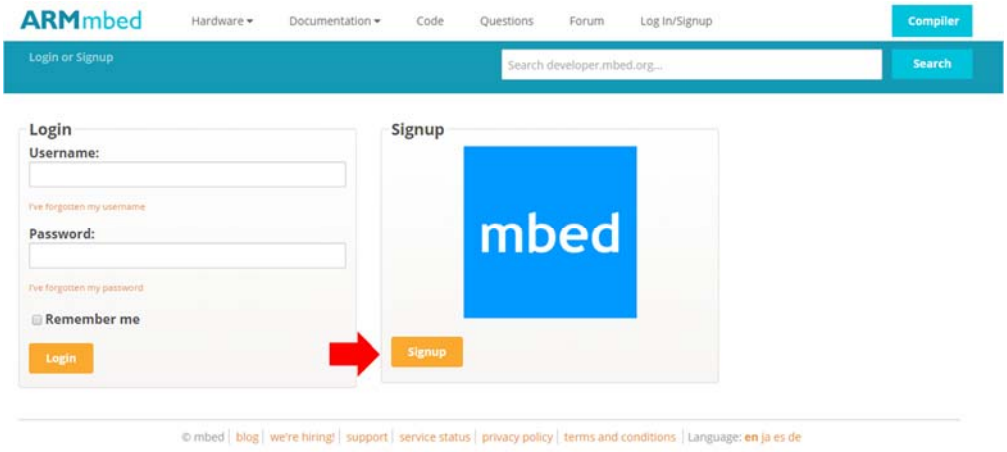
AT&T Shape Hackathon QuickStart Instructions

AT&T Cellular IoT Starter Kit

Note: Prior to going through this series of instructions, you should complete the AT&T IoT Starter Kit LTE Shield, M2X and AT&T Flow instruction guide.

Software Setup Instructions

1. To download and modify the firmware for the kit, you must first create a developer account on the https://developer.mbed.org/. If you do not have an account, please go to the mbed web site and follow the instructions to create one now.

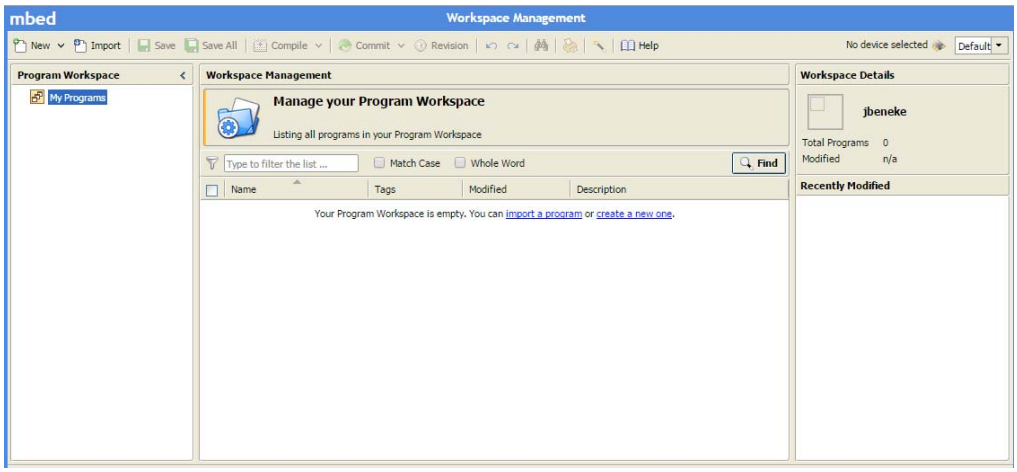


2. Next, you will need to install the necessary serial port driver to allow your Windows laptop to see the NXP FRDM-K64F board as a serial port. If you are using a MAC or Linux based laptop, you can skip this step. Go to https://developer.mbed.org/handbook/Windows-serial-configuration and following the instructions to install the driver. To perform this step, you will need the FRDM-K64F board and a USB cable. Connect one end of the USB cable to the SDA USB connector on the FDRM-K64F board (see diagram in the Hardware setup instructions below) and connect the other end to your laptop's USB port.

3. Although not required for the Hackathon demonstration, it may be useful to have a terminal program to monitor the output information from the FRDM-K64F program. The mbed site provides instructions for setting up a terminal on either a Windows, MAC, or Linux computer. Go to https://developer.mbed.org/handbook/Terminals and follow the respective instructions.

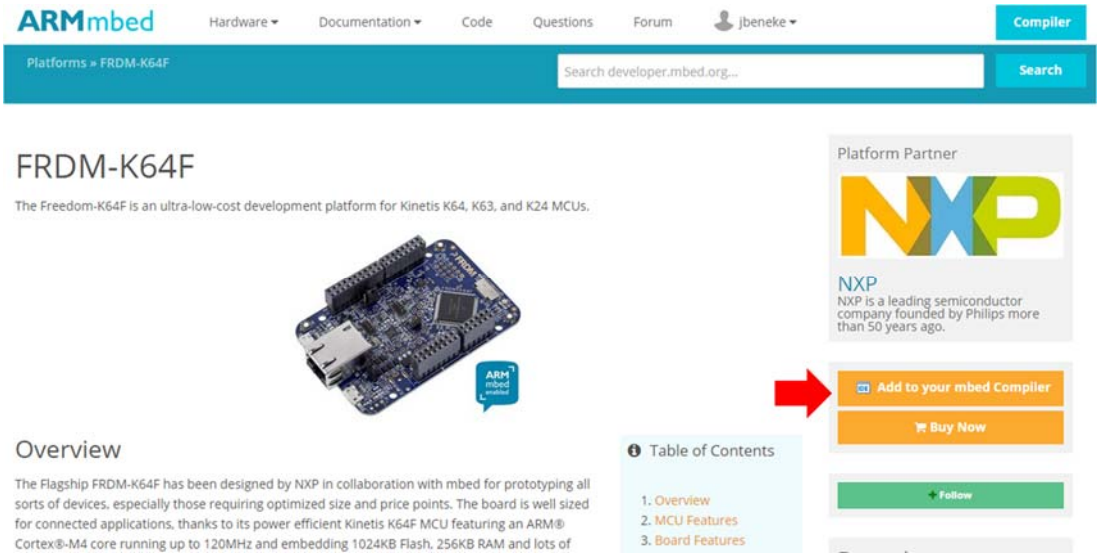
4. Now you will need to update the FRDM-K64F boot firmware to the latest version. Follow the instruction provided at: https://developer.mbed.org/handbook/Firmware-FRDM-K64F

5. Next, you will need to create your cellular application project that will run on the FRDM-K64F board. Log into your https://developer.mbed.org/ account and click on the **Compiler** button in the top right corner of the screen. This will bring you to the development environment where you can import the code for the FRDM-K64F board that was developed for the SHAPE Hackathon. Your screen should appear as below.



6. Click on the **Import** button (upper left ribbon location) to import the FRDM-K64F software project. Once **Import** is pressed, a pop-up window will appear asking you to **Add Platform**. Click the **Add Platform** and then select **NXP Semiconductor** from the left hand Platform Vendor bar. This will narrow the search items. Scroll down to select the **FRDM-K64F** platform.

7. Click the Add to your mbed Complier button on the right side of the screen.

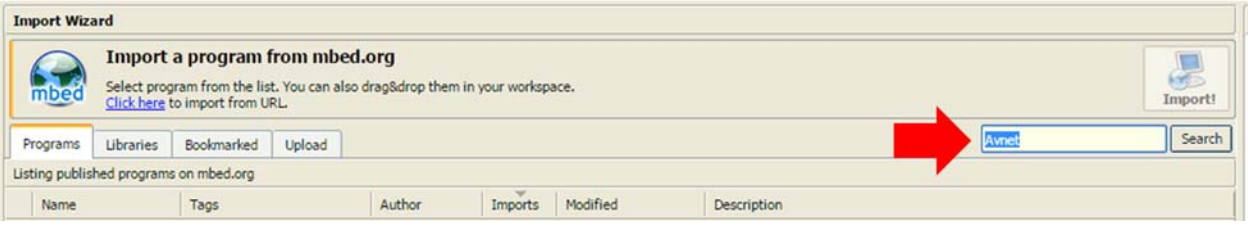


8. Then click on the **Open mbed Compiler** button also on the right side of the screen.

9. If a **Create New Program** pop-up window appears, select **Cancel**.

10. Click on the **Import** button (upper left ribbon location) to import the FRDM-K64F software project.

11. In the **Import Wizard** window, type **Avnet** in the Search box and click **Search** to list Avnet created mbed projects.



12. Scroll through the list to find the **AvnetATT_shape_hackathon** project. If you click on the **Modified** header, you can sort the projects from newest to oldest and find the AvnetATT project easier.

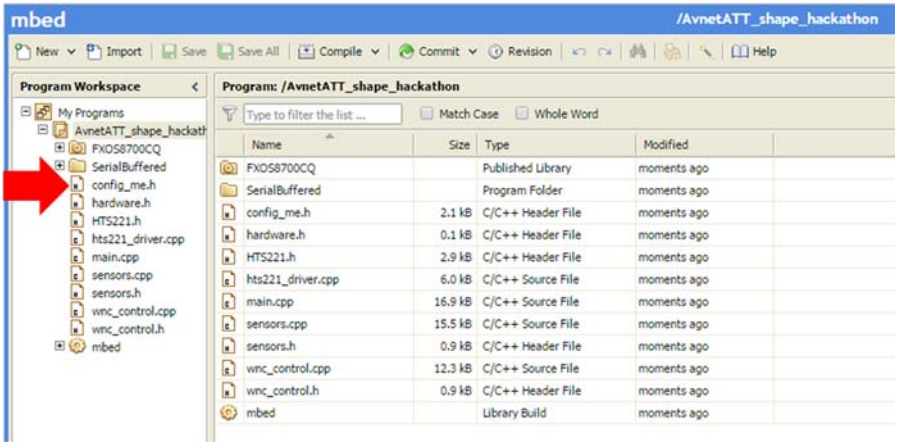
13. Click on the line for the **AvnetATT_shape_hackathon** project to highlight it. Then click on the **Import** button in the upper right corner.

14. A pop-up window will appear showing where the source project is coming from. Click **Import**.

At this point, you could compile the program/firmware by pressing the **Compile** button. The web-based tools will compile the program, and download it to your laptop (typically into the Downloads folder). However, before you compile, you will need to customize a couple of parameters to make this firmware unique to your device and your AT&T IoT Services account. We will tackle this next.

Modifying the Firmware Parameters

Inside the mbed **AvnetATT_shape_hackathon** project, the parameters that are needed to customize your board are in the **config_me.h** file.



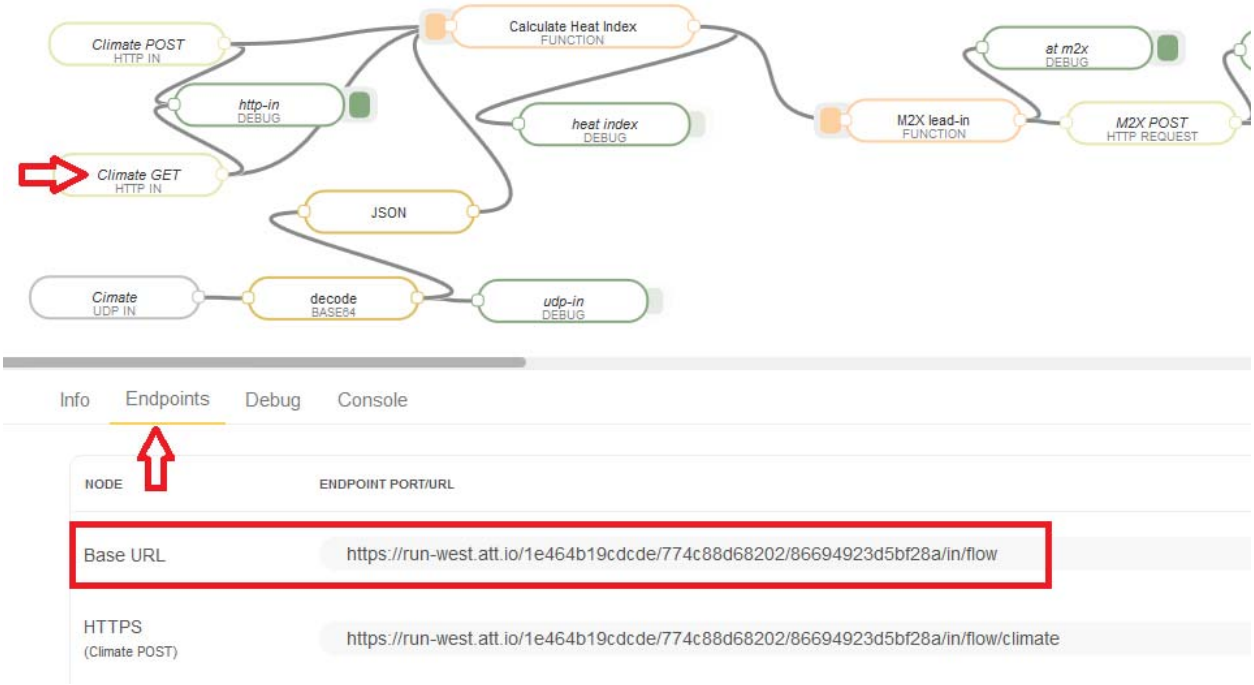
Flow parameters: This project assumes that you are using a fork of the "Starter Kit Base" project, which is a reference design that was created using AT&T's Flow (https://flow.att.com) that allows the creation of on-line virtualization and other IoT functionality.

The default parameters in the **config_me.h** file are set for a specific instance of this project. When you fork the original project, you get your own instance and it will have its own base address. At the bottom of the Flow environment, when you click on the **Endpoints** tab, you will see the URL information that is specific to your instance. Of note is the **Base URL**.

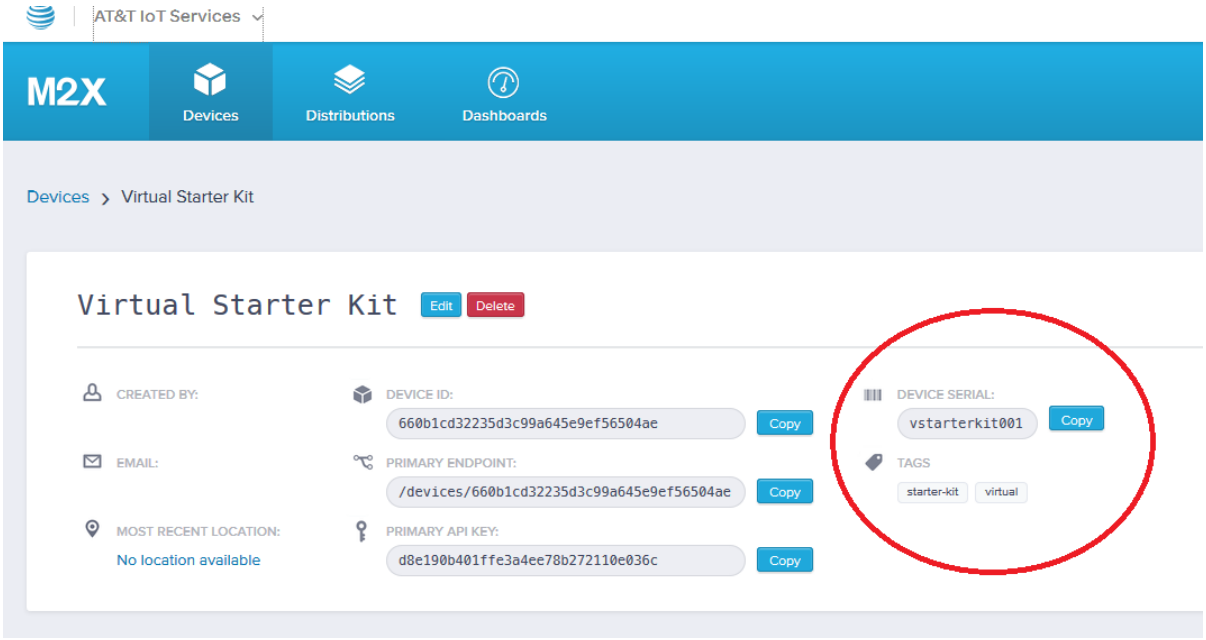
In the example below (as in the default mbed project), the Base URL is:
https://run-west.att.io/1e464b19cdcde/774c88d68202/86694923d5bf28a/in/flow

You have to take note of two parts of this address. The **run-west.att.io** part is the server URL, and you have to make sure the **MY_SERVER_URL** field in **config_me.h** matches this. Then there is the rest of the base URL in green above, that needs to be pasted into the **FLOW_BASE_URL** field.

There is also a **FLOW_INPUT_NAME** field. This should match the name of the HTTP IN port in the Flow project that you want to send sensor data to. In the default Flow image below this input is inside the "Climate GET" port, and is named "**/climate**".



The **FLOW_DEVICE_NAME** field must contain the name of the instance of the Virtual Starter kit in Flow that you will be communicating with. Usually this will be "vstarterkit001", but if you have problems communicating you can verify that this is indeed correct. Note that this device will not be created until you click the "Initialize" input on the Virtual Device tab of the Starter Kit project in Flow. At that point it becomes available in M2X and you can see it there, as the **DEVICE SERIAL** field under Devices as in the image below.



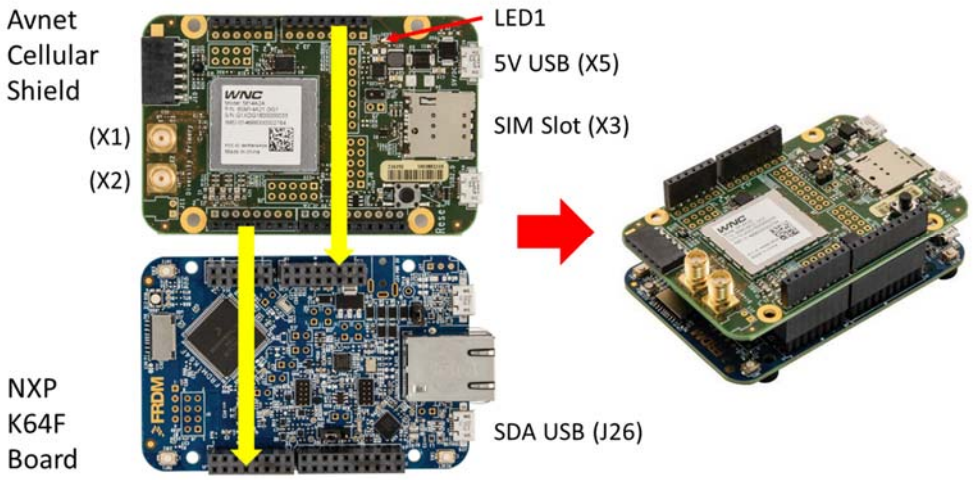
1. After making these modifications to the **config_me.h** file, click the **Save** button along the top bar.
2. To compile the program with the customized settings for your device and AT&T IoT Services account, click the **Compile** button along the top bar. The compiler should successfully compile your source files and download the binary programming file, **AvnetATT_shape_hackathon_K64F.bin** to your laptop. Depending on the browser you are using or the browser's download settings, this file may automatically get placed in your Downloads folder or prompt you for a location to save the file. You may wish to move this file to a local project folder for later use in this tutorial.

3. Disconnect the USB cable from your laptop to remove power from the FRDM-K64F board.

You have now built the software that will be needed by the FRDM-K64F board to run the SHAPE Hackathon demonstration.

Hardware Setup Instructions

1. Plug the Avnet Cellular shield onto the Arduino connectors on FRDM-K64F board.



2. Plug the supplied AT&T SIM card into the SIM socket (X3) on the shield.

3. Screw the two antennas to the shield SMAs connectors (X1, X2).

4. The cellular shield requires 5V power that is supplied by the included AC/DC power adapter. It is not recommended to use a laptop USB port for this power source due to the limited power capabilities that most USB ports have. Plug a microUSB cable into the 5V USB shield power (X5) on the cellular shield and connect the other end of the cable to the provided AC/DC supply. LED1 will light green.

5. Plug a microUSB cable into the SDA USB (J26) port on the FRDM-K64F board. Connect the other end of the cable to a USB port on your laptop. The kit should enumerate as a standard **MBED** USB drive.

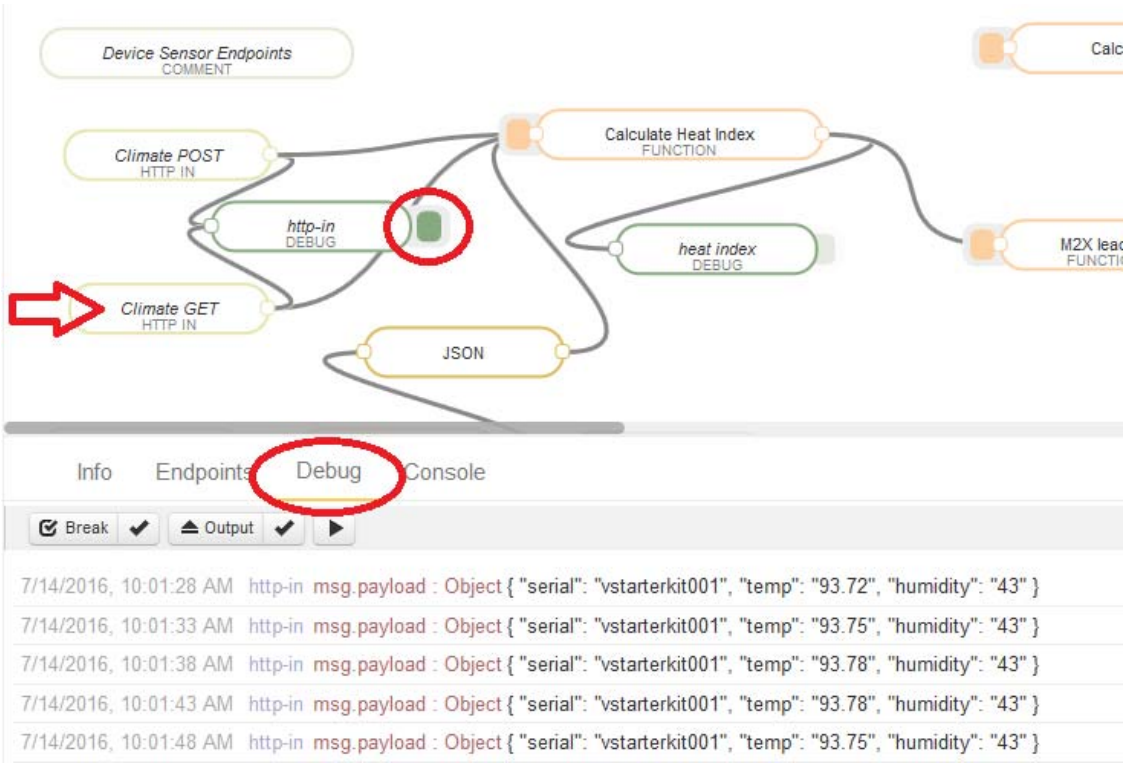
6. From your laptop, locate your compiled **AvnetATT_shape_hackathon_K64F.bin** file and drag and drop this file to the FRDM-K64F board (MBED device) connected to your laptop via the USB cable. This will program the non-volatile Flash memory on the FRDM-K64F board with your application firmware. Programming should take about 10 seconds, during which the FRDM-K64F board green LED should go through several flashing sequences.

7. Once the download is complete, unplug both the USB cable from your laptop and from the AC/DC power adapter to power down the system. Then reconnect the cables, connecting the 5V USB power cable to the power adapter first, followed by the SDA USB cable to the laptop.

8. The User LED on the FRDM-K64F board should be RED while the wireless connection is established. It will then turn BLUE when it successfully connects to the AT&T network. The LED then turns GREEN when it connects to your Flow project and gets a response back. These results

can also be monitored through a terminal connection to the SDA USB serial port on the FRDM-K64F board.

9. In your Flow design, you should see debug messages as the temperature and humidity sensor data starts coming in. Debug messages can be viewed by clicking on the Debug tab at the bottom of the Flow environment. There are a couple of Debug ports (green) in the Flow design and you can enable or disable them by clicking the tab/dot on their right side. When you have only the http-in Debug port enabled, you should see messages from the "Climate GET" HTTP input appearing as in the image below.



This concludes the Quick Start Instructions for your AT&T Cellular IoT Starter Kit.

To download additional information on the kit, including board schematics, visit:
www.cloudconnectkits.org/product/att-cellular-iot-starter-kit