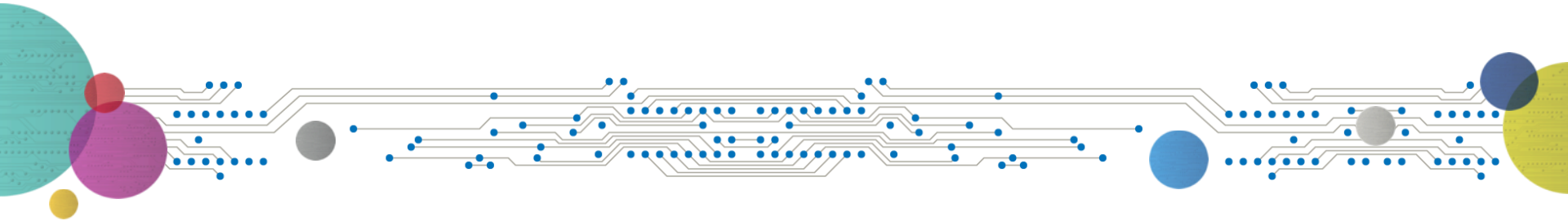




LAB Overview

Mbed Instructions for MultiTech Dragonfly Nano



Intro to Mbed

- ARM Mbed is a free, open-source platform and operating system for embedded devices using the ARM Cortex-M microcontrollers.
- The Mbed website provides free software libraries, hardware designs, and online tools for rapid prototyping of products.
- The platform includes a standards-based C/C++ SDK, a microcontroller HDK, and supported development boards, an online compiler and online developer collaboration tools.

Lab Overview

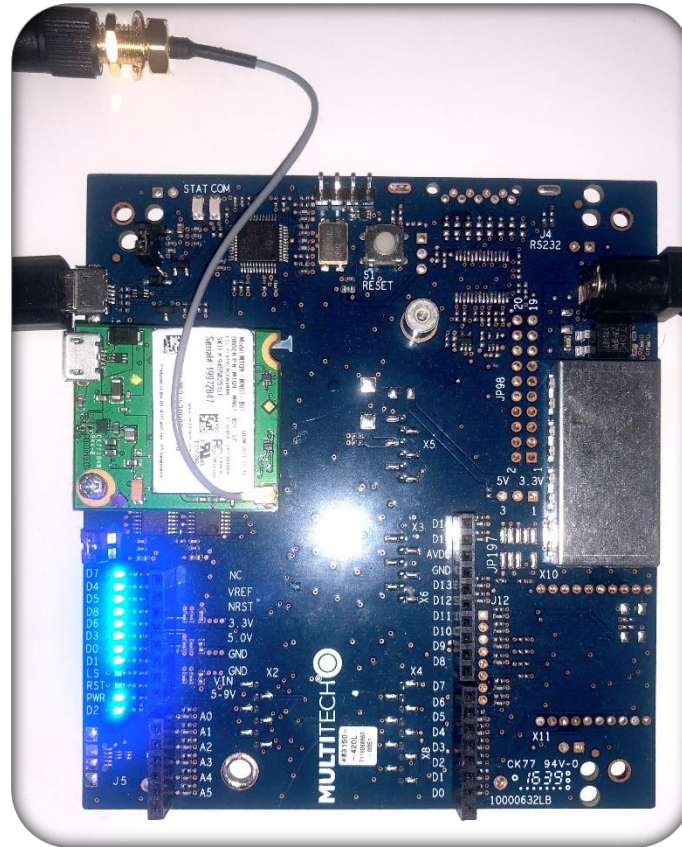
Labs

- Lab 1: Hello World
- Lab 2: Connect to cellular network
 - Verify we can talk on the cell network

Is the USB in
the right Port?



If not:
Drivers will not
download



Power needs
to be applied,
or the disk is
the wrong size.

You only
need One
Antenna.
M = Main

Before we get Started with Mbed

1. Insert **SIM Card** in Dragonfly Nano
2. **Cell Antenna** are attached on top right of the Dragonfly Nano
3. Apply **DC Power (9V)**
4. Connect the USB to the port in developer board
5. Download the terminal program TeraTerm
<https://osdn.net/projects/ttssh2/releases/>

Install Drivers

- Before getting started we need to install the latest serial drivers
 - If you are using Mac or Linux the serial port will appear by default
 - For Windows, you may need to download the serial driver

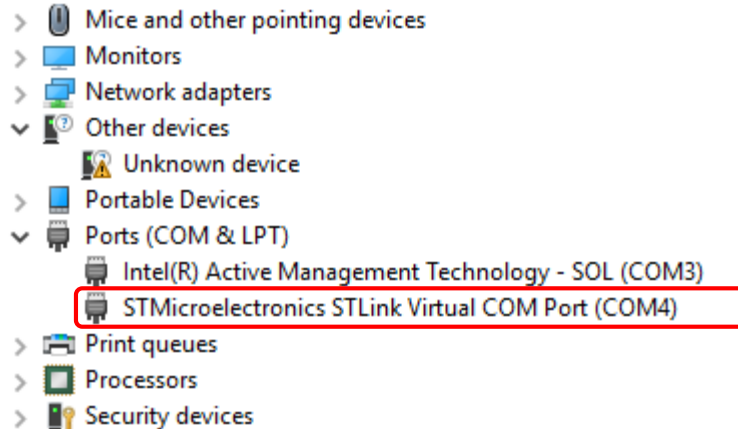
https://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-utilities/stsw-link009.htm

Before we get Started with Mbed (cont.)

- **Note:** The UDK developments boards identify devices as MTS_DRAGONFLY_F411RE, you will have to change the default ID in the UDK to recognize the dragonfly Nano
- Download the STSW-LINK007 from www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-programmers/stsw-link007.html
- Unzip the files to a known location, open a Command Window and browse to that location and find the folder with the correct executable (Windows or All Platforms),
 - then type in the command window **'st-LinkUpgrade.exe -force_prog -board -0312'**

Before we get Started with Mbed (cont.)

- Once all the drivers are installed and completed, open Device Manager (Windows) and you should see a new COM port under device manager. Note: your port name may be different



Getting started with Mbed

- Create an account at <https://os.mbed.com>
- Go to the Dragonfly Nano platform page on Mbed <https://os.mbed.com/platforms/MTS-Dragonfly-Nano/>

Add Dragonfly Nano the Mbed Compiler

- Multiple I/O interfaces for connecting almost any "Thing"

Offline Development Options

It is possible to develop offline for the Dragonfly Nano using mbed-cli and the Eclipse IDE. See our [wiki page](#) for more information.

⚠ Developer Kit Required

To program and use the Dragonfly Nano, you will need a **UDK2 Developer Kit**.

□ Note

- By default, UDK development boards identify target devices as MTS_DRAGONFLY_F411RE. To run Mbed OS automated tests or perform debug, you need to either mock or change the device ID to MTS_DRAGONFLY_L471QG.

□ To change the default device ID in the UDK

```
1 Download the application STSW-LINK007 from here:
2 https://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-developme
3 Once you have installed it, run
4 'st-LinkUpgrade.exe -force_prog -board -0312' to program the interface chip on the UDK2 as MTS_DRAGONFLY_L471QG.
```

□ Mock the device ID with this command on the command line

```
1 mbedls --mock 0310:MTS_DRAGONFLY_L471QG
```

+ Add to your Mbed Compiler



Mbed Enabled

- Baseline

Mbed OS support

- Mbed OS 5.10
- Mbed OS 5.11
- Mbed OS 5.12
- Mbed OS 5.13
- Mbed OS 5.14
- Mbed OS 5.15
- Mbed OS 6.0
- Mbed OS 6.1
- Mbed OS 6.2

Example
programs

Hello World

Yes it's silly, but lets get the LED to blink and test TeraTerm.

- Add the blinky program https://os.mbed.com/users/bdavis/code/YYYY_Dragonfly_HelloWorld/

Repository toolbox

Import into Compiler

Export to desktop IDE

Build repository

+ Follow

Embed url:

<<program /users/BlueShadow

Clone repository to desktop:

hg clone https://rndip@os.mbe

Hello World (Cont.)

1. **Verify** the right board, **MultiTech Dragonfly Nano**, is selected at the top right
2. In the left Column where the files are:
Double Click `YYY_Dragonfly>HelloWorld`
3. **Double Click** on `main.cpp`
4. **Modify** the code as you see fit.
Change the message, rate, sequence, ect.

Mbed

/YYY_Dragonfly>HelloWorld/main.cpp

1.10.25.0

New Import Save Save All Compile Pelion Device Management Commit Revision Help

MultiTech Dragonfly Ni

Program Workspace

- My Programs
 - Dragonfly_Cayenne_Sprint_IK
 - Dragonfly_Cellular_SMS_Exan
 - HelloWorld_IKS01A1
 - Files
 - X_NUCLEO_IKS01A1
 - main.cpp
 - mbed
 - mbed-os-example-blinky
 - resources
 - CONTRIBUTING.md
 - main.cpp
 - README.md
 - mbed-os
 - mbed-os-example-cellular
 - mbed-os-example-cellular2
 - mbed-os-example-cellular3
 - Mbed-to-AWS-IoT
 - Mbed-to-AWS-IoT2
 - YYY_Dragonfly>HelloWorld
 - main.cpp
 - mbed

```
50 print_timer.start(); //Start timers, will count until stopped
51 led_timer.start();
52
53 while (1) {
54     if (print_timer.read() >= 5) { //print_timer.read() returns time in seconds
55         printf("Hello World!\n");
56         print_timer.reset(); //Resets timer count to 0
57     }
58
59     //Calculates interval needed for specified frequency
60     if ( led_timer.read_ms() >= (2000.0/(2*LED_BLINK_RATE)) )
61         temp = data01; //Invert LED output
62         data01 = data00; //Invert LED output
63         data00 = data03; //Invert LED output
64         data03 = data06; //Invert LED output
65         data06 = data08; //Invert LED output
66         data08 = data05; //Invert LED output
67         data05 = data04; //Invert LED output
68         data04 = data07; //Invert LED output
69         data07 = temp; //Invert LED output
70         led_timer.reset(); //Resets timer count to 0
71     }
72 }
73 }
74
75
76
```

1 →

2 →

3 →

4 →

Hello World (Cont.)

5. **Click** on **Compile, Save** the file to your favorite location, **Open** the download folder
6. **Right Click** on the file and **Send** the new file to the **MULTITECH Drive**: The LED should be on for a few seconds during the download process.

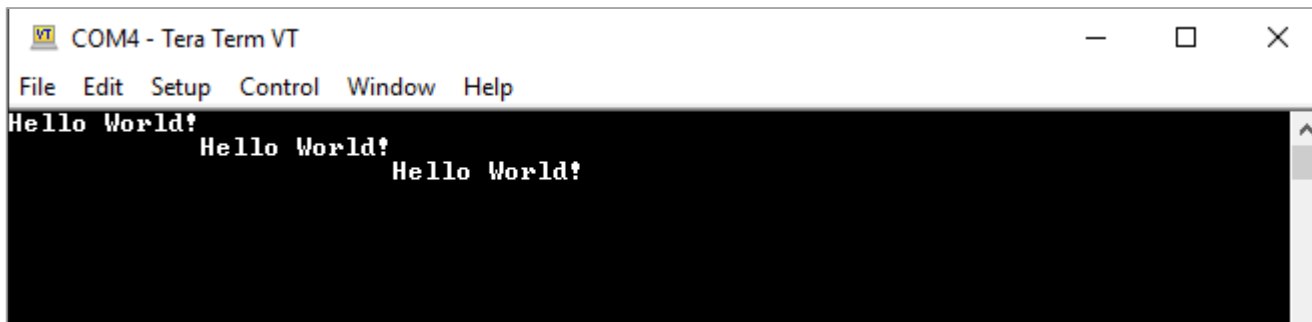
Hello World (Cont.)

7. Push the **Reset Button**

8. Start **TeraTerm**, Click on **Serial** and choose the correct COM port.

Settings: **Setup, Serial**, values are: Baud rate: 115200, Data: 8, Parity: N, Stop: 1, Flow: none.

You should see Hello World! Every 5 seconds.
You can adjust variables in Main.cpp.

A screenshot of a TeraTerm VT window titled 'COM4 - Tera Term VT'. The window has a menu bar with 'File', 'Edit', 'Setup', 'Control', 'Window', and 'Help'. The main area is black with white text. The text 'Hello World!' is displayed on three lines, with each subsequent line indented further to the right. A vertical scrollbar is visible on the right side of the window.

```
COM4 - Tera Term VT
File Edit Setup Control Window Help
Hello World!
    Hello World!
        Hello World!
```

Mbed-OS-Cellular

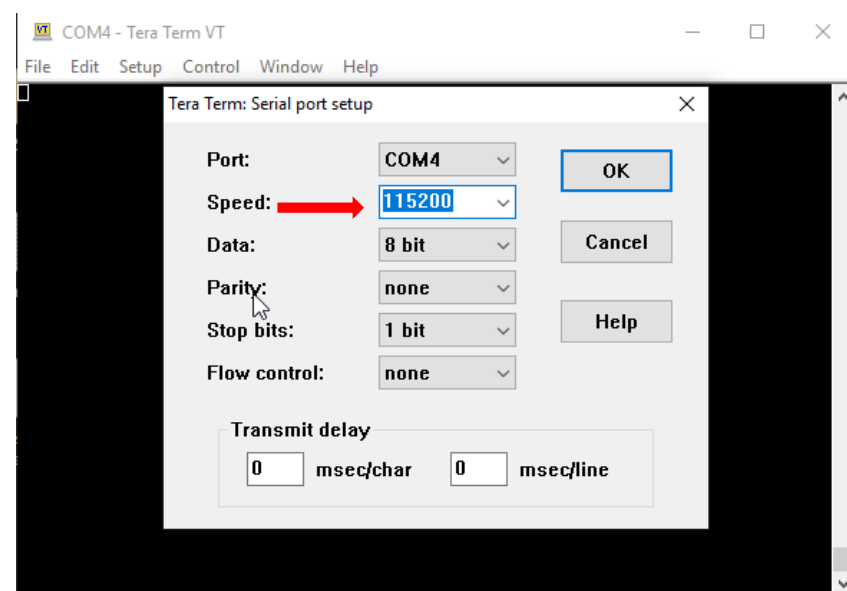
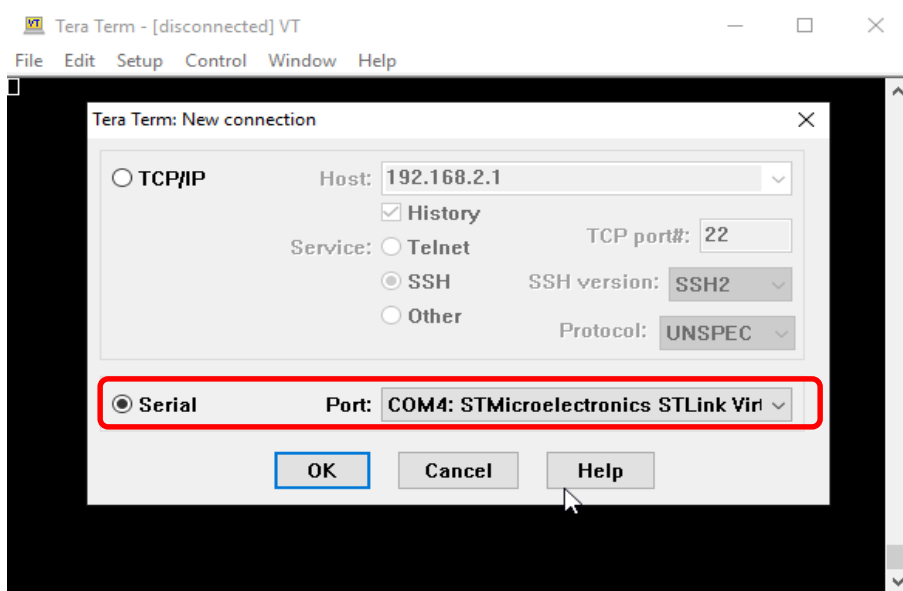
- This next program we will connect the Dragonfly Nano to the cellular network.
- This is an example based on 'Mbed-OS' cellular APIs that demonstrates a TCP or UDP echo transaction with a public echo server.

Mbed-OS-Cellular

- Import the Mbed-os-example cellular from here:
<https://os.mbed.com/users/rndip/code/mbed-os-example-cellular/>
- You will need to **modify** the mbed_app.json file to connect to the modem.
 - In line 34, modify to include your apn for example ATT M1 Sim
 - "nsapi.default-cellular-apn": "\ "APN\ "
- You can also turn modify the json file to turn on the trace level
 - In line 22, change the mbed trace level to true
 - "mbed-trace.enable": **true**,
 - In line 31 will enable the cellular debug information
 - "cellular.debug-at": **true**,

Mbed-OS-Cellular

- Open TeraTerm, connect to correct Port
- Under Setup, make sure the baud speed is set (115200)



Mbed-OS-Cellular

- After running the program, if your device connected to the server you should see something similar to:

```
mbed-os-example-cellular
```

```
Establishing connection .....
```

```
Connection Established.
```

```
TCP: connected with echo.mbedcloudtesting.com server
```

```
TCP: Sent 4 Bytes to echo.mbedcloudtesting.com
```

```
Received from echo server 4 Bytes
```

```
Success. Exiting
```

Additional Info and Resources

- [MTUDK-ST-Cell Developer Guide](#)
 - Information on installing dragonfly into the developer board, SIM installation, Arduino Shield Instructions, LED indicators and more.
- [MTQN-MNG1-B01 Device Guide](#)
 - Mechanical drawings, PIN definitions, hardware and specifications
- [U-blox SARA R4 / SARA N4 AT Command Guide](#)
- [Latest Mbed-OS Documentation](#)

Thank You!



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