USR-K6 User Manual

File Version: V1.0.0



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1. Get Start

USR-K6 is a small module for serial port to Ethernet, which can realize the bi-directed data transparent transmission between RJ45 port and TTL serial port. It can be applied to interface 232 and 485 by level conversion circuit.

Product link: https://www.usriot.com/products/low-cost-solution-super-port-ethernet-module.html

Related software:

- ✓ M0 setting software: https://www.usriot.com/support/downloads/usr-m0-setup-software-v224288.html (which can be also used in the the low cost serial to ethernet converters such as USR-TCP232-302, USR-TCP232-304 and USR-TCP232-306, and embedded ethernet modules USR-TCP232-T2,USR-TCP232-S2)
- ✓ Testing software: https://www.usriot.com/support/downloads/usr-tcp-test-testing-software.html (USR-TCP232-Test.exe)

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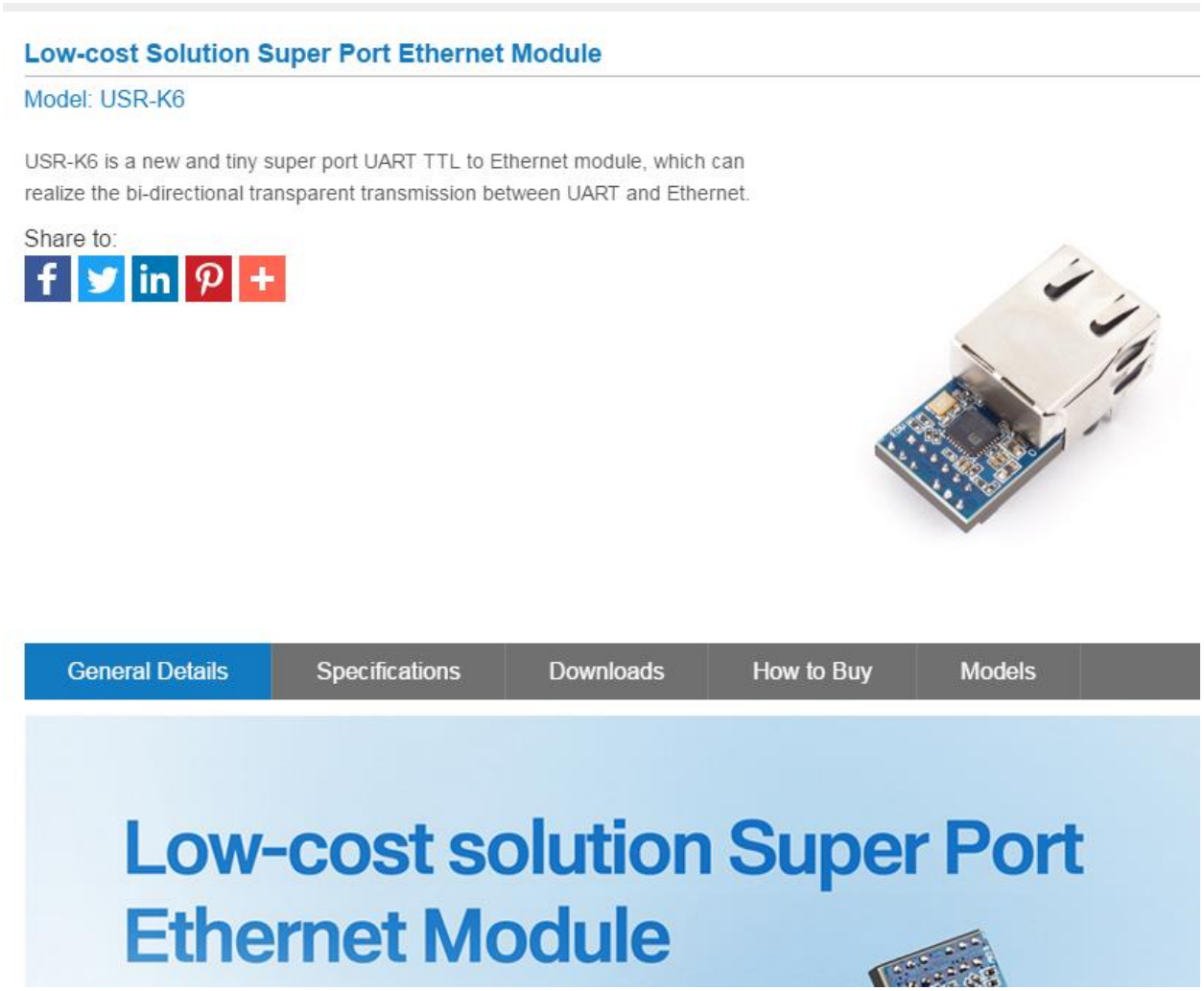


Diagram 1-1 Download Page

Some question in you using, please refer to the applications:http://www.usr.cn/Faq/cat-46.html

Also can be submit to our USR custom supporting: http://h.usriot.com

1.1. Testing Environment

1.1.1. Hardware Prepare

- USR-K6*1

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- USR-Kx-EVK*1
- Cable*1
- Power (DC5V 1A)*1
- Serial port cable *1
- PC*1



Diagram 1.1.1-1 Testing Tools

1.Test purposes:

Test to realize the USR-K6, have a basic understanding of USR-K6

Test to know whether there are some thing wrong with it.

2.Data direction:

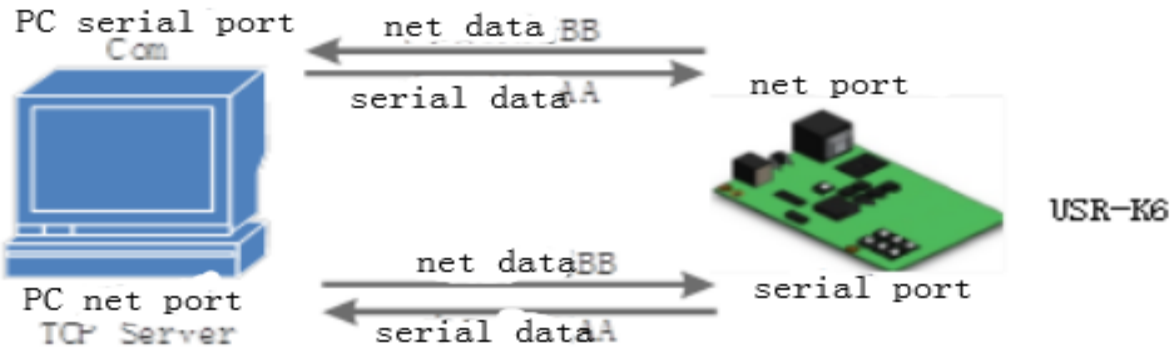


Diagram 1.1.1-2 Data Direction

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1.1.2. Hardware Connection

To test the conversion from serial port to ethernet, we put the serial port of K6 connected to PC via serial cable. Connect the interface of the K6 and PC using net cable. After testing and found no mistake, powered for K6.



Diagram 1.1.2-1 Hardware Connection

Note: the power adapter and the cable are from USR

1.2. Network Testing

To prevent the thing that occurs when the custom use the K6 such as finding no server, can not ping and can not enter the webpage, after connecting you should check the PC before testing.

1)Shut down firewall and antivirus software.

2)Shut down net card none-related and reserve only one local connection .

3)For the direct connection between PC and server, please provide a static IP in the same LAN with the IP of K6.

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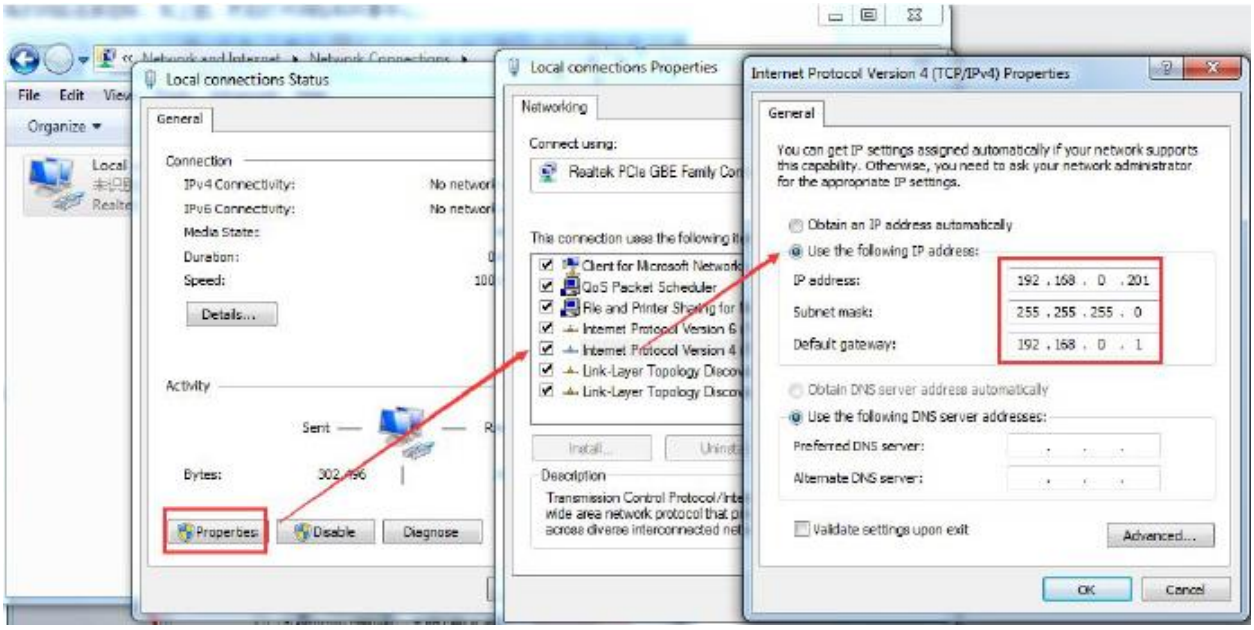


Diagram 1.2-1 Local Connection of the PC

1.3. Default Parameters

Project	Intro
User name	admin
Key word	admin
IP address	192.168.0.7
Subnet masks	255.255.255.0
Default network gateway	192.168.0.1
Default work mode	TCP client
Default local port	0
Default target port	8234
Default local port	20108

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Default target IP	192.168.0.201
Serial port baud	115200
Serial parameter	None/8/1

Form 1.3-1 Default Parameters

1.4. Data Transport Testing

Then the serial port and ethernet can communicate bi-directly, steps are as fellows:

① Open the"USR-TCP232-Test.exe" and connect the hardware as the Diagram 1.1.2-1 Hardware Connection

② Select the TCP server mode in the "Net Setting" . Fill the PC IP into the server IP, server port 8324, click to start listen and build TCP client. Baud rate:115200, serial parameters:None/8/1, then click to open the serial port.

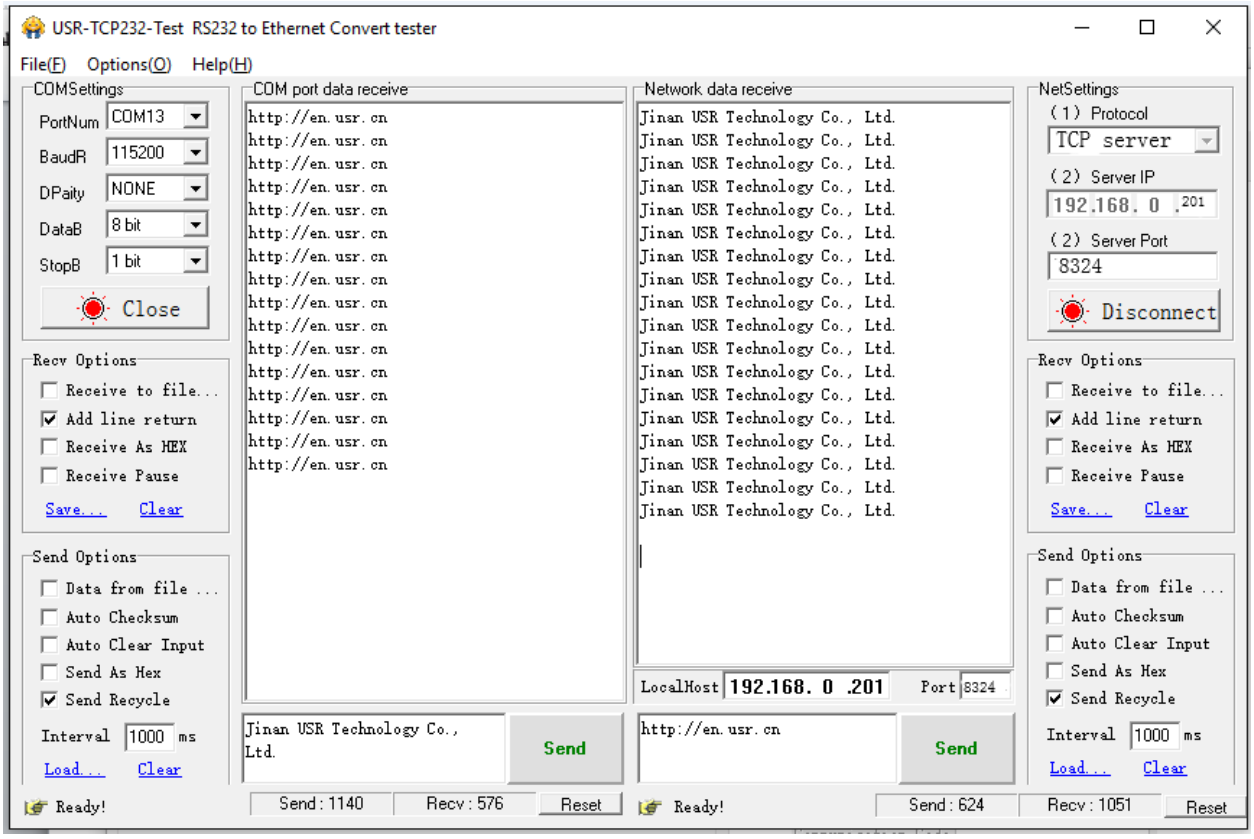


Diagram 1.4-1 Default Parameters Testing

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2. Overview

2.1. Brief Introduction

USR-K6 is a tiny size serial port to Ethernet module which can realize the bi-direct data transparent transmission between RJ45 port and TTL serial port. It can be applied to RS232 and RS485 by level conversion circuit.

Supports low power consumption, only consume a little current in full speed work. Equipped with Cortex-M0 core, fast speed and high efficiency. Supports several functions to meet more need.

K6 is easy to operate and have strong compatibility. On the basis of adding new functions, it is compatible with the setting protocol of K5, which provide convenience for old users. At the same time, a setting protocol similar to K3 is added. For customers who adopt other series of products, it can be applied to K6 only by simple adjustment.

2.2. Function feature

- 10/100Mbps can adopted to Ethernet, supports AUTO-MDIX switching of network cable crossovers.
- Work modes:TCP server, TCP client, UDP server, UDP client, Httpd client, can be chose.
- Baud of the serial port can edit from 600bps to 460.8Kbps. Parity including None, Odd, Eben, Mark, Space.
- Customize heartbeat package and keep the connection real and reliable, can be used to test the death connection
- Customize registration package, check the connection status, and also customize the head of package.
- Under TCP Server mode, the number of client connected can be modify from 1 to 16, default is 4. The IP of connected client can be see. Send and receive data according to connection calculation.
- Under TCP Server mode, when the client number reach the max number, the new client can instead of the old one or not can be set.
- Support webpage, AT command, serial port protocol, webpage setting parameter, setting protocol. Provide custom to use in their own software.
- Support TCP client short connection, the time can be set.

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- Support restart out time, the time can be set.
- Before the TCP connect, whether clear the data before can be set.
- Support DHCP, get IP automatically
- The unique MAC address in the world, and the address can be modify. Support the function of customize MAC.
- Support DNS, domain name resolution.
- Support customize the address of DNS server.
- Support upgrade the firmware from webpage, more convenient.
- Support V-com.
- Support software and hardware restore to the factory setting.
- Support across the gateway, switching and router.
- Support work in LAN, also can access the external.

2.3. Basic Parameters

Parameter	Value
Input Voltage	DC3～3.6V
Working Current	136mA@3.3V
Net port	Rj45, 10/100mMbps
Serial port	600~460.8K(bps)
Software parameters	
Network protocol	IP, IPV4, TCP/UDP, ARP, ICMP
Access way to IP	Static IP, DHCP

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DDNS	Support
User parameters	Software setting, webpage setting, AT command
Single transparent transmission	TCP Server/TCP client/UDP Server/UDP Client
Similar RFC2217	Support
Httpd client	support
TCP server connection	Default 4 and maximum 16
Net buffer	Send:6Kbyte; receive:4Kbyte
Serial port buffer	Receive: 2048byte
Average transport delay	<10ms
Set software	USR-VCOM, USR-Cloud, parameters setting software
Package mechanism	4 byte package time and 1024byte length
others	
Certification	CE,FCC
Size	35.0x19.39x18.25 mm(L*W*H)
Operating Temp.	-25～+75°C
Storage temp	-45～+105°C
operating humidity	5%～95% RH
Storage humidity	5%～95% RH

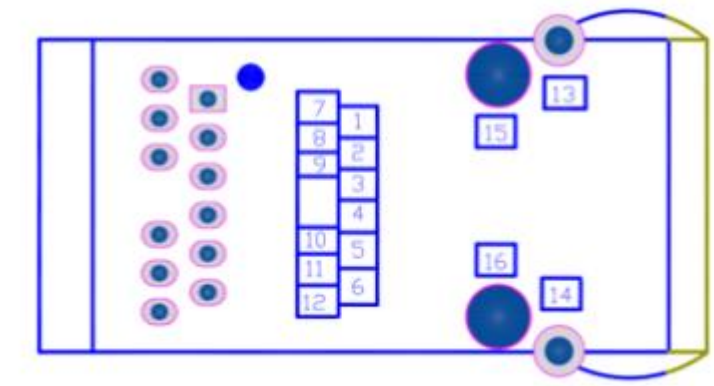
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Package	Electrostatic bubble

Form 2.3-1 Basic Parameters

3. Hardware Parameters

3.1. Pin Definition



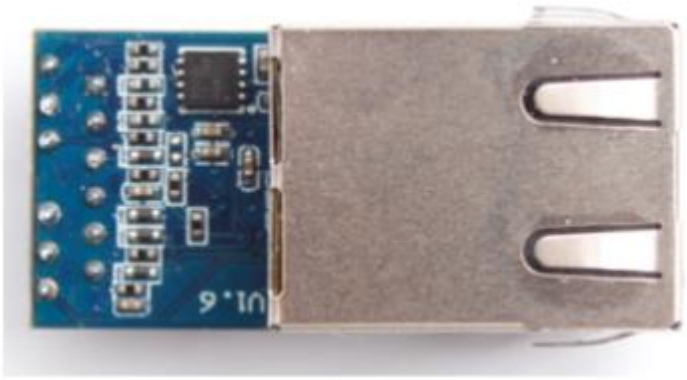


Diagram 3.1-1 Pin

Num	Pin	Function	Instr

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1	N/C	N/C	N/C
2	N/C	N/C	N/C
3	Link	Connected status of TCP	Used as indication pin for TCP connection status. If the LINK function is enable and connected, this LED will light.
4	RST	reset	Connected to the IP of the user's MCU, reset when abnormal, reset when the pin reach 200ms
5	485-en	Reserve pin	RS485 enable pin
6	CFG (reload)	Configuring the pin using serial	When normal working , don't connect the pin or connect to high level. Under low level, the pin is used for module configuration, access to power then pull down"Reload" pin Refer to 4.4.3 Factory Reset
7	LED2	Net port data instr	Single chip data indicator foot, when data transport in the network, it will flash.
8	RXD	Module data receive	TTL connect to 3.3v MUC
9	TXD	Module data send	TTL connect to 3.3v MCU
10	GND	Signal location	Grounding
11	VCC	Power	Power:3.3V@200mA
12	NC	\	

Form 3.1-1 Pin Definition

3.2. Dimension

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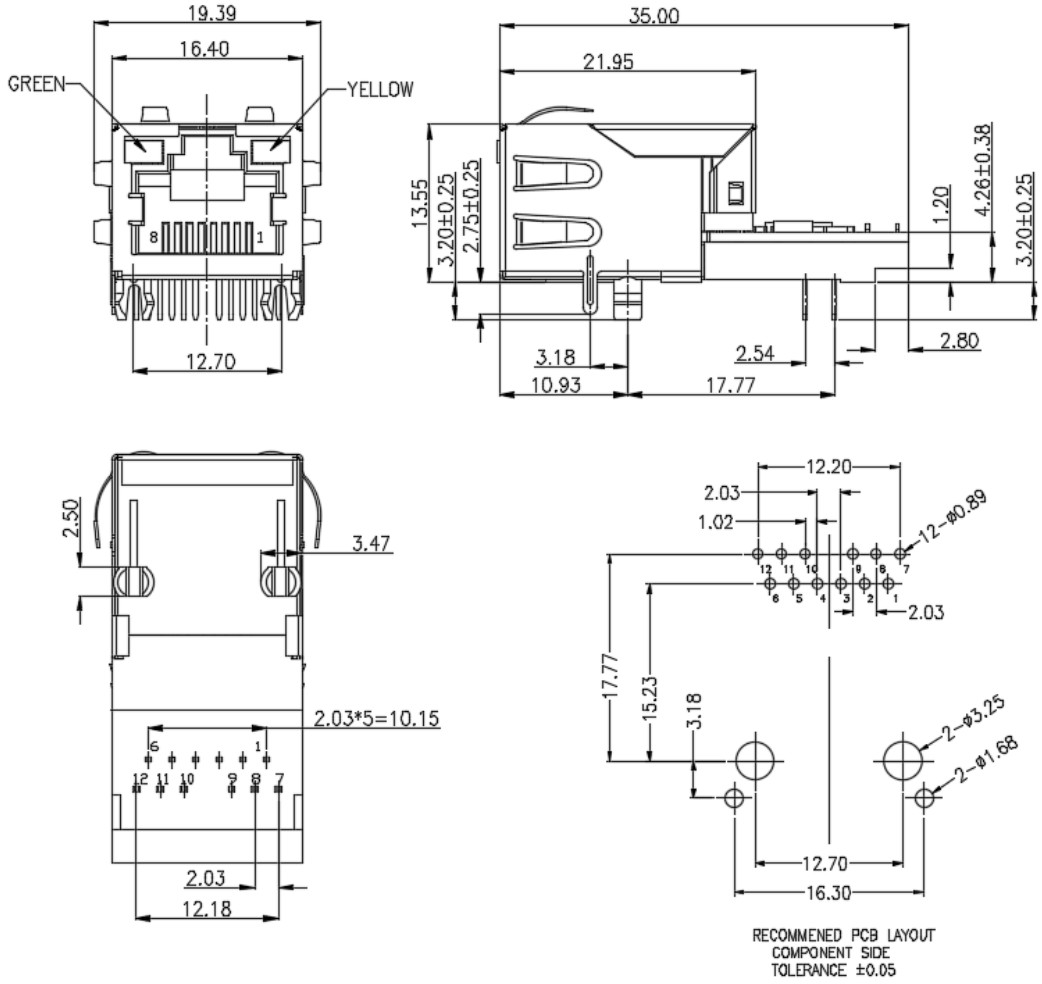


Diagram 3.2-1 Dimension

4. Product Function

Here are the functions of K6, below is the overall block diagram.

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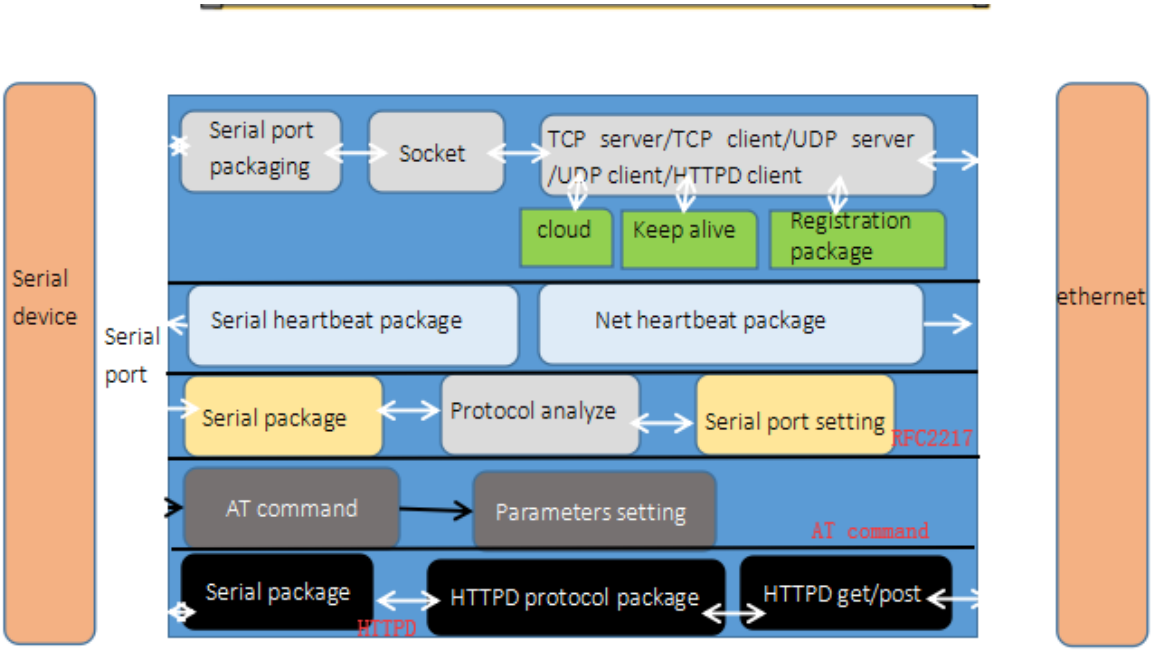


Diagram 4-1functions

4.1. Network Basic Functions

4.1.1. IP address/ subnet masks/ gateway

1. IP address is the identity representation of the module in the LAN, which is unique in the LAN, so please be sure there is no another device same as it in the LAN.

- Static IP

Handle to setting. Note fill the IP, subnet masks and gateway.

Static IP adopted to the environment that required to statistics the IP and the device and makes them correspond one to one.

Advantage: accessing the device that can not distribute IP address can be searched via UDP broadcast.

Disadvantage: different net segment in the different LAN can not communicate normally.

- DHCP

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Get IP address , gateway address, DNS server and other information from the gateway server to easy the step for setting IP address, DHCP adopted to the environment that have no special requirement to IP.

Advantage: accessing the device equipment with the DHCP server such as router can communicate directly. Reduce the hassle of setting IP address and subnet masks.

Disadvantage: accessing the device with no DHCP server such as computer directly, K6 can not work.

2. Subnet masks used to determine the host number and the network number, indicates the number of subnet and determine the flag within the subnet. The subnet masks needed to set, usually we use the subnet masks: 255.255.255.0, the network number is the former 24, the holder name is the last 8, number of subnet is 255, the module IP is in the range of 255, and then we are sure that the module IP is in this subnet.

3. Gateway is the net port of the LAN. If you connect the router to access the internet, the gateway is the router IP address, setting wrong and can not access into the net. No device such as router and no setting, keep the default.

4. Related AT command.

command name	instr
AT+WAN	Setting and query the access way of K6 IP, IP/subnet masks/gateway parameters

From4.1.1-1 Related AT Command

5. Software setting:

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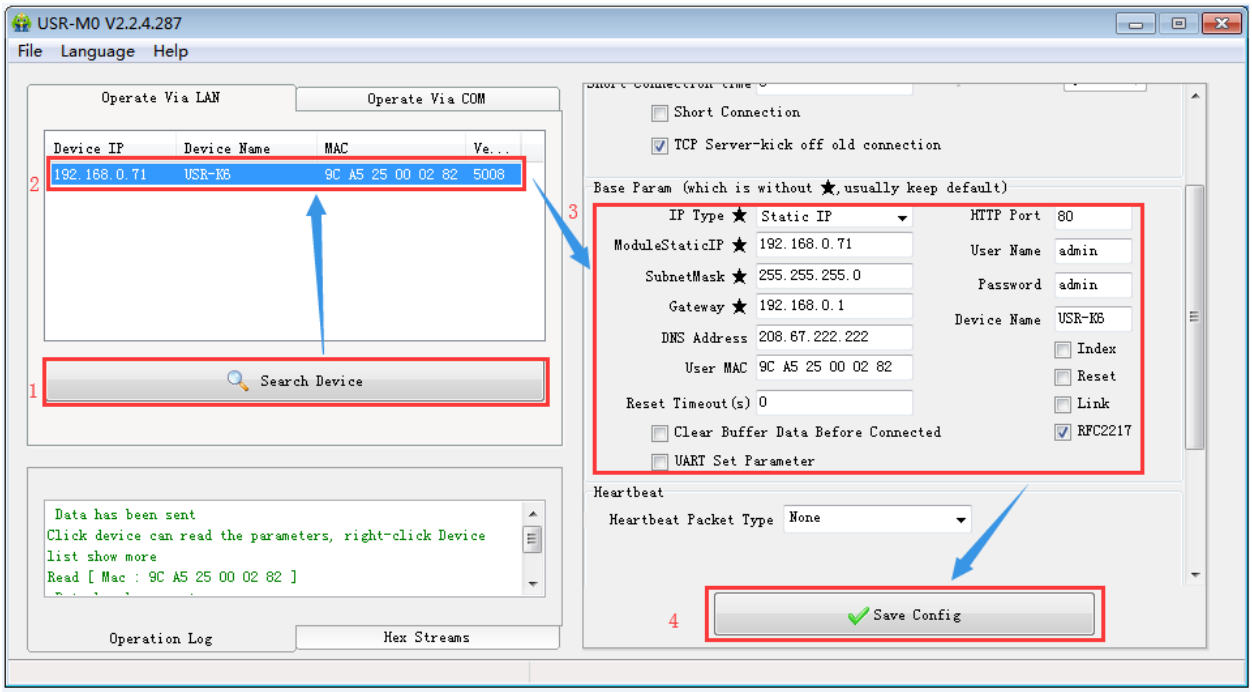


diagram 4.1.1-1 Software Setting

4.1.2. DNS Server Address

DNS servers are used to convert domain names into IP addresses that are recognized by the network. DNS server address can be set, which can realize domain name resolution in the case of imperfect local domain name server. Users can also set the address of specific DNS server according to requirements. When K6 needs domain name resolution, it will submit the resolution request to the DNS server set.Using is more flexible and reliable.

In static IP mode, the default DNS server address is 208.67.222.222, and in DHCP mode, the DNS server address is obtained automatically. Version 4015 above support domain name server address can be set.

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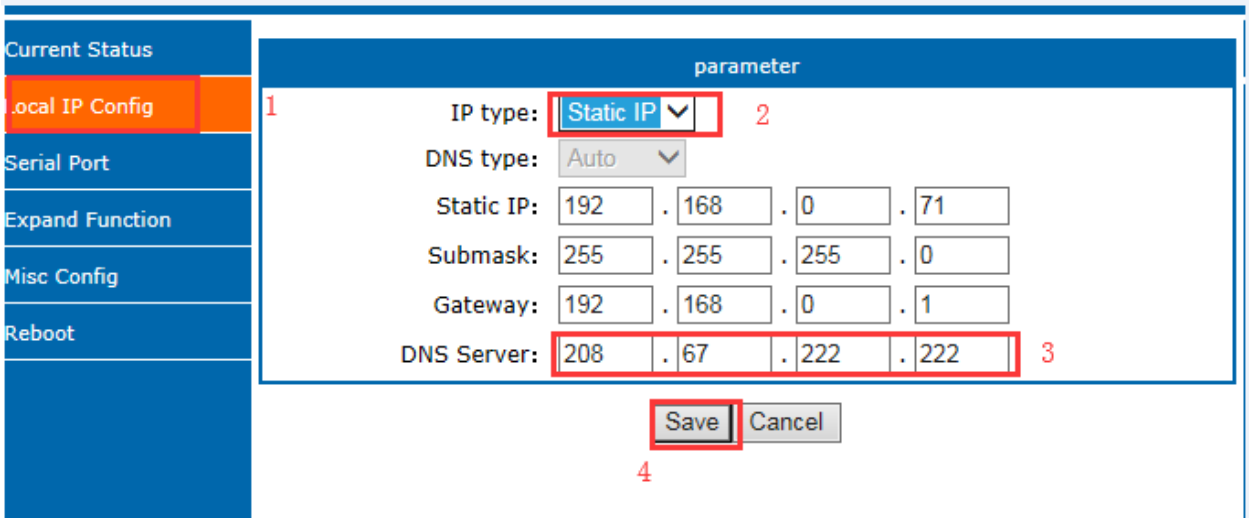


Diagram 4.1.2-1 DNS Setting Webpage

command name	Instr
AT+DNS	Setting and query the DNS address of K6

Form 4.1.2-1 Reference AT Command

4.1.3. Web Server

webpage server of K6 is same as the normal webpage server, which is convenient for user to setting parameter and query the status.

The port of webpage can be setting, default is 80.

Steps:

- Open the browser, fill the IP of K6, e.g.:192.168.0.7(IP address and PC in the same net segment.)
- Fill the user name and key word in the login webpage, default is admin, click to enter.

TX Count: the data count sent from K6 to the external

RX Count: the data count received by K6 from thee net.

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Remote IP/TX/RX:via it , you can see the device connected to the K6, and the sent count and received count.

Note: under the UDP server mode, only send/received data, and no connected IP

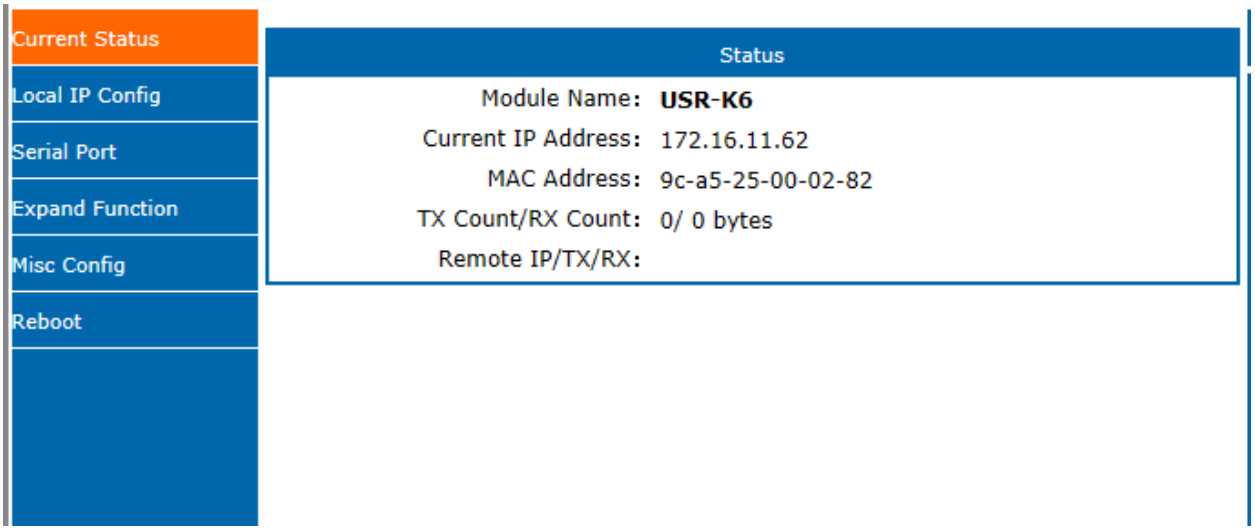


Diagram 4.1.3-1 Current Status

4.1.4. Restore to the Factory Setting.

1) Hardware restore: K6 supports the hardware restore to the factory setting. Keep putting down reload pin 5s in powered condition, the put up and it will restore.

Steps：power on→keep the reload pin down→keep for 5s→put up.

2) Software restore: via the software setting and the net protocol sending command.

3) AT command restore: enter the AT command, AT +RELD to restore.

4.1.5. Network Upgrade Firmware

Webpage upgrading firmware, stable and simple. Using this new function meets the custom requirement. If you need to upgrade, you can query us from the USR support:http://h.usriot.com and asking firmware from supply. The way to upgrade please reference5.1.1.

4.2. Socket

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There are five work modes for K6, including TCP Client, TCP Server, UDP Client, UDP Server and Httpd Client. Setting from the webpage and the software setting, as below:

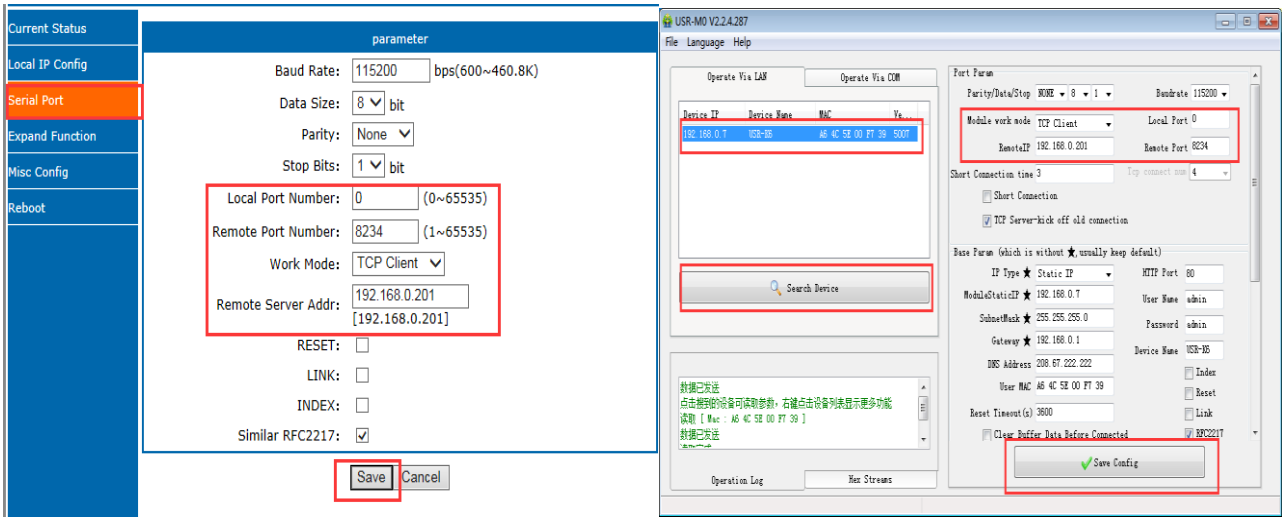


Diagram 4.2-1 Work mode Setting

Note: Default IP address and type is static IP at 192.168.0.201. Default remote port:8234

Related AT command:

command name	instr
AT+sock	Setting the work mode/target IP/ target port

Form 4.2-1 Related AT Command

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4.2.1. TCP Client

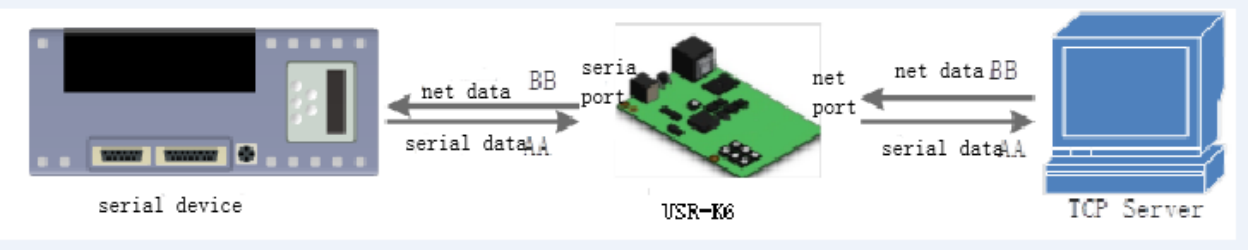


Diagram 4.2.1-1 TCP Client

It has to be connected before transferring data.

1) In TCP Client Mode, K6 connects TCP Server actively, establish a connection to transmit date. According to the TCP protocol related rule, there difference for TCP client between connect and disconnect, to make sure the data exchange more stable. Usually used in the data interaction between device and server, which is the most common form of network communication.

2) In TCP Client Mode, support the function of identifying disconnected link. When connected, it will send keepalive package every 15s. If unconnected, it can be detected timely and enforce K6 to disconnect the former link to establish a new one.

3) When K6 try to connect remote server, if the local port number is not “0" ,it will establish a connection with the same source port every time.

4) Support synchronizing baud rate, USR-cloud and short connection function.

5) In a LAN, if the K6 is static IP, please keep K6 IP stay in the same network segment with gateway, and setting the gateway IP, otherwise can not work as normal.

6) **note**:keepalive, synchronizing baud rate and USR-cloud are more on the below.

7)Communication example

① Software setting, take the K6 as a TCP client, remote IP:192.168.0.201,(for my PC is 172.16.11.8, so for the next testing ,change remote IP to 172.16.11.8) remote port:8234, then save it. Research to make sure the parameters are right. Also you can set work mode, remote IP and remote port in the webpage then save and restart.

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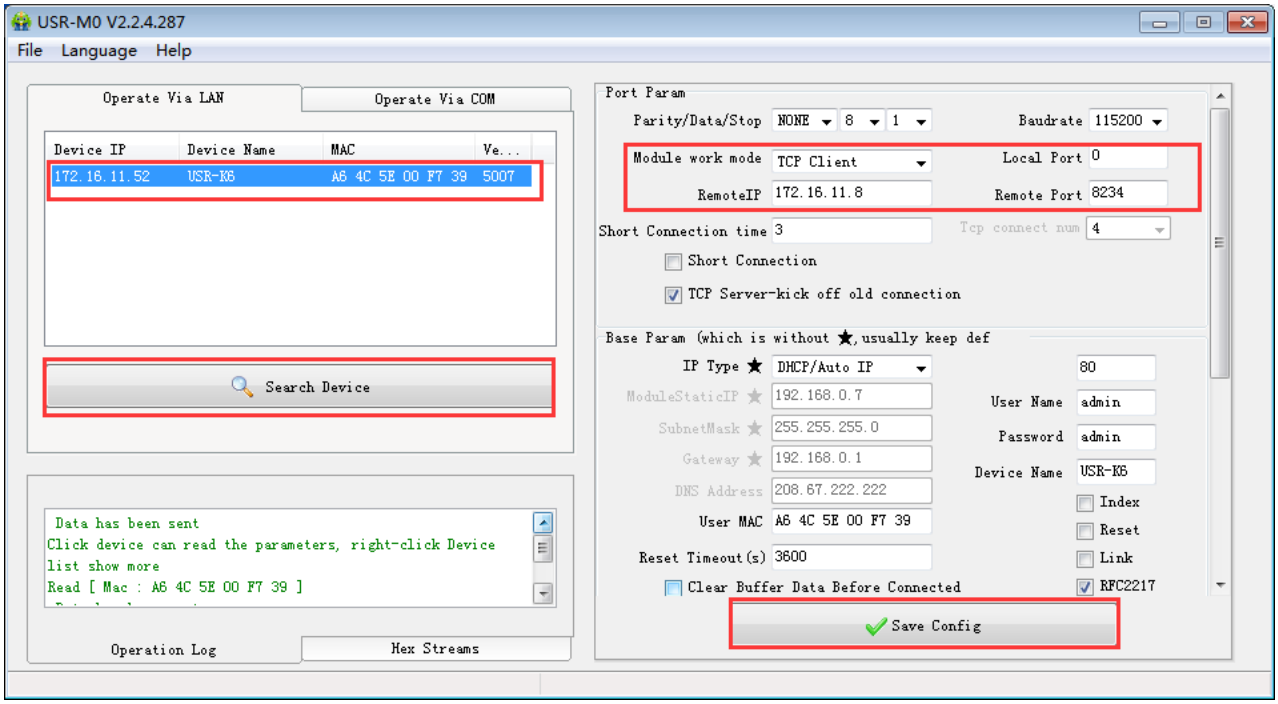


Diagram 4.2.1-2 TCP Client Software

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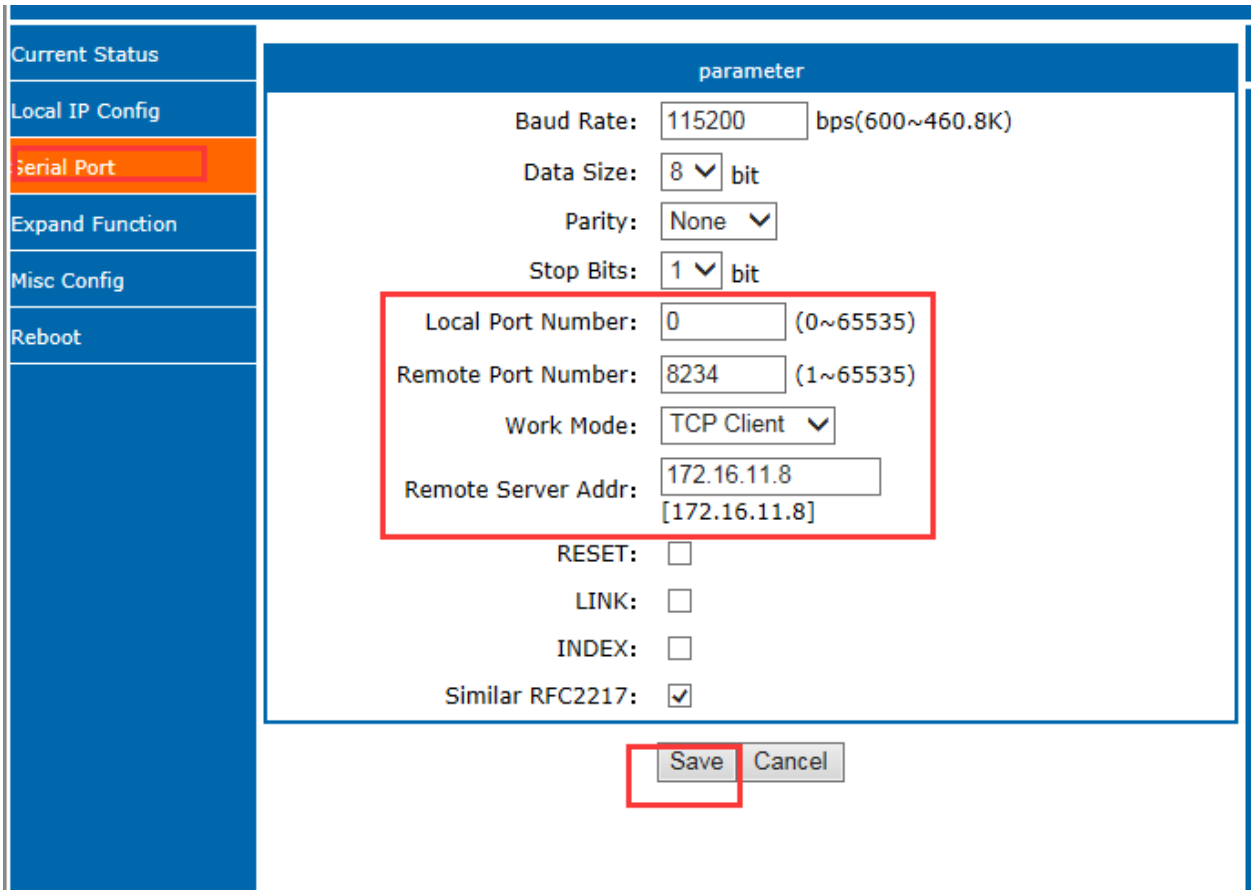


Diagram 4.2.1-3 TCP Client Webpage Setting

② set the testing software as TCP server, local IP is the IP of the PC ,locally is 192.168.0.201, listen port is 8234 and click listening. Testing software show the 192.168.0.7:4117(distribute randomly). setting the right serial port parameters and open the serial port.

Note : default remote IP is192.168.0.201.But in order to keep the device and PC in the same network segment to make the communication correct so we change IP type as DHCP. Just likes the above picture.

③ Click send to receive the bi-direction data.

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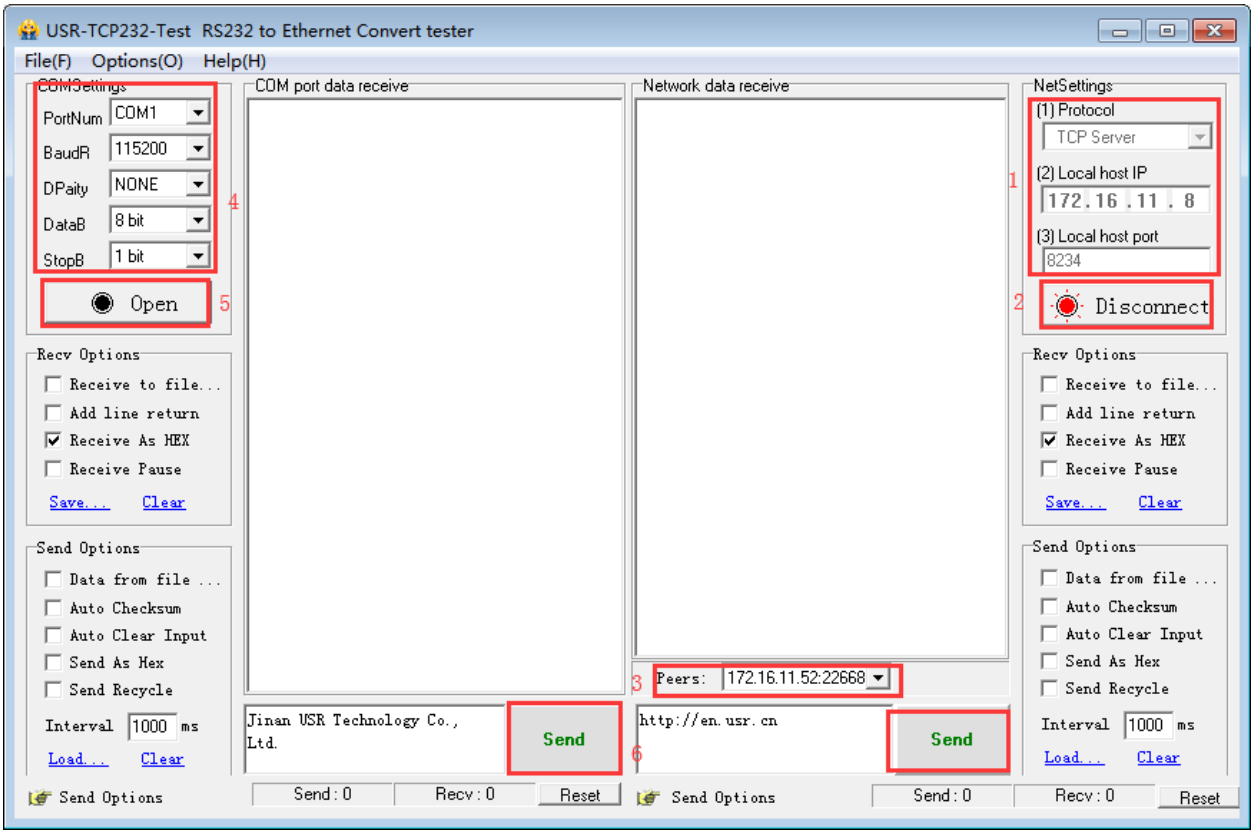


Diagram 4.2.1-4TCP Connection Testing

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4.2.2. TCP Server

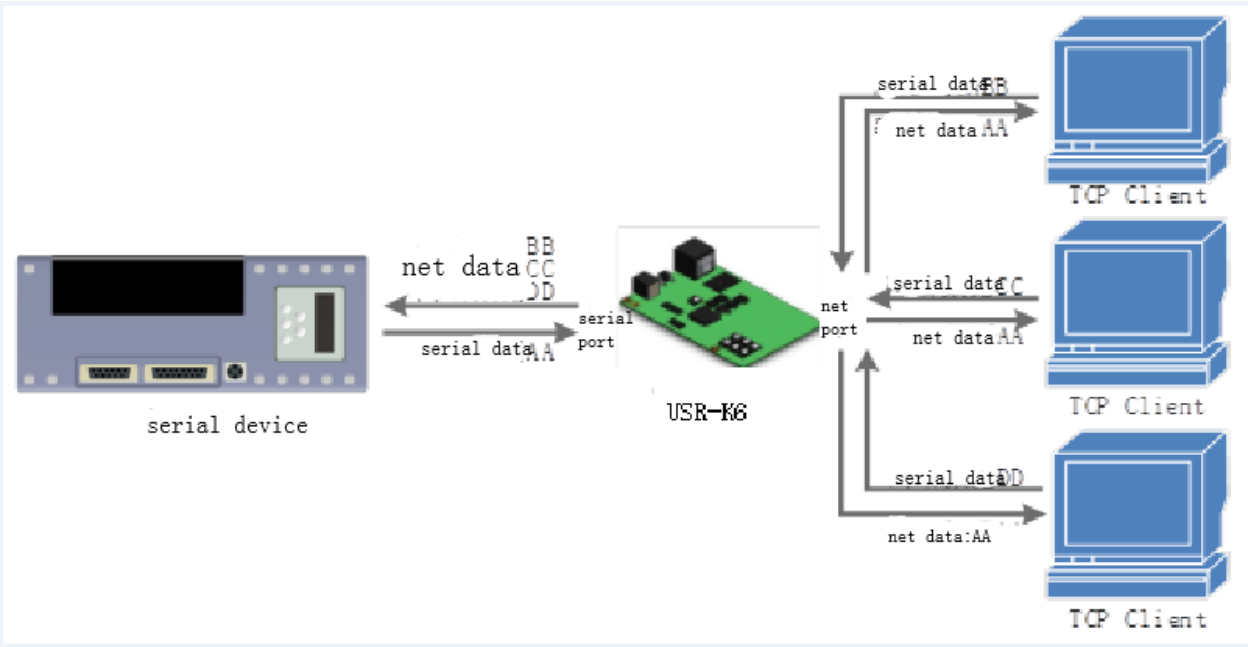


Diagram 4.2.2-1 TCP Server

1) In TCP Server Mode, K6 listens local port, it will response and establish a connection when there is a request. When the K6 receive the data, it will send it to all the client connected to K6, meanwhile, this mode can monitor the connect timely with keepalive function.

2) Usually it is used in the LAN communicating with TCP client. Adopt the case that more than one PC or phone asking data without server. Same as the TCP client ,there are different between connect and disconnect.

3) Support synchronizing baud rate.

4) TCP Client number is from 1 to 16, default value 4. the port is fixed., can not be set to 0.

5) If the number of the TCP client is more than 16, default kick the old one, and this function can be set via webpage.

6) TCP server example

① Set K6 as a TCP server via software setting, local port is 20108, then save. Also you can set via webpage.

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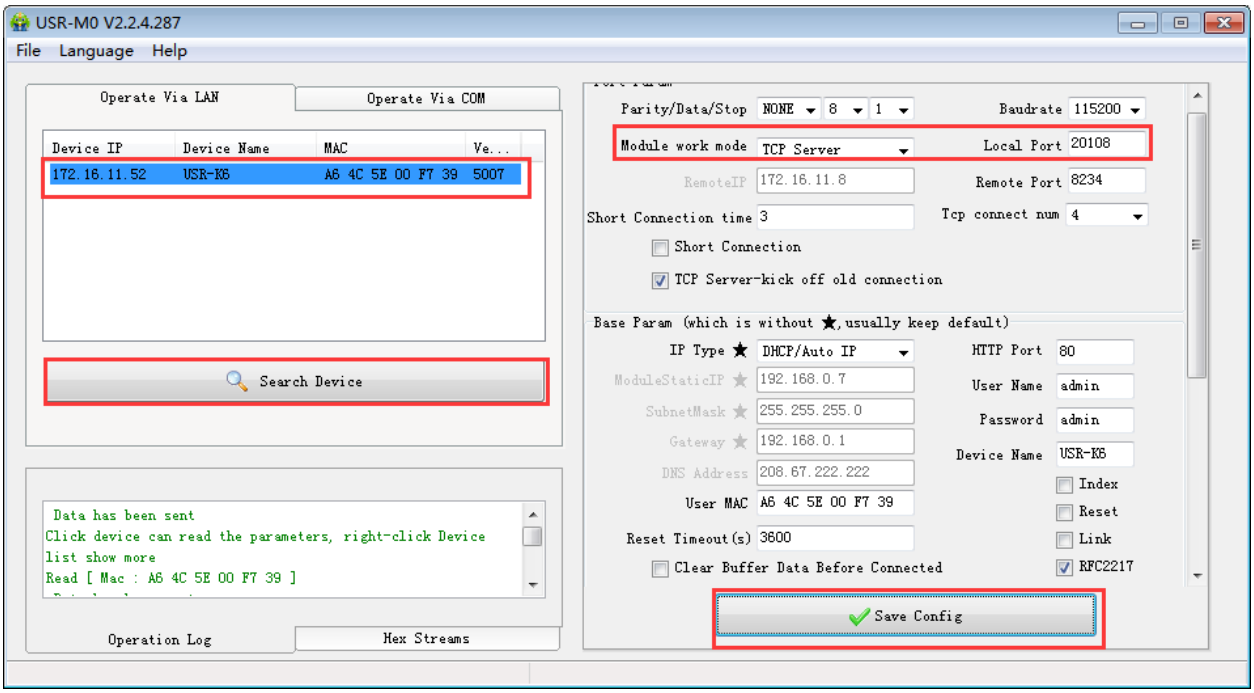


Diagram 4.2.2-2 TCP Server Software Setting

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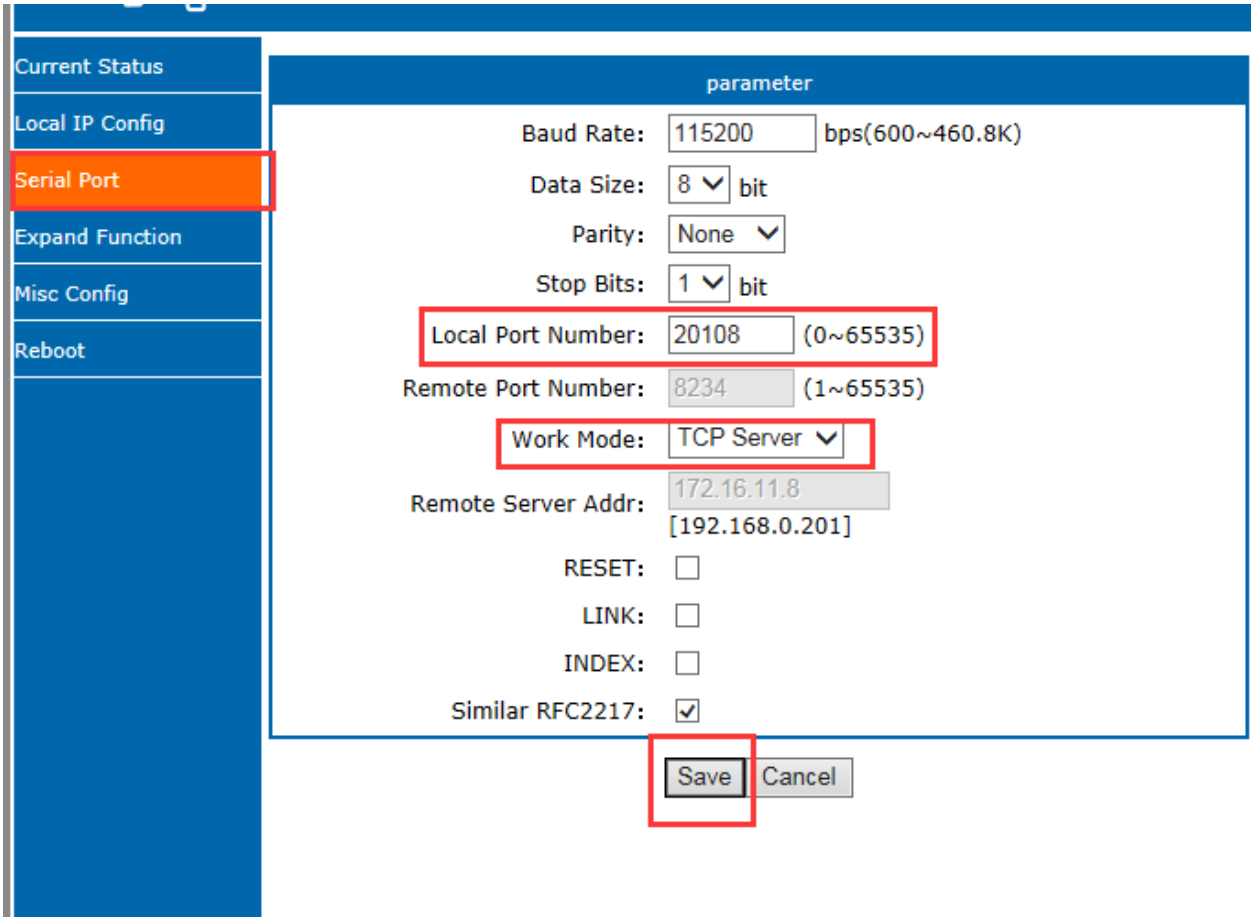


Diagram 4.2.2-3 TCP Server Webpage Setting

② Testing software set to be TCP client, server IP is IP of K6 and the server port is port of the K6, then connect.

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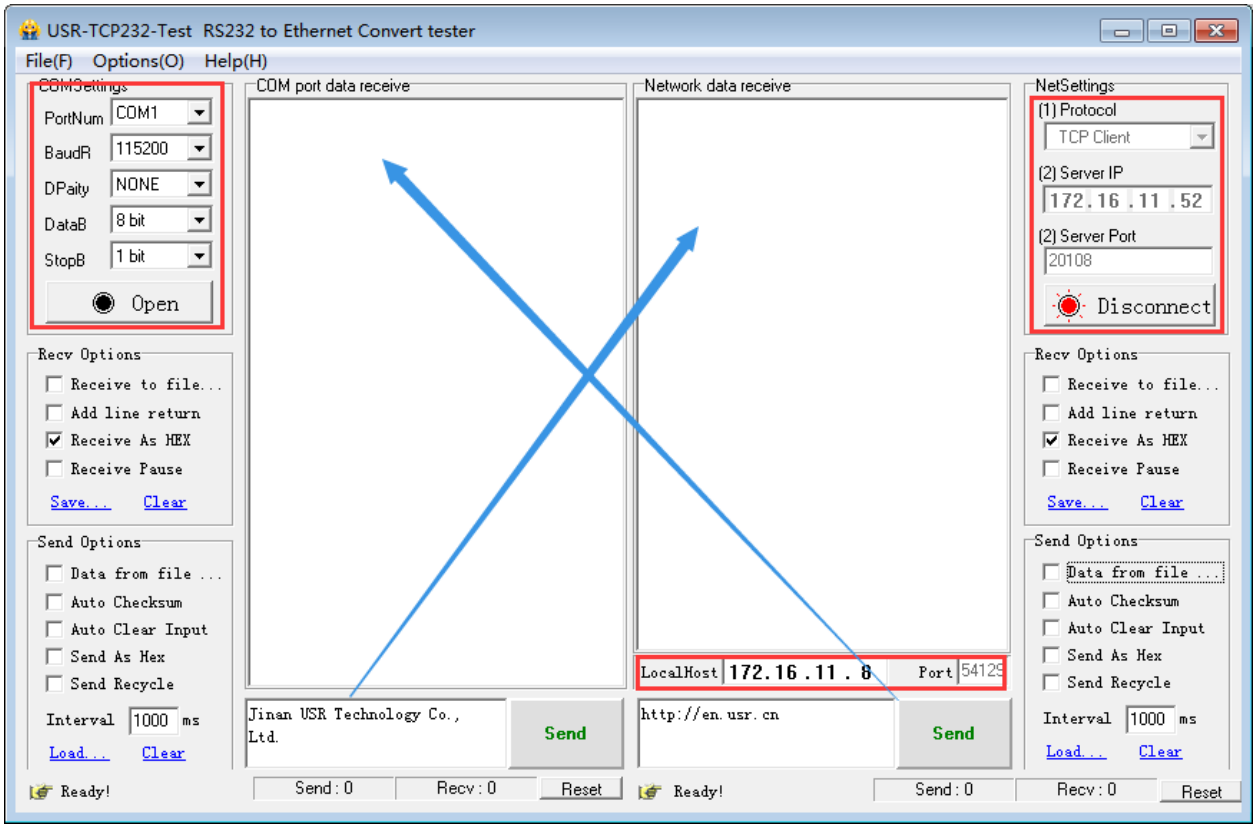
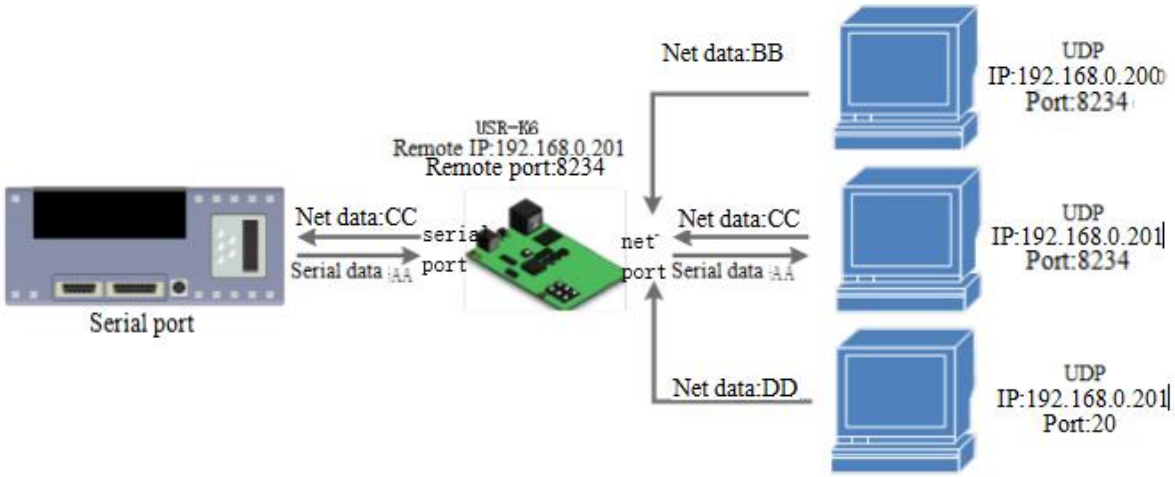


Diagram 4.2.2-4 TCP Server Testing

4.2.3. UDP Client



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Diagram 4.2.3-1 UDP Client

1) The Model belongs to UDP Protocol.

2) In UDP Client Mode, TCP232-K6 won't establish the connection actively.

3) It can communicate with the target port whose IP has been set. If data doesn't come from this channel, it will not be accepted by TCP232-K6.

4) In UDP Client Mode, if target IP is set as 255.255.255.255, it can realize function of entire network broadcast, also can receive broadcast data. 4015and the later vision support broadcast. e.g.xxx.xxx.xxx.255.

5) Example

① Set the K6 as UDP client, remote port 8234

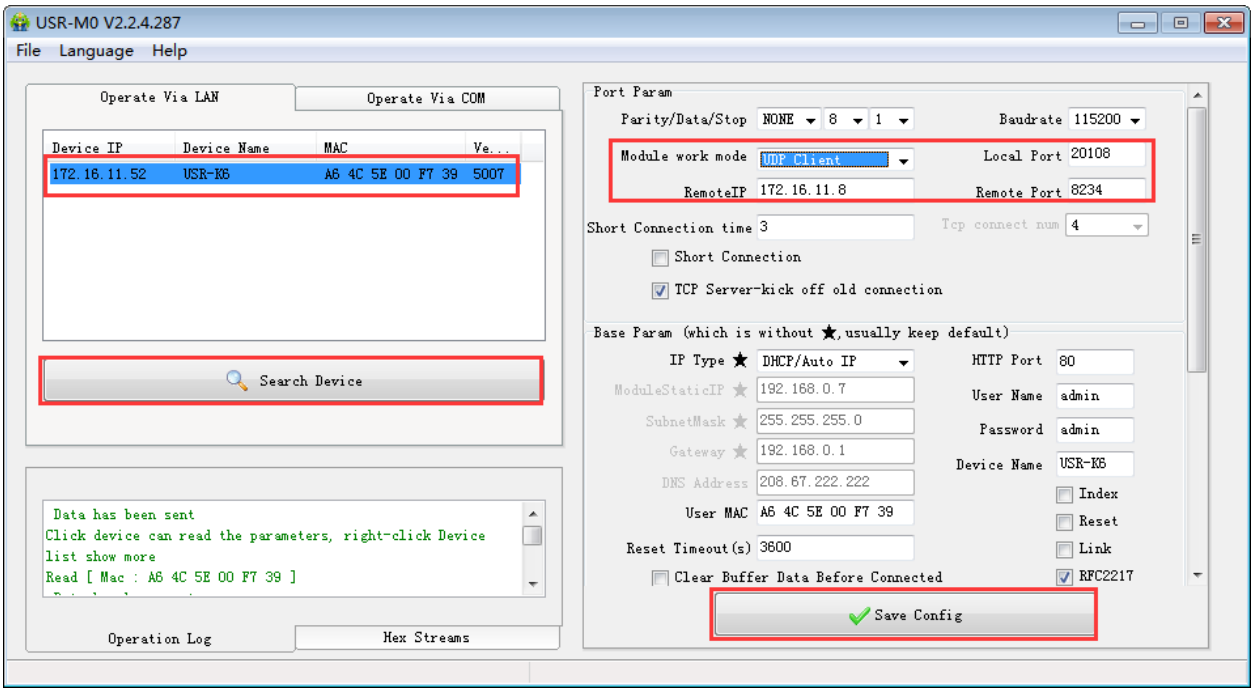


Diagram 4.2.3-2 UDP Client Software Setting

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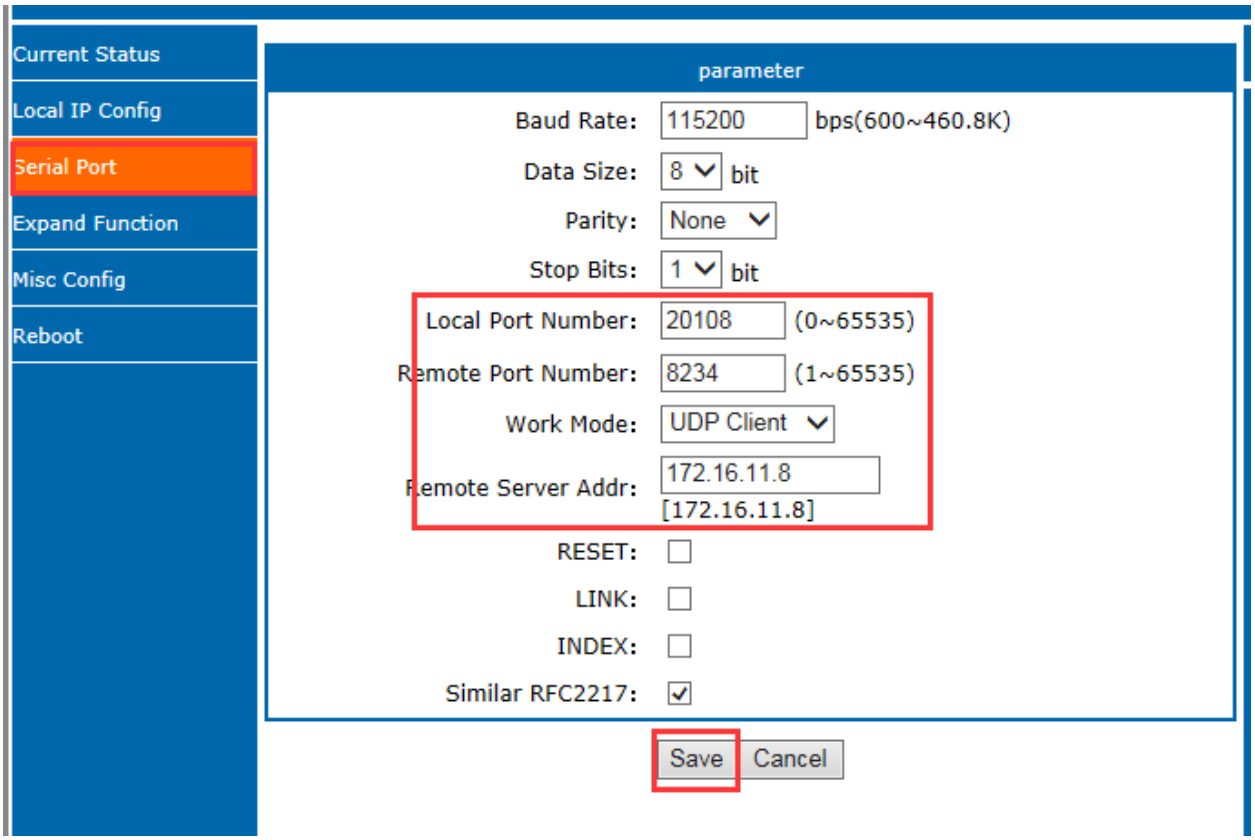


Diagram 4.2.3-3 UDP Client Webpage Setting

② Set the testing software as UDP, local IP is the IP of the PC, local port is the remote port for K6, the connect. Setting the correct serial parameters and click to open the serial.

③ Send the send of the serial and receive the data,testing software remote IP and remote port change into the IP and port of K6, then click the net send, send data to serial port.

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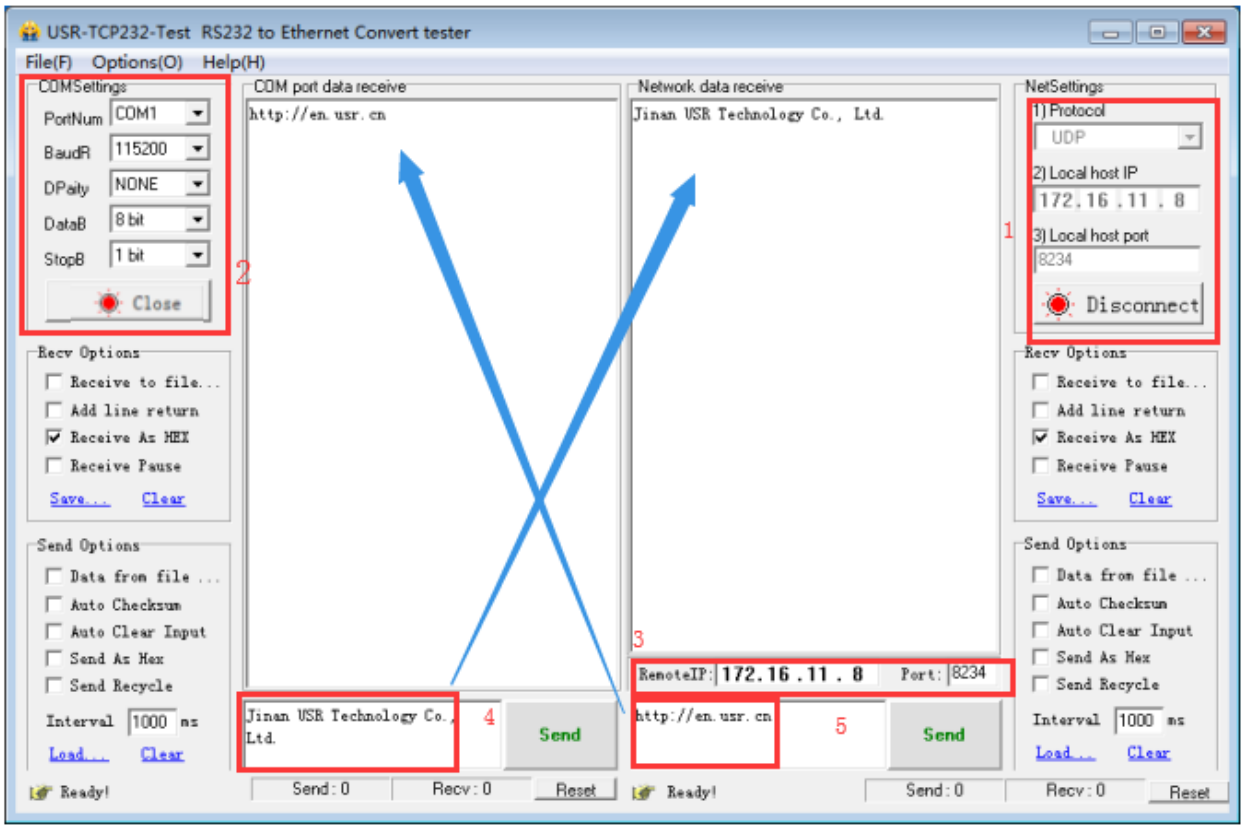
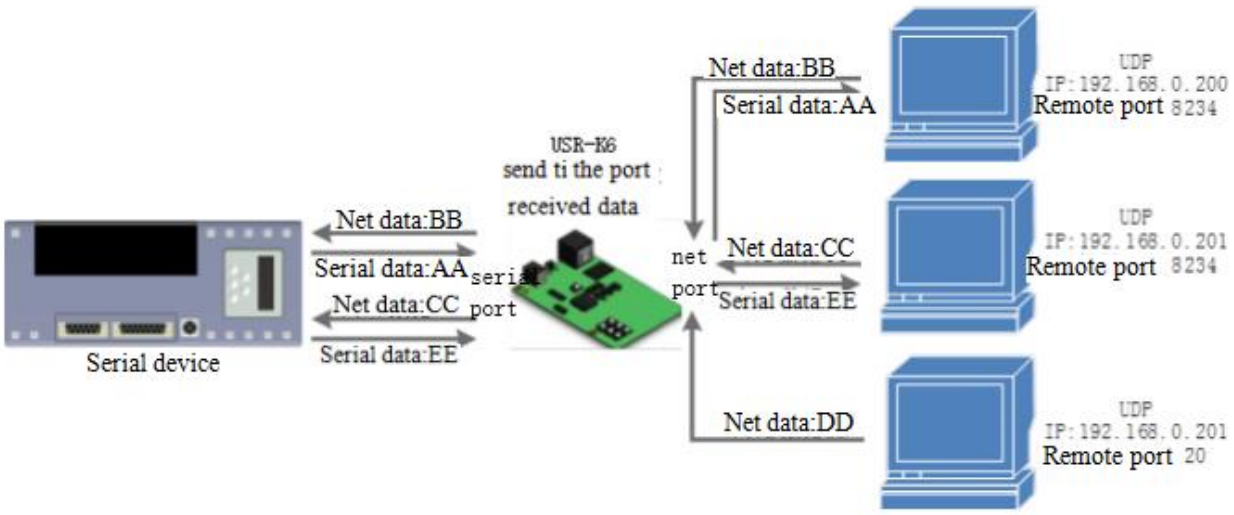


Diagram 4.2.3-4 UDP Connection Testing

4.2.4. UDP Server



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Diagram 4.2.4-1 UDP Server

1) UDP server is a IP address do not verify the resource in the normal UDP. After receive every UDP package, change the target IP into data resource IP and port. When sending data, sending to the least IP and port.

2) Usually this mode, several net device communicate with module and do not want to use TCP for high frequency.

3) Example:

① Set the K6 as UDP server, local port is 20108

② Open the testing software, choose UDP and the local IP is IP of the PC, set the ports to be different, e.g. 23 and 8234 in the below diagram, then click.

4.2.5. HTTPD Client

In this mode , users' terminal device can send required data to assigned HTTPD server via K6, and then, K6 receives the data from HTTP server, analyzes the data and sends the result back to the serial port.

No need for paying attention to the process of data conversion between the serial data and net data package. Simple parameter setting can realize the requirement serial device sent to HTTP server.

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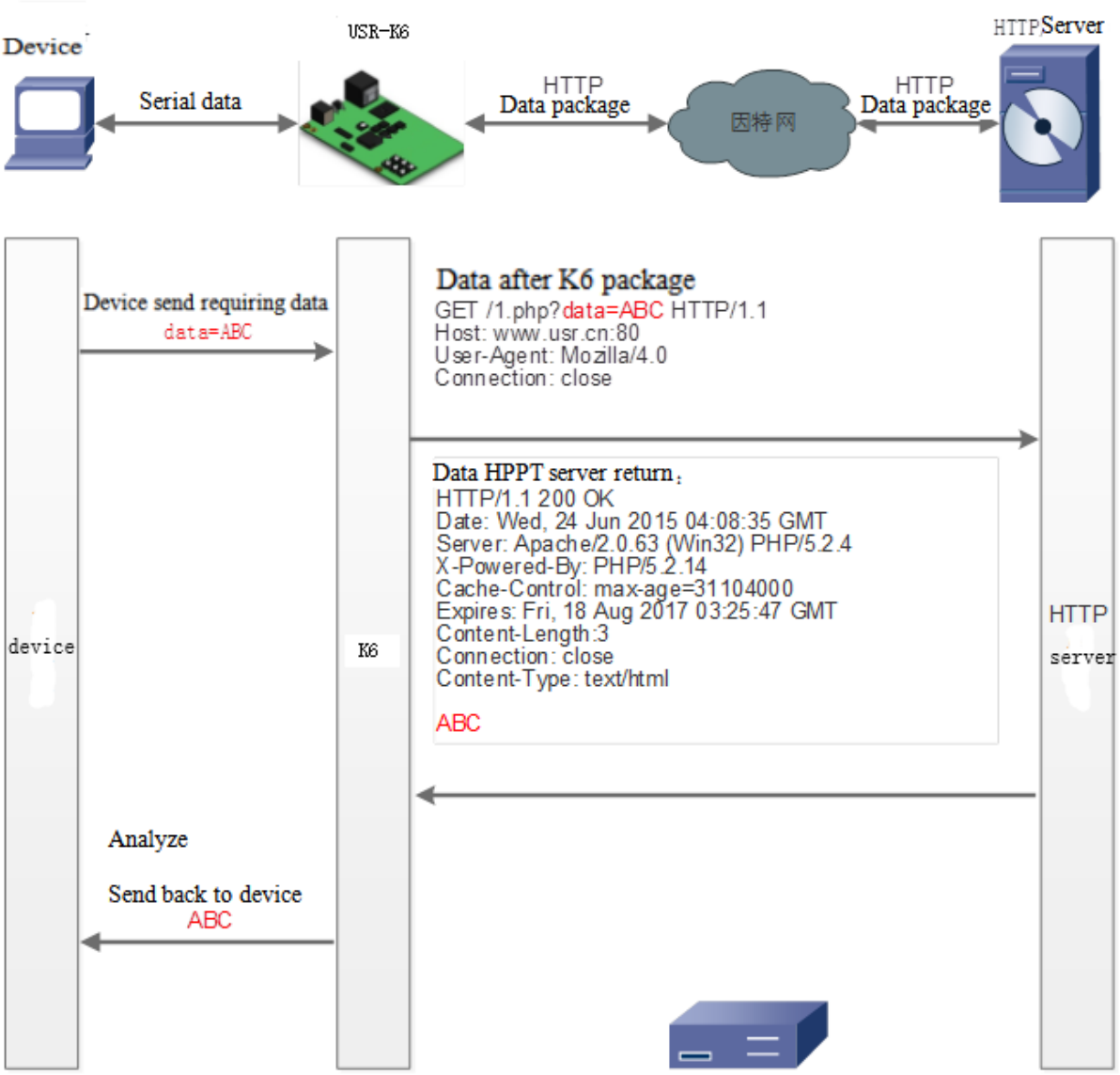


Diagram 4.2.5-1HTTPD client

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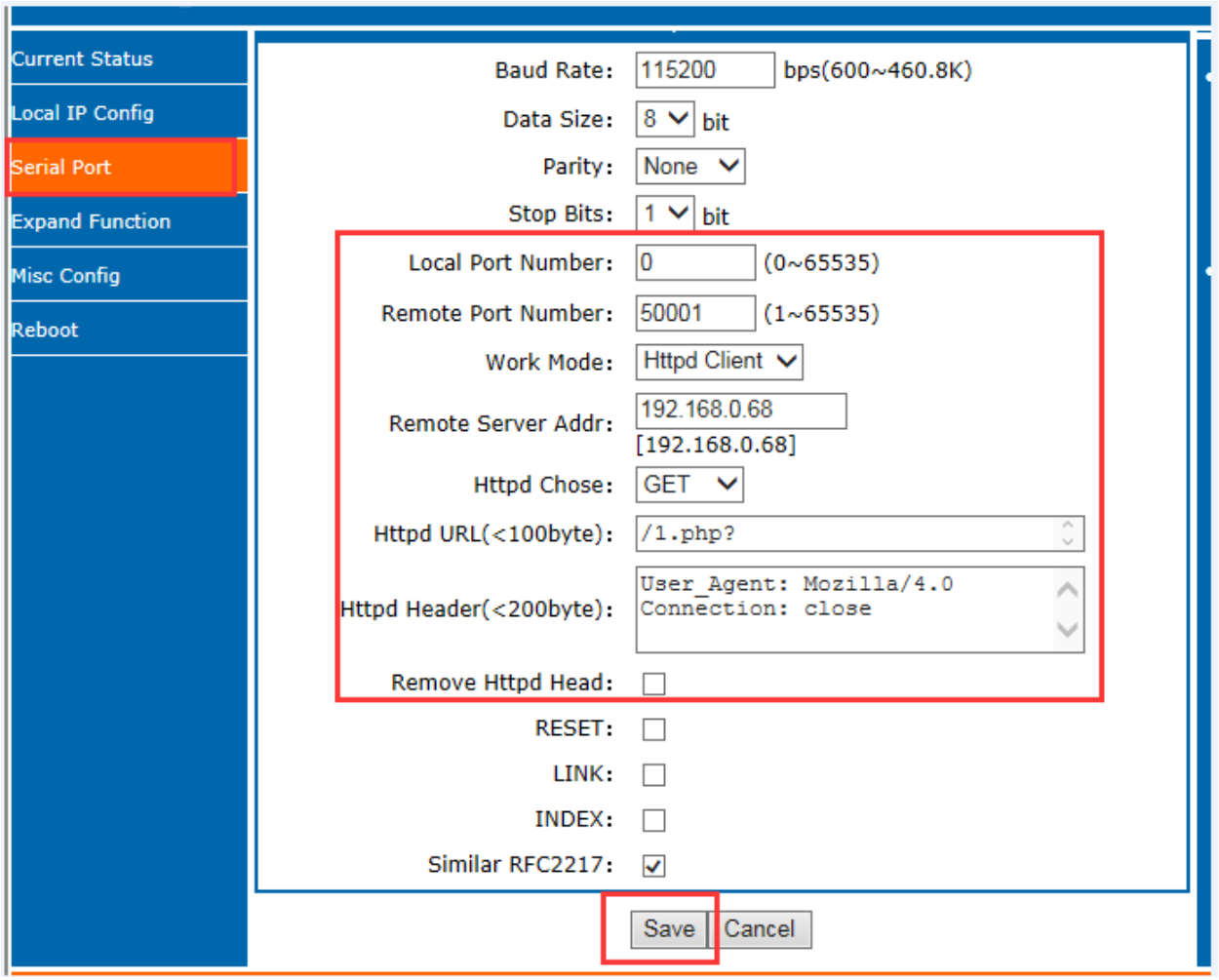


Diagram 4.2.5-1HTTPD client Webpage

1.Setting K6 as Httpd Client mode via webpage, and setting corresponded remote port and remote IP.

2.Setting the way to requirement of the Httpd and the URL and the package head information of the requirement package.

3.The return data whether drop the package head can be set by webpage:remove HTTPD head

4.Click save, then restart to work.

5.Open serial port to send data, then the data of the serial port will submit to your webpage, meanwhile the serial port will receive the reply.

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4.2.6. VCOM

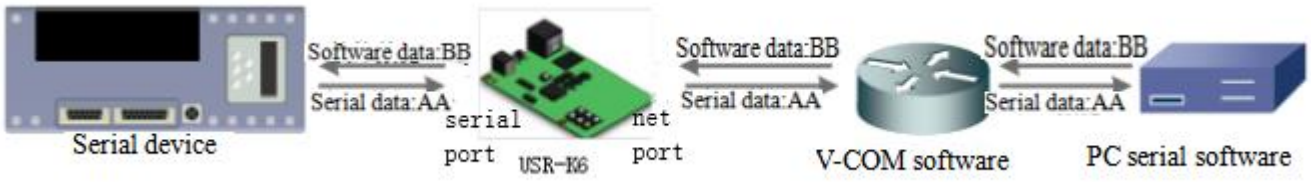


Diagram 4.2.6-1 VCOM

Receive the data assigned VCOM data, and send it in the data of net data using VCOM to solve the PC as a serial port and can not connect with device,which is convenient for users.

E.g.

1. Take K6 in TCP Server mode as a server, which is convenient for user to change the computer and connected.

2. Setting the way to connect the VCOM and K6 manually:

① Open the VCOM and add the serial port, choose the port: COM2(avoid the exist COM port) protocol use the TCP client, remote IP set to the IP of the K6, remote port is the port of the K6. note fill the device name.

② Click sure, observe if the connection is established, if the connection has established, and you can test the data transport transmission.

3.More information reference the below:

http://www.usr.cn/Search/getList/keyword/%E8%99%9A%E6%8B%9F%E4%B8%B2%E5%8F%A3/

4.3. Serial Port Function

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4.3.1. Basic Parameters

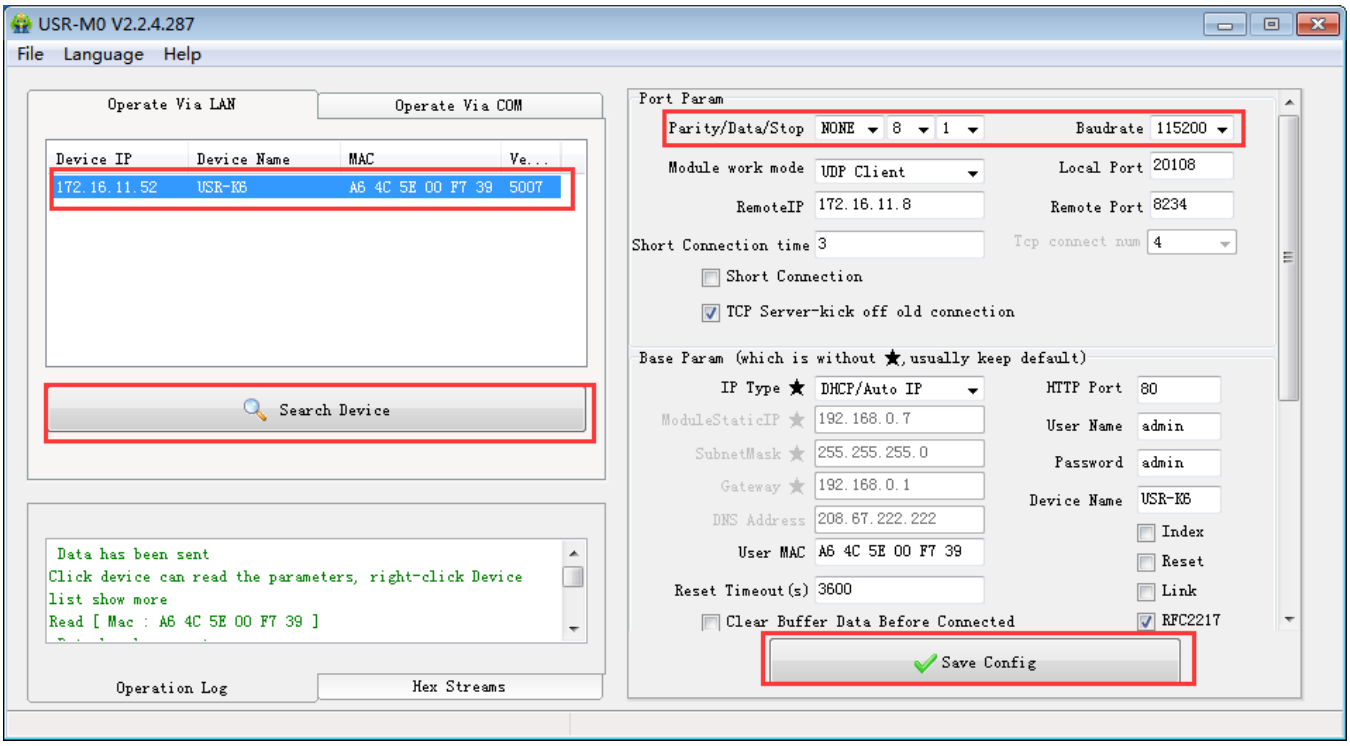


Diagram 4.3.1-1 Basic Parameters

Serial port basic parameters including: baud rate; data bits; stop bits; parity.

1.Baud rate: communicating speed of serial port, can be set from 600~460.8Kbps, support random baud rate.

2.Data bits:the range of it from 5to 8.

3.Stop bits:can set from 1 to 2.

4.Parity: support none, odd, even, mark and space

4.3.2. Serial Port Framing

Since the data on the network is transmitted in the unit of data frames, it is necessary to send the frame data via serial port to the network, so as to transmit data more efficiently and quickly.K6 packages serial port data according to fixed packaging length and packaging time during data transmission.The default K6 packaging time is 4 bytes of packaging time and 400 bytes of packaging length.

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The frame mechanism of serial port is based on the packaging time and the packaging length.

1. Serial port packaging time: the default is 4 bytes of send time.

The default package time of K6, the interval that serial port receive time more than 4 bytes packaging time, K6 packaging sending. E.g. baud rate is 115200K time for 4 bytes is 0.4ms, if the value less than 0.1ms, the package time calculate as 0.1ms. A formula to calculate as fellows:

$$T = 1/\text{baud rate} * 10 * 4$$

2. Serial port package length: default package length is 400 bytes

When K6 receive data from webpage, and then send to serial port. For the limited of the serial speed, the user need to control the flow, otherwise data overflow problems can be occur and drop the package. So when send data from network to serial port, please calculate the flow.

Calculate way: if sending M bytes need N s. the way to check for possible overflow methods (if the net situation is ok, the time can be ignored). The time for M bytes:

$$T = 1/\text{baud rate} * 10 * m$$

If there is no overflow, M bytes of data must be transmit within Ns, then N>2T is require for K6 to work properly.

4.3.3. RFC2217

Similar RFC2217 is a simple RFC2217 protocol, working with the VCOM and changing serial port parameters candynamically to realize the communication with variable serial port parameters.

Enable this function, using USR-VCOM can open this function,which can realize the serial baud of the PC software and K6 automatically match. No need to pay attention to serial port baud rate setting.

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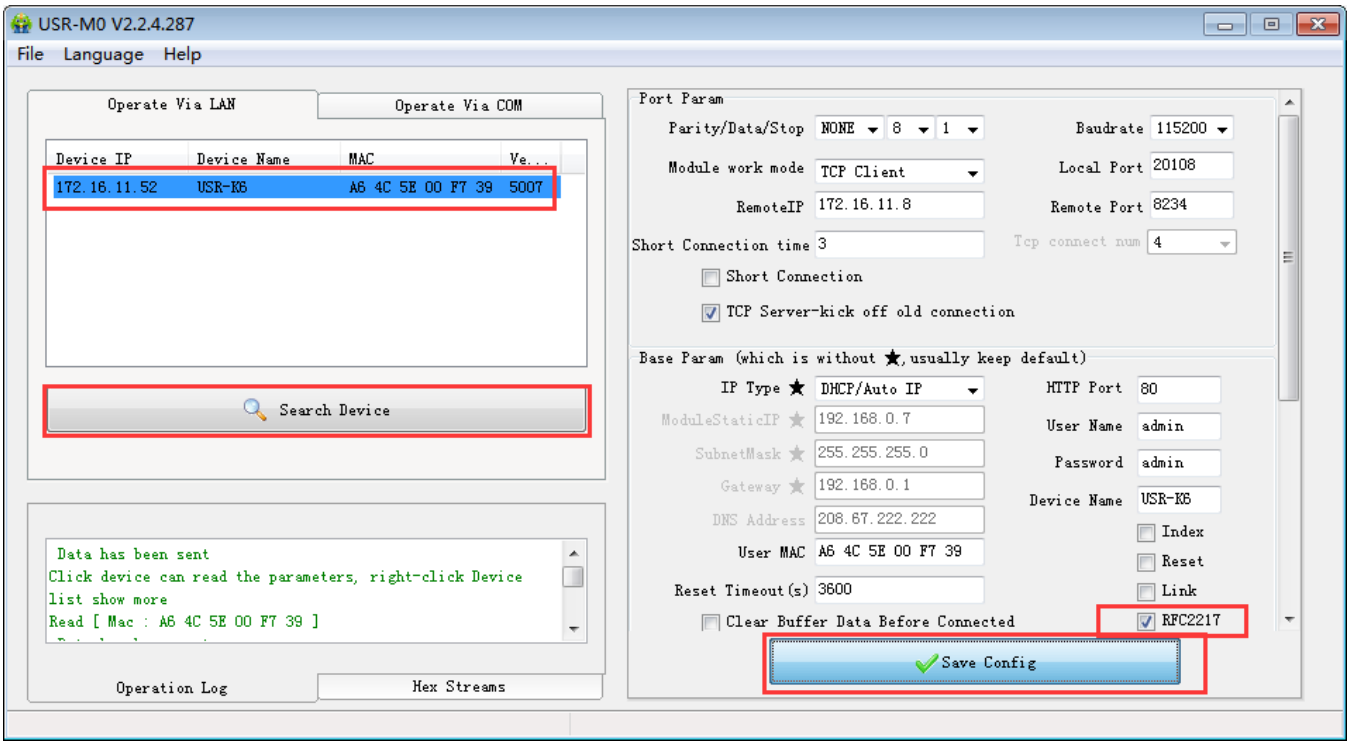
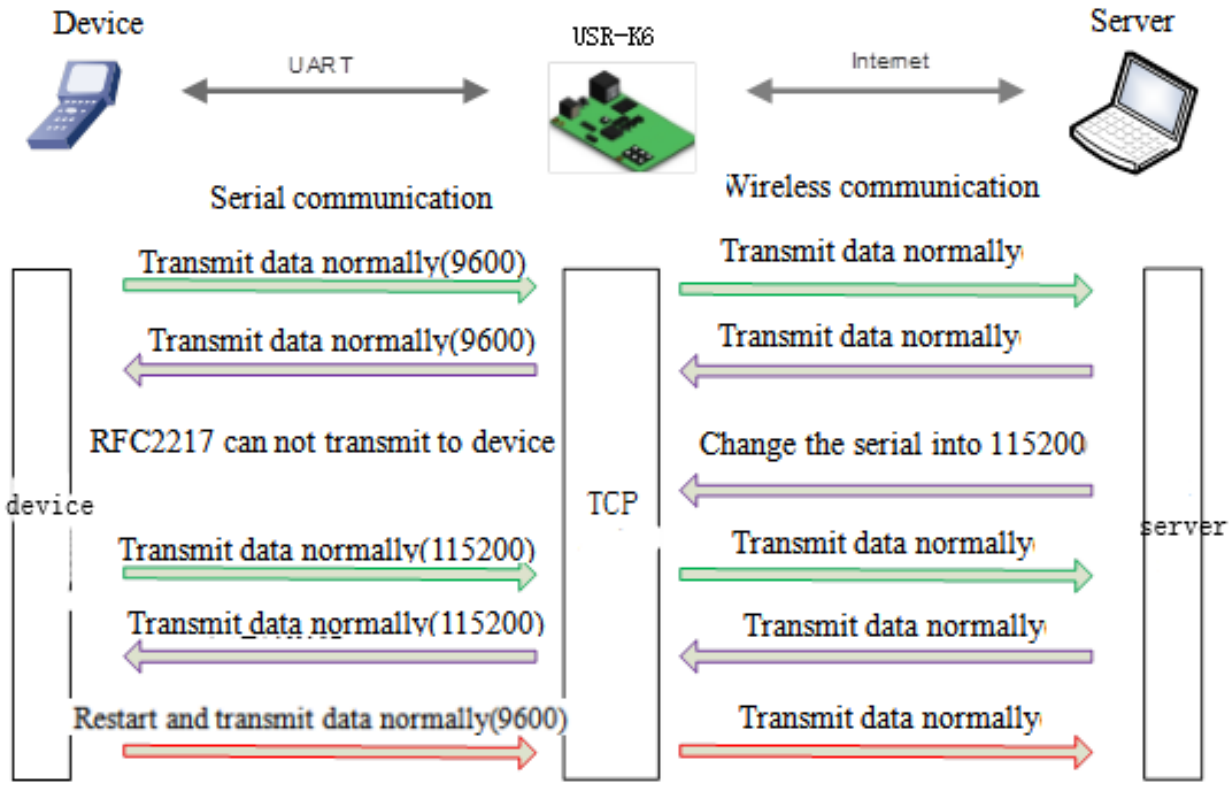


Diagram 4.3.3-1 Similar RFC2217 Function



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Diagram 4.3.3-2 RFC2217 Function

Modify the serial port baud rate from 115200bps to 9600bps. FRC2217 can be set using software or webpage, default is enable.

This function modify from RFC2217, promote the certainty for transmission. Length is 8 bytes.detailed note and the protocol content are as fellows(e.g. value is HEX).

① Send the protocol to the device, if the requirements are met, the serial port parameters shall be set, and no transparent transmission, if there is something wrong, the data package will be forwarded through the serial port as ordinary data.

② TCP Client, TCP Server, UDP Client, UDP Server and radio support this function.

③ The modify of this order effect in time, do not restart. Effective during this operation cycle, will not save, power loss.

name	Package head	Baud rate	Median parameter	Parity sum
bytes	3	3	1	1
instr	3 byte to reduce miscalculation	High in front, and the minimum is 600(00 02 58)	data/stop/parity, next chart	Four sum except the package head .
115200,N,8,1	55 AA 55	01 C2 00	03	C6
9600, N,8,1	55 AA 55	00 25 80	03	A8

Form4.3.3-1 RFC 2217 Function Protocol

A no.	instr	value	Describe
1:0	data bits select	00	5 data bits
		01	6 data bits
		10	7 data bits

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		11	8 data bits
2	stop	00	1 stop
		01	2 stop
3	Parity enable	00	Disable parity
		01	Enable parity
5:4	Parity type	00	ODD
		01	EVEN
		10	Mark
		11	Clear
7:6	none	00	Please fill 0

Form4.3.3-2 Serial Port Parameters Basic Meaning

④ Enable Note:

1) When using RFC2217, click setting software RFC2217 to enable this function.

2) When the serial port parameters change, send the RFC2217 package, after K6 received the RFC2217 command, modify the serial parameters and can not transparent transmission.

⑤ E.g.

Protocol command:

- 55AA5501C2008346 setting serial port parameter is 115200 N,8,1
- 55AA550025808328 setting serial port parameter is 9600 N,8,1

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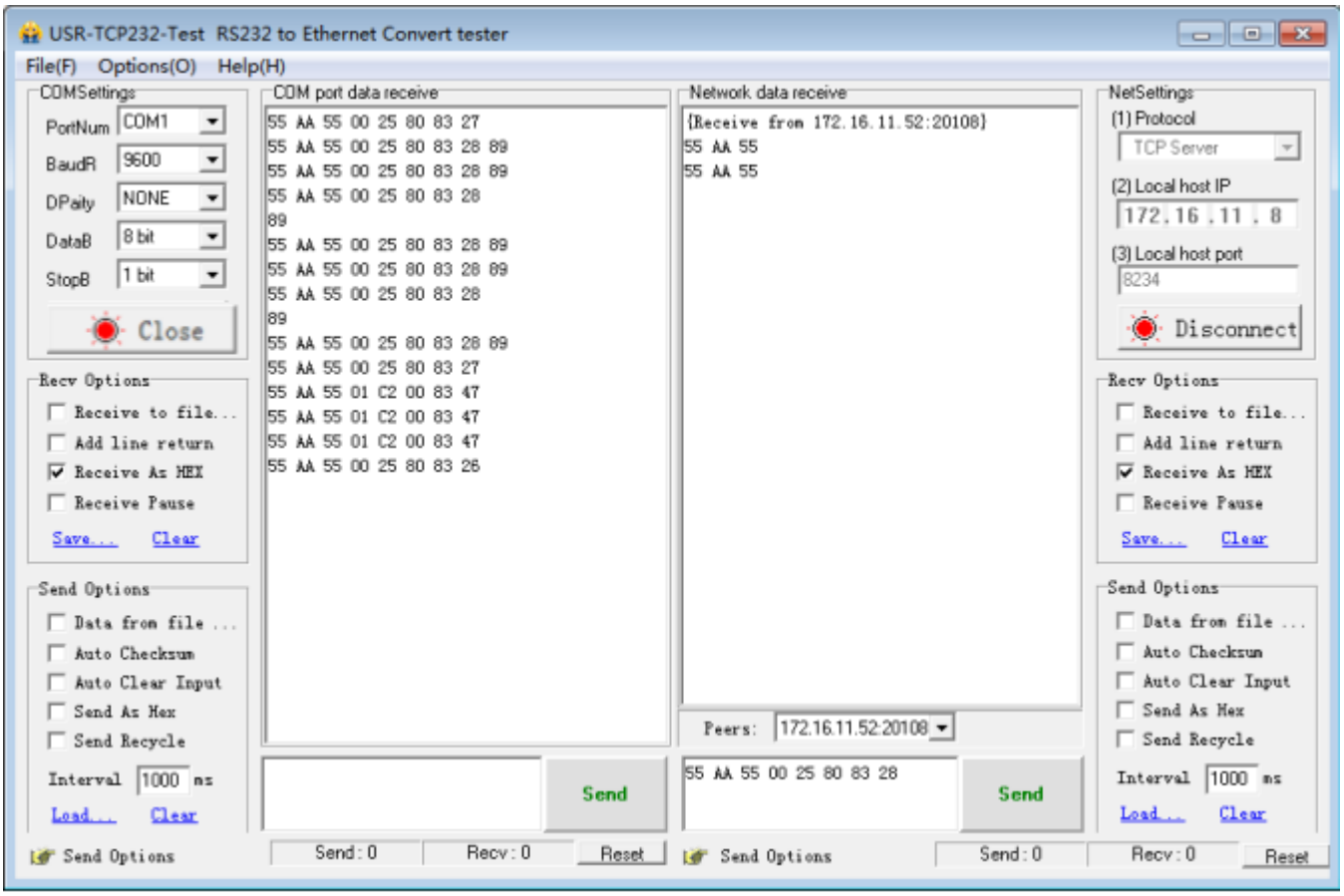


Diagram 4.3.3-3 Testing

4.4. Special Function

4.4.1. Heartbeat Package

In the transparent transport mode, user can choose K6 to send heartbeat package. Heartbeat package can be sent to net server, also can send to serial port, but can not send in the same time.

Sending to the net aimed at connecting with server, effect only in TCP client and UDP client.

In the application of the server sending fixed query command to device, to reduce the communication flow. The user can choose using the serial port to send the heartbeat package instead of the heartbeat from server.

4015 and the later vision support heartbeat package. The longest content is 40 bite.

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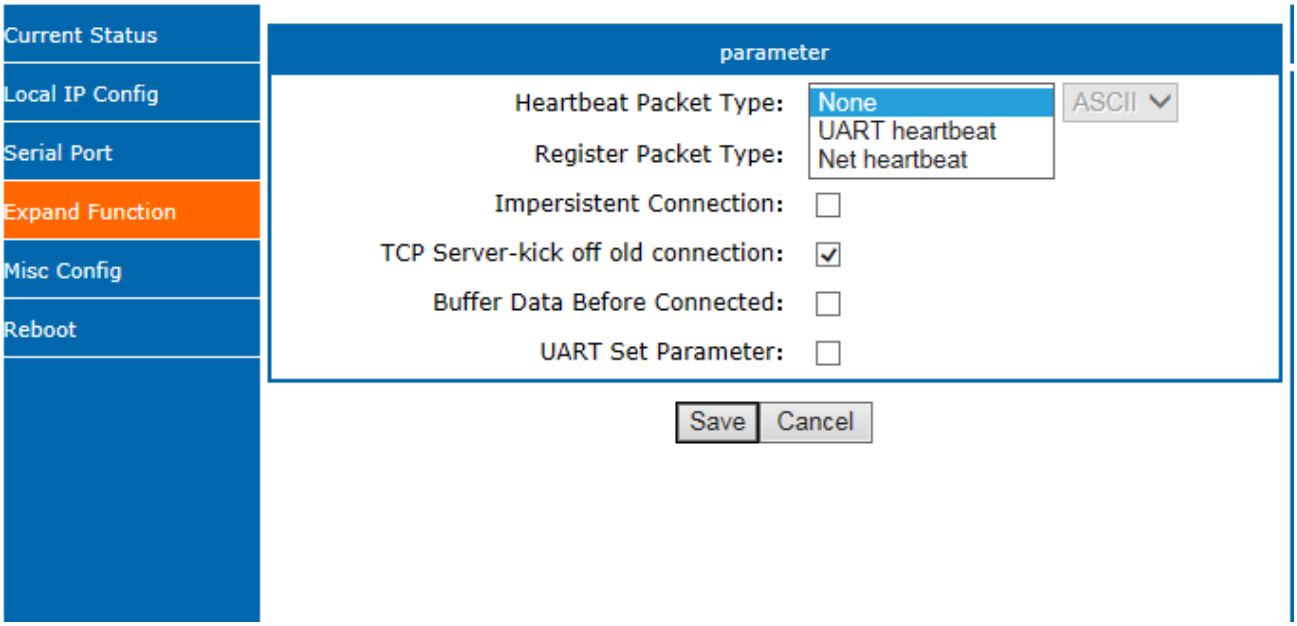
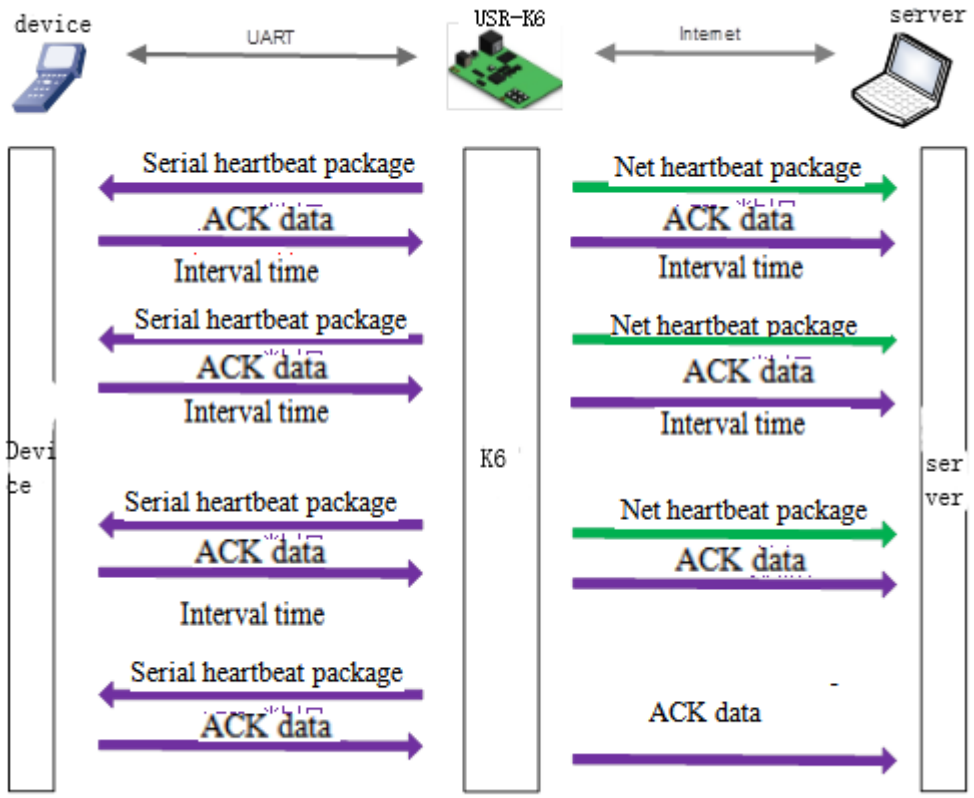


Diagram 4.4.1-1 Heartbeat Webpage



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Diagram 4.4.1-2 Heartbeat Function

4.4.2. Registration package

In the transparent transport mode, user can choose K6 to send registration package. Registration package is used to identify data sources or do as the code to get the server authorization.

Registration package can be sent when the K6 built connection with server, also can installed in the head of the data package, as a data package. Registration package data can be MAC address or customize registration package data, where the custom registry setting content is up to 40 bytes.

The connection setting and sending registration package is mainly used to connect the server that needs to be registered. The application diagram is as follows:

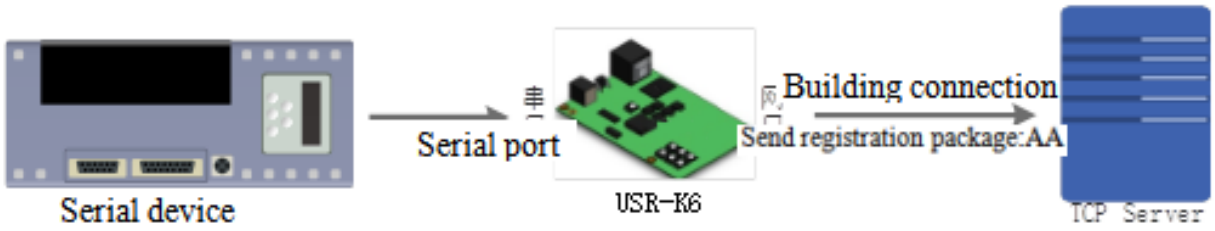
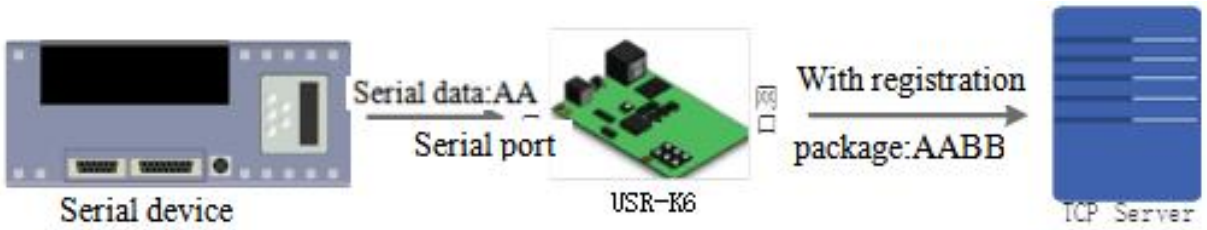


Diagram 4.4.2-1 Building the Connection to Send Registration Package

Data carries the registration package: sending data in the front of the data access to the registration package,mainly for protocol transmission application diagram is as follows:



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Diagram 4.4.2-2 Data with Registration Package

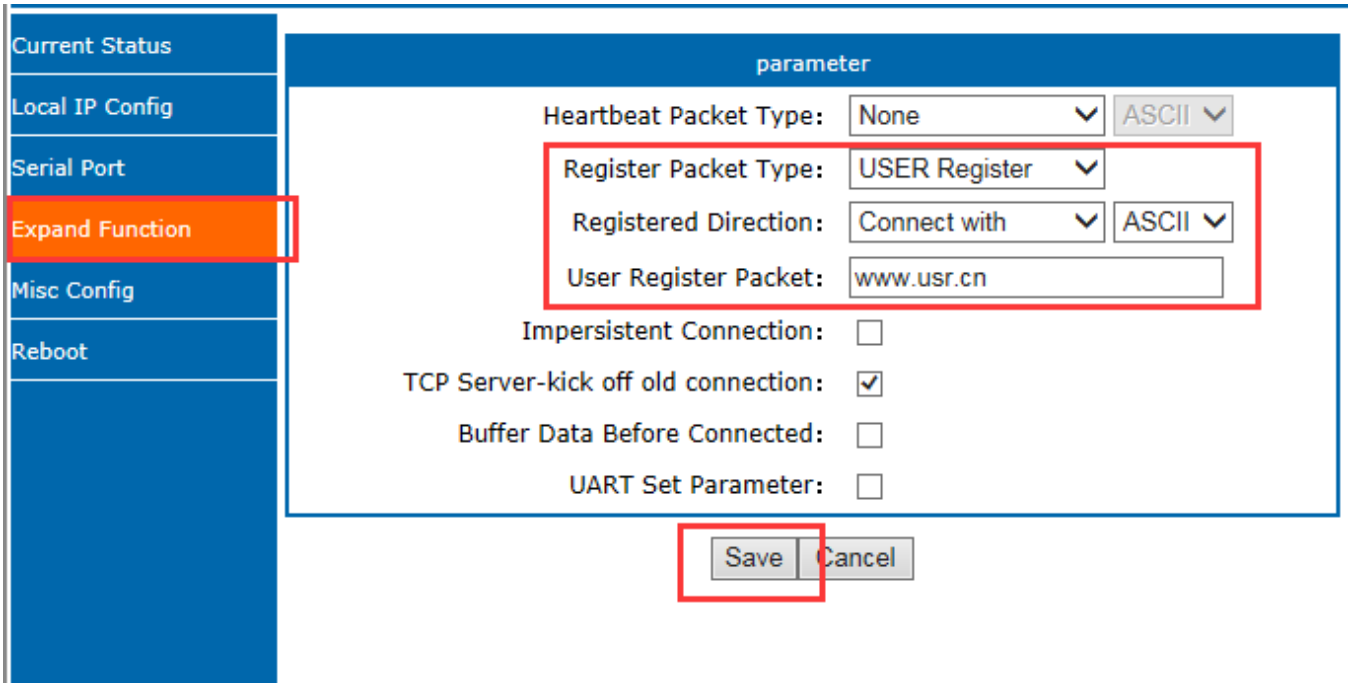


Diagram 4.4.2-3 Registration Package Webpage

4.4.3. USR-cloud

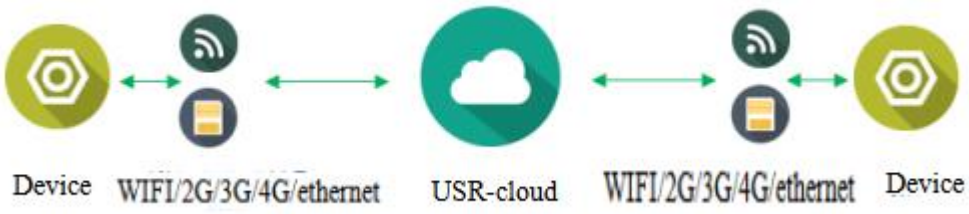


Diagram 4.4.3-1 USR-cloud

USR-Cloud software is a platform for communication between devices and PC software. The cloud software is mainly used for data transmission or monitoring remotely. This function only works in TCP client mode.

✓ Login link of USRIOT Cloud: http://console.usriot.com

✓ Remote server address: console.usriot.com

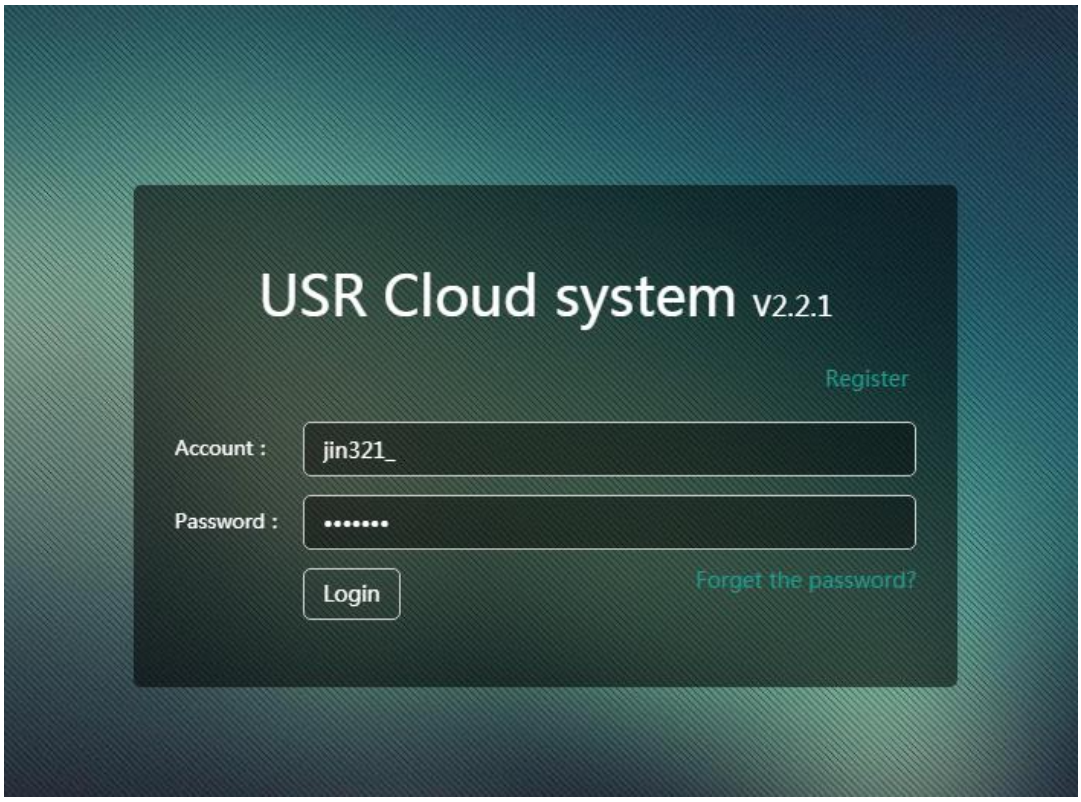
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- ✓ Local port: The port of device, Remote port: Cloud software's port
- ✓ Device ID: It is assigned to device by cloud software
- ✓ Communications Code: Pass word generated after adding the device to cloud software

The following is test account of USR-Cloud:

Account: jin321_

Password: 1987322



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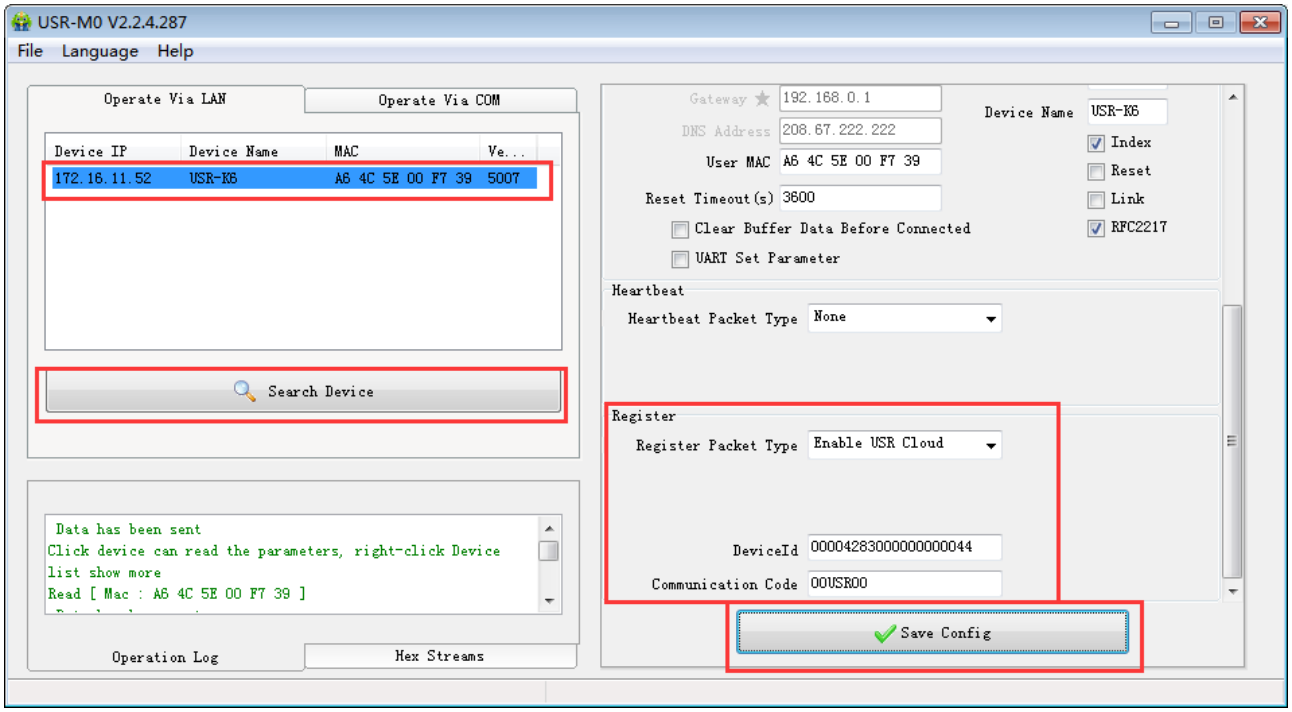
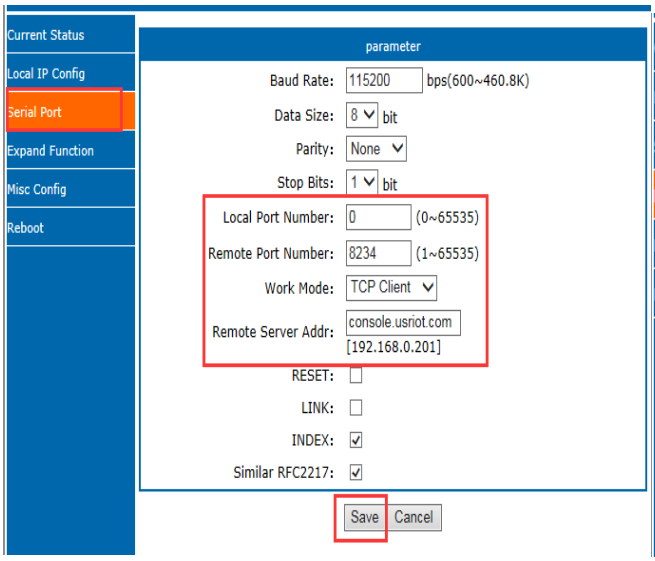
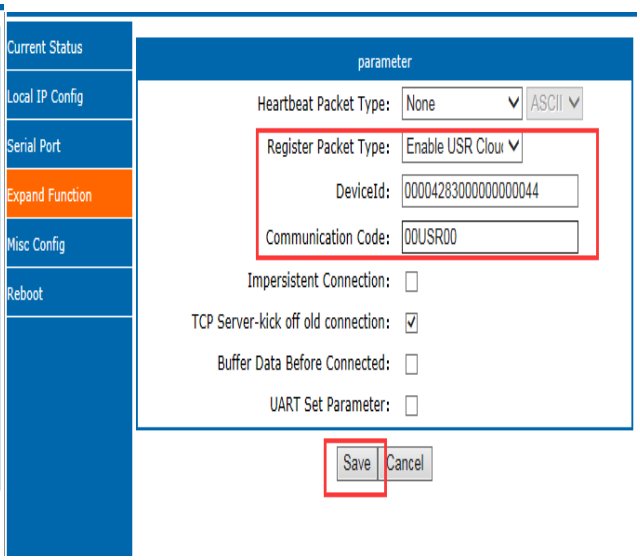


Diagram 4.4.3-2 USR-cloud Software Setting

Note: Module needs work at TCP client

Also can be set in the webpage as fellows:





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Diagram 4.4.3-3 USR-cloud Webpage Setting

4.4.4. Customize webpage

K6 support customize webpage. The user can upgrade their webpage into K6 via customize webpage. To be more convenient for user, we have prepared upgrade webpage package in our website:

https://www.usriot.com/support/downloads/customized-webpage-usr-tcp232-K6-s2-customized-webpage-v4017.html

Including webpage code, webpage tools can be download.

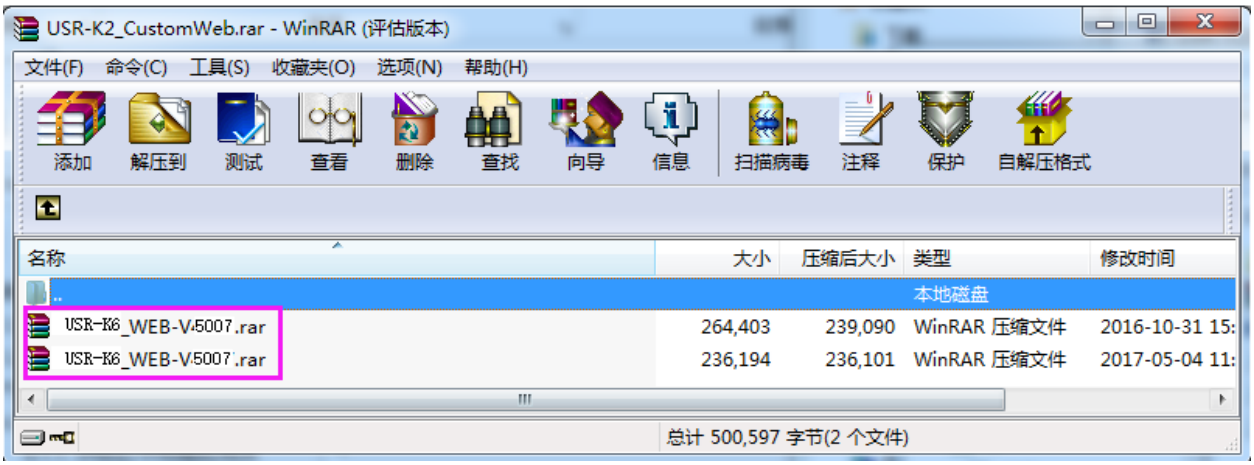
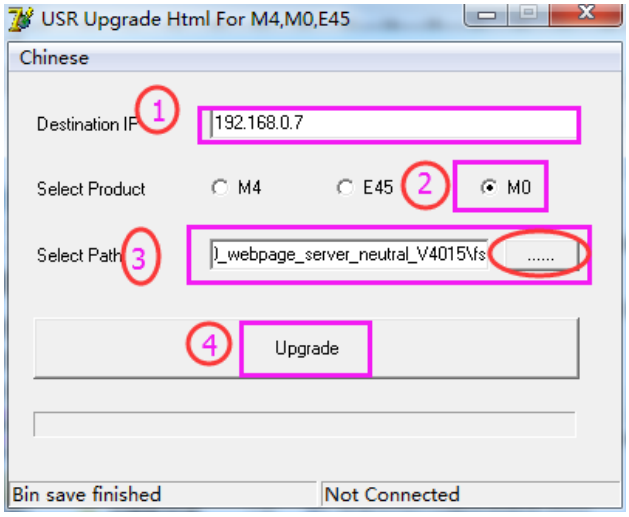


Diagram 4.4.4-1 Package

Upgrade webpage need to notes that, destination IP set to be the IP address of K6, the final name of file is “fs”,product choose the”M0”, then click the upgrade.



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Diagram 4.4.4-2 Webpage Upgrade

4.4.5. Link

Link pin can be used as indication pin for TCP connection status. When connected, it output low level; When unconnected, high level. When K6 is under TCP model, Link pin will pull down. otherwise, it stays in high level. When K6 is under DUP model, Link pin will always pull down. By default, it is not checked.

4.4.6. Reset

Reset used when the K6 fly or crash and can not built the normal connection,so can not work. Reset to initialize the module to resume normal operation.

When working as TCP Client, K6 connects to TCP Server actively. When start Reset function, K6 try to connect to TCP Server for 30 times. If failed, K6 will restart automatically. By default, it won't be chose.

4.4.7. Index

Index is to resolve the problem that under TCP server mode, K6 can not divide the data sources or send data to special client when user have more than 2 client to connect the K6.

At most there can be 16 links when the K6 in the TCP server mode. The max number can set from 1to 16 as you want. Here we take the default number is 16 as example. Server send data to 16 clients, or the server receive the data from 16 clients, open the Index, mark to divide the different clients and user can recognize the data sources according to the mark, meanwhile send different data to special clients.

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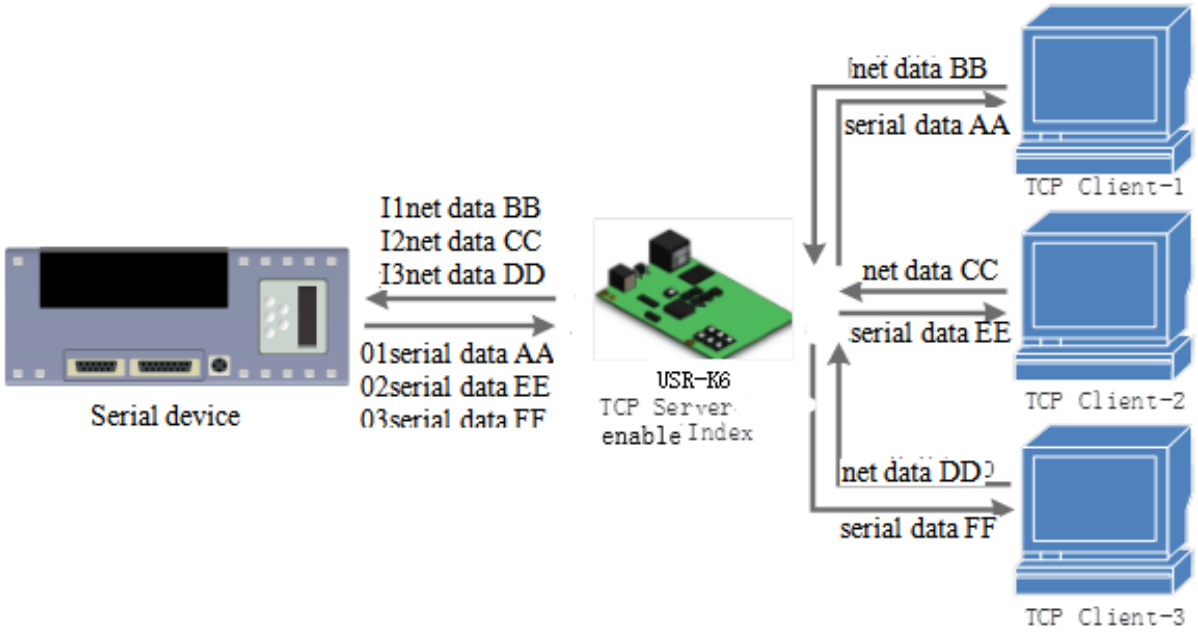


Diagram 4.4.7-1 Index Function

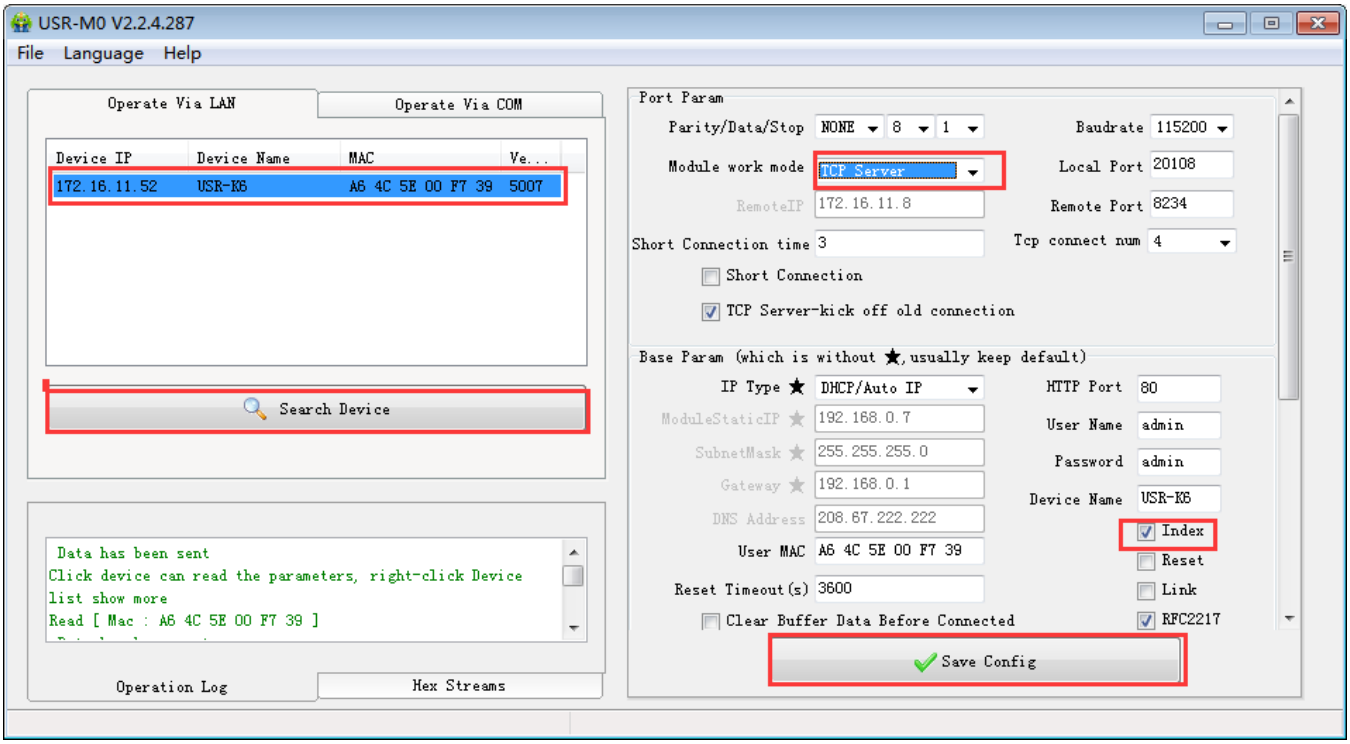


Diagram 4.4.7-2 Index Software Setting

1.After the server receive data, output 'I' 'N' data…… to user MCU via server serial port. I means receive; N means

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the data from which index ranging from 31 to 40 in hexadecimal.

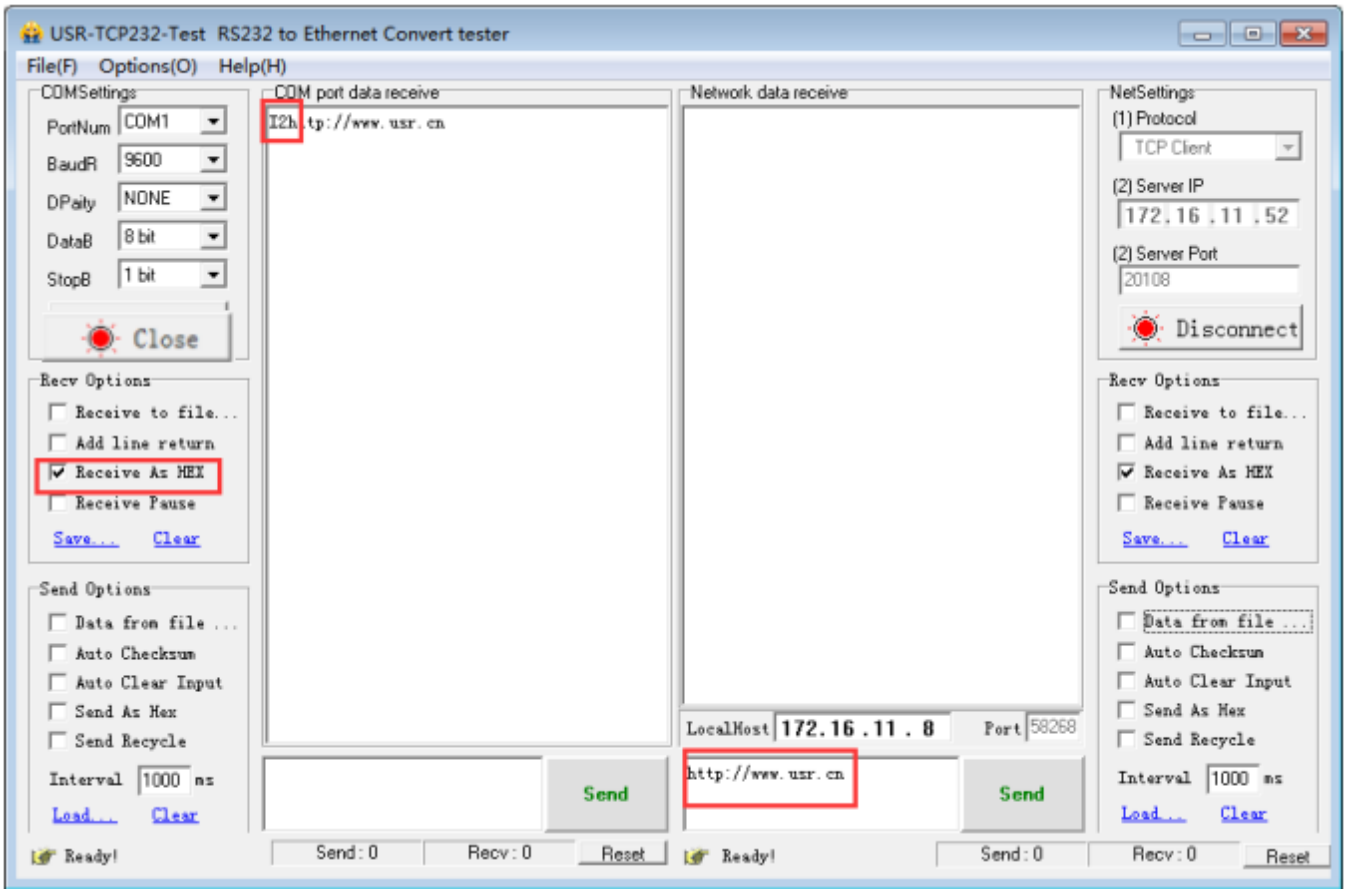
2.User MCU fill 'O' 'N' data……via the server serial port, O means output, N means using which Index to sending, K6 server send data from serial port to net client port.(note o refers to the character “o”in ASCII and N is the character N, such as 1,2, etc)

3.K6 server port input 'C' 'N' 'M' to user MCU when the new TCP connected, means the current one is the number N and on total there are M .

4.When there are 16 client to connected,if there is new connection to ask, input F,F to MCU.

5.Break off it, K6 server input 'D' 'N' 'M' to user MCU, N means the original number of connections deleted, and remaining M connections.

Data transmission as the below:



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4.4.8. The number of the connected client

USR-K6 works in the TCP server mode, the max number of client to connect is 16, default is 4, the max number can be configuring as you want, which is be convenient for using. When the the number connecting clients more than 4, we should control the total data flow in 2.5KB/s if we need to send and receive meanwhile(not more than 200 bite/s).

If the number is 16 now(e.g. the number you set is 16), default use the new link instead of the older one, also you can set to use the older one. The webpage are as fellow.

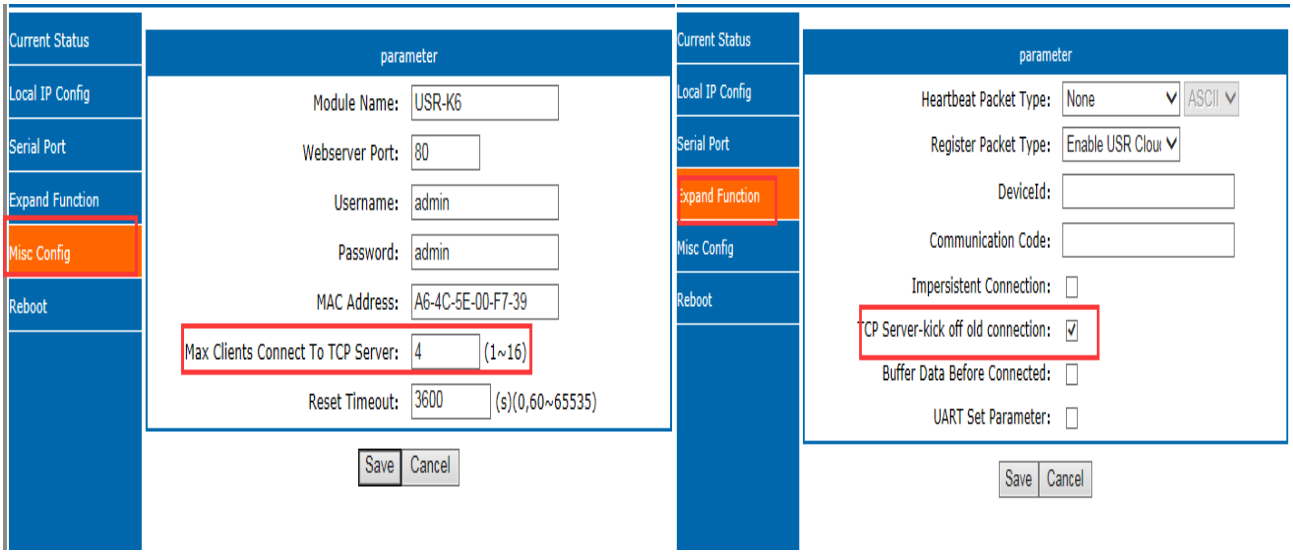


Diagram 4.4.8-1 Webpage

4.4.9. State

In the webpage of the USR-K6, there is the current static page, which can show the current IP and the each connection sends data and the number of bytes of connection data, along with the total number of bytes sent and received by the K6 server on the page.

Now, under the TCP client mode, K6 can statistic the former 5 IP of devices and the number of the sent and received data. Refresh every ten seconds automatically. Under the UDP server mode, the K6 only static the number of the sent and received data, no connected IP.

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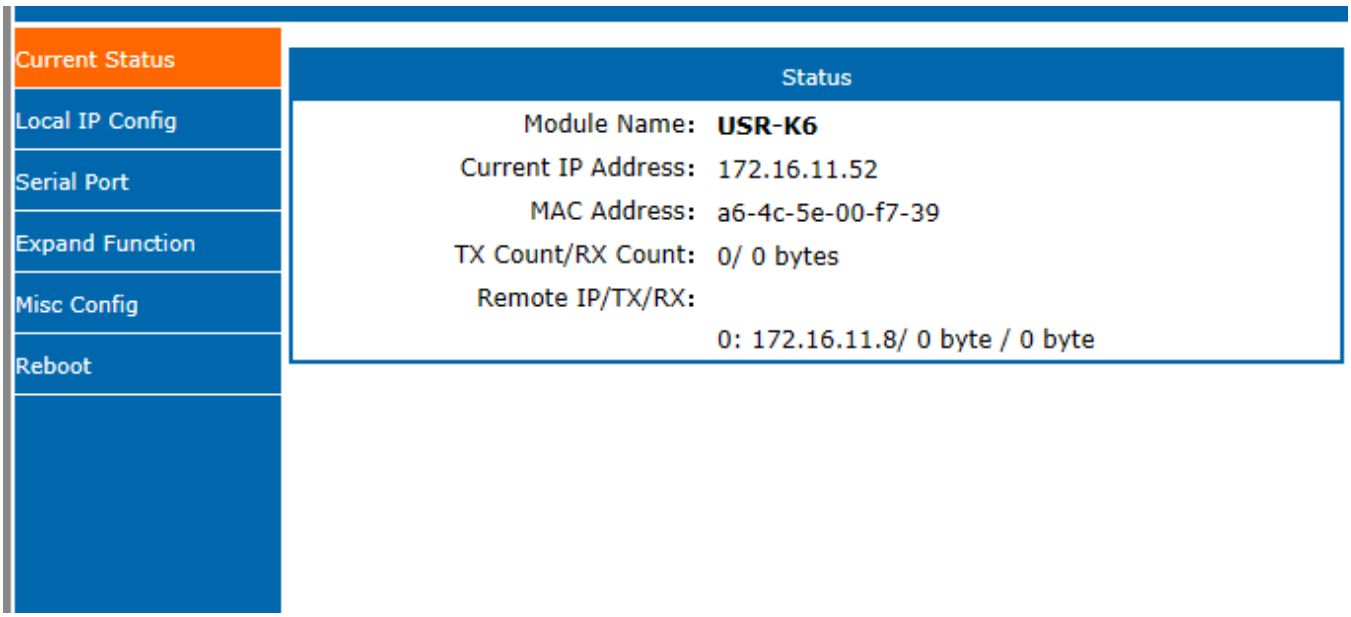


Diagram 4.4.9-1 Current Status

4.4.10. Short Connection

The aim to use this function is to save the resource of the server, usually used in the points to one point. Using the short connection can sure the current connection is the useful one, no extra control tools to screening.

TCP short connection can sued in the TCP client, open it and send message. The connection will be broken automatically.

This function default disable, the interval of disconnect can be configured after enable it, the range from 2 to 255s, default is 3s, the diagram is as fellow:

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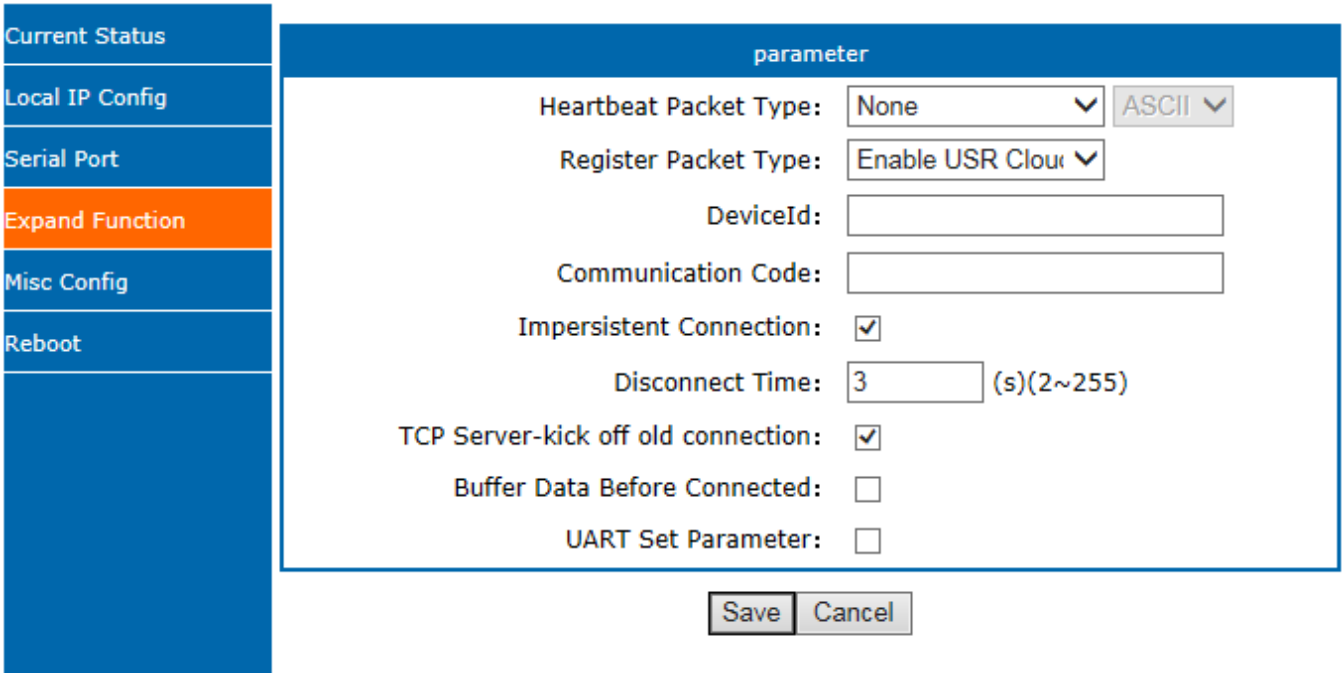


Diagram 4.4.10-1 Impersistent Connection

4.4.11. Clear Buffer Data

If the TCP have no connection, the data that serial received will be placed in the cache, and the K6 serial port can receive 800K byte, after the TCP built, you can select is clear the cached data.

Default disable. Under the Httpd client mode or the TCP client mode, enable the short connection and this function do not work.

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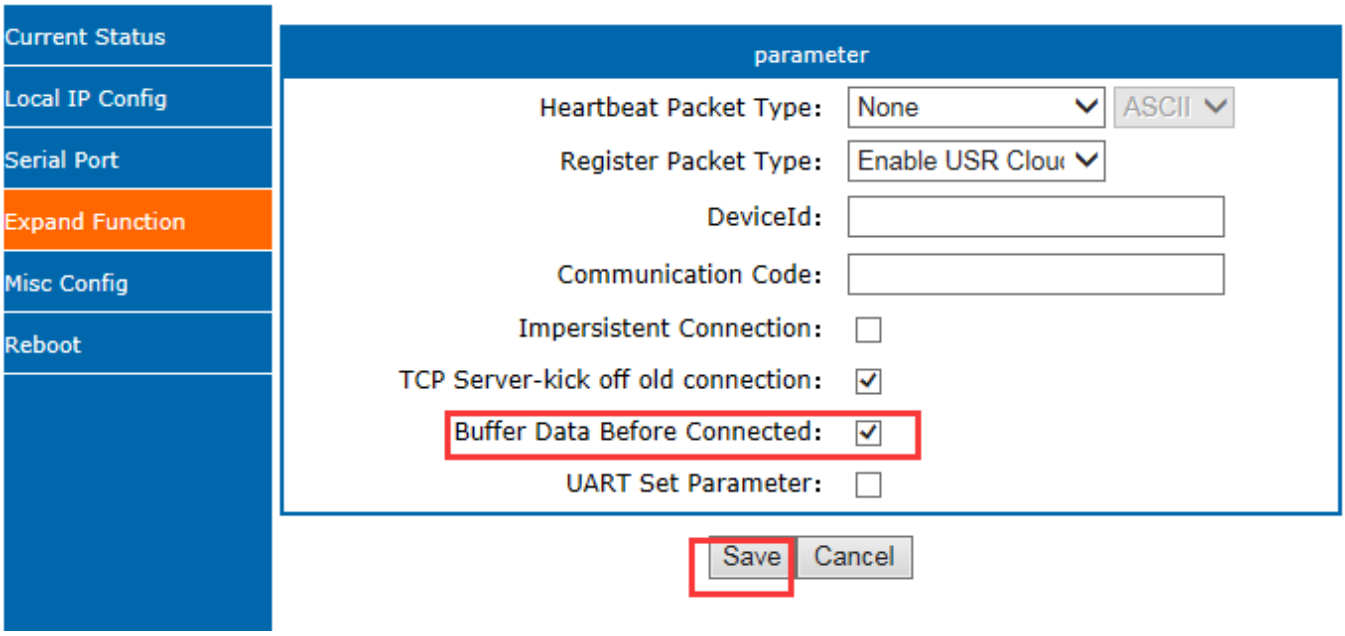


Diagram 4.4.11-1 Clear Buffer Data

4.4.12. Restart Timeout

Restart timeout is to make sure the long and stable work of K6, when the net port or network can not receive data for long time, K6 will restart out the setting time to avoid abnormal conditions affect the connection. Time for restart can set in the webpage. The normal work time of this function set 60~65535s, default is 3600s. if setting time less than 60s, default to be 0 and turn off this function. The setting is as fellow:

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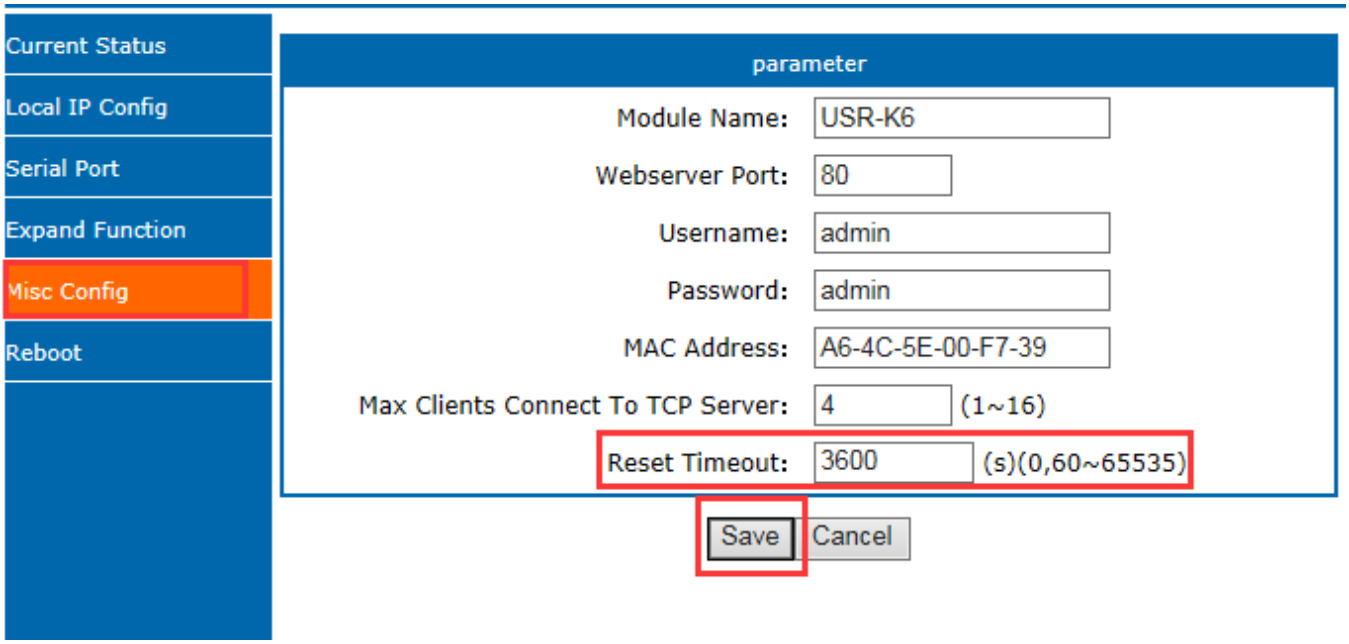


Diagram 4.4.12-1 Restart Timeout

5. Parameter Setting

This character mainly to introduce how to setting the K6 parameters and achieve their own personalized application through parameter settings

Including setting software setting parameter, webpage setting parameter and serial setting parameter.

User setting steps:

Modify the user name and password→ setting the access way to the IP address→ serial parameter→ the related parameters for working method.

To ensure the normal using of software, the following steps are necessary

1.When using setting software to setting parameter, K6 and the PC of the setting software are in a LAN.

2.Close the antivirus software and firewall software.

3.Close the irrelevant network card.

5.1. Net Protocol Setting Parameters

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5.1.1. Setting Software Setting Parameters

Open the software setting and click search.

Download link: https://www.usriot.com/support/downloads/usr-m0-setup-software-v224288.html

Search all the K6 in the LAN, including current IP, device name, MAC and version of the K6.

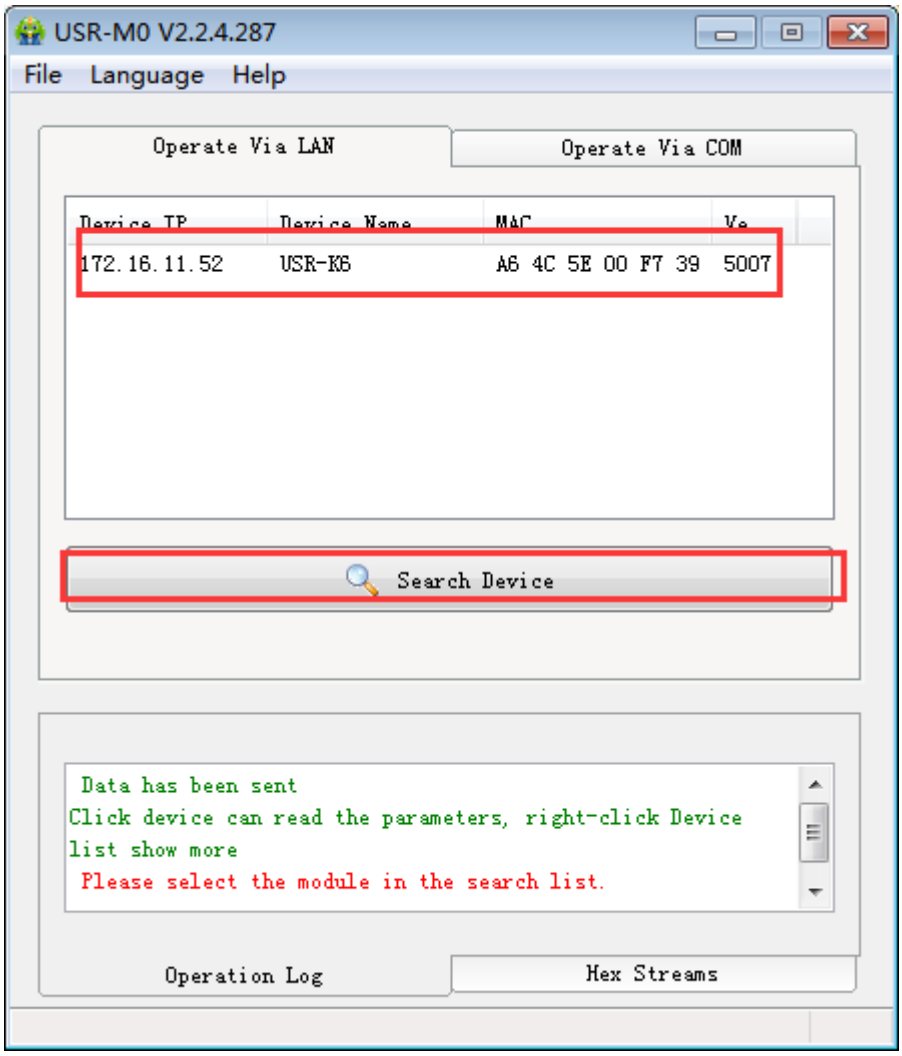


Diagram 5.1.1-1 Searching

1. Click the k6, enter the password and you can see the detailed parameters of the K6. if wrong, there will be the window for username and password. Fill them and enter. Default username and password:admin(software setting default username and password are admin, so under default condition,the setting software will not pop-up the window.

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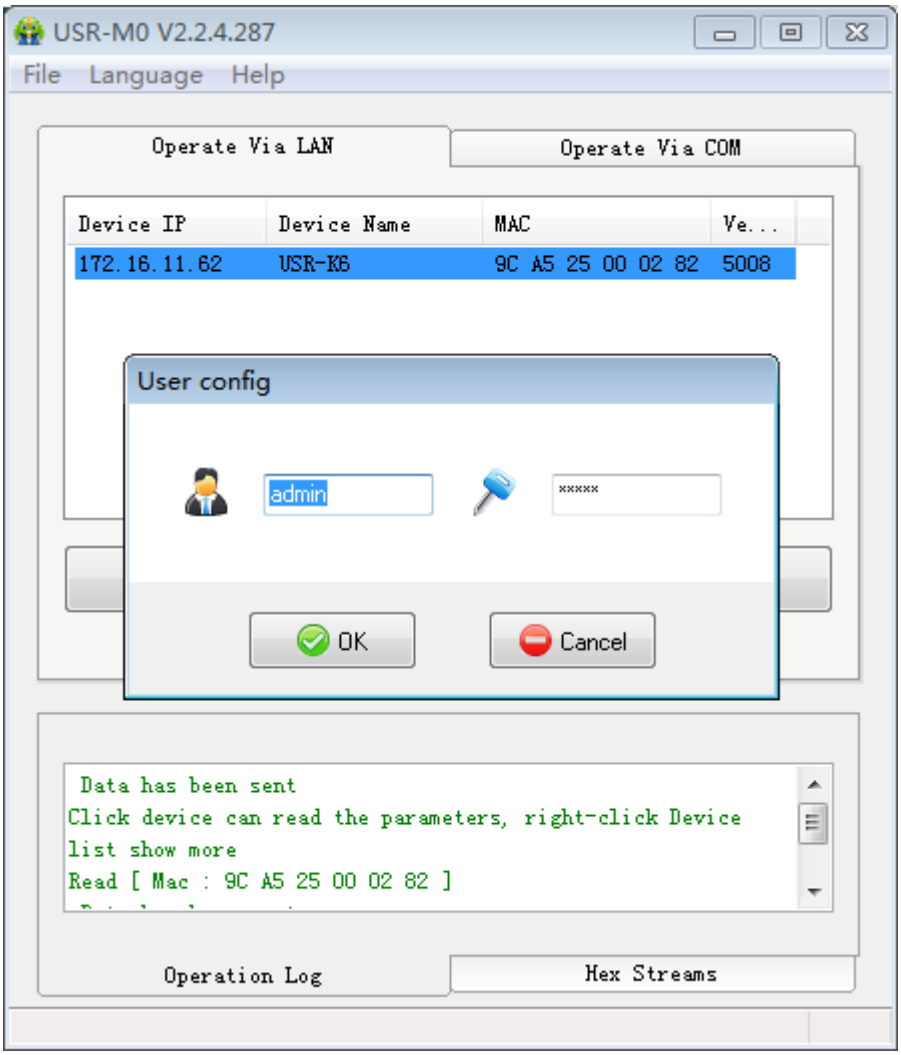


Diagram 5.1.1-2 Username and Password

2. Basic parameter setting

Click the searching device and you can see the basic parameters needed to set, combined with the function introduction of the third chapter, setting the parameter you need, then click the save. Then you are succeed to modify the parameters you have change, others keep default.

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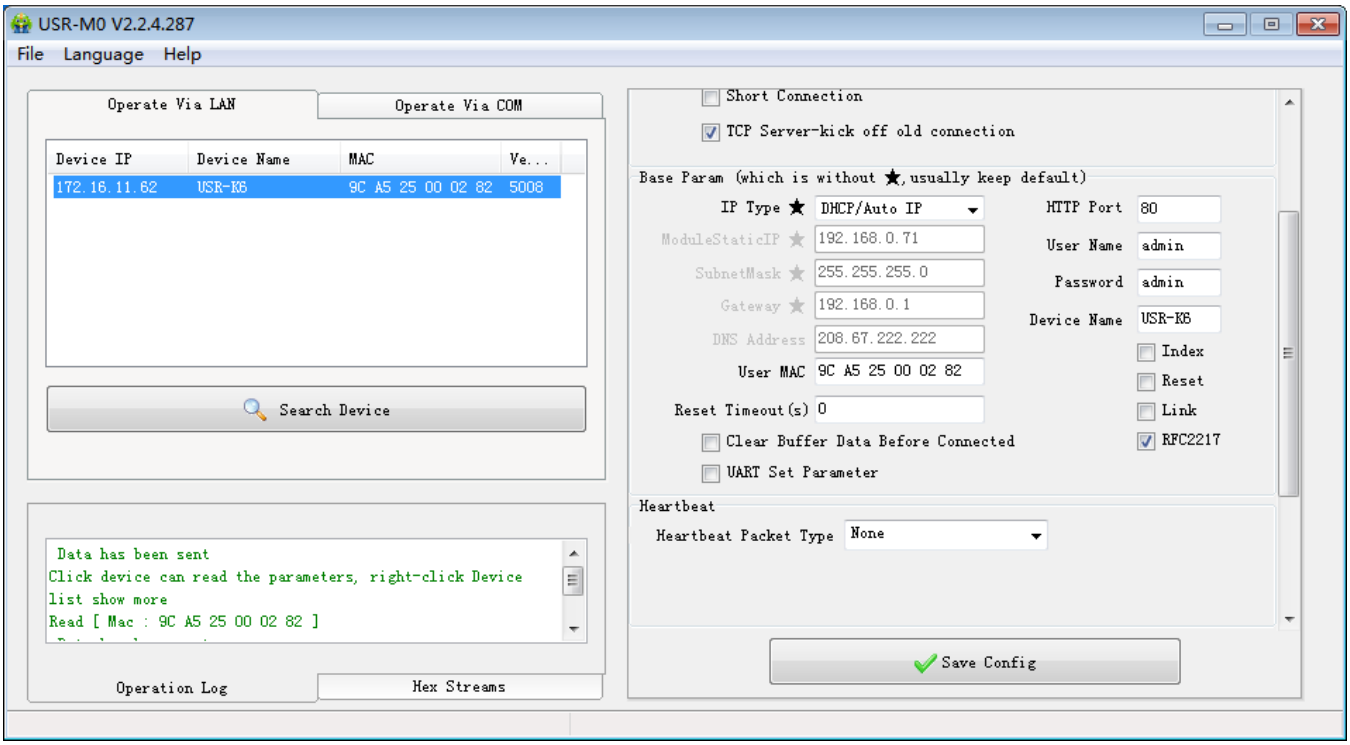


Diagram 5.1.1-3 Basic Parameters

- HTTP port: the port default is 80
- Username: the login username of K6, the authentication code for modify the parameter, can prevent other users modify the parameters of K6 in LAN.
- Pass word: the password of the K6, correspond with username.
- Device name: the K6 name can be customize.
- IP type: static IP and DHCP
- Static IP: the static IP of K6, please put it in the same LAN when setting it.
- Subnet masks: default is 255.255.255.0
- Gateway: usually is the router IP, after correct setting you can communicate across the LAN and do the domain name resolution.

3. Serial port parameters

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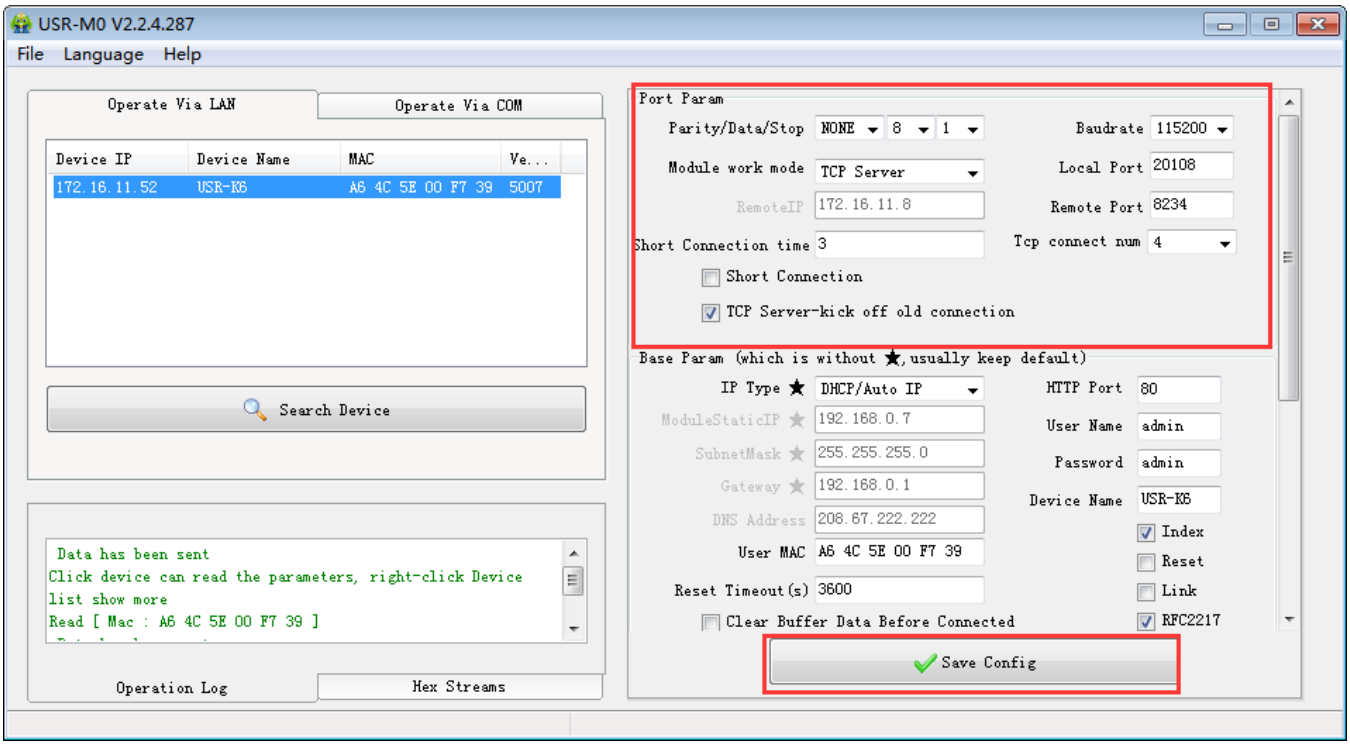


Diagram 5.1.1-4 Serial Port Parameters

- Serial baud rate: the baud rate for serial port communication, both standard and customize baud rate are ok.
- Parity/data/stop: serial port parameters
- Work mode: TCP Server /TCP Client/Httpd Client/UDP Client/UDP Server
- Remote IP: when K6 works in TCP client, UDP client and HTTPD client mode as a client, the IP or domain name of the server that it connected.
- Similar RFC2217: used if need to change the serial port in transport. Use with V-COM or you can reference the software manual.

4. Firmware Upgrade

If the module firmware need to upgrade to the high vision,user can consult with sales to get the upgraded firmware and click the device, upgrade the vision. When you upgrade it,connect directly the device and PC and notice that PC upgrading module is forbidden.

Select the device and right click, then upgrade the firmware.

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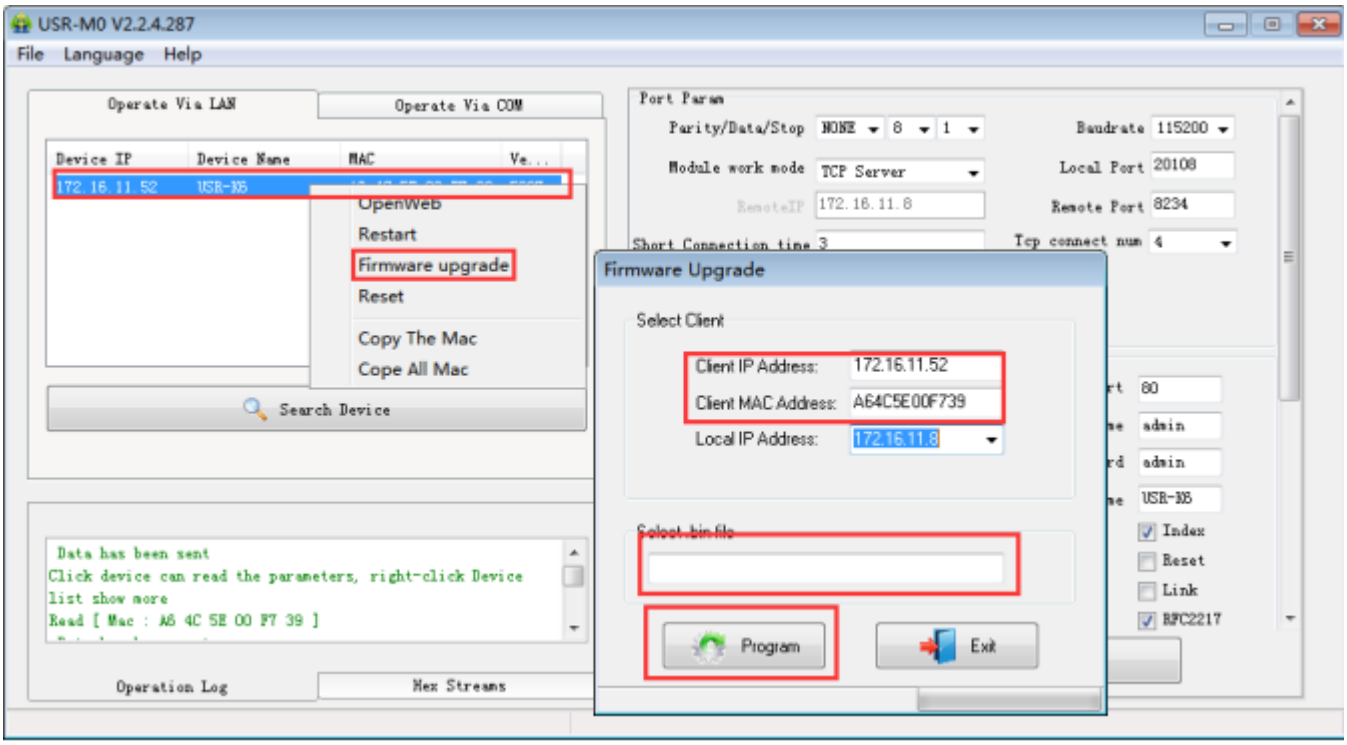


Diagram 5.1.1-5 Firmware Upgrade

5.1.2. Setting Protocol Setting the Parameters

We set special protocol on the net setting. To be convenient to set across the net, all communication protocol adopted UDP mode, the lower is in front. When setting, make sure the remote port is 1500 for UDP communication, the local port is random and all the communication protocol using UDP.

1. Net setting parameters steps

① Built socket:

Build a UDP socket, remote IP :255.255.255.255, remote port:1500, lower is in front.

② Setting command steps

➢ Send searching order on the internet.

➢ K6 return the IP address, MAC, device name and version.

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- Net port read the parameter that K6 returned.
- Combine the MAC address the username, password and the parameter that need setting to be a setting command.
- Send setting command and restart.
- K6 return setting right.
- Restart command.
- The return command of K6 right (wrong).

2. Net setting command content

Net setting protocol command means upper send command via net to modify the protocol command of the module or the server.

① Command query

function	Package head	length (order~ parameters bit)	order	MAC (6 bits)	Username and password (12 bits)	parameters	Parity (sum)
search	FF	01	01	-	-	-	02
restart	FF	xx	02	[MAC]	[usrname] [password]	-	xx
Read setting	FF	xx	03	[MAC]	[usrname] [password]	-	xx
basic setting	FF	xx	05	[MAC]	[usrname] [password]	basic parameters	xx
serial port 0 setting	FF	xx	06	[MAC]	[usrname] [password]	serial port parameters	xx

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reset	FF	xx	0b	[MAC]	[usrname] [password]	-	xx
USR-cloud	FF	xx	0c	[MAC]	[usrname] [password]	serial port parameters	xx
Heartbeat/ registration package setting	FF	xx	21	[MAC]	[usrname] [password]	serial port parameters	xx
Httpd URL setting	FF	xx	22	[MAC]	[usrname] [password]	Httpd URL	xx
Httpd package head setting	FF	xx	23	[MAC]	[usrname] [password]	Httpd package head	xx
Extend setting	-	-	-	-	-	-	-

Form 5.1.2-1 Command Query

To make sure the accuracy of the command, we setting the algorithm and check of sending command in protoco: the parity is sum parity: begin at the length add to the first digit of the parity. The sum is the value to parity, and reserve the lower bits.

② Search command

Search command is: FF 01 01 02, parity sum 02 = 01 + 01.

③ Restart command

Send (22 bits) FF 13 02 D8 B0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 40, parity sum: 40 = 13 + 02 + ... + 6E + 00, from 4th to 9th is the address of the MAC, the last 12 bits in front add the parity is the user name and password. These are 6 bits, add 0 if less than 6 bits.

Note: the last one of the username and password is 0,below are same.

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④ Read setting command

Send (22bits): FF 13 03 D8 B0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 41, parity sum: 41 = 13 + 03 + ... + 6E + 00, from 4th to 9th is the address of the MAC, the last 12 bits in front add the parity is the user name and password. These are 6 bits, add 0 if less than 6 bits.

⑤ Basic parameter setting command

Basic setting command including 67 basic parameters. Setting For better Settings, here are some examples: sending: FF 56 05 D8 B0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 95 63 03 00 00 00 50 00 00 07 00 A8 C0 01 00 A8 C0 00 FF FF FF 55 53 52 2D 4B 32 00 00 00 00 00 00 00 00 00 00 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 01 00 E0 D8 B0 4C 46 35 CA 00 00 00 00 03 00 00 00 59, parity bits is still parity sum algorithm: 59 = 56 + 05 + D8+ ... + 03: from 4th to 9th is the address of the MAC, from 10th to the 22th is the username + password, the latter bits is fixed length basic setting parameters. The last bit is the parity sum.

Name	bits	E.g.	Instr
Uc Sequence Num	1	00	reserve package head
Uc CRC	1	00	reserve package head
Uc Version	1	00	reserve package head
Uc Flags	1	C0	8^{th} is 0: DHCP: 1: static IP 6^{th} is 0: long connection: 1: short connection 5^{th} is 0: not clear cache: 1: clear cache
Us Location URL Port	2	00 00	Not enable,reserve the protocol
Us HTTP Server Port	2	50 00	HTTP server port
Uc User Flag	1	00	Not enable,reserve the protocol
Ul Static IP	4	07 00 A8 C0	Static IP
Ul Gateway IP	4	C9 00 A8 C0	Gateway
Ul Subnet Mask	4	00 FF FF FF	Subnet Mask

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Uc Mod Name	14	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00	Mod Name
Protocol reserve	2	00 00	0
username	6	61 64 6D 69 6E 00	username
password	6	61 64 6D 69 6E 00	password
Uc Net Send Time	1	00	Not enable,reserve the protocol
Ui Id	2	01 00	device ID
Uc Id Type	1	00	8th is 1: RFC2217 on, 0: RFC2217 off: 7th is 1: index on: 0: index off: 6th is 1: link light on: 0: link light off: 5th is 1: reset on: 0: reset off 2th is 1: send data carry ID: 0: off 1th is 1: build connection send ID: 0: off
mac_add rs	6	D8 B0 4C 11 22 33	Device MAC address
DNS Gateway IP	4	01 00 A8 C0	DNS server address
TC_sh_time	1	03	The time for short connection
Uc Reserved	3	00 00 00	Not enable,reserve the protocol

Form 5.1.2-2 Basic Parameter Web Setting

⑥ Serial port parameters command

There are 63 bits to setting net port and serial port parameters, so this command is of high value. Here is a example to show how to use:(sending 63 bits): FF 52 0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 C2 01 00 08 01 01 01 00 00 00 00 8C 4E 2A06 D8 B 20 31 39 32 2E 31 36 38 2E 31 2E 31 33 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 85 01 A8 C0 01 03 00 04 10 0E 00 00 00 00 00 00 00 16, parity bits algorithm: 16 = 52 + 06 + ... + 00;

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from 4th to 9th is the address of the MAC, from 10th to the 22th is the username + password,then is the port parameters + 1bits and parity.

name	bits	E.g.	Instr
Ul Baud Rate	4	00 C2 01 00	Serial port baud rate
Uc Data Size	1	08	Serial port data bits(0X05/0x06/0x07/0x08)
Uc Parity	1	01	Serial port parity 1: no, 2: odd, 3: even, 4: mark, 5: space
Uc Stop Bits	1	01	Serial port stop(0x01/0x02)
Uc Flow Control	1	00	Not enable,reserve the protocol
Ul Telnet Timeout	4	00 00 00 00	Not enable,reserve the protocol
Us Telnet Local Port	2	8C 4E	Local port
Us Telnet Remote Port	2	2a 20	Remote port
Ui Telnet URL	30	31 39 32 2E 31 36 38 2E 30 2E 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Send the IP address or domain name in ASCII code, e.g:92.168.0.201 (remote IP setting)
Ul Telnet IP Addr	4	00 00 00 00	No effect, set randomly
Uc Flags	1	00	5th is 0: disable USR-cloud: 1: enable USR-cloud: 6th is 0: TCP Server mode do not click the order one. 1: TCP Server mode click the order one. 7th is 0: close MAC registration package: 1: MAC do as registration package:

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Uc Work Mode	1	01	Work mode: 0: UDP, 1: TCP Client, 2: UDP Server, 3: TCP Server, 4: HTTPD Client
HTP uc Flags	1	00	0: HTTPD GET: 1: HTTPD POST
tc_number	1	04	The number of client that TCP Server connected
Timeout_restart	2	00 00	Restart timeout
cos_register_flag	1	00	Customize registration package
Uc Time Count	1	91	Please withe the read fetch value as it is
Ui Pack Len	2	00 00	Not enable,reserve the protocol
Uc Reserved	3	00 00 00	Not enable,reserve the protocol

Form 5.1.2-3 Serial Port Parameters

⑦ Restore to factory command

Send: FF 13 0B D8 B0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 49: parity sum: 49 = 13 + 0b+ ... + 6E + 00: from 4th to 9th is the address of the MAC, from 10th to the 21th is the username + password, These are 6 bits, add 0 if less than 6 bits.

⑧ USR-cloud command

Send: FF 13 0c 00 71 77 7c 42 2F 61 64 6d 69 6e 00 61 64 6d 69 6e 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 08;

Parity sum: 07 = 13 + 0c + ... + 6E + 00+...+00:

From 4th to 9th is the address of the MAC, from 10th to the 21th is the username + password, These are 6 bits, add 0 if less than 6 bits. The later are the USR-cloud ID and password of device, the last one is parity.

⑨ Heartbeat/registration package command

Send: FF 68 21 D8 B0 4C 46 35 CA 61 64 6D 69 6E 00 61 64 6D 69 6E 00 04 1E 00 0A 0A 77 77 77 2E 75 73 72 2E 63 6E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Parity sum: C2 = 68 + 21 + ... + 6E + 00+...+00:

From 4th to 9th is the address of the MAC, from 10th to the 21th is the username + password. These are 6 bits, add 0 if less than 6 bits. The later are sending direct of heartbeat package and registration package, heartbeat time0, length of the heartbeat, length of registration package, heartbeat package, registration package, heartbeat package and registration package. These are 40 bits, add 0 if less than 40. The last one is parity.

Name	Bits	E.g.	Instr
H_R_uc Flags	1	00	Heartbeat registration package mark: 1th is 1: send heartbeat package to net port 2th is 1: send heartbeat package to serial port; 3th is 1: connected sending to registration package: 4th is 1: data carry registration package: 5th is 1: Httpd information drop package head 6th is 1: serial port setting parameters function on 7th is 1: heartbeat package hexadecimal input 8th is 1: registration package hexadecimal input
heart_times	2	00 1e	Heartbeat time
heart_len	1	00	Length of heartbeat package
register_len	1	00	Length registration package
heartbeat	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Heartbeat package content
register_s	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Registration package content

Form 5.1.2-4 Heartbeat Registration Package Net Setting

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⑩ HTTPD client header setting

➢ Setting URL protocol

Name	Bits	E.g.	Instr
url_len	1	00	Length of Httpd URL
httpd_send_url	100	00	Httpd Client URL

Form 5.1.2-5 URL Protocol

Send : FF 78 22 D8 B0 4C 44 85 64 61 64 6D 69 6E 00 61 64 6D 69 6E 00 07 2F 31 2E 70 68 70 3F 00 00 00

From 4th to 9th is the MAC address of the module, the later 12 is username and password, these are 6 bits add 0 if less than 6, the last one is parity.

3. Net return the command

① The result of search command return

The result of search command return(36 bits): FF 24 01 00 00 c0 a8 00 07 00 71 77 7c 42 2F 01 0c 00 00 55 53 52 2d 4b 32 00 00 00 00 00 00 00 00 00 00 F2,

Parity way is reduce parity sum, the initial value is 0x00, reduce every bits in order, algorithm is as fellow: F2 = 00 - FF - 24 - 01 - 00 - 4B - ... - 32 – 00-...-00.

name	bits	E.g.	Instr
TAG_STATUS	0	FF	fixed number
Packet_length	1	24	fixed number
CMD_DISCOVER_TARGET	2	01	fixed number
Board_type	3	00	fixed number
Board_ID	4	00	fixed number
Client_IP_address	5~8	C0 A8 00 07	device IP(higher in front)
MAC_address	9~14	AC CF 23 20 FE 3D	device MAC(higher in front)
Firmware_version	15~18	01 00 00	Firmware version
Application_title	19~34	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00 00 00	device name
checksum	35	F0	(this value can be ignore) Check sum initial value is 0x00, reduce every bits of TAG_STATUS in order,till the last bit, and the result is

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			checksum.

Form 5.1.2-7 Return Command

② Restart command return result

Respond (4 bits): FF 01 02 4B if the password right 4B = 'K'

FF 01 02 50 username password wrong 50 ＝'P'

③ Read order command return result

The return are all the parameters, total 576, no parity and protocol, return parameters directly. Method of reading reference “basic parameters chart” “serial parameters chart”and USR-cloud function, heartbeat registration package function and Httpd Client package head setting. Return divide into 4 package, including 130 bits, 50bits, 85 bits and 302 bits.

Respond e.g.: 95 63 03 00 00 00 50 00 00 07 00 A8 C0 01 00 A8 C0 00 FF FF FF 55 53 52 2D 54 43 50 32 33 32 2D 33 31 30 00 00 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 01 00 A4 AC CF 23 20 FE 10 00 00 00 00 00 00 00 00 80 25 00 00 08 01 01 01 00 00 00 00 8C 4E 2A 20 31 39 32 2E 31 36 38 2E 31 2E 31 33 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 85 01 A8 C0 00 01 00 00 00 00 00 00 00 00 00 00:

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

④ Basic parameters setting command return result

Setting correct return: FF 01 05 4B if the password right 4B = 'K':

FF 01 05 50 username password wrong 50 ='P'.

⑤ Serial parameters setting command return result

Setting correct return: FF 01 06 4B if the password right 4B = 'K':

FF 01 06 50 username password wrong 50 ='P'.

⑥ USR-cloud parameters setting command return result

Setting correct return: FF 01 06 4B if the password right 4B = 'K':

FF 01 06 50 username password wrong 50 ='P'.

⑦ Heartbeat registration package parameters setting command return result

Setting correct return: FF 01 06 4B if the password right 4B = 'K':

FF 01 06 50 username password wrong 50 ='P'.

⑧ Httpd URL setting command return result

Setting correct return: FF 01 22 4B if the password right 4B = 'K':

FF 01 22 50 username password wrong 50 ='P'.

⑨ Httpd package head command return result

Setting correct return: FF 01 23 4B if the password right 4B = 'K':

FF 01 23 50 username password wrong 50 ='P'.

⑩ Other return

Parity and return: return 'E' + right value:

Correct perform: FF 01 CMD‘K’:

Username password wrong return: FF 01 CMD‘P‘:

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Other wrong return: FF 01 CMD'E'.

4. Message monitoring method

If you want to get some real message using the way as below:the tool is setting softwareUSR-M0:

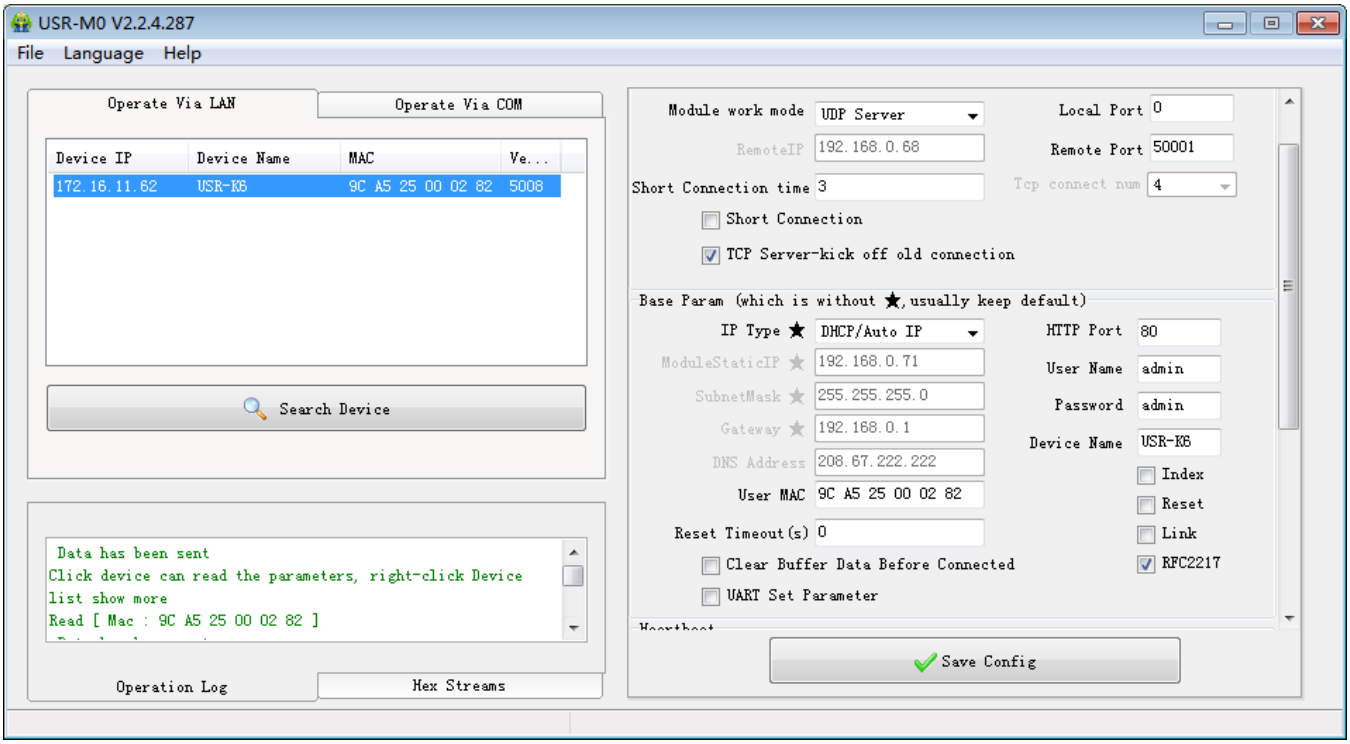


Diagram 5.1.2-1 Catch the Message

5.2. Webpage Setting Parameters

Open the browser and enter the IP of K6, default is (192.168.0.7). filled the user name: admin and password: admin, then login and you can enter the login page.

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Diagram 5.2-1 Username and Password

Click the English or Chinese on the right upper to switch the language.

1. Current status

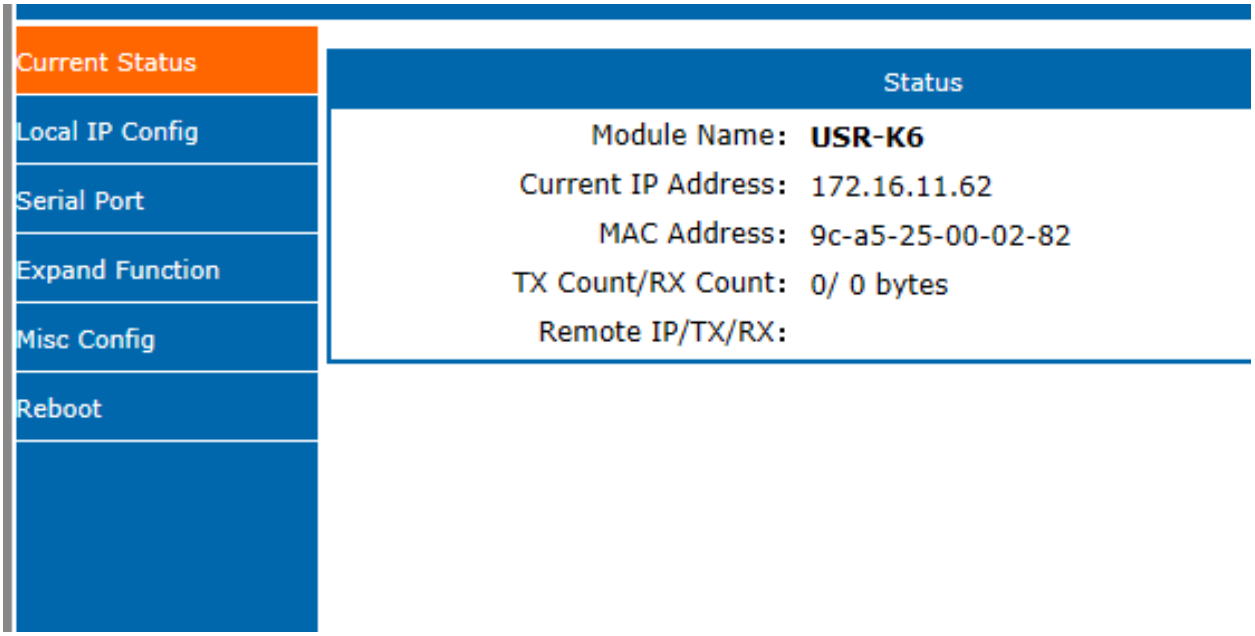


Diagram 5.2-2 Current Status

This page show song information of the K6

- Module name
- Current IP address
- MAC address

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- IP of the connected device and the sent of receive number of the data.
- Total number of connection receive or send

2. Local IP Configure

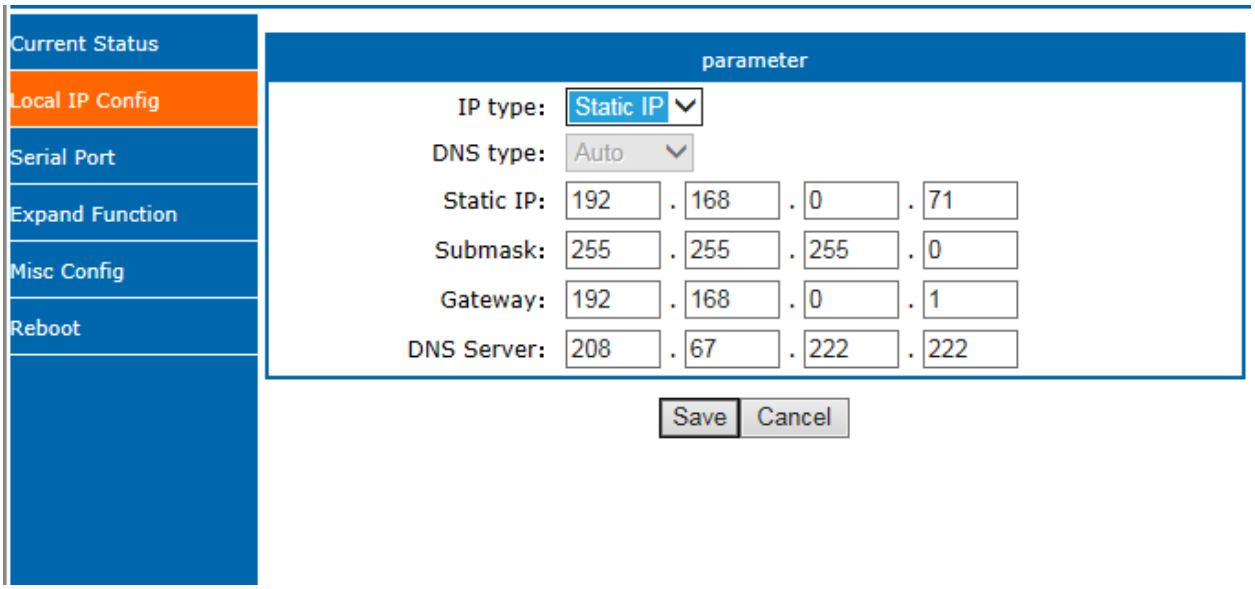


Diagram 5.2-3 Local IP Configure

Modify the parameters and save,then modify the parameter in next page. If the parameter need not to modify ,click the restart and work.

- IP type
- Static IP
- Subnet masks
- Gateway
- DNS server

3. Serial port

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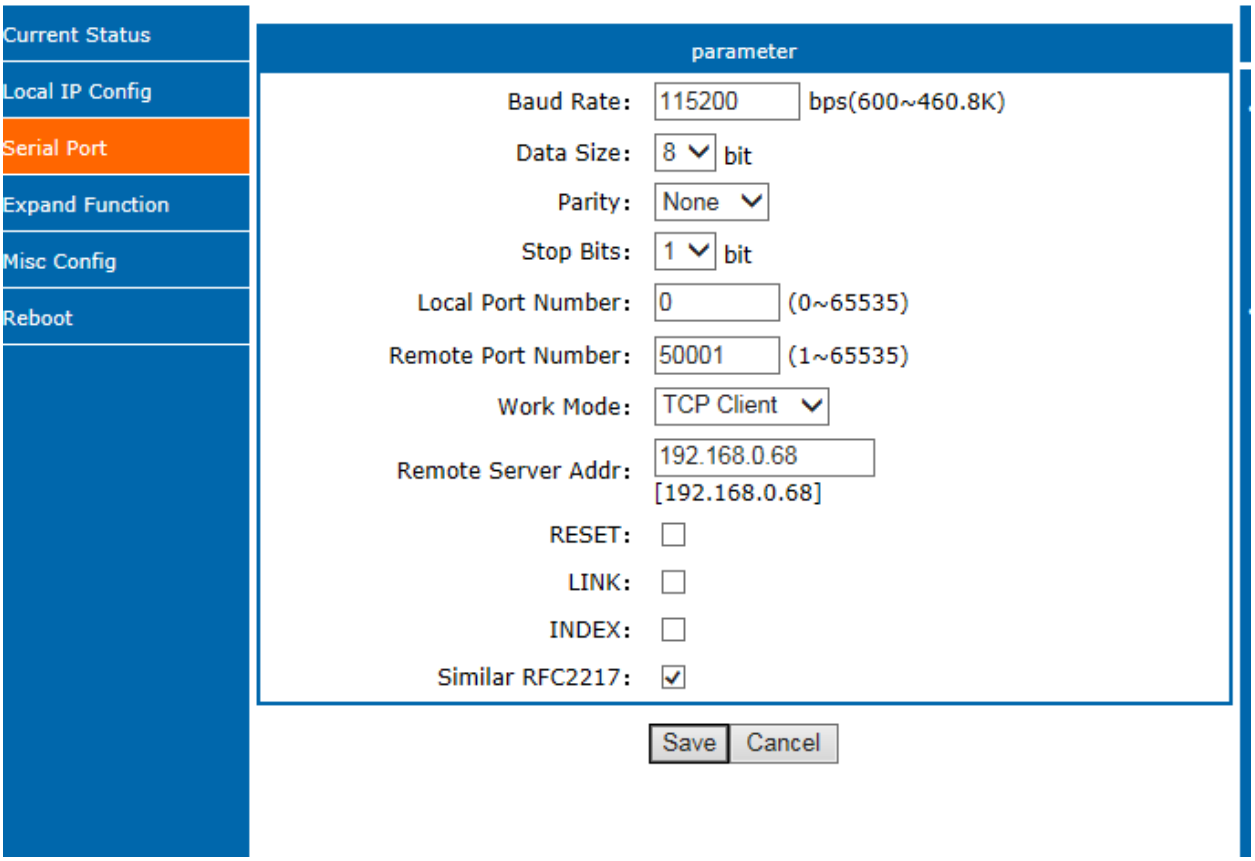


Diagram 5.2-4 Serial Port

- Baud rate
- Data
- Parity
- Stop
- Local port
- Remote port
- Work mode
- Remote server address
- Special functions

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4. Expand Function

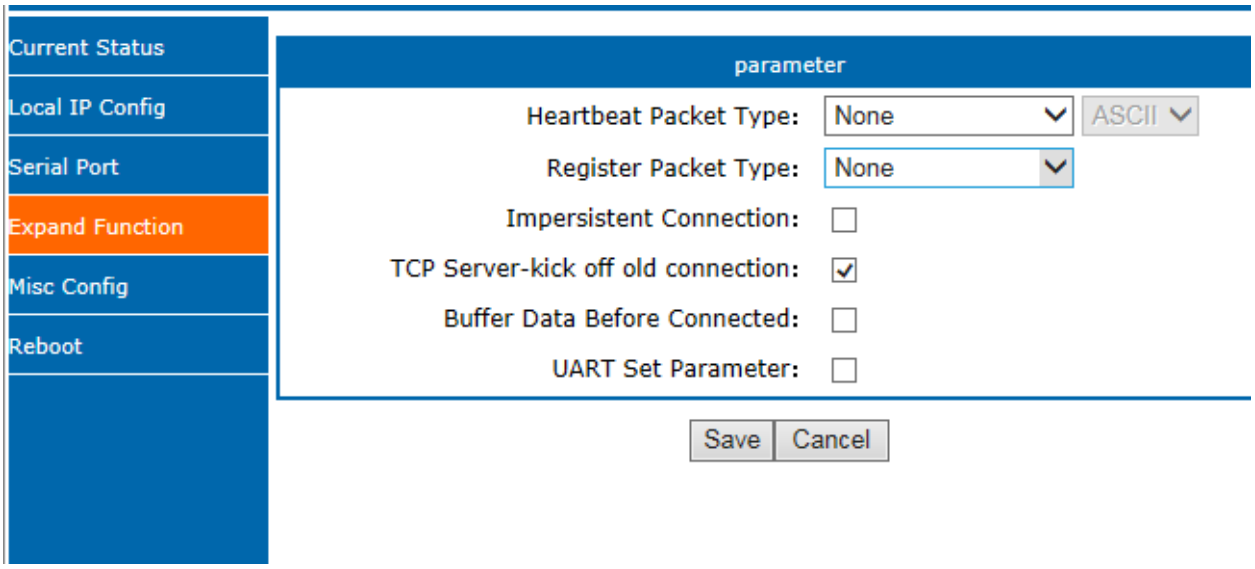


Diagram 5.2-5 Expand Function

- USR-cloud number and password
- Customize heartbeat package: open with webpage, content customize and the max number is 40bite
- Customize registration package: open with webpage, content customize and the max number is 40bite, the method to use can be customize
- Short connection: enable under the TCP client and the time can be customize
- Clear buffer data: whether or not
- TCP server-kick off old connection
- Serial port parameter setting: open with webpage and setting with serial port parameter

5. Miss configure

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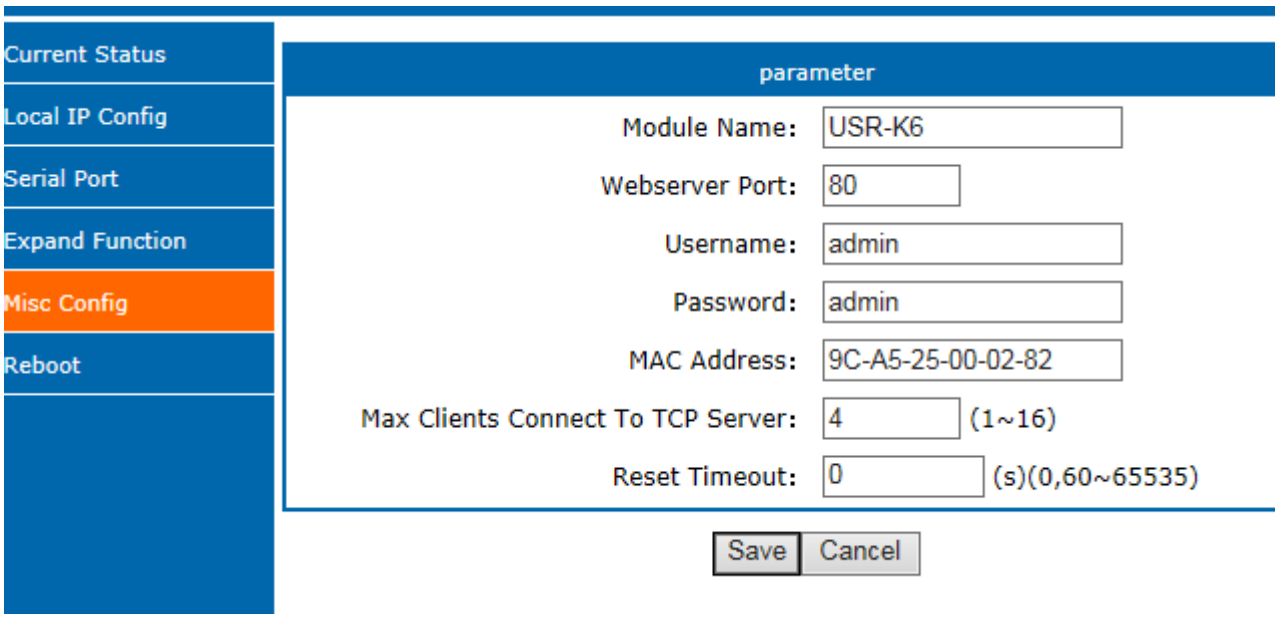


Diagram 5.2-6 Miss configure

- Module name
- Webserver port
- Username
- Password
- MAC address
- Max client connected to TCP server
- Reset timeout

6. Reboot

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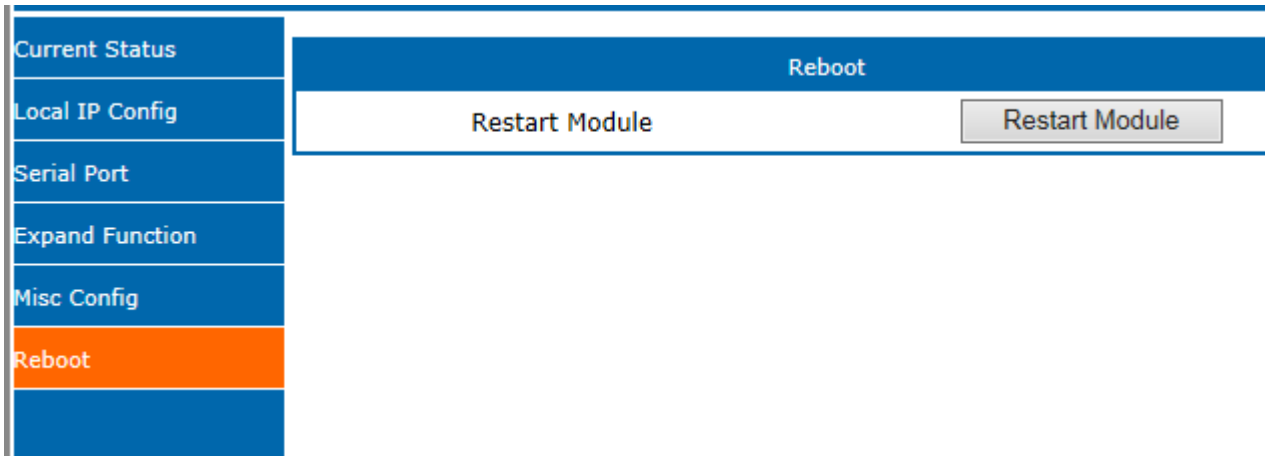


Diagram 5.2-7 Reboot

Save all the data and restart, then the K6 work.

5.3. AT Command

AT command is used for controlling module. You can use AT command to configure and query the settings. Later we will interpret the type in detail.

5.3.1. AT Command Overview

AT+ command is the command collection that perform the command transport using UART and module under the order mode. Later we will interpret the type in detail.

Powered successfully, we can setting the module with UART.

The default UART port parameters of the module are: baud rate1152000, no parity, data 8 and stop 1.

Instr

AT command test tools.UART interface recommand to use secureCRT software tool or USR pro APP. Below are using the secureCRT with UART to perform.

From transparent transport to order mode need two step as below:

- Fill “+++”in the UART. After the module receive the “++++”,it will send a “a” to confirm;
- Fill the confirming “a” in the UART, after the module receive and send “+ok”, enter the command mode.

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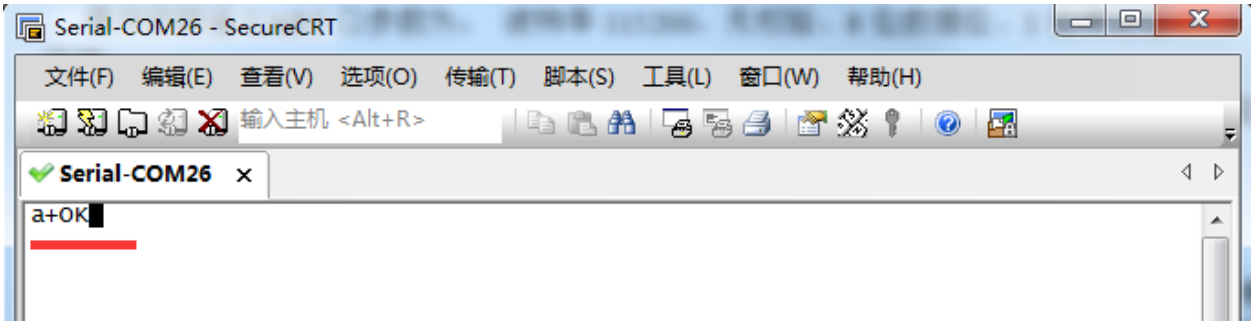


Diagram 5.3.1-1 Enter the AT Command

Instr: if no feedback after fill "++++"and "a", as the above.

Fill "+++"and "a" need to achieve in the time to reduce the chance of entering command mode while working normally accidentally. Detail requirement are as fellows.

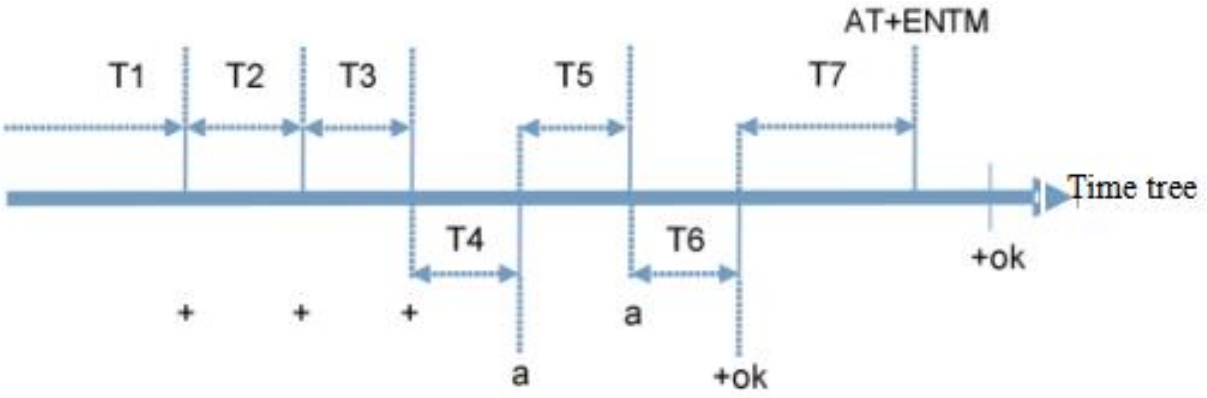


Diagram 5.3.1-2 Time Tree

Time requirement:

T1>the interval of serial port package

T2<300ms

T3<300ms

T5<3s

The order change into temporary command mode from transparent transport mode:

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1. Serial mode device send “+++”to module continuously. The module receive and send “a” back. Before sending“+++”is the packaging time and can not send any data.

2. After receive “a” feedback a “a”in 3s.

3. After the module receive “a, send “ok”to the device, and enter “AT”command

4. After the device receive “+ok” and know the module enter the AT command mode, then send AT command.

The order change into net transparent transport from AT command mode:

1.Serial device send “AT+ENTM”to module.

2.After the module receive the command, feedback “+ok”, then back to the previous working mode.

5.3.2. AT Command Error Code

Error code	Instr
-1	Invalid format
-2	Invalid order
-3	Invalid operator
-4	Invalid parameter
-5	Not allow

Form 5.3.2-1 Error Code List

5.3.3. AT Command

Num	command	Instr
1	E	Enable/disable the echo function
2	Z	restart module
3	VER	Query the vision

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4	ENTM	Exit AT command mode
5	RELD	Reset default settings
6	MAC	Query module MAC address
7	USERMAC	Setting customize MAC
8	WEBU	Setting/ query username and password
9	WANN	Setting/ query WAN port parameters
10	DNS	Setting/ query DNS server address
11	WEBPORT	Setting/ query webpage port
12	UART	Setting/ query serial parameters
13	SOCK	Setting/ query SOCK parameters
14	TCPSE	Setting/ query whether kick off order connection
15	SOCKLK	Query TCP connect status
16	SOCKPORT	Setting/ query local port number
17	RECEN	Setting/ query RFC2217 enable
18	PDTIME	Query the product time
Registration package function		
19	REGEN	Setting/ query registration package mechanism
20	REGTCP	Setting/ query registration package perform mechanism
21	REGCLOUD	Setting/ query USR-cloud username and password
22	REGUSR	Setting/ query the content of registration package that customized
Httpd client function		

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23	HTPTP	Setting/ query in httpd client mode, the asking way of the http
24	HTPURL	Setting/ query the URL in httpd client mode
25	HTPHEAD	Setting/ query the package head in httpd client
26	HTPCHD	Setting/ query HTP remove the package head
Heartbeat package		
27	HEARTEN	Setting/ query heartbeat package enable
28	HEARTTP	Setting/ query method of the heartbeat package send
29	HEARTTM	Setting/ query the heartbeat package time
30	HEARTDT	Setting/ query customize heartbeat package
Expand function command		
31	SCSLINK	Setting/ query the indicating function of the status of socket connection
32	CLIENTRST	Setting/ query the TCP client mode reset function enable/disable
33	INDEXEN	Setting/ query index function
34	SOCKSL	Setting/ query short connection function
35	SHORTO	Setting/ query short connection time
36	UARTCLBUF	Setting/ query clear serial port cache before module build connection function enable/disable
37	RSTIM	Setting/ query timeout reset time
38	MAXSK	Setting/ query maximum client connections in TCP server mode
39	MID	Setting/ query module name
40	H	Query help message
(V4017 supporting command)		

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41	AT+CFGTF	Save the current parameters as the default parameters
42	AT+PING	Ping automatically

Form 5.3.3-1 AT Command

5.3.4. AT Command Details

1. AT+E

Function: query/ setting module echo of the AT command setting

Format: query:

A+E<CR>

<CR><LF>+OK=< on/off ><CR><LF>

setting:

A+E=< on/off ><CR>

<CR><LF>+OK<CR><LF>

Parameters: ON: enable the echo, echo the command entered by the AT command.

OFF: under AT command mode, the entered command do not echo.

E.g.: AT+E=0N

2. AT+Z

Function: restart module

Format: setting:

AT+Z<CR>

<CR><LF>+OK<CR><LF>

Parameters: none

<note>: after perform this command correctly, module restart and exit the AT command mode.

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3. AT+VER

Function: query module firmware version.

Format: query:

AT+VER<CR>

<CR><LF>+OK=< ver ><CR><LF>

Parameters: ver: query module firmware version.

4. AT+ENTM

Function: exit the AT command mode and enter the transparent transmission:

Format: setting:

AT+ENTM<CR>

<CR><LF>+OK<CR><LF>

Parameters: none

<note>: after perform this command correctly, module change into command mode from transparent transmission mode.

5. AT+RELD

Function: module reset

Format: setting:

AT+RELD<CR>

<CR><LF>+OK<CR><LF>

parameters: none.

6. AT+MAC

Function: query module MAC

Format: query:

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AT+MAC<CR>

<CR><LF>+OK=< MAC ><CR><LF>

parameters: mac: MAC address of the module(e.g.00020K2050A)

7. AT+USERMAC

Function: setting module customize MAC

Format: setting:

AT+ USERMAC =< MAC ><CR>

<CR><LF>+OK<CR><LF>

Parameters: mac: MAC address of the module, the first byte should be even, e.g. 002233445566

E.g.: AT+USERMAC=002233445566

8. AT+WEBU

Function: setting /query module username and password

Format: query:

AT+WEBU<CR>

<CR><LF>+OK=< username,password ><CR><LF>

setting:

AT+WEBU=< username,password ><CR>

<CR><LF>+OK<CR><LF>

Parameters: username: username, support 5 bytes at longest and can not be none:

password: password, support 5 bytes at longest.

E.g.: AT+WEBU=admin,admin

9. AT+WANN

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Function: setting /query the IP of WAN(DHCP/STATIC) that module access

Format: query:

AT+WANN<CR>

<CR><LF>+OK=< mode,address,mask,gateway ><CR><LF>

setting:

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

<CR><LF>+OK<CR><LF>

Parameters: mode: web IP mode (static/DHCP)

static: static IP

DHCP: dynamic IP(address,mask,gateway parameters ignore)

address: IP address

mask: subnet masks

gateway: gateway address

E.g.: AT+WANN=static,192.168.0.7,255.255.255.0,192.168.0.1

10. AT+DNS

Function: setting /query DNS server address:

Format: query:

AT+DNS<CR>

<CR><LF>+OK=< address ><CR><LF>

setting:

AT+DNS=< address ><CR>

<CR><LF>+OK<CR><LF>

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Parameters: address: DNS server address(default value is 208.67.222.222).

E.g.: AT+DNS=208.67.222.222

11. AT+WEBPORT

Function: setting /query webpage port

Format: query:

AT+WEBPORT<CR>

<CR><LF>+OK=< port ><CR><LF>

setting:

AT+WEBPORT=< port ><CR>

<CR><LF>+OK<CR><LF>

Parameters: port: module the port of the web server that built in of module. default 80:

E.g.: AT+WEBPORT=80

12. AT+UART

Function: setting /query UART interface parameters

Format: query:

AT+UART<CR>

<CR><LF>+OK=< baudrate,data_bits,stop_bit,parity,flowctrl ><CR><LF>

setting:

AT+UART=< baud rate,data_bits,stop_bit,parity,flowctrl ><CR><LF>

<CR><LF>+OK<CR><LF>

Parameters: baudrate: baud rate600~460800bps,can be customized .

data_bits: data 5、6、7、8

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stop_bits: stop 1、2

parity: parity

NONE(no parity)

EVEN(even parity)

ODD(odd parity)

MASK(1 parity)

SPACE(0 parity)

Flowctrl: flow control(none flow control, can not setting , default setting to be the NFC)

NFC: none: hardware flow control

FCH: have hardware flow control

FCR: software flow control

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

13. AT+SOCK

Function: setting /query web protocol parameters format

Format: query:

AT+SOCK<CR>

<CR><LF>+OK=< protocol,IP,port ><CR><LF>

setting:

AT+SOCK=< protocol,IP,port ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Protocol: protocol type, including

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TCPS is TCP server

TCPC is TCP client

UDPS is UDP server

UDPC is UDP client

HTPC is Httpd Client

IP: when the module setting into “CLIENT”mode, the IP address and domain name of the remote server.

Port: local port under Server mode and remote port under Client mode,decimal number and less than 65535.

E.g.: AT+SOCK=TCPC,192.168.0.201,8234

14. AT+TCPSE

Function: module is TCP Server, the processing mechanism after the connection reaches the maximum number of connections.

Format: query:

AT+TCPSE<CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+TCPSE=< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status: setting status keep/kick

keep: after reach the maximum number of connection, do not receive new one.

kick: after reach the maximum number of connection, delete the order one and connect the new one.

E.g.: AT+TCPSE=keep

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15. AT+SOCKLK

Function: query whether the TCP has connected

Format: query:

AT+ SOCKLK<CR>

<CR><LF>+OK=< sta ><CR><LF>

Parameters:

Sta: built the TCP connection or not

Connect: TCP connected

Disconnect: TCP not connected

16. AT+SOCKPORT

Function: setting /query local socket port

Format: query:

AT+SOCKPORT<CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ SOCKPORT =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Sta: 0 is using port randomly. 1-65535 is using the local port of the socket.

E.g.: AT+SOCKPORT=20108:

17. AT+RFCEN

Function: enable/ disable RFC221 7function

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Format: query:

AT+RFCEN<CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+RFCEN =< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

status:

ON: enable RFC2217function

OFF: disable RFC2217function

E.g.: AT+RFCEN=ON

18. AT+PDTIME

Function: query produce time

Format: query:

AT+PDTIME<CR>

<CR><LF>+OK=< time ><CR><LF>

Parameters:

time: produce time, e.g.: 2016-10-18 11:20:02

19. AT+REGEN

Function: setting query registration package mechanism

Format: query:

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AT+REGEN<CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+REGEN =< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

status:

MAC: enable registration package mechanism, registration package is 6 bites MAC

Usr: customize registration package

Off: disable registration package mechanism

E.g.: AT+REGEN=MAC

20. AT+REGTCP

Function: setting query tcp client mode registration package perform mechanism

Format: query:

AT+REGTCP<CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+REGTCP =< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status:

first: send a registration package when connected the server at first time

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every: add a registration package in front of the every data package sent to server.

all: send registration package when first connected to the server and add registration package in front of the data package.

E.g.: AT+REGTCP=first

21. AT+REGCLOUD

Function: setting /query USR-cloud username and password

Format: query:

AT+REGCLOUD<CR>

<CR><LF>+OK=< name, password ><CR><LF>

setting:

AT+REGCLOUD=< name, password ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status:

name: USR-cloud device port:

password: USR-cloud password .

E.g.: AT+REGCLOUD=00000000000000000000, 00000000

22. AT+REGUSR

Function: setting query customize registration package content

Format: query:

AT+REGUSR<CR>

<CR><LF>+OK=< data ><CR><LF>

setting:

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AT+ REGUSR =< data ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

data: ASCII code in 40 bytes

E.g.: AT+REGUSR=www.usr.cn

23. AT+HTPTP

Function: setting /query the asking way under HTTPD Client mode.

Format: query:

AT+HTPTP<CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+HTPTP =< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status:

GET: is the http asking way

POST: is the http asking way

E.g.: AT+HTPTP=GET

24. AT+HTPURL

Function: setting /query Httpd 的 URL.

Format: query:

AT+HTPURL<CR>

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<CR><LF>+OK=< URL ><CR><LF>

setting:

AT+HTPURL =< URL ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

URL: start with "/", less than 99 bytes .

E.g.: AT+HTPURL=/2.php

25. AT+HTPHEAD

Function: setting /query Httpd Client customize package head message

Format: query:

AT+HTPHEAD<CR>

<CR><LF>+OK=< data ><CR><LF>

setting:

AT+ HTPHEAD =< data ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

data: customize package message, less than 199 bytes. And using <<CRLF>> translating the characters in stead of the enter.

E.g.: AT+HTPHEAD=Accept:text<<CRLF>>

26. AT+HTPCHD

Function: setting /query filter the package head of the return information of Http

Format: query:

AT+ HTPCHD <CR>

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<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ HTPCHD =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters: Sta:

ON: enable

OFF: disable

E.g.: AT+HTPCHD=ON

27. AT+HEARTEN

Function: setting /query enable or not heartbeat package

Format: query:

AT+ HEARTEN <CR>

<CR><LF>+OK=< status ><CR><LF>

setting:

AT+ HEARTEN =< status ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status:

ON:enable heartbeat package

Off: disable heartbeat package

E.g.: AT+HEARTEN=ON

28. AT+HEARTTP

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Function: setting /query heartbeat package send way

Format: query:

AT+ HEARTTP <CR>

<CR><LF>+OK=< type ><CR><LF>

setting:

AT+ HEARTTP =< type ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Status:

NET: send heartbeat package to server

COM: send heartbeat package to serial port

E.g.: AT+HEARTTP=NET

29. AT+HEARTTM

Function: setting /query time of heartbeat package

Format: query:

AT+ HEARTTM <CR>

<CR><LF>+OK=< time ><CR><LF>

setting:

AT+ HEARTTM =< time ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

Time: heartbeat time ,default is 30s, range from 1 to 65535s.

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E.g.: AT+HEARTTM=30

30. AT+HEARTDT

Function: setting query customize heartbeat package content

Format: query:

AT+ HEARTDT <CR>

<CR><LF>+OK=< data ><CR><LF>

setting:

AT+ HEARTDT =< data ><CR>

<CR><LF>+OK<CR><LF>

Parameters:

data: less than 40 bytes ASCII code.

E.g.: AT+HEARTDT=www.usr.cn.

31. AT+ SCSLINK

Function: setting /query Socket connected status instructions function (connection status instructions pin change or not according to the connection status)

Format: query:

AT+ SCSLINK <CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ SCSLINK =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters: sta: status

ON: enable link function

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OFF: disable link function

E.g.: AT+ SCSLINK=ON

32. AT+ CLIENTRST

Function: setting /query TCP Client mode filed to connect several time and reset (repeat 30 times connection failed, module restart)

Format: query:

AT+ CLIENTRST <CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ CLIENTRST =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters: sta: status

ON: enable TCP Client reset function

OFF: disable TCP Client reset function

E.g.: AT+CLIENTRST =ON

33. AT+ INDEXEN

Function: setting /query index function

Format: query:

AT+ INDEXEN <CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ INDEXEN =< sta ><CR>

<CR><LF>+OK<CR><LF>

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Parameters: sta: status

ON: enable index function

OFF: disable index function

E.g.: AT+INDEX=ON

34. AT+ SOCKSL

Function: setting /query short connection function

Format: query:

AT+ SOCKSL <CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ SOCKSL =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters:sta: status

ON: enable short connection function

OFF: disable short connection function

E.g.: AT+SOCKSL =ON

35. AT+ SHORTO

Function: setting /query short connection time

Format: query:

AT+ SHORTO <CR>

<CR><LF>+OK=< time ><CR><LF>

setting:

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AT+ SHORTO =< time ><CR>

<CR><LF>+OK<CR><LF>

Parameters: time: short connection time, 2-255s

E.g.: AT+SHORTO =3

36. AT+ UARTCLBUF

Function: setting /query if the module clear the serial port cache before connected

Format: query:

AT+ UARTCLBUF <CR>

<CR><LF>+OK=< sta ><CR><LF>

setting:

AT+ UARTCLBUF =< sta ><CR>

<CR><LF>+OK<CR><LF>

Parameters: sta: status

ON: clear the serial port cache before connected

OFF: do not clear the serial port cache before connected

E.g.: AT+UARTCLBUF =ON

37. AT+ RSTIM

Function: setting /query restart timeout

Format: query:

AT+ RSTIM <CR>

<CR><LF>+OK=< time ><CR><LF>

setting:

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AT+ RSTIM =< time ><CR>

<CR><LF>+OK<CR><LF>

Parameters: time: short connection time: 0, 60-65535s

E.g.: AT+RSTIM =3600

38. AT+ MAXSK

Function: setting /query the maximum number of the client that TCP Server connected Format: query:

AT+ MAXSK <CR>

<CR><LF>+OK=< num ><CR><LF>

setting:

AT+ MAXSK =< num ><CR>

<CR><LF>+OK<CR><LF>

Parameters: num: the maximum number of the client that TCP Server connected, range from 1 to 16

E.g.: AT+MAXSK =4

39. AT+ MID

Function: setting /query module name

Format: query:

AT+ MID <CR>

<CR><LF>+OK=< name ><CR><LF>

setting:

AT+ MID =< name ><CR>

<CR><LF>+OK<CR><LF>

Parameters: name: module name, maximum 15 bytes and can not be none.

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E.g.: AT+MID =USR-K6

40. AT+ H

Function: help

Format: query:

AT+ H <CR>

<CR><LF>+OK=< sta ><CR><LF>

Parameters: sta: help information

41. AT+CFGTF

Function: save the current parameters as the default parameters

Format: query:

AT+ CFGTF <CR>

<CR><LF>+OK=< sta ><CR><LF>

Parameters: sta: slave: saved

42. AT+PING

Function: setting ping the remote IP and operate the “ping”1 time.

Format: query:

AT+ PING=< IP ><CR>

<CR><LF>+OK<CR><LF>

Parameters: IP: ping the remote IP or the domain name automatically, maximum 30 bytes

E.g.: AT+PING=www.baidu.com

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6. Contact us

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7. Disclaimer

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8. Modified History

vision	Modify instr	Time
V1.0.0	The first one	2016-03-30
V1.0.1	Modify the work way of heartbeat package and the range of heartbeat time, modify some instr of some function	2016-05-26
V1.0.2	Add some AT command, restart out time, short connection. Schematic diagram of key functions added	2016-08-23
V1.1.1	Add some AT command and ping	2017-05-04

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