

QuecPython Alibaba Cloud IoT Platform Access User Guide

LTE Standard Module Series

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1 Introduction

This document takes EC100Y-CN as an example to show how to access Alibaba Cloud with QuecPython class library APIs.

2 Alibaba Cloud IoT Platform

2.1. Platform Introduction

Alibaba Cloud IoT Platform allows stable communication between devices and the IoT platform, connects massive devices downwards, supports to collect device data and uploads to the cloud; provides cloud APIs upwards, and the server sends commands to the device by calling the cloud APIs to achieve remote control. The IoT platform also provides other communication management capabilities, such as device management, rule engine, security capabilities, etc. for rapid data collection, storage, and application development.

Alibaba Cloud IoT platform document center URL:

<https://www.alibabacloud.com/help?spm=a2c63.128256.3156523820.dnavd>. You can log on to this website to learn more about the IoT platform and device access related knowledge.

2.2. Explanation of Key Terms in the IoT Platform

The following table briefly introduces the key terms in the Alibaba Cloud IoT platform. For detailed information, see Alibaba Cloud official documents in URL: <https://www.alibabacloud.com/help/doc-detail/30524.htm?spm=a2c63.128256.b99.4.67e82b73H77imJ>.

Table 1: Key Terms

Key Term	Explanation
product	A product is a set of devices that have the same features. IoT Platform issues a unique ProductKey for each product.
device	A physical device that belongs to a product. IoT Platform issues a DeviceName that is unique under the same product for each device. Devices can directly connect to IoT Platform, or be attached as sub-devices to a gateway that is connected to IoT Platform.
sub-device	Sub-devices cannot directly connect to IoT Platform and must be attached to a gateway.

gateway	A gateway can directly connect to IoT Platform and allows you to manage sub-devices. Sub-devices can communicate with IoT Platform only by using a gateway.
device certificate	<p>A device certificate consists of ProductKey, DeviceName, and DeviceSecret.</p> <ul style="list-style-type: none"> ● ProductKey is the unique identifier of a product in IoT Platform. This parameter is required in device authentication and communication. You must safely keep this parameter. ● DeviceName is the device name that is generated by IoT Platform during device registration. You can also upload custom device names. Each device has a unique DeviceName under the same product. This parameter is required in device authentication and communication. You must safely keep this parameter. ● DeviceSecret is the private key that is issued by IoT Platform for each device. DeviceSecret is used in pair with DeviceName. This parameter is required in device authentication and communication. You must safely keep this parameter.
ProductSecret	ProductSecret is the private key that is issued by IoT Platform for each product. ProductSecret is used in pair with ProductKey for unique-certificate-per-product authentication. This parameter is required in device authentication and communication. You must safely keep this parameter.
unique-certificate - per-device authentication	A device certificate is burned to each device. The device certificate includes a ProductKey, DeviceName, and DeviceSecret. When you connect a device to IoT Platform, IoT Platform authenticates the device based on the certificate.
unique-certificate - per-product authentication	A product certificate is burned to all devices under the same product. A product certificate includes a ProductKey and ProductSecret. When a device sends an activation request, IoT Platform authenticates the device based on the certificate. If the authentication succeeds, IoT Platform issues a DeviceSecret to the device. Then, the device uses the DeviceSecret to connect with IoT Platform.
Topic	A topic is a UTF-8 character string that is used as a transmission medium during publish/subscribe communication. A device can publish messages to a topic or subscribe to messages from a topic.
rules engine	You can create and configure rules in IoT Platform to achieve the following features: server-side subscription, data forwarding, and scene orchestration.
TSL model	IoT Platform uses the Thing Specification Language (TSL) to describe device features. A TSL model defines the device properties, services, and events. TSL models use the JSON format. You can organize data based on a TSL model and submit the data to IoT Platform.

- **Prototype**



-

3 Alibaba Cloud related APIs

3.1. aLiYun

This function configures the product and device information of the Alibaba Cloud IoT suite

- **Prototype**

```
aLiYun(productKey, productSecret, DeviceName, DeviceSecret)
```

- **Parameter**

productKey:

The unique identifier of a product

productSecret:

The product secret which is optional. Default: None.

In unique-certificate-per-device authentication, input None (Cannot be an empty string). In unique-certificate-per-product authentication, input the real product secret.

deviceName: Device
name

deviceSecret:

Device secret which is optional. Default: None.

In unique-certificate-per-product authentication, input None

- **Return Value**

Return the Alibaba Cloud connection object.

3.2. aLiYun.setMqtt

This function sets the parameters of the MQTT data channel.

```
aLiYun.setMqtt(clientID, clean_session, keepAlive)
```

Parameter

clientID:

Customized Alibaba Cloud connection ID

clean_session:

A Boolean value that determines the client type which is optional. Default: False.

If it is True, the agent deletes all information about this client when it disconnects from the client.

If it is False, the client is a persistent client. When the client disconnects, subscription information and queued messages are reserved.

keepAlive:

The maximum time allowed between communications. Range: 60–1200; Unit: second; Default: 300.

● Return Value

None

3.3. aLiYun.setCallback

This function registers the callback function.

● Prototype

```
aLiYun.setCallback(sub_cb)
```

● Parameter

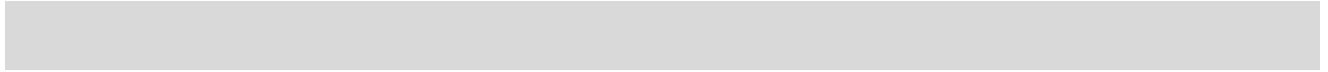
sub_cb:

The callback function

● Return Value

None

- **Prototype**



- **3.4. aLiYun.subscribe**

This function subscribes to MQTT topics.

- **Prototype**



- `aLiYun.subscribe(topic,qos)`

- **Parameter**

topic: The
subscribed topic

qos:
MQTT message service quality. Default: 0. It can be 0 or 1.

- **Return Value**

None

3.5. aLiYun.publish

This function published a message.

- **Prototype**

```
aLiYun.publish(topic,msg)
```

- **Parameter**

topic:
The published topic

msg:
The data to be sent

- **Return Value**

None

- **Prototype**



-

3.6. aLiYun.start

This function starts to run the connection.

```
aLiYun.start()
```

Parameter

None

- **Return Value**

None

4 Connecting Alibaba Cloud with QuecPython

4.1. Creating Products and Equipment

When using the Alibaba Cloud IoT platform, you first need to create products and corresponding devices in the cloud, and obtain device certificates (ProductKey, DeviceName, and DeviceSecret). A product is equivalent to a collection of devices of one type, and devices under the same product have the same functions. Download the device certificate issued by the IoT platform to the device and use it for identity verification when the device is connected to the IoT platform.

Step 1: Log in to the Alibaba Cloud IoT platform console by <https://www.alibabacloud.com/>. After login, Click "**Devices**" and then "**Products**" in the navigation bar to start creating product and configure the parameters.

The screenshot displays the 'Create Product (Device Model)' page in the Alibaba Cloud IoT Platform console. The left sidebar contains a navigation menu with options: Public Instance, Devices, Products (selected), Rules, Maintenance, Resource Allocation, Link Analytics, and Documentation and Tools. The main content area is titled 'Create Product (Device Model)' and includes a 'Create Product' button and a link to 'New product from equipment center'. The form fields are as follows:

- Product Name:** A text input field with a placeholder 'You must specify a product name'.
- Category:** A dropdown menu with 'Standard Category' selected and 'Custom Category' as an option. A 'View Features' link is next to it.
- Node Type:** Three selectable options: 'Directly Connected Device' (selected), 'Gateway sub-device', and 'Gateway device'.
- Networking and Data Format:**
 - Network Connection Method:** A dropdown menu with 'Wi-Fi' selected.
 - Data Type:** A dropdown menu with 'ICA Standard Data Format (Alink JSON)' selected.
 - Authentication Mode:** A section header with a dropdown arrow.
- More:** A section header with a dropdown arrow.
- Buttons:** 'OK' and 'Cancel' buttons at the bottom.

Figure 1: Create Product

Step 2: It is recommended to configure according to the parameters shown in the figure below. To learn more about the parameter configuration, please visit the official address of Alibaba Cloud IoT platform: <https://www.alibabacloud.com/help/product/30520.htm>.

After creation, click "OK" to save the configuration.

The screenshot displays the 'Create Product' interface in the Alibaba Cloud IoT Platform. The left sidebar contains navigation links: Public Instance, Devices, Products (selected), Rules, Maintenance, Resource Allocation, Link Analytics, and Documentation and Tools. The main panel shows the configuration for a new product named 'smartLight'. The 'Category' is set to 'Standard Category' with a value of '智能城市 / 公共服务 / 路灯照明'. The 'Node Type' is 'Directly Connected Device'. Under 'Networking and Data Format', the 'Network Connection Method' is 'Cellular (2G / 3G / 4G / 5G)', 'Data Type' is 'ICA Standard Data Format (Alink JSON)', and 'Authentication Mode' is 'Device Secret'. At the bottom, there are 'OK' and 'Cancel' buttons.

Figure 2: Reference of Product Configurations

Step 3: A product refers to a certain type of device. After creating the product, you need to add an identity for the device. You can add one single device or a batch of devices at a time. Here takes the creation of one single device as an example for detailed introduction. Click "**Devices**" and "**Add Device**" to start adding a device.

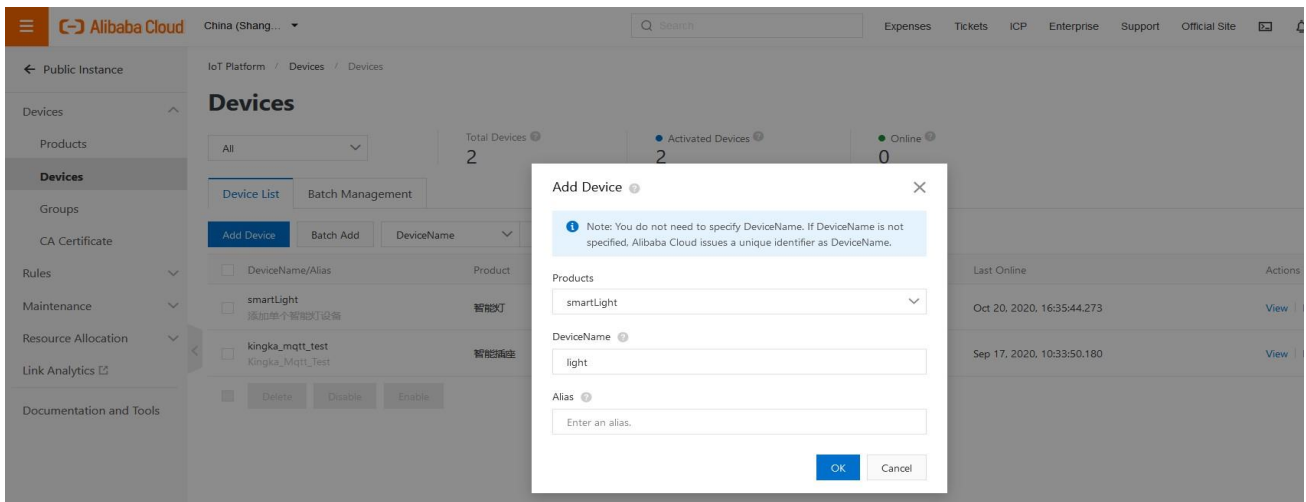


Figure 3: Add Device

Step 4: After the device is successfully added, the "Device Certificate" window automatically pops up, and you can view and copy the device certificate information. Consisting of ProductKey, DeviceName, and DeviceSecret of the device, the device certificate is an important identity authentication for the communication between the device and the IoT platform. Please keep the device certificate properly.

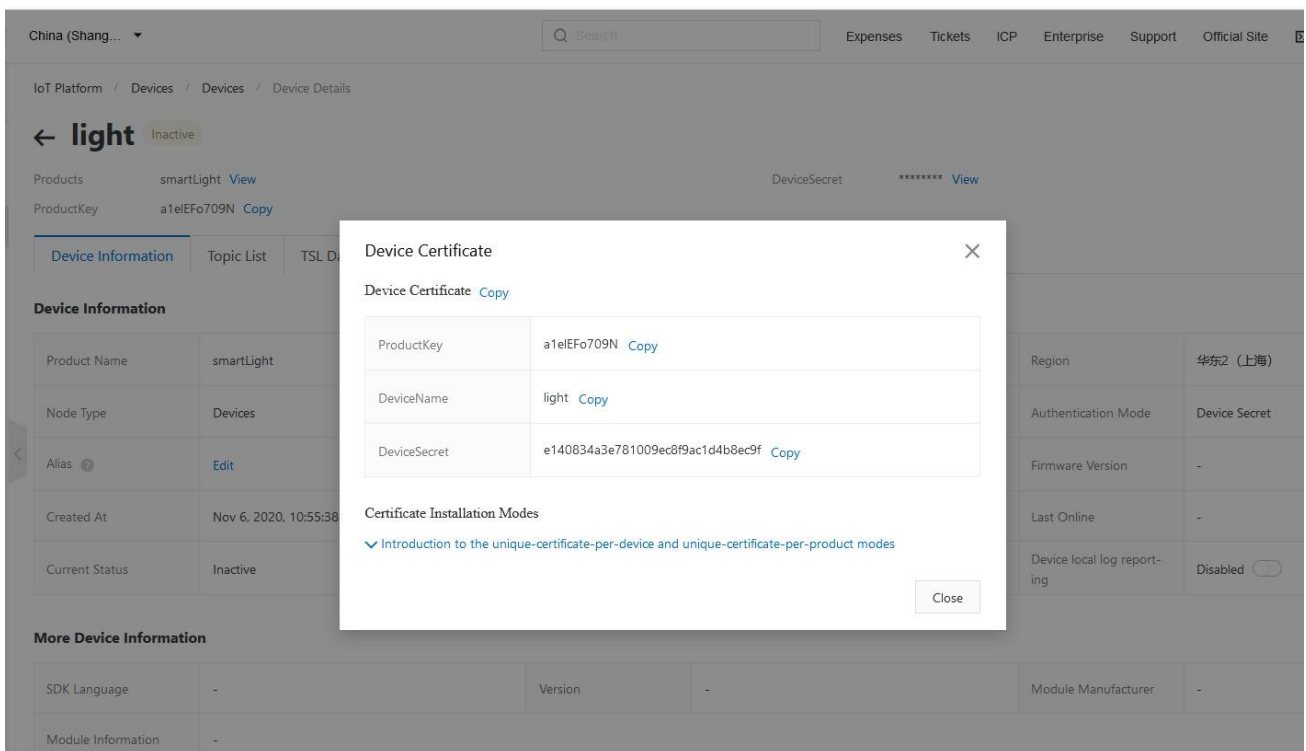


Figure 4: Device Certificate Information

4.2. Connet to Alibaba Cloud IoT Platform

Before accessing the Alibaba Cloud IoT platform, please confirm that you have added products and devices on the IoT platform console and had the device certificate information (ProductKey, DeviceName, and DeviceSecret).

4.2.1. Connect to the IoT Platform through MQTT.fx and Test

Download and install the software MQTT.fx.

Step 1: Open the MQTT.fx software and click the setting icon "".



Figure 5: Device Certificate Information

Step 2: Set the connection parameters. The IoT platform currently supports two connection modes, with different settings. See the parameter settings in the table below.

Table 2: Connection Parameters

Name	Input Information
Profile Name	Customized name
Profile Type	MQTT Broker
Broker Address	<p>Indicates the access domain name. Enter the access domain name of the purchased instance. Please enter the instance management page of the Alibaba Cloud IoT platform console to view the connected domain name information in the instance details.</p> <p>The access domain name of the public instance is <code>\${YourProductKey}.iot-as-mqtt.\${YourRegionId}.aliyuncs.com</code>.</p> <ul style="list-style-type: none"> ● <code>\${YourProductKey}</code> should be replaced with the ProductKey of the product to which the device belongs (ProductKey can be obtained from the device details page of the IoT platform console). ● See Regions and Availability Zones and replace <code>\${YourRegionId}</code> with a customized region ID.
Broker Port	1883

Client ID	<p>Input the mqttClientId for the underlying protocol message of MQTT</p> <p>Fixed format: <code>\${clientId} securemode=3,signmethod=hmactsha1 </code></p> <p>A complete example is: <code>12345 securemode=3,signmethod=hmactsha1 </code></p> <ul style="list-style-type: none"> ● <code>\${clientId}</code> is the device ID. It can take any value and the length is within 64 characters. It is recommended to use the MAC address or SN of the device. ● <code>securemode</code> is a secure mode, TCP direct connection mode is set <code>securemode=3</code>, and TLS direct connection is set <code>securemode=2</code>. ● <code>signmethod</code> is an algorithm type, supporting <code>hmacmd5</code> and <code>hmactsha1</code>.
General	<p>The setting items under General can be the default value of the system, or can be set according to specific needs.</p>
User Name	<p>It is composed of DeviceName, symbol (&) and ProductKey.</p> <p>Fixed format: <code>\${YourDeviceName}&\${YourProductKey}</code>.</p> <p>A complete example is: <code>device&alxxxxxxxxx</code>.</p>
Password	<p>Download the Password generation tool.</p> <p>Enter https://files.alicdn.com/tpsservice/88413c66e471bec826257781969d1bc7.zip to decompress the download package and double-click the <i>sign</i> file. The parameters for generating the password are as follows:</p> <ul style="list-style-type: none"> ● <code>productKey</code>: Product key to which the device belongs. It can be viewed on the console device details page. ● <code>deviceName</code>: device name. It can be viewed on the console device details page. ● <code>deviceSecret</code>: device secret. It can be viewed on the console device details page. ● <code>timestamp</code>: (optional) timestamp. ● <code>clientId</code>: device ID, consistent with <code>\${clientId}</code> in the Client ID. ● <code>method</code>: select the type of signature algorithm, which is consistent with the encryption method determined by <code>signmethod</code> in Client ID

NOTES

1. After entering the client ID information, do not click "Generate".
2. When TCP is connected directly, `securemode=3` in Client ID, there is no need to set SSL/TLS information.
3. For TLS direct connection, `securemode=2` in the Client ID, you need to set SSL/TLS information.
4. When setting parameters, make sure that there are no spaces in or before or after the parameter value.

An example of setting connection parameter information is shown in the figure below:

Profile Name 阿里云mqtt智能灯测试

Profile Type MQTT Broker

MQTT Broker Profile Settings

Broker Address a1b2gBFGcLF.iot-as-mqtt.cn-shanghai.

Broker Port 1883

Client ID 12345|securemode=3,signmethod=hmac Generate

General **User Credentials** SSL/TLS Proxy LWT

User Name smartLight&a1b2gBFGcLF

Password

Revert Cancel OK Apply

Figure 6: Parameter Configurations

Step 3: After setting the connection parameters, click "OK" to confirm the application. Then click the "Connect" button to connect to the Alibaba Cloud IoT platform.

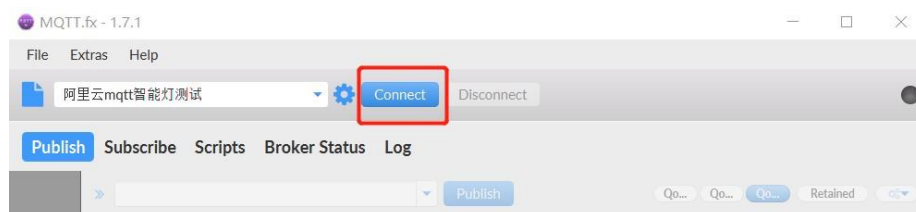


Figure 7: Device Details

4.2.1.1. Data Test

4.2.1.1.1. Downlink Data test

Downlink data test refers to sending messages from the Alibaba Cloud IoT platform and receiving messages on MQTT.fx. Here is an example to test whether MQTT.fx is successfully connected to the IoT platform.

Step 1: Click “**Subscribe**” of the navigation bar on MQTT.fx.

Step 2: Enter a customized topic for which the device has subscription rights, and click “**Subscribe**” to subscribe to the topic.

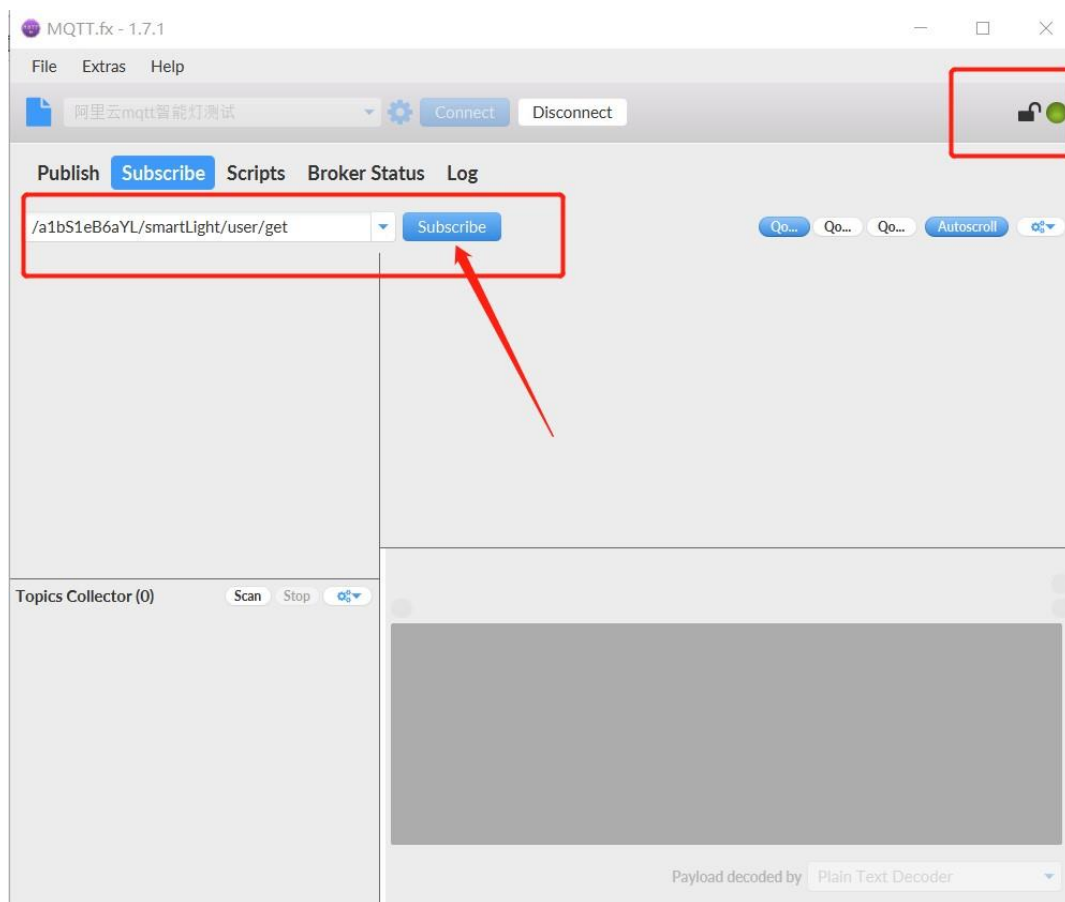


Figure 8: Subscribe to Customized Topic

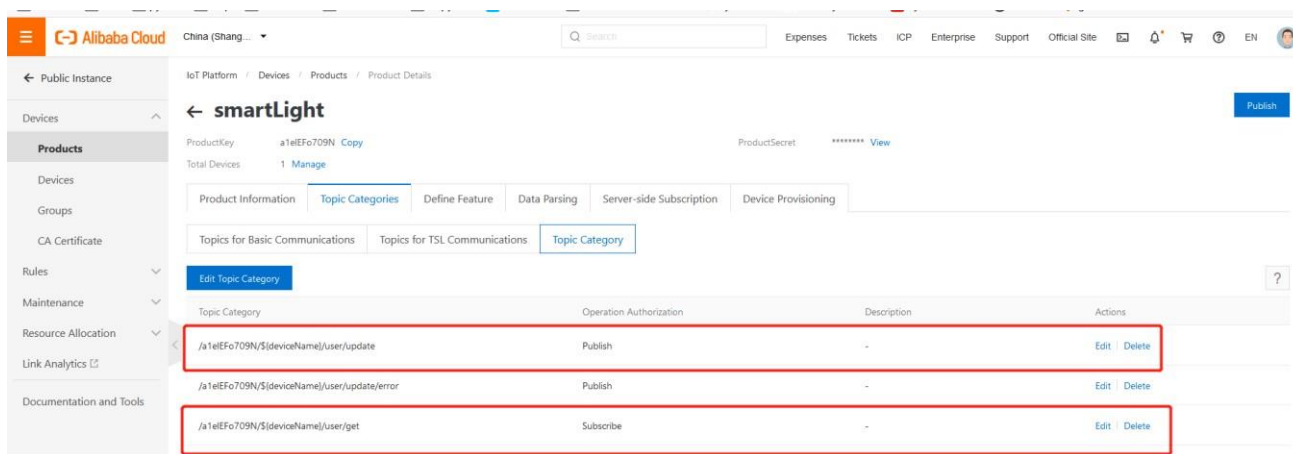


Figure 9: Customized Topic

Step 3: After the subscription is successful, the topic is displayed in the list.

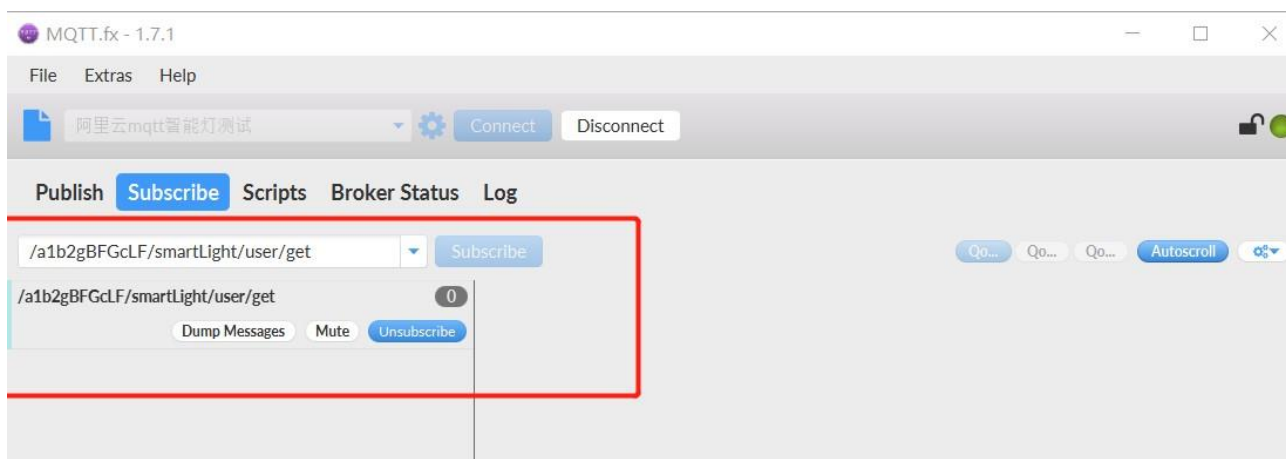


Figure 10: Subscribed Successfully

Step 4: Under the topic list page of the device details of the device in the IoT platform console, click the publish message corresponding to the subscribed topic. Enter the content of the message and click "OK".

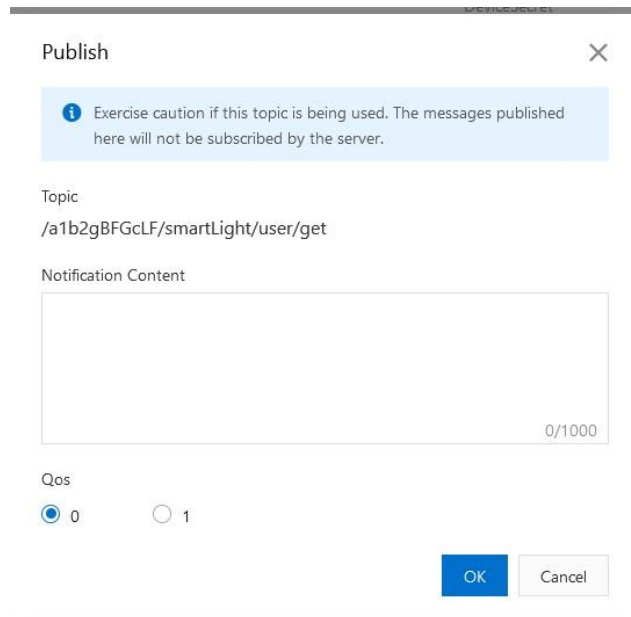


Figure 11: Send a Message from the IoT Platform

Step 5: Log in to the MQTT.fx and check whether the message has been received.

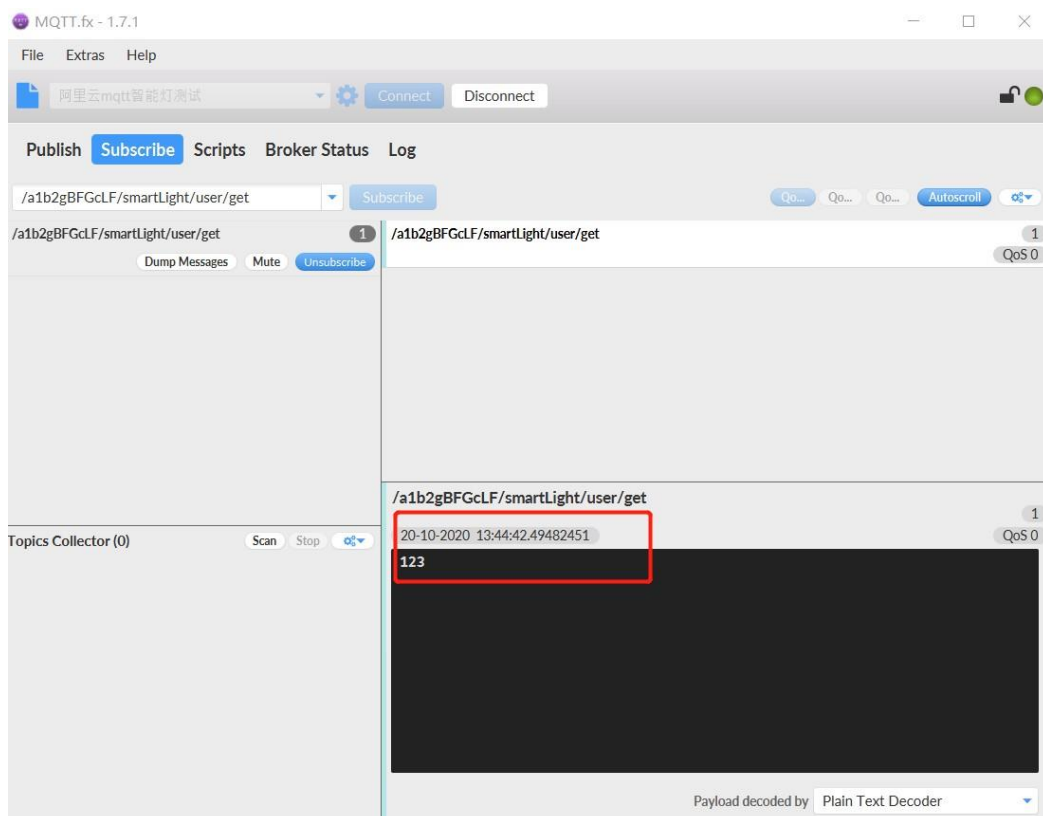


Figure 12: Receive the message sent from the IoT Platform

4.2.1.1.2. Uplink Data Test

Uplink data test refers to sending messages on MQTT.fx and viewing device logs through the IoT platform. Here is an example to test whether MQTT.fx is successfully connected to the IoT platform.

Step 1: Click “**Publish**” of the navigation bar on MQTT.fx.

Step 2: Input a topic for which the device has publishing permission and input the content of the message to be sent, and click “**Publish**” to push a message to this topic.

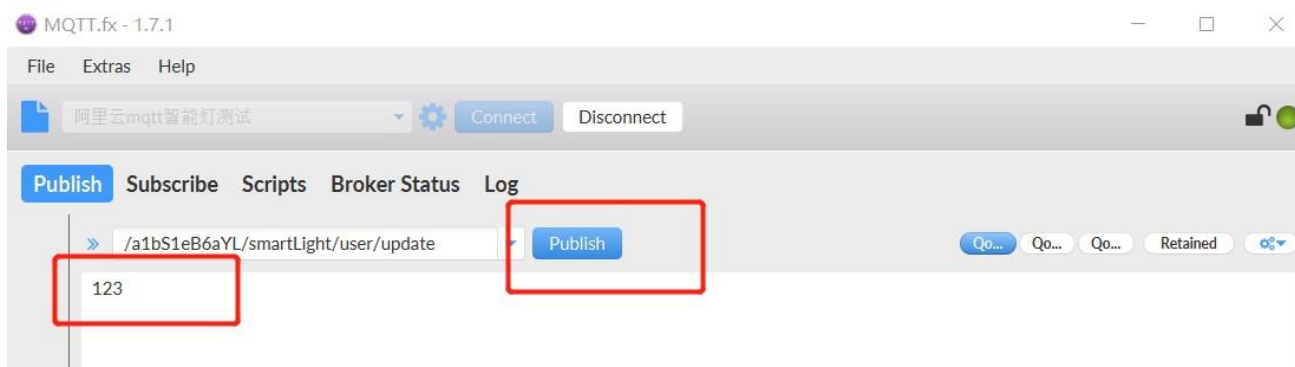


Figure 13: Publish a message to the IoT Platform

Step 3: In the IoT platform console, click "Maintenance", "Device Log", and "Cloud run log" in turn to view the cloud messages of the device.

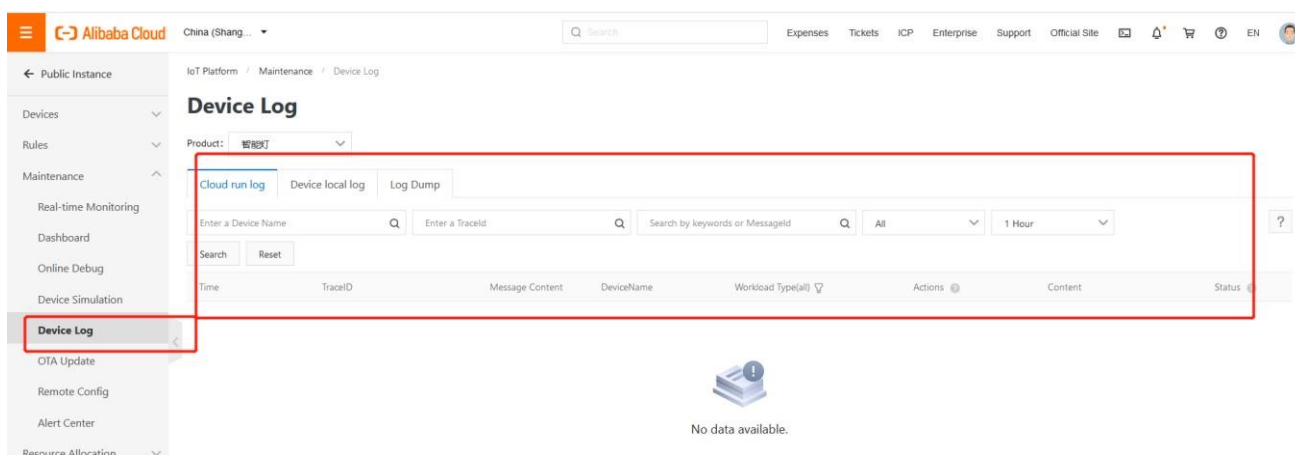


Figure 14: View the Message Content

4.2.2. Connect to the IoT Platform through QuecPython

Run the following code on EC100Y-CN, see *Quectel_QuecPython_Basic_Operation_Instructions* for details.

```
from aLiYun import aLiYun import
utime

productKey = "a1b2gBFGcLF"    # product key
productSecret = None # product secret (Input None in unique-certificate-per-device authentication)
DeviceName = "smartLight"    # device name
DeviceSecret = "78a3407e7d43b445cd2dd895cec50ffa" # device secret (Input None in unique-
certificate-per-product authentication )

# Add Alibaba Cloud connection object
ali = aLiYun(productKey, productSecret, DeviceName, DeviceSecret)

# Configure MQTT connection property clientID =
"12345" # customized string (within 64)
ali.setMqtt(clientID, clean_session=False, keepAlive=300)

# Callback function def
sub_cb(topic, msg):
    print("subscribe recv:")
    print(topic, msg)

# Configure the callback function ali.setCallback(sub_cb)

topic = "/a1b2gBFGcLF/smartLight/user/get" # Topic
# Subscribed topic
ali.subscribe(topic)

topicP="/a1b2gBFGcLF/smartLight/user/update"
# publish a message
ali.publish(topic, "hell world")

# Start to run
ali.start()
utime.sleep(2)
```

The result of running the code are as follows:

1. View the log from the Alibaba Cloud IoT platform.

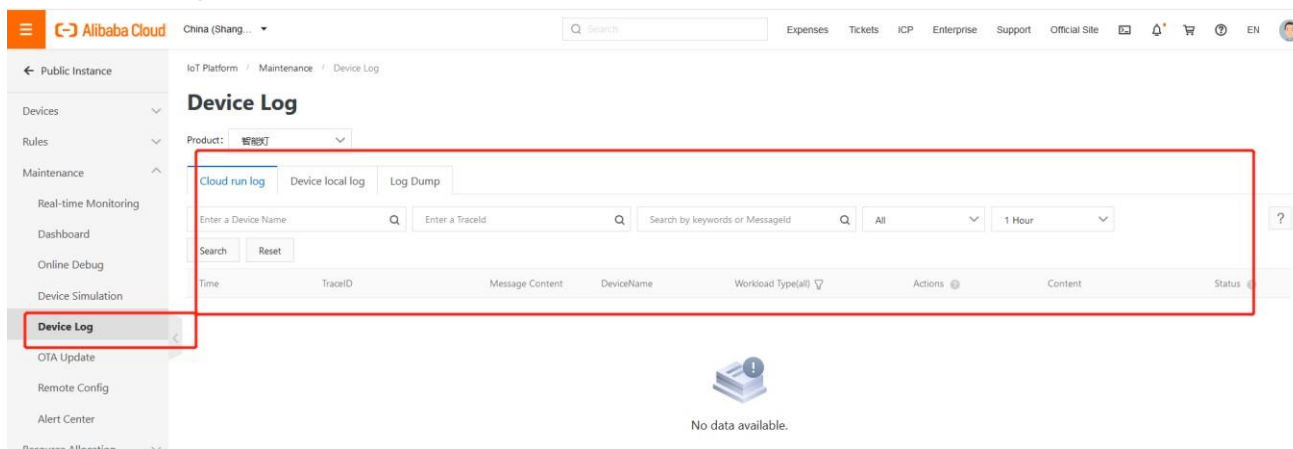


Figure 15: View the Message Content

2. The cloud publishes a message, and the device receives it in the `sub_cb` callback function.

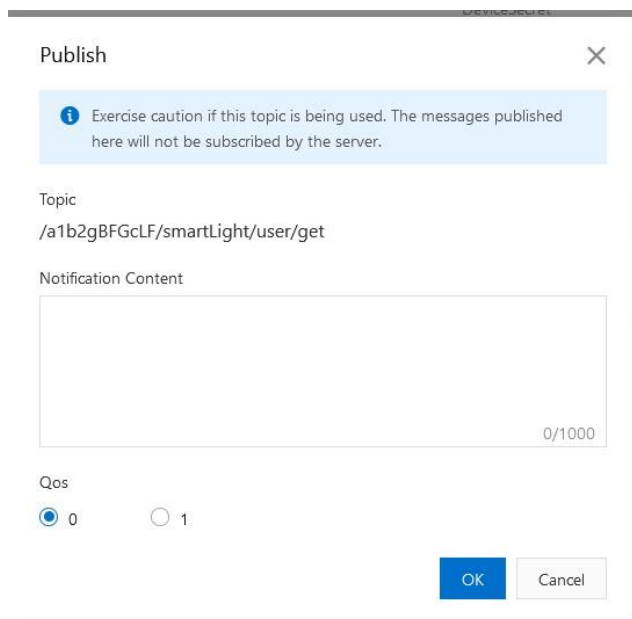


Figure 16: View the Message Content

```
b' /a1b2gBFGcLF/smartLight/user/get' b'wyc mqtt test'
subscribe recv:
b' /a1b2gBFGcLF/smartLight/user/get' b'wyc mqtt test'
```

5 Appendix A References

Table 3: Related Documents

SN	Document Name	Remark
[1]	Quectel_QuecPython_Basic_	QuecPython uploading and downloading file
	Operation_Instructions	introduction

Table 4: Terms and Abbreviations

Abbreviation	Description
API	Application Programming Interface
ID	Mostly refers to Identifier in terms of software
ID ²	Internet Device ID
IoT	Internet of Things
MAC	Medium Access Control
MQTT	Message Queuing Telemetry Transport
SN	Serial Number
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TSL	Thing Specification Language