

USR-G786-G User Manual

version V1.0.4



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1. Introduction

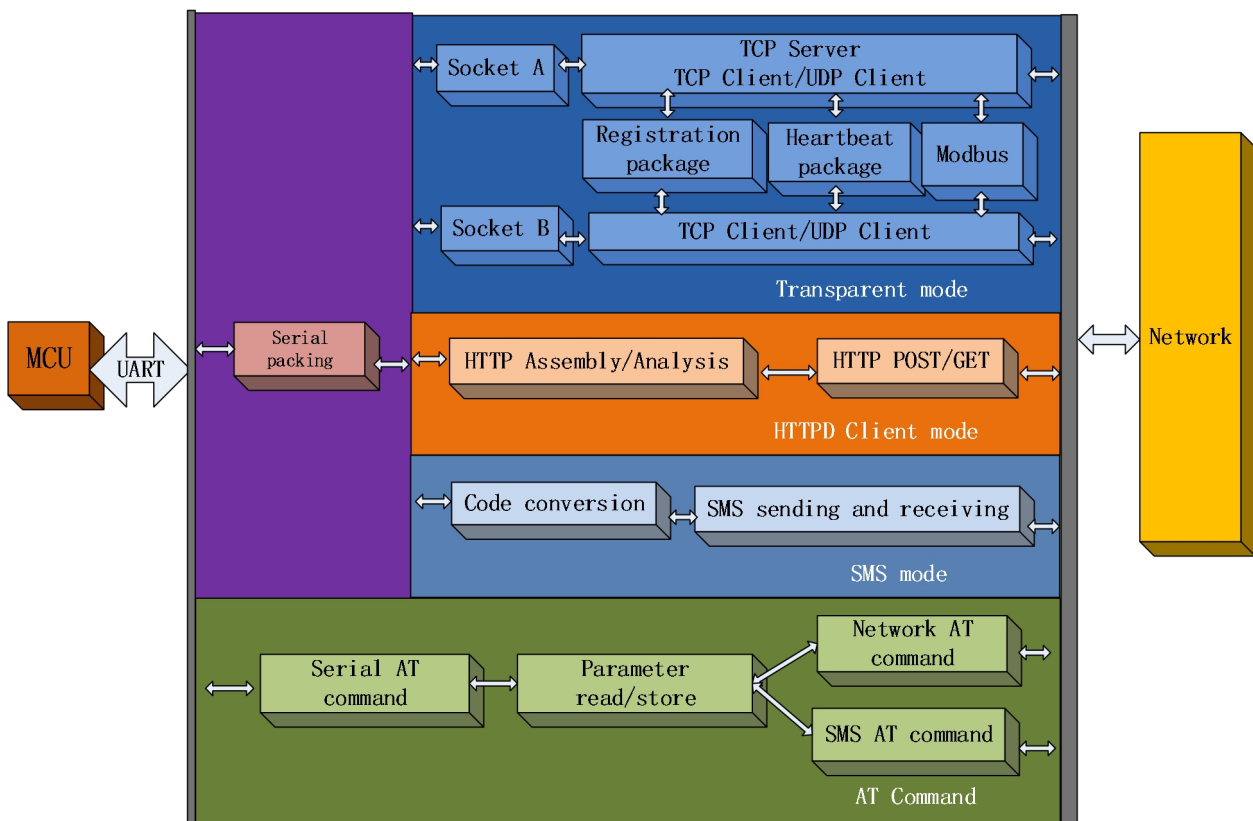
1.1. Overview

4G cellular modem USR-G786-G is launched in 2020 featuring with rugged design, high speed, low latency, compact size, high reliability and global bands. G786 provides wireless data communications between field serial devices and the central control system to enable remote control of industrial field sites. It supports TCP/UDP/HTTP protocol, SMS work mode, user-defined identity and heartbeat packets, 2 sockets connection, underneath device FTP upgrade and remote self-update. G786 is ideal for M2M and IoT applications including distribution automation, smart metering, water & wastewater, heating, street light monitoring and etc.

Please open our official website for more information.

<https://www.pusr.com/products/4g-cellular-modems-with-global-bands-usr-g786-g.html>

1.2. Features



- Supports global 4G LTE frequency bands.
- Supports 2 sockets, TCP Server, TCP Client, UDP and HTTP client.
- Built-in hardware watchdog.
- Each socket supports buffering 5 packets of serial data, each packet up to 1000bytes.
- Supports user-defined identity and heartbeat packets.
- Supports configuration by serial / SMS / network AT commands.
- Supports base station location.
- Supports Modbus RTU/TCP protocol conversion.
- Supports base station positioning.
- Supports multiple modes including transparent transmission mode, HTTPD Client mode and SMS mode.
- Supports remote firmware upgrade, keep the firmware up to date.
- Supports sending English SMS.

2. Get Started

2.1. Specification

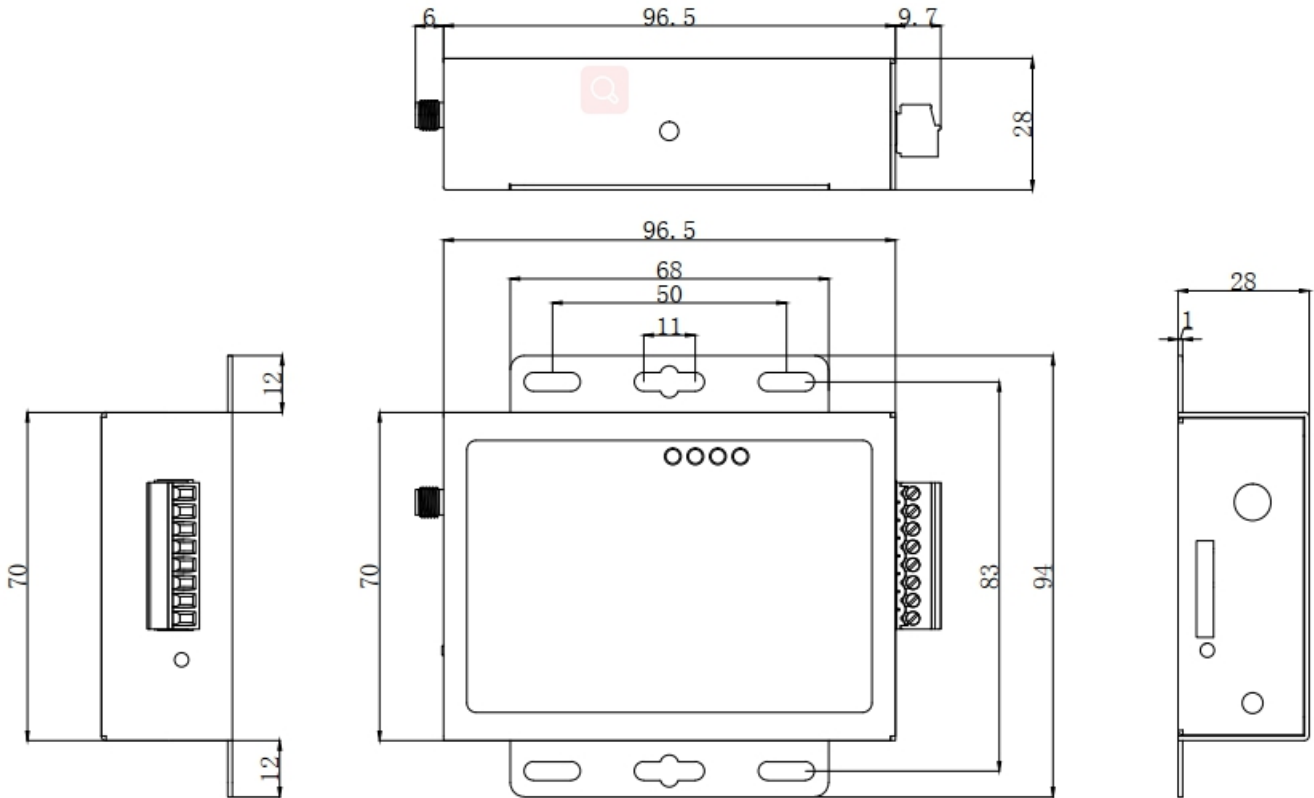
Item	Description	Parameter		
Wireless module	Standard	FDD-LTE, TDD-LTE, UMTS, GSM		
	Frequency Band	FDD-LTE	B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28	
		TDD-LTE	B38/B39/B40/B41	
		WCDMA	B1/B2/B4/B5/B6/B8/B19	
		GSM	B2/B3/B5/B8	
	Transmitting Power	TDD-LTE	+23dBm±2dB(Power class 3)	
		FDD-LTE	+23dBm±2dB(Power class 3)	
		WCDMA	+24dBm+1/-3dB(Power class 3)	
		PCS1900 8-PSK	+26dBm±2dB(Power class E2)	
		DCS1800 8-PSK	+26dBm±2dB(Power class E2)	
		EGSM900 8-PSK	+27dBm±27dB(Power class E2)	
		GSM850 8-PSK	+2dBm±2dB(Power class E2)	
		PCS1900	+30dBm±2dB(Power class 1)	
		DCS1800	+30dBm±2dB(Power class 1)	
		EGSM900	+33dBm±2dB(Power class 4)	
	GSM850	+33dBm±2dB(Power class 4)		
Data Speed	FDD-LTE	Download 150Mbps, upload 50Mbps		
	TDD-LTE	Download 130Mbps, upload 30Mbps		
	WCDMA	Download 384Kbps, upload 384Kbps		

		EDGE	Download 296Kbps, upload 236.8Kbps
		GPRS	Download 107Kbps, upload 85.6Kbps
Hardware	Serial Port Type	1 x RS-232/RS-485, software selection	
	Baud Rate	RS232: 2400bps - 460800bps	
		RS485: 2400bps - 230400bps	
	Port Connector	Pluggable industrial terminal block	
	Serial Signals	RS232:TX RX GND RS485:A B GND	
	Serial Port Protection	ESD: IEC 61000-4-2 Level 4 Surge: IEC 61000-4-5 Level 3 EFT: IEC 61000-4-5 Level 3	
	Power Interface	Pluggable industrial terminal block	
	Power Interface Protection	ESD: IEC 61000-4-2 Level 4 Surge: IEC 61000-4-5 Level 3 EFT: IEC 61000-4-4 Level 3 Anti-reverse protection	
	Power Input	DC 9V~36V	
	Consumption	Working current: 77mA@12V Peak current:165mA@12V	
	RS485 Pull-down resistance	2.2KΩ	
	SIM card slot	1,8V/3V, drawer-type slot	
	Antenna	1 x SMA Female interface	
	Working Temperature	-35℃ - 75℃	
	Storage Temperature	-40℃ - 90℃	
	Ambient Humidity	5 ~ 95% (non-condensing)	
	Indicators	Power, Work, Net, LinkA	
Enclosure	Metal casing		
Protection Rating	IP30		
Installation	Wall-mounting		
Dimension (mm)	112.2*94*28(L*W*H)		
Software	Work mode	Transparent mode, HTTPD mode, SMS mode	
	Configuration	Serial AT command, Net AT command, SMS AT command, windows utility	
	Network Protocol	TCP/UDP/DNS/HTTP/FTP	
	Maximum NO. Of TCP connection	2	
	Network Access	APN, VPDN	
	Modbus RTU/TCP protocol conversion	Support	
	SMS functions	Support	
	Heartbeat packet	Support	
	Identity packet mechanism	User defined identity packet/ICCID /IMEI	
	FTP upgrade	Support	

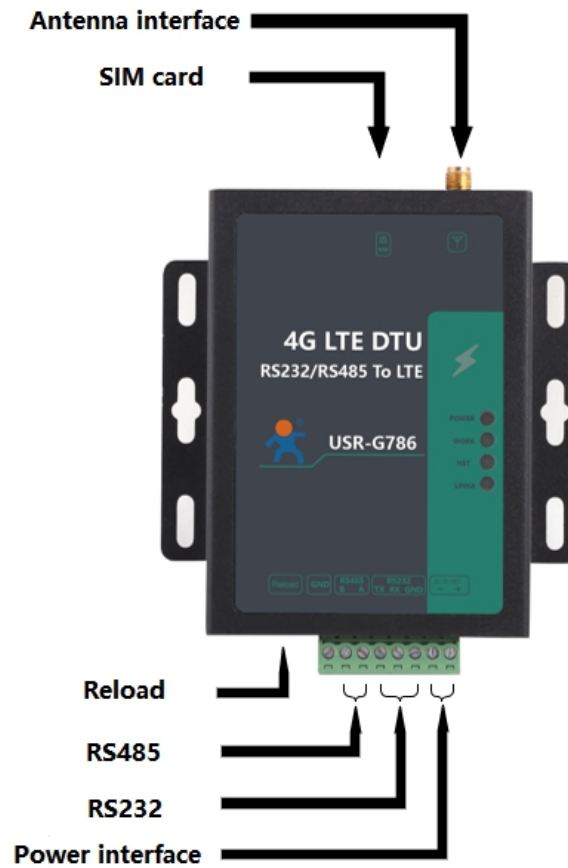
2.2. Hardware

2.2.1. Dimensions

UNIT: mm.



2.2.2. Interfaces



2.2.3. Indicators





There are four LED indicators on USR-G786-G, POWER,WORK,NET,LINKA. Status of the indicator is explained as follows:

Indicators	Function	Description
POWER	Power indicator	Always on after power on
WORK	System status.	Blinking after system run
NET	Network status.	Always on after registering the network
LINKA	Socket A connection status	Always on after socket A connection

2.3. Connecting Hardware

2.3.1. Hardware Preparation

Open the packing box, the following accessories will be found:

			
<p>USR-G786-G</p>	<p>Sucker 4G antenna</p>	<p>Power adapter (optional)</p>	<p>Power cord</p>

Required additional testing tools:

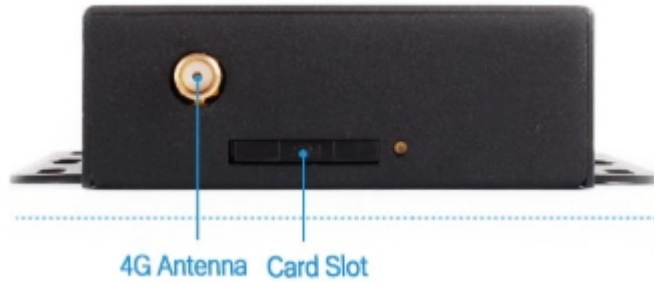


RS232 serial to USB cable



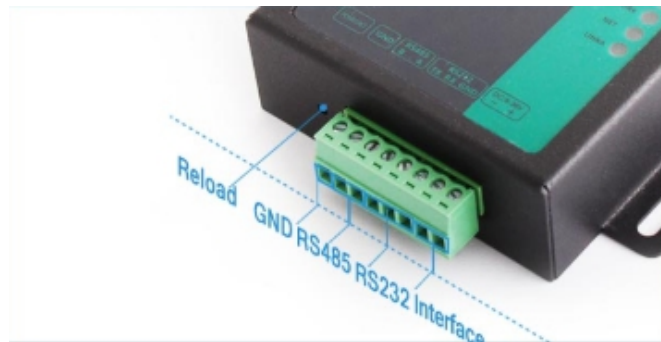
PC

2.3.2. Installing SIM card and antenna



Press and hold the ejection button of the sim card holder to eject it and install the sim card. Install the antenna. Gently rotate the movable part of the metal SMA male connector to the end with your hand, until the external threads of the antenna SMA female connector cannot be seen.

2.3.3. Serial Connecting

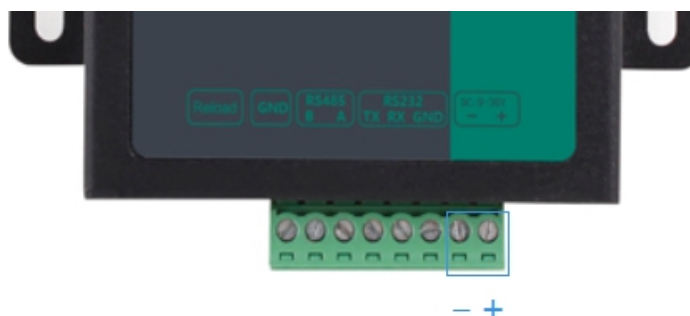


Remove the terminal from the device during installation, loosen the locking screws on the terminal, connect the corresponding wires to the terminal, and tighten the screws.

RS232: When connecting to a RS232 serial device, connect TX of RS232 interface of G786-G to RX of the serial device, RX of G786-G to TX of the serial device, GND to GND.

RS485: When connecting to a RS485 serial device, connect A of RS485 interface of G786-G to A pin of the serial device, B of G786-G to B of serial device.

2.3.4. Power Supply



Connect a 9-36V DC power adapter to the power terminal. "POWER" LED will always be on and the

“WORK” LED will blink after power on.

3. Utility Configuration

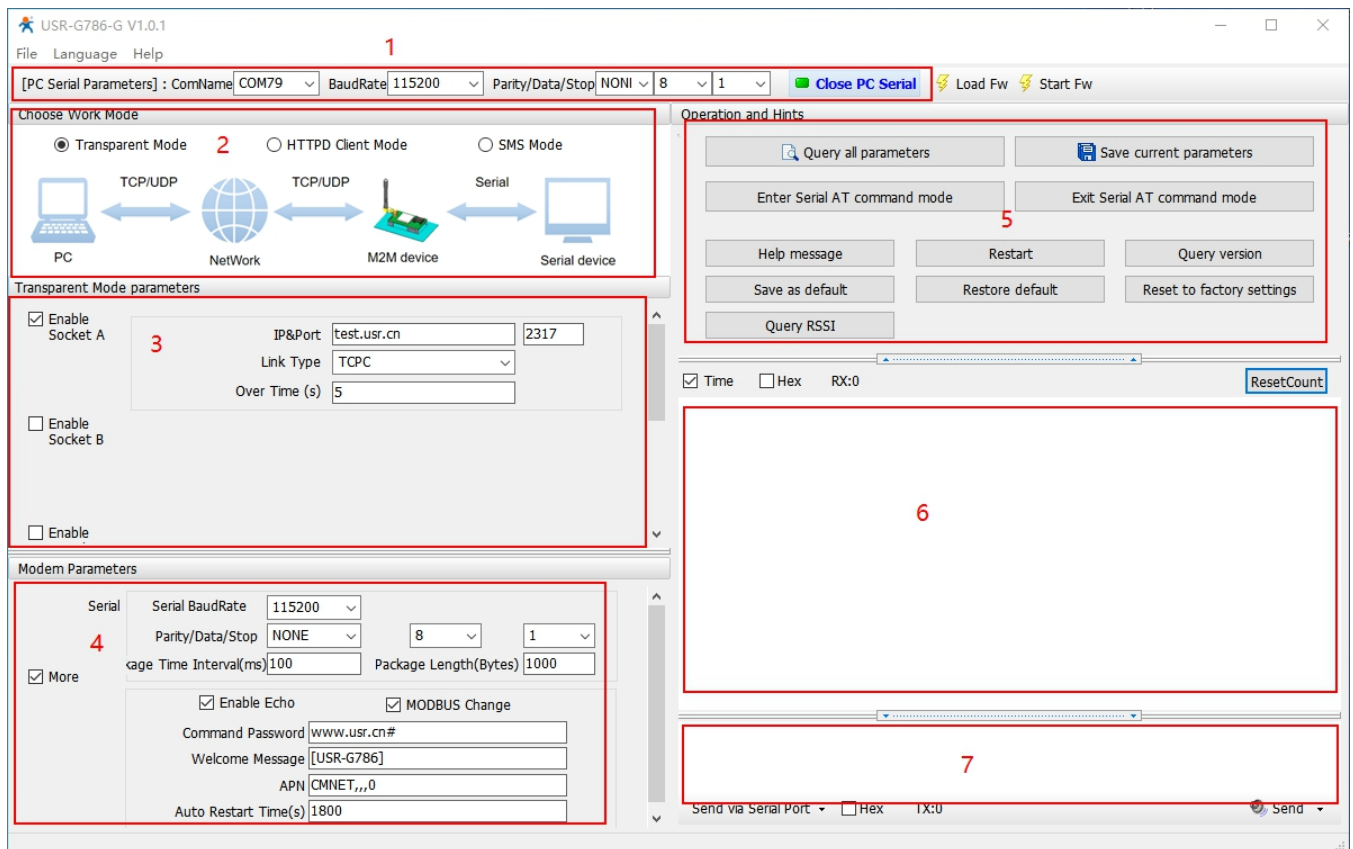
3.1. Download the Utility

Please download the utility from our official website:

https://www.pusr.com/support/downloads/usr_g786_g-setup-software-v1.0.1.html

3.2. Configuration via PC

USR-G786-G configuration utility is shown below:



Step1: Set the serial port parameters of the utility, which must be the same with current parameters of serial port of G786, otherwise it cannot communicate with DTU. Default settings of serial port of G786: 115200, 8, None,1.

Step2: Select the work mode of DTU, transparent mode.

Step3: Select a transparent transmission protocol.

Step4: If you want to change the serial port parameters of the DTU in accord with the connected device, please change the parameters here. You can also enable modbusRTU/TCP conversion by click the “modbus change” option.

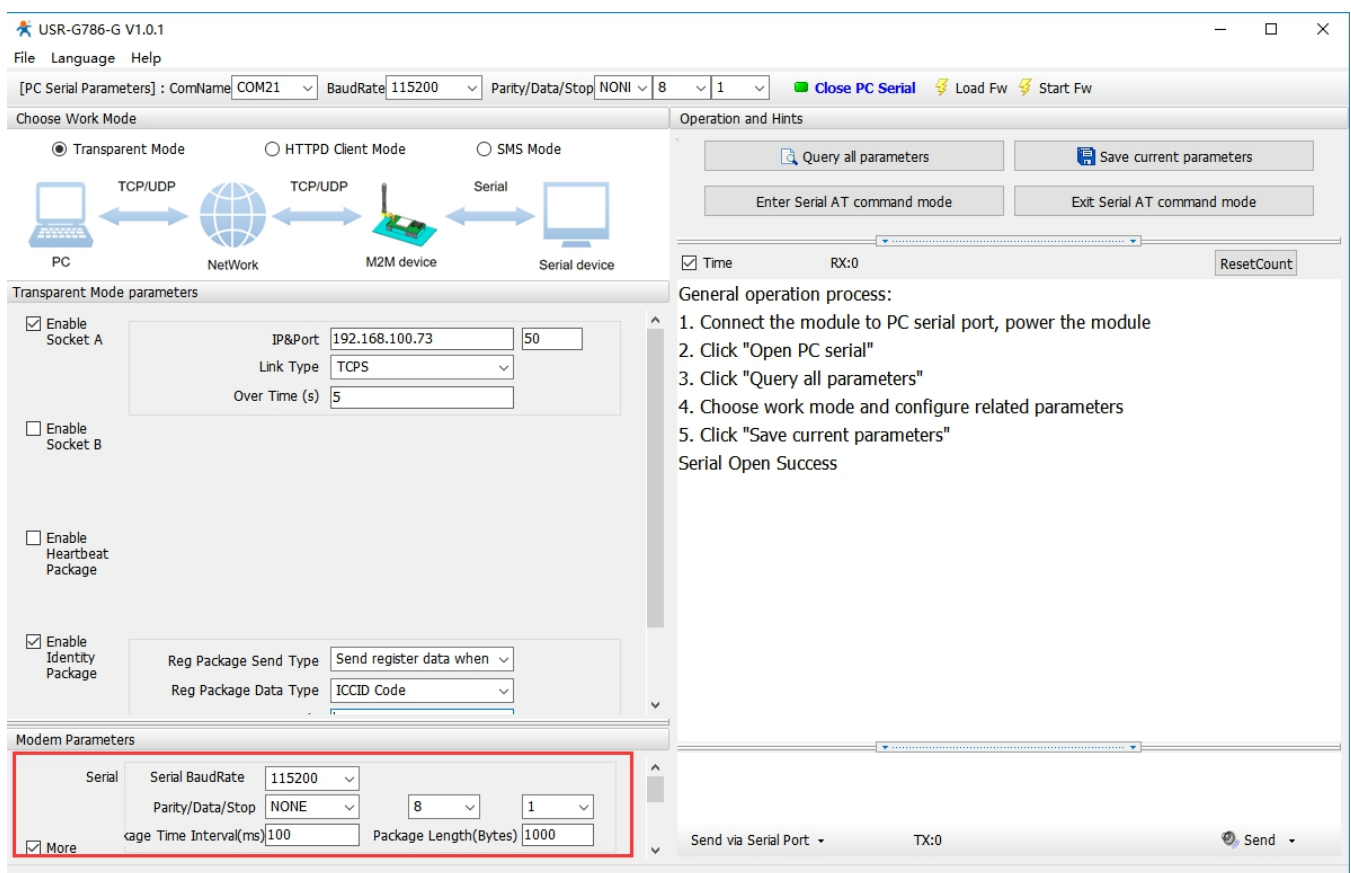
Step5: Save all configuration parameters, please click “save current parameters” button. G786 will save the configuration and restart automatically. If you changed serial parameters, please check the step1 before continuing.

Step6: Data display area, displaying the data sent and received with time stamp when click the “time” option.

Step7: Data sending area, enter the data and click Send.

4. Serial Port

4.1. Basic Parameters



Serial parameters of USR-G786-G must be consistent with the parameters of the connected serial device.

Item	Parameter
Baud rate	RS232: 2400,4800,9600,14400,19200,28800,33600,38400,57600,115200,230400,460800
	RS485: 2400,4800,9600,14400,19200,28800,33600,38400,57600,115200,230400
Data bits	8
Stop bits	1,2

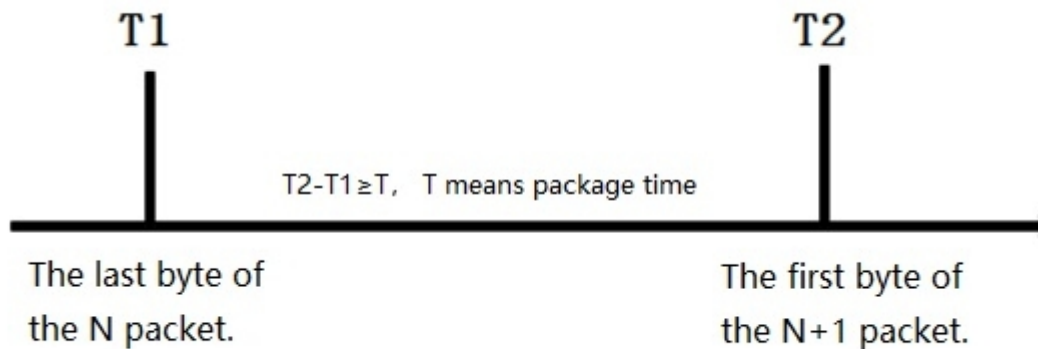
Parity bit	NONE EVEN ODD
------------	---------------------

4.2. Framing mechanism

4.2.1. Time Trigger

When G786-G receives data from the UART, it continuously checks the interval of two adjacent bytes. If the interval time is greater or equal to a certain "time threshold", then a frame is considered finished, otherwise the data is received until greater or equal to the packet length byte set. This frame is sent to the network as a TCP or UDP packet. The "time threshold" here is the time between packages. The range of settable is 100ms~60000ms. Factory default: 100ms.

This parameter can be set by AT command, `AT+UARTFT=<time>`.

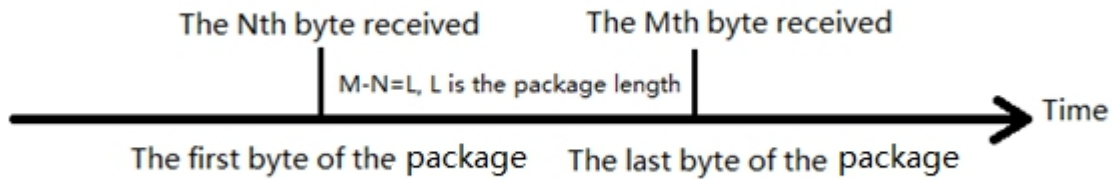


4.2.2. Length trigger

When G786-G receives data from the UART, it constantly checks the number of bytes received. If the number of bytes received is equal to a certain "length threshold", a frame is considered to have ended, otherwise the packaging time is waiting for the end. This frame is sent to the network as a TCP or UDP packet. The "length threshold" here is the package length. The settable range is 100~1000. Factory default 1000.

(Note: when using "command password +AT command" function, the package length must be larger than the "command password +AT command", otherwise AT command is invalid)

This parameter can be set by AT command, `AT+UARTFL=<length>`.



4.2.3. Network Data Output Port

We need to set the output serial port of the USR-G786-G network data. Setting commands and parameters as follows:

Table1 Network data output serial port setting instructions

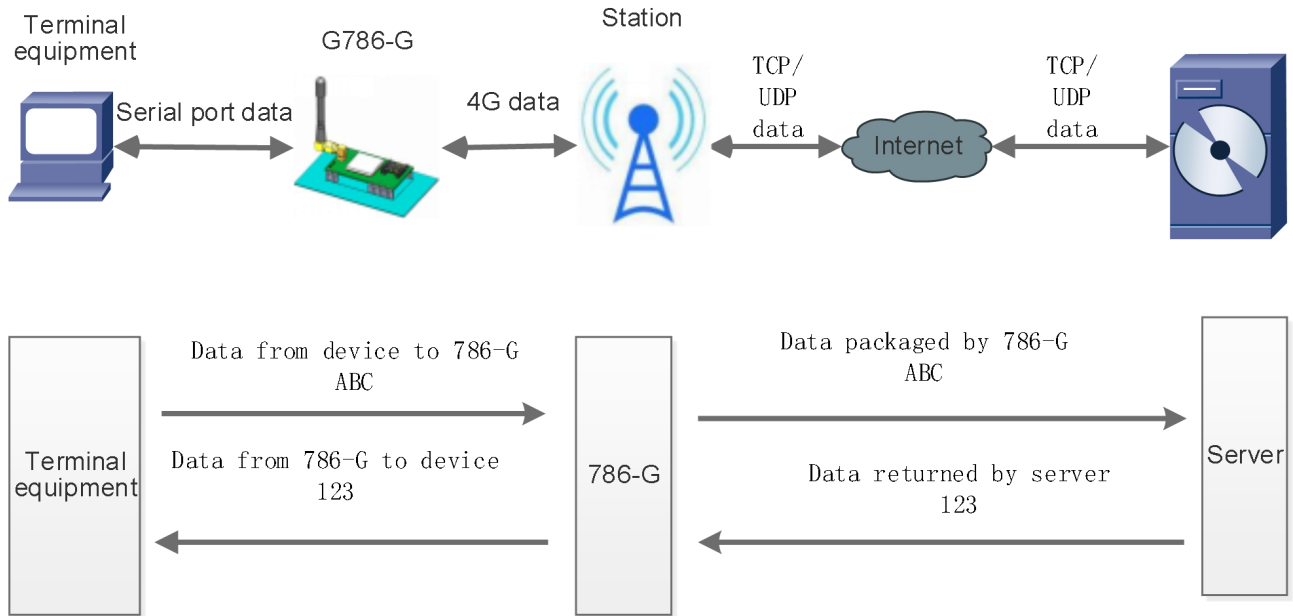
Command	Descriptions
AT+CMDPT=RS232	Data sent from network is output on 232 serial port.
AT+CMDPT=RS485	Data sent from network is output on 485 serial port.
AT+CMDPT=RSALL	Data sent from network is output on 232 and 485 port. (Default)

In order to ensure the data output efficiency, please select one serial port as the network data output port according to needs.

5. Selecting an Operating Mode

USR-G786-G has three working modes: net transparent mode, HTTPD Client mode and SMS mode.

5.1. Net Transparent Mode



In this mode, user's serial device can directly send data to the specified network server through G786-G. Module can also receive data from the server and directly forward to the serial device.

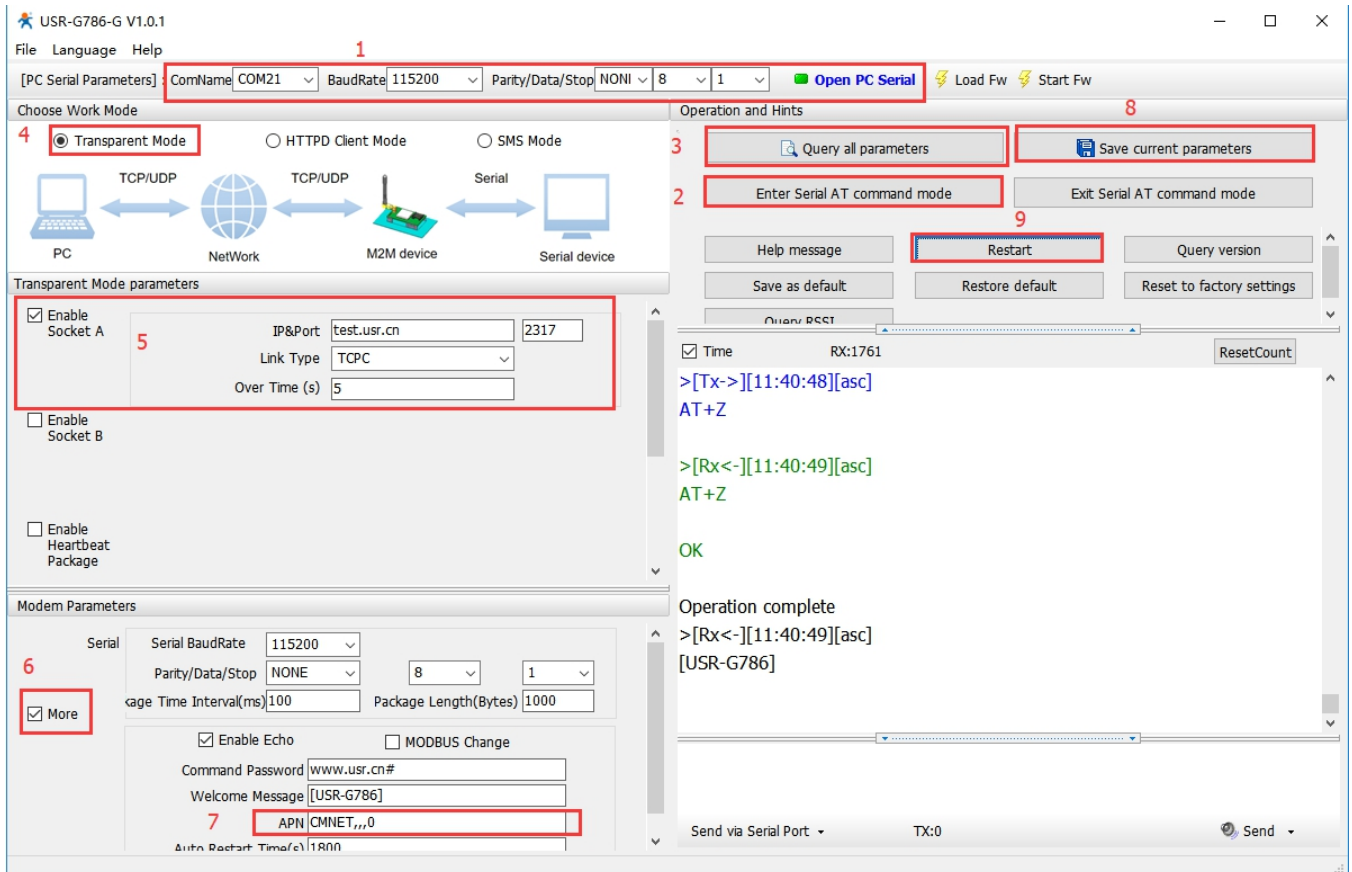
In this mode, users do not need to pay attention to the data conversion process between serial port and network data packets. They only need to set simple parameters to realize the transparent transmission of data between serial devices and network servers.

G786-G supports 2 socket connections, Socket A and Socket B, which are independent of each other. Only Socket A supports as TCP Client, TCP Server and UDP Client. Socket B only supports TCP Client and UDP Client .

It supports up to 3 TCP Clients when works as a TCP Server. Because the conventional operator network can not be accessed through the external network, so for the Server function need to use a dedicated APN card .

5.1.1. TCP Client Mode

- ① Set parameters by software:



1. Open the setup software. Set the Serial port parameters according to the serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode" and wait for the device to enter AT command mode.
3. Click "Query all parameters" and wait for obtaining all current parameters.
4. In "Choose Work Mode", select "Transparent Mode".
5. Set "IP&Port" to test.usr.cn and 2317, link type to TCPC(TCP Client).
6. Check "More". If using an APN card, need to set the APN information.
7. Set APN parameter: CMNET,,,0. E.g: APN: CMNET, username: empty, password: empty, authentication method: NONE.
8. Click "Save current parameters".
9. Click the "Restart" button to restart the module.
10. After the device restarts, NET and LINKA lights will be on, then we can transmit data in both directions.

② Set by AT command:

1. Set the work mode to net transparent transmission:

AT+WKMOD=NET

2. Enable socket A:

AT+SOCKAEN=ON

3. Set socket A to TCP Client:

AT+SOCKA=TCPC,test.usr.cn,2317

4. Set APN. E.g: APN is CMNET, username is empty, password is empty, authentication method is NONE:

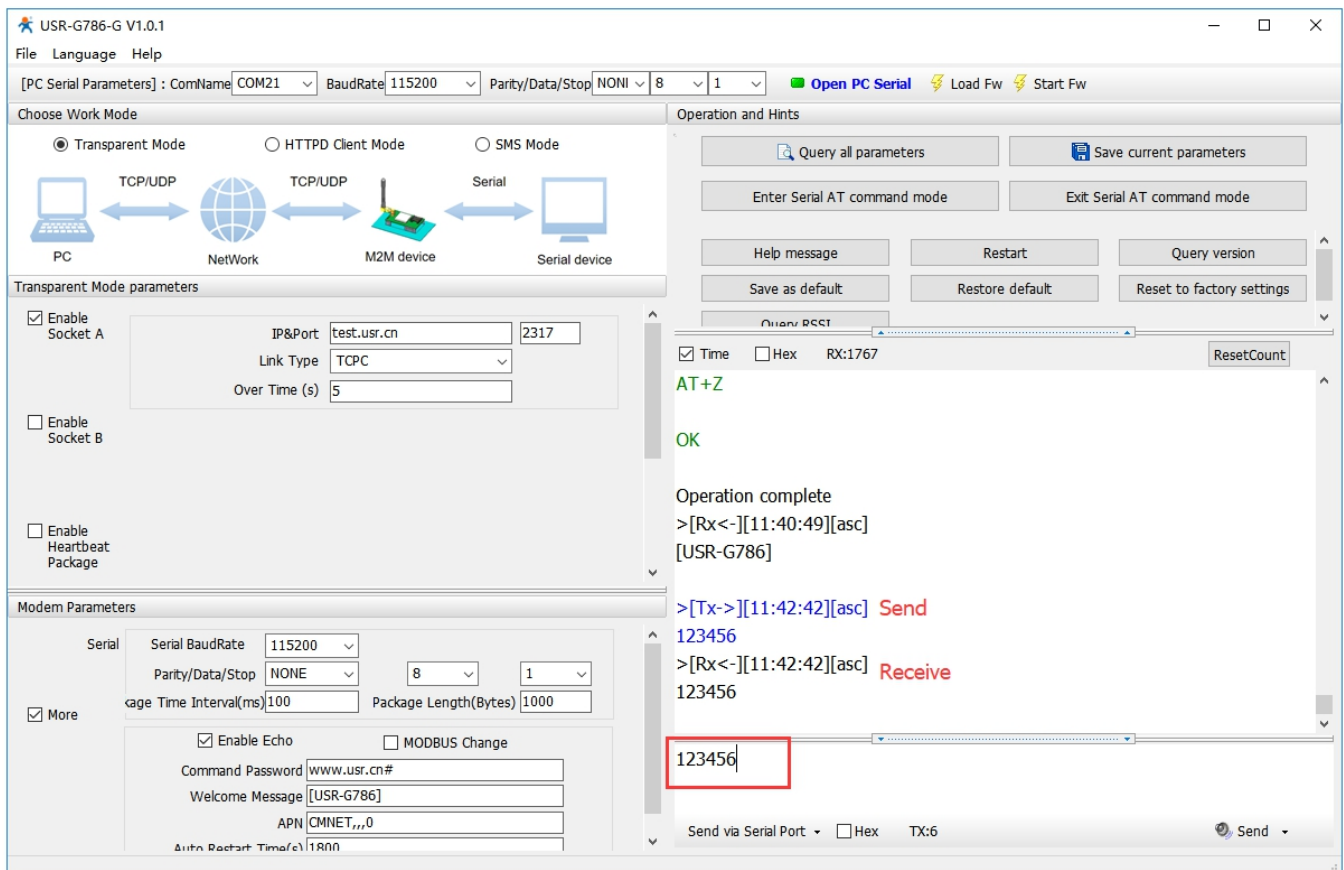
AT+APN=CMNET,,,0

5. Reboot:

AT+Z

③ Test

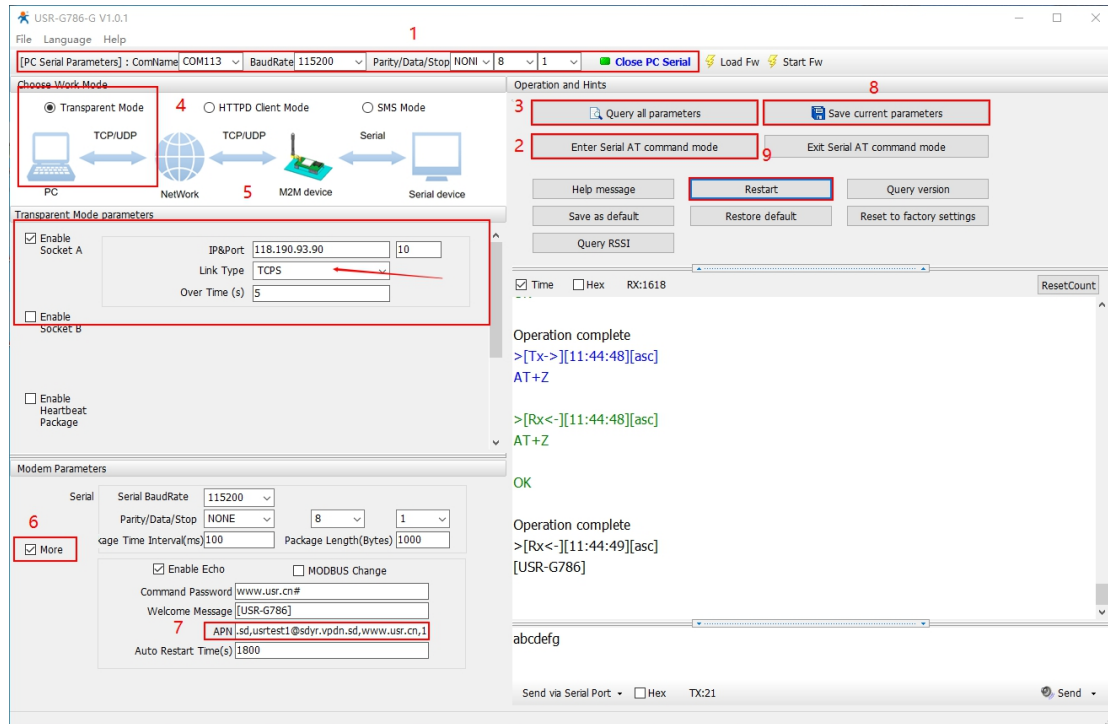
Connect the serial port of USR-G786-G to the computer via a RS232 serial to USB cable, send data from the setup software, our test server will return the same data to serial port.



5.1.2. TCP Server Mode

TCP Server function needs to be test through an APN dedicated network card.

- ① Set parameters by setup software:



Device works as TCP Server, and need to be filled in the IP and port of itself in "IP & Port".

- ② Set by AT command:

1. Set the work mode to net transparent mode:

AT+WKMOD=NET

2. Enable socket A:

AT+SOCKAEN=ON

3. Set socket A as TCP Server, local port 2317, IP has no reference meaning in Server:

AT+SOCKA=TCPS,test.usr.cn,2317

4. Set APN. E.g: APN:CMNET, username: empty, password: empty, authentication method: NONE:

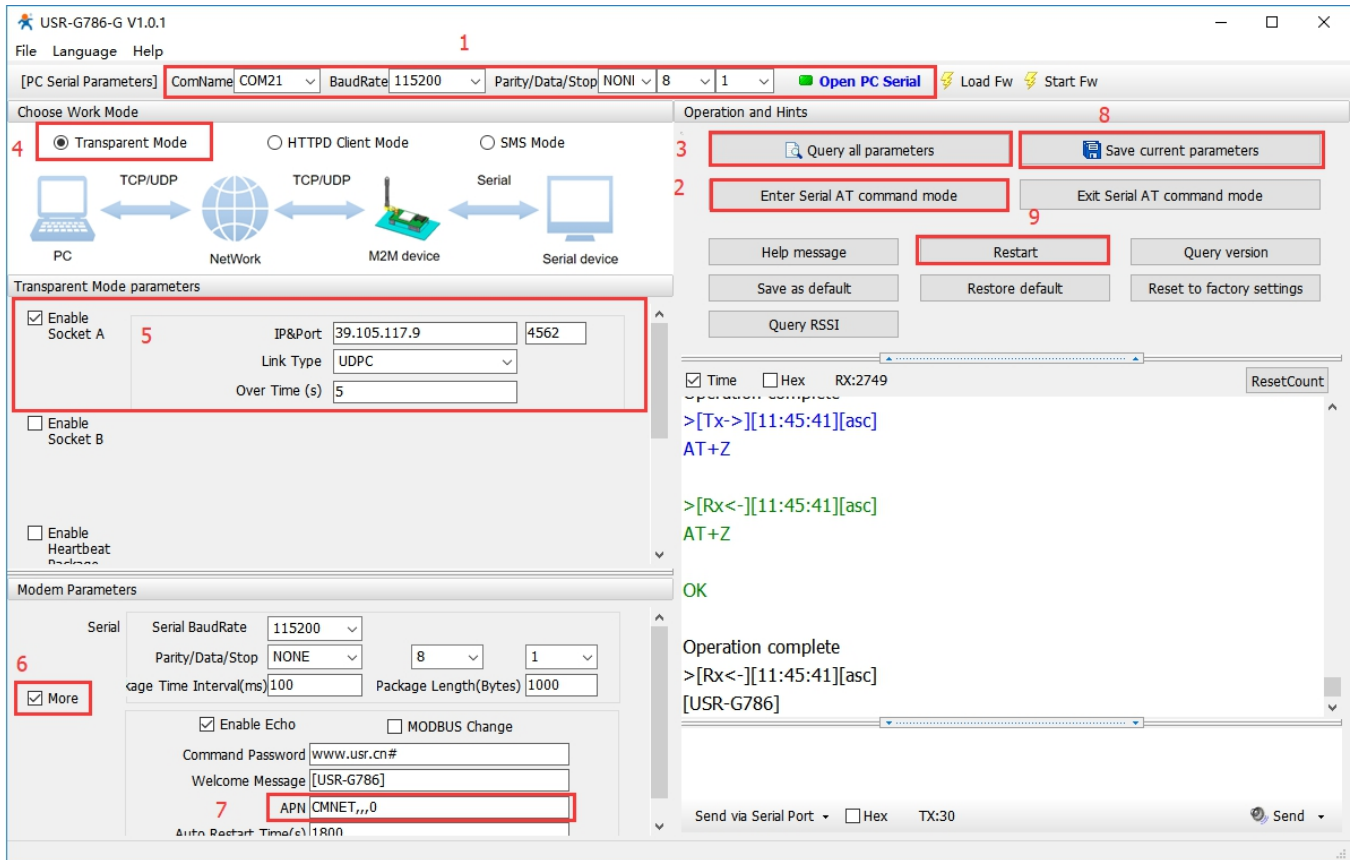
AT+APN=CMNET,,,0

5. Reboot:

AT+Z

5.1.3. UDP Client Mode

① Set parameters by software:



Set the link type to UDPC, fill in the IP and port of UDC server.

② Set by AT command:

1. Set the work mode to net transparent mode:

AT+WKMOD=NET

2. Enable socket A:

AT+SOCKAEN=ON

3. Set socket A as UDP Client, port 2317:

AT+SOCKA=UDPC,test.usr.cn,2317

4. Set APN. E.g: APN:CMNET, username: empty, password: empty, authentication method: NONE:

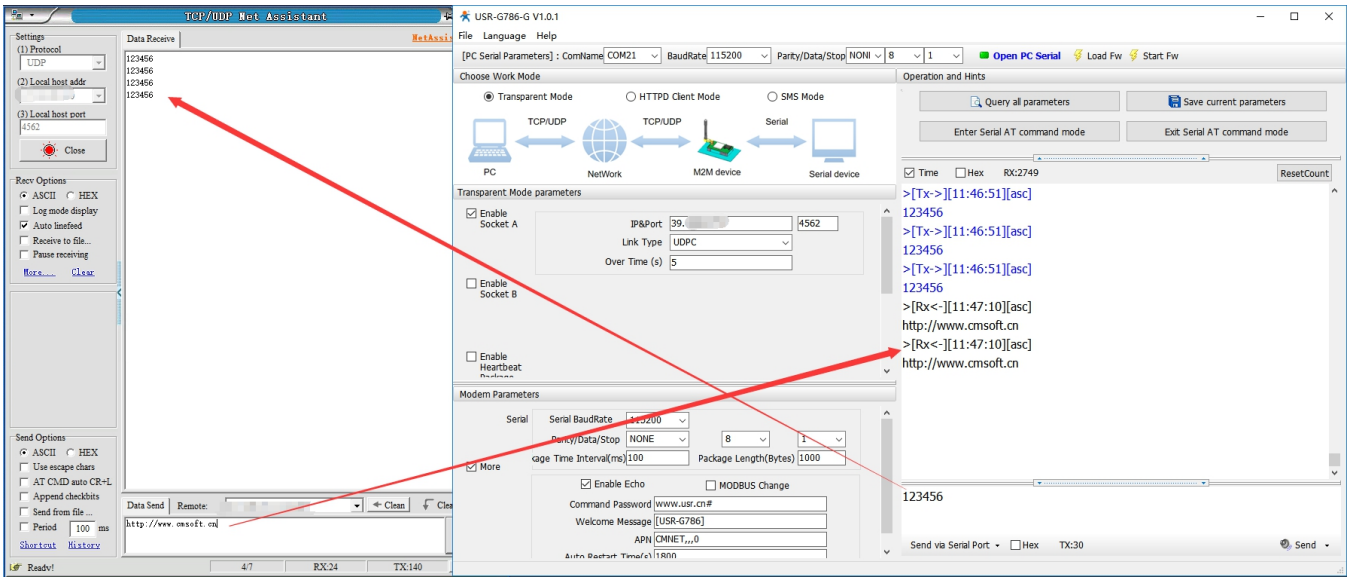
AT+APN=CMNET,,0

5. Reboot:

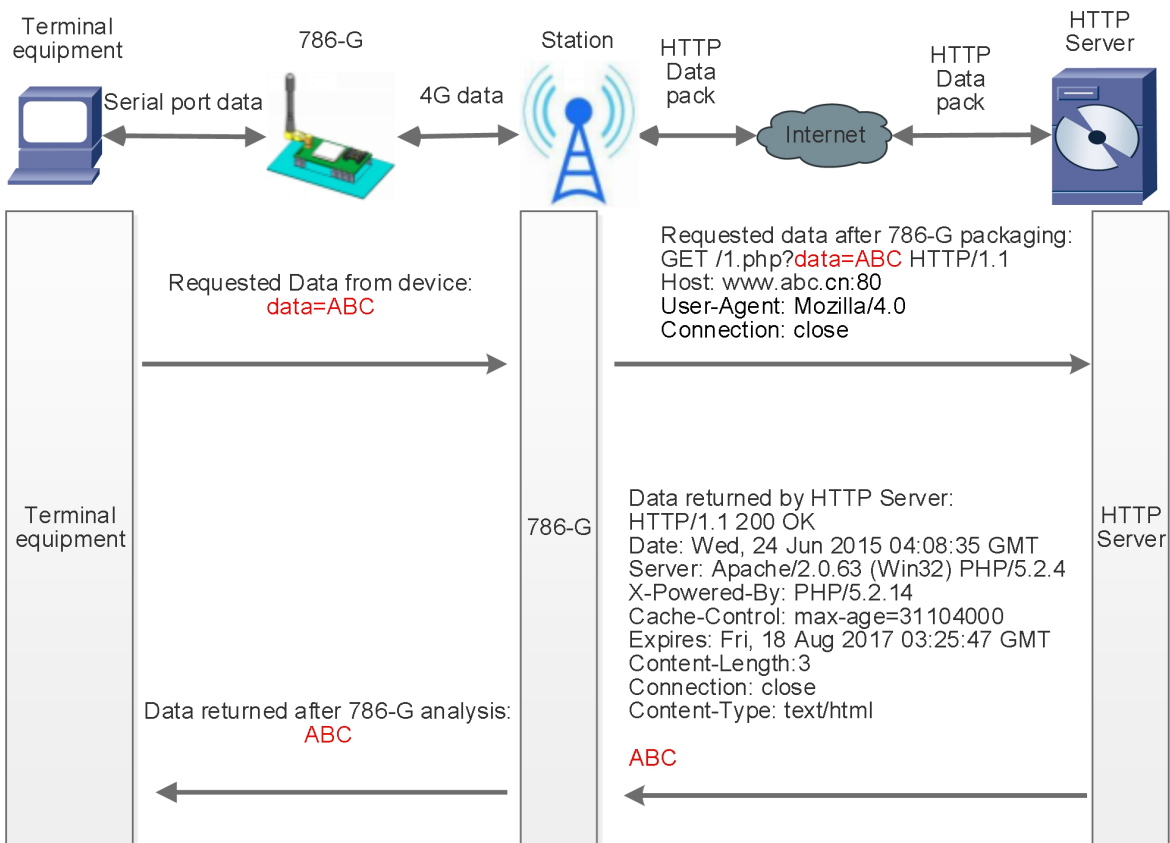
AT+Z

③ Test

Connect the serial port of USR-G786-G to the computer via a serial to USB cable, realize the data transmission of serial port and network



5.2. HTTPD Client Mode



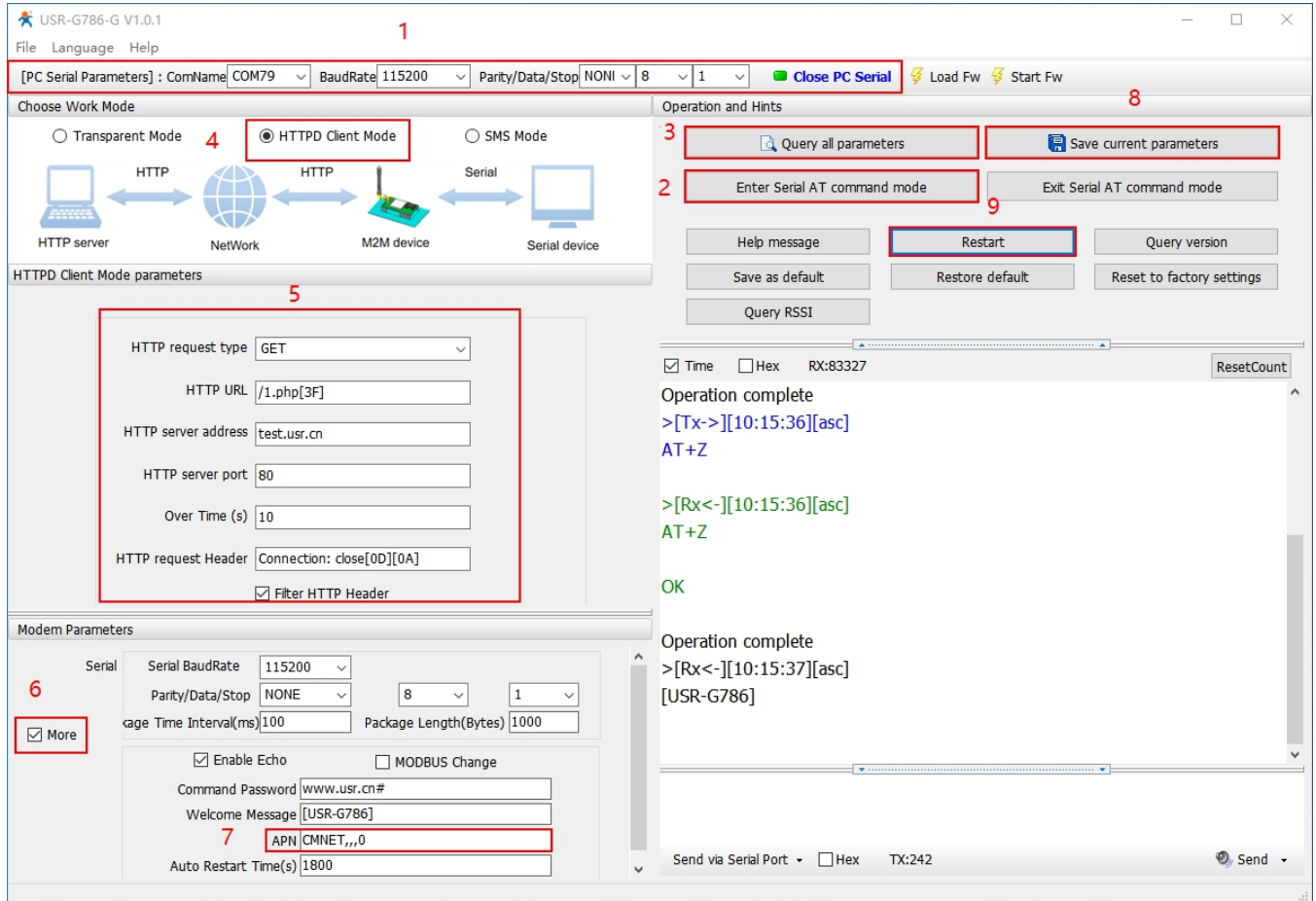
In this mode, user's terminal device can send request data to the specified HTTP server through this module, then the module receives data from HTTP server, parses and sends data to the serial device.

User does not need to pay attention to the data conversion process between the serial data and the network data packet, and can achieve the data request from the serial device to the HTTP server through simple parameter

settings.

The module will filter out the received HTTP protocol header data by default, only output user data to the serial port. Customers can choose whether to filter HTTPD header data by AT command.

① Set parameters by software:



1. Open the setup software. Set the serial port parameters according to the serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode" and wait for the device to enter AT command mode.
3. Click "Query all parameters" and wait for obtaining all current parameters.
4. In "Choose Work Mode" column, select "HTTPD Client Mode".
5. Set HTTPD Client mode parameters.
6. Check "More".
7. If using an APN card, need to set the APN information.
Set APN parameter: CMNET,,0. E.g: APN: CMNET, username:empty, password:empty, authentication method: NONE.
8. Click "Save current parameters" to set and save all parameters.
9. Click "Restart" to restart the module.

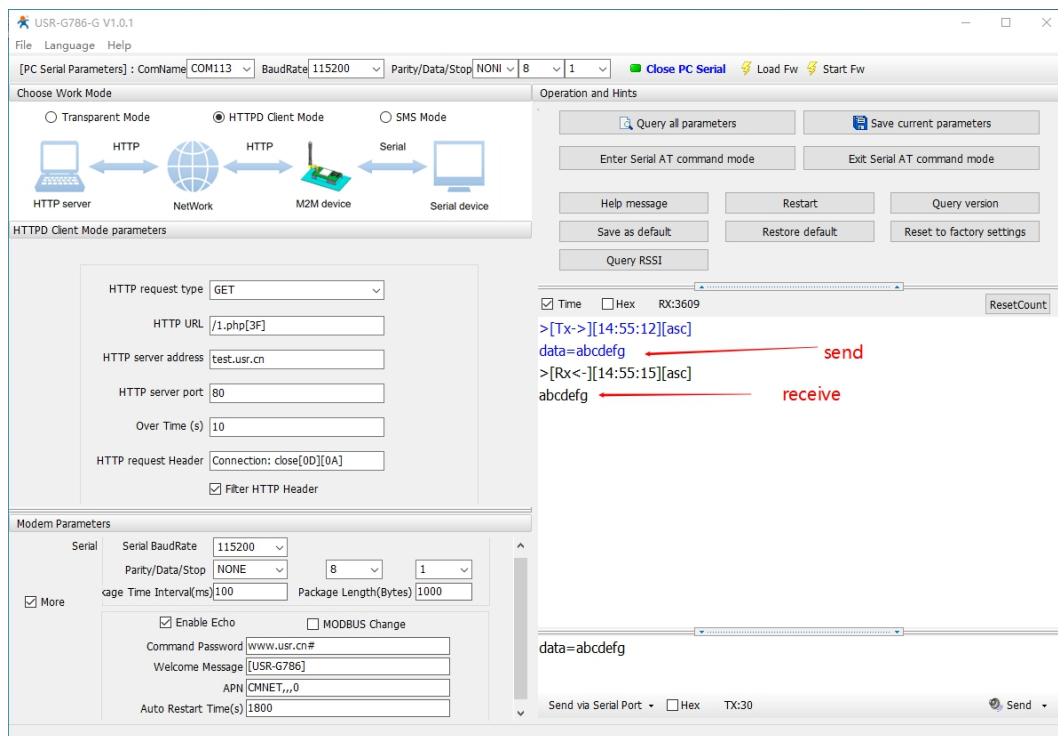
② Set by AT command:

1. Set the work mode to HTTPD:
AT+WKMOD=HTTPD

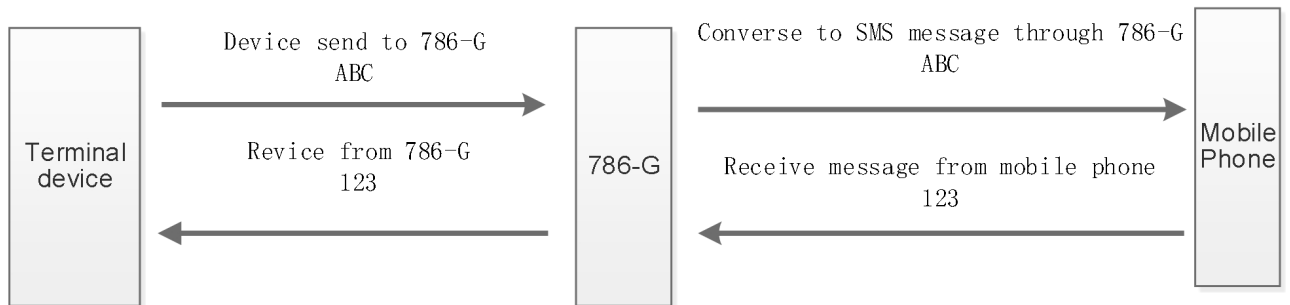
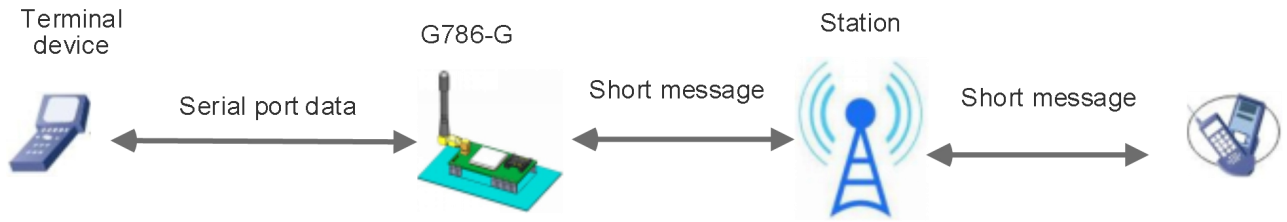
2. Set the request type:
AT+HTPTP=GET
3. Set HTTP URL:
AT+HTPURL=/1.php[3F]
4. Set the HTTP server address:
AT+HTPSV=test.usr.cn,80
5. Set HTTP request header:
AT+HTPHD=Connection: close[0D][0A]
6. Set HTTP over time:
AT+HTPTO=10
7. Whether to filter HTTP header:
AT+HTPFLT=ON
8. Reboot
AT+Z

③ Test

After the NET light is on, send the data in the format of "data =". After the data is sent successfully, server will return the data.



5.3. SMS Mode

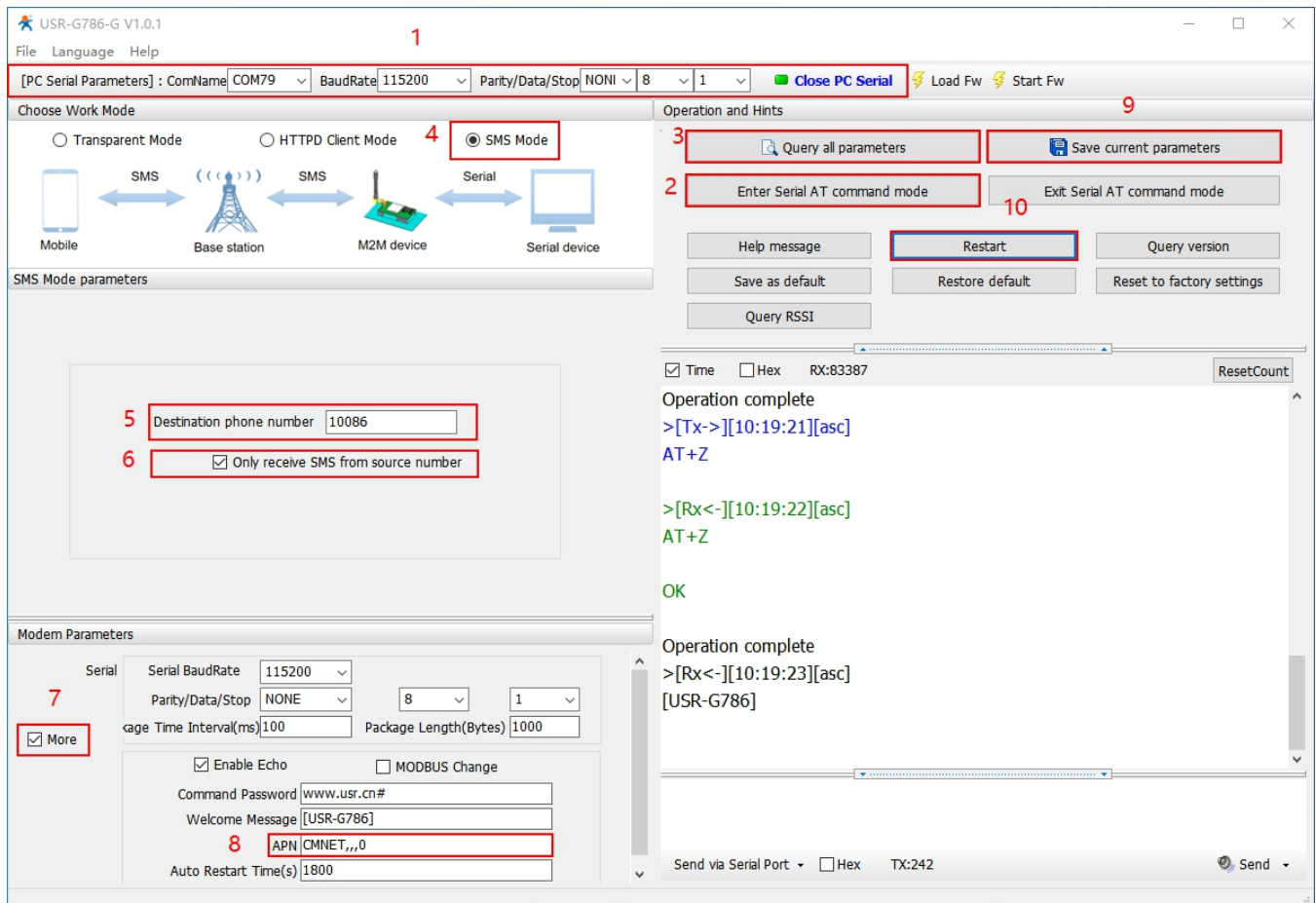


In this mode, user's serial device can send SMS to the specified mobile phone and receive SMS from any mobile phone. User can decide whether to transmit the data of the specified mobile phone to the serial device through settings.

Users do not need to pay attention to the data conversion process between serial port data and SMS. They only need to set simple parameters to realize transparent data communication between mobile phones and serial port devices.

If the user's serial device is placed in a remote place, G786-G can be used to check the running status of the device or control the running parameters by sending and receiving SMS.

- ① Set by software:



1. Open the setup software. Setting the serial port parameters according to the serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode" and wait for the device to enter AT command mode.
3. Click "Query all parameters" and waiting for obtaining all current parameters.
4. In "choose work Mode", select "SMS Mode".
5. Set the destination phone number to "10086".
6. If need to filter SMS from other mobile numbers, enable "Only receive SMS from source number".
7. Click "More".
8. Set APN parameter: CMNET,,0.
E.g: APN: CMNET, username:empty, password:empty, authentication method: NONE.
9. Click "Save current parameters" to set and save all parameters.
10. Click "Restart" to restart the module.

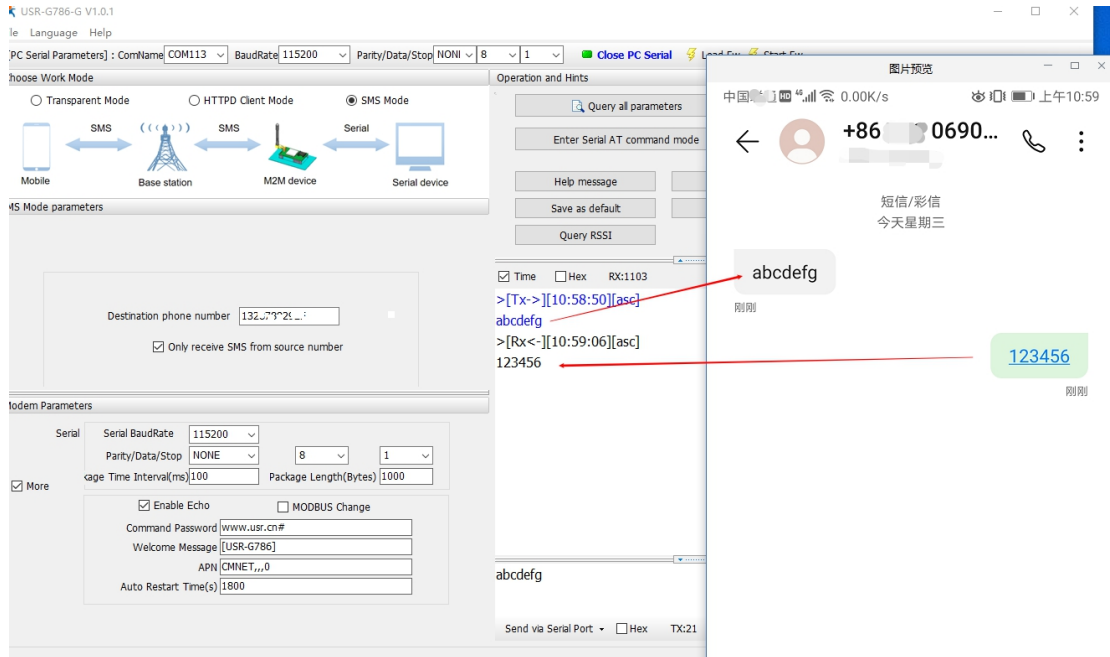
② Set by AT command:

1. Set work mode to SMS mode:
AT+WKMOD=SMS
2. Set the target mobile phone number to 10086. E.g:10086:
AT+DSTNUM=10086
3. Restart the module:
AT+Z

- Note: 1. The target phone number of SMS should be added with the international number.**
2. When non-target mobile phone number filtering is enabled, the non-target mobile phone number can still query or set parameters.

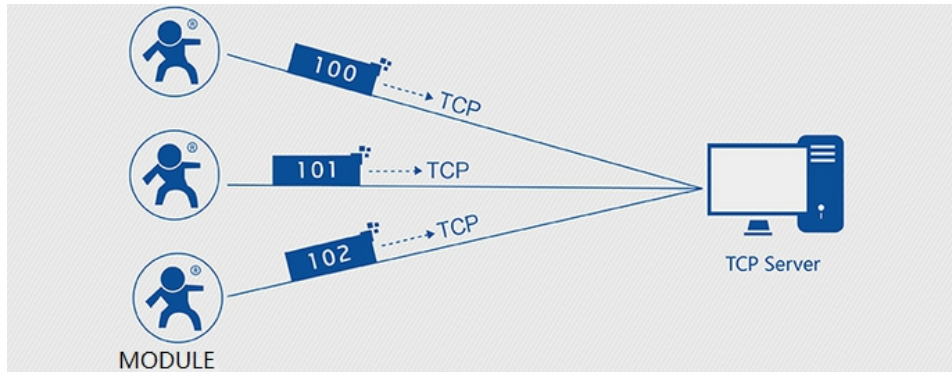
③ Test

When the NET light is on, we can send and receive data in both directions via SMS with destination phone number.



6. General Function

6.1. Identity Package

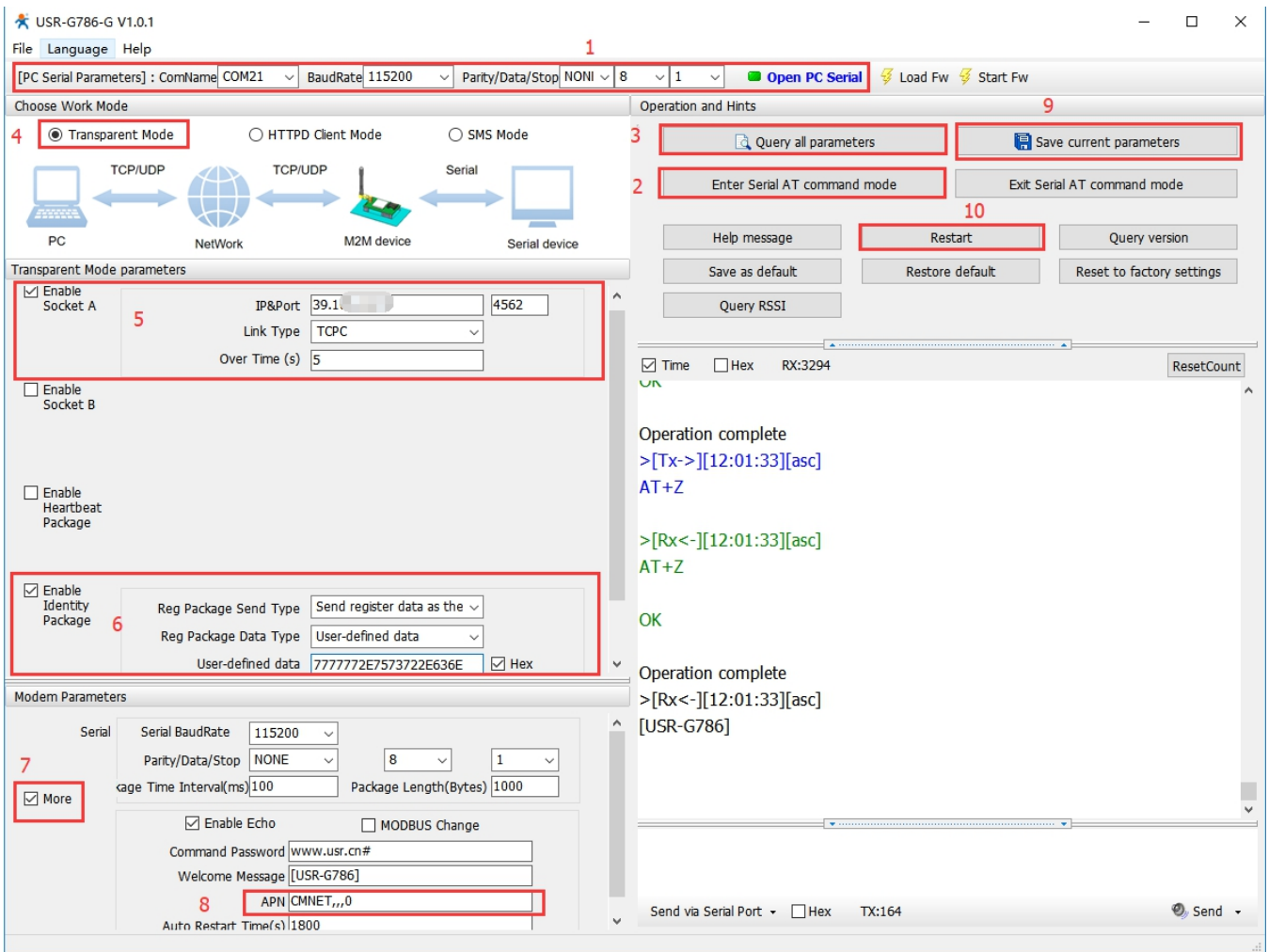


In network transparent mode, user can set the device to send identity package to the server. Identity package is intended to allow the server to identify the data from which device or to use it as a password to obtain authorization for the server's functions. Identity package can be sent when the module establishes a connection with the server, or be added at the forefront of each data packet to form a data packet to be sent to the network. Identity package data can be ICCID code, IMEI code, or User-defined data.

ICCID: Unique SIM identification code, for applications based on SIM card identification.

IMEI: Unique identification code of the Internet module, which is mainly used in device identification, has nothing to do with SIM card.

- ① Set by software:



1. Open the setup software. Set the Serial port parameters according to the actual serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode" and wait for the device to enter AT command mode.
3. Click "Query all parameters" and wait for obtaining all current parameters.
4. In "Choose Work Mode", select "Transparent Mode".
5. Set the parameter of Socket A.
6. Enable identity package and set various parameters.
7. Click "More".
8. Set APN parameters.
9. Click "Save current parameters" to save all parameters.
10. Restart the module.

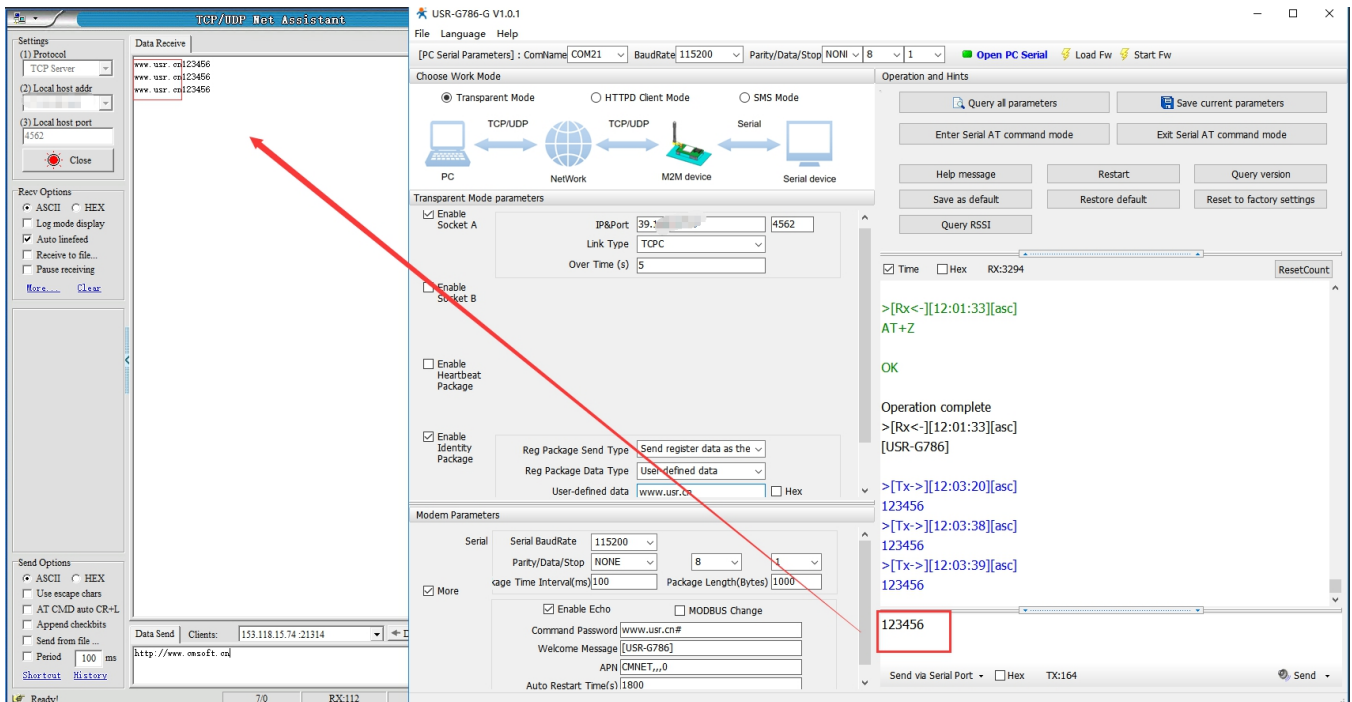
② Set by AT command:

Command	Function	Default
AT+REGEN	Query/setting enable identity package	OFF
AT+REGTP	Query/setting the type of identity package content	USER
AT+REGDT	Query/setting user-defined information	7777772E7573722E636E
AT+REGSND	Query/setting the sending mode of identity package	DATA

1. Enable identity package function:
AT+REGEN=ON
2. Set the type to User-defined data:
AT+REGTP=USER
3. Setup the contents:
AT+REGDT=7777772E7573722E636E
4. Setup the sending mode:
AT+REGSND=DATA
5. Reboot:
AT+Z

③ Test

Connect the serial port of USR-G786-G to the computer via a serial to USB cable, send data from serial port:



The screenshot shows the USR-G786-G V1.0.1 software interface. The 'Data Send' field contains the command `AT+Z`. The 'Data Receive' field shows the response: `>[Rx->][12:01:33][asc] AT+Z OK Operation complete >[Rx->][12:01:33][asc] [USR-G786] >[Tx->][12:03:20][asc] 123456 >[Tx->][12:03:38][asc] 123456 >[Tx->][12:03:39][asc] 123456`. The 'Data Receive' field also shows `123456`. A red arrow points from the 'Data Receive' field to the 'Data Send' field.

6.2. Heartbeat Package

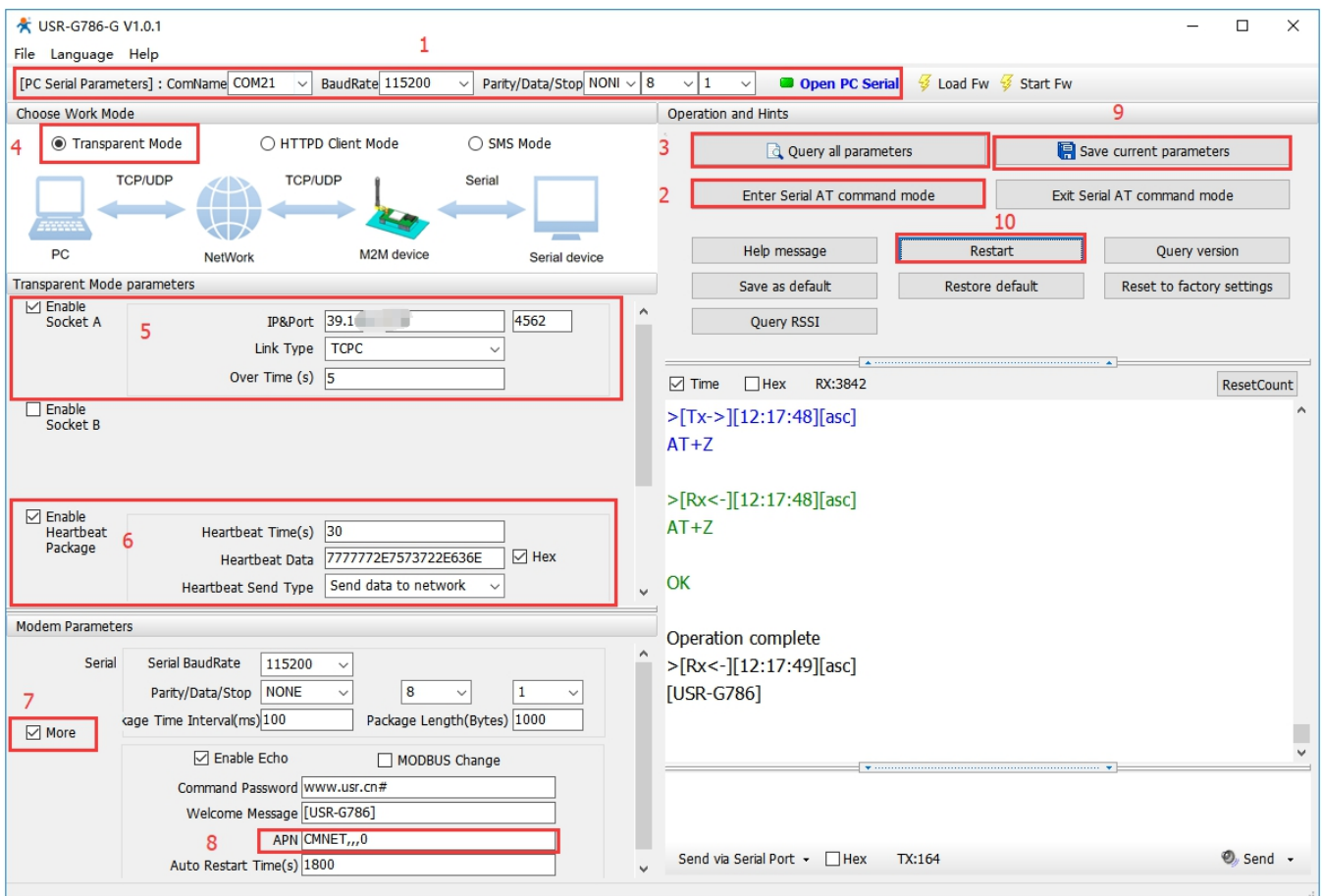


In network transparent mode, user can send the heartbeat package from the module to meet specific requirements.

Heartbeat package can be sent to the network or serial port device . The main purpose of sending to the network is to keep the connection stable and reliable, to ensure the normal connection of the module, and at the same time, to let the server know the online status of the module.

In the application of fixed query commands sent by the server to the device, in order to reduce communication traffic, user can choose to send heartbeat package (query commands) to the serial device instead of sending query commands from the server, so as to save traffic and respond faster.

① Set by software:



1. Open the dedicated setup software. Set the Serial port parameters according to the serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode" and wait for the device to enter AT command mode.
3. Click "Query all parameters" and wait for obtaining all current parameters.

4. In "Choose Work Mode", select "Transparent Mode".
5. Set the parameters of Socket A.
6. Enable heartbeat package function and set various parameters.
7. Click "More".
8. Set APN parameters.
9. Click "Save current parameters" to set and save all parameters.
10. Restart the module.

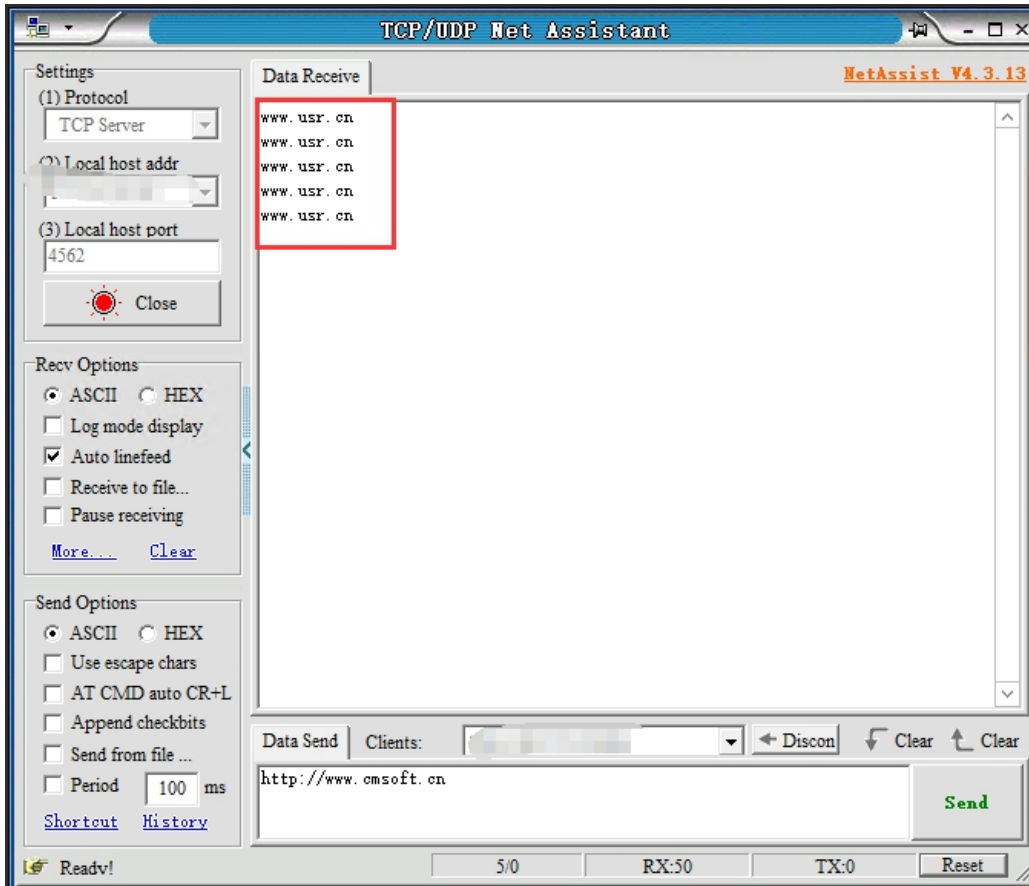
② Set by AT command:

Command	Function	Default parameter
AT+HEARTEN	Query/Setting enable heartbeat package	ON
AT+HEARTDT	Query/Setting heartbeat data	7777772E7573722E636E
AT+HEARTSND	Query/Setting heartbeat package sending mode	NET
AT+HEARTTM	Query/Setting heartbeat package interval	30

1. Enable heartbeat function:
AT+HEARTEN=ON
2. Setup the contents of heartbeat data:
AT+HEARTDT=7777772E7573722E636E
3. Set the mode of heartbeat data:
AT+HEARTTP=NET
4. Setup the sending interval:
AT+HEARTTM=30
5. Reboot:
AT+Z

③ Test

Heartbeat package data sent from G786-G to the network:



6.3. Base Station Position

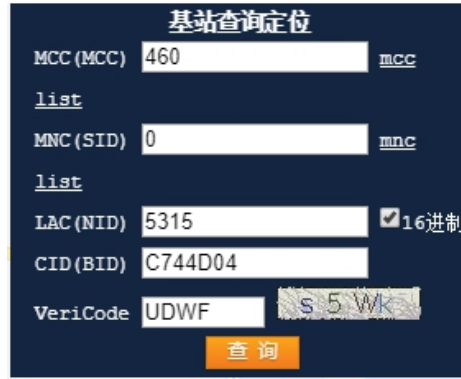
USR-G786-G supports LBS base station positioning function, and can obtain general location of the device through the operator's network. Base station positioning information is obtained through AT command, which can be used flexibly with serial AT and SMS AT command.

AT command

Command	Function	Default parameter
AT+LBS	Query station positioning information	Empty

Note: This function does not obtain positioning information directly(E.g: latitude and longitude information), but base station location information. Users need to obtain direct positioning information through calculation on a third-party platform. Third-party location information services are generally require charges. User can go to the URL to convert the actual location to test:

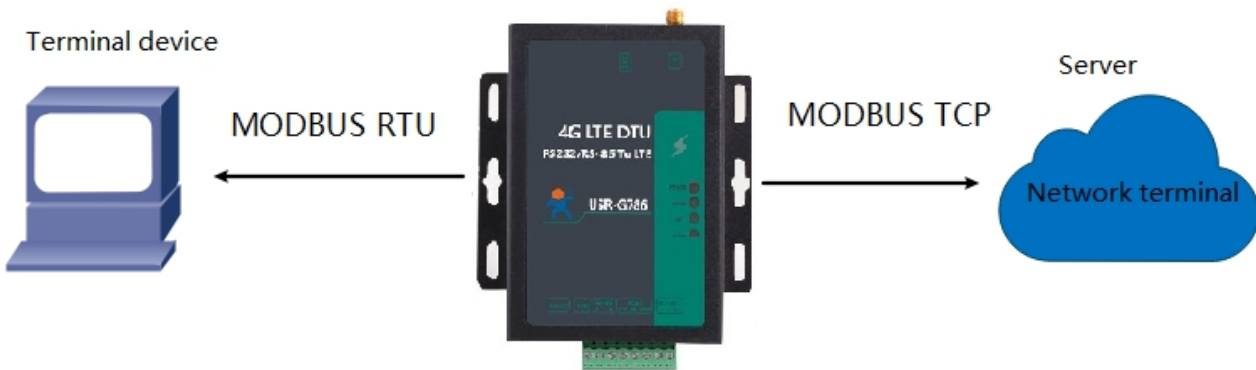
<http://www.minigps.net/cellsearch.html> (This URL is for testing only and does not guarantee site stability)
Query interface is shown below:



Click the query to get the converted location information

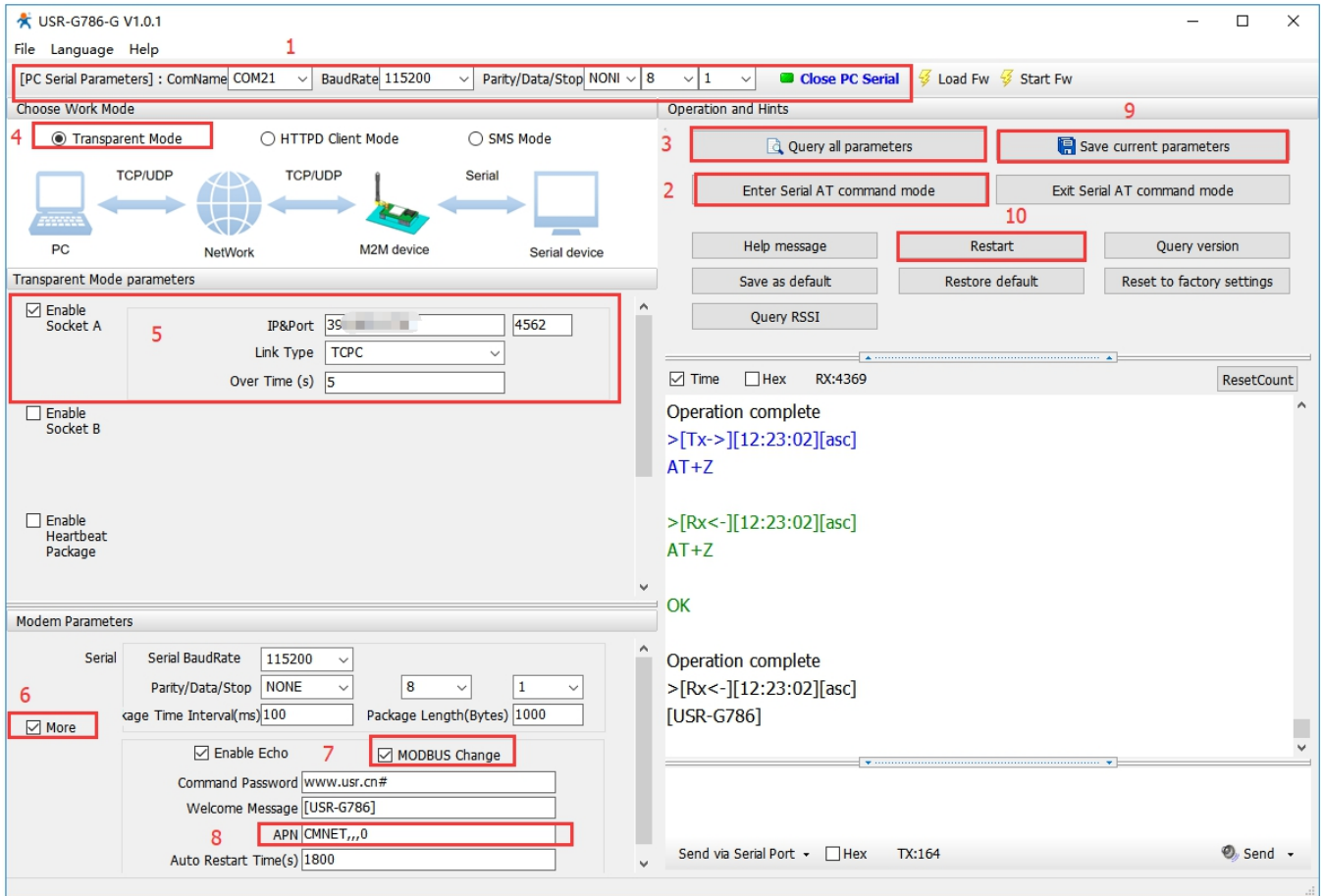


6.4. Modbus



In network transparent mode, if the terminal device transmits data through Modbus RTU protocol and the server communicates through Modbus TCP protocol, user can enable Modbus function. After this function is enabled, G786-G converts the Modbus TCP protocol data sent by the server into Modbus RTU data and sends it to the terminal device, and converts the Modbus RTU protocol data sent by the terminal device into Modbus TCP data and sends it to the server.

- ① Set by software:



1. Open the dedicated setup software. Set the serial port parameters according to the serial device and click "Open PC Serial".
2. Click "Enter Serial AT command mode".
3. Click "Query all parameters", waiting to get all current parameters.
4. In "Choose Work Mode", check "Transparent Mode"
5. Set the parameters of Socket A.
6. Click "More".
7. Check "MODBUS Change".
8. Set the APN parameters.
9. Click "Save current parameters" to set and save all parameters.
10. Click "Restart" to restart the module.

② Set by AT command:

Command	Functions	Default parameter
AT+MODBUSEN	Query/Setting whether to enable Modbus function	OFF

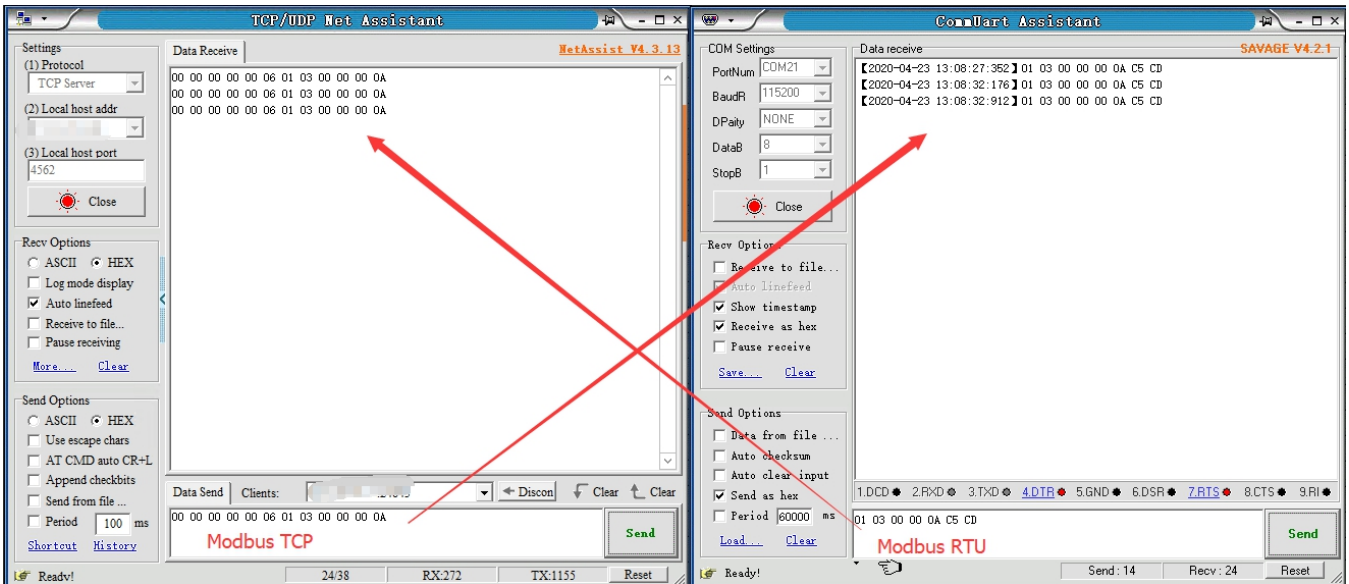
1. Set work mode to Transparent mode.:

AT+WKMOD=NET

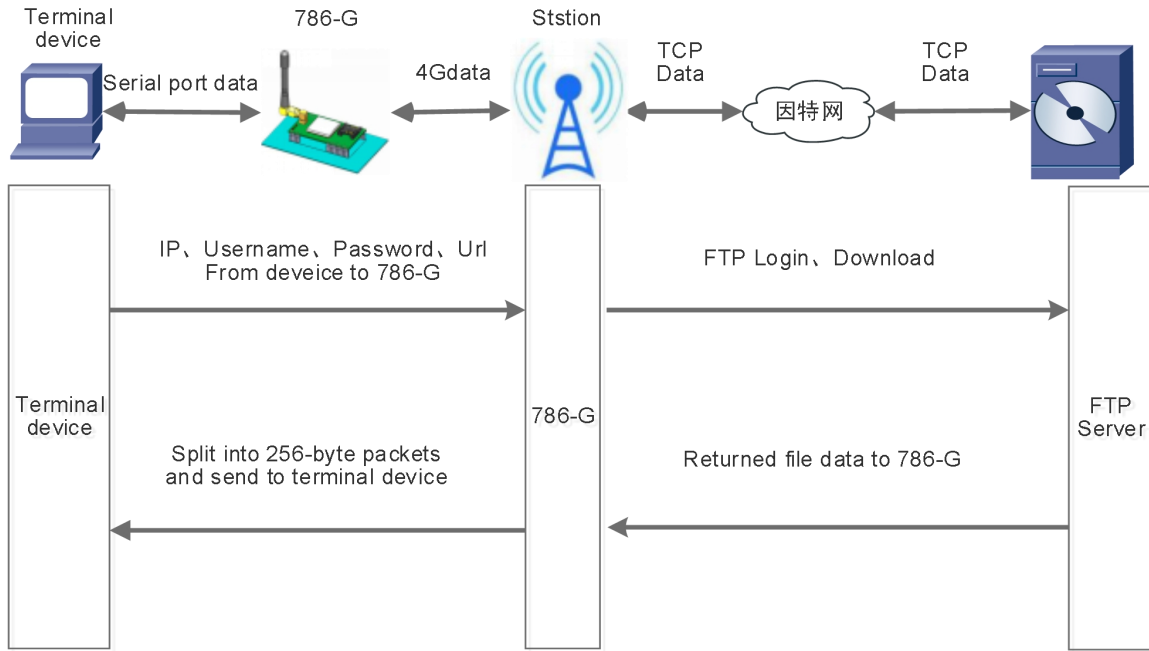
2. Enable Socket A:
AT+SOCKAEN=ON
3. Set socket A to TCP Client:
AT+SOCKA=TCP,test.usr.cn,2317
4. Enable Modbus protocol conversion:
AT+MODBUSEN=ON
5. Restart the module:
AT+Z

③ Test

Connect the serial port of USR-G786-G to the computer via a serial to USB cable, Modbus RTU data sent by the serial port is converted into MODBUS TCP data by G786-G and then sent to the network side. Similarly, G786-G converts the MODBUS TCP data on the network side into MODBUS RTU data and transmits it to the serial port.



6.5. FTP Upgrade



G786-G supports FTP upgrade protocol, user's device can request files on FTP server by special protocol through serial port. The file of the server can be split into small packets with a maximum size of 256 bytes for transmission, which is convenient for customer device to upgrade or download large files remotely. For details, please refer to "USR FTP Upgrade protocol".

6.6. Restore to Factory Default Settings

After power on, press the "Reload" button for 3~15S and release it to restore the device parameters to factory default parameters.

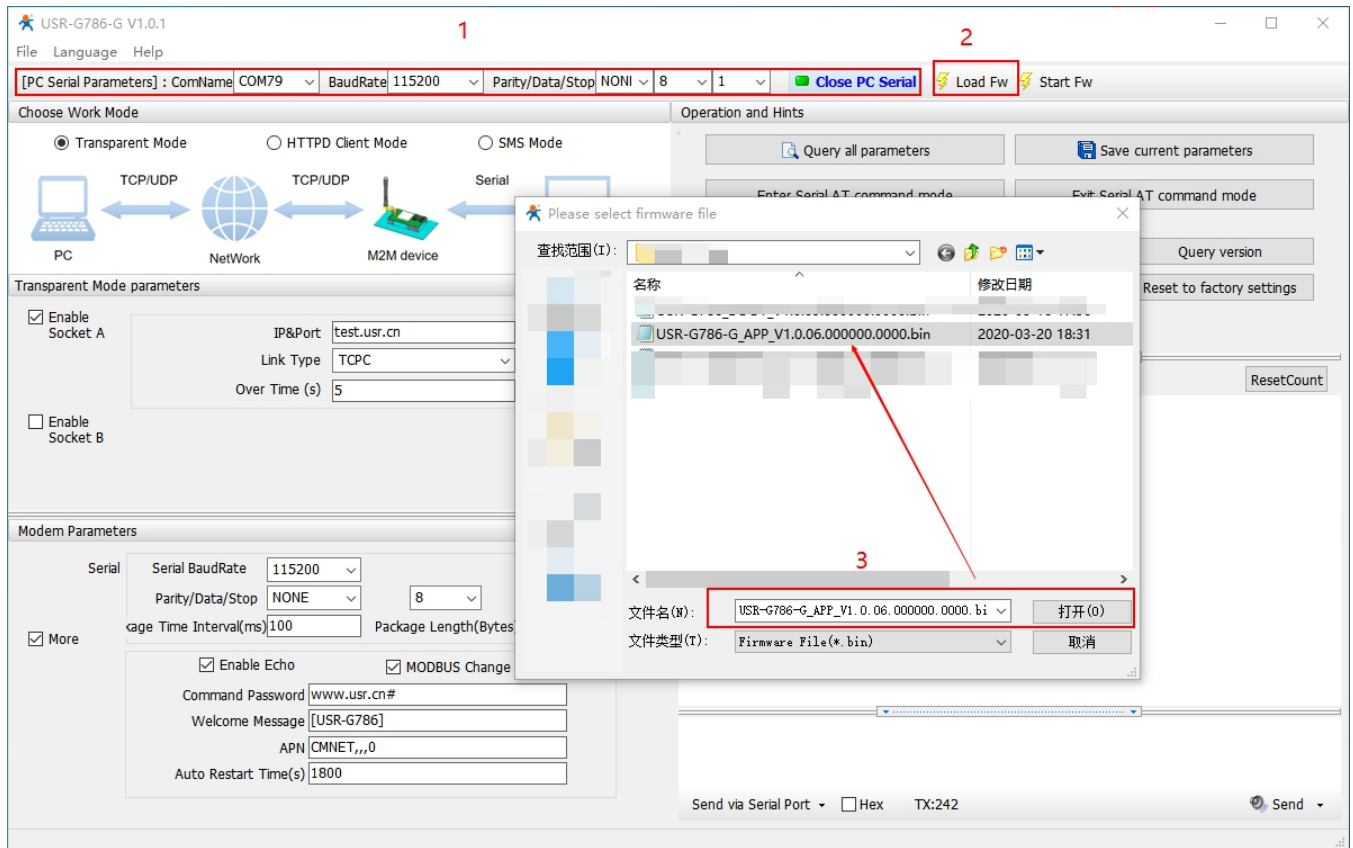


6.7. Upgrade Firmware

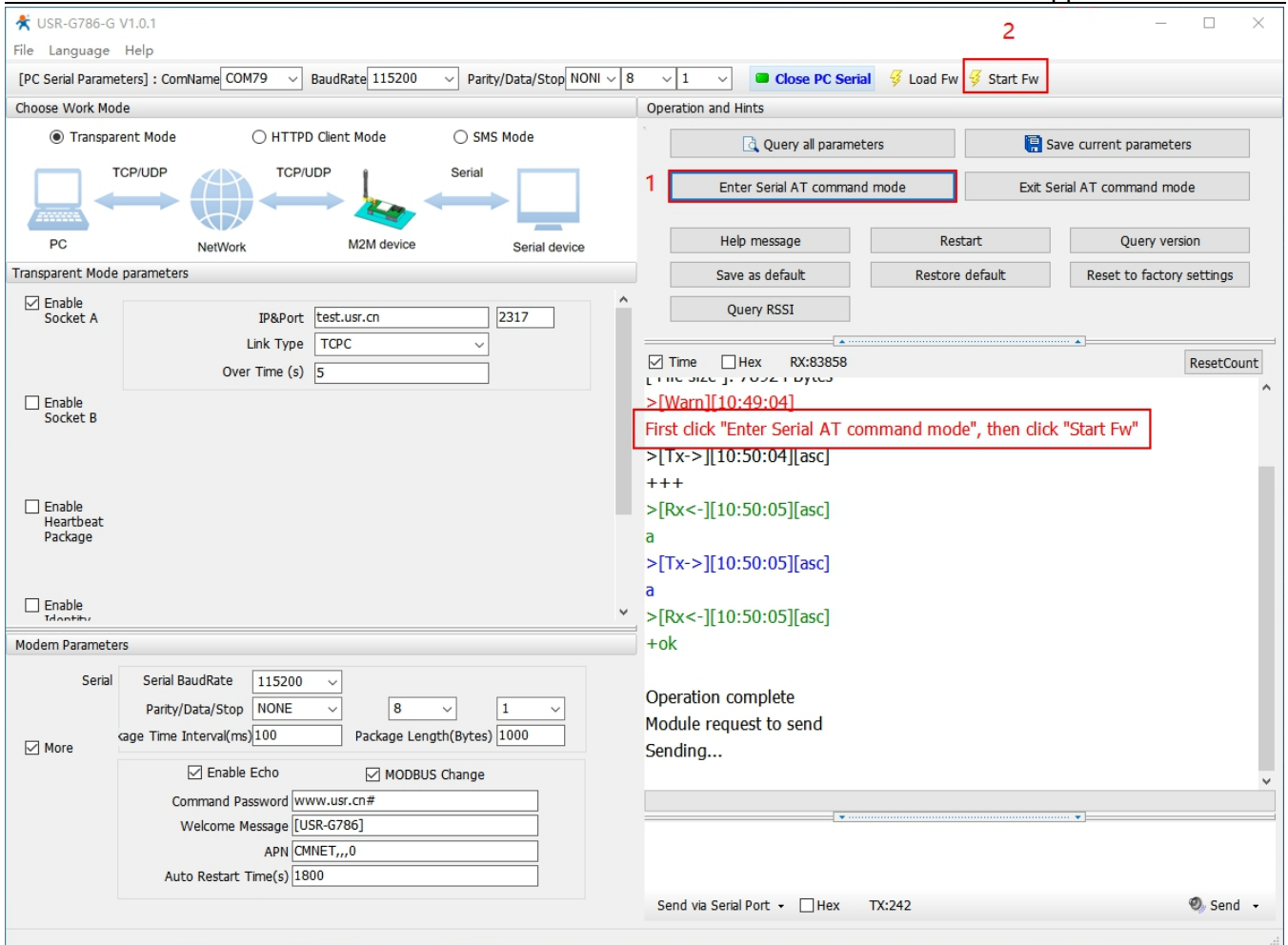
6.7.1. Upgrade by Serial Port

In order to reduce the complexity of firmware upgrade, USR-G786-G has set up the firmware upgrade with serial ports. As follows:

(1) Set baud rate to 115200, no check bit, data bit 8, stop bit 1, open serial port, click “Load Fw”, and select the firmware to be upgraded.



(2) Follow the prompts and wait for the device to be upgraded.



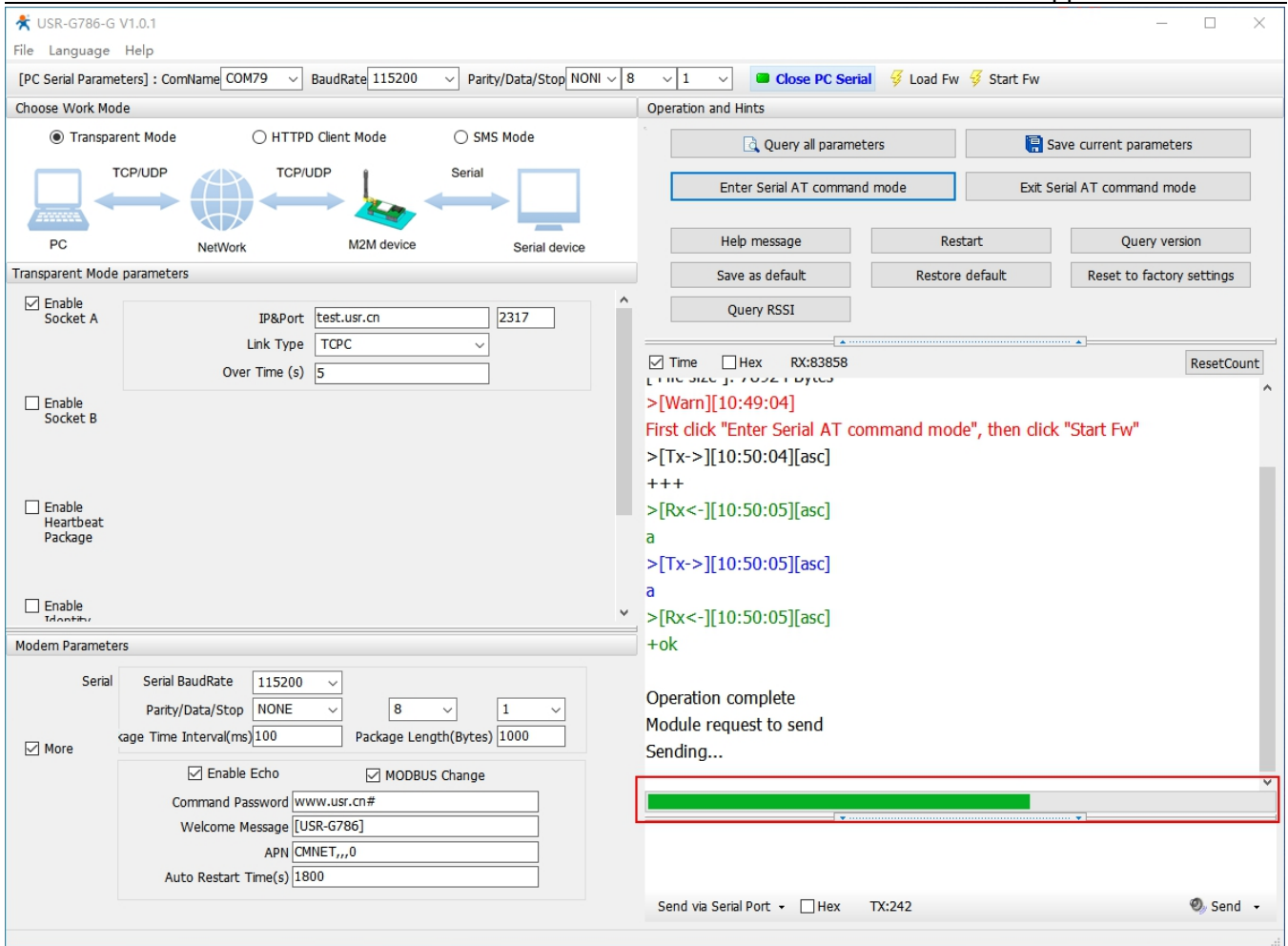
The screenshot shows the USR-G786-G V1.0.1 software interface. The 'Operation and Hints' panel on the right contains several buttons, with 'Enter Serial AT command mode' highlighted by a red box and labeled '1'. The 'Start Fw' button is also highlighted by a red box and labeled '2'. The main terminal window displays the following text:

```

>[Warn][10:49:04]
>[Tx->][10:50:04][asc]
+++
>[Rx<-][10:50:05][asc]
a
>[Tx->][10:50:05][asc]
a
>[Rx<-][10:50:05][asc]
+ok
  
```

Below the terminal text, a red box contains the instruction: "First click 'Enter Serial AT command mode', then click 'Start Fw'". The 'Operation complete' message is visible at the bottom of the terminal window.

(3) Now the firmware is being downloaded, waiting for the upgrade to complete.



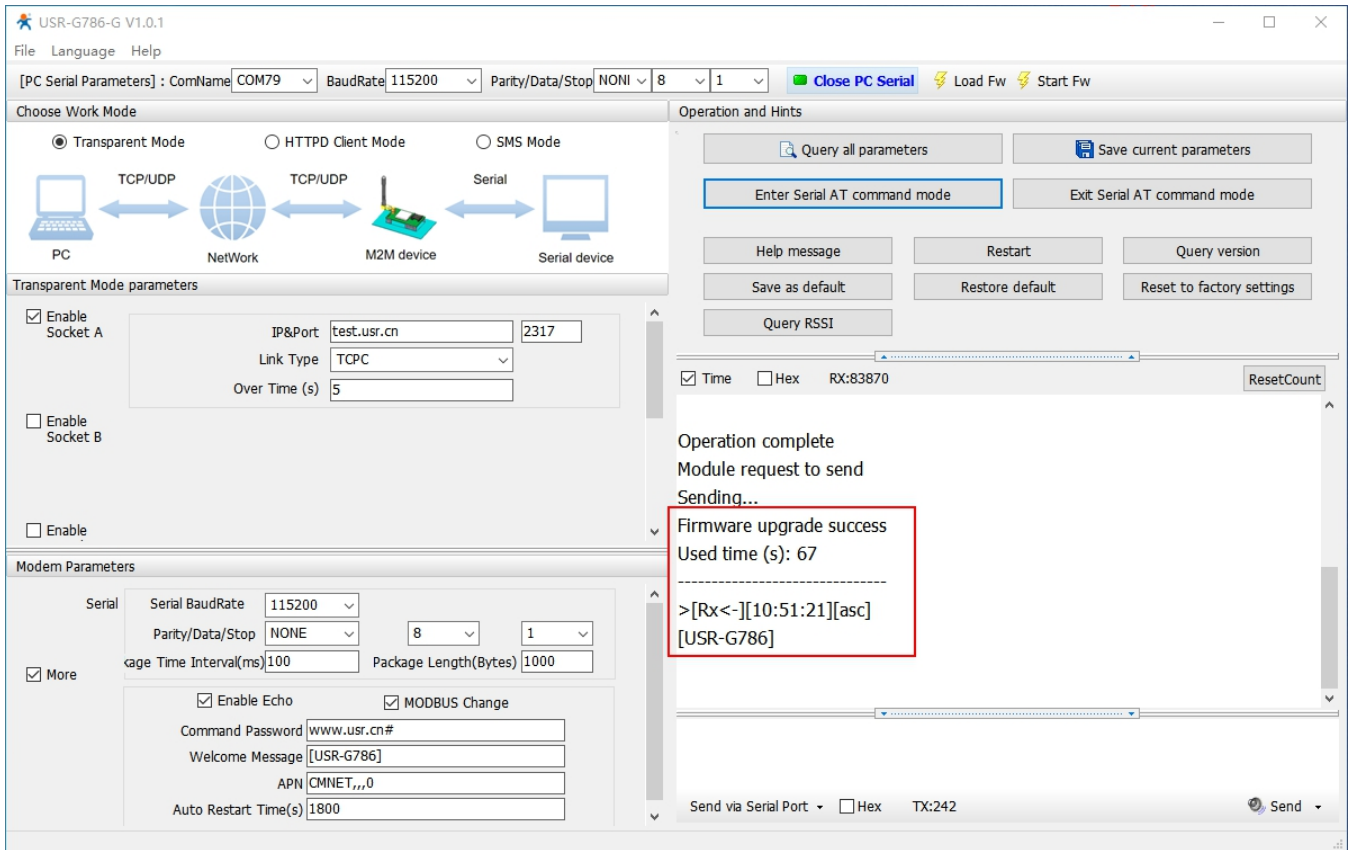
The screenshot shows the USR-G786-G V1.0.1 software interface. The 'Choose Work Mode' section has 'Transparent Mode' selected. The 'Transparent Mode parameters' section shows 'Enable Socket A' checked with IP & Port 'test.usr.cn' and 2317, Link Type 'TCPC', and Over Time (s) '5'. The 'Modem Parameters' section shows 'Serial' parameters: BaudRate '115200', Parity/Data/Stop 'NONE', 8, 1, Package Time Interval (ms) '100', and Package Length (Bytes) '1000'. The 'Operation and Hints' panel shows a terminal window with the following text:

```

>[Warn][10:49:04]
First click "Enter Serial AT command mode", then click "Start Fw"
>[Tx->][10:50:04][asc]
+++
>[Rx<-][10:50:05][asc]
a
>[Tx->][10:50:05][asc]
a
>[Rx<-][10:50:05][asc]
+ok
  
```

The terminal window also shows 'Operation complete' and 'Module request to send Sending...'. A green progress bar is visible at the bottom of the terminal window, and a red box highlights it. The 'Send' button is visible at the bottom right of the terminal window.

(4) Firmware update is completed and the device is restarted.



6.7.2. Remote Upgrade

G786-G queries by polling, request the server once every 30 minutes by default to get whether there is an upgrade demand. If the upgrade is needed, the firmware data will be downloaded from the server for the upgrade; if not, the system will sleep and wait for the next round. The polling time of Fota upgrade can be set through "AT+FOTATIME" with a range of 10~65535s. Set to 0 to close the upgrade request.

7. AT Command Set

7.1. AT Command Examples

When the device works in network transparent mode, can switch to "AT command mode" by sending time-specific data by serial port. When the operation is completed in "AT command mode", send specific commands to return to the previous working mode.

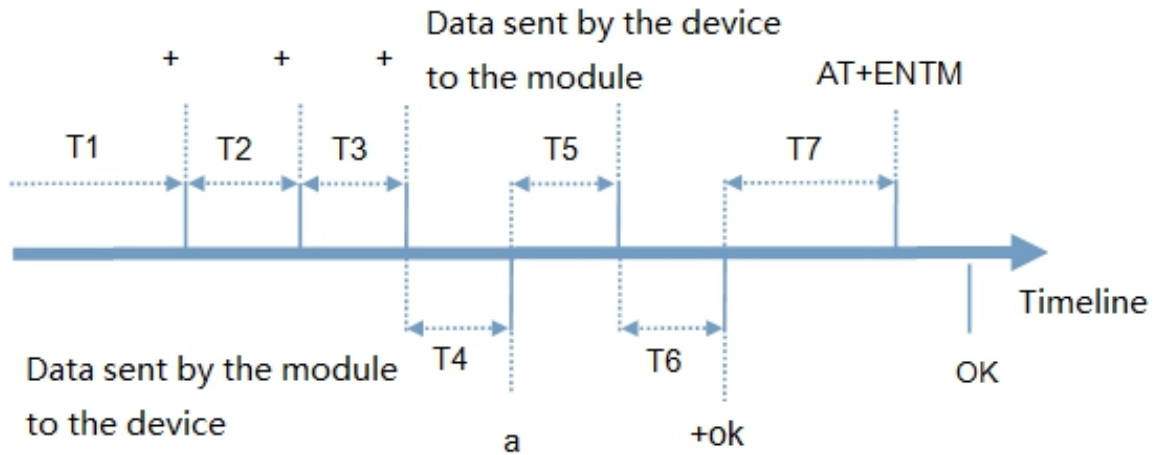


Diagram 1 Toggles the timing of command

Toggles the timing of command mode:

In the figure above, the horizontal axis is time, data above the time axis is sent by the serial device to G786-G, data below the time axis is sent by G786-G to the serial port.

Time requirement:

- T1 > current serial port packaging interval (refer to AT+UARTFT)
- T2 < current serial port packaging interval time (refer to AT+UARTFT)
- T3 < current serial port packaging interval time (refer to AT+UARTFT)
- T4 = current serial port packaging interval time (refer to AT+UARTFT)
- T5 < 3 s
- T6 = current serial port packaging interval time (refer to AT+UARTFT)

The time sequence of switching from Transparent mode to “AT Command mode” :

Serial device continuously sends "+++" to the device. After receiving "+++", the device will send an "a" to the serial device. No data can be sent during a packaging cycle before sending "+++".

When the serial device receives “a”, a “a” must be sent to the device within 3 seconds.

After receiving 'a', the device returns "+ok" and enter “temporary command mode”.

After receiving "+ok", the device has enter "temporary command mode" and now can send AT command to it.

Time sequence of switching from AT command mode to network transparent mode:

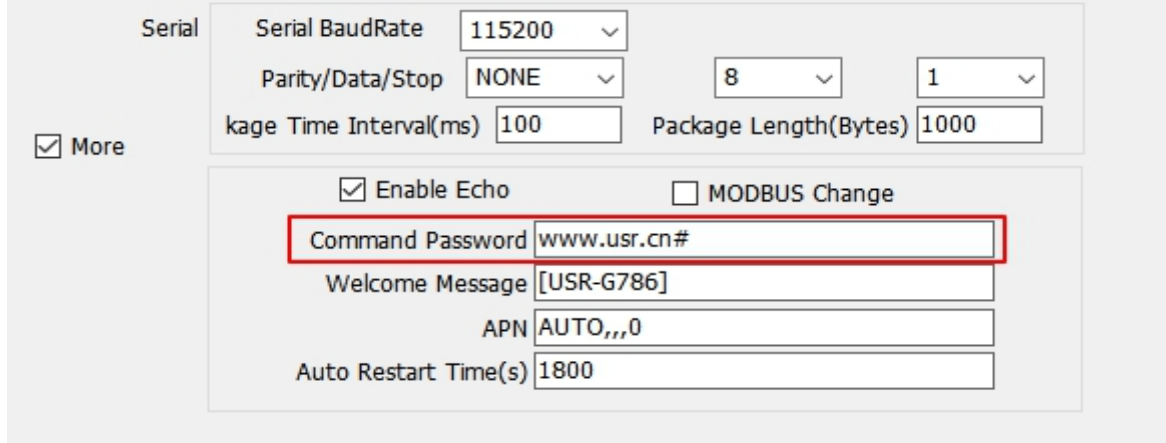
Serial device sends "AT+ENTM" to G786-G.

After receiving the command, sends "OK" to the serial device and returns to the previous working mode.

After the serial device receives "OK", it knows that the device has returned to its previous working mode.

7.1.1. Serial AT Command

In transparent mode, do not need to switch to the command mode, we can use “password + AT command” to query and set parameters. Generally, it is used when user’s equipment needs to query or modify parameters when G786-G is running. It does not need complicated “+++” timing sequence to enter AT command mode, so as to quickly query or set parameters.



Serial BaudRate: 115200
Parity/Data/Stop: NONE 8 1
Package Time Interval(ms): 100 Package Length(Bytes): 1000

More

Enable Echo MODBUS Change

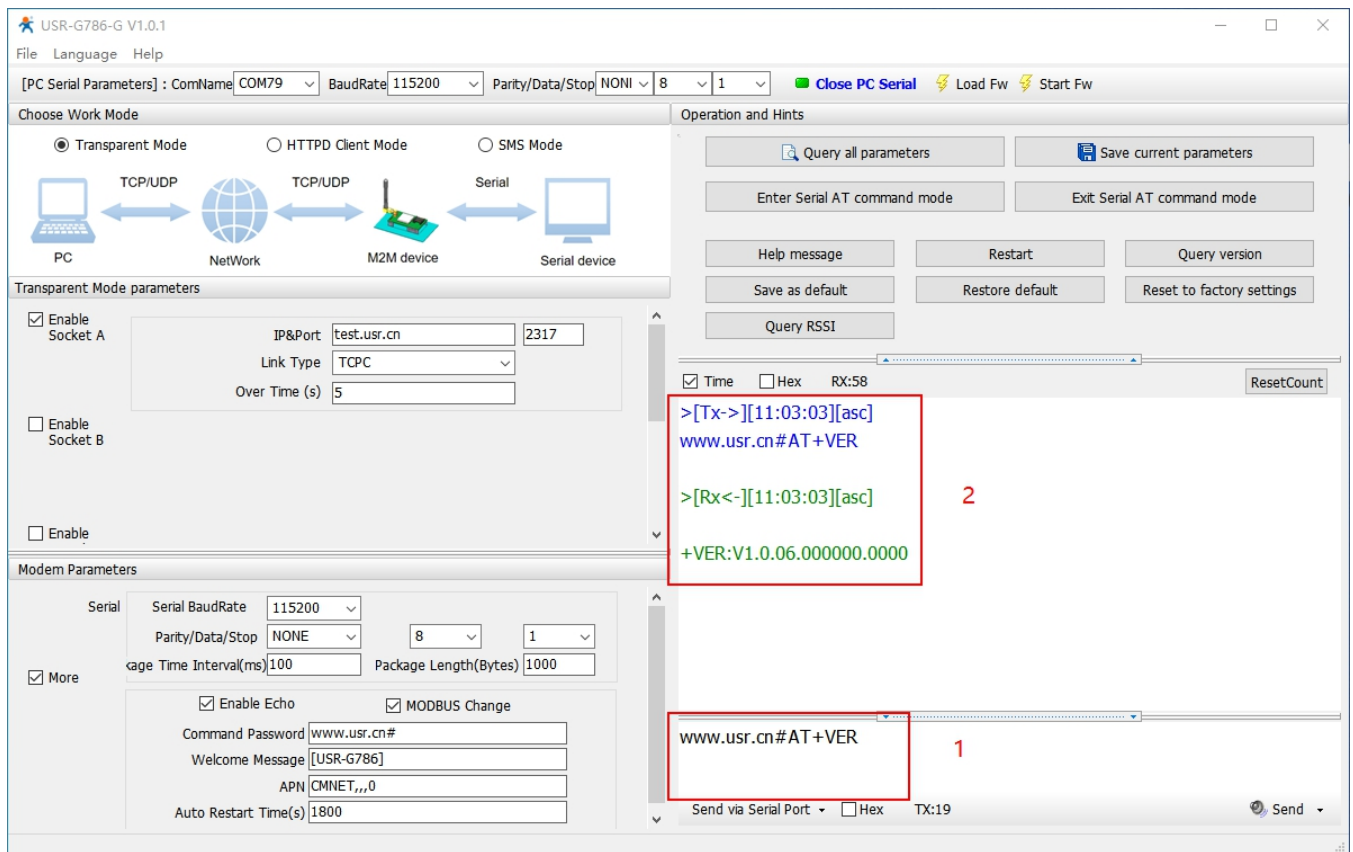
Command Password: www.usr.cn#
Welcome Message: [USR-G786]
APN: AUTO,,,0
Auto Restart Time(s): 1800

Diagram 2 Software schematic diagram

Query current password, query/setting command: `AT+CMDPW`

We can check the current command password by setup software is: www.usr.cn#

After the setting is completed, restart the module, and send `www.usr.cn#AT+VER` (Note: there is an Carriage Return at the end of the string) from the serial port to the module. After receiving the string, module will return the response information.



The screenshot shows the software interface with the following details:

- Operation and Hints:** Buttons for "Query all parameters", "Save current parameters", "Enter Serial AT command mode", "Exit Serial AT command mode", "Help message", "Restart", "Query version", "Save as default", "Restore default", "Reset to factory settings", and "Query RSSI".
- Transparent Mode parameters:** "Enable Socket A" is checked. IP&Port: test.usr.cn, 2317. Link Type: TCPC. Over Time (s): 5.
- Modem Parameters:** Serial BaudRate: 115200, Parity/Data/Stop: NONE 8 1, Package Time Interval(ms): 100, Package Length(Bytes): 1000. "Enable Echo" and "MODBUS Change" are checked. Command Password: www.usr.cn#, Welcome Message: [USR-G786], APN: CMNET,,,0, Auto Restart Time(s): 1800.
- Terminal:** Shows the command `>[Tx->][11:03:03][asc] www.usr.cn#AT+VER` (labeled 1) and the response `>[Rx<-][11:03:03][asc] +VER:V1.0.06.000000.0000` (labeled 2).

7.1.2. Network AT Command

Network AT command refers to set and query parameters by sending “password + AT command” through the network when working in transparent mode. Network AT command is similar to serial AT command. The difference is that network AT command is issued through the network, which is used for remote inquiry or parameter modification by customer's server. Customers can use the network AT command for batch parameter modification and query, which is convenient for managing owned equipment.

For example, query the firmware version and send `www.usr.cn#AT+VER` (note: there is an Carriage Return at the end of the string) from the server to the module. After receiving the command, the module will return a response message:

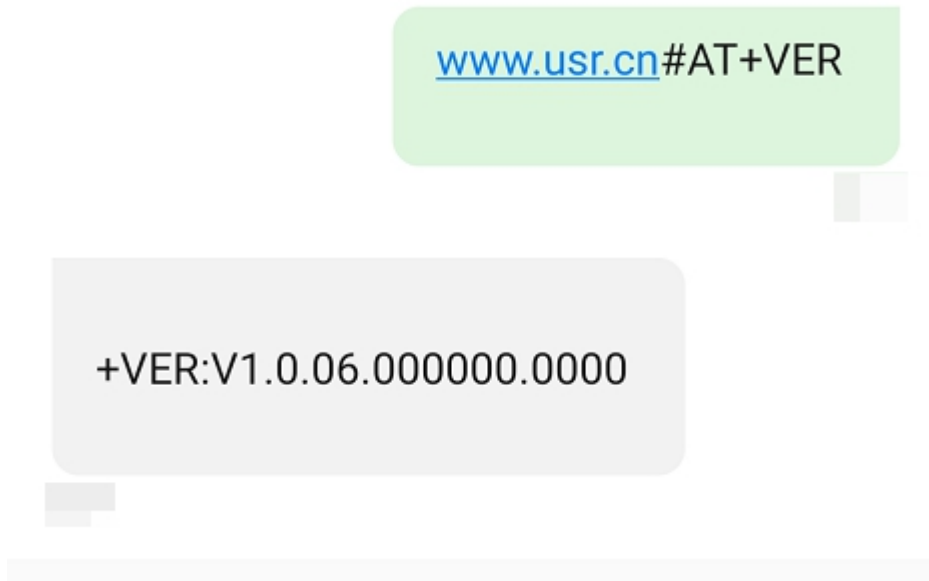


7.1.3. SMS AT Command

SMS AT command means that we can use SMS to query and configure the parameters of G786-G.

SMS AT command is generally used when customers need to query or modify parameters temporarily. We can query and modify parameters as long as know the phone number of the device, which is very convenient for equipment management in remote areas.

Take the query of firmware version as an example, send AT command. Send "www.usr.cn#AT+VER" (Note: there is an Carriage Return at the end of the string) from the mobile phone to the module. After receiving it, the module will return the response information as shown in the figure below:



7.1.4. Command Format

AT command is "query and reply" command, divided into "query" and "reply" two parts."Query" means that the device sends an AT command to G786-G, and "reply" means that G786-G sends a reply to the device.

Note: characters in instructions are case-insensitive.

7.1.4.1 Symbol Introduction

Figure 9 Symbol introduction

Symbol	Implication
<>	The content is essential items
[]	The content is non-essential items
{}	The content is a string with special meaning
~	Parameter range, e.g. A~B. Parameter 's range is from A to B
CMD	Command code
OP	The operator
PARA	Parameters
CR	Carriage Return in ASCII, 0X0D in hex

LF	Line Feed in ASCII, 0X0A in hex
----	---------------------------------

7.1.4.2 Query format in command

Command string: <AT+>[CMD][OP][PARA]<CR>

Figure 10 symbol description

Command code	Implication	Necessary or not
AT+	AT command header	YES
CMD	Command name	NO
OP	Operator, such as =,?	YES
PARA	Executed Parameter	NO
CR	Carriage Return, command terminator	YES

Command type description

Figure 11 Command string format description

Type	String format	Description
0	<AT+><CMD>?<CR>	Query current parameters
1	<AT+><CMD><CR>	Execute the action of this command or query current parameters
2	<AT+><CMD>=<PARA><CR>	Set this command's parameter

7.1.4.3 Reply format in command

Note: the response information of the command can be divided into two types: echo and no echo. Echo means to return the input content when the command is input, and then make a response to the command.

No echo means no input is returned and only the command is responded to. In the following instructions, no echo mode is used as an example.◦

Command String: [CR][LF][+CMD][OP][PARA][CR][LF]<CR><LF>[OK]<CR><LF>

Figure 11 Symbol descriptions

Command	Implication	Necessary or not
CR	Carriage Return	No
LF	Line Feed	No
+CMD	Response header	No
OP	Operator , e.g: ":"	No
PARA	Returned parameter	No
CR	Carriage Return	No
LF	Line Feed	No
CR	Carriage Return	Yes
LF	Line Feed	Yes
OK	Operate successfully	No
CR	Carriage Return	Yes
LF	Line Feed	Yes

Response command type description:

Figure 13 The description of string format

Type	String Format	Description
0	<CR><LF><OK><CR><LF>	Means command send success
1	<CR><LF><+CMD:><PARA><CR><LF><CR><LF><OK><CR><LF>	Return current parameters

7.1.4.4 Special symbols

In AT commands, "=", ",", "?" , carriage return, line feed are special symbols, so the parameter can not directly contain "=", ",", "?". All need to be escaped.

Escape rule: use [] to enclose the hexadecimal code of a special symbol, representing the ASCII code represented by an input hexadecimal code.

E. g:

"?": The hexadecimal encoding of 0x3F is expressed as [3F] after escaping by this escape method.

Symbol	Implication	Escape characters
=	Equal sign	[3D]
,	Comma	[2C]
?	Question mark	[3F]
<CR>	Enter key	[0D]
<LF>	Line break	[0A]

7.2. AT Command Set

Figure 15 AT command error code

Code	Implication
Err1	Does not conform to the AT commands format, is not the beginning of AT
Err2	The AT command was not found and does not exist
Err3	Not meet the format of query or settings
Err4	Wrong parameters or number
Err5	Setting parameter failed

Figure 16 AT commands

Command	Command description
Executive command	
AT	Test Command
H	Help information
Z	Module reboot
E	Query/set whether to enable command echo

ENTM	Exit AT command mode
WKMOD	Query/set work mode
CMDPW	Query/set command password
STMSG	Query/set module start information
RSTIM	Query/set the time of equipment automatically restart
CSQ	Query signal strength information of device currently
SYSINFO	Query network information of device
UCPIN	Query/set PIN code
Query/set query commands	
RELD	Restore to the user default settings
CLEAR	Restore original factory settings
CFGTF	Save current settings to default settings
Query/set information query commands	
VER	Query version information
SN	Query SN code
ICCID	Query ICCID code
IMEI	Query IMEI code
CIP	Query IP address
LBS	Query base station positioning information
CCLK	Query current time
PING	Query the network status
Serial parameter commands	
UART	Query / set the parameters of serial ports
CMDPT	Query/set network data output serial port
UARTFT	Query/set serial port package time
UARTFL	Query/set the serial port package length
Network commands	
APN	Query/set APN information
SOCKA	Query/set socket A parameter
SOCKB	Query/set socket B parameter
SOCKAEN	Query/setup whether to enable socket A
SOCKBEN	Query/setup whether to enable socket B
SOCKALK	Query socket A connection status
SOCKBLK	Query socket B connection status
SOCKATO	Query/set reconnect time after disconnection of socket A
SOCKBTO	Query/set reconnect time after disconnection of socket B
SOCKRSTM	Query/Set the max number of reconnect when socket connection failure
MODBUSEN	Query/set whether to enable Modbus protocol conversion
Identity package commands	
REGEN	Query/set whether to enable identity package
REGTP	Query/set the content type of identity package
REGDT	Query/set user-defined identity package data

REGSND	Query/set identity package sending type
Heartbeat package commands	
HEARTEN	Query/set whether to enable heartbeat
HEARTDT	Query/set heartbeat package data
HEARTSND	Query/set heartbeat package sending type
HEARTTM	Query/set heartbeat package sending interval
HTTPD commands	
AT+HTPTP	Query/set HTTP request type
AT+HTPURL	Query/set URL
AT+HTPSV	Query/set HTTP server address and port
AT+HTPHD	Query/set HTTP request header
AT+HTPTO	Query/set HTTP timeout
AT+HTPFLT	Query/set whether to filter HTTP header
SMS commands	
DSTNUM	Query/set the target mobile phone number of SMS mode
SMSFLT	Query/set whether to enable only receive SMS from source number
CISMSEND	Send SMS

7.2.1. AT

- Function: Test commands to test whether the current device is active
- Format
 - ◆ Query:


```
AT{CR}
{CR}{LF}OK{CR}{LF}
```

7.2.2. AT+H

- Function: Helping command
- Format
 - ◆ Query:


```
AT+H{CR}
{CR}{LF} help message {CR}{LF}
```
- Parameter:
 - ◆ help message: command.

7.2.3. AT+Z

- Function: Reload the module.
- Format


```
AT+Z{CR}
{CR}{LF}OK{CR}{LF}
```

7.2.4. AT+E

Function: Query/set the echo status of AT commands.

Format:

- ◆ Query current parameter:

AT+E{CR} or AT+E?{CR}
{CR}{LF}+E:status{CR}{LF}

- ◆ Setting:

AT+E=status{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameter:

- ◆ status: echo status, including:

ON: open

OFF: close

Command echo default is on.

➤ E.g: AT+E=ON

7.2.5. AT+ENTM

➤ Function: set the device to return to the previous working mode.

➤ Format:

- ◆ Perform specified function:

AT+ENTM{CR}
{CR}{LF}OK{CR}{LF}

7.2.6. AT+WKMOD

➤ Function: Query/Setting module's work mode

➤ Format:

- ◆ Query current parameter:

AT+WKMOD{CR} or AT+WKMOD?{CR}
{CR}{LF}+WKMOD:mode{CR}{LF}

- ◆ Setting:

AT+WKMOD=mode{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameter:

- ◆ mode: work mode, including:

NET: Network transparent mode

HTTPD: HTTPD Client mode

SMS: SMS mode

Default in NET mode:

➤ E.g: AT+WKMOD=NET

7.2.7. AT+CMDPW

➤ Function: Query/Setting command password

➤ Format:

- ◆ Query current parameter:

AT+CMDPW{CR} or AT+CMDPW?{CR}
{CR}{LF}+CMDPW:password{CR}{LF}

- ◆ Setting:
AT+CMDPW=password{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameter:

- ◆ password: Command password, 1~11 bytes ASCII code, default is www.usr.cn#.

E.g: AT+CMDPW=www.usr.cn#

7.2.8. AT+STMSG

➤ Function: Query/Setting module's welcome message.

➤ Format:

- ◆ Query current parameter:
AT+STMSG{CR} or AT+STMSG?{CR}
{CR}{LF}+STMSG:message{CR}{LF}

- ◆ Setting:
AT+STMSG=message{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameter:

- ◆ message: Welcome message, after the device is powered on. ASCII of 1~20 bytes, default is [USR-G786].

➤ E.g: AT+STMSG=www.usr.cn

7.2.9. AT+RSTIM

➤ Function: Query/Setting module's automatic restart time.

➤ Format:

- ◆ Query current parameter:
AT+RSTIM{CR} or AT+RSTIM?{CR}
{CR}{LF}+RSTIM:time{CR}{LF}

- ◆ Setting:
AT+RSTIM=time{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameter:

- ◆ Time: s. Range can be set from 60s to 60000s. When the network does not respond to data longer than this time, device will restart. The default time is 1800s. When the parameter is set to 0, this function is disabled.

➤ E.g: AT+RSTIM=1800

7.2.10. AT+CSQ

➤ Function: Query module's current signal strength.

➤ Format:

- ◆ Query current parameter
AT+CSQ{CR} or AT+CSQ?{CR}
{CR}{LF}+CSQ: rssi {CR}{LF}

➤ Parameter:

- ◆ rssi: Received signal strength information.

Figure 1 Mapping relation

Number	Implication
0	Less than -113 dBm
1	-111 dBm
2....31	-109... -53 dBm
99	Unknown or unmeasured

7.2.11. AT+SYSINFO

- Function: Query module 's network information
- Format:
 - ◆ Query current parameter:
 AT+SYSINFO{CR} or AT+SYSINFO?{CR}
 {CR}{LF}+SYSINFO: state,srv_domain ,roam_status,sys_mode,sim_state{CR}{LF}
- Parameter
 - ◆ state: current network status

Figure 2 Sever status list

Number	Implication
0	No service
1	Restricted service
2	Network service
3	Restricted regional services
4	Power saving state

- ◆ srv_domain: business domain

Figure 3 Business domain list

Number	Implication
0	No service
1	Only CS service
2	Only PS service
3	PS+CS service
4	CS,PS is not registered and is in the search state

- ◆ roam_status: Roaming state
 - 0: Non-roaming state
 - 1: Roaming state
- ◆ sys_mode: System mode

Figure 4 System mode list

Number	Implication
0	No service
1	AMPS mode
2	CDMA mode
3	GSM mode
4	HDR mode
5	WCDMA mode
6	GPS mode
7	GSM/WCDMA mode

8	CDMA/HDR mixed mode
9	LTE mode
10	GSM/WCDMA/LTE mode
11	TDS mode

- ◆ sim_state: UIM state.

Figure 5 UIM status list

Number	Implication
0	UIM card status is invalid
1	UIM card status is effective
2	UIM card status is invalid under CS
3	UIM is invalid under PS
4	UIM is invalid under PS+CS
240	ROMUIM version
255	UIM card not exist

7.2.12. AT+UCPIN

Function: Query/Setting PIN code.

- Function: Query/Setting PIN code
- Format
 - ◆ Query current parameter:
AT+UCPIN{CR} or AT+UCPIN?{CR}
{CR}{LF}+UCPIN:pin{CR}{LF}
 - ◆ Setting:
AT+UCPIN=pin{CR}
{CR}{LF}OK{CR}{LF}
- Parameter:
 - ◆ pin: PIN code, default is empty.
- E.g: AT+PIN=1234

7.2.13. AT+RELD

- Function: Restore to default settings and the device will restart.
- Format:
 - ◆ Execute the specified function
AT+RELD{CR}
{CR}{LF}OK{CR}{LF}

7.2.14. AT+CLEAR

- Function: Reload the default settings, device will restart.
- Format:
 - ◆ Execute specified function:
AT+CLEAR{CR}
{CR}{LF}OK{CR}{LF}

7.2.15. AT+CFGTF

- Function: Save current parameter to default parameter.
- Format:
 - ◆ Execute specified function:
AT+CFGTF{CR}
{CR}{LF}OK{CR}{LF}

7.2.16. AT+VER

- Function: Query module's firmware version.
- Format:
 - ◆ Query current parameter:
AT+VER{CR} or AT+VER?{CR}
{CR}{LF}+VER:version{CR}{LF}
- Parameters:
 - ◆ version: Firmware version.

7.2.17. AT+SN

- Function: Query module's SN code.
- Format:
 - ◆ Query current parameter:
AT+SN{CR} or AT+SN?{CR}
{CR}{LF}+SN:code{CR}{LF}
- Parameters:
 - ◆ code:SN code

7.2.18. AT+ICCID

- Function: Query module's ICCID code.
- Format:
 - ◆ Query current parameter:
AT+ICCID{CR} or AT+ICCID?{CR}
{CR}{LF}+ICCID:code{CR}{LF}{CR}{LF}
- Parameters:
 - ◆ code: ICCID code.

7.2.19. AT+IMEI

- Function: Query module's IMEI code.
- Format:
 - ◆ Query current parameter:
AT+IMEI{CR} or AT+IMEI?{CR}
{CR}{LF}+IMEI:code{CR}{LF}
- Parameters:
 - ◆ code: IMEI code.

7.2.20. AT+CIP

- Function: Query local IP address.
- Format:
 - ◆ Query current parameter:
AT+CIP{CR} or AT+CIP?{CR}
{CR}{LF}+CIP: IP {CR}{LF}
- Parameters:
 - ◆ IP: local IP address.

7.2.21. AT+LBS

- Function: Query base station positioning.
- Format:
 - ◆ Query:
AT+LBS{CR}
{CR}{LF}+IMEI : <lac>,<cid>{CR}{LF}
- Parameters:
 - ◆ <lac>: LAC information, Range: 1~65535
 - ◆ <cid>: CID information, Range: 2G: (1-65535) 3G/4G (1~268435455)
- E.g: AT+LBS

7.2.22. AT+CCLK

- Function: Query current time.
- Format:
 - ◆ Query:
AT+CCLK{CR}
{CR}{LF}+CCLK : <lac>,<cid>{CR}{LF}
- Parameters:
 - ◆ <data>: Data information
 - ◆ <time>: Time information
- E.g: AT+CCLK

7.2.23. AT+PING

- Function: Query network continuity.
- Format:
 - ◆ Query:
AT+PING="ip_address"{CR}
{CR}{LF}+PING: <result>,<ip_adress>, <bytes>, <time>, <ttl>{CR}{LF}
{CR}{LF}+PING: <finresult>, <sent>, <rcvd>, <lost>, <min>,<max>,<avg>{CR}{LF}
- Parameters:
 - ◆ <result>: The result of each ping request. 0 means success.
 - ◆ <ip_address>: IP address.

- ◆ <bytes>: The length of each sent ping request. Unit: byte.
 - ◆ <time>: The time wait for the response of the ping request. Unit: ms.
 - ◆ <ttl>: Time to live value of the response packet for the ping request.
 - ◆ <finresult>: The final result of the command. 0 means success.
 - ◆ <sent>: Total number of sent ping requests.
 - ◆ <rcvd>: Total number of the ping requests that received the response.
 - ◆ <lost>: Total number of the ping requests that are timeout.
 - ◆ <min>: The minimum response time. Unit: ms.
 - ◆ <max>: The maximum response time. Unit: ms.
 - ◆ <avg>: The average response time. Unit: ms.
- E.g: AT+PING="www.baidu.com"

7.2.24. AT+UART

- Function: Query/Setting serial port parameters

- Format:

AT+UART{CR} or AT+UART?{CR}
{CR}{LF}+UART:baud,data bit,stop bit,parity {CR}{LF}

- ◆ Setting:

AT+UART=baud,data bit,stop bit,parity {CR}
{CR}{LF}OK{CR}{LF}

- Parameters:

- ◆ Baud:band rate:2400,4800,9600,14400,19200, 28800, 33600,38400,57600,115200,230400,460800
Default rate 115200.

- ◆ data bit: data bit, including:

8: 8 data bits.

Default data bit :8.

- ◆ stop bit: stop bit, including:

1: 1 stop bit.

2: 2 stop bits.

Default 1 stop bit.

- ◆ parity: Checking methods, including:

NONE: NO check.

ODD: ODD check.

EVEN: EVEN check.

Default is NONE.

- E.g.: AT+UART=115200,8,1,NONE.

7.2.25. AT+CMDPT

- Function: Query /Setting network data output port.

- Format:

AT+CMDPT{CR} or AT+CMDPT?{CR}
{CR}{LF}+CMDPT: {CR}{LF}

- ◆ Setting:
AT+CMDPT=port{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ Port
RS232
RS485
RSALL

Default is RSALL.

Note: If set to RS232, network data will only be output on RS232 port. Set to RS485, network data will only be output on RS485 port. Set to RSALL, network data will be output on both RS232 and RS485 ports. In order to ensure the data output efficiency, please choose one serial port as the network data output port according to the actual application needs.

- E.g: AT+CMDPT=RS232

7.2.26. AT+UARTFT

- Function: Query/Setting serial port packaging interval.

➤ Format:

AT+UARTFT{CR} or AT+UARTFT?{CR}
{CR}{LF}+UARTFT:time{CR}{LF}

- ◆ Setting:
AT+UARTFT=time{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ time: Packaging interval, the range is 100~60000ms, default is 100ms.

- E.g: AT+UARTFT=100.

7.2.27. AT+UARTFL

- Function: Query/Setting serial port packaging length.

➤ Format:

AT+UARTFL{CR} or AT+UARTFL?{CR}
{CR}{LF}+UARTFL:length{CR}{LF}

- ◆ Setting:
AT+UARTFL=length{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ length: Package length, ranging from 100 to 1000 bytes, default to 1000 bytes.

- E.g: AT+UARTFL =1000

7.2.28. AT+APN

- Function: Query/Setting APN code

➤ Format

- ◆ Query current parameter:

AT+APN{CR} or AT+APN?{CR}
{CR}{LF}+APN:code,user_name,password,auth{CR}{LF}

◆ Setting:

AT+APN=code,user_name,password,auth{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ code: APN, default is AUTO, with a maximum length of 50.
- ◆ user_name: User name, default is empty, maximum length 64.
- ◆ password: Password, default empty, maximum length 127.
- ◆ auth: Authentication mode, 0: None, 1: PAP, 2: CHAP, 3: PAP+CHAP, default is 0.

➤ E.g: AT+APN=4gnet,admin,admin,1.

7.2.29. AT+SOCKA

➤ Function: Query/Setting the parameters of socket A.

➤ Format:

◆ Query current parameter:

AT+SOCKA{CR} or AT+SOCKA?{CR}
{CR}{LF}+SOCKA:protocol,address,port{CR}{LF}

◆ Setting:

AT+SOCKA=protocol,address,port{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

◆ protocol: Connection Type, including:

TCPS: TCP Server
TCPC: TCP Client
UDPC: UDP Client
Default is TCPC.

◆ address: Server address. This address can be a domain name or IP. Default is test.usr.cn. It is invalid under TCPS. Can set any domain name or IP. Cannot be empty.

- ◆ port: Server port, range 1~65535, default 2317, local port in TCPS mode

➤ E.g: AT+SOCKA=TCPC,test.usr.cn,8899.

7.2.30. AT+SOCKB

Function: Query/Setting the parameters of socket B.

➤ Function: Query/Setting the parameters of socket B.

➤ Format:

◆ Query current parameter:

AT+SOCKB{CR} or AT+SOCKB?{CR}
{CR}{LF}+SOCKB:protocol,address,port{CR}{LF}

◆ Setting:

AT+SOCKB=protocol,address,port{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ protocol: protocol, including:

TCPC: TCP Client

UDPC: UDP Client

Default TCPC.

- ◆ address: Server address, this address can be domain name or IP, maximum support 100 bytes, default is test.usr.cn.
- ◆ port: Server port, range 1~65535, default 2317
- E.g: AT+SOCKB=TCPC,test.usr.cn,2317

7.2.31. AT+SOCKAEN

- Function: Query/Setting whether to enable socket A
- Format:
 - ◆ Query current parameter:
AT+SOCKAEN{CR} or AT+SOCKAEN?{CR}
{CR}{LF}+SOCKAEN:status{CR}{LF}
 - ◆ Setting:
AT+SOCKAEN=status{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ status: whether to enable socket A, including:
ON: enable.
OFF: disable.

7.2.32. AT+SOCKBEN

- Function: Query/Setting whether to enable socket B.
- Format:
 - ◆ Query current parameter:
AT+SOCKBEN{CR} or AT+SOCKBEN?{CR}
{CR}{LF}+SOCKBEN:status{CR}{LF}
 - ◆ Setting:
AT+SOCKBEN=status{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ status: whether to enable socket B, including:
ON: enable.
OFF: disable

7.2.33. AT+SOCKALK

- Function: Query whether socket A is connected.
- Format:
 - ◆ Query current parameter:
AT+SOCKALK{CR} or AT+SOCKALK?{CR}
{CR}{LF}+SOCKALK:status{CR}{LF}
- Parameters:
 - ◆ status: socket A connection status, including:

ON: connected.

OFF: unconnected.

7.2.34. AT+SOCKBLK

- Function: Query whether socket B is connected.
- Format:
 - ◆ Query current parameter:
AT+SOCKBLK{CR} or AT+SOCKBLK?{CR}
{CR}{LF}+SOCKBLK:status{CR}{LF}
- Parameters:
 - ◆ status: socket B connection status, including:
ON: connected.
OFF: unconnected.

7.2.35. AT+SOCKATO

- Function: Query/Setting reconnect time of Socket A once timeout.
- Format:
 - ◆ Query current parameter:
AT+SOCKATO{CR} or AT+SOCKATO?{CR}
{CR}{LF}+SOCKATO:time{CR}{LF}
- Parameters:
 - ◆ time: reconnect time, time range is 1~100 s. Default time is 5s.
- E.g: AT+SOCKATO=10

7.2.36. AT+SOCKBTO

- Function: Query/Setting reconnect time of Socket B once timeout.
- Format:
 - ◆ Query current parameter:
AT+SOCKBTO{CR} or AT+SOCKBTO?{CR}
{CR}{LF}+SOCKBTO:time{CR}{LF}
- Parameters:
 - ◆ time: reconnect time, time range is 1~100 s. Default time is 5s.

7.2.37. AT+SOCKRSTIM

- Function: Query/Setting the maximum number of re-connections after connection failure, device will restart after the maximum number of re-connections.
- Format:
 - ◆ Query current parameter:
AT+SOCKRSTIM{CR} or AT+SOCKRSTIM?{CR}
{CR}{LF}+SOCKRSTIM:num{CR}{LF}
- Parameters:
 - num: Maximum re-connection times. Setting range is 10~600 times, default is 60 times.

7.2.38. AT+MODBUSEN

- Function: Query/Setting whether to enable Modbus protocol conversion function.
- Format:
 - ◆ Query current parameter:
AT+MODBUSEN{CR} or AT+MODBUSEN?{CR}
{CR}{LF}+MODBUSEN:status{CR}{LF}
 - ◆ Setting:
AT+MODBUSEN=status{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ status: Modbus protocol conversion function status, including:
ON: enable
OFF: disable
Default is OFF.

7.2.39. AT+REGEN

- Function: Query/Setting whether to enable identity package.
- Format:
 - ◆ Query current parameter:
AT+REGEN{CR} or AT+REGEN?{CR}
{CR}{LF}+REGEN:status{CR}{LF}
 - ◆ Setting:
AT+REGEN=status{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ status: identity package status, including:
ON: open.
OFF: close.
Default: OFF.

7.2.40. AT+REGTP

- Function: Query/Setting identity package type.
- Format:
 - ◆ Query current parameter:
AT+REGTP{CR} or AT+REGTP?{CR}
{CR}{LF}+REGTP:type{CR}{LF}
 - ◆ Setting:
AT+REGTP=type{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ type: Identity package data type, including:
ICCID: ICCID code.
IMEI: IMEI code.

CLOUD: USR-cloud.

USER: User-defined data.

Default: USER.

- E.g: AT+REGTP =ICCID

7.2.41. AT+REGDT

- Function: Query/Setting user-defined identity package data.

- Format:

- ◆ Query current parameter:

AT+REGDT{CR} or AT+REGDT?{CR}
{CR}{LF}+REGDT:data{CR}{LF}

- ◆ Setting:

AT+REGDT=data{CR}
{CR}{LF}OK{CR}{LF}

- Parameters:

- ◆ data: User-defined identity package data, hexadecimal string format, maximum 160 bytes, 2 ~ 160 even bytes, default 7777772E7573722E636E, with ASCII code for the expression of www.usr.cn.

Note: The maximum bytes is the number of bytes after ASCII code is converted to a hexadecimal string.

- E.g: AT+REGDT =7777772E7573722E636E

7.2.42. AT+REGSND

- Function: Query/Setting the sending mode of the identity package.

- Format:

- ◆ Query current parameter:

AT+REGSND{CR} or AT+REGSND?{CR}
{CR}{LF}+REGSND:type{CR}{LF}

- ◆ Setting:

AT+REGSND=type{CR}
{CR}{LF}OK{CR}{LF}

- Parameters:

- ◆ type: Sending mode, including:

LINK: Sending when connection is established.

DATA: Identity package data as the beginning of each package data.

Default is DATA.

- E.g: AT+REGSND =DATA

7.2.43. AT+HEARTEN

- Function: Query/Setting whether to enable heartbeat package function.

- Format:

- ◆ Query current parameter:

AT+HEARTEN{CR} or AT+HEARTEN?{CR}
{CR}{LF}+HEARTEN:status{CR}{LF}

- ◆ Setting:

AT+HEARTEN=status{CR}

{CR}{LF}OK{CR}{LF}

- Parameters:
 - ◆ status: the status of heartbeat package, including:
 - ON: open
 - OFF: close
 - Default: ON.

7.2.44. AT+HEARTDT

- Function: Query/Setting heartbeat package data.
- Format:
 - ◆ Query current parameter:
AT+HEARTDT{CR} or AT+HEARTDT?{CR}
{CR}{LF}+HEARTDT:data{CR}{LF}
 - ◆ Setting:
AT+HEARTDT=data{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - data: User custom heartbeat package data, hexadecimal string format, the maximum length is 160 bytes, 2 ~ 160 even bytes, default is 7777772E7573722E636E. E.g: data is 7777772E7573722E636E, in ASCII code is www.usr.cn.

Note: The maximum length of 160 bytes is the number of bytes after ASCII code is converted to a hexadecimal string.
- E.g: AT+HEARTDT =7777772E7573722E636E

7.2.45. AT+HEARTSND

- Function: Query/Setting the sending mode of heartbeat package.
- Format:
 - ◆ Query current parameter:
AT+HEARTSND{CR} or AT+HEARTSND?{CR}
{CR}{LF}+HEARTSND:type{CR}{LF}
 - ◆ Setting:
AT+HEARTSND=type{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ type: sending mode, including:
 - COM: Send heartbeat package to serial port.
 - NET: Send heartbeat packet to network side.
 - Default is NET.
- E.g: AT+HEARTSND =COM

7.2.46. AT+HEARTTM

- Function: Query/Setting the interval time of heartbeat package.
- Format:
 - ◆ Query current parameter:

AT+HEARTTM{CR} or AT+HEARTTM?{CR}
{CR}{LF}+HEARTTM:time{CR}{LF}

◆ Setting:

AT+HEARTTM=time{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ time: sending interval time, range is 1 ~ 6000s, default is 30s.

➤ E.g: AT+HEARTTM=60

7.2.47. AT+HTPTP

➤ Function: Query/Setting HTTP request type.

➤ Format:

◆ Query current parameter:

AT+HTPTP{CR} or AT+HTPTP?{CR}
{CR}{LF}+HTPTP:type{CR}{LF}

◆ Setting:

AT+HTPTP=type{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

- ◆ type: HTTP request type, including:

GET
POST

Default is GET.

➤ E.g: AT+HTPTP=POST

7.2.48. AT+HTPURL

➤ Function: Query/Setting HTTP URL

➤ Format:

◆ Query current parameter:

AT+HTPURL{CR} or AT+HTPURL?{CR}
{CR}{LF}+HTPURL:URL{CR}{LF}

◆ Setting:

AT+HTPURL=URL{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

URL: HTTP URL, Maximum 100 bytes, default is /1.php[3F], please refer to the chapter of "Special Symbol" for the escaping rules.

➤ E.g: AT+HTPURL=/1.php[3F]

7.2.49. AT+HTPSV

➤ Function: Query/Setting HTTP server parameters.

➤ Format:

- ◆ Query current parameter:
AT+HTPSV{CR} or AT+HTPSV?{CR}
{CR}{LF}+HTPSV:address,port{CR}{LF}
- ◆ Setting:
AT+HTPSV=address,port{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ address: Server address, can be domain name or IP address. Maximum 100 bytes, default is test.usr.cn.
 - ◆ port: Server port, can be set from 1-65535, default is 80.
- E.g: AT+HTPSV=test.usr.cn,80

7.2.50. AT+HTPHD

- Function: Query/Setting HTTP request header.
 - ◆ Format:
AT+HTPHD{CR} or AT+HTPHD?{CR}
{CR}{LF}+HTPHD:head{CR}{LF}
 - ◆ Setting:
AT+HTPHD=head{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ head : HTTP request header, range from 9 to 200 bytes, must end with[0D][0A]. Default is Connection:close[0D][0A], please refer to the chapter of "Special Symbol" for the escaping rules.
- E.g: AT+HTPHD=Connection:close[0D][0A]

7.2.51. AT+HTPTO

- Function: Query/Setting HTTP request over time.
- Format:
 - ◆ Query current parameter:
AT+HTPTO{CR} or AT+HTPTO?{CR}
{CR}{LF}+HTPTO:time{CR}{LF}
 - ◆ Setting:
AT+HTPTO=time{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ time: HTTP request over time, range is 1-600s, default is 10s.
- E.g: AT+HTPTO=60

7.2.52. AT+HTPFLT

- Function: Query/Setting whether to enable filter HTTP header.
- Format:
 - ◆ Query current parameter:

AT+HTPFLT{CR} or AT+HTPFLT?{CR}
{CR}{LF}+HTPFLT:status{CR}{LF}

◆ Setting:

AT+HTPFLT=status{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

◆ status: Whether to enable filter HTTP header.

ON: enable.

OFF: disable.

Default is on.

➤ E.g: AT+HTPFLT=OFF

7.2.53. AT+DSTNUM

➤ Function: Query/Setting the target mobile phone number for SMS mode.

➤ Format:

◆ Query:

AT+DSTNUM{CR} or AT+DSTNUM?{CR}
{CR}{LF}+DSTNUM: number{CR}{LF}

◆ Setting:

AT+DSTNUM=number{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

◆ number: SMS target phone number, please add international number, default number is 4000255652, up to 20 bytes.

➤ E.g: AT+DSTNUM=8618888888888

7.2.54. AT+SMSFLT

➤ Function: Query/Setting whether to enable only receive SMS from source number.

➤ Format:

◆ Query:

AT+SMSFLT{CR} or AT+SMSFLT?{CR}
{CR}{LF}+SMSFLT: status{CR}{LF}

◆ Setting:

AT+SMSFLT=status{CR}
{CR}{LF}OK{CR}{LF}

➤ Parameters:

◆ Status:

ON: enable.

OFF: disable.

Default : ON.

➤ E.g: AT+SMSFLT=ON

7.2.55. AT+CISMSEND

➤ Function: Sending SMS.

- Format:
 - ◆ Setting:
AT+CISMSSEND=number,data{CR}
{CR}{LF}OK{CR}{LF}
- Parameters:
 - ◆ number: Target cellphone number for SMS, need add international number. E.g: 8618888888888
 - ◆ data: Content of the SMS, can be sent up to 70 characters once.
- E.g: AT+CISMSSEND=86188888888888,Hello!

8. Contact Us

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9. Disclaimer

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10. Update History

2020-03-23 V1.0.1. established.

2020-11-20 V1.0.3. established. Update the description by Dean, Gao