

CREATE and CONFIGURE IBM CLOUD SERVICES – CREATE IBM WATSON IOT PLATFORM and DEVICE

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Team ID	PNT2022TMID45560
Project Name	SMART SOLUTIONS FOR RAILWAY SYSTEMS



Connect Device to IBM Watson IoT Platform

IBM Watson IoT Platform is a complete end-to-end solution for IoT needs. It integrates a bundled set of services to connect, capture, register, analyze, and archive your IoT devices and data.

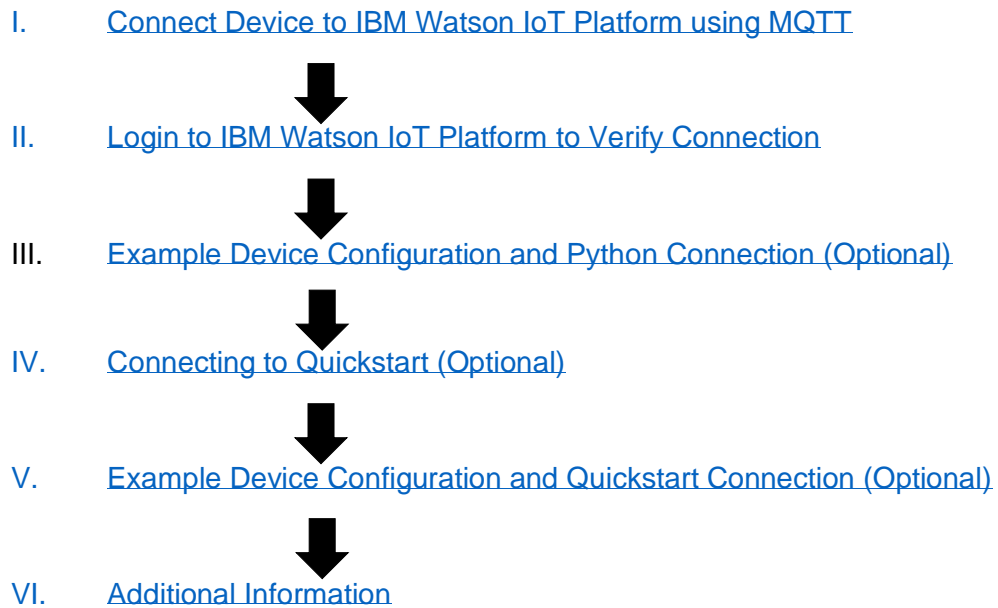
For more information and documentation on IBM Watson IoT Platform please see the following - https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/kc_welcome.htm

This is part two of a two-part series. This document is a simple, easy to follow process to connect a device to IBM Watson IoT Platform. It will go through connecting via an MQTT connection.

In part one, [see part 1 - Configure IBM Watson IoT Platform to Connect a Device](#), IBM Watson IoT Platform account was created and configured, a device type was created, and a device was added.



The process is:





I. Connect Device to IBM Watson IoT Platform using MQTT

The main means to connect devices to IBM Watson IoT Platform is via MQTT. The device will need a MQTT client software to connect and publish events. To add MQTT capability to devices, IBM provides reference implementations

Please see the following. <https://github.com/mqtt/mqtt.github.io/wiki/libraries>

The device must satisfy the requirements for the connection to be able to publish an event. On the device add a username, and password/authentication token and connect. Use the registration information to connect the device and start receiving device data. Set up the device for MQTT messaging and authenticate by using the organization ID, device type, device ID, and authentication token that was created in part one of this series. How to setup a specific device will vary by device.

The following information is required when connecting your device

URL

`<orgid>.messaging.internetofthings.ibmcloud.com`

where orgid is the ID of the IBM Watson IoT Platform organization created in part one.

Port

8883

This is a secure encrypted connection

Device ID

d: `<orgid>:<device type>:<device id>`

where:

orgid in the ID of the IBM Watson IoT Platform organization created in part one

device type is the device type created in IBM Watson IoT Platform in part one

device id is the device created in IBM Watson IoT Platform in part one

Username

use-token-auth

Username is the same value for all devices - use-token-auth

This tells IBM Watson IoT Platform to use the devices authentication token which is the password.

**Password**

Authentication token

Password is the device's unique authentication token that was generated when the device was created in part one.

Event topic format

iot-2/evt/<eventid>/fmt/<formatstring>

where:

eventid specifies the event name that is shown in IBM Watson IoT Platform

formatstring is the format of the event, such as JSON.

Message format

JSON

Certificate (optional)

when you use secure MQTT messaging, newer client libraries automatically trust the default certificate that is presented by IBM Watson IoT Platform service. If this is not the case for your client environment, you will need a full certificate chain and specify that in the connection.

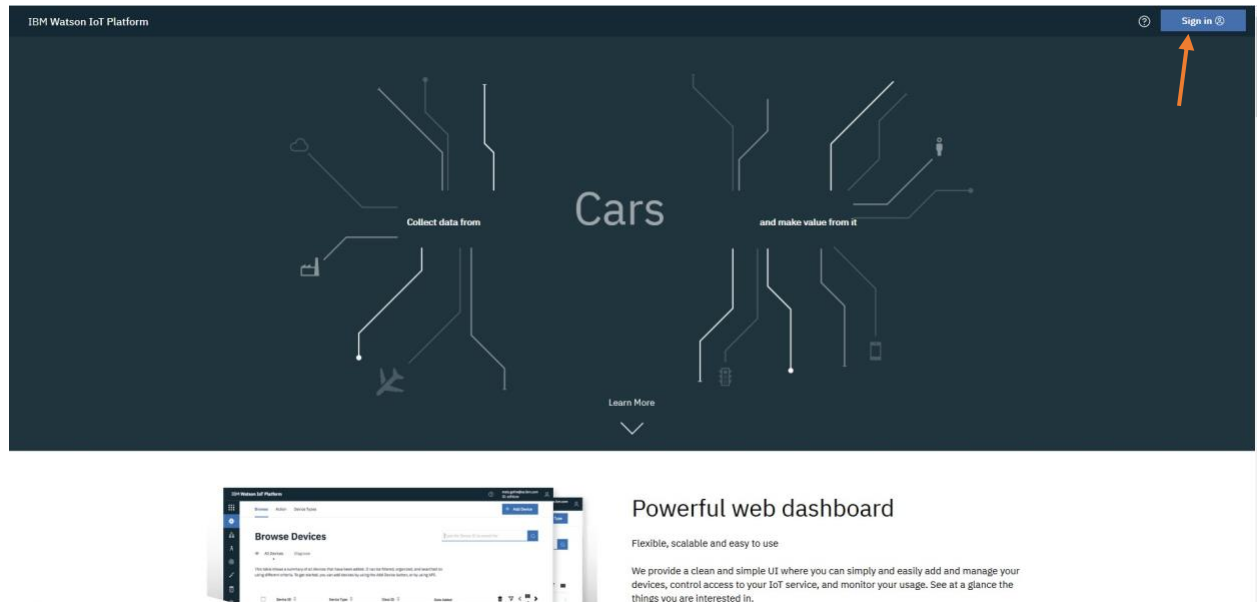
Once connected you will see the device connected in IBM Watson IoT Platform and the device can send data.



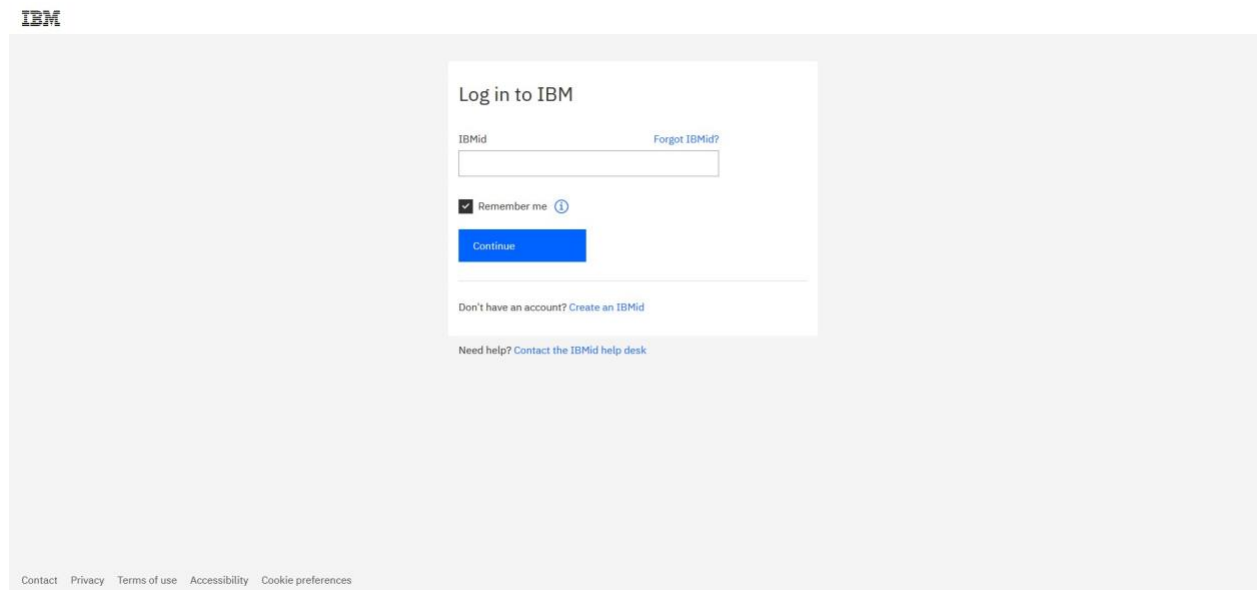
II. Login to IBM Watson IoT Platform to Verify Connection

Go to URL - <https://internetofthings.ibmcloud.com/>

Click Sign in



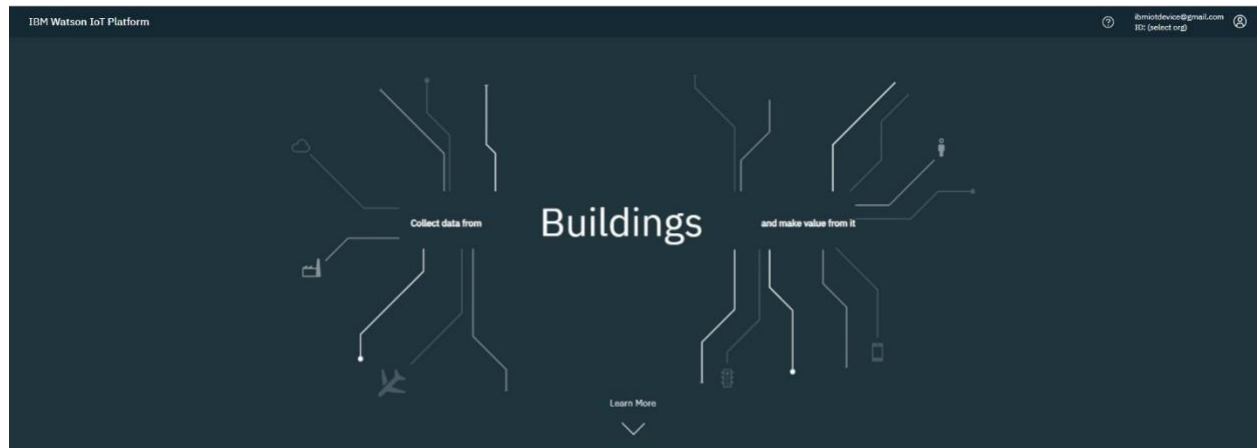
Enter an IBMid and click Continue
(Click Remember Me if you want)





Enter the Password and click Login
(Click Remember Me if you want)

You are now logged into IBM Watson IoT Platform

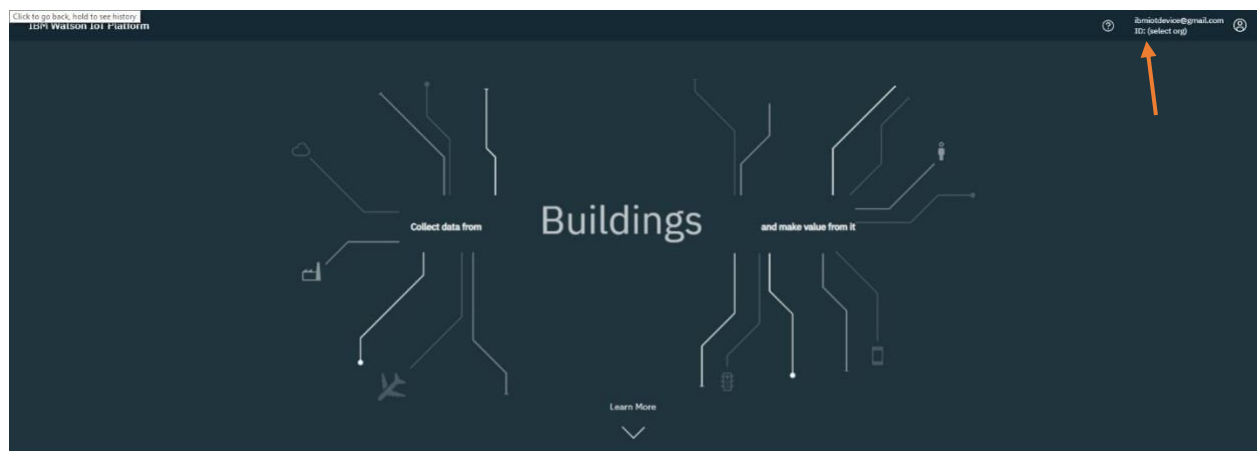


Powerful web dashboard

Flexible, scalable and easy to use

We provide a clean and simple UI where you can simply and easily add and manage your devices, control access to your IoT service, and monitor your usage. See at a glance the things you are interested in.

Click select org

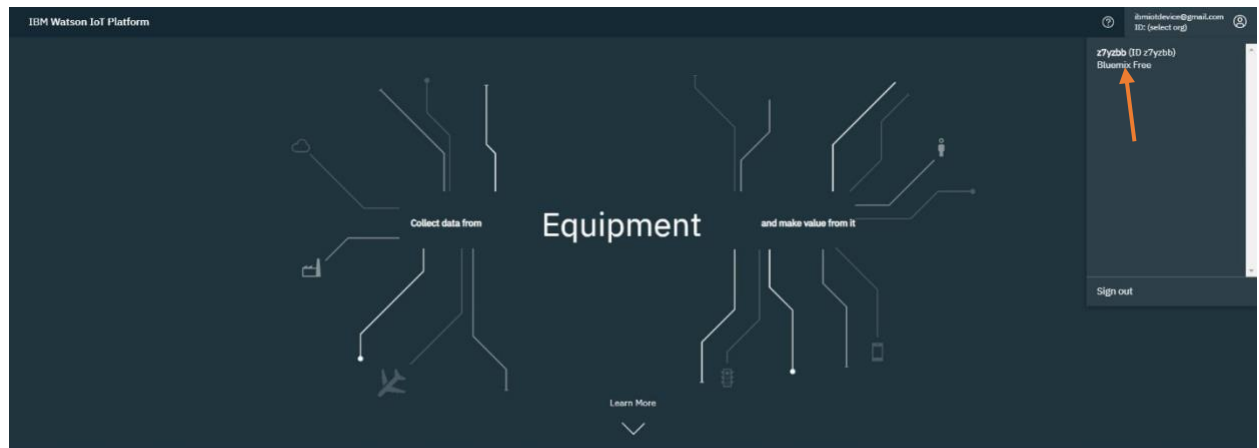


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Select the org



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Click Devices option and see that the device is Connected.

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

Browse Devices

All Devices Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Search by Device ID

Device Simulator

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location	Added By	Device Class
<input type="checkbox"/>	TestDevice	Connected	DeviceTypeTest	Device	Sep 19, 2019 10:32 AM		ibmiotdevice@gmail.com	

Items per page 50 | 1-1 of 1 items

1 of 1 pages

Click the device and Logs and see that the connection was made

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

Search by Device ID

Device Simulator

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location	Added By	Device Class
<input type="checkbox"/>	TestDevice	Connected	DeviceTypeTest	Device	Sep 19, 2019 10:32 AM		ibmiotdevice@gmail.com	

Identity Device Information Recent Events State Logs

Diagnostic Logs

A list of device errors and timestamps detailing when the error occurred.

Severity	Message	Timestamp
----------	---------	-----------

Connection Logs

A list of the connection events reported for this device.

Message	Timestamp
Token auth succeeded: ClientID=qtz7yzbb;DeviceTypeTest:TestDe...	Oct 1, 2019 1:35 PM



Click Recent Events and see the data that was sent from the device to IBM Watson IoT Platform

IBM Watson IoT Platform

ibmclouddevice@gmail.com
IT: Pyeab

Add Device

Browse Action Device Types Interfaces

All Devices Diagnose

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Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location	Added By	Device Class
TestDevice	Connected	DeviceTypeTest	Device	Sep 19, 2019 10:32 AM		ibmclouddevice@gmail.com	

Identity Device Information Recent Events State Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
event	["d":{"temp":"46.2"}]	json	a few seconds ago
event	["d":{"temp":"46.2"}]	json	a few seconds ago
event	["d":{"temp":"46.2"}]	json	a few seconds ago
event	["d":{"temp":"46.2"}]	json	a few seconds ago
event	["d":{"temp":"45.6"}]	json	a few seconds ago



III. Example Device Configuration and Python Connection (Optional)

Test done with a Raspberry PI with Python

Install Python

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

Install the wiotp-sdk and psutil python modules

```
sudo pip install wiotp-sdk psutil
```

Define environmental variables for the org, device type, device id, and authentication token. These values are the ones created and/or generated in IBM Watson IoT Platform in part one.

These variables correspond to the device parameters for the registered device

WIOTP_IDENTITY_ORGID

WIOTP_IDENTITY_TYPEID

WIOTP_IDENTITY_DEVICEID

WIOTP_AUTH_TOKEN

Commands

```
export WIOTP_IDENTITY_ORGID=<orgid>
```

```
export WIOTP_IDENTITY_TYPEID=<devicetype>
```

```
export WIOTP_IDENTITY_DEVICEID=<deviceid>
```

```
export WIOTP_AUTH_TOKEN=<authtoken>
```

Run python

```
python iotpsutil.py
```



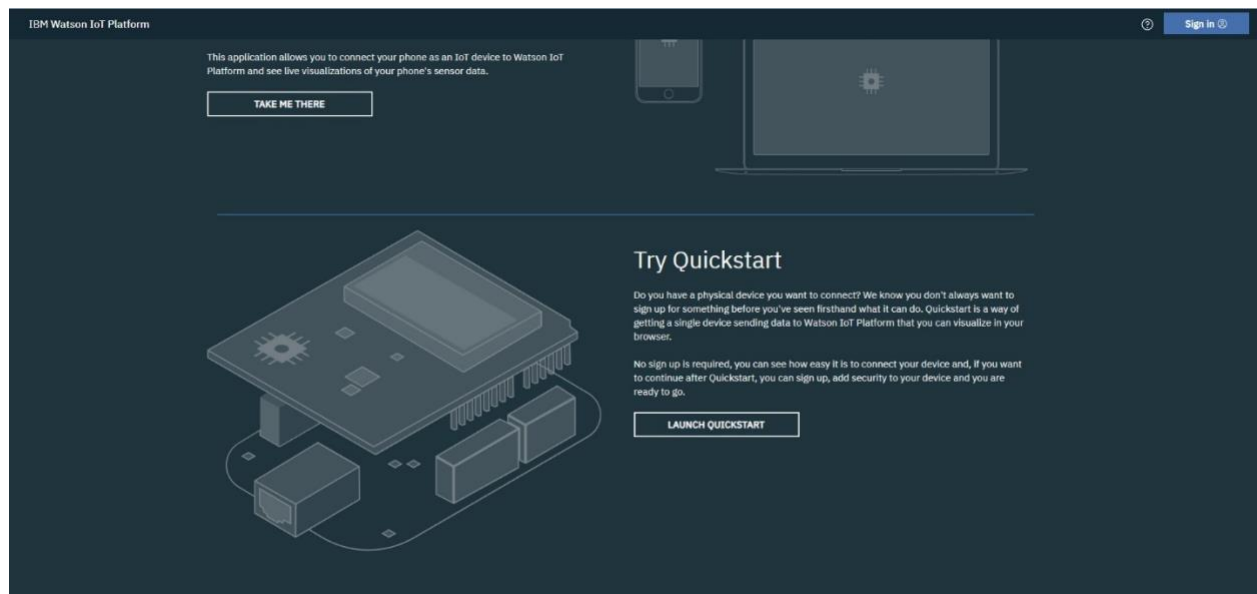
IV. Connecting to Quickstart (Optional)

If you have issues connecting the device, you can use Quickstart to troubleshoot with a 'simple' connection. To make a quick connection of the device to IBM Watson IoT Platform you can use Quickstart. Connecting to Quickstart allows you to quickly verify your installation and connectivity to IBM Watson IoT Platform. It is not required to test via Quickstart. When you connect to the Quickstart service, authentication or registration is not required, and the orgId must be set to quickstart.

Quickstart does not require any IBM Watson IoT Platform configuration. It is a quick way to test connectivity from a device to IBM Watson IoT Platform in a unsecure connection.

Go to URL - <https://internetofthings.ibmcloud.com/>

Scroll down and click Launch Quickstart





Click the box to accept the terms and enter the device id. Click Go
Device id will be a value from the device. See [example below of a Raspberry Pi test](#).

IBM Watson IoT Platform

QUICKSTARTSERVICE STATUSDOCUMENTATIONBLOGSIGN IN

Quickstart

No sign-up required to see how easy it is to connect your device to Watson IoT Platform and view live sensor data.

☐ I accept IBM's Terms of Use

Device ID eg. 580b0c07ac03

Go

Get your device (or simulate one)

Follow a recipe to get it connected

View live data from your device

Got a physical device?

We have a partner program for IoT along with a set of verified instructions, or 'recipes', for connecting devices, sensors, and gateways.

VIEW RECIPES

Don't have a device?

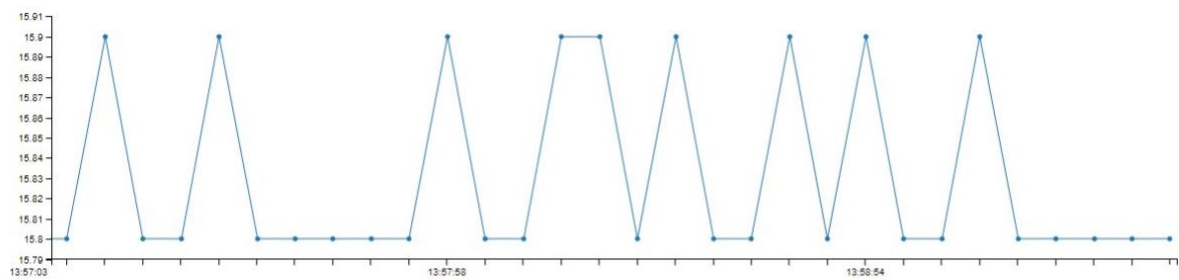
You don't need to have a physical device to see Quickstart in action. Try it out by using our simulator.

FIND OUT MORE

Data will start appearing for the device

b827ebda3192L

psutil.mem



Event	Datapoint	Value	Time Received
psutil	mem	15.8	Sep 24, 2019 1:59:34 PM
psutil	network.down	0.22	Sep 24, 2019 1:59:34 PM
psutil	network.up	0.07	Sep 24, 2019 1:59:34 PM
psutil	disk.read	0	Sep 24, 2019 1:59:34 PM
psutil	disk.write	0.8	Sep 24, 2019 1:59:34 PM
psutil	name	raspberrypi	Sep 24, 2019 1:59:34 PM
psutil	cpu	1	Sep 24, 2019 1:59:34 PM



V. Example Device Configuration and Quickstart Connection (Optional)

Test done with a Raspberry PI with Python

Install Python

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

Install the wiotp-sdk and psutil python modules

```
sudo pip install wiotp-sdk psutil
```

Download the sample code from GitHub

```
sudo apt-get update
```

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

```
sudo pip install wiotp-sdk psutil
```

```
wget https://github.com/ibm-watson-iot/iot-python/archive/master.zip
```

```
unzip master.zip
```

```
cd iot-python-master/samples/psutil/src
```

Connect to quickstart

```
python iotpsutil.py --quickstart
```

The `--quickstart` command line argument will configure the device client to connect to quickstart using a generated deviceId based on the Pi's MAC address.

Output

```
<DateTime Stamp> wiotp.sdk.device.client.DeviceClient INFO
```

```
Connected successfully: d:quickstart:sample-iotpsutil:b827ebda3192L
```

```
Welcome to IBM Watson IoT Platform Quickstart, view a vizualization of  
live data from this device at the URL below:
```

```
https://urldefense.proofpoint.com/v2/url?u=https-XXXX
```

```
(Press Ctrl+C to disconnect)
```

Where XXXX is the rest of the specific URL



VI. Additional Information

- For more information and documentation on MQTT please see the following – <https://www.ibm.com/support/knowledgecenter/SSQP8H/iot/platform/reference/mqtt/index.html>
- <https://developer.ibm.com/blogs/open-source-ibm-mqtt-the-messaging-protocol-for-iot/>
- For more information and documentation on MQTT connectivity please see the following - <https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/platform/devices/mqtt.html>
- If you're not using MQTT, there are other ways to get data from devices to the Watson IoT Platform. Please see the IBM Watson IoT Platform Knowledge Center for information - https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/platform/iotplatform_task.html#iotplatform_task
- IBM Watson IoT Github repositories - <https://github.com/ibm-watson-iot/>