
```

```
wmiconfig --ipdhcp
```

```
IP:192.168.1.10 Mask:255.255.255.0, Gateway:192.168.1.1
```

5. Refer to *GT202 MQX PDK Demo Applications User Guide* for additional Throughput demo commands

3 Installing OS and Development Tools

This chapter describes the procedures to install the RTOS (real-time operating system) and the development tools required for building the utilities and demo applications for the GT202 Development kit.

3.1 Installing IAR embedded workbench for ARM®

IAR Embedded Workbench is the IDE for developing applications targeted for a FRDM-K22F120M platform. The applications such as the throughput demo are provided as IAR workspace projects.

1. Contact IAR support team to download the installer of the IAR Embedded Workbench for ARM v7.1. Later versions may work, but have not been verified.

2. Install the IAR Embedded Workbench v7.1.

3. Register a license for the IAR Embedded Workbench v7.1 through the IAR License Manager.

    a. Open the IAR License Manager from the Windows Start menu or from the IAR Embedded Workbench IDE.

    b. Select **License → Get evaluation license**. Follow the instructions to register a new license for version 7.10.

4. Activate the license on the computer.

    In IAR License Manager, select **License → Activate License** and enter the license number. Follow the instructions to activate the license.

3.2 Installing MQX4.1 RTOS for FRDM-K22F120M

The MQX4.1 operating system, MQX patches, and the GT202 MQX PDK must be installed before compiling the utilities and applications.

Freescale Download Page

http://www.freescale.com/webapp/connect/displayPartnerProfile.sp?partnerId=5640

Download the following items from the page:

- Freescale MQX RTOS 4.1.0 GA
- Freescale MQX RTOS 4.1.0 FRDM-K22F120M GA
- FRDM-K22F120M and GT202 Support Patch for Freescale MQX RTOS 4.1

Arrow Software Download Site for GT202 PDK

http://download.arrow.com

Download the following item:

- GT202 MQX (3.0.2) PDK - IoE GT202 Wi-Fi Module MQX Platform Development Kit for FRDM-K22F120M

3.2.1 Installing the Freescale MQX 4.1.0 operating system

1. Download the installer of the MQX RTOS 4.1.0 GA from Freescale website.
2. Run the OS installer **FSLMQXOS_4_1_0_GA.exe** and follow the instructions to install.
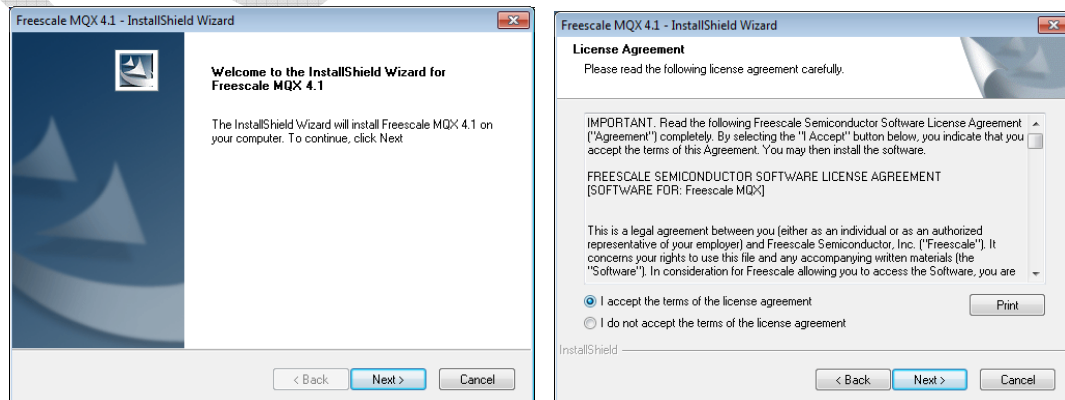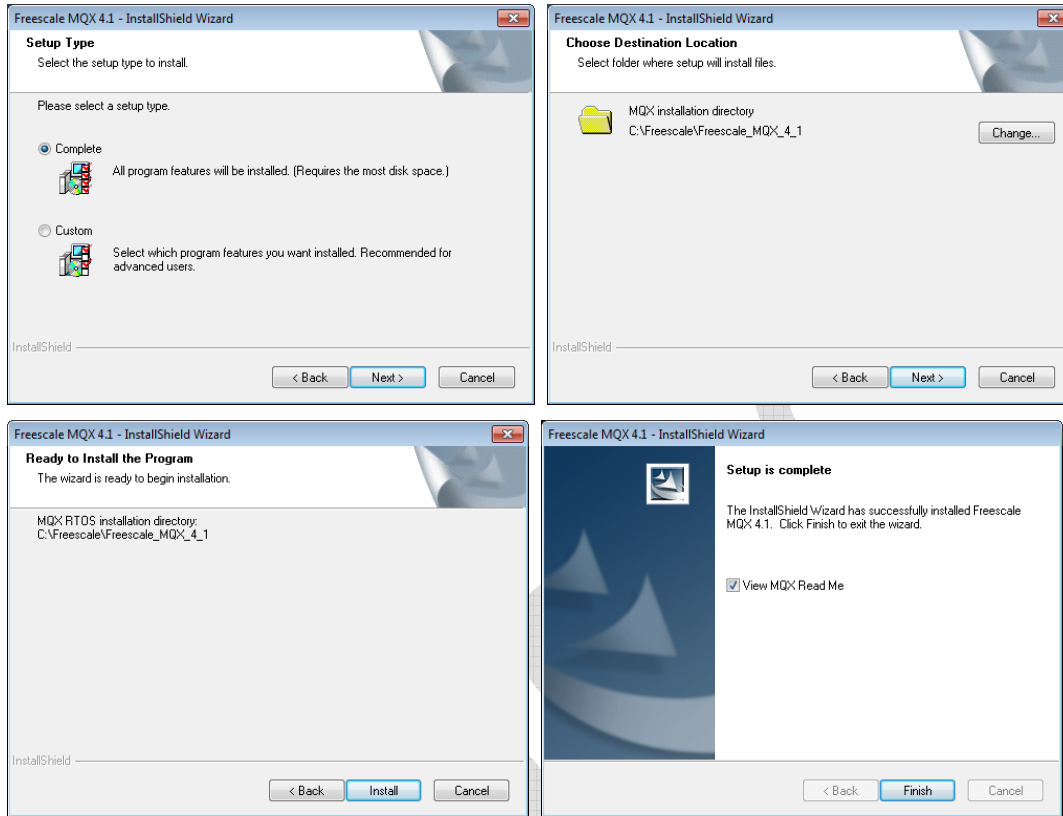
3.2.2 Installing the MQX RTOS 4.1.0 FRDM-K22F120M GA

1. Download the installer of the MQX RTOS 4.1.0 FRDM-K22F120M GA from Freescale website.

2. Run the patch installer **FSLMQXOS_4_1_0_FRDMK22F120M.exe**.
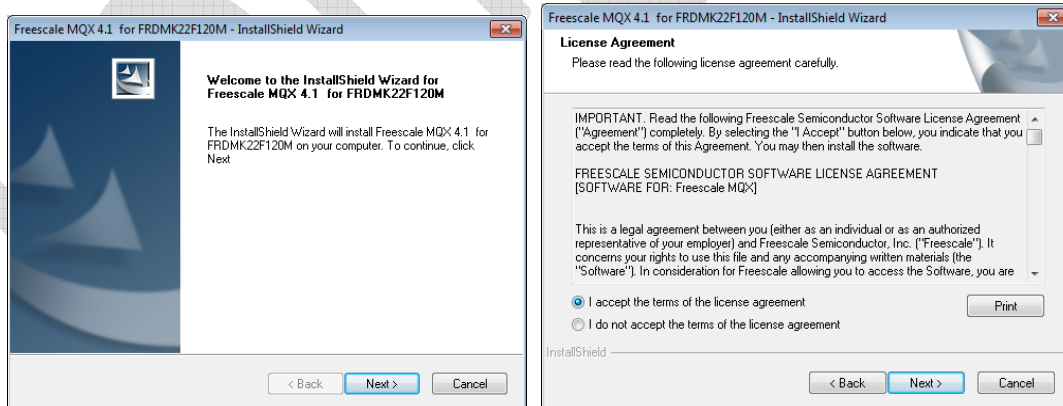
Shenzhen Longsys Electronics Co.,Ltd www.Longsys.com
8/F, 1 Building. Finance Base, NO.8, KeFa Road, Shenzhen, China   Tel: 86-755-86168848
10/F, CHINA AEROSPACE CENTRE,143 HOI BUN ROAD,HKTel: 852-23850111

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3. Set the destination to the *MQX 4.1.0 OS installation directory* and follow the instructions to complete the installation.
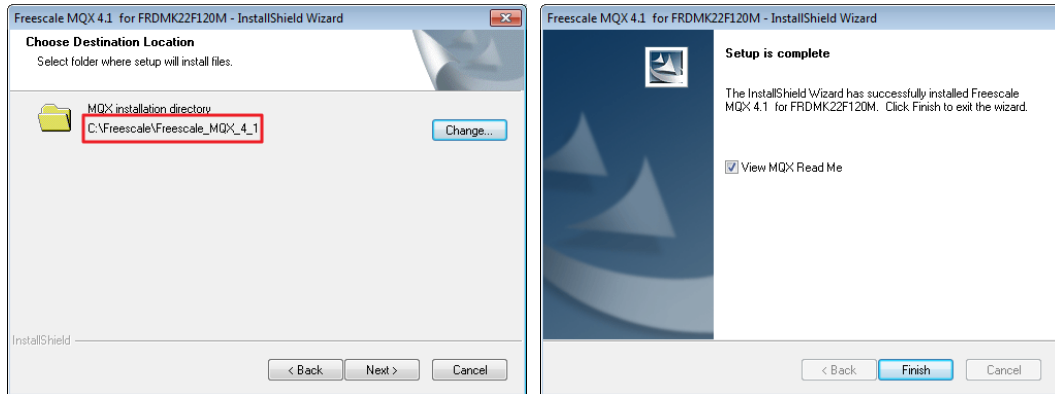
3.2.3 Installing FRDM-K22F120M and GT202 Support Patch for Freescale MQX RTOS 4.1

1. Download the installer of the FRDM-K22F120M and GT202 support patch from Freescale site.

2. Run the patch installer **Install_MQX4.1_Patches_GT202_3.0.2CS.exe**.
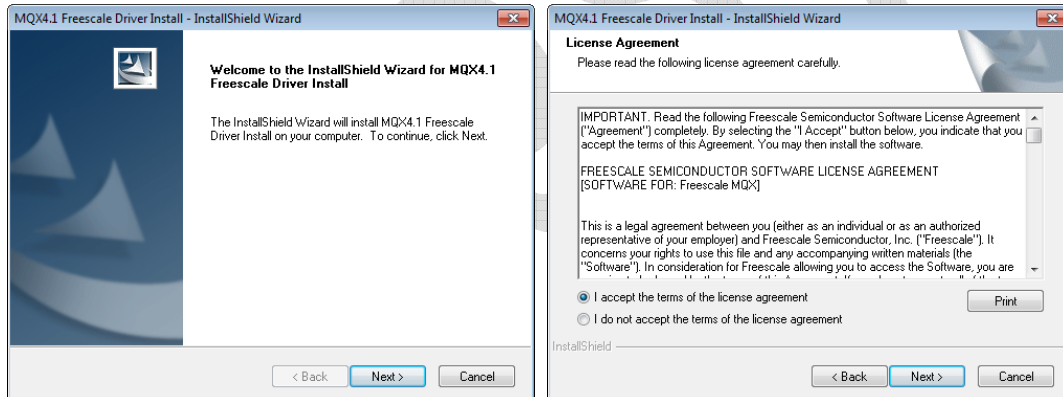
3. Set the destination to the *MQX4.1.0 OS installation directory* and follow the instructions to complete the installation.
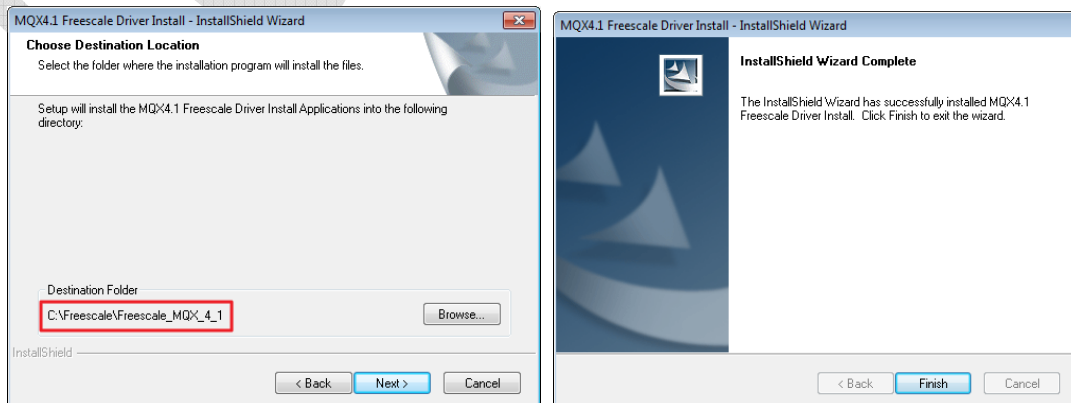
3.2.4 Installing the GT202 MQX PDK 3.0.2 CS

1. Download the GT202 MQX PDK 3.0.2 CS installer from Arrow support site (http://download.arrow.com)

2. Run the driver installer **Setup_MQX4.1_GT202_3.0.2CS.exe**.
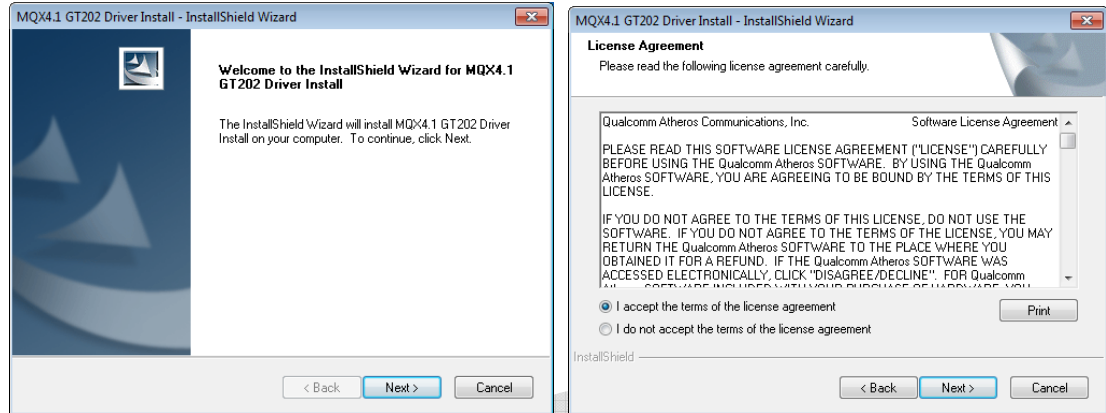
3. Set the destination to the *MQX 4.1.0 OS installation directory* and follow the instructions to complete the installation.
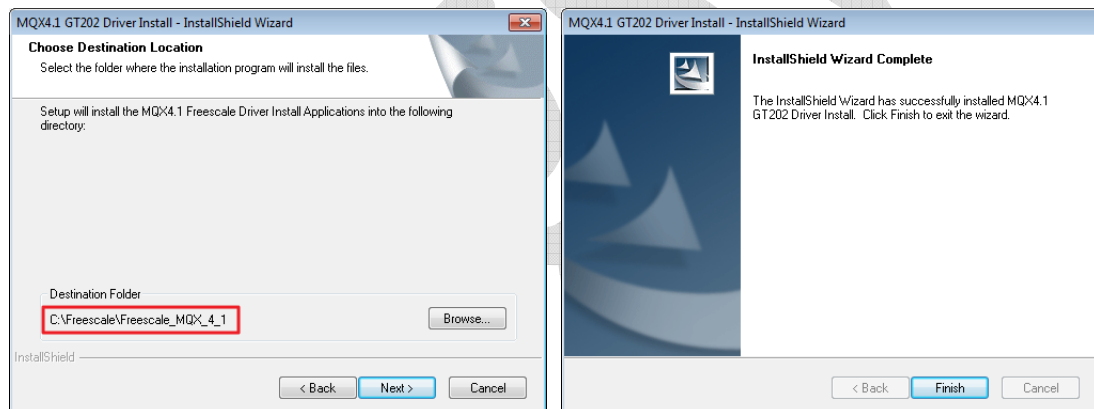
3.3 Installation directory structure

After the OS, patches, and driver are correctly installed following the steps in section 3.2, the installation directory structure looks like:

```
|--demo
|   |--config_tool
|         |--common
|         |--custom
|         |--driver_plugin
|         |--sensor
|
```

```
|   |--flash_agent
|           |--bin
|
|   |--flash_config
|           |--bin
|           |--driver_plugin
|           |--iar
|           |--src
|
|   |--p2p_demo
|           |--bin
|           |--driver_plugin
|           |--iar
|           |--src
|
|   |--throughput_demo
|           |--bin
|           |--driver_plugin
|           |--iar
|           |--src
|
|   |--utf_agent
|           |--bin
|           |--driver_plugin
|           |--iar
|           |--src
|
|--FirmareUpdate
|--mfs
|   |--build
|   |--source
|   |--examples
|
|--mqx
|   |--build
|   |--source
|   |--examples
|
|--rtcs
|   |--build
|   |--source
|   |--examples
|
|--shell
|   |--build
|   |--source
|   |--examples
|
.
.
.
.
```

4 Building Utilities and Demo Applications

4.1 Preparing the build environment

The host driver is configured through a header file **a_config.h**. Since each demo application requires a slightly different driver configuration, the **prepare_app.bat** file shall be run at the beginning to copy the required configuration header file and ensure the appropriate links are in place for creating the proper build structure.

1. Open a DOS command prompt with **administrator** privileges.

2. Change to the installation directory.

3. Run the <MQX_DIR>/**prepare_app.bat** from the installation directory and select an application.

   □   1 = Flash Agent

   □   2 = Throughput Demo

   □   3 = P2P Demo
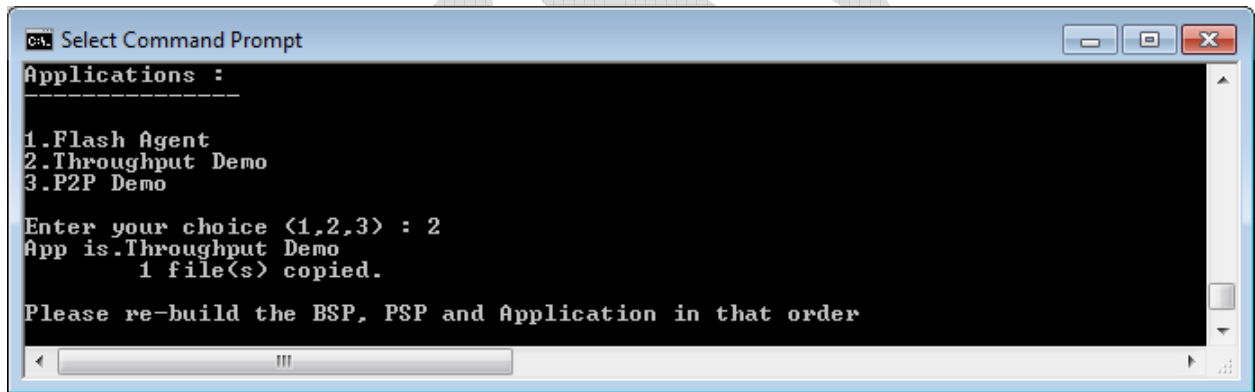
4.2 Building BSP, PSP, RTCS, MFS, shell components

This section describes the procedures to build the following components:

- bsp_frdmk22f120m

- psp_ frdmk22f120m

- rtcs_ frdmk22f120m

- mfs_ frdmk22f120m

- shell_ frdmk22f120m

To build the components:

1. Double click the **frdmk22f120m.eww** file in the MQX installation folder to open the IAR IDE.
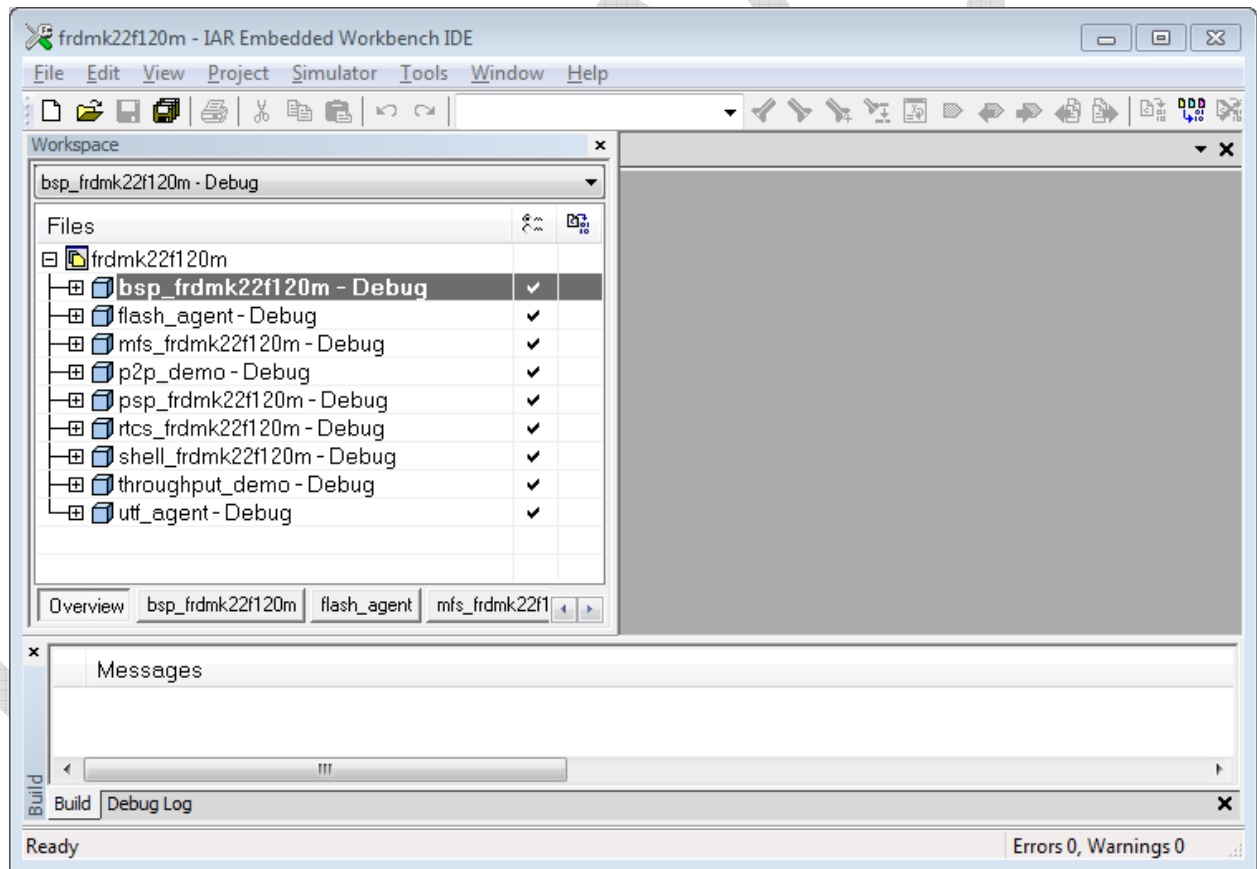
2. Right click a project and select **Set As Active**.

3. Right click the project and select **Options…**.

4. In **General Options → Target → Device**, click to select the MCU model used on the FRDM-K22F120M, **Freescale MK22FN512xxx12**.

5. Save the project.

6. Right click the project and select **Make** to build.

7. Repeat step 2 to 6 to build other components.

4.3 Building throughput demo, flash agent, UTF agent

This section describes the procedures to build the following application and utilities:

- flash_agent
- utf_agent
- throughput_demo

To build the applications:

1. Run **prepare_app.bat** as described in section 4.1.

2. Double click the **frdmk22f120m.eww** file in the MQX installation folder to open the IAR IDE.

3. Right click a project and select **Set As Active**.

4. Right click the project and select **Options…**.

5. In **General Options → Target → Device**, click to select the MCU model used on the FRDM-K22F120M, **Freescale MK22FN512xxx12**.

6. Save the project.

7. Right click the project and select **Make** to build.

8. Repeat step 2 to 6 to build other applications.

4.4 Building P2P demo

This section describes the procedures to build the following demo application:

- p2p_demo

To compile the P2P demo application:

1. Run **prepare_app.bat** as described in section 4.1

2. Double click the **frdmk22f120m.eww** file in the MQX installation folder to open the IAR IDE.

3. Rebuild **BSP, PSP, RTCS, MFS, shell,** and **P2P demo** in order, see section 4.2.

5 Downloading Images to FRDM-K22F120M

FRDM-K22F platform can be loaded with OpenSDAv2.1 J-Link firmware for image download and application debugging tasks. Please refer to **Quick Start Guide for the Freescale Freedom Development Platform FRDM-K22F** (FRDM-K22F-QSG.pdf, available from FRDM-K22F120M product page on www.freescale.com) on how to install JLink CDC UART Port and load J-link application firmware on FRDM-K22F.

5.1 Downloading demo applications

Before proceeding, ensure the demo applications are built following the steps in chapter 4.

1.   Open the workspace in the IAR IDE.

   □   **frdmk22f120m.eww:** flash_agent, utf_agent, throughput_demo, p2p_demo

2.   Right click the demo project and select **Option…**.

3.   In **Debugger → Setup** tab, set **Driver** to **J-Link/J-Trace**.
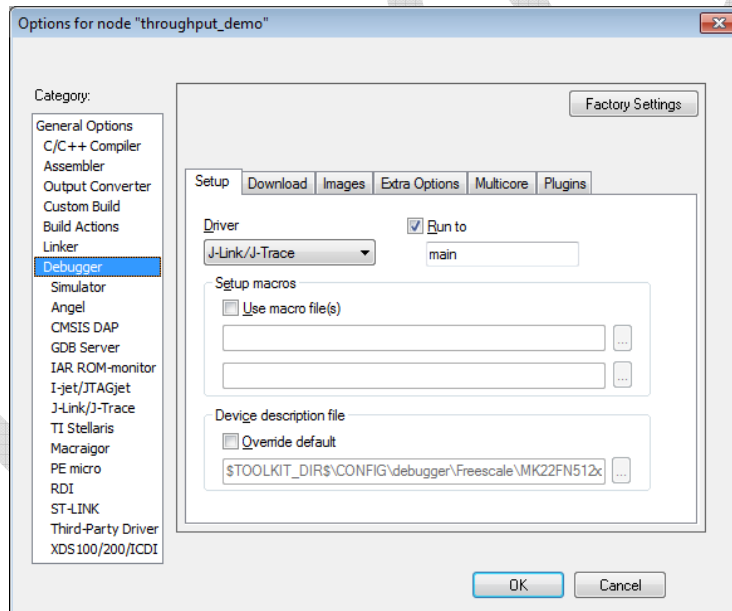
4.   In **Debugger -> J-Link/J-Trace -> Connection tab**
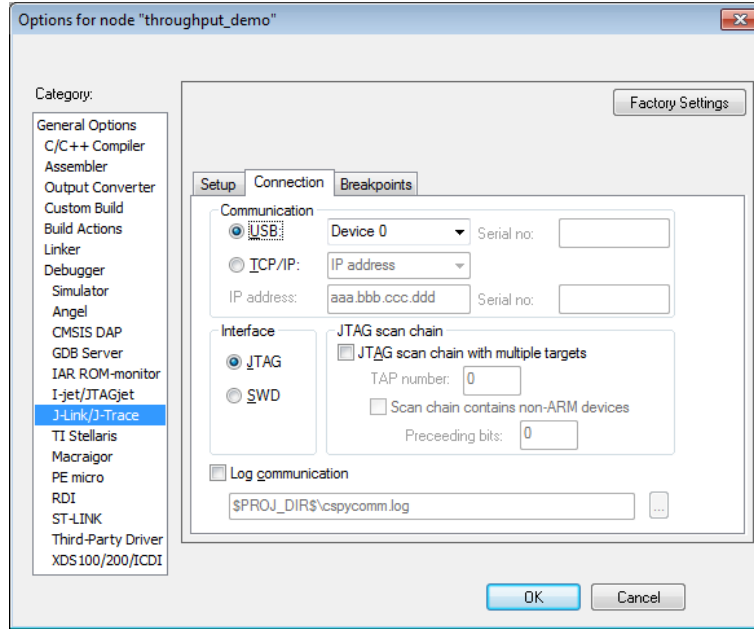
5. Save the project.

6. Right click the project and select **Set As Active**.

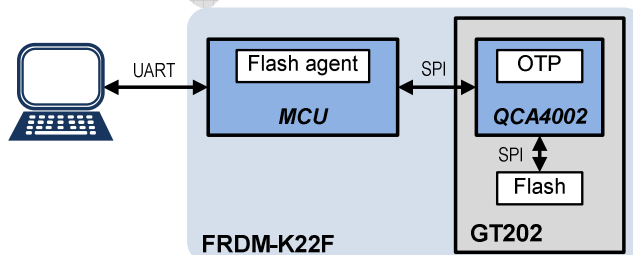7. Select **Project → Download → Download and Debug** to download and debug the demo application on FRDM-K22F.

5.2 Flashing firmware image to GT202
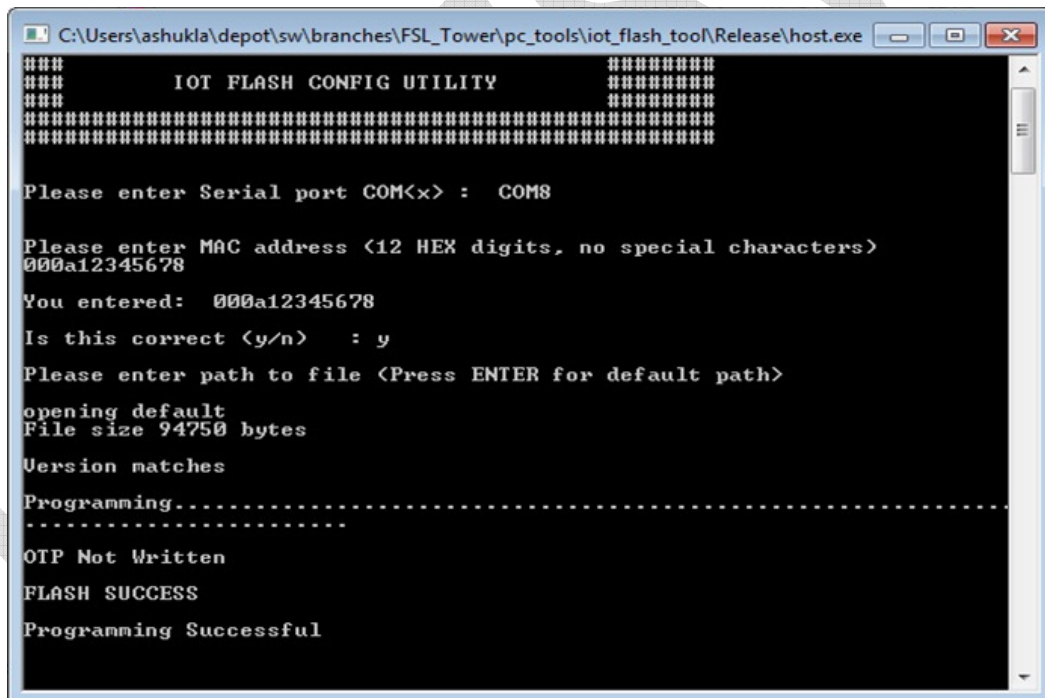
The GT202 module is preconfigured with a firmware image. To program a different firmware image, the following components are required:

MCU flash agent	Provided as an example project in software package. The agent interacts with an application running on a Windows machine over UART.
host.exe	A Windows-based programming tool that interacts with the agent running on the K22F MCU. The agent prepares the image by adding MAC address to the header and fragments the image in 1-Kbyte chunks and sends it to the MCU.
flashotp.bin	The release package include the following images based on the I/O and host: sp141_flashRead1IO_spiHost.bin Rename the corresponding bin file to **flashotp.bin**.

![Longsys logo]

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8/F, 1 Building. Finance Base, NO.8, KeFa Road, Shenzhen, China   Tel: 86-755-86168848
10/F, CHINA AEROSPACE CENTRE,143 HOI BUN ROAD,HKTel: 852-23850111
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Firmware flashing setup

1. Copy demo\flash_agent\bin**host.exe** to a working directory.

2. Copy the corresponding firmware image from **demo\flash_config\bin** to the working directory and rename it to **flashotp.bin**.

3. Flash demo\flash_config\iar\frdmk22f120m\Int Flash Debug\Exe**flash_agent.out** to the K22F MCU using the IAR embedded workbench.

4. Reset the FRDM-K22F board.

5. Invoke the **host.exe** program.

6. Enter the COM port corresponding to the UART terminal in the format of **COM<x>**. The utility moves to the next step if the COM port is opened correctly; otherwise it prints an error and exits.

7. Enter a MAC address in 12 hexadecimal digits without any special characters and confirm the address. If a MAC address is already programmed, the new address is ignored.

8. Press Enter to use the default path for the firmware image. If the image and the host.exe utility are located at different paths, provide the path of the image.

9. The host.exe tool starts the flash process and prints the results. If the OTP has been programmed before, it prints *OTP not Written* and continues to program the flash.

```
C:\Users\ashukla\depot\sw\branches\FSL_Tower\pc_tools\iot_flash_tool\Release\host.exe
###                                              ########
###           IOT FLASH CONFIG UTILITY           ########
###                                              ########
########################################################
########################################################

Please enter Serial port COM<x> :   COM8

Please enter MAC address (12 HEX digits, no special characters)
000a12345678

You entered:   000a12345678

Is this correct (y/n)   : y

Please enter path to file (Press ENTER for default path>

opening default
File size 94750 bytes

Version matches

Programming.................................................
.......................

OTP Not Written

FLASH SUCCESS

Programming Successful
```