

Advantech AE Technical Share Document

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Category	■FAQ □SOP	Related OS	N/A
Abstract	How to use MQTT downlink to control WISE-4000's DO or Modbus RTU Server?		
Keyword	MQTT		
Related 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.

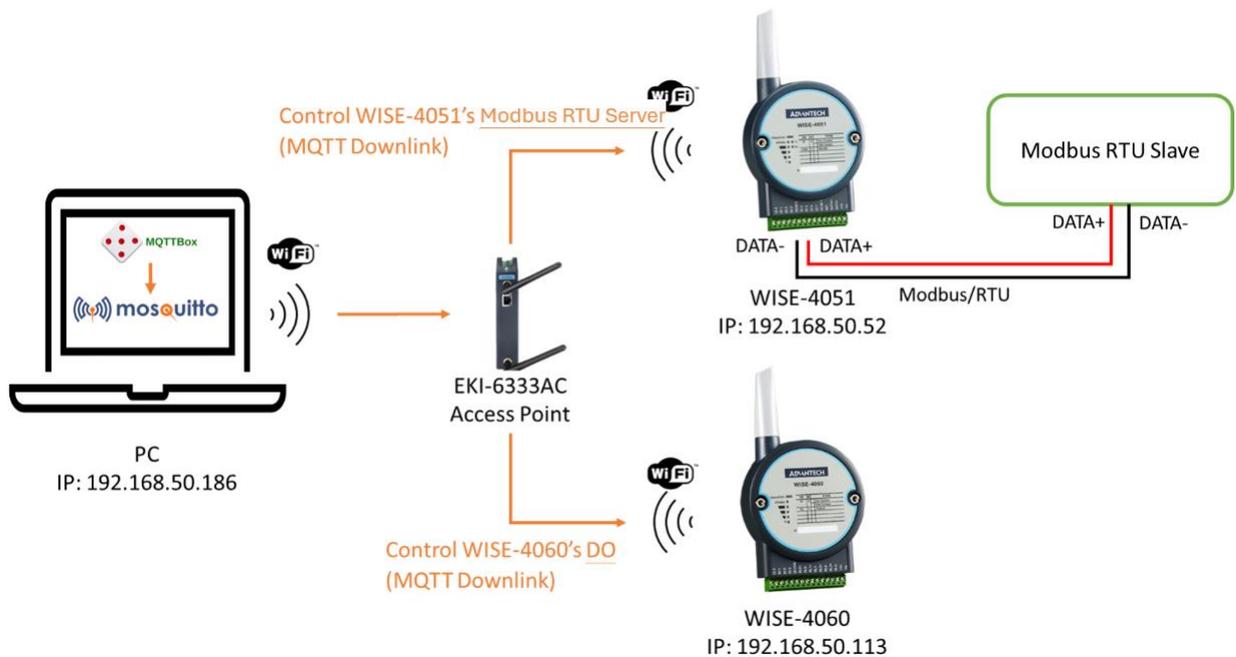


Figure 1. Topology of MQTT downlink control

■ 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.

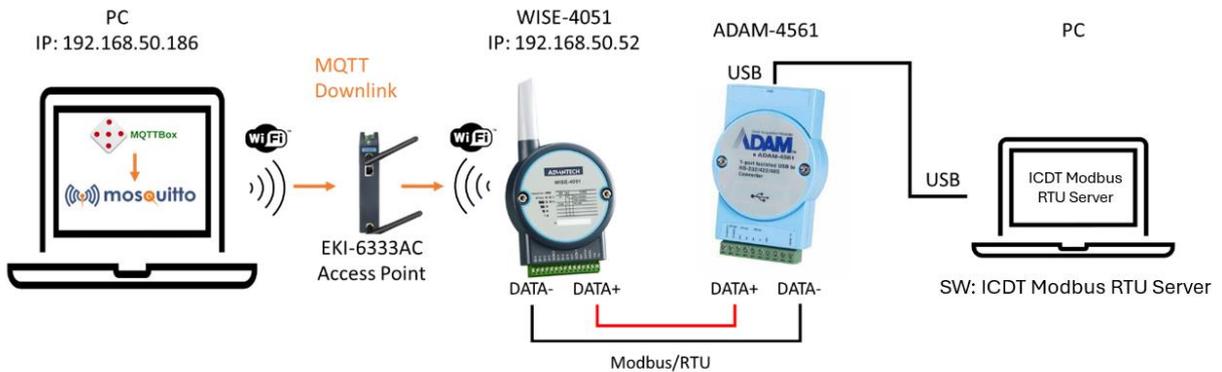


Figure 2. Topology of controlling WISE-4051's Modbus server via MQTT

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.

Step2: 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

DI COM1

Status Modbus/RTU Configuration Diagnostician

Modbus/RTU Configuration

Common Setting Rule Setting

Because of coil type, the real address in Modbus server is 10005.

Rule	Server ID	Type	Start Address	Length	R/W	Scan Interval	Mapping Channel	Log	Deviation/COS	Deviation Value	Rule Status
0	1	01 Coil status	5	1	R/W	2000	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	✓
1	1	03 Holding register	5	1	R/W	2000	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	✓

Because of holding register type, the real address in Modbus server is 40005.

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.
<https://advdownload.advantech.com/productfile/Downloadfile2/1-14JNLJL/UM-WISE-4000-Ed.4-EN.pdf#page=69>

Step3: 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.

The screenshot displays the 'Cloud Configuration' interface for the WISE-4051 device. At the top, a navigation menu includes 'Information', 'Wireless', 'Network App', 'Time & Date', 'Time Sync', 'Modbus', 'Control', 'General', 'Cloud' (highlighted), 'Firmware', and 'Account'. The main heading is 'Cloud Configuration'. Below this, there is a 'Select Service' dropdown menu set to 'iSensing MQTT'. Under 'Current Status', the 'Connection Status' is 'Connected' and the 'Error Code' is 'None', with a 'Refresh' button below. The settings are divided into two sections: 'Connection Settings' and 'Advanced Settings'. In 'Connection Settings', 'MQTT Host Name' is '192.168.50.186' (labeled 'Broker IP'), 'SSL secure' is 'Disable', 'WebSocket' is 'Disable', 'User Name' is empty, 'Heartbeat Frequency (sec)' is '60', 'Publish QoS' is '1', and 'Publish Retain' is 'Disable'. In 'Advanced Settings', 'Port Number' is '1883' (labeled 'Broker port'), 'WebSocket Path' is 'mqtt', 'Password' is empty, 'Subscribe QoS' is '1', and 'Will Retain' is 'Disable'.

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>

Step4: 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.

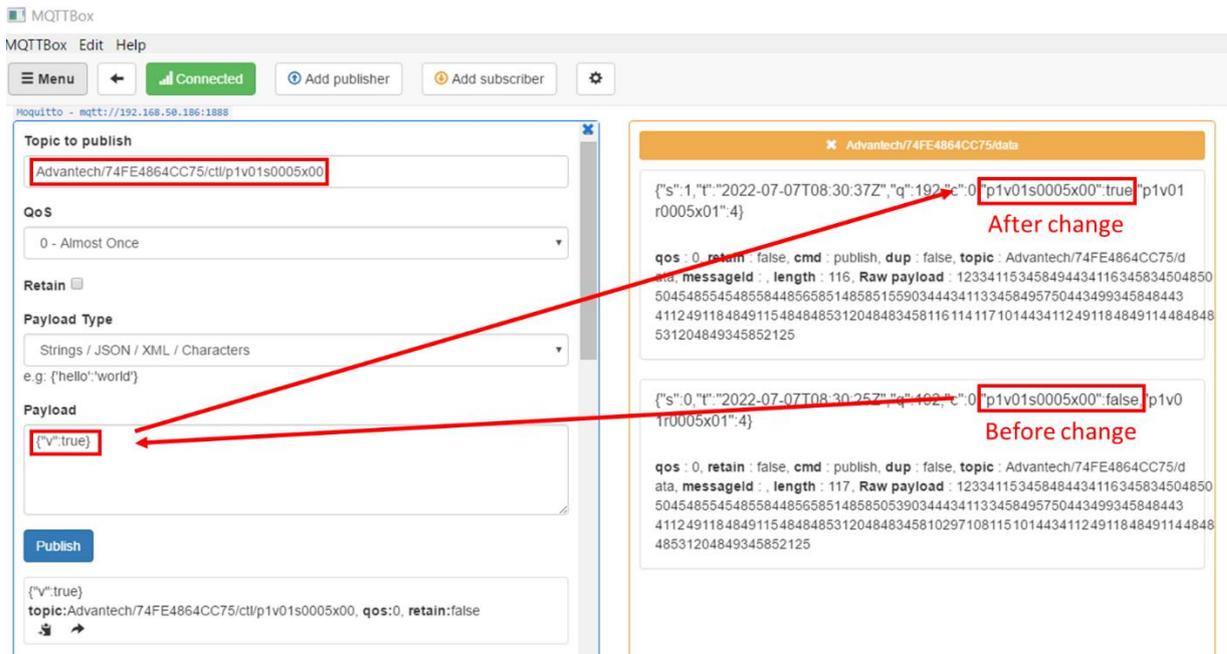


Figure 5. Process of coil address value changed

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.

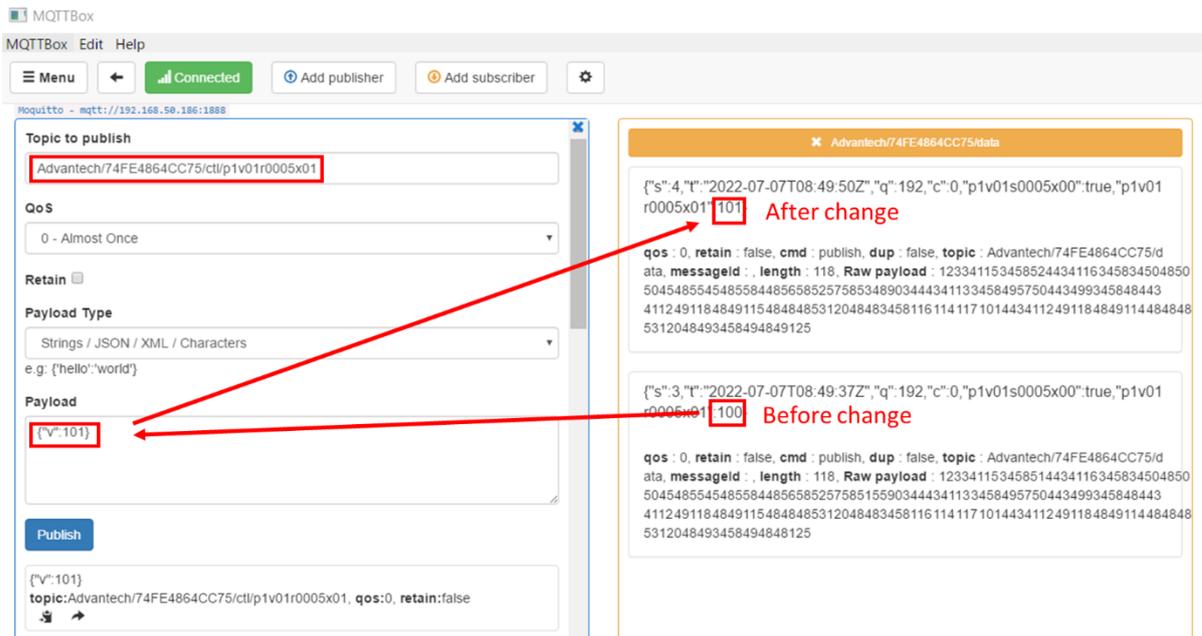


Figure 6. Process of holding register address value changed

Note: 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 **COM1 port channels** 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

Step1: 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

Step2: 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.

The screenshot shows the Cloud Configuration page for the WISE-4060 device. The page is divided into several sections:

- Cloud Configuration:** Select Service is set to iSensing MQTT.
- Current Status:** Connection Status is Connected, and Error Code is None. A Refresh button is present.
- Connection Settings:**
 - MQTT Host Name: 192.168.50.186 (labeled "Broker IP")
 - Port Number: 1883 (labeled "Broker port")
 - SSL secure: Disable (selected)
 - WebSocket: Disable (selected)
 - User Name: [empty]
 - Heartbeat Frequency (sec): 60
 - Publish QoS: 1
 - Publish Retain: Disable (selected)
- Advanced Settings:**
 - WebSocket Path: mqtt
 - Password: [empty]
 - Subscribe QoS: 1
 - Will Retain: Disable (selected)

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.

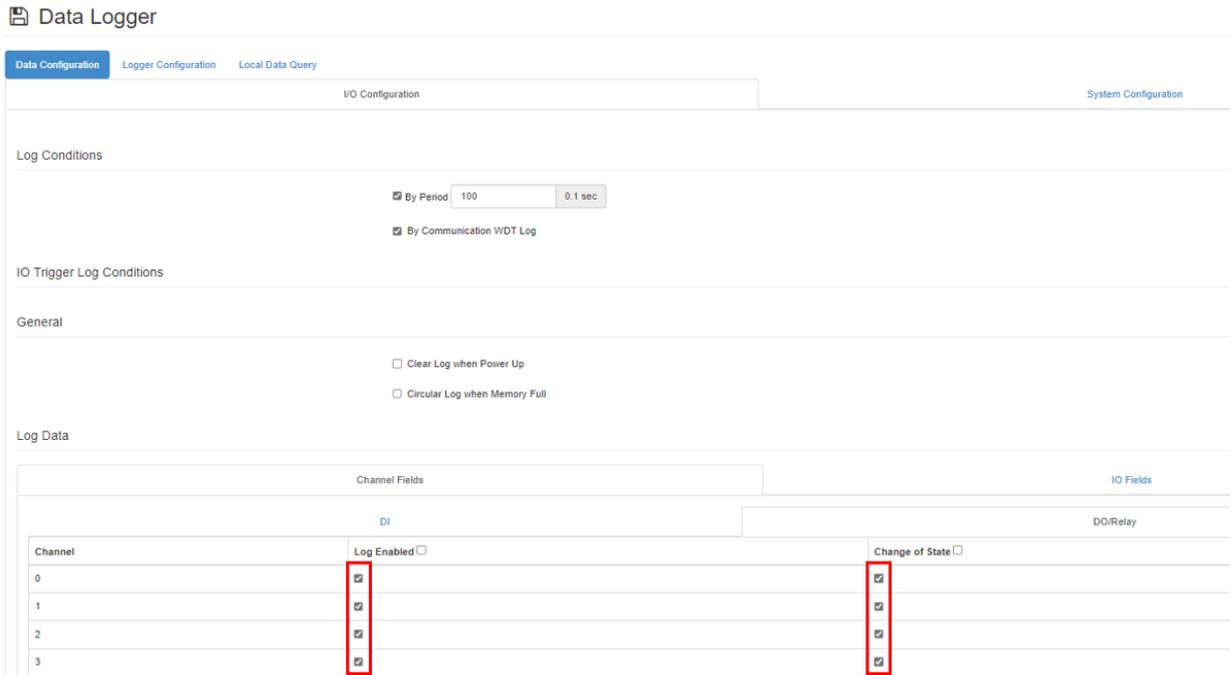


Figure 9. Setting of Log Enabled and Change of State of WISE-4060's DO

Step4: 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.

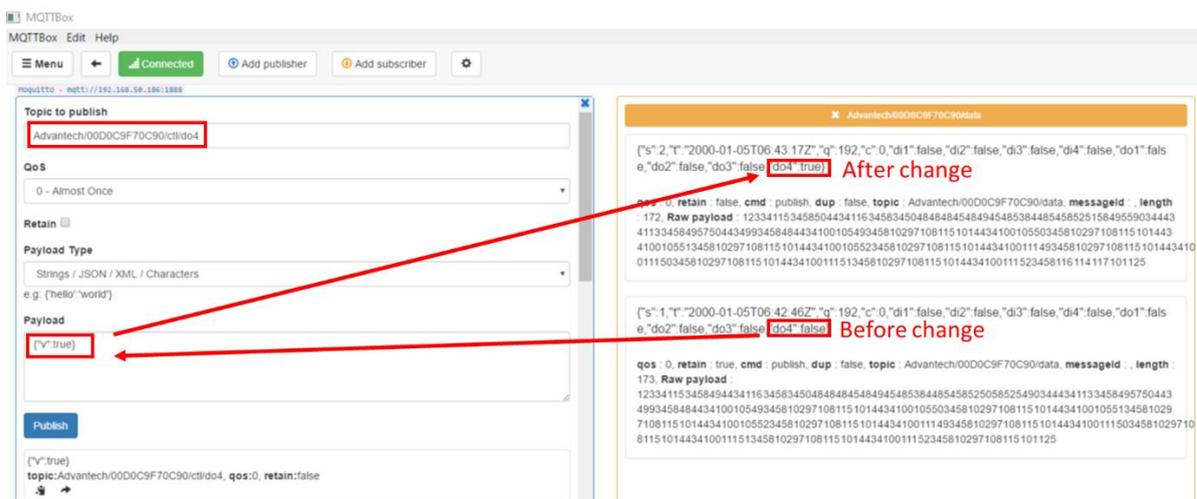


Figure 10. Process of WISE-4060's DO value changed

Note: 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**}