EC20 WIFI Application Note

LTE Module Series

Rev. EC20_WIFI_Application_Note_V1.0

Date: 2015-12-15

Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.
Office 501, Building 13, No.99, Tianzhou Road, Shanghai, China, 200233
Tel: +86 21 5108 6236
Mail: info@quectel.com

Or our local office, for more information, please visit:
http://www.quectel.com/support/salesupport.aspx

For technical support, to report documentation errors, please visit:
http://www.quectel.com/support/techsupport.aspx
Or Email: Support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THIS INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

About the Document

History

Revision	Date	Author	Description
1.0	2015-12-15	Scott HU	Initial

Content

About the Document **2**
Content **3**
Table Index **4**
Figure Index **5**

1 4G+WIFI Solution **6**
1.1. Introduction 6
1.2. FC10 Features 7
1.3. WIFI Solution Architecture 8

2 WIFI Related AT Commands **9**
2.1. AT+QWIFI Enable or Disable WIFI Function 10
2.2. AT+QWSSID Set SSID 10
2.3. AT+QWSSIDHEX Set SSID Encoding 11
2.4. AT+QWBCAST Set Broadcast 12
2.5. AT+QWAUTH Set Authorization Type, Encryption Mode and Password 13
2.6. AT+QWMOCH Set 802.11 Mode and Channel 15
2.7. AT+QWISO Enable or Disable Isolation 16
2.8. AT+QWDHCP Set DHCP 17
2.9. AT+QWNAT Set NAT type 18
2.10. AT+QWCLICNT Query the Number of WIFI Client 19
2.11. AT+QWRSTD Restore Factory Settings 19
2.12. AT+QWCLIP Query Client's IP Address 20
2.13. AT+QWSETMAC Set Module's MAC Address 21
2.14. AT+QWSERVER Enable or Disable qserver 21
2.15. AT+QWCLILST List MAC Address of Connected Client 22
2.16. AT+QWCLIRM Disconnect a Connected Client 23
2.17. AT+QWTOCLIEN Assign a Port for the Client to Transfer Data 24
2.18. AT+QWTOCLI Send Data to Client 25

3 WIFI Related URC **26**
3.1. +QWIFIND URC of Client Connection Status 26
3.2. +QWCLIND URC for Client Data Transmission 26

Table Index

TABLE 1: FC10 FEATURES 7
TABLE 2: WIFI RELATED AT COMMANDS 9

Figure Index

FIGURE 1: SOFTWARE WORKFLOW 6
FIGURE 2: WIFI SOLUTION ARCHITECTURE 8

1 4G+WIFI Solution

1.1. Introduction

The rapid development of LTE and IoT (Internet of Thing) accelerates the integration of 4G and WIFI technology, many companies turn to convert the operator's 4G signal to WIFI signal so that the smartphone, PAD and laptop users can enjoy free WIFI access to share local resources and communicate with several terminals via high-speed network.

Therefore, Quectel provides a 4G+WIFI one-stop solution based on its own EC20 LTE wireless module and FC10 WIFI module, this solution is realized by converting 4G signal to WIFI signal to create WIFI hotspots.

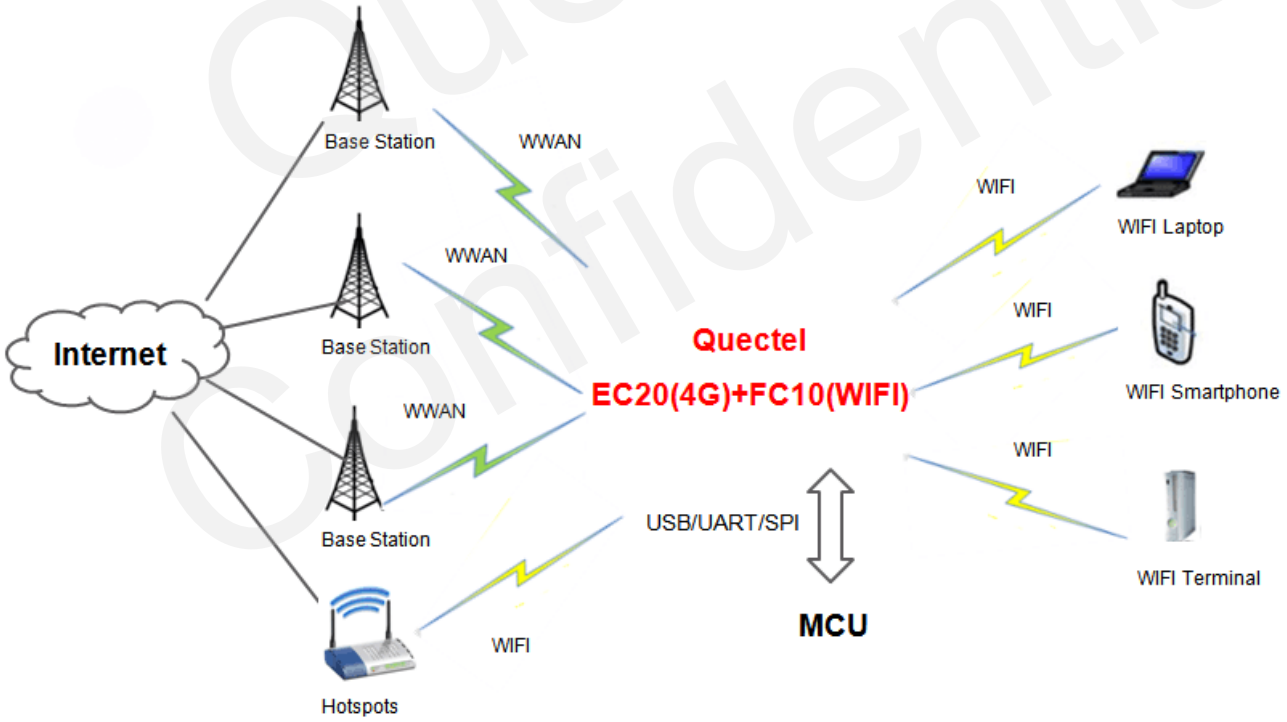

Figure 1: Software Workflow

1. Client and MCU can access to 4G network through EC20 at the same time.
2. MCU can control WIFI connection by AT commands.
3. FC10 WIFI module supports AP mode and STA mode (under development), when there are other WIFI hotspots around, Network data can be uploaded to the Internet through other WIFI hotspots to save data traffic.
4. EC20 LTE module supports various connections such as USB, UART and SPI.
5. The maximum access point is 10.

1.2. FC10 Features

Table 1: FC10 Features

Dimensions	16.6 × 13.0 × 2.1mm
Package	LCC
Frequency	2.4 ~ 2.4835GHz
The Number of PIN	24
Supply Voltage	3.3V
Interface	SDIO
WLAN Standard	802.11b/g/n
Antenna	External antenna
Transmission Data	65Mbps @802.11n; 54Mbps @802.11g; 11Mbps @802.11b
AP (The Maximum Access Point)	10
Other Pins	Reset
Operation Temperature	-40°C ~ +85°C

1.3. WIFI Solution Architecture

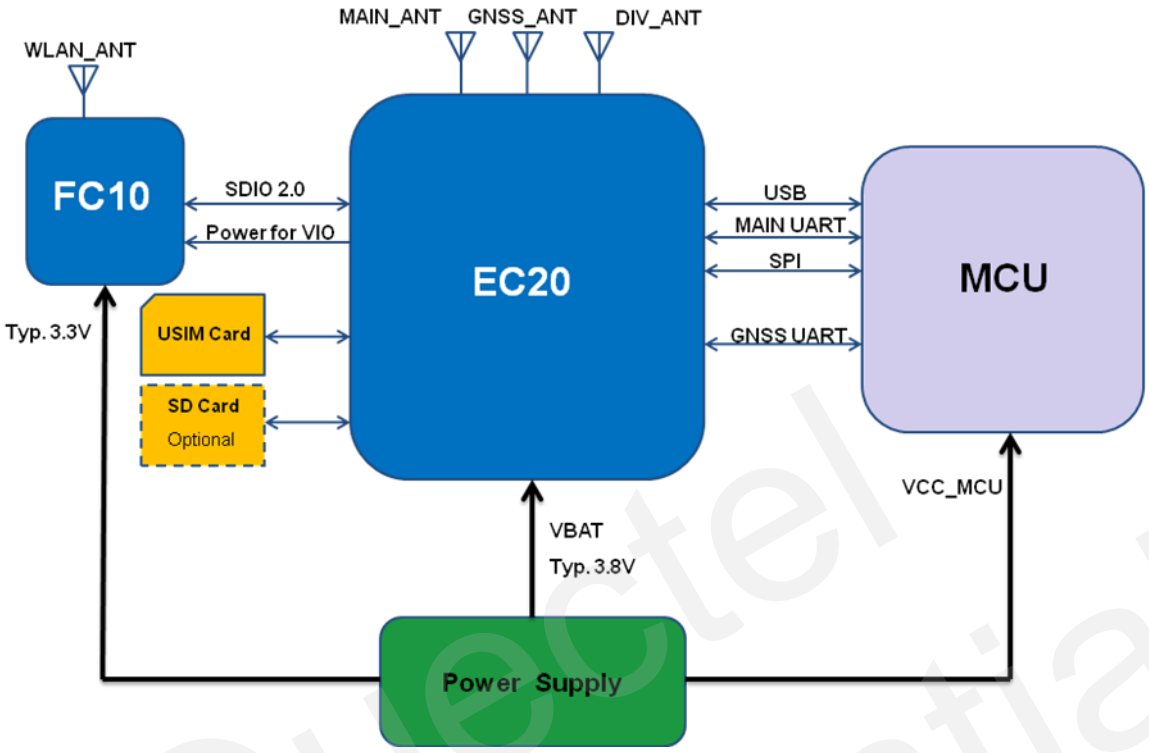

Figure 2: WIFI Solution Architecture

1. EC20 and FC10 adopt SDIO 2.0 interface to communicate, data rate can reach up to 100Mb/s, which can fully accommodate 100Mbps(DL) and 50Mbps(UL) of LTE.
2. The communication between MCU and EC20 module can be realized by USB, UART or SPI.
3. EC20 module can output GPS information via GNSS_UART port. If GPS function is needed, you can use this port to communicate with MCU.

2 WIFI Related AT Commands

The following table lists the WIFI related AT commands.

Table 2: WIFI Related AT Commands

AT Commands	Description
AT+QWIFI	Enable or disable WIFI function
AT+QWSSID	Set SSID
AT+QWSSIDHEX	Set SSID encoding
AT+QWBCAST	Set broadcast
AT+QWAUTH	Set authorization type, encryption mode and password
AT+QWMOCH	Set 802.11 mode and channel
AT+QWISO	Enable or disable Isolation
AT+QWDHCP	Set DHCP
AT+QWNAT	Set NAT type
AT+QWCLICNT	Query the number of WIFI Client
AT+QWRSTD	Restore factory settings
AT+QWCLIP	Query Client's IP address
AT+QWSETMAC	Set module's MAC address
AT+QWSERVER	Enable or disable qserver
AT+QWCLILST	List MAC address of connected Client
AT+QWCLIRM	Disconnect a connected Client
AT+QWTOCLIEN	Assign a port for the client to transfer data
AT+QWTOCLI	Send the data to Client

2.1. AT+QWIFI Enable or Disable WIFI Function

This command is used to enable or disable WIFI Function.

AT+QWIFI Enable or Disable WIFI Function	
Test Command **AT+QWIFI=?**	Response **+QWIFI: <value>** **OK**
Read Command **AT+QWIFI?**	Response **+QWIFI: <value>** **OK**
Write Command **AT+QWIFI=<value>**	Response **OK** **ERROR**

Parameter

<value>	Indicate the current state of WIFI 0 WIFI is disabled 1 WIFI is enabled

Example

```
AT+QWIFI?
+QWIFI: 0                    //The WIFI is currently disabled

OK
AT+QWIFI=1                   //Enable WIFI function
OK
```

2.2. AT+QWSSID Set SSID

This command is used to set WIFI SSID.

AT+QWSSID Set SSID	
Test Command **AT+QWSSID=?**	Response **+QWSSID: <ssid>**

	OK
Read Command **AT+QWSSID?**	Response **+QWSSID: <ssid>** **OK**
Write Command **AT+QWSSID=<ssid>**	Response **OK** **ERROR**

Parameter

<ssid>	When AT+QWSSIDHEX=0, <ssid> is ASCII string with length ≤ 32 bytes Default SSID: Quectel-WIFI When the AT+QWSSIDHEX=1, <ssid> is HEX digits, indicates the length of raw data ≤ 32 bytes after coding (such as GBK, utf-8, etc.). This is mainly used to set SSID in Chinese

Example

```
AT+QWSSIDHEX?
+QWSSIDHEX: 0

OK
AT+QWSSID?
+QWSSID: Quectel-WIFI          //The current SSID is Quectel-WIFI
OK
AT+QWSSID=EC20_WIFI            //Set new SSID to EC20_WIFI
OK
```

2.3. AT+QWSSIDHEX Set SSID Encoding

This command is used to set the SSID encoding.

AT+QWSSIDHEX Set SSID Encoding	
Test Command **AT+QWSSIDHEX=?**	Response **+QWSSIDHEX: (0,1)** **OK**
Read Command **AT+QWSSIDHEX?**	Response **+QWSSIDHEX: <enable>** **OK**

Write Command	Response
AT+QWSSIDHEX=<enable>	**OK** **ERROR**

Parameter

<enable>	Set whether the parameter of AT+QWSSID command is HEX number or not, and the SSID will be saved separately 0 Parameter of AT+QWSSID command is a string 1 Parameter of AT+QWSSID command is HEX number

Example

```
AT+QWSSIDHEX?
+QWSSIDHEX: 0                          //The current SSID is the string

AT+QWSSID?
+QWSSID: Quectel-WIFI                  //The current SSID is Quectel-WIFI

OK
AT+QWSSIDHEX=1                         //Set SSID to HEX number
OK
AT+QWSSID?
+QWSSID: 5175656374656c2d57494649      //The current SSID is Quectel-WIFI for the ASCII encoding

OK
```

2.4. AT+QWBCAST Set Broadcast

This command is used to enable or disable the broadcast.

AT+QWBCAST Set Broadcast	
Test Command **AT+QWBCAST=?**	Response **+QWBCAST: (0,1)** **OK**
Read Command **AT+QWBCAST?**	Response **+QWBCAST: <broadcast>** **OK**

Write Command	Response
AT+QWBCAST=<broadcast>	**OK** **ERROR**

Parameter

<broadcast>	Enable or disable broadcast	
	0	Disable broadcast
	1	Enable broadcast

Example

```
AT+QWBCAST?
+QWBCAST: 1                    //The broadcast is enabled

OK
AT+QWBCAST=0                   //Disable broadcast
OK
```

2.5. AT+QWAUTH Set Authorization Type, Encryption Mode and Password

This command is used to set network authorization type, encryption mode and password.

AT+QWAUTH Set Authorization Type, Encryption Mode and Password	
Test Command **AT+QWAUTH=?**	Response **+QWAUTH: <auth>** **OK**
Read Command **AT+QWAUTH?**	Response **+QWAUTH: <auth>,<encrypt>[,<passwordindex>][,<password1>][,<password2>,<password3>,<password4>]** **OK**
Write Command **AT+QWAUTH=<auth>,<encrypt>[,<passwordindex>][,<password1>][,<password2>,<password3>,<password4>]**	Response **OK** **ERROR**

Parameter

<auth>	Authorization type	
	0	Open/shared
	1	Open
	2	Shared
	3	WPA
	4	WPA2
	5	WPA/WPA2
<encrypt>	Encryption mode	
	0	No encryption
	1	WEP
	2	TKIP
	3	AES
	4	TKIP-AES
<passwordindex>	Password string	
<password1>	Password string	
<password2>	Password string	
<password3>	Password string	
<password4>	Password string	

NOTES

The default network authorization mode is WPA/WPA2, encryption mode is TIKP-AES and password is 12345678. The setting of these parameters should comply with the following criteria:

1. If <auth> is 0 or 1, <encrypt> must be 0 or 1.
2. If <auth> is 2, <encrypt> must be 1.
3. If <auth> ≥3, <encrypt> must ≥2.
4. If <encrypt> =0, <passwordindex>, <password1>, <password2>, <password3>, <password4> are all null.
5. If <encrypt> =1:
   1) 1≤ <passwordindex> ≤4
   2) <passwordindex>=1, <password1> must be in password format, <password2>, <password3>, <password4> can be set to ""
   3) Password format: 5 or 13 ASCII characters,10 or 26 HEX number and ASCII characters need to add ""
6. If <encrypt> ≥2:
   1) <passwordindex> cannot be set.
   2) <password2>, <password3>, <password4> cannot be set.
   3) <password1> needs 8-63 ASCII characters or 64 HEX number and ASCII characters need to add ""

Example

```
AT+QWAUTH?
+QWAUTH: 0,1,1,“11111”,“22222”,“33333”,“44444”

OK
AT+QWAUTH?
+QWAUTH: 5,4,“12345678”

OK
AT+QWAUTH=0,0                          //Set auth>=open/share & <encrypt>=null
OK
AT+QWAUTH=0,1,1,“11111”,“22222”,“”,“”  //Set <auth>=open/share & <encrypt>=WEP
OK
AT+QWAUTH=2,1,2,“11111”,“22222”,“”,“”  //Set <auth>=share & <encrypt>=WEP
OK
AT+QWAUTH=5,4,“12345678”               //Set <auth>=WPA/WPA2 & <encrypt>=TIKP-AES
OK
```

2.6. AT+QWMOCH Set 802.11 Mode and Channel

This command is used to set the mode and channel of the 802.11 network.

AT+QWMOCH Set 802.11 Mode and Channel	
Test Command **AT+QWMOCH=?**	Response **+QWMOCH: (1-4),(0-13,149,153,157,161,165)** **OK**
Read Command **AT+QWMOCH?**	Response **+QWMOCH: <mode>,<channel>** **OK**
Write Command **AT+QWMOCH=<mode>,<channel>**	Response **OK** **ERROR**

Parameter

<mode>	802.11 Network frequency mode		
	1	a/n	5G mode (currently not supported)
	2	b	2.4G mode

	3	b/g	2.4G mode
	4	b/g/n	2.4G mode
<channel>	Channel selection		
	0		Automatic selection
	1-13		2.4G channel
	149/153/157/161/165		5G channel (currently not supported)

NOTES

<mode> and <channel> need to meet the following requirements:

1. If <mode> equals to 1, <channel> must be set to 0 or 149/153/157/161/165.
2. If <mode> is 2/3/4, <channel> can be set to 0-13.
3. If <mode> is 1, the Client device must support 5G mode.

Example

```
AT+QWMOCH?
+QWMOCH: 4,0                    //Current mode is 2.4G b/g/n, automatically select channel

OK
AT+QWMOCH=3,1                   //Set mode to 2.4G b/g, channel 1
OK
```

2.7. AT+QWISO Enable or Disable Isolation

This command is used to enable or disable Isolation

AT+QWISO Enable or Disable Isolation	
Test Command **AT+QWISO=?**	Response **+QWISO: (0,1)** **OK**
Read Command **AT+QWISO?**	Response **+QWISO: <isolation>** **OK**
Write Command **AT+QWISO=<isolation>**	Response **OK** **ERROR**

Parameter

<isolation>	Isolation status	
	0	Disabled
	1	Enabled

Example

```
AT+QWISO?
+QWISO: 0                    //Currently isolation is disabled

OK
AT+QWISO=1                   //Enable isolation
OK
```

2.8. AT+QWDHCP Set DHCP

This command is used to configure DHCP settings. And the settings will take effect after restarting WIFI.

AT+QWDHCP Set DHCP	
Test Command **AT+QWDHCP=?**	Response **+QWDHCP:** **<host_ip>,<range_start_ip>,<range_end_ip>,<leasetime>** **OK**
Read Command **AT+QWDHCP?**	Response **+QWDHCP:** **<host_ip>,<range_start_ip>,<range_end_ip>,<leasetime>** **OK**
Write Command **AT+QWDHCP=<host_ip>,<range_start_ip>,<range_end_ip>,<leasetime>**	Response **OK** **ERROR**

Parameter

<host_ip>	The IP of EC20 WIFI, format: 192.168.x.y
<range_start_ip>	Start IP distributed by DHCP, format: 192.168.sx.sy
<range_end_ip>	End IP distributed by DHCP, format: 192.168.ex.ey
<leasetime>	IP lease time for DHCP Client
	1-48 1-48 hours

NOTES

The x, y, SX, sy, ex and ey have the following relations:

1. 0<=x=sx=ex<= 255
2. y+9 <sy<=ey<=254

Example

```
AT+QWDHCP?
+QWDHCP: “192.168.1.1”,“192.168.1.100”,“192.168.1.120”,12

OK
AT+QWDHCP= “192.168.1.1”,“192.168.1.50”,“192.168.1.100”,6
OK
```

2.9. AT+QWNAT Set NAT type

This command is used to configure the NAT type.

AT+QWNAT Set NAT type	
Test Command **AT+QWNAT=?**	Response **+QWNAT: (0,1)** **OK**
Read Command **AT+QWNAT?**	Response **+QWNAT: <nat_type>** **OK**
Write Command **AT+QWNAT=<nat_type>**	Response **OK** **ERROR**

Parameter

<nat_type>	NAT type	
	0	Symmetric
	1	Cone

Example

```
AT+QWNAT?
+QWNAT: 0                    //The current NAT type is Symmetric

OK
AT+QWNAT=1                   //Set the NAT type to Cone
OK
```

2.10. AT+QWCLICNT Query the Number of WIFI Client

This command is used to query the number of Clients connected to AP.

AT+QWCLICNT Query the Number of WIFI Client	
Read Command **AT+QWCLICNT?**	Response **+QWCLICNT: <count>** **OK**

Parameter

<count>	Number of Clients connected to AP

Example

```
AT+QWCLICNT?
+QWCLICNT: 2                 //Currently 2 Clients are connected to AP

OK
```

2.11. AT+QWRSTD Restore Factory Settings

This command is used to restore WIFI to default settings. After the command is executed successfully, WIFI function will be enabled automatically.

AT+QWRSTD Restore Factory Settings	
Write Command **AT+QWRSTD**	Response **OK**

Example

```
AT+QWRSTD          //Restore WIFI to default settings
OK
```

2.12. AT+QWCLIP Query Client's IP Address

This command is used to query the IP address of the Client.

AT+QWCLIP Query Client's IP Address	
Test Command **AT+QWCLIP=?**	Response **+QWCLIP: <mac>** **OK**
Read Command **AT+QWCLIP?**	Response **ERROR**
Write Command **AT+QWCLIP=<mac>**	Response **+QWCLIP: <mac>,<ip>** **OK** **ERROR**

Parameter

<mac>	MAC address of the Client, when the Client is connected to AP, URC will be reported. Format: HEX number, such as:“0A:0B:0C:0D:0E:0F”
<ip>	IP address of the Client. such as: “123.123.123.123”

Example

```
+QWIFIND: 1,“0A:0B:0C:0D:0E:0F”          //The MAC address of the Client is "0A:0B:0C:0D:0E:0F"

AT+QWCLIP=“0A:0B:0C:0D:0E:0F”            //Query the IP address of the "0A:0B:0C:0D:0E:0F"
+QWCLIP: “0A:0B:0C:0D:0E:0F”,“123.123.123.123”   //Client IP is: “123.123.123.123”

OK
```

2.13. AT+QWSETMAC Set Module's MAC Address

This command is used to configure the MAC address of the EC20 module. The new address will only take effect after restarting EC20 module.

AT+QWSETMAC Set Module's MAC Address	
Test Command **AT+QWSETMAC=?**	Response **+QWSETMAC: <mac>** **OK**
Read Command **AT+QWSETMAC?**	Response **+QWSETMAC: <mac>** **OK**
Write Command **AT+QWSETMAC=<mac>**	Response **OK** **ERROR**

Parameter

<mac>	MAC address string of EC20 module. Format: HEX number. Module default MAC address is: “00:03:7F:05:C0:CA”

Example

```
AT+QWSETMAC?
+QWSETMAC: “00:03:7F:05:C0:CA”      //The MAC address of EC20 module is "00:03:7F:05:C0:CA"

OK
AT+QWSETMAC=“00:03:7F:05:C0:CB”     //Set the MAC address of EC20 module as "00:03:7F:05:C0:CB"

OK
```

2.14. AT+QWSERVER Enable or Disable qserver

This command is used to enable or disable the qserver function.

AT+QWSERVER Enable or Disable qserver	
Test Command **AT+QWSERVER=?**	Response **+QWSERVER: <enable>**

	OK
Read Command **AT+QWSERVER?**	Response **+QWSERVER: <enable>** **OK**
Write Command **AT+QWSERVER=<enable>**	Response **OK** **ERROR**

Parameter

<enable>	Current qserver status 0 qserver function is disabled 1 qserver function is enabled

Example

```
AT+QWSERVER?
+QWSERVER: 0                    //The current qserver is disabled

OK
AT+QWSERVER=1                   //Enable qserver function
OK
```

2.15. AT+QWCLILST List MAC Address of Connected Client

This command is used to list the MAC address of the Client that has been connected to AP.

AT+QWCLILST List MAC Address of Connected Client	
Read Command **AT+QWCLILST?**	Response **[+QWCLILST: <mac1>]** **[+QWCLILST: <mac2>]** **OK**

Parameter

<mac1>,<mac2>	Similar to the HEX number MAC address, such as aa:bb:cc:xx:xx:xx

Example

```
AT+QWCLILST?
OK                                  //No Client is connected to AP
AT+QWCLILST?                        //There are two Clients connected to AP
+QWCLILST: “AB:CD:EF:xx:xx:xx”
+QWCLILST: “xx:xx:xx:AB:CD:EF”

OK
```

2.16. AT+QWCLIRM Disconnect a Connected Client

This command is used to disconnect a connected Client.

AT+QWCLIRM Disconnect a Connected Client	
Test Command **AT+QWCLIRM=?**	Response **+QWCLIRM: <mac>** **OK**
Write Command **AT+QWCLIRM=<mac>**	Response **OK** **ERROR**

Parameter

<mac>	Similar to the HEX number MAC address, such as aa:bb:cc:xx:xx:xx

Example

```
AT+QWCLILST?                        //There are two Clients connected to AP
+QWCLILST: “AB:CD:EF:12:34:56”
+QWCLILST: “12:34:56:AB:CD:EF”

OK
AT+QWCLIRM=“11:22:33:44:55:66”
ERROR                               //This client is not connected.
AT+QWCLIRM=“AB:CD:EF:12:34:56”
OK                                  //Successfully disconnect the Client of which MAC
                                      address is AB:CD:EF:12:34:56
```

2.17. AT+QWTOCLIEN Assign a Port for the Client to Transfer Data

This command specifies a TCP port to start a TCP server at EC20. After the Client is connected to the port, it will receive the data sent by AT+QWTOCLI command, and the data sent by the Client will report URC (+QWCLIND) to EC20 URC port. This command is used only when the WIFI function has been enabled (AT+QWIFI=1) and the data transferred by the Client must be visible string and ended by '\n'.

AT+QWTOCLIEN Assign a Port for the Client to Transfer Data	
Test Command **AT+QWTOCLIEN=?**	Response **+QWTOCLIEN: (0,1)[,(1025-65535)]** **OK**
Read Command **AT+QWTOCLIEN?**	Response **+QWTOCLIEN: <enable>** **OK**
Write Command **AT+QWTOCLIEN=<enable>[,<port>]**	Response **OK** **ERROR**

Parameter

<enable>	Enable or disable data transmission function 0 Disabled 1 Enabled
<port>	TCP port connected by the Client, that is the port started on TCP server. If this parameter is not specified, the default port is 5555

Example

```
AT+QWTOCLIEN?
+QWTOCLIEN: 0,5555

OK
AT+QWTOCLIEN=1,5544
OK
AT+QWTOCLIEN?
+QWTOCLIEN: 1,5544

OK
```

2.18. AT+QWTOCLI Send Data to Client

After the Client is connected to the specified port by AT+QWTOCLIEN, it will receive the data sent by the AT+QWTOCLI command.

AT+QWTOCLI Send Data to Client	
Test Command **AT+QWTOCLI=?**	Response **+QWTOCLI: <string>** **OK**
Write Command **AT+QWTOCLI=<string>**	Response **OK** **ERROR**

Parameter

<string>	The string in quotation marks, the maximum length is 520 bytes

Example

```
AT+QWTOCLIEN?
+QWTOCLIEN: 0,5555

OK
AT+QWTOCLIEN=1,5544        //Failed to enable the function, WIFI is disabled.
ERROR
AT+QWIFI=1                 //Enabled WIFI
OK
AT+QWTOCLIEN=1,5544        //WIFI is enabled successfully.
OK

//The WIFI port connected to EC20 by the Client is 5544 and the default IP is192.168.225.1
//If the Client has connected to the port

AT+QWTOCLI="data from at port"
OK

//The Client will receive data from port
//Client sends data from client\n

+QWCLIND: data from client      //Data will be reported from EC20 URC port
```

3 WIFI Related URC

3.1. +QWIFIND URC of Client Connection Status

After WIFI is enabled (AT+QWIFI=1), if a Client is connected or disconnected to AP, URC will be reported to indicate the Client's MAC address.

+QWIFIND URC of Client Connection Status
+QWIFIND: <connect>,<mac>

Parameter

<connect>	Indicate Client connection/disconnection status 0 Client is disconnected to AP 1 Client is connected to AP
<mac>	MAC address of the Client. Format: HEX number, such as: “0A:0B:0C:0D:0E:0F”

Example

```
+QWIFIND: 1,“0A:0B:0C:0D:0E:0F”      //The Client of which MAC address is “0A:0B:0C:0D:0E:0F” has been connected to AP

+QWIFIND: 0,“0A:0B:0C:0D:0E:0F”      //The Client of which MAC address is “0A:0B:0C:0D:0E:0F” has been disconnected
```

3.2. +QWCLIND URC for Client Data Transmission

After the Client is connected to the port, it will receive the data sent by AT+QWTOCLI command, and the data sent by the Client will report URC to EC20 URC port. This command is used only when the WIFI function has been enabled (AT+QWIFI=1) and the data transferred by the Client must be visible string and

ended by '\n'.

+QWCLIND URC for Client Data Transmission
+QWIFIND: <string>

Parameter

<string>	Data string sent by the Client

Example

```
+QWCLIND: data from client      // Data sent by the Client
```