EC20 Wi-Fi Application Note

LTE Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2015-12-15	Scott HU	Initial
1.1	2016-10-12	Tommy ZHANG	1. Deleted the command AT+QWTOCLI and URC +QWCLIND 2. Updated the command AT+QWMOCH: added the parameter <rate> for data rate configuration 3. Added the command AT+QLINUXCMD 4. Added the command AT+QWPARAM

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1 4G+Wi-Fi Solution

1.1. Introduction

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

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

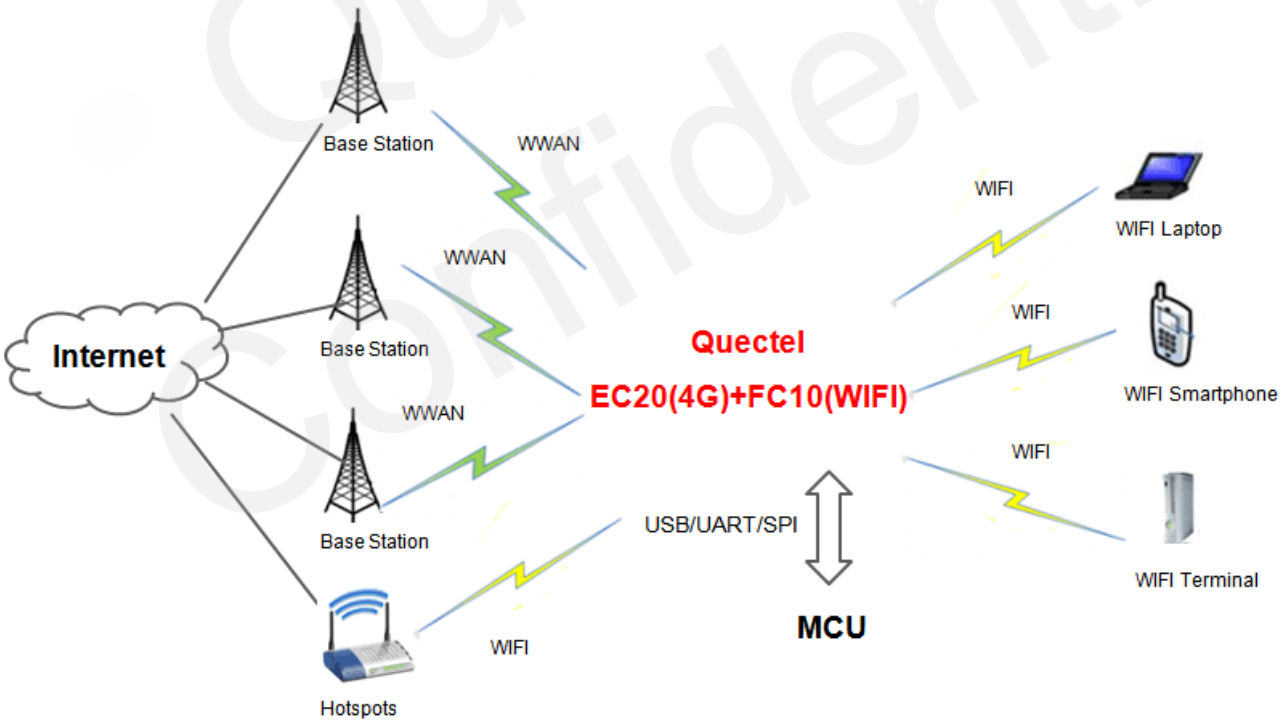

Figure 1: Software Workflow

1. Client and MCU can access to 4G network through EC20 at the same time.
2. MCU can control Wi-Fi connection via AT commands.
3. FC10 Wi-Fi module supports AP mode and STA mode (under development), when there are other Wi-Fi hotspots around, Network data can be uploaded to the Internet through other Wi-Fi 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

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1.3. Wi-Fi Solution Architecture

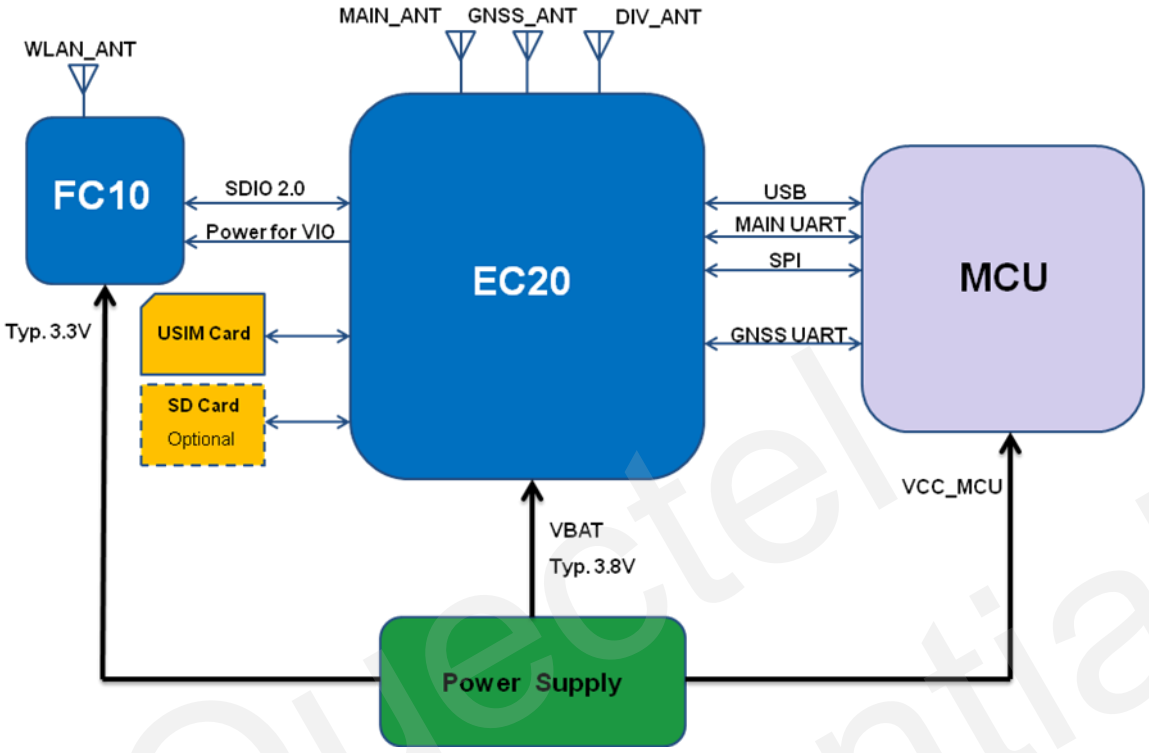

Figure 2: Wi-Fi Solution Architecture

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.

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2 Wi-Fi Related AT Commands

The following table lists the Wi-Fi related AT commands.

Table 2: Wi-Fi Related AT Commands

AT Commands	Description
AT+QWIFI	Enable or disable Wi-Fi 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 Wi-Fi 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+QWPARAM	Portal configuration

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2.1. AT+QWIFI Enable or Disable Wi-Fi Function

This command is used to enable or disable Wi-Fi Function.

AT+QWIFI Enable or Disable Wi-Fi 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 Wi-Fi 0 Wi-Fi is disabled 1 Wi-Fi is enabled

Example

```
AT+QWIFI?
+QWIFI: 0                    //The Wi-Fi is currently disabled.

OK
AT+QWIFI=1                   //Enable Wi-Fi function.
OK
```

2.2. AT+QWSSID Set SSID

This command is used to set Wi-Fi SSID.

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

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	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 **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 SSID encoding.

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

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

OK
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
AT+QWSSID=D2C6D4B6CDA8D0C5             //Set the new SSID as Quectel's GBK 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 **AT+QWBCAST=<broadcast>**	Response **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**

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Write Command	Response
AT+QWAUTH=<auth>,<encrypt>[,<passwordindex>][,<password1>][,<password2>,<password3>,<password4>]	**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 numbers. ASCII characters need to be added “” and HEX numbers do not need to be added “”.
6. If <encrypt> ≥2:

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1) <passwordindex> cannot be set.
2) <password2>, <password3>, <password4> cannot be set.
3) <password1> needs 8-63 ASCII characters or 64 HEX numbers. ASCII characters need to be added “” and HEX numbers do not need to be added “”.

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 Network Mode, Channel and Data Rate

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

AT+QWMOCH Set 802.11 Network Mode, Channel and Data Rate	
Test Command **AT+QWMOCH=?**	Response **+QWMOCH: (1-4),(0-13,149,153,157,161,165)[,(0-19)]** **OK**
Read Command **AT+QWMOCH?**	Response **+QWMOCH: <mode>,<channel>[,<rate>]** **OK**
Write Command **AT+QWMOCH=<mode>,<channel>[,<rate>]**	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
	5	g_only	2.4G mode
	6	n_only	2.4G mode
<channel>	Channel selection		
	0		Automatic selection
	1-13		2.4G channel
	149/153/157/161/165		5G channel (currently not supported)
<rate>	802.11 data rate configuration. It's optional		
	b		0 - 3
	b/g		0 - 11
	b/g/n		0 - 19
	g_only		4 - 11
	n_only		12 – 19
	Data rate chart: 0 - 1Mb/s; 1 - 2Mb/s; 2 - 5.5Mb/s; 3 - 11Mb/s; 4 - 6Mb/s 5 - 9Mb/s; 6 - 12Mb/s; 7 - 18Mb/s; 8 - 24Mb/s; 9 - 36Mb/s 10 - 48Mb/s; 11 - 54Mb/s; 12 - 6.5Mb/s; 13 - 13Mb/s; 14 - 19.5Mb/s 15 - 26Mb/s; 16 - 39Mb/s; 17 - 52Mb/s; 18 - 58.5Mb/s; 19 - 65Mb/s		

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
```

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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 Wi-Fi.

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

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	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 Wi-Fi. 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 set the NAT type.

AT+QWNAT Set NAT type	
Test Command	Response

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AT+QWNAT=?	**+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 Wi-Fi Client

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

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

Parameter

<count>	Number of Client connected to AP

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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 Wi-Fi to default settings. After the command is executed successfully, Wi-Fi function will be enabled automatically.

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

Example

```
AT+QWRSTD          //Restore Wi-Fi 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**

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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”.

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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
```

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2.15. AT+QLINUXCMD Execute Linux Command

This command is used to execute Linux command.

AT+QLINUXCMD Execute Linux Command	
Test Command **AT+QLINUXCMD=?**	Response **+QLINUXCMD: <command>** **OK**
Write Command **AT+QLINUXCMD=<command>**	Response **OK** **ERROR**

Parameter

<command>	Valid Linux command. The result of Linux command will not return.

Example

```
AT+QLINUXCMD=“ls -la”                                    //List files of the current directory.
OK

AT+QLINUXCMD="echo 1 > /proc/sys/net/ipv4/ip_forward"    //Enable IP forward.
OK
```

2.16. 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.

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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
```

2.17. 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.
```

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2.18. 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 via **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 Wi-Fi 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
```

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2.19. AT+QWPARAM Set Portal Configuration

This command is used to configure EC20 Wi-Fi portal.

- **Portal Application**

When Wi-Fi SSID is connected, the user will be redirected to portal URL page if there is a need to access the internet. The user has to enter the user name and password for authentication, and only after the authentication success, the user can then connect to Internet.

- **EC20 Portal Modes**

Currently EC20 supports two kinds of portal authentication methods. One is the Quectel custom portal mode, and the other is the standard WiFiDog portal mode.

Quectel custom portal mode is shown as following figure. When Wi-Fi SSID is connected, the user will be redirected to portal URL page if there is a need to access the Internet. The user will be asked for some authentication such as user name and password, and then the authentication server will send the result to the MCU. The MCU controls whether the user can access the Internet finally.

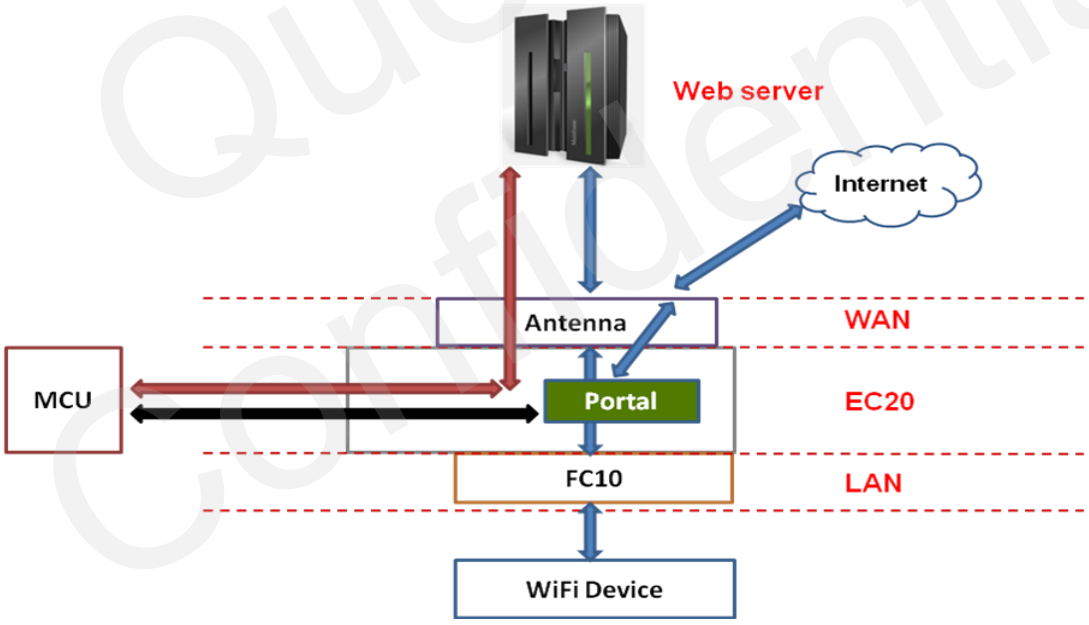

Figure 3: Quectel Custom Portal Mode

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Standard WiFiDog portal mode is shown as ***Figure 4***. When Wi-Fi SSID is connected, the user will be redirected to portal URL page if there is a need to access the Internet. The user will be asked for some authentication such as user name and password, and then the authentication server will send the result to EC20. The EC20 controls whether the user can access the internet finally. External MCU intervention is no longer required. For detailed authentication processes, please refer to ***Figure 5***.

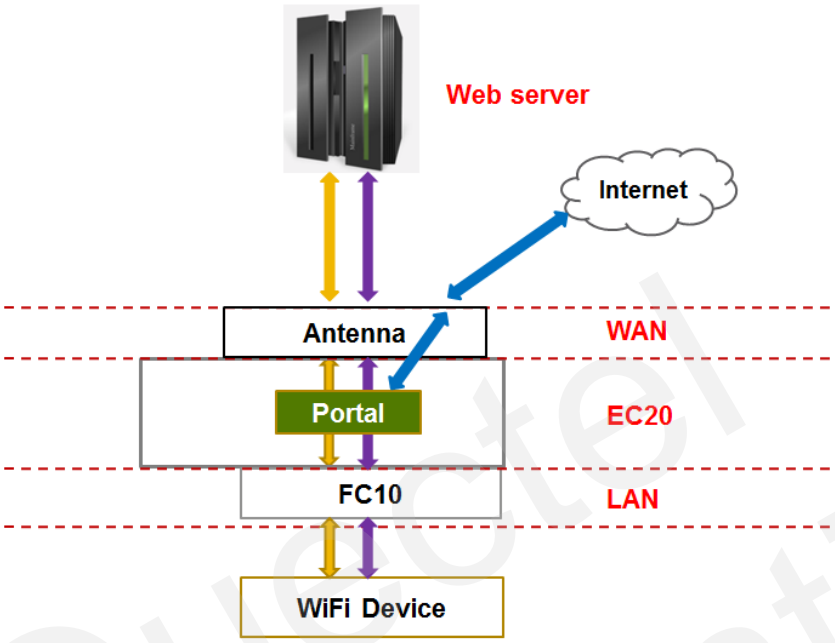

Figure 4: Standard WiFiDog Portal Mode

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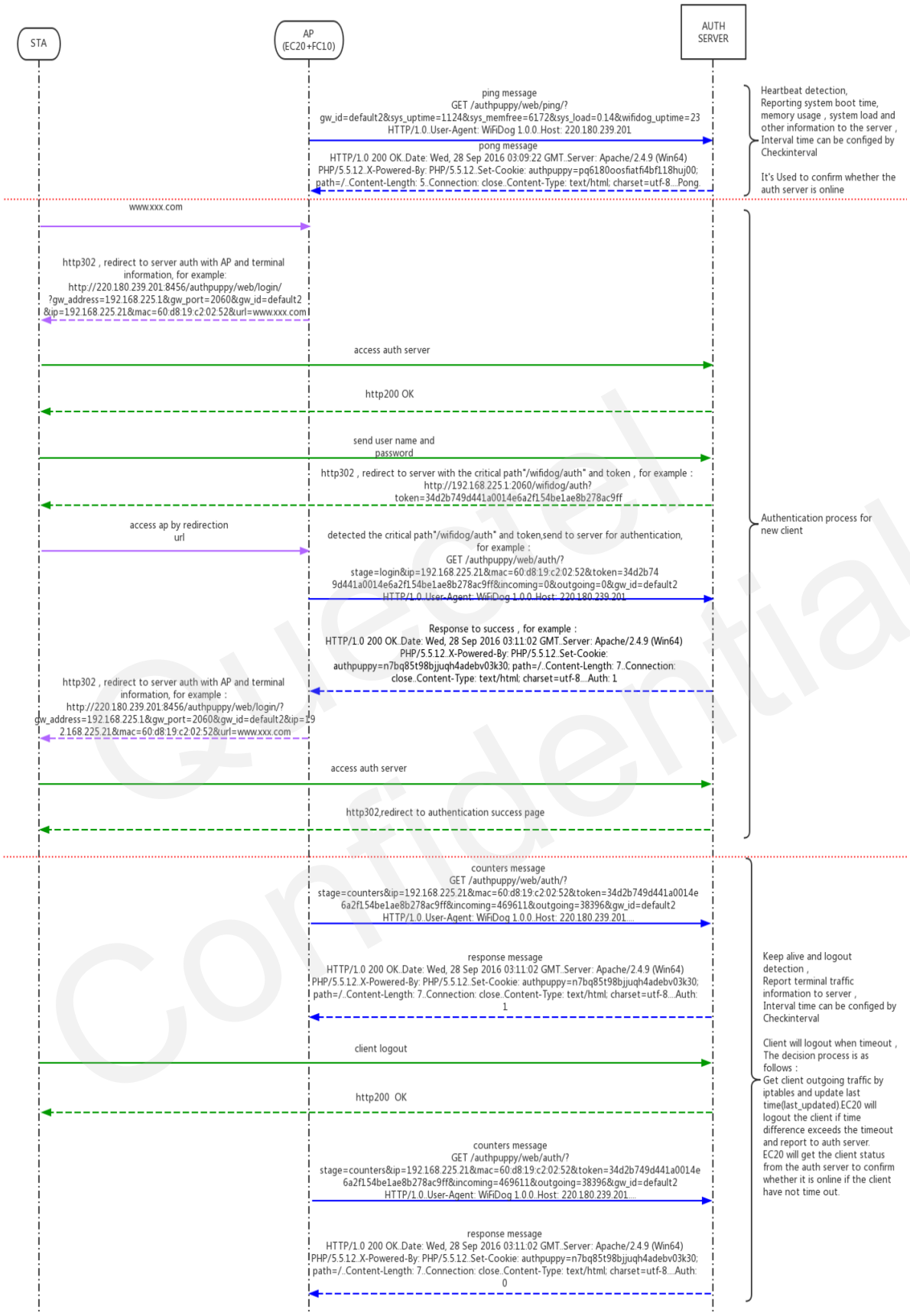

Figure 5: Authentication Processes of Standard WiFiDog Portal

AT+QWPARAM Set Portal Configuration	
Test Command **AT+QWPARAM=?**	Response **+QWPARAM: (0-6)[,<url>][,<deviceID>][,<client_mac>,<limit>,<reserved>][,<whitelst>][,<client_mac>][,<mode>][,<option>][,<typical_mode>][,<timeout>]** **OK**
Read Command **AT+QWPARAM?**	Response **OK**
Set URL **AT+QWPARAM=0,<url>**	Response Enter <url>, write the url **OK** **ERROR** Omit <url>, read the url **+QWPARAM: 0,<url>** **OK**
Set device ID **AT+QWPARAM=1,<deviceID>**	Response Enter <deviceID>, write the device ID **OK** **ERROR** Omit <deviceID>, read the deviceID **+QWPARAM: 1,<deviceID>** **OK**
Enable client **AT+QWPARAM=2,<client_mac>,<limit>,<reserved>**	Response **OK** **ERROR**
Set white list **AT+QWPARAM=3,<whitelst>**	Response Enter <whitelst>, write the white list **OK** **ERROR** Omit <whitelst>, read all white list **+QWPARAM: 3,<whitelst>** **OK**
Clean white list **AT+QWPARAM=4**	Response **OK** **ERROR**

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Delete a white list **AT+QWPARAM=5,<client_mac>**	Response **OK** **ERROR**
Enable/disable portal **AT+QWPARAM=6,<mode>**	Response Enter <mode>, enable or disable portal **OK** **ERROR** Omit <mode>, read the mode **+QWPARAM: 6,<mode>** **OK**
Set local portal **AT+QWPARAM=7,<option>**	Response Enter <option>, enable or disable local portal **OK** **ERROR** Omit <option>, read the option **+QWPARAM: 7,<option>** **OK**
Query client traffic **AT+QWPARAM=8,<client_mac>**	Response **+QWPARAM: 8,<Rx bytes>,<Tx bytes>** **OK** **ERROR**
Enable/disable standard wifidog portal **AT+QWPARAM=9,<typical_mode>**	Response Enter <typical_mode>, enable or disable standard wifidog portal **OK** **ERROR** Omit <typical_mode>, read the typical mode **+QWPARAM: 9,<typical_mode>** **OK**
Set client timeout **AT+QWPARAM=10,<timeout>**	Response Enter <timeout>, write client timeout **OK** **ERROR** Omit <timeout>, read the timeout **+QWPARAM: 10,<timeout>**

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	OK

Parameter

<url>	The portal server URL. Must begin with http://. The default is NULL.
<deviceID>	EC20's ID. Used for portal authentication, 4-20 byte. The default is NULL.
<client_mac>	Client's MAC address. Example: 11:bb:22:dd:33:ff. Case-insensitive.
<limit>	Traffic upper limit that Client uses. The Client can't access network when the traffic reaches the limit. Unit: MB.
<reserved>	Reserved parameter
<whitelst>	White list. Default allowed Client MAC address, in hexadecimal not case-sensitive. If there are multiple MACs, use delimiter |. Example: 11:22:aa:bb:cc:dd|33:44:ee:ff:aa:bb. The default is NULL.
<mode>	Wi-Fi authentication mode 0 Normal authentication, configured via **AT+QWAUTH** 1 Portal authentication
<option>	Local portal mode 0 Disable the local portal, must be executed before **AT+QWIFI=1**. 1 Enable the local portal, must be executed before **AT+QWIFI=1** and **AT+QWSERVER=1**. 2 Download the portal html and save it to Flash, so that it will not be lost when power down. This must be executed before **AT+QWIFI=1**.
<typical_mode>	Portal mode 0 Quectel custom portal mode 1 Standard wifidog portal mode
<timeout>	The Client timeout. The unit is second. Client will log out when time is out.
<Rx bytes>	Downstream traffic. Unit: byte.
<Tx bytes>	Upstream traffic. Unit: byte.

Example

```
AT+QWPARAM=0
+QWPARAM: 0,                    //Portal server URL is NULL.

OK

AT+QWPARAM=1
+QWPARAM: 1,                    //DeviceID is NULL.

OK

AT+QWPARAM=3
+QWPARAM: 3,                    //White list is NULL.
```

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```
OK

AT+QWPARAM=6
+QWPARAM: 6,0                                   //Authentication is normal mode.

OK

AT+QWPARAM=0,http://aaa.bbb.com/portal          //Set authentication url.
OK

AT+QWPARAM=1,12345678                           //Set deviceID.
OK

AT+QWPARAM=3,11:22:bb:cc:dd:33|22:33:44:aa:bb:cc  //Set white list.
OK

AT+QWPARAM=6,1                                  //Set authentication mode.
OK

AT+QWAUTH=0,0                                   //Set Wi-Fi without password.
OK

AT+QWIFI=1                                      //Enable Wi-Fi.
OK
```

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3 Wi-Fi Related URC

3.1. +QWIFIND URC of Client Connection Status

After Wi-Fi 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.
```

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