Airborne Mesh Radio
Mimo 2×5 Watt
（Model：XK-M414E）

Shenzhen Xingkai Technology Co., Ltd
2025.6.3（V1.0）

www.xingkaitech.com

contents

■ Disclaimer

Thank you very much for using our products!

Please use this product in accordance with the local laws and regulations. We will not bear any legal liability for any result or loss caused by unauthorized use, installation or refit of this product, etc. Please use this product carefully according to the procedures and precautions mentioned in this manual. No any refund or exchange support and free-maintenance services will be provided if this product is damaged due to disassembly, impact, misoperation and other reasons.

■ Precautions

In order to ensure the correct and best use of this product, before operation, please read this manual carefully and follow the relevant procedures and precautions for fear of damage to the device or poor performance due to misoperation or improper use. The operator should have some basic knowledge on communication electronics. When installing and using this product, please pay attention to the followings.

Installation precautions:

1. Before the XK-M414E device is powered on, loads such as an antenna or an attenuator must be installed to the antenna interface, otherwise the power amplifier module inside the device will be damaged.
2. When replacing the antenna, the power must be cut off first, otherwise the power amplifier module inside the device will be damaged.
3. The antenna connection matching the device frequency should be selected, otherwise the power amplifier module inside the device may be damaged.
4. Please use DC power supply of dc20v ~ dc28v to supply power to the device, otherwise the circuit may be damaged or the device may work abnormally.
5. The antenna of the device should be exposed in the air as far as possible and obstacles should be avoided in order to prevent shortened communication distance.

6. The antenna should be installed as far away from large metal parts as possible.
7. The device should be kept a certain distance from other electronic device as far as possible to reduce electromagnetic interference between devices.

Operation precautions:

1. Make sure that all interfaces of the device are correctly connected and tightened with intact wiring.
2. After power on, wireless data transmission can be realized in about 28 seconds.
3. If there is high power co-channel interference in the surrounding environment, it will lead to poor reception of M414E, and the problem can be solved by changing the operating frequency of the equipment or switching off the surrounding co-channel interference sources.

1. Product Overview

XK-M414E mesh radio is the mobile broadband multimedia communication system based on based on LTE wireless communication standard. The mesh network adopts the same frequency networking and multi-hop relay. Each node can move quickly and randomly, and the network topology can be changed and updated quickly without affecting the network transmission. The whole network is convenient to deploy, flexible to use, simple to operate and easy to maintain. It can provide users with reliable, timely, efficient and secure full IP broadband data, high-definition video and visual command and scheduling and other multimedia integrated services under complex application scenarios such as fast movement and non-line-of-sight shielding.

The broadband self-organizing network can be widely used in the military, public security, armed police, fire protection, civil air defense, electric power, petroleum, mining, transportation, water conservancy, forestry, radio and television, medical, water and air communications and other sectors, providing users with reliable, timely, Rich integrated services such as safe and efficient voice, data, video and visual command and dispatch can meet users’wireless

broadband communication needs in normal or emergency situations to the greatest extent, and truly achieve “anytime, anywhere on demand”.

2. Product features and functions

2.1 Product features

- Self-assembling network with no centre homodyne frequency;
- Maximum bandwidth support is 100Mbps;
- Up to 100km transmission distance;
- Automatic detection of interference signals, real-time selection of the optimal frequency point work;
- Automatic retransmission of burst error data to improve data reliability;
- Automatically adjusts channel modulation based on signal quality in real time;
- Support OTA upgrade, support local and remote upgrade;
- Supports maintaining normal communication at 300km/h relative movement speed between nodes;
- Support to meet the basic configuration and check device information through WEBUI.

2.2 Product functions

- The operating frequency band can be customised to 600MHz/1.4GHz;
- Adjustable bandwidth, 3MHz, 5MHz, 10MHz, 20MHz, 40MHz (optional);
- 64QAM, 16QAM, QPSK multiple code rate adaptive;
- The same frequency supports a maximum of 32 nodes and a maximum of 31 hops;
- Supports unicast, multicast, and broadcast services;
- QoS priority is supported;
- AES128, SNOW, ZUC encryption, supports user-defined encryption;
- Centreless self-organising network for point-to-point,point-to-multipoint, relay and other applications;
- Supports multiple serial ports, SBUS;

- Supports simultaneous transmission of up to 3 network port devices.

3. Technical Parameters

Item	Spec/Parameters
Operation Voltage	DC 20V~DC28V，Standard input DC24V
Power Consumption	≤35W @ 37dBm
Modulation	Supports QPSK, 16QAM, 64QAM modulations
Data interface	ETH*3, UART*3（TTL/RS232）, UART*1（RS232/RS485/RS422）, SBUS*1
Frequency	1420-1530MHz
Channel rate	bandwidth :20MHz, Transmission not less than 100Mbps
Bandwidth	3/5/10/20MHz
Latency	≤15ms
Tx Power	2*33dBm（Adjustable）
single-hop delay	≤20ms
Maximum number of networks	32
Maximum supported hops	31
transmission distance	100km（point-to-point）
encryption method	AES128, SNOW, ZUC
Working temperature	-30℃~60℃
Storage temperature	-40℃~75℃
Communication Protocol	IEEE802.3，Transparent serial data
Communication	Distributed centreless point-to-point, point-to-multipoint, relay mode, mesh networking
Dimensions	125*95*42mm
Weight	≤650g

4. Physical product and interface description

4.1 Physical picture and dimension of the transmission device

Fig. 4.1Physical picture and dimension of XK-M414E

4.2 Device interface

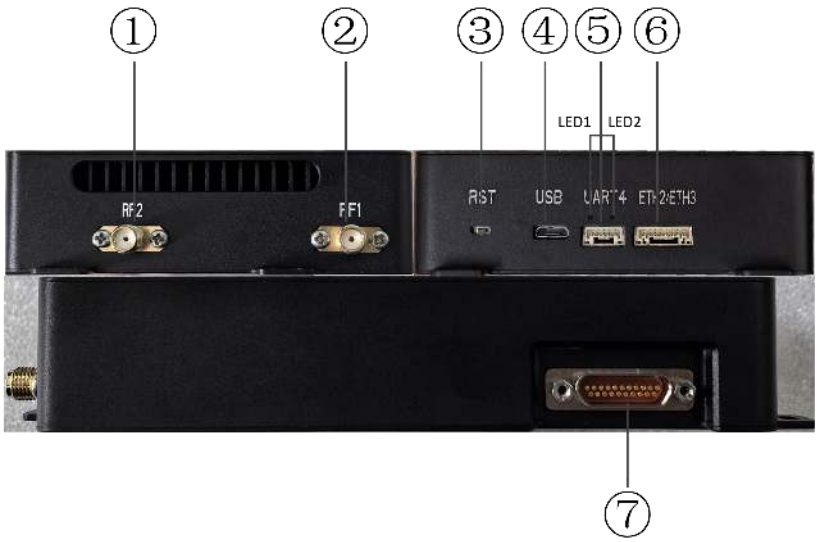
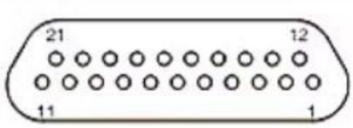


Fig. 4.2 Physical interface of XK-M414E

①J30 Joint Definition Notes:



connector	PIN	define
ETH	1	TX+
	2	TX-
	12	RX+
	13	RX-
UART1	6	TX1
	7	RX1
	8	GND
UART2	3	TX2
	4	RX2
	5	GND
UART3	14	TX3
	15	RX3
	16	GND
SBUS	17	SO
	9	GND

	18	SI
	19	GND
DC	10	VCC
	11	VCC
	20	GND
	21	GND

②Power interface, power supply range 20-28V;

③Secondary antenna interface;

④Main antenna interface;

⑤Two standby network ports are provided, the air device can connect 3 cameras, and the ground device can connect at most 3 computers for monitoring;

⑥UART1, transparent data transmission serial port, supporting RS485/RS232; LED1 is the band light; LED2 is the communication light;

⑦USB interface

⑧Reset: the device can be restarted by pressing it down for 1~2s; the factory settings can be restored by pressing it down for more than 5s;

5. Installation instructions

5.1 Installation Diagram

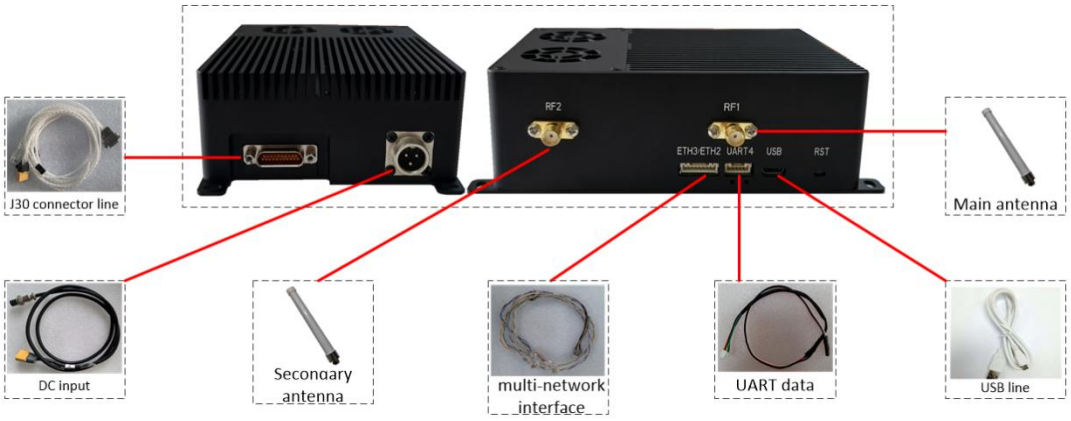


Fig. 5.1 Schematic diagram of air device installation and connection

5.2 Installation Instructions

The XK-M414E two-way graphic-digital integrated device is shown in Figure 5.1. The

specific installation steps are as follows:

① Connect the main and secondary antennas of the corresponding frequency points to Port RF1 and RF2 first, and make sure that the connection is tight;

②The network port is directly connected to the relevant device (PC/camera, etc.);

③SBUS interface, mainly for telemetry data;

④ If the user's serial data is needed to be transmitted, use a USB serial cable to connect it to the PC ;

⑤ Finally, power on.

6. Web page configuration

6.1. Login interface

Input the device IP on the web page to enter the interface shown in Fig. 6.1.

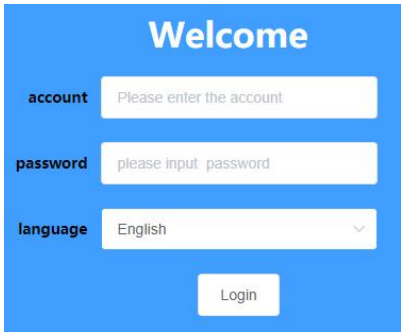


Fig. 6.1 Login interface

The parameter setting page can be shown by entering Account: "admin" and Password: "admin". Chinese / English pages are supported.

6.2. ‘Wireless Parameter Setting’ interface

Wireless parameter settings include: operating mode, frequency band setting, frequency hopping setting, power setting, bandwidth setting, encryption setting, Update AII Nodes.

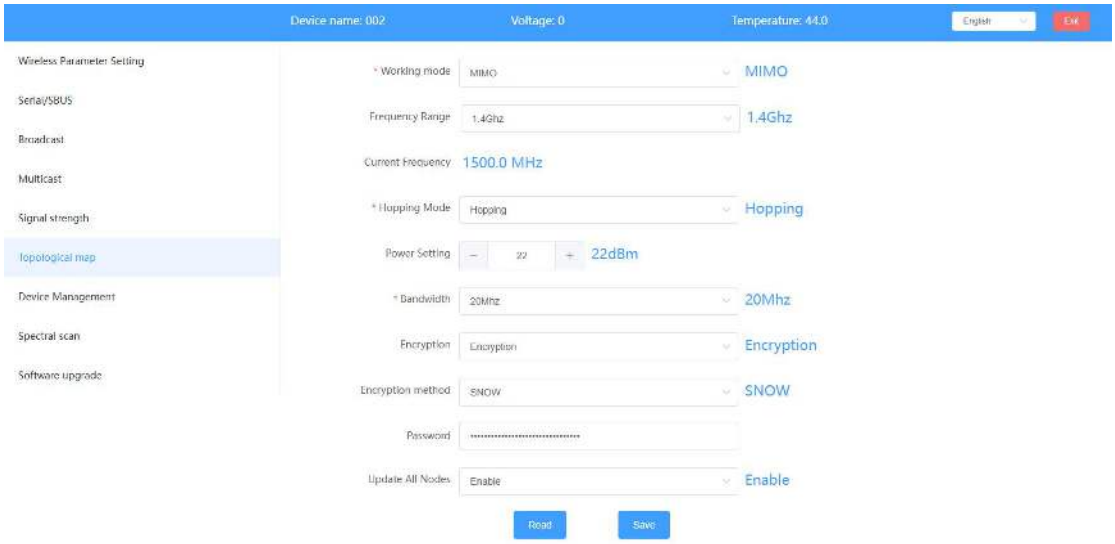


Figure 6.2.1 'Wireless Parameter Setting' Interface

a) working mode

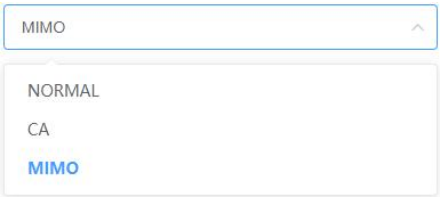


Figure 6.2.2 'Working Mode' drop-down option

There are three operating modes, NORMAL, CA, and MIMO.

b) Frequency Range

Figure 6.2.3 'Frequency Range' drop-down options

Support 600MHz and 1.4GHz band, default 1.4GHz band, not open user setting function, 600MHz band needs to be customised separately.

c) Hopping Mode

The frequency hopping setting contains two options: frequency hopping and frequency fixing.

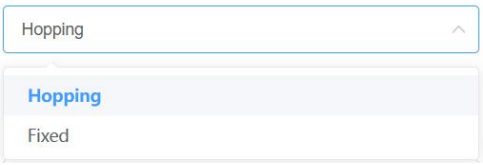


Figure 6.2.4 'Hopping Mode' drop-down options

hopping: When frequency hopping is set, the frequency is selected according to the environmental factors when the equipment is running.

Fixed: When setting the fixed frequency, you need to select the frequency point manually. Fixed can be manually set in the list of frequency points, including: 1430-1520MHz every

10MHz a total of 10 frequency points can be set. Such as 1.4G band frequency points as shown in the figure below:

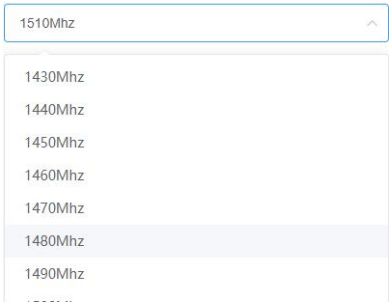


Figure 6.2.5 'Fixed Frequency' drop-down option

d) power setting

Setting range: 0~33dBm

e) Bandwidth Setting

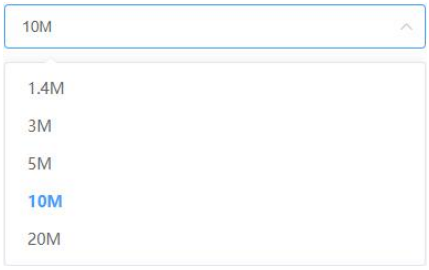


Figure 6.2.6 'Bandwidth Settings' drop-down options

Bandwidth settings include: 1.4MHz, 3MHz, 5MHz, 10MHz, 20MHz.

The larger the bandwidth, the clearer the image, the relatively shorter the transmission distance; conversely, the longer the transmission distance, the relative sacrifice of picture quality.

f) encryption settings

Support AES128, SNOW and ZUC encryption methods.

g) Update All Nodes

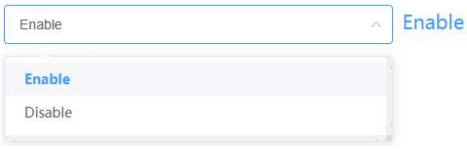


Figure 6.2.7 'Update All Nodes' drop-down options

In the wireless parameter interface, the parameter option with '*' can support the whole network configuration function, in all the node devices in the network, only modify one of the nodes to achieve the parameter configuration of all the node devices in the network.

6.3‘Serial/SBUS’ interface

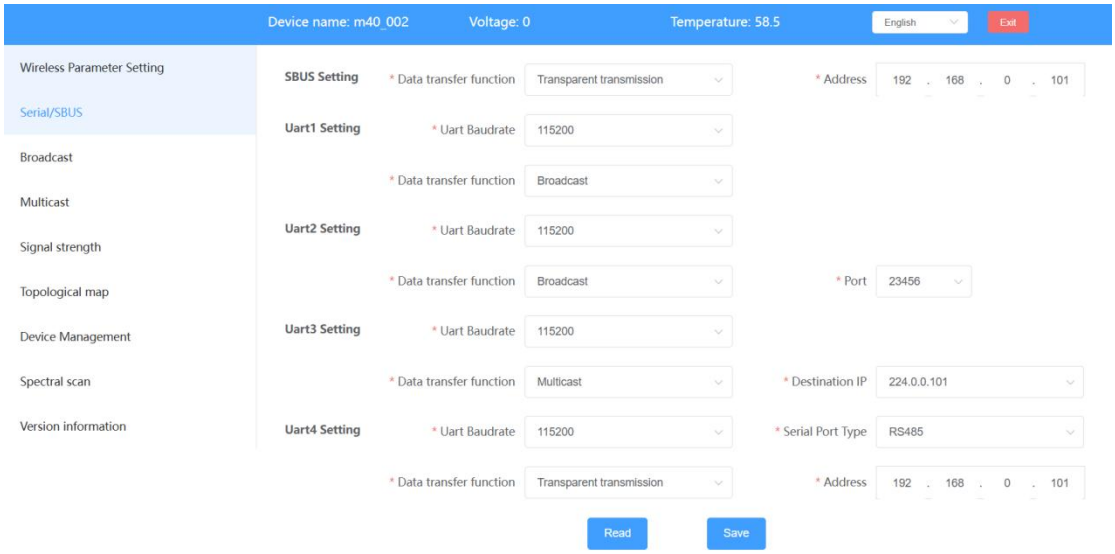


Figure 6.3.1 ‘Serial/SBUS’ Interface

Provides 5 data links: SBUS, serial ports 1-4; of which SBUS supports UDP network forwarding function, serial port 1 supports pass-through and broadcast function, and serial ports 2-4 support pass-through, UDP/TCP network forwarding function, multicast and broadcast.

a) Serial Baud Rate Setting

Serial ports 1-4 provide a variety of baud rate settings, select the serial port baud rate in the ‘Baud Rate Setting’ drop-down box.

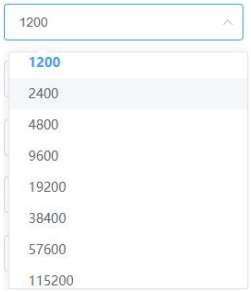


Figure 6.3.2 ‘Baud Rate Setting’ Drop-down Options

The baud rates that can be set are: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

b) Data transfer function settings

Data transmission functions are passthrough, network forwarding, multicast and broadcast.

Pass-through: Pass-through is used for point-to-point data transmission, both devices are enabled at the same time, fill in the IP address field with the IP of the opposite end.

Network forwarding: the terminal (PC, tablet) can send data through the network to reach the node, the node serial port output, or node serial port data sent to the terminal

through the network.

Specific steps for using the network forwarding feature:

- The device connected to one end of the flight control is set to Network Forwarding Enable in the configuration interface of that device;
- The device connected to the PC side only needs to be connected to the network port, and there is no need to turn on the network forwarding enable again;
- At this time, when the ground station software establishes the connection, it selects UDP or TCP connection mode, which should be consistent with the protocol set by the device. When TCP protocol is used, the terminal should use TCP Client to match when the device is in TCP Server mode.

Note: Serial port pass-through and network forwarding can only be used with one of the two settings!

Figure 6.3.3 Network transmission

Multicast: Multicast is used for point-to-multipoint data transmission, joining the same multicast group of devices, any device sends data, the same multicast group of devices can receive data.

Specific steps for using the multicast feature:

- Add a multicast group on the Multicast Settings screen, refer to Section 6.5 for adding a multicast group.
- Select ‘Multicast’ from the ‘Data Transfer Function’ drop-down list, and select a multicast group from the IP address column.

Note: Only when you add a multicast group on the Multicast Settings page, the optional multicast group will be available in the IP address column.

Figure 6.3.4 Serial Multicast

Broadcast: Devices or terminal devices that join a broadcast group can receive broadcast data from the device or terminal.

Specific steps for using the broadcast function:

- Add a broadcast group on the ‘Broadcast settings’ screen, and refer to Section 6.4 for details.
- Select ‘Broadcast’ in the ‘Data Transfer Function’ drop-down, and select Broadcast Group in the Port column.

Note: Only when you add a broadcast group on the ‘Broadcast Settings’ screen, there is an optional broadcast group in the port column drop-down.

Figure 6.3.5 Serial broadcast

6.4‘Broadcast’ interfaces

Includes: broadcast port list and display port serial port list

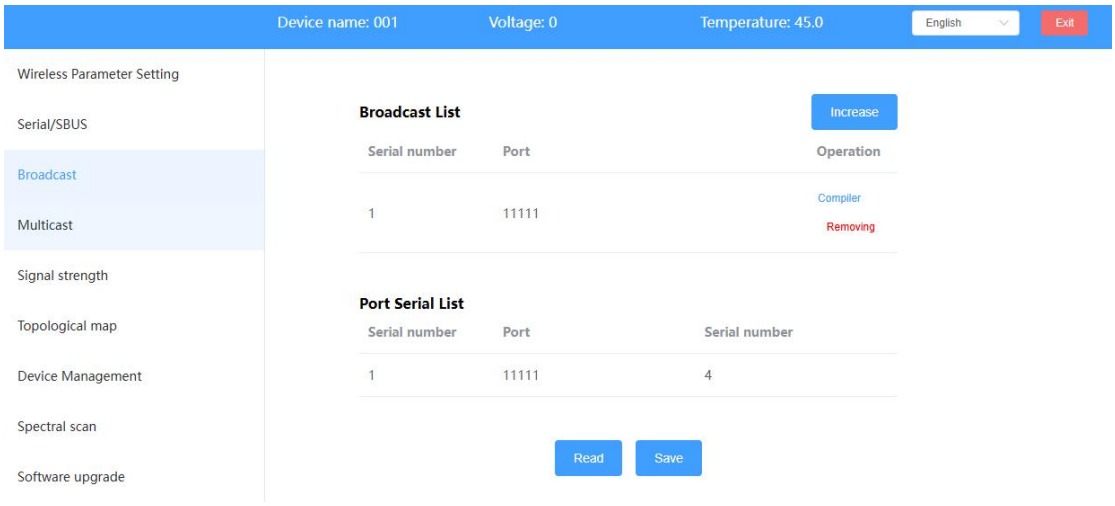


Figure 6.4.1 Broadcast interfaces

a) Adding a broadcast port

Click ‘Add’ button, fill in the required port number, ‘Confirm’ and go back to Figure 6.4.1 ‘Broadcast Settings’ interface to ‘Save’. Confirm’ to go back to “Save” in Figure 6.4.1 “Broadcast Settings” screen. After saving successfully, you can select these added broadcast ports in the ‘Serial/SBUS Settings’ interface when using the broadcast function on the serial port.

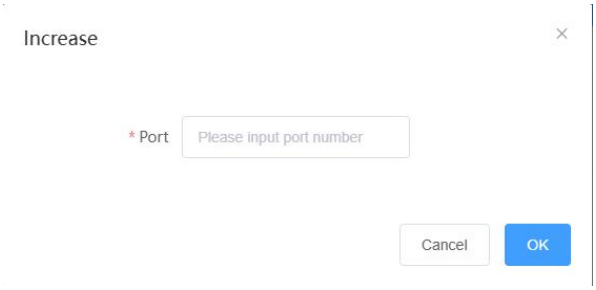


Figure 6.4.2 Adding a broadcast port

b) Port Serial List

This column mainly shows which serial port the broadcast port is being used by.

6.5 ‘Multicast’ interface

Contains: multicast group IP list and IP serial port list.

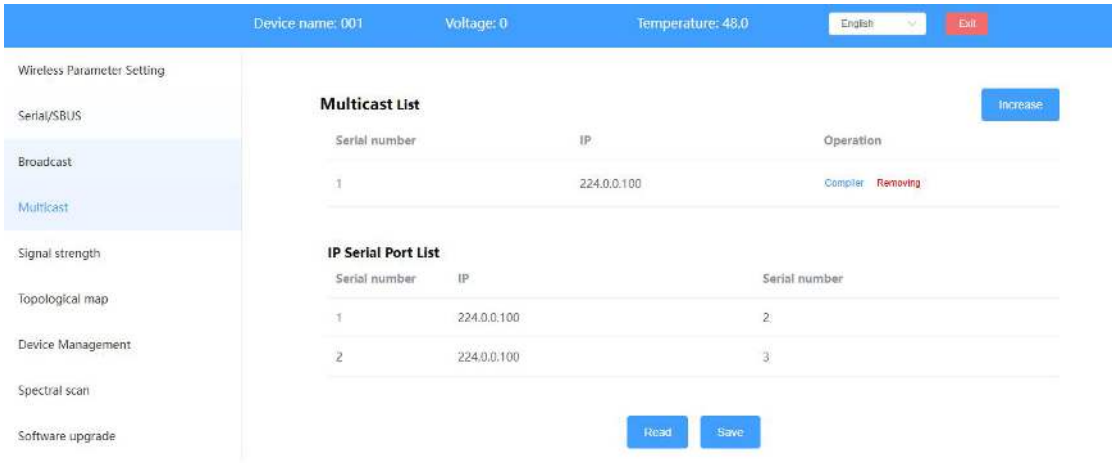


Figure 6.5.1 Multicast Settings Screen

a) Adding a Multicast Group

As shown in Figure 6.5.1 above, click the ‘Add’ button, fill in the IP address of the desired multicast group, and ‘Confirm’ to return to the ‘Multicast Settings’ interface in Figure 6.5.1. ‘Save’. After saving successfully, you can select the added multicast group in the ‘Serial/SBUS Settings’ interface when using the multicast function on the serial port. The IP range of multicast group is 224.0.0.10-224.0.0.150.

Figure 6.5.2 Adding a Multicast Group

b) IP Serial Port List

This column mainly shows which serial port the multicast group is being used by.

6.6 **‘Signal Strength’ interface**

Includes: ‘Link information’ and ‘Device information’.

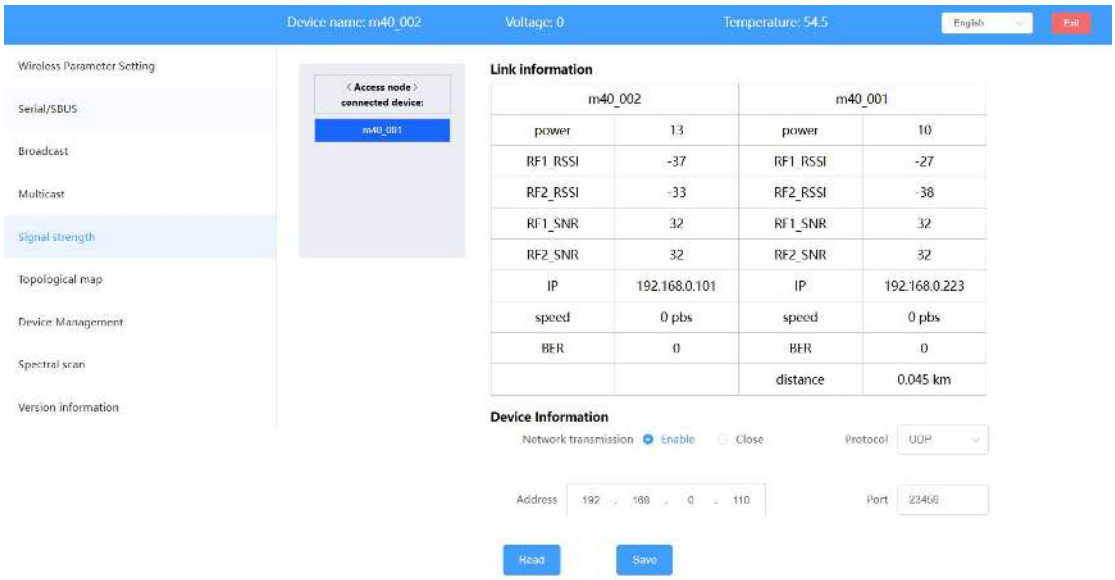


Figure 6.6.1 ‘Signal Strength’ interface

a) The device signal strength and other information support UDP/TCP protocol forwarding
   - ➢ When the current device's device status network transmission is enabled, it can forward all device link information that is networked with this device.
   - ➢ Fill in the IP of the terminal in ‘Address’, and customise the port number.

b) Link Information Display

The devices shown in the list on the left indicate information about the networking of this device:

All devices grouped with this device can be observed on the Signal Strength per Device page.

Link information display: It shows the link status of the device network, RSSI signal strength ‘-141~-13’ from weak to strong, the larger the SNR value, the better the wireless signal quality.

6.7 **‘Topology Map’ interface**

Topology maps allow real-time monitoring of device network status.

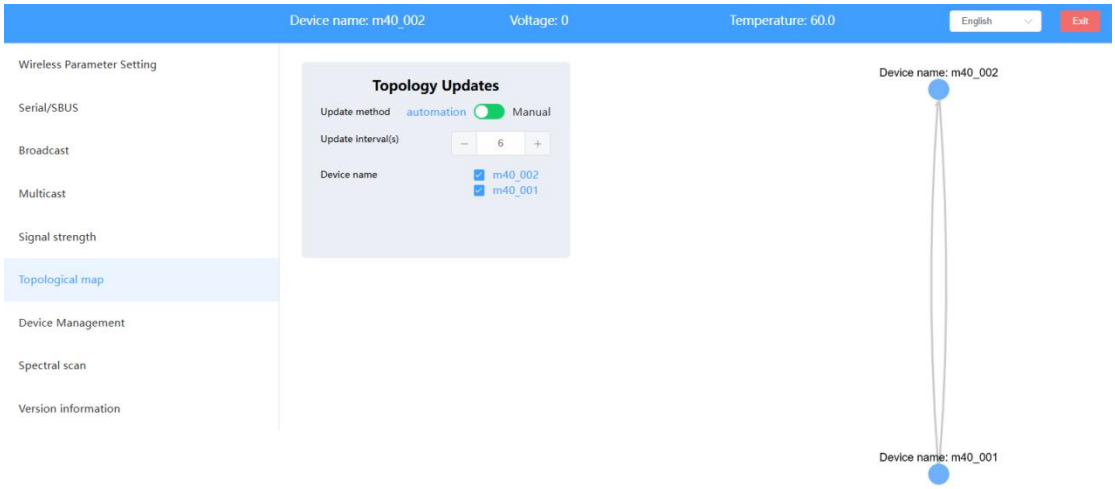


Figure 6.7.1 Topology Map interface

a) Topology map update

Auto Update: As in Figure 6.7.2 select Auto Update and the network topology map on the right will be updated automatically according to the update interval.

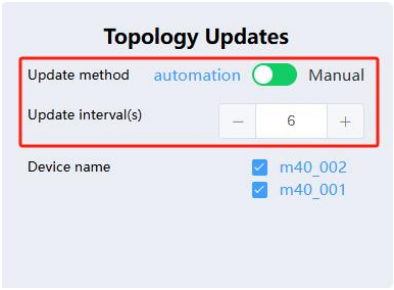


Figure 6.7.2 Automatic update of flutter diagrams

Manual Update: If you select Manual Update in Figure 6.7.3, you need to click the Update button to update the topology network status, device information, link information, etc. on the right side.

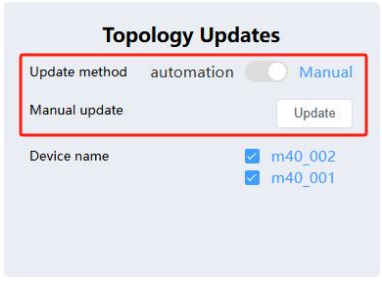


Figure 6.7.3 Puff diagram manual update

Device Name: As Figure 6.7.4 shows all the node names of the network, if you only want to view a device or part of the device information, you can put the corresponding device '√' selected or cancelled, '√' selected state of the device can be viewed in real time device status information.

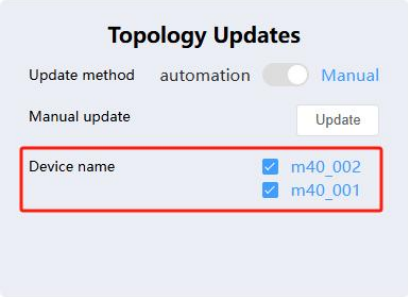


Figure 6.7.4 Puff diagram device name

b) Viewing Device Status

View node information: Hover your mouse over the device in the topology page (the blue dot in the figure below), you can watch the status of the corresponding device, the device information includes device name, IP, power, frequency, bandwidth, total output rate, the number of pro-nodes, etc.

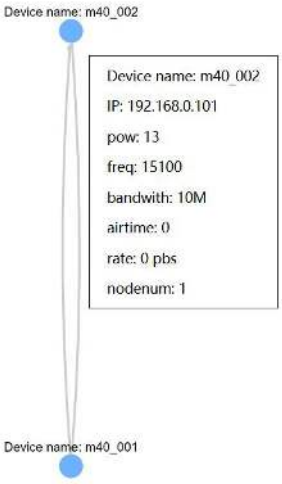


Figure 6.7.5 Looking at device information

View link information: Hover the mouse over the link line to view the RSSI, SNR, data rate, distance and other information between devices.

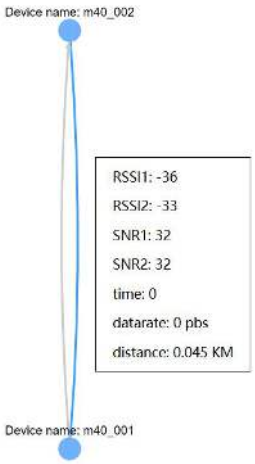


Figure 6.7.6 View link information

6.8 ‘Device Management’ interface

Include: device name, device IP, remote upgrade, system reboot, restore factory settings, etc.

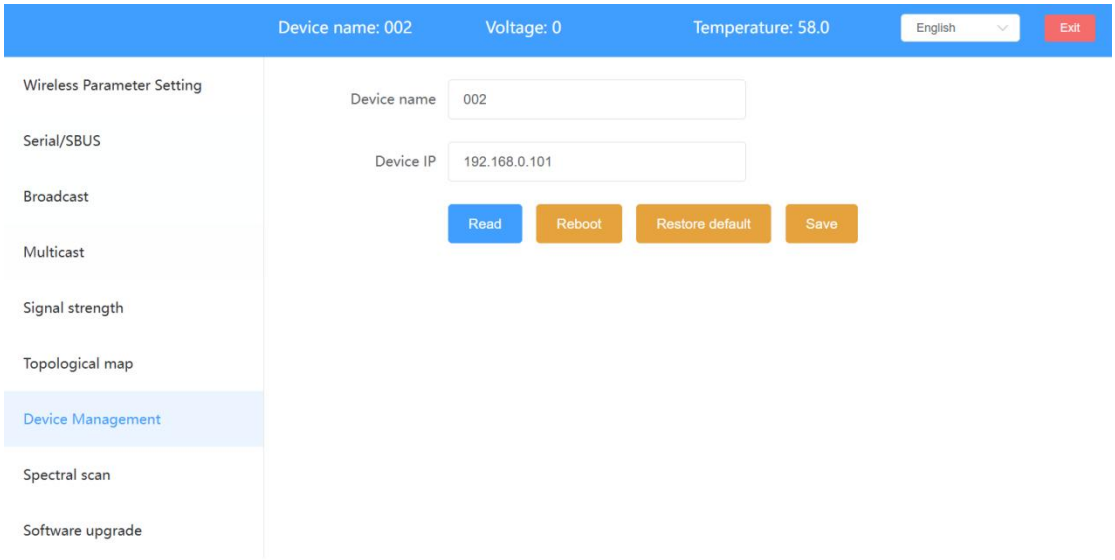


Figure 6.8.1 ‘Device Management’ Interface

a) Modify the device IP and name

Support to modify node name and IP, all the devices in the network should be in the same network segment. ‘Save’ can complete the IP and name modification.

b) Device Management

Support soft reboot, restore factory settings function.

6.9‘Spectrum Scan’ interface

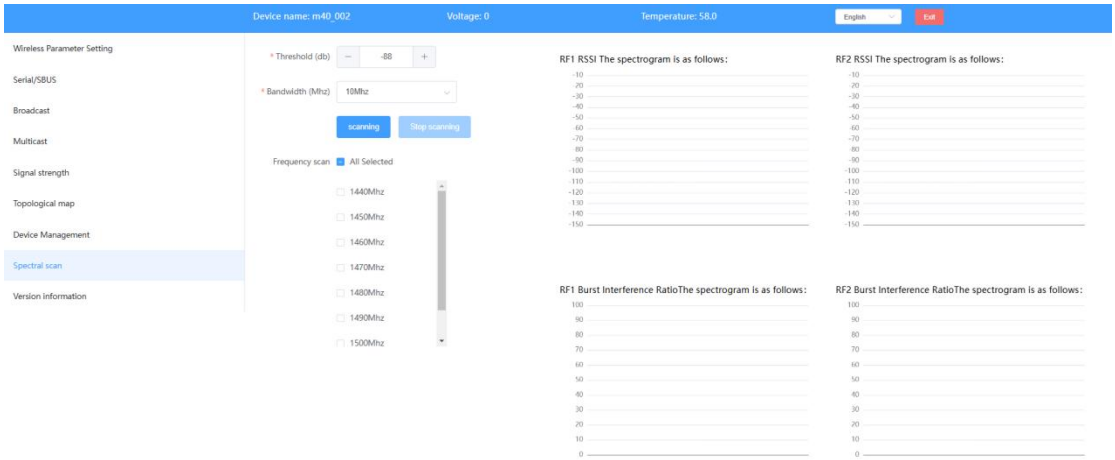


Figure 6.8.1 Spectrum Scan interface

As in Figure 6.8.1 above, when scanning the RSSI of this node, set the threshold, select the bandwidth, and select the frequency, if you want to scan the whole frequency band,

you can directly select all, if you only want to scan part of the frequency, you can check the box individually. Click ‘Sweep’ to start scanning.

RSSI: The noise power within the sweep bandwidth, i.e. the size of the interference.

Burst Interference Ratio: Burst Interference Ratio refers to the percentage of time that the noise power within the swept bandwidth within the sampling range is above the threshold. As shown in Figure 6.8.1 above, the threshold can be set, the default threshold is -88, which refers to the noise power within the swept bandwidth. 100 means that there is above-threshold interference one hundred per cent of the time in the test null frame, and 87 means that there is above-threshold interference eighty-seven per cent of the time. The presence or absence of interference is determined by comparing the sampled values to the set threshold, above which interference is considered to be present, otherwise it is considered to be absent.

6.10‘Version Information’ interface

Figure 6.10.1 Version Information interface

Supports system upgrade, displaying firmware version, baseband version, web version and other information.

7. Decoding setting

7.1 PC IP setting

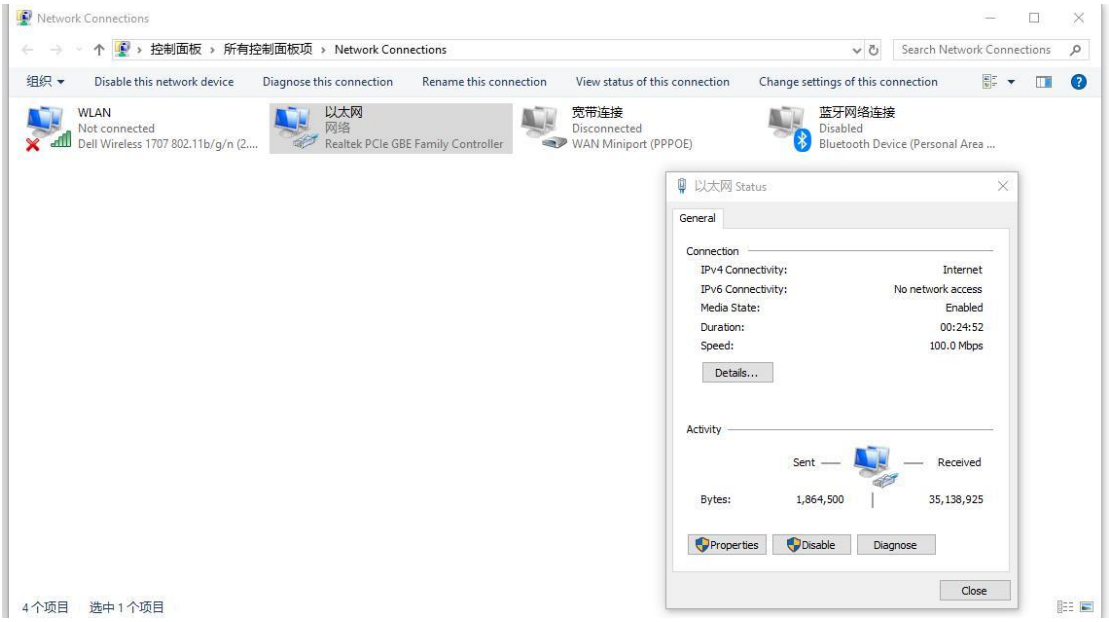


Fig. 7.1.1 Network connection

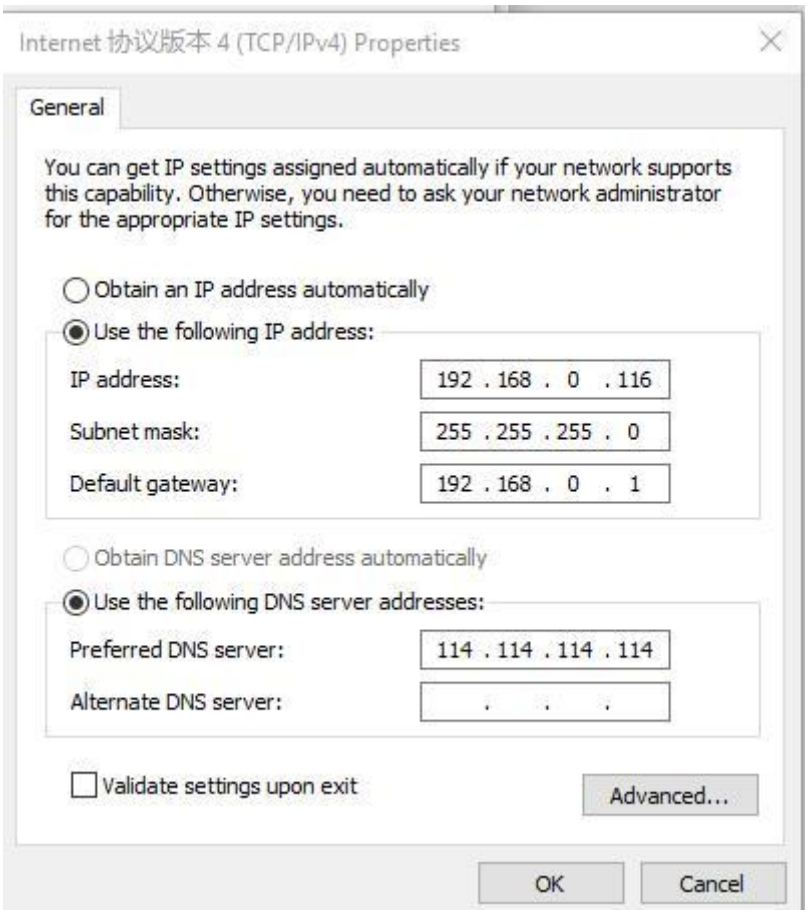


Fig. 7.1.2 PC IP address setting

The PC IP address network segment should be consistent with that of the network camera! The IP address should not change, otherwise a connection failure will be caused.

7.2 Network camera setting

First, log in to network camera page to learn how to set the IP address parameters of the network camera. The parameter selection of different types of webcam is a little different. The setting is shown below:

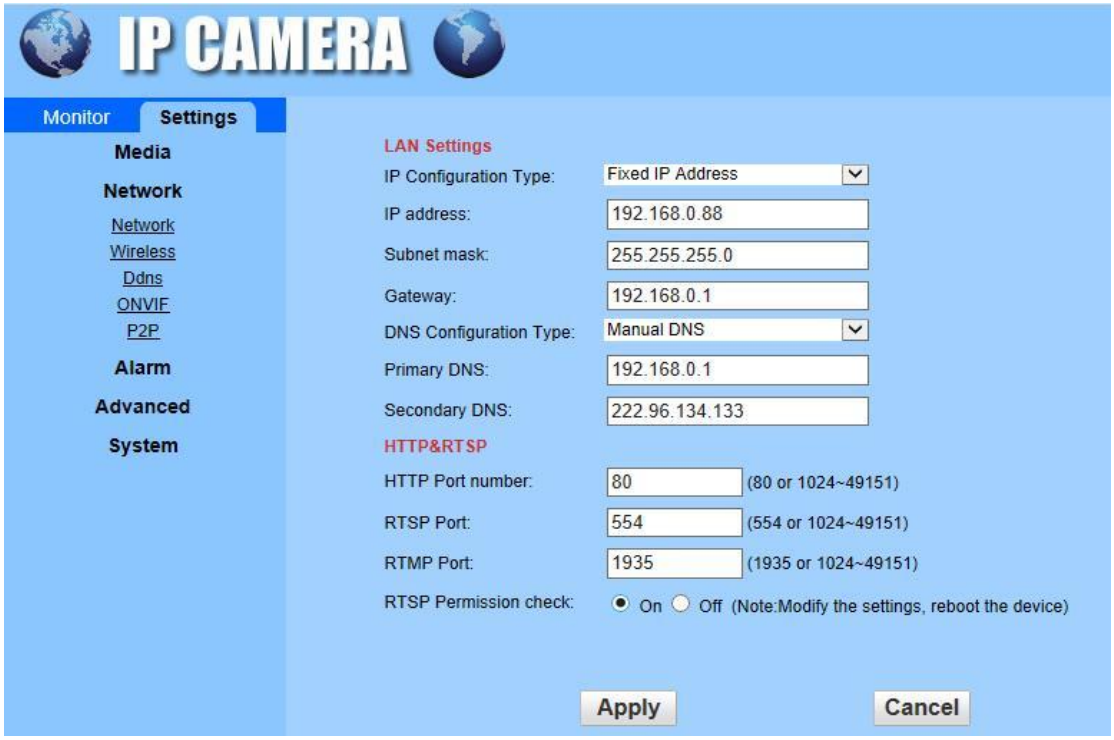


Fig. 7.2 Network setting of network camera

The network segment of the camera should be the same as that of the PC IP address. For example, the above configuration is 192.168.0.X, however the two IP addresses cannot be the same, otherwise a failure will be caused.

7.3 Network decoding

Enter the IP address of the camera in the browser player to observe the decoding effect. Other decoding software can also be used, enter the rtsp streaming address and port number.

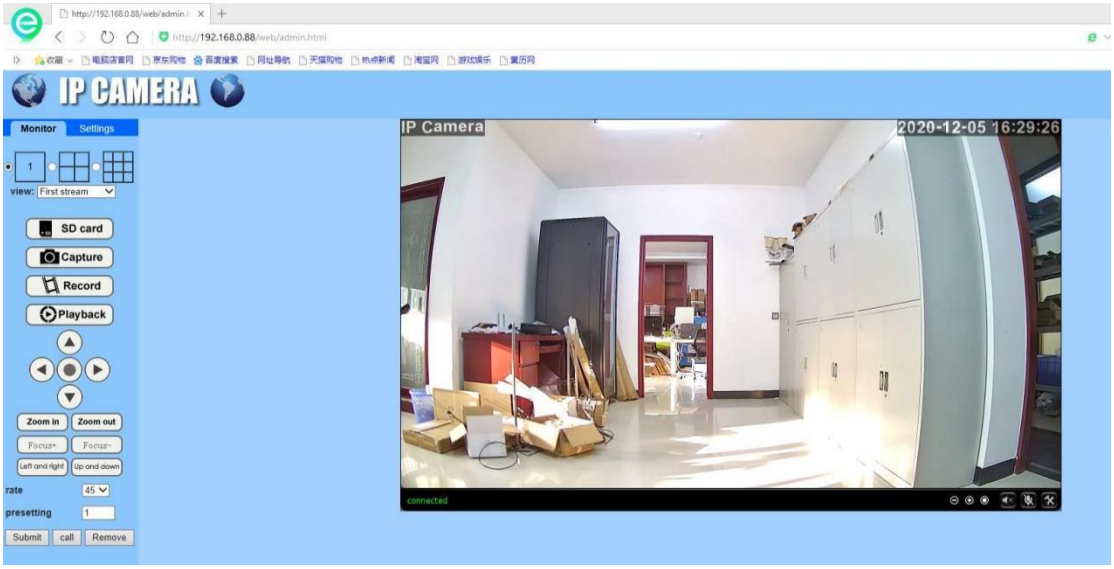


Fig. 7.3 Decoding effect of browser