VW801

VW802

VW803

VW804

Serial-WiFi Modem User Manual (Rev. 1.0)

Overview of Characteristics

- ✧ Support IEEE802.11b/g/n Wireless Standards
- ✧ Built-in USB-Serial Bridge Chip (Silabs CP2102)
- ✧ Support AT commands sending from serial port
- ✧ Support connections over AT commands
- ✧ Support transparent mode (serial<->wifi)
- ✧ Support STA /AP /AP+STA Modes
- ✧ Support WPS functions
- ✧ Support automatically DDNS connections
- ✧ Based on High performance MCU
- ✧ High sensitivity, Long range
- ✧ Support Multi-TCP Link (5 Channel) Application
- ✧ Variable Interfaces: USB(Virtual COM), RS485, 232TTL, RS232
- ✧ Onboard PCB Antenna

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TABLE OF CONTENTS

1. PRODUCT OVERVIEW

1.1. General Description

VW801/2/3/4 low-power embedded Serial-WiFi modem series provides a way to use the popular serial interface (RS485, USB virtual COM, 232TTL, RS232,) to transfer data over Wi-Fi wireless networking. The module integrates hardware MAC, baseband chip, RF transceiver unit, and a power amplifier; the embedded firmware supports flexible Wi-Fi protocols, TCP / IP protocol stack, as well as kinds of networking configuration.

VW801 modem built-in a USB-Serial bridge chip, an integrated 801.11 b/g/n Wi-Fi subsystems. Through VW801, a large number of traditional serial interface based applications can easily access/control Wi-Fi enabled networks/devices.

VW80x uses the industry's lowest-power embedded structure, targeting embedded wifi data/ control applications, for the instance, for example in: smart home, wifi lighting, wifi socket, smart grid, handheld devices, personal medical, industrial control, IP sensors, etc. VW801 series modems do a professional optimization on these applications.

VW80x series integrate all wifi features in a compact size measure only 72mm x 24mm x 9mm. Using a convenient solid USB connector, allowing the user plug into the user end equipment easily. Module is equipped with built-in PCB antenna, no external antenna needs.

VW80x series modem looks clean and beautiful, suitable for the various embedded I.O.T applications.

VW80x series include these 4 models modem (interface different):

- ✧ VW801: USB VCOM
- ✧ VW802: 232TTL interface
- ✧ VW803: RS232C interface
- ✧ VW804: RS485 interface

1.1.1. Device Features

- Support IEEE802.11b/g/n Wireless Standards
- Built-in USB-Serial Bridge Chip (Silabs CP2102, VW801)
- Various interface: RS485, 232TTL, RS232C, USB VCOM
- Support AT commands sending from serial port
- Support connections on AT commands
- Support transparent mode (serial<->wifi)

- Support STA /AP /AP+STA Modes
- Support WPS functions
- Support automatically DDNS connections
- Based on High performance MCU
- High sensitivity, Long range
- Support Multi-TCP Link (5 Channel) Application
- Onboard PCB Antenna
- Compact surface mount module 72mm x 24mm x 9mm

1.1.2. Specifications

Table 1 VW801 Module Technical Specifications

Class	Item	Parameters
Wireless Parameters	Certification	FCC/CE
	Wireless standard	802.11 b/g/n
	Frequency range	2.412GHz-2.484GHz
	Transmit Power	802.11b: +16 +/-2dBm (@11Mbps)
		802.11g: +14 +/-2dBm (@54Mbps)
		802.11n: +13 +/-2dBm (@HT20, MCS7)
	Receiver Sensitivity	802.11b: -93 dBm (@11Mbps ,CCK)
		802.11g: -85 dBm (@54Mbps, OFDM)
		802.11n: -82 dBm (@HT20, MCS7)
Hardware Parameters	Data Interface	USB/ RS485/ 232TTL
	Operating Voltage	4~5.5V
	Operating Current	Peak [Continuous TX]: ~200mA Normal [WiFi ON/OFF, DTIM=100ms]: Average. ~12mA, Peak: 200mA Standby : <200uA(Reserved)
	Operating Temp.	-40℃- 85℃
	Storage Temp.	-45℃- 125℃
	Dimensions and Size	72mm×24mm×9mm
Software Parameters	Network Type	STA /AP/STA+AP
	Security Mechanisms	WEP/WPA-PSK/WPA2-PSK
	Encryption	WEP64/WEP128/TKIP/AES
	Network Protocol	IPv4, TCP/UDP/FTP/HTTP
	User Configuration	AT+instruction set

1.1.3. Key Application

- Smart lighting, smart socket
- Home automation

- IP sensors
- Embedded I.O.T add-on WIFI
- Remote equipment monitoring
- Asset tracking and telemetry
- Security
- Industrial sensors and controls
- Medical devices
- etc

1.2. Hardware Introduction

Figure 1. VW801/ VW802/ VW803/ VW804 View

1.2.1. Pins Definition

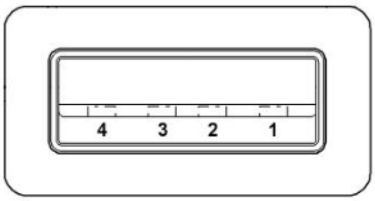


Figure 2. VW801 Pins Map

(USB A type, front view)

Table 2 VW801(USB VCOM) Pins Definition

Pin	1	2	3	4
Signal	VCC	D-	D+	GND

Table 3 VW802(232TTL) Pins Definition

Pin	1	2	3	4
Signal	VCC	RXD	TXD	GND

Table 4 VW803(232C) Pins Definition

Pin	1	2	3	4
Signal	VCC	RXD	TXD	GND

Table 5 VW804(RS485) Pins Definition

Pin	1	2	3	4
Signal	VCC	B	A	GND

2. FUNCTIONAL DESCRIPTION

Notes for symbols:

AP: that is the wireless Access Point, the founder of a wireless network and the centre of the network nodes. The wireless router we use at home or in office may be an AP.

STA: short for Station, each terminal connects to a wireless network (such as laptops, PDA and other networking devices) can be called with a STA device.

2.1. Wireless Networking

VW801 series modem can be configured as both wireless STA and AP base on network type. Logically there are two interfaces in VW801: STA or AP. When VW801 operates as AP, other STA equipments are able to connect to VW801 modem directly. Wireless networking with VW801 series modem is very flexible.

In the following diagram, we'll use VW801 as example.

2.1.1. Basic Wireless Network Based On AP (Infrastructure)

Infrastructure: it's also called basic network. It is built on AP and many STAs which join in.

The characters of network of this type are that AP is the centre, and all communication between STAs is transmitted through the AP. The following figure shows this type of networking.

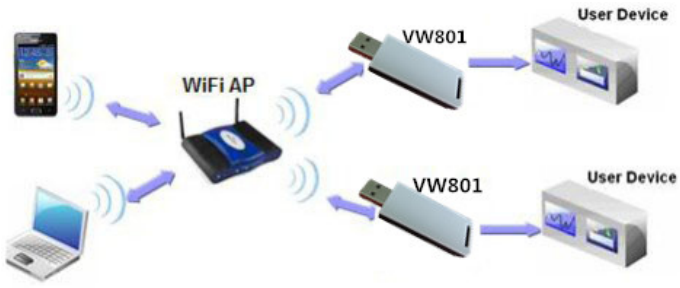


Figure 3. VW801 Basic Wireless Network Structure

2.1.2. Wireless Network Based On AP+STA

VW801 series modem support AP+STA network mode, means VW801 support one AP interface and one STA interface at the same time, as following figure,

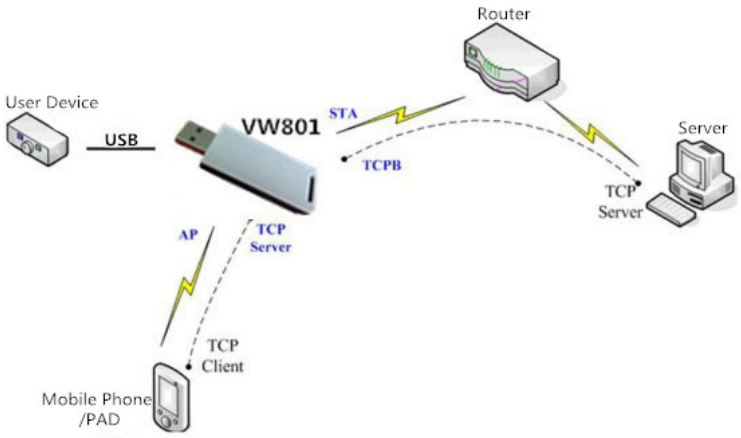


Figure 4. VW801 AP+STA Network Structure

When VW801 modem enables AP+STA function, Modem's STA interface can connect with router and then connect to TCP server in the network. At the same time, module's AP interface is also active and allow phone/PAD to connect it through TCPB, then phone/PAD can control / communicate with VW801 and other devices within the network.

The advantage of AP+STA mode is:

- Users can easily control user device through Phone/PAD, and no need changing the original network setting.
- Users can easily setting modem's parameters through WiFi when module works as STA mode.

2.2. Operate Mode : Transparent Transmission Mode

VW801 modem support serial interface transparent transmission mode.

In this mode, VW801 functions as a serial<->WIFI bridge, gives user a wireless serial port over WIFI. Users just only configure the necessary parameters. After power on, the modem will automatically connect to the default wireless network / server.

When in this mode, the modem's serial port always work in the transparent transmission mode, users can think it as a virtual wireless serial cable, and can send and receive data as usual like using a simple wired serial cable. In other words, the original serial cable on devices is directly replaced with the modem; user devices can then be easily converted to wireless enabled devices without any changes.

The transparent transmission mode will fully compatible with user's original software platform and reduce the software development effort for integrate wireless data transmission.

The parameters which need to configure include:

- **Wireless Network Parameters**
  - Wireless Network Name（SSID）
  - Security Mode
  - Encryption Key

- **TCP/UDP Linking Parameters**
  - Protocol Type
  - Link Type（Server or Client）
  - Target Port ID Number
  - Target Port IP Address
- **Serial Port Parameters**
  - Baud Rate
  - Data Bit
  - Parity (Check) Bit
  - Stop Bit
  - Flow Control

2.3. UART Frame Scheme

2.3.1. UART Free-Frame

VW801 support UART free-frame function. If user select open this function, module will check the intervals between any two bytes when receiving UART data. If this interval time exceeds defined value (50ms default), VW801 will think it as the end of one frame and transfer this free-frame to WiFi port, or VW801 will receive UART data until 1000 bytes, then transfer the 1000 bytes frame to WiFi port.

VW801's default interval time setting is 50ms. User can also set this interval some faster (10ms) through AT command. But user have to consider if user MCU / applications can send all UART data continuously within 10ms interval time requirement ,or the UART data may be divide as fragment chocks.

Through AT command: AT+UARTTE=fast/normal, user can select the interval time: fast (10ms) and normal (50ms).

2.3.2. UART Auto-Frame

VW801 support UART auto-frame function. If user select open this function and setting auto-frame trigger length and auto-frame trigger time parameters, then module will auto framing the data which received from UART port and transmitting to the network as pre-defined data structure.

- **Auto-frame trigger length**: The fixed data length that module used to transmitting to the network.

- **Auto-frame trigger time:** After the trigger time, if UART port received data can't reach auto-frame trigger length, then module will transmitting available data to the network and bypass the auto-frame trigger length condition.

Detailed UART auto-frame function can refer to AT+instruction set "UARTF/UARTFT/UARTFL" introduction.

2.4. Encryption

Encryption is a method of scrambling a message that makes it unreadable to unwanted parties, adding a degree of secure communications. There are different protocols for providing encryption, and the VW801 modem supports following:

- WEP
- WPA-PSK/TKIP
- WPA-PSK/AES
- WPA2-PSK/TKIP
- WPA2-PSK/AES

2.5. Parameters Configuration

VW801 modem supports AT + instruction set mode parameter configuration. AT+instruction set configuration means user configure parameters through serial interface command.

Refer to “AT+instruction set” chapter for more detail.

2.6. SOCKET B Function

VW801 support double socket communication, the socket B function is disabled by default.

After the modem is ready, send command “AT+SOCKB” to set the connection parameter, send command “AT+TCPDISB=on” to try to connect with TCP server. Send command “AT+TCPDISB=off” to close connection. Send command “AT+TCPLKB” to inquire TCP connection.

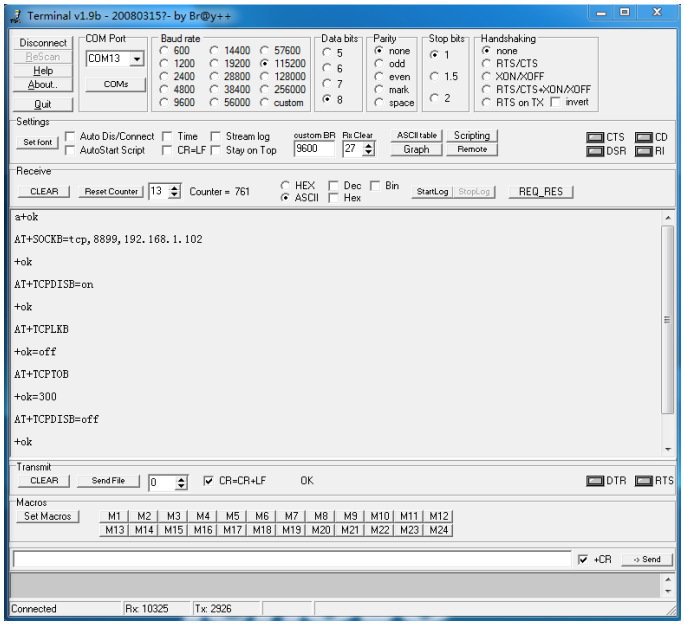


Figure 5. Socket B function demo

2.7. Multi-TCP Link Connection

When VW801 modem configured as a TCP Server, it supports Multi-TCP link connection, and maximum 5 TCP clients are allowed. User can realize multi-TCP link connection at each operation mode.

Multi-TCP link connection will work as following structure:

Upstream: All dates from different TCP connection or client will be transmitted to the serial port as a sequence.

Downstream: All data from serial port (user) will be duplicate and broadcast to every TCP connection or client.

Detailed multi-TCP link data transition structure as following figure:

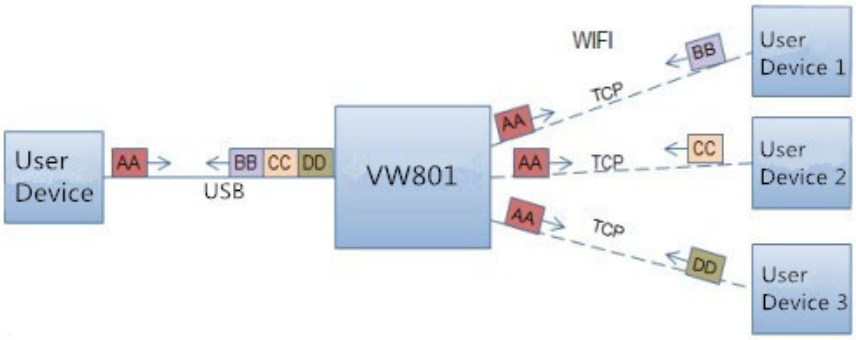


Figure 6. Multi-TCP Link Data Transition Structure

3. OPERATION GUIDELINE

3.1. VW801/ VW802/ VW803/ VW804 Usage Introduction

3.1.1. Software Tools

VW801 use two common software tools debugging and applying VW801 modem.

(User can also select other tools used to debug serial port).

- Serial Debugging Software: Terminal
- Ethernet Debugging Software: TCP to serial client software

3.1.2. Network Connection

User can select two methods to connect VW801 modem base on dedicated application.

- **Use VW801 STA interface.** VW801 and debugged PC2 connect to a wireless AP,

Another PC1 (or user device) connect to VW801 modem with serial port:

Figure 7. STA Interface Debug Connection

- **Use VW801 AP interface.** Debug PC2 connect to VW801 through wireless connection, another PC1 (or user device) connect to VW801 modem with serial port.

Figure 8. AP Interface Debug Connection

3.1.3. Default Parameter Setting

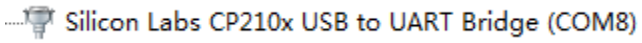
- Default SSID: VW801;
- Default security mode: open, none;
- User UART parameter setting:115200,8,1,None;
- Default network parameter setting:TCP,Server,8899,10.10.100.254;
- Module IP address: dhcp,0.0.0.0,0.0.0.0,0.0.0.0;

3.1.4. Modem Test

VW801 built in with a silabs USB-VCOM bridge chip: CP2102. Prior to use it, a driver is needed to be installed. We can go to Silabs website www.silabs.com to get the latest driver. Alertly a copy of the driver is put in the following link:
http://www.vital-well.com/webfile/software/CP210x_VCP_Windows.zip

when the driver is correctly installed, after plugging VW801 modem, a virtual COM port will be created. To find the COM port number assigned by the system, you can

Right-click the icon "My Computer" ->"Properties"-> "Hardware" -> "Device Manager" -> "Ports (COM & LPT) ", (in our example it is COM8, the port number will be different depending on the PC)



Open HyperTerminal serial software Terminal, the port number found in the above selected port number (eg COM8),

set:

Baud rate: 115200 (default is 115200)
Data bits: 8
Parity: None
Stop bits: 1
Flow Control: None

Click "Connet"

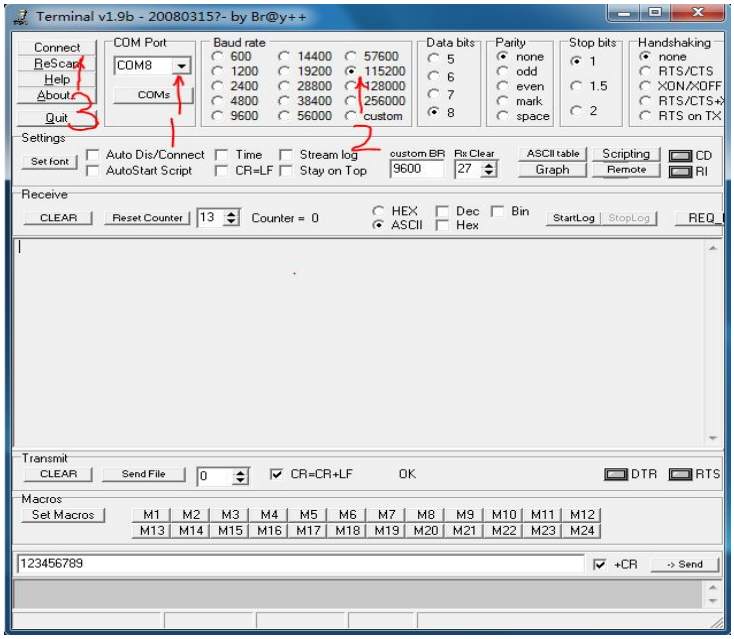


Figure 9. “Terminal” Serial Debug Tools

PC2 (wifi enabled) is connected to the modem on wifi interface, as shown in VW801.

Figure 10. Computers Connected to Wifi Module

Click TCPUDPDbg to open“TCPUDPDbg” software.Click CreateConnn ，select Type：TCP，DestIP：10.10.100.254，Port：8899，click “Create”.

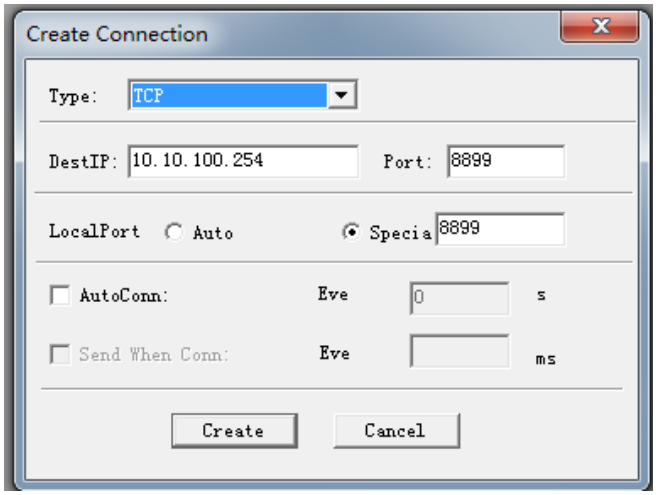


Figure 11. "TCPUDPDbg" Creating a connection

Click Connect on the left panel, input data in the send window, click Send will send data out.

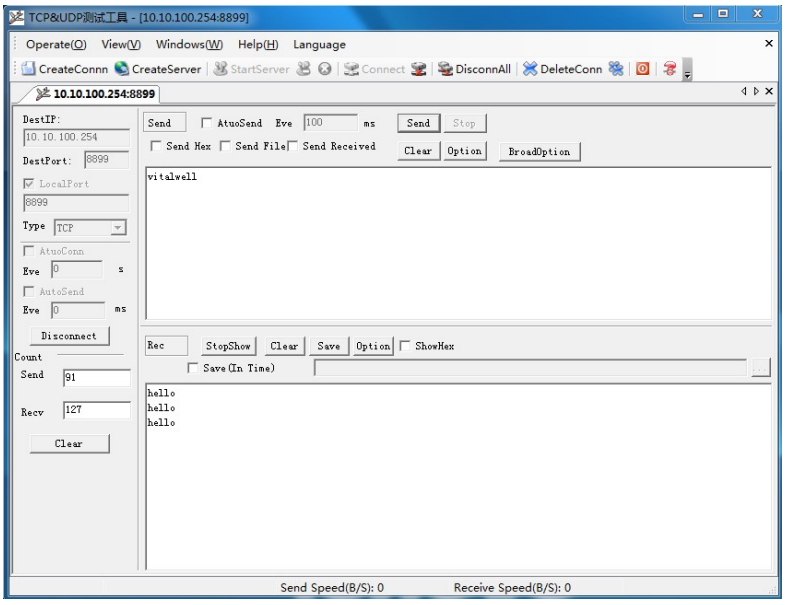


Figure 12. “TCPUDPDbg” Tools Connection

As VW801 module supports transparent transmission mode by default, so you can now send any data through Terminal tool between PC1 & PC2. All the procedure is the same as using a wired serial cable between these 2 PCs.

3.2. Typical Application Examples

3.2.1. Wireless Control Application

Figure 13. Wireless Control Application

For this wireless control application, VW801 operates as AP mode. Modem's serial port connects to user device. Then, a control agent (a smart phone for this example) can manage and control the end user's device through the wireless connection over VW801 modem.

3.2.2. Remote Management Application

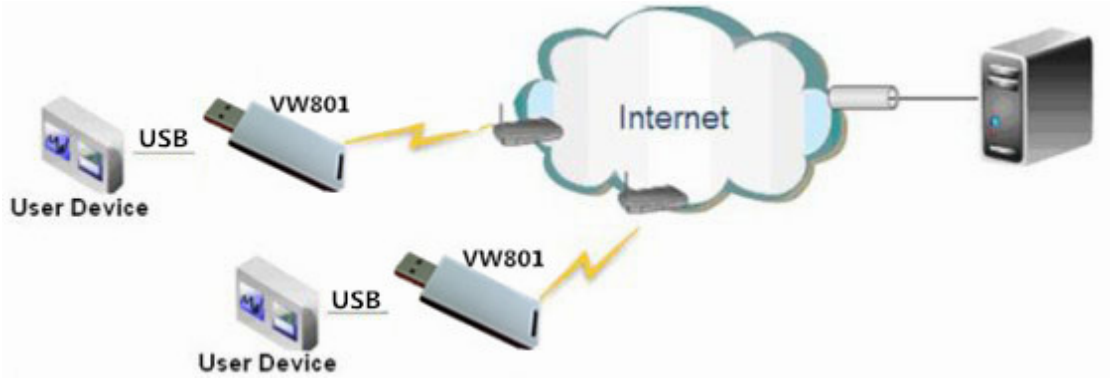


Figure 14. Remote Management Application

For this remote management application, VW801 works as STA mode and connects to Internet through wireless AP. Modem configured as TCP Client and communicates with remote TCP server in Internet.

VW801 serial port connects to user device.

Then the user device will become of an internet enabled device. You can then access the device anywhere in the world. All you need is just an internet connection.

3.2.3. Transparent Serial Port Application

For this transparent serial port application, two VW801 modules connect as below figures to build up

a transparent serial port connection. One VW801 operates as AP mode, and the other VW801 operates as STA mode. Let the STA device connects to AP.

Figure 15. Transparent Serial Port Application

4. AT+INSTRUCTION INTRODUCTION

4.1. Configuration Mode

When VW801 power up, it will default operates as transparent mode, user can switch to configuration mode by sending AT command over serial interface. VW801 UART default parameters setting as below figure,

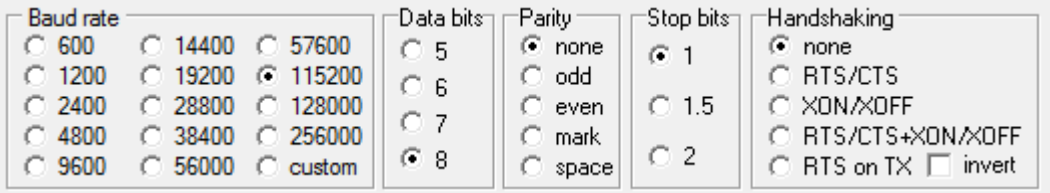


Figure 16. VW801 Default UART Port Parameters

In configuration mode, user can set the modem through AT+instruction set.

4.1.1. Switch to Configuration Mode

Two steps to finish switching from transparent transmission mode to configuration mode.

. **UART input "+++", after module receive "+++", and feedback "a" as confirmation.**

. **UART input "a", after module receive "a" and feedback "+ok" to go into AT+instruction set configuration mode.**

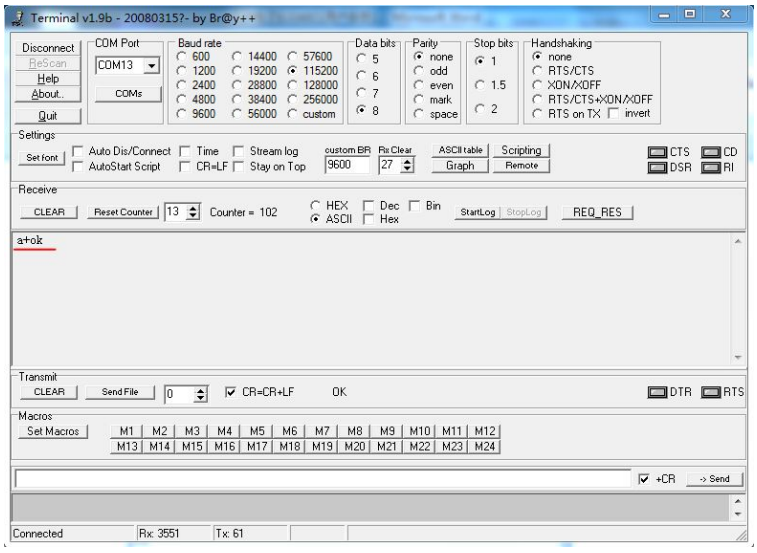
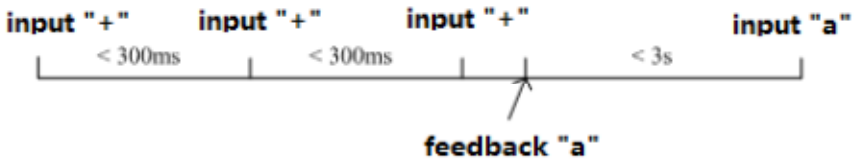


Figure 17. Switch to Configuration Mode

Notes:

1. "+++" and "a" should be input in a certain period of time to make the module switch to configuration mode (and should not in a continuous stream). Like the following sequence.



2. When user input "+++" (No "Enter" key required), the UART port will display feedback information "a", and not display input information"+++" as above UART display.

3. Any other input or wrong step to UART port will cause the module still works as original mode (Transparent transmission).

4.2. AT+Instruction Set Overview

User can input AT+Instruction through hyper terminal or other serial debug terminal, also can program the AT+Instruction to script. User can also input "AT+H" to list all AT+Instruction and description to start.

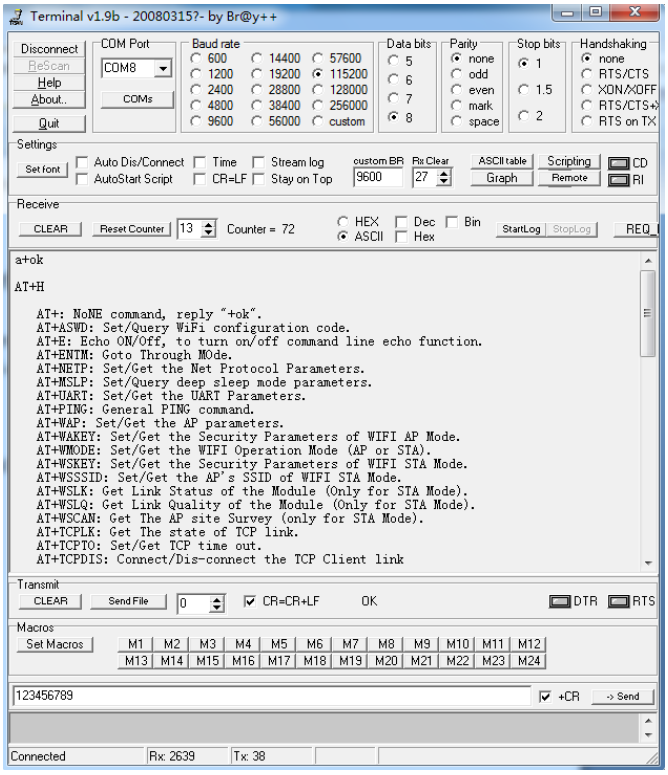


Figure 18. "AT+H" Instruction for Help

4.2.1. Instruction Syntax Format

AT+Instruction protocol is based on the instruction of ASCII command style, the description of syntax format as follow.

- **Format Description**
  - **< >**: Means the parts must be included
  - **[ ]**: Means the optional part
- **Command Message**

AT+<CMD>[op][para-1,para-2,para-3,para-4…]<CR>

  - AT+: Prefix of command message;
  - CMD: Command string;
  - [op]: Symbol of command operator,
    - “=” : The command requires parameters input;
    - “NULL”: Query the current command parameters setting;
  - [para-n]: Parameters input for setting if required;
  - <CR>, <LF>: ”Carriage Return ” Key, it’s ASCII value is 0x0A or 0x0D hex format;

Notes: When input AT+Instruction, “AT+<CMD>” character will display capital letter automatic and other parts will not change as you input.

- **Response Message**

+<RSP>[op] [para-1,para-2,para-3,para-4…]<CR><LF><CR><LF>

  - +: Prefix of response message;
  - RSP: Response string;
    - “ok” : Success
    - “ERR”: Failure
  - [op] : =
  - [para-n]: Parameters if query command or Error code when error happened;
  - <CR>: ASCII 0x0d;
  - <LF>: ASCIII 0x0a;

- **Error Code**

Table 6 Error Code Describtion

Error Code	**Description**
-1	Invalid Command Format
-2	Invalid Command
-3	Invalid Operation Symbol
-4	Invalid Parameter
-5	Operation Not Permitted

4.2.2. AT+Instruction Set

Table 7 AT+Instruction Set List

Instruction Set List

4.2.2.1. AT+E

- Function: Open/Close show back function;
- Format:
  - Set Operation

    AT+E=<status><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - status: Echo status
    - on: Open echo
    - off: Close echo

When VW801 module firstly switch from transparent transmission to configuration mode, show back status is open, input “AT+E” to close show back function, input“AT+E” again to open show back function.

4.2.2.2. AT+WMODE

- Function: Set/Query Wi-Fi work mode. Setting is valid after reset;
- Format:
  - Query Operation

    AT+WMODE<CR>
    +ok=<mode><CR><LF><CR><LF>
  - Set Operation

    AT+WMODE=<mode><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - mode:Wi-Fi work mode
    - AP
    - STA
    - APSTA

4.2.2.3. AT+ENTM

- Function: Set module into transparent mode;
- Format:

  AT+ENTM<CR>

  +ok<CR><LF><CR><LF>

When operate this command, module switch from configuration mode to transparent transmission

mode.

4.2.2.4. AT+TMODE

- Function: Set/Query module data transfer mode. Setting is valid after reset.
- Format:
  - Query Operation

    AT+TMODE<CR>
    +ok=<tmode><CR><LF><CR><LF>
  - Set Operation

    AT+TMODE=<tmode><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - tmode: data transfer mode, include:
    - ✧ throughput: throughput mode
    - ✧ cmd: command mode
    - ✧ pwm: PWM/GPIO mode

4.2.2.5. AT+MID

- Function: Query module ID information;
- Format:
  - Query Operation

    AT+MID<CR>
    +ok=<module_id><CR><LF><CR><LF>
- Parameters:
  - module_id: Module ID information;
    - ✧ VW801, VW802, VW803, VW804

Notes: User can set this parameter through AT+WRMID.

4.2.2.6. AT+VER

- Function: Query module software version information;
- Format:
  - Query Operation

    AT+VER<CR>

    +ok=<ver><CR><LF><CR><LF>
- Parameters:
  - ver: Module software version information;

4.2.2.7. AT+LVER

- Function: Query module detailed software version information;
- Format:
  - Query Operation

    AT+LVER<CR>
    +ok=<ver><CR><LF><CR><LF>
- Parameters:
  - ver: Module software detailed version information;

4.2.2.8. AT+RELD

- Function: module restore to factory default setting;
- Format:
  - Set Operation

    AT+RELD<CR>
    +ok=rebooting…<CR><LF><CR><LF>

When operate this command, module will restore to factory default setting and reboot.

4.2.2.9. AT+Z

- Function: Re-start module;
- Format:

  AT+Z<CR>

4.2.2.10. AT+H

- Function: Help;
- Format:
  - Query Operation

    AT+H<CR>
    +ok=<command help><CR><LF><CR><LF>
- Parameters:
  - command help: command introduction;

UART Instruction Set

4.2.2.11. AT+UART

- Function: Set/Query serial port parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+UART<CR>
    +ok=<baudrate,data_bits,stop_bit,parity><CR><LF><CR><LF>

- Set Operation

  AT+UART=<baudrate,data_bits,stop_bit,parity><CR>
  +ok<CR><LF><CR><LF>
- Parameters:
- baudrate:
  - 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 380400, 460800, 921600
- data_bits:
  - 8
- stop_bits:
  - 1,2
- parity:
  - NONE
  - EVEN
  - ODD
- Flowctrl: (CTSRTS)
  - NFC: No hardware flow control
  - FC: hardware flow control

4.2.2.12. AT+UARTF

- Function: Open/Close UART auto-frame function;
- Format:
  - Query Operation

    AT+UARTF<CR>
    +ok=<para><CR><LF><CR><LF>
  - Set Operation

    AT+UARTF=<para ><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - para:
    - disable - Close auto-frame function;
    - enable - Open auto-frame function;

4.2.2.13. AT+UARTFT

- Function: Set/Query UART auto-frame trigger time;
- Format:
  - Query Operation

    AT+UARTFT<CR>
    +ok=<time><CR><LF><CR><LF>

- Set Operation

  AT+UARTFT=<time ><CR>
  +ok<CR><LF><CR><LF>

- Parameters:
  - time: Range 100 ~10000; Unit: ms. Auto-frame trigger time

4.2.2.14. AT+UARTFL

- Function: Set/Query UART auto-frame trigger length;
- Format:
  - Query Operation

    AT+UARTFL<CR>
    +ok=<len><CR><LF><CR><LF>
  - Set Operation

    AT+UARTFL=<len ><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - len: Range 8 ~1000; Unit: Byte. Auto-frame trigger length;

4.2.2.15. AT+UARTTE

- Function: Set/Query UART free-frame trigger time between two bytes;
- Format:
  - Query Operation

    AT+UARTTE<CR>
    +ok=<mode><CR><LF><CR><LF>
  - Set Operation

    AT+UARTTE=<mode><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - mode:
    - ✧ fast: free-frame trigger time between two bytes is 10ms;
    - ✧ normal: free-frame trigger time between two bytes is 50ms;

Network Instruction Set

4.2.2.16. AT+NETP

- Function: Set/Query network protocol parameters, Setting is valid after reset.
- Format:
  - Query Operation

AT+NETP<CR>
+ok=<protocol,CS,port,IP><CR><LF><CR><LF>

- Set Operation

AT+NETP=<protocol,CS,port,IP><CR>
+ok<CR><LF><CR><LF>

- Parameters:
  - protocol:
    - TCP
    - UDP
  - CS: Network mode:
    - SERVER
    - CLIENT
  - Port: protocol port ID: Decimal digit and less than 65535
  - IP: Server's IP address when module set as client

If set as UDP SERVER, the module will save the IP address and port of the latest UDP packet received. The data will be sent to the saved IP address and port. If the module hasn't saved any IP address and port when power up. The data will be sent to the IP address and port which is set by this command.

If set as UDP,CLIENT, the data will always be sent to the IP address and port set by this command.

4.2.2.17. AT+MAXSK

- Function:Set/ Query TCP Client connection number.
- Format:
  - Query Operation

AT+MAXSK<CR>
+ok=<num><CR><LF><CR><LF>

- Set Operation

AT+MAXSK=<num><CR>
+ok<CR><LF><CR><LF>

- Parameters:
  - num: TCP Client connection number. Range: 1~5. 5 is the default value it means when the module work in TCP server , it accepts max 5 TCP clients' connection.

4.2.2.18. AT+TCPLK

- Function: Query if TCP link already build-up;
- Format:

AT+TCPLK<CR>
+ok=<sta><CR><LF><CR><LF>

- Parameters:

- sta.: if module already setup TCP link;
  - on: TCP link setup;
  - off: TCP link not setup;

4.2.2.19. AT+TCPTO

- Function: Set/Query TCP timeout; Setting is valid after reset.
- Format:
  - Query Operation

    AT+TCPTO<CR>
    +ok=<time><CR><LF><CR><LF>
  - Set Operation

    AT+TCPTO=<time ><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - time: TCP timeout time.
    - <= 600, (600s);
    - >=0, (0 means no timeout);
    - Default, 300s;

Module begin to count time when TCP channel don't receive any data, clecherar time counter when TCP channel receive any data. If the time counter reaches the TCPTO, the tcp channel will be break. If the module work in TCP Client, it will connect the TCP server instantly and when the module work in TCP Server, the TCP client device should make the connection itself.

4.2.2.20. AT+TCPDIS

- Function: Open/Close TCP link;
- Format:
  - Query Opera

    AT+TCPDIS<CR>
    +ok=<sta><CR><LF><CR><LF>
  - Set Operation

    AT+TCPDIS =<on/off><CR>
    +ok<CR><LF><CR><LF>
- Parameters:

When query, sta.: Feedback if TCP Client can be link,

- On, TCP link close
- off，TCP link on

When setting, "off" means close TCP link. After finish this command, module disconnect TCP link and not connect again. "On" means open TCP link. After finish this command, module reconnect TCP server

right away.

4.2.2.21. AT+SOCKB

- Function: Set/Query SOCKB parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+SOCKB<CR>
    +ok=<protocol,port,IP><CR><LF><CR><LF>
  - Set Operation

    AT+SOCKB=<protocol,port,IP><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - Protocol: Protocol type:
    - TCP: Only for TCP Client
    - UDP: UDP Client
    - UDPS: UDP Server
  - Port: Protocol Port in decimal, less than 65535
  - IP: Destination IP address, domain name is support

If set as UDP SERVER, the module will save the IP address and port of the latest UDP packet received. The data will be sent to the saved IP address and port. If the module hasn't saved any IP address and port when power up. The data will be sent to the IP address and port which is set by this command.

If set as UDP,CLIENT, the data will always be sent to the IP address and port set by this command.

4.2.2.22. AT+TCPDISB

- Function: Open/Close SOCKB connection
- Format:
  - Query Operation

    AT+TCPDISB<CR>
    +ok=<sta><CR><LF><CR><LF>
  - Set Operation

    AT+TCPDISB =<on/off><CR>
    +ok<CR><LF><CR><LF>
- Parameters:

When setting, "off" means close TCP link. After finish this command, module disconnect TCP link and not connect again. "On" means open TCP link. After finish this command, module reconnect TCP server right away.

4.2.2.23. AT+TCPTOB

- Function: Set/Query Operation SOCKB timeout. Setting is valid after reset.
- Format:
  - Query Operation

    AT+TCPTOB<CR>
    +ok=<time><CR><LF><CR><LF>
  - Set Operation

    AT+TCPTOB=<time ><CR>
    +ok<CR><LF><CR><LF>
- Parameters
  - Time: TCP timeout
    - <= 600:600s
    - >=0:0 means no timeout
    - Default:300s

The module will not connect SOCKB after TCP timeout. The module will make connection after another "TCPDISB" command.

4.2.2.24. AT+TCPLKB

- Function:Query SOCKB connection status
- Format:

  AT+TCPLKB<CR>
  +ok=<sta><CR><LF><CR><LF>
- Parameters:
  - sta.: SOCKB connection status
    - on: TCP connected
    - off: TCP disconnected

Wi-Fi STA Instruction Set (Effective when module works as STA)

4.2.2.25. AT+WSSSID

- Function: Set/Query Wi-Fi associated AP SSID parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WSSSID<CR>
    +ok=<ap's ssid><CR><LF><CR><LF>
  - Set Operation

AT+WSSSID=<ap's ssid ><CR>
+ok<CR><LF><CR><LF>

- Parameters:
  - ap's ssid: AP's SSID (Within 32 character);

4.2.2.26. AT+WSKEY

- Function: Set/Query STA security parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WSKEY<CR>
    +ok=<auth,encry,key><CR><LF><CR><LF>

  - Set Operation

    AT+WSKEY=< auth,encry,key><CR>
    +ok<CR><LF><CR><LF>

- Parameters:
  - auth: Authentication mode
    - OPEN
    - SHARED
    - WPAPSK
    - WPA2PSK
  - encry:Encryption algorithm
    - NONE: When "auth=OPEN", effective
    - WEP: When "auth=OPEN" or "SHARED", effective
    - TKIP: When "auth= WPAPSK" or "WPA2PSK", effective
    - AES: When "auth= WPAPSK" "WPA2PSK", effective
  - key: password, ASCII code, shall less than 64 bit and greater than 8bit

4.2.2.27. AT+WANN

- Function: Set/Query STA network setting. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WANN<CR>
    +ok=<mode,address,mask,gateway><CR><LF><CR><LF>

  - Set Operation

    AT+WANN=< mode,address,mask,gateway ><CR>
    +ok<CR><LF><CR><LF>

- Parameters:
  - mode: STA's IP network setting
    - static: Static IP
    - DHCP: Dynamic IP
  - address: STA IP address;
  - mask: STA subnet mask;
  - gateway: STA gateway address;

4.2.2.28. AT+WSMAC

- Function: Set/Query STA MAC address parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WSMAC<CR>
    +ok=<mac_address><CR><LF><CR><LF>

  . Set Operation

    AT+WSMAC=<code,mac_address><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - code: security code
    - 8888 (default value)
  - Mac_address: STA MAC address, such as ACCF23FF1234

4.2.2.29. AT+WSLK

- Function: Query STA WiFi link status
- Format:
  - Query Operation

    AT+WSLK<CR>
    +ok=<ret><CR><LF><CR><LF>
- Parameters:
  - ret
    - "Disconnected", if no WiFi connection;
    - "AP' SSID（AP's MAC"）, if WiFi connection available;

4.2.2.30. AT+WSLQ

- Function: Query STA WiFi signal strength;

- Format:
  - Query Operation

    AT+WSLQ<CR>
    +ok=<ret><CR><LF><CR><LF>

- Parameters:
  - ret
    - ✧ ”Disconnected”, if no WiFi connection;
    - ✧ ”AP’s WiFi signal strength” , if WiFi connection available;

4.2.2.31. AT+WSCAN

- Function: Scan AP;
- Format:

  AT+WSCAN<CR>
  +ok=<ap_site><CR><LF><CR><LF>

- Parameters:
  - ap_site: AP searched;

4.2.2.32. AT+WSDNS

- Function: Set/Query STA static DNS server address;
- Format:
  - Query Operation

    AT+WSDNS<CR>
    +ok=<address><CR><LF><CR><LF>
  - Set Operation

    AT+WSDNS =<address><CR>
    +ok<CR><LF><CR><LF>

- Parameters:
  - address: STA’s DNS server address; Effective right away.

Wi-Fi AP Instruction Set (Effective when module works as AP)

4.2.2.33. AT+LANN

- Function: Set/Query AP’s network parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+LANN<CR>

+ok=<ipaddress,mask><CR><LF><CR><LF>

- Set Operation

  AT+LANN=< ipaddress,mask><CR>
  +ok<CR><LF><CR><LF>

- Parameters:
  - ipaddress: AP's IP address;
  - mask: AP's net mask;

4.2.2.34. AT+WAP

- Function: Set/Query AP Wi-Fi parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WAP<CR>
    +ok=<wifi_mode,ssid,channel><CR><LF><CR><LF>

  - Set Operation

    AT+WAP =<wifi_mode,ssid,channel><CR>
    +ok<CR><LF><CR><LF>

- Parameters:
  - wifi_mode: Wi-Fi mode, include:
    - 11B
    - 11BG
    - 11BGN (Default Value)
  - ssid:SSID at AP mode
  - channel: Wi-Fi channel selection:
    - AUTO
    - CH1~CH11; (Default CH1)

4.2.2.35. AT+WAKEY

- Function: Set/Query AP Wi-Fi secruity parameters. Setting is valid after reset.
- Format:
  - Query Operation

    AT+WAKEY<CR>
    +ok=<auth,encry,key><CR><LF><CR><LF>

  - Set Operation

    AT+WAKEY=< auth,encry,key><CR>

+ok<CR><LF><CR><LF>

- Parameters:
  - auth: include
    - OPEN
    - WPA2PSK
  - Encry: include
    - NONE: When “auth=OPEN” available;
    - AES: When “auth=WPA2PSK” available;
  - key: security code, ASCII code, smaller than 64bit and bigger than 8 bit;

4.2.2.36. AT+WAMAC

- Function: Query AP MAC address parameters;
- Format:
  - Query Operation

    AT+WAMAC<CR>
    +ok=<mac_address><CR><LF><CR><LF>
- Parameters:
  - mac_address:AP’s MAC address;

Note: Module AP mode’s MAC address is related to STA mode’s MAC address.

4.2.2.37. AT+WADHCP

- Function: Set/Query AP DHCP server status; Setting is valid after reset.
- Format:
  - Query Operation

    AT+WADHCP<CR>
    +ok=<status><CR><LF><CR><LF>
  - Set Operation

    AT+WADHCP=<status><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - status:AP’s DHCP server function status:
    - on:DHCP Server Open;
    - off:DHCP Server Close:

4.2.2.38. AT+WALK

- Function: Query MAC address of STA device connecting to module AP
- Format:
  - Query Operation

    AT+WALK<CR>
    +ok=<status> <CR><LF><CR><LF>
- Parameters:
  - status: MAC address of STA device connecting to module AP.
    - ✧ No Connection: No STA device connecting to module AP;

4.2.2.39. AT+WALKIND

- Function: Enable/Disable indication of module AP connection status.
- Format:
  - Query Operation

    AT+WALKIND<CR>
    +ok=<status> <CR><LF><CR><LF>
  - Set Operation

    AT+WALKIND=<status><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - status: indication of module AP connection status.
    - ✧ on: Enable nLink indication function. When STA device connecting to module AP, nLink output Low, otherwise output High.
    - ✧ off: Disable nLink indication function. **(default mode)**.

Others Instruction Set

4.2.2.40. AT+WRMID

- Function: Set module ID;
- Format:
  - Set Operation

    AT+WRMID=<wrmid> <CR><LF><CR><LF>
- Parameters:
  - wrmid: set module's ID (within 20 characters).

4.2.2.41. AT+MDCH

- Function: Set Wi-Fi Auto Switch Function. Setting is valid after reset.
- Format:
  - Query Operation

    AT+MDCH<CR>
    +ok=<mode> <CR><LF><CR><LF>
  - Set Operation

    AT+MDCH=<mode> <CR><LF><CR><LF>
- Parameters:
  - mode: Wi-Fi Auto Switch Mode
    - ✧ off: Disable Wi-Fi auto switch.
    - ✧ on: Enable Wi-Fi auto switch. When the modem (STA mode) fail to connect to the router, it will switch to AP mode automatically after one minute.
    - ✧ auto: Enable Wi-Fi auto detect function. The modem will reset itself when encounter any abnormal. The default time interval is 10 minutes. **(default mode)**
    - ✧ 3-120: unit: minute. Set the time interval to reset itself when abnormal.

4.2.2.42. AT+TXPWR

- Function: Set/Query Wi-Fi Transmit Power, Real Transmit Power=Default Transmit Power (16dBm) – [Setting Value] * 0.5dBm. Setting is valid after reset.
- Format:
  - Query Operation

    AT+TXPWR <CR>
    +ok=<num><CR><LF><CR><LF>
  - Set Operation

    AT+TXPWR=<num><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - num: [Setting Value]. The default is 0, it can be sent from 0 ~ 24. If set to 24, the moudule transmit power will be at a minium of 4dBm. Reboot to make this setting change valid. It will not restore to default if reload the module.

APPENDIX A: HTTP PROTOCOL TRANSFER

A.1. HTTP AT command

A.1.1. AT+HTTPURL

- Function: Set /Query HTTP server IP address and Port Number.
- Format:
  - Query Operation

    AT+HTTPURL<CR>
    +ok=<IP, Port><CR><LF><CR><LF>
  - Set Operation

    AT+HTTPURL=<IP, Port><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - IP：IP address.
  - Port：Port number.

A.1.2. AT+HTTPTP

- Function:Set /Query HTTP request type
- Format:
  - Query Operation

    AT+HTTPTP<CR>
    +ok=<Type><CR><LF><CR><LF>
  - Set Operation

    AT+HTTPTP=<Type><CR>
    +ok<CR><LF><CR><LF>
- Parameters:
  - Type：GET(default) or POST。

A.1.3. AT+HTTPPH

- Function:Set/Query HTTP protocol header path.
- Format:
  - Query Operation

AT+HTTPPH<CR>
+ok=<Path><CR><LF><CR><LF>

- Set Operation

AT+HTTPPH=<Path><CR>
+ok<CR><LF><CR><LF>

- Parameters:
  - Path：Max length is 50 bytes.

A.1.4. AT+HTTPCN

- Function:Set/Query Connection of HTTP protocol header
- Format:
  - Query Operation

AT+HTTPCN<CR>
+ok=<Connection><CR><LF><CR><LF>

  - Set Operation

AT+HTTPCN=<Connection><CR>
+ok<CR><LF><CR><LF>

- Parameters:
  - Connection：Max length is 20 bytes.

A.1.5. AT+HTTPUA

- Function:Set/Query User-Agent of HTTP protocol header.
- Format:
  - Query Operation

AT+HTTPUA<CR>

+ok=<Parameter><CR><LF><CR><LF>

  - Set Operation

AT+HTTPUA=<Parameter><CR>

+ok<CR><LF><CR><LF>

- Parameters:
  - Parameter：Max length is 20 bytes.

A.1.6. AT+HTTPDT

- Function: Send HTTP request or data.

- Format:
  - Set Operation

    AT+HTTPDT=<Data><CR>

    +ok<CR><LF><CR><LF>

- Parameters:
  - Data：HTTP request data, send AT+HTTPDT directly if no data to be sent.

A.2. HTTP Example

HTTP parameter settings are as follows：

AT+HTTPURL=192.168.1.1,80 Set HTTP server address and port

AT+HTTPTP=POST Set HTTP request type

AT+HTTPPH=/abcd Set HTTP protocol header path

AT+HTTPCN= keep-alive Set HTTP Connection area

AT+HTTPUA= lwip1.3.2 Set HTTP User-Agent area

If send “AT+HTTPDT”, the data packet will be sent as the following instance including the two new line:

POST /abcd HTTP/1.1

Connection:keep-alive

User-Agent:lwip1.3.2

Content-Length:0

Host:192.168.0.127:8999

If send AT+HTTPDT=abcd, the data packet will be sent as the following instance:

POST /abcd HTTP/1.1

Connection:keep-alive

User-Agent:lwip1.3.2

Content-Length:4

Host:192.168.0.127:8999

abcd

The data received from HTTP server will be output to serial port and end with “+ok”.

If the module hasn’t received data from HTTP server for 5 second, it will cut the TCP link with HTTP server.

APPENDIX B: Document History:

Rev 1.0: 20140707 initial release