AzureWave Technologies, Inc.

AzureWave IoT Connectivity Module (AICM)

AT Command Set

Rev. 0.3

Revision History

Revision	*Date*	*Description*	*Initials*	*Approved*
0.1	2020/05/01	Initial release	Jackson Boon	S. C. Chueh
0.2	2020/09/04	Correct and add the contents	Craig Tsai	S. C. Chueh
0.3	2021/03/11	Add “Terms of Use”	Josh Lin	Patrick Lin

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Effective Date: May 10, 2021

1. Introduction

This document gives details of the AT Command Set supported by AWS Connector.

1.1 Definitions

- <CR> Carriage return character
- <LF> Line feed character
- <..> Parameter name. Angle brackets do not appear on command line
- [..] Option parameter. Square brackets do not appear on the command line.

1.2 AT Command Syntax

Execute command	AT+<cmd>	Execute command

For parameters that may include commas (e.g., JSON documents related to MQTT messages and/or Shadows), put the parameter in single quotes. For example AT+MQTT_Publish=topic,'{"key1":"value1", "key2":"value2"}', 0. Otherwise, the parser may inadvertently parse the parameters incorrectly.

1.3 AT Command Responses

All commands sent to the Connector shall have a response. These commands will have the following structure:
Start of Message <message> End of Payload <OK | Error Code> End of Message.

- **Start of Message**
  The Start of Message sequence will be Carriage Return Line Feed (CRLF) – "\r\n".

- **Message**
  This is the information sent by the Connector and may be empty or blank, depending on the command issued.

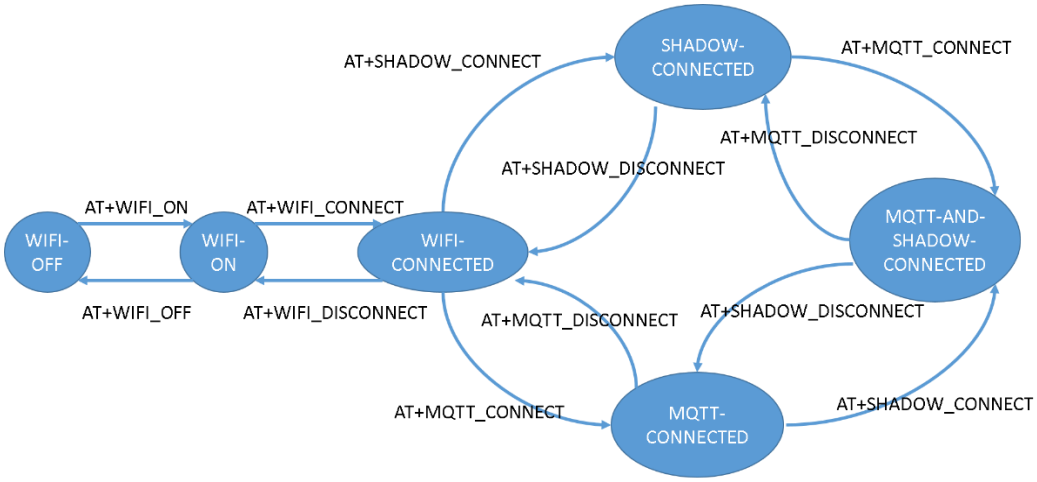
- **End of Payload**
  The End of Payload sequence will be a Carriage Return Line Reed (CRLF) – "\r\n".

- **Status**
  This will either be "OK" or an Error Code.

- **End of Message**
  The End of Message sequence will be a Carriage Return Line Feed (CRLF) – "\r\n".

1.4 CONNECTOR State Transition Diagram

The following diagram is a Connector Transition Diagram and please follow the state step to change the command state. For example, if you are on WIFI-CONNECTED state, you can't execute AT+WIFI_OFF command directly. Please execute AT+WIFI_DISCONNECT command to change the state to WIFI-ON and execute AT+WIFI_OFF to WIFI-OFF state.



Connector State Transition Diagram

2. Thing-specific Commands

2.1 Define and store Thing-specific configuration (+THING_Set)

Command	Response	Example
AT+THING_Set=<client ID>,<endpoint>,<client certificate>,<client private key>	OK	

Description
This command define and store Thing-specific configuration.

Defined values

<client ID>	Thing name (Client ID)
<endpoint>	AWS IoT endpoint URL
<client certificate>	Certificate for this Thing
<client private key>	Private key for this Thing

Implementation
- No example provided.

2.2 Get Thing-specific configuration (+THING_Get)

Command	Response	Example
AT+THING_Get	<thing name> <endpoint>	AT+THING_Get AZ-TE a2xxxxxxxxxx-ats.iot.us-east-2.amazonaws.com OK

Description
This command returns the Thing-specific configuration.

Defined values

<thing name>	Thing name (Client ID)
<endpoint>	AWS IoT endpoint URL

3. WiFi-specific Commands

3.1 Turns on Wi-Fi module. Initializes the drivers (+WIFI_On)

Command	Response	Example
AT+WIFI_On	OK	AT+WIFI_On OK

Description
This command turns on Wi-Fi module.

3.2 Turns off Wi-Fi (+WIFI_Off)

Command	Response	Example
AT+WIFI_Off	OK	AT+WIFI_Off OK

Description
This command turns off Wi-Fi module.

3.3 Set and store the WiFi AP information when Connector in Station Mode (+WIFI_SetAP)

Command	Response	Example
AT+WIFI_SetAP=<ssid>,<password>,<security type>	OK	AT+WIFI_SetAP=airport,password,WPA2 OK

Description
This command set and store the Wi-Fi AP (Access Point) information when the Connector is in Station Mode.
If you want to connect to AP with OPEN security, password can be ignored.
AT+WIFI_SetAP=airport,,WPA2
Defined values
<ssid> SSID of AP

<password> Password for AP (Ignore if security type is OPEN)

<security type> OPEN | WEP | WPA | WPA2

3.4 Connect to the AP (+WIFI_Connect)

Command	Response	Example

AT+WIFI_Connect	OK	AT+WIFI_Connect OK

Description
This command connect to the AP with stored credential.

3.5 Disconnects from the currently connected AP (+WIFI_Disconnect)

Command	Response	Example
AT+WIFI_Disconnect	OK	AT+WIFI_Disconnect OK

Description
This command disconnect from currently connected AP.

3.6 Performs a Wi-Fi network scan (+WIFI_Scan)

Command	Response	Example
AT+WIFI_Scan	OK	AT+WIFI_Scan "BP"38, "airport"38 OK

Description
This command scan all nearby APs sorted by RSSI in descending order showing SSID and RSSI (if no APs are found, thre response shall be NONE)

Defined values

<ssid> SSID of scaned AP.

<rssi> RSSI of scaned AP.

3.7 Retrieves the Wi-Fi interface's IP address (+WIFI_GetIP)

Command	Response	Example
AT+WIFI_GetIP	<IP>	AT+WIFI_GetIP 192.168.1.57 OK

Description
This command retrieves Wi-Fi interface's IP address.

Defined values
<IP> Wi-Fi interface's IP address

3.8 Retrieves the Wi-Fi interface's MAC address (+WIFI_GetMAC)

Command	Response	Example
AT+WIFI_GetMAC	<MAC>	AT+WIFI_GetMAC 0:50:43:2:fe:1 OK

Description
This command retrieves Wi-Fi interface's MAC address.

Defined values
<MAC> Wi-Fi interface's MAC address

3.9 Retrieves the Wi-Fi gateway's IP address (+WIFI_GetGW)

Command	Response	Example
AT+WIFI_GetGW	<GW>	AT+WIFI_GetGW 192.168.1.1 OK

Description
This command retrieves Wi-Fi gateway's IP address.

Defined values
<GW> Wi-Fi gateway's MAC address

3.10 Ping an IP address (+WIFI_Ping)

Command	Response	Example
AT+WIFI_Ping=<IP>	<n1> packets transmitted, <n2> received OK	AT+WIFI_Ping=192.168.1.1 4 packets transmitted, 4 received OK

Description
This command ping specific IP address.

Defined values
<IP> IP address to ping.

<n1> Number of packets sent.

<n2> Number of packets received.

3.11 Reset Wi-Fi module (+WIFI_Reset)

Command	Response	Example
AT+WIFI_Reset		AT+WIFI_Reset

Description
This command reset Wi-Fi module.

Implementation
- No response with this command.

3.12 Sets the IP Mode to either static or DHCP (+WIFI_SetIPMode)

Command	Response	Example
AT+WIFI_SetIPMode=<mode>,<IP>, <NET MASK>, <GATEWAY>,<DNS>	OK	AT+WIFI_SetIPMode=DHCP OK Or AT+WIFI_SetIPMode=STATIC,192.168.43.10, 255.255.255.0,192.168.43.1,8.8.8.8 OK

Description
This command sets the IP mode to either static or DHCP. If using STATIC, please fill in these parameter. If

Defined values
<mode> STATIC | DHCP

<IP> IP address (ignored if mode is DHCP)
<NETMASK> IP network mask (ignored if mode is DHCP)
<GATEWAY> IP network mask (ignored if mode is DHCP)
<DNS> IP network mask (ignored if mode is DHCP)

3.13 Retrieves the host IP address from a hostname using DNS (+WIFI_GetHostIP)

Command	Response	Example
AT+WIFI_GetHostIP=<host>	<IP> OK	AT+WIFI_GetHostIP=www.google.com 172.217.160.68

		OK

Description
This command retrieves host IP address from hostname.

Defined values
<host> Name of host.

<IP> Hostname's IP address.

3.14 Sets the Connector Mode to Station or AP (AP is used during provisioning) (+WIFI_SetMode)

Command	Response	Example
AT+WIFI_SetMode=<mode>,<password>	OK	AT+WIFI_SetMode=STATION OK

Description
This command set Connector Mode. If AP mode is executed, the ssid name will be AICX-Mac. (For example Azw-c0e4343f25E4)

Defined values
<mode> AP | STATION

<password> password to be used when the Connector in AP mode (The SSID does not need to be set, since it's unique to the device and already defined), this parameter is ignored in Station mode.

3.15 Retrieves the Wi-Fi AP Mode(+WIFI_GetMode)

Command	Response	Example
AT+WIFI_GetMode	<mode> OK	AT+WIFI_GetMode Station OK

Description
This command get Connector Mode.

Defined values
<mode> AP | Station

4. MQTT-specific Commands

4.1 Connect the client to MQTT broker (+MQTT_Connect)

Command	Response	Example
AT+MQTT_Connect	OK	AT+MQTT_Connect OK

Description
This command connect the client to the MQTT broker. Please execute AT+THING_Set command to inject Thing-Name and Endpoint address first or the default value will be performed.

4.2 Disconnect the client from the broker (+MQTT_Disconnect)

Command	Response	Example
AT+MQTT_Disconnect	OK	AT+MQTT_Disconnect OK

Description
This command disconnect the client from the broker.

4.3 Subscribe to and save MQTT topic (+MQTT_Subscribe)

Command	Response	Example
AT+MQTT_Subscribe=<topic>,<qos>	OK	AT+MQTT_Subscribe=car,0 OK

Description
This command subscribe to and save MQTT topic.

Defined values
<topic> Topic to subscribe to.

<qos> 0 | 1

4.4 Unsubscribe from MQTT topic (+MQTT_Unsubscribe)

Command	Response	Example
AT+MQTT_Unsubscribe=<topic>	OK	AT+MQTT_Unsubscribe=car

		OK

Description
This command unsubscribe from MQTT topic.

Defined values
<topic> topic to unsubscribe from.

4.5 Publish to MQTT topic (+MQTT_Publish)

Command	Response	Example
AT+MQTT_Publish=<topic>, <message>,<qos>	OK	AT+MQTT_Publish=car,{"vibratio":{"values":"123"}},0 OK

Description
This command publish message to the topic.

Defined values
<topic> Topic to publish to.

<message> Message to publish.

<qos> 0 | 1

5. Shadow-specific Commands

5.1 Connect to shadow (+SHADOW_Connect)

Command	Response	Example
AT+SHADOW_Connect	OK	AT+SHADOW_Connect OK

Description
This command Connect to shadow service.

5.2 Disconnect to shadow (+SHADOW_Disconnect)

Command	Response	Example
AT+SHADOW_Disconnect	OK	AT+SHADOW_Disconnect OK

Description
This command disconnect to shadow service.

5.3 Get the shadow document (+SHADOW_Get)

Command	Response	Example
AT+SHADOW_Get	<document> OK	AT+SHADOW_Get {"state":{"desired":{"powerOn":6},"delta":{"powerOn":6}}, "metadata":{"desired":{"powerOn":{"timestamp":1588917125}}}, "version":3,"timestamp":1588917732} OK

Description
This command get shadow document.

Defined values
<document> Shadow document.

5.4 Delete the shadow document (+SHADOW_Delete)

Command	Response	Example

AT+SHADOW_Delete	OK	AT+SHADOW_Delete OK

Description
This command delete the shadow document.

5.5 Update the shadow document (+SHADOW_Update)

Command	Response	Example
AT+SHADOW_Update=<document>	OK	AT+SHADOW_update={"state":{"desired":{"powerOn":5}}} OK

Description
This command update the shadow document.

Defined values
<document> Shadow document.

6. 6. Module-specific Commands

6.1 Gets current Wi-Fi and MQTT state (+MOD_State)

Command	Response	Example
AT+MOD_State	<state> OK	AT+MOD_State WiFi OFF OK

Description
This command gets current Wi-Fi and MQTT state.

Defined values
<state> WiFi OFF | WiFi On | WiFi Connected | Shadow Connected | MQTT Connected | MQTT and Shadow Connected

6.2 Gets HW and FW information (+MOD_About)

Command	Response	Example
AT+MOD_About	hardware: <HW> firmware: <FW> OK	AT+MOD_About hardware: Marvell mw300_rd firmware: 0.1 OK

Description
This command gets HW and FW information.

Defined values
<HW> Hardware information.

<FW> Firmware information.

6.3 Turn echoing of AT commands on or off (+MOD_Echo)

Command	Response	Example
AT+MOD_Echo=<mode>	OK	AT+MOD_Echo=off OK

Description
This command turn echoing of AT commands on or off. (Default values is ON)

Defined values
<mode> ON | OFF

6.4 Reset module to factory defaults (+MOD_Reset)

Command	Response	Example
AT+MOD_Reset	OK	AT+MOD_Reset OK

Description
This command reset module to factory default and all values will be clear to default.

6.5 Set UART baud rate (+MOD_Baud)

Command	Response	Example
AT+MOD_Baud=<baud>	OK	AT+MOD_Baud=115200 OK

Description
This command set UART baud rate. (Connector will be reboot after command execute successfully)
The supported baud rate values are as below:
115200, 57600, 38400, 19200, 9600, 4800

Defined values
<baud> Baud rate to set.

6.6 Get a pending asynchronous event from the queue (+MOD_GetEvent)

Command	Response	Example
AT+MOD_GetEvent	OK	AT+MOD_GetEvent {"event": "NETWORK Connected", "message": "[EVENT]Wifi AP link is connected"} OK

Description
This command get a pending asynchronous event from the queue. (If event queue is empty, it will return “QUEUE EMPTY”)

6.7 Get the size of the next asynchronous event from the queue (+MOD_PeekEvent)

Command	Response	Example
AT+MOD_PeekEvent	<Event Message length | QUEUE EMPTY >	AT+MOD_PeekEvent 77 OK

Description
This command get the size of the next asynchronous event from the queue.

Defined values
<Event Message length | QUEUE EMPTY> Event Message Length or QUEUE EMPTY.

6.8 Set the timeout for the Connector to wait for a device to connect for provisioning (+MOD_Timeout)

Command	Response	Example
AT+MOD_Timeout=<timeout>	OK	AT+MOD_Timeout=30 OK

Description
This command set the timeout period for the Connector to wait for a device to connect for provisioning. (When Connector is on Provisioning mode, it will become AP mode)

Defined values
<timeout> timeout period in seconds.

6.9 Start Firmware Upgrade of the Connector (+MOD_OTA)

Command	Response	Example
AT+MOD_OTA	OK	AT+MOD_OTA OK

Description
This command Start Firmware Upgrade of the Connector. If OTA complete, it will restart the Connector and you can use AT+MOD_GetEvent to check the OTA result. If there is any error occurs in OTA procedure, you can get error result after Connector restart. Otherwise, if there are no error, you can get success result and use AT+MOD_About to obtain new FW version.

7. Error Values

7.1 General Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
1	Parameter error				

7.2 Thing Specific Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
100	Allocate memory failed	101	Credential write error	102	Client certificate or private key failed
103	Key Provision failed	104	Thing name and endpoint are both empty		

7.3 Wi-Fi Specific Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
200	WiFi turn on failed and please reboot dongle	201	WiFi is not turned on	202	WiFi turn off failed
203	IP mode type error	204	IP format error	205	Flash write error
206	WiFi is not connected	207	WiFi disconnect failed	208	WiFi scan failed
209	WiFi don't obtain IP now	210	WiFi get IP failed	211	WiFi get host IP failed
212	WiFi get gateway IP failed	213	WiFi get MAC failed	214	WiFi security do not support
215	WiFi Connect AP failed	217	WiFi reset failed	218	Host name error

7.4 MQTT Specific Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
300	No MQTT connection	301	MQTT Subscribe failed	303	MQTT Unsubscribe failed

304	Thing name and endpoint error	305	MQTT connection failed	306	QoS parameter error
307	Generate MQTT Publish payload failed	308	MQTT Publish failed		

7.5 Shadow Specific Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
400	SHADOW connection failed	401	No SHADOW connection	402	SHADOW document length error
403	SHADOW Update failed	404	SHADOW Get failed	405	SHADOW Delete failed
406	SHADOW init failed				

7.6 Module Specific Errors

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
500	Wrong argument(ON|OFF)	501	Flash write error	503	System write error
504	Restore default failed	505	Network parameter error		

Abort process

Some action commands that require time to execute may be aborted while in progress. Aborting of commands is accomplished by manually reset the Connector by 60 seconds timeout.