Connect to Alibaba Cloud with the MGate 5105 Industrial Protocol Gateway

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About Moxa

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1. Introduction

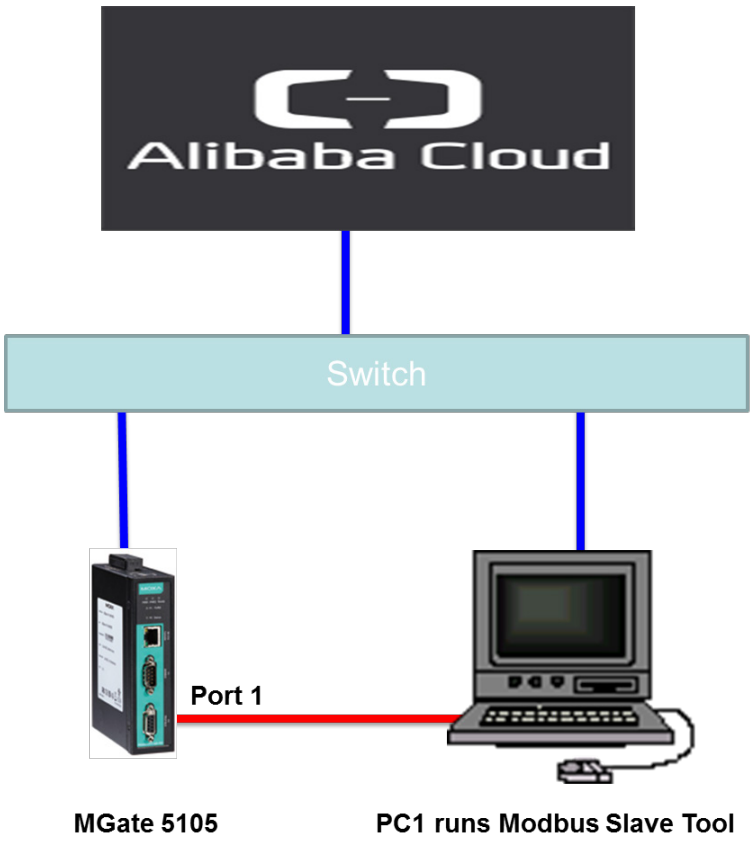
The MGate 5105 performs easy protocol conversions between Modbus RTU/ASCII, Modbus TCP, and EtherNet/IP protocols. From Firmware Versions 4.0 upwards support publishing the time stamps of the fieldbus devices to cloud servers. The cloud server include Microsoft Azure, Alibaba Cloud, or MQTT Broker.

This document demonstrates how to connect the MGate 5105 to Alibaba Cloud IoT Platform.

2. System Topology

Figure 1 illustrates the system topology. PC1 runs Modbus Slave tool to act as a Modbus RTU device. It connects to MGate 5105's Port 1. The MGate 5105 acts as an Alibaba Cloud device and connects to the Alibaba Cloud IOT Platform.

< Figure 1. System Topology >



3. Prerequisites

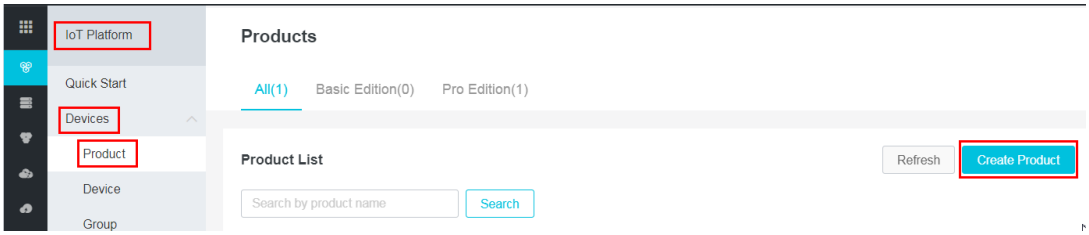
3.1 Modbus Slave Tool

Modbus Slave is a very popular Modbus slave simulator for testing and debugging of your modbus devices, which support Modbus RTU/ASCII and Modbus TCP/IP.

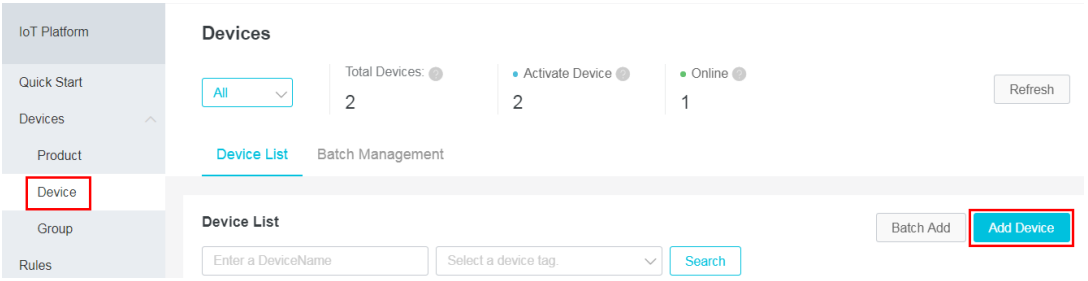
Download from website: http://www.modbustools.com/download.html

3.2 Create Alibaba Cloud IoT Platform Product and Devices

1. Use Alibaba user account to log in to Alibaba Cloud Console.
   Website: https://home-intl.console.aliyun.com
2. Create a new IoT Platform Product: IoT Platform → Devices → Product → Create Product.



3. Add a new IoT Platform Device: IoT Platform → Devices → Device → Add Device.



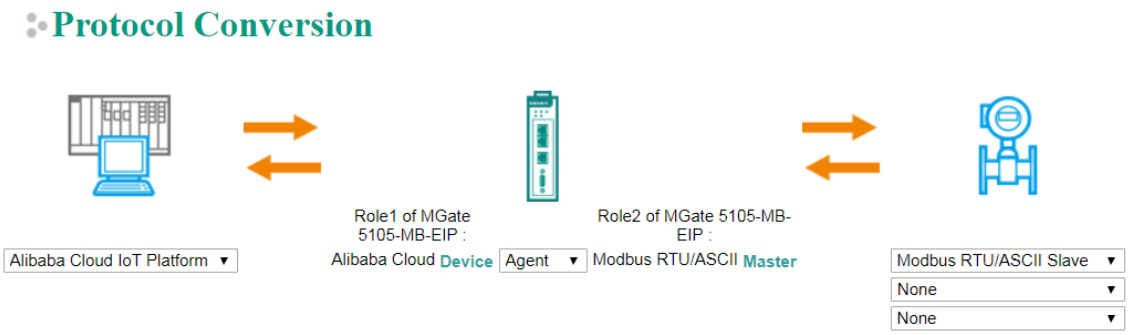
4. MGate 5105 Settings

Log in to MGate 5105's web console, then do the following settings:

4.1 Protocol Conversion

In **Protocol Conversion** settings, we choose Alibaba Cloud Device as Role 1. In the fieldbus site, for Role 2, we can choose Modbus RTU/ASCII Slave, Modbus TCP Server, or EtherNet/IP Adapter. Note that multiple combinations are allowed for settings in Role 2. For this demonstration, we choose Modbus RTU/ASCII Slave.

Set as below:



4.2 Modbus RTU Master Settings

1. In the **Modbus RTU/ASCII Master** Settings web page, we choose **RTU** for Mode and keep **Master Settings** as the default setting.
2. Add a **Read1** Modbus command to send a function code 03 and a command for quantity as 1, and Endian Swap as Byte. Poll interval is 1000 ms.
3. Add a **Write1** Modbus command to send a function code 06 command, and Endian Swap as Byte. Its **Trigger** command is **Data Change**.

Set as below:

Role	Master
Mode	RTU

Master Settings

Initial delay	0	(0 - 30000 ms)
Max. retry	3	(0 - 5)
Response timeout	1000	(10 - 120000 ms)
Inter-frame delay	0	(10 - 500 ms, 0: default)
Inter-character timeout	0	(10 - 500 ms, 0: default)

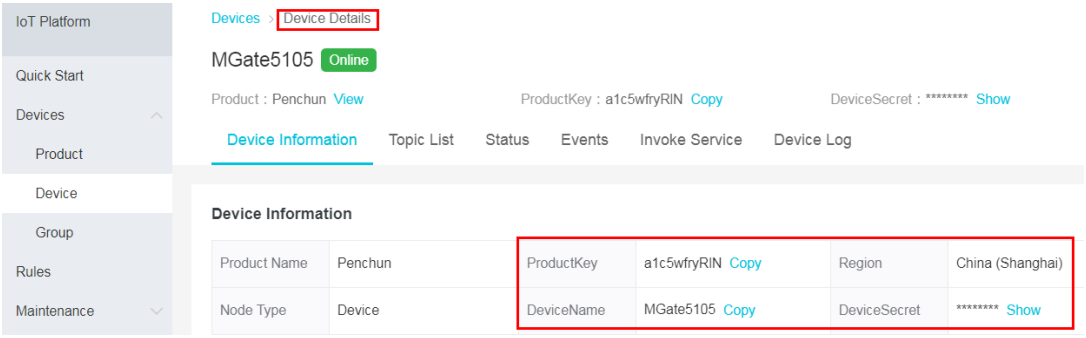
Modbus Commands

Add Edit Clone Delete Move

Index	Name	Slave ID	Function	Address / Quantity	Trigger	Poll Interval	Endian Swap
1	Read1	1	3	Read address 0, Quantity 1	Cyclic	1000	Byte
2	Write1	1	16	Write address 0, Quantity 1	Data Change	N/A	Byte

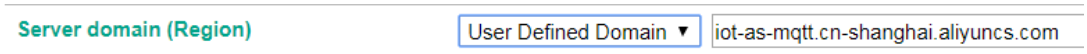
4.3 Alibaba Device Settings

1. Basic Settings:
   In Basic Settings, there are serveral connection information fields. These can be found on **Device Details** of the Alibaba Cloud IoT Platform as below:



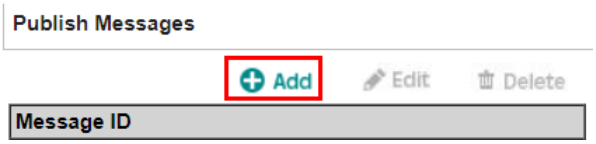
   Set as below:

   If your Server domain is not on the drop-down list, you can choose **User Defined Domain** and fill in the Region domain address.

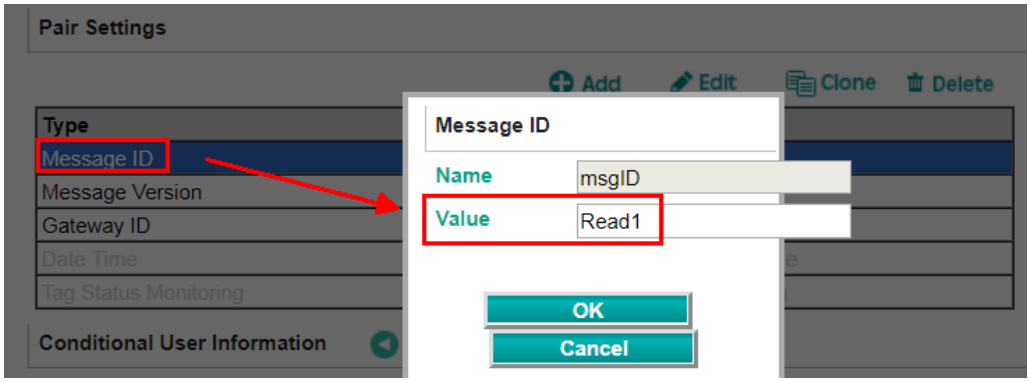


   The Region domain address format is iot-as-mqtt.${region}.aliyuncs.com. In this format, variable ${region} indicates the region's ID of your IoT platform's service region. For region IDs, see https://www.alibabacloud.com/help/doc-detail/40654.htm?spm=a2c63.p38356.a3.10.73a95f07Czw8z8.

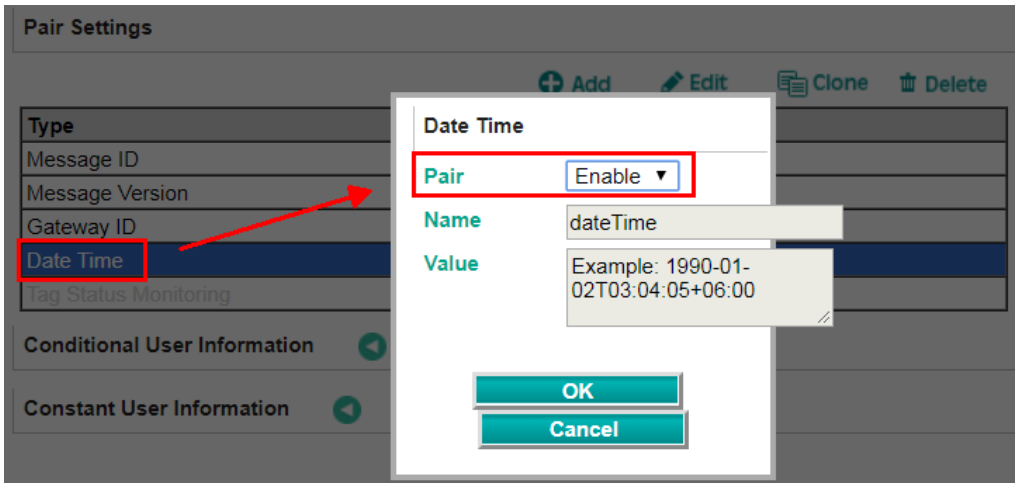
2. Publish Messages:
   Click the **Add** button to Publish Message and click it to edit message settings.



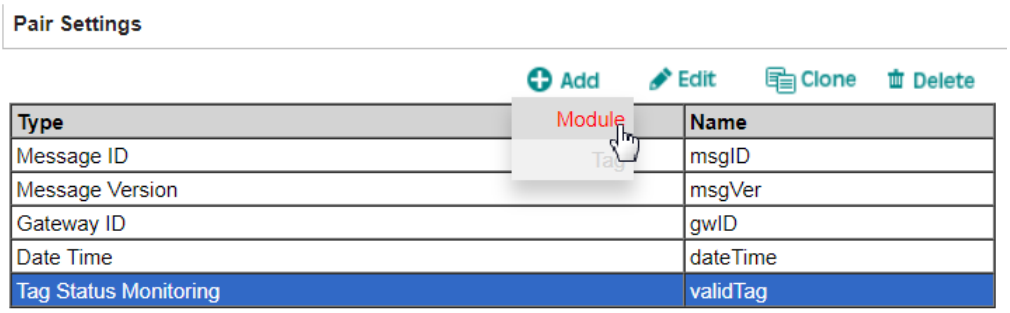
   In **Pair Settings**, we click **Message ID** to edit **Name** and set **Value** as **Read1**.



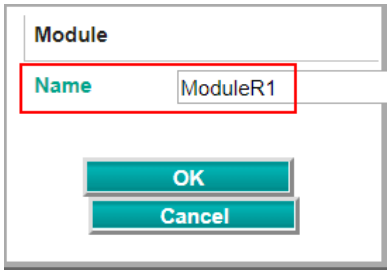
Click **Date Time** to enable **dateTime** padding in the message.



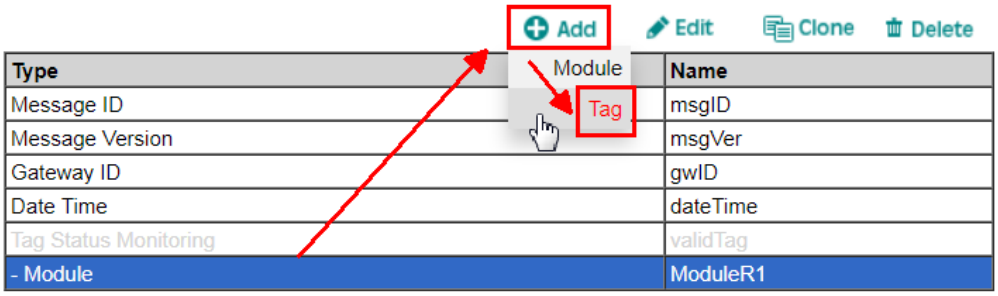
Click **Add** → **Module** to create a new module.



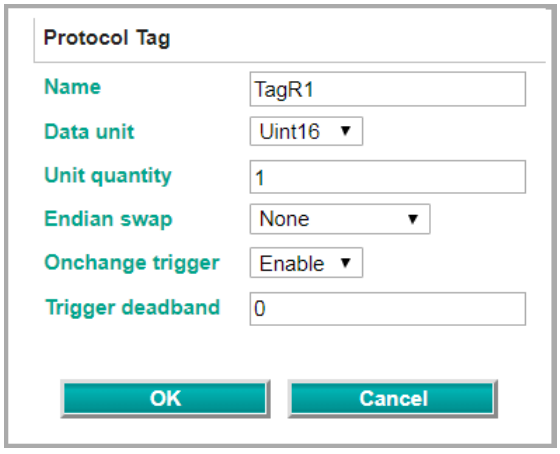
Under **Name**, choose ModuleR1.



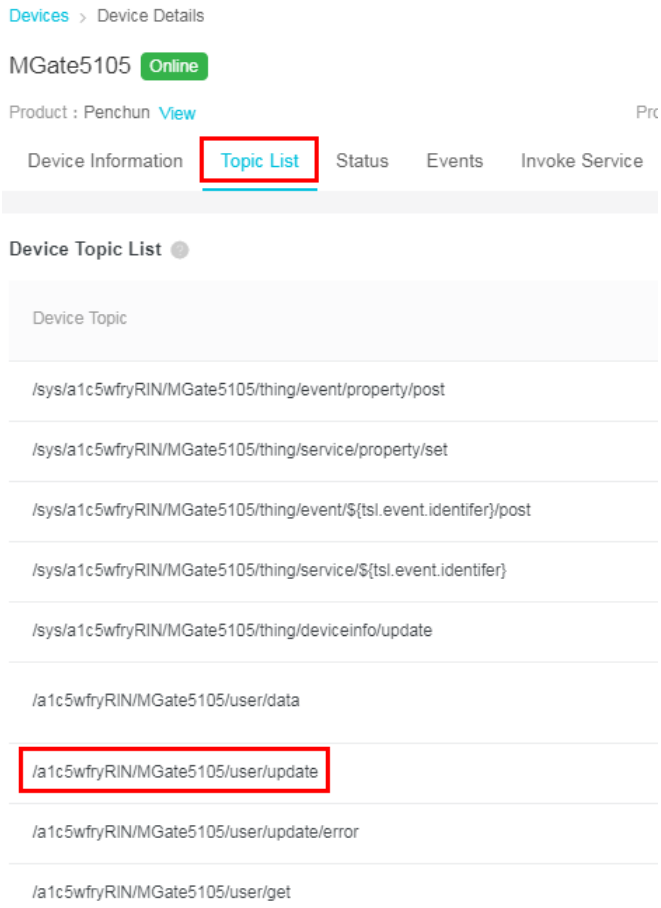
Then click **Add → Tag**.



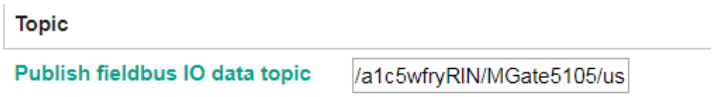
Create a Protocol Tag as below:



The publish topic name can be found under **Device Details → Topic List** on Alibaba Cloud IoT Platform:

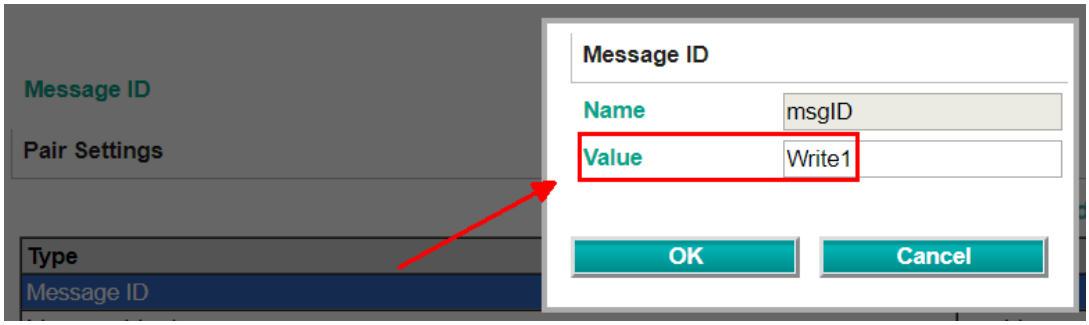


Set as below:

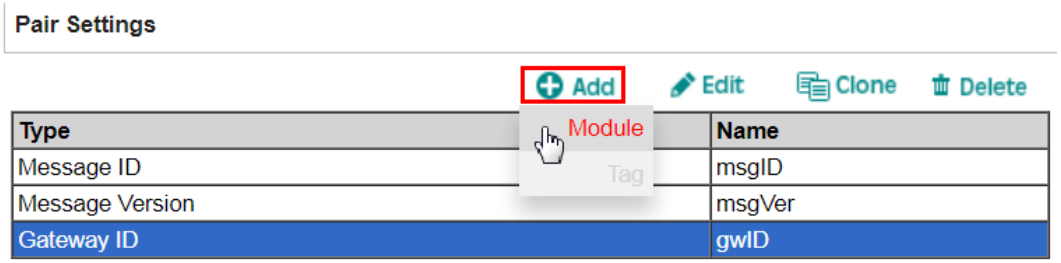


3. Subscribe Messages:
   Click the **Add** button to create a subscribe message and click it to edit message settings.

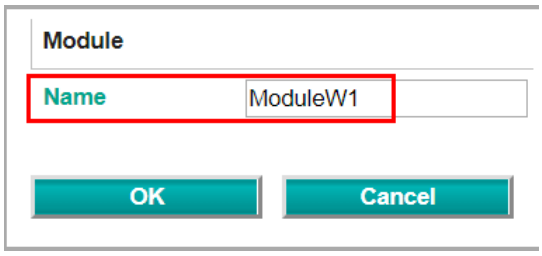
In **Pair Settings**, click **Message ID** to edit **Name** and set **Value** as **Write1**.



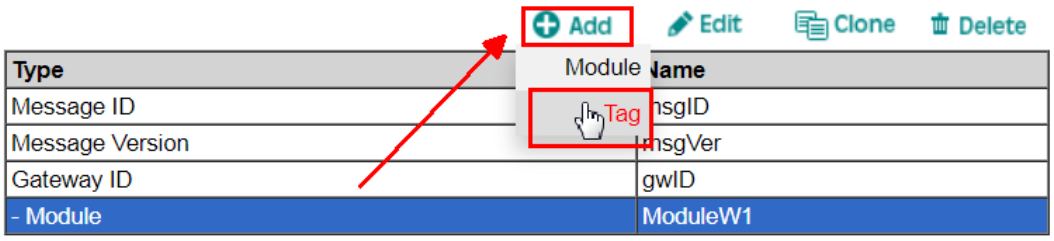
Click **Add** → **Module** to create a new module.



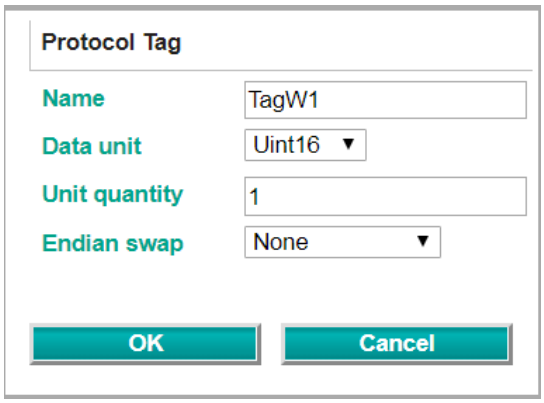
Under **Name**, select **ModuleW1**.



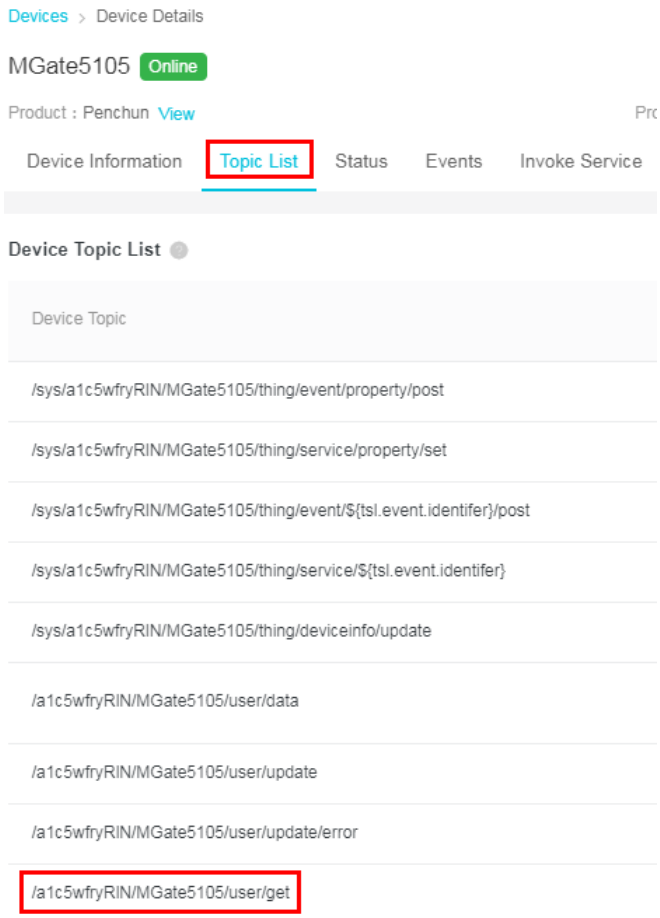
Then click **Add** → **Tag**.



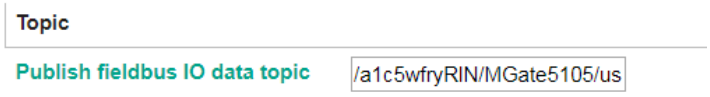
Create a Protocol Tag as below:



The publish topic name can be found under **Device Details** → **Topic List** on Alibaba Cloud IoT Platform:

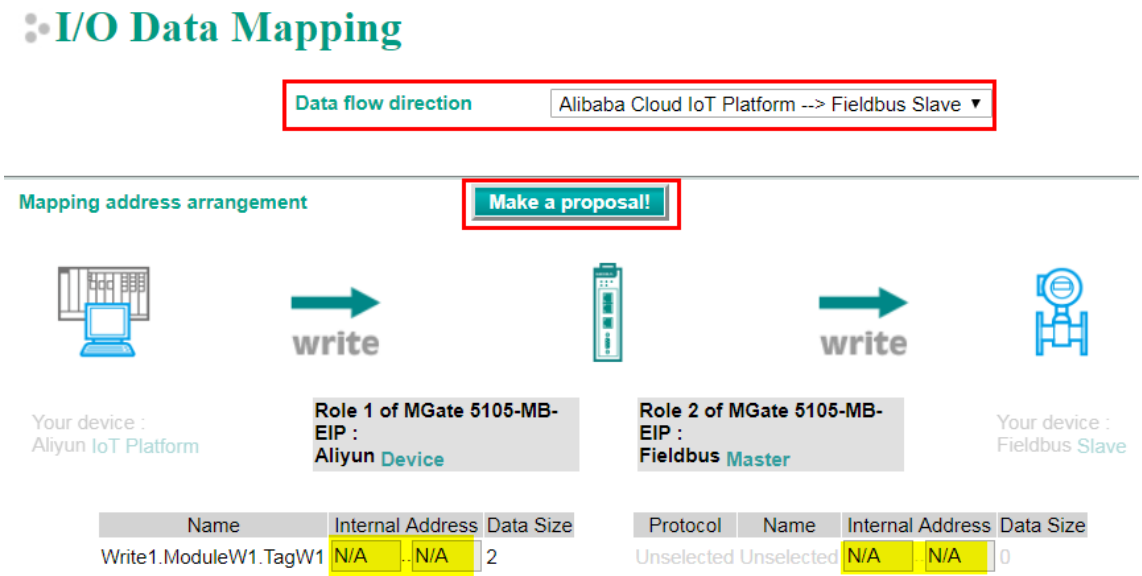


Set as below:

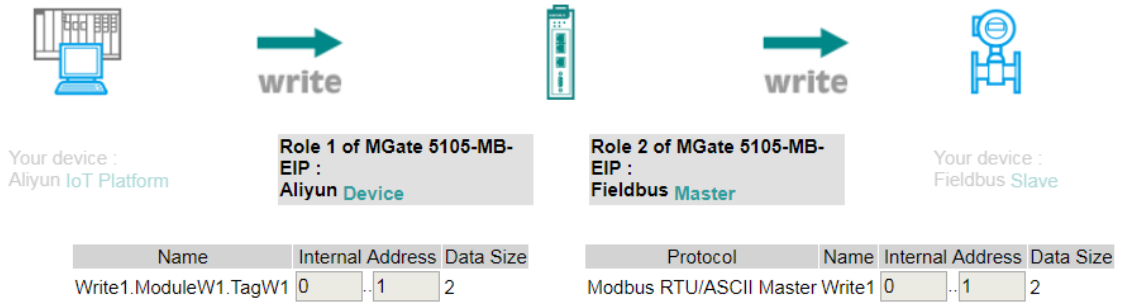


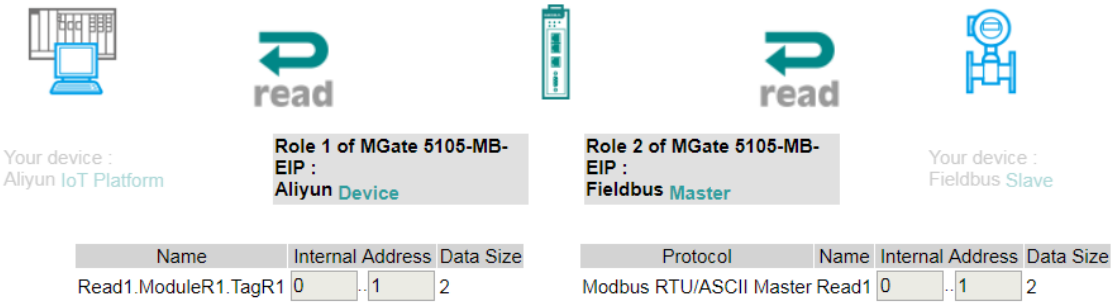
4.4 I/O Data Mapping

When the protocol settings is done, I/O Data mapping is not mapped yet. Click **Make a proposal** to auto map in **Alibaba Cloud IoT Platform → Fieldbus Slave** direction and **Fieldbus Slave → Alibaba Cloud IoT Platform** direction.



The mapping result is as below:





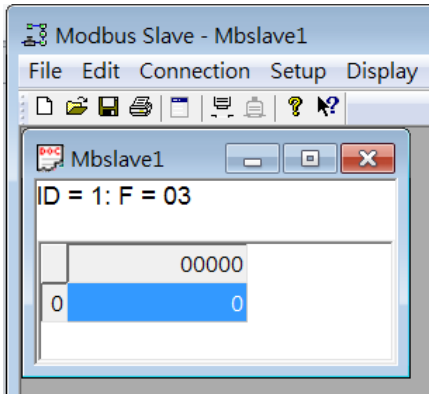
4.5 Serial Settings

Serial Port1 connects to Modbus RTU device, so you must set the serial parameters of Port1.

Set as below:

5. Modbus Slave Tool Settings

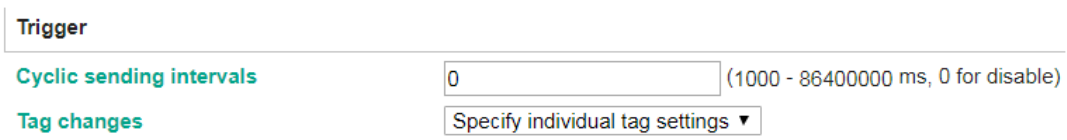
PC1 runs **Modbus Slave tool** and connects to MGate 5105's Serial Port. Add the Modbus definition below:



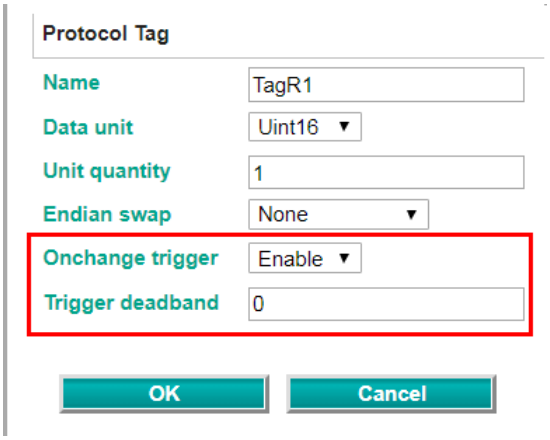
6. Communication Test

6.1 Publish message

We set **Trigger** as follows: For Cyclic sending interval, choose **0**; for tag changes, choose **Specify individual tag settings**:



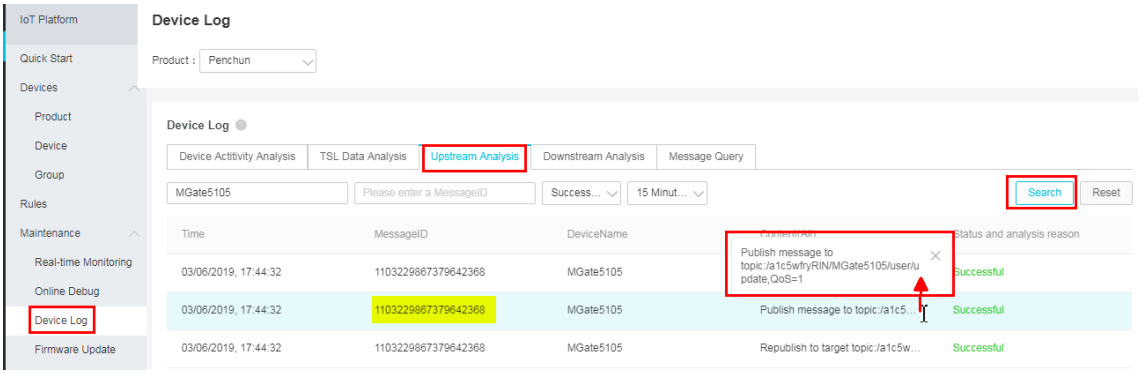
We set TagR1 **Onchange trigger** as enable with **Trigger deadband** as 0.



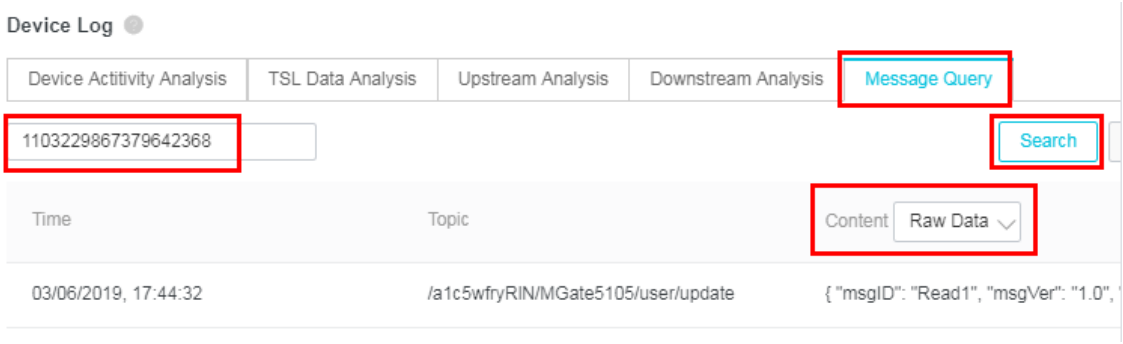
So when the MGate 5105 gets Modbus RTU device Register0's value changed, it triggers to publish the message to the IoT platform.

Now, update Modbus Register0's value as 1.

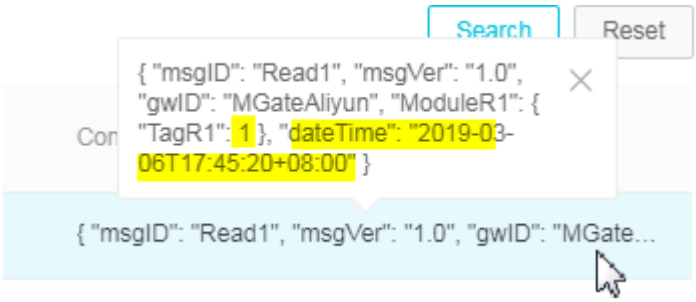
We can check **Device Log** on Alibaba Cloud IoT Platform. Select **Upstream Analysis** tab and click **Search**. The MGate 5105 published messages are on the list. Find the **Publish message to topic …/update** message in the **Content** column.



Copy Message ID. Paste it in the **Message Query** tab, then click **Search**. It will show the content of the message. Under **Content**, choose **Raw Data**.



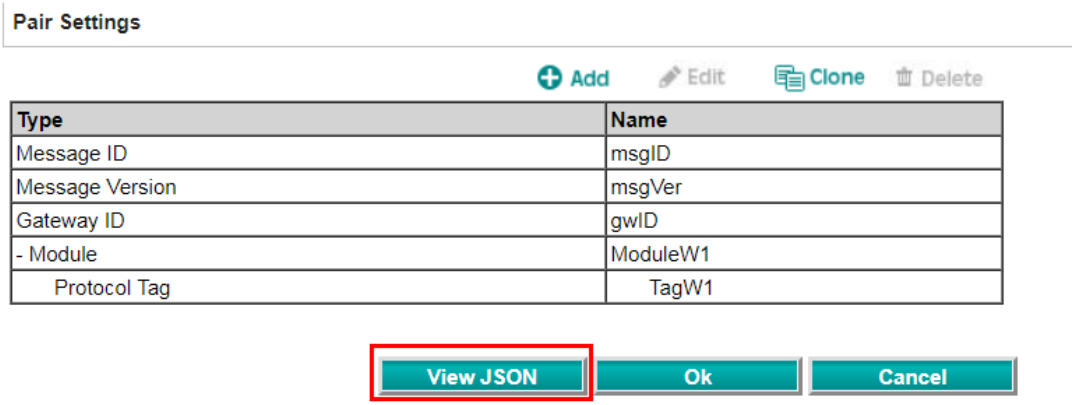
Move the mouse over it, and the message details will pop up. We can see TagR1's value is 1 and with dateTime padding.



6.2 Subscribe message

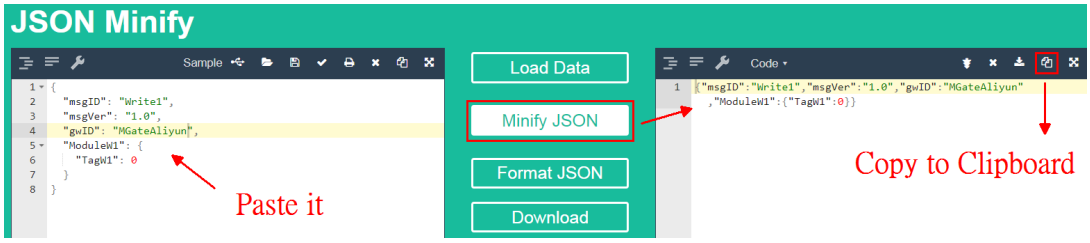
We can send the message to the MGate 5105 from Alibaba Cloud IoT Platform. You can follow the steps below:

1. Click **View JSON** button.

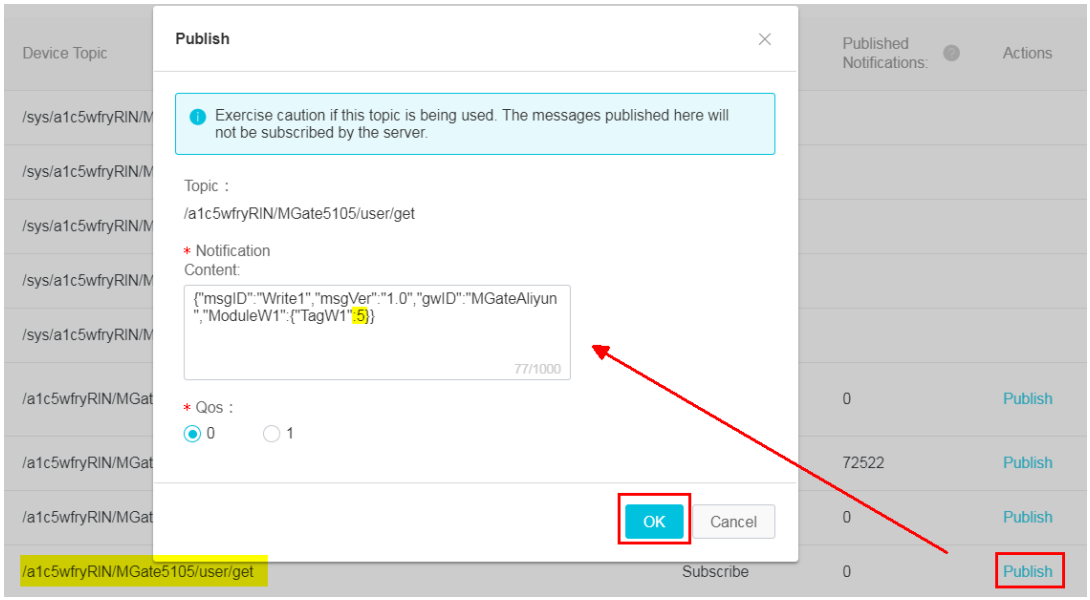


Copy Subscribe message JSON format:

2. The copied message has a lot of space and line feed. Use tool to compact it. Download a free online tool: https://jsonformatter.org/json-minify
   Paste the message on the left side, then click **Minify JSON**. It will show a compact JSON format message on the right side. Click **Copy to Clipboard**.



3. On **Topic List** tab of Alibaba Cloud IoT Platform, choose **Subscribe topic** then click **Publish**. A window with a published message will pop up. Paste it in the **Content** field and modify the **TagW1** value to 5, then click **OK**.



4. Check on Modbus Slave tool; Register0's value is updated as 5.