MULTITECH®

CREATE • CONNECT • COMMUNICATE

Sensor Harvesting made easy using mDot, ST Sensor Shield & myDevices Cayenne WORKSHOP

TTN Conference - *Feb, 2018*

Win a Conduit AP Configured for TTN

Develop the best ST Sensor Shield to Cayenne recipe using MultiTech mDot

- ST Micro recently released a new ST Sensor Shield (IKS01A2) with enhanced sensors/MEMs
- Enhance this workshops mDot firmware using Arm Mbed OS to communicate all ST IKS01A2 Sensor Shield data to myDevices Cayenne
- Recipe in your name published on www.multitech.com/landing-pages/starter-kit

Conduit AP Specification:

- LoRaWAN 868 MHz
- 1 DL x 8 UL channels
- Semtech v1.5 SPI Design for Improved Performance
- ISM band scanning for Improved Range
- Integrated LoRa + 4G-LTE Antennas
- LTE Cat 3 with fallback to 3G-HSPA+ / 2G GSM-EDGE
- Pre-Configured for TTN

Sign up for an Arm Mbed Account & Install Drivers

Getting started with Mbed

- **Create an account** at https://os.mbed.com
- **Find** the board you are using on mbed.com: https://os.mbed.com/platforms/
  - MultiTech developer boards can be found by choosing "MultiTech" from the "Platform Vendor" options on the left of the page.
  - The xDot based L-Tek FF1705 can be found under L-Tek. You may also use xDot as the target.
- **Click** the target board to go to its "Platform" page.
- On the right side of the platform page

Getting started (cont'd)

Click on the yellow box, (under the ST logo)
"Add to your Mbed Compiler" right column

- Under PC Configuration:
  (If you **have** a **Windows** machine)
  Right Click (new tab) on **"Mbed serial driver" or "Windows Serial Configuration"**
  and **install** the latest driver. (hardware required)
  https://developer.mbed.org/handbook/Windows-serial-configuration or
  http://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-utilities/stsw-link009.html
  - Windows 10 will have this driver built in.
  - Linux and OSX users should immediately see a ttyUSB device, the exact naming will depend on your distribution.

Getting started (cont'd)

Under PC Configuration on any of these pages:

https://os.mbed.com/platforms/MTS-mDot-F411/	mDot
https://os.mbed.com/platforms/MTS-xDot-L151CC/	xDot
https://os.mbed.com/platforms/L-TEK-FF1705/	xDot Shield by L-Tek

You will need a terminal application.

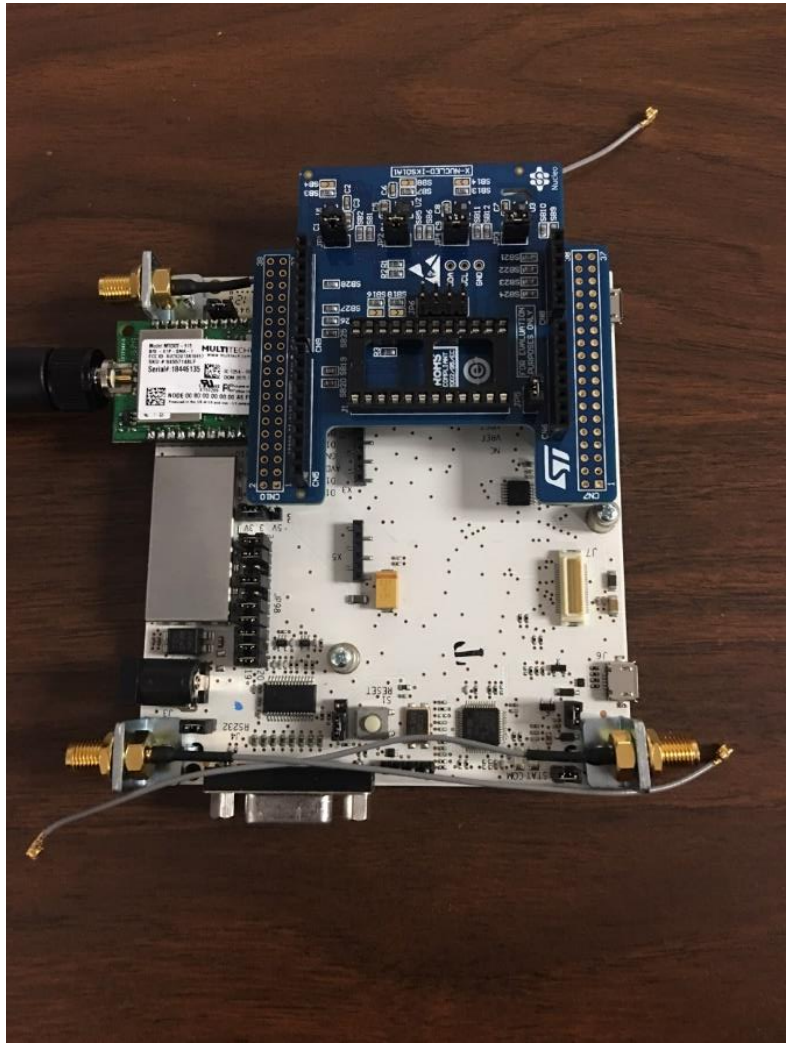
- If you **don't have** a **terminal** program, **Right Click** (new tab) on **Terminal** and follow the instructions.
- When you are done close that tab.

Connect and Communicate with ST Micro Sensor Shield

Install the X-NUCLEO-IKS01A2

Align the IKS01A2 sensor board as shown:
Gently install the board, don't bend pins!

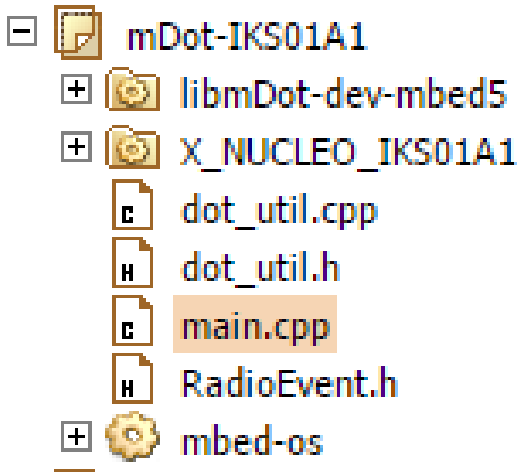
(Your developer board may appear different)



LoRaWAN and IKS01A2

One more program at the following URL:

1. https://os.mbed.com/users/pferland/code/mDot-IKS01A2
2. **Click "Import into Compiler"** on the right.
   Again ensure it's imported as a program.
   Libraries will be automatically imported.
3. **Click** Import
4. **Click/Expand mDot-IKS01A2**
5. **Double click** main.cpp



Modifications to main.cpp

At the top of main.cpp there are variables for your network settings.

Line 9: Confirm it is **#define TTN**

Line 40**: network_id** is your TTN Application's "Application EUI".

This is the same for all of the devices you add to the application

Line 42: **network_key** is the device specific "App Key"

This is **unique** for each device you add

You need to use the TTN Console to get these values

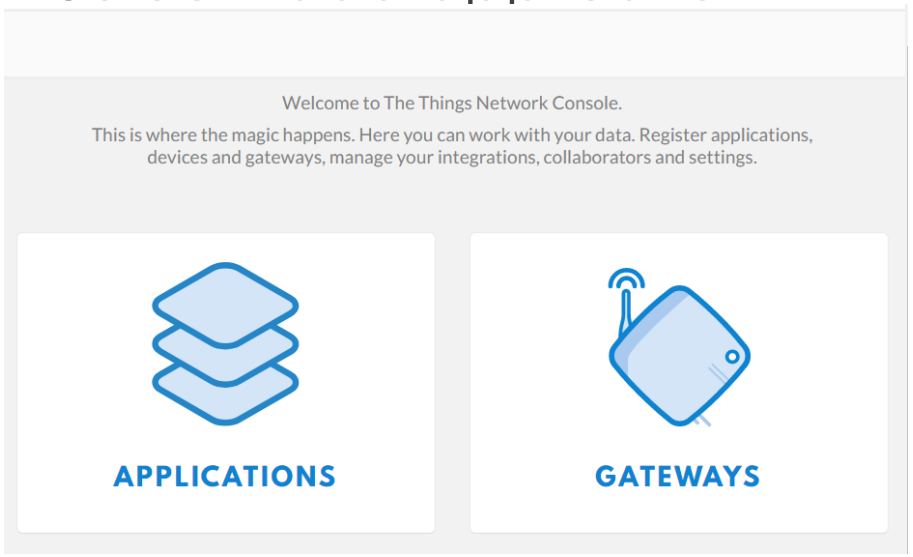
The Things Network Console

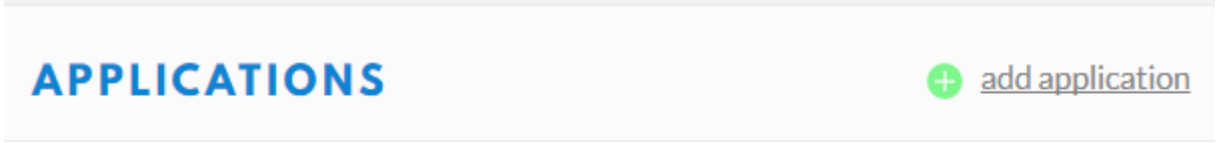
Log in or **create an account** at https://thethingsnetwork.org if you have not already

Go to https://console.thethingsnetwork.org/

Select Applications

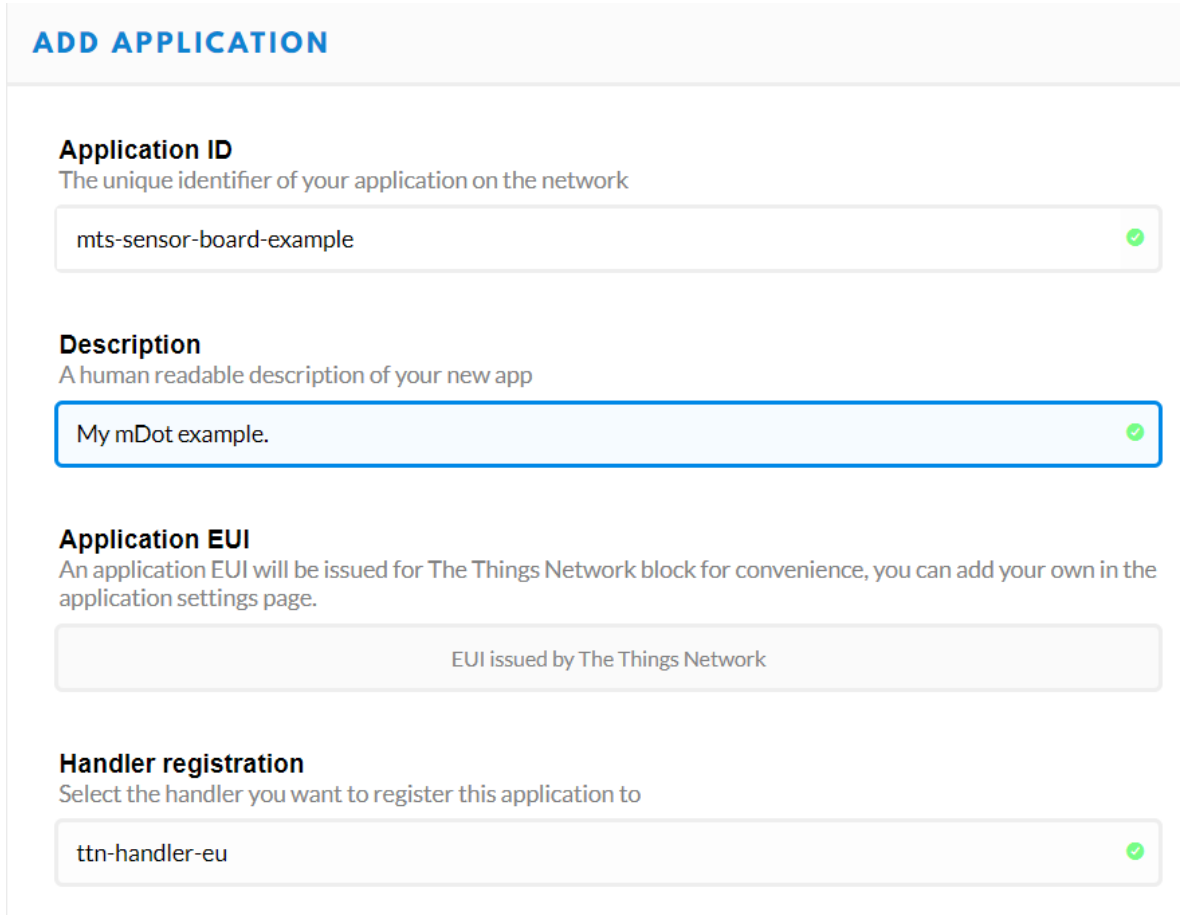
Select "add application"





Add Application

- Enter an **Application ID**. Note that it must be unique throughout the entire network and has restrictions on the characters used.
- The description can be anything you like.
- **Ensure** that the correct handler for your region is selected for "Handler Registration"
- **Click** "Add Application" at the bottom right

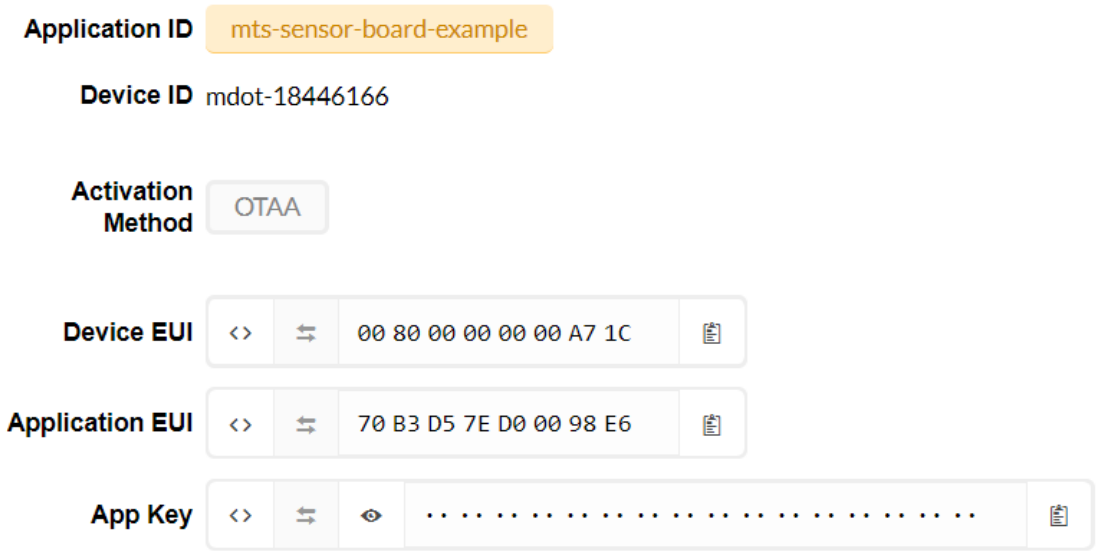


Application Overview

- You should now be on the "Application Overview" page
- **Find** the "**APPLICATION EUIS**" section. Click the clipboard to copy it to be used in your Mbed program. You will need to manually format it into an C array like the examples.
- **Find** the "**DEVICES**" section. Click **"register device"**
- Enter anything for the Device ID. It must be unique within your application.
- The **Device EUI** is set on an mDot or xDot at the factory and is printed on the device's label. On the label it is the **Node ID**
  - It will start with 00:80:00
  - You can use a 2D barcode reader to capture this easily.
  - On a phone the "Scandit" application may be useful.
- **Click** register.

Device Overview

- You should see the Device Overview page similar to the right
- Click the clipboard next to the **App Key** field to copy it.



Compile/Save/Program

Click Save All button

Click Commit button

Add a Commit **Message**, and **Click OK**

Click Compile

Save the file to a location you can remember.

Right Click on the file name and Send To the "MULTITECH" or "XDOT" Drive.
A blue LED in the corner will flash

Push the **RESET** button, (Diagonal direction from LEDs).

Open TeraTerm (or other serial program) ALT+I, ALT+N, Select "Mbed Serial Port"

Under "Setup->Serial Port" **change**

"Baud rate:" to **115200**

Press the **"RESET" button** on the dev board.

Accessing Your Sensor Data Using myDevices Cayenne

Running Device

- Your device should be connected to The Things Network.
- You can view the connection status on the **Devices** tab of your application
- You can view raw data on the **Data** tab of your application.

- For more information on TTN Console: https://www.thethingsnetwork.org/docs/network/console/
- The example program uses an uplink format understood by **MyDevices Cayenne.**
- For instructions on connecting to Cayenne: https://mydevices.com/cayenne/docs/lora/#lora-the-things-network-create-application

MultiTech LoRa Kit & Support Links

MultiConnect® Conduit™

IoT Starter Kit for LoRa® Technology

MultiConnect® Conduit™ + mDot™ & xDot™

- Everything you need to prove your LoRa Application
- Conduit Gateway with your choice of 868 or 915MHz
- Choice of IP backhaul, Ethernet or Cellular 4G-LTE
- mDot's and developer board
- xDot MicroUDK USB Dongle
- Site Survey mDot Box tool

MultiTech Website

http://www.multitech.com/brands/multiconnect-conduit-lora-starter-kits

Information on MultiTech Conduit IoT Starter Kit for LoRa Technology

Where to go for more LoRa Product Information?

MultiTech website

- www.multitech.com
  - Choose the product you're interested in to obtain datasheets and other product info

MultiTech Developer Website

- www.multitech.net
  - Detailed technical and specification information on MultiTech products, including the LoRa-based portfolio

MultiTech Support

- Support.multitech.com
  - Open and manage support requests for a faster response to your questions

Thank You!

www.multitech.com
www.multitech.net

support.multitech.com