

# UP-IQRF IoT Starter Kit – Part 3: Connect to the cloud – IBM Cloud

**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 IBM Cloud. It is one of the possible clouds that you can get connected to from your IQRF Gateway Daemon using the MQTT channel.

## 1 IBM Cloud and Watson IoT platform

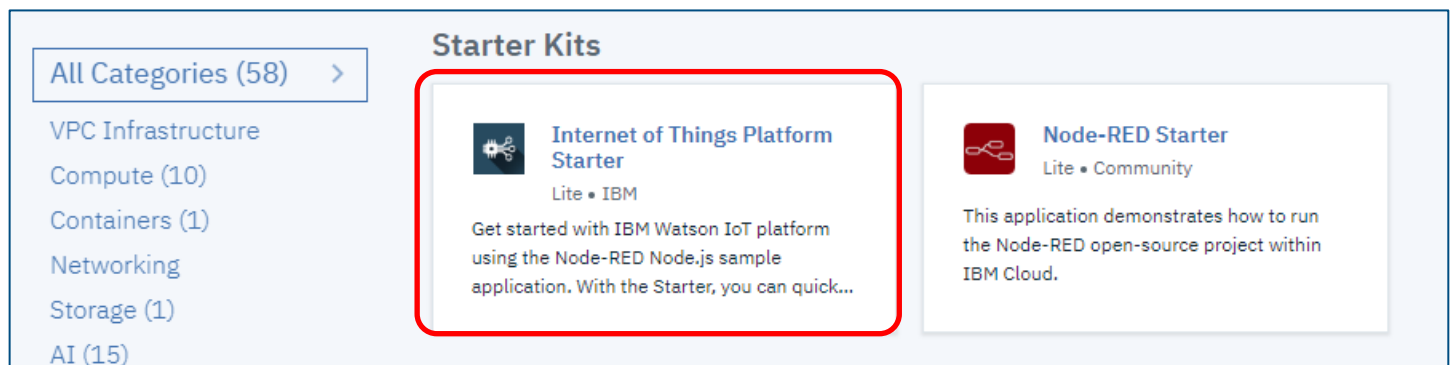
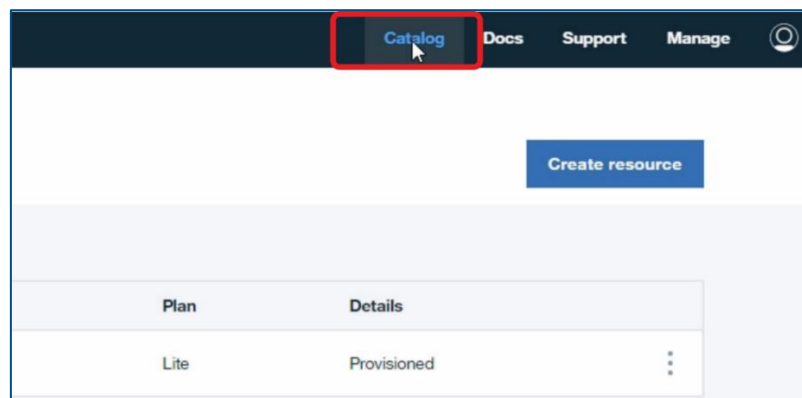
**Note:** The environment of IBM Cloud may look different because of possible changes. This guide shows the status of August 2019.

IBM provides developers some free services for a limited time and you don't have to enter any credit card details on the beginning. Create your IBM Cloud account and log into it on [console.bluemix.net](https://console.bluemix.net).

To connect remotely to your IQRF network from the IBM cloud, you need to set up some services first.

### 1.1 Internet of Things Platform Starter

Click the **Catalog** button and find the **Internet of Things Platform Starter**.



Fill in this form to set up your cloud application. Type in a unique **App name**, select your **deployment location** and your **pricing plan** and click **Create** button. Your web application will be available at the given address.

## Internet of Things Platform Starter

Get started with IBM Watson IoT platform using the Node-RED Node.js sample application. With the Starter, you can quickly simulate an Internet of Things device, create cards, generate data, and begin analyzing and displaying data in the Watson IoT Platform dashboard.

[View Docs](#)

VERSION	0.7.1
TYPE	Boilerplate
LOCATION	Frankfurt, London, Dallas

App name:  
IQRFtest-demo2

Host name: IQRFtest-demo2 Domain: eu-gb.mybluemix.net

Choose a region/location to deploy in:  
London

Choose an organization:  
ivona.spurna@iqrf.org

Choose a space:  
dev

Tags: ⓘ  
Examples: env:dev, version-1

Selected Plan:

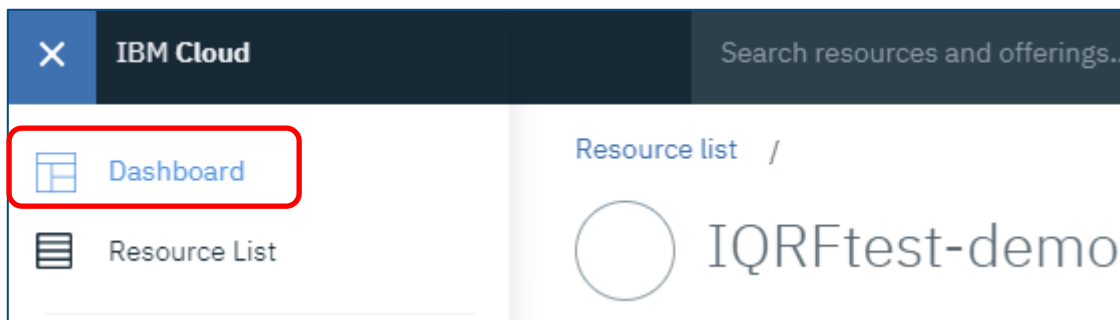
SDK for Node.js™ Lite	Cloudant Lite
Internet of Things Platform Lite	

Need Help?  
[Contact IBM Cloud Support](#)

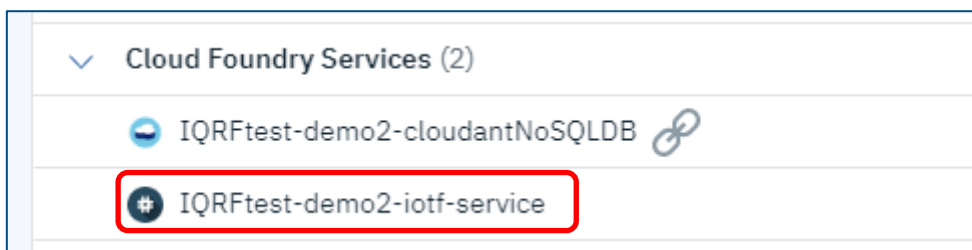
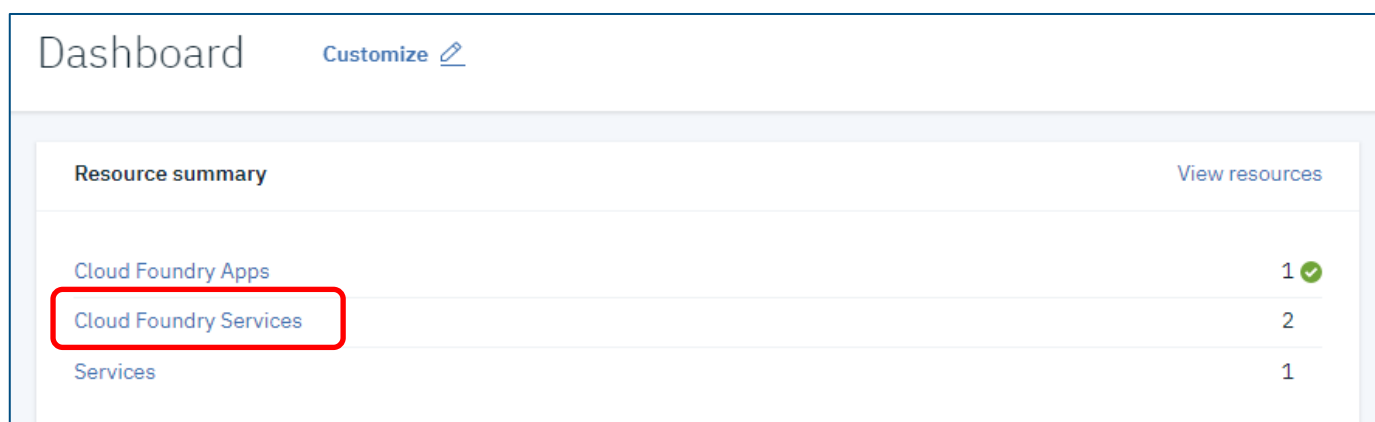
Create

## 1.2 Watson IoT Platform

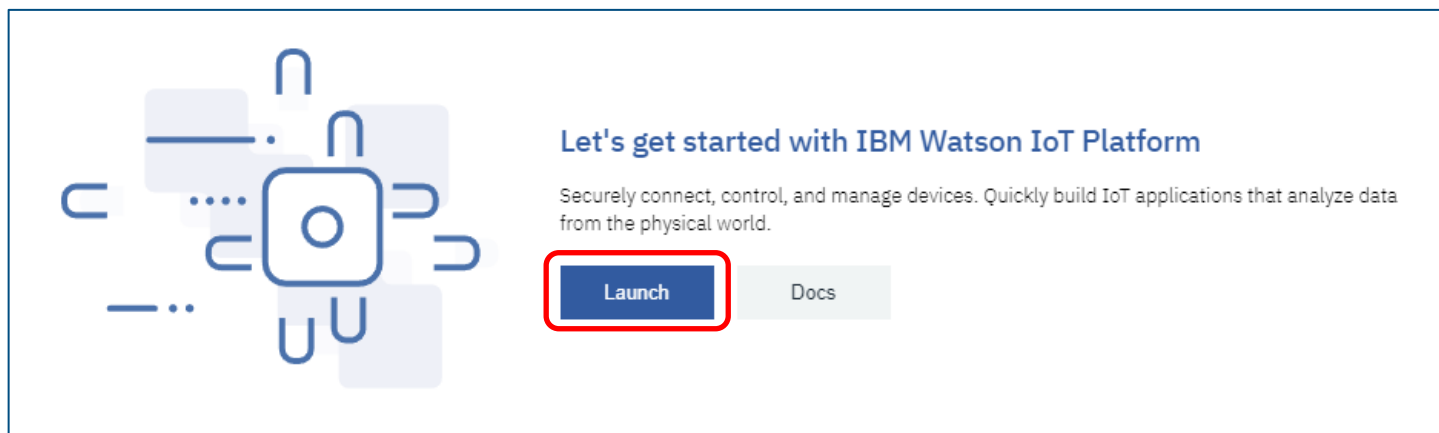
Click the **Dashboard** in the left IBM Cloud navigation menu.



Click the Cloud Foundry Services item and then click the service which was created when you set up your cloud application in the previous step (it ends with *iotf-service*).

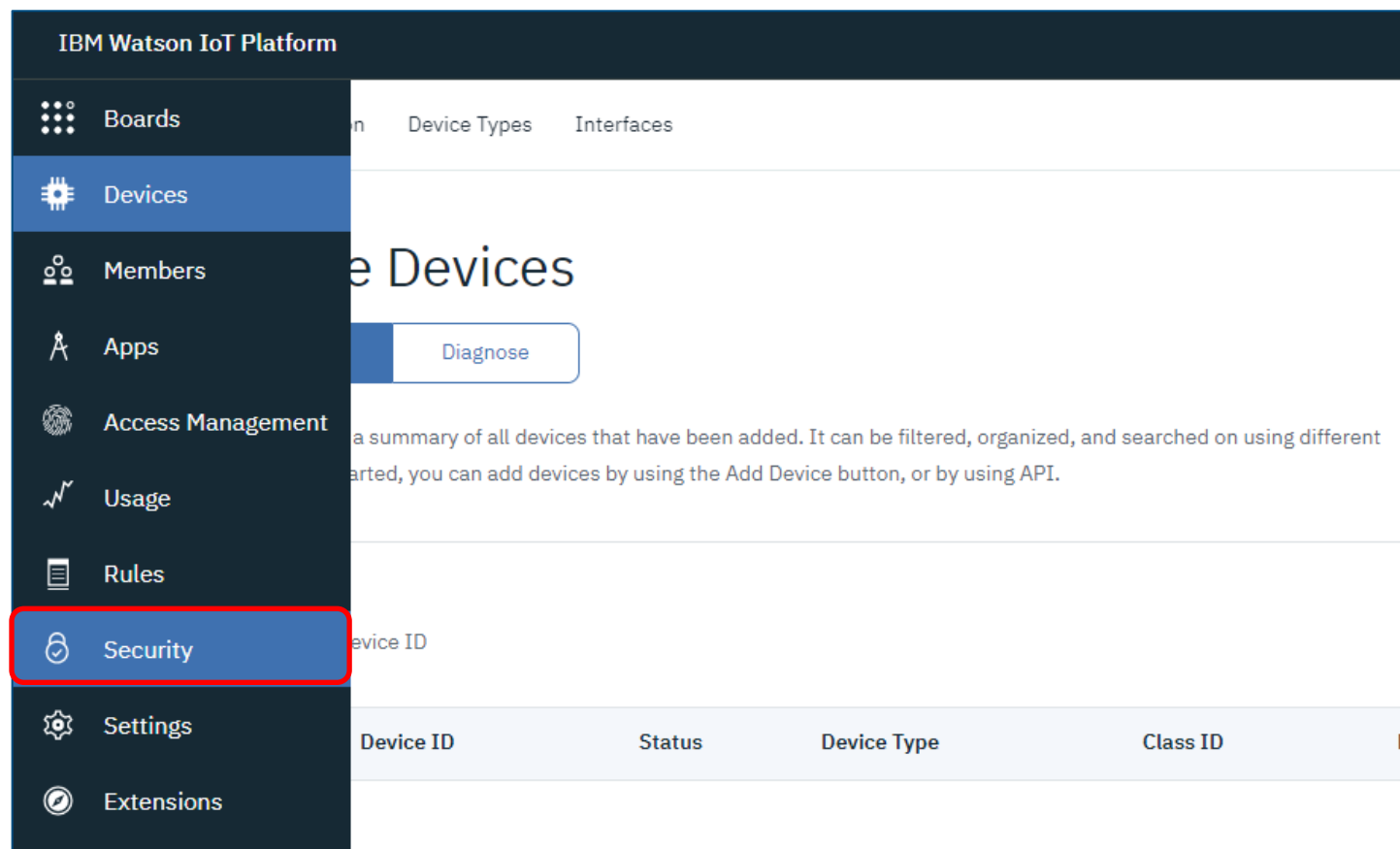


Launch the **IBM Watson IoT Platform**.

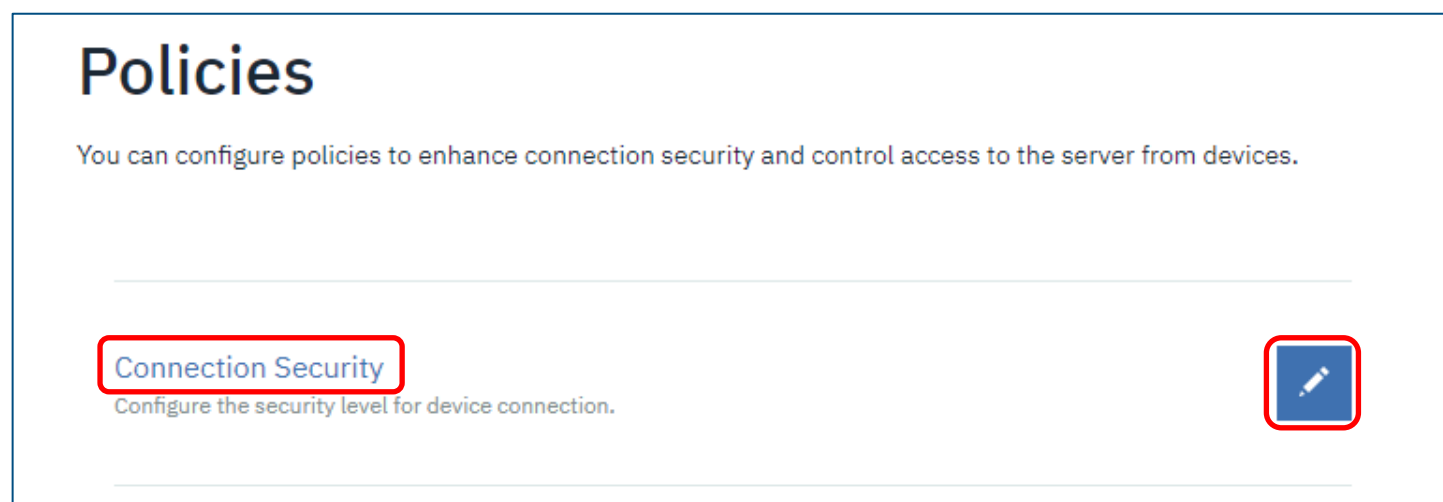


### 1.2.1 Security

Click the **Security** item in the left menu and check the connection security.



Set up the **Security** level according to your needs and possibilities. We have chosen the **TLS Optional**. Save the configuration.



## Default Rule

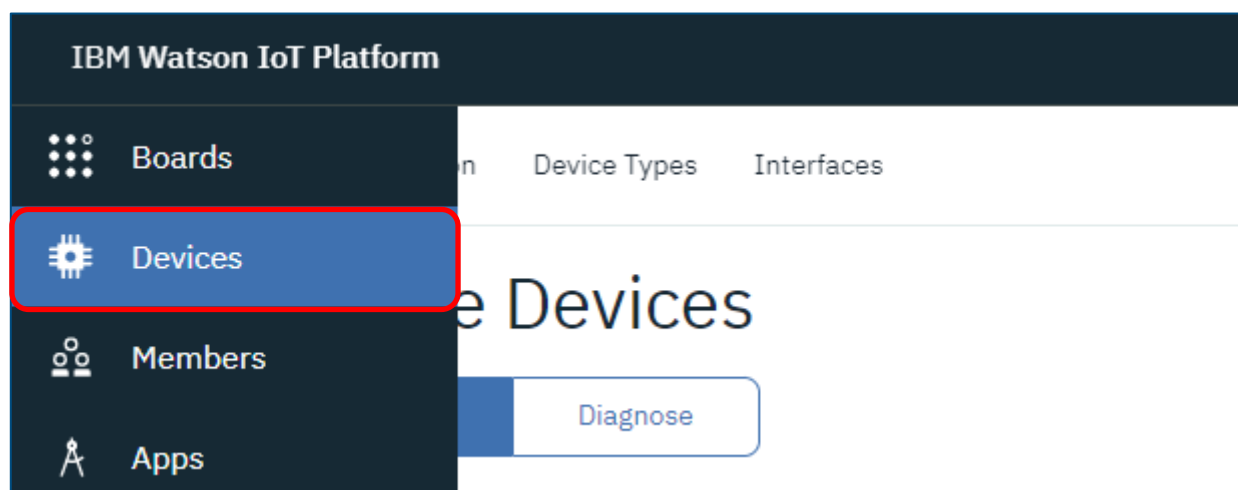
Define the default connection security level to use for all device types that do not have custom rules defined. You can view the number of devices that are affected and then predicted level of compliance.

Note: The device number and predicted compliance values are estimates based on a report that runs at varying intervals.

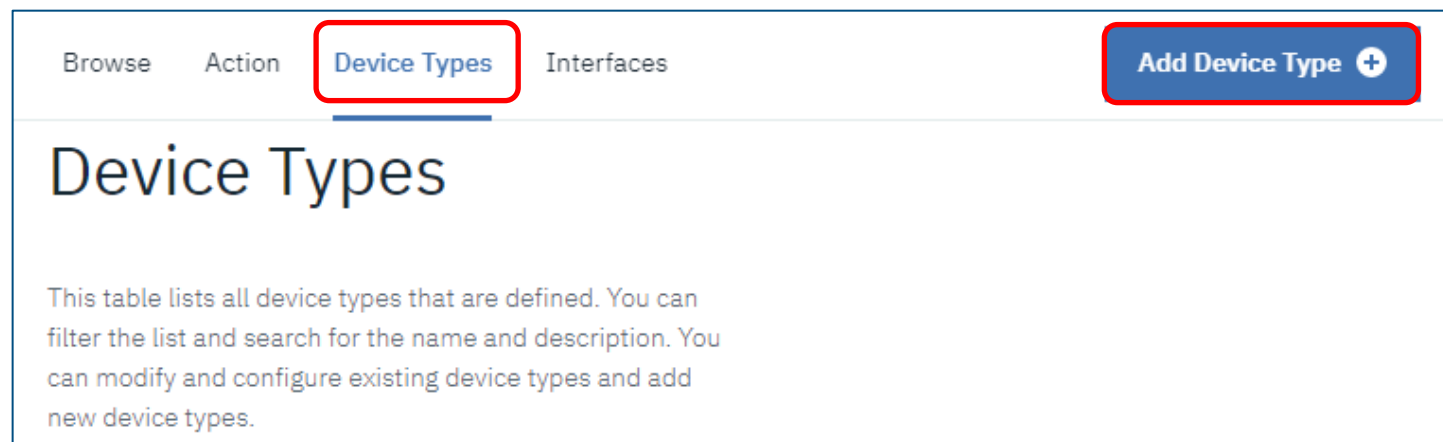
Scope	Security Level	Predicted Compliance ⓘ
Default	TLS Optional	<div>◀ +1 ▶</div> <div>Refresh compliance</div>

### 1.2.2 Create the Device Type

Click the **Devices** item in the left menu.



First, add the **Device Type**.



It's important to select the type: "**Device**". Then, fill in the name of a device type.

### Add Type

☒ Identity — ☐ Device Information

Device types group devices that have similar characteristics, such as model number, firmware version, or location. Give the device type a unique name and a description that identifies characteristics that are shared by devices of this type.

Type 

Device Or Gateway

Name 

IQRF\_GW2

The device type name is used to identify the device type uniquely and uses a restricted set of characters to make it suitable for API use.

### 1.2.3 Create the Device

Click the **Browse** menu. Create a new virtual device by clicking on **Add Device**.

Browse

ActionDevice TypesInterfaces

Add Device +

## Browse Devices

All DevicesDiagnose

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.

Select the **Device Type** which you have created in the previous step, enter the **Device ID** and click **Next**.

### Add Device

Identity

Device Information

Security

Summary

Select a device type for the device that you are adding and give the device a unique ID.

Device Type

IQRF\_GW2

Device ID

UP\_IQRF\_GW2

Cancel

Next

Fill in your **Authentication Token** and click Next.

Authentication Token

UP\_IQRF\_GW2\_token ⓘ

Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.

Authentication token are encrypted before we store them.

**Copy** the device credentials. You will use them in the next step.

### Device Credentials

You registered your device to the organization. Add these credentials to the device to connect it to the platform. After the device is connected, you can navigate to view connection and event details.

Organization ID	3j1ozv
Device Type	IQRF_GW2
Device ID	UP_IQRF_GW2
Authentication Method	use-token-auth
Authentication Token	UP_IQRF_GW2_token

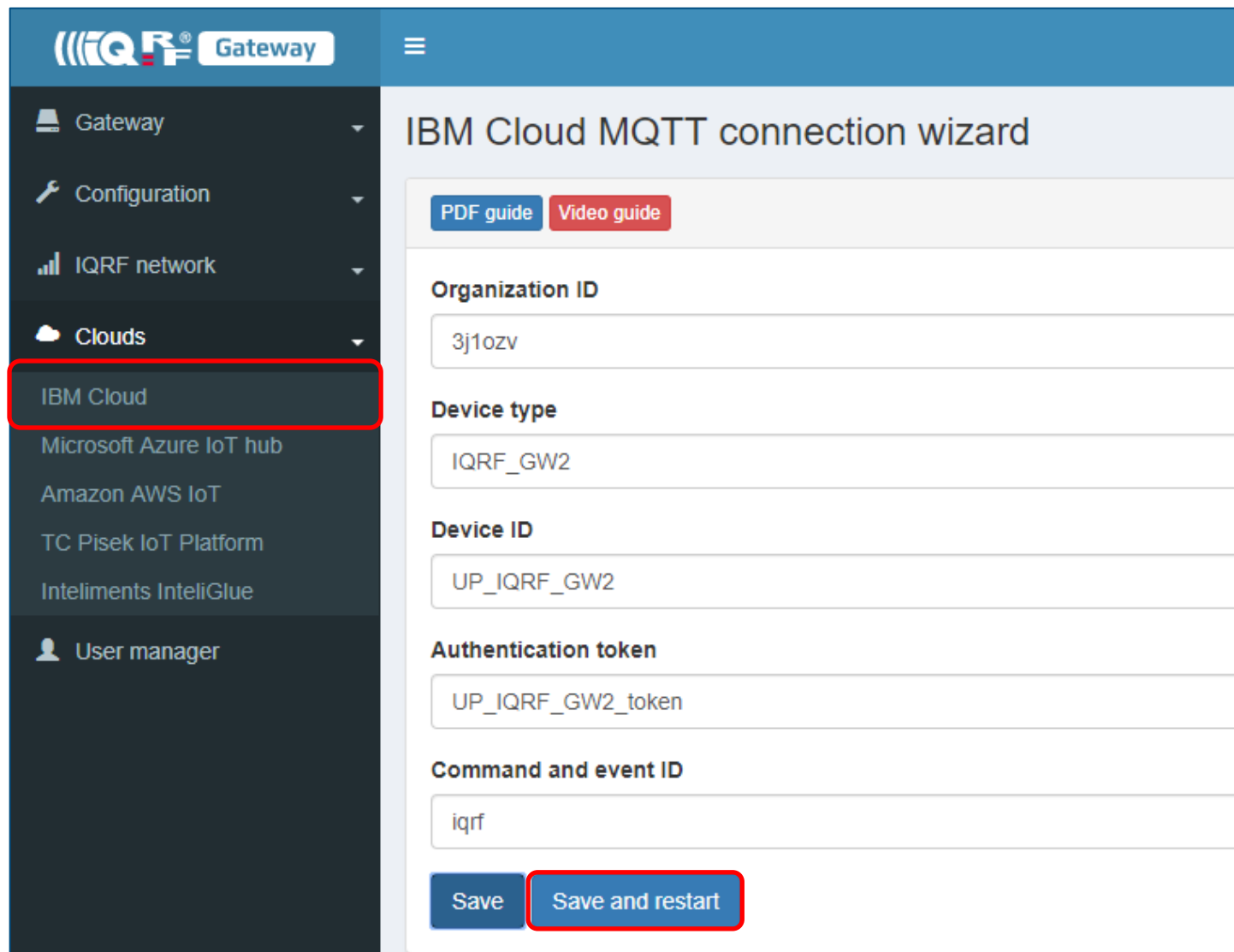


## 2 Set up the MQTT interface at the IQRF Gateway

Configure the MQTT channel to the IBM Cloud. In the web browser on your computer, insert the IP address of your UP board, and log in to it as *admin* with password *iqrf* (or with the account you have created).

In the IQRF Gateway web application, click on the **IBM Cloud** item in the **Clouds** menu.


Fill in the credentials related to your virtual device from the IBM Cloud, save the configuration and restart the IQRF Gateway Daemon service (click *Save and restart*).



The screenshot shows the IQRF Gateway web application interface. On the left is a dark sidebar menu with the following items: Gateway, Configuration, IQRF network, Clouds, IBM Cloud (highlighted with a red box), Microsoft Azure IoT hub, Amazon AWS IoT, TC Pisek IoT Platform, Inteliments IntelliGlue, and User manager. The main content area is titled 'IBM Cloud MQTT connection wizard'. It features two buttons at the top: 'PDF guide' and 'Video guide'. Below these are several input fields: 'Organization ID' with the value '3j1ozv', 'Device type' with the value 'IQRF\_GW2', 'Device ID' with the value 'UP\_IQRF\_GW2', 'Authentication token' with the value 'UP\_IQRF\_GW2\_token', and 'Command and event ID' with the value 'iqrf'. At the bottom of the form are two buttons: 'Save' and 'Save and restart' (highlighted with a red box).

## 3 Node-RED

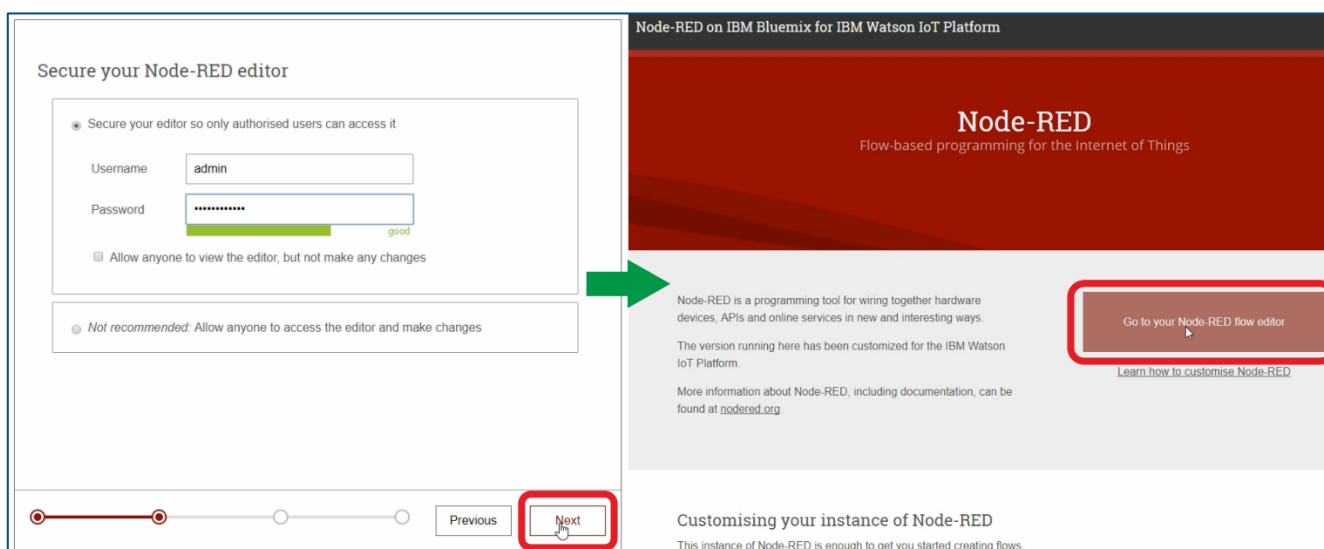
Find your **Cloud Foundry Application** in the dashboard and check its status. It should be running. Then click it.

Cloud Foundry Apps (1)			
 IQRFDemo2	ivona.spurna@iqrf.org / dev	London	<span style="color: green;">●</span> Running

Next, click the link **Visit App URL**.

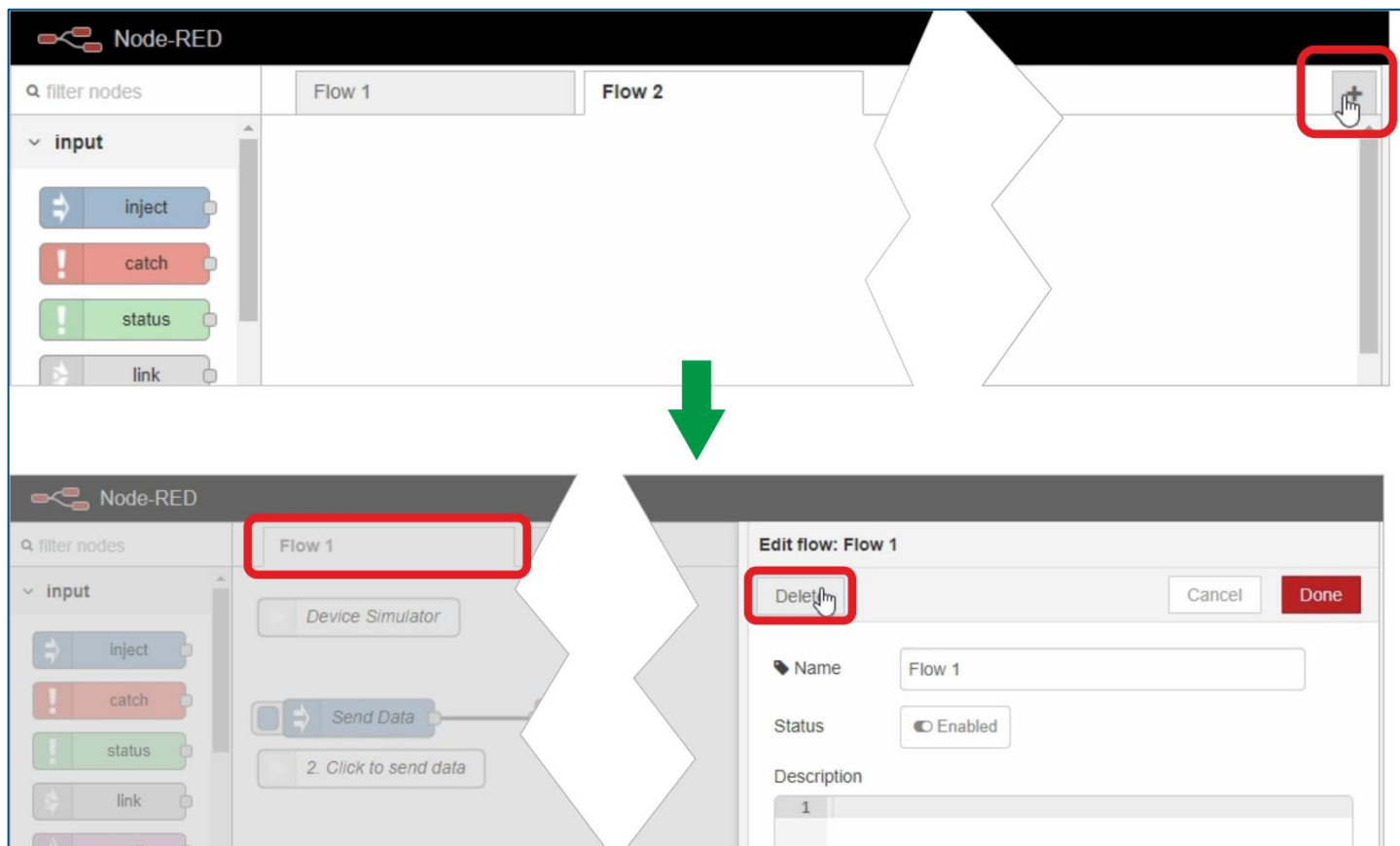


Go through the wizard and set up the **Node-RED** application. Go to your Node-RED flow editor and log in to it.

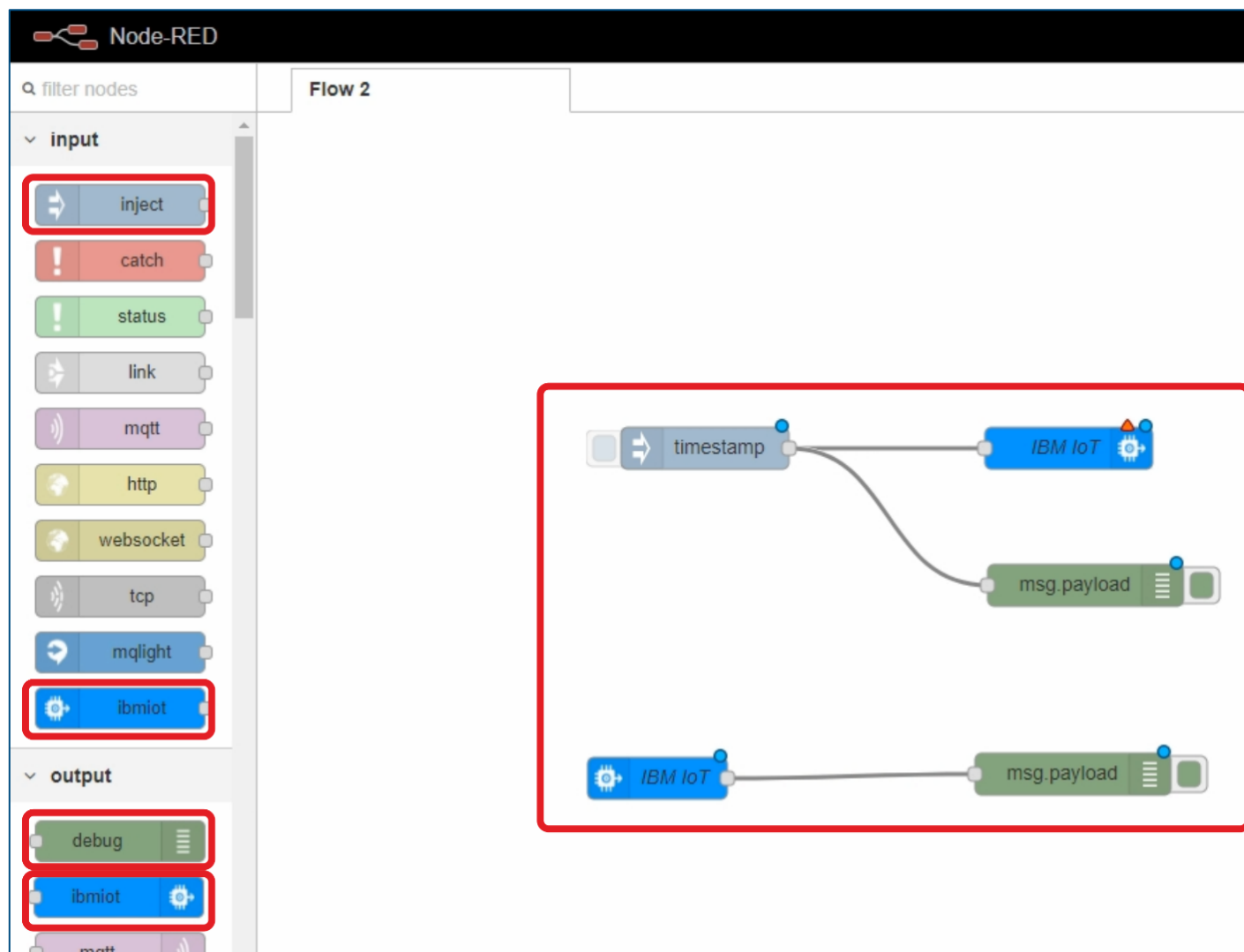


### 3.1 Node-RED flow

Create a **new flow** and **delete** the example. You will do it by *double-clicking* the *Flow 1* tab. Then press *Delete*.



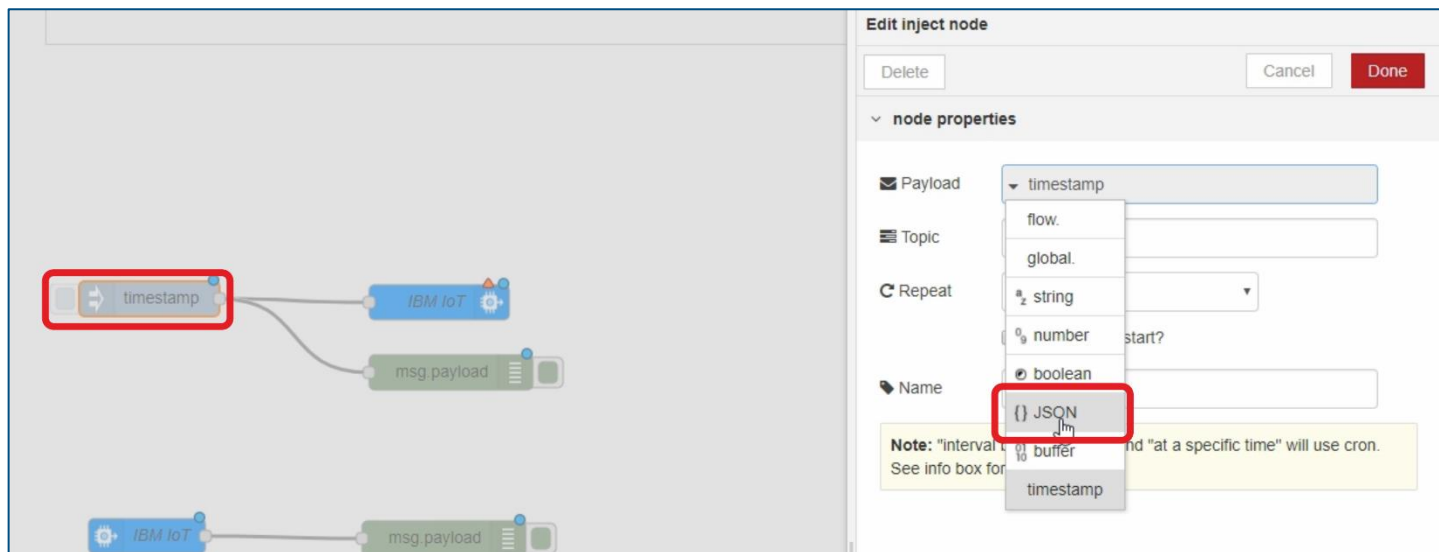
Insert **ibmiot input**, **ibmiot output**, two **debug outputs** and **inject input**. Connect the objects like it is shown in the picture.



Using the inject input, we will send **DPA commands** to the MQTT broker running at the IBM Cloud and our IQRF Gateway will get commands from there. We will also send the commands to the debug window to see the output. All incoming messages from the MQTT broker will be displayed in the debug window.

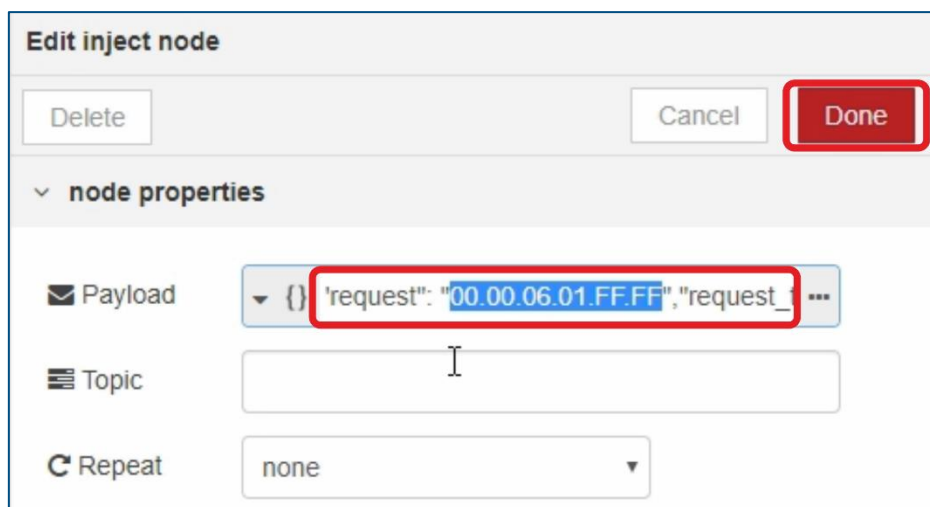
### 3.1.1 Modify the inject input

Double-click the **inject input**, change the payload type to JSON and insert the DPA command in JSON format here.



Here is the command which **turns ON the red LED** on the IQRF coordinator. Click on **Done**.

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



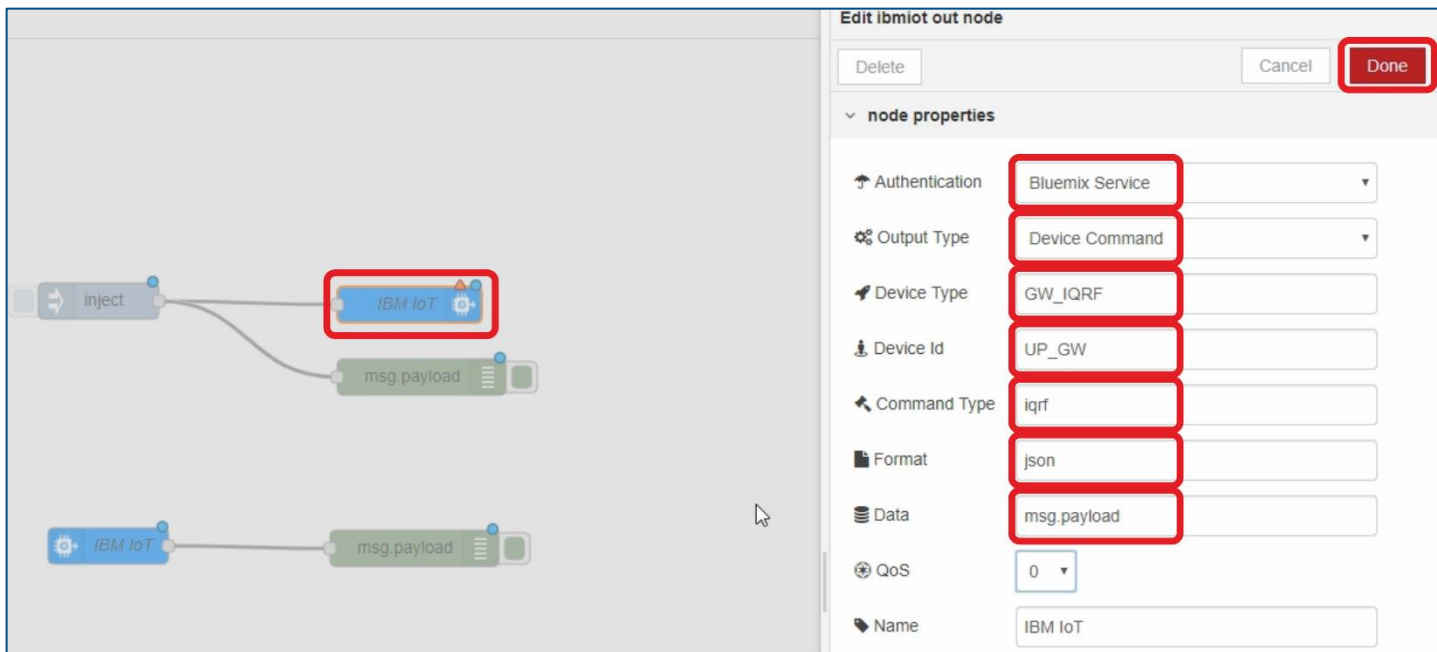
More examples:

- Collecting all sensory data from Node #1 using the connected DDC-SE kit: 01.00.5E.01.FF.FF.FF.FF.FF.
- Turning ON both relays of DDC-RE kit connected to Node #2: 02.00.4B.00.FF.FF.03.00.00.00.01.01.
- Acquiring temperature from Node #3: 03.00.0A.00.FF.FF.

For more information about macros and the IQRF network read the [IoT Starter Kit – Part 1: Build your IQRF network](#).

### 3.1.2 Modify the ibmiot output

Click the **ibmiot output**. Change the authentication to **Bluemix service**, set the output type to **Device Command**, and fill in the information of the virtual device you have created earlier. Enter “**iqrf**” as the command type. Enter “**msg.payload**” as the Data and click **Done**.



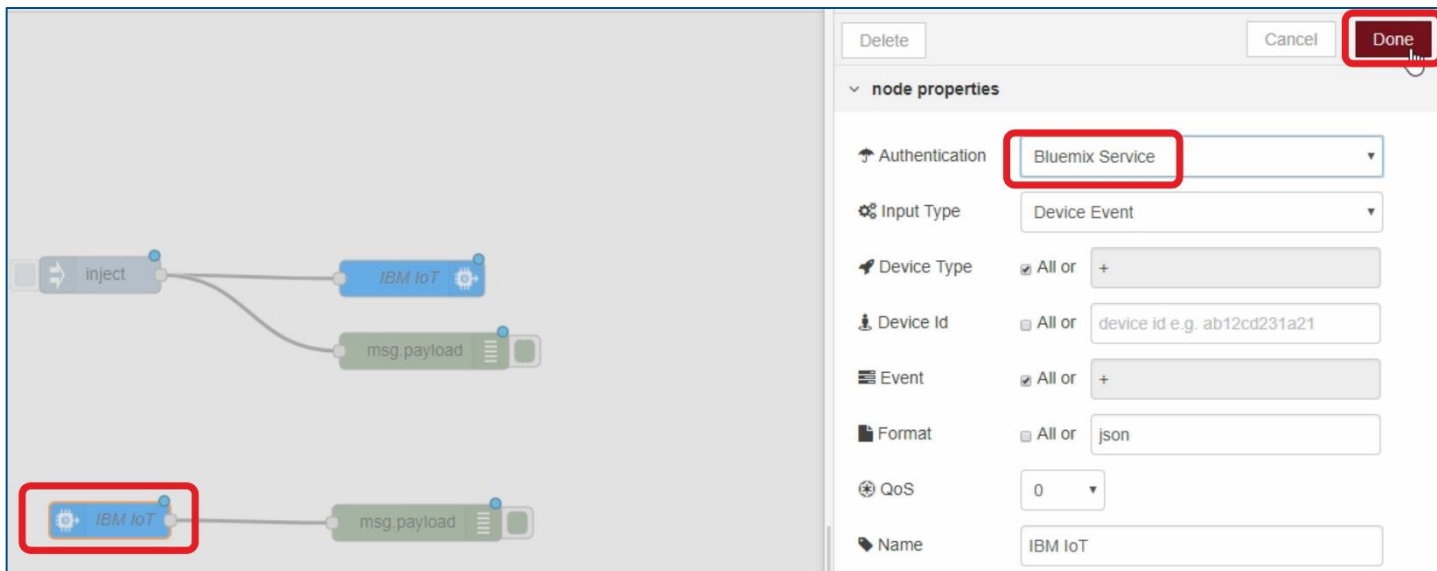
The screenshot shows the 'Edit ibmiot out node' dialog box. The 'node properties' section is expanded, and the following settings are visible:

- Authentication: Bluemix Service
- Output Type: Device Command
- Device Type: GW\_IQRF
- Device Id: UP\_GW
- Command Type: iqrf
- Format: json
- Data: msg.payload
- QoS: 0
- Name: IBM IoT

The 'Done' button is highlighted with a red box.

### 3.1.3 Modify the ibmiot input

Click the **ibmiot input** and select **Bluemix Service** as the authentication type. **Save** the configuration.



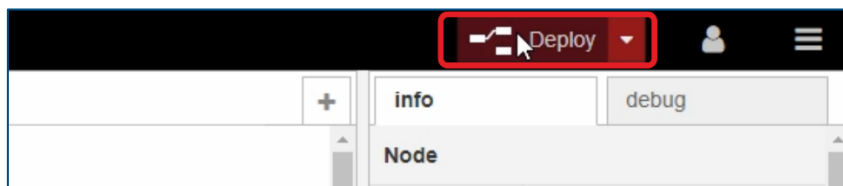
The screenshot shows the 'Edit ibmiot in node' dialog box. The 'node properties' section is expanded, and the following settings are visible:

- Authentication: Bluemix Service
- Input Type: Device Event
- Device Type: All or +
- Device Id: device id e.g. ab12cd231a21
- Event: All or +
- Format: json
- QoS: 0
- Name: IBM IoT

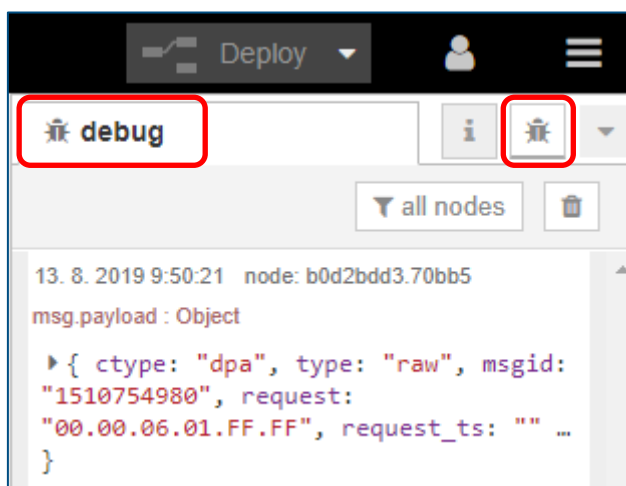
The 'Done' button is highlighted with a red box.

### 4 Test the connection

Click the **Deploy** button.



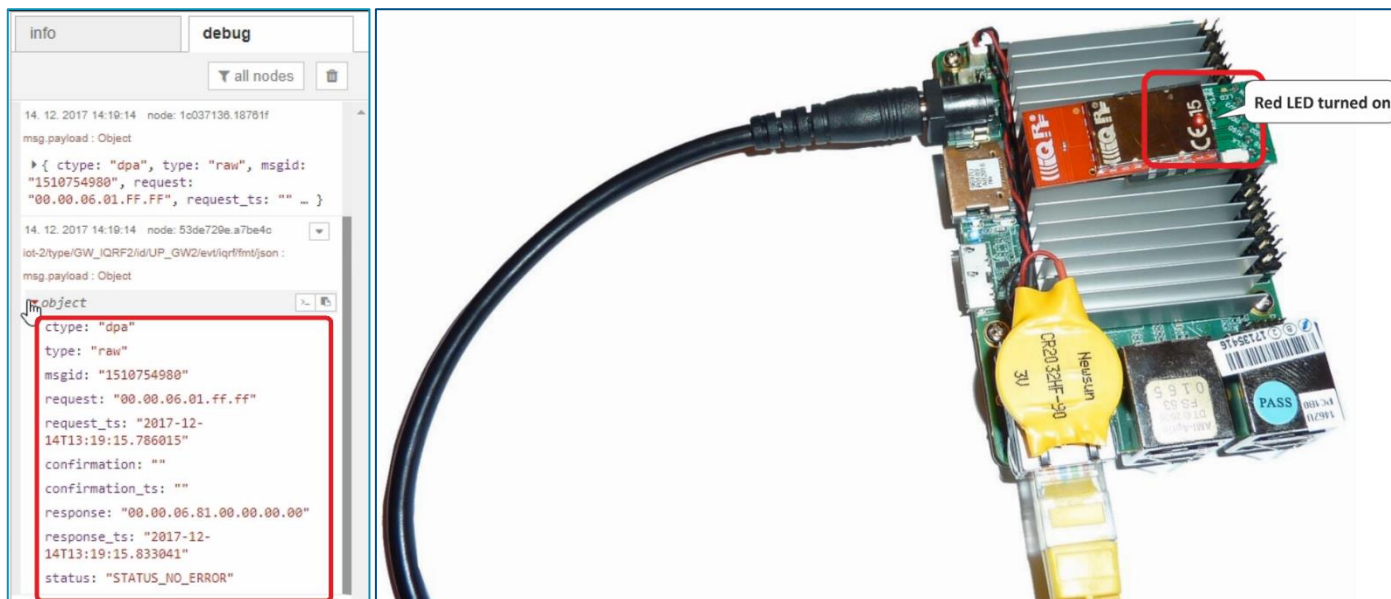
Show the **Debug** tab.



Click the left corner of the **Inject** button. You send the prepared command to the MQTT broker and to the debug output as well.



In the **Debug** tab, you can see the ongoing communication between *IBM Cloud* and the *IQRF Gateway*. 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.

## 5 Summary

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