



FSC-BW256B User Guide

Release 2.2.1

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This guide applies to the FSC-BW256x series Bluetooth + Wi-Fi SOC modules. Specific module models include:

- FSC-BW256B

This guide consists of the following chapters:

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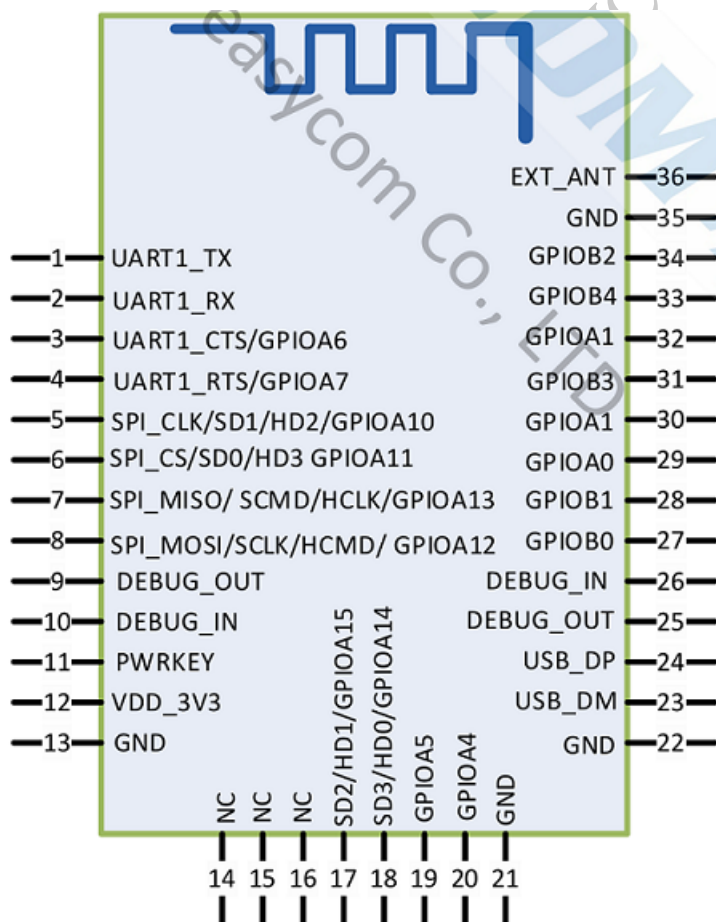
Chapter 1

Hardware Design

[中文版]

1.1 1. Module Pin Diagram

Diagram with FSC-BW256B:



1.2 2. Description of PIN Definitions

Pin	Pin Name	Type	Descriptions
1	UART_TX	O	Serial port TX
2	UART_RX	I	Serial port RX
3	UART_CTS	I	Serial port flow control pin(High effective)
4	UART_RTS	O	Serial port flow control pin(High effective)
9	UART_LOG_OUT	O	Module debugging serial port TX
10	UART_LOG_IN	I	Module debugging serial port RX
11	Pwrkey	I/O	power key(software reset pin)
12	VDD_3V3	VDD	3.3V power supply
13	GND	VSS	Ground connection
21	GND	VSS	Ground connection
22	GND	VSS	Ground connection
32	LED0	I/O	Bluetooth is connected to output high
33	LED1	I/O	Wi-Fi is connected to output high level
35	GND	VSS	Ground connection
36	EXT_ANT	ANT	antenna

1.3 3. Hardware Design Note

- The simple test of the module only requires connecting VDD/GND/UART_RX/UART_TX to be used
- The programming manual only provides simple descriptions of IO ports. For more detailed instructions and precautions, please refer to the design document
- After drawing the schematic diagram, please send it to Feasycom for review to avoid the Bluetooth or Wi-Fi distance not achieving the best effect

1.4 4. Hardware Interface

- GPIO
- PWM
- UART

- USB 2.0
- SPI
- SDIO 3.0
- I2S Master/Slave
- Analog Input/Output

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Chapter 2

Function Description

[中文版]

2.1 1. Basic product specifications

Model	FSC-BW256B
Bluetooth version	Bluetooth 5.4
Bluetooth Protocol	BLE & BR/EDR
Bluetooth frequency band	2.4G
Wi-Fi standard	IEEE 802.11 a/b/g/n/ac (Wi-Fi5) /ax (Wi-Fi6)
Wi-Fi frequency band	2.4G&5G

2.2 2.Support Communication Protocols

2.2.1 2.1 Support Bluetooth protocol

- SPP Client (Serial Port Profile)
- SPP Server (Serial Port Profile)
- GATT Server (Generic Attribute Profile)

2.2.2 2.2. Support Wi-Fi protocol

- TCP (Transmission Control Protocol)
- UDP (USER Datagram Protocol)

- HTTP (Hypertext Transfer Protocol)
- HTTPS (Hypertext Transfer Protocol Secure)
- MQTT (Message Queuing Telemetry Transport)
- SSL (Secure Socket Layer)

2.3 3. Module Default Parameter

2.3.1 3.1 Wi-Fi Default Settings

Wi-Fi Mode	STA Mode
Local AP SSID	FSC-BW256B-AP
Local AP Password	12345678
Local AP Channel	1
Local AP IP Address	192.168.1.1

2.3.2 3.2 Bluetooth Default Settings

BLE Name	FSC-BW256B-LE
BLE Mode	LE-Peripheral
SPP Name	FSC-BW256B
SPP Pair Code	0000
SPP COD	0x680

2.3.3 3.3 Serial Port Default Settings

Baudrate	921600bps
Data Bits	8
Parity	None
Stop Bits	1

Chapter 3

Quick Development Kit

[中文版]

3.1 1. Datasheet

- FSC-BW256B Datasheet

3.2 2. Evaluation Board

- FSC-DB105 : Feasycom USB-to-Serial Port Bluetooth & Wi-Fi Data Transmission Application Development Board.

3.3 3. AT Command Set

- FSC-BW256B General Data AT Command Set

3.4 4. Serial Port Tool

- Feasycom Serial Port Tool : A serial communication analysis tool based on Windows PC.

3.5 5. APP&SDK

- FeasyBlue : Feasycom APP & SDK resource supporting Android and iOS platforms, which enables functions such as Bluetooth BLE & SPP data communication debugging,

Feasycom module firmware version reading, firmware OTA upgrade, parameter configuration, etc.

3.6 6. Firmware Upgrade

- OTA Upgrade
 - Upgrade Techniques : ****FeasyBlue APP OTA Upgrade ****、**OTA Upgrade By AT Command**
 - Upgrade Guide : Please refer to **FSC-BW256x - OTA Upgrade**

Chapter 4

Quick Start

[中文版]

4.1 1. Hardware preparation

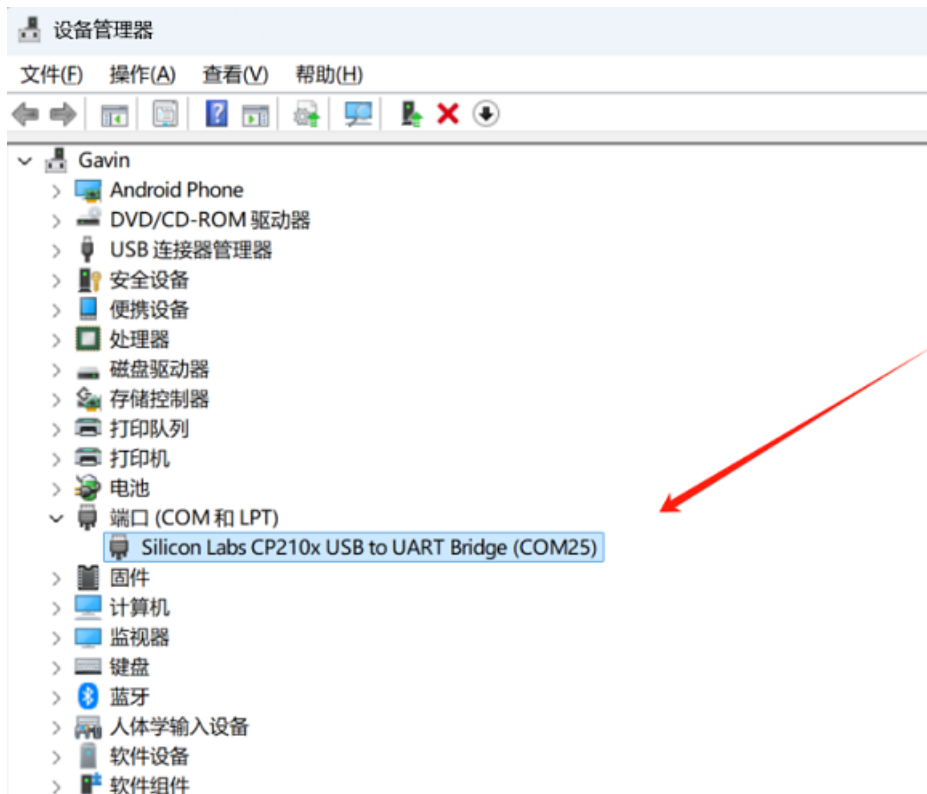
- 1 x FSC-DB105-BW256B Development Kit : FSC-DB105 USB-to-Serial Port quick evaluation board integrated with FSC-BW256B
- 1 x Computer (Windows / Mac)

4.2 2. Software Preparation

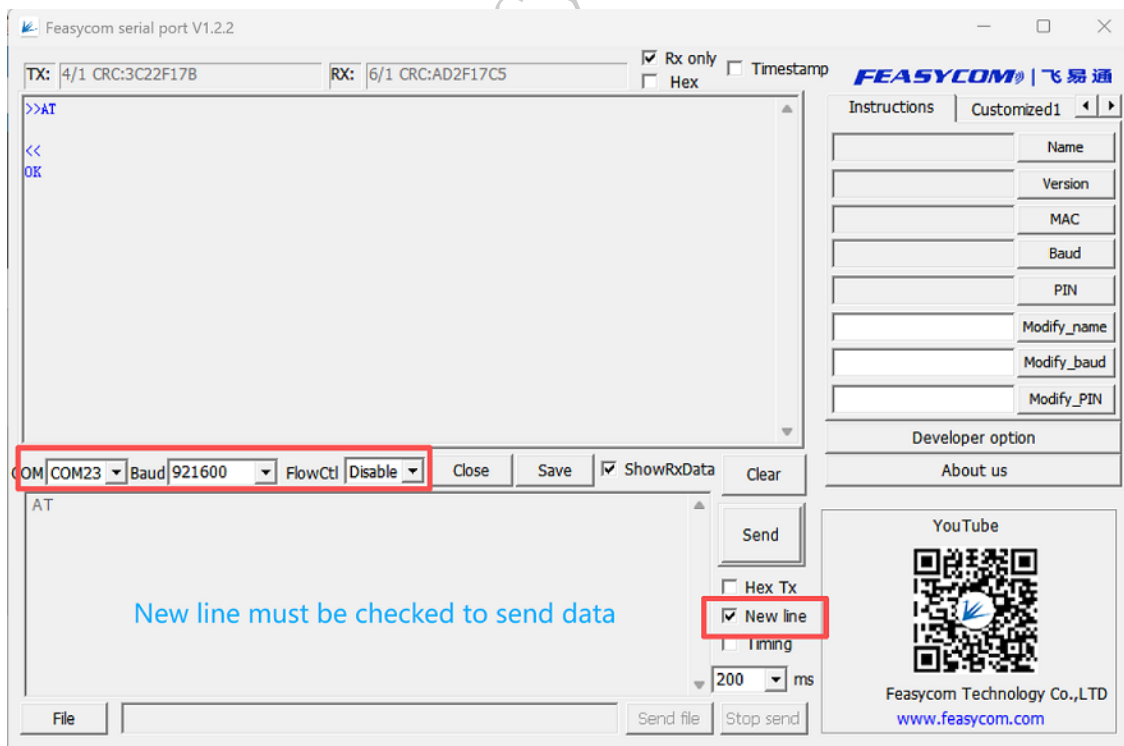
- Feasycom Serial Port Tool
- **Communication Interface:** UART
- **UART Configuration:** 921600/8/N/1

4.3 3. Hardware connection method

1. Connect the FSC-DB105-BW256B to the PC through USB, and the PC will automatically identify the serial port and generate the virtual COM port.



2. Run Feitong Serial Assistant on PC, set the correct **COM** and **Baud**, and check **New line**.



4.4 4. Communication test

Such as the following a few basic general the AT command test sample, more instructions refer to form a complete set of applicable FSC-BW256B General Data AT Command Set

4.4.1 AT - Serial Communication Test

Com-mand	AT\r\n
Response	\r\nOK\r\n
Descrip-tion	Test the UART communication between HOST and Module after power on, baudrate changed, etc.

Example:

```
Send :<<AT\r\n
Response :>>\r\nOK\r\n      //successfully connected
```

4.4.2 AT+NAME - Read the BR/EDR Bluetooth name

Example:

```
Send:<< AT+NAME
Response :>> +NAME=FSC-BW256B-XXXX      //Example, please refer to
→the actual reading result
Response :>> OK
```

4.4.3 AT+VER - Read the current firmware version

Example:

```
Send:<< AT+VER
Response :>> +VER=FSC-BW256B,V1.0.0      //Example, please refer to
→the actual reading result
Response :>> OK
```

Chapter 5

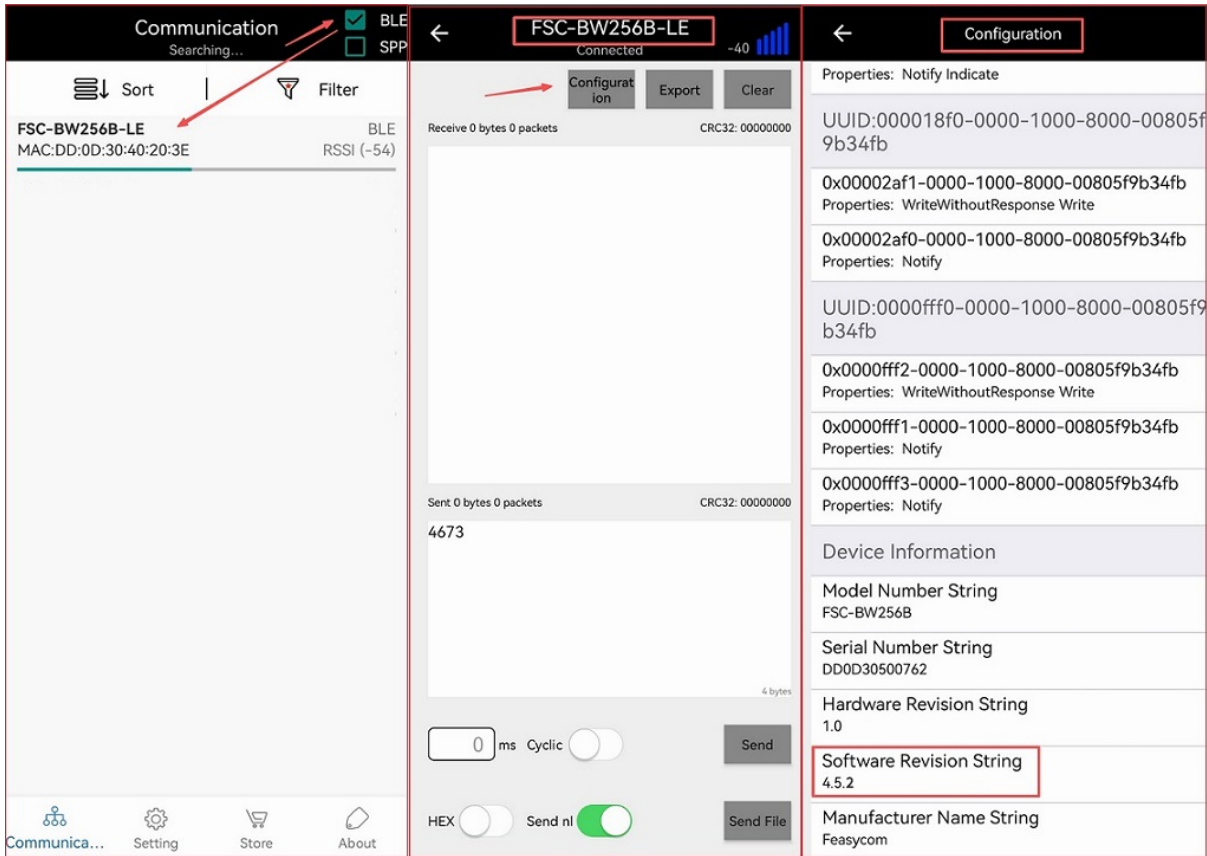
Obtain Firmware Version

[中文版]

Currently, the following two methods are supported to quickly obtain the firmware version information of Feasycom modules:

5.1 1. FeasyBlue APP

After establishing a BLE connection with the FSC-BW256x series Bluetooth module via the mobile application **FeasyBlue**, view the firmware version information in the **Transfer Configuration** function interface. The following operation diagram is shown:



5.2 2. UART AT command

Send the **AT+VER** command via the serial port to view the firmware program version information of the module. Examples of AT command operation and response events are as follows:

```
Send: >>AT+VER
Response: <<+VER=FSC-BW256B,V4.5.2    //Example, please refer to the actual reading result
Response: <<OK
```

Chapter 6

Development Examples

[中文版]

6.1 Bluetooth Networking

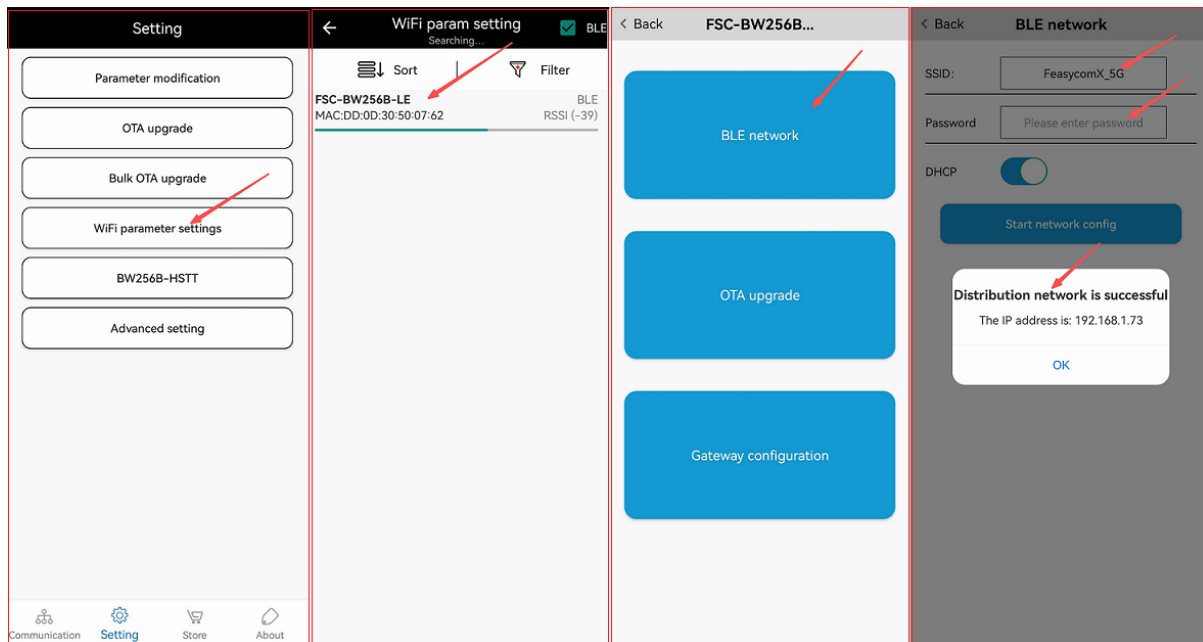
6.1.1 FeasyBlue Bluetooth Networking

APP Download

- [FeasyBlue APP]

Networking Guide

1. Open the **FeasyBlue** app and click on **Settings - WiFi Parameter Settings** in sequence.
2. Check **BLE** in the upper right corner of the application interface, scan and select the Bluetooth device BW256B you want to upgrade.
3. Select and click on **Bluetooth Distribution Network** - In the pop-up **SSID** 和 **Password** window, enter the **SSID** 和 **password** of the Wi-Fi AP to be connected, and click **Start Distribution Network**. After the distribution network is completed, It will display the **successful network distribution** and the obtained **IP address** .



6.2 Data Throughput Mode Application

6.2.1 What Is Throughput Mode?

FSC-BW256x series Bluetooth & Wi-Fi module features two data transmission modes:

Throughput Mode and **Command Mode**.

The default command mode of the general data transmission application firmware. If you need to switch, you can refer to [FSC-BW256B General Data AT Command Set], and using the **AT+TPMODE** command.

The working mechanisms and differences of the two data transmission modes are as follows:

- **Throughput Mode:**

Without Bluetooth or Wi-Fi connection, the data received through the serial port is parsed in the format of AT instructions;

Bluetooth or Wi-Fi connection has been established, All the data received through the serial port is sent to the remote end as is.

- **Command Mode:**

Without Bluetooth or Wi-Fi connection, The data received through the serial port is parsed in the format of AT instructions;

Bluetooth or Wi-Fi connection has been established, The data received through the serial port is still parsed in the AT instruction format and needs to be sent to the remote end via AT

instructions. For example, when connecting with BLE, use the AT+LESEND command to send data. When establishing a TCP connection, use the AT+WFSEND command to send data.

6.2.2 Switch To Throughput Mode

Enter the Throughput Mode: Before establishing a Bluetooth or Wi-Fi connection, the FSC-BW256B module can use the command AT+TPMODE=1 to activate the transparent transmission mode. The operation example is as follows:

```
Send: >> AT+TPMODE=1 //Set it.
      ↳to transparent transmission mode
Response: << OK
```

When Bluetooth or Wi-Fi connection has been established, exit throughput mode:

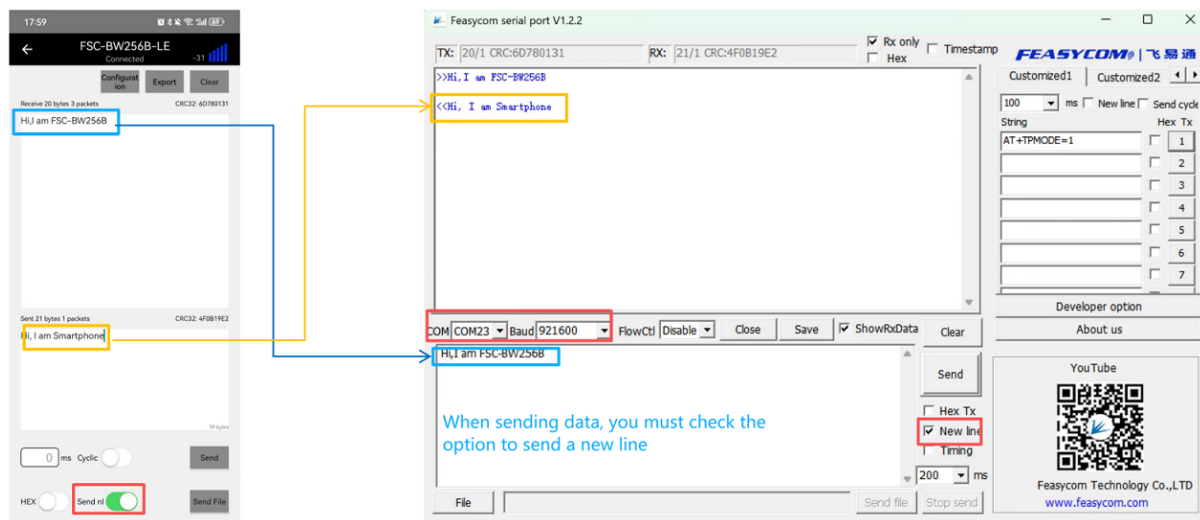
```
Send: >> +++ //Send "+++". Note: When operating on the host.
      ↳computer's serial port tool, please uncheck "New Line" at this.
      ↳time.
Response: << a //Received response "a"
Send: >> a //Send "a". Note: When operating on.
      ↳the host computer's serial port tool, please uncheck "New Line" at.
      ↳this time.
Response: << +ok //Successfully exited
```

Note

- Throughput Mode only takes effect when connections (such as Bluetooth, TCP/UDP) have been established. Therefore, the methods to exit transparent transmission also only work under such circumstances. When no connections have been established, you can directly use the AT command (AT+TPMODE) to switch (modes).
- The data format for sending and receiving mentioned above differs from that of AT commands. Standard AT commands end with <CR><LF> , while the above-mentioned control commands are strings that do not come with <CR><LF>.

6.2.3 Throughput Mode Application

Module to Phone Communication

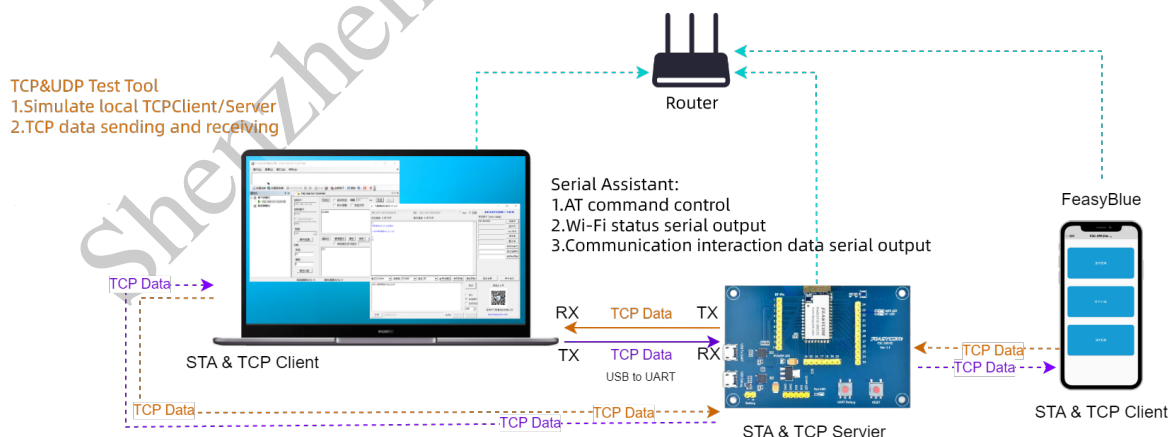


6.3 TCP Server Application

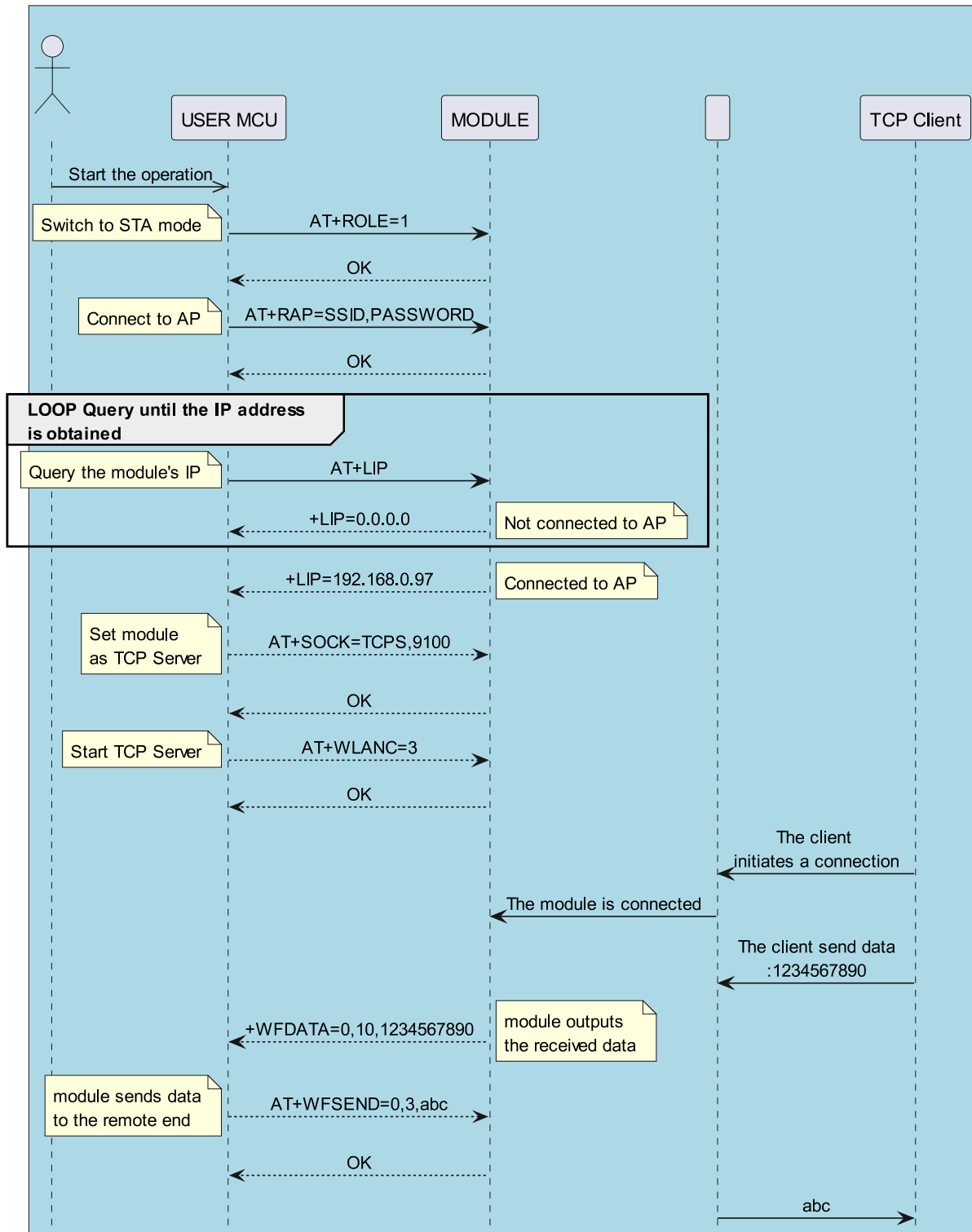
6.3.1 Tools

- Feasycom Serial Port Tool : A serial communication analysis tool based on Windows PC.
- (Option) TCP&UDP Test Tool : Optional third-party PC-based network debugging tools are available.

6.3.2 TCP Server Application Block Diagram



6.3.3 TCP Server Application Flowchart



6.3.4 TCP Server Application Example

1. Set the module to Wi-Fi mode. If it is already in the current mode, you can skip this step.
The operation example of the AT command is as follows:

```
Send: << AT+ROLE=1
```

```
Response: >> OK
```

2. The module is connected to the AP hotspot. An example of AT command operation is as follows:

```
Send: << AT+RAP=ssid,password
```

```
Response: > OK
```

3. Query the IP address of the module to confirm that it has been connected to the network. The operation example of the AT command is as follows:

```
Send: << AT+LIP
```

```
Response: >> +LIP=192.168.0.97 //For local examples, please refer to the actual IP address obtained by connecting to the AP
```

```
Response: >> OK
```

4. Set the module to TCP server with port 9100. The operation example of the AT command is as follows:

```
Send: << AT+SOCK=TCPS,9100
```

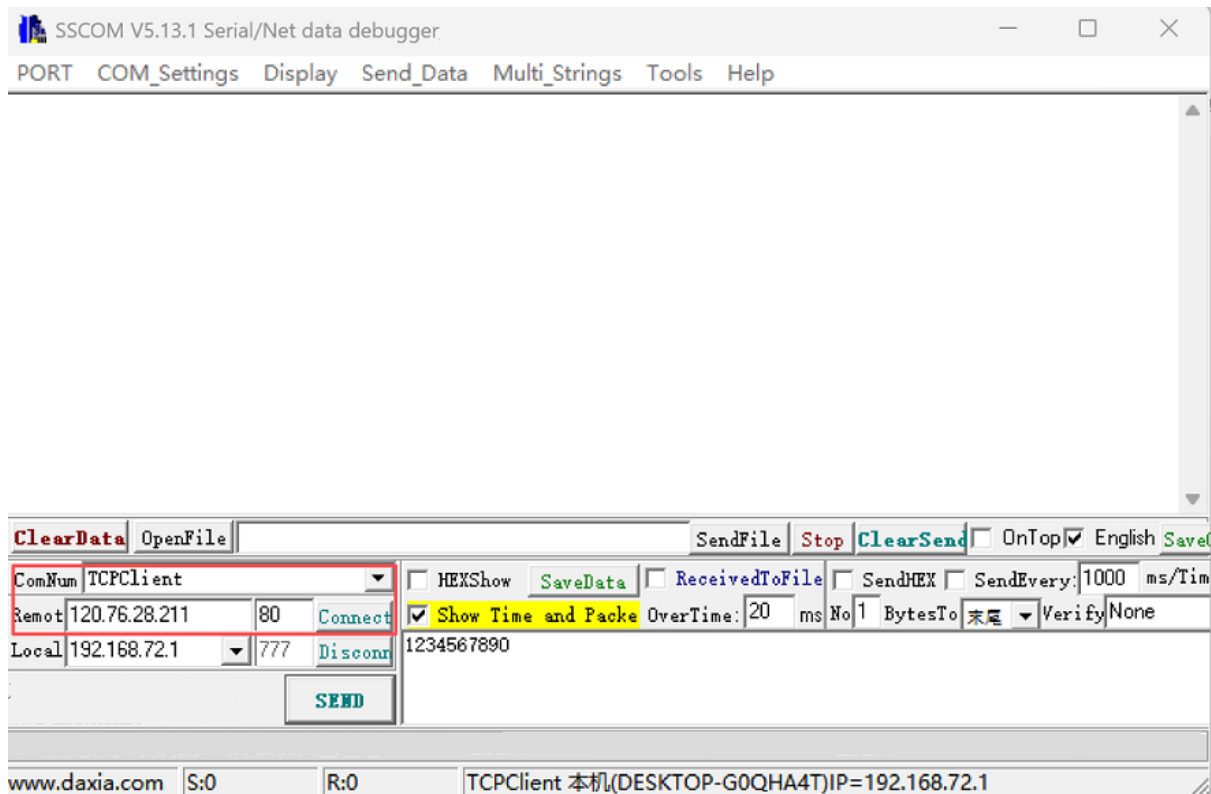
```
Response: >> OK
```

5. To create a TCP server for the module, an example of the AT command operation is as follows:

```
Send: << AT+WLANC=3
```

```
Response: >> OK
```

6. The PC and the module (FSC-BW256B) are connected to the same AP hotspot. On the PC, a third-party network debugging tool is used to create an IP address for the TCP connection to the TCP Server (module) as a TCP client. And after establishing a TCP connection, send TCP data to the TCP Server (module), such as 1234567890



7. The module receives TCP data sent by the TCP Client. In instruction mode, an example of the received data format serial port response is as follows:

```
Response: >> +WFDATA=0,10,1234567890    //Supports simultaneously
↳receiving data sent from multiple TCP clients to the TCP Server,
↳with the first parameter being the connection ID
Response: >> +WFDATA=1,10,1234567890
Response: >> +WFDATA=2,10,1234567890
```

8. The module supports the simultaneous reception of data sent from multiple TCP clients to the TCP Server. The first parameter is the connection ID. In command mode, an example of the AT command operation is as follows:

```
Send: << AT+WFSEND=0,3,abc
Response: >> OK
```

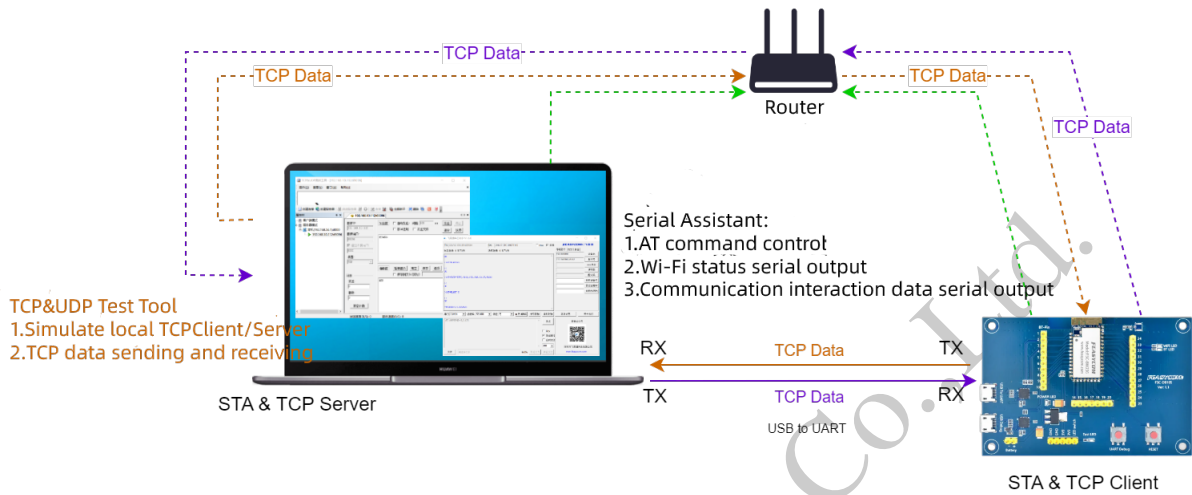
6.4 TCP Client Application

6.4.1 Tools

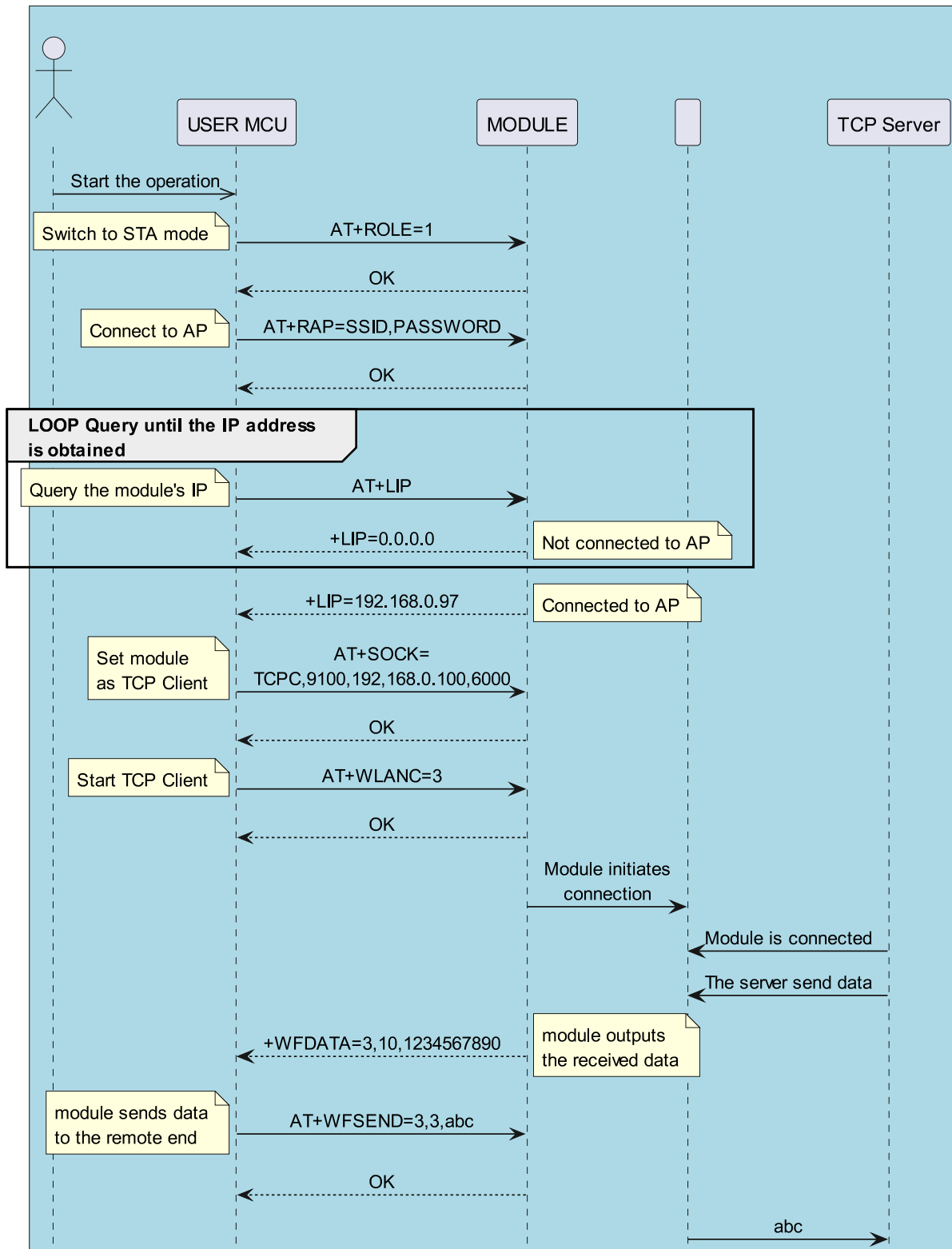
- **Feasycom Serial Port Tool** : A serial communication analysis tool based on Windows PC.

- (Option) **TCP&UDP Test Tool** : Optional third-party PC-based network debugging tools are available.

6.4.2 TCP Client application block diagram



6.4.3 TCP Client Application Flowchart



6.4.4 TCP Server Application Example

1. Set the module to Wi-Fi mode. If it is already in the current mode, you can skip this step.
The operation example of the AT command is as follows:

```
Send: << AT+ROLE=1
Response: >> OK
```

2. Connect the module to the AP hotspot. The AT command operation example is as follows:

```
Send: << AT+RAP=ssid,password
Response: >> OK
```

3. To query the IP address of the module, an example of the AT command operation is as follows:

```
Send: << AT+LIP
Response: >> +LIP=192.168.0.97 //For local examples, please refer_
→to the actual IP address obtained by connecting to the AP
Response: >> OK
```

4. Connect the PC and the module to the same AP hotspot. Use a third-party network debugging tool on the PC to create a TCP Server. For example, the IP address of the TCP Server is 192.168.0.79 and the port number is 8080.
5. Set the module as TCP client and configure the IP and port number of the remote TCP Server. The operation example of the AT command is as follows:

```
Send: << AT+SOCK=TCPC,9100,192.168.0.79,8080
Response: >> OK
```

6. The module acts as a TCP client to initiate the establishment of a TCP connection with the remote TCP Server. An example of the AT command operation is as follows:

```
Send: << AT+WLANC=3
Response: >> OK
```

7. After the TCP connection is successfully established, the PC-end network debugging tool will display the successful connection, as well as the data sending area and receiving area.

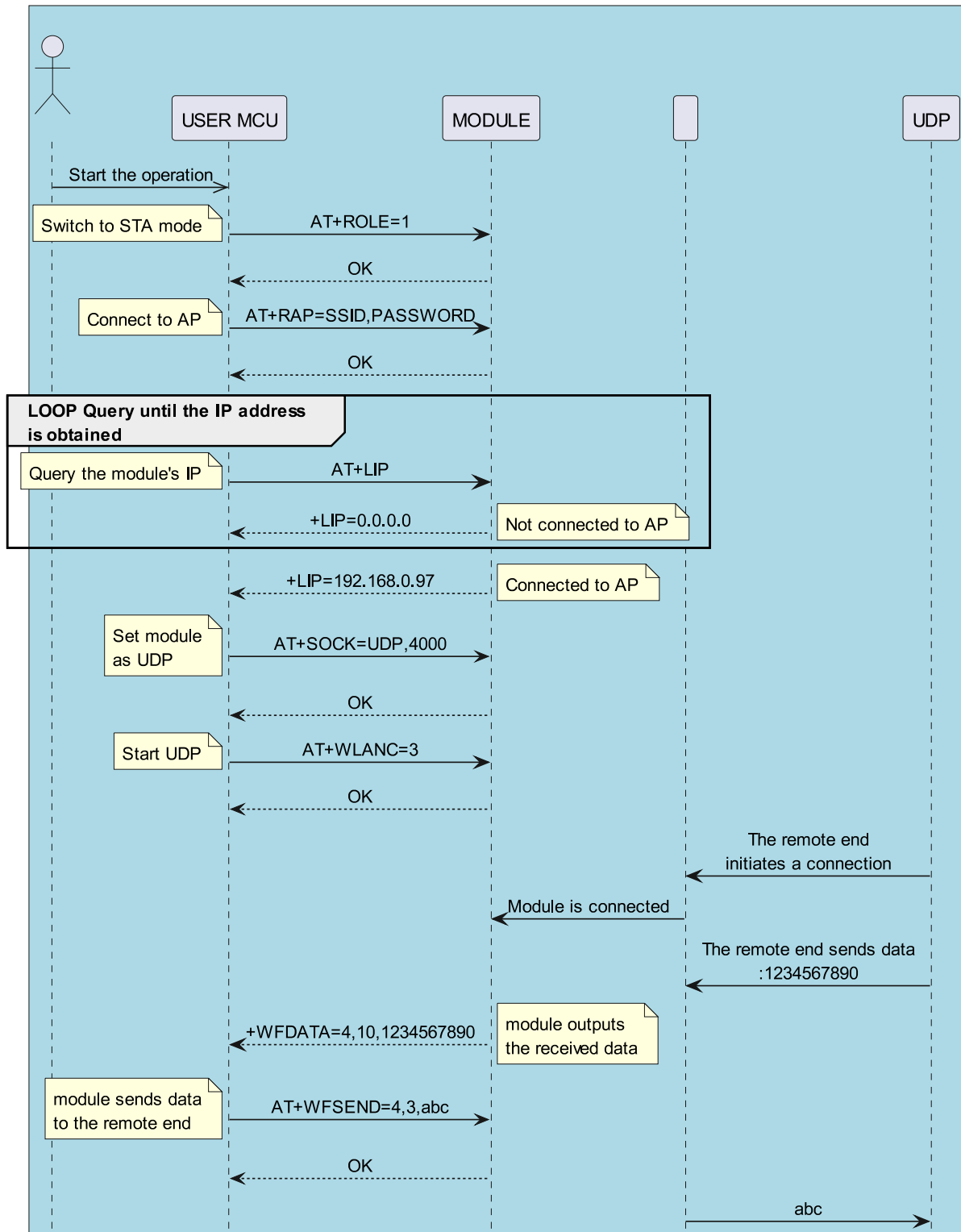
TCP data sending and receiving can be carried out, such as sending data 1234567890 to the remote TCP Client module

8. The module receives TCP data sent from the TCP Server. In instruction mode, an example of the received data format response is as follows:

```
Response: >> +WFDATA=3,10,1234567890
```

6.5 UDP Application

6.5.1 UDP Application Flowchart



6.5.2 UDP Application Example

1. Set the Wi-Fi mode. If you are already in the current mode, you can skip this step

Send: << AT+ROLE=1

Response: >> OK

2. Connect to AP

Send: << AT+RAP=ssid,password

Response: >> OK

3. Query the IP address of the module

Send: << AT+LIP

Response: >> +LIP=192.168.0.97 //For local examples, please refer to the actual IP address obtained by connecting to the AP

Response: >> OK

4. Set module as UDP

Send: << AT+SOCK=UDP,4000

Response: >> OK

5. Start UDP Server

Send: << AT+WLANC=3

Response: >> OK

6. The PC and the module are connected to the same hotspot. On the PC, a network debugging tool is used to start a UDP Client with the target IP 192.168.0.97 and the target port number 4000.

7. Receive data

Response: >> +WFDATA=4,10,1234567890

8. Send data

Send: << AT+WFSEND=4,3,abc

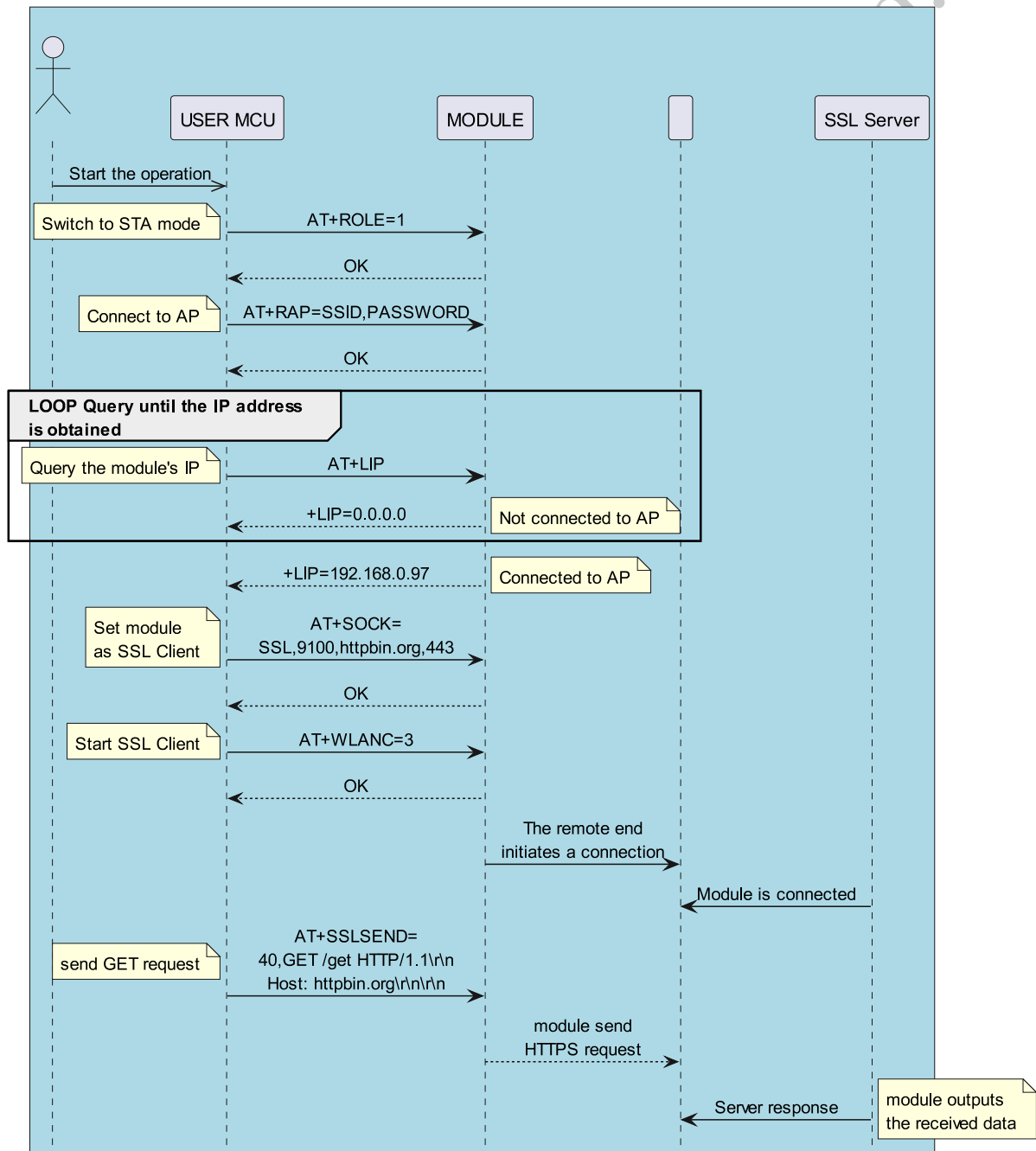
Response: >> OK

Note

- To use transparent data transmission, simply send “AT+TPMODE=1” before setting the Wi-Fi mode.

6.6 SSL Client Application

6.6.1 SSL Client Application Flowchart



6.6.2 SSL Client Application Example

1. Set the Wi-Fi mode. If you are already in the current mode, you can skip this step

```
Send: << AT+ROLE=1
Response: >> OK
```

2. Connect to AP

```
Send: << AT+RAP=ssid,password
Response: >> OK
```

3. Query the IP address of the module

```
Send: << AT+LIP
Response: >> +LIP=192.168.0.97 //For local examples, please refer_
↪to the actual IP address obtained by connecting to the AP
Response: >> OK
```

4. Set the module as SSL client and configure the remote server and port number

```
Send: << AT+SOCK=SSL,9100,httpbin.org,443
Response: >> OK
```

5. The module initiates a connection to the remote end as an SSL client

```
Send: << AT+WLANC=3
Response: >> OK
```

6. Send relevant requests, such as GET requests

```
Send: << AT+SSLSEND=40,GET /get HTTP/1.1\\r\\nHost: httpbin.org\\r\\n\\
↪\\r\\n
Response: >> OK
```

7. Receive data

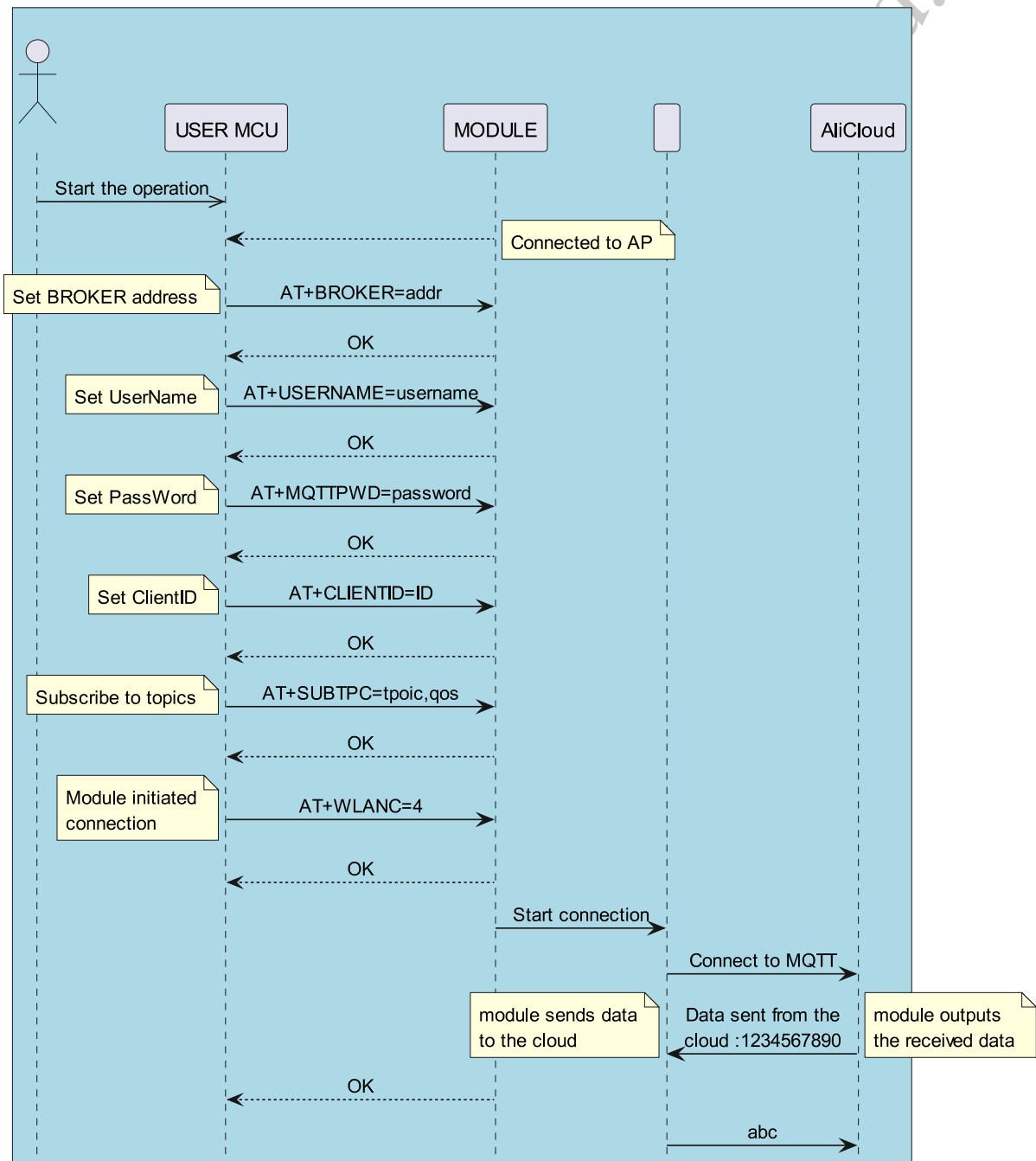
```
Response: >> +SSLDATA=Specific data
```

Note

- Note: If you want to use transparent data transmission, just send AT+TPMODE=1 before setting the Wi-Fi mode.

6.7 MQTT Application

6.7.1 MQTT Application Flowchart



6.7.2 MQTT Application Example

1. Set the Wi-Fi mode

```
Send: << AT+ROLE=1
Response: >> OK
```

2. Connect to AP

```
Send: << AT+RAP=ssid,password
Response: >> OK
```

3. Query the IP address of the module

```
Send: << AT+LIP
Response: >> +LIP=192.168.0.97 //For local examples, please refer_
to the actual IP address obtained by connecting to the AP
Response: >> OK
```

4. Set the BROKER address

```
Send: << AT+BROKER=gpsensor.ddns.net
Response: >> OK
```

5. Set User Name

```
Send: << AT+USERNAME=admin
Response: >> OK
```

6. Set Password

```
Send: << AT+MQTTPWD=12345678
Response: >> OK
```

7. Subscribe to topics

```
Send: << AT+SUBTPC=user/get,0
Response: >> OK
```

8. Connect to MQTT

Send: << AT+WLANC=4

Response: >> OK

9. Receive the data sent by the cloud platform

1234567890

10. Send data to the cloud platform

Send: << AT+MQTTPUB=user/post,0,3,abc

Response: >> OK

Chapter 7

Firmware Upgrade

[中文版]

7.1 1. OTA Upgrade

7.1.1 1.1 OTA by AT Command

Specific Instruction Process Description

1、 Switch to STA mode. If you are already in STA mode, you can omit this command

```
Send: << AT+ROLE=1
Response: >> OK
```

2、 Connect to AP

```
Send: << AT+RAP=ssid,password
Response: >> OK
```

3、 Query the IP address to determine if it is connected to the hotspot. If the IP address can be obtained, it indicates that it has been connected

```
Send: << AT+LIP
Response: >> +LIP=192.168.0.87 //Example, please refer to
→the actual reading result
```

4、 The upgrade begins. The firmware name is provided by Feasycom

```

Send: << AT+OTA=Feasycom_test //Example,please refer to the actual_
      ↪firmware name. It is provided by Feasycom
Response: >> OK
Response: >> $OTA=1 //Receiving this response means the_
      ↪upgrade has begun

```

-
-

7.1.2 1.2 FeasyBlue OTA

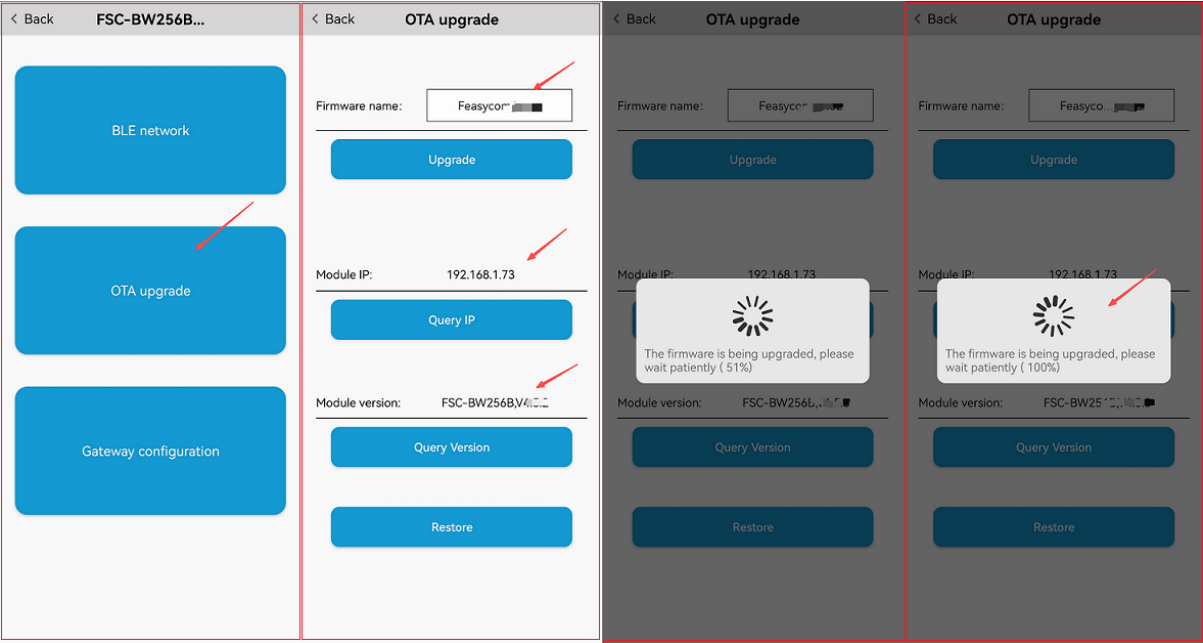
App Download

- FeasyBlue APP

Upgrade guide

1. **Network Distribution:** Before performing the firmware over-the-air upgrade, network distribution operations are required. Refer to the section of the **Application Development Example - Network Distribution** column. You can choose to use **FeasyBlue** to access the network through the Bluetooth configuration module;
2. Run the FeasyBlue App, select **Settings - OTA Upgrade** from the menu bar to enter the OTA upgrade interface;
3. On the **OTA Upgrade page** click on **Query IP** to obtain the current IP address and ensure that you have been correctly connected to the network;
4. On the **OTA Upgrade page** click on **Query Version Number** to obtain the current module firmware version and confirm whether the firmware is up to date;
5. On the **OTA Upgrade page** click on **Firmware Name** box and enter the **Firmware Name** (the parameters shown in the illustration are demonstration examples. Please refer to the latest firmware name provided by Feasycom for the actual situation) ,Click **Start Upgrade** ,and it will display **Firmware upgrade in Progress** and **Upgrade progress** prompts. This means that it has entered the upgrade mode;
6. When the progress bar on the interface is **100%** ,and shows **successful upgrade** ,OTA upgrade is completed.
 - Hotspot support is needed to access the external network

FeasyBlue OTA Show



Chapter 8

Appendix

8.1 Download PDF

Download PDF

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