Advantech AE Technical Share Document

Date	2022/07/14	SR#	1-4899613861						
Category	Category ■FAQ □SOP Related OS N/A								
	How to use MQTT downlink to control WISE-4000's DO or Modbus RTU								
Abstract	Server?								
Keyword	MQTT								
Related	WHEE 4000 WHEE 4000/LAN WHEE 4000								
Product	WISE-4000, WISE-4000/LAN, WISE-4220								

Problem Description

In this case, we will take two models, WISE-4051 and WISE-4060, to control Modbus RTU Server and DO channel via MQTT downlink. The controlling method is that we use MQTTBox to publish certain topic and payload to WISE-4000, and WISE-4000 will control Modbus RTU server and DO corresponding the topic and payload. Please refer to the Figure 1.



Figure 1. Topology of MQTT downlink control

Brief Solution

There are two model to demonstrate how to control WISE-4000's Modbus RTU server and DO respectively, so the below will be divided to two sections. Section 1: Controlling WISE-4000's Modbus RTU server Section 2: Controlling WISE-4000's DO

Section1: Controlling WISE-4000's Modbus RTU Server

Step1: In the case, we use ADAM-4561 to convert PC's USB to RS-485. In addition, we use ICDT RTU Modbus RTU server software to simulate Modbus RTU Server on PC. Therefore, WISE-4051 can communicate with Modbus RTU Server simulator on PC via Modbus RTU protocol. The topology is shown as Figure 2.



Figure 2. Topology of controlling WISE-4051's Modbus server via MQTT

This document will skip how to use ADAM-4561 and ICDT RTU Modbus server software, so please build a Modbus server to communicate with WISE-4051 before step 2.

<u>Step2</u>: On the WISE-4051 webpage, please go to **IO Status > COM1 > Modbus/RTU Configuration > Rule Setting** and set what addresses WISE-4051 need to read and write. In this case, the setting is shown in Figure 3.

IO Status

	:	Status		Modb	us/RTU Configur	ration		Diagnostician			
Modbus/RTU Configuration											
		Common Settin	g Becau	Because of coil type, the real address in Modbus serveris 10005.					Rule Setting		
Rule	Server ID	Туре	Start Addre	Length	R/W	Scan Interval	Mapping Channel	Log	Deviation/COS	Deviation Value	Rule Status
0	1	01 Coil status 🗸 🗸	5	1	R/W v	2000	0			1	•
1	1	03 Holding register 🗸	5	1	R/W v	2000	1			1	•
						1	1.1			1	

Figure 3. Setting of WISE-4051's COM1

Reference:

How to check WISE-4051 RS-485 communication status with Modbus address https://www.advantech.com/support/details/faq?id=1-1ECHV9I User Manual for WISE-4000 Series chapter 4.2.7 Configuring the RS-485 Port of WISE-4051. <u>https://advdownload.advantech.com/productfile/Downloadfile2/1-14JNLJL/UM-WISE-4000-</u> <u>Ed.4-EN.pdf#page=69</u>

<u>Step3</u>: On the WISE-4051 webpage, please go to **Configuration** > **Cloud** > **iSensing MQTT** and set what broker the customer makes WISE-4051 to connect. In this case, the setting is shown in Figure 4.

Information Wireless Network App	Time & Date	Time Sync	Modbus	Control	General	Cloud	Firmware	Account			
Cloud Configuration											
	Select Service	Sensing iSensing	g MQTT	~							
Current Status											
Cc	onnection Status	Connected									
	Error Code	None									
C Refresh											
	Connection	o Cottingo									Advanced Cettings
	Connection	in Setungs									Auvanceu Setungs
MQTT Host Name	192.168.50.186	Broke	erIP					Port N	lumber	1883	Broker port
SSL secure	Disable O Ena	ble									
WebSocket	Disable O Ena	ble						WebSocke	et Path	mqtt	
User Name	8338							Pas	ssword	[]	
Heartbeat Frequency (sec)	60										
Publish QoS	1							Subscrib	be QoS	1	
Publish Retain	Disable O Ena	ble						Will	Retain (Disable	C Enable

Figure 4. Setting of WISE-4051's iSensing MQTT cloud service

Reference: How to connect Mosquitto with iSensing MQTT https://www.advantech.com/support/details/faq?id=1-1L5RLK8

<u>Step4</u>: After WISE-4051 connects to a broker, please use any MQTT client to publish a command to control WISE-4051's Modbus RTU server.

In this case, MQTTBox is used to publish a command to WISE-4051 to write certain coil address of Modbus RTU server. When Modbus RTU server changed value, the new value published from WISE-4051 will be changed. Just like Figure 5.

MQTTBox	
MQTTBox Edit Help	
Image: Menu Imag	
Moquitto - mqtt://192.168.50.186:1888	
Topic to publish	X Advantech/74FE4864CC75/data
Advantech/74FE4864CC75/ctl/p1v01s0005x00	
QoS	{"s":1,"t""2022-07-07T08:30:37Z","q":192"c":0"p1v01s0005x00":true"p1v01 r0005x01":4} After change
0 - Almost Once 🔹	dos : 0 roken : false and : publish dun : false tonic : Advantech/74EE4964CC75/d
Retain 🗐	quasi of similar latest time potential, dup latest optimilar to a subsection and a subsection of the subsection of th
Payload Type	4112491184849115484848531204848345811611411/1014434112491184849114484848 531204849345852125
Strings / JSON / XML / Characters	
e.g: {'hello':'world'}	
Payload	{"s":0,"t":"2022-07-07T08:30:25Z","q":402,"c":0 "p1v01s0005x00":false,"p1v0
{"v":true}	Before change
	qos: 0, retain : false, emd : publish, dup : false, topic : Advantech/74FE4864CC75/d ata, messageld : , length : 117, Raw payload : 123341153458484434116345834504850 5045485545485584486585148585053903444341133458495750443491934584844 411249118488491548484855190484833581029710811510143431124911848491144848
Publish	48531204849345852125
{"v":true} topic:Advantech/74FE4864CC75/ctl/p1v01s0005x00, gos:0, retain:false ❀ ◆	

Figure 5. Process of coil address value changed

In addition, please use MQTTBox to publish a command to WISE-4051 to write certain holding register address of Modbus RTU server. When Modbus server changed value, the new value published from WISE-4051 will be changed. Just like Figure 6.

MQTTBox	
MQTTBox Edit Help	
Image: Second state Image: Second state Image: Second state Image: Second state Image: Second state Image: Second state	٥
Moquitto - mqtt://192.168.50.186:1888	
Topic to publish	Advantech/74FE4864CC75/data
Advantech/74FE4864CC75/ctl/p1v01r0005x01	
QoS	{"s":4,""."2022-07-07T08:49:50Z","q":192,"c":0,"p1v01s0005x00":true,"p1v01 r0005x01"101 After change
0 - Almost Once	Anter endinge
Retain	qos : 0, retain : false, cmd : publish, dup : false, topic : Advantech/74FE4864CC75/d ata, messageld : , length : 118, Raw payload : 123341153458524434116345834504850 50454855454855844856585257585348903444341133458495750443499345848443
Payload Type	411249118484911548484853120484834581161141171014434112491184849114484848
Strings / JSON / XML / Characters	
e.g: {'hello':'world'}	
Payload	{"s":3,"t":"2022-07-07T08:49:37Z","q":192,"c":0,"p1v01s0005x00":true,"p1v01 <u>r0005w01</u> [100] Before change
{"v":101}	
Publish	qos: 0, retain : false, cmd : publish, dup : false, topic : Advantech/74FE4864CC75/d ata, messageld : , length : 118, Raw payload : 123341153458514434116345834504850 50454855454865584486565257585155903444341133458495750443499345848443 41124911848491154848485312048483458116114117101443411249118484911448488 5312048493458494848125
{'V":101} topic:Advantech/74FE4864CC75/ctl/p1v01r0005x01, qos:0, retain:false	

Figure 6. Process of holding register address value changed

<u>Note</u>: The command rule of controlling WISE-4000's Modbus RTU server is described below. First, please note that, in the payload of "Advantech/MAC of WISE/data" topic, the "p1v01s0005x00" and "p1v01r0005x01" keys of JSON data represent <u>COM1 port channels</u> bonded with Modbus RTU server's addresses. Each part of the "p1v01s0005x00" and "p1v01r0005x01" are shown as below. "p1v01s0005x00" => COM port number; RTU Server ID; Start addr. of RTU server's coil register; Channel ID "p1v01r0005x01" => COM port number; RTU Server ID; Start addr. of RTU server's holding register; Channel ID

Second, MQTT downlink's rule is shown as following. Topic Rule: Advantech/**MAC of WISE**/ctl/**key of certain COM port channel** Payload Rule: {"v": **Value(Boolean or Number)**} Topic Example1: Advantech/74FE4864CC75/ctl/p1v01s0005x00 Payload Example1: {"v": **true**} Topic Example2: Advantech/74FE4864CC75/ctl/p1v01r0005x01 Payload Example2: {"v": **10**}

Section2: Controlling WISE-4000's DO

<u>Step1</u>: In this case, WISE-4060's DO channel is controlled via MQTT downlink. The topology is like Figure 7.



Figure 7. Topology of controlling WISE-4060's DO

<u>Step2</u>: On the WISE-4060 webpage, please go to **Configuration > Cloud > iSensing MQTT** and set what broker the customer makes WISE-4060 connect. In this case, the setting is shown in Figure 8.

Information Wireless Network App	Time & Date	Time Sync	Modbus	Control	General	Cloud	Firmware	Account			
Cloud Configuration											
s	Select Service	S iSensin	g MQTT	~							
Current Status											
Conn	nection Status	Connected									
	Error Code	None									
	2 Refresh										
	Connection	n Settings								,	Advanced Settings
MQTT Host Name	192.168.50.186	Broke	er IP					Port Nu	umber	1883	Broker port
SSL secure	Disable Ena	ble									
WebSocket @	Disable Ena	ble						WebSocket	t Path	mqtt	
User Name	S. S.							Pass	sword	()	
Heartbeat Frequency (sec)	60										
Publish QoS	1							Subscribe	e QoS	1	
Publish Retain	Disable O Ena	ble						Will R	Retain @	Disable	O Enable

Figure 8. Setting of WISE-4060's iSensing MQTT cloud service

Reference: How to connect Mosquitto with iSensing MQTT https://www.advantech.com/support/details/faq?id=1-1L5RLK8

Step3: On the WISE-4060 webpage, please go to Advanced > Data Logger > Data Configuration > IO Configuration > Log Data > Channel Fields > DO/Relay. And turn on Log Enabled and Change of State checkbox of DO channel. Just like Figure 9.

B	Data Logger			
Dat	ta Configuration Logger Configuration Local Data Query			
		I/O Configuration		System Configuration
Lo	g Conditions			
		By Period 100 0.1 sec By Communication WDT Log		
10	Trigger Log Conditions			
Ge	eneral			
		Clear Log when Power Up Circular Log when Memory Full		
Lo	g Data			
		Channel Fields		IO Fields
		DI		DO/Relay
	Channel	Log Enabled	Change of State 🗆	
	0		2	
	1		2	
	2		2	
	3			

Figure 9. Setting of Log Enabled and Change of State of WISE-4060's DO

<u>Step4</u>: After WISE-4060 connects to a broker, please use any MQTT client to publish a command to control WISE-4060's DO channel.

In this case, MQTTBox is used to publish a command to WISE-4060 to convert DO4 from false to true. When WISE-4060's DO changed value, the new value published from WISE-4060 will be changed. Just like Figure 10.

MQTBox	
E Menu ← ▲ Connected ③ Add publisher ④ Add subscriber ◆	
roquitto - mqtt://192.168.50.186:1888	
Topic to publish	X Advantech/00D0C9F70C90/data
Advantech/00D0C9F70C90/ctl/do4	
Qos	(*s*2.***2000-01-0570643.172**;9*:192,***0;"d11**false;"d3**false;"d3**false;"d4**false;"do1**fals e;"do2**false;"do3**false;"do4**true) After change
0 - Almost Once	0. retain : false, cmd : publish, dup : false, topic : Advantech/00D0C9F70C90/data, messageld : , length
Retain	172, Raw payload : 123341153458504434116345834504848484548494548538448545852515849559034443
Payload Type	41133458495/50443499345848443410010549345810297108115101443410010550345810297108115101443 410010551345810297108115101443410011552345810297108115101443410011149345810297108115101443410 01115004581029710811510144341001151345810297108115101443410011155245811511417101155
Strings / JSON / XML / Characters	
e.g: {'hello'.'world'}	Part 98/9000 04 05700 40 4079 5-5 402 5-5 0 84454-1-5 54054-1-5 54054-1-5 54454-1-5
Payload	e,"do2".false,"do3".false,"do4".false e,"do2".false,"do3".false,"do4".false Before change
(v.nue)	qos : 0, retain : true, cmd : publish, dup : false, topic : Advantech/00D0C9F70C90/data, messageld : , length :
	173, Raw payload : 12334115345849443411634583450484848454849454853844854585250585254903444341133458495750443
Publish	49934584844341001054934581029710811510144341001055034581029710811510144341001055134581029 7108115101443410010552248610297108115101443410011493486102971081151014434100115034581029710 811510144341001151345810297108115101443140101152345810297108115101125
(V*true) topic:Analoch/00D0C9F70C90(ctlido4, qos:0, retain:false €	

Figure 10. Process of WISE-4060's DO value changed

<u>Note</u>: The command rule of controlling WISE-4000's DO is described below. First, please note that, in the payload of "Advantech/MAC of WISE/data" topic, the "do4" represent DO channel 3 of WISE-4000. The rule of naming is shown as below. do(Number+1) => DO channel number of WISE-4000

Second, MQTT downlink's rule is shown as following. Topic Rule: Advantech/**MAC of WISE**/ctl/**key of certain DO channel** Payload Rule: {"v": **Value(Boolean)**} Topic Example: Advantech/74FE4864CC75/ctl/do4 Payload Example: {"v": **true**}