

XLW-220SD

802.11 b/g/n WIFI Module

User Manual



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XLW-220SD is a WiFi module which is lower energy consuming, compact designed size, stronger signal, quick start reading, higher reliability, higher cost-efficiency. This module integrates the MCU, RF transceiver, TCP / IP protocol stack and application software. Users only need provide 3.3v power supply to the module. XLW-220SD Wi-Fi module is equipped with a variety of standard interfaces, including UART, GPIO, I2C, etc., and also provides a Command Line Interface, AT Instruction Set , SDK kit etc.. User could easily integrate into their products , accelerate product development, shorten time to market. It provides users a low-cost & reliable wireless solutions.

Product features:

- Support 802.11b/g/n
- Support 1 second quick start-up
- Low energy consumption, support sleep mode, optionally powered by battery
- Support AP/ STA/AP+STA modes etc.
- Support all WiFi Encryption Protocol, applicable for all types of routers; can connect to Iphone and Adroid mobile phone
- Support UART/GPIO/I2C interfaces
- Support PCB antenna or external antenna IPEX Interface
- Support command line configuration interface, compatible with the AT instruction
- Support TCP / UDP / DNS / HTTP
- Supports various parameter configuration interfaces, including serial configuration / web Configuration / Network Configuration
- Support Smart Config
- Support App Server application server, users can remotely control domestic appliance through a mobile phone
- Provide SDK kit and Demo apk software to support secondary development

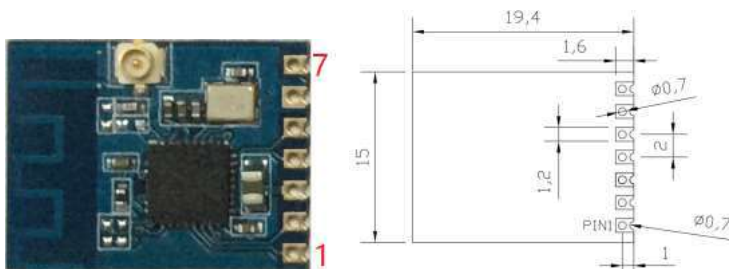
Suitable for :

- Intelligent home system, small appliances, intelligent home appliances, light.
 - Wearable, handheld devices, health/medical care equipment.
 - Toys, automotive electronics, all types of industrial control products.
-

XLW-220SD

Main characteristics:

- PCB Size: 15 X 19.4MM, 7 PIN 2.0 pin pitch, optional pcb antenna and external antenna
- IPEX Interface
- 3.3 V power voltage, 1 URAT and 3 GPIO connections; up to 5 GPIO without UART



XLW-220SD Module

PIN NO.	Item	Description
1	P1 / LED STATUS	GPIO P1, the default is module LED status light
2	P2 / RESET	GPIO P2, The default is to restore factory setting, active low
3	VCC33	3.3v power supply
4	RXD	UART interface, can reset as GPIO interface
5	TXD	UART interface, can reset as GPIO interface
6	GND	Ground
7	P3	GPIO P3, suspension if not in use

1. Quick Start

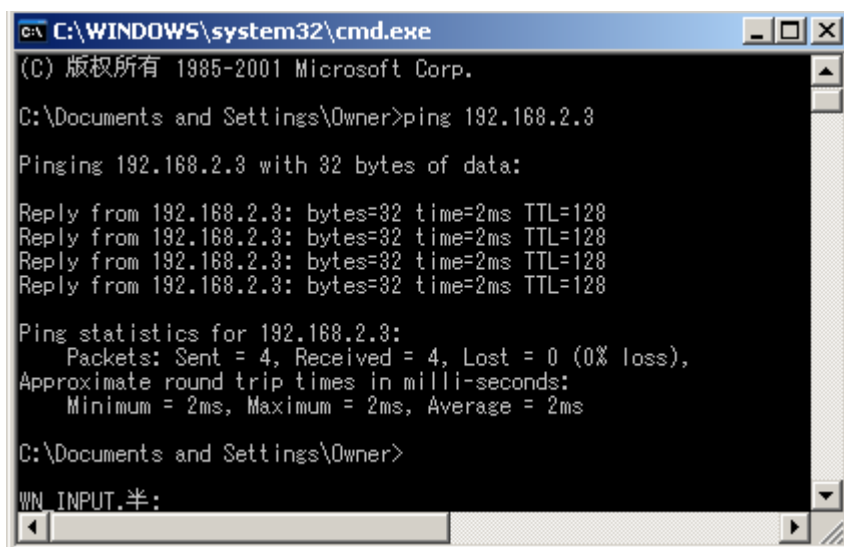
1.1. Preparation

- Hardware Requirement
 - ✓ XLW-220SD WiFi module
 - ✓ USB to TTL Serial 3.3V Adapter
- Software
 - ✓ Serial debugging assistant, like CommAssistant
 - ✓ TCPUDP testing software, like TCPUDPDebu



1.2. Command Line Interface

1. Connect the WIFI module to the serial adapter cable and insert adapter to computer usb interface.
2. Connect computer's wireless card to wifi module's hotspots("R2WiFi"), and can enter "ping 192.168.2.3" command to check the wireless connection is in function.

A screenshot of a Windows command prompt window titled 'C:\WINDOWS\system32\cmd.exe'. The window shows the execution of a 'ping' command. The output indicates a successful connection to 192.168.2.3 with 0% packet loss and a 2ms round trip time.

```
C:\WINDOWS\system32\cmd.exe
(C) 版权所有 1985-2001 Microsoft Corp.

C:\Documents and Settings\Owner>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

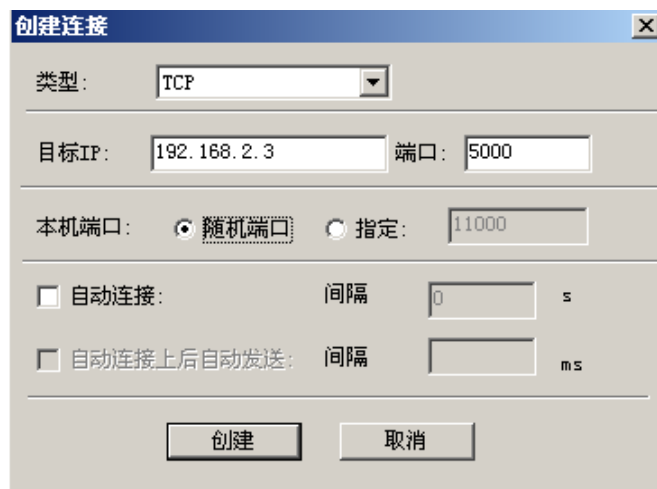
Reply from 192.168.2.3: bytes=32 time=2ms TTL=128
Reply from 192.168.2.3: bytes=32 time=2ms TTL=128
Reply from 192.168.2.3: bytes=32 time=2ms TTL=128
Reply from 192.168.2.3: bytes=32 time=2ms TTL=128

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\Documents and Settings\Owner>
WN INPUT.半:
```

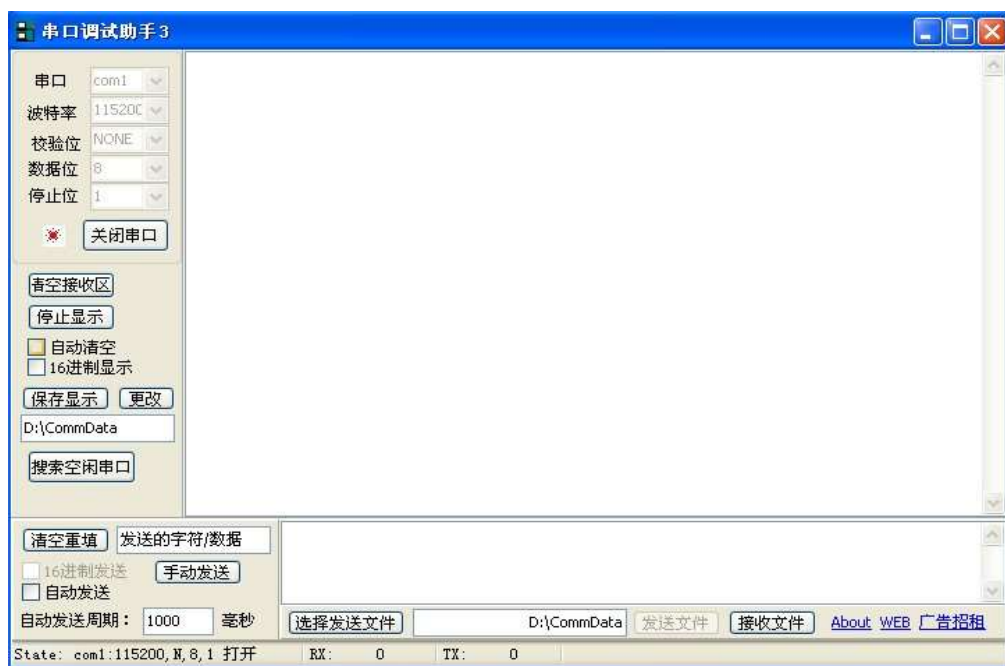
Notice: 192.168.2.3 is the default ip address of the WIFI module.

- Open TCP / UDP debugging software, in this case using TCPUDPdebug.exe, to create a TCP client to connect to a TCP server module



Notice: The module default to tcp server mode, listening port 5000.

- Open serial debugging assistant CommAssistan, set baudrate to 115200:



- Manually click in the serial debugging assistant send data. TCP / UDP Debug program can receive data.
- Click “ send data” in the TCP / UDP Debug. The serial debugging assistant can receive data.
- To this step, bi-directional data transfer should be in function. If there is no distortion, no loss of data reception, it means the data transfer performs correctly.



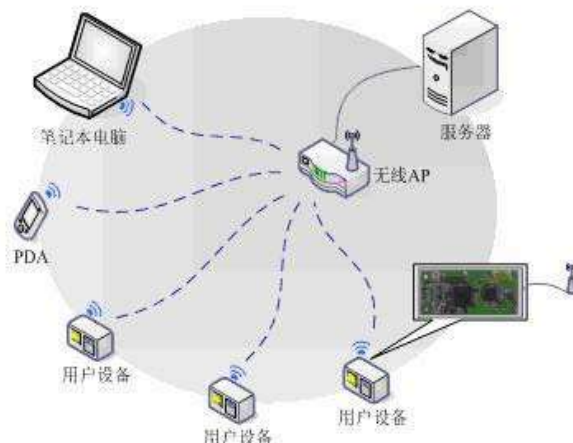
2. Product Overview

2.1. Main functions

2.1.1. Connect to wireless network

➤ Network Topology

wireless network built on basis of AP structure (Infrastructure). It is a kind wireless network consisted of AP & many STA joined. The feature of such network is that AP is the center of the entire network and forwarding all communication in the system.



XLW-220SD supports both modes of wireless networks, either as AP allows access to other

modules, or to be used as a basis for the formation of AP and STA joined to form the Infrastructure network.

➤ Security policy

The module supports a variety of wireless network encryption & can fully guarantee the secure transmission of user data, including:

- Non encrypted
- WEP64
- WEP128
- WPA-PSK/TKIP
- WPA-PSK/AES
- WPA2-PSK/TKIP
- WPA2-PSK/AES
- Auto adapted

➤ Wireless Roaming

The module supports 802.11-based wireless roaming agreements. Wireless roaming refers to, in order to expand the coverage of a wireless network, a plurality of co-AP with the same SSID / ESSID formed a wireless network, each AP to cover different areas, STA accessing the network by selecting to connect to a nearest AP (i.e., the strongest signal) and switch between different AP according to its geographical location .

When the wireless roaming is on, the module will scan automatically scan every 100 seconds and select a nearest AP to connect on basis of the current scan result. During wireless roaming, network may occur short interruption. It is recommended to turn it off if not using.

Be aware that the BSSID address binding is enabled, the wireless roaming is dis-enabled.

➤ Channel setting

The module supports wireless channel setting function. Users can configure parameters to set the radio channel frequency of the current module.

2.1.2. Serial Data Transmission

The module supports Serial data transmission can be a real serial plug and play, giving maximum convenience to user. Under this mode, user simply pre-set network parameters. Thereafter, once the module is turned on, it can automatically connect to the default wireless network and servers. Since the serial data is transmitted transparently, users only need send and receive data like regular serial data transportation . In other word, the module is used instead of serial cable to connect the user's original serial so that users can use it for wireless data transmission without any change.

Under transparent transmission mode, the module allow user to set automatical trigger frame length and trigger time. Automatical trigger frame length means the procedure that after the module receives a specified length of data from the serial port, consists of a network of data frames and immediately start the process of sending the data.

Automatic framing trigger time means the procedure that after the module receives data less than

above specified length from the serial port, module will send consists of a network of data frames and immediately start the process of sending the data.

that when data is received from the serial port to a specified length less than the above, the module will be compelled to send out the data consisted of current data frame after the specified timeout period, and start sending.

2.1.3. Multifunction GPIO

XLW-220SD provides up to five GPIO function pins. To fulfill customer special requirements , only need customized pins .

2.1.4. TCP/IP Protocol Stack

This module contains a complete TCP / IP protocol stack and supports TCP / UDP / ICMP / ARP / DHCP / DNS / HTTP protocol.

- Supports up to 8 TCP connections (adjustable according to user requirement)

- Supports up to 12 UDP connections (adjustable according to user requirement)

- Supports UDP broadcast

- Support DHCP Server / Client

- Support DNS

- Supports HTTP, built-in WEB server

- Support Socket Programming Interface

2.1.5. Flexible Parameter Configuring

This module is mainly running based on the default parameters. The configuration parameters are stored in the internal flash memory. Support power-down save, . User can select different ways to modify the configuration parameters of the module, including:

1) Configuring parameters based on the serial port

Under the default state of the UART interface, the baud rate is 115200bps, check bits none, data bits 8, stop bit 1. UART has two alternative working modes: data mode and command mode. Data mode is used for transparent data transmission. Command mode is used to configure the module parameters. Every time after start-up, UART2 is under data model. Enter three “+” to switch from data mode to command mode, which is called escape character. Enter “quit” command to switch module from command mode to data mode. Under command mode, it would automatically switch back to data mode if no operation is occurred over 30s.

If need, user could integrate parameter configuration function into MCU. User need program their own MCU and send command string to do configuration.

2) Configuring parameters based on the socket

The module has a built-in socket server,the user can through own app,send commands to the port,

parameter configuration of modules, the advantages of this approach is convenient for the user to the parameter configuration function intergrated into their mobile phone APP.

2.1.6. SmartConfig Function

The WIFI module through the SmartConfig function can quickly connect to the router. SmartConfig have two kinds of configure mode. The user by entering the command "smartconfig" to make the module into the SmartConfig configuration status; Or enter the reset level button, after 3 second to release the button, automatically enter the SmartConfig status. (Users can also the GPIO pin functions, custom startup of smartconfig process)

When the WIFI module into the SmartConfig mode, can input the router SSID name and password via the mobile APP, click the APP configuration to configure the WIFI module.

This process takes around 15-30s, the module will automatically connect to routers, if the connection is successful, the indicator light on the module is continuous light, at the same time the WIFI module can save configuration parameters. After reboot, the WIFI module will automatically connects to the designated router.

If the module connected to the router failure, the reboot to restore the original parameters.

2.1.7. App Server function

The WIFI through APP Server commands supports remote server's applications, mobile phone through the APP Server can remote to control home devices, e.g. smart sockets. When using APP Server commands, the data in the specified format sent from the user's phone applications will sent to the MCU via the serial port. Responded data from MCU, will also send to the user's phone application through the APP Server.

2.1.8. Firmware Upgrade Online

The WIFI module support this function.

2.2. Technical specification

Item	Specification
wireless standard	802.11 b/g/n

Antenna		on-board antenna or external antenna optional
Frequency		2.412 ~ 2.484 GHz
Data Transfer Rate		IEEE 802.11b: 1, 2, 5.5 和 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48 和 54 Mbps IEEE 802.11n: 6.5M-65Mbps
RF receiver sensitivity		802.11b 11M bps: -88 dBm 802.11g 54M bps: -73 dBm 802.11n MCS7 : -72 dBm
RF maximum output power		802.11b: 16 dBm 802.11g: 15 dBm 802.11n: 15 dBm
Encryption mode		WEP-64/128, WPA-PSK(TKIP) 和 WPA2-PSK(AES)
I/O function	UART interface	Baud rate 1200-921600
	I2C interface	Need to customize,must modify the module's program coed
	GPIO	Support up to 5 GPIO(Need to customize)
Average Power	Rx Mode	67mA
	802.11b 11M bps	282mA(19dBm)
	802.11g 54M bps	218mA(16dBm)
	802.11n 65M bps	223mA(12dBm)
Working Voltage		3.3V
Working Temperature		-20° C ~ +70° C

2.3. Applications

Applications	Products
Utilities and smart energy	<ul style="list-style-type: none"> • Thermostat • Smart Meter • White appliances • HVAC
Consuming Electronics	<ul style="list-style-type: none"> • Remote Control • Internet Radio

	<ul style="list-style-type: none"> • Family Security • Toy • M2M Communications
Industrial Controlling	<ul style="list-style-type: none"> • Chemical Sensors • Security System
Equipment remote management	<ul style="list-style-type: none"> • Location and Asset Tracking • Automobile • Code Updating
Retailing	<ul style="list-style-type: none"> • POS terminals • Wireless price tag • Digital Remote
Health, fitness and wellness	<ul style="list-style-type: none"> • Blood glucose meter • Fitness Equipment • Patients history tracking

3. Application Circuit

3.1. Reset circuit

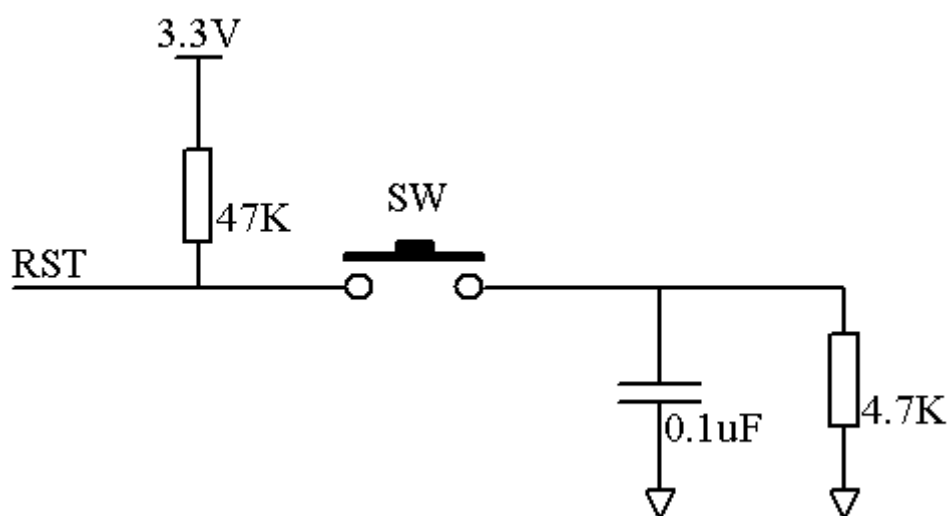
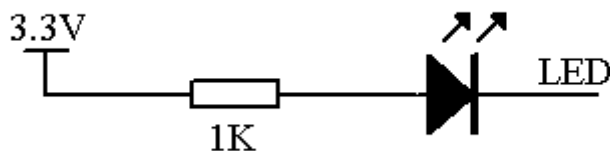


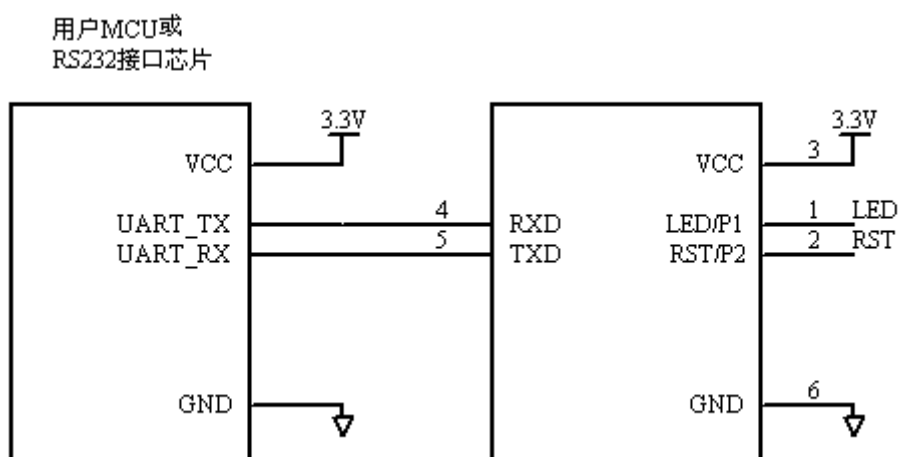
Figure: Reset circuit

3.2. LED Status driving circuit LED Status



LED Status driver circuit

3.3. UART Application Circuit



4. AT CMD Line Interface

4.1. Overview

Users can send the XCMD command to WIFI module through serial or network ports to complete the configuration and control of the WIFI module.

In the serial port section, XCMD is represented as an AT+XCMD extension instruction. In the network section, the module has a built-in UDP server with a port of 25000. Users can connect to the 25000 port of the module through UDP, send XCMD instructions, and receive responses.

1) XCMD Introduction

XCMD is a pure text instruction, with a request instruction format of:

```
xcmd_req:sn:key1=value1,key2=value2....\r\n
```

The response format is

```
xcmd_rsp:sn:key1=value1,key2=value2,key3=value3....\r\n
```

For example, the ipconfig instruction is

```
xcmd_req:10:cmd=ipconfig,  
xcmd_rsp:10:ret=1,ip=192.168.0.56,mask=255.255.255.0,gw=192.168.0.1,
```

Explanation:

- The instruction must end with a return and line feed "\r\n", with a hex value of 0d0a.
- the sn in the response is used to uniquely match the request, for example, it can be incremented from 0 to 999. If matching is not required, the sn can also be left blank.
- In most cases, the return value of ret=1 indicates success,=0 indicates that the instruction is currently executing, and <0 indicates execution failure and reason values
- The parameter fields in the request and response are in the key=value mode, and the order can be swapped. If it is not necessary, it can also be left blank.

2) Serial port AT instruction

Serial AT instruction, with a request instruction header of at+xcmd_Req, the response instruction header remains unchanged. For example:

```
at+xcmd_req:10:cmd=ipconfig,  
xcmd_rsp:10:ret=1,ip=192.168.0.56,mask=255.255.255.0,gw=192.168.0.1,
```

Before and after requesting instructions, there must be an idle time of more than 3 characters (this parameter can be modified through configuration). For example, if the baud rate of the serial port is 9600, the time to transmit a byte is approximately 1ms, which means it needs to be idle for more than 3ms before sending the request instruction, and it also needs to be idle for 3ms after sending the request instruction.

3) xopt field

You can add xopt=3 after the instruction to allow the module to save the configuration and restart, replacing or omitting the saveconfig and reboot instructions.

For example: at+xcmd_req::cmd=ipset,ip=192.168.1.5,xopt=3,

4.2. XCMD instruction

1) info instruction

```
xcmd_req:21:cmd=info,  
xcmd_rsp:21:ret=1, mac=000ec601a5fa,ver=3.0-b20,cap=R2WIFI,
```

Used to query the MAC address and version information of the module. The cap field is used to represent the features supported by the module, such as different cap fields for different products

2) ipconfig instruction

```
at+xcmd_req:12:cmd=ipconfig,  
xcmd_rsp:12:ret=1,ip=192.168.0.56,mask=255.255.255.0,gw=192.168.0.1,
```

Used to query the current IP address information of the module.

3) setdef instruction

```
at+xcmd_req:3:cmd=setdef,  
xcmd_rsp:3:ret=1,
```

Used to restore default factory settings.

4) wifiset instruction

```
at+xcmd_req:10:cmd=wifiset, wtype=0,ssid=xlwtech,pass=89808472,enc=7,  
xcmd_rsp:10:ret=1,
```

Used to set the WIFI parameters of the module. If there are no parameters later, it is used to query the current WIFI configuration of the module.

- wtype: mandatory field,=0 for sta mode, and=2 for ap mode
- ssid: WIFI hotspot name. When wtype=0, it represents the name of the AP hotspot to be connected, and when wtype=2, it represents the name of the hotspot when it is in AP mode. The following is the same
- pass: WIFI hotspot password, if left blank, it means no encryption

5) wifistart instruction

```
at+xcmd_req:11:cmd=wifistart,  
xcmd_rsp:11:ret=1,
```

Used to activate the module wifi signal.

6) wifistop instruction

```
at+xcmd_req:12:cmd=wifistop,  
xcmd_rsp:12:ret=1,
```

Used to deactivate the module wifi signal.

8) ipset instruction

```
at+xcmd_req:14:cmd=ipset, dhcpc=1,dhcps=1,ip=192.168.2.3,mask=255.255.255.0,gw=192.168.2.1  
xcmd_rsp:6:ret=1,
```

Used to set the current IP configuration parameters of the module. If there are no parameters, it is used to query the current IP configuration information.

- Dhcpc:=1open dhcp client,=0close dhcp client, only effective in sta mode.
- dhcps:=1open dhcp server,=0close dhcp server, only effective in ap mode.
- Ip,mask,gw: The IP address, subnet mask, and gateway when the module uses static IP.

9) sockset instruction

```
at+xcmd_req:15:cmd=sockset,id=1,mode=1,lport=5000,rhost=192.168.2.4,rport=5000,  
xcmd_rsp:15:ret=1,id=1,
```

Used to set the current socket parameters of the module. If there are no parameters, it is used to query the current socket configuration parameters. In TCP server mode, use the lport parameter for listening, and in TCP client mode, use the rhost and rport parameters.

- id: range 1-10, indicating the id of the socket to be configured. If multiple sockets are configured, the id will be different. If this field is not present, the system will automatically assign an empty id number to the user. If the id numbers are the same, the socket parameters will be modified
- mode: socket mode
 - =1 is tcp server, using the lport field for listening
 - =2 is tcp client, connected using the rhost and port fields
 - =3 is udp server, uses the lport port to receive data and sends it back and forth from where
 - =4 is udp client, uses the lport port to receive data (or after sending data, the peer will receive the original Road return), use the rhost, rport fields to send data,
- lport: local port, =0 is automatic allocation
- rhost, rport: The host address and port of the opposite end, which can be filled in with a domain name

10) sockstop instruction

```
at+xcmd_req:17:cmd=sockstop,id=1,  
xcmd_rsp:17:ret=1,,
```

Used to stop a socket configuration link. If it is a TCP sever, it will disconnect all clients under the ID name..

11) sockrestart instruction

```
at+xcmd_req:18:cmd=sockrestart,id=1,  
xcmd_rsp:18:ret=1,,
```

Used to restart a socket configuration connection and reset the relevant statistical data of the connection.

12) uartset instruction

```
at+xcmd_req:20:cmd=uartset,uartb=9600,uartd=8,uartp=2,uarts=1,uartsz=1024,uarttime=10,uarts  
tr=2,  
xcmd_rsp:20:ret=1,
```

Used to configure the serial port parameters of the module.

- uartb: serial port baudrate
115200 4800
57600 2400
38400 1200
19200 300
9600 110
- uartd: data bits, 5, 6, 7, 8
- uartp: parity bits, o: Odd e: Even n: None
- uarts: stop bits, 1, 1.5, 2
- uartsz: Package size packaging detection. When the serial port receives this quantity of data, it submits the data for external packaging once
- uarttime: Packet interval packaging detection. When the serial port exceeds this event (ms) and no data is received, it will be packaged and submitted to the external system once
- uartstr: String packaging detection, such as 0d0a, indicates that if the serial port detects 0x0d and 0x0a, it will submit data for external packaging once. Fill in 00 to not detect

15) smartconfig instruction

```
at+xcmd_req:20:cmd=smartconfig,
```

Used to enter one key configuration mode.

16) saveconfig instruction

```
at+xcmd_req:20:cmd=saveconfig,  
xcmd_rsp:20:ret=1,
```

Used to save parameters.

17) reboot instruction

```
at+xcmd_req:20:cmd=reboot,  
xcmd_rsp:20:ret=1,
```

5. Application Case

5.1. Active Serial Devices Networking

Active serial device networking refers that a connection initiated by a device and transport interactive data with back-end server (upload or download), typical active type devices, such as wireless POS. Right after completion of the transaction, it would connect to the back-end server,

and upload transaction data. See topology network built by Active serial device as shown below. The back-end server is used as TCP Server; device access to the network via wireless AP / router as a TCP Client.

5.1.1. Application Scenarios

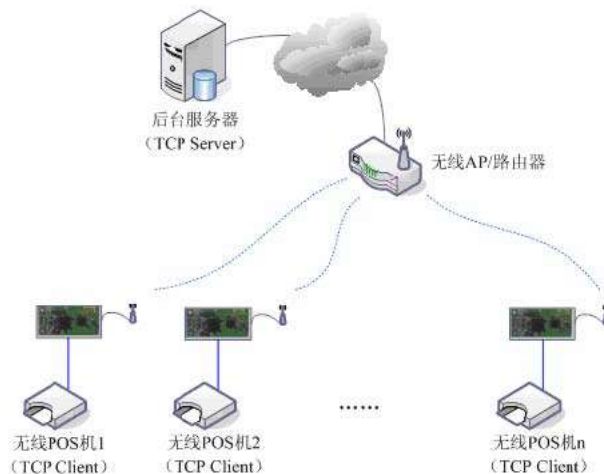


Figure: Active serial device networking

5.1.2. Setting reference

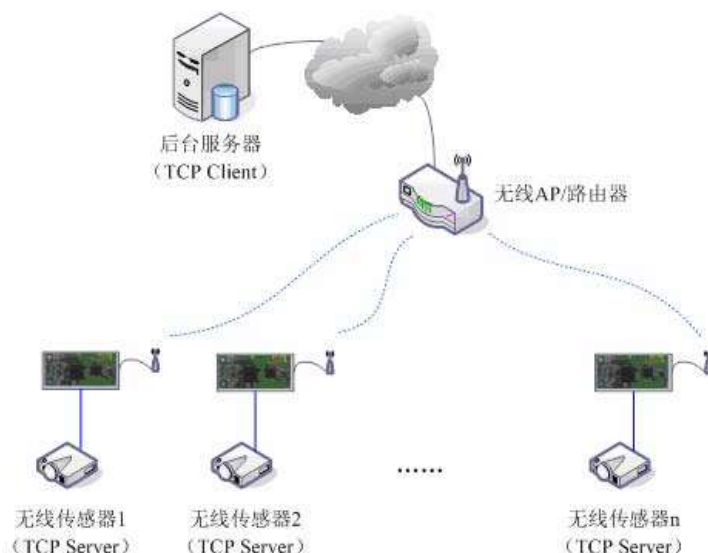
- Wireless Setup: The network name, encryption type, key, etc.
- Network settings: Enable DHCP client automatically obtain an IP
- Network type: STA mode
- Transportation Protocol: TCP
- Client / server settings:
 - C / S mode: client
 - Server Address: IP address of the backend server, such as 192.168.1.
 - Server port number: background server port number, such as 5000

5.2. Passive serial port devices networking

5.2.1. application scenarios

Passive serial device networking means that all devices in the system has been in a state of passive

waiting for a connection, and only the back-end server initiates the connection with the device, and request or download data. Typical applications, is like certain wireless sensor networks. Each sensor terminal is always in real-time data collection, but the data collected did not immediately upload, but temporarily stored in the device. The backend server is periodically every once active connected devices, and request uploading.



5.2.2. Setting reference

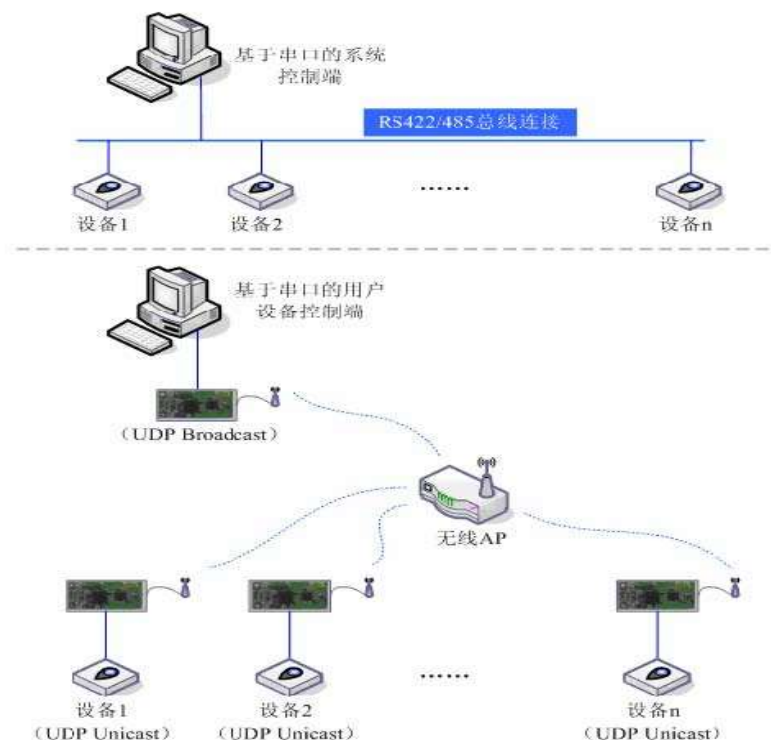
- Wireless Setup: The network name, encryption type, key, etc.
- Network setting:
 - ✓ IP address: 192.168.2.X
 - ✓ Subnet mask: 255.255.255.0
 - ✓ Gateway address: 192.168.2.1
 - ✓ DNS server address : 192.168.2.1
- Transport protocol: TCP
- Client / server setting
 - ✓ C/S mode: server C/S
 - ✓ Server port: 5000
 - ✓ Connection timeout: 120

5.3. Broadcast serial device networking

5.3.1. application scenarios

Broadcast serial device networking is a networking protocol based on UDP. Network host work under UDP broadcast mode, all devices are working in client UDP unicast mode. This is also a way of essentially passive networks. Typical applications is to upgrade wireless network which is on the basis of traditional RS422/485 bus network. Under such kind of networking, there won't be

any software change on any equipments or terminals controlled by those equipment in the original system. Use this module directly to replace the original RS422/485 hardware connection. It achieves truly "plug and play."



5.3.2. Setting reference

Network Host Device(Server)

- Wireless Setup:The network name、 encryption、 type、 key、 etc
- Network setting
 - ✓ IP address: 192.168.2.Y
 - ✓ Subnet mask: 255.255.255.0
 - ✓ Gateway address: 192.168.2.1
 - ✓ DNS server address: 192.168.2.1
- Transport protocol: UDP
- Client / server setting:
 - ✓ C/S mode: broadcast
 - ✓ Port: 5000
 - ✓ Connection timeout: 0

Device end(client)

- Wireless network setting: name, encryption type, key etc.
- Network setting
 - ✓ IP address: 192.168.2.X
 - ✓ Subnet mask: 255.255.255.0
 - ✓ Gateway address: 192.168.2.1

- ✓ DNS server address: 192.168.2.1
- Transport protocol: UDP
- Client/server setting:
 - ✓ C/S mode: unicast
 - ✓ Port: 5000
 - ✓ Connection timeout: 0

6. Restore Default Settings

- 1、Keep REST pin low level condition for 8 seconds, the module will automatically reboot. All the parameters will be restored to factory setting.
- 2、Input the “setdef” command through serial port.

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help important announcement

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following"

Contains FCC ID: **2BC2K-XLW-220SD** "

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2.7 Antennas

This radio transmitter **FCC ID:2BC2K-XLW-220SD** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
			Antenna	
2.4G Wi-Fi	/	PCB Antenna	2.0	2412-2462MHz

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains **FCC ID:2BC2K-XLW-220SD**".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

2.11 Note EMI Considerations

Host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.