This article gives you the steps required to use IBM Bluemix Watson IoT platform along with the Intel Edison device

1. How devices can be registered with Watson IoT platform
2. How to connect and login the Intel Edison device
3. How Device can publish events and receive commands
    - Usage of the IoT library (ibmiotf) across different programming language
4. Mobie developer approach to Watson IoT platform

Step 1: How to Register Devices with Bluemix Watson IoT Platform:

Following link gives you the details on the device registration (till step 4)

- **https://developer.ibm.com/recipes/tutorials/how-to-register-devices-in-ibm-iot-foundation/**

At the end of this step , make a note of the following:

- Organization
- Device type
- Device ID
- Auth Token

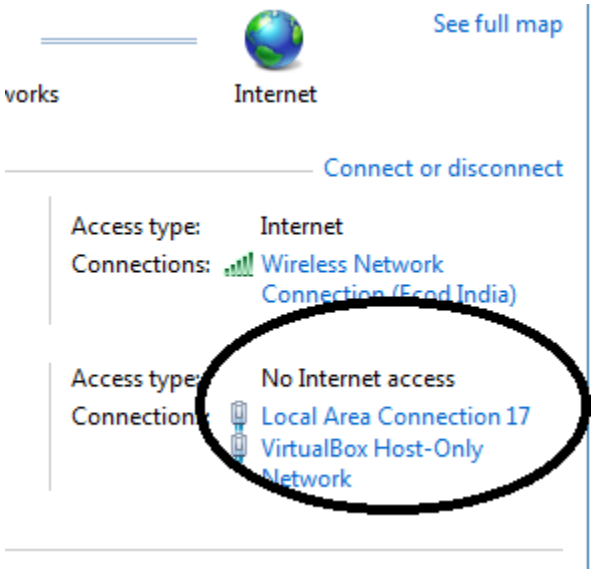
Step 2. Connecting and Login to Intel Edison device

Ensure the following steps are taken care:

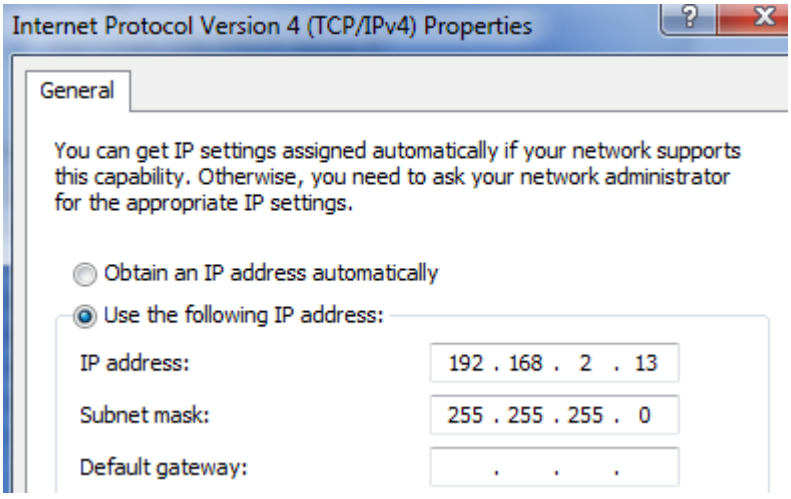
- Installing the USB driver
    i. https://software.intel.com/en-us/get-started-edison-windows-32-step2

- Connect the Intel device and connect to it using their static IP 192.168.2.15

    i. Ensure the drive against the Device is connected is assigned with a static IP too (say 192.168.2.13)



- Assign a static IP to the new interface (in this case Local area connection 17) , say 192.168.2.13



- Connect to the device using the username and password

    i. User id / passwd will be root / bluemix123

- Ibmiotf library is been installed, if not execute the following command

i. “npm install ibmiotf”

Device is now ready to publish the data back to the cloud.Use the sample program available at https://github.com/ECoDIndia/IoT_hack to publish the temperature data:

- Iot_hack.js
- Device.json
    - Update the Device.json file with the data from Step 1

Note: No device ?? ..Dont worry, use the simulator to publish the temperature data to cloud

- Details in the libk: https://github.com/ECoDIndia/gctcblrfeb06/blob/master/lab2_bluemix_boiler_quickstart.pdf

Step 3: How Device can publish events and receive commands:

- Device could be of anything like the mobile phone, raspberry, Intel Edison and so on
- Devices can consolidate the sensor data and then publish it to the server for further data exploration
- MQTT is the protocol used by IBM Watson IoT platform
- mqtt client libraries (ibmiotf) are provided for publishing the data (Event) from the device .Similarly the same libraries can be used to send comands back to the device
- IBM provides ibmiotf libraries to connect the device and publish events .
    - Authorized access – registration is required

Usage of the IoT library (ibmiotf) across different programming language for developing device connectivity

The objective of this library is to implement the following functions

1. **Initialize :** Set IoT Foundation connection parameters
2. **Connect:** Create Device client
3. Connect to Device
4. **Publishing Events:** Construct the data and publish it as event
5. **Handling commands:**Await to receive the command

Libraries are available in the following languages

- Python
- C#
- Java
- Node js
- C++
- mBed C++
- Embedded C

Python:

Install **python package manager** and **IBM IoT library** on your raspberry Pi

```
sudo apt-get install python-pip
sudo pip install ibmiotf
```

Embedded C:

Sample code: https://github.com/ibm-watson-iot/iot-embeddedc

Sample code : https://developer.mbed.org/teams/IBM_IoT/code/IBMIoTClientLibrarySample/file/e7b2f56c4f3f/src/Main.cpp

Nodejs:

```
// var Client = require('ibmiotf');
```

```
npm install ibmiotf
```

```
https://github.com/ibm-watson-iot/iot-nodejs
```

C++ (CPP)

Sample code - https://github.com/ibm-watson-iot/iot-cpp/blob/master/samples/sampleDevice.cpp

Reference link - https://github.com/ibm-watson-iot/iot-cpp
https://github.com/ibm-watson-iot/iot-cpp/blob/master/docs/cpp_cli_for_devices.rst

Java:

https://github.com/ibm-watson-iot/iot-java

C#:

https://github.com/ibm-watson-iot/iot-csharp

Step 4: **Mobile Developer approach to Watson IoT platform:**

Mobile developer can consider using their mobile as

1. Mobile as device/gateway where the data is published
2. Mobile as client to display data status and/or sending commands

Mobile as a Device:

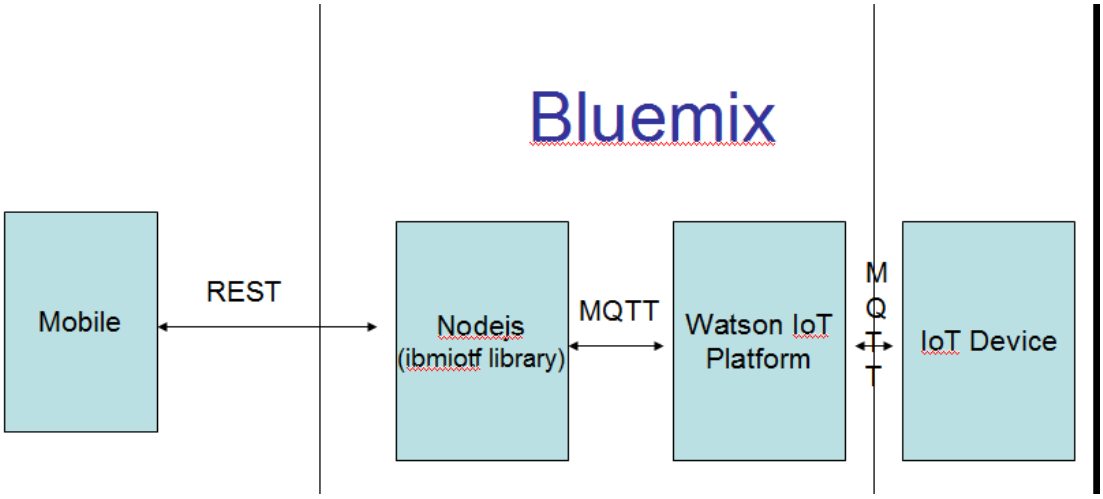
How to send the sensor data from smartphone ?

- Like any other device, register the device with Watson IoT platform and get the organization, Device ID, Device Type and auth details
- Use the Paho MQTT client library (https://eclipse.org/paho/clients/java/) to publish the data from smartphone sensors
    - Import mqtt libraries
        - ***org.eclipse.paho.android.service.jar and org.eclipse.paho.client.mqttv3.jar file***
    - Sample code:
        - https://github.com/ibm-watson-iot/iot-starter-for-android
        - https://developer.ibm.com/recipes/tutorials/android-wear-iot-bluemix/

Mobile as Client:

Mobile can be used to send command back to device or to invoke any device specific actions.

- **HTTP POST:** Use the following architecture to send command back to IoT device
    - Have a server application running on Bluemix. Use the ibmiotf library to send commands
    - Send command from Mobile through REST based calls to the server running on Bluemix which inturn connects to the IoT device



- **Swagger HTTP api's:**
    - Use Swagger based HTTP REST api's to interact with the device
        - `https://docs.internetofthings.ibmcloud.com/swagger/v0002.html`

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