AT Command Reference

Table of Contents

1. DEFINITIONS

In this document, the following naming conventions are used:

- DCE (Data Communications Equipment): the Wi-Fi module.
- DTE (Data Terminal Equipment): the terminal that issues commands to the Wi-Fi module.

2. NOTE

- In the command description below or while using the AT commands with the module, there are some parameters which are placeholder for future releases. Please refer to this document to find the list of parameters which are supported. If a parameter is not mentioned in this document but gets printed while reading the configuration, it is just a placeholder for a future release.

3. Command Reference: General/Miscellaneous

3.1 Command Echo Control E

3.1.1 Description

This command controls if characters received from the DTE are echoed back to the DTE.

3.1.2 Command Syntax

```
ATE[<N>]
```

Parameter Name	Type	Description
<N>	Integer	0. Turn of character echo 1. Turn on character echo

3.1.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

3.1.4 Examples:

ATE0	Turn off character echo
OK	Command completed

3.2 Request Manufacturer Identification +GMI

3.2.1 Description

This command retrieves the manufacturers information from the DCE.

The format of the returned data is platform dependent, the information returned for a WINC-based platform is as given below:

3.2.2 Command Syntax

```
AT+GMI
```

3.2.3 Response Syntax

Response	Description
+GMI:<MAN_ID>	Information response
OK	Successful response
ERROR:<ERROR_CODE>	Error response

Parameter Name	Type	Description
<MAN_ID>	String	Manufacturers ID/Name

3.2.4 Examples:

`AT+GMI`	Query the manufacturers ID/name
`+GMI:"Microchip"`	Manufacturers information
`OK`	Command completed

3.3 Request Model Identification +GMM

3.3.1 Description

This command retrieves the model information from the DCE.

The format of the returned data is platform dependent, the information returned for a WINC-based platform is as given below:

3.3.2 Command Syntax

`AT+GMM`

3.3.3 Response Syntax

Response	Description
`+GMM:<MODEL_ID>`	Information response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

Parameter Name	Type	Description
<MODEL_ID>	String	Model Information

3.3.4 Examples:

`AT+GMM`	Query the model information
`+GMM:"WINC1500"`	Model information
`OK`	Command completed

3.4 Request Revision Identification +GMR

3.4.1 Description

This command retrieves version information from the DCE.

The format of the returned data is platform dependent, the information returned for a WINC-based platform is as given below:

3.4.2 Command Syntax

```
AT+GMR
```

3.4.3 Response Syntax

Response	Description
+GMR:<RELEASE_VER>	Information response
OK	Successful response
ERROR:<ERROR_CODE>	Error response

Parameter Name	Type	Description
<RELEASE_VER>	String	Release version

3.4.4 Examples:

AT+GMR	Query the revision information
+GMR:""0.3.0"	Version information
OK	Command completed

3.5 Request Revision Identification +IPR

3.5.1 Description

This command retrieves the current baud rate for the UART interface.

The command can also be used to set a different baud rate as given below:

3.5.2 Command Syntax

Command	Description
AT+IPR	Read configuration
AT+IPR=<baud_rate>	Set baud rate

3.5.3 Supported Parameters

When not connected to an AP these parameters are available for configuration.

ID	Name & Default Value	Type	Description
1	<baud_rate>	Integer	Baud rate to be set: Can be one of the following values: 230400, 115200, 57600, 38400, 19200, 14400, 9600

3.5.4 Response Syntax

Response	Description
+IPR:<Baud Rate>	Information response
OK	Successful response

3.5.5 Examples:

`AT+IPR`	Query the baud rate information
`+IPR:230400`	Baud rate information
`OK`	Command completed

3.6 Low Power +LOWPOWER

3.6.1 Description

The LOWPOWER command can be used to put the device in Low Power Mode.

Once the device has been put in Low Power Mode, a GPIO needs to be pressed to bring the device out of Low Power Mode. When the device comes out of low power mode, the device needs to be reconfigured with the Home AP details to start connection with the Home AP.

3.6.2 Command Syntax

AT+LOWPOWER[=<MODE>]

Parameter Name	Type	Description
<MODE>	Integer	Low Power Mode 4 Put device in low power mode **Note:** 0-3 are placeholders for features not supported in this release.

3.6.3 Response Syntax

Response	Description
`ERROR:<ERROR_CODE>`	Error response

3.7 Read Certificate +READCERT

3.7.1 Description

The READCERT command can be used for reading the certificate from the TNG (ECC608).

Once the device has been put in Low Power Mode, a GPIO needs to be pressed to bring the device out of Low Power Mode. When the device comes out of low power mode, the device needs to be reconfigured with the Home AP details to start connection with the Home AP.

3.7.2 Command Syntax

AT+READCERT[=<TYPE>]

Parameter Name	Type	Description
<TYPE>	Integer	Certificate Type 1. Device Certificate 2. Root Certificate 3. Last Certificate Loaded by the Host

3.7.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

3.8 Load Certificate +LOADCERT

3.8.1 Description

The LOADCERT command can be used to loading a server certificate into the device for secured TCP Connection with that Server.

The certificate is loaded in Binary Mode. Once the LOADCERT command is given, the UART switches to binary mode and waits for LEN bytes of the certificate, or +++ to exit the binary mode. The Certificate can be in PEM or DER Mode.

3.8.2 Command Syntax

AT+LOADCERT[=<LEN>][<NAME>]

Parameter Name	Type	Description
<LEN>	Integer	Length of the certificate in bytes (Max length = 1500)
<NAME>	String	Certificate Name

3.8.3 Response Syntax

Response	Description
OK	Successful response
+LOADCERT:<RESPONSE>	0: Success; 1: Failure

4. Command Reference: Scanning

4.1 Configure Scan Behavior +WSCNC

4.1.1 Description

This command is used to modify or query the configuration of the scanning function.

4.1.2 Command Syntax

Command	Description
AT+WSCNC[=<param_id>]	Read configuration
AT+WSCNC=<param_id>,<param_val>	Set configuration

4.1.3 Supported Parameters

ID	Name & Default Value	Type	Description
1	<SCAN_TIME>	Integer	The time in milliseconds to wait for probe responses
2	<PASV_LISTEN>	Integer	The time in milliseconds to wait for beacons

4.1.4 Response Syntax

Response	Description
+WSCNC:<param_id>,<param_val>	Read response
OK	Successful response
ERROR:<ERROR_CODE>	Error response

4.1.5 Examples:

AT+WSCNC	Query the current active scan configuration settings
+WSCNC:1,30	30ms wait
+WSCNC:2,300	300ms duration for passive scans
OK	Command completed

4.2 Active Scanning Command +WSCNA

4.2.1 Description

This command is used to actively scan for infrastructure networks in range of the DCE.

This form of scanning causes the device to transmit energy on each channel being scanned.

4.2.2 Command Syntax

AT+WSCNA=<CHANNEL>[,<SSID>]

Parameter Name	Type	Description
<CHANNEL>	Integer	The channel to scan, a value of 255 scans all available channels
<SSID>	String	Scan for a specific SSID, confirms presence of a cloaked network

4.2.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

4.2.4 AEC Syntax (scan indications)

+WSCNIND:<RSSI>,<SEC_TYPE>,<CHANNEL>,<BSSID>,<SSID>

Parameter Name	Type	Description
<RSSI>	Integer	Received Signal Strength (higher is better)
<SEC_TYPE>	Integer	Security Type 0 No security (open network) 1 WEP 2 WPA Personal (pre-shared key) 3 WPA2 Personal (pre-shared key)
<CHANNEL>	Integer	Channel number of detected device
<BSSID>	String	BSSID of detected device
<SSID>	String	SSID of detected device

4.2.5 AEC Syntax (scan completed)

+WSCNDONE

4.2.6 AEC Syntax (scan failed)

+WSCNERROR

4.2.7 Example:

AT+WSCNA=255	Scan all channels
OK	
+WSCNIND:-57,0,1,"98:FC:11:41:E7:7C","test-network"	Scan indication: open network, channel 1, SSID test-network
+WSCNIND:-62,0,6,"24:F2:7F:A5:8B:81",[466F6F20C2A920626172]	Open network, channel 6, with UTF-8 SSID Foo © Bar
+WSCNDONE	Indication of completion of scanning activities

4.3 Passive Scanning Command +WSCNP

4.3.1 Description

This command is used to passively scan for infrastructure networks in range of the DCE.

This form of scanning causes the device to tune to the required channel(s), turn on its receiver, and listen for beacons from nearby devices. No energy is transmitted on the scanned channel(s) during this operation.

4.3.2 Command Syntax

```
AT+WSCNP=<CHANNEL>[,<SSID>]
```

Parameter Name	Type	Description
<CHANNEL>	Integer	The channel to scan, a value of 255 scans all available channels
<SSID>	Integer	Scan for a specific SSID

4.3.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

4.3.4 AEC Syntax (scan indications)

+WSCNIND:<RSSI>,<SEC_TYPE>,<CHANNEL>,<BSSID>,<SSID>

Parameter Name	Type	Description
<RSSI>	Integer	Received Signal Strength (higher is better)
<SEC_TYPE>	Integer	Security Type 0 No security (open network) 1 WEP 2 WPA Personal (pre-shared key) 3 WPA2 Personal (pre-shared key) 4 Enterprise
<CHANNEL>	Integer	Channel number of detected device
<BSSID>	String	BSSID of detected device
<SSID>	String	SSID of detected device

4.3.5 AEC Syntax (scan completed)

+WSCNDONE

4.3.6 AEC Syntax (scan failed)

+WSCNERROR

4.3.7 Examples:

AT+WSCNP=255	Scan all channels
OK	
+WSCNIND:-57,0,1,"98:FC:11:41:E7:7C","test-network"	Scan indication: open network, channel 1, SSID test-network
+WSCNIND:-62,4,1,"24:F2:7F:A5:8B:80","enterprise-secure"	Scan indication: Enterprise, channel 1, SSID enterprise-secure
+WSCNIND:-62,0,6,"24:F2:7F:A5:8B:81",[466F6F20C2A920626172]	Open network, channel 6, with UTF-8 SSID Foo © Bar
+WSCNIND:-70,1,11,"24:F2:7F:A5:8B:81",[]	Open network, channel 11, with hidden SSID
+WSCNDONE	Scanning completed

5. Command Reference: WLAN Configuration

5.1 Wi-Fi Station Configuration +WSTAC

5.1.1 Description

This command is used to read / set the DCE's Wi-Fi station mode configuration.

5.1.2 Command Syntax

Command	Description
AT+WSTAC[=<param_id>]	Read configuration
AT+WSTAC=<param_id>,<param_val>	Set configuration

5.1.3 Supported Parameters

When not connected to an AP these parameters are available for configuration.

ID	Name & Default Value	Type	Description
1	<SSID>	String	Network Name (Mandatory parameter)
2	<SEC_TYPE>: 0	Integer	Security Type 0 No security (open network) 1 WEP 2 WPA Personal (pre-shared key) 3 WPA2 Personal (pre-shared key) 4 WPA2 and WPA3 Mixed 5 WPA3
3	<CREDENTIALS>: ""	String	Credentials for connecting to the network: SEC_TYPE Credentials format (ASCII or hex string) 0 "" (empty string) 1 Any ASCII or hex string 2 Of format "KEYINDEX*PASSWORD" 3 Of format "USERNAME*PASSWORD"
4	<CHANNEL>: 255 (any channel)	Integer	The channel the network must reside on.
12	<NTP_SVR>: ""	String	The address/name of NTP server

13	<NTP_STATIC>: 0	Integer	NTP configuration mode	
			0	DHCP – can be set via DHCP **(Placeholder for future release)**
			1	Static – cannot be set by DHCP

5.1.4 Response Syntax

Response	Description
`+WSTAC:<param_id>,<param_val>`	Read response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

5.2 Wi-Fi Station, Start and Stop +WSTA, +WSTALU & +WSTALD Link Notifications

5.2.1 Description

This command is used to enable the DCE's station mode functionality.

5.2.2 Command Syntax

Command	Description
`AT+WSTA`	Read State of STA function
`AT+WSTA=<STATE>`	Set State of STA function

Parameter Name	Type	Description	
<STATE>	Integer	State of the Wi-Fi station feature	
		0	Disable
		1	Use configuration from +WSTAC command

5.2.3 Response Syntax

Response	Description
`+WSTA:<ASSOC_ID>,<STATE>[,<SSID>,<RSSI>,<SEC_TYPE>]`	Read response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID
<SSID>	String	Network Name

<RSSI>	Integer	Received Signal Strength (higher is better) **Placeholder for future release (always reported as 0 in this version)**
<SEC_TYPE>	Integer	Security Type 0 No security (open network) 1 WEP (**Not Supported in PIC32MZW1)** 2 WPA Personal (pre-shared key) 3 WPA2 Personal (pre-shared key) 4 Enterprise

5.2.4 AEC Syntax (Link established)

+WSTALU: <ASSOC_ID>,<BSSID>,<CHANNEL>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID
<BSSID>	String	The BSSID of the Access Point the DCE has connected to
<CHANNEL>	Integer	The channel number of network

5.2.5 AEC Syntax (Link lost)

+WSTALD: <ASSOC_ID>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID

5.2.6 AEC Syntax (Indication of STA Automatic Address Assignment)

+WSTAAIP: <ASSOC_ID>,<IP_ADDRESS>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID
<IP_ADDRESS>	String	IP address assigned

5.2.7 AEC Syntax (Connection Error)

+WSTAERR: <ERROR_CODE>

Parameter Name	Type	Description
<ERROR_CODE>	Integer	Error Code

5.2.8 Examples:

```
AT+WSTAC=1,"MyAP"                                    Configure AP connection parameters
OK
AT+WSTAC=2,1
```

OK	
AT+WSTAC=3,"MyAPPSK"	
OK	
AT+WSTA=1	Connect to AP
OK	
+WSTALU:1,"00:01:02:03:04:05",6	Link up: connected on channel 6
+WSTAAIP:1,"19.168.0.20"	IP address received via auto configuration (DHCP/SLAAC)
AT+WSTA	
+WSTA:1,1,"MyAP",-50,0	
OK	
+WSTALD	Link down

5.3 Wi-Fi Hotspot (AP) Configuration +WAPC

5.3.1 Description

This command is used to read or set the DCE's hotspot access point configuration.

5.3.2 Command Syntax

Command	Description
AT+WAPC[=<param_id>]	Read configuration
AT+WAPC=<param_id>,<param_val>	Set configuration

5.3.3 Supported Parameters

When not configured as an AP these parameters are available for configuration.

ID	Name & Default Value	Type	Description
1	<SSID>: DEMO_AP	String	Network Name
2	<SEC_TYPE>: 0	Integer	Security Type 0 No security (open network) 1 WEP 2 WPA Personal (pre-shared key) 3 WPA2 Personal (pre-shared key) 4 Enterprise

3	<CREDENTIALS>: “”	String	Credentials required for connecting to the network of the security type specified: SEC_TYPE: Credentials format 0: “” (empty string) 1: Any ASCII or hexadecimal string 2: Any ASCII or hexadecimal string of format “KEYINDEX*PASSWORD” 3: Any ASCII or hexadecimal string of format “USERNAME*PASSWORD”
4	<CHANNEL>: 6	Integer	The channel of the network to connect to
5	<HIDDEN>: 0	Integer	Visibility of the network 0: Not hidden, SSID is broadcast in beacons 1: Hidden, SSID is not broadcast

When configured as an AP the parameter entries are ‘Read Only’ and cannot be modified.

5.3.4 Response Syntax

Response	Description
`+WAPC:<param_id>,<param_val>`	Read response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

5.4 Wi-Fi Hotspot (Soft AP) Start/Stop/Status +WAP, +WAPSC & +WAPSD Link Indications

5.4.1 Description

This command is used to enable the DCE’s hotspot access point functionality.

5.4.2 Command Syntax

Command	Description
`AT+WAP`	Read Status of AP function
`AT+WAP=<STATE>`	Set State of AP function

Parameter Name	Type	Description

<STATE>	Integer	State of the hotspot feature 0 Disable 1 Enable

5.4.3 Response Syntax

Response	Description
`+WAP:<STATE>[,<BSSID>,<RSSI>]`	Query state response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

Parameter Name	Type	Description
<BSSID>	String	The BSSID of the STA connecting to the AP
<RSSI>	Integer	Received Signal Strength (higher is better)

5.4.4 AEC Syntax (Station Connected)

+WAPSC: <ASSOC_ID>,<BSSID>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID

5.4.5 AEC Syntax (Station Disconnected)

+WAPSD: <ASSOC_ID>,<BSSID>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID

5.4.6 AEC Syntax (DHCP Server Indication of Connected STA Address Assignment)

+WAPAIP: <ASSOC_ID>,<IP_ADDRESS>

Parameter Name	Type	Description
<ASSOC_ID>	Integer	Association ID

Examples:

`AT+WAPC=1,"MyAPSSID"`	AP SSID
`OK`	
`AT+WAPC=2,2`	WEP security
`OK`	
`AT+WAPC=3,"MyAPPassword"`	WEP key
`OK`	

AT+WAPC=4,11	Channel
OK	
AT+WAP=1	
OK	
+WAPSC:2,"00:01:02:03:04:05"	STA connected
+WAPAIP:2,"192.168.0.100"	STA assigned IP address
+WAPSD:2,"00:01:02:03:04:05"	STA disconnected

5.5 Configure Provisioning +WPROVC

5.5.1 Description

This command is used to modify or query the configuration of the provisioning function.

When using the provisioning method, the SSID used for the SoftAP can be set using the +WAPC command. The SSID needs to be set before the device is put in Provisioning Mode.

By default the device is in STA mode. To put the device in provisioning mode, the “AT+WPROV=1” command needs to be given. Once the device enters the provisioning mode, it opens a socket on the provisioning port and waits for a TCP client to connect. Any TCP client can be used to connect to the device.

Once a TCP connection has been setup with the device under provisioning mode, the AT+WSTAC commands can be given (refer to the AT+WSTAC section to know about the format in which commands need to be given) to configure the device for Home Router details. Once all provisioning commands are given, the “AT+WPROV=0” command needs to be given to make the device exit the provisioning mode. As soon as the device receives the “AT+WPROV=0” command over the TCP connection, it would stop its SoftAP interface. Hence the TCP client will lose connection with the device. “+WPROVEXIT” will be sent on the UART to indicate to the Host MCU that now it can give the “AT+WSTA=1” command to start connection with the Home Router.

Note: In case the scan results need to be retrieved over the TCP connection, then the “AT+WSCNA” or “AT+WSCNP” command can be used to retrieve the scan results from the device. When the scan command is given on the TCP Client, the scan results will be sent by the device to the TCP Client.

5.5.2 Command Syntax

Command	Description
AT+WPROVC[=<param_id>]	Read configuration
AT+WPROVC=<param_id>,<param_val>	Set configuration

5.5.3 Supported Parameters

ID	Name & Default Value	Type	Description
1	<MODE>	Integer	Mode in which provisioning would be done. In existing release, only mode 2 (Socket based provisioning) is supported
2	<PIN>	String	Pin number to be used for WPS. **Not supported in existing release.**

3	<PROV_PORT >	Integer	Port number on which a TCP server will wait for provisioning data. Default port number is set to 7777.

5.5.4 Response Syntax

Response	Description
+WPROVC:<param_id>,<param_val>	Read response
OK	Successful response
ERROR:<ERROR_CODE>	Error response

5.5.5 Examples:

AT+WPROVC	Query the current provisioning configuration settings
+WPROVC:1,2	Mode is set to 2 (Socket based provisioning).
+WPROVC:2,[]	Not used in this release
+WPROVC:3,7777	Provisioning Port number is set to 7777
OK	
AT+WPROVC=3,8888	Set the provisioning port to 8888
OK	

5.6 Start / Stop Provisioning +WPROV

5.6.1 Description

The WPROV command can be used to start / stop the provisioning mode.

5.6.2 Command Syntax

AT+WPROV[=<STATE>]

Parameter Name	Type	Description	
<STATE>	Integer	Provisioning feature state	
		0	Stop
		1	Start

5.6.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

6. Command Reference: MQTT

6.1 MQTT Configuration +MQTTC

6.1.1 Description

This command is used to read or set the MQTT configuration.

6.1.2 Command Syntax

Command	Description
AT+MQTTC[=<param_id>]	Read configuration
AT+MQTTC=<param_id>,<param_val>	Set configuration

6.1.3 Supported Parameters

ID	Name & Default Value	Type	Description
1	<BROKER_ADDR>: “”	String	Broker domain name or IPv4 address
2	<BROKER_PORT>: 8883	Integer	Broker listening TCP port
3	<CLIENT_ID >: “<Device ID>”	String	MQTT Client ID
6	<KEEPALIVE>	Integer	Keep alive time in sec
4	<USERNAME>: “”	String	Username
7	<TLS_CONF_IDX>: 1	Integer	Enable (1)/ Disable(0) TLS

6.1.4 Response Syntax

Response	Description
+MQTTC:<param_id>,<param_val>	Read response
OK	Successful response
ERROR:<ERROR_CODE>	Error response

6.2 MQTT Connection +MQTTCONN

6.2.1 Description

This is used to connect to an MQTT broker or request current connection status.

6.2.2 Command Syntax

AT+MQTTCONN[=<CLEAN>]

Parameter Name	Type	Description

<CLEAN>	Integer	**Placeholder for future release. Ignored in this release.** Clean session flag: 0 Reuse existing session if possible **(Placeholder for future release)** 1 Request clean session

6.2.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

6.2.4 AEC Syntax

+MQTTCONNACK:<CONNACK_FLAGS>,<RETURN_CODE>

Parameter Name	Type	Description
<CONNACK_FLAGS>	Integer	Connect Acknowledge Flags
<RETURN_CODE>	Integer	Connect Return code

6.2.5 AEC Syntax

+MQTTCONN:<CONN_STATE>

Parameter Name	Type	Description
<CONN_STATE>	Integer	MQTT connected state: 0 Not connected 1 Connected

6.2.6 Examples:

`AT+MQTTCONN=1`	Connect to broker
`OK`	Command completed
`+MQTTCONNACK:0,0`	Connection acknowledgement
`+MQTTCONN:1`	Connected

6.3 MQTT Subscribe +MQTTSUB

6.3.1 Description

This is used to subscribe to an MQTT topic.

6.3.2 Command Syntax

AT+MQTTSUB=<TOPIC_NAME>,<MAX_QOS>

Parameter Name	Type	Description
<TOPIC_NAME>	String	Name of topic to subscribe to

<MAX_QOS>	Integer	Max QoS (Valid values are 0, 1 and 2)

6.3.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

6.3.4 AEC Syntax

+MQTTSUB:<REASON_CODE>

Parameter Name	Type	Description
<REASON_CODE>	Integer	Result of unsubscribe request: 0. Request succeeded 1. Request failed

6.3.5 Examples:

AT+MQTTSUB="Topic/name"	Subscribe to a topic
OK	Command completed
+MQTTSUB:0	Subscription successful

6.4 MQTT Unsubscribe +MQTTUNSUB

6.4.1 Description

This is used to unsubscribe from an MQTT topic.

6.4.2 Command Syntax

AT+MQTTUNSUB=<TOPIC_NAME>

Parameter Name	Type	Description
<TOPIC_NAME>	String	Name of topic to unsubscribe from

6.4.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

6.4.4 AEC Syntax

+MQTTUNSUB:<RESULT>

Parameter Name	Type	Description

<RESULT>	Integer	Result of unsubscribe request: 1. Request failed 2. Request succeeded

6.4.5 Examples:

`AT+MQTTUNSUB="Topic/name"`	Unsubscribe from topic
`OK`	Command completed
`+MQTTUNSUB:1`	Unsubscribe was successful

6.5 MQTT Publish +MQTTPUB

6.5.1 Description

This is used to publish a message.

6.5.2 Command Syntax

AT+MQTTPUB=<DUP>,<QOS>,<RETAIN>,<TOPIC_NAME>,<TOPIC_PAYLOAD>

Parameter Name	Type	Description
<DUP>	Integer	**Placeholder for future release. Always set to 0 in this release.** Duplicate flag: 0. First attempt to send message 1. Subsequent attempt to send message
<QOS>	Integer	QoS: 0. At most once 1. At least once 2. Exactly once
<RETAIN>	Integer	Retain flag: 0. Do not retain message on server 1. Retain message on server
<TOPIC_NAME>	String	Name of topic to send message to
<TOPIC_PAYLOAD>	String	Content of message to send

6.5.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

6.5.4 AEC Syntax (QoS=1)

+MQTTPUBACC

6.5.5 AEC Syntax (QoS=2)

+MQTTPUBCOMP

6.5.6 AEC Syntax (Error)

+MQTTPUBERR

6.5.7 Examples:

`AT+MQTTPUB=0,1,0,"Topic/name","123456"`	Publish to a topic, QoS is 1
`OK`	Command completed
`+MQTTPUBACC`	Publish acknowledged

6.6 MQTT Disconnect +MQTTDISCONN

6.6.1 Description

This is used to disconnect from a broker.

<REASON_CODE> parameters is for MQTT V5 only.

6.6.2 Command Syntax

AT+MQTTDISCONN[=<REASON_CODE>]

Parameter Name	Type	Description
<REASON_CODE>	Integer	Reason code describing reason for disconnecting.

6.6.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

6.6.4 AEC Syntax

+MQTTCONN:<CONN_STATE>

Parameter Name	Type	Description
<CONN_STATE>	Integer	MQTT connected state: 0 Not connected 1 Connected

6.6.5 Examples:

`AT+MQTTDISCONN`	Disconnect
`OK`	Command completed
`+MQTTCONN:0`	Not connected

7. Command Reference: Network Stack

7.1 Create Socket +SOCKO

7.1.1 Description

This command is used to open a new socket.

7.1.2 Command Syntax

`AT+SOCKO=<PROTOCOL>`

Parameter Name	Type	Description
<PROTOCOL>	Integer	The protocol to use 1 UDP 2 TCP

7.1.3 Response Syntax

Response	Description
`+SOCKO:<SOCK_ID>`	Socket open response with new ID
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

Parameter Name	Type	Description
<SOCK_ID>	Integer	ID of the socket opened

7.1.4 Examples:

(TCP):

`AT+SOCKO=2`	Open a new listening socket, TCP
`+SOCKO:1`	Socket opened, ID is 1
`OK`	Command completed

(UDP):

`AT+SOCKO=1`	Open a new listening socket, UDP
`+SOCKO:5`	Socket opened, ID is 5
`OK`	Command completed

7.2 Close Socket +SOCKCL

7.2.1 Description

This command is used to close a socket.

The AEC signals that the socket was closed by the remote address or due to a failure.

Note: Receiving the AEC indicates a shutdown of the socket at the remote end, the socket will still exist locally, `AT+SOCKCL` must still be sent to remove the socket locally.

7.2.2 Command Syntax

`AT+SOCKCL=<SOCK_ID>`

Parameter Name	Type	Description
<SOCK_ID>	Integer	ID of the socket to close

7.2.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

7.2.4 AEC Syntax

`+SOCKCL:<SOCK_ID>`

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID which has closed

7.2.5 Examples:

`AT+SOCKCL=2`	Close socket ID 2
`OK`	Command completed
`+SOCKCL:4`	Socket ID 4 was closed remotely
`AT+SOCKCL=4`	Close socket ID 2 locally
`OK`	Command completed

7.3 Bind a Listening Socket +SOCKBL

7.3.1 Description

This command is used to bind a socket to a local port.

A locally bound socket allows network services to be implemented. Any remote device may send data to this socket and the DCE will issue a data ready indication. For TCP sockets a connection must have been established prior to sending and receiving data.

7.3.2 Command Syntax

`AT+SOCKBL=<SOCK_ID>,<LCL_PORT>`

Parameter Name	Type	Description

<SOCK_ID>	Integer	ID of the socket to bind
<LCL_PORT>	Integer	The port number to use

7.3.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

7.3.4 AEC Syntax (TCP Connection Established) +SOCKIND

+SOCKIND:<SOCK_ID>,<LCL_ADDR>,<LCL_PORT>,<RMT_ADDR>,<RMT_PORT>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The ID of the passive listening socket which received connection
<LCL_ADDR>	String	The address of the local end of the connection
<LCL_PORT>	Integer	The port number of the local end of the connection
<RMT_ADDR>	String	The address of the remote end of the connection
<RMT_PORT>	Integer	The port number of the remote end of the connection

7.3.5 Examples:

(TCP):

AT+SOCKBL=2,6000	Bind a listening socket, port 6000
OK	Command completed
:	
+SOCKIND:4,"192.168.0.100",6000,"192.168.0.1",12345	New incoming TCP connection creating socket ID is 4

(UDP):

AT+SOCKBL=1,6000	Bind a listening socket, port 6000
OK	Command completed

7.4 Bind a Remote Socket +SOCKBR

7.4.1 Description

This command is used to bind a socket to a remote address.

7.4.2 Command Syntax

AT+SOCKBR=<SOCK_ID>,<RMT_ADDR>,<RMT_PORT>

Parameter Name	Type	Description

<SOCK_ID>	Integer	ID of the socket to bind
<RMT_ADDR>	String	The address of the remote device
<RMT_PORT>	Integer	The port number on the remote device

7.4.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

7.4.4 AEC Syntax (TCP Bind Success) +SOCKIND

+SOCKIND:<SOCK_ID>,<LCL_ADDR>,<LCL_PORT>,<RMT_ADDR>,<RMT_PORT>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The ID of the bound socket
<LCL_ADDR>	String	The address of the local end of the connection
<LCL_PORT>	Integer	The port number of the local end of the connection
<RMT_ADDR>	String	The address of the remote end of the connection
<RMT_PORT>	Integer	The port number of the remote end of the connection

7.4.5 AEC Syntax (TCP Bind Failed) +SOCKERR

+SOCKERR:<SOCK_ID>,<STATUS_CODE>[,<STATUS_MSG>]

Parameter Name	Type	Description
<SOCK_ID>	Integer	The ID of the bound socket
<STATUS_CODE>	Integer	Numeric status code, see Error! Reference source not found. Status Response CodesError! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.
<STATUS_MSG>	String	Descriptive text detailing the error

7.4.6 Examples:

(UDP):

AT+SOCKBR=1,"192.168.0.1",6000	Bind a connection to remote host, port 6000
OK	Command completed

(TCP):

AT+SOCKBR=4,"192.168.0.1",9000	Bind a connection to remote host, port 9000
OK	Command completed

`+SOCKIND:4,"192.168.0.100",12345,"192.168.0.1",9000`	Connection established

7.5 Bind a Multicast Socket (+SOCKBM)

7.5.1 Description

These commands are used to bind a UDP socket to a multicast group.

7.5.2 Command Syntax

`AT+SOCKBM=<SOCK_ID>,<MCAST_ADDR>,<MCAST_PORT>`

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID to change
<MCAST_ADDR>	String	The address of the multicast group
<MCAST_PORT>	Integer	The port of the multicast group

7.5.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

7.5.4 Examples:

`AT+SOCKBM=7,"224.0.0.1",6000`	Add socket to multicast group
`OK`	Command completed

7.6 Upgrade Socket to TLS +SOCKTLS

Description

This command is used to enable TLS on a socket.

7.6.1 Command Syntax

`AT+SOCKTLS=<SOCK_ID>,<TLS_CONF_IDX>`

Parameter Name	Type	Description
<SOCK_ID>	Integer	ID of the socket
<TLS_CONF_IDX>	Integer	TLS certificate configuration index to use (see +TLSC)

7.6.2 Response Syntax

Response	Description
`+SOCKTLS:<SOCK_ID>`	Socket information

OK	Successful response
ERROR:<ERROR_CODE>	Error response

Parameter Name	Type	Description
<SOCK_ID>	Integer	Socket ID

7.6.3 AEC Syntax (TLS Succeed) +SOCKTLS

+SOCKTLS:<SOCK_ID>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The ID of the bound socket

7.6.4 AEC Syntax (TLS Failed) +SOCKERR

+SOCKERR:<SOCK_ID>,<STATUS_CODE>[,<STATUS_MSG>]

Parameter Name	Type	Description
<SOCK_ID>	Integer	The ID of the bound socket
<STATUS_CODE>	Integer	Numeric status code, see Error! Reference source not found. Status Response CodesError! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.
<STATUS_MSG>	String	Descriptive text detailing the error

7.6.5 Examples:

AT+SOCKTLS=1	Command: list all open sockets
OK	Command completed successfully
+SOCKTLS:1	TCP socket completed TLS negotiation

7.7 List Current Sockets +SOCKLST

7.7.1 Description

This command is used to present a list of the DCE's open sockets/connections.

7.7.2 Command Syntax

AT+SOCKLST[=<SOCK_ID>]

Parameter Name	Type	Description
<SOCK_ID>	Integer	ID of the socket

7.7.3 Response Syntax

Response	Description

+SOCKLST:<SOCK_ID>,<PROTOCOL>,<RMT_ADDR>,<RMT_PORT>,<LCL_PORT>	Socket information
OK	Successful response
ERROR:<ERROR_CODE>	Error response

Parameter Name	Type	Description
<SOCK_ID>	Integer	Socket ID
<PROTOCOL>	Integer	The protocol in use on the socket 1 UDP 2 TCP
<RMT_ADDR>	String	The destination address associated with the socket (if any)
<RMT_PORT>	Integer	The destination port associated with the socket (if any)
<LCL_PORT>	Integer	The local port associated with this socket

7.7.4 Examples:

AT+SOCKLST	Command: list all open sockets
+SOCKLST:1,2,"",0,6000	TCP listening socket on port 6000
+SOCKLST:2,2,"192,168.0.1",4000,12345	TCP connection with 192.168.0.1:4000 local port 12345
+SOCKLST:3,1,"192.168.0.2",4000,12345	UDP connection with 192.168.0.1:4000 local port 12345
OK	Command completed successfully

7.8 Send Data to Network +SOCKWR

7.8.1 Description

This command is used to send data over a socket.

For TCP sockets the socket must be connected to a remote address/port.

7.8.2 Command Syntax

AT+SOCKWR=<SOCK_ID>,<LENGTH>[,<DATA>]

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID to transmit the data through
<LENGTH>	Integer	The length of the data to send (1 – 1500 bytes)

<DATA>	String	The data to send in either ASCII or hexadecimal string format. If omitted the DCE will enter raw binary mode and will remain in that mode until the specified length of binary data has been received from the DTE.

7.8.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

7.8.4 Examples:

Terminal mode:

AT+SOCKWR=1,7,"hello2u"	Send hello2u to 192.168.0.1:6000 via socket ID 1
OK	
AT+SOCKWR=1,7,[68656c6c6f3275]	Send data given in hexadecimal string format
OK	7 bytes successfully queued for transmission

Non-Terminal mode, length unknown:

AT+SOCKWR=1,0	Prepare to send an unknown number of bytes (non-terminal mode)
#One fine day+++	'#' followed by 12 bytes of data
OK	Command completed successfully

Non-Terminal mode, length known:

AT+SOCKWR=1,5	Prepare to send an known number of bytes (non-terminal mode)
#hello	'#' followed by 5 bytes of data
OK	Command completed successfully

7.9 Send Data to Specific Address (UDP only) +SOCKWRTO

7.9.1 Description

This command is used to send data to an arbitrary destination using the connectionless UDP protocol.

7.9.2 Command Syntax

AT+SOCKWRTO=<SOCK_ID>,<RMT_ADDR>,<RMT_PORT>,<LENGTH>[,<DATA>]

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID to transmit the data through
<RMT_ADDR>	String	The destination address

<RMT_PORT>	Integer	The destination port
<LENGTH>	Integer	The length of the data to send (1 – 1500 bytes)
<DATA>	String	The data to send in either ASCII or hexadecimal string format. If omitted the DCE will enter raw binary mode and will remain in that mode until the specified length of binary data has been input.

7.9.3 Response Syntax

Response	Description
OK	Successful response
ERROR:<ERROR_CODE>	Error response

7.9.4 Examples:

Terminal mode:

AT+SOCKWRTO=1,"192.168.0.1",6000,7,"hello2u"	Send hello2u to 192.168.0.1:6000 via socket ID 1
OK	
AT+SOCKWRTO=1,"192.167.0.1",6000,7,[68656c6c6f3275]	Send data given in hexadecimal string format
OK	7 bytes successfully queued for transmission

Non-Terminal mode, length unknown:

AT+SOCKWRTO=1,"192.168.0.1",6000,0	Prepare to send an unknown number of bytes (non-terminal mode)
#One fine day+++	'#' followed by 12 bytes of data
OK	Command completed successfully

Non-Terminal mode, length known:

AT+SOCKWRTO=1,"192.168.0.1",6000,5	Prepare to send an known number of bytes (non-terminal mode)
#hello	'#' followed by 5 bytes of data
OK	Command completed successfully

7.10 Receive Data from Network +SOCKRXU, +SOCKRXT and +SOCKRD

7.10.1 Description

Two AECs present notification of data received by the DCE:

- +SOCKRXU indicates UDP data has been received.
- +SOCKRXT indicates TCP data has been received.

The DTE is responsible for retrieving the datagram/stream data via the +SOCKRD command.

For TCP sockets the DCE will indicate, via +SOCKRXT, the number of bytes of data which are currently available for reading via the +SOCKRD command. The DCE may issue multiple +SOCKRXT AECs as data is received. When requesting data via the +SOCKRD command the DTE may receive less data than request, the number of bytes provided by the DCE will be declared in the +SOCKRD response before the data is presented. The DTE may request less data than that declared by the +SOCKRXT AEC as being available, the remaining data will be available for subsequent reading.

For UDP sockets the DCE will indicate, via +SOCKRXU, the number of bytes of data which were received in the oldest datagram received by the DCE. Only a single +SOCKRXU will be issued by the DCE even if subsequent UDP datagrams are received. Reading data from the UDP socket via the +SOCKRD command will read and discard the current datagram, if less data is requested than was indicated by the +SOCKRXU AEC the remaining unread data in the datagram will be discarded.

7.10.2 AEC Syntax (TCP)

+SOCKRXT:<SOCK_ID>,<LENGTH>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID on which there is data to read
<LENGTH>	Integer	The number of bytes received

7.10.3 AEC Syntax (UDP)

+SOCKRXU:<SOCK_ID>,<RMT_ADDR>,<RMT_PORT>,<LENGTH>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID on which there is data to read
<RMT_ADDR>	String	The sender’s IP address
<RMT_PORT>	Integer	The sender’s port number
<LENGTH>	Integer	The number of bytes received

7.10.4 Command Syntax (+SOCKRD - read socket data)

AT+SOCKRD=<SOCK_ID>,<OUTPUT_MODE>,<LENGTH>

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket number to read data from
<OUTPUT_MODE >	Integer	The format the DTE wishes to receive the data: 1 ASCII or hex String 2 Binary
<LENGTH>	Integer	The number of bytes the DTE wishes to read

7.10.5 Response Syntax

Response	Description
`+SOCKRD:<SOCK_ID>,<LENGTH>,<DATA>`	Socket read
`OK`	Successful response

ERROR:<ERROR_CODE>	Error response

Parameter Name	Type	Description
<SOCK_ID>	Integer	The socket ID the data is being retrieved from
<LENGTH>	Integer	The number of bytes being retrieved
<DATA>	Variable	The data in the format requested, either ASCII/hex string or binary

7.10.6 Examples:

+SOCKRXT:1,7	AEC indicating TCP data available on socket ID 1, length 7 bytes
AT+SOCKRD=1,1,999	Command – read 999 bytes, ASCII/hex string format, socket ID 1
+SOCKRD:1,7,[466F6FC2A9626172]	Response – 7 bytes. Data is Foo©Bar
OK	Command completed
+SOCKRXU:4,"1.2.3.4",6000,7	AEC: UDP data from 1.2.3.4:6000 available on socket 4, 7 bytes
AT+SOCKRD=4,2,999	Command – read 999 bytes, binary format, socket ID 4
+SOCKRD:1,7, #<7_bytes_binary>	Response – 7 bytes from socket 4 to be presented in binary Response – 8 bytes binary data (includes leading '#' marker)
OK	Command completed

7.11 TLS Configuration +TLSC

7.11.1 Description

This command is used to read or set the TLS configuration. Multiple TLS configurations are possible, each configuration has an index starting with 1 for the first configuration. The index must be specified when using this command.

7.11.2 Command Syntax

Command	Description
AT+TLSC=<conf_idx>[,<param_id>]	Read configuration
AT+TLSC=<conf_idx>,<param_id>,<param_val>	Set configuration

7.11.3 Supported Parameters

ID	Name & Default Value	Type	Description

1	<CA_CERT_NAME>: “”	String	CA certificate name
2	<CERT_NAME>: “”	String	Certificate name
3	<PRI_KEY_NAME>: “”	String	Private key name
4	<PRI_KEY_PASSWORD>: “”	String	Private key password
5	<SERVER_NAME>: “”	String	Server name

7.11.4 Response Syntax

Response	Description
`+TLSC:<param_id>,<param_val>`	Read response
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

Note: The user needs to ensure that the certificates are a part of the image. Please check “8. Appendix A: Establishing a secured connection using AT Commands” for more details.

7.12 DNS Name Resolution +DNSRESOLV

7.12.1 Description

This command is used to resolve domain names via DNS.

7.12.2 Command Syntax

AT+DNSRESOLV=<TYPE><DOMAIN_NAME>

Parameter Name	Type	Description
<TYPE>	Integer	Type of record: 1. A 2. AAAA
<DOMAIN_NAME>	String	Domain name to resolve

7.12.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

7.12.4 AEC Syntax (Success) +DNSRESOLV

+DNSRESOLV:<TYPE>,<DOMAIN_NAME>[,<QUERY_RESP>]

Parameter Name	Type	Description

<TYPE>	Integer	Type of record: 1. A Record 2. AAAA Record
<DOMAIN_NAME>	String	Original domain name requested
<QUERY_RESP>	String	Query response received

7.12.5 AEC Syntax (Failure) +DNSERROR

+DNSERROR:<ERROR_CODE>

Parameter Name	Type	Description
<ERROR_CODE>	Integer	Error response

7.12.6 Examples:

`AT+DNSRESOLV=1,"www.example.com"`	Request A record for www.example.com
`OK`	Command completed
`+DNSRESOLV:1,"www.example.com","192.168.0.1"`	A record response for www.example.com

7.13 Ping Link Check +PING

7.13.1 Description

This command sends a ping (ICMP Echo Request) to the target address.

7.13.2 Command Syntax

AT+PING=<TARGET_ADDR>,[<IP_PROTOCOL_VERSION>]

Parameter Name	Type	Description
<TARGET_ADDR>	String	IP address or domain name of target
<IP_PROTOCOL_VERSION>	Integer	IP protocol version: 1. IPv4 2. IPv6

7.13.3 Response Syntax

Response	Description
`OK`	Successful response
`ERROR:<ERROR_CODE>`	Error response

7.13.4 AEC Syntax

+PING:<IP_ADDRESS>,<RTT>

Parameter Name	Type	Description
<IP_ADDRESS>	String	IP address of the target responding

<RTT>	Integer	Round trip time (in milliseconds)

7.13.5 Examples:

`AT+PING="www.example.com"`	Ping the host www.example.com
`OK`	Command completed

8. Appendix A: Establishing a secured connection using AT Commands

In case the user wants to establish a connection with a Server, one needs to ensure that the server certificate needed for verification of the server during the TLS negotiations is loaded into the device.

When establishing a secured TCP connection:

1. Once the Wifi connection has been established, load a TLS Certificates using AT+LOADCERT:
   a. *a. AT+LOADCERT=1500, "app_client_cert_der_mosquitto_org"*
2. Establish the normal TCP connection with the server first
   a. *AT+SOCKO=2*
   b. *AT+SOCKBR=1,"5.196.95.208",8883*
3. Once the connection has been established, to start the secured connection
   a. *AT+SOCKTLS=1,1*
4. Check more details in the section 7.11. TLS Configuration +TLSC and 7.6. Upgrade Socket to TLS +SOCKTLS on the usage of respective AT Commands.