

# IoT Starter Kit – Part 3:

## Connect to the cloud – Microsoft Azure

**Note:** If the PDF Guide is opened in a viewer mode, we strongly recommend downloading it and open on your computer locally to have hyperlinks functional and to be able to copy strings. The Download button you will find at the top of the page with a PDF preview.

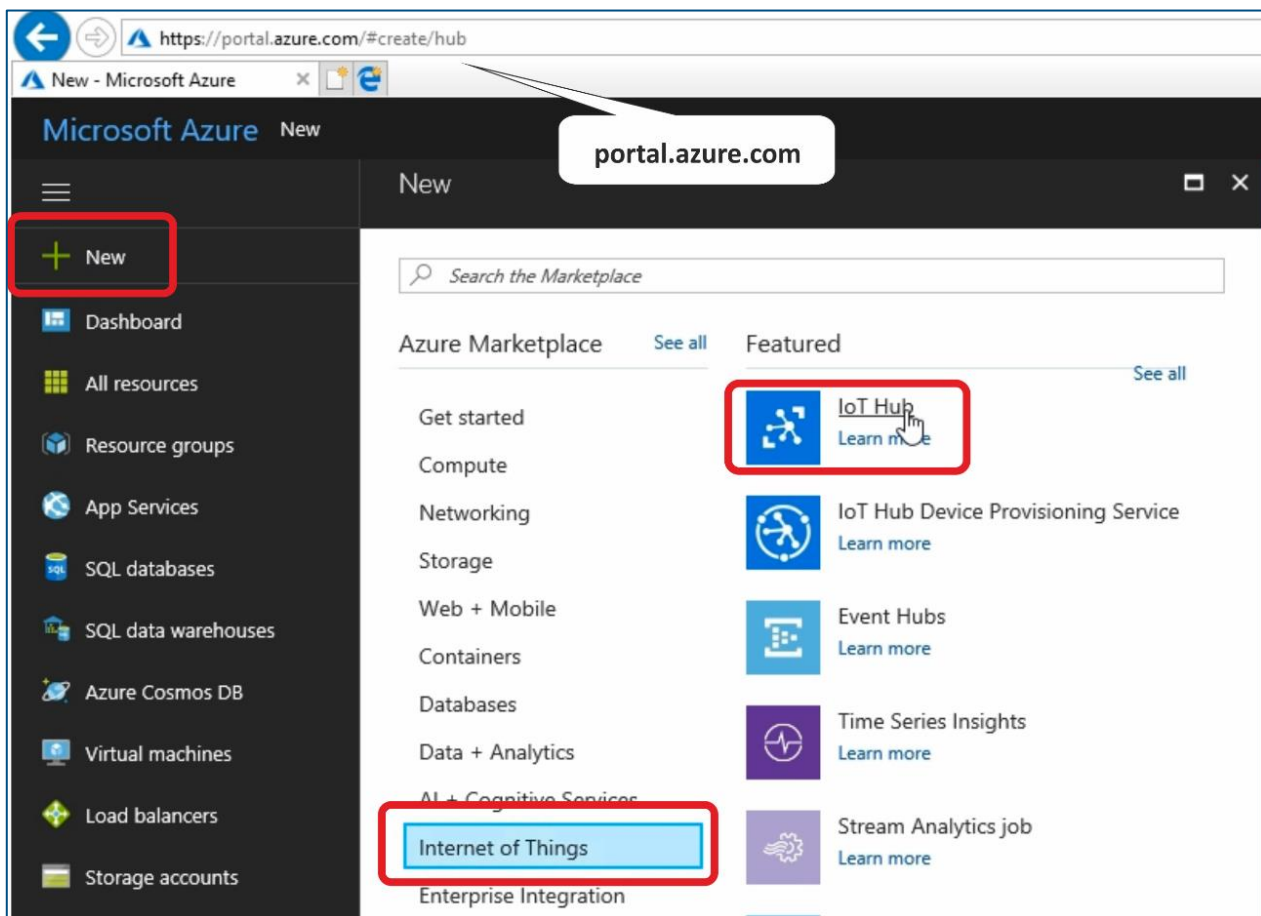
In this part, we will connect an IQRF gateway to Microsoft Azure. Microsoft Azure offers free services for developers for a limited time and in a limited amount. You will be asked to enter your credit card details. Your credit card will be used only if you exceed the services provided free of charge. It is one of the possible clouds that you can get connected to from your IQRF Gateway Daemon using the MQTT channel.

### 1 Virtual device in Microsoft Azure

#### 1.1 Set up the IoT Hub

**Note:** the environment of Microsoft Azure may look different because of possible changes. This guide shows the status of March 2018. You need to look for appropriate items to configure the MQTT connection.

First, log in to your Microsoft Azure account on [portal.azure.com](https://portal.azure.com). Click on the **New item** in the left menu, go to the **Internet of Things** and select **IoT Hub**.



Setup the **IoT Hub name** and your **pricing model**. As a developer you can create one IoT Hub for free.

**IoT hub**  
Microsoft

\* Name  
IQRfTest ✓

\* Pricing and scale tier  
S1 - Standard >

\* IoT Hub units ⓘ  
1

\* Device-to-cloud partitions ⓘ  
4 partitions

\* Subscription

**Choose your pricing and scale tier**

F1 Free	S1 Standard	S2 Standard
8k messages/unit/day	400k messages/unit/day	6M messages/unit/day
Device-to-cloud telemetry	Device-to-cloud telemetry	Device-to-cloud telemetry
Cloud-to-device messaging	Cloud-to-device messaging	Cloud-to-device messaging
1 unit	200 units maximum	200 units maximum
Unable to display pricing	42,17 EUR PER IOT HUB UNIT	421,65 EUR PER IOT HUB UNIT

Set up a name of your **Resource group**. Click on the **Create** button.

\* Resource group ⓘ

☒ Create new ☐ Use existing

IQRfRes ✓

\* Location

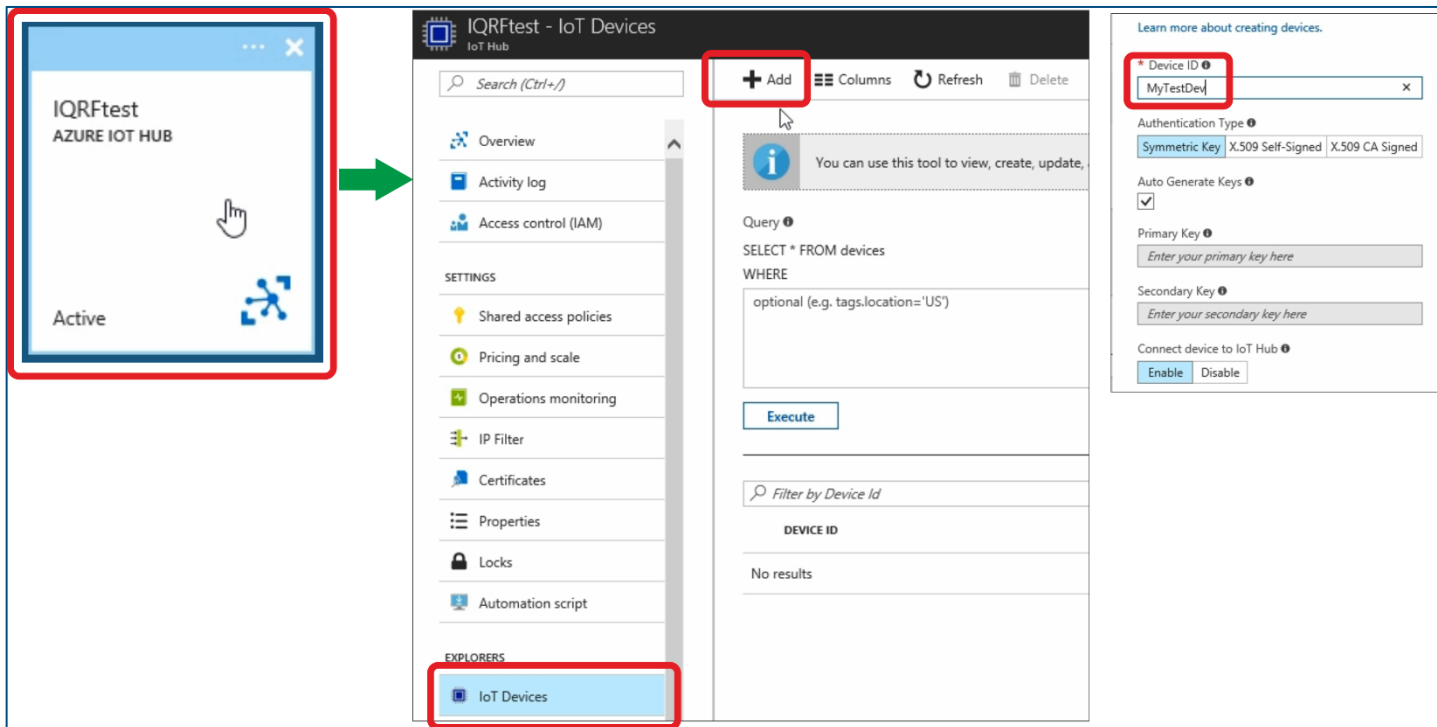
West Europe

☒ Pin to dashboard

**Create** Automation options

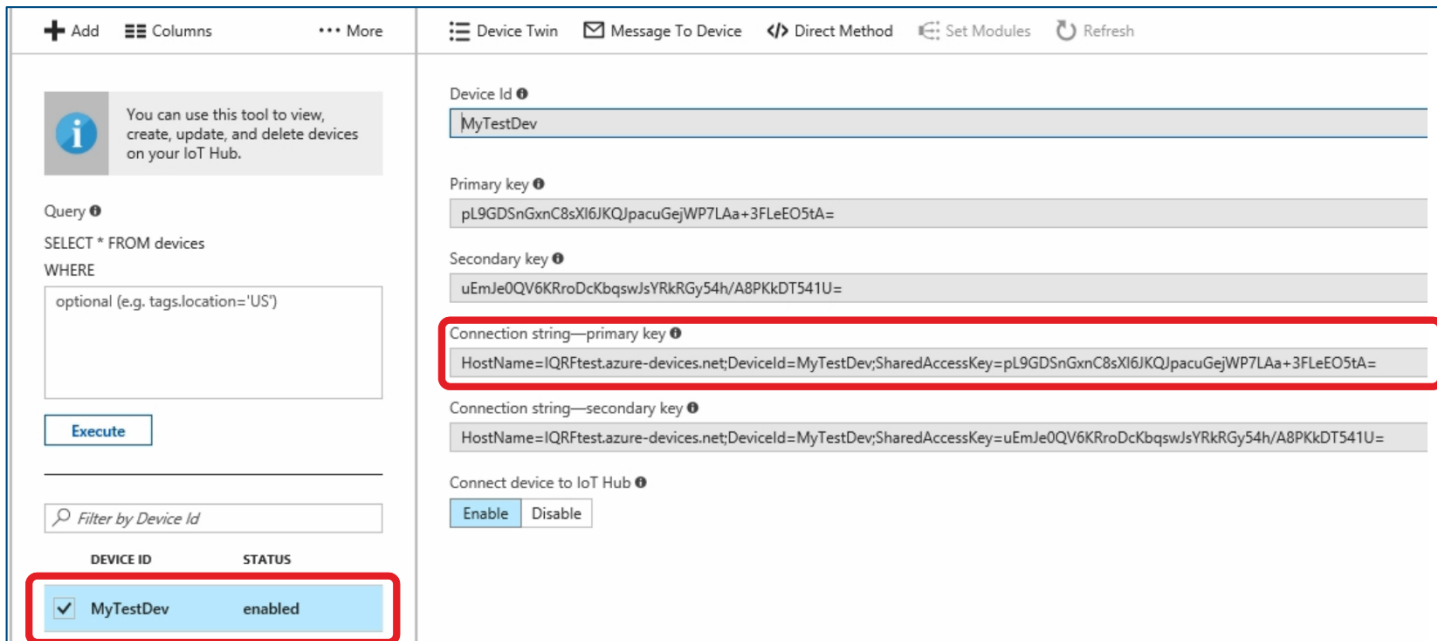
## 1.2 Create a virtual device

In the **IoT Hub** find the **IoT Devices** item. Click on the **Add** button and create your new IoT device. This virtual device represents your UP board.



The screenshot shows the IoT Hub interface. On the left, a sidebar lists various settings like Overview, Activity log, Access control (IAM), Shared access policies, Pricing and scale, Operations monitoring, IP Filter, Certificates, Properties, Locks, and Automation script. The 'IoT Devices' item is highlighted in the 'EXPLORERS' section. In the main area, the 'Add' button is circled in red. To the right, a panel shows the 'Device ID' field with 'MyTestDev' entered, and the 'Authentication Type' set to 'Symmetric Key'. The 'Primary Key' and 'Secondary Key' fields are also visible.

Copy the **Connection string primary key**. It will be used in the MQTT interface configuration.

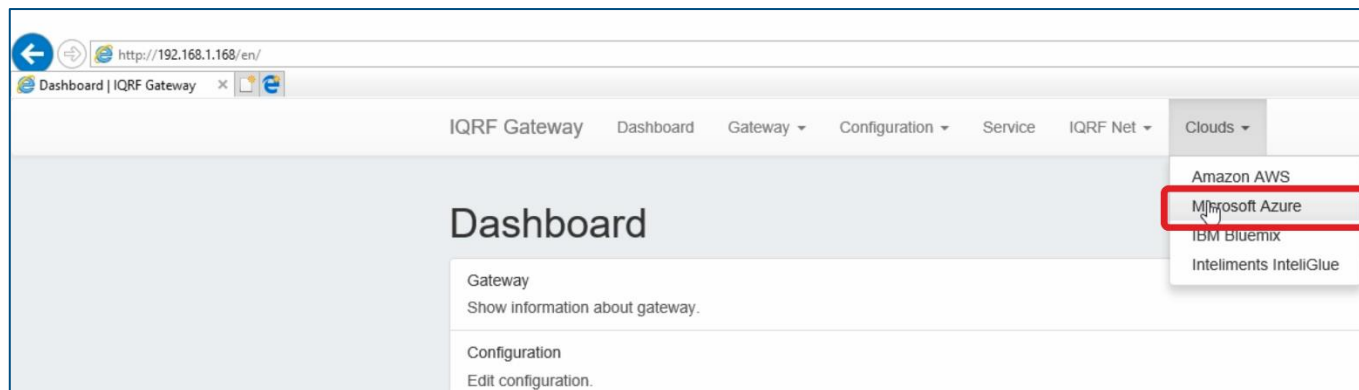


The screenshot shows the details of the 'MyTestDev' device. The 'Device Id' is 'MyTestDev'. The 'Primary key' is 'pL9GDSnGxnC8sXI6JKQJpacuGejWP7LAa+3FLeEO5tA='. The 'Secondary key' is 'uEmJe0QV6KRroDcKbqswJsYRkRGy54h/A8PKkDT541U='. The 'Connection string—primary key' is highlighted in red and contains the text: 'HostName=IQRfTest.azure-devices.net;DeviceId=MyTestDev;SharedAccessKey=pL9GDSnGxnC8sXI6JKQJpacuGejWP7LAa+3FLeEO5tA='. The 'Connection string—secondary key' is also visible. At the bottom, a table shows the device status: 'MyTestDev' is 'enabled'.

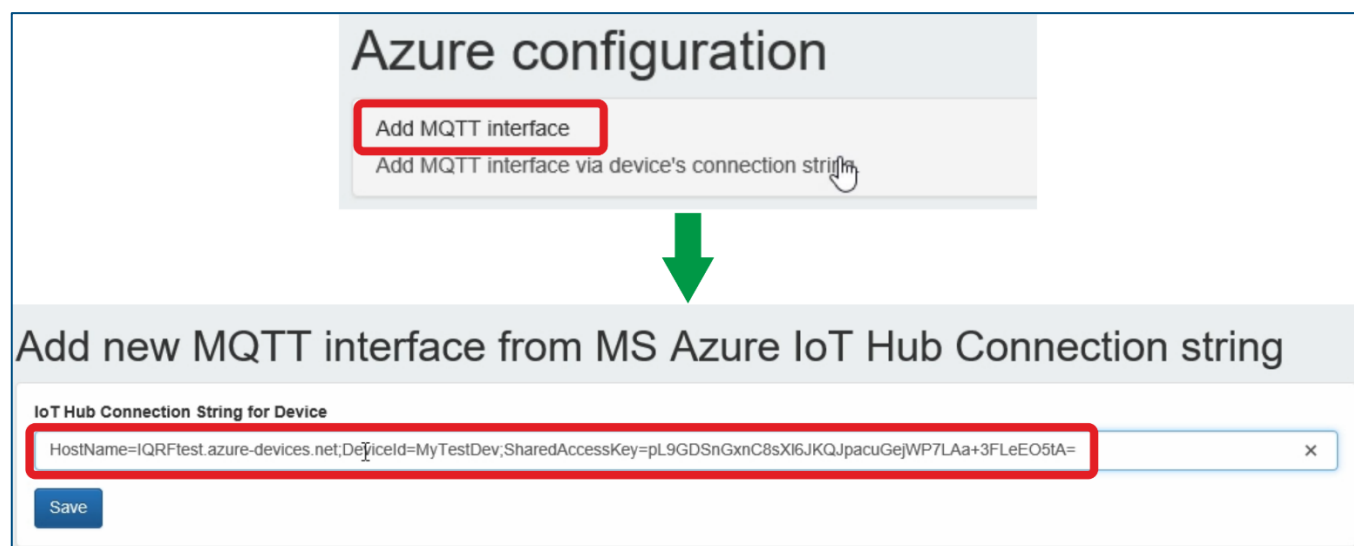
## 2 Set up the MQTT interface in the IQRF Gateway

### 2.1 Create a new MQTT interface

In the web browser on your computer, insert the IP address of your UP board, and login to it as *admin* with password *iqrf*. In the IQRF Gateway Daemon web application, click on the **Microsoft Azure** item in the **Clouds** menu.

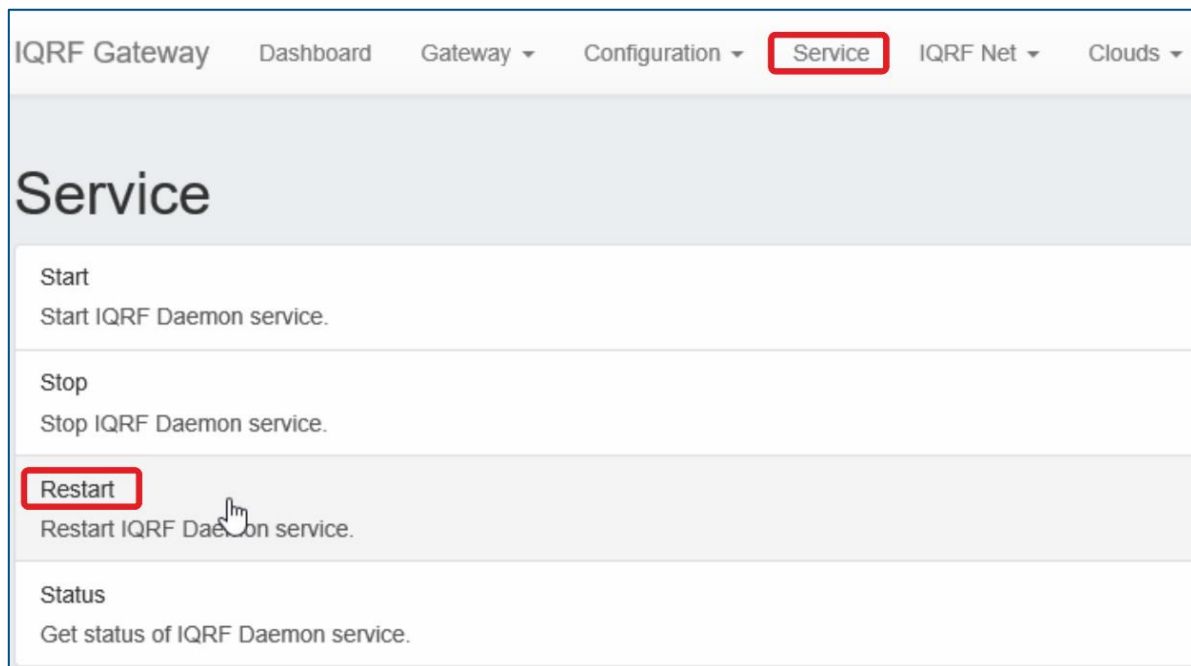


Add a new **MQTT interface**. Paste here the **connection string** which you copied before and save the configuration.



### 2.2 Restart the service

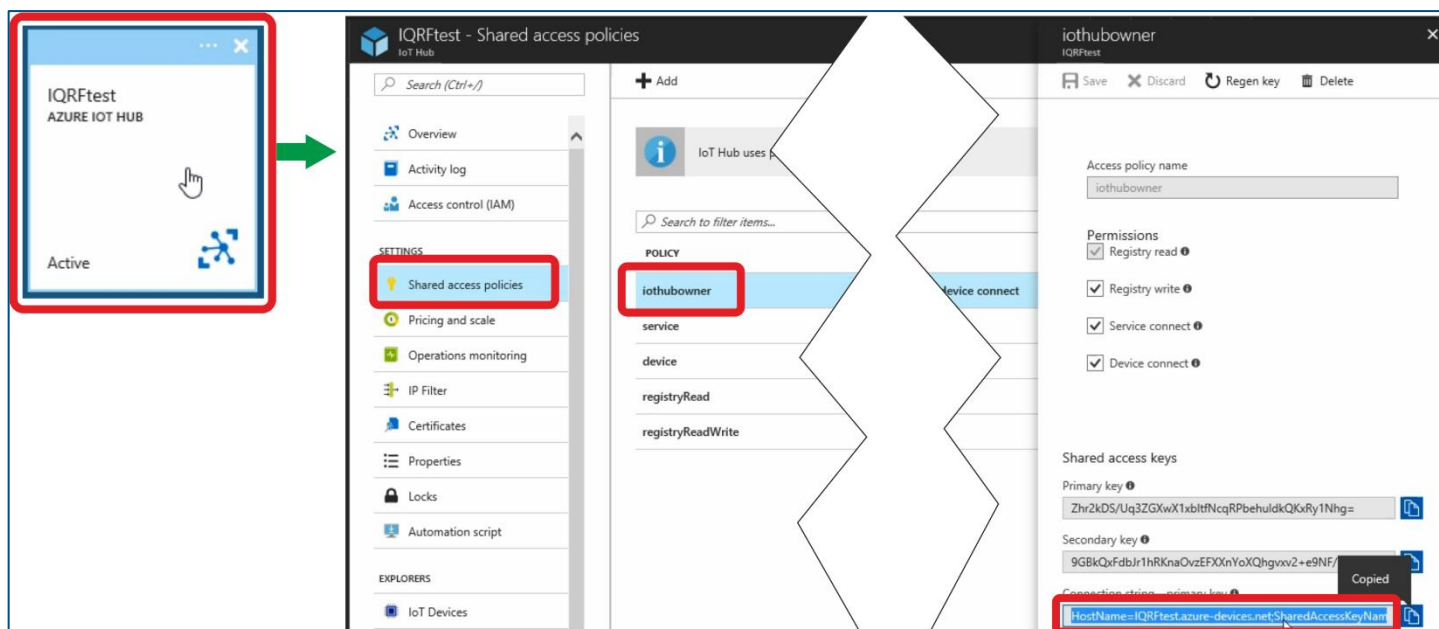
Restart the IQRF Gateway Daemon service.



## 3 Test the connection using Device Explorer

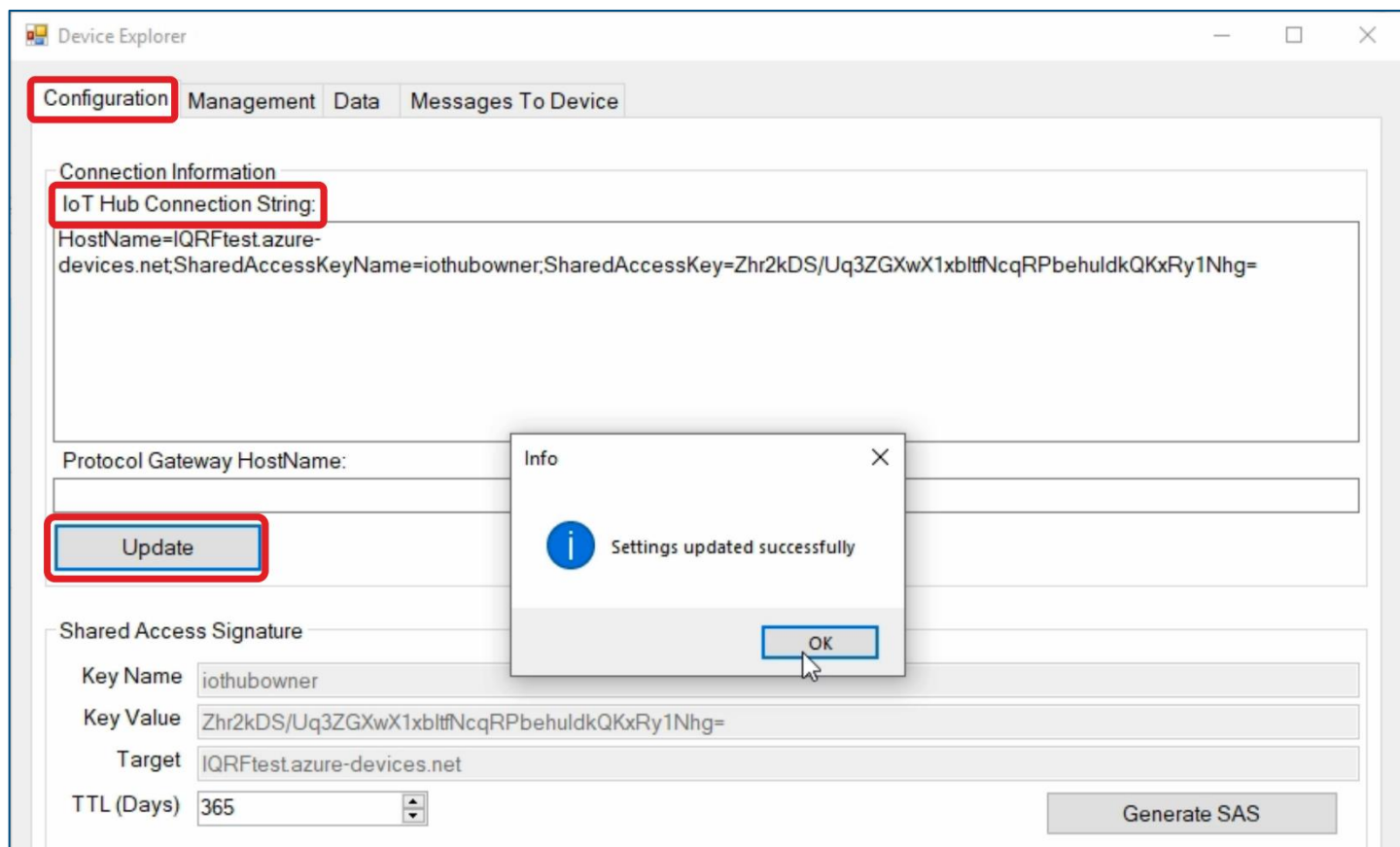
### 3.1 Copy credentials from IoT Hub

In the **IoT Hub** find the **Shared access policies** menu. Copy the **Connection string primary key** for the **iothubowner**.

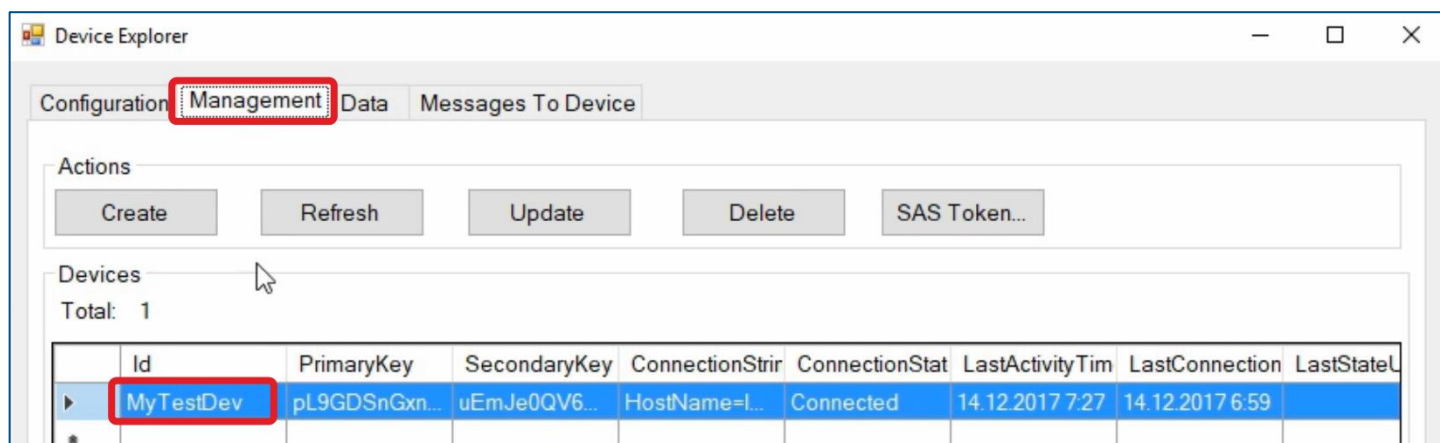


## 3.2 Set up the Device Explorer

Insert this string into the connection information in the **Device Explorer** application. We will use this application for sending DPA packets to our IQRF network. Click on the **Update** button.

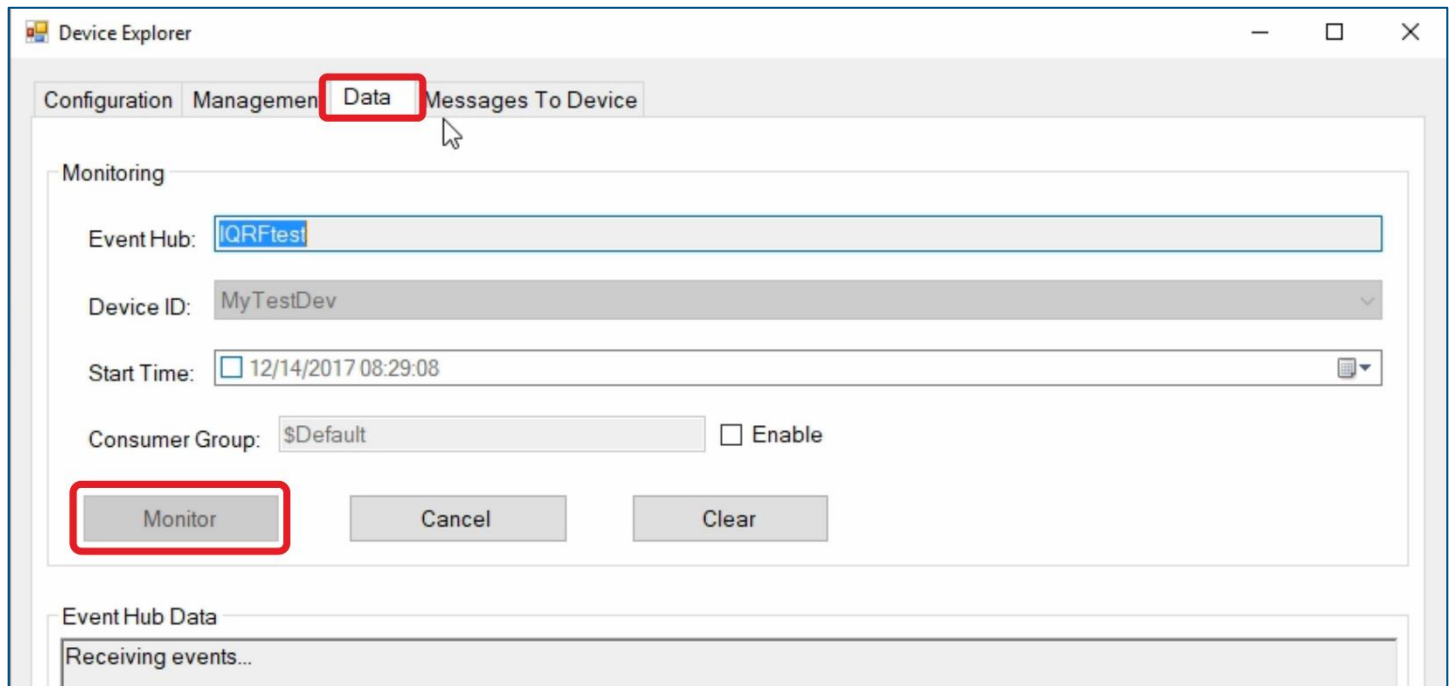


In the **Management** tab we can see our virtual device that we've just set up.



### 3.3 Inspect the communication

In the **Data** tab, click on **Monitor**. This will enable you to read received events.



Device Explorer

Configuration Management **Data** Messages To Device

Monitoring

Event Hub: IQRFtest

Device ID: MyTestDev

Start Time: 12/14/2017 08:29:08

Consumer Group: \$Default ☐ Enable

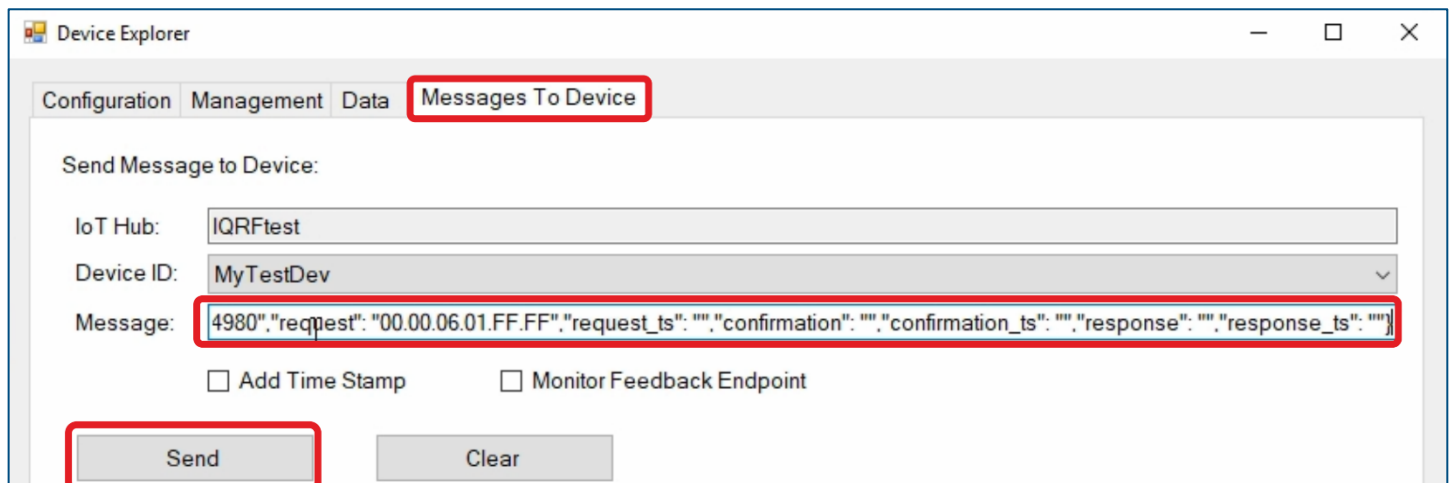
**Monitor** Cancel Clear

Event Hub Data

Receiving events...

Go to the **Messages To Device** tab, insert a DPA packet in JSON format into the **Message** textbox and click on **Send**. We've just sent a command for turning on the red LED on the IQRF coordinator.

```
{
  "ctype": "dpa",
  "type": "raw",
  "msgid": "1510754980",
  "request": "00.00.06.01.FF.FF",
  "request_ts": "",
  "confirmation": "",
  "confirmation_ts": "",
  "response": "",
  "response_ts": ""
}
```



Device Explorer

Configuration Management Data **Messages To Device**

Send Message to Device:

IoT Hub: IQRFtest

Device ID: MyTestDev

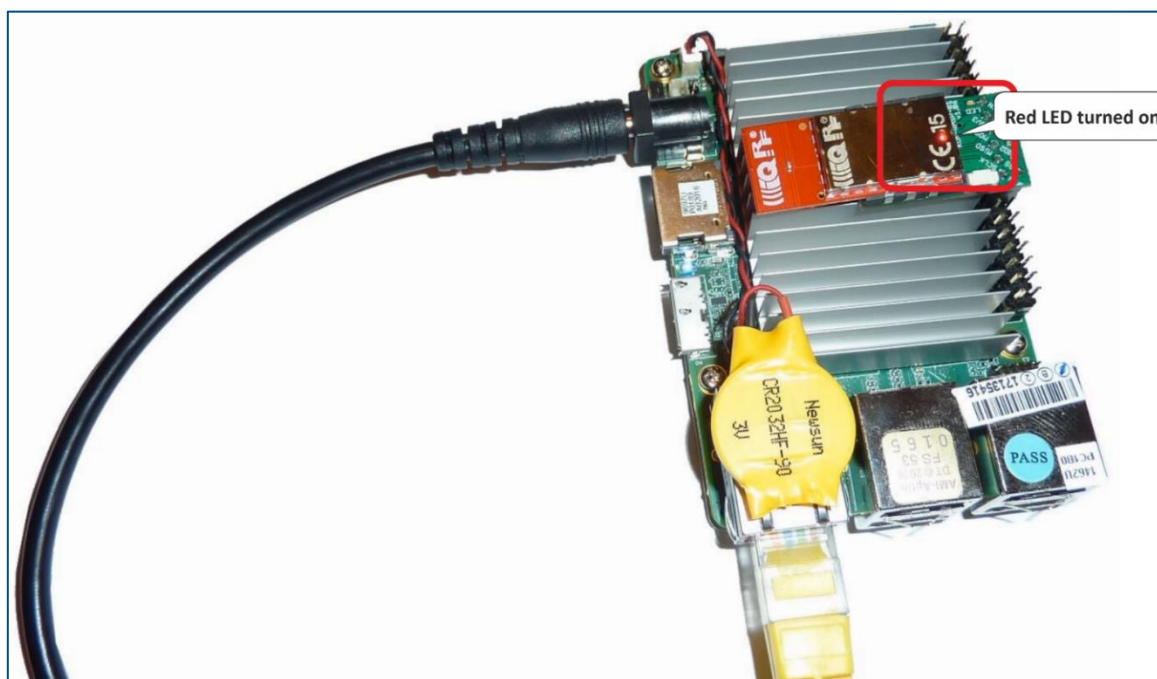
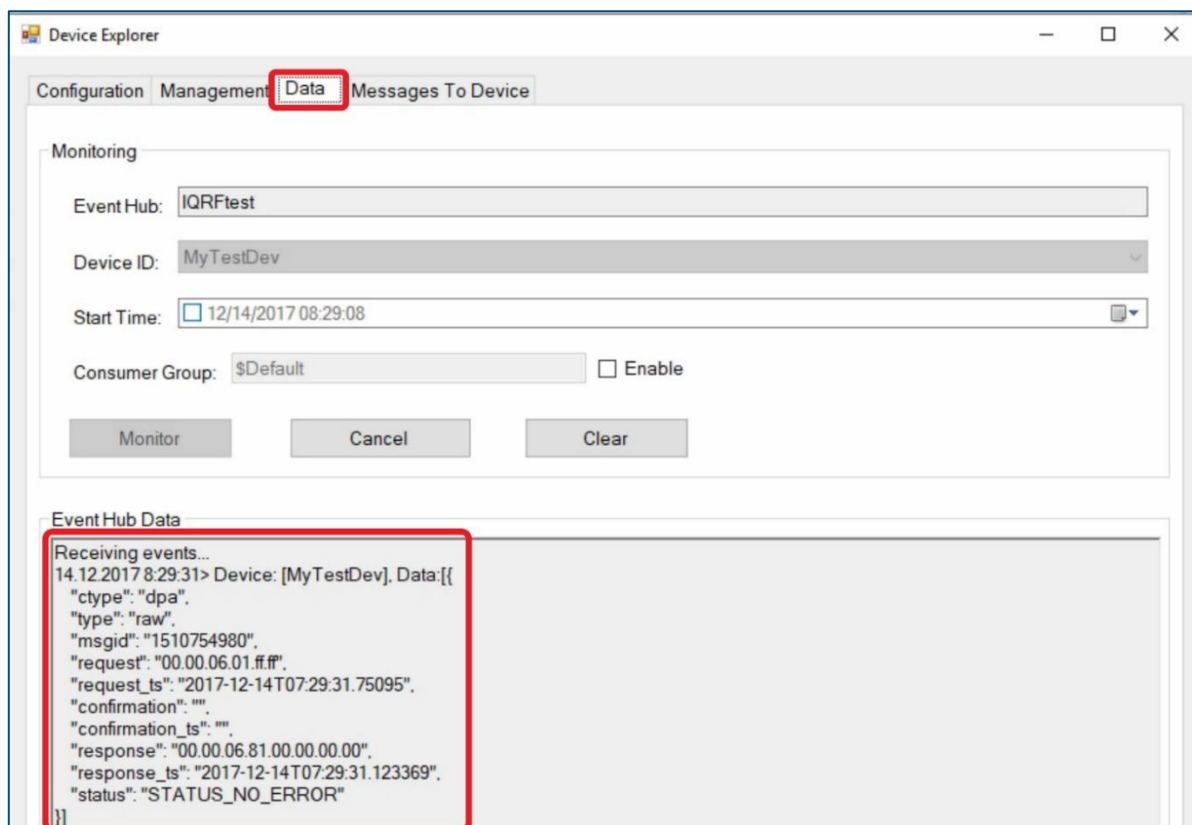
Message: 4980,"request": "00.00.06.01.FF.FF","request\_ts": "", "confirmation": "", "confirmation\_ts": "", "response": "", "response\_ts": ""

☐ Add Time Stamp ☐ Monitor Feedback Endpoint

**Send** Clear



In the **Data** tab, you can see the incoming communication from the UP board. You can easily double check that the command has been executed.



In the same way, you can turn the red LED off as well as send any other DPA command to your network.

## 4 Summary

The bidirectional communication between IQRF network and the Microsoft Azure is up and running. Now it's just up to you to use it for your own IoT solution.