NPort IA5000A-I/O or NPort IAW5000A-I/O to Mosquitto Alibaba

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1. Introduction

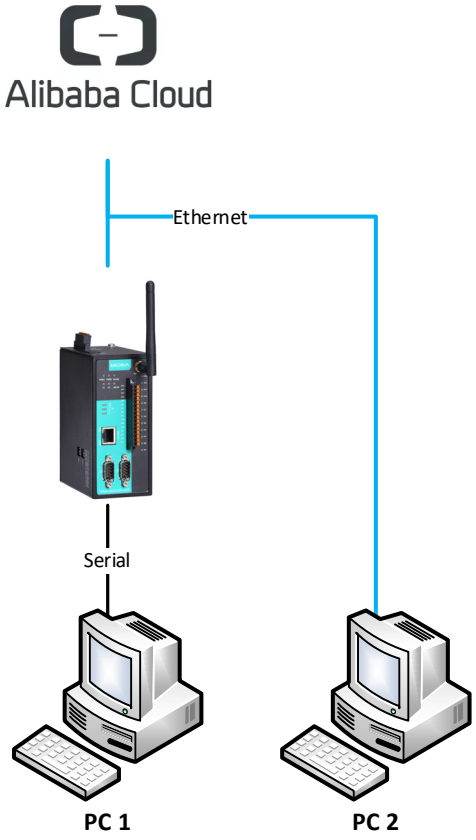
The NPort IA5000A-I/O and NPort IAW5000A-I/O serial device servers, which have built-in digital I/Os, provide maximum flexibility when you need to integrate serial equipment in the field with an Ethernet network or cloud platform. From Firmware Version 2.0 onwards, they support communications with IIoT applications, using generic MQTT or third-party cloud services, such as Azure and Alibaba Cloud.

This document demonstrates how to use the NPort IA5000A-I/O or NPort IAW5000A-I/O serial device to connect to Alibaba Cloud IoT Platform. We also demonstrate how to publish serial or I/O data messages to the cloud and subscribe messages from the cloud.

2. System Topology

Figure 1 illustrates the system topology. PC1 runs PComm Lite to act as a serial device. It connects to Port 1 of the NPort IA5000A-I/O or NPort IAW5000A-I/O serial device. The NPort IA5000A-I/O or NPort IAW5000A-I/O acts as an Alibaba Cloud device and connects to Alibaba IOT Platform. PC2 accesses Alibaba Cloud Console.

< Figure 1. System Topology >



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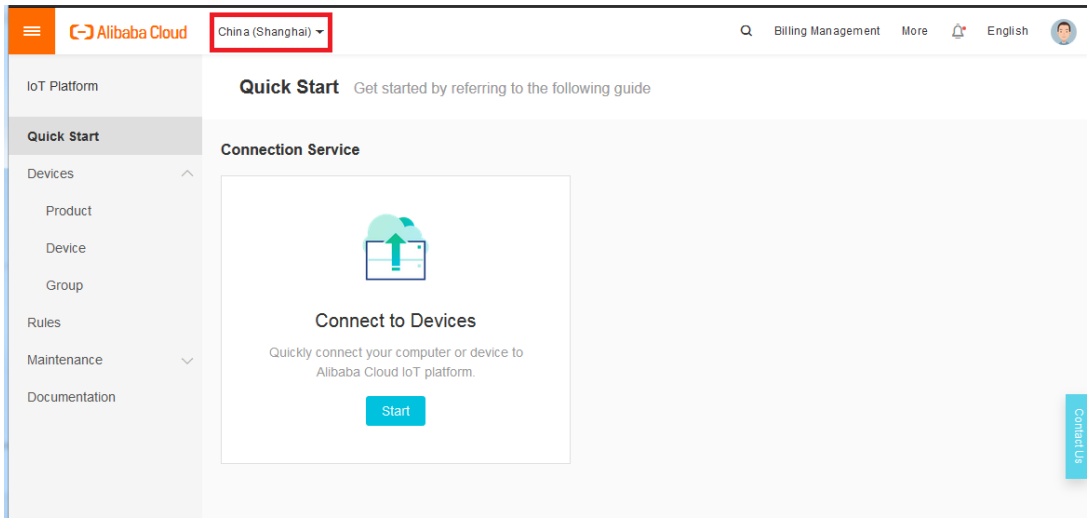
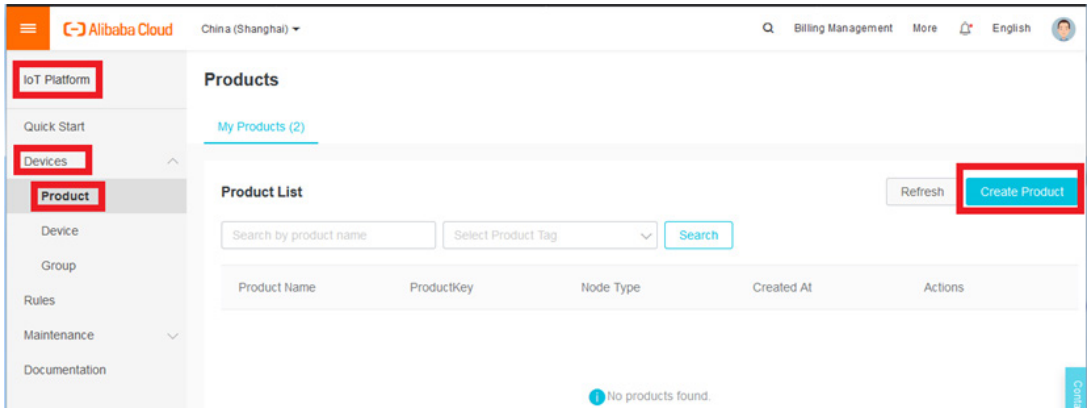
2.1 Creating a Product and Device on Alibaba

1. Use Alibaba user account to log in to Alibaba Cloud Console.
   Website: https://www.alibabacloud.com/
2. Select the region you want.



3. Create a new IoT Platform Product: **IoT Platform → Devices → Product → Create Product**.



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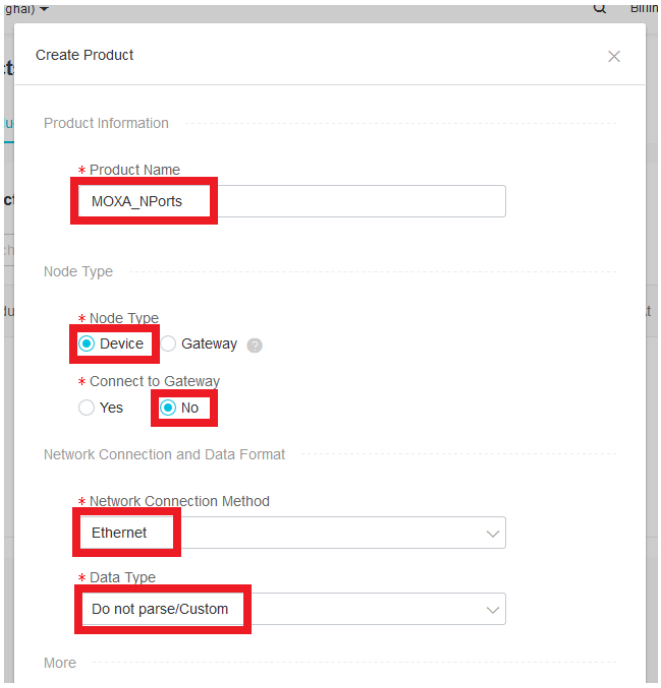
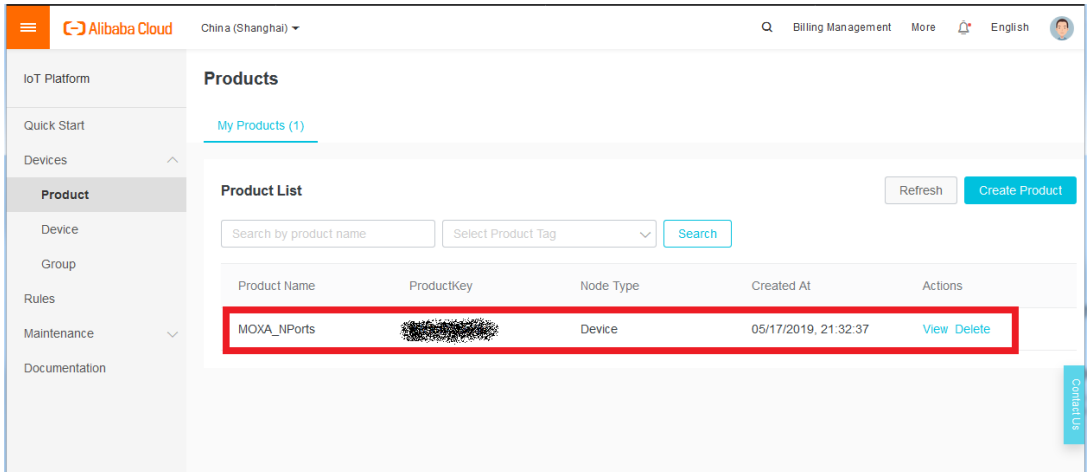
Set the product's settings as below. Click the **OK** button at the bottom.

- Product Name: MOXA_NPorts
- Node Type: Device
- Connect to Gateway: No
- Network Connection Method: Ethernet
- Data Type: Do not parse/Custom



After completing the above steps, the product name "MOXA_NPorts" will appear in **Product List**.



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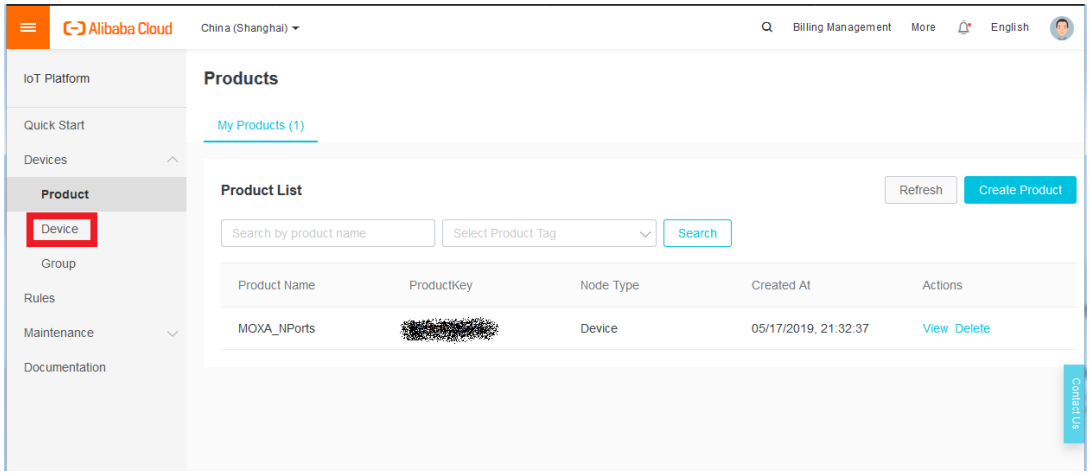
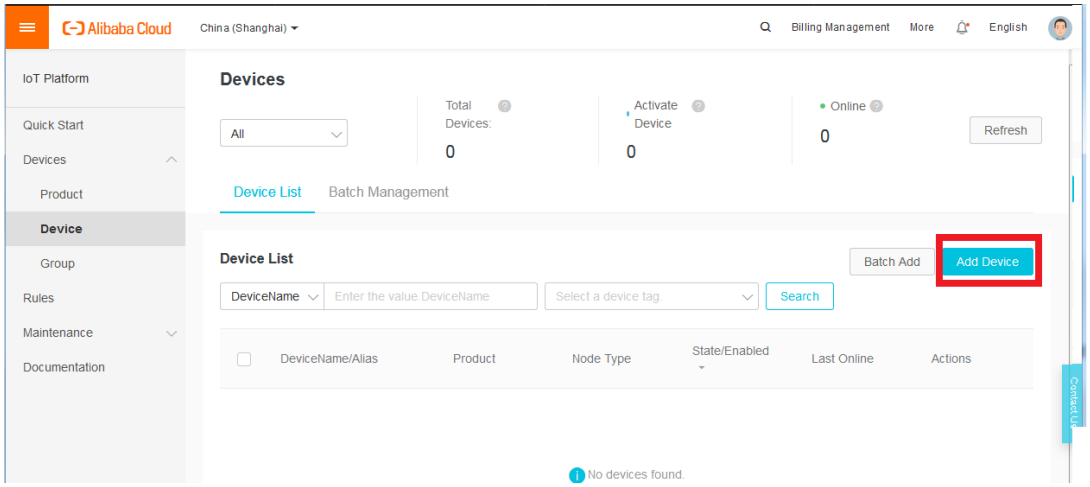
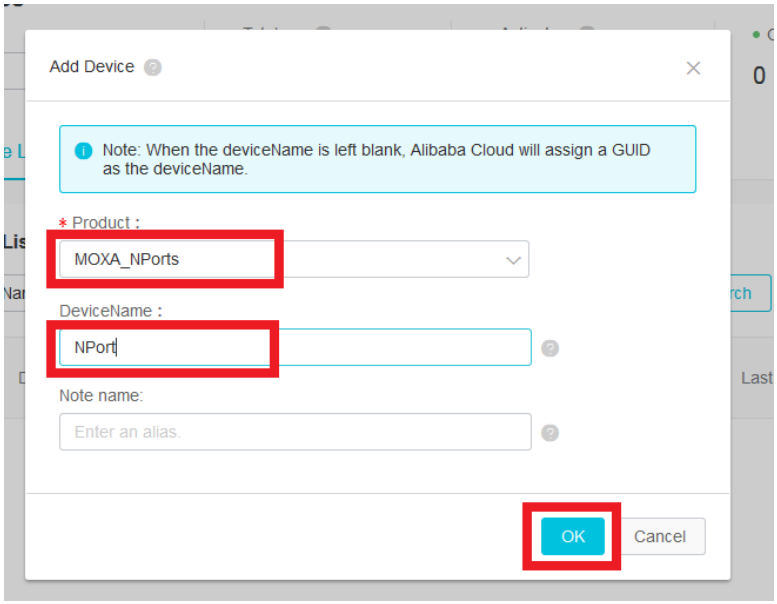
4. The next step is to add a new IoT Platform Device: **IoT Platform → Devices → Device.**



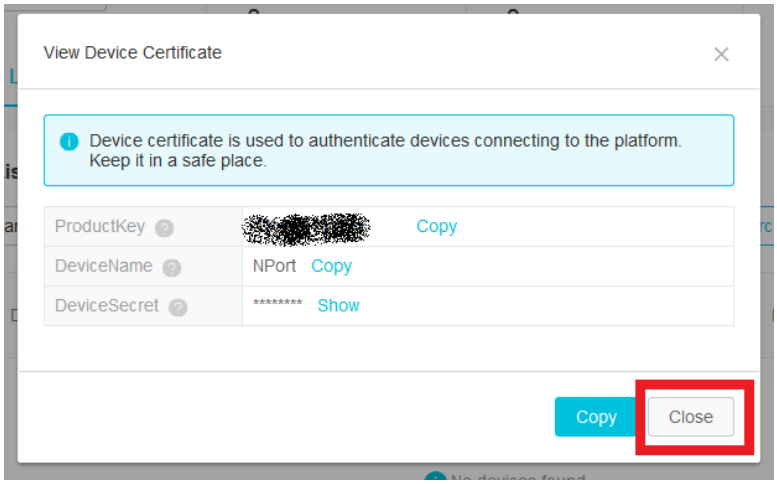
On the **Device** page, click **Add Device**.



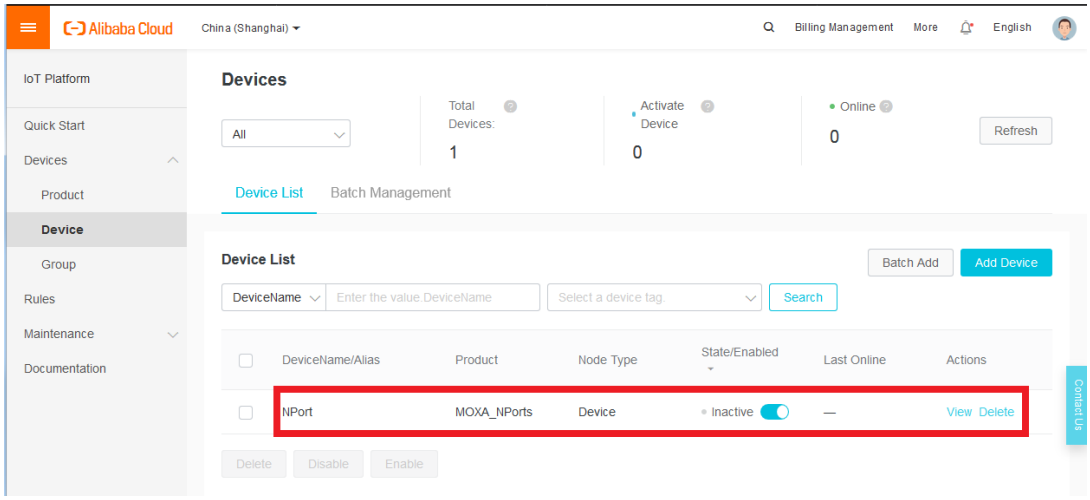
On the pop-up page, select **MOXA_NPorts** in the drop-down menu under **Product**, and fill in "NPort" under **DeviceName**.



After clicking **OK**, the device certificate will appear. Click **Close** and exit this window.

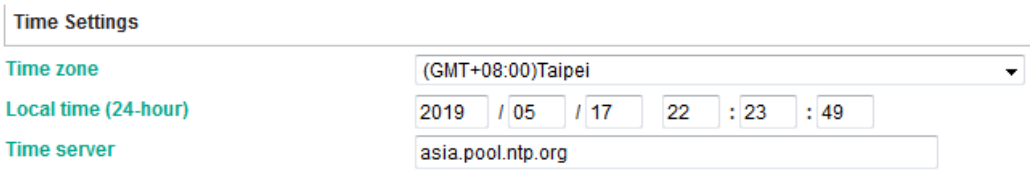


Next, "NPort" will appear under **DeviceName/Alias** in the **Device List**.



2.2 Set Up NPort IA5000A-I/O and NPort IAW5000A-I/O to Connect to Alibaba Cloud IoT Platform

1. Log in to the NPort IA5000A-I/O or NPort IAW5000A-I/O's web console. Set the correct time setting on the **Basic Settings** page. Also fill in **Time server** to correct the NPort's time-on period. You can find the NTP service at https://www.pool.ntp.org/zone/@



2. Under **Main Menu → IoT Management → IoT Mode**, set **IoT platform** as "**Alibaba Cloud IoT Platform**".

The IoT Mode is running with Alibaba Cloud IoT Platform; it will show more settings about the platform as below:

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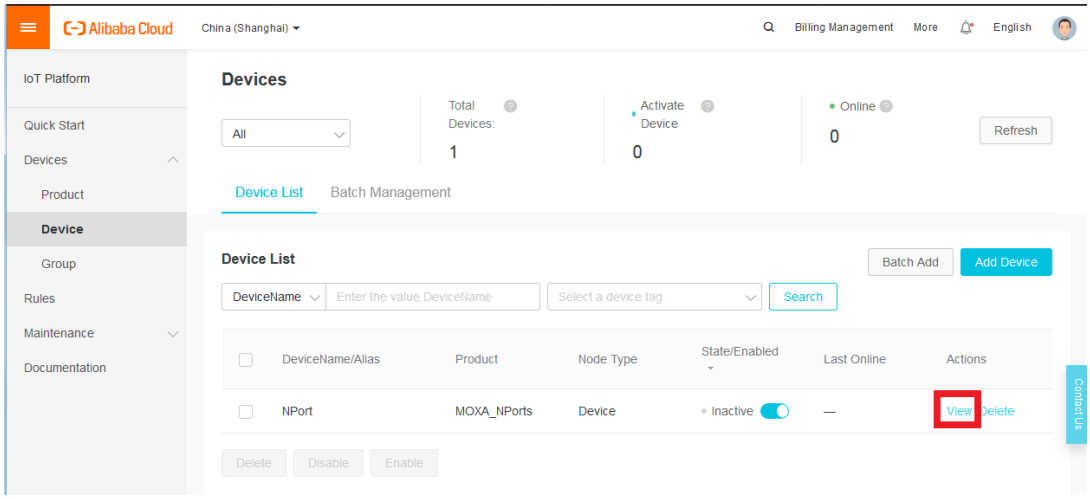
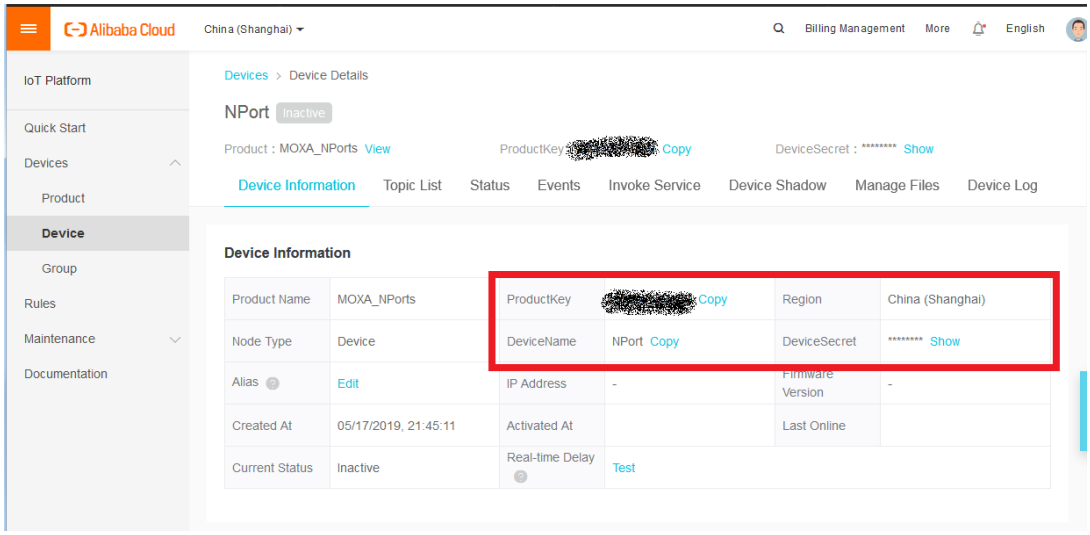
3. Go back to Alibaba Cloud Console. Information about the device certificate, you can find under **IoT Platform → Devices → Device → Device List → NPort → View**.



Under Alibaba Cloud IoT Platform settings, there are several connectivity information fields. They can be found under **Device** on the Alibaba Cloud Platform as below:



Set as below:

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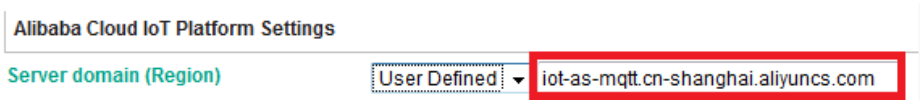
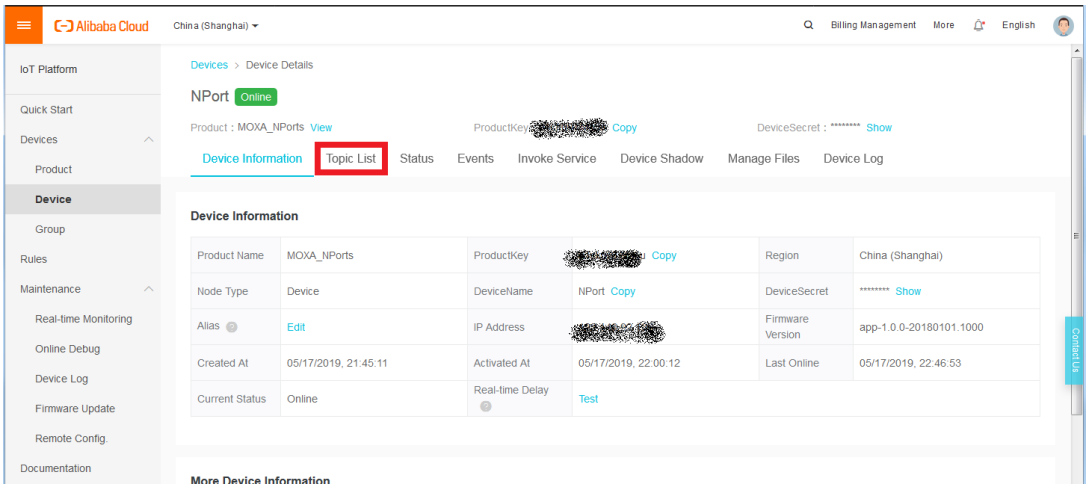
If your region is not included in the drop-down menu, choose "User Defined" and fill in the region domain address.

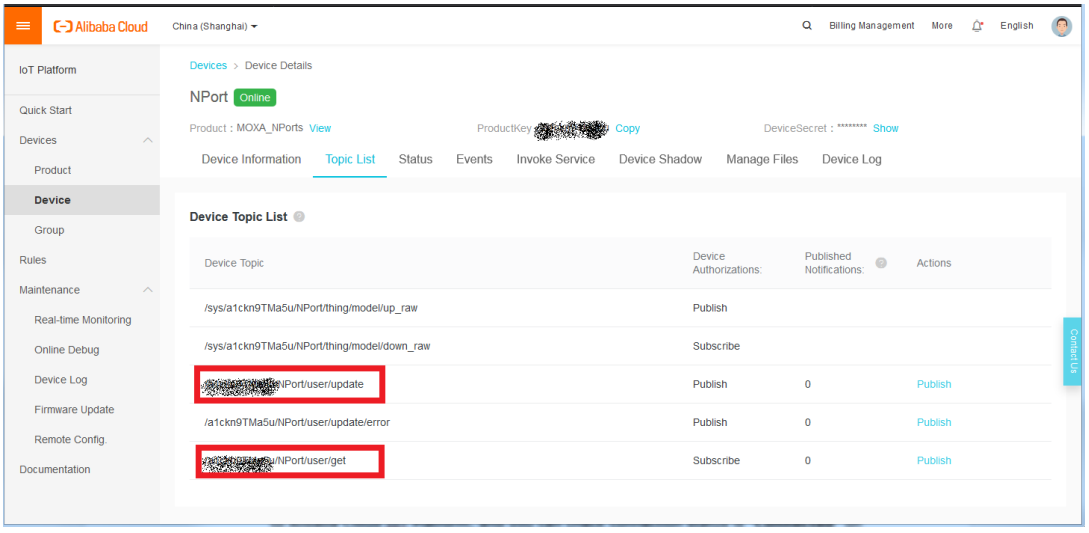


The region domain address format is iot-as-mqtt.${region}.aliyuncs.com. In this format, the variable ${region} indicates the region's ID of region's IoT Platform service. For region IDs, see https://www.alibabacloud.com/help/doc-detail/40654.htm?spm=a2c63.p38356.a3.10.73a95f07Czw8z8

4. Go back to Alibaba Cloud and click **Topic List**.



You will find two topics: /{ProductKey}/{DeviceName}/user/*. One is a publish topic; the other is a subscribe topic.



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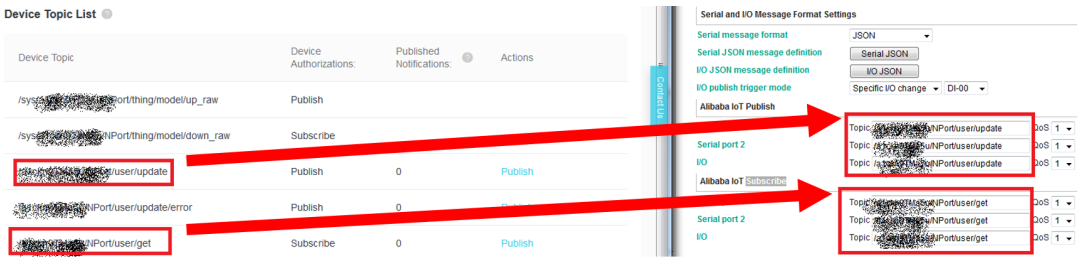
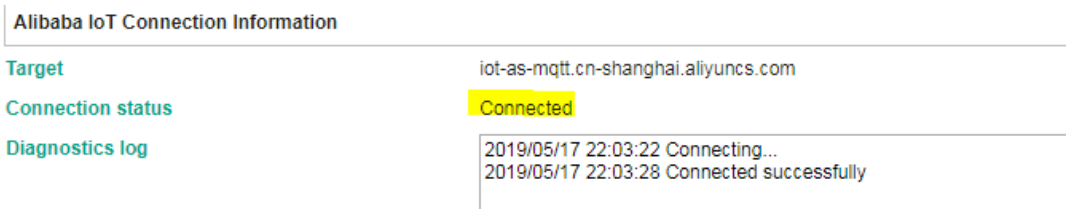
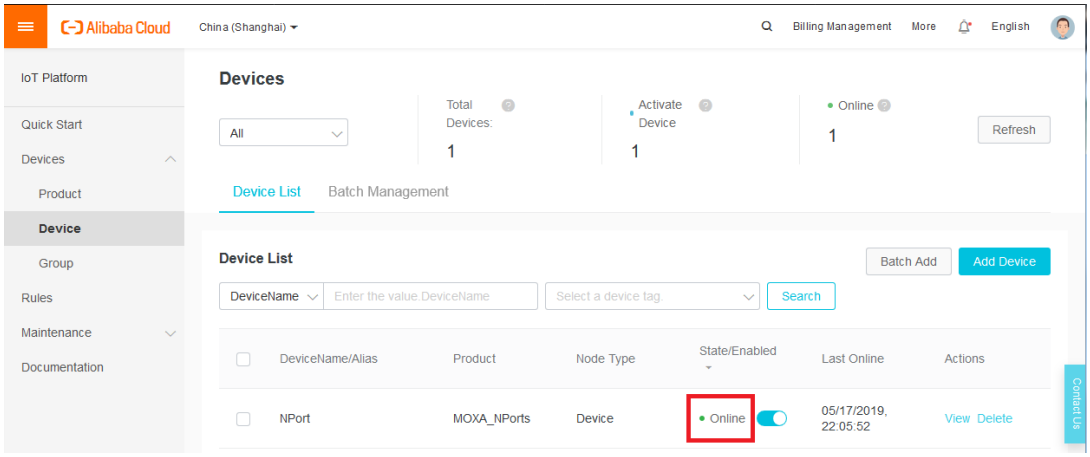
Copy the publish topic to Alibaba IoT Publish topic for all serial ports and I/O topics, and copy the subscribe topic to Alibaba IoT Subscribe topic for all serial ports and I/O topics. Set as below:



5. Click **Submit**. The NPort IA5000A-I/O or NPort IAW5000A-I/O will connect to Alibaba Cloud IoT Platform, and you can check that **Connection status** reads "Connected" under **Alibaba IoT Connection Monitoring** as below:



Also, you will see that the device is online, as shown below:



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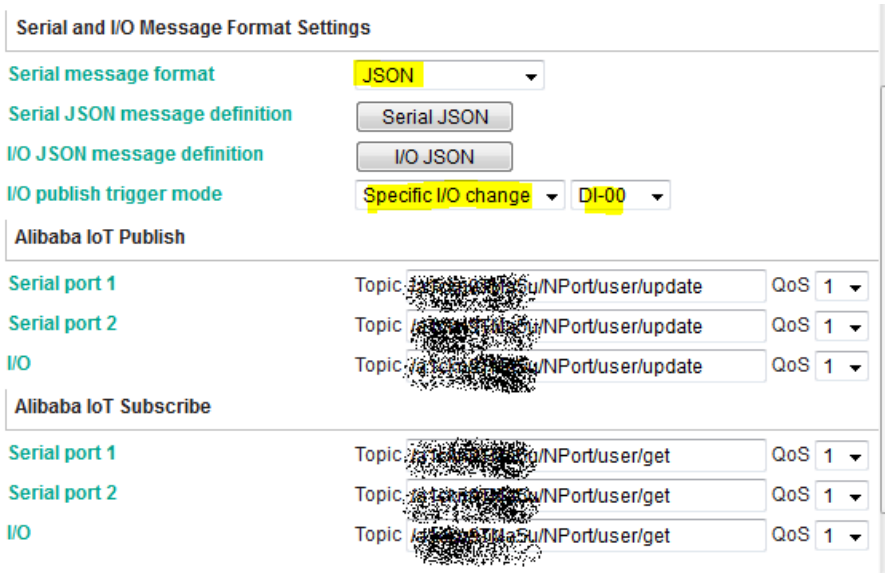
3. Upload/Download Serial Pattern and I/O Status With Cloud

In this section, we will instruct you how the NPort IA5000A-I/O and NPort IAW5000A-I/O (in the section belows, referred to as NPort or NPorts) send serial patterns to the cloud and receive patterns from the cloud. If a DI is triggered, the NPorts will publish the I/O status to the cloud, and publish a message from the cloud to the NPorts to change the I/O status. The NPorts support three types of message formats: JSON, RAW with header, and RAW. For this demonstration, we use JSON format. For **Serial Message format,** select "JSON", and for **I/O publish trigger mode**, select "Specific I/O change" along with "DI-00".



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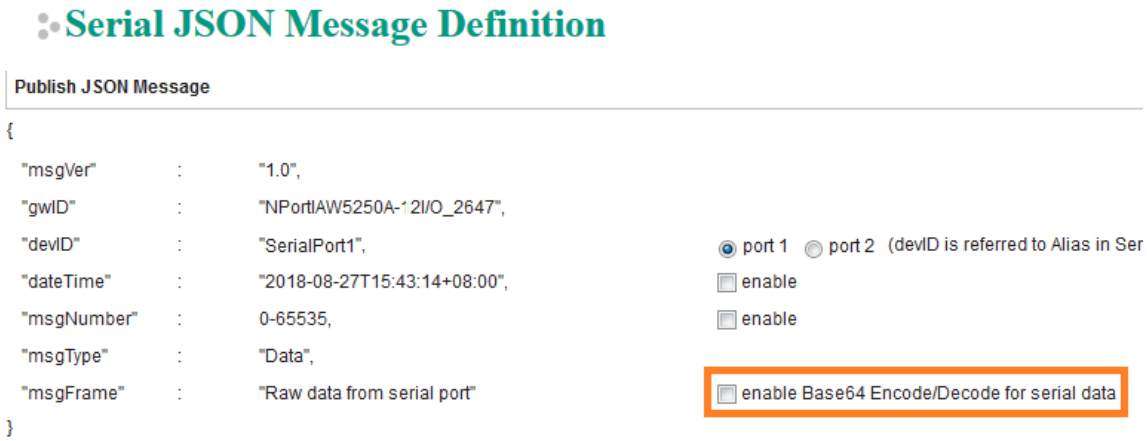
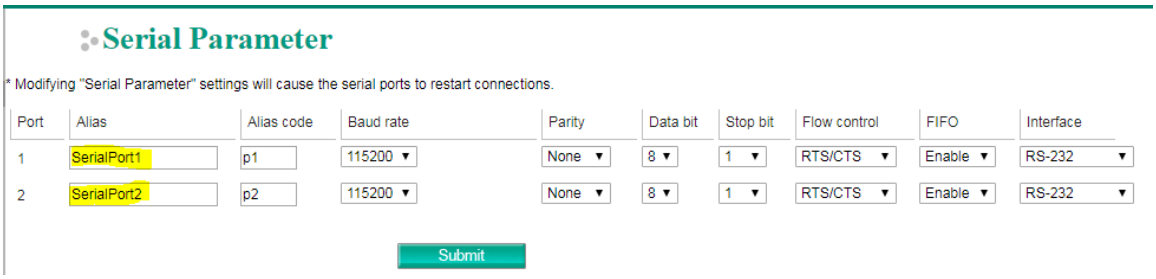
For the purpose of this demonstration, we we will show you the text content of the data we upload to the cloud platform. Click the **Serial JSON** button to uncheck the **enable Base64 Encode/Decode for serial data** checkbox. JSON format does not support special characters. If needed, set **Encode/Decode for serial data**. For more about JSON format rules, please reference http://json.org/



Note: You must fill in serial **alias name**, which is an identifiable ID for serial data on "Serial Parameter" page.



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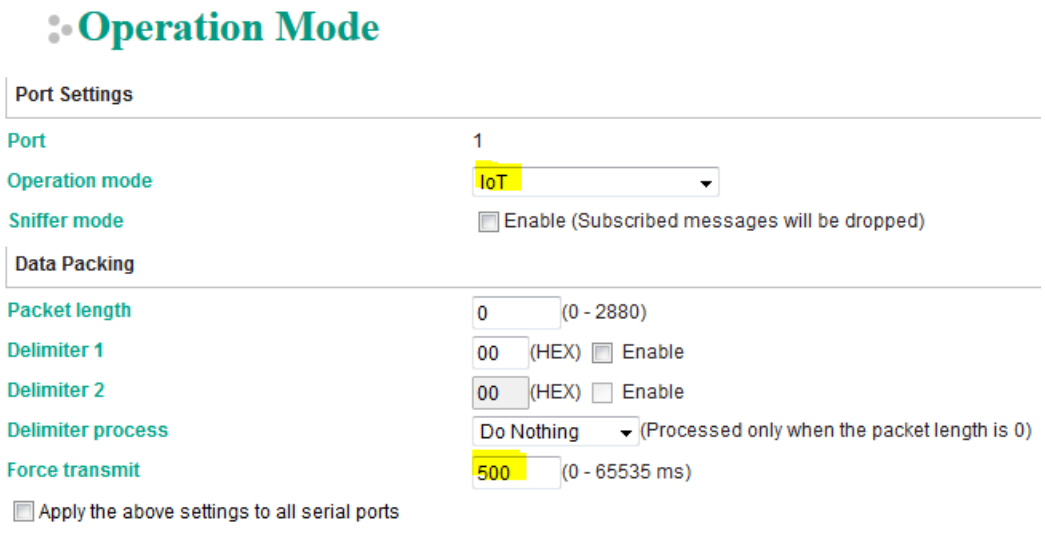
In this demonstration, we use the NPorts' DO-00 to trigger DI-00 (connect DO-00 to DI-00 by wire).

3.1 Send Serial Pattern From the Device to the Cloud

In this section, we will instruct you on how to send serial data to the cloud. We will send a serial pattern from PC 1 through the NPort to the cloud so that Alibaba Cloud can receive a message from the NPort.

1. Log in to the NPort's web console and change Serial Port 1's **Operation mode** to "IoT" and **Force transmit** to 500. The NPorts support various types of Data Packing combinations. In this demonstration, we use **Force transmit**. If needed, set the correct **Data Packing** method.



Click **Submit** to activate the new settings.

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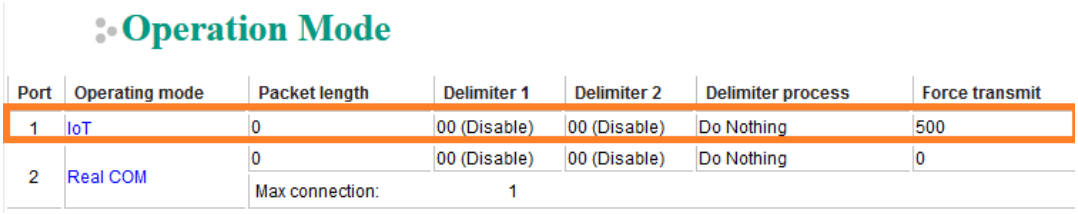
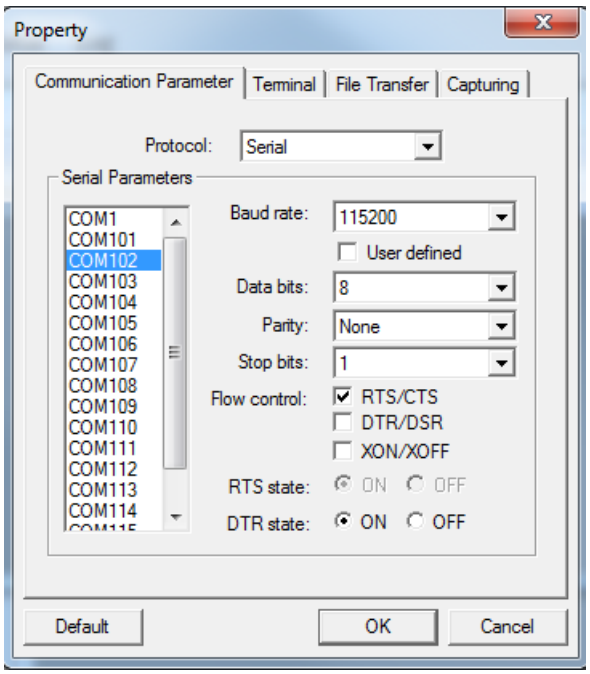


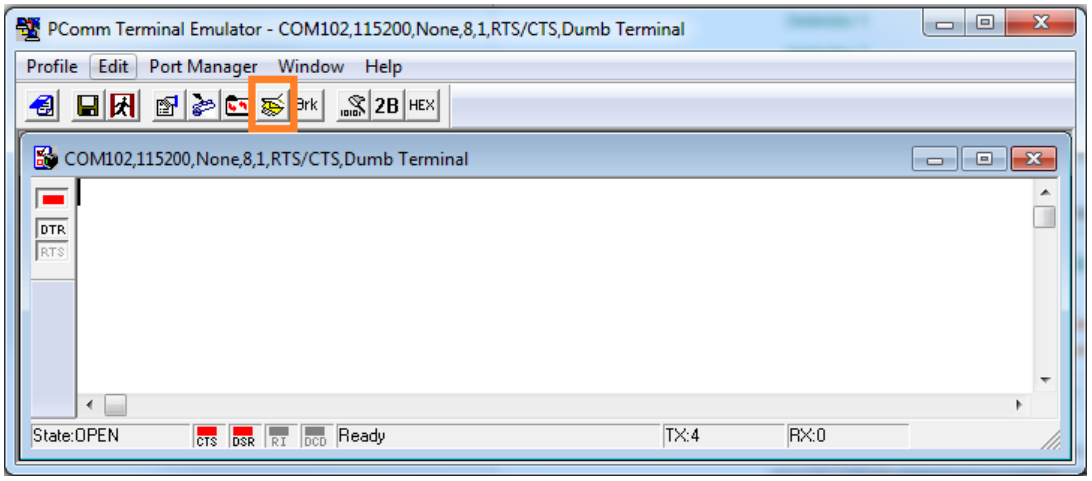
Operation Mode

Port	Operating mode	Packet length	Delimiter 1	Delimiter 2	Delimiter process	Force transmit
1	IoT	0	00 (Disable)	00 (Disable)	Do Nothing	500
2	Real COM	0	00 (Disable)	00 (Disable)	Do Nothing	0
		Max connection:	1			

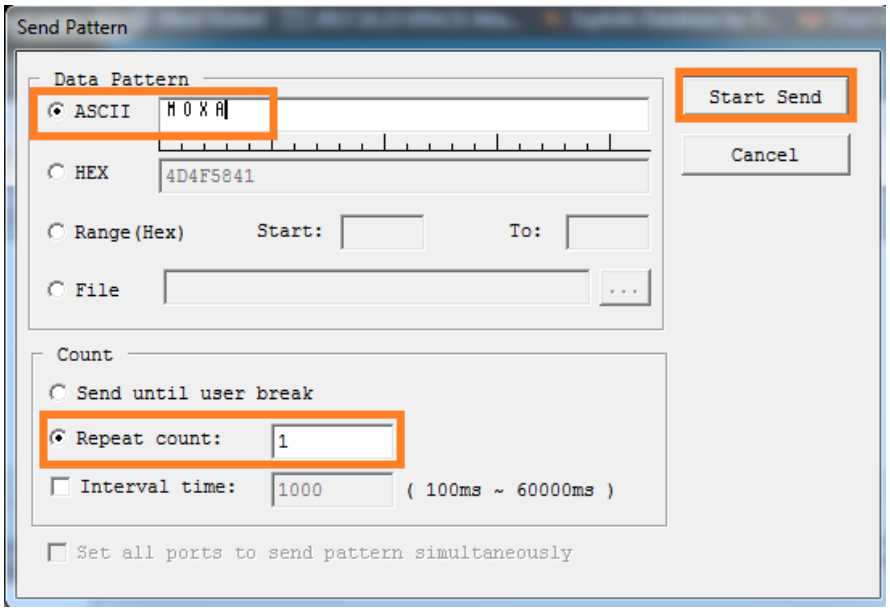
2. Launch PComm Terminal Emulator on PC 1 and open COM Port with the NPort's serial default settings as below:
   - Port number: PC 1's native COM port connecting to the NPort's Port 1
   - Baud rate: 115200
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: RTS/CTS



3. Click the **Send Pattern** button, or on the toolbar, select **Port Manager → Send Pattern** to send a serial pattern.



On the Send Pattern window, select **ASCII** and fill in "MOXA"; then, select **Repeat count** and enter **1**. Click **Start Send** to send the pattern.



On Alibaba Cloud, you can check the message on **Device Log > Upstream Analysis**. Find the latest message and copy the MessageID. You can check the topic on **Content(All)**, which is an Alibaba IoT Publish topic.

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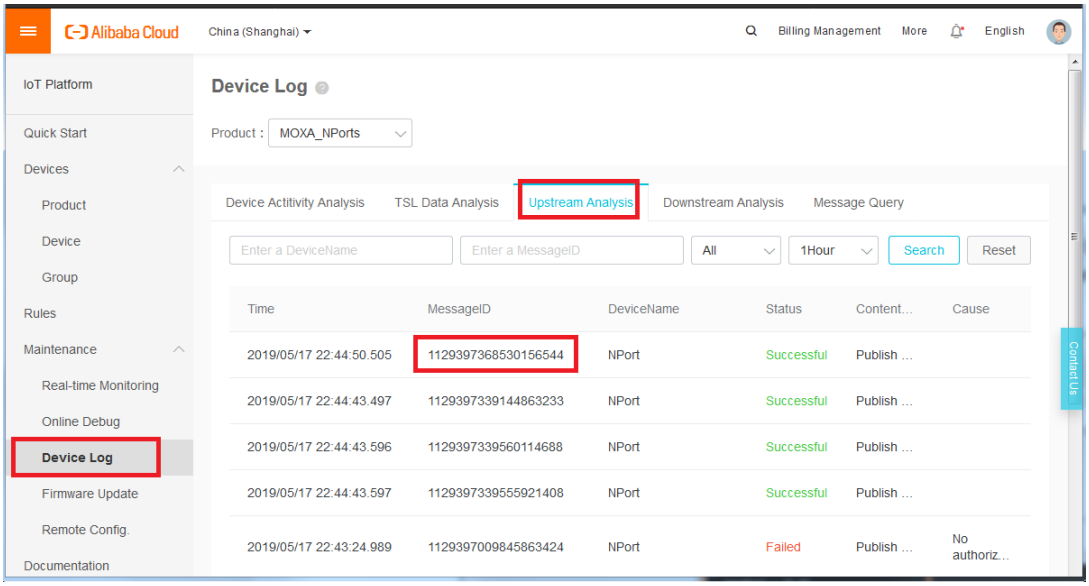

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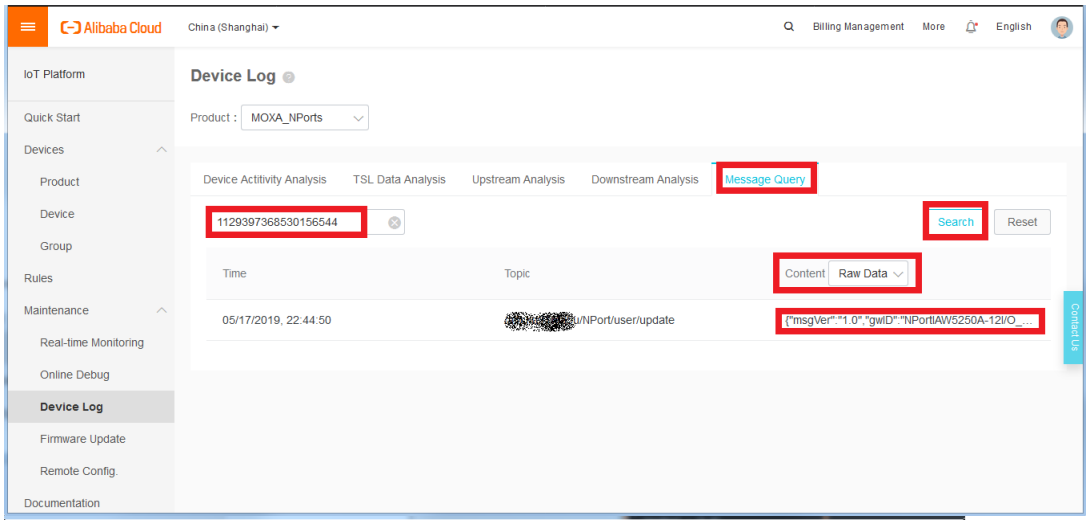
Select the **Message Query** tab, paste the MessageID, and click **Search**. The content of MessageID will then be shown. Under **Content,** select "Raw Data" to allow the NPort's message to be readable.

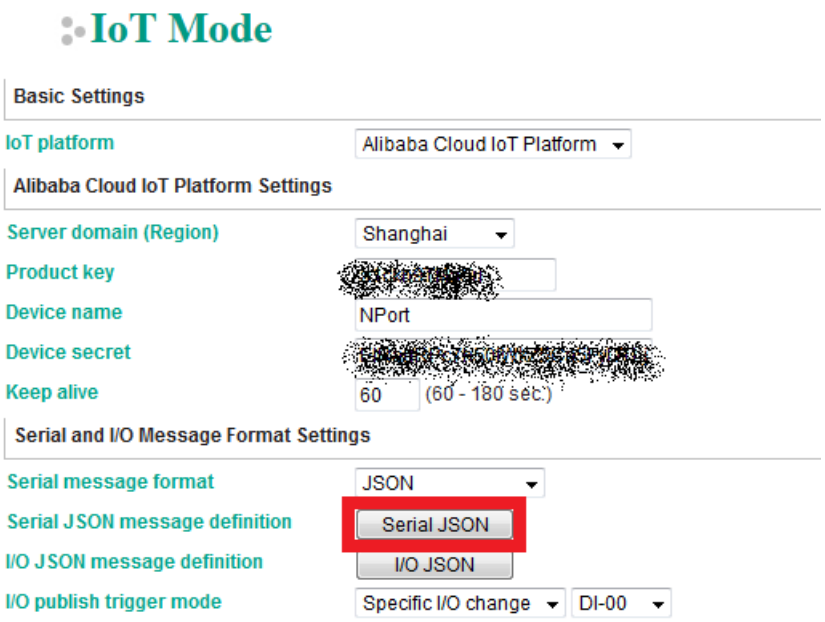


Move the cursor of your mouse over the message, and you will find the serial data pattern filled in the msgFrame.

3.2 Send Serial Data from the Cloud to the Device

In this section, we will instruct you on how to send serial data to PC 1 from the cloud. We use Alibaba Cloud Console to send an IoT message to the NPort's Serial Port 1.

1. Click **Serial JSON**.



Copy **Subscribe JSON Message**:

Serial JSON Message Definition

Publish JSON Message

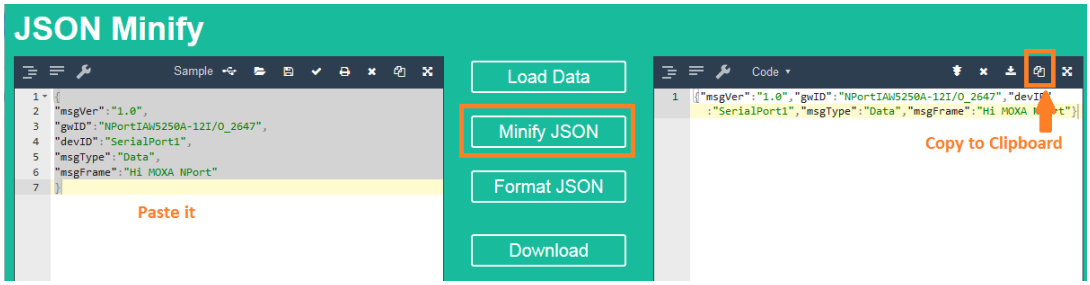
```
{
  "msgVer"      :  "1.0",
  "gwID"        :  "NPortIAW5250A-12I/O_2647",
  "devID"       :  "SerialPort1",
  "dateTime"    :  "2018-08-27T15:43:14+08:00",
  "msgNumber"   :  0-65535,
  "msgType"     :  "Data",
  "msgFrame"    :  "Raw data from serial port"
}
```

Subscribe JSON Message

```
{
  "msgVer"      :  "1.0",
  "gwID"        :  "NPortIAW5250A-12I/O_2647",
  "devID"       :  "SerialPort1",
  "msgType"     :  "Data",
  "msgFrame"    :  "Raw data to serial port"
}
```

2. The copied message has a lot of space and line feed. We can use a tool to compact it. Below is a free online tool:
   https://jsonformatter.org/json-minify

   Paste the message in the column on the left and change the msgFrame stating "Raw data to serial port" to read:"Hi MOXA NPort", then click **Minify JSON**. It will show a compact JSON format message in the column on the right side. Click **Copy to Clipboard**.



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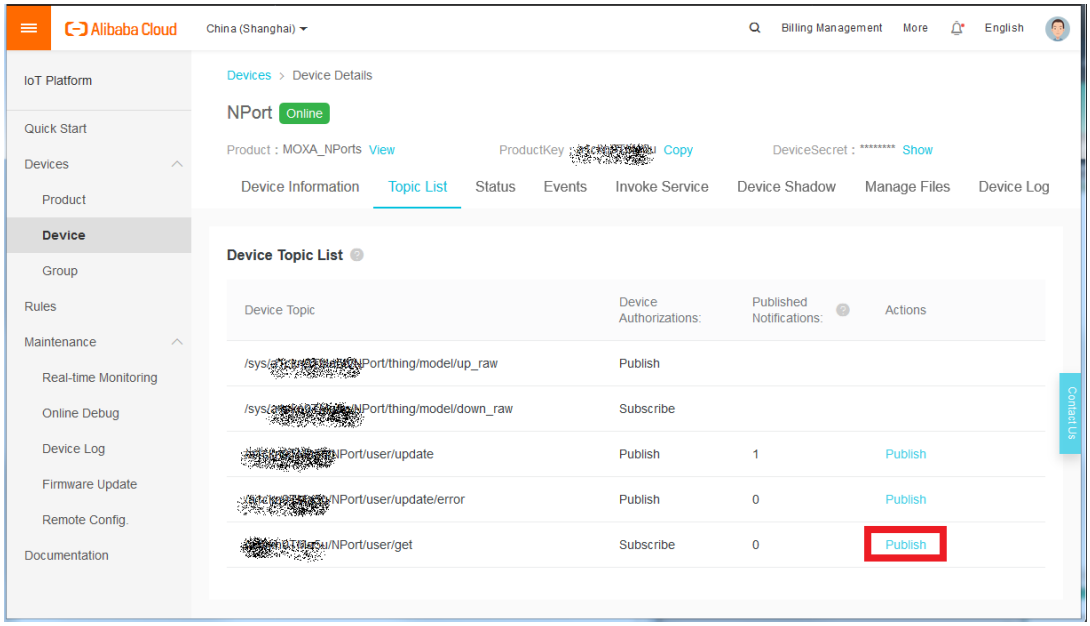
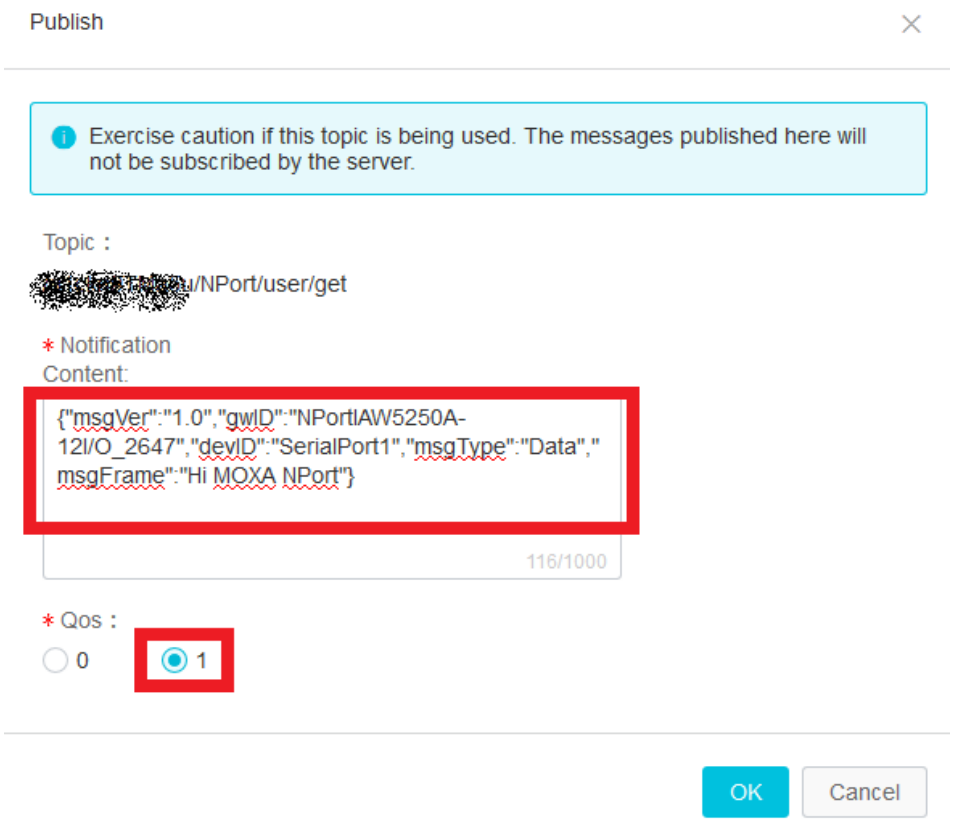
3. On Alibaba Cloud, click **Publish** next to the **Subscribe** topic.



To publish a topic to the NPort's Serial Port 1: in the **Publish** window, paste the clipboard message in the big text area, then select **1** under **Qos**, and click **OK**.



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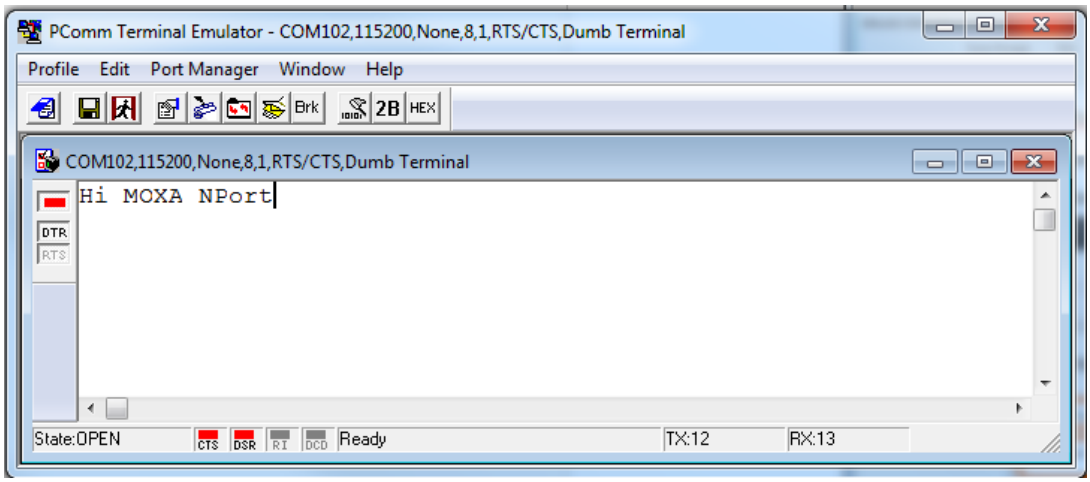
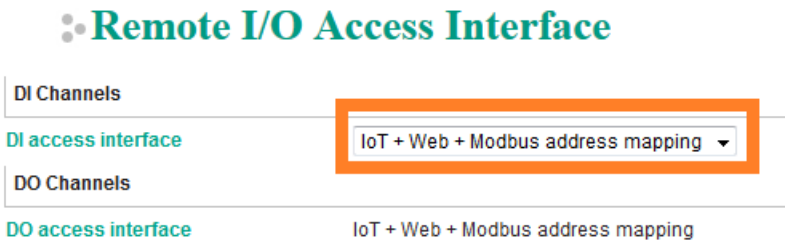
On the **PComm Terminal Emulator** page, you will receive a message from the cloud.



3.3 Send the NPort's DI and DO Status to the Cloud

In this section, we will instruct you on how to trigger the DI status to the cloud. We trigger the DI status to change. We will then receive an IoT message that is the NPort's DI and DO statuses on Alibaba Cloud Console.

1. Log in to NPort's web console and change **DI assess interface** to "IoT+Web+Modbus address mapping" on the **Remote I/O Access Interface** page.



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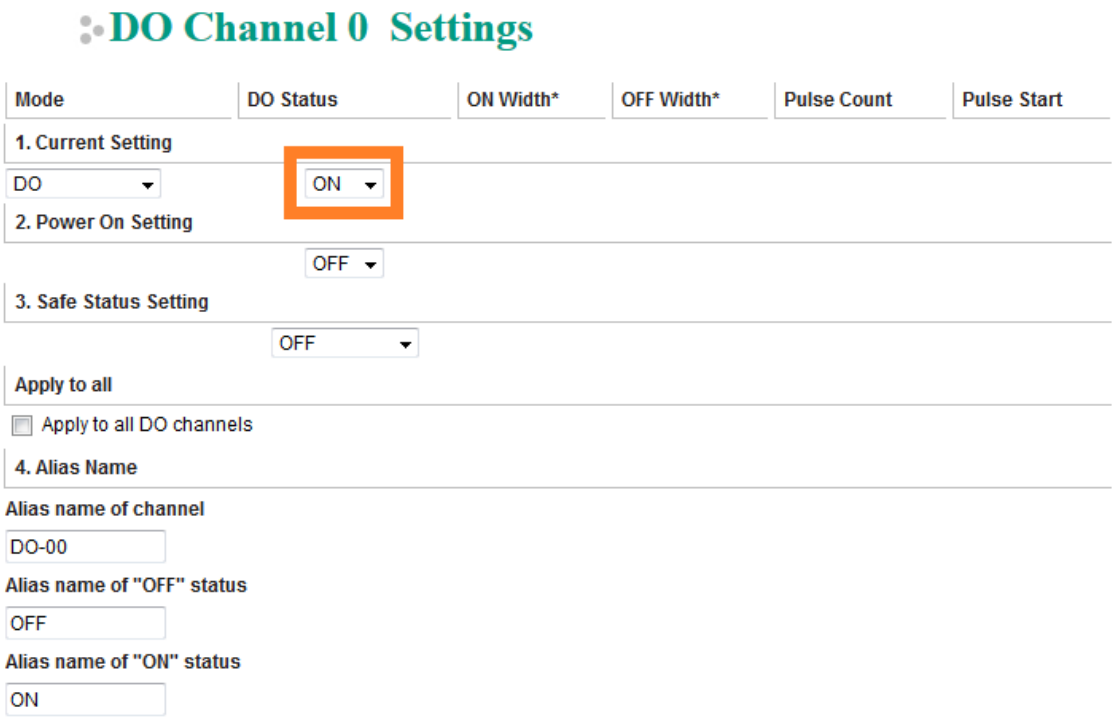
2. Change **DO Status** to "ON" on the **DO Channel 0 Settings** page.



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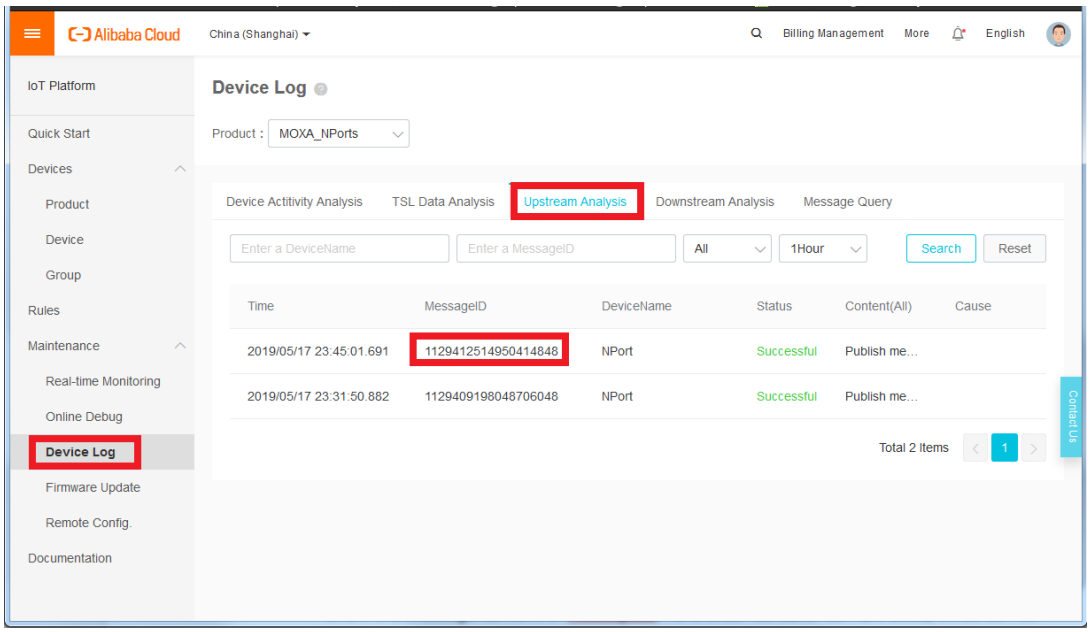
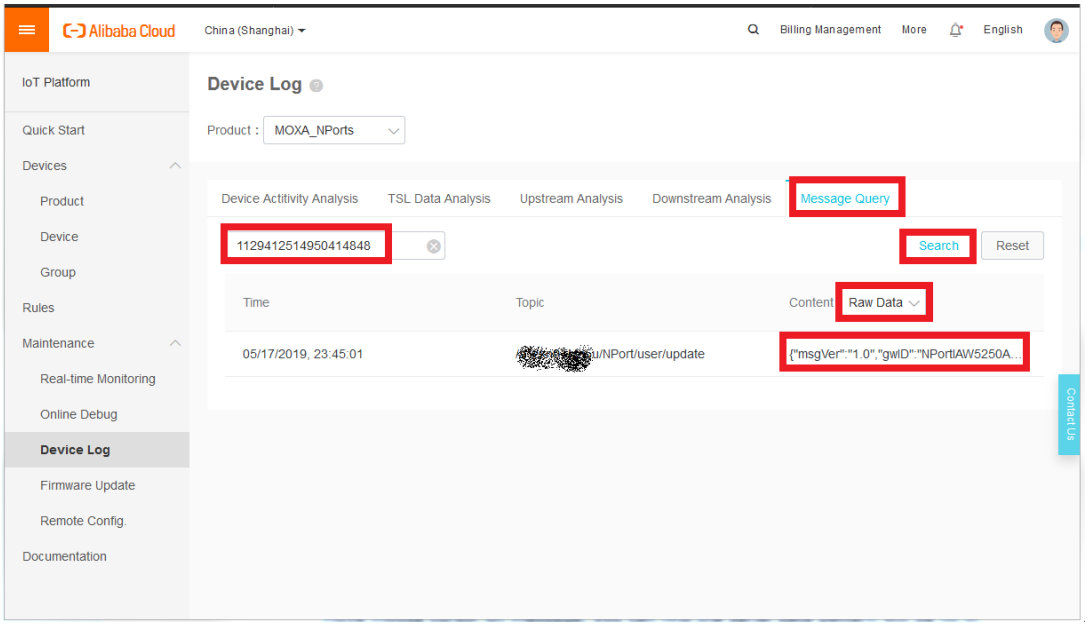
3. On Alibaba Cloud, you can check the message under **Device Log → Upstream Analysis**. Find the latest message, and copy the MessageID. You can check the topic on Content(All), which is an Alibaba IoT Publish topic.



Select the **Message Query** tab, paste the MessageID, and click **Search**. The content of MessageID will then be shown. Under **Content**, select Raw Data to allow the NPort's message to show up.



Move the cursor of your mouse over the message, and you will find the DI and DO statuses filled in JSON message. The message shows both DI-00 and DO-00 statuses as

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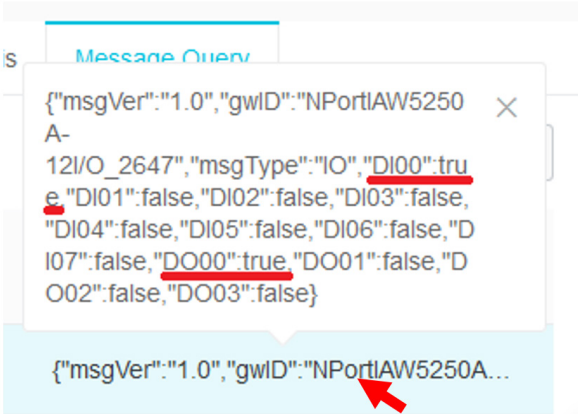
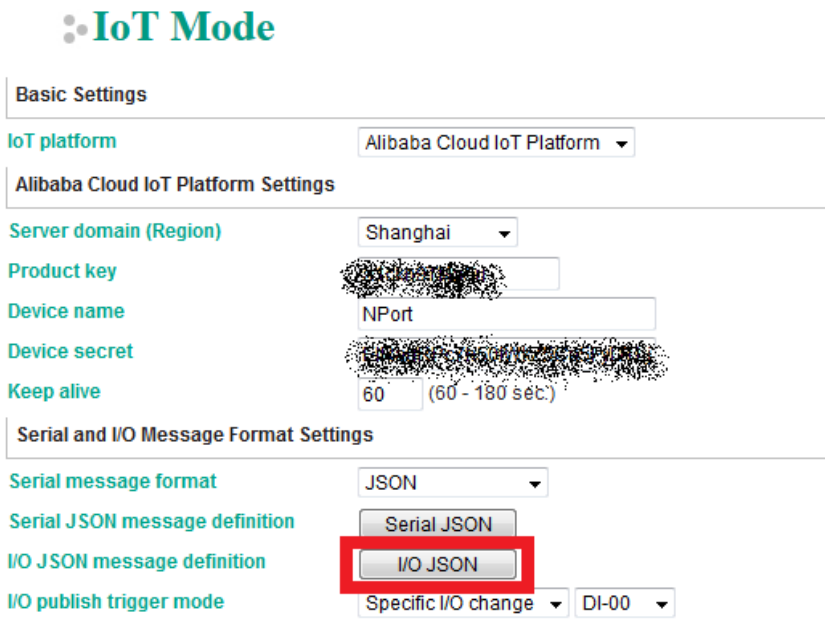
true.


Message Query
{"msgVer":"1.0","gwID":"NPortIAW5250A-12I/O_2647","msgType":"IO","DI00":true,"DI01":false,"DI02":false,"DI03":false,"DI04":false,"DI05":false,"DI06":false,"DI07":false,"DO00":true,"DO01":false,"DO02":false,"DO03":false}
{"msgVer":"1.0","gwID":"NPortIAW5250A...

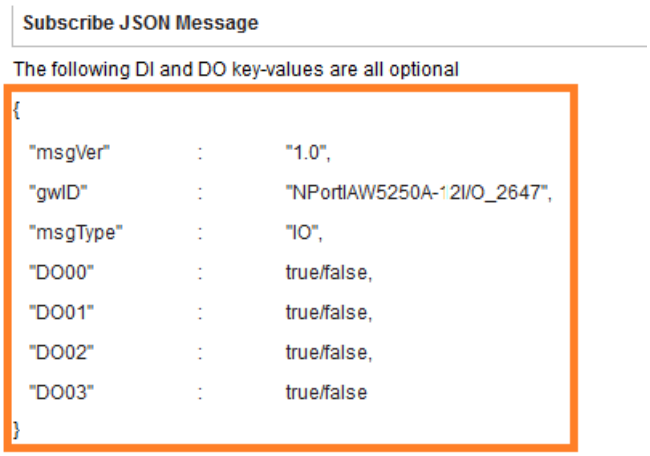
3.4 Control NPorts' DO Status Through the Cloud

In this section, we will instruct you on how to change an NPort's DO status via the cloud. First, we use Alibaba Cloud Console to send an IoT message to the NPort's I/O topic; second, the NPort will receive an IoT message from the cloud to change the DO statuse; lastly, we will change the NPort's DO status on the web console.

1. Click **I/O JSON**.



Copy **Subscribe JSON Message**:



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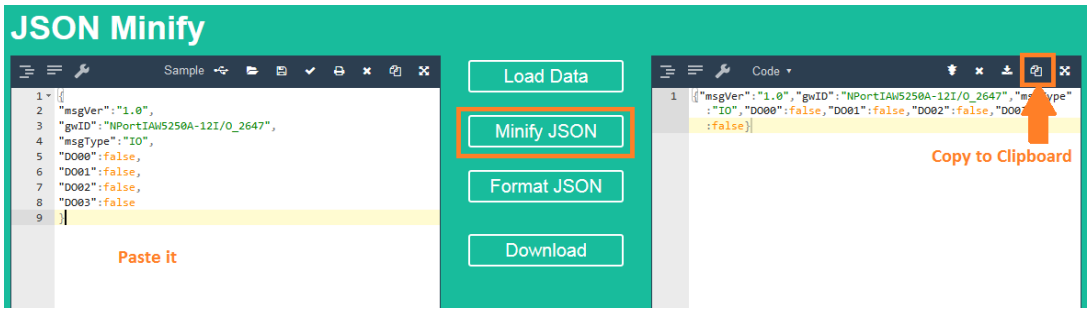
2. The copied message has a lot of space and line feed. We can use tool to compact it. Below is a free online tool:
   https://jsonformatter.org/json-minify
   Paste the message in the column on the left side and change all of the DO status to false.

Click **Minify JSON**. It will show a compact JSON format message in the column on the right. Click **Copy to Clipboard**.



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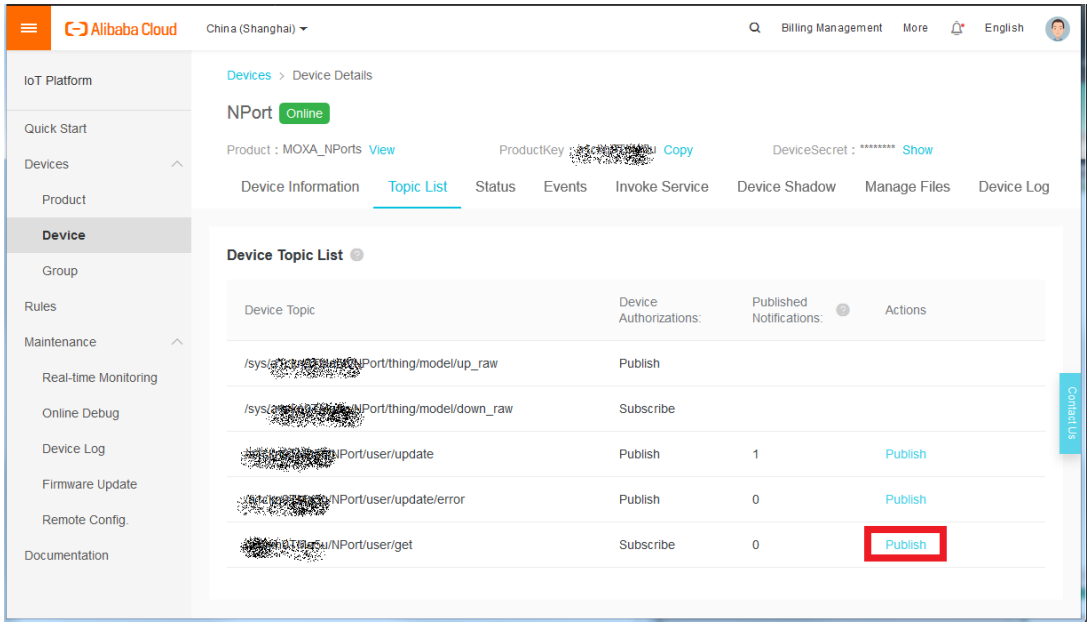
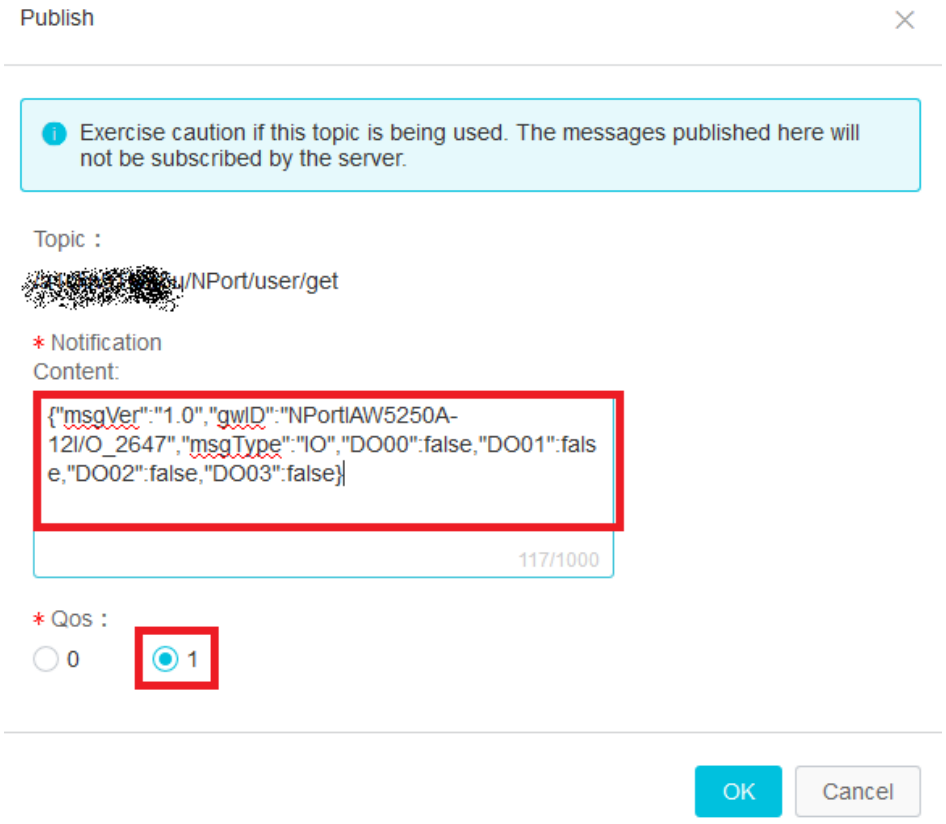
3. On Alibaba Cloud, click **Publish** next to the **Subscribe** topic.



To publish a topic to NPort's I/O: on the **Publish** window, paste the clipboard message in the big text area, select **1** under **QoS**, and click **OK**.

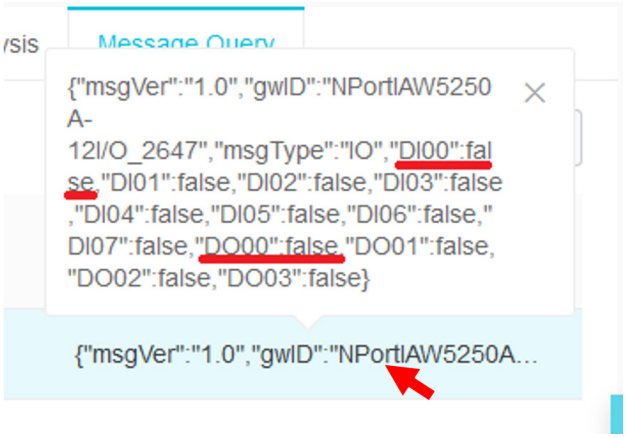


On the NPort's web console, check DO-00 status as OFF.

DO Channel Settings

DO Channel	Mode	Status	ON Width	OFF Width
DO-00	DO	OFF	--	--
DO-01	DO	OFF	--	--
DO-02	DO	OFF	--	--
DO-03	DO	OFF	--	--

You can also find new MessageID under Upstream Analysis on Alibaba Cloud, because we connect DO-00 to DI-00. The new message shows both DI-00 and DO-00 statuses as false.



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