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1. Quick Start

Double serial port server USR-N520 is used to realize data transparent transmission between TCP/UDP data package and RS232/RS485/RS422 interface. Three in one serial port communicating code, support common RS232/RS485/RS422 serial interfaces.

Any question during testing, please submit it on our technical support center: http://h.usriot.com

1.1. Hardware Testing Environment

Connect the COM port of USR-N520 with PC's via serial cable(or USB to serial cable).

Connect network interface between USR-N520 and PC via RJ45 cable.

Then supply power for USR-N520 with our AC adapter

The below picture will show you the connection.



Hardware Connection

Notes:

- AC adapter and connection cable are provided by USR IOT.
- RS232 is involved, no connection for RS485.
- PCs in above picture is the same one.

1.2. Network Test Environment

Please check PC setting after hardware connection.

- 1) Disable PC Firewall and anti-virus software.
- 2) Disable the network card nothing to do with testing and just leave one local connection.
- 3) As for USR-N520 connect with PC directly, should set static IP for PC, which in the same network



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segment with USR-N520, like 192.168.0.201.



PC Local Connection Configuration

1.3. Default Parameter

Default parameter is as below:

User name	admin
Password	admin
IP address	192.168.0.7
Subnet mask	255.255.255.0
Default gateway	192.168.0.1
Default work dode of port 1	TCP Server
Default local port of port 1	23
Default work mode of port 2	TCP Server
Default local port of port 2	26
Baud Rate	115200
Parity bit/Data bit/Stop bit	None/8/1

1.4. Data Transmission Test

Data transmission test is based on the default parameters, please refer to the following steps:

1) Open test software "USR-TCP232-Test.exe", and do hardware connection according to Chapter 1.1





Hardware Testing Environment.

2) The right side is Network Settings: TCP Client, IP address: 192.168.0.7, port number: 23, click "Connect" to build TCP connection.

The left side is Serial Settings: Baud Rate: 115200, Parity/Data bit/Stop bit: None/8/1, Click "Open" to enable the COM.

Then we can test data transmission between COM and network.

Data from serial to network is: PC' COM->USR-N520' COM->USR-N520 Ethernet port->PC Network; Data from network to serial is: PC Network->N520' Ethernet port->N520 COM-> PC's COM.

The below picture is for your reference:

STATE OF THE CONTRACT OF THE CONTRACT.	2 to Ethernet Convert tester		– 🗆 X
COMSettings	円) 「COM port data receive	Network data receive	NetSettings
PortNum COM13 BaudR 115200 DPaity NONE DataB 8 bit StopB 1 bit Close Recv Options Receive to file Add line return Receive As HEX Receive Pause Save Clear Send Options Data from file Auto Clear Input Send As Hex V Send Recvole	<pre>http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on</pre>	Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	(1) Protocol TCP Client (2) Server IP 192.168.0.7 (2) Server Pott 23 Disconnect Receive Pots Receive to file Add line return Receive As HEX Receive Pause Save Clear Send Options Data from file Auto Checksum Auto Checksum Send As Hex Send As Hex Send Recycle
Interval 1000 ms Load <u>Clear</u>	Jinan USR Technology Co., Ltd. Send	http://en.usr.on Send	Interval 1000 ms Load Clear
👉 Ready!	Send : 1140 Recv : 576 <u>Reset</u>	i∉ Ready! Send: 624	Recv : 1051 Reset

Default Parameter Test



2. Overview

2.1. Brief Introduction

USR-N520 is used to transmit data transparently between TCP/UDP data packet and RS232/RS485/RS422

interface. It carries ARM processor, low power, fast speed, high stability and two serial port can work as

RS232 or RS485 or RS422 serial interface which comfort to industrial standard.

2.2. Features

- 1. ARM base on Cortex-M4 kernel, and reliable TCP/IP protocol stack
- 2. Industrial working temperature range from -40C ~85C
- 3. Auto-MDI/MDIX,RJ45 port with 10/100Mbps
- 4. Support TCP server, TCP client, UDP, UDP server and HTTPD client work mode
- 5. One port corresponding to two socket
- 6. Support network printing via IP address
- 7. Function of Modbus gateway, modbus RTU to modbus TCP, modbus multi-host Polling
- 8. Two serial port, each port can work as RS232 or RS485 or RS422 and work individually
- 9. Distinguish which serial port connect to device via port number
- 10. Support virtual serial port and provide corresponding software USR-VCOM
- 11. Serial baud rate from 600bps to 230.4K bps; Check bit of None,Odd,Even,Mark and Space
- 12. Support static IP, DHCP/DNS and search devices within network through UDP broadcast.

13. Provide serial and network setting protocol, TCP/IP socket example code such as VB, C++ Delphi,Android,IOS

- 14. Built-in web page; Customized web page is acceptable
- 15. Reload button, one key to restore default settings
- 16. RJ45 with Link/Data indicator light, built-in isolation transformer and 2 KV electromagnetic isolation
- 17. The global unique MAC address bought from IEEE, also user can define MAC address
- 18. Upgrade firmware via network
- 19. Support web port revise (80 by default)
- 20. Keepalive, detect dead links and reconnect rapidly
- 21. Support account and password, used to page log in and network settings safely
- 22. Support one channel Web socket, realize bidirectional transparent transmission between web page



and serial side

- 23. Power supply in two mode, DC adapter or 5.08-2 terminal pin
- 24. Communication indicator light of two serial port: RX/TX
- 25. UPD broadcast function, can receive/send data to all IP in the same network

2.3. Basic Parameter

Parameter	Value
Input Voltage	DC5~36V
Working Current	90mA@5V
Operating Temp.	-40~+85°C
Power	<1W
Storage Temp.	-45~105°C, 5~95%RH

2.4. Dimension



mm



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2.5. Indicators and Dial switch

<Indicator light>



Indicator	Description
①Power Indicate power. It is on when power is s	
	Indicate working status. It twinkles when N520 works
2)Work	well. If it is on or off for a period, N520 works
	improperly, you should cut the power and restart.
③TX1	It twinkles when port 1 sends data



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④RX1	It twinkles when port 1 receive data
⑤TX2	It twinkles when port 2 sends data
6 RX2	It twinkles when port 2 receive data

<Dial Switch>

 \diamond For RS232 port, dial switch are down, such as the below picture.



♦ For RS485 port, dial switch are up, such as the below picture.



♦ For RS422 port, dial switch on the left are up, dial switch on the light are down,





2.6. DB9 Pin Definition



♦ For RS232 port, pin definition is as below

Pin	Definition
2	RX, pin of receives data
3	ТХ
5	GND
7	RTS
8	CTS

♦ For RS485 port, pin 3 works as "B(-)", Pin 7 works as "A+"

♦ For RS422 port

Pin	Definition
2	RX+, pin of receives data
3	RX-
5	GND
7	TX+
8	TX-



3. Product Function

The following is function diagram of USR-N520



USR-N520 Function Diagram

Each serial port corresponds to two socket: socket A and socket B. Socket B can be opened or closed.

3.1. Socket A Communication

3.1.1. TCP Client Model

4.1.1 TCP Client Mode

1) Different from UDP mode, in this mode, connection has status of disconnection and remaining.





Connection is still remained although USR-N520 does not send data.

- Identify disconnects. After connection built, it sends keepalive searching packet every 15 seconds. Once there is an interrupt, it can be detected rapidly then make USR-N520 disconnect from former connection and reconnect.
- 3) It will connect to same source port when USR-N520 try to connect server and local port is not "0".
- 4) It supports USR Synchronous baud rate (Similar RCF2217), which can revise USR-N520's serial parameter as baud rate accordingly. This function should be combined with USR-VCOM.
- 5) Under the same LAN, USR-N520 must be in the same network segment then can communicate. If not, USR-N520 must be set with right one.
- 6) Support USR Cloud.
- 7) Support Modbus TCP function.
- 8) USR-N520 work as TCP Client, it connects to TCP server, Destination IP and port should be cared. The IP can be device with same LAN, also can be different LAN or cross public network. If it connects to server cross public network, the server should have public IP.
- 9) USR-N520 work under TCP Client, It connects to the target IP/Port automatically, will not accept other connection request.
- 10) As TCP Client, need to set USR-N510's local port number to be "0 then it can visit server with randomized port number, so that it can solve unsuccessful re-connection in case server judge connection status abnormally and shield USR-N520 re-connection request.
- 11) Test Example
- Open "USR-TCP232-M4_E45 setup" software. Set USR-N520 as TCP Client, Destination IP: 192.168.0.95. Destination port:20108. Click "Save COM1", and search USR-N520.

Then check if the parameters are correct when USR-N520 is found.

evice IP	Device Name	MAC	Version			
92.168.0.7	USR-TCP232-410S	D8 B0 4C 11 22 33	3009	Baudrate: Parity/Data/Stop:	115200 • NONE • 8 • 1 •	(?) (?)
				FlowControl:	None V	(?)
				Work Mode:	TCP Client 💌	(?)
				RemoteIP:	192. 168. 0. 95	(?)
(🔍 Search Device	Cle	ear ARP table	Remote Port:	20108	(?)
- 10				Local Port:	0	(?)
📄 Open De	vice 🚫 Devic	Restart	actory Reset	TCP Server style:	Transparent transmi 👻	(?)
se Save				ModbusTCP:	None 🔻	(?)
	_			PackTime:	10 ms (0~255)	(?)
	IP Type: St.	atic IP 🔻 (?)		PackLen:	200 byte (0~1460)	(?)
	ModuleStaticIP:192	. 168. 0. 7 (?)		Synchronize ba	udrate (RFC2217	(?)
	SubnetMask: 255	. 255. 255. 0 (?)		Enable USR Clo	1d	(?)
	Gateway: 192	. 168. 0. 1 (?)		Device I	D 12345678901234567890	
	n 1	4 P C		Communication Coo	2 12040010	

Configuration



② Open "USR-TCP232-TEST" software:

Need to connect to PC's TCP Server, its IP: 192.168.0.95, Port number: 20108, Click "Listening"



TCP Client Test Screen shot

③ USR-TCP232-TEST software:

Configure serial parameter. Click to open the port. Test software network part shows connection message:192.168.0.7:49153(port# assigned randomly). Click "send", you can gain data from each side.



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COMSettings	COM port data receive	Network data receive	NetSettings
PortNum COM13 BaudR 115200 Daily NONE DataB 8 bit StopB 1 bit Close Recv Options Receive to file Atto Clear Send Options Data from file Auto Clear Input	<pre>http://en.usr.on http://en.usr.on http://en.usr.on</pre>	[Receive from 192, 168, 0, 7 : 49153] : Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	(1) Protocol TCP Server (2) Local host IP 192,168, 0,95 (3) Local host port 20108 ©: Disconnect Reco Options Receive to file V Add line return Receive As MEX Receive Pause Save Clear Send Options Data from file Auto Checksum Auto Clear Input
☐ Send As Hex ✓ Send Recycle	·	Peers: 192.168.0.7:49153 💌	Send As Hex Send Recycle
Interval 1000 ms	Jinan USR Technology Co., Ltd. Send	http://en.usr.on Send	Interval 1000 ms Load Clear

TCP Client Software Configuration

3.1.2. TCP Server Mode

- 1) Different from UDP, in this mode, connection has status of disconnection and remaining. Connection is still remained although USR-N520 does not send data.
- USR-N520 listens to local port set firstly, respond and build connection when there is a connection request. Serial port will send data to all client which connected with USR-N520 at the same time once serial port received data.
- 3) It supports USR Synchronous baud rate (Similar RCF2217), which can revise USR-N520 serial parameter as baud rate accordingly. This function should be combined with USR-VCOM.
- 4) It support 8 clients connections at max. (32 clients will be improved in the following.)
- 5) Support Modbus TCP function.
- 6) Under TCP Server mode, USR-N520 listens to local port actively and will not monitor connected IP and port. When the 9th client is connected, the oldest one will be ticked.
- 7) Test Example
- ① Set USR-N520 as TCP Server Mode, local port 23, same as default.
- ② Open "USR-TCP232-TEST" Software, on the side of NetSettings: Protocol: TCP Client

Server IP/Port: the same value as the default parameter of N520 $\,$

③ Click "Connect" to test data transmission.



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(F) Options(O) Hel	p(H)				
DMSettings	COM port data receive		Network data receive		NetSettings
PortNum COM1 💌					(1) Protocol
115200 V					TCP Client
					(2) Server IP
Paity NUNE					192.168.0.7
)ataB 8 bit 💌					(2) Server Pert
itopB 1 bit 💌					23
					1-4
🖲 Open					🕘 🔘 Connect
ecv Uptions					Kecv Uptions
Receive to file					Receive to file.
Add line return					Add line return
🗸 Receive As HEX					✓ Receive As HEX
Receive Pause					🔽 Receive Pause
<u>Save</u> <u>Clear</u>					Save <u>Clear</u>
and Ontions					Send Ontions
- D.4. 6 6:1.					E Data from file
Data from file					Thata from fife .
Auto Checksum					Auto Checksum
Auto Clear Input					Cond An Way
Send As nex					Send As nex
Send Accycle		- 1			J J J Send Recycle
Interval 1000 ms	Jinan USK lechnology Co., I+d	Send	nttp://en.usr.cn	Send	Interval 1000 ms
Load Clear	And to the			100 C	Load Clear

TCP Server Test Screenshot

3.1.3. UDP Client Mode

- 1) It subjects to UDP protocol, no connection, just only sending data.
- 2) USR-N520 only communicate with destination port of IP. Otherwise, the data cannot be received.
- 3) Under this mode, destination Address is 255.255.255.255, then it can make UDP broadcast and receive broadcast data. Broadcast within segment as 192.168.0.255, it can be sent but cannot be received currently.
- 4) Under UDP Client/ UDP Server mode, host PC allow data length 1460 bytes at max to USR-N520.
- 5) Test Example:
 - ① Open USR-TCP232-M4, E45 Setup Software: build a UDP firstly. PC's IP is 192.168.0.95. Port to be listened is 20108.
 - ② Open USR-TCP232-TEST Software: set USR-N520 as UDP Client, destination port: 20108.

③ Click "Send" at serial side. Remote IP and port becomes USR-N520's after receiving the data. Then click "Send" in network part and send data to COM.



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earch List [Ulick a device to r	ead parameters in th	e Search List] RS2	32 RS485 none		
Device IP Device Name	MAC	Version			
192.168.0.7 USR-TCP232-410S	D8 B0 4C C0 08 DB	3009	Baudrate:	115200 ~	(?)
			Parity/Data/Stop:	NONE ~ 8 ~ 1 ~	(?)
			FlowControl:	RS485 ~	(?)
			Work Mode:	udp 🗸	(?)
	ur offension		RemoteIP:	192. 168. 0. 95	(?)
🔍 Search Device		ar ARP table patible with	Remote Port:	20108	(?)
			Local Port:	0	(?)
📄 Open Device 🔤 Devic	e Restari 🥥 Fa	ctory Reset	TCP Server style:	Transparent transmi 🗸	(?)
ase Save			ModbusTCP:	None 🗸	(?)
			PackTime:	0 ms (0~255)	(?)
				 0 byte (0~1460)	(2)
IP Type: St	atic IP 🗸 (?)		PackLen:		
IP Type: St ModuleStatioIP	atic IP 🗸 (?) 2.168.0.7 (?)		PackLen: 🔽 Synchronize ba	udrate(RFC2217	(?)
IP Type: St ModuleStaticIP 192 SubnetMask: 255	atic IP v (?) 2.168.0.7 (?) 5.255.255.0 (?)		PackLen: ☑ Synchronize ba □ Enable VSR Clo	udrate(RFC2217 ud	(?) - (?)
IP Type: St ModuleStatioIP 193 SubnetMask: 255 Gateway: 193	atio IP (?) 2. 168. 0. 7 (?) 5. 255. 255. 0 (?) 2. 168. 0. 1 (?)		PackLen: Synchronize ba Enable USR Clo Device I	udrate(RFC2217	(?) - (?)
IP Type: St ModuleStatioIP 192 SubnetMask: 255 Gateway: 192	atic IP (?) 2.168.0.7 (?) 5.255.255.0 (?) 2.168.0.1 (?)		PackLen: Synchronize ba Fable USR Clor Device I Communication Cod	udrate(RFC2217 ud D	(?) - (?)

UDP Client Software Configuration



UDP Client Testing Screenshot



3.1.4. UDP Server Mode

- Base on normal UDP, it doesn't verify source IP address. Every time USR-N520 receive one UDP data packet, it changes destination IP to where data comes and it sends the data to the IP and port which communicate latest.
- 2) Test Example:
- ① Open "USR-TCP232-M4_ E45 Setup" Software: Set USR-N520 as UDP Server, local port: 23.

② Open "USR-TCP232-TEST" Software twice. Set work mode as UDP, remote IP and port same with USR-N520'.

Click "Send" then the COM receive data.

Click "Send" at serial side, only the software communicate latest can receive the data.

USR-TCP232-Test RS232	2 to Ethernet Convert tester		– 🗆 X
COMSettings PortNum COM13 V BaudR 115200 V DPaity NONE V DataB 8 bit V StopB 1 bit V Conse Receive to file V Add line return Receive As HEX Receive Pause Save Clear Send Options Data from file Auto Checksum Auto Clear Input	COM port data receive http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on	Network data receive [Receive from 192, 168.0.7 : 23]: Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	NetSettings (1) Protocol UDP (2) Local host IP 192,168, 0, 95 (3) Local host port 15000 (b) Disconnect Receive to file Add line return Receive As HEX Receive Pause Save Send Options Data from file Auto Checksum Auto Clear Input
Send As Hex ▼ Send Recycle Interval 1000 ms Load Clear	Jinan USR Technology Co., Ltd. S	RemoteIP: 192.168.0.7 Port: http://en.usr.on Send	23 Send AS flex ✓ Send Recycle Interval 1000 ms Load Clear
👉 Ready!	Send: 2700 Recv: 1232	Reset 💣 Ready! Send: 1	328 Recv: 2461 Reset

UDP Server Test Screenshot



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OMSettings	COM port data receive	Network data receive	NetSettings
PortNum COM13 ▼ BaudR 115200 ▼ Paity NONE ▼ DataB 8 bit ▼ StopB 1 bit ▼ ∲C Close	http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on	[Receive from 192.168.0.7 : 23] : Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	(1) Protocol UDP (2) Local host IP 192.168.0.95 (3) Local host pot 15001 © Disconnec
eev Options Receive to file ✓ Add line return Receive As HEX Receive Pause Save Clear	http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on	Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	Recv Options TReceive to file. Add line return Receive As HEX Receive Pause Save Clear
end Options Data from file Auto Checksum Auto Clear Input Send As Mex Sond Reguelo		RemoteIF: 192.168.0.7 Port: 23	Send Options Data from file . Auto Checksum Auto Clear Input Send As Hex Send Regula
✓ Sena necycle Interval 1000 ms	Jinan USR Technology Co., Ltd. Send	http://en.usr.on Send	Interval 1000 ms

UDP Server Test Screenshot

3.1.5. TCP and UDP Comparison

	ТСР	UDP
Advantages	Stable, no loss	No Connection mechanism, simple, flexible
	Reliable connection mechanism	Suit for small packet and high frequency
	Resend after data sending fails	Accurate data sending interval
Disadvantages	Long packet starting Jam for small packet and high frequency Inaccurate interval resulted from check and resend mechanism	More less under bad network environment

3.1.6. HTTPD Client

It is used to transmit data from USR-N520 to HTTP server or gain data from HTTP server.

USR-N520 can handle complex HTTP protocol so user just do programming for serial, and not need to worry about HTTP.

When USR-N520 sends data to HTTP server via serial port, it only needs to send the header of requested data; All the returned data will be transmitted by USR-N520, user need to analyze the packets.



Test Example:

1) Entry http://192.168.0.7 (N520's IP) to open its web page

- 1. SetUSR-N520 as HTTPD Client.
- 2. Set HTTPD packet Header.

firmware revision: \	v3009			<u> 由文</u> loqout
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	USR IOT -IOT Experts-	2 2 2	Be Honest,	Do Best!
Current Status		parameter		help
Local IP Config	Baud Rate:	115200 bps(600~1024000)		hue
RS232	Data Size:	8 V bit	2	32 and 485 can
R5485	Parity:	None <b>T</b>		15200bps
	Stop Bits:	1 V bit	• f	lowcontrol and
Web to Serial	Flow Control and RS485:	RS485 •		efault RS485
Misc Config	Local Port Number:	23	- 1	ocal port
Reboot	Remote Port Number:	80		CP Client, set
	HTTPD Client header(<180byte):	GET /1.php?data=\$ HTTP/1.1 Host: test.usr.cn		ise random local oort emote port ~65535 backet ime/length
	Remote Server Addr:	192.168.0.201	c c	lefault 0/0, neans automatic
	Timeout:	0 seconds (< 256, 0 for	no timeout)	packet
	UART packet Time:	0 ms (< 256)	c	an modify it as a
	UART packet length:	0 chars (<= 1460, 0 for	r no use)	ione-zero value
	Sync Baudrate(RF2217 similar):			
	Enable USR Cloud :			
	Device ID:			
	Communications Code -			*
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#### HTTPD Client Web page Configuration Screen shot

<Note>:

- HTTPD Client only support GET to request HTTPD Server. POST will be available in the following.
- GET/ is fixed packet header.
- 1.php?data= is the visited/submitted the page
- \$ stands for data sent by serial (Serial port does not need to send "\$")
- HTTP/1.1 is requested protocol.
- Host is means requested IP address/ domain.
- Enter twice



- 2) Save the parameters and restart USR-N520.
- 3) Open serial port to send data, then the data can be submitted onto our web page server.



HTTPD Client Test Screenshot

### 3.2. Socket B Communication

USR-N520 support double socket communication mode, socket A and socket B. One serial port corresponding to two socket communication mode can be realized through setting the parameter of socket B. But socket B is only used for transparent transmission and only worked as TCP client or UDP client.

Set USR-N520 as double socket communication mode, the data of serial port will be transparently transmitted to socket A and socket B at one time. When data comes from socket A and socket B simultaneously, USR-N520 will transmit the data of socket A to serial port firstly, and then transmit the data of socket B once the data of socket A finished.

Communication example:

1. Set the parameter of socket A and socket B by web page



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firmware revision: v	/3033	<u> 中文</u> <u>loqout</u>
^ر م	USR IOT Be Hone	est, Do Best!
Current Status	UART Packet Length: 0 chars (<= 1460, 0 for no use)	packet     time/length
Local IP Config	Sync Baudrate(RF2217 Similar): 🕑	default 0/0,
PORT1	Enable Uart Heartbeat Packet: 📃	packet
DODTO	Socket & Parameters	can modify it as a
PURTZ	None	none-zero value
Web to Serial	Remote Server Addr: 192.108.0.95	
Misc Config	Local/Remote Port Number: 23 23	
SNTP	timeout reconnection : 86400 seconds	
Reboot		
	Socket B Parameters	
	Work Mode: TCP Client 🔻	
	Remote Server Addr: 192.168.0.95	
	Local/Remote Port Number: 20105 20105	
	Save Cancel	
Copyright © 2009 -	2015 - JiNan Usr IOT Technology Limited	website: <u>www.usriot.com</u>

- 2. Set up socket A and socket B by "USR-TCP232-Test.exe", and open serial port which connects to server.
- 3. Click "Send" on the software, data will be transmitted from socket A and socket B to serial port.

ile(F) Options(O) Help	(H)			File(F) Options(O) He	lp(H)		
COMSettings	COM port data receive	Network data receive	NetSettings	COMSettings	COM port data receive	Network data receive	NetSettings
PortNum COM3 💌		济南有人科技有限公司	(1) Protocol	PortNum COM3 💌	http://www.usr.cn	济南有人科技有限公司	(1) Protocol
n			TCP Server 💌	P.mdp 115200 ▼	http://www.usr.on		TCP Server 💌
Bauun Interes		1	(2) Local host IP				(2) Local host IP
DPaity NUNE			192,168, 0 . 95	DPaity NUNE			192,168.0.95
DataB 8 bit 💌				DataB 8 bit 💌			(2) 1 11 1 1
Charp Thit T			(3) Local host port	Steep 1 hit 💌			(3) Local nost port
Stohe Line			120100				123
Open			Disconnect	· Close			🔅 Disconnect
Recv Options			Recv Options	Recv Options			Recv Options
TReceive to file			TReceive to file	🗌 🔲 Receive to file			T Receive to file.
Add line return			Add line return	Add line return			Add line return
Receive As HEX			Receive As HEX	Receive As HEX			Receive As HEX
Receive Pause			Receive Pause	Receive Pause			Receive Pause
				C			
Save Llear			Save Llear	Save Clear			Save Liear
Send Options			Send Options	Send Options	1		Send Options
🔲 Data from file			🔲 Data from file	🗖 Data from file			🔲 🔲 Data from file
🔲 Auto Checksum			🗖 Auto Checksum	🔲 Auto Checksum			🔲 Auto Checksum
🗌 Auto Clear Input			🗌 Auto Clear Input	🗌 🗖 Auto Clear Input			🔲 Auto Clear Input
Send As Hex			🔲 Send As Hex	🗌 Send As Hex			Send As Hex
Send Recycle	<u> </u>	Peers:  192.168.0.7:49158 💌	🔽 Send Recycle	🗌 🗌 Send Recycle	<u>I</u>	Feers:  192.168.0.7:49159 💌	🔲 Send Recycle
Interval 10 ms	济南有人科技有降	http://www.usr.c	Interval 10 ms	Interval 10 ms	济南有人科技有	http://www.usr.	Interval 10 ms
Ind Claw	司 Send	n Send	Load Clear	Load Clear	限公司 Send	on Send	Load Clear



### 3.3. USR-VCOM Application

It solve the transmission problem of traditional device PC software working as COM. USR-VCOM (Virtual com software) support receiving data from set COM and send serial data out as network.

How to connect USR-N520 with Virtual COM:

1. Set USR-N520 as TCP server

2. Open USR-VCOM software, click "Add COM' and select COM2 (Avoid existed COM).

Net Protocol: TCP Client

Remote IP and port is the same one with USR-N520

Remarks: Can write the name of device

3. Click "OK' to check whether connection is built. "Connected" sow ready for data transmission.

More details, please refer to http://www.usriot.com/?s=vcom

WISR-VCOM Virtual Serial Port Server V3.7.1.520	
Device(D) Tools(T) Options(O) Chinese Help(H)	
Add LOM De LOM Connect Reset Count Search Smart VCOM Quit	
Remarks COM Name Parameters COM State Net Protocol Remote IP Remote Port Local Port COM Received Net Received Net State	Reg ID CloudID
Add Virtual Serial Port       23         Virtual CDM:       CDM2         Net Protocol:       TCP Client         Remote IP/addr.       192168.0.7         Remote Port:       20108         Local Port:       8234         Remarks:       Device 1         OK:       & Cancel	

#### USR-VCOM Add a COM



www.usriot.com

4	QUSR-VCO	M Virtual Seri	ial Port Serv tions( <u>O)</u> C	er V3.7.1.520 hinese Help( <u>H</u> )									2 <b>—</b> 3	×
1	Add COM	Del COM	Connect	Reset Count	Monitor	Search Smart	/сом	Quit						
1	Bemarks	COM Name	Parameters	COM State	Net Protocol	Bemote IP	Bemote Por	t Local Port	COM Recei	ed Net Becei	ved Net State	Beg ID	CloudID	
l		COM2		Not used	TCP Client	192.168.0.7	23		0	0	Connected	0		

#### USR-VCOM Build Connection

### 3.4. Modbus Gateway

#### 3.4.1. Transmit modbus protocol in transparent mode

USR-N520 supports the transmission of modbus protocol in transparent mode

#### 3.4.2. Modbus RTU to Modbus TCP

USR-N520 support Modbus RTU to Modbus TCP, setting method as below:

- 1. Open USR-TCP232-M4,E45 Setup Software, set USR-N520 as TCP server or TCP client.
- 2. Select "ModbusTCP" on the red color
- 3. Click to save the parameter



www.usriot.com

earch List [	(L) Heip Click a device t	o read parameters	in the Search List]			
Device IP	Device Name	MAC	Version	Port1 Port2		
192.168.0.119	USR-N520	80 10 48 40 CD	C7 3033			
				Baudrate:	115200 🗸	(?)
				Parity/Data/Stop:	NONE $\sim$ 8 $\sim$ 1 $\sim$	(?)
				FlowControl:	None $\sim$	(?)
				Work Mode:	TCP Server $\sim$	(?)
				RemoteIP	192.168.0.201	(?)
C	👢 Search Devic		Clear ARP table	Renote Port.	23	(?)
			] Compatible with	Local Port:	23	(?)
📄 Open Dev	rice 💽 De	wice Restart	Factory Reset	TCP Server style:	Transparent transmi $\sim$	(?)
ase Save				ModbusTCP:	ModbusTCP $\sim$	(?)
				PackTine:	0 ms (0~255)	(?)
	IP Type:	DHCP/Auto II ~ (	?)	PackLen:	0 byte (0~1460)	(?)
	ModuleStaticIP	192.168.0.7 (	?)	C Supebropize be		(2)
	SubnetHask;	255.255.255.0 (	?)	Frahla ISB Clo	and are (arczzzz)	- (2)
	Gatewar	192 168 0 1	2)	Device 1	ED	
	SCORE AND ADD IN			Communication Co	de	

Modbus TCP Configuration

- 4. Check and verify Modbus RTU to Modbus TCP through modbus Poll and Modbus Slave
- 5. Setting modbus software is as below:



www.usriot.com

Modbus Slave - Mbslav1     —     —     X       File Edit Connection     Setup Display View Window       Help	聞 Modbus Poll - Mbpoll1 File Edit Connection Setup Functions Dis Connection Setup	− □ × plav View Window ×
□         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □         □	Connection Modbus TCP/IP	OK 2 2
Serial Port OTCP/IP OUDP/IP	Serial Settings CDM1	Mode
Port 3 V ASCII	9600 Baud ~ 8 Data bits ~	Response Timeout 1000 [ms]
8 Data bits CTS RTS Toggle 1 [ms] RTS disable delay	Even Parity V 1 Stop Bit V	Delay Between Polls 20 [ms]
None Parity         TCP/IP           1 Stop Bit         Port         502         Ignore Unit ID	Bemote Modhus Server IP Address or Node Name	
0         0           7         0           a         0	192.168.0.7           Server Port         Connect Timeout           23         3000         [ms]	✓ ✓ ● IF v4 ○ IP v6
o         o           q         0           For Help, press F1.         Port 3: 115200-8-N-1	For Help, press F1. [192.168.0.7]:	23

6. Click OK once configuration finished, update the data of modbus slave and modbus data will also be updated.

File Edit	s Slave - Mbslav Connection Se	1 — □ etup Display View Windo	× 웹 Modb w File Edit Help	us Poll - Mbpoll1 Connection S	etup Functions	Display	/ View	□ Windo	×
	<b>8</b>  □ <u>₹</u>	1 <b>? N?</b>		I @   <mark>×</mark>   □	見直 几 05	i 06 15	16 17	22 23	TC 👂
🔛 Mbslav	1		Mbpc						
ID = 1: F =	= 03		Tx = 199	1: Err = 22: ID =	1: F = 03: SR =	1000m	s		
	Alias	00000		Alias	00000				
0		2	0		2				
1		5	1		5				
2		O	2		0				
3		0	3		0				
4		0	4		0				
5		0	5		0				
6		0	6		0				
7		0	7		0				
8		0	8		0				
9		0			0				

### 3.4.3. Modbus Active Query Function

Modbus active query function can be realized through the serial heartbeat packet function of USR-N520.

1. Open serial heartbeat packet function via web page, query command is heartbeat packet data, example:



www.usriot.com

firmware revision:	V3033		<u> TRADUC</u>
۲	USR IOT -IOT Experts-	Be Hones	t, Do Best!
Current Status		parameter	help
Local IP Config	Baud Rate:	115200 bps(600~230400)	local port
PORT1	Data Size:	8 V bit	1~65535. when
PORT2	Parity: Stop Bits:	None V	this to 0 means use random local
Web to Serial	Flow Control:	None T	port
Misc Config	UART Packet Time:	0 ms (< 256)	<ul> <li>remote port 1~65535</li> </ul>
SNTP	UART Packet Length:	0 chars (<= 1460, 0 for no use)	<ul> <li>packet time/length</li> </ul>
Reboot	Sync Baudrate(RF2217 Similar): Enable Uart Heartbeat Packet:	<ul> <li>Image: A state of the state of</li></ul>	default 0/0, means automatic packet
	Uart Heartbeat Packet:	0103000000AC5CD	mechanism; you can modify it as a
		HEX: 🗹 ASCII: 📄	none-zero value
	Beat Time:	0 seconds (< 65536)	
	Socket A	Parameters	
	Work Mode:	1CP Server • Modbus 1CP •	
	PRINT:		
	ModbusTCP Poll:	Poll Timeout : 200 (0~65536ms)	
	Enable USR Cloud:		
	Enable Net Heartbeat Packet:	•	
	Registry Type:	None	

2. Set modbus slave software, refer to the following:



www.usriot.com

anastian Catur		~
Connection Setup		ОК
Port 3 v		Cancel
115200 Baud 🖂	Flow Control	
3 Data bits 🛛 🗸	DSR CTS	S disable delay
None Parity 🔍 🗸		
1 Charle Dill and	Port 502	U.a.ID

### 3. Return result for query command is as drawing:

232 to Ethernet Convert tester		– 🗆 X
(H)		
Network data receive		NetSettings
01       03       14       00       01       00       02       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       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       00       00       00       00       00       00       00       00       00       00       00       00       00 <td< th=""><th></th><th>(1) Protocol TCP Client (2) Server IP 192,168.0.7 (2) Server Port 23 © Disconnect Receive to file V Add line return V Receive As HEX Receive Pause Save Clear</th></td<>		(1) Protocol TCP Client (2) Server IP 192,168.0.7 (2) Server Port 23 © Disconnect Receive to file V Add line return V Receive As HEX Receive Pause Save Clear
LocalHost <b>192.168. 0 .95</b> Port 61089 http://www.usr.on	Send	Send Options Data from file Auto Checksum Auto Clear Input Send As Hex Send Recycle Interval 10 ms Load Clear
¦∉ Ready!	Send: 0	Recv : 250 Reset



#### 3.4.4. Modbus Polling Function

USR-N520 support modbus polling function under TCP server mode. Set USR-N520 as Modbus Poll, support multiple host polling to check parameter.

- 1. Multiple host polling is realized through virtual com.
  - ① Set parameter of USR-N520 via web page, make sure to select ModbusTCP Poll and set overtime

firmware revision:	v3033	<u>中文</u> logout
<b>1</b>	USR IOT -IOT Experts-	onest, Do Best!
Current Status Local IP Config PORT1 PORT2 Web to Serial Misc Config SNTP Reboot	UART Packet Length: 0 chars (<= 1460, 0 for no use) Sync Baudrate(RF2217 Similar): Enable Uart Heartbeat Packet: Socket A Parameters Work Mode: TCP Server V None V Local/Remote Port Number: 23 23 Net Buffer: PRINT: PRINT: ModbusTCP Poll: Poll Timeout : 200 (0~65536ms) Enable USR Cloud: Enable Net Heartbeat Packet: Registry Type: None V Socket B Parameters Work Mode: NONE V Save Cancel	packet time/length default 0/0, means automatic packet mechanism; you can modify it as a none-zero value
Copyright © 2009 -	- 2015 · JiNan Usr IOT Technology Limited	website: <u>www.usriot.com</u>

② Open virtual com softarae to setup servel ports and connects to USR-N520



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Device(D)       Tools(T)       Options(O)       Chinese       Help(H)         Image: Add CDM       Image: Connect Help(H)       Image: Connect Help(H)       Image: Connect Help(H)         Remarks:       COM Kame       Presence For Local Port       COM Port COM Reserved Net Reserved Net State       Reg (D)         COM5       Notuced       TCP Cleret       132:168:07       23       -       0       0       Connected       0         COM4       Notuced       TCP Cleret       132:168:07       23       -       0       0       Connected       0         COM4       Notuced       TCP Cleret       132:168:07       23       -       0       0       Connected       0         COM4       Notuced       TCP Cleret       132:168:07       23       -       0       0       Connected       0         CDM4       Notuced       TCP Cleret       132:168:07       23       -       0       0       Connected       0         CDM6       Net used       TCP Cleret       132:168:07       23       -       0       0       Connected       0	USR-VCOM Virtual Serial Port Server V3.7.1.520	↔		×
Remarks         CDM Name         Parameters         CDM State         Not used         TCP Clement         132188.07         23	Device(D) Tools(T) Options(O) Chinese Help(H)			
	Remarks         COM Name         Parameters         COM State         Net Protocol         Remote IP         Remote Pot         Local Pot         COM Received         Net Received         Net State           COMS         Not used         TCP Client         192 (58.0.7)         23          0         0         Connected           COM3         Not used         TCP Client         192 (58.0.7)         23          0         0         Connected           COM4         Not used         TCP Client         192 (58.0.7)         23          0         0         Connected           COM4         Not used         TCP Client         192 (58.0.7)         23          0         0         Connected           CDM6         Not used         TCP Client         192 (58.0.7)         23          0         0         Connected           CDM6         Not used         TCP Client         192 (168.0.7)         23          0         0         Connected	Reg ID 0 0 0 0 0	CloudID	

 $\odot$  Open modbus slave software, choose the serial port which connected with USR-N520. Run modbus Poll software and make port-forwarding with this serial port.

④ The value of modbus poll will also be changed when you revise the value of modbus slave.

3 M. 🗆 🖸		27 1	ŵd 🗖		월길 M		8	뀝	M		-	Wo 🗆 🛙	a 🛛 🕅	-	M	- 0	23
File Edit Connection Display Vi	Setup	File Setu Disp	Edit Cor p Functio lav View	nnection ns	File Conr Funct	Edit lection tions D	Setup isplay	File Co Fu	e Edit nnection nctions	Setup Display	Fil Se	le Edit Co etup Functio isplay View	nnection ns	Fi	le I gnne	Edit ection	Setup
Window H	lelp	Wind	low Help		View	Windo	w	Vie	ew Win	dow	W	findow Help		V	iew	Windo	w
0 🖨 🖬	801		28	X	Help			He	lp			) 🚅 🔒 🖨	X	н	elp		Part.
ID = 1: F =	1	Tx :	Mb 📼 = 703: Err	= 28: ID =		⊯	.rr = 28:		) 🛋 🖬 Mbpol × = 842:	🖨   🗙   🕻  1   Err = 30:	E.	S Mbpoll1 x = 857: Err	= 35: ID			₽ ₽ € Ibpoll1 732: E	<b>}   ×</b>   rr = 27:
Alia	s 00000		Alias	00000								Alias	00000			1000100	
0	0	0		0		Alias	00000	II-	Alias	00000		0	0			Alias	00000
1	0	1		0	0		0		0	0		1	0		0		0
2	5	2		5	1		0		1	0		2	5		1		0
3	7	3		7	2		5		2	5		3	7		2		5
4	0	4		0	3		7		3	7		4	0		3		7
5	12	5		12	4		0		4	0		5	12		4		0
6	6	6		6	5		12		5	12		6	6		5		12
7	0	7		0	6		6		6	6		7	0		6		6
8	0	8		0	7		0		7	0		8	0		7		0
9	0	9		0	8		0		8	0		9	0		8		0
					9		0		9	0					9		0
For Help, pre	ess F1.	For H	elp, press	F1.	For H	elp, pres	is F1.	For	Help, pr	ess F1.	Fo	r Help, press	F1.	Fo	r He	lp, pres	s F1.

- 2. Conduct Modbus Polling through Modbus TCP to Modbus RTU
  - ① Set USR-N520 via software, select Modbus TCP



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		o read parameter	s in in	e Search Listj	Port1	Port2				
Device IP	Device Name	MAC		Version						
192.168.0.119	USR-N520	80 10 48 40 0	CD C7	3033	Bau	drate:	115200	~	(?)	
					Par	ity/Data/Stop:	NONE	~ 8 ~ 1 ~	(?)	
					Flo	Control:	None	~	(?)	
					Worl	k Mode:	TCP Ser	ver 🗸	(?)	
					Ren	steIP:	192.168	0.201	(?)	
C	🔾 Search Device		Clea	ar ARP table patible with	Ren	ote Port	23		(?)	
	_				Loc	al Port:	23		(?)	
📄 Open De	rice 💽 De	wice Restart	🥥 Fa	otory Reset	TCP	Server style:	Transpa	rent transmi $\sim$	(?)	
ase Save					Mod	busTCP:	ModbusT	CP 🗸	(?)	٦
					Pac	Time:	0	ms (0~255)	(?)	
	IP Type:	DHCP/Auto II $\sim$	(?)		Pac	Len:	0	byte (0~1460)	(?)	
	ModuleStaticIP	192.168.0.7	(?)			Synchronize ba	udrate(RF	C2217	(?)	
	SubnetHask:	255.255.255.0	(?)			Inable USR Clo	ud		(?)	
		192.168.0.1	(?)			Device I	D			
		192.168.0.1	(?)							

② Open modbus slave software, choose the serial port which connected with USR-N520. Run modbus polling softare to select network mode and connect with USR-N520.

③ The value of modbus poll will also be changed when you revise the value of modbus slave.

File Edit	File Edit	File Edit	File Edit	File Edit	File Edit
Connection	Connection	Connection	Connection	Connection	Connection
Setup Display	Setup Functions	Setup Functions	Setup Functions	Setup Functions	Setup Functions
View Window	Display View	Display View	Display View	Display View	Display View
Help	Window Help	Window Help	Window Help	Window Help	Window Help
D 🚅 🖬 🎒 [	D 🚅 🖬 🎒 🗙		🛛 🗅 🖻 🖥 🎒 🗙	D 🗃 🖬 🎒 🗙	0688
				M	M
ID = 1: F = 03	T× = 956: Err = 0:	Tx = 885: Err = 0:	Tx = 581: Err = 1:	Tx = 441: Err = 2:	Tx = 375: Err = 0:
Alia 2000	Alias 10000	Alias 00000	Alias 00000		Al'
Allas J000	Allas 10000		Allas 00000	Alias 00000	Allas 00000
0 0	0 0	0 0	0 0	0 0	0 0
1 2	1 2	1 2	1 2	1 2	1 2
2 0	2 0	2 0	2 0	2 0	2 0
3 0	3 0	3 0	3 0	3 0	3 0
4 0	4 0	4 0	4 0	4 0	4 0
5 0	5 0	5 0	5 0	5 0	5 0
6 0	6 0	6 0	6 0	6 0	6 0
7 0	7 0	7 0	7 0	7 0	7 0
8 0	8 0	8 0	8 0	8 0	8 0
9 0	9 0	9 0	9 0 '	9 0	
For Help, press F	For Help, press F1	For Help, press F:	For Help, press F1	For Help, press F1.	For Heip, press F1.

3. Modbus Polling supports 8 host query for the most, more in the near future. Need set polling time properly when using modbus polling function. If polling interval is too shot and baud rate is too low for the process of



polling command which might lead to conflict between command circle and polling time.

### 3.5. Value-added Functions

#### 3.5.1. DHCP

DHCP is obtaining IP address automatically. USR-N520 IP obtaining have 2 types: DHCP and static IP. It is static IP192.168.0.7 by default.

DHCP is effective after change to DHCP and restart. When USR-N520 connects to router or device assigning IP, it require IP address from host within network, which takes about 5-15 seconds. Then you can search N520's IP address. It is convenient for setting different IP address in different environment.

<Note> Don't set DHCP when USR-N520 connected to PC directly because generally PC don't have the ability of assigning IP. Otherwise, USR-N520 cannot transmit data normally, but wait for IP.

#### 3.5.2. DNS

USR-N520 access the domain name or dynamic domain name when work under Client mode. The length of domain name must be less than 30 bytes .USR-N520 will analysis the domain name constantly if cannot connect to destination server.

When server's IP address is dynamics, DNS make USR-N520 ' parameter no changes if according IP doesn't change no matter how server IP address changes.

### 3.5.3. Self-Defined Heartbeat Function

USR-N520 supports heartbeat function. Heartbeat is divided into network heartbeat and serial port heartbeat.

① Set Network heartbeat through web page



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firmware revision: \	/3033		中文 logout
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	USR IOT -IOT Experts-	Be Hone	st, Do Best!
Current Status	UART Packet Length:	0 chars (<= 1460, 0 for no use)	packet time/length
Local IP Config	Sync Baudrate(RF2217 Similar):		default 0/0, means automatic
PORT1	Enable Uart Heartbeat Packet:		packet
PORT2	Socket A Work Mode:	TCP Server V None V	can modify it as a
Web to Serial	Local/Remote Port Number:	23 23	none-zero value
	Net Buffer:		1
Misc Config	PRINT:		
SNTP	ModbusTCP Poll:	Poll Timeout : 200 (0~65536ms)	
Reboot	Enable USR Cloud:		
	Enable Net Heartbeat Packet:		
	Net Heartbeat Packet:	www.usr.cn	
		HEX: ASCII:	
	Beat Time:	2 seconds (< 65536)	
	Registry Type:	None 🔻	
	Socket B	Parameters	
	work Hode.		
		Save Cancel	
Copyright © 2009 -	2015 · JiNan Usr IOT Technology Li	imited	website: www.usriot.com

Drawing 26 - Self-Defined Heartbeat Function



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DMSettings	COM port data receive		Network data receive	NetSettings
COM3 -			www.usr.cn	(1) Protocol
115200 -			www.usr.cn	TCP Client
audR 115200			www.usr.cn	(2) Server IP
Paity NONE 💌			www.usr.cn	192 168 0 7
lataB 8 bit 👻			www.usr.cn	1132,100, 0 , 7
			www.usr.cn	(2) Server Port
			www.usr.cn	23
Close			www.usr.cn	Disconnec
<u> </u>			www.usr.cn	, Disconnee
cv Options			www.usr.cn	Recv Options
Receive to file				🗌 🗖 Receive to file
Add line return				Add line return
Receive As HEX				Receive As HEX
Receive Pause				Receive Pause
Class.				Sere Clear
ave <u>crear</u>				Save Clear
nd Options	1			Send Options
Data from file				Data from file
Auto Checksum				Auto Checksum
Auto Clear Input				Auto Clear Innu
Send As Hex				Send As Hex
Send Recycle				Send Recycle
	这南有人利坊有限公司		1	
nterval 10 ms		Canad		Interval 10 ms

3.5.4. Self-Defined Registration Package Function

USR-N520 supports self-defined registration package function and also supports to send self-defined registration package after connection establishment, meanwhile, it supports to send registration package when sending data. One example as blow:

① Configure the relevant parameters via web page



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	USR IOT -TOT Experts-	Be Hones	st, Do Best
irrent Status	Stop Bits:	1 V bit	use random local
cal IP Config	Flow Control:	None 🔻	remote port
रग1	UART Packet Time:	0 ms (< 256)	1~65535
כדכ	UART Packet Length:	0 chars (<= 1460, 0 for no use)	 packet time/length
N12	Sync Baudrate(RF2217 Similar):		default 0/0,
b to Serial	Enable Uart Heartbeat Packet:		packet
c Config	Corket A	Disementare	mechanism; you can modify it as a
IP	Work Mode:	TCP Client Vone	none-zero value
xoot	Remote Server Addr:	192.168.0.95	
	Local/Remote Port Number:	23 23	
	Net Buffer:		
	PRINT:	8	
	ModbusTCP Poll:	Poll Timeout : 200 (0~65536ms)	
	Enable USR Cloud:		
	Eachie Net Vesstheet Reducts		
	Registry Type:	Sended when connected *	
	Net Registry Packet:	www.usr.cn	
		HEX: 📄 ASCII: 🕑	
	Socket B	Parameters	
	Work Mode:	NONE •	
		Save Cancel	

② Testing result:

COMSettings	COM port data receive		Network data receive	NetSettings
PortNum COM3 BaudR 115200 DPaity NONE DataB 8 bit StopB 1 bit			www.usr.cn	(1) Protocol TCP Server (2) Local host IP 192,168, 0,95 (3) Local host port 23 • • Disconnect
teov Options Teoeive to file Add line return Receive As HEX Receive Pause Save Clear				Recv Options Receive to file. Add line return Receive As HEX Receive Pause Save Clear
end Options Data from file Auto Checksum Auto Clear Input Send As Mex Send Recycle				Send Options Data from file Auto Checksum Auto Clear Input Send As Hex Send Recycle
Interval 10 ms	济南有人科技有限公司	Send	Peers: 192.168.0.7:23 -	Interval 10 ms



3.5.5. Web to serial

Web to serial function can make interaction between webpage and serial.

- 1. Set port 6432 as default.
- 2. Open webpage and click "web to serial". It pops up "connect success" then can send/receive data. Open USR-TCP232-TEST Software, configure serial parameter and click "Open".
- 3. Click "send ASCII data", COM can receive data. Click "Send" in TEST Software, webpage can receive data.

← → 🗙 🗋 192.168.0.7				☆ 🕥 🔳
	firmware revision: v3009	192.168.0.7 says: × connect success!	nest, Do Best!	*
	-IOT Experts- Current Status Local IP Config RS232 RS485 Web to Senial Misc Config Reboot	OK Websocket connection: 0 Receive hex data	help * • web to serial this page use websocket to transmit data between webpage and uart	
		send ascii data send hex data clear		
192.168.0.7/websocket.shtml			• • • • • • • • • • • • • • • • • • •	

Web to Serial Webpage



	USR-N520	User Manual	www.usriot.con
📕 ᄎ USR-TCP232-410	s ×		
i 🏧 小包 W 税号 ! firmware revision:vi	嗮 TNT <mark>一</mark> DHL 📴 電源 🏠 大附件 <mark>🏂</mark> 一达 3009	通 🔽 小包跟踪 <mark>—</mark> DHL发件 🚺 海关数	据 <mark>G</mark> Google 🗋 UKW 中文 logout
	USR IOT -IOT Experts-	Be Hone	st, Do Best!
Current Status	paramet	ter	help
ocal IP Config	Websocket con	nection: 0	 web to serial
IS232 IS485	Receive hex data		this page use websocket to transmit data between webpage
leb to Serial isc Config			and uart
eboot	send ascii data send	l hex data clear	
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Web to Serial COM Send/Receive Data



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Web to serial test

Web to serial needs user's webpage programming ability. Design webpage, request own device's data and process data then reveal the results on webpage. According to chapter4.1.17 Customized Webpage, can download revised webpage into USR-N520.

```
1. Build a connection and connect to USR-N520
        function connectx(){
        try{
        socket=new WebSocket('ws://'+window.location.host+':6432');
        socket.binaryType = "arraybuffer";
        }catch(e){
        alert('error');
        return;
       }
        socket.onopen = sOpen;
        socket.onerror=sError;
        socket.onmessage=sMessage;
        socket.onclose=sClose
        }
2. Receive Data Function
        function sMessage(msg)
3. Send data function
       function send()
```



3.5.6. Customized Webpage

User can make revision as LOGO/NAME on the basis of USR-N520's webpage to realize the personalized applications.

- 1. Download Upgrade
- 2. http://www.usriot.com/e45-m4-seriesk3-self-defined-webpage/
- 3. Revise webpage code

4. Open "UpgradeHtml.exe", set USR_N520' IP, Select product M4 and upload revised webpage file. Then upgrade.

hinese			
Destination IP	192.168.0.7		
Select Product	☞ M4	⊂ E45	
Select Path	E:\M4\TivaWare_	_C_Series-2.1.0.12!	
	Upgrade		

Customized Webpage Upgrade

3.5.7. Network Printing Function

Network printing function is similar to printer server, it can be realized by the previous serial printer through the existed printing driver.

Testing Method:

① Configure the parameter, set work mode as "TCP Server", local port number "9100", and have to choose "Net Buffer" and "PRINT". Others do not need to be chosen.



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TIRMware revision: V	USR IOT Be H	Ionest, Do Best!
Current Status	parameter	help
Local IP Config PORT1 PORT2 Web to Serial Misc Config SNTP Reboot	Baud Rate: 115200 bps(600~230400) Data Size: 8 ▼ bit Parity: None ▼ Stop Bits: 1 ▼ bit Flow Control: None ▼ UART Packet Time: 0 ms (< 256) UART Packet Length: 0 chars (<= 1460, 0 for no use) Sync Baudrate(RF2217 Similar): ♥ Enable Uart Heartbeat Packet: □ Socket A Parameters Work Mode: TCP Server ▼ None ▼ Local/Remote Port Number: 9100 23 Net Buffer: ♥ PRINT: ♥ ModbusTCP Poll: □ Poll Timeout : 200 (0~65536ms)	 local port l~65535. when TCP Client, set this to 0 means use random local port remote port 1~65535 packet time/length default 0/0, means automatic packet mechanism; you can modify it as a none-zero value
	Enable USR Cloud: Enable Net Heartbeat Packet: Registry Type: None Socket B Parameters	
	Work Mode: NONE	

② Set Printer Driver





C Lenovo M1851 Properties	×
General Sharing Ports Advanced Color Managem Image: Color Mill Enovo Mill Print to the fc Available port types: Port Color Managem Color Mill Enclored Port COM4: Color Managem COM4: Cocal Port COM4: Color Mill COM6: COM7: FIFE: 92.16 Managem Delete Port Add Port Delete Port Enable bidirectional support. Enable printer pooling	Add Standard TCP/IP Printer Port Wizard Welcome to the Add Standard CCP/IP Printer Port Wizard This wizard helps you add a port for a network printer. Before continuing be sure that: 1. The device is turned on. 2. The network is connected and configured. To continue, click Next.
	OK Cancel Apply Help

Click next and input the USR-N520'IP address, then keep clicking next til finished

③ Serial port connects to the printer, open a word file to print

Standard TCP/IP Printer Port Wiza	rd	Detecting TCP/IP port Windows is detecting the TCP/IP port and will move to	Add Standard TCP/IP Printer Port	: Wizard	
Id port For which device do you want to ac	d a port?			Completing t Printer Port	the Add Standard TCP/IP Wizard
Enter the Printer Name or IP ad	dress, and a port name for the d			You have selected a	pert with the following characteristics.
		Detecting the TCP/IP port Windows will automatically move to the pert p		CNIME-	No
Printer Name or IP Address:	192.168.0.7	windows win automatically move to the next pr		Protocol:	RAW, Post 9100
Port Name:	192,168,0,7,1			Device:	192. 168 0. 10
ron Name.		x		Port Name:	192.168.0.10
		Sec. Sec. Sec. Sec. Sec. Sec. Sec. Sec.		Adapter Type:	Generic Network Card
		1		To complete this wiz	and click Frish.
	1				< Back Linjah Cancel
			< Back Next >	Cancel	
	< <u>B</u> ack	Next > Cancel			

3.5.8. Serial Port Packaging Mechanism

USR-N520 can configure serial port packaging time and serial port packaging length. USR-N520 will make packaging for the data of serial port according to the packaging length and packaging time in the transparent





transmission mode.

Example for judgment of packaging time and packaging length:

① Set packaging time as 10ms, packaing length as 512 bytes

When serial port received data, USR-N520 will package and send it to network if the interval time of receiving data is over than 10ms or data length is more than 512.

2 If the value of packaging time or packaging length is 0, the packaging rule is effective for non-zero one.

③ Set packaging time and length as 0. USR-N520 will conduct default packaging time when packaging time is set as 0ms. Namely, when serial port receiving data, USR-N520 will package and send the data to network if interval time more than packaging time of sending 4 bytes. For example, baud rate 115200, packaging time for 4 bytes is T=0.4ms, when the calculated value is smaller than 0.1ms, packaging time can be calculated as 0.1ms.

T= 1/baud rate*10*4

3.5.9. Flow Calculation

When USR-N520 receives data from network and then send to serial port, as the limit of serial port speed, user have to control the flow, if not the problem of data overflow on serial port side will occur. So data flow is required to calculated when sending data from network to serial port.

Example:

Network sends data in m bytes every n seconds. Method of checking if there is overflow: (Supposed network condition is good and network data transmission time is negligible)

① If there is no overflow, m bytes data must be transmitted within n seconds, then the transmitting time of M bytes data:

$$T = \frac{1}{\text{Baud Rate}} * 10 * \text{m}$$

If n >2T, then data will not overflow, USR-N520 can work normally. Just need keep n>T under baud rate 9600.

3.5.10. Synchronous baud rate (RFC2217)

For encryption during data transmission, devices change data bytes, baud rate, parity and so on. USR-N520 supports revise serial parameter accordingly.



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Synchronous baud rate is named RFC2217. USR Similar RFC2217 make adjustments on the basis of RFC2217 protocol to improve accuracy of transmission.

Name	Packet Header	Baud Rate	Bytes parameter	Parity
Bytes	3	3	1	1
Explanation	reduce misjudgment	High is in front, smallest is 600(00 02 58)	data bytes, baud rate, parity	Remove 4 bits of header and ignore the high bit
(115200, N,8,1)	55 AA 55	01 C2 00	03	46
(9600,	55 AA 55	00 25 80	03	28

Protocol length is 8 bytes. And values taken for example is in HEX:

Serial parameter bit:

N,8,1)

Bit #	Explanation	Value	Description
1.0		00	5 bits
	Data hit coloction	01	6 bits
1.0		10	7 bits
		11	8bits
2	Stop Dit	00	1 bit
2		01	2bits
2	Darity Enable	00	Disable Parity
5		01	Enable Parity
		00	ODD
5.4	Parity Type	01	EVEN
5.4	Failty Type	10	Mark
		11	Clear
8:6	NC	000	0

Using methods:

- 1. USR-TCP232-M4,E45 Setup software, click "Synchronous baud rate (RFC2217)".
- 2. When serial parameter changes is needed, it send RFC 2217 packet. USR-N520 receive the command from network and revise serial parameter accordingly.



3.5.11. KeepAlive

When USR-N520's network is abnormal, it can judge the status in time and disconnect. And connect to server once network recovers.

3.5.12. Device ID

The function have 2 types: send ID once connection and send ID once sending data. It is used to condition that need register packet or need packet header/tail for normal transmission.

3.5.13. Webpage Port

USR-N520 has built-in webpage server and the port is 80. Also the port can be revised and visit the web via revised port.

3.5.14. Revise MAC

User can check software's MAC address. USR-N520 MAC is Globally Unique. Also it support customized MAC.

3.5.15. Firmware Upgrade

Firmware upgrade is fulfilled via network. For details, please refer to Chapter 5.1 configure parameter with configuration software.

3.5.16. Hardware Flow Control RTS/CTS & XON/XoFF

RTS/CTS: USR-N520 supports serial RTS/CTS Hardware flow control function. It is disabled by default. Don't enable it if device doesn't support Hardware flow control. This function is only run under RS232 port.

XoN/XoFF: USR-N520 support software flow control function. It is disabled by default. It can be selected under RS232 port or RS422 port.

3.5.17. Reload

Cut off power firstly. Press "reload" and supply power. Then keep pressing reload for 5 seconds.





Reload

4. Setting Protocol

USR-N520 includes two protocol: network setting protocol and serial port setting protocol.

4.1. Network Setting Protocol

4.1.1. Set Parameter Process

1. Build SOCKET:

Build UDP SOCKET, destination IP: 55.255.255.255, destination port: 1901. Low is in front.

- 2. Setting command process:
 - ① The network send searching command
 - ② USR-N520 returns IP address and MAC
 - ③ The network read USR-N520's parameter

④ Organize setting command according to MAC, known user name/password and parameter to be configured.

- 5 Send setting command
- 6 USR-N520 returns "correct setting"
- ⑦ Host PC send "save setting" command
- ⑧ USR-N520 returns "correct"
- 9 Restart command
- 10 USE-N520 returns "correct setting"

4.1.2. Setting Command Content

Command Look-up List:

Function	Header	Length	command	MAC	User name	Parameter	Parity
				(6 bytes)	/password		(sum)
					(12bytes)		



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search	FF	01	01	-	-	-	02
reset	FF	xx	02	[MAC]	[usrname]	-	xx
					[password]		
read	FF	хх	03	[MAC]	[usrname]	-	XX
settings					[password]		
Save	FF	хх	04	[MAC]	[usrname]	-	XX
settings					[password]		
Basic	FF	хх	05	[MAC]	[usrname]	Basic	xx
settings					[password]	parameter	
Com 0	FF	хх	06	[MAC]	[usrname]	СОМ	xx
settings					[password]	parameter	
Com 1	FF	хх	07	[MAC]	[usrname]	СОМ	xx
settings					[password]	parameter	
Com 2	FF	хх	08	[MAC]	[usrname]	СОМ	xx
settings					[password]	parameter	
USR			0x10	[MAC]	[usrname]		
Cloud					[password]		

Notice: Check bit is sum check, starts from length byte (including length) to adding before checking (not including checking), result is check value, only low byte is remained.

1. Command examples

① Search command example

Search command is set to:

FF 01 01 02

Sum check: 02 = 01 + 01

② Reset command example

FF 13 02 d8 b0 4c 00 04 c9 61 64 6d 69 6e 00 61 64 6d 69 6e 00 c8

Sum check:

C8 = 13 + 02 + ... + 6E + 00

User name and password both are 5 bytes+00 bits 0 for the lack.

③ Read settings command example

Send (16 bytes): FF 13 03 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 F9

④ Save reading settings command example

Send (16 bytes): FF 13 04 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 FA

- 2. Some commands detailed annotation
 - ① Basic setting parameter command



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Basic Parameter:

Name	Byte	Example	Explanation
ucSequenceN um	1	xx	Write the read values
ucCRC	1	ХХ	Write the read values
ucVersion	1	ХХ	Write the read values
ucFlags	1	80	IP address type: 0 in 8 th bit: DHCP;1 in 8 th bit: Static IP
usLocationUR LPort	2	20 19	Write the read values
usHTTPServer Port	2	50 00	HTTP server port
ucUserFlag	1		Write the read values
ulStaticIP	4	38 00 A8 C0	Static IP
ulGatewayIP	4	01 00 A8 C0	Gateway
ulSubnetMask	4	00 FF FF FF	Subnet Mask
ucModName	16	55 53 52 2D 54 43 50 32 33 32 2D 45 00 00 00 00	USR-N520 name
username	6	61 64 6D 69 6E 00	username
password	6	61 64 6D 69 6E 00	password
ucNetSendTim e	1		Write the read values
uild	2	01 00	Device ID
ucldType	1	0	Device ID type (0~3) 0:no use 1:send id when connect 2:send id when send data 3:both
ucUserMAC	6	FF FF FF FF FF FF	MAC
ucReserved	8		Unused

Example:

FF 56 05 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 61 66 03 80 20 19 50 00 02 07 00 A8 C0 01 00 A8 C0 00 FF FF FF 55 53 52 2D 54 43 50 32 33 32 2D 45 34 35 00 00 61 64 6D 69 6E 00 61 64 6D 69 6E 00 02 01 00 00 AC CF 23 66 66 67 00 48 54 54 50 2F 31 2E 1C



2 Port settings parameter command

Port parameter:

Name	bytes	example	Explanation
ulBaudRate	4	00 C2 01 00	Baud Rate
ucDataSize	1	08	COM data bits (0X05/0x06/0x07/0x08)
ucParity	1	01	COM parity 1: no, 2: odd, 3: even, 4: mark, 5: space
ucStopBits	1	01	COM stop bit (0x01/0x02)
ucFlowControl	1	01	COM flow control (0x01; no, 0x03:HW)
ulTelnetTimeout	4	00 00 00 00	Network reconnection time
usTelnetLocalPort	2	17 00	Local Port
usTelnetRemotePort	2	17 00	Remote Port
uiTelnetURL	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	IP address send in ASCII. Example: 192.168.0.1
ulTelnetIPAddr	4	00 00 00 00	Not adopted
ucFlags	1	02	Enable MODBUSTCP: 0x010(bit2) Enable 2217: 0x08(bit3) Enable USR cloud: 0x010(bit4)
ucWorkMode	1	03	Working mode: 0: UDP, 1: TCP Client, 2: UDP Server, 3: TCP Server, 4: HTTPD Client
uiPackLen	4	C8 00 00 00	COM pack length
ucPackTime	1	0A	COM pack time
ucTimeCount	1	91	Write the read values
TCP server type	1	1	Write the read values
ucReserved	4	Casual value	saved

Example:



4.1.3. Commands' Return Content

1. Return results of search command

Return command:

Bytes	Name	Example	Explanation
0	TAG_STATUS	FF	
1	Packet_length	24	
2	CMD_DISCOVER_TARG ET	01	
3	Board_type	00	
4	Board_ID	00	
5~8	Client_IP_address	C0 A8 00 07	Device IP(High in front)
9~14	MAC_address	AC CF 23 20 FE 3D	Device MAC(High in front)
15~18	Firemware_version	D0 07 12 34	D0 07: device version# (low in front) 12 34: encrypted version
19~34	Application_title	55 53 52 2D 54 43 50 32 33 32 2D 35 30 30 00 00	Device name
35	checksum	F0	checksum

Example:

Return results of search command(36 bytes)

FF 24 01 00 4B C0 A8 00 4D D8 B0 4C 00 04 C9 DD 07 01 00 55 53 52 2D 54 43 50 32 33 32 2D 34 30 31 00 00 EF

The method of the check is as follow:

0xEF = 00 - FF - 24 - 01 - 00 - 4B - ... - 31 - 00 - 00

2. Return results of reset command

Response(4 bytes): FF 01 02 4B, if user name and password are right, 4B = 'K'

FF 01 02 45, if user name and password are wrong, 45 = 'E'

3. Return results of read command

Description:

Return all parameter of USR-N520 network. 193 bytes in total, no parity, no protocol, return parameter directly.



Returned content: 193 (basic parameter+serial parameter+serial parameter)

- Return results of save settings command If settings are correct, it returns: FF 01 04 4B
- 5. Return results of basic settings command FF 01 05 4B
- Others return results Sum check fault returns 'E' + right parity Correct execution: FF 01 CMD 'K' User name/password fault returns: FF 01 CMD 'P' Others faults return: FF 01 CMD 'E'

4.2. Serial Setting Protocol

4.2.1. AT Command

AT Command List:

	Table 1 AT Command List
Command	Instruction
(blank)	Blank Command
E	Open/close echo function
Z	Re-start device
VER	Query version number
ENTM	Enter to transparent transmission mode
MAC	Query/set MAC
UART	Set/query serial port parameter
SOCKMN	Set SOCK parameter
DHCPEN	Open/close automatic obtaining IP address
WANN	Open/close WAN port parameter
WEBU	Query/set web page user's name and password
WEBPOR T	Query/set web page port number
SEARCH	Query/set searching key words
CLEAR	Factory reset
UART	Set/query serial port 0 parameter



UART1	Set/query serial port 1 parameter
SOCK	Set/query port 0 network SOCKETA parameter
SOCK1	Set/query port 1 network SOCKETA parameter
SOCKB	Set/query port 0 network SOCKETB parameter
SOCKB1	Set/query port 1 network SOCKETB parameter
MAC	Query MAC parameter
WRMAC	Set MAC parameter
DNS	Set/query domain name analyzing address
WANN	Set/query module IP address, gateway, subnet mask
	parameter



4.2.2. Enter AT Command Mode

- ① Send +++ to USR-N520 through serial port
- 2 USR-N520 return 'a'
- ③ Need reply "a" within 3s once received previous 'a'
- ④ Return+ok to enter AT command mode

4.2.3. AT Command details

- 1. AT+E
 - Function: Set/query echo setting
 - ➢ Format:
 - Query
 - AT+E <CR>

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

♦ Set

```
AT+E=<on/off><CR>
```

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

- > Parameter:
- ① on: Open echo function, and input AT command (Echo on)
- 2 off: Close echo function. (Echo off)
- 2. AT+ENTM

 \triangleright

- > Function: Enter transparent transmission mode (Exit command mode)
 - Format:
 - Set

AT+ENTM<CR>

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

Parameter: N/M

Change work mode from command mode to transparent transmission mode after run this command correctly

3. AT+Z

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- Function: Re-start USR-N520
 - Format:
 - ♦ Set

AT+Z<CR>

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

Parameter: N/M

<Notice>: USR-N520 will re-start after run this command correctly.

◆ Date xxxx.xx.xx (For example 2014.01.02 stands for January 2nd, 2014).



- 4. AT+VER
 - Function: Set/query firmware version
 - Format:
 - Query
 - AT+VER<CR>

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

- > Parameter:
 - ver: Set/Query the firmware version of USR-N520
 - Gerenal version: AA.BB.CC: AA stands for big version, BB stands for small version number, CC stands for hardware version C.C
 - Custom version: AA.BB.CC.DD-ID; DD stands for customer's version, ID stands for customer's ID number

5. AT+MAC

- Function: Query MAC
- ➢ Format:
 - Query

AT+MAC<CR>

<CR><LF>+OK=<mac><CR><LF>

- > Parameter:
 - mac: MAC Address of USR-N520 (Example 01020304050A);

6. AT+WRMAC

- ➢ Function: Set MAC
- Format:
 - Set

AT+WRMAC=<mac><CR>

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

- Parameter:
 - mac: MAC Address of USR-N520 (Example 01020304050A);

7. AT+WEBU

- > Function: Set/query user's name and password of web page
- ➢ Format:
 - Query

AT+WEBU<CR>

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

♦ Set

AT+WEBU<CR>

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

- Parameter:
 - username: user's name, supports max 5 bytes. Does not support blank
 - password: password, supports max 5 bytes



- 8. AT+WEBPORT
 - > Function: Set/query web server port of USR-N520
 - > Format:
 - ♦ Query
 - AT+WEBPORT<CR>

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

Set

AT+WEBPORT<CR>

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

- Parameter:
 - port: web server's port of USR-N520, default 80;
- 9. AT+SEARCH
 - > Function: Set/query search port and key words of USR-N520 inside LAN
 - ➢ Format:
 - Query

AT+SEARCH<CR>

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

Set

AT+ SEARCH <CR>

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

- > Parameter:
 - port: serching port of USR-N520, default 48899
 - ♦ keywords: searching key words of USR-N520, Default: www.usr.cn (Max 20 bytes).
- 9. AT+CLEAR
 - Function: Restore factory setting
 - Format:
 - ♦ Set

AT+CLEAR<CR>

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

Parameter: N/M

10. AT+UART

- > Function: Set/query the parameter of UART0
- ➤ Format:
 - ♦ Query:
 - AT+UART<CR>

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

Set

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

- Parameter:
 - baudrate: baud rate
 - 9600,19200,38400,57600,115200,230400,380400,460800



- data_bits: data bits 5,6,7,8
- stop_bits: stop bits 1,1.5,2 (which module supports)
- parity: check bit
 - NONE (no check bit)
 - EVEN (even check)
 - ODD (odd check)
 - MASK (1 check)
 - SPACE (0 check)
- flowctrl: hardware flow control (CTS RTS)
 - NFC: no hardware flow control
 - FC: hardware flow control
 - 485: supports 485, after opening, RS_EN pin and RTS pin are the same
- uartnum: 0

11. AT+UART1

> Function: Set/query UART0 interface parameter

12. AT+SOCKMN

(M: socket number, A~H. N: corresponding serial port number, 1~8. Omit MN numbers for single serial port and single socket)

- > Function: Set/query network protocol parameter format:
 - ♦ Query

AT+SOCKMN<CR>

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

Set

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

- > Parameter:
 - Protocol: protocol type
 - TCPS: TCP server
 - TCPC: TCP client
 - UDPS: UDP server
 - UDPC: UDP client
 - TCPA: TCP auto
 - WEBUART: websocket, tranmission from webpage to serial port
 - IP: Server's IP address when USR-N520 works as "CLIENT'
 - Port: Protocol port, decimal number, smaller than 65535
- 13. AT+DHCPEN
 - Function: Open/close DHCP Server;
 - Format:
 - Query

AT+DHCPEN<CR> <CR><LF>+OK=<Type><CR><LF>



Set
 AT+DHCPGW=<Type><CR>

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

- Parameter
 - Type:
 - On: open DHCP server function
 - Off: close DHCP server function (USR-N520 works as wireless switch at this time)

14. AT+WANN

- Function: Set/query obtained WAN port IP (DHCP/STATIC);
- ➢ Format:
 - Query

AT+WANN<CR>

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

Set

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

- > Parameter:
 - mode: network IP mode.
 - static: static IP
 - DHCP: dynamic IP (address, mask, gateway parameter is omitted)
 - address: IP address.
 - mask: subnet mask.
 - gateway: gateway address.

5. Parameter Configuration

It is setup software configuration, webpage configuration and serial configuration.

How to configure:

Revise user name/password \rightarrow set IP access method \rightarrow serial parameter \rightarrow USR-N520 work mode \rightarrow work mode related parameter

5.1. Software Configuration

To make sure setup software normal running, please check the below firstly:

- 1. USR-N520 and setup software PC are within same LAN.
- 2. Disable the anti-virus software and firewall on PC.
- 3. Disable network card nothing to do with this testing.

Download [USR-TCP232-M4&E45] Setup software here: http://www.usriot.com/usr-tcp232-m4e45-setup-v2-3-0-78/



www.usriot.com

Search device and all USR-N520 device within LAN can be found. It includes IP, name, MAC and version.

(D) #X	(L) Help					
arch List	[Click a device to	o read parameters in	the Search List]	Port1 Port2		
evice IP	Device Name	MAC	Version			
92.168.0.7	USR-N520	80 10 48 00 00 44	3033	Baudrate:	115200 ▼	(?)
				Parity/Data/Stop:		(?)
	/			FlowControl:	None 🔻	(?)
				Work Mode:	TCP Server 🔹	(?)
		_		RemoteIP:	192. 168. 0. 201	(?)
(🔍 Search Device		Clear ARP table Compatible with	Remote Port:	23	(?)
				Local Port:	23	(?)
🔵 Open De	vice 💽 Dev	vice Restart	Factory Reset	TCP Server style:	Transparent transmi 💌	(?)
e Save				ModbusTCP:	None 🔻	(?)
				PackTime:	0 ms (0~255)	(?)
	IP Type: (Static IP 👻 (?)		PackLen:	0 byte (0~1460)	(?)
	ModuleStaticIP:	192.168.0.7 (?)		V Synchronize ba	udrate (RFC2217	(?)
	SubnetMask:	255, 255, 255, 0 (?)		📃 Enable USR Clou	1d	(?)
	Gateway:	192.168.0.1 (?)		Device I	D []	
				Communication Cod	e	
Full	Show +	Sase	e Save		✔ Save COM1	

Software Configuration—Search

 Click 'Device' on the top of the program and then check user name/password via 'User config'. If it is correct, it reveals USR-N520 information. If not, it pops up retype window, click "Confirm". User name and password is admin by default.



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Search List [(L) Help Click a device to) read parameters in	the Search List]	Putt			
Device IP	Device Name	MAC	Version	Forti Port2			
192.168.0.7	USR-N520	80 10 48 00 00 44	3033				
				Baudrate:	115200	•	(?)
				Parity/Data/Stop:	NONE	▼ 8 ▼ 1 ▼	(?)
				FlowControl:	None	•	(?)
		Turner C			TCP Se	rver 🔻	(?)
		User config		1	192.16	8. 0. 201	(?)
G	Seerah Deviae				02		(2)
	Sea en perice		idmin 🎾	*****	20		N. 7
					23		(?)
Upen Dev	lce Dev	TCE N			Transp	arent transmi 🔻	(?)
Base Save			🥝 ОК	Cancel	None	▼]	(?)
	t:6432 (?)	Device Wame. 030	. H520 (7)		0	ms (0~255)	(?)
febsocket Por		User MAC: 80	10 48 00 00 (?)	PackLen:	0	byte (0~1460)	
″ebsocket Por ″eb Port:	80 (?)						(?)
Websocket Por Web Port: Device ID:	80 (?) 1 (?)	IP Type: Sta	tic IP 🔻 (?)	🔽 Synchronize ba	audrate ()	FC2217	(?) (?)
Websocket Por Web Port: Device ID: Device ID Typ	80 (?) 1 (?) e: Disa' + (?)	IP Type: Sta ModuleStaticIP 192	tic IP • (?)	✓ Synchronize ba ■ Enable USR Clo	audrate () oud	JFC2217	(?) (?) (?)
Websocket Por Web Port: Device ID: Device ID Typ User Name:	80 (?) 1 (?) e: Disa' (?) admin (?)	IP Type: Sta ModuleStaticIP 192 SubnetMask: 255	tic IP (?) .168.0.7 (?) .255.255.0 (?)	V Synchronize ba	audrate () oud ID	JFC2217	(?) (?) (?)
Websocket Por Web Port: Device ID: Device ID Typ Jser Name: Password:	80 (?) 1 (?) e: Disa + (?) admin (?) admin (?)	IP Type: Sta ModuleStaticIP 192 SubnetMask: 255 Gateway: 192	ttic IP ▼ (?) .168.0.7 (?) .255.255.0 (?) .168.0.1 (?)	Synchronize be Enable USE Clo Device Communication Co	audrate () oud ID de	JFC2217	(?) (?) (?)

Software Configuration-Password

2. Basic parameter configuration

Click "Full Show" and all basic parameter is revealed.

Set the parameter as needs and click "Base Save" then can set successfully.



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00(0) 10	文(L) Help					
earch List	[Click a device to	read parameters in t	he Search List] [Port1 Port2		
Device IP	Device Name	MAC	Version			
192.168.0.7	USR-N520	80 10 48 00 00 44	3033	Bandrata	115200 -	(2)
				Dadui ate.	113200	07
				Parity/Data/S	top: NONE • 8 • 1 •	(?)
				FlowControl:	None 🔻	(?)
				Work Mode:	TCP Server 💌	(?)
				RemoteIP:	192.168.0.201	(?)
	🔍 Search Device	C1	ear ARP table mpatible with	Remote Port:	23	(?)
				Local Port:	23	(?)
Dpen D	evice 💽 Devi	ce Restart 🥥 F	actory Reset	TCP Server sty	yle: Transparent transmi 🔻	(?)
ase Save				ModbusTCP:	None 💌	(?)
				PackTime:	0 ms (0~255)	(?)
	IP Type: S	tatic IP 🔻 (?)		PackLen:	0 byte (0~1460)	(?)
	ModuleStaticIP:1	92.168.0.7 (?)		📝 Synchroni z	e baudrate(RFC2217	(?)
	SubnetMask: 2	55. 255. 255. 0 (?)		📰 Enable USR	Cloud	(?)
				Devi	ce ID	
	Gatawar	92 168 0 1 (2)				
	Gateway: 1	92.168.0.1 (?)		Communication	i Code	
-	Gateway: 1	92. 168. 0. 1 (?)		Communication	i Code	

Software Configuration --Full Show



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arch List [Click a device to r	ead parameters in :	the Search L]. []		
- Nevice IP Device Name	MAC	Version	Port1 Port2		
92.168.0.7 USR-N520	80 10 48 00 00 44	3033		3 <u>-2-</u>	
			Baudrate:	115200	• (?)
			Parity/Data/Stop:	NONE v 8 v 1	• (?)
			FlowControl:	None	• (?)
			Work Mode:	TCP Server	• (?)
			RemoteIP:	192. 168. 0. 201	(?)
🔍 Search Device		lear ARP tab. ompatible wi	Remote Port:	23	(?)
			Local Port:	23	(?)
📄 Open Device 🛛 🔯 Device	e Restart 📿 🥥	Factory Rese	TCP Server style:	Transparent transmi	i 🔻 (?)
se Save			ModbusTCP:	None	• (?)
bsocket Port:6432 (?) D	evice Name: USR-D	N520	PackTime:	0 ms (0~255) (?)
b Port: 80 (?) V	ser MAC: 80 10	0 48 00 00	PackLen:	0 byte (0~1-	460) (?)
wice ID: 1 (?) I	P Type: Stat	ic IP 🔻	👽 Synchronize bau	idrate (RFC2217	(?)
vice ID Type: Disa 🗸 (?) 🕅	oduleStaticIP 192.	168.0.7	Enable USR Clou	1d	(?)
	ubnetMask: 255.2	255. 255. 0	Device I	D	
er Name: admin (?) St					

On-line Device NUM:1 Search Port:1901

Software Configuration-Base Save

- Websocket port: refer to Chapter 4.1.8.3 Webpage to serial
- Webpage port: it is 80 by default when visit webpage.
- Device ID: refer to Chapter 4.1.8.6 Device ID
- Device ID type: sending ID type
- User name: Authentication Code for revising parameter to avoid other users within same LAN revising it.
- Password: same as user name.
- Device Name: USR-N520 's name an be revised.
- MAC address: USR-N520 ' MAC
- IP address type: Static and DHCP
- USR-N520 static IP: same segment with router.
- Subnet Mask: 255.255.255.0 by default.
- Gateway: it is router IP generally, can transmit cross network segment and DNS if set correctly.



3. Port configuration (Port1 / Port2 configuration)

Click the COM to set, revise parameter then click "Save COM1".

		,,		Por	rt1	Port2			
Device IP	Device Name	MAC	Version						
192.168.0.7	USR-N520 Search Dev	D8 B0 4C E0	CE 32 3033	ble th	Bauda Parit Flow Work Remot Remot	rate: ty/Data/Sto Control: Mode: teIP: te Port: L Port:	115200 pp: NONE None TCP Se 192.16 23 23	• 8 • 1 • • 8 • 1 • • • • • * *	(?) (?) (?) (?) (?) (?)
E open bev	.ce 🚬 🚩	Device Vestar	Factory hes		TCP S Modbu	Server styl 1sTCP:	Le: Transp	oarent transmi ♥	(?) (?)
ase Save					P1-7	P:	nome	(0~255)	(2)
'ebsocket Port	:6432 (?) Device Name:	USR-N520	(?)	I ack	lime.	U	ms (0 233)	(i)
'eb Port:	80 (?) User MAC:	D8 B0 4C E0 CE	(?)	Packl	Len:	0	byte (0~1460)	(?)
levice ID:	1 (?) IP Type:	Static IP 🔻	(?)	🔽 S3	ynchroni ze	baudrate ()	RFC2217	(?)
levice ID Type	: Disa 🗸 (?) ModuleStaticIP	192. 168. 0. 7	(?)	Er Er	able USR C			(?)
/ser Name:	admin (?) SubnetMask:	255. 255. 255. 0	(?)		Devic	e ID		
		as Gatewarr	192, 168, 0, 1	(?)	Comm	unication	Code		

Software Configuration-COM 1 Configuration

- Serial Baud rate: it can be standard or customized.
- Parity/Data/Stop: serial parameter.
- Serial Flow control: None/Hardware/XON XOFF, None for no flow control, Hardware for hardware flow control, XON/XOFF for software hardware flow.
- Work Mode: TCP Server /TCP Client/HTTPD Client/UDP Client/UDP Server
- Destination IP/Port: IP connected when USR-N520 works as client (TCP Client/HTTPD Client/UDP Client)
- Local Port: port USR-N520 to connect. Advice to set it to "0" when USR-N520 works under TCP Client for connection with Random port.
- TCP Server Type: No.
- Modbus TCP: set this when Modbus TCP to Modbus RTU is needed.
- Serial pack time: relate to serial unpacking mechanism.
- Serial pack length: relate to serial unpacking mechanism.
- Similar RFC2217: Please refer to Chapter 3.5.10 Similar RFC2217



4. Firmware Upgrade

If USR-N520 need to upgrade with new firmware, please contact USR sales. During firmware upgrade, USR-N520 connects to PC directly. PC Upgrade via Wi-Fi is prohibited.

User config		o read parameter	's in the Search I	ist] Port1	Port2	Port3	
Firmware upo	grade	МАС	Version		101.62	10103	
Exit		5 D8 B0 4C 11	22 33 3009	Bau	idrate:	▼	(?)
				Par	ity/Data/Stop: wControl:	NONE • 8 • 1 • RS485 •	(?) (?)
				Wor	k Mode:	TCP Server 🔻	(?)
				Rem	oteIP:	192.168.0.201	(?)
Q	Search De	vice	Clear ARP tab	Le Rem	ote Port:	23	(?)
-				Loc	al Port:	23	(?)
Open Devi	2e 💊	Device Restart	Factory Res	TCP	Server style:	[Transparent transmi ▼	(?)
Base Save				Mod	lbusTCP:	None 🔻	(?)
#ebsocket Port:	6432	(?) Device Name:	USR-TCP232-4105	(?) Pac	kTime:	0 ms (0~255)	(?)
∦eb Port:	80	(?) User MAC:	D8 B0 4C 11 22	(?) Pac	kLen:	0 byte (0~1460)	(?)
Device ID:	1	(?) IP Type:	Static IP 🔻	(?)	Synchronize be	audrate (RFC2217	(?)
Device ID Type:	Disa 🗸	(?) ModuleStaticI	? 192.168.0.7	(?)	Enable USR Clo	ud	(?)
User Name:	admin	(?) SubnetMask:	255.255.255.0	(?)	Device :		
Password:	admin	(?) Gateway:	192.168.0.1	(?) Con	nmunication Co	de	
-					ſ		



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ar cir Erse	[Llick a device to :	read parameters in	the Search List]	Port1 Port2		
Device IP	Device Name	MAC	Version			
192.168.0.7	USR-N520	D8 B0 4C E0 CE 3	2 3033	Baudrate:	115200 ▼	(?)
						(0)
		>		Parity/Data/Stop:		(Y)
		Firmware Upgr	ade	Real-an-s	None 👻	(?)
		Coloot Client	~		TCP Client 💌	(?)
					192, 168, 0, 201	(?)
		Clier	nt IP Address: 19	92.168.0.7		(1 0)
	Search Device	Clier	nt MAC Address: D	880 4C EO CE 32	23	(9)
		_			23	(?)
Open De	vice 💽 Devi	ce Select .bin fil	le		Transparent transmi 👻	(?)
_		C:\Users\	Administrator\Deskto	p\USR_K3_FW_2	None	(?)
ise Save —						(0)
	TP Trme S		Program	🛶 Exit	0 ms (0 255)	(7)
	II Type.				0 byte (0~1460)	(?)
	ModuleStaticIP:19	92. L		y syncia onrie ba	ddrate (RFC2217	(?)
	SubnetMask: 25	55, 255, 255, 0 (?)		Enable USR Clo	1d	(?)
	Gateway: 19	92.168.0.1 (?)		Device I	D	
				Committeeting Cold		

Firmware Upgrade

5.2. Webpage Configuration

Open browser and type in USR-N520 ' IP (192.168.0.7 by default) Then user name: admin and password: admin.



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http://192.168.0.8	requires a username and passwo	rd.		
Your connection to	o this site is not private.			
User Name	admin			
ober manner				
Password:	****			
Password:	****			
Password:	****			

Webpage Log In

firmware revision: v3	033	中文 logout
	JSR IOT IOT Experts-	Be Honest, Do Best!
Current Status	parameter	help
Local IP Config PORT1 PORT2 Web to Serial Misc Config SNTP Reboot	Module Name: USR-N520 Firmware Revision: 3033 Current IP Address: 192.168.0.7 MAC Address: d8-b0-4c-e0-ce-32 Run Time: 0day: 0hour: 0min TX Count(ETH) : 0/0 bytes RX Count(ETH) : 0/0 bytes Conn Status(ETH)A: CONNECTING/IDLE Conn Status(ETH)B: IDLE/IDLE	 Run time: run time means the minutes since latest reboot TX/RX Count: TX/RX count give us a calculation of the total byte we have been received or send.

- 1. Current Status reveals basic information:
 - USR-N520 name
 - Firmware version
 - Current IP address
 - MAC address
 - Total running time: from be powered
 - Count of data sending: how many data sent from powered



<u> 中文 loqout</u>

- Count of data receiving: how many data received from powered
- USR-N520 connection status: check whether connection is built.
- 2. Local IP Config

Save configuration after revise. Then restart.

- Local IP Configuration
- IP address gaining methods
- Local IP
- Subnet Mask
- Gateway

firmware revision: v3033

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	USR IOT Be-IOT Experts-	e Honest, Do Best!
Current Status	parameter	help
Local IP Config	IP Type: Static IP V	• IP type:
PORT1	Static IP: 192 . 168 . 0 . 7	StaticIP or DHCP
PORT2		StaticIP     Module's static ip
Web to Serial	Submask: 255 · 255 · 255 · 0	<ul> <li>Submask usually</li> </ul>
Misc Config	Gateway: 192 · 168 · 0 · 1	255.255.255.0
SNTP	Dns Server: 208 . 67 . 222 . 222	<ul> <li>Gateway</li> <li>Usually router's ip</li> <li>address</li> </ul>
Reboot	Save	

#### Webpage Configuration-Local IP Configuration

### 3. PORT1

- 1) Basic Parameter, as below
  - Baud Rate
  - Data Bit
  - Parity Bit
  - Stop Bit
  - Flow hardware and RS485
  - Local Port
  - Remote Port
  - Work Mode
  - Remote server address
  - Serial pack time
  - Serial pack length



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#### ■ Similar RCF2217

firmware revision:	v3033		<u>中文</u> loqout
<i>€</i> [®]	USR IOT -IOT Experts-	Ве Нол	est, Do Best!
Current Status		parameter	help
Local IP Config PORT1 PORT2	Baud Rate: Data Size: Parity: Stop Bits:	115200 bps(600~230400) 8 ▼ bit None ▼ 1 ▼ bit	<ul> <li>local port         <ol> <li>65535. when             <li>TCP Client, set             this to 0 means             use random local</li> </li></ol> </li> </ul>
Web to Serial Misc Config	Flow Control: UART Packet Time:	None ▼ 0 ms (< 256)	port <ul> <li>remote port <ul> <li>1~65535</li> </ul> </li> </ul>
SNTP Reboot	UART Packet Length: Sync Baudrate(RF2217 Similar): Enable Uart Heartbeat Packet:	0 chars (<= 1460, 0 for no use)	packet     time/length     default 0/0,     means automatic     packet

### ② Socket A Parameters Configuration

PORTI	Socket A	Parameters	5
PORT2	Work Mode:	TCP Clien	t ▼ Short Connection ▼
Web to Serial	Remote Server Addr:	192.168.0.201	
Misc Config	Local/Remote Port Number:	23	23
chilling (	timeout reconnection :	86400	seconds
SNTP	Disconnect Time :	7	seconds
Reboot	PRINT:		
	ModbusTCP Poll:	:  Poll Timeout : 200 (0~65536ms)	
	Enable USR Cloud:		
	Enable Net Heartbeat Packet:		
	Registry Type:	None	×
Work Mode			
Remote Serve	r Address		
Local/Remote	Port number		
Timeout recon	nection		
Disonnect time	Э		
Print: Function	for network printing		
ModbusTCP F	Poll: Function for Modbus Polling		
Enable Net He	artbeat Packet: user-defined hea	artbeat pao	cket

- Registry type: User-defined registration packet
- ③ Socket B Parameters Configuration



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Socket B	Parameters
Work Mode:	TCP Client V
Remote Server Addr:	192.168.0.201
Local/Remote Port Number:	20105 20105

- Work Mode: TCP Client/UDP Client
- Remote Server Address
- Local/Remote Port number
- 4. Web to serial

Click "web to serial " and "connect success" pops up. Confirm then send data.

firmware revision: v3033	connect success! 确定	±ż logout est, Do Best!
Current Status	parameter	help
Local IP Config	Websocket connection: 0	web to serial
PORT1	Receive hex data	this page use websocket to
PORT2		transmit data between webpage
Web to Serial		and uart
Misc Config		
SNTP	514. 	
Reboot		
	send ascii data send hex data clear	

Web to Serial

- 5. Misc Config (Advanced configuration)
  - Module Name: USR-N520 (User can modify it)
  - Websocket Port
  - Webserver Port
  - User Name/ Password: For webpage, user can modify it
  - MAC Address (can be revised)
  - Buffer data before connected: whether serial and network data are cached if disconnection.
  - Reset timeout: how long USR-N520 reset when no data from COM or Network. Set to "0" then no rest.



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	SR IOT T Experts-	Be Honest, Do Best
Current Status	parameter	help
Local IP Config	Module Name: USR-N520	
PORT1	Websocket Port: 6432	• module name max length is 15
	Webserver Port: 80	char
PORTZ	MAC Address: d8-b0-4c-e0-c	e-32 • Web port default 80
Web to Serial	User Name: admin	• ID and ID type
Misc Config	Pass Word: admin	we could use it for D2D
CNTD	Buffer Data Before Connected:	Mac address
SNIP		user could modify

#### 6. Reboot

Save all data then click restart to take effect.

firmware revision:	v3033		<u>中文</u> <u>loqout</u>
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	USR IOT -IOT Experts-	Be Hon	est, Do Best!
Current Status	Reboot/Rese	et and a second s	help
Local IP Config	Restart Module	Restart Module	Reboot:
PORT1			Click to make your config take
PORT2			effect
Web to Serial			
Misc Config			
SNTP			
Reboot			
Ī			
	Webnade conf	iguration- Restart	

5.3 Serial Configuration

Serial configuration use AT command, please refer to Chapter 4.2 Serial setting Protocol.



6. Contact

Company:Jinan USR IOT Technology LimitedAddress:Floor 11,Building1,No.1166 Xinluo Street,Gaoxin Distric,Jinan,Shandong,250101 ChinaTel:86-531-55507297, 86-531-88826739Web:http://www.usriot.comSupport :http://h.usriot.comEmail:sales@usr.cn