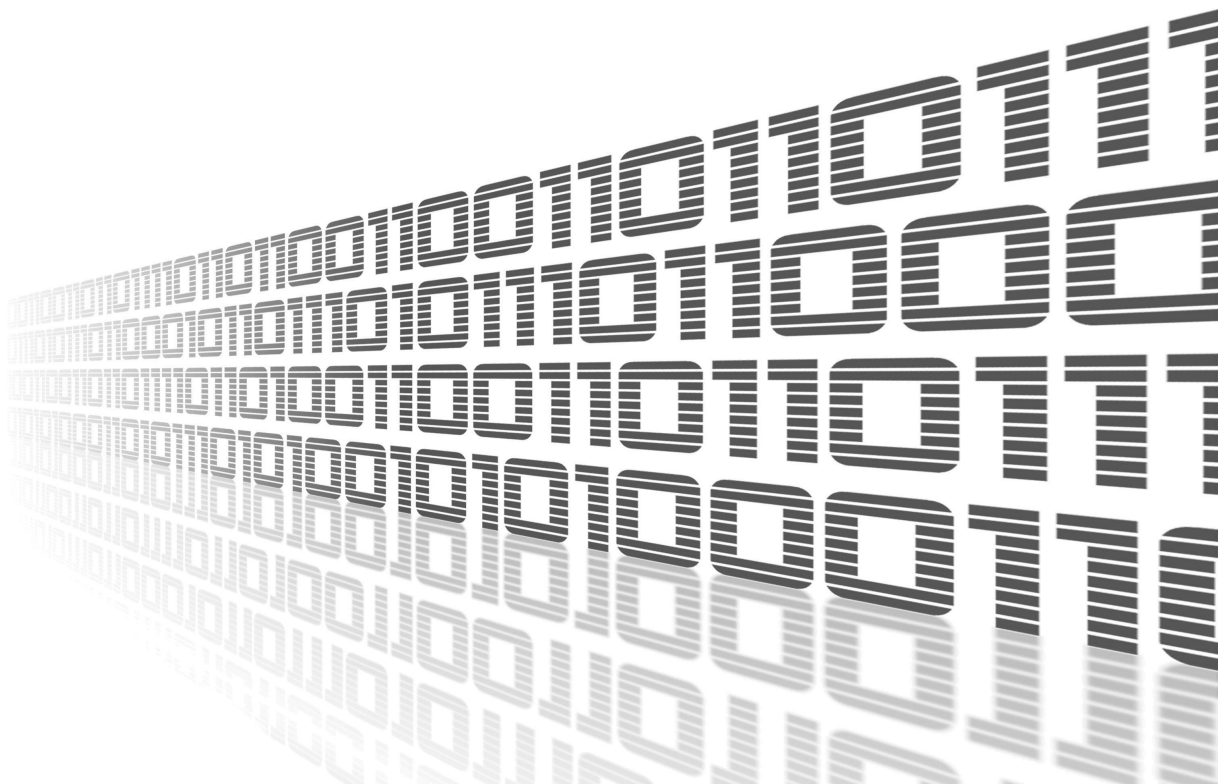




User Module

Modbus to MQTT

APPLICATION NOTE



ADVANTECH

Used symbols



Danger – Information regarding user safety or potential damage to the router.



Attention – Problems that may arise in specific situations.



Information or notice – Useful tips or information of special interest.



Example – example of function, command or script.



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1. Description of the module



This user module is not installed on *Advantech* routers by default. See *Configuration Manual* for the description how to upload a user module to the router. For more information see the *Configuration manual*, chapter *Customization* → *User Modules*.



The user module is v2 router platform compatible.

Modbus to MQTT is an user module for providing seamless communication between Modbus/TCP devices and MQTT device. Modbus to MQTT works as Modbus/TCP master to communicate with Modbus/TCP devices, and works as MQTT publisher/subscriber to communicate with MQTT broker.

2. Web Interface

Once the installation of the module is complete, the module's GUI can be invoked by clicking the module name on the User modules page of router's web interface.

Left part of this GUI contains menu with Router menu section. Return to Router menu section switches back from the module's web page to the router's web configuration pages. The main menu of module's GUI is shown on Figure 1.

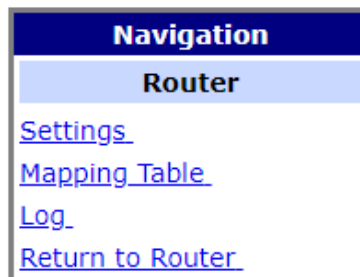


Figure 1: Menu

2.1 Router

2.1.1 Settings

Configuration of this user module can be done on Settings page, under Router menu section. All configuration items for Settings configuration page are described in the table below.

mb2mqtt Settings	
Modbus to MQTT	
Service Enable	
OFF <input type="button" value="v"/>	Enable the Modbus to MQTT.
Log Enable	
OFF <input type="button" value="v"/>	Enable the Service Log.
Broker Address	
(null) <input type="text"/>	The remote Broker Server Address.
Broker Server Port	
0 <input type="text"/>	The Broker Server Port Number (1 - 65535).
MQTT Keepalive	
0 <input type="text"/>	
MQTT QoS	
0 <input type="text"/>	
MQTT Retain	
OFF <input type="button" value="v"/>	
Client ID	
(null) <input type="text"/>	
MQTT Anonymous	
Disable <input type="button" value="v"/>	
MQTT Username	
(null) <input type="text"/>	
MQTT Password	
(null) <input type="text"/>	
MQTT TLS	
Disable <input type="button" value="v"/>	
Interval(ms)	
0 <input type="text"/>	The Modbus TCP Polling Interval.
Timeout(ms)	
0 <input type="text"/>	The Modbus TCP Timeout.
<input type="button" value="Upload CSV config file"/>	last upload at Mon Aug 10 13:23:44 2020 , size 835 bytes.
<input type="button" value="Upload CA certificate file"/>	
<input type="button" value="Download CSV config file"/>	
<input type="button" value="Save"/>	

Figure 2: Settings

Item	Description
Service Enable	Enabled, Modbus to MQTT APN functionality of the module is turned on.
Log Enable APN	Enable the Service Log.
Broker Address	Enter the remote Broker Server Address.
Broker Server Port	Enter Broker Server Port Number (1-65535).
MQTT Keepalive	Enter MQTT keepalive interval (1-3600).
MQTT QoS	Enter MQTT QoS value (0,1,2).
MQTT Retain	Enable for message retaining.
Client ID	Enter Client ID.
MQTT Anonymous	Enable MQTT Anonymous
MQTT Username	Enter MQTT Username.
MQTT Password	Enter MQTT Password.
MQTT TLS	Enable MQTT TLS.
Interval(ms)	Enter Modbus TCP Polling Interval.
Timeout(ms)	Enter Modbus TCP Timeout.

Table 1: Settings Example Items Description

2.1.2 Config file

In Modbus to MQTT, user configures the mapping between Modbus/TCP and MQTT through CSV file. In the csv file, the field separator (delimiter) is a comma.

	A	B	C	D	E	F	G	H	I	J
1	Topic	Name	IP	Port	Device ID	Function Code	Address	Data length	Data type	Data Swap
2	env1-DI	DI_01	192.168.1.15	502	1	2	1	1	Boolean	None
3	env1-DO	DO	192.168.1.15	502	1	1	1	1	Boolean	None
4	env1-Temp	Temperature	192.168.1.15	502	1	4	1	2	Float	None
5	env1-Mode	Mode	192.168.1.15	502	1	3	10	2	Unsigned Integer	None
6	env1-Mode-w	Mode	192.168.1.15	502	1	16	10	2	Unsigned Integer	None
7										
8	env2-DI	DI_01	192.168.1.16	502	1	2	1	1	Boolean	None
9	env2-DO	DO	192.168.1.16	502	1	1	1	1	Boolean	None
10	env2-Temp	Temperature	192.168.1.16	502	1	4	1	2	Float	None
11	env2-Mode	Mode	192.168.1.16	502	1	3	10	2	Unsigned Integer	None
12	env2-Mode-w	Mode	192.168.1.15	502	1	16	10	2	Unsigned Integer	None

Figure 3: CSV file

Item	Description
Topic	MQTT topic
Name	The name to identify the mapping.
IP	The Modbus device IP address.
Port	The TCP port number of the remote Modbus slave device.
Device ID	The Modbus/TCP slave ID.
Function Code	Modbus Function Code (FC). In Modbus to MQTT, supported function codes are: 1, 2, 3, 4, 5, 6, 15, 16 01: Read coils; 02: Read discrete inputs; 03: Read holding registers; 04: Read input register; 05: Write single coil; 06: Write single register; 15: Write multiple coils; 16: Write multiple registers.
Address	Designate the read from/write to starting address for the Modbus registry.
Data length	When FC=1, 2, 5 or 15, the unit is bit(s) When FC=3, 4, 6 or 16, the unit is word(s)
Data type	MQTT data type. Options: Boolean, Integer, Unsigned Integer, Float
Data Swap	The Data Swap field determines the order in which the particular bytes of the received/transmitted data are delivered. None: Do not swap; Word: 0x01, 0x02 becomes 0x02, 0x01; Double Word: 0x01, 0x02, 0x03, 0x04 becomes 0x04, 0x03, 0x02, 0x01.

Table 2: Configuration items description

2.1.3 Mapping table

The Modbus/TCP to MQTT mapping will be shown in Mapping Table WEB page.

mb2mqtt Settings									
Mapping Table									
Topic	Name	Modbus IP:Port	Modbus Slave ID	Modbus Function Code	Modbus Address	Data Length	Data Type	Data Swap	
env1-DI	DI_01	192.168.1.15:502	1	2	1	1	Boolean	None	
env1-DO	DO	192.168.1.15:502	1	1	1	1	Boolean	None	
env1-Temp	Temperature	192.168.1.15:502	1	4	1	2	Flot	None	
env1-Mode	Mode	192.168.1.15:502	1	3	10	2	Unsigned-Integer	None	
env1-Mode-w	Mode	192.168.1.15:502	1	16	10	2	Unsigned-Integer	None	
env2-DI	DI_01	192.168.1.16:502	1	2	1	1	Boolean	None	
env2-DO	DO	192.168.1.16:502	1	1	1	1	Boolean	None	
env2-Temp	Temperature	192.168.1.16:502	1	4	1	2	Flot	None	
env2-Mode	Mode	192.168.1.16:502	1	3	10	2	Unsigned-Integer	None	
env2-Mode-w	Mode	192.168.1.15:502	1	16	10	2	Unsigned-Integer	None	

Figure 4: Mapping table

2.1.4 MQTT Data Format

When Modbus/TCP FC is 1, 2, 3 or 4, Modbus to MQTT will work as MQTT publisher to post Modbus/TCP data in JSON format to MQTT broker. When Modbus/TCP FC is 5, 6, 15 or 16, Modbus to MQTT will work as MQTT subscriber to ask subscription information, and forward the data to Modbus/TCP device.

Here are the example of MQTT data that is published from Modbus to MQTT.

```
{
  "time" : "2020-06-09 15:25:06.667",
  "topic" : "env1-DI"
  "name" : "DI_01",
  "value" : true,
  "ip" : "192.168.1.15",
  "port" : "502",
  "id" : "1",
  "fc" : "1",
  "address" : "1",
  "data length" : "1"
}
```

Note that Modbus to MQTT verify just topic, name and value fields of the received subscription information.

```
{
  "topic": "env1-Mode-w",
  "name": "Mode",
  "value": "1234"
}
```

3. Related Documents

- [1] Advantech Czech: **v2 Routers Configuration Manual** (MAN-0021-EN)
- [2] Advantech Czech: **SmartFlex Configuration Manual** (MAN-0023-EN)
- [3] Advantech Czech: **SmartMotion Configuration Manual** (MAN-0024-EN)
- [4] Advantech Czech: **SmartStart Configuration Manual** (MAN-0022-EN)
- [5] Advantech Czech: **ICR-3200 Configuration Manual** (MAN-0042-EN)



Product related documents can be obtained on *Engineering Portal* at <https://ep.advantech-bb.cz/> address.