

Swarm Wireless Client

USR-FQ610

User Manual



V2.0

Be Honest & Do Best

Your Trustworthy Smart Industrial IoT Partner

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1. Introduction

Swarm ad hoc network is a network of autonomous mobile devices that communicate and cooperate with each other to form a dynamic, self-organizing network without a central controller. It has the characteristics of self-organization, self-repair, high flexibility, distribution, etc.; it supports 16-level relay in the physical layer, 1S fast networking, and 1024 equipment communication; it can perform the conversion between serial port/network port and swarm wireless network, and can support the function of wireless switch. USR-FQ610 adopts this kind of wireless network.

The product adopts industrial standard, wide temperature and wide voltage, high hardware protection; with 1*RS232/1*RS485/1* Ethernet, supporting TCP, UDP and other transmission protocols; built-in software and hardware dual watchdog, fault recovery and other mechanisms.

This product adopts wall mounting installation, which is widely used in scenarios requiring wireless centralized large connection and low delay requirements, such as swarm unmanned aerial vehicles, unmanned systems, data links, individual equipment, fire Internet of Things, power meter reading, urban pipe gallery, intelligent military camp, intelligent transportation and other fields.

1.1. Features

Stable and reliable

- ◆Fully industrial design, metal house, protection grade IP30;
- Supports desktop placement, wall-mounting installation;
- ♦Wide voltage DC 9-24V input, with power reverse protection;
- ◆Industrial grade design, wide temperature -25℃~+75℃;
- Built-in hardware watchdog, fault self-detection, self-repair, and firmware backup and restoration functions to ensure system stability and not crash;
- Relaying based on physical layer, any node leaving or joining does not affect the entire network communication;

Flexible networking

- Support physical layer relay networking, reduce application burden, and any node leaving or joining will not affect the communication of the whole network;
- High-speed synchronization and signal processing, Ad hoc network nodes can move quickly and in any way in the network;
- The network topology between terminals can be changed arbitrarily, and can be deformed, folded and reconstructed freely.



- Support stereo networking, realize signal continuity through automatic relay and multi-hop forwarding of equipment, and realize ground and underground intercommunication;
- No need to give time, boot network construction, support 16-hop centerless ad hoc network, expand communication distance by 16 times, can carry 1024 devices;
- The single-hop communication distance is 1-3 km, and the maximum rate is 740kbps. The more nodes, the better the signal coverage.

Powerful

- ◆Support RS232\RS485\Network port and swarm wireless network conversion;
- Support serial broadcast mode, network broadcast mode, wireless serial service mode, wireless switch mode;
- ◆Support TCPC\TCPS\UDPC\UDPS network communication, DHCP, STATIC;
- Support custom key, user total control, device ID, group definition;
- Support network hop number can be set, relay, FM control, transmit power adjustable;

1.2. Technical Parameters

USR-FQ610 Wireless client parameters are as follows:

Items	Description
	DC: 9 [~] 24V,
Power Supply	2-pin terminal block connector, 5.08mm-2P, reverse polarity protection,
5.5*2.1 DC jack connector	
Working Current	Average: 300mA@12V, max: 600mA @12V
Serial port	
No	1 x RS485, 2-pin terminal block connector, 3.81mm-2P
NO.	1 x RS232, DB9 female
	RS232:
	600/1200/2400/4800/9600/14400/19200/28800/38400/43000/57600/76800/115200/
Baud rates	128000/230400
Daud Tates	RS485:
	600/1200/2400/4800/9600/14400/19200/28800/38400/43000/57600/76800/115200/
	128000/230400
Data bits	7, 8
Stop bits	1, 2
Parity	NONE, ODD, EVEN, Mark, Space
Flow Control	None
Ethernet Ports	
No.	1 x Ethernet ports



Interface	RJ45, 10/100 Mbps, compliance with IEEE 802.3, supports auto MDI/MDIX,	
Interface	1.5KV network isolation transformer protection	
Wireless		
Frequency	902~928MHz,	
Bandwidth	125/200/500KHz/1MHz	
Data speed	Up to 740kbps	
Jump	16	
Capacity	1024	
Covering distance	1-3 kilometers/jump For 16 jumps, up to (1-3)*16 kilometers	
Tx power	10-27dBm	
Antenna Connector	1 x SMA-female	
Time required for		
networking	ls	
Physical Property		
Casing material	Metal shell, IP30 protection	
Dimensions	86*82.5*25mm(L*W*H, antenna pedestal, terminal block are not included)	
Installation	Wall munting, desktop placement	
	Surge protection: level 2, IEC61000	
EMC	ESD protection: level 2, IEC61000	
	EFT protection: level 2, IEC61000	
Operating		
temperature	$-25 C \sim +75 C$	
Storage	40°C - 125°C	
temperature	-40 C + 125 C	
Operating	5% ~ 0.5% PU non-condensing	
humidity	5% 55% kii, non condensing	
Storage humidity	1% $^{\sim}$ 95% RH, non-condensing	
Software Function		
Network protocols	TCP, UDP	
IP	DHCP/StaticIP	
Socket mode	TCP server, TCP client, UDP server, UDP client	
Work mode	4 work modes: Wireless switch mode, network broadcast mode, serial	
WOLK MODE	broadcast mode, wireless serial device server mode	
Relay function	\checkmark	
Data encryption	\checkmark	
User Configuring	Configure tool, AT command	
Others		
Reload	Pinhole reset button, press and hold for $3^{\sim}15$ to reset to factory	
norodu	settings	



Indicators	1 x Power, 1 x Work, 1x Mesh, 1 x TXD, 1 x RXD
APPROVALS	
Regulatory	CE/RED*, RoHS*, WEEE*, FCC*

1.3. Indicator status description

Table 1. Indicator Status

Name	Description		
PWR	Long light after power-on		
WORK	Network port broadcast mode: 300ms frequency flash (300ms on, 300ms off) Serial broadcast mode: 1000ms interval slow flash (1000ms on, 1000ms off) Wireless serial service mode: 1300ms off, 200ms on Wireless switch mode: 1300ms on, 200ms off		
Mesh	Flashes when there is data communication		
TXD	Flashes when there is data communication		
RXD	Flashes when there is data communication		

1.4. Dimensions

Unit: mm





2. Function description

USR-FQ610 takes swarm module as its core function, and realizes communication functions from serial port to swarm module and network port to swarm module respectively. USR-FQ610 supports 4 working modes in total: serial broadcast mode, network port broadcast mode, wireless serial service mode and wireless switch mode.

Note: Under the swarm network, the user ID of each USR-FQ610 must not be duplicate, the key frequency and the total number of users must be consistent, and the group ID must be consistent or set to 0. If the group ID is 0, it means that the broadcast domain can be received.

2.1. Serial broadcasting mode

2.1.1. Function introduction

When USR-FQ610 works in serial broadcast mode, the main function is that the data received by RS232/RS485 port is sent to the swarm network through the swarm module. Then other modules in the swarm network receive the data, the data is sent out from RS232/RS485 port.

In the serial broadcast mode, the data sent and received by the serial port is purely transparent and does not do any changing.

As shown below:





2.1.2. Operating steps

The function configuration process is as follows:

- (1)Configure USR-FQ610 to work in transparent mode
- (2)Configure another USR-FQ610 in the same way, taking care that the user ID is not the same.
- (3)After saving the parameters, restart the device to take effect, and access the device to view the effect.

👫 USR-DTMB-TC	OOL-v1.0.0.3		– D X
中文			
Serial Port COM57	Baud rate 230400 V Data/Pa	rity/Stop 8 🗸	NONE - 1 - Open Enter configuration Exit configuration
Wirel Basic settings	less communication param	eters	Device work parameters
Total users	255 Relay control	None 🗸 🗸	Work mode Serial port broadcast mode \sim
User ID	8 Time solt	4	Serial communication setup
Group ID	8 Frequency	915000000	Baud rate 230400 V Data/Parity/Stop 8 V NOWEV 1 V
RF bandwidth	1Mbps v Lowest frequency	902000000	
Network hop count	2 lighest frequency	928000000	Ethernet communication setup
		Advanced	IP Setup STATIC Static IP 192.168.1.2 Static Gateway 255.255.255.0 Static DNS 208.67.222.222 Socket setup Socket type Remote IP 192.168.1.26 Remote IP 192.168.1.26
ogs	Firmware version Factory reset		Get parameters Restart
OK=TCPC, 192. 168. 1	. 26, 8435	^	22222
T+WANN OK=STATIC, 192.168	. 1. 2, 255. 255. 255. 0, 192. 168. 1. 1		
T+DNS 0K=208.67.222.222			
.T +DTMBFRANGE OK=902000000, 9280	00000, 915000000	~	Clear logs send



2.1.3. The communication tests



2.2. Network broadcast mode

2.2.1. Function introduction

When USR-FQ610 works in the network broadcast mode, the main function is to transmit and receive data from the network port to the swarm module. The terminal device communicates with the USR-FQ610 through the socket. After receiving the data, the USR-FQ610 socket sends it to the swarm network through the swarm module. After receiving the data, the USR-FQ610 in the swarm network sends it to the terminal device at the other end through the socket.

In the network broadcast mode, the data sent and received by the socket and the data transmitted in the swarm are transparent.

Note: For UDP protocol, the maximum length of a packet is 1024 bytes. For TCP protocol, data transmission needs to be less than 100 bytes/500ms transmission.

As shown below:



2.2.2. Operating steps

The function configuration steps is as follows:



(1)Configure USR-FQ610 to work in network broadcast mode. Socket mode: UDPS, remote address and port

can be ignored. Set the local static IP address. Another USR-FQ610 was set up in the same way.

KUSR-DTMB-TOOL-v1.0.0.3	- 🗆 X
中文	
Serial Port COM57 V Baud rate 230400 V Data/Parity/Stop 8 V	NOME - 1 - Open Enter configuration Exit configuration
Wireless communication parameters	Device work parameters
Basic settings	Work mode
Total users 255 Relay control None	work mode Ethernet broadcast mode 🗸
User ID 8 Time solt 4	Serial communication setup
Group ID 8 Frequency 915000000	Baud rate 230400 \checkmark Data/Parity/Stop 8 \checkmark NONE \checkmark 1 \checkmark
RF bandwidth 1Mbps VLowest frequency 902000000	
Network hop count 2 [ighest frequency 928000000	Ethernet communication setup
Advanced	IP Setup STATIC ~
	Static IP 192.168.1.2 Subnet mask 192.168.1.1
	Static Gateway 255.255.255.0 Static DNS 208.67.222.222
	Socket setup
	Socket type TCPC V
	Remote IP 192.168.1.26 Remote port 8435
Firmware version reset	Get Save Restart
LOGS	22222
AT +#ANN	
+0K=STATIC, 192. 168. 1. 2, 255. 255. 255. 0, 192. 168. 1. 1	
AT +DNS +OK=208.67.222.222	
AT +DTMBFRANGE +0K=902000000, 928000000, 915000000	
v	Clear logs send
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(2)Set the static IP address of the computer, as shown below.

(3)After the configuration is completed, power on again, and use the test software to test the effect as

follows.



2.2.3. The communication tests

	Network Assistant	4 - 🗆 ×		Network Assistant	= ×
Settings (1) Protocol TCP Server	Data log	NetAssist V5.0.2 @ 4	Settings (1) Protocol	Data log NetAssist V5.0.2	Þ 🗘
(2) Local Host Addr 192.168.1.26	[2024-00-27 11:05:41:19]; Climit 12, 100.1.2.0450 gets 00.110. [2024-06-27 11:05:08.521]# RECV ASCII FROM 192.168.1.2 :8435> Welcome to NetAssist		[2] Local Host Addr [192.168.1.201 ▼	[2024-06-27 11:54:56.234]# Client 192.168.1.5:8435 gets online. [2024-06-27 11:55:05.586]# SEND ASCII TO ALL>	
8435	[2024-06-27 11:55:15.563]# SEND ASCII TO ALL> 111111		(3) Local Host Port 8435	[2024-06-27 11:55:12:656]# RECV ASCII FROM 192.168.1.5 :8435>	
Recv Options	[2024-06-27 11:55:19.261]# SEND ASCII TO ALL) 111111 [2024-06-27 11:55:23.114]# RECV ASCII FROM 192.168.1.2 :8435)		Recv Options	[2024-06-27 11:55:16.336]# RECV ASCII FROM 192.168.1.5 :8435> 111111	
 ✓ Auto Linefeed ☐ Hide Received Data ☐ Save Recv to File 	Feloume to setablist		 ASCII € HEX ✓ Log Display Mode ✓ Auto Linefeed ✓ Uide Received Data 	[2024-06-27 11:55:20.177]# SEND ASCII TO ALL> Welcome to NetAssist [3024-06-27 11:55:31]	
AutoScroll Clear AutoReply Themes BatchSend Export			Save Recy to File <u>AutoScroll</u> <u>Clear</u>		
ASCIT-Man Ronate Send Options		· ·	Send Options		
Use Escape Chars (i) Auto Append Bytes Send from File Cycle 500 ms	Data Send Clients: All Connections (2) + Discor	n]	Auto Append Bytes Send from File Cycle 1000 ms	Data Send Clients: All Connections (2)	Clear
Shortout History	2/15 RX:44	TX:90	<u>Shortcut</u> <u>History</u> I Ready!	2/7 RX:12 TX:154 Reset	

2.3. Wireless serial sever mode

2.3.1. Function introduction

When USR-FQ610 works in wireless serial service mode, the main function is to receive serial data and encapsulate it through TCP/IP protocol, and then send the data to the bee colony network through the bee colony module.After receiving the data, USR-FQ610 at the other end hands it over to TCP/IP protocol for unpacking, and then sends it out through serial port, or cooperates with wireless switch mode to send socket data to the corresponding socket of the computer.

In wireless serial service mode, the data transmitted in the swarm is encapsulated by TCP/IP protocol, and socket parameters need to be configured when using it.





2.3.2. Operating steps

(1)Configure the USR-FQ610 to work in wireless serial server mode. Set IP to 192.168.1.23 and 192.168.1.10 respectively, and set socket to UDPS and UDPC respectively, as shown below:



KUSR-DTMB-TOOL-v1.0.0.3	- 🗆 🗙
中文	
Serial Port COMM57 \sim Baud rate 230400 \sim Data/Parity/Stop 8 \sim	NONE - 1 - Close Enter configuration Exit configuration
Wireless communication parameters	Device work parameters
Basic settings Total users 255 Relay control users	Work mode Work mode Wireless serial device mod
User ID 8 Time solt 4	
Group ID 8 Fremency 915000000] Serial communication setup
BF bandwidth 199 V Lowest frequency 20200000	Baud rate 230400 v Data/Parity/Stop 8 v NONE 1 v
Network hop count 2 lightst frequency 928000000	Ethernet communication setup
	IP Setup STATIC ~
Advanced	2 Static IP 192.168.1.2 Subnet mask 192.168.1.1
	Static Gateway 255.255.255.0 Static DNS 208.67.222.222
	Sadat satur
	Sacket time WPS
	Benote TP 192.168.1.2 Remote port 8435
	Nemole II Annual Remole por
Firmware Factory	Get Save Restart
	Paramerers Paramerers
νυκ=υμr5, 192. 168. 1. 2, 8436	
+0K=STATIC, 192. 168. 1. 2, 255. 255. 255. 0, 192. 168. 1. 1	
AT+UNS +0K=208.67.222.222	
AT+DTMBFRANGE +0K=902000000, 928000000, 915000000	
USR-DTMB-TOOL-v1.0.0.3 文 rial Port COM7 ~ Baud rate 230400 ~ Data/Parity/Stop 8 ~	NONE V 1 V Close Enter configuration Exit confi
USR-DTMB-TOOL-v1.0.0.3 P文 arial Port COM7 V Baud rate 230400 V Data/Parity/Stop 8 V Wireless communication parameters	NONE ~ 1 ~ Close Enter configuration Exit confi
USR-DTMB-TOOL-v1.0.0.3 파文 rial Port COM7 ~ Baud rate 230400 ~ Data/Parity/Stop 8 ~ Wireless communication parameters Basic settings	NONE V 1 V Close Enter configuration Exit confi Device work parameters Work mode
USR-DTMB-TOOL-v1.0.0.3 PX rial Port COM7 V Baud rate 230400 V Data/Parity/Stop 8 V Wireless communication parameters Basic settings Total users 255 Relay control None V	NONE < 1 <
USR-DTMB-TOOL-v1.0.0.3 Trial Port COM7 V Baud rate 230400 Data/Parity/Stop 8 V Wireless communication parameters Total users 255 Relay control None V User ID 7 Time solt 4	NONE ~ 1 ~ Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod ~ Serial communication setup
USR-DTMB-TOOL-v1.0.0.3	NONE V 1 V Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod. V Serial communication setup Band rate 220400 v Date/Parity/Ston 2 v WWE
USR-DTMB-TOOL-v1.0.0.3	NONE V 1 V Close Enter configuration Exit confi Device Work parameters Work mode 1 Work mode Wireless serial device mod V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V
USR-DTMB-TOOL-v1.0.0.3	NONE V 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup
USR-DTMB-TOOL-v1.0.0.3 TX rial Port COM7 V Baud rate 230400 Data/Parity/Stop 8 V Wireless communication parameters Pasic settings Total users 255 Relay control None V User ID 7 Time solt 4 Group ID 8 Frequency 915000000 RF bandwidth 11Mbps V Lowest frequency 902000000 twork hop count 2 lighest frequency 92800000	NONE V 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup IP Setup STATIC V
USR-DTMB-TOOL-v1.0.0.3	NONE V 1 V Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mode V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup 2 IP Setup STATIC Static IP 192.168.1.5 Subnet mask 192.168.1
USR-DTMB-TOOL-v1.0.0.3	NONE × 1 × Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode 1 Work mode Wireless serial device mode 2 Serial communication setup 2 IP Setup STATIC 2 IP Setup Static IP 2 Static IP 192.168.1.5 Static IP 192.168.1.5 Subnet mask 1 192.168.1.5 Static INS
USR-DTMB-TOOL-v1.0.0.3	NONE 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod. 1 Work mode Work mode 2 Serial communication setup NONE 2 IP Setup Static IP 192.168.1.5 Subnet mask 192.168.1.5 3 static Gateway 255.255.255.0 Static DNS 208.67.22
USR-DTMB-TOOL-v1.0.0.3	NONE V 1 V Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mode V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup 2 IP Setup STATIC Static IP 192.168.1.5 Subnet mask 192.168.1 S atic Gateway 255.255.0 Static DNS 208.67.22 Socket setup
USR-DTMB-TOOL-v1.0.0.3	NONE 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Work mode 1 Work mode Wireless serial device mode Image: Serial communication setup Baud rate 230400 Data/Parity/Stop 8 NONE Ethernet communication setup Image: Static IP Subnet mask 192.168.1.5 Static IP 192.168.1.5 Subnet mask 192.168.1.2 Socket setup Socket type VDPC Image: Socket type
USR-DTMB-TOOL-v1.0.0.3	NONE × 1 Close Enter configuration Exit confi Device work parameters Device work parameters Work mode 1 Work mode Wireless serial device mod. × Serial communication setup Baud rate 230400 × Data/Parity/Stop 8 × NONE × Ethernet communication setup 2 IP Setup STATIC × 2 Static IP 192.168.1.5 Subnet mask 192.168.1 3 socket type UIPC × 3 Remote IP 192.168.1.2 Remote port 8435
USR-DTMB-TOOL-v1.0.0.3 FX rial Port COM7 V Baud rate 230400 Data/Parity/Stop 8 V Wireless communication parameters Basic settings Total users 255 Relay control None V User ID 7 Time solt 4 Group ID 8 Frequency 915000000 RF bandwidth IMbps V Lowest frequency 902000000 etwork hop count 2 Lighest frequency 928000000 etwork hop count 2 Lighest frequency 928000000 Advanced Settings Signal Type Normal V Secret Key1 00000000 Carrier Sense None Secret Key2 00000000 FM control Disabled V Secret Key4 0603033 Data Cache 255	NONE 1 Close Enter configuration Exit confi Device work parameters Image: Close Image: Close
USR-DTMB-TOOL-v1.0.0.3	NONE > 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mode > 1 Work mode Wireless serial device mode > Serial communication setup Baud rate 230400 >> Data/Parity/Stop 8 >> NONE > Ethernet communication setup 2 IP Setup STATIC >> Subnet mask 192.168.1.5 Static IP 192.168.1.5 Subnet mask 192.168.1.5 Subnet mask 192.168.1.2 Socket setup Socket type UDPC >> Remote port 8435 Get parameters Save parameters Restar
USR-DTMB-TOOL-v1.0.0.3	NONE 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod. Serial communication setup Baud rate 230400 Data/Parity/Stop 8 NONE Ethernet communication setup 2 IP Setup STAILC Static IP 192.168.1.5 Subnet mask 192.168.1 Static Gateway 255.255.0 Static DNS 208.67.22 Socket setup 3 Cocket type UDPC Remote IP 192.168.1.2 Remote port 8435 Cocket Setup 3 Cocket IP 192.168.1.2 Remote Port 8435 Cocket IP 192.168.1.2 Remote Port 8435
USR-DTMB-TOOL-v1.0.0.3 FX arial Port COM7 Baud rate 230400 Data/Parity/Stop 8 V Wireless communication parameters Basic settings Total users 255 Relay control None V User ID 7 Time solt 4 Group ID 8 Frequency 915000000 RF bandwidth IMbps Lowest frequency 902000000 etwork hop count 2 Iighest frequency 928000000 etwork hop count 2 Iighest frequency 928000000 Advanced Settings Signal Type Normal Secret Key1 00000000 Carrier Sense None Secret Key2 00000000 FM control Disabled Secret Key3 6E023FB9 ransmit Power Full Secret Key4 06030303 Data Cache 255 Firmware Version Factory reset GS =UDFC, 192. 168. 1. 2, 8435 maxw	NONE V 1 V Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mode V Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup 2 IP Setup STATIC Static IP 192.168.1.5 Subnet mask 192.168.1 Static Gateway 255.255.255.0 Static DNS 208.67.22 Socket setup 3 Remote IP 192.168.1.2 Remote port 8435 Get Save Parameters Rester 111
USR-DTMB-TOOL-v1.0.0.3	NONE 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod. Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V Ethernet communication setup 2 IP Setup STATIC Static IP 192.168.1.5 Subnet mask 192.168.1 S atic Gateway 255.255.0 Static DNS 208.67.22 Socket setup Socket type WDPC Remote IP 192.168.1.2 Remote port 8435 Remote IP 192.168.1.2 Remote port 8435 Marameters Parameters Restar
USR-DTMB-TOOL-v1.0.0.3	NONE × 1 × Close Enter configuration Exit confi Device work parameters Image: Close work parameters Work mode Image: Close work parameters 1 Work mode Wireless serial device mode × Serial communication setup Baud rate 230400 × Data/Parity/Stop 8 × NONE × Ethernet communication setup Image: Close work parameters 2 IP Setup STATIC × 2 IP Setup STATIC × 2 Static IP 192.168.1.5 Subnet mask 192.168.1.2 3 static Gateway 255.255.0 Static DNS 208.67.22 3 Socket type UDPC × Remote IP 192.168.1.2 3 Remote IP 192.168.1.2 Remote port 8435 Get Save parameters Save parameters Intervalue of the setup Socket type UDPC × Save parameters Save parameters Save parameters Battar
USR-DTMB-TOOL-v1.0.0.3	NONE 1 Close Enter configuration Exit confi Device work parameters Work mode 1 Work mode Wireless serial device mod Serial communication setup Baud rate 230400 Data/Parity/Stop 8 NONE Ethernet communication setup 2 IP Setup STAILC Static IP 192.168.1.5 Subnet mask 192.168.1 Static Gateway 255.255.0 Static DNS 208.67.22 Socket setup 3 Socket type UDPC Remote IP 192.168.1.2 Remote port 8435 Get Save Parameters Restar 111

(2)Restart after setting and send data to serial port respectively



2.3.3. The communication tests



2.4. Wireless Switch Mode

2.4.1. Function introduction

When USR-FQ610 works in wireless switch mode, the main function is to send data received by Ethernet interface to swarm network through swarm module, and send data from Ethernet interface after other modules in swarm network receive data.

In wireless switch mode, USR-FQ610 realizes transparent transmission of Ethernet port data, and the network data transmitted in the swarm is TCP/IP protocol.

Note: UDP protocol a packet maximum of 1024 bytes, TCP protocol, data transmission needs to be less than 100 bytes/500ms transmission; time slot minimum set to 4, each more relay forwarding FQ610 hop point, time slot on the basis of 4 + 2.



2.4.2. Operating steps

(1)Configure the USR-FQ610 to work in wireless switch mode, the user ID should be different with each other device.



Wireless communication parameters Device work parameters Basic settings Ital users 255 Relay control None User ID 6 Time solt 2 Ital users 255 Group ID 8 Frequency 91500000 Baud rate 230400 Ital/Parity/Stop 8 Ital RF bandwidth IMEps Lowest frequency 902000000 Data/Parity/Stop 8 Ital Network hop count 1 iighest frequency 928000000 Ital rate 230400 Ital/Parity/Stop 8 Ital IP Setup Static IP 192.168.2.23 Subnet mask 10 Static Gateway 255.255.0 Static DNS 2 Socket setup Socket setup Socket retup Socket retup Socket IP 192.168.2.23 Local port 2	au rore comits of paul rate 200400 O Data/Par	ity/Stop	MORE OF LATER CONFIGURATION LXIT CONFIGURATION
Firmware Factory Get Save parameters parameters	Wireless communication parame sic settings Total users 255 Relay control User ID 6 Time solt Group ID 8 Frequency RF bandwidth 1Mbps Uowest frequency work hop count 1 ighest frequency	None 2 2 2 91500000 30200000 92300000 32300000 Advanced	Device work parameters Work mode Serial communication setup Baud rate 230400 V Data/Parity/Stop 8 V NONE V 1 Ethernet communication setup IP Setup STATIC Static IP 192.168.2.23 Static Gateway 255.255.0 Static DNS 208.67.222 Socket setup Socket setup Socket type NDPS Remote IP 192.168.2.23 Local port 8234
Logs	Firmware version Factory reset		Get Save parameters Restart
AT+WANN +0K=STATIC, 192. 168. 2. 23, 255. 255. 255. 0, 192. 168. 2. 1	NN	^	123
AT +DNS +0K=008, 67, 222, 222	IAIIL, 192. 166. 2. 23, 266. 266. 266. 0, 192. 166. 2. 1		

(2)Configure PC IP to 192.168.1.10 and 192.168.1.201 respectively.

(3)After configuration is completed, power on again and access the equipment to check the effect.

(4)Set up socket through test software, and send data

2.4.3. The communication tests



3. Firmware upgrade

Before firmware upgrade, the device need be set in network broadcast mode. Please download **the upgrade**

tool: https://www.pusr.com/support/download/Setup-Software-USR-M0-V2-2-6-1-exe.html



Steps of upgrading firmware:

(1)Connect the PC to FQ610 via RS232 cable, open the PC software to read parameters, and ensure that it is

in network broadcast mode.

K USR-DTMB-TOOL-v1.0.0.3	- 🗆 X
中文	
Serial Port COMM57 \sim Baud rate 230400 \sim Data/Parity/Stop 8 \sim	NONE - 1 - Open Enter configuration Exit configuration
Wireless communication parameters Basic settings Total users 255 Relay control None Vser ID 8 Time solt 4 Group ID 8 Frequency 915000000 RP bandwidth IMbps Lowest frequency 926000000 Network hop count 2 ighest frequency 926000000 Advanced	Device work parameters Work mode Serial communication setup Baud rate 230400 v Data/Parity/Stop 8 v NONE v 1 v Ethernet communication setup IP Setup STATIC v Static IP 192.168.1.24 Subnet mask 192.168.1.1 Static Gateway 255.255.255.0 Static DNS 208.67.222.222 Socket stup Socket type TCFS v Remote IP 192.168.1.24 Remote port 2434
Firmware Factory Version Fest ODS 100-100, 102, 168, 1.24, 8434 Version 100-100, 102, 168, 1.24, 255, 255, 255, 0, 192, 168, 1, 1	Get Save Restart Restart
AT+DNS +OK=208.67.222.222	
AT+DTMBFRANGE +OK=902000000, 928000000, 915000000	Clear logs send

(2)Connect the PC to FQ610 via Ethernet cable, and set the IP of PC to the same network segment as FQ610.

(3)Open the upgrade software, search for the device, then right-click the device and select firmware

upgrade

e Language Help				
Operate Via LAN	Opera	ate Via COM	Base Param (which is without *,usually keep default)	^
			IP Type * Static IP V HTTP Port 8	30
Device IP Device Name 192.168.1.24 USR-FQf 10	MAC	Ver	ModuleStaticIP * 192.168.1.24 User Name a SubnetMask * 255.255.0 Password a	admin
2	OpenWeb Restart		Gateway * 192.168.1.1 Device Name	JSR-FQ6
3	Firmware upgrade Reset		Reset Timeout(s) 3600] Index] Reset
	Copy The Mac		UART Set Parameter] Link] RFC2217
	Cope All Mac		Port Param	
			Parity/Data/Stop NO1 × 8 × 1 × Baudrate	23040 ~
1 🔍 Sea	arch Device		Module work mode TCP Server V Local Port	8434
			RemoteIP 192.168.2.23 Remote Port	8435
			Short Connection time 3 Tcp connect num	4 ~
Data has been sent Data has been sent		^	PackTime 0 PackLen	400
Click device can read the parame	eters, right-click De	vice list show	Short Connection	
more			✓ TCP Server-kick off old connection	
Read [Mac : D4 AD 20 7F 16 EA]			UDP data source judgment	
Data has been sent			II. d. a	
Read OK			Heartbeat Packet Type None	
Read [Mac : D4 AD 20 7F 16 EA Nata has been sent]	~		v
			Save Config	DataDabug

(4)Select local IP address (PC IP), select firmware, click Upgrade, wait for upgrade to complete successfully.



Opera	te <mark>Via L</mark> AN	Ope	ate Via COM	Base Param (which is without *,usually keep default)
Device IP 192.168.1.24	Device Name USR-FQ610	MAC D4 AD 20 7F	Ver 16 4300	ModuleStaticIP * 192.168.1.24 User Name admin SubnetMask * 255.255.255.0 Password admin Gateway * 192.168.1.1 USR-FQ6:
	Q Search	h Device		Notes: Please disable firewall and antivirus software before upgrade firmware! □ Reset Select Client □ Link Client IP Address: 192.168.1.24 □ Local IP Address: 192.168.1.26 □ I Port 8434 □ Port 8435 □
Data has beer Data has beer Click device ca nore Read [Mac : D Data has beer Read OK Read [Mac : D Data has beer	n sent n sent an read the paramete 04 AD 20 7F 16 EA] n sent 04 AD 20 7F 16 EA] n sent	rrs, right-click D	evice list show	Select .bin file D:\1圆件相关\0产品资料\0firmware\firmware-r Program 重 Exit Heartbeat Heartbeat Packet Type None v

4. AT command

4.1. AT command mode

You can switch the device to Command Mode by sending data at a specific timing to the device's serial port. After completing operation in "command mode", return the device to the previous operating mode by sending specific commands.



Toggles the timing of command mode:

In the figure above, the horizontal axis is time, data above the time axis is sent by the serial device to FQ610,

data below the time axis is sent by FQ610 to the serial port.

Time requirement:

T1 > current serial port packaging interval



T2 < current serial port packaging interval time

T3 < current serial port packaging interval time

T4 = current serial port packaging interval time

T5 < 3 s

T6 = current serial port packaging interval time

The time sequence of switching from transparent mode/HTTP mode to "AT Command mode" :

1.Serial device continuously sends "+++" to the device. After receiving "+++", the device will send an "a" to the

serial device. No data can be sent during a packaging cycle before sending "+++".

2.When the serial device receives "a", a "a" must be sent to the device within 3 seconds.

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

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

Time sequence of switching from AT command mode to transparent mode.HTTP mode:

1.Serial device sends "AT+ENTM" to FQ610.

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

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

4.2. Introduction to instruction

AT command is a question-and-answer command, which is divided into two parts: "question" and "answer". "Ask" means to send AT command to T0 through serial port,"answer" means T0 replies information to device through serial port.

Symbol name	Description
\diamond	Included content is required
0	Included content is not required
8	Included are strings with special meanings in this document
~	Parameter range, example A~B, parameter range is from A to B
CMD	indication instruction code
CR	Represents "carriage return" in ASCII code, hexadecimal number is represented as 0x0D
LF	Represents "newline" in ASCII code, hexadecimal number is 0x0A

Table 2. Symbol description



4.2.1. Command content

AT command format:

Туре	Command format	Explain
0	<at+><cmd><cr></cr></cmd></at+>	Execute the action of the instruction or query the
		current parameter value
1	<at+><cmd><cr></cr></cmd></at+>	Execute the action of the instruction or query the
		current parameter value
2	<at+><cmd>=[para-1,para-2,para-3,para-</cmd></at+>	Set parameter values for this command
	4] <cr></cr>	

Table 3. Command format

<Note>: If the user does not turn off the echo function (AT+E), the command entered by the user will be sent back by the module, and the terminator CR> will not be returned.

4.3. AT error description

Table 4. Error code list

Error code	Explain
ERR1	Invalid command format
ERR2	invalid command
ERR3	invalid operator
ERR4	invalid parameter

4.4. AT command set

4.4.1. Instruction specification

serial	name	function
number		
1	AT	Test AT command available
2	AT+E	Enable AT command echo
3	AT+Z	Restart the device
4	AT+ENTM	Exit configuration state and enter
		transparent transmission
5	AT+CLEAR	Factory data reset



6	AT+VER	Query Equipment Version No.
7	AT+MAC	Query current device MAC
9	AT+WKMODE	Set DTMB operating mode
10	AT+DTMBID	Set DTMB ID information
11	AT+DTMBBASE	Setting DTMB Basic Information
12	AT+DTMBRELAY	Set DTMB relay information
13	AT+DTMBRF	Set DTMB RF message
14	AT+DTMBCACHE	Set DTMB cache information
15	AT+DTMBSLOT	Set DTMB time slot information
16	AT+DTMBFREQ	Set DTMB frequency
17	AT+DTMBPSW	Set DTMB plus password
18	AT+WANN	Set/query WAN port parameters
19	AT+DNS	Set/Query DNS Server Address
20	UART	Set/query serial port parameters
21	ѕоск	Set/Query SOCK Parameters
22	SOCKLK	Set/query TCP connection status
23	SOCKPORT	Set/query local port
24	PDTIME	Query production time

4.4.1.1. AT

Name	AT
Function	Test AT command
Inquire	AT <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Set	1
Parameter	Return: OK
Explain	The command takes effect immediately, and
	returning OK means that the AT command is OK.

4.4.1.2. AT+E

Name	AT+E
Function	Set/query device at command echo settings



Inquire	AT+E <cr></cr>
	<cr><lf>+OK=<status><cr><lf></lf></cr></status></lf></cr>
Set	AT+E=< ON/OFF> <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	ON: Turn on echo, echo commands entered under
	AT command,
	OFF: In AT command mode, input commands are
	not echoed.
Explain	This command must be in capital letters and take
	effect after restarting DTU

4.4.1.3. AT+Z

Name	AT+Z
Function	restart the device
Inquire	not have
Set	AT+Z <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	/
Explain	The command is executed correctly, OK is replied
	and the device restarts

4.4.1.4. AT+ENTM

Name	AT+ENTM	
Function	Exit AT command mode and enter transparent	
	transmission mode	
Inquire	/	
Set	AT+ENTM <cr></cr>	
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>	
Parameter	Not have	
Explain	Exit AT command mode and enter transparent	
	transmission mode	



4.4.1.5. AT+CLEAR

Name	AT+CLEAR
Function	Factory data reset
Inquire	/
Set	AT+CLEAR <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	Not have
Explain	This command is executed correctly to restore the
	factory restart equipment.

4.4.1.6. AT+VER

Name	AT+VER
Function	Query device software version number
Inquire	AT+VER <cr></cr>
	<cr><lf>+OK=<ver><cr><lf></lf></cr></ver></lf></cr>
Set	/
Parameter	ver: Current software version number
Explain	This command executes correctly and returns the
	current software version number.

4.4.1.7. AT+MAC

Name	AT+MAC
Function	Query WAN port MAC
Inquire	AT+MAC <cr></cr>
	<cr><lf>+OK=<nac><cr><lf></lf></cr></nac></lf></cr>
Set	/
Parameter	mac:WAN port MAC
Explain	

4.4.1.8. AT+WKMODE

Name	AT+WKMODE
Function	Set DTMB operating mode
Inquire	AT+WKMODE <cr></cr>
	<cr><lf>+OK=<mode><cr><lf></lf></cr></mode></lf></cr>



Set	AT+WKMODE= <mode><cr></cr></mode>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	mode: working mode
	0: Serial broadcast mode
	1: Network port broadcast mode
	2: Wireless serial service mode
	3: Wireless switch mode

4.4.1.9. AT+DTMBID

Name	AT+DTMBID
Function	Set DTMB ID information
Inquire	AT+DTMBID <cr></cr>
	<cr><lf>+OK=<all>,<userid>,<group><cr><lf></lf></cr></group></userid></all></lf></cr>
Set	AT+DTMBID= <all>,<userid>,<group><cr></cr></group></userid></all>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	all: Total number of users, range 1-1024
	userid: User ID, range 1-1024
	group: group number, range 0-15, 0 is broadcast
	group

4.4.1.10. AT+DTMBBASE

Name	AT+DTMBBASE
Function	Setting DTMB Basic Information
Inquire	AT+DTMBBASE <cr></cr>
	<cr><lf>+OK=<baudrate>,<signaltype>,<enablehe< td=""></enablehe<></signaltype></baudrate></lf></cr>
	ader>, <bandrate><cr><lf></lf></cr></bandrate>
Set	AT+DTMBBASE= <baudrate>,<signaltype>,<enableheade< td=""></enableheade<></signaltype></baudrate>
	r>, <bandrate><cr></cr></bandrate>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	Baud rate: 9600, 19200, 38400, 57600, 115200,
	230400, 460800, 921600
	Signal type: signal type, 0 normal, 1 test, 2 single



	frequency	
	Enable header: enable header	
	Band rate: RF bandwidth, 0, 1M 1, 500K 2, 250K 3,	
	125К	

4.4.1.11. AT+DTMBRELAY

Name	AT+DTMBRELAY
Function	Set DTMB relay information
Inquire	AT+DTMBRELAY <cr></cr>
	<cr> LF>+OK=Parameter 1>, Parameter 2>,</cr>
	Parameter 3> <cr> LF></cr>
Set	AT+DTMBRELAY= Parameter 1>, Parameter 2>,
	Parameter 3>, <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	Parameter 1: carrier sense, 0 no sense, 1 short
	sense, 2 medium sense, 3 long sense
	Parameter 2: Networking hops, 0-16
	Parameter 3: Relay control, 0 No relay, 1 Intelligent
	relay, 2 Forced relay

4.4.1.12. AT+DTMBRF

Name	AT+DTMBRF
Function	Set DTMB RF message
Inquire	AT+DTMBRF <cr></cr>
	<cr><lf>+OK=<skip>,<power>,<noise>,<rf><cr><lf< td=""></lf<></cr></rf></noise></power></skip></lf></cr>
	>
Set	AT+DTMBRF= <skip>,<power>,<noise>,<rf>,<cr></cr></rf></noise></power></skip>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	skip: Frequency hopping control, 0 off, 1 enabled
	power: transmit power, 0, low 1, medium 2,
	medium 3, full
	noise: low noise switch, 0, off, 1, enable
	rf: amplifier switch, 0, off, 1, enable



4.4.1.13. AT+DTMBCACHE

Name	AT+DTMBCACKE
Function	Set DTMB cache information
Inquire	AT+DTMBCACKE <cr></cr>
	<cr><lf>+OK=<cache><cr><lf></lf></cr></cache></lf></cr>
Set	AT+DTMBCACKE= <cache><cr></cr></cache>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	cache: data cache size, values 1-256, actual cache
	is cache*32, maximum 8192(256*32) bytes

4.4.1.14. AT+DTMBSLOT

Name	AT+DTMBSLOT
Function	Set DTMB time slot information
Inquire	AT+DTMBSLOT <cr></cr>
	<cr><lf>+OK=<slot><cr><lf></lf></cr></slot></lf></cr>
Set	AT+DTMBSLOT= <slot><cr></cr></slot>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	slot: transmit slot, values 1-16

4.4.1.15. AT+DTMBFREQ

Name	AT+DTMBFREQ
Function	Set DTMB frequency information
Inquire	AT+DTMBFREQ <cr></cr>
	<cr><lf>+OK=<freq><cr><lf></lf></cr></freq></lf></cr>
Set	AT+DTMBFREQ= <freq><cr></cr></freq>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	freq: Operating frequency
Example	AT+DTMBFREQ
	+OK=915000000

4.4.1.16. AT+DTMBPSW

Name	AT+DTMBPSW
Function	Set DTMB plus password



Inquire	AT+DTMBPSW <cr></cr>
	<cr><lf>+OK=<password><cr><lf></lf></cr></password></lf></cr>
Set	AT+DTMBPSW= <password><cr></cr></password>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	password: A 32-byte string in hexadecimal
	notation, such as 00000000006 E023FB906030304

4.4.1.17. AT+WANN

Name	AT+WANN
Function	Set/query WAN port parameters
Inquire	AT+WANN <cr></cr>
	<cr><lf>+OK=<mode,address,mask,gateway><cr></cr></mode,address,mask,gateway></lf></cr>
	<lf></lf>
Set	AT+WANN= <mode,address,mask,gateway><cr></cr></mode,address,mask,gateway>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	mode: network IP mode,STATIC: static IP,DHCP:
	dynamic IP; default: STATIC
	Address:IP address; default: 192.168.1.23
	Mask: subnet mask; default: 255.255.255.0
	Gateway: Gateway address; default: 192.168.1.1

4.4.1.18. AT+DNS

Name	AT+DNS
Function	Query/set moduleDNS server address
Inquire	AT+DNS <cr></cr>
	<cr><lf>+OK=< address ><cr><lf></lf></cr></lf></cr>
Set	AT+DNS=< address > <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	address:DNS server address, default: 208.67.222.222

4.4.1.19. AT+UART

Name	AT+UART
Function	Set/query serial port parameters



Inquire	AT+UART <cr></cr>
	<cr><lf>+OK=<baudrate,data_bits,stop_bit,parity,f< td=""></baudrate,data_bits,stop_bit,parity,f<></lf></cr>
	lowctrl > <cr><lf></lf></cr>
Set	AT+UARTN= <baudrate,data_bits,stop_bit,parity,flowctrl< td=""></baudrate,data_bits,stop_bit,parity,flowctrl<>
	> <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	baudrate: Baud rate: 600-230400 Default: 230400
	data_bits: 7, 8; default: 8
	stop_bits: 1, 2; default: 1
	parity:
	NONE
	EVEN
	ODD
	MARK
	SPACE
	Default:NONE
	Flowctrl: Flow control,
	NFC: no flow control
	FCR: with software flow control, default: NFC

4.4.1.20. AT+SOCK

Name	AT+SOCK
Function	Query/set socket parameters of port
Inquire	AT+SOCK <cr></cr>
	<cr><lf>+OK=<work_mode,ip_addr,port><cr><lf></lf></cr></work_mode,ip_addr,port></lf></cr>
Set	AT+SOCKMN=< work_mode,ip_addr,port > <cr></cr>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	work_mode: Protocol type:
	TCPS: TCP Server
	TCPC: TCP Client
	UDPS: UDP Server
	UDPC: UDP Client,default: UDPS



ip_addr: Local IP/Destination IP or Domain Name (64
characters)
According to C/S mode differentiation, when the
module is set to "Client", IP address is remote server IP;
when it is "Server", it islocal server; default:
192.168.1.23
Port:protocol port, decimal number, 0~65535
When port=0 is a random port number. Default 8234

4.4.1.21. AT+SOCKPORT

Name	AT+SOCKPORT
Function	Query/setSOCK local port number of port
Inquire	AT+SOCKPORT <cr></cr>
	<cr><lf>+OK=<server>,<local><cr><lf></lf></cr></local></server></lf></cr>
Set	AT+SOCKPORTAN= <server>,<local><cr></cr></local></server>
	<cr><lf>+OK<cr><lf></lf></cr></lf></cr>
Parameter	server: The server port number to which you need to
	connect as a client
	local: Local port number as client (0 = port =65535)
	Random port number 0 when port=0; default, 8234

4.4.1.22. AT+PDTIME

Name	AT+PDTIME
Function	Query production time
Inquire	AT+PDTIME <cr></cr>
	<cr><lf>+OK=<time><cr><lf></lf></cr></time></lf></cr>
Set	/
Parameter	Date of birth: year-month-date hour:minute:second
	Example:202 3-07-23 11:37:13

5. Contact Us

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