Connect to Alibaba Cloud with the MGate 5105 Industrial Protocol Gateway

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MGate 5105 to Alibaba Cloud

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 >

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3. Prerequisites

3.1 Modbus Slave Tool

<u>Modbus Slave</u> 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: <u>http://www.modbustools.com/download.html</u>

3.2 Create Alibaba Cloud IoT Platform Product and Devices

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

	IoT Platform	Products	
*	Quick Start	All(1) Basic Edition(0) Pro Edition(1)	
	Devices		
	Product	Product List	Refresh Create Product
•	Device	Search by product name Search	
	Group		٢

3. Add a new IoT Platform Device: IoT Platform \rightarrow Devices \rightarrow Device \rightarrow Add Device.

IoT Platform	Devices	
Quick Start Devices	All Total Devices: • Activate Device • Online 2 2 1	Refresh
Product	Device List Batch Management	
Device		
Group	Device List	Batch Add Add Device
Rules	Enter a DeviceName Select a device tag. V Search	

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.

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Set as below:

Protocol Conversion



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**.

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

Set as below:

				🔂 Add	d Edit	🕆 Clone 🏦 De	elete 🗘 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

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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:

IoT Platform	Devices > Device	Details						
Quick Start	MGate5105	Online						
Devices	Product : Penchur	1 View		ProductKey : a1	c5wfryRIN Copy		DeviceSecret : ***	Show
Product	Device Inform	ation Topic List	Statu	is Events	Invoke Service	Device	Log	
Device								
Group	Device Informa	tion						
Rules	Product Name	Penchun		ProductKey	a1c5wfryRIN Cop	у	Region	China (Shanghai)
Maintenance	Node Type	Device		DeviceName	MGate5105 Copy	,	DeviceSecret	******* Show

Set as below:

Role	Device
Basic Settings	
Server domain (Region)	Shanghai 🔹
Product key	a1c5wfryRIN
Device name	MGate5105
Device secret	

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

Server domain (Region)	User Defined Domain 🔻	iot-as-mqtt.cn-shanghai.aliyuncs.com

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.

Publish Messages			
	🔂 Add	🔊 Edit	🖞 Delete
Message ID			

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

MGate 5105 to Alibaba Cloud

Pair Settings					
		🔂 Add	💉 Edit	Clone	🏛 Delete
Туре	Message	D			
Message ID Message Version	Name	msgID			
Gateway ID	Value	Read1			
Date Time			•	e	
Tag Status Monitoring		OK			
Conditional User Information		Cancel			

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

Pair Settings			
		🗭 Add 🛛 🛷 Edit	🖶 Clone 🏾 🗖 Delete
Туре	Date Time		
Message ID	Pair	Enable V	
Message Version	Fair		
Gateway ID	Name	dateTime	
Date Time	Value	Example: 1990-01-	
Tag Status Monitoring		02T03:04:05+06:00	
Conditional User Information			
Constant User Information		OK Cancel	

Click **Add** \rightarrow **Module** to create a new module.

Pair Settings

	🔂 Add	Ø	Edit	🖹 Clone	🛍 Delete
Туре	Module		Name		
Message ID	Tay		msgID		
Message Version			msgVe	r	
Gateway ID			gwlD		
Date Time			dateTir	ne	
Tag Status Monitoring			validTa	g	

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Under Name, choose ModuleR1.

Module Name ModuleR1 OK Cancel

Then click **Add → Tag**.

	🗘 Add	ø	Edit	E Clone	🛍 Delete
Туре	Module	e	Name		
Message ID	🛛 👗 Tag	9	msgID		
Message Version	~ <u>_</u>		msgVer		
Gateway ID			gwlD		
Date Time			dateTime		
Tag Status Monitoring			validTag		
- Module			ModuleR	1	

Create a Protocol Tag as below:

Name	TagR1
Data unit	Uint16 ▼
Unit quantity	1
Endian swap	None •
Onchange trigger	Enable •
Trigger deadband	0

MGate 5105 to Alibaba Cloud

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

Devices > Device Details				
MGate5105 Online				
Product : Penchun View			Pr	C
Device Information Topic List S	tatus	Events	Invoke Service	
Device TopicList 🔘				
Device Topic				
/sys/a1c5wfryRIN/MGate5105/thing/event/	property/p	ost		
/sys/a1c5wfryRIN/MGate5105/thing/service	e/property	/set		
/sys/a1c5wfryRIN/MGate5105/thing/event/	\${tsl.eveni	t.identifer}/pc	st	
/sys/a1c5wfryRIN/MGate5105/thing/service	e/\${tsl.eve	nt.identifer}		
/sys/a1c5wfryRIN/MGate5105/thing/device	info/updat	ie		
/a1c5wfryRIN/MGate5105/user/data				
/a1c5wfryRIN/MGate5105/user/update				
/a1c5wfryRIN/MGate5105/user/update/erro	or			
/a1c5wfryRIN/MGate5105/user/get				
Set as below:				
Торіс				
Publish fieldbus IO data topic	/a1c5w	/fryRIN/M	Gate5105/us	

3. Subscribe Messages:

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

Subscribe Messages			
	🗘 Add	🖋 Edit	🖞 Delete
Message ID			

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

	Message ID	
Message ID	Name	msgID
Pair Settings	Value	Write1
Туре	ОК	Cancel
Message ID		

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

Pair Settings

	🔂 Add	e 🖉	dit	🖹 Clone	並 Delete
Туре	Module		Name		
Message ID	Tag		msgID		
Message Version			msgVe	er	
Gateway ID			gwlD		

Under Name, select ModuleW1.

Module		
Name	ModuleW1	
ОК	Ca	ncel

Then click **Add** \rightarrow **Tag**.

	🗘 Add	🖋 Edit	🖺 Clone	並 Delete
Туре	Module	ame		
Message ID		nsgID		
Message Version	U	rnsgVer		
Gateway ID		gwlD		
- Module		ModuleW1		

MGate 5105 to Alibaba Cloud

Create a Protocol Tag as below:

Protocol Tag	
Name	TagW1
Data unit	Uint16 ▼
Unit quantity	1
Endian swap	None <

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

Devices > Device Details							
MGate5105 Online							
Product : Penchun View Pro							
Device Information Topic List Status Events Invoke Service							
Device Topic List 🔘							
Device Topic							
/sys/a1c5wfryRIN/MGate5105/thing/event/property/post							
/sys/a1c5wfryRIN/MGate5105/thing/service/property/set							
/sys/a1c5wfryRIN/MGate5105/thing/event/\${tsl.event.identifer}/post							
/sys/a1c5wfryRIN/MGate5105/thing/service/\${tsl.event.identifer}							
/sys/a1c5wfryRIN/MGate5105/thing/deviceinfo/update							
/a1c5wfryRIN/MGate5105/user/data							
/a1c5wfryRIN/MGate5105/user/update							
/a1c5wfryRIN/MGate5105/user/update/error							
/a1c5wfryRIN/MGate5105/user/get							

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Set as below:
Topic
Publish fieldbus IO data topic /a1c5wfryRIN/MGate5105/us

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.

I/O Data Mapping



Moxa Tech Note			MGate 510	5 to A	libaba	Cloud
	Pead		rea	Did	© H	
Your device : Aliyun IoT Platform	Role 1 of MGate 5 EIP : Aliyun _{Device}	5105-MB-	Role 2 of MGate 5105-MB EIP : Fieldbus _{Master}	÷	Your device Fieldbus Sla	: ave
Name	Internal Address	s Data Size	Protocol	Name Inte	ernal Address	Data Size
Read1.ModuleR1.TagR	10.1	2	Modbus RTU/ASCII Master	Read1 0	1	2

4.5 Serial Settings

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

Set as below:

Serial Settings

Port	Baud rate	Parity	Data bit	Stop bit	Flow control	FIFO	Interface	RTS on delay	RTS off delay
1	115200 🔻	Even •	8 🔻	1 🔻	None 🔻	Enable 🔻	RS-232 V	0	0

5. Modbus Slave Tool Settings

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



MGate 5105 to Alibaba Cloud

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**:

Trigger		
Cyclic sending intervals	0	(1000 - 86400000 ms, 0 for disable)
Tag changes	Specify individ	ual tag settings ▼

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

Name	TagR1
Data unit	Uint16 V
Unit quantity	1
Endian swap	None •
Onchange trigger	Enable T
Trigger deadband	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.

IoT Platform	Device Log			
Quick Start	Product : Penchun			
Devices ^				
Product	Device Log 🔘			
Device	Device Actitivity Analysis	TSL Data Analysis Upstream Analysis	Downstream Analysis Me	ssage Query
Group Rules	MGate5105	Please enter a MessageID	Success V 15 Minut.	. V
Maintenance \land	Time	MessageID	DeviceName	ContenitAin Status and analysis reason
Real-time Monitoring	03/06/2019, 17:44:32	1103229867379642368	MGate5105	Publish message to topic:/a1c5wt/yRIN/MGate5105/user/u pdate,QoS=1
Device Log	03/06/2019, 17:44:32	1103229867379642368	MGate5105	Publish message to topic:/a1c5 Successful
Firmware Update	03/06/2019, 17:44:32	1103229867379642368	MGate5105	Republish to target topic:/a1c5w Successful

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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**.

Device Log 🔘					_
Device Actitivity Analysis	TSL Data Analysis	Upstream Analysis	Downstream Analysis	Message Query	
1103229867379642368					Search
Time	Т	opic		Content Raw Data 🗸]
03/06/2019, 17:44:32	14	a1c5wfryRIN/MGate510	5/user/update	["msgID": "Read1", "m	sgVer": "1.0",

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.

Pair Settings

	🔂 Add	🔊 Eclit	💼 Clone	🖞 Delete
Туре		Name		
Message ID		msgID		
Message Version		msgVer		
Gateway ID		gwlD		
- Module		ModuleW1		
Protocol Tag		TagW1		

View JSON	Ok	Cancel

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Copy Subscribe message JSON format:

JSON View	
{	
"msgID": "Write1",	
"msgVer": "1.0",	
"gwID": "MGateAliyur	۱",
"ModuleW1": {	
"TagW1": 0	
}	
}	
Conv	Cancel

The copied message has a lot of space and line feed. Use tool to compact it. Download a free online tool: <u>https://jsonformatter.org/json-minify</u>
 Paste the message on the left side, then slick Minify ISON. It will show a compact ISON

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**.

JSON Minify	
] = = 🌶 Sample 🍕 🖻 🗸 🖶 🗙 🖄	Load Data 🔄 🚍 🎤 Code - 🛛 🛊 🗶 🖄 🛠
1 * { 2 "msgID": "Write1".	1 ["msgID":"Write1","msgVer":"1.0","gwID":"MGateAliyun" ."ModuleW1":("TagW1":0)}
3 "msgVer": "1.0",	Minify JSON
4 "gwID": "MGateAllyun", 5 - "ModuleW1": {	
6 "TagW1": 0 7 } 8 }	Format JSON Copy to Clipboard
Paste it	Download

MGate 5105 to Alibaba Cloud

 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.

Device Topic	Publish	×	Published Notifications:	Actions
/sys/a1c5wfryRIN/M	Exercise caution if this topic is being used. The messages published here will not be subscribed by the server.			
/sys/a1c5wfryRIN/M	Topic :			
/sys/a1c5wfryRIN/№	/a1c5wfryRIN/MGate5105/user/get			
/sys/a1c5wfryRIN/M	* Nouncation Content: {"msalD":"Write1" "msaVer":"1 0" "awID":"MGateAlivun			
/sys/a1c5wfryRIN/M	","ModuleW1":("TagW1" <mark>:5</mark> })			
/a1c5wfryRIN/MGat	+ Qos : ● 0 0 1		0	Publish
/a1c5wfryRIN/MGat		\geq	72522	Publish
/a1c5wfryRIN/MGat	ОК Сал	cel	0	Publish
/a1c5wfryRIN/MGate	Subscrib	e	0	Publish

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

