

# IoT Starter Kit – Part 3:

# Connect to the cloud – Microsoft Azure

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

First, log in to your Microsoft Azure account on <u>portal.azure.com</u>. 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	Choose your pricing and scale tier	×
* Name IQRFtest ✓	F1 Free         S1 Standard           8k messages/unit/day         400k messages/unit/day	S2Standard6Mmessages/unit/day
* Pricing and scale tier	Cloud-to-device messaging Device-to-cloud telemetry Cloud-to-device messaging	Device-to-cloud telemetry     Cloud-to-device messaging
* IoT Hub units <b>0</b>	200 units maximum	200 units maximum
* Device-to-cloud partitions •		
* Subscription	42,1 Unable to display pricing EUR PER IOT HUB UN	7 421,65 EUR PER IOT HUB UNIT

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

<ul> <li>★ Resource group ●</li> <li>● Create new ○ Use existing</li> <li>IQRFres ✓</li> </ul>
* 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.

··· ×	IQRFtest - IoT Devices	Learn more about creating devices.
IODEtest	<i>Search (Ctrl+/)</i>	Delete MyTestDev X
AZURE IOT HUB	Overview     Activity log	Authentication Type © Symmetric Key X.509 Self-Signed X.509 CA Signed Auto Generate Keys ©
Ę	Access control (IAM) Query  Qu	Primary Key <b>0</b> Enter your primary key here
Active	Shared access policies     WHERE     optional (e.g. tags.location='US')	Secondary Key <b>0</b> <i>Enter your secondary key here</i>
	• Pricing and scale	Connect device to IoT Hub
	Operations monitoring Execute	
	IP Filter	
	Certificates  Filter by Device Id  Filter by Device Id	
	Properties DEVICE ID	
	Locks No results	
	Automation script	
	EXPLORERS	
	I IoT Devices	

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

➡ Add III Columns ···· More	🧮 Device Twin 🛛 Message To Device 📣 Direct Method 🥰 Set Modules 💍 Refresh
You can use this tool to view, create, update, and delete devices on your IoT Hub.	Device Id 🖲 MyTestDev
Query 🖲	Primary key 🕈 pL9GDSnGxnC8sXl6JKQJpacuGejWP7LAa+3FLeEO5tA=
SELECT * FROM devices WHERE	Secondary key  uEmJe0QV6KRroDcKbqswJsYRkRGy54h/A8PKkDT541U=
optional (e.g. tags.location='US')	Connection string—primary key <b>0</b> HostName=IQRFtest.azure-devices.net;DeviceId=MyTestDev;SharedAccessKey=pL9GDSnGxnC8sXI6JKQJpacuGejWP7LAa+3FLeEO5tA=
Execute	Connection string—secondary key <b>1</b> HostName=IQRFtest.azure-devices.net;DeviceId=MyTestDev;SharedAccessKey=uEmJe0QV6KRroDcKbqswJsYRkRGy54h/A8PKkDT541U=
	Connect device to IoT Hub  Enable Disable
DEVICE ID STATUS           V         MyTestDev         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.

(-) @ http://192.168.1.168/en/								
Ø Dashboard   IQRF Gateway								
	IQRF Gateway	Dashboard	Gateway 🕶	Configuration -	Service	IQRF Net 🕶	Clouds -	
							Amazon AWS	;
	Dashbor	ord					Mimosoft Azu	re
	Dashbua	aru -					IBM Bluemix	
	Gateway						Inteliments Int	teliGlue
	Show information a	bout gateway.						
	Configuration							
	Edit configuration.							

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

Azure configuration	
Add MQTT interface Add MQTT interface via device's connection striffer	
Add new MQTT interface from MS Azure IoT Hub Conne	ection string
IoT Hub Connection String for Device	
HostName=IQRFtest.azure-devices.net;DeyiceId=MyTestDev;SharedAccessKey=pL9GDSnGxnC8sXl6JKQJpacuGejWP7LAa+3FLeEO5tA	/= X
Save	



#### 2.2 Restart the service

Restart the IQRF Gateway Daemon service.

IQRF Gateway	Dashboard	Gateway 👻	Configuration -	Service	IQRF Net 👻	Clouds -
Service						
Start Start IQRF Daemo	n service.					
Stop Stop IQRF Daemo	n service.					
Restart Restart IQRF Dae	Don service.					
Status Get status of IQRF	Daemon service	2.				

# **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.

··· ×	IQRFtest - Shared access pol	icies		iothubowner X
IQRFtest	Search (Ctrl+/)	+ Add		🕞 Save 🗶 Discard 🕐 Regen key 💼 Delete
AZURE IOT HUB	Overview	IoT Hub uses		Access policy name
Ţ	Access control (IAM)	Q Search to filter items		iothubowner
Active 💦	SETTINGS	POLICY		Permissions
	Shared access policies     Pricing and scale	iothubowner service	Vevice connect	Registry write      Service connect
	Operations monitoring	device	$\geq$	V Device connect 0
	Certificates	registryRead registryReadWrite		
	Properties			Shared access keys Primary key 0
	😫 Automation script			Zhr2kUS/UqsZGXWX1xbittNcqKPBehuldkQKxRy1Nhg=
	EXPLORERS BIT Devices			Soperation string - primary key  Copied Copied HostName=IQRFtest.azure-devices.net_SharedAccessKeyNam



## 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.

Device Explorer						_	)
Configuration	Management Data Messag	ges To Device					
Connection Inf	ormation						
IoT Hub Conn	ection String:						_
HostName=IQ devices.net;SI	RFtest.azure- haredAccessKeyName=iothub	owner;SharedAcces	sKey=Zhr2kDS/Uq	3ZGXwX1xbltfNcqF	RPbehuldkQKxRy	y1Nhg=	
		-					
Protocol Gate	way HostName:	Info		×			
L la data							
Update		Settings	updated successfully				
Shared Acces	s Signature			_			
Kev Name	iothubowner	_	OK				
Kennik		RPbehuldkOKvRv1	Nha=				
Key Value		In Dendron on the start of the	ang				
Key Value Target	IORFtest azure-devices net						

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

Device Explorer						-		×
Configuration Ma	nagement Data N	lessages To Devic	e					
Actions Create	Refresh	Update	Delet	e SAS	Token			
Devices Total: 1	3							
ld	PrimaryKey	SecondaryKey	ConnectionStrin	ConnectionStat	LastActivityTim	LastConnection	LastState	-L
MyTestD	ev pL9GDSnGxn.	uEmJe0QV6	HostName=I	Connected	14.12.2017 7:27	14.12.2017 6:59		



## 3.3 Inspect the communication

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

Configuration Managemen Data Messages To Device Monitoring Event Hub: QRFtest	]
Monitoring Event Hub: IQRFtest	]
Event Hub: QRFtest	]
Device ID: MyTestDev	
Start Time: 12/14/2017 08:29:08	]
Consumer Group: \$Default	
Monitor Cancel Clear	
Event Hub Data	_

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.

🛃 Device Explorer –		×
Configuration Management Data Messages To Device		
Monitoring		
Event Hub: IQRFtest		]
Device ID: MyTestDev	V	
Start Time: 21/14/2017 08:29:08		
Consumer Group: \$Default		
Monitor Cancel Clear		
Event Hub Data		
Receiving events 14.12.2017 8:29:31> Device: [MyTestDev], Data:[{ "ctype": "fraw". "msgid": "1510754980", "request": "00.00.06.01.ff.ff". "request_ts": "2017-12-14T07:29:31.75095", "confirmation": "", "confirmation": "", "response": "00.00.06.81.00.00.00.00", "response_ts": "2017-12-14T07:29:31.123369", "status": "STATUS_NO_ERROR" }]		
	ED turned	d on

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.