Trusted ePlatform Services

ADVANTECH

ADAM-6000/6200 Series MQTT User Manual V1.0

History Record:

Revision Date	Revision	Description	Creator
2024/07/09	1.0	First version released	Jayden.Chiang

Table of Contents

1.Function Introduction

Our utility provides secure cloud functions to help you achieving effectively remote device management and deployment. We'll provide guidelines from this manual to setup your cloud IO devices.

1.1 Function list

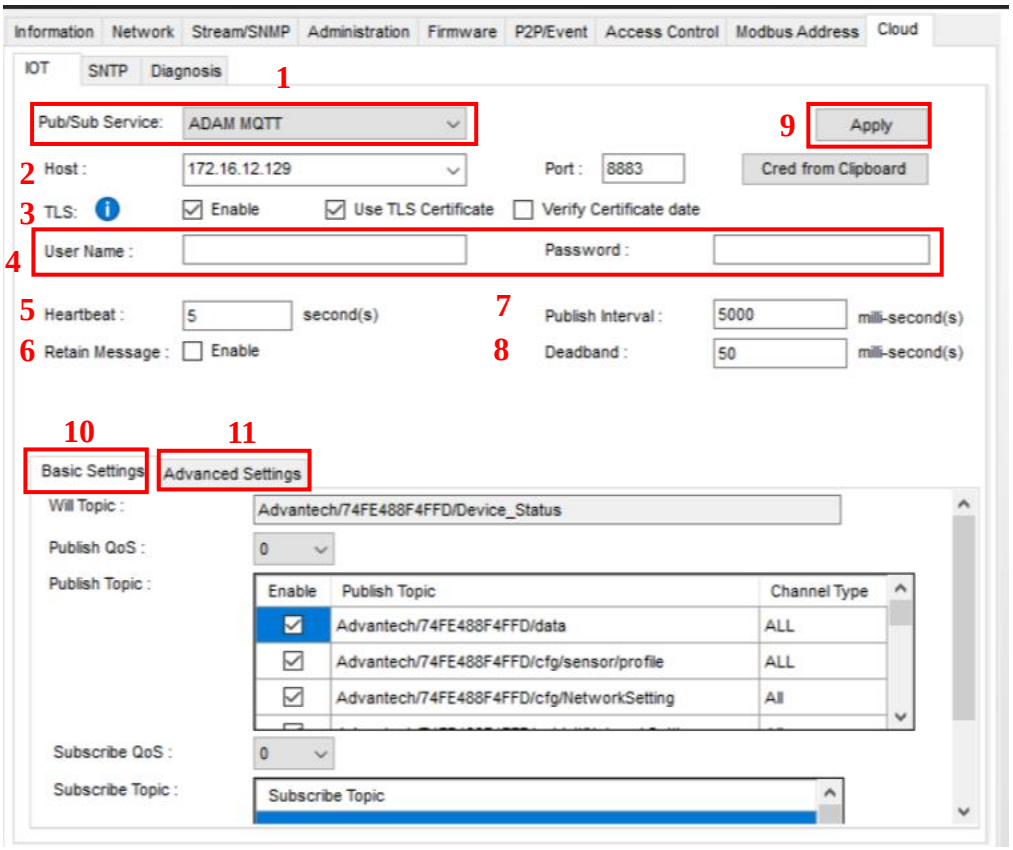


Figure 1. Utility B51 Interface

This section is for cloud I/O setup via MQTT, as below introductions are items marked from above figure.

1. Pub/Sub service

A way to integrate various Enable mode functions into drop-down options.

2. Host IP

You can set up the broker URL or IP address. ADAM modules connect to the broker via the standard MQTT protocol.

3. MQTT TLS Encryption

ADAM modules support TLS encryption during data transmissions. We can choose to use TLS certificate and verify certificate date.

4. User Name & Password

For some applications that require authorization control, the broker will constrain the subscriber's authority to the data. ADAM modules can have the username/password set using Adam/Apax .NET utility. Then, an MQTT message from an ADAM module will come with the username and password to access the broker

5. Heartbeat

The broker will regularly check the connection with the ADAM at the heartbeat interval (keep-alive) setting. The minimum interval setting is 5 s

6. Retain Message

When the retain function is enabled. The broker will store the last message of the topic. If a new subscription for the topic is made, the message will be sent to the client. The client can get the last message and does not need to wait until the next message is updated.

7. Deadband

Deadband is set to determine the minimum interval between publishing two MQTT messages. This is intended to prevent MQTT messages from being published excessively due to noise

8. Interval

Set the interval for automatically publishing all data topics.(Interval must be more than Deadband)

9. Apply

Set Utility MQTT settings (excluding Advanced Settings) to the ADAM module. After pressing Apply, the connection will be automatically disconnected to set the mqtt Settings, and then reconnect.

10. Basic Settings

Setup Publish Qos 、Publish Topic enable and Subscribe Qos

(Need to use "Apply to setup on ADAM module")

11. Advanced Settings

Let user enable "User Defined MQTT Publish/Subscribe" and customize topic name and payload message. **Advanced Settings has a separate Apply button**。

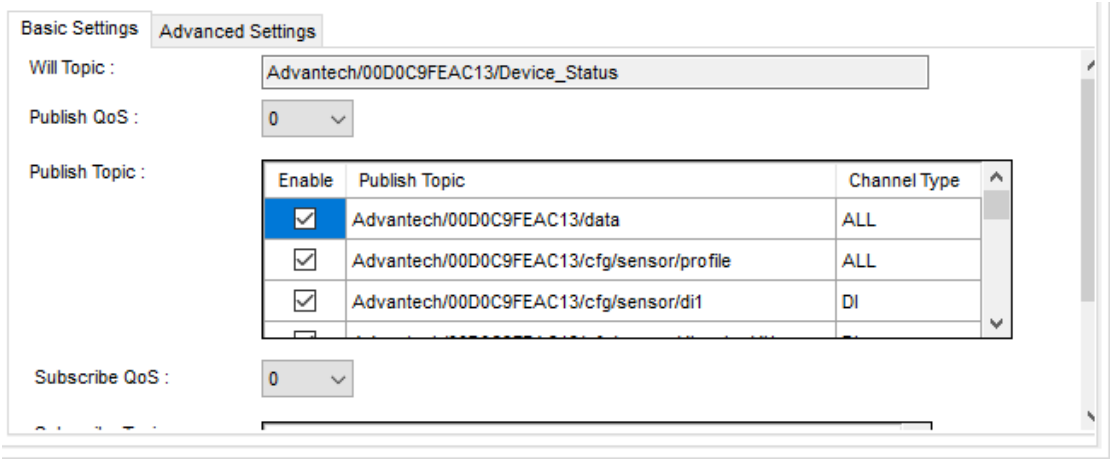


Figure 2. Basic Setting

Figure 3. Advanced Settings

1.2 Function support

√:origin support X:not support v:start support

	ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
Settings					
ADAM MQTT Enable	√	√	√	√	√
EdgeSync 360/EdgeHub MQTT Enable	√	v6.11B14	v6.01B20	v6.01B18	v6.01B22
Azure	√	√	v6.01B24	v6.01B19	v6.01B23
Diagnostic	v6.11B41	v6.11B20	v6.01B26	v6.01B19	v6.01B23

ADAM MQTT					
Host IP	√	√	√	√	√
TLS	√	√	v6.01B21	v6.01B18	v6.01B22
User name Password	√	√	√	√	√
Heartbeat	√	√	√	√	√
Retain Message	√	√	√	√	√
Deadband	v6.11B37	v6.11B16	v6.01B22	v6.01B18	v6.01B22
Interval	v6.11B37	v6.11B16	v6.01B22	v6.01B18	v6.01B22
WDT	v6.13B07	X	X	X	X
Basic Settings	√	√	v6.01B24	v6.01B19	v6.01B23
Advanced Settings	√	√	v6.01B24	v6.01B19	v6.01B23
Basic Topic	√	√	√	√	√
All data Topic	√	√	√	√	√
CH config Topic	v6.11B30	v6.11B14	v6.01B20	v6.01B18	v6.01B22
CH value Topic	v6.11B30	v6.11B14	v6.01B20	v6.01B18	v6.01B22
Network Setting Topic	v6.13B08	v6.13B00	v6.03B00	v6.03B00	v6.03B00
Access Control Topic	v6.13B08	v6.13B00	v6.03B00	v6.03B00	v6.03B00
User-defined Modbus address Topic	v6.13B08	v6.13B00	v6.03B00	v6.03B00	v6.03B00
OTA	v6.13B09	v6.13B00	v6.03B00	v6.03B00	v6.03B00
EdgeSync 360/ EdgeHub					
Heartbeat	X	X	X	X	X
Retain Message	X	X	X	X	X
New Deadband	v6.11B37	v6.11B16	v6.01B22	v6.01B18	v6.01B22
New Interval	v6.11B37	v6.11B16	v6.01B22	v6.01B18	v6.01B22
Basic Settings	X	X	X	X	X
Advanced Settings	X	X	X	X	X
Basic Topic	√	v6.11B14	v6.01B20	v6.01B18	v6.01B22
All data Topic	√	v6.11B14	v6.01B20	v6.01B18	v6.01B22
CH config Topic	√	v6.11B14	v6.01B20	v6.01B18	v6.01B22
CH value Topic	√	v6.11B14	v6.01B20	v6.01B18	v6.01B22
OTA	v6.13B09	v6.13B00	v6.03B00	v6.03B00	v6.03B00

2. Service Setting

As below chart, * is a command that has been written in the ADAM-6000/6200 product user manual and is open to users.

2.1 ADAM MQTT Enable

This section helps to set ADAM MQTT enable/disable.

- When ADAM MQTT or Azure or SNMP Trap has been enabled, set EdgeSync 360/ EdgeHub enable/disable will return Error。
- When ADAM MQTT is connected to the broker, set disable will actively publish will topic (status: disconnect)。

ASCII command:

Command	Description	Remarks
%aaSETMQTTENxx*	aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETMQTTEN*	aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

2.2 EdgeSync 360/ EdgeHub MQTT Enable

Set EdgeSync 360/ EdgeHub enable/disable.

- When ADAM MQTT or Azure or SNMP Trap has been enabled, set EdgeSync 360/ EdgeHub enable/disable will return Error。
- When EdgeSync 360/ EdgeHub is connected to the broker, set disable will actively publish the will topic (status: disconnect)。

ASCII command:

Command	Description	Remarks
%aaSETWMPENxx	aa: always 01 xx: 01 (enable),	Return: >01 Error: ?01

	00 (disable)	
%aaGETWPMPEN	aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

2.3 Azure Enable

Set Azure enable/disable.

- When ADAM MQTT or EdgeSync 360/ EdgeHub or SNMP Trap has been enabled, set Azure enable/disable will return an Error.
- When Azure connected broker，set disable proactively publish will topic (status: disconnect)。

ASCII command:

Command	Description	Remarks
%aaSETAHENxx	aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETAHEN	aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

2.4 MQTT diagnosis

It's used to diagnose the MQTT connection status and receive related information during Pub/Sub.

➢ Support MQTT diagnosis starting from the following version:

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11 B41	V6.11 B20	V6.01B26	V6.01B19	V6.01B23

➢ Utility start to support diagnosis function from B18 version。(Utility → Cloud → Diagnosis)

➢ Enter Diagnosis page, then Utility start Polling command。

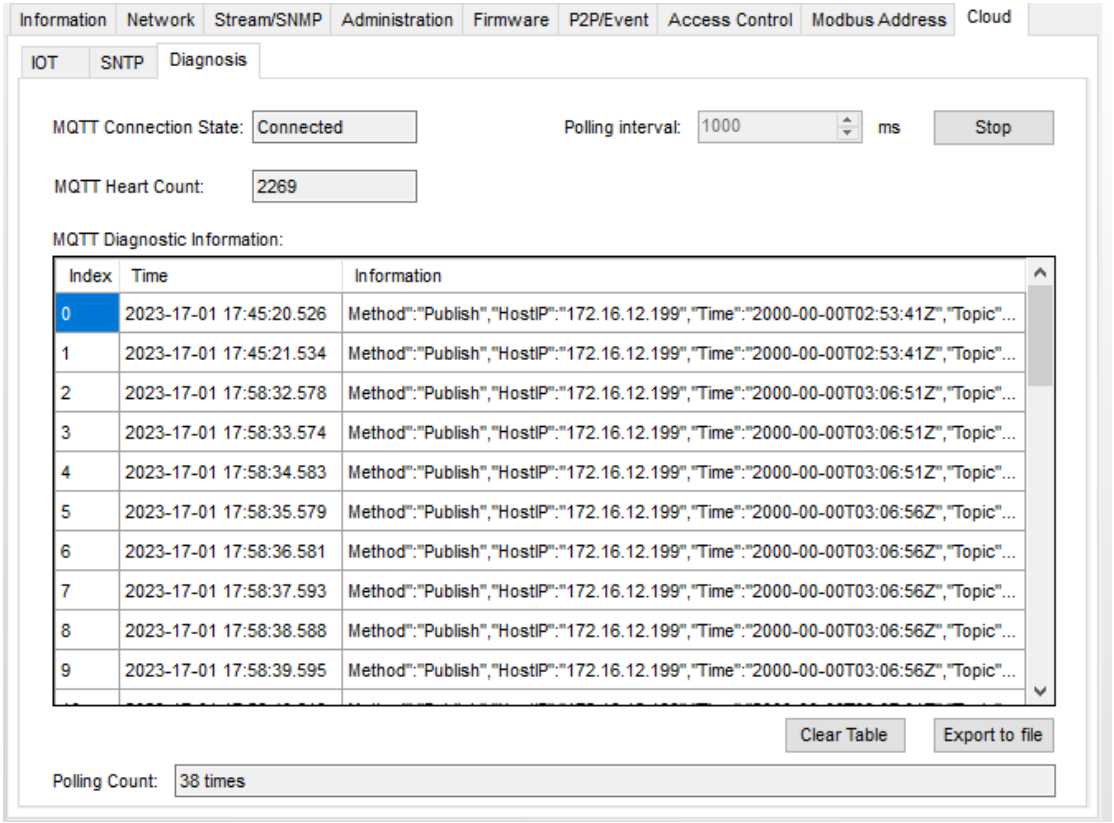


Figure 4. MQTT Diagnosis

2.4.1 MQTT heart counter

This function is to confirm the current connection status and continuous running heart counter.
As below is the process of connecting and reconnecting Module and broker:

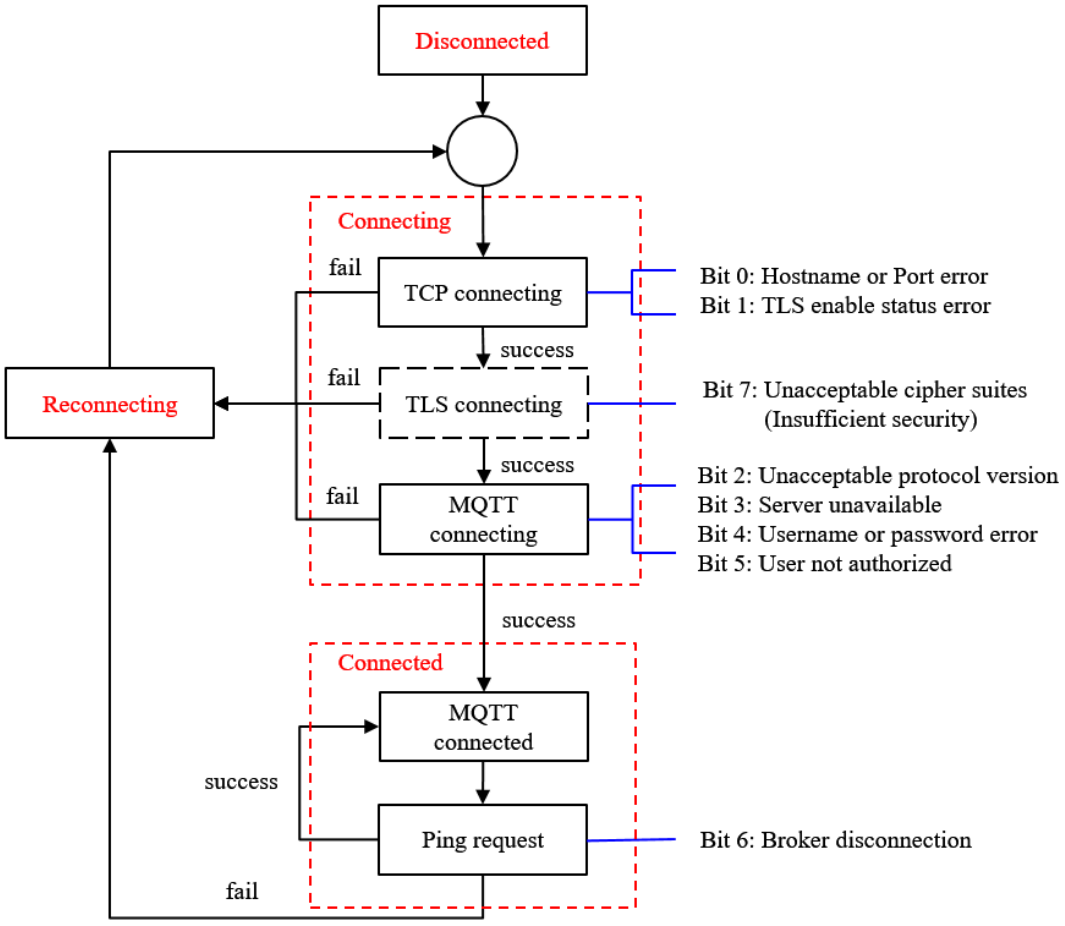


Figure 5. MQTT Heart Counter Process

ASCII command:

Command	Description	Remarks
%aaGETMQTTHC	Gonnection error alaet MQTT heart counter aa: always 01	Return: !HeartCounter Error: ?01

➢ MQTT heart counter is an unsigned long variable. Bits 30 and 31 show the current connection status, and

the remaining bits are used to record the heart counter to know the module operation status.

➢ Heart counter will react and increase with below conditions :

1. When starting to connect for the first time
2. When trying to connect again
3. When publishing any publish information
4. When receiving any subscribe information
5. Pending requests happens according to heartbeat settings

➢ The Heart counter will return to zero when Disconnecting.

2.4.2 MQTT diagnostic event

According to MQTT connection status, MQTT diagnostic event includes MQTT error/alarm information。

ASCII command:

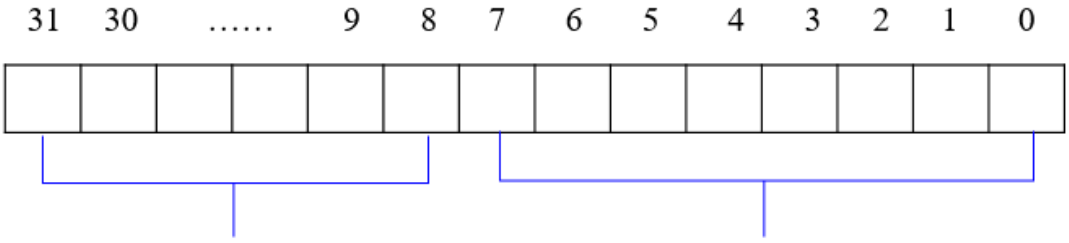
Command	Description	Remarks
%aaGETMQTTDE	Get MQTT diagnostic event aa: always 01	Return: !0MQTT information or !1xxxx (error alarm) Error: ?01

➢ Connection error alarm is an unsigned long variable. The 31st bit is used to determine whether the connection is abnormal, and the 0th to 7th bits correspond to possible error causes。

Bit 0	The Broker's hostname or Port setting is incorrect. module cannot find broker
Bit 1	TLS status setting error. For example, the broker does not enable TLS but the Utility enables TLS, or conversely, the broker does enable TLS but the Utility disables TLS.
Bit 2	The protocol version of Mqtt is wrong. Currently, Mqtt is usually version 3.1.1. This alarm may only appear if the broker's protocol version is upgraded in the future.
Bit 3	Broker server cannot be used. This alarm may occur when the host IP can be transferred but the server cannot be connected. (For example, when the EdgeSync 360/ EdgeHub server fails to connect abnormally)

Bit 4	Username or password is incorrect. When the broker is set up with mosquitto and an account is set, this alarm will appear if the Utility's account is set incorrectly.
Bit 5	User is not authorized. Ex. This alarm will appear if the account password is incorrect when connecting to EdgeSync360/ EdgeHub, or if the Connection String is connected to Azure.
Bit 6	The Broker disconnected after being connected. This alarm will appear when the Broker is abnormal after there has been a correct connection.
Bit 7	When Cipher Suites for TLS cannot be paired. This alarm occurs when the Cipher Suites supported by the Broker do not match the Cipher Suites supported by the module. ◦
Bit 8	This alarm occurs when the CA certificate fails to verify the Server certificate
Bit 9	This alarm occurs when there is a problem with the validity date of the Server certificate or the SNTP time of the module is wrong.
Bit 10	This alarm occurs when there is a problem with the expiration date of the Server certificate or the SNTP time of the module is wrong.

(Bit 2 ~ Bit 5 alarm definition is based on MQTT v3.1.1 error definition)



Bit 0	Hostname or Port
Bit 1	TLS enable status
Bit 2	Protocol version
Bit 3	Server unavailable
Bit 4	Username or password
Bit 5	User not authorized
Bit 6	Broker disconnection
TLS	
Bit 7	Cipher Suites

Figure 6. MQTT diagnostic event table

➢ Diagnostic Information contents :

1. Publish or Subscribe
2. Host IP (Source or Destination)

3. Time (RTC time or systick)
4. Topic name

Ex:

"Method":"Publish",“HostIP":"172.16.12.223","Time":"1196779","Topic":"Advantech/00D0C9FEAC13/data"

or

"Method":"Subscribe","HostIP":"172.16.12.33",
"Time":"2000-01-01T01:26:21Z","Topic":"Advantech/00D0C9FE6050/ctl/do1"

3. ADAM MQTT

* command has been written in the ADAM-6000/6200 product user manual and is open to users.

3.1 Host IP

You can set the broker Domain name/IP Address and port which will be connected. ADAM modules will connect to the broker via standard MQTT.

➢ You don’t need to add Port when setting the host IP.
➢ Port uses 1883 by default, and 8883 is used by default when TLS is enabled.
➢ From following version (from below table), the maximum length of the host IP is modified to 199 characters (original maximum length is 50 characters), and the storage location of the flash is adjusted.

When the old version is upgraded to these versions, the host IP will be inherited, but when the new version is downgraded to the old version, the IP address will be changed to the default value (0.0.0.0)

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11 B04	V6.11 B04	V6.01B24	V6.01B19	V6.01B23

Format: Domain Name、IP address、Domain Name:port、IP address:port
Example: 10.0.0.0 or iot.eclipse.org:83
default: 0.0.0.0

ASCII command:

Command	Description	Remarks
%aaSETMQTTADxx…x* or	Set IP address of the broker	Return: >01 Error: ?01

%aaSETMQTTADxx…x:aaaa*	aa: always 01 xx…x: IP address/domain (1~127 character) aaaa: port address port range:0~65535	
%aaGETMQTTAD*	Get IP address of the broker aa: always 01	Return: !IPAddress/Domain or !IPAddress/Domain:port Error: ?01

3.2 TLS Enable

ADAM modules support TLS encryption during data transmissions. To enable TLS encryption, simply check the checkbox labelled “Enable” and click “Apply” to implement the setting. (Requires HOST Port to support TLS)

- When the broker is connected, changing the enable status will actively publish the will topic (status: disconnect) and reconnect.。
- Current ADAM module support TLS v1.2。

  As below are supported Cipher Suites:

  TLS_RSA_WITH_AES_256_CBC_SHA256 (0x003d)
  TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
  TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
  TLS_RSA_WITH_AES_128_CBC_SHA256 (0x003c)
  TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
  TLS_RSA_WITH_3DES_EDE_CBC_SHA (0x000a)
  TLS_EMPTY_RENEGOTIATION_INFO_SCSV (0x00ff)

ASCII command:

Command	Description	Remarks
%aaSETMQTTTLSxx	aa: always 01 xx: 01 (enable),	Return: >01 Error: ?01

	00 (disable)	
%aaGETMQTTTLS	aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

➢ Added ASCII command for reading Cipher Suites start from following versions.

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.13 B00	V6.13 B00	V6.03 B00	V6.03 B00	V6.03 B00

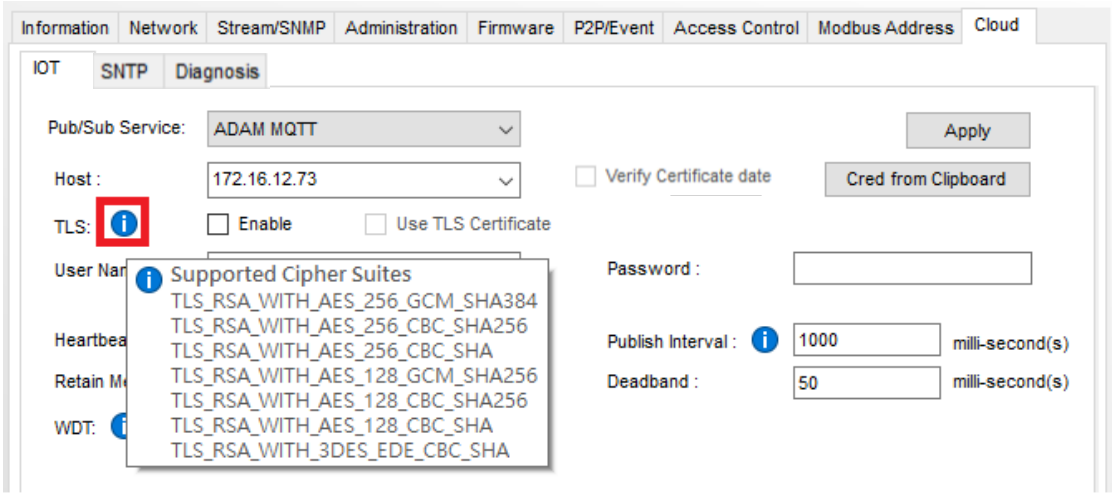


Figure 7. TLS enable page and supported Cipher Suites

ASCII command:

Command	Description	Remarks
%aaGETTLSSUPCS	The number and types of TLS CipherSuites that received support aa: always 01	Return: !nnXXXX…. Error: ?01 nn: total XXXX: CipherSuites types(HEX) Ex: !06003D0035009C003C002F000A

3.3 User Name & Password

For some applications that require authorization control, the broker will constrain the subscriber's authority to the data. For ADAM-6000/6200 modules, the username/password can be set using

Adam/Apax .NET utility. Then the MQTT message from ADAM-6000/6200 modules will come with the username and password to access the broke

- If set null module will disable the username and password function.
- Utility changed to display user name and password in plain text in B16, and the old version is displayed with * 。
- When connected to the broker, using SET will actively publish the will topic (status: disconnect) and reconnect.
- Starting from following version, the maximum length of user name and password will be modified to 199 characters (the original maximum length was 50 characters), and the storage location of flash will be adjusted. When the old version is upgraded to this version, the user name and password will be inherited, but when the new version is downgraded to the old version, user name and password changed to default (user name: Advantech, password:00000000)

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11 B04	V6.11 B04	V6.01B24	V6.01B19	V6.01B23

ASCII command:

Command	Description	Remarks
%aaSETMQTTUNxx…x*	aa: always 01 xx…x: user name (0~199 character)	Return: >01 Error: ?01
%aaGETMQTTUN*	aa: always 01	Return: !UserName Error: ?01
%aaSETMQTTPWxx…x*	aa: always 01 xx…x: password (0~199 character)	Return: >01 Error: ?01
%aaGETMQTTPW*	aa: always 01	Return: !Password Error: ?01

3.4 Heartbeat

The broker will regularly check the connection with the ADAM at the heartbeat interval (keep-alive) setting. Default: 5 second

- EdgeSync 360/ EdgeHub don’t use this setting，fixed as 300 second。

ASCII command:

Command	Description	Remarks
%aaSETMQTTHBxxxx*	aa: always 01 xxxx: heartbeat interval in second (0005~FFFF)	Return: >01 Error: ?01
%aaGETMQTTHB*	aa: always 01	Return : !xxxx (heartbeat interval in hex format) Error: ?01

3.5 Retain Message

When the retain function is enabled. The broker will store the last message of the topic. If a new subscription for the topic is made, the message will be sent to the client. The client can get the last message and does not need to wait until the next message is updated.

➢ EdgeSync 360/ EdgeHub and Azure don't use this setting，fixed as disable。

ASCII command:

Command	Description	Remarks
%aaSETMQTTPRxx*	aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETMQTTPR*	aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

3.6 Deadband

Deadband is set to determine the minimum interval between two publishing MQTT messages. It prevents MQTT messages from being excessively published due to noise interferences。

Since the new version let Deadband range be set to 32 bits, there is a new ASCII command to facilitate identification and used by Utility and customers. At the same time, because the old ASCII command is

already opened to customers, it is retained to facilitate customers to continue to use it.

After Utility B16, the new GET ASCII query modules will be used first. If the new ASCII does not respond, the old GET ASCII query modules will be used.

- Default: 50 ms
- All MQTT modes of all modules will support the setting value of this command.
- Due to the limitation of the default value of flash table in FW, the maximum value only reaches 0xfffffffe.
- During setting, it will check whether the new deadband is greater than the current interval. If it is less than the current interval, an Error will be returned.

ASCII command:

Command	Description	Remarks
%aaSETMQTTDBxxxxxxxx	aa: always 01 xxxxxxxx: publishing deadband in milliseconds (0x00000032~0xfffffffe)	Return: >01 Error: ?01
%aaGETMQTTDB	aa: always 01	Return: !xxxxxxxx (deadband in hex format) Error: ?01

3.7 Interval

Set the interval for automatically publishing all data topic (Advantech/{mac}/data). Since deadband is the minimum sampling interval, interval must be larger than deadband.

Since the new version opens and sets the Interval range to 32 bits, there is new ASCII command to facilitate identification and use by Utility and customers. At the same time, because the old ASCII command is already open to customers, it is retained to facilitate customers to continue to use it.

After Utility B16, the new GET ASCII query modules will be used first. If the new ASCII does not respond, the old GET ASCII query modules will be used.。

- Default: 5000 ms
- All MQTT mods in all modules will support the setting value of this command.
- When setting, check whether the new interval is greater than the current deadband. Error will happens if interval is less than deadband.

ASCII command:

Command	Description	Remarks
%aaSETMQTTPIxxxxxxxx	aa: always 01 xxxxxxxx: publishing Interval in milliseconds (0x00000032~0xffffffff)	Return: >01 Error: ?01
%aaGETMQTTPI	aa: always 01	Return: !xxxxxxxx (Interval in hex format) Error: ?01

3.8 WDT

The complete mechanism of MQTT triggering WDT/FSV functions has been added in the following versions.。

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.13 B07	X	X	X	X

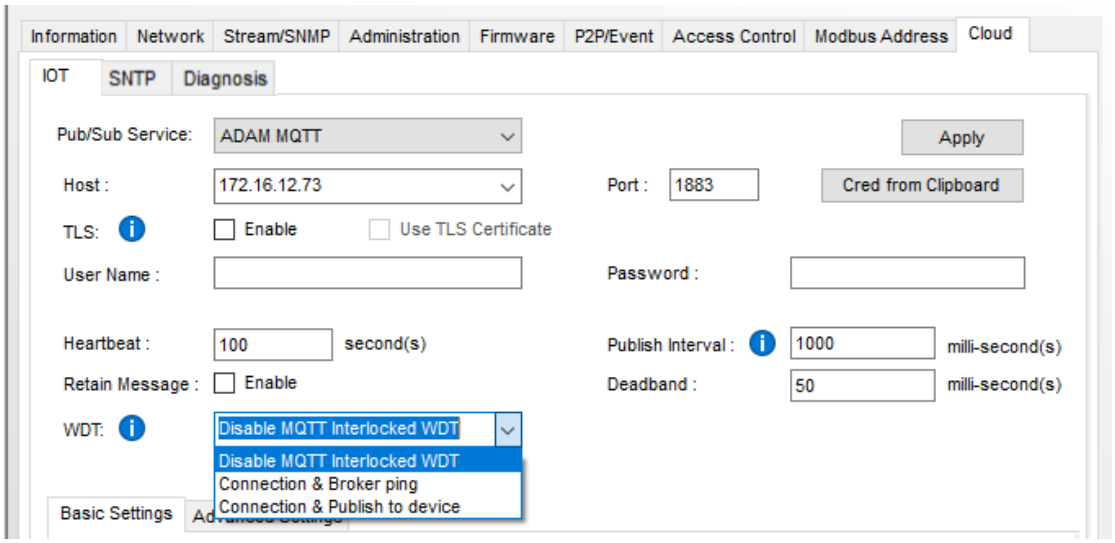


Figure 8. WDT function settings

Need to open Communication WDT in IO page, then MQTT WDT setting can be effective。

There’re 3 security levels on MQTT WDT。

1. Disable MQTT Interlocked WDT

2. Connection & Broker ping

FSV is triggered when the Broker is disconnected or the device fails to receive a ping response within the

Host idle time.

So it needs Heartbeat time ≦ Host Idle time

3. Connection & Publish to device

FSV is triggered when the Broker is disconnected or the device fails to receive a valid Publish packet within the Host idle time.。

The valid Publish packet is as follows

Set Do Status : Advantech/{mac}/ctl/don {"v":true} or {"v":false}

Set setting : Advantech/{mac}/ctl/sensor/di_config/din
or Advantech/{mac}/ctl/sensor/do_value/don

Get IO Status : Advantech/{mac}/read/data {"v":true}

ASCII command:

Command	Description	Remarks
%aaSETMQTTWDTxx	Set the level of MQTT trigger WDT/FSV aa: always 01 xx: 00 -> disable, 01 -> Connection & Broker ping, 02 -> Connection & Publish to device	Return: >01 Error: ?01
%aaGETMQTTWDT	Get the level of MQTT trigger WDT/FSV aa: always 01	Return: !xx Error: ?01 xx: 00 -> disable, 01 -> Connection & Broker ping, 02 -> Connection & Publish to device

3.9 Apply

After modifying various settings of MQTT in Utility, you must press Apply to finalize the setting values to the module.

3.10 Basic Settings

Basic Settings can setup topic Pub/Sub QoS and enable/disable Publish channel topic。

- Basic Settings can only be used in ADAM MQTT mode. In other mode, Pub/Sub QoS are fixed as 0, and Channel Publish topic fixed enabled。
- The topic list displayed in the Utility interface is written directly in the Utility's code. Therefore, when there're more topics requirements, User need to contact Advantech to modify the displayed topics.
- Disable Channel Publish topic can impact All data topic payload。
- ADAM-6018+ newly supports enable/disable Channel Publish topic since v6.01B24。
- ADAM-6024、ADAM-6224 currently don't support enable/disable Channel Publish topic。

ASCII command:

Command	Description	Remarks
%aaSETMQTTPQxx*	Set publishing Qos aa: always 01 xx: publishing Qos (00~02)	Return: >01 Error: ?01
%aaGETMQTTPQ*	Get publishing Qos aa: always 01	Return: !xx (publishing Qos in hex format) Error: ?01
%aaSETMQTTSQxx*	Set subscribing Qos aa: always 01 xx: subscribing Qos (00~02)	Return: >01 Error: ?01
%aaGETMQTTSQ*	Get subscribing Qos aa: always 01	Return: !xx (subscribing Qos in hex format) Error: ?01
%aaSETMQTTDICHxxxx or %aaSETMQTTDOCHxxxx or %aaSETMQTTAICHxxxx	Set enable publish channel topic flags aa: always 01 xxxx: enable channel by bit	Return: >01 Error: ?01

or %aaSETMQTTAOCHxxxx		
%aaGETMQTTDICH or %aaGETMQTTDOCH or %aaGETMQTTAICH or %aaGETMQTTAOCH	Get enable publish channel topic flags aa: always 01	Return: !xxxx (enable channel by bit) Error: ?01

3.11 Pub/Sub Topic

ADAM module supports topic: 1. Will Topic、2. Profile Topic、3.Channel Type Topic、4. Control Topic、5. All Data Topic、6. Channel Config Topic、7. Channel Value Topic、8. Network Setting Topic、9. Access Control Topic、10. User-defined Modbus address Topic、11. OTA for Firmware/Configuration File。

3.11.1 Will Topic

When the Module actively connects/disconnects with the broker, the module will publish a will topic with connect/disconnect message. Or when an accident occurs between the module and the broker and abnormal disconnection happens, the broker will publish a will topic with disconnect message.。

Will Topic name: Advantech/{mac}/Device_Status
Will message payload example:
{"status":"connect","name":"ADAM6050","macid":"00D0C9FEAC13","ipaddr":"172.16.12.36"}

3.11.2 Profile Topic

Description	Device sends device information including the I/O module slots.
PUBLISH Topic	Device sends the current configurations. **Advantech/{MAC}/cfg/sensor/profile**
Example	**Send Advantech/00D0C9CC0099/ cfg/sensor/profile** { "SL": 0,

```
"Id": "ADAM-6050",
"DIn": 8,
"DOn": 2,
"RLAn": 0,
"AIn": 0,
"UIn": 0,
"AOn": 0,
"Cntn": 0,
"Ch": 0,
"RL": 0,
"FwVer": "A2.00 B01",
"BVer": "A1.00 B01",
"FCS": 0,
"IId":"00D0C9CC0099",
"DFS": 7
}
```


➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Slot Number	SL	Number	R	0, 1 ~: Slot number.
Model ID	Id	String	R	Model ID. For example, “ADAM-6050” “ADAM-6051” “ADAM-6052” “ADAM-6060” “ADAM-6066” “ADAM-6250” “ADAM-6251” “ADAM-6256” “ADAM-6260” “ADAM-6266” “ADAM-6017” “ADAM-6217” “ADAM-6018+” “ADAM-6024-D” “ADAM-6224”
Total DI Number	DIn	Number	R	0, 1 ~: Digital input channel number.
Total DO Number	DOn	Number	R	0, 1 ~: Digital output channel number.
Total Relay Number	RLAn	Number	R	0, 1 ~: Relay output channel number.
Total AI Number	AIn	number	R	0, 1 ~: Analog input channel number.
Total UI Number	UIn	number	R	0, 1 ~: Universal input channel number.
Total AO Number	Aon	Number	R	0, 1 ~: Analog output channel number.
Total Counter Number	Cntn	Number	R	0, 1 ~: Counter channel number.

Total modbusRTU rule	RL	Number	R	0, 1 ~: modbusRTU rule number.
Total MBRTU channel	MCh	Number	R	0, 1 ~: modbusRTU channel number.
Firmware Version	FwVer	String	R	Version information of main firmware image. "" : none
Bootloader Version	BVer	String	R	Version information of bootloader firmware image. "" : none
Function support	FCS	Number	R	Supported function table, bit x = 1 is supported Bit: 0 — P2P; 1~15 — Reserved for future use
Identity	IId	String	R	iSensing asset ID
Device Cloud Feature support	DFS	Number	R	Features which are supported by device. Each Bit=1 represent one supported feature. Please see Feature suppor table.
Remarks				

3.11.3 Channel Type Topic

For the config topic initially supported by ADAM MQTT, the payload only contains messages of DIO/AIO type. In addition to being published when the computer is powered on and connected, it will also be published when the type changes.

- ADAM-6017 only have AI Config Topic name，don't have DO Config Topic name。
- ADAM-6024 only have AIO Config Topic name，don't have DIO Config Topic name。
- ADAM-6224 only have AO Config Topic name，don't have DI Config Topic name。
- Type message format refer to 3.11.13

Config Topic name: DIO: Advantech/{mac}/cfg/sensor/din(don)
AIO: Advantech/{mac}/cfg/sensor/ain(aon)
n (channel number) starts from 1
Config message payload example: DIO: {"typ":"counter"}
AIO: {"typ":"+-10V"} or {"typ":"J Type:0-760C"}

3.11.4 Control Topic

It is the control topic initially supported by ADAM MQTT. The functions that can be controlled are 1. DO

High/Low, 2. AIO range type, and 3. AO value. (Cannot set DIO type through control topic)

- Type message format refer to 3.11.13
- Using DO Control Topic will clear WDT flags and reset Watch-dog timer to zero. (WDT processing will be performed regardless of whether DO changes)

Control Topic name: DO: Advantech/{mac}/ctl/don
AIO: Advantech/{mac}/set/sensor/ain(aon)
AO: Advantech/{mac}/ctl/aon
n (channel number) starts from 1

Control message payload example: DO: {"v":true}
AIO: {"typ":"0-20mA"}
AO: {"v":5.0}

3.11.5 All Data Topic

Publish the topic of all data messages. Interval is the only fixed topic。

- IO number to start from 1 (ex: di1, ai_st1)
- Topic name: Advantech/{mac}/data
- Message payload example:

ADAM-6050:

{"s":1,"t":0,"q":192,"c":1,"di1":0,"di2":true,"di3":true,"di4":true,"di5":true,"di6":true,"di7":true,"di8":true,"di9":true,"di10":true,"di11":true,"di12":true,"do1":true,"do2":false,"do3":false,"do4":false,"do5":false,"do6":false}

ADAM-6017:

{"s":1,"t":"2000-00-17T08:45:46Z","q":192,"c":1,"ai1":-0.002,"ai_st1":1,"ai2":-0.002,"ai_st2":1,"ai3":-0.002,"ai_st3":1,"ai4":-0.002,"ai_st4":1,"ai5":-0.002,"ai_st5":1,"ai6":-0.002,"ai_st6":1,"ai7":-0.002,"ai_st7":1,"ai8":-0.002,"ai_st8":1,"do1":false,"do_st1":1,"do2":false,"do_st2":1}

ADAM-6024:

{"s":1,"t":"2000-00-00T06:12:10Z","q":192,"c":1,"di1":true,"di_st1":1,"di2":true,"di_st2":1,"do1":false,"do_st1":1,"do2":false,"do_st2":1,"ai1":9999.9999,"ai_st1":0,"ai2":4.000,"ai_st2":1,"ai3":0.000,"ai_st3":1,"ai4":-0.003,"ai_st4":1,"ai5":-0.001,"ai_st5":1,"ai6":-0.002,"ai_st6":1,"ao1":4.000,"ao_st1":0,"ao2":5.001,"ao_st2":0}

ADAM-6224:

{"s":1,"t":0,"q":192,"c":1,"di1":false,"di2":false,"di3":false,"di4":false,"ao1":0.487,"ao2":-4.757,"ao3":-10.000,"ao4":0.000}

General:

s:	Reserved for further use, default value = 1
t:	Trigger time Format: YYYY-MM-DDThh:mm:ss YYYY = year, MM = month, DD = date, hh = hour, mm = minute, ss = second Note: the function is not applied on ADAM-6050/6051/6052/6060/6066, t = 0
q:	Reserved for further use, default value 192
c:	Reserved for further use, default value 1

di_st value(ADAM-6024 only):

1	Streaming, normal
2	DI change

do_st value(ADAM-6017、ADAM-6024 only):

1	Streaming, normal
2	DO change

ai_st value:

0	Channel disable
1	Streaming, normal
2	High latch
3	High momentary
4	Low latch
5	Low momentary

➢ ADAM-6024 only 0 and 1

ao_st value(ADAM-6024 only):

0	Streaming, normal

If you want to get the data updated immediately on broker , you can use topic:
Advantech/{mac}/read/data
{"v":true}

3.11.6 Channel Config Topic

3.11.6.1 Digital input of ADAM-6000/6200 DIO

Description	Retrieves information about the digital input configuration resource.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/di_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/di_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/di_config/din**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di9**
	{
	"Ch":9,
	"Md":0,
	"Inv":1,
	"Fltr": 1,
	"FtLo": 10000,
	"FtHi": 10000,
	"FqP": 0,
	"CntKp": 0,
	"Tag": "FrontDoor"
	}
	
	Get Advantech/00D0C9CC0099/ctl/sensor/di_config/di9
	{
	"cfg_id":"123",
	"Md":0,
	"Inv":1,
	"Fltr": 1,
	"FtLo": 10000,

"FtHi": 10000,
"FqP": 0,
"CntKp": 0,
"Tag": "FrontDoor"
}
Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_config/di9
{
"cfg_id":"123",
"error":"No error
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Mode	Md	Number	RW	Digital input mode. 0 DI 1 Counter 2 LowToHighLatch 3 HighToLowLatch 4 Frequency
Invert Signal	Inv	Number	RW	1 or 0: Enable or Disable invert signal function. (if mode = Frequency, the function is not available)
Digital Filter	Fltr	Number	RW	1 or 0: Enable or Disable digital filter function

				(if mode = DI or Counter, the function is available)
Min. Low Signal Width	FtLo	Number	RW	Minimum low signal width of digit filter 0 -4294967295 (0.1 ms)
Min. High Signal Width	FtHi	Number	RW	Minimum high signal width of digit filter 0 -4294967295 (0.1 ms).
Frequency Precise 0.01Hz	FqP	Number	RW	1 or 0: Enable / Disable Frequency Precise 0.01Hz (Frequency Precise is 0.01Hz or 0.1Hz. Default Frequency Precise is 0.1Hz)
Keep Counter Value When Poweroff	CntKp	Number	RW	1 or 0: Enable / Disable keep last value when power off.
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.2 Common Digital output of ADAM-6000/6200 DIO

Description	Retrieves information about the digital output configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/do_genconfig**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_genconfig**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/do_genconfig**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_genconfig** {

<table>
<tr><td></td><td>
"WDT":0,
"HI":720
}
Get Advantech/00D0C9CC0099/ctl/sensor/do_genconfig
{
"cfg_id":"123",
"WDT":0,
"HI":720
}
Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_genconfig
{
"cfg_id":"123",
"error":"No error"
}
</td></tr>
</table>

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Communication WDT Enable	WDT	Number	RW	1 / 0: Enable / Disable function of FSV watchdog timer.
Host Idle	HI	Number	RW	TCP communication timeout and FSV watchdog timer. default：720 (second) range:5 - 4095 (second)

Remarks	

3.11.6.3 Digital output of ADAM-6000/6200 DIO

Description	Retrieves information about the digital output configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/do_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/do_config/din**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di9**
	{
	"Ch":9,
	"Md":0,
	"FSV":0,
	"PsLo":0,
	"PsHi":0,
	"HDT": 0,
	"LDT": 0,
	"Tag": "DigOut"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di9
	{
	"cfg_id":"123",
	"Md":0,
	"FSV":0,
	"PsLo":0,
	"PsHi":0,
	"HDT": 0,
	"LDT": 0,
	"Tag": "DigOut"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di9

```
{
        "cfg_id":"123",
        "error":"No error"
}
```


➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Mode	Md	Number	RW	Digital output mode. Value / Mode / Note 0 / DO / 1 / Pulse Output / 2 / LowToHighDelay / 3 / HighToLowDelay /
Fail Safety Value	FSV	Number	RW	1 or 0: Enable or Disable fail safety value function.
Low Signal Width	PsLo	Number	RW	Low signal width of pulse 0 -4294967295 (0.1 ms)
High Signal Width	PsHi	Number	RW	High signal width of pulse 0 -4294967295 (0.1 ms).
High To Low Delay Time	HDT	Number	RW	Time for High To Low Delay 0 -4294967295 (0.1 ms)
Low To High Delay Time	LDT	Number	RW	Time for Low To High Delay 0 -4294967295 (0.1 ms).
Keep Last DO	LKp	Number	RW	1 or 0: Enable / Disable keep last DO value

	Value			when power off. Note: Can only be set when DO mode
	Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters
Remarks				

3.11.6.4 Digital output of ADAM-6017

Description	Retrieves information about the digital output configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/do_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/do_config/din**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di9**
	{
	"Ch":9,
	"En":1,
	"ACh": 0,
	"AMd": 0,
	"Tag": "DigOut"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di9
	{
	"cfg_id":"123",
	"ACh": 0,
	"AMd": 0,
	"Tag": "DigOut"
	}

	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di9
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters
The Number of AI Channel which drives the DO signal	ACh	Number	RW	0, 1, …: Analog input channel number to drive the DO
The Driving Alarm Mode	AMd	Number	RW	The driving mode 0 No 1 High alarm drived 2 Low alarm drived

Remarks	

3.11.6.5 Common Analog input of ADAM-6017/6217

Description	Retrieves information about the analog input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_genconfig**

SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_genconfig**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_genconfig**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**
	{
	"Res":16,
	"BMd":0,
	"AiT":0,
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"BMd":0,
	"AiT":0,
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions for all channels:

Field	Abbreviation	Data Type	Property	Description

AI Resolution	Res	Number	R	1 ~ 32: Number of bits for AI value. For example, the resolution of ADAM-T110 AI 12-bit.
Burn-out Up/Down Scale Mode	BMd	Number	RW	The burn-out value 0 – Down scale 1 – Up scale
AI Filter Mode	AiT	Number	RW	The AI filter mode **ADAM-6017 support** 0 – Auto (50/60Hz) 1 – 50 Hz 2 – 60 Hz 3 – High Speed **ADAM-6217 support** 0 – Auto (50/60Hz) 1 – 50 Hz 2 – 60 Hz

Remarks	

3.11.6.6 Analog input of ADAM-6017/6217

Description	Retrieves information about the digital input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_config/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_config/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_config/ain**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"EnLA": 1,
	"EnHA": 1,
	"LAMd": 0,
	“HLAMd": 0,
	"LoA": "2.0",
	"HiA": "6.3",
	"Tag": "Analog Input 0"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_config/ai2
	{
	"cfg_id":"123",
	"En":1,
	"Rng":328,
	"EnLA": 1,
	"EnHA": 1,
	"LAMd": 0,
	“HAMd": 0,
	"LoA": "2.0",
	"HiA": "6.3",
	"Tag": "Analog Input 0"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description

Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions by **Each Channel** :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog input channel number.
Channel Enable	En	Number	RW	1 / 0: Enable / Disable AI conversion
Input Range	Rng	Number	RW	Analog input range. Notice: Average channel is read only.
Enable Low Alarm	EnLA	Number	RW	1 / 0: Enable / Disable AI low alarm function
Enable High	EnHA	Number	RW	1 / 0: Enable / Disable AI high alarm function

Range code	
328	(0x0148) 0 – 10 V
327	(0x0147) 0 ~ 5 V
325	(0x0145) 0 ~ 1 V
262	(0x0106) 0 ~ 500 mV
261	(0x0105) 0 ~ 150 mV
323	(0x0143) +/- 10 V
322	(0x0142) +/- 5 V
~~321~~	~~(0x0141) +/- 2.5 V~~
259	(0x0103) +/- 150 mV
320	(0x0140) +/- 1 V
260	(0x0104) +/- 500 mV
384	(0x0180) 4 ~ 20 mA
385	(0x0181) +/- 20 mA
386	(0x0182) 0 ~ 20 mA

Alarm				
Alarm Low Mode	LAMd	Number	RW	The alarm mode 0 Momentary 1 Latch
Alarm High Mode	HAMd	Number	RW	The alarm mode 0 Momentary 1 Latch
Low Alarm Value	LoA	String	RW	Set/get the low alarm limit value. Data format is “±xxxx.yy” Value range: -9999 ~ +9999 For example, “+0003.250” or “3.25”
High Alarm Value	HiA	String	RW	Set/get the high alarm limit value. Data format is “±xxxx.yy” Value range: -9999 ~ +9999 For example, “15.25”
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.7 Common Analog input of ADAM-6018+

Description	Retrieves information about the analog input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_genconfig**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_genconfig**

Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_genconfig**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**
	{
	"Res":16,
	"EnB":1,
	"BMd":0,
	"AiT":1,
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"EnB":1,
	"BMd":0,
	"AiT":1,
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"error":"No error"
	
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions for all channels:

Field	Abbreviation	Data Type	Property	Description
AI Resolution	Res	Number	R	1 ~ 32: Number of bits for AI value.

				For example, the resolution of ADAM-T110 AI 12-bit.
Burn-out Detection Enable	EnB	Number	RW	1 / 0: Enable / Disable AI burn-out detection function
Burn-out Up/Down Scale Mode	BMd	Number	RW	The burn-out value 0 Down scale 1 Up scale Note: Can only be set when Burn-out Enable
AI Filter Mode	AiT	Number	RW	The AI filter mode 1 50 Hz 2 60 Hz

Remarks	

3.11.6.8 Analog input of ADAM-6018+

Description	Retrieves information about the temperature input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_config/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_config/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_config/ain**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2** { "Ch":2, "En":1, "Rng":1024,

"EnLA": 1,
"EnHA": 1,
"LAMd": 0,
“HLAMd": 0,
"LoA": "50.52",
"HiA": "700.36",
"LoS": "0.00",
"HiS": "760.00",
"Tag": "Temperature Input 0"
}

Get Advantech/00D0C9CC0099/ctl/sensor/ai_config/ai2

{
"cfg_id":"123",
"En":1,
"Rng":1024,
"EnLA": 1,
"EnHA": 1,
"LAMd": 0,
“HLAMd": 0,
"LoA": "50.52",
"HiA": "700.36",
"Tag": " Temperature Input 0"
}

Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions by **Each Channel** :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Temperature input channel number.
Channel Enable	En	Number	RW	1 / 0: Enable / Disable AI conversion Notice: Average channel is read only. When channel mask of average is not 0, the value is 1.
Input Range	Rng	Number	RW	Analog input range.

Range code	
1024 (0x400)	T/C TypeJ 0~760℃
1056 (0x420)	T/C TypeK 0~1370℃
1088 (0x440)	T/C TypeT -100~400℃
1120 (0x460)	T/C TypeE 0~1000℃
1152 (0x480)	T/C TypeR 500~1750℃
1184 (0x4A0)	T/C TypeS 500~1750℃
1216 (0x4C0)	T/C TypeB 500~1800℃

Enable Low Alarm	EnLA	Number	RW	1 / 0: Enable / Disable temperature low alarm function
Enable High Alarm	EnHA	Number	RW	1 / 0: Enable / Disable temperature high alarm function
Alarm Low Mode	LAMd	Number	RW	The alarm mode

0	Momentary

				1 Latch
Alarm High Mode	HAMd	Number	RW	The alarm mode 0 Momentary 1 Latch
Low Alarm Value	LoA	String	RW	Set/get the low alarm limit value. Data format is “±xxxx.yy” Round to two decimal places Value range: -9999 ~ +9999 For example, “3.2546” “3.25”
High Alarm Value	HiA	String	RW	Set/get the high alarm limit value. Data format is “±xxxx.yy” Round to two decimal places Value range: -9999~ +9999 For example, “15.2567” “15.26”
Temperature Min Scaling Value	LoS	String	R	Get the scaling min value Value is depended on the min. of the Input Range For example, If range input is “0~760°C”, Min scaling value should be 0.
Temperature Max Scaling Value	HiS	String	R	Get the scaling max value Value is depended on the max. of the Input Range For example, If range input is “0~760°C”, Max scaling value should be 760.
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.9 Digital input of ADAM-6024

Description	Retrieves information about the digital input configuration resource.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/di_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/di_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/di_config/din**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di2**
	{
	"Ch":2,
	"Tag": "FrontDoor"
	}
	
	Get Advantech/00D0C9CC0099/cfg/sensor/di_config/di2
	{
	"cfg_id":"123",
	"Tag": "FrontDoor"
	}
	Send Ack. Advantech/00D0C9CC0099/cfg/sensor/di_config/di2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description

Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.10 Digital output of ADAM-6024

Description	Retrieves information about the digital output configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/do_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/do_config/din**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di2**
	{
	"Ch":2,
	"Tag": "DigOut"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di2
	{

	"cfg_id":"123",
	"Tag": "DigOut"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.11 Common Analog input of ADAM-6024

Description	Retrieves information about the analog input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_genconfig**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_genconfig**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_genconfig**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**
	{
	"Res":16,
	"AiT":0,
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"AiT":0,
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions for all channels:

Field	Abbreviation	Data Type	Property	Description
AI Resolution	Res	Number	R	1 ~ 32: Number of bits for AI value. For example, the resolution of ADAM-T110 AI 12-bit.
AI Filter Mode	AiT	Number	RW	The AI filter mode 0 – Auto (50/60Hz) 1 – 50 Hz 2 – 60 Hz

	3	High Speed
Remarks		

3.11.6.12 Analog input of ADAM-6024

Description	Retrieves information about the digital input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ai_config/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_config/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_config/ain**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Tag": "Analog Input 0"
	}
	Get Advantech/00D0C9CC0099//ctl/sensor/ai_config/ai2
	{
	"cfg_id":"123",
	"En":1,
	"Rng":328,
	"Tag": "Analog Input 0"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions by **Each Channel**:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog input channel number.
Channel Enable	En	Number	RW	1 / 0: Enable / Disable AI conversion
Input Range	Rng	Number	RW	Analog input range. Notice: Average channel is read only. Range code: 323 = (0x0143) +/- 10 V; 384 = (0x0180) 4 ~ 20 mA; 386 = (0x0182) 0 ~ 20 mA
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters

Remarks	

3.11.6.13 Analog output of ADAM-6024

Description	Retrieves information about the digital input configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ao_config/aon** **where n = 1 ~ : the channel number**
SUBSCRIBE	Get the configurations from DeviceCloud.

Topic	**Advantech/{MAC}/ctl/sensor/ao_config/aon**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ao_config/aon**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ao_config/ao2**
	{
	"Ch": 2,
	"Rng": 328,
	"AoIV": 100,
	"Tag": "Analog Output 2"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ao_config/ao2
	{
	"cfg_id":"123",
	"Rng":328,
	"AoIV":100,
	"Tag":"Analog Output 2"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_config/ao2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions by **Each Channel :**

Field	Abbreviation	Data Type	Property	Description

Channel Number	Ch	Number	R	0, 1, …: Analog output channel number.
Output Range	Rng	Number	RW	Analog output range. Range code: 328 (0x0148) 0 – 10 V; 384 (0x0180) 4 ~ 20 mA; 386 (0x0182) 0 ~ 20 mA
Startup Value	AoIV	Number	RW	Set/get the startup value Value range: 0 ~ 4095
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters
Remarks				

3.11.6.14 Digital input of ADAM-6224

Description	Retrieves information about the digital input configuration resource.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/di_config/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/di_config/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/di_config/din**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di2** { "Ch":2, "En":1, "Md":0, "Inv":1, "Fltr": 1,

```
        "FtLo": 10000,
        "FtHi": 10000,
        "Tag": "FrontDoor"
}
```


Get Advantech/00D0C9CC0099/ctl/sensor/di_config/di2


```
{
        "cfg_id":"123",
        "Md":0,
        "Inv":1,
        "Fltr": 1,
        "FtLo": 10000,
        "FtHi": 10000,
        "Tag": "FrontDoor"
}
```


Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_config/di2


```
{
        "cfg_id":"123",
        "error":"No error"
}
```


➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Mode	Md	Number	RW	Digital input mode.

0	DI
85	HighTriggerStartup
90	HighTriggerSafty

				165 LowTriggerStartup 170 LowTriggerSafty
Invert Signal	Inv	Number	RW	1 or 0: Enable or Disable invert signal function.
Digital Filter	Fltr	Number	RW	1 or 0: Enable or Disable digital filter function
Min. Low Signal Width	FtLo	Number	RW	Minimum low signal width of digit filter 0 – 4294967295 (0.1 ms)
Min. High Signal Width	FtHi	Number	RW	Minimum high signal width of digit filter 0 – 4294967295 (0.1 ms).
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters
Remarks				

3.11.6.15 Common Analog output of ADAM-6224

Description	Information about the analog output configuration resource on specific slot.
PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ao_genconfig**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ao_genconfig**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ao_genconfig**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ao_genconfig** { "Res":2,

	" EnSV ":0
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ao_genconfig
	{
	"cfg_id":"123",
	"EnSV ":1
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_genconfig
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions for all channels:

Field	Abbreviation	Data Type	Property	Description
AO Resolution	Res	Number	R	1 ~ 32: Number of bits for AO value. For example, the resolution of ADAM-6224 A is 12-bit.
Enable Safety Value	EnSV	Number	RW	1 or 0: Enable or Disable safety value function

Remarks	

3.11.6.16 Analog output of ADAM-6224

Description	Retrieves information about the digital input configuration resource on specific slot.

PUBLISH Topic	Send the current configurations. **Advantech/{MAC}/cfg/sensor/ao_config/aon** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the configurations from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ao_config/aon**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ao_config/aon**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ao_config/ao2**
	{
	"Ch": 2,
	"Rng": 328,
	"AoIV": 2.0,
	"SV": 10.0,
	"SR": 3,
	"Tag": "Analog Output 2"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ao_config/ao2
	{
	"cfg_id":"123",
	"Rng":328,
	"AoIV":2.0,
	"SV":10.0,
	"SR":3,
	"Tag":"Analog Output 2"
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_config/aon2{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description

Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions by **Each Channel :**

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog output channel number.
Output Range	Rng	Number	RW	Analog output range. Range code: 328 (0x0148) 0 – 10 V; 327 (0x0147) 0 ~ 5 V; 323 (0x0143) +/- 10 V; 322 (0x0142) +/- 5 V; 384 (0x0180) 4 ~ 20 mA; 386 (0x0182) 0 ~ 20 mA
Startup Value	AoIV	Number	RW	Set/get the startup value Value range: 0 ~ 4095
Safety Value	SV	Number	RW	Set/get the safety value Value range: 0 ~ 4095
Slew Rate	SR	Number	RW	Set/get the slew rate Slew Rate: 0 disable; 1 1V/sec (or 1mA/sec); 2 2V/sec (or 2mA/sec); 3 4V/sec (or 4mA/sec)

				4 8V/sec (or 8mA/sec) 5 16V/sec (or 16mA/sec) 6 32V/sec (or 32mA/sec) 7 64V/sec (or 64mA/sec)
Tag Name	Tag	String	RW	The description tag for this channel. Max. 21 characters
Remarks				

3.11.7 Channel Value Topic

3.11.7.1 Digital input of ADAM-6000/6200 DIO

Description	Retrieves information about the digital input value resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/di_value/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/di_value/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/di_value/din**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2** { “Ch”:2, “En”:1, “Md”:0, “Stat”:1, “Val”:1, “Cnting”:0, “ClrCnt”:0, “OvLch”: 0,

“CtFq”:0,
“Fq”:0,
“Lch”:0,
“Hch”:0,
}

Get Advantech/00D0C9CC0099/ctl/sensor/di_value/di2

{
"cfg_id":"123",
“Cnting”:0,
“ClrCnt”:0,
“OvLch”: 0,
“Lch”:0,
“Hch”:0,
}

Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_value/di2

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Channel Enable	En	Number	R	1 : Enable function of this input channel.
Mode	Md	Number	R	Digital input mode. 0 DI

				1 Counter 2 LowToHighLatch 3 HighToLowLatch 4 Frequency
Signal Logic Status	Stat	Number	R	1, 0: Input signal is Logic High or Low.
Channel Value	Val	Number	R	DI measurement data Input Mode / Value Description DI / Logic status of DI Counter / Counter value LowToHighLatch / Logic status of DI HighToLowLatch / Logic status of DI Frequency / Frequency(unit. 0.1 Hz_ ● Frequency is multiplied by 10 if frequency precise is 0.1Hz ● Frequency is multiplied by 100 if frequency precise is 0.01Hz
Start Counter	Cnting	Number	RW	Start/Stop counter counting Read 1 : counter is counting 0 : not counting Write 1 : start counting 0 : stop counting
Clear Counter	ClrCnt	Number	W	1 : Clear the counter value
Get/Clear Counter Overflow	OvLch	Number	RW	counter overflow Read 1 : overflow occurred. 0 : no overflow Write 0 : clear the overflow
Counter Value	CtFq	Number	R	The counter value
Frequency Value	Fq	Number	R	● Value is multiplied by 10 if frequency precise is 0.1Hz ● Value is multiplied by 100 if frequency precise is 0.01Hz

Get/Clear L2H Latch Status	Lch	Number	RW	L2H latch status Read 1 : L2H latch occurred. 0 : no L2H latch Write 0 : clear the L2H latch status
Get/Clear H2L Latch Status	Hch	Number	RW	H2L latch status Read 1 : H2L latch occurred. 0 : no H2L latch Write 0 : clear the H2L latch status

Remarks	

3.11.7.2 Digital output of ADAM-6000/6200 DIO

Description	Information about the digital input value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/do_value/don** **where n = 0 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_value/don**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/cfg/sensor/do_value/don**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**
	{
	"Ch":2,
	"En":1,
	"Md":0,
	"Stat":1,
	"Val":1,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	}

Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2

```
{
        "cfg_id":"123",
        "Ch":2,
        "Val":1,
        "PsCtn":0,
        "PsStop":0,
        "PsIV": 0
}
```

Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2

```
{
        "cfg_id":"123",
        "error":"No error"
}
```

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Channel Enable	En	Number	R	1 : Enable function of this output channel.
Mode	Md	Number	R	Digital output mode. 0 DO 1 Pulse Output 2 LowToHighDelay 3 HighToLowDelay
Signal Logic Status	Stat	Number	R	1, 0: Output signal is Logic High or Low.
Channel Value	Val	Number	RW	DO measurement data

				<table><tr><th>Output Mode</th><th>Value Description</th></tr><tr><td>DO</td><td>Get the current signal status or set its status</td></tr><tr><td>Pulse Output</td><td>Get or set the absolute pulse count value</td></tr><tr><td>LowToHighDelay</td><td>Get the current signal status or set its status</td></tr><tr><td>HighToLowDelay</td><td>Get the current signal status or set its status</td></tr></table>
Pulse Output Continue State	PsCtn	Number	RW	1 / 0: Pulse outputting is continuous or not.
Stop Pulse Output	PsStop	Number	W	1: Stop the pulse outputting. (Continue is disabled, Absolute and incremental values are reset to zero. DO signal status is set to logic low.)
Incremental Pulse Output Value	PsIV	Number	RW	Incremental Pulse Output Value

Remarks	

3.11.7.3 Digital output of ADAM-6017

Description	Information about the digital input value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/do_value/don** **where n = 0 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_value/don**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/cfg/sensor/do_value/don**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**
	{
	"Ch":2,
	"Stat":1,
	"Val":1,
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2
	{
	"cfg_id":"123",
	"Val":1,
	}
	Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Signal Logic Status	Stat	Number	R	1, 0: Output signal is Logic High or Low.
Channel Value	Val	Number	RW	DO measurement data

Remarks	

3.11.7.4 Analog input of ADAM-6017/6217

Description	Information about the analog input value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/ai_value/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_value/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_value/ain**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":0,
	"Evt":0,
	"LoA":0,
	"HiA":0,
	"HVal":32768,
	"LVal":0,
	"EgF":5000,
	"HEgF":5000,
	"LEgF":0,
	“Uni”:“Volt”
	
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_value/ai2
	{
	"cfg_id":"123",
	"ClrH": 1,
	"ClrL": 1
	"En":1

<table>
<tr><td></td><td>}
Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2
{
"cfg_id":"123",
"error":"No error"
}</td></tr>
</table>

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog input channel number. Note for the average channel: The average channel number for a 4-ch AI module is 4.
Input Range	Rng	Number	R	Analog input range. ADAM-6017-D/ ADAM-6217-B:

Range code	
328	(0x0148) 0 – 10 V
327	(0x0147) 0 ~ 5 V
325	(0x0145) 0 ~ 1 V
262	(0x0106) 0 ~ 500 mV
261	(0x0105) 0 ~ 150 mV
323	(0x0143) +/- 10 V
322	(0x0142) +/- 5 V
259	(0x0103) +/- 150 mV

<table>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><td>320</td><td>(0x0140) +/- 1 V</td></tr>
<tr><td>260</td><td>(0x0104) +/- 500 mV</td></tr>
<tr><td>384</td><td>(0x0180) 4 ~ 20 mA</td></tr>
<tr><td>385</td><td>(0x0181) +/- 20 mA</td></tr>
<tr><td>386</td><td>(0x0182) 0 ~ 20 mA</td></tr>
</table>
</td></tr>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 / 0: Enable / Disable AI conversion
Notice: Average channel is read only. When channel mask of average is not 0, the value 1.</td></tr>
<tr><td>Channel Raw Value</td><td>Val</td><td>Number</td><td>R</td><td>0 ~ 65535 :AI measurement data (Raw data)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AI statuses
<table>
<tr><td>Bit Order</td><td>Description</td></tr>
<tr><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>Over Range</td></tr>
<tr><td>2</td><td>Under Range</td></tr>
<tr><td>3</td><td>Open Circuit (Burnout)</td></tr>
<tr><td>4</td><td>Reserved</td></tr>
<tr><td>5</td><td>Reserved</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>ADC initializing/Error</td></tr>
<tr><td>8</td><td>Reserved</td></tr>
<tr><td>9</td><td>Zero/Span Calibration Error</td></tr>
<tr><td>10~31</td><td>Reserved</td></tr>
</table>
</td></tr>
<tr><td>Low Alarm Status</td><td>LoA</td><td>Number</td><td>RW</td><td>Low alarm status
Read 1 : low alarm occurred.
0 : not occurred
Write 0 : clear the low alarm status</td></tr>
<tr><td>High Alarm Status</td><td>HiA</td><td>Number</td><td>RW</td><td>High alarm status
Read 1 : high alarm occurred.
0 : not occurred
Write 0 : clear the high alarm status</td></tr>
<tr><td>Maximum AI Raw</td><td>HVal</td><td>Number</td><td>R</td><td>AI max. measurement data (Raw data)</td></tr>
</table>

Value				
Minimum AI Raw Value	LVal	Number	R	AI min. measurement data (Raw data)
Clear Maximum AI Value	ClrH	Number	W	1 : Clear the Maximum AI value (clear would be done at the rising edge)
Clear Minimum AI Value	ClrL	Number	W	1 : Clear the Minimum AI value (clear would be done at the rising edge)
Channel Engineering data (floating type)	EgF	Number	R	AI engineering data, the value is floating type. Unit: mV or mA For example, 9.120 → 9.12 mV or -3.220→-3.22 mA
Maximum AI Engineering data (floating type)	HEgF	Number	R	AI max. engineering data, the value is is floating type. Unit: mV or mA For example, 10.200→10.2 mV -5.120→-5.12 mV
Minimum AI Engineering data (floating type)	LEgF	Number	R	AI min. engineering data, the value is floating type. Unit: mV or mA For example, 250.350 → 250.35 mV -0.120→-0.12 mV
Mapping unit	Uni	String	R	Unit for mapping value(mV or mA) Max. 32 characters

Remarks	

3.11.7.5 Analog input of ADAM-6018+

Description	Information about the analog input value resource on specific slot.

PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/ai_value/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_value/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_value/ain**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":0,
	"Evt":0,
	"LoA":0,
	"HiA":0,
	"HVal":32768,
	"LVal":0,
	"EgF":5000,
	"HEgF":5000,
	"LEgF":0,
	“Uni”:“Volt”
	
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ai_value/ai2
	{
	"cfg_id":"123",
	"ClrH": 1,
	"ClrL": 1
	"En":1
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2
	{
	"cfg_id":"123",

<table>
<tr><td></td><td>"error":"No error"
}</td></tr>
</table>

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog input channel number. Note for the average channel: The average channel number for a 4-ch AI module is 4.
Input Range	Rng	Number	R	Analog input range.

Range code	
1024 (0x400)	T/C TypeJ 0~760℃
1056 (0x420)	T/C TypeK 0~1370℃
1088 (0x440)	T/C TypeT -100~400℃
1120 (0x460)	T/C TypeE 0~1000℃
1152 (0x480)	T/C TypeR 500~1750℃
1184 (0x4A0)	T/C TypeS 500~1750℃
1216 (0x4C0)	T/C TypeB 500~1800℃

<table>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 / 0: Enable / Disable AI conversion
Notice: Average channel is read only. When channel mask of average is not 0, the value 1.</td></tr>
<tr><td>Channel Raw Value</td><td>Val</td><td>Number</td><td>R</td><td>0 ~ 65535 :AI measurement data (Raw data)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AI statuses
<table>
<tr><th>Bit Order</th><th>Description</th></tr>
<tr><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>Over Range</td></tr>
<tr><td>2</td><td>Under Range</td></tr>
<tr><td>3</td><td>Open Circuit (Burnout)</td></tr>
<tr><td>4</td><td>Reserved</td></tr>
<tr><td>5</td><td>Reserved</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>ADC initializing/Error</td></tr>
<tr><td>8</td><td>Reserved</td></tr>
<tr><td>9</td><td>Zero/Span Calibration Error</td></tr>
<tr><td>10~31</td><td>Reserved</td></tr>
</table></td></tr>
<tr><td>Low Alarm Status</td><td>LoA</td><td>Number</td><td>RW</td><td>Low alarm status
Read 1 : low alarm occurred.
0 : not occurred
Write 0 : clear the low alarm status</td></tr>
<tr><td>High Alarm Status</td><td>HiA</td><td>Number</td><td>RW</td><td>High alarm status
Read 1 : high alarm occurred.
0 : not occurred
Write 0 : clear the high alarm status</td></tr>
<tr><td>Maximum AI Raw Value</td><td>HVal</td><td>Number</td><td>R</td><td>AI max. measurement data (Raw data)</td></tr>
<tr><td>Minimum AI Raw Value</td><td>LVal</td><td>Number</td><td>R</td><td>AI min. measurement data (Raw data)</td></tr>
<tr><td>Clear Maximum AI Value</td><td>ClrH</td><td>Number</td><td>W</td><td>1 : Clear the Maximum AI value
(clear would be done at the rising edge)</td></tr>
</table>

Clear Minimum AI Value	ClrL	Number	W	1 : Clear the Minimum AI value (clear would be done at the rising edge)
Channel Engineering data (floating type)	EgF	Number	R	AI engineering data, the value is floating type. Unit: 1℃ For example, 50.12 ℃
Maximum AI Engineering data (floating type)	HEgF	Number	R	AI max. engineering data, the value is is floating type. Unit: 1℃ For example, 50.12 ℃
Minimum AI Engineering data (floating type)	LEgF	Number	R	AI min. engineering data, the value is floating type. Unit: 1℃ For example, 50.12 ℃
Mapping unit	Uni	String	R	Unit for mapping value (1C) Max. 32 characters

Remarks	

3.11.7.6 Digital input of ADAM-6024

Description	Retrieves information about the digital input value resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/di_value/din** **where n = 1 ~ : the channel number**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2**
	{
	“Ch”:2,
	“Stat”:1
	}

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Signal Logic Status	Stat	Number	R	1, 0: Input signal is Logic High or Low.

Remarks	

3.11.7.7 Digital output of ADAM-6024

Description	Information about the digital input value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/do_value/don** **where n = 0 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/do_value/don**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/cfg/sensor/do_value/don**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**
	{
	"Ch":2,
	"Stat":1,
	"Val":1,
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2
	{
	"cfg_id":"123",
	"Val":1,
	}

	Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Signal Logic Status	Stat	Number	R	1, 0: Output signal is Logic High or Low.
Channel Value	Val	Number	RW	DO measurement data

Remarks	

3.11.7.8 Analog input of ADAM-6024

Description	Information about the analog input value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/ai_value/ain** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ai_value/ain**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ai_value/ain**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":0,
	"Evt":0,
	"HVal":32768,
	"LVal":0,
	"EgF":5000,
	"HEgF":5000,
	"LEgF":0,
	“Uni”:“Volt”
	
	}
	Get Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2
	{
	"cfg_id":"123",
	"ClrH": 1,
	"ClrL": 1
	"En":1
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

<table>
<tr><th>Field</th><th>Abbreviation</th><th>Data Type</th><th>Property</th><th>Description</th></tr>
<tr><td>Channel Number</td><td>Ch</td><td>Number</td><td>R</td><td>0, 1, …: Analog input channel number.</td></tr>
<tr><td>Input Range</td><td>Rng</td><td>Number</td><td>R</td><td>Analog input range.<table><tr><td>Range code</td><td></td></tr><tr><td>323</td><td>(0x0143) +/- 10 V</td></tr><tr><td>384</td><td>(0x0180) 4 ~ 20 mA</td></tr><tr><td>386</td><td>(0x0182) 0 ~ 20 mA</td></tr></table></td></tr>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 / 0: Enable / Disable AI conversion
Notice: Average channel is read only. When channel mask of average is not 0, the value 1.</td></tr>
<tr><td>Channel Raw Value</td><td>Val</td><td>Number</td><td>R</td><td>0 ~ 65535 :AI measurement data (Raw data)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AI statuses<table><tr><td>Bit Order</td><td>Description</td></tr><tr><td>0</td><td>normal</td></tr><tr><td>1</td><td>Over Range</td></tr><tr><td>2</td><td>Under Range</td></tr><tr><td>3</td><td>Open Circuit (Burnout)</td></tr><tr><td>4</td><td>Reserved</td></tr><tr><td>5</td><td>Reserved</td></tr><tr><td>6</td><td>Reserved</td></tr><tr><td>7</td><td>ADC initializing/Error</td></tr><tr><td>8</td><td>Reserved</td></tr><tr><td>9</td><td>Zero/Span Calibration Error</td></tr><tr><td>10~31</td><td>Reserved</td></tr></table></td></tr>
<tr><td>Maximum AI Raw Value</td><td>HVal</td><td>Number</td><td>R</td><td>AI max. measurement data (Raw data)</td></tr>
<tr><td>Minimum AI Raw</td><td>LVal</td><td>Number</td><td>R</td><td>AI min. measurement data (Raw data)</td></tr>
</table>

Value				
Clear Maximum AI Value	ClrH	Number	W	1 : Clear the Maximum AI value (clear would be done at the rising edge)
Clear Minimum AI Value	ClrL	Number	W	1 : Clear the Minimum AI value (clear would be done at the rising edge)
Channel Engineering data (floating type)	EgF	Number	R	AI engineering data, the value is floating type. Unit: mV or mA For example, 9.120 → 9.12 mV or -3.220→-3.22 mA
Maximum AI Engineering data (floating type)	HEgF	Number	R	AI max. engineering data, the value is is floating type. Unit: mV or mA For example, 10.200→10.2 mV -5.120→-5.12 mV
Minimum AI Engineering data (floating type)	LEgF	Number	R	AI min. engineering data, the value is floating type. Unit: mV or mA For example, 250.350 → 250.35 mV -0.120→-0.12 mV
Mapping unit	Uni	String	R	Unit for mapping value (mV or mA) Max. 32 characters

Remarks	

3.11.7.9 Analog output of ADAM-6024

Description	Retrieves information about the analog output value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/ao_value/aon**

	where n = 1 ~ : the channel number
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ao_value/aon**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ao_value/aon**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ao_value/ao2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":4095,
	"Eg":10,
	"Evt":8,
	"Uni":"Volt"
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ao_value/ao2
	{
	"cfg_id":"123",
	"Val ":410,
	" Eg ":1000,
	}
	Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_value/ao2
	{
	"cfg_id":"123",
	"error":"No error"
	}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions :

<table>
<tr><th>Field</th><th>Abbreviation</th><th>Data Type</th><th>Property</th><th>Description</th></tr>
<tr><td>Channel Number</td><td>Ch</td><td>Number</td><td>R</td><td>0, 1, …: Analog output channel number.</td></tr>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 : Enable function of this output channel.</td></tr>
<tr><td>Output Range</td><td>Rng</td><td>Number</td><td>R</td><td>Analog output range.

ADAM-6024-D<table><tr><td>Range code</td><td></td></tr><tr><td>328</td><td>(0x0148) 0 – 10 V</td></tr><tr><td>384</td><td>(0x0180) 4 ~ 20 mA</td></tr><tr><td>386</td><td>(0x0182) 0 ~ 20 mA</td></tr><tr><td></td><td></td></tr></table>
ADAM-6224<table><tr><td>Range code</td><td></td></tr><tr><td>328</td><td>(0x0148) 0 – 10 V</td></tr><tr><td>327</td><td>(0x0147) 0 ~ 5 V</td></tr><tr><td>323</td><td>(0x0143) +/- 10 V</td></tr><tr><td>322</td><td>(0x0142) +/- 5 V</td></tr><tr><td>384</td><td>(0x0180) 4 ~ 20 mA</td></tr><tr><td>386</td><td>(0x0182) 0 ~ 20 mA</td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>Channel Engineering data</td><td>Eg</td><td>Number</td><td>RW</td><td>AO engineering data, the value is 1/1000 scale.
Unit: V or mA
For example,
1120 → 1.12 V (or mA)
-3220→-3.22 V (or mA)</td></tr>
</table>

<table>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AO channel status
<table>
<tr><th>Bit Order</th><th>Description</th></tr>
<tr><td>0~2</td><td>Reserved</td></tr>
<tr><td>3</td><td>Open Circuit (Burnout)</td></tr>
<tr><td>4~15</td><td>Reserved</td></tr>
<tr><td>16</td><td>DI Triggered Safety</td></tr>
<tr><td>17</td><td>DI Triggered Startup</td></tr>
<tr><td>18</td><td>FSV Triggered Safety</td></tr>
<tr><td></td><td></td></tr>
</table></td></tr>
<tr><td>Mapping unit</td><td>Uni</td><td>String</td><td>R</td><td>Unit for mapping value(V or mA)
Max. 32 characters</td></tr>
</table>

Remarks	

3.11.7.10 Digital input of ADAM-6224

Description	Retrieves information about the digital input value resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/di_value/din** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/di_value/din**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/di_value/din**
Example	**Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2** { “Ch”:2, “En”:1, “Md”:0, “TSt”:1,

“TSa”:1,
}

Get Advantech/00D0C9CC0099/ctl/sensor/di_value/di2

{
"cfg_id":"123",
“TSt”:0,
“TSa”:0,
}

Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/di_value/di2

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.
Mode	Md	Number	R	Digital input mode. 0 DI 85 HighTriggerStartup 90 HighTriggerSafty 165 LowTriggerStartup 170 LowTriggerSafty 255 Invalid mode
Signal Logic Status	Stat	Number	R	1, 0: Input signal is Logic High or Low.

Get/Clear DI triggered Startup Status	TSt	Number	RW	DI triggered startup status Read 1 : startup triggered. 0 : startup not triggered Write 0 : clear the startup triggered status
Get/Clear DI triggered Safty Status	TSa	Number	RW	DI triggered safty status Read 1 : safty triggered. 0 : safty not triggered Write 0 : clear the safty triggered status
Remarks				

3.11.7.11 Analog output of ADAM-6224

Description	Retrieves information about the analog output value resource on specific slot.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/sensor/ao_value/aon** **where n = 1 ~ : the channel number**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/sensor/ao_value/aon**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/sensor/ao_value/aon**

Example	**Send Advantech/00D0C9CC0099/cfg/sensor/ao_value/ao2**
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":4095,
	"Eg":10,
	"Evt":8,
	“Uni”:“Volt”
	}
	Get Advantech/00D0C9CC0099/ctl/sensor/ao_value/ao2
	{
	"cfg_id":"123",

"Val ":410,
" Eg ":1000,
}
Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_value/ao2
{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: Analog output channel number.
Channel Enable	En	Number	R	1 : Enable function of this output channel.
Output Range	Rng	Number	R	Analog output range.

ADAM-6024-D

Range code	
328	(0x0148) 0 – 10 V
384	(0x0180) 4 ~ 20 mA
386	(0x0182) 0 ~ 20 mA

ADAM-6224

Range	

				code: (0x0148) 0 – 10 V; 328 (0x0147) 0 ~ 5 V; 327 (0x0143) +/- 10 V; 323 (0x0142) +/- 5 V; 322 (0x0180) 4 ~ 20 mA; 384 (0x0182) 0 ~ 20 mA; 386
Channel Engineering data	Eg	Number	RW	AO engineering data, the value is 1/1000 scale. Unit: V or mA For example, 1120 → 1.12 V (or mA) -3220→-3.22 V (or mA)
Channel Event Status	Evt	Number	R	AO channel status Bit Order: Description 0~2: Reserved 3: Open Circuit (Burnout) 4~15: Reserved 16: DI Triggered Safety 17: DI Triggered Startup 18: FSV Triggered Safety
Mapping unit	Uni	String	R	Unit for mapping value(V or mA) Max. 32 characters

Remarks	

3.11.8 Network Setting Topic

Description	Retrieves information about the Network Setting resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/NetworkSetting**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/NetworkSetting**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/NetworkSetting**

Example	**Send Advantech/00D0C9CC0099/cfg/NetworkSetting**
	{
	"ipMd":1,
	"ipaddr":"172.16.12.99",
	"subnet":"255.255.254.0",
	"gateway":"172.16.13.254",
	"hostIdle":720,
	"devName":"ADAM-6250_00D0C9CC0099",
	"devDesc":"FW_RD 123",
	"EnLocate":0,
	"reset2FacDef":0
	}
	
	Get Advantech/00D0C9CC0099/ctl/NetworkSetting
	{
	"cfg_id":"123",
	"ipMd":1,
	"ipaddr":"172.16.12.99",
	"subnet":"255.255.254.0",
	"gateway":"172.16.13.254",
	"hostIdle":720,
	"devName":"ADAM-6250_00D0C9CC0099",
	"devDesc":"FW_RD 123",
	"EnLocate":0,

"reset2FacDef":1
}

Send Ack. Advantech/00D0C9CC0099/ack/ctl/NetworkSetting
{
"cfg_id":"123",
"error":"Setting IP not supported under DHCP"
}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
IP Mode	ipMd	Number	RW	IP Mode: 0 Static IP 1 DHCP IP
IP Address	ipaddr	String	R	Note: Can only be set when Static mode
Subnet Address	subnet	String	R/W	Note: Can only be set when Static mode
Default Gateway	gateway	String	R/W	Note: Can only be set when Static mode
Host Idle (Timeout)	hostIdle	Number	R/W	Allowable duration for the server to remain inactive. default：720 (second) range：1 - 4095 (second)
Device Name	devName	String	R/W	Max length: 64 bytes.
Device Description	devDesc	String	R/W	Max length: 128 bytes.
Locate	EnLocate	Number	R/W	Help user search ADAM module with

				light sign. (The status LED will be constantly on for 30 seconds.) Locate Mode: 0 Disable 1 Enable
Reset to Factory Defaults	reset2FacDef	Number	R/W	Set 1 to Reset to Factory Defaults default：0

Remarks	

3.11.9 Access Control Topic

Description	Retrieves information about the Access Control resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/AccessControl**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/AccessControl**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/AccessControl**
Example	**Send Advantech/00D0C9CC0099/cfg/AccessControl** { "CtlMd":1, "EN0":0, "IP0":"172.16.12.38", "MAC0":"00D0C9FEFF06", "EN1":0, "IP1":"255.255.255.255", "MAC1":"FFFFFFFFFFFF", "EN2":0,

"IP2":"255.255.255.255",
"MAC2":"FFFFFFFFFFFF",
"EN3":0,
"IP3":"255.255.255.255",
"MAC3":"FFFFFFFFFFFF",
"EN4":0,
"IP4":"255.255.255.255",
"MAC4":"FFFFFFFFFFFF",
"EN5":0,
"IP5":"255.255.255.255",
"MAC5":"FFFFFFFFFFFF",
"EN6":0,
"IP6":"255.255.255.255",
"MAC6":"FFFFFFFFFFFF",
"EN7":0,
"IP7":"255.255.255.255",
"MAC7":"FFFFFFFFFFFF"
}

Get Advantech/00D0C9CC0099/ctl/AccessControl

{
"cfg_id":"123",
"CtlMd":0,
"EN6":1,
"IP6":"172.16.12.38"
}

or

{
"cfg_id":"123",
"CtlMd":1,
"EN6":1,
"MAC6":"00D0C9FEFF06"
}

Send Ack. Advantech/00D0C9CC0099/ack/ctl/AccessControl

{
"cfg_id":"123",
"error":"Setting IP not supported under DHCP (IP0)"

}

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
Control Mode	CtlMd	Number	R/W	Control Mode: 0 IP address 1 MAC address
Enable	ENn	Number	R/W	Enable Mode: 0 Disable 1 Enable Note : n = 0 ~ 7
Security IP address	IPn	String	R/W	Security IP/MAC Setting IP example: 255.255.255.255 Note1 : n = 0 ~ 7 Note2 : It can only be set when CtlMd is IP address
Security MAC address	MACn	String	R/W	Security IP/MAC Setting MAC example: 00D0C9FEFF06 Note1 : n = 0 ~ 7 Note2 : It can only be set when CtlMd is MAC address

Remarks	

3.11.10 User-defined Modbus address Topic

Description	Retrieves information about the User-defined Modbus address resource.
PUBLISH Topic	Send the current status. **Advantech/{MAC}/cfg/UserDefMBAddr**
SUBSCRIBE Topic	Get the operation from DeviceCloud. **Advantech/{MAC}/ctl/ UserDefMBAddr**
Ack. Topic	Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud **Advantech/{MAC}/ack/ctl/UserDefMBAddr**

Example	**Send Advantech/00D0C9CC0099/cfg/UserDefMBAddr**
	{
	"0x_DIStatus":"0x0001",
	"0x_StartCnt":"0x0033",
	"0x_ClrCnt":"0x0039",
	"0x_ClrOverflow":"0x0045",
	"0x_DILatch":"0x0051",
	"4x_CntFreqVal":"4x0001",
	"4x_ModName":"4x0211",
	"4x_DOStatus":"4x0303"
	}
	Get Advantech/00D0C9CC0099/ctl/UserDefMBAddr
	{
	"cfg_id":"123",
	"0x_DIStatus":"0x0001",
	"0x_StartCnt":"0x0033",
	"0x_ClrCnt":"0x0039",
	"0x_ClrOverflow":"0x0045",
	"0x_DILatch":"0x0051",
	"4x_CntFreqVal":"4x0001",
	"4x_ModName":"4x0211",
	"4x_DOStatus":"4x0303"
	}
	Note: An address cannot be assigned to two Field.

i.e: if the DI status address is 0001 and its length is 6, no other function can be assigned to addresses 0001 to 0007.

Send Ack. Advantech/00D0C9CC0099/ack/ctl/UserDefMBAddr

```
{
   "cfg_id":"123",
   "error":"Modbus address overlap occurs (0x_DIStatus, 0x_StartCnt)"
}
```

➢ Message information definition:

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	RW	Max length: 31 bytes.
Acknowledge Description	error	String	R	See Error Table in 3.11.14

➢ Resource value definitions:

Field	Abbreviation	Data Type	Property	Description
		DIO address		
DI status	0x_DIStatus	String	R/W	starting coil address of DI Status default："0x0001" Number of points : Total number of DIs
DO status	0x_DOStatus	String	R/W	starting coil address of DO Status default："0x0017" Number of points : Total number of DOs
Start Counter	0x_StartCnt	String	R/W	starting coil address of start/stop counter length : Total number of DIs
Clear counter	0x_ClrCnt	String	R/W	Starting coil address of clear counter length : Total number of DIs
Clear overflow	0x_ClrOverflow	String	R/W	Starting coil address of clear overflow

				length : Total number of DIs
DI latch status	0x_DILatch	String	R/W	Starting coil address of DI latch status length : Total number of DIs
Counter/Frequency Value	4x_CntFreqVal	String	R/W	Starting register address of Counter/Frequency value default："4x0001" Number of registers : Twice the total number of DIs
Pulse output low level width	4x_PulsL	String	R/W	Starting register address of Pulse output low level width Number of registers : Twice the total number of DOs
Pulse output high level width	4x_PulsH	String	R/W	Starting register address of Pulse output high level width Number of registers : Twice the total number of DOs
Set absolute pulse	4x_AbsPuls	String	R/W	Starting register address of set absolute pulse Number of registers : Twice the total number of DIs
Set incremental pulse	4x_IncPuls	String	R/W	Starting register address of Set incremental pulse Number of registers : Twice the total number of DOs
Registers DI status	4x_DIStatus	String	R/W	Starting register address of DI Status default："4x0301" Number of registers: 1
Registers DO status	4x_DOStatus	String	R/W	Starting register address of DO Status default："4x0303"

				Number of registers: 1
Registers **DI event status**	4x_DIevt	String	R/W	Starting register address of DI event status default：“4x0111” Number of registers: Total number of DIs
		AI address		
Registers **Reset max AI value**	0x_RstHi	String	R/W	Starting register address of Reset max AI value default：“0x0101” Number of points : Total number of AIs
Registers **Reset max AI value average**	0x_RstHiAvg	String	R/W	Starting register address of Reset max AI value average default：“0x0109” Number of points : 1
Registers **Reset min AI value**	0x_RstLo	String	R/W	Starting register address of Reset min AI value default：“0x0111” Number of points : Total number of AIs
Registers **Reset min AI value average**	0x_RstLoAvg	String	R/W	Starting register address of Reset min AI value average default：“0x0119” Number of points : 1
Registers **Burnout**	0x_Burnout	String	R/W	Starting register address of Burnout default：“0x0121” Number of points : Total number of AIs
Registers **High alarm Status**	0x_HiAS	String	R/W	Starting register address of High alarm Status default：“0x0131”

				Number of points : Total number of AIs
Registers High alarm Status average	0x_HiASAvg	String	R/W	Starting register address of High alarm Status average default："0x0139" Number of points : 1
Registers Low Alarm Status	0x_LoAS	String	R/W	Starting register address of Low Alarm Status default："0x0141" Number of points : Total number of AIs
Registers Low Alarm Status average	0x_LoASAvg	String	R/W	Starting register address of Low Alarm Status average default："0x0149" Number of points : 1
AI value	4x_AIVal	String	R/W	Starting register address of AI value default："4x0001" Number of registers : Total number of AIs
AI value average	4x_AIValAvg	String	R/W	Starting register address of AI value average default："4x0009" Number of registers : 1
Maximum AI Raw Value	4x_HiVal	String	R/W	Starting register address of Max. AI Raw Value default："4x0011" Number of registers : Total number of AIs
Maximum AI Raw Value average	4x_HiValAvg	String	R/W	Starting register address of Max. AI Raw Value average default："4x0019"

				Number of registers : 1
Minimum AI Raw Value	4x_LoVal	String	R/W	Starting register address of Min. AI Raw Value default："4x0021" Number of registers : Total number of AIs
Minimum AI Raw Value average	4x_LoValAvg	String	R/W	Starting register address of Min. AI Raw Value average default："4x0029" Number of registers : 1
AI Engineering data (floating type)	4x_AIEgF	String	R/W	Starting register address of AI max. engineering data default："4x0031" Number of registers : Twice the total number of AIs
AI Engineering data average (floating type)	4x_AIEgFAvg	String	R/W	Starting register address of AI value average default："4x0047" Number of registers : 2
Maximum AI Engineering data (floating type)	4x_HiEgF	String	R/W	Starting register address of Max. AI Engineering Value default："4x0051" Number of registers : Twice the total number of AIs
Maximum AI Engineering data average (floating type)	4x_HiEgFAvg	String	R/W	Starting register address of Max. AI Engineering Value average default："4x0067" Number of registers : 2
Minimum AI Engineering data (floating type)	4x_LoEgF	String	R/W	Starting register address of Min. AI Engineering Value default："4x0071" Number of registers : Twice the

				total number of AIs
Minimum Minimum AI Raw Value average	4x_LoEgFAvg	String	R/W	Starting register address of Min. AI Engineering Value average default："4x0087" Number of registers : 2
AI status	4x_AIStatus	String	R/W	Starting register address of AI status default："4x0101" Number of registers : Twice the total number of AIs
AI range	4x_AIRng	String	R/W	Starting register address of AI range default："4x0201" Number of registers : Total number of AIs
AI range average	4x_AIRngAvg	String	R/W	Starting register address of AI range average default："4x0209" Number of registers : 1
AI channel enable	4x_AIEn	String	R/W	Starting register address of AI channel enable default："4x0209" Number of registers : 1
		AO address		
AO value	4x_AOVal	String	R/W	Starting register address of AO value default："4x0001" Number of registers : Total number of AOs
AO slew rate	4x_SR	String	R/W	Starting register address of AO value default："4x0011"

				Number of registers : Total number of AOs
AO status	4x_AOStatus	String	R/W	Starting register address of AO status default："4x0101" Number of registers : Twice the total number of AOs
AO range	4x_AORng	String	R/W	Starting register address of AO range default："4x0201" Number of registers : Total number of AOs
AO startup value	4x_SupVal	String	R/W	Starting register address of AO startup value default："4x0401" Number of registers : Twice the total number of AOs
AO safety value	4x_SftVal	String	R/W	Starting register address of AO safety value default："4x0411" Number of registers : Twice the total number of AOs
		Base address		
Clear GCL counter	0x_GCL_ClrCnt	String	R/W	Starting coil address of Clear GCL counter default："0x0301" length : 8
Module name	4x_ModName	String	R/W	Starting register address of Module name default："4x0211" Number of registers : 2
Registers	4x_GCL_Flag	String	R/W	Starting register address of GCL

GCL flag				flag default："4x0305" Number of registers: 1
Registers **GCL counter**	4x_GCL_Cnt	String	R/W	Starting register address of GCL counter default："4x0311" Number of registers: 16
Remarks				

3.11.11 OTA for Firmware/Configuration File

This chapter describes how to perform Firmware OTA (Over-The-Air) upgrade for Advantech devices. There are three types of OTA:

- Firmware image
- Device configuration file :

  A file exported by Utility that contains configuration settings such as device information, IO settings, network settings, Cloud settings, SNTP settings, etc.

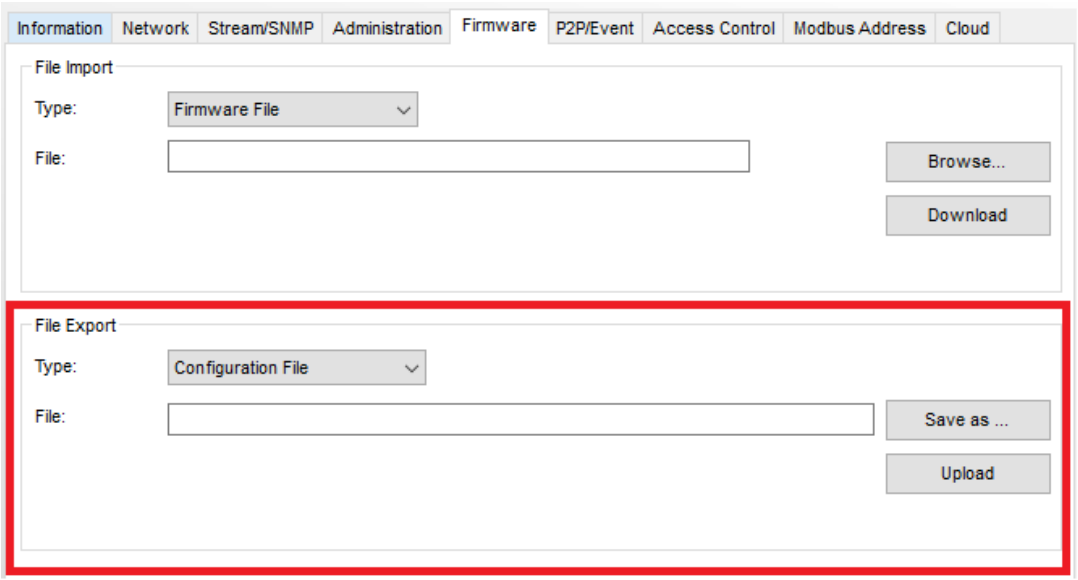


Figure 9. OTA Firmware and Configuration File upload

- CA File

  The certificate required for MQTT TLS authentication must have a public key that is an RSA key with a length of up to 4096 bits.

OTA Operation Process:

➢ The file server must be set up using a web server, and the web server needs to provide a URL of the HTTP protocol.

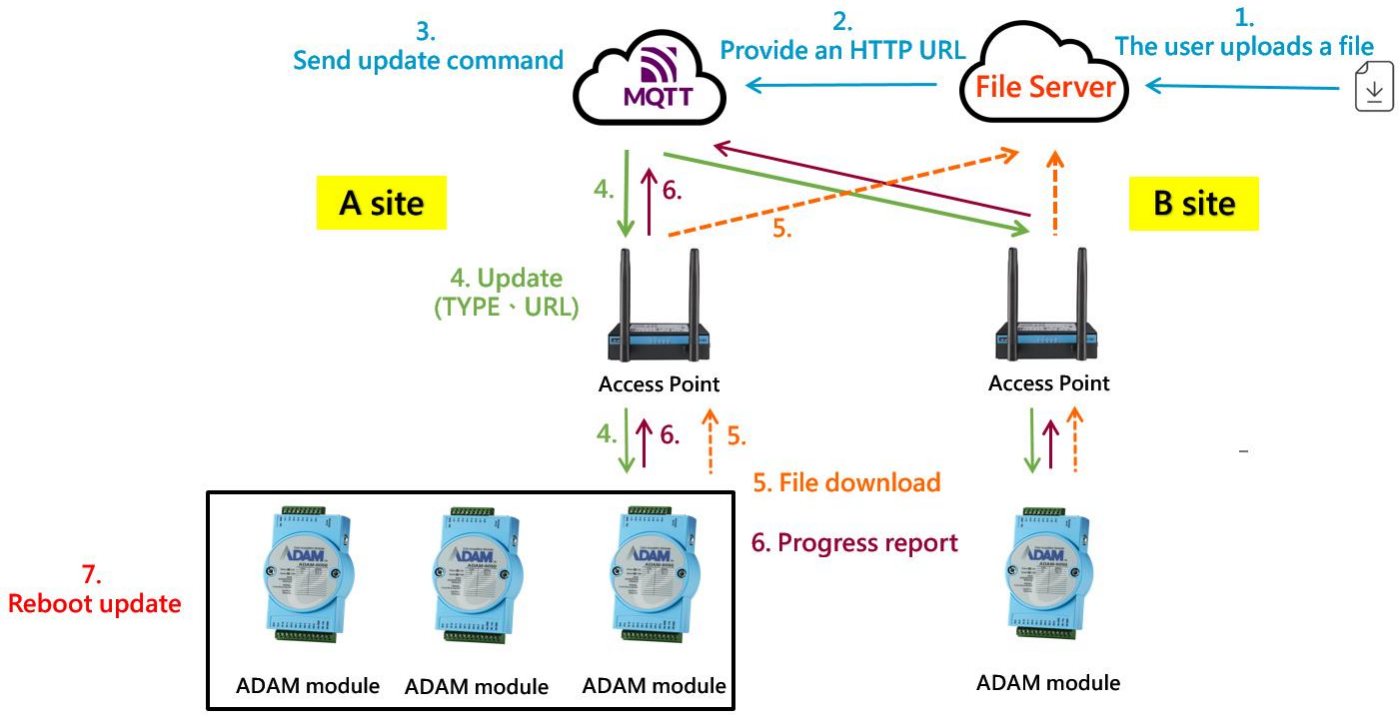


Figure 10. OTA Operation Process

3.11.11.1 Scenario

1. Cloud sends OTA Request to device. MQTT topic: Advantech/{MAC}/ota
2. Device Publishes MQTT message to Accept/Reject OTA request. MQTT topic: Advantech/{MAC}/ack/ota
3. Device starts to download firmware or configuration file and publish MQTT messages to notify Cloud its current download progress. Device could publish MQTT messages several times or every n seconds to notify Cloud. MQTT topic: Advantech/{MAC}/update/ota
4. Before or after perform firmware/configuration file upgrade, device publish MQTT message to report to Cloud the OTA result. MQTT topic: Advantech/{MAC}/update/ota

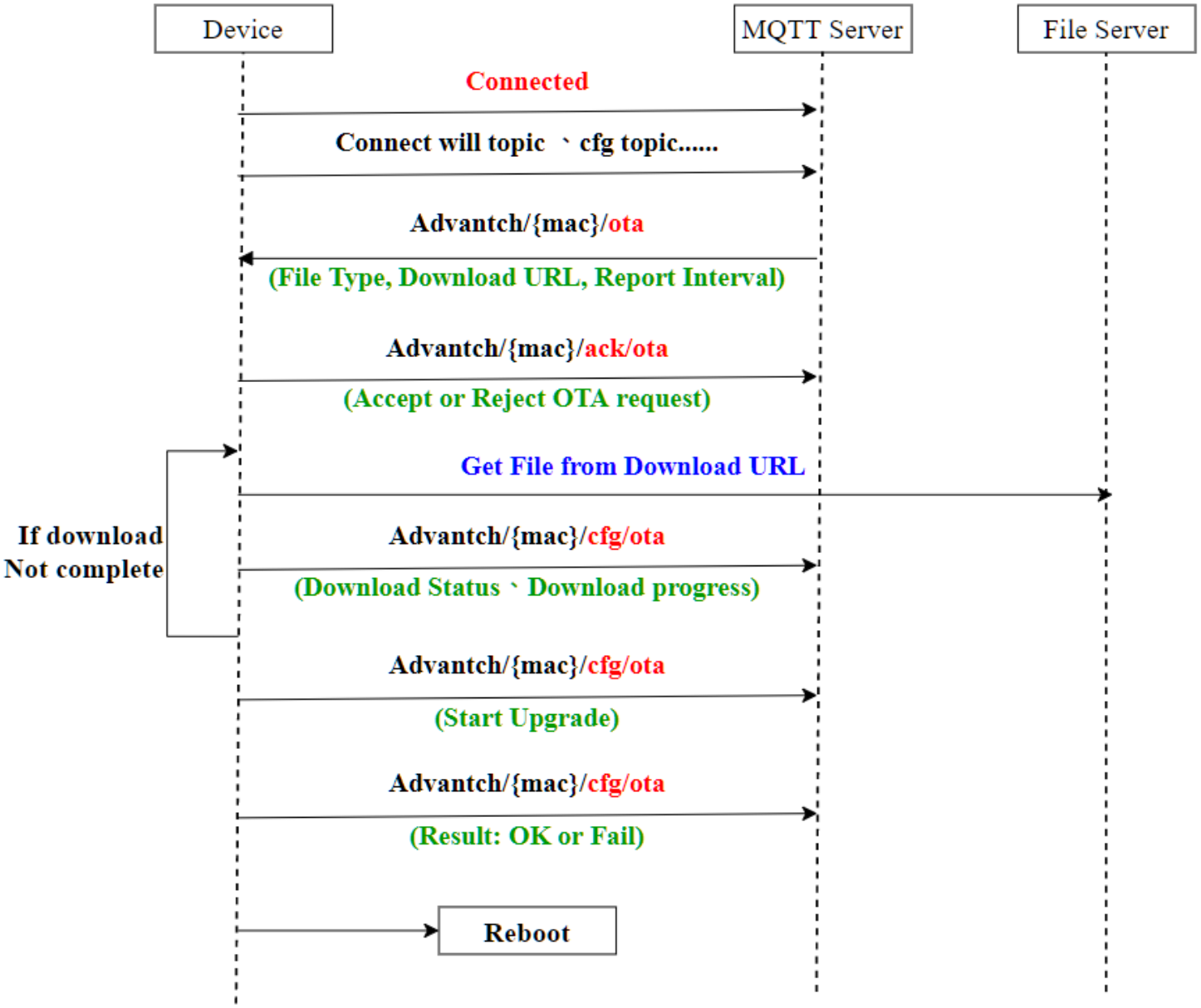


Figure 11. OTA Scenarios

3.11.11.2 OTA Request from Cloud

➢ **Device Subscribe MQTT topic:**

Advantech/{MAC}/ota

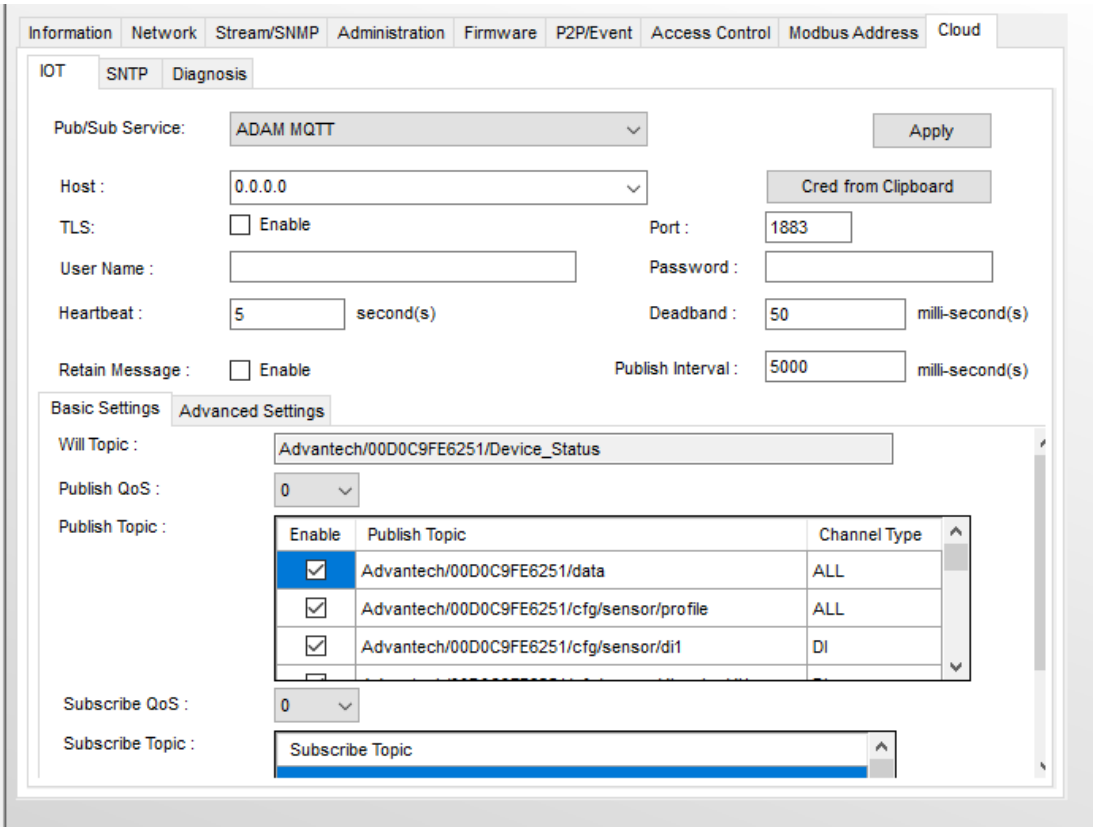
Description	The cloud sets the information about OTA to the device
SUBSCRIBE Topic	**Advantech/{MAC}/ota**

Example	**Cloud sends Advantech/00D0C9CC0099/ota to Device**
	{
	"cfg_id":"5f4744bf50ac705ac8ac2dce",
	"Url":"https://advantech.blob.windows.net/devicecloud/ADAM-6050/V6.13 B00/V6.13 B00.bin",
	"Typ":0,
	"Itv":10
	}

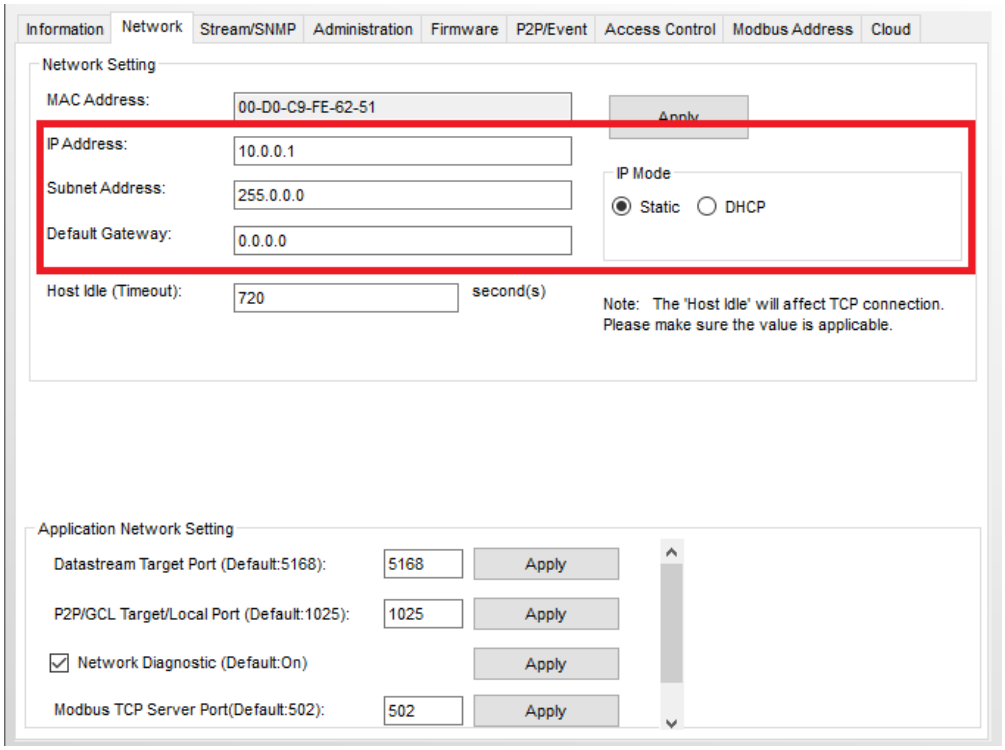
➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	W	Max length: 31 bytes.
File Download URL	Url	String	W	File download URL Max length: 256 bytes.
File Type	Typ	Number	W	Type: **0** — Description: Firmware Type: **4** — Description: configuration File Type: **18** — Description: configuration File Without Cloud Settings[1] Type: **19** — Description: configuration File Without Cloud Settings and Network Settings[2]
Device Report Interval	Itv	Number	W	Interval of how often device reports current file download progress to Cloud. Unit: second.

Remarks	1. Cloud Settings: Utility → Cloud → IOT → All setting



2. Network Settings: Utility → Network → IP Address、Subnet Address、Default Gateway、IP mode



3.11.11.3 Device ACK OTA Request

➢ **Device Publish MQTT message to ACK Cloud request:**
Advantech/{MAC}/ack/ota

Description	Send the acknowledgement for the received OTA topic to Cloud
PUBLISH Topic	**Advantech/{MAC}/ack/ota**

Example	**Device sends Advantech/00D0C9CC0099/ack/ota to Cloud**
	{
	"cfg_id": "5f4744bf50ac705ac8ac2dce",
	"Typ": 0,
	"ackstatus":"0",
	"cost":90,
	"error":"No error"
	}

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description
Message ID	cfg_id	String	R	Max length: 31 bytes.
File Type	Typ	Number	R	Type: **0** — Description: Firmware Type: **4** — Description: configuration File Type: **18** — Description: configuration File Without Cloud Settings Type: **19** — Description: configuration File Without Cloud Settings and Network Settings
Acknowledge status	ackstatus	Number	R	OTA Command Code: 1 — Description: Device **accepts** OTA firmware download Request

				2	Device **rejects** OTA firmware download Request
Firmware/Configuration upgrade Time	cost	Number	R	If OTA request is accepted, device reports estimate time of firmware/configuration upgrade. Unit: second. If OTA request is rejected, this field is ignored.	
Acknowledge Description	error	String	R	See Error Table	
Remarks					

3.11.11.4 Device Reports OTA Status

Device Publish MQTT message to report current OTA status:
Advantech/{MAC}/cfg/ota

Description	The device reports the current status of OTA download and update.
PUBLISH Topic	**Advantech/{MAC}/cfg/ota**

Example	**Device sends Advantech/00D0C9CC0099/cfg/ota to Cloud**
	{
	"cfg_id": "5f4744bf50ac705ac8ac2dce",
	"otastatus": 100,
	"progress": 60,
	"error":"No error"
	}

➢ Resource value definitions :

Field	Abbreviation	Data Type	Property	Description	
Message ID	cfg_id	String	R	Max length: 31 bytes.	
OTA Status	otastatus	Number	R	OTA Status Code	Description
				100	OTA download is in progress
				101	OTA download is failed

				102 OTA download is finished 200 Start upgrade 300 Upgrade is success and finished 301 Upgrade is failed and terminated
Firmware/Configuration File Download progress	progress	Number	R	Download progress unit is percentage and value range is 0~100.
Acknowledge Description	error	String	R	See Error Table in 3.11.14
Remarks				

3.11.12 Pub/Sub Topic Rules

The Pub/Sub interval of the original boot connection is controlled by Deadband, but when the Deadband is too large, it will cause too long period to boot devices. Therefore, the Pub/Sub interval of the new version is changed to be fixed at 50ms. Starts from following versions support these rules:

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11B37	V6.11B23	V6.01B24	V6.01B19	V6.01B23

ADAM MQTT Sub/Pub topic mechanism is as follows:

Boot connection sequence:

1. Set Will Topic (Disconnect)
2. Subscribe
   - Advantech/{mac}/ctl/#
   - Advantech/{mac}/set/sensor/# (AIO only)
   - Advantech/{mac}/read/data
3. Publish
   - Will Topic(Connect)
   - Profile Topic

Channel Config Topic
Channel Value Topic

4. Subscribe
Channel Config Topic
Channel Value Topic

5. Publish
Channel Type Topic
All Data Topic

The following topic send intervals are subject to Deadband restrictions
Interval:
All Data Topic

When any Config changes:
Channel Config Topic

When Channel type changes:
Channel Type Topic

When any Value changes:
Channel Config Topic

DIO/AO data changes:
All Data Topic

When received Advantech/{mac}/read/data:
All Data Topic

When disconnected with broker:
Will Topic(Disconnect)

3.11.13 Range command format

DI command :
di、counter、lowToHighLatch、highToLowLatch、frequency

DO command :

do、pulseOutput、lowToHighDelay、highToLowDelay

Analog Range:

command	range	support module
0-20mA	0~20 mA	6017/6217/6024/6224
4-20mA	4~20 mA	6017/6217/6024/6224
+-20mA	±20 mA	6017/6217
0-5V	0~5 V	6017/6217/6224
0-10V	0~10 V	6017/6217/6224
0-1V	0~1 V	6017/6217
0-500mV	0~500 mV	6017/6217
0-150mV	0~150 mV	6017/6217
+-10V	±10 V	6017/6217/6024/6224
+-5V	±5 V	6017/6217/6224
+-1V	±1 V	6017/6217
+-150mV	±150 mV	6017/6217
+-500mV	±500 mV	6017/6217

Thermocouple Range:

command	range
K Type:0-1370C	K Type 0-1370°C
J Type:0-760C	J Type 0-760°C
E Type: 0-1000C	E Type 0-1000°C
T Type:-100-400C	T Type -100-400°C
R Type:500-1750C	R Type 500-1750°C
S Type:500-1750C	S Type 500-1750°C
B Type:500-1800C	B Type 500-1800°C

3.11.14 ACK Error Table

error	Corresponding action
No error	No error
Invalid configuration parameter (Abbreviation of error function)	Check whether configuration parameter is correct. (Abbreviation of error function)

Modbus address overlap occurs (Abbreviation of error function)	Check whether there is overlap in Modbus table (Abbreviation of error function)
Invalid network setting.	Check whether IP, subnet and gateway are all correct
Setting IP not supported under DHCP	It is not supported to set IP under DHCP.
Security address not supported under current control mode (Abbreviation of error function)	Depending on current control mode, security IP(MAC) address is allowed to be referenced (Abbreviation of error function)
Invalid IP address (Abbreviation of error function)	Check whether IP address is correct (Abbreviation of error function)
Invalid MAC address (Abbreviation of error function)	Check whether MAC address is correct (Abbreviation of error function)
OTA	
Updating is in progress	An update is currently in progress.
Error in the module type of the configuration file.	Check the module type of the configuration file.
Failed to connect to the file server	Check if the file server is functioning properly
Invalid Firmware version	Check whether Firmware version is correct
Invalid file type	Check whether file type is correct

3.12 Advanced Settings

User can do customized setting topic name and payload message。Advanced Settings have independent Apply button.(EdgeSync 360/ EdgeHub don’t support Advanced Settings)

- When the broker is connected, using the SET command will actively publish the will topic (status: disconnect) and reconnect.
- Support Advanced Settings from the following version:

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11 B41	V6.11 B20	V6.01B26	V6.01B19	V6.01B23

ASCII command:

Command	Description	Remarks
%aaSETMQTPCENxx	Enable/Disable MQTT user define publish aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETMQTPCEN	Get MQTT user define publish flags aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01
%aaSETMQTPCSENxx	Enable/Disable MQTT user define subscribe aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETMQTPCSEN	Get MQTT user define subscribe flags aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

3.12.1 Publish Will Topic and Message

User can do customized setting will topic name and will/connect message.

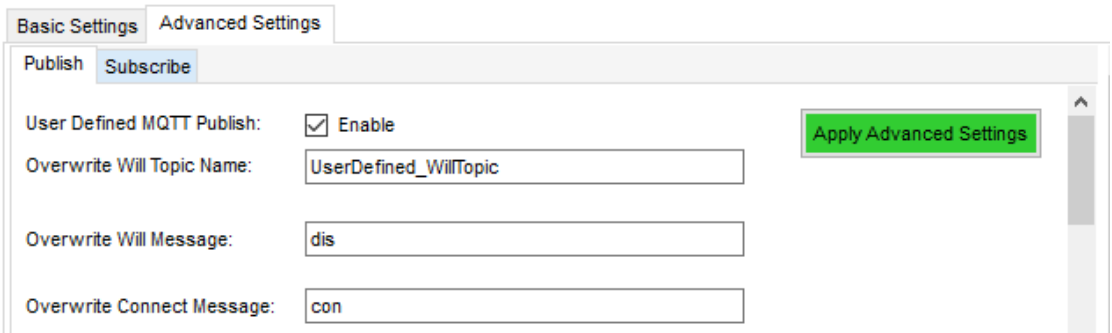


Figure 12. Advanced setting

When module is disconnected:

When module is connected:

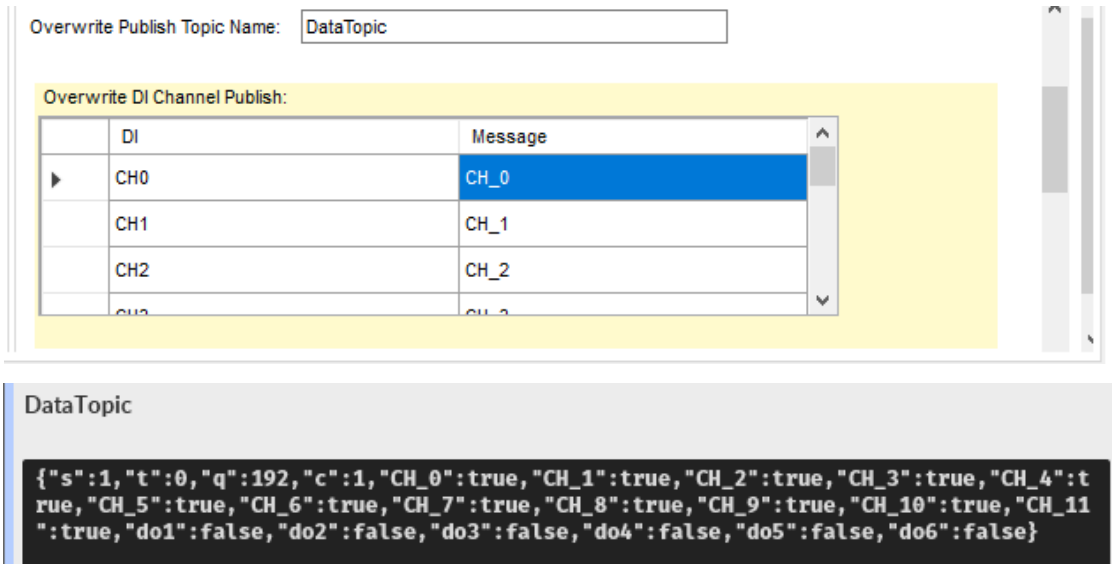
ASCII command:

Command	Description	Remarks
%aaSETMQTPCWTx...x	Set the will topic of user define aa: always 01 x…x: will topic name (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCWT	Get the will topic of user define aa: always 01	Return: !WillTopicName Error: ?01
%aaSETMQTPCWMx...x	Set the Will message of user define aa: always 01 x…x: Will message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCWM	Get the Will message of user define aa: always 01	Return: !WillMessage Error: ?01
%aaSETMQTPCCMx...x	Set the Connect message of user define aa: always 01 xx…x: Connect message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCCM	Set the Connect message of user define aa: always 01	Return: !ConnectMessage Error: ?01

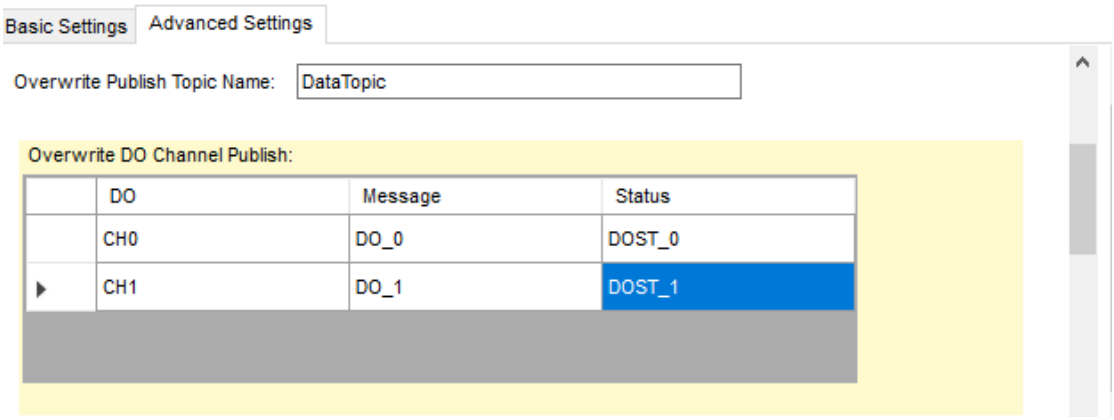
3.12.2 Publish All Data Topic and Message

User can define All data topic name(default:Advantech/{mac}/data) or Channel/AlarmStatus name of message(default:don or ai_stn, n starts from 1).

DIO module:



AIO module:



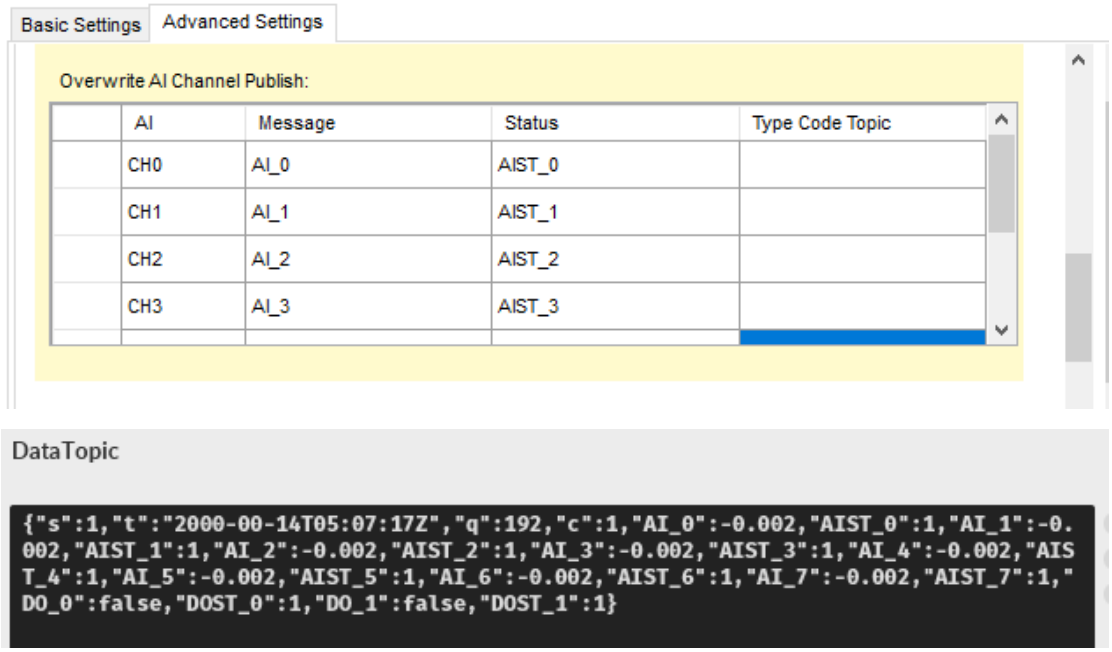


Figure 13. Publish DIO/AIO Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPTDx...x	Set the Publish data topic of user define aa: always 01 x…x: data topic name (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCPTD	Get the Publish data topic of user define aa: always 01	Return: !DataTopicName Error: ?01
%aaSETMQTPCPMDIccx...x or %aaSETMQTPCPMDOccx...x or %aaSETMQTPCPMAIccx...x or %aaSETMQTPCPMAOccx...x	Set the Publish channel message of data of user define aa: always 01 cc: channel(hex format) x…x: channel message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCPMDIcc or %aaGETMQTPCPMDOcc or %aaGETMQTPCPMAIcc	Get the Publish channel message of data of user define aa: always 01 cc: channel(hex format)	Return: !ChannelMessage Error: ?01

or %aaGETMQTPCPMAOcc		
%aaSETMQTPCPMSTDIccx...x or %aaSETMQTPCPMSTDOccx...x or %aaSETMQTPCPMSTAIccx...x or %aaSETMQTPCPMSTAOccx...x	Set the Publish channel alarm status message of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCPMSTDIcc or %aaGETMQTPCPMSTDOcc or %aaGETMQTPCPMSTAIcc or %aaGETMQTPCPMSTAOcc	Get the Publish channel alarm status message of user define aa: always 01 cc: channel (hex format)	Return: !AlarmStatusMessage Error: ?01

3.12.3 Publish AI Type Topic and Message

User can do customized setting AI Type Topic name and AI type message name.

AI Type Topic Default: Advantech/{mac}/cfg/sensor/ain

AI Type Topic User defined example: **Advantech/AIType_0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

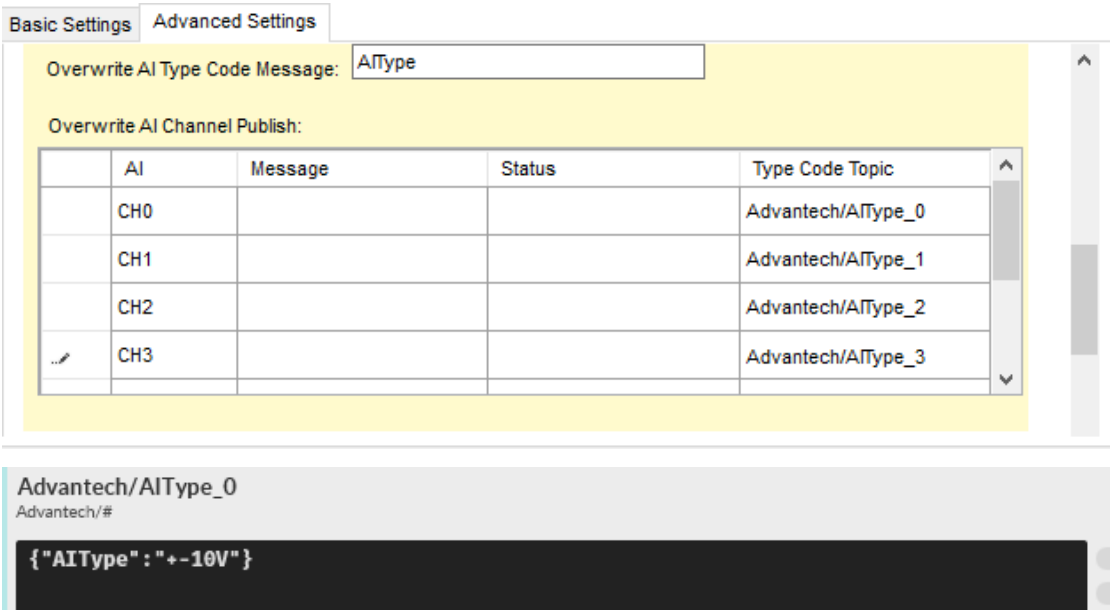


Figure 14. Publish AI Type Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPMTx...x	Set the Publish AI channel type message of user define aa: always 01 x…x: AI type message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCPMT	Get the Publish AI channel type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCPTTccx...x	Set the Publish AI channel type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message	Return: >01 Error: ?01

	(0~127 character)	
%aaGETMQTPCPTTcc	Get the Publish AI channel type topic of user define aa: always 01 cc: channel(hex format)	Return: !ChannelTypeTopic Error: ?01

3.12.4 Publish AO Type Topic and Message

User can do customized setting AO Type Topic name and AO type message name.

AO Type Topic Default: Advantech/{mac}/cfg/sensor/ain

AOType Topic User defined example: **Advantech/AOType_0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}

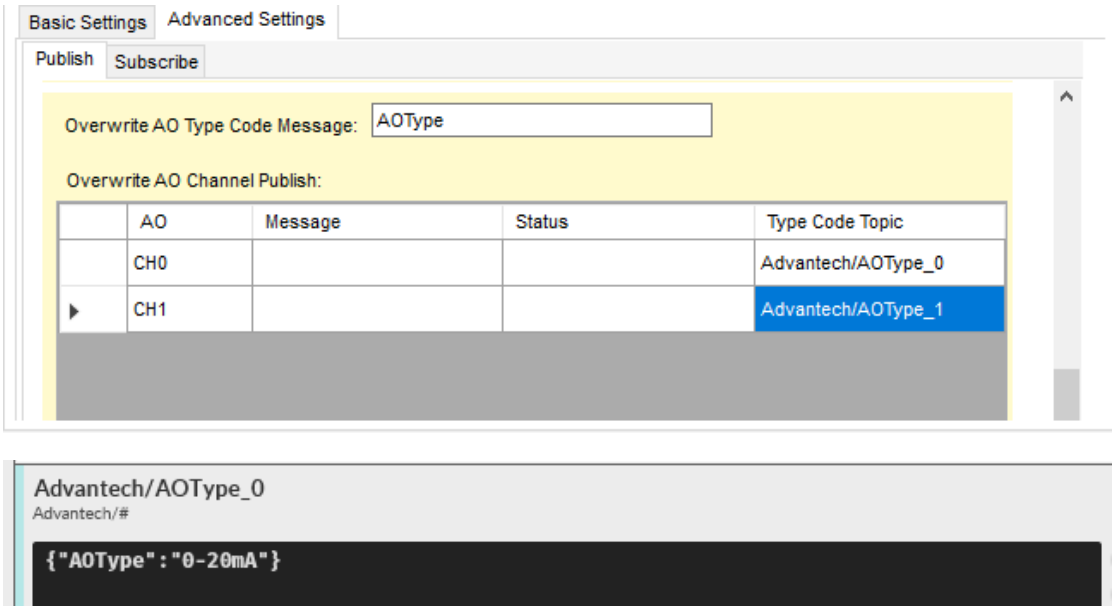


Figure 15. Publish AO Type Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPAOMTx...x	Set the Publish AO channel type message of	Return: >01 Error: ?01

	user define aa: always 01 x…x: AI type message (0~63 character)	
%aaGETMQTPCPAOMT	Get the Publish AO channel type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCPAOTTccx...x	Set the Publish AO channel type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCPAOTTcc	Get the Publish AO channel type topic of user define aa: always 01 cc: channel(hex format)	Return: !ChannelTypeTopic Error: ?01

3.12.5 Subscribe DO Control Topic and Message

User can do customized setting DO control Topic name and DO control message name.

DO control Topic Default: Advantech/{mac}/ctl/don

DO control Topic User defined example: **Topic_DO0**

➢ n (channel number) starts from 1

DO control message

Default example: {"v":true}

User defined example: {"data": true}

DIO module:

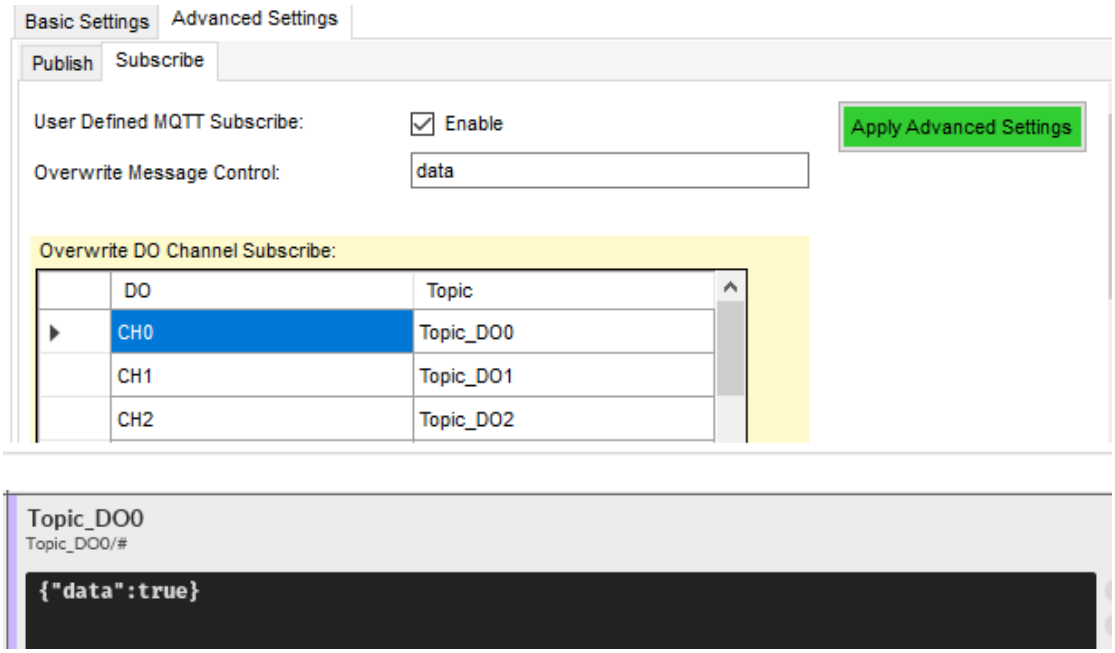


Figure 16. Publish DO Type Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMCTLx...x	Set the subscribe DO control message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMCTL	Get the subscribe DO control message of user define aa: always 01	Return: !DOControlMessage Error: ?01
%aaSETMQTPCSTCTLccx...x	Set the subscribe DO control topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTCTLcc	Get the subscribe DO control topic of user define	Return: !DOControlTopic Error: ?01

	aa: always 01 cc: channel(hex format)	

3.12.6 Subscribe AI Type Topic and Message

User can do customized setting AI Type Topic name and AI Type message name.

AI Type Topic Default: Advantech/{mac}/set/sensor/ain

AI Type Topic User defined example: **AIType_topic/AI0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

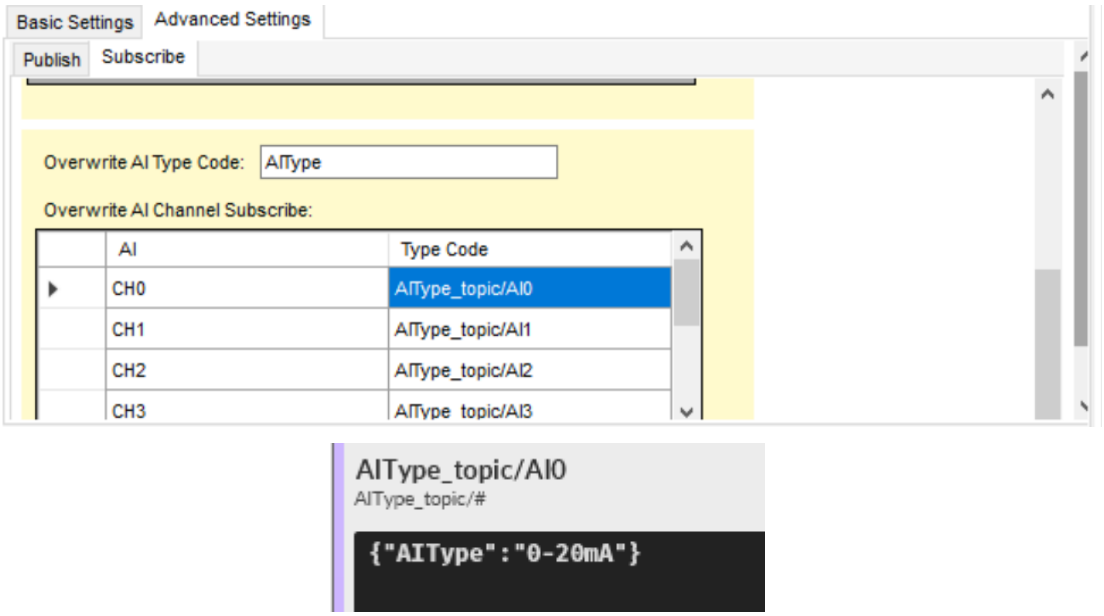


Figure 17. Subscribe AI Type Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMCFGx...x	Set the subscribe AI type message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01

%aaGETMQTPCSMCFG	Get the subscribe AI type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCSTCFGccx...x	Set the subscribe AI type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTCFGcc	Get the subscribe AI type topic of user define aa: always 01 cc: channel(hex format)	Return: !AITypeTopic Error: ?01

3.12.7 Subscribe AO Control Topic and Message

User can do customized setting AO control Topic name and AO control message name.

AO control Topic Default: Advantech/{mac}/ctl/aon

AO control Topic User defined example: **Topic_AOctl_0**

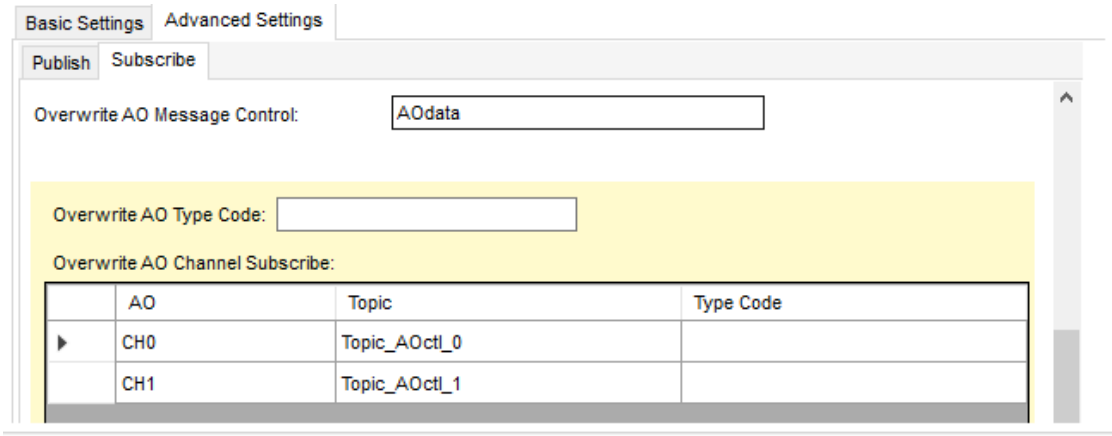
➢ n (channel number) starts from 1

AO control message

Default example: {"v":1.0}

User defined example: {"AOdata":1.0}

AO module:



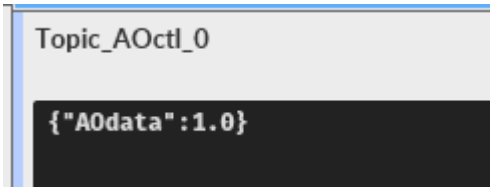


Figure 18. Subscribe AO Control Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMAOCTLx...x	Set the subscribe AO control message of user define aa: always 01 x…x: AO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMAOCTL	Get the subscribe AO control message of user define aa: always 01	Return: !AOControlMessage Error: ?01
%aaSETMQTPCSTAOCTLccx...x	Set the subscribe AO control topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTAOCTLcc	Get the subscribe AO control topic of user define aa: always 01 cc: channel(hex format)	Return: !AOControlTopic Error: ?01

3.12.8 Subscribe AO Type Topic and Message

User can do customize settings AO Type Topic name and AO Type message name.

AO Type Topic Default: Advantech/{mac}/set/sensor/aon

AO Type Topic User defined example: **AOType_topic/AO0**

➢ n (channel number) starts from 1

➢ Type message format refer to 3.11.13

AO Type message
Default example: {"typ":"0-20mA"}
User defined example: {"AOType":"0-20mA"}

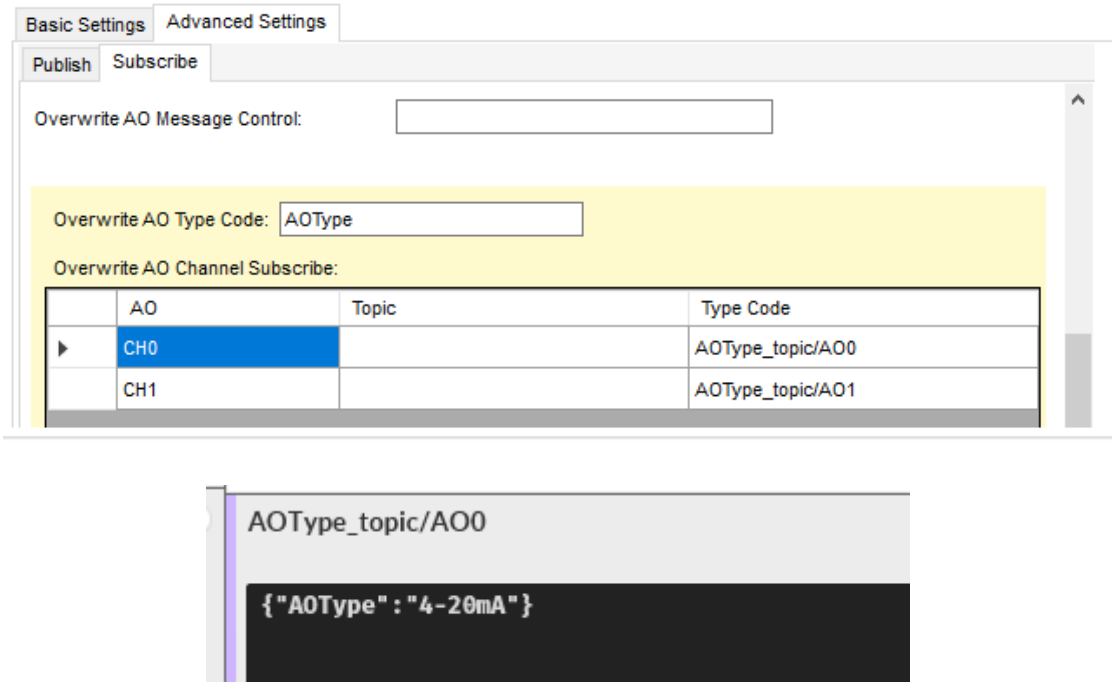


Figure 19. Subscribe AO Type Topic and Message

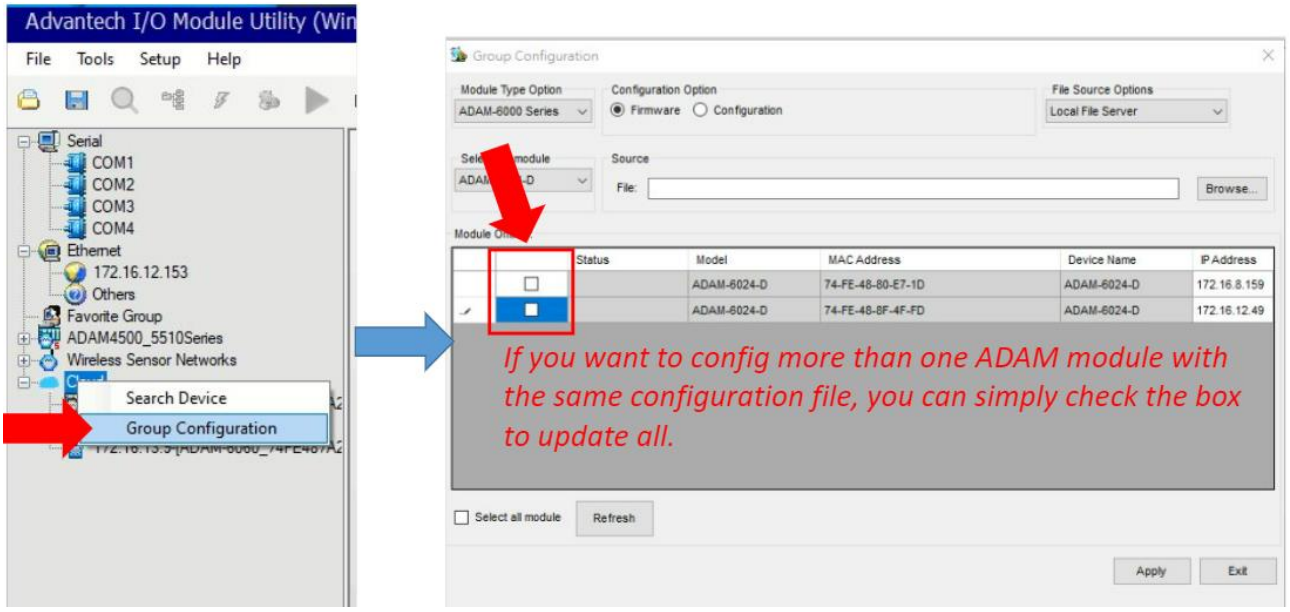
ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMAOCFGx...x	Set the subscribe AO type message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMAOCFG	Get the subscribe AO type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCSTAOCFGccx...x	Set the subscribe AO type topic of user define aa: always 01 cc: channel (hex format)	Return: >01 Error: ?01

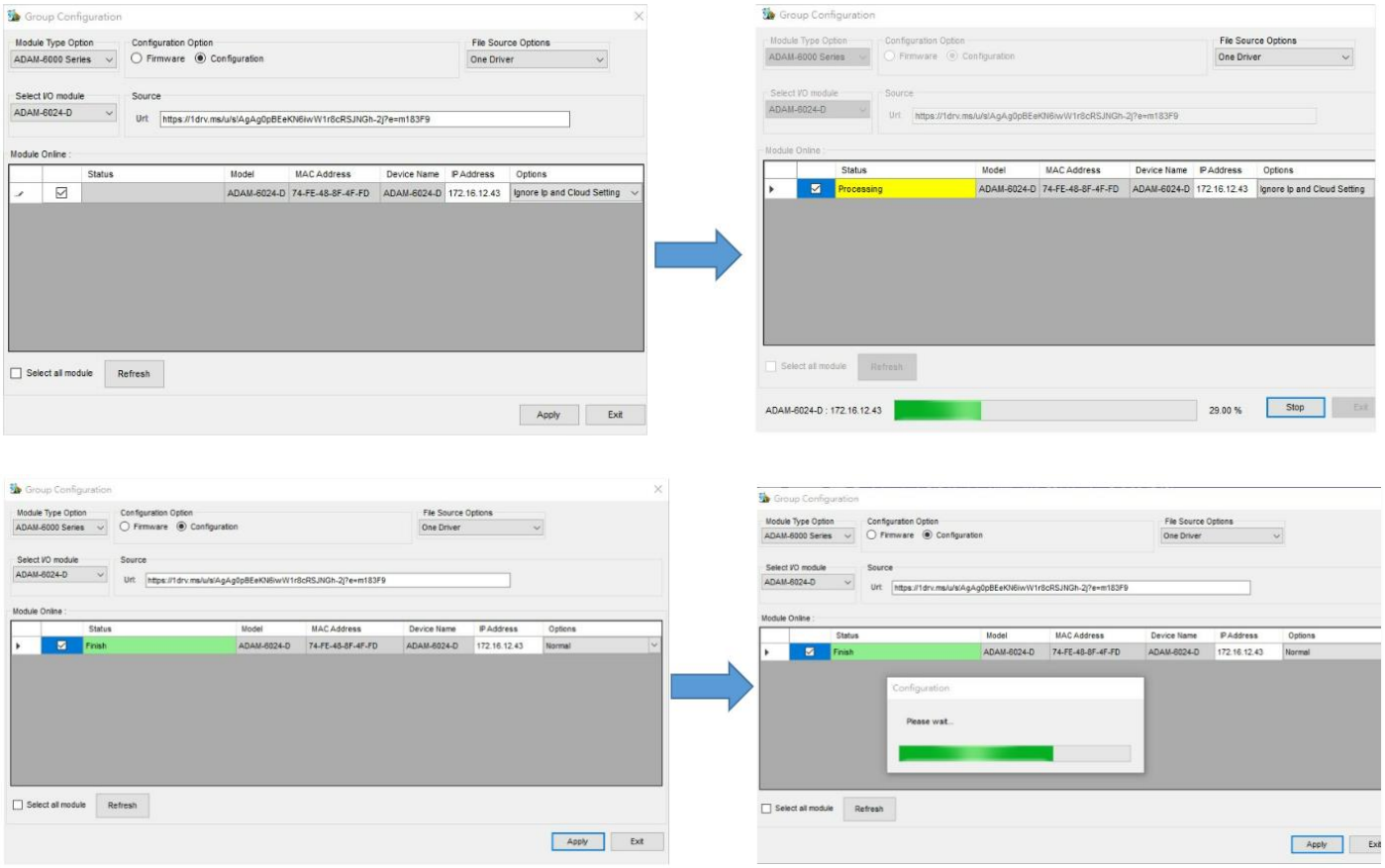
	x…x: channel message (0~127 character)	
%aaGETMQTPCSTAOCFGcc	Get the subscribe AO type topic of user define aa: always 01 cc: channel(hex format)	Return: !AITypeTopic Error: ?01

3.13 Group configuration

If users would like to implement Firmware or Configuration for multiple devices, there's also "Group Configuration" function in "Cloud". Firstly, please right click "Cloud" then select "Group Configuration".



Then select devices you want (or you can select all) to apply the firmware or configuration you want. The devices will be one-by-one in processing and finish implement in batch.



4. EdgeSync 360/ EdgeHub

4.1 What is EdgeSync 360/EdgeHub

EdgeSync 360/ EdgeHub is an Advantech IoT Core Service. Users can combine ADAM-6000/6200 series and Advantech EdgeSync 360/ EdgeHub to enable internet/intranet IO rapid development, management, and scaling of IoT projects. The product goal is to provide an out-of-the-box IoT cloud or on-premises solution that will enable server-side infrastructure for IoT applications. Customers can gain the benefits of scalability, agility, and cost-efficiency offered by the cloud, while maintaining control over sensitive data and meeting regulatory requirements.

Please refer to below links for more EdgeSync 360/ EdgeHub details.

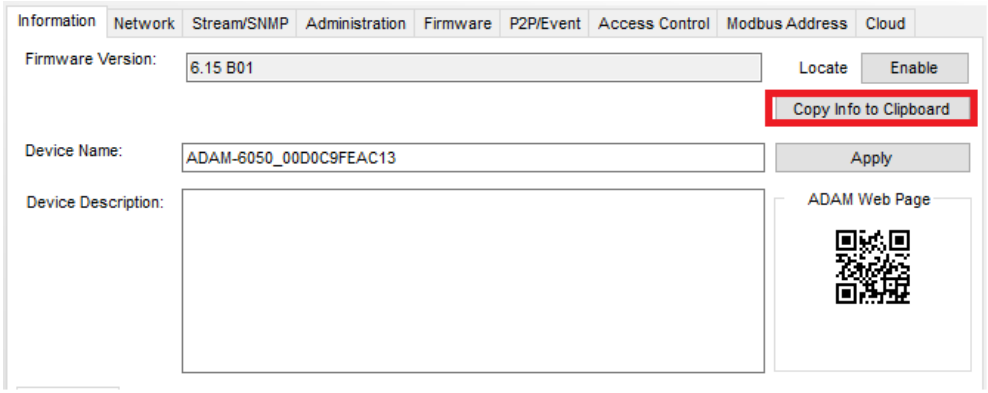
(https://docs.wise-paas.advantech.com/en/Guides_and_API_References/1676956646152508777/16770462063775138 84/1677051715349911768/v1.0.1)

(https://www.advantech.com/zh-tw/products/edgesync-360-edgehub/sub_a3e4d4db-6fb1-4809-b621-56f6968ca6bd)

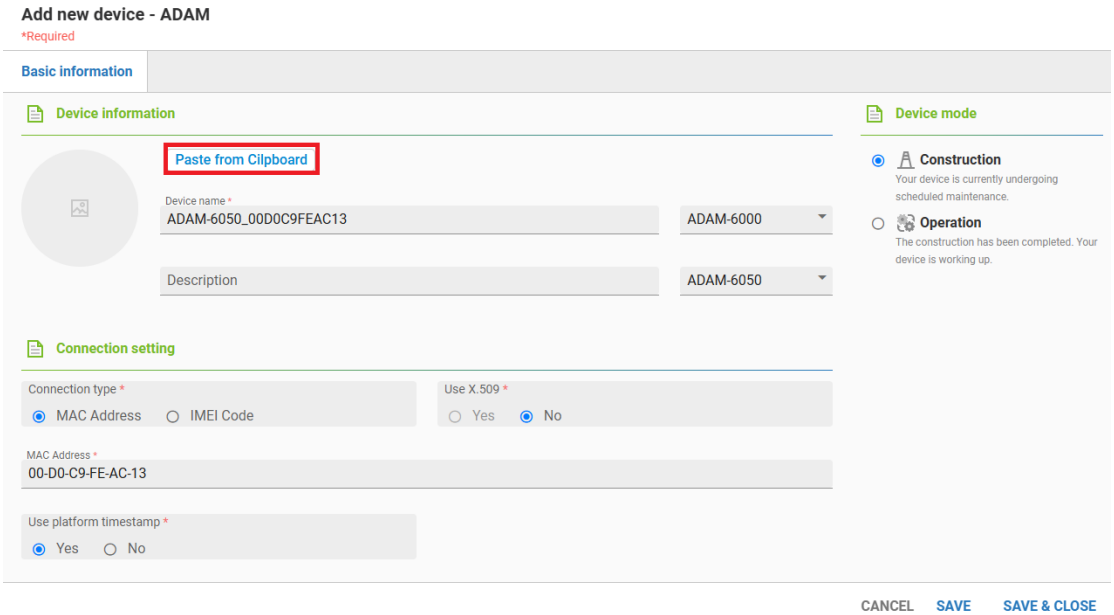
4.2 EdgeSync 360/ Edgehub creates ADAM module

- ADAM-6000/6200 modules can be created in EdgeSync 360/Edgehub.
- ADAM-6000/6200 series can help connecting to EdgeSync 360/ Edgehub via utility

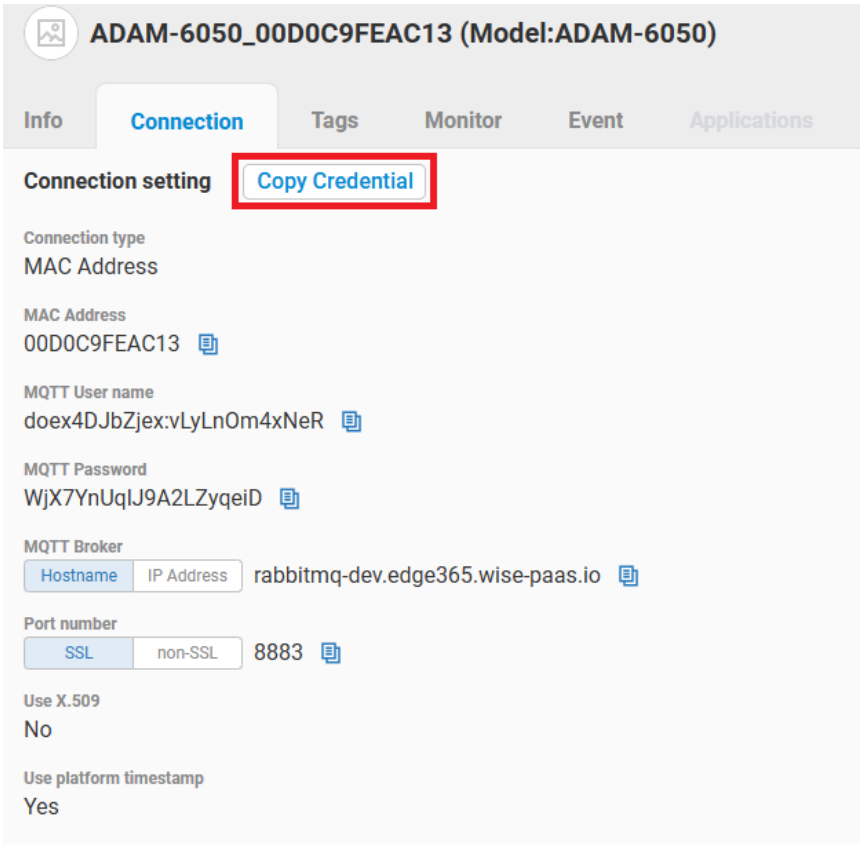
Step 1: Copy module information (Device Name, mac, etc.) in Utility



Step 2: Fill in "DPM Device information" and create the device

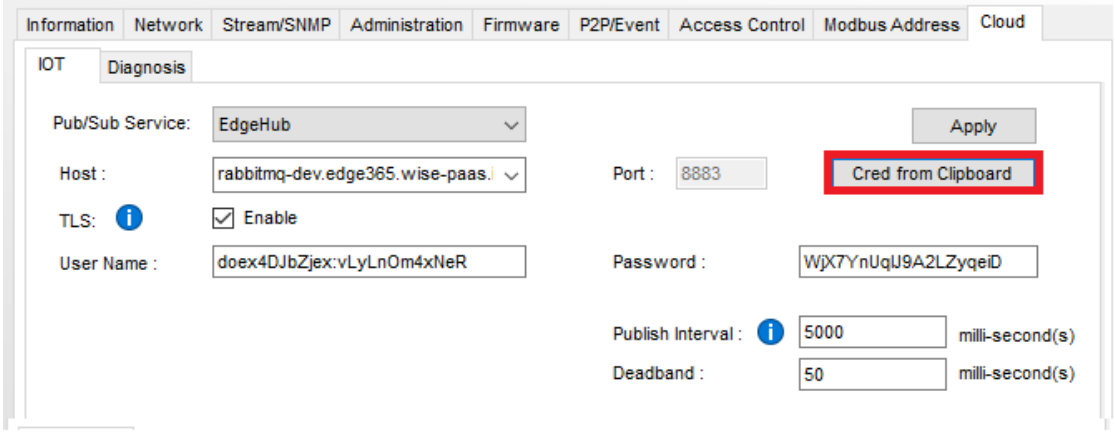


Step 3: Copy DPM connection information



Step 3: Fill in Utility and establish a connection

(Publish interval reference ch3.7、Deadband reference ch3.6)



5. Azure

➢ Support Advanced Settings from the following version:

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11 B00	V6.11 B00	V6.01 B24	V6.01 B19	V6.01B23

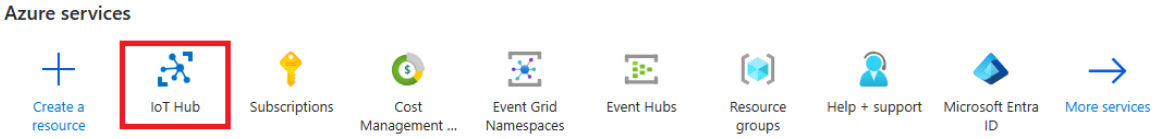
5.1 Azure Connected

➢ Tool:

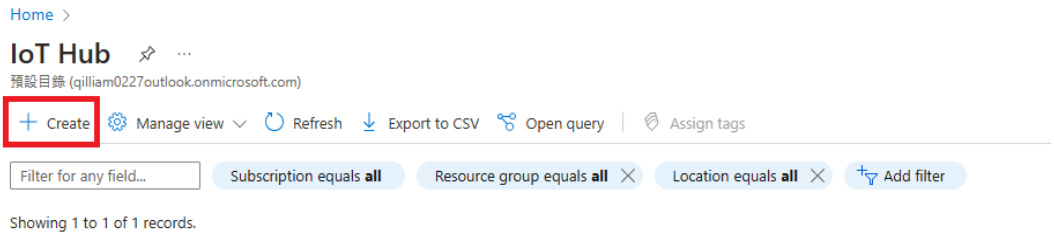
1. Utility
2. Azure cloud: https://azure.microsoft.com/zh-tw/
3. Device explore: Download URL: There are 12 files in total. After downloading, click on setupdeviceexplorer.msi to start the installation. After installation, you can use device explorer. https://github.com/Azure/azure-iot-sdk-csharp/releases/tag/2019-1-4

5.1.1 Setup Azure cloud

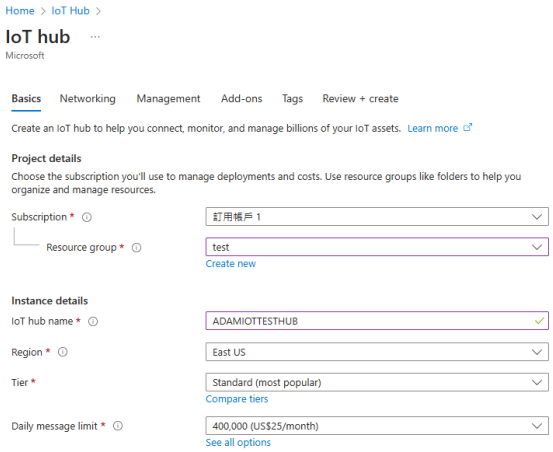
1. Enter: https://azure.microsoft.com/zh-tw/
2. Log in
3. Entrance website
4. Click IoT Hub



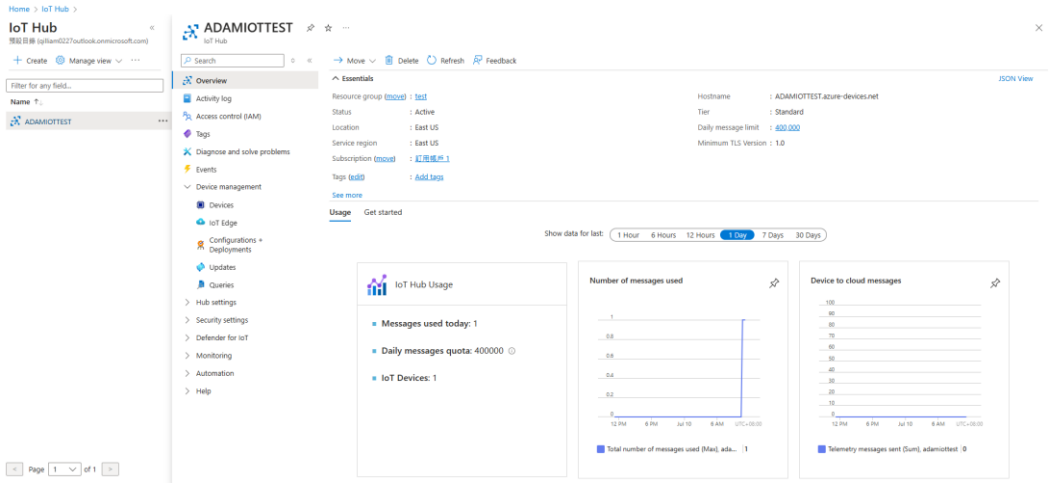
5. Setup new IoT hub -> Create



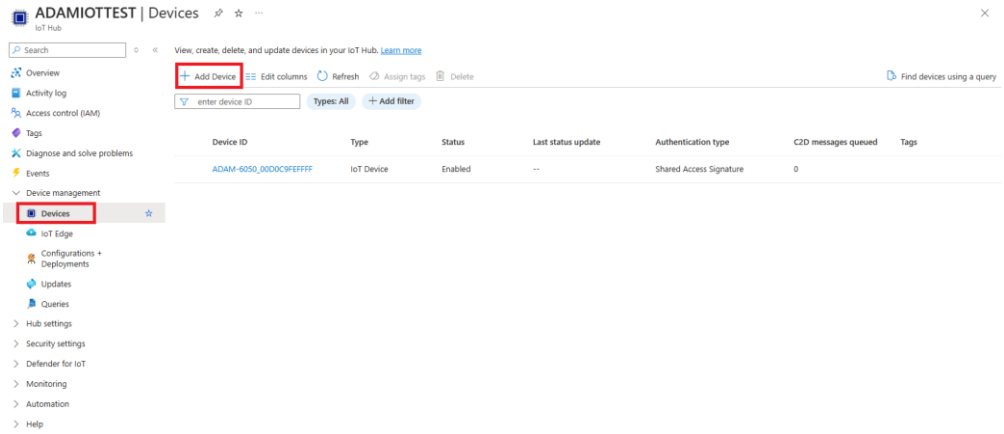
6. Complete the form and create it. It will take a while (about 10 minutes) before you can start using the newly created IoT hub.



7. Click on the created IoT hub to enter the IoT hub interface.



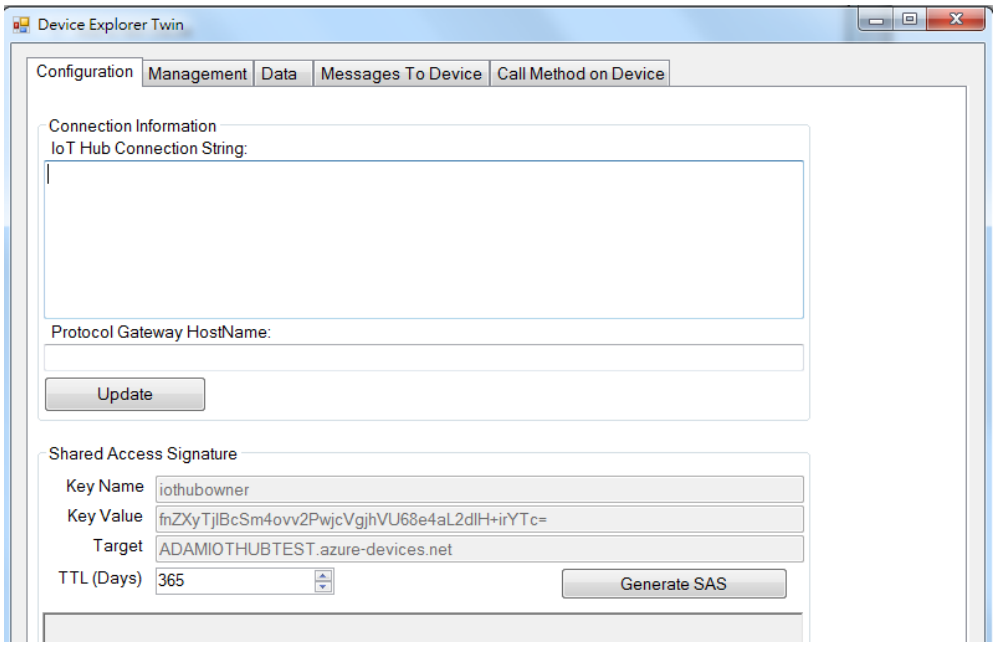
8. Click Devices → Add Device



9. Set the device identification code and click Save to complete the addition. This identification code is the DeviceID used when setting the publish topic and using User defined.。

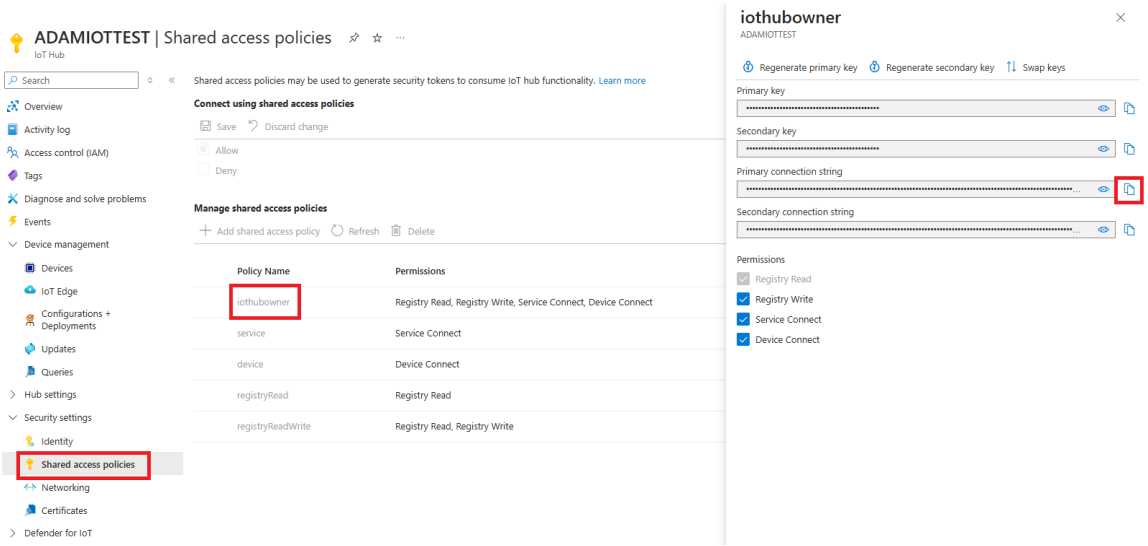
5.1.2 Setup device explore and connect Azure

1. Open device explore (After downloading, there is no shortcut on the desktop or start, you can use windows search to find it.)

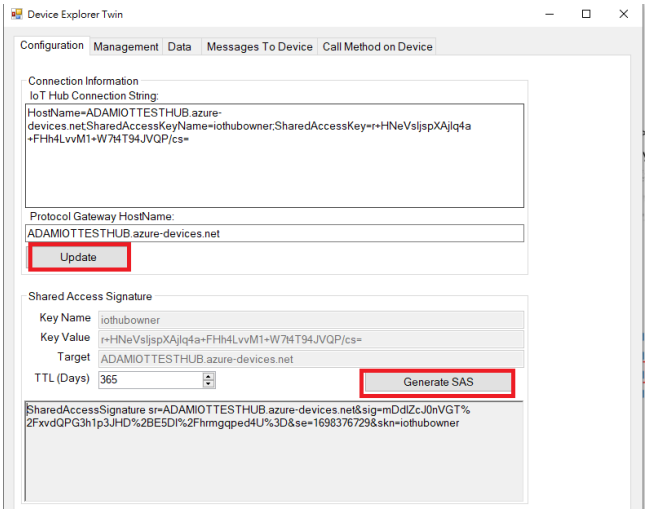


2. Input IoT hub connection string

(Get location: Azure cloud → Shared access policies →iot hub policy name → primary connection string

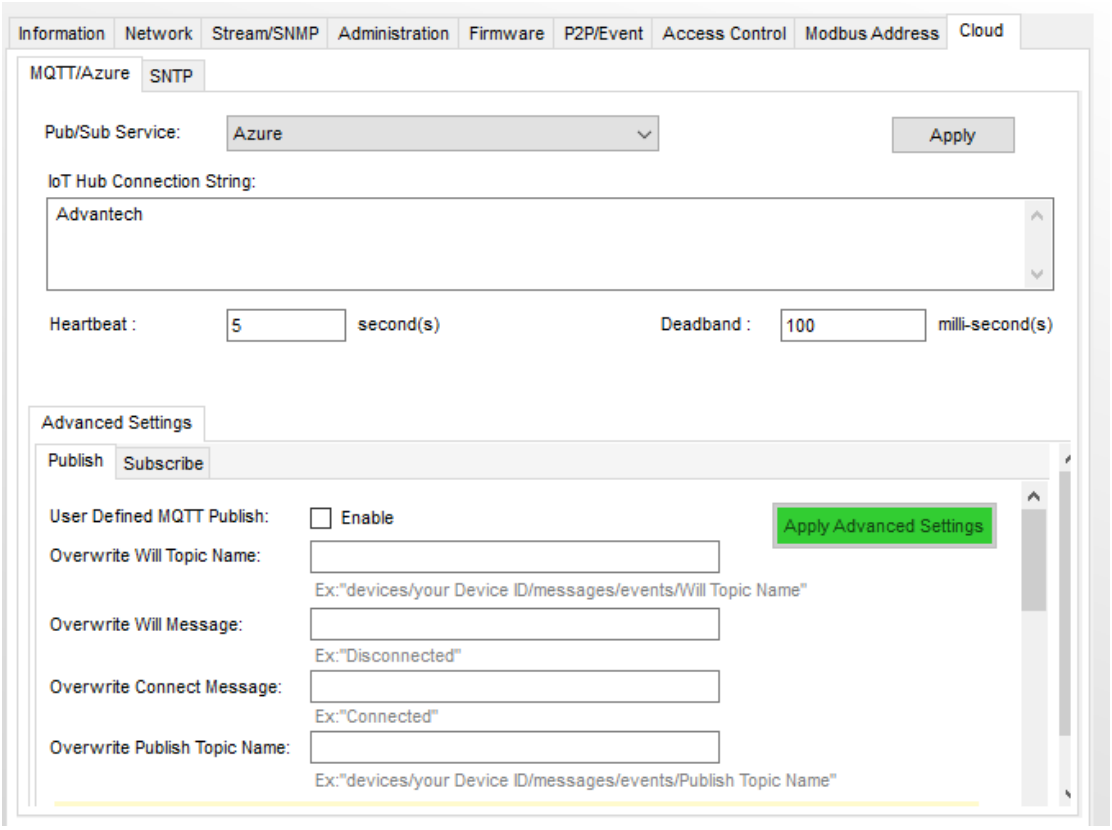


3. Click device explorer ”update” then pick “generate SAS”, then finished azure connection



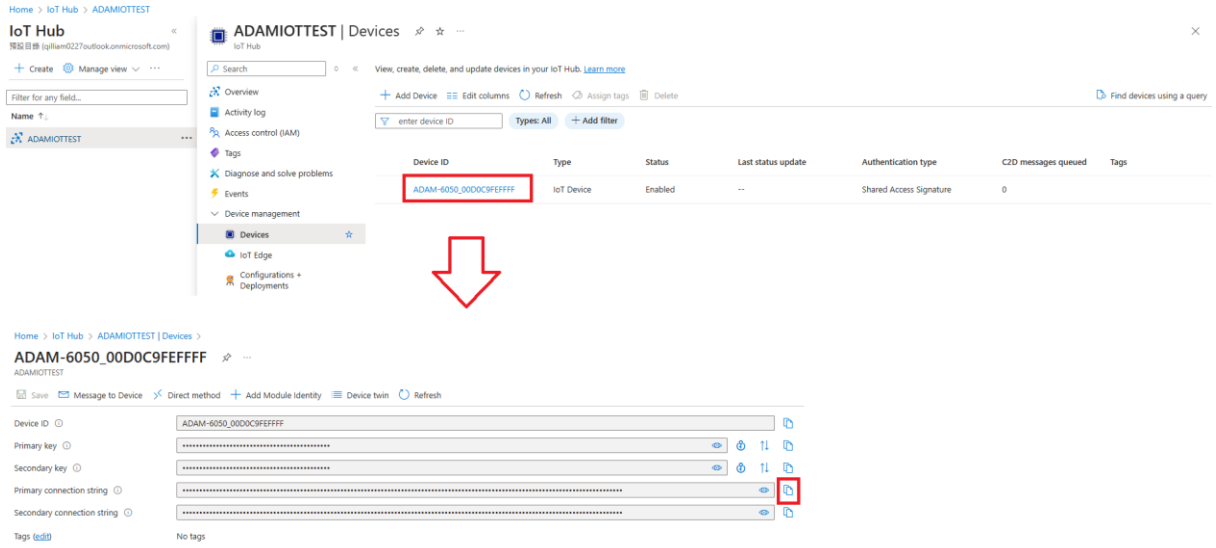
5.1.3 Setup ADAM module and connect Azure (Utility)

1. Module connect PC and open utility
2. Utility Ethernet> refresh subnodes> search device> enter ADAM module page> Cloud> Azure



3. Input IoT hub connection string

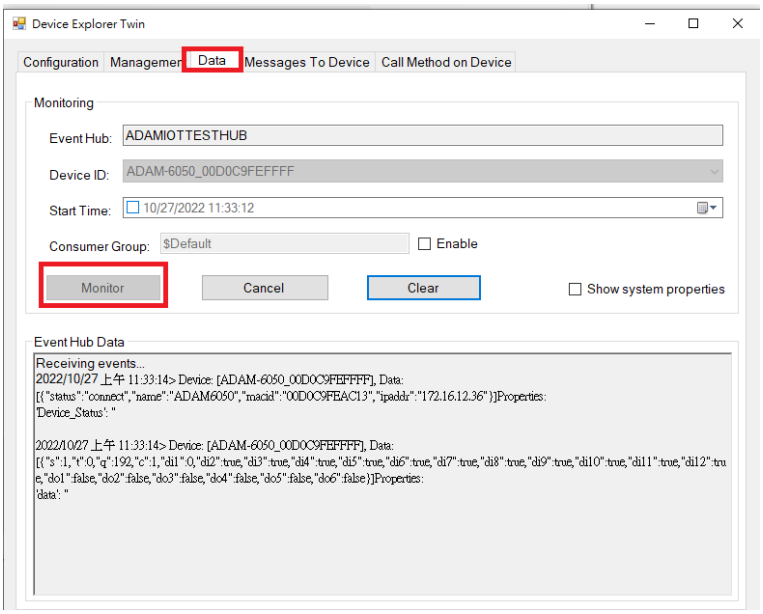
(Get location: Azure cloud name → Devices → Device ID → Primary connection string)



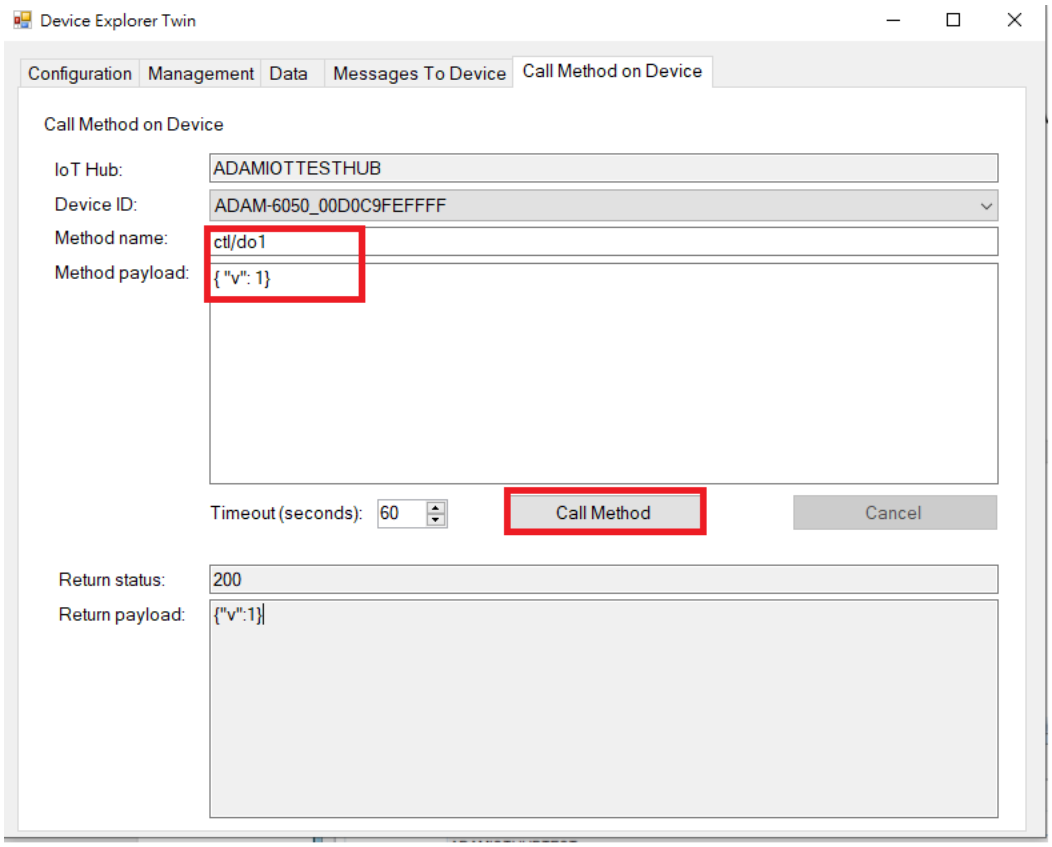
4. Click Apply，Utility will automatically parse 1.Host ID and Port 2. Password 3. DeviceID from the main connection string and set it to the module.

5.1.4 Device Explore Operation

1. Read topic and message



2. Setup Control topic (Return status fixed as 200)



5.2 IoT Connection String

Set the main connection string for the Azure device. After pressing Apply, Utility will automatically parse 1.Host ID and Port 2. Password 3. DeviceID from the main connection string and set it to the module.

- Before ADAM DIO **v6.11B23** and ADAM-6017/6217 **v6.11B18**, the azure DeviceID cannot be customized, so when Azure creates the device identification code, it must be the same as the ADAM module ID (module_mac, ex:ADAM6017_00D0C9123456)。
- Utility will automatically set DeviceID (%aaSETAHIDx…x) to ADAM-6017/6217 after version B16.

ASCII command:

Command	Description	Remarks
%aaSETAHCSx…x	Set azure connection string aa: always 01 x…x: IP address/domain (0~255 character)	Return: >01 Error: ?01
%aaGETAHCS	Get azure connection string aa: always 01	Return: !ConnectionString Error: ?01
%aaSETAHADx…x:aaaa	Set azure domain name aa: always 01 x…x: domain name (1~126 character) aaaa: port address(0~65535)	Return: >01 Error: ?01
%aaGETAHAD	Get IP address of the broker aa: always 01	Return: !Domain:port Error: ?01
%aaSETAHPWx…x	Set azure password aa: always 01 x…x: password (0~254 character)	Return: >01 Error: ?01
%aaGETAHPW	Get azure password aa: always 01	Return: !Password Error: ?01
%aaSETAHIDx…x	Set azure DeviceID aa: always 01 x…x: Azure DeviceID (0~254 character)	Return: >01 Error: ?01

%aaGETAHID	Get azure DeviceID aa: always 01	Return: !AzureDeviceID Error: ?01

5.3 TLS

In Azure mode, TLS fixed as enable。

Current ADAM modules support **TLS v1.2** and below Cipher Suites:
TLS_RSA_WITH_AES_256_CBC_SHA256 (0x003d)
TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
TLS_RSA_WITH_AES_128_CBC_SHA256 (0x003c)
TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
TLS_RSA_WITH_3DES_EDE_CBC_SHA (0x000a)
TLS_EMPTY_RENEGOTIATION_INFO_SCSV (0x00ff)

5.4 Heartbeat & Deadband & Interval

In Azure mode, Heartbeat、Deadband、Interval all use ADAM MQTT same command, function and usage are same as ADAM MQTT.

5.5 Retain Message

Retain Message cannot be set in Azure mode and is fixed to disable. Retain Message will not be displayed in Utility B16 version.

5.6 Basic Settings

Basic Settings can’t be setup in Azure mode, Pub/Sub Qos sixed as 0, Channel Publish topic fixed as enable. Utility B16 version not show Basic Settings。

5.7 Pub/Sub Topic

Azure mode supports topic: 1. Will Topic; 2.Channel Type Topic; 3. Control Topic; 4. All Data Topic. (Azure mode currently don't support Profile Topic, Channel Config Topic and Channel Value Topic)

5.7.1 Will Topic

When the Module actively connects/disconnects with the broker, the module will publish a will topic with connect/disconnect message. Or when an accident occurs between the module and the broker and there is an abnormal disconnection, the broker will publish a will topic with disconnect message.

Will Topic name: devices/{DeviceID}/messages/events/Device_Status

Will message payload example:

```
2022/10/27 上午 10:16:31> Device: [ADAM6017_00D0C9E4FC6C], Data:
[{"status":"disconnect","name":"ADAM6017","macid":"00D0C9E4FC6C","ipaddr":"172.16.12.188"}]Properties:
'mqtt-retain': 'true'
'iothub-MessageType': 'Will'
'Device_Status': ''
```

5.7.2 Channel Type Topic

For Azure's config topic, the payload only has a message of AIO range type. In addition to being published when the connection is started, it will also be published when the range type changes.

- Only support AIO Channel Type Topic in AIO module, no Channel Type Topic from DIO module.
- Type message format refer to 3.11.13

Config Topic name: AIO: devices/{mac}/messages/events/cfgain(cfgaon)
n (channel number) starts from 1

Config message payload example:

```
2022/10/27 上午 10:16:36> Device: [ADAM6017_00D0C9E4FC6C], Data:[{"typ":"0-20mA"}]Properties:
'cfgai1': ''
```

5.7.3 Control Topic

As Azure Control topic, Functions that can be set: 1. DO High/Low; 2. AI range type.

- Type message format refer to 3.11.13

➢ Using DO Control Topic will clear WDT flags and reset Watch-dog time to zero.r

Control Topic name:

DO: iothub/methods/POST/**ctl/don**

AIO: iothub/methods/POST/**set/sensor/ain(aon)**

AIO: iothub/methods/POST/**ctl/aon**

n (channel number) starts from 1

Control message payload example:

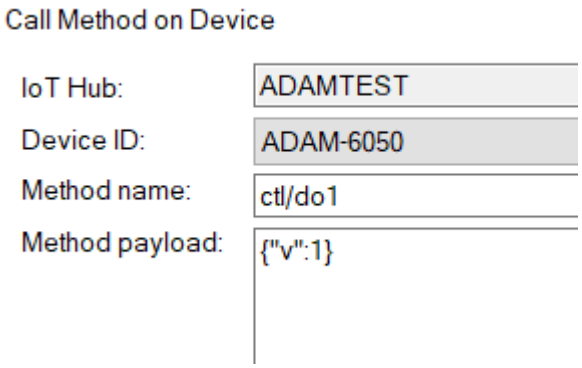
DO : {"v":1}

AIO: {"typ":"0-20mA"} or

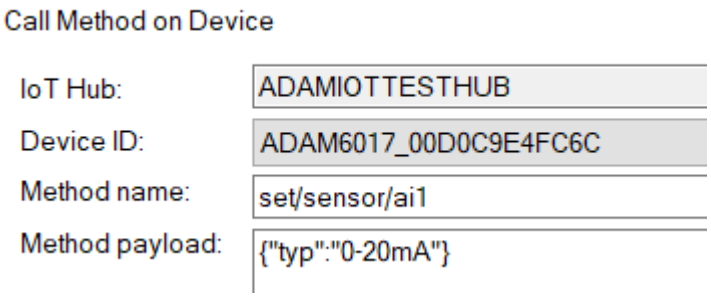
{"typ":"J Type:0-760C"}

AO: {"v":1.0}

DI :



AI type:



5.7.4 All Data Topic

Publish all data message topic。What Intervalonly send topic。

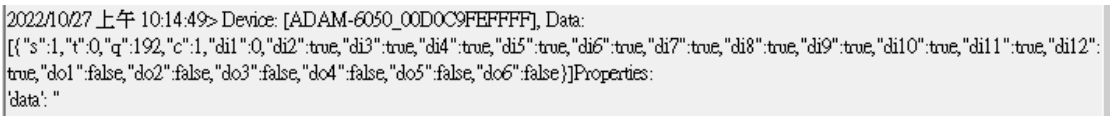
➢ IO number to start from 1 (ex: di1, ai_st1)

➢ Topic name: devices/{DeviceID}/messages/events/data

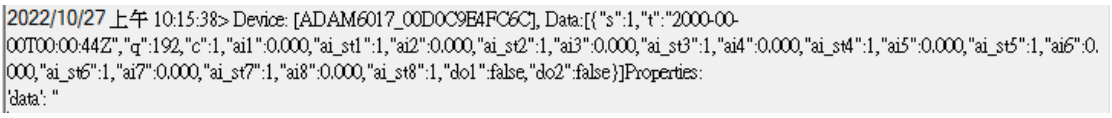
➢ Message payload refer to 3.10.5

Message payload example:

ADAM-6050:



ADAM-6017:



5.7.5 Pub/Sub Topic Rules

The Pub/Sub interval of the original boot connection is controlled by Deadband, but when the Deadband is too large, it will take too much time to cause the boot. Therefore, the Pub/Sub interval of the new version of the connection is changed to be fixed at 50ms. Product supports rules starting from below versions:

ADAM DIO	ADAM-6017/6217	ADAM-6018+	ADAM-6024	ADAM-6224
V6.11B37	V6.11B23	V6.01B24	V6.01B19	V6.01B23

➢ Azuer mode Sub/Pub topic mechanism is as follows:

Boot connection sequence:

1. Set Will Topic (Disconnect)
2. Subscribe
   iothub/methods/POST/#
3. Publish
   Will Topic(Connect)
   Channel Type Topic
   All Data Topic

➢ Below topic send interval are limited by Deadband

Interval:

All Data Topic

When AI Channel type changes:
Channel Type Topic

DIO/AO data changes:
All Data Topic

When disconnected with broker:
Will Topic(Disconnect)

5.8 Advanced Settings

User can do customize setting topic name and payload message.

- Advanced Settings have independent Apply button.
- ADAM MQTT commonly use all Advanced Settings ASCII command.
- Azure has a format for defining topics, so User defined topics must conform to the format. (https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-mqtt-support)
- When connected to broker, please use command SET and then proactively publish will topic (status: disconnect) then do re-connection.

ASCII command:

Command	Description	Remarks
%aaSETMQTPCENxx	Enable/Disable MQTT user define publish aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01
%aaGETMQTPCEN	Get MQTT user define publish flags aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01
%aaSETMQTPCSENxx	Enable/Disable MQTT user define subscribe aa: always 01 xx: 01 (enable), 00 (disable)	Return: >01 Error: ?01

%aaGETMQTPCSEN	Get MQTT user define subscribe flags aa: always 01	Return: !01 (enable), !00 (disable) Error: ?01

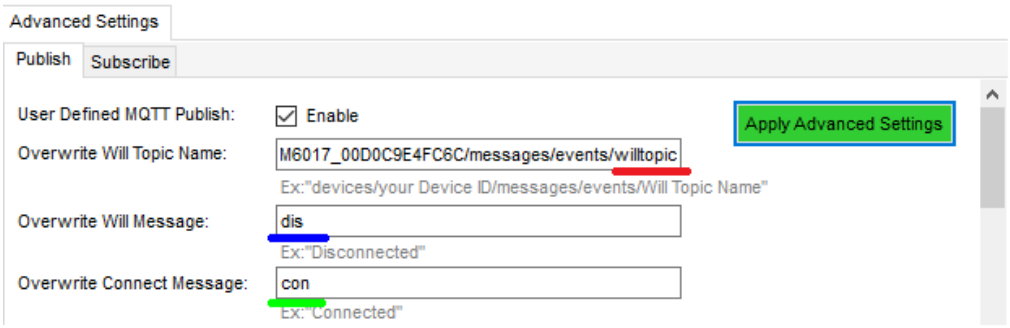
5.8.1 Publish Will Topic and Message

User can do customized setting will topic name and will/connect message.

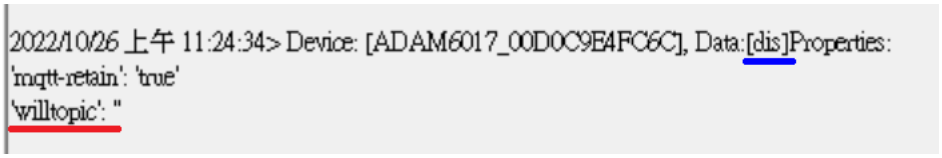
Will Topic Default: devices/{DeviceID}/messages/events/Device_Status

Will Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

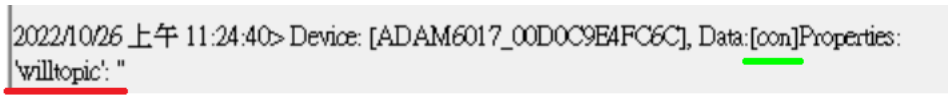
- Device ID is gotten from device connect string
- property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.



When module is disconnected:



When module is connected:



ASCII command:

Command	Description	Remarks
%aaSETMQTPCWTx...x	Set the will topic of user define aa: always 01 x…x: will topic name (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCWT	Get the will topic of user	Return: !WillTopicName

	define aa: always 01	Error: ?01
%aaSETMQTPCWMx...x	Set the Will message of user define aa: always 01 x…x: Will message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCWM	Get the Will message of user define aa: always 01	Return: !WillMessage Error: ?01
%aaSETMQTPCCMx...x	Set the Connect message of user define aa: always 01 xx…x: Connect message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCCM	Set the Connect message of user define aa: always 01	Return: !ConnectMessage Error: ?01

5.8.2 Publish All Data Topic and Message

User can do customized setting All Data topic name and Channel/AlarmStatus message name.

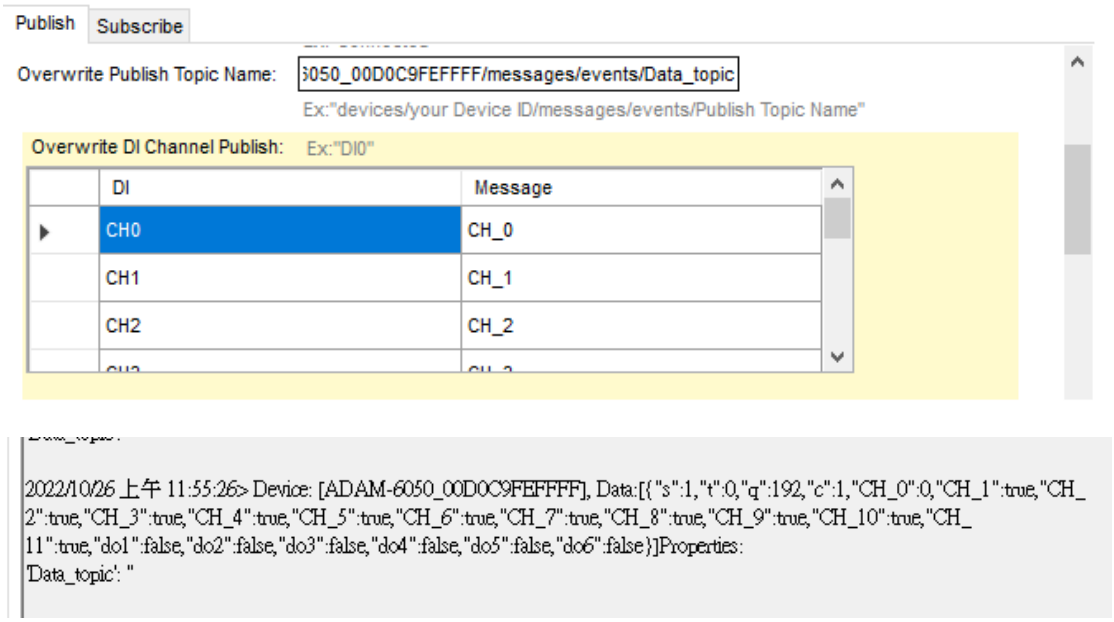
All Data Topic Default: devices/{DeviceID}/messages/events/**data**

All Data Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is gotten from device connect string
- property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.

Channel/AlarmStatus message

Default: don or ai_stn, n (channel number) starts from 1



AI module:

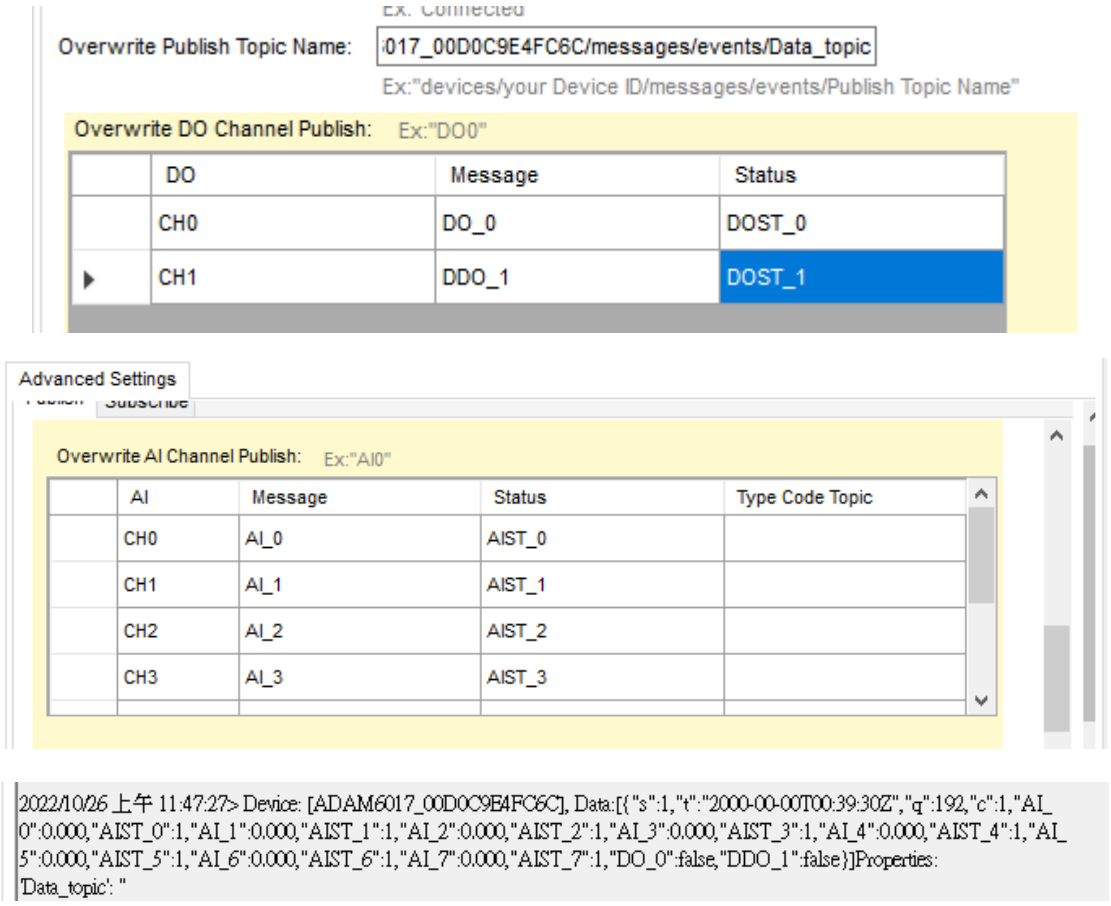


Figure 20. Publish All Data Topic and Message Setting

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPTDx...x	Set the Publish data topic of user define aa: always 01 x…x: data topic name (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCPTD	Get the Publish data topic of user define aa: always 01	Return: !DataTopicName Error: ?01
%aaSETMQTPCPMDIccx...x or %aaSETMQTPCPMDOccx...x or %aaSETMQTPCPMAIccx...x or %aaSETMQTPCPMAOccx...x	Set the Publish channel message of data of user define aa: always 01 cc: channel(hex format) x…x: channel message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCPMDIcc or %aaGETMQTPCPMDOcc or %aaGETMQTPCPMAIcc or %aaGETMQTPCPMAOcc	Get the Publish channel message of data of user define aa: always 01 cc: channel(hex format)	Return: !ChannelMessage Error: ?01
%aaSETMQTPCPMSTDIccx...x or %aaSETMQTPCPMSTDOccx...x or	Set the Publish channel alarm status message of user define aa: always 01	Return: >01 Error: ?01

%aaSETMQTPCPMSTAIccx...x or %aaSETMQTPCPMSTAOccx...x	cc: channel (hex format) x…x: channel message (0~63 character)	
%aaGETMQTPCPMSTDIcc or %aaGETMQTPCPMSTDOcc or %aaGETMQTPCPMSTAIcc or %aaGETMQTPCPMSTAOcc	Get the Publish channel alarm status message of user define aa: always 01 cc: channel (hex format)	Return: !AlarmStatusMessage Error: ?01

5.8.3 Publish AI Type Topic and Message

User can do customize setting AI Type Topic name 和 AI Type message name。

AI Type Topic Default: devices/{DeviceID}/messages/events/**cfgain**

AI Type Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format，When setting with Utility, special characters will be automatically converted to url-encoded.。
- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

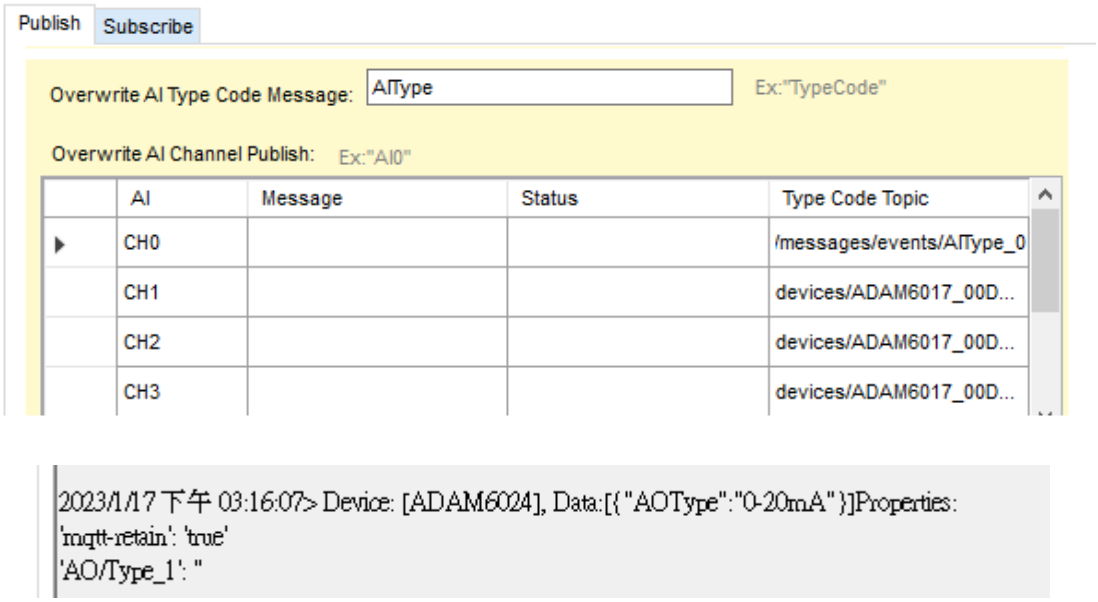


Figure 21. Publish AI Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPMTx...x	Set the Publish AI channel type message of user define aa: always 01 x…x: AI type message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCPMT	Get the Publish AI channel type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCPTTccx...x	Set the Publish AI channel type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCPTTcc	Get the Publish AI channel type topic of user define aa: always 01	Return: !ChannelTypeTopic Error: ?01

	cc: channel(hex format)	

5.8.4 Publish AO Type Topic and Message

User can do customized setting AO Type Topic name and AO type message name.

AO Type Topic Default: devices/{DeviceID}/messages/events/**cfgaon**

AO Type Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.
- n (channel number) starts from 1
- Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}

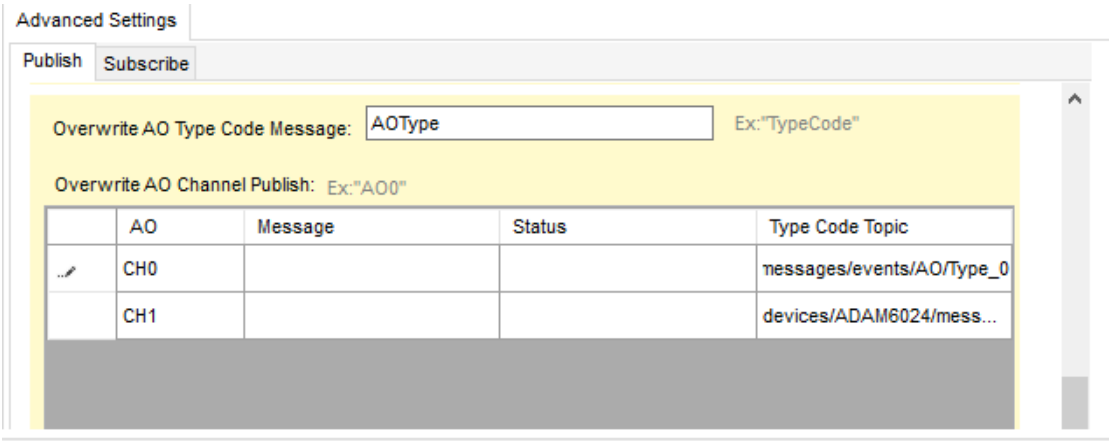


Figure 22. Publish AO Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCPAOMTx...x	Set the Publish AO channel type message of user define aa: always 01 x…x: AI type message (0~63 character)	Return: >01 Error: ?01

%aaGETMQTPCPAOMT	Get the Publish AO channel type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCPAOTTccx...x	Set the Publish AO channel type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCPAOTTcc	Get the Publish AO channel type topic of user define aa: always 01 cc: channel(hex format)	Return: !ChannelTypeTopic Error: ?01

5.8.5 Subscribe DO Control Topic and Message

User can do customized setting DO control Topic name and DO control message name.

DO control Topic Default: $iothub/methods/POST/**ctl/don**

DO control Topic User defined: $iothub/methods/POST/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.
- n (channel number) starts from 1

DO control message

Default example: {"v":1}

User defined example: {"data":1}

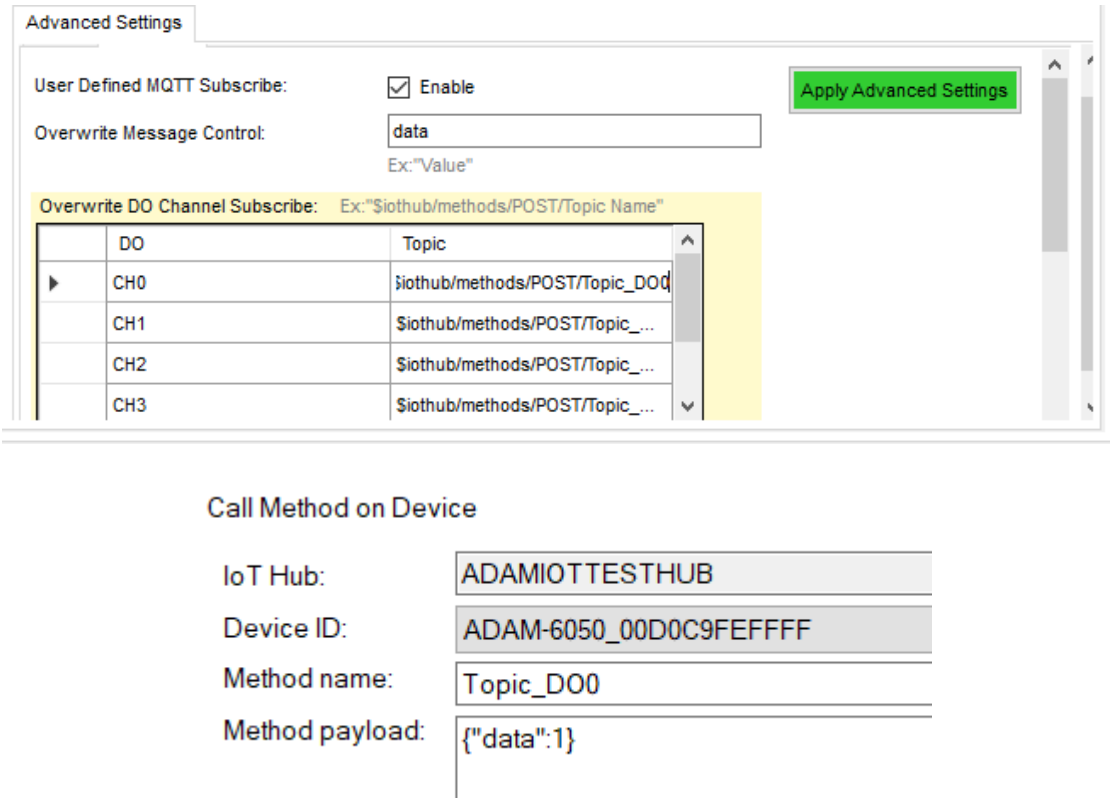


Figure 23. Publish DO Control Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMCTLx...x	Set the subscribe DO control message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMCTL	Get the subscribe DO control message of user define aa: always 01	Return: !DOControlMessage Error: ?01
%aaSETMQTPCSTCTLccx...x	Set the subscribe DO control topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01

%aaGETMQTPCSTCTLcc	Get the subscribe DO control topic of user define aa: always 01 cc: channel(hex format)	Return: ! DOControlTopic Error: ?01

5.8.6 Subscribe AI Type Topic and Message

User can do customized setting AI Type Topic name and AI Type message name.

AI Type Topic Default: $iothub/methods/POST/**set/sensor/ain**

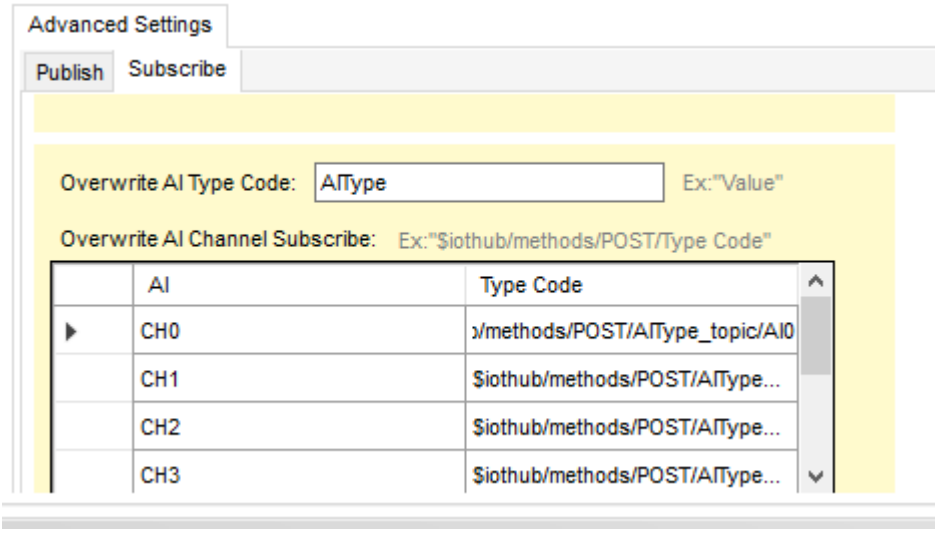
AI Type Topic User defined: $iothub/methods/POST/**{property bag}**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {" AIType ":"J Type:0-760C"}



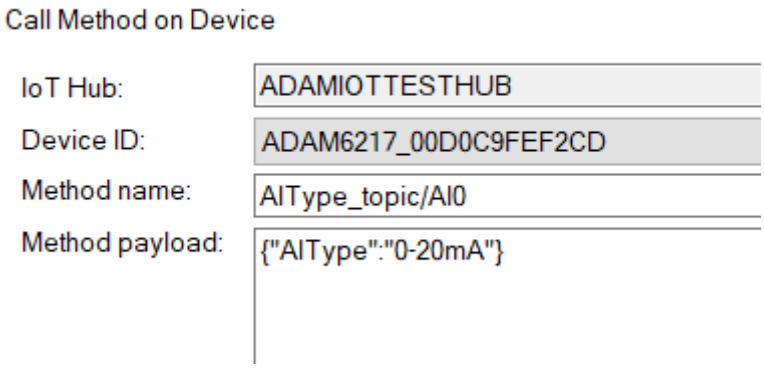


Figure 24. Subscribe AI Type Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMCFGx...x	Set the subscribe AI type message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMCFG	Get the subscribe AI type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCSTCFGccx...x	Set the subscribe AI type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTCFGcc	Get the subscribe AI type topic of user define aa: always 01 cc: channel(hex format)	Return: !AITypeTopic Error: ?01

5.8.7 Subscribe AO Control Topic and Message

User can do customized setting AO control Topic name and AO control message name.

AO control Topic Default: $iothub/methods/POST/**ctl/aon**

DO control Topic User defined: $iothub/methods/POST/**{property bag}**

➢ Device ID is get from device connect string

➢ property bag need to use url-encoded format，When setting with Utility, special characters will be

automatically converted to url-encoded。

➢ n (channel number) starts from 1

AO control message
Default example: {"v":1.0}
User defined example: {"data":1.0}

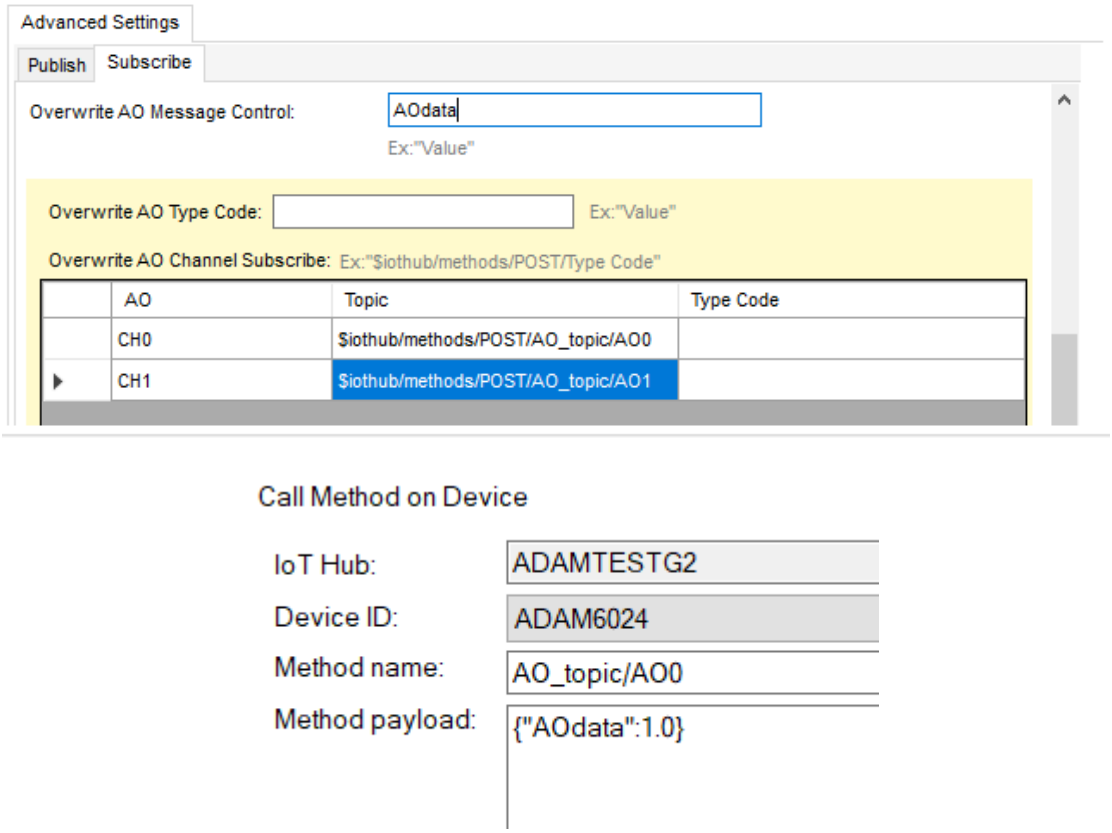


Figure 25. Subscribe AO Control Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMAOCTLx...x	Set the subscribe AO control message of user define aa: always 01 x…x: AO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMAOCTL	Get the subscribe AO control message of user define	Return: !AOControlMessage Error: ?01

	aa: always 01	
%aaSETMQTPCSTAOCTLccx...x	Set the subscribe AO control topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTAOCTLcc	Get the subscribe DO control topic of user define aa: always 01 cc: channel(hex format)	Return: !AOControlTopic Error: ?01

5.8.8 Subscribe AO Type Topic and Message

User can do customized setting AO Type Topic name and AO Type message name.

AO Type Topic Default: $iothub/methods/POST/**set/sensor/aon**

AO Type Topic User defined: $iothub/methods/POST/**{property bag}**

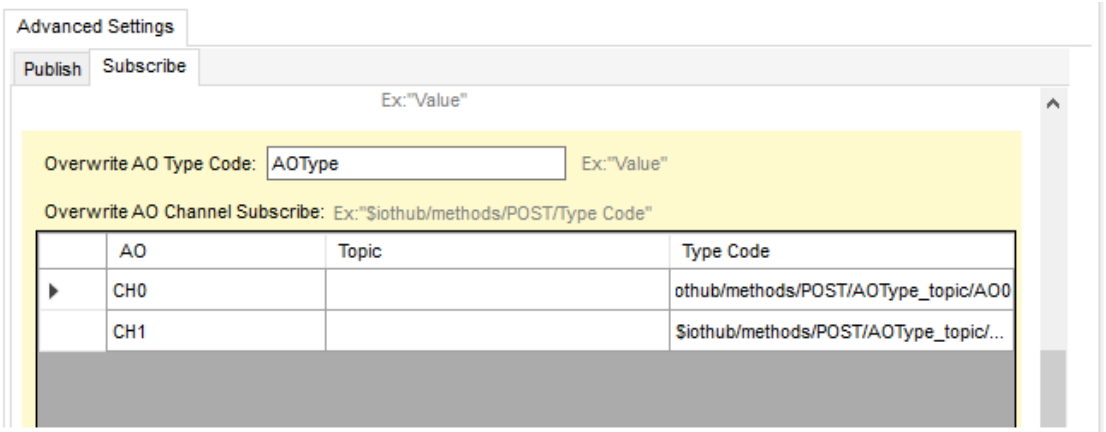
n (channel number) starts from 1

➢ Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}



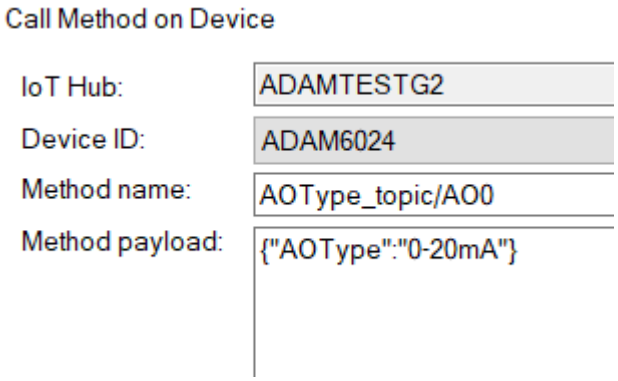


Figure 26. Subscribe AO Type Data Topic and Message

ASCII command:

Command	Description	Remarks
%aaSETMQTPCSMAOCFGx...x	Set the subscribe AO type message of user define aa: always 01 x…x: DO message (0~63 character)	Return: >01 Error: ?01
%aaGETMQTPCSMAOCFG	Get the subscribe AO type message of user define aa: always 01	Return: !AITypeMessage Error: ?01
%aaSETMQTPCSTAOCFGccx...x	Set the subscribe AO type topic of user define aa: always 01 cc: channel (hex format) x…x: channel message (0~127 character)	Return: >01 Error: ?01
%aaGETMQTPCSTAOCFGcc	Get the subscribe AO type topic of user define aa: always 01 cc: channel(hex format)	Return: !AITypeTopic Error: ?01