1. Preparation before using

1.1 Connect the antenna to the SMA connected to the gateway;



1.2 Use a USB-B cable to connect to the gateway (local direct connection application, need not connect power adapter) or use a network cable to connect to the router (network connection application, need to connect 12V power adapter to the gateway module);



Network connected applications

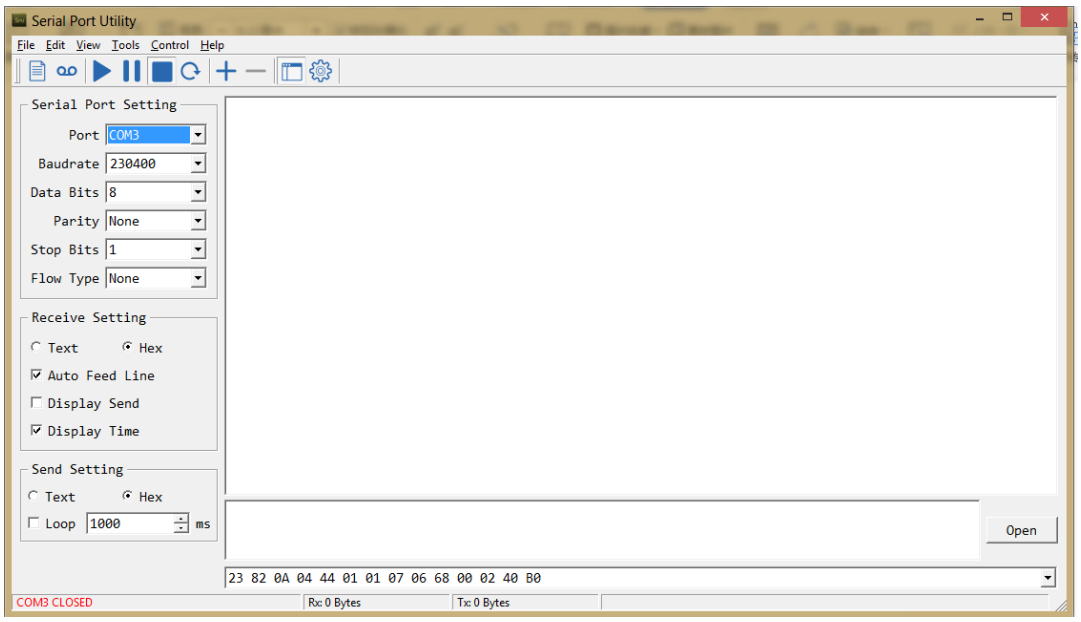
1.3 Select the data communication path (the setting will be saved after power off)

Short press the button, the red light flashes twice, indicating that the serial port is switched to the Ethernet module and output through the RJ45 interface;

Short press the button, the blue light double flashes, indicating that the serial port is switched to the USB-to-serial chip, and output through the USB interface;

2. When using the USB interface to communicate

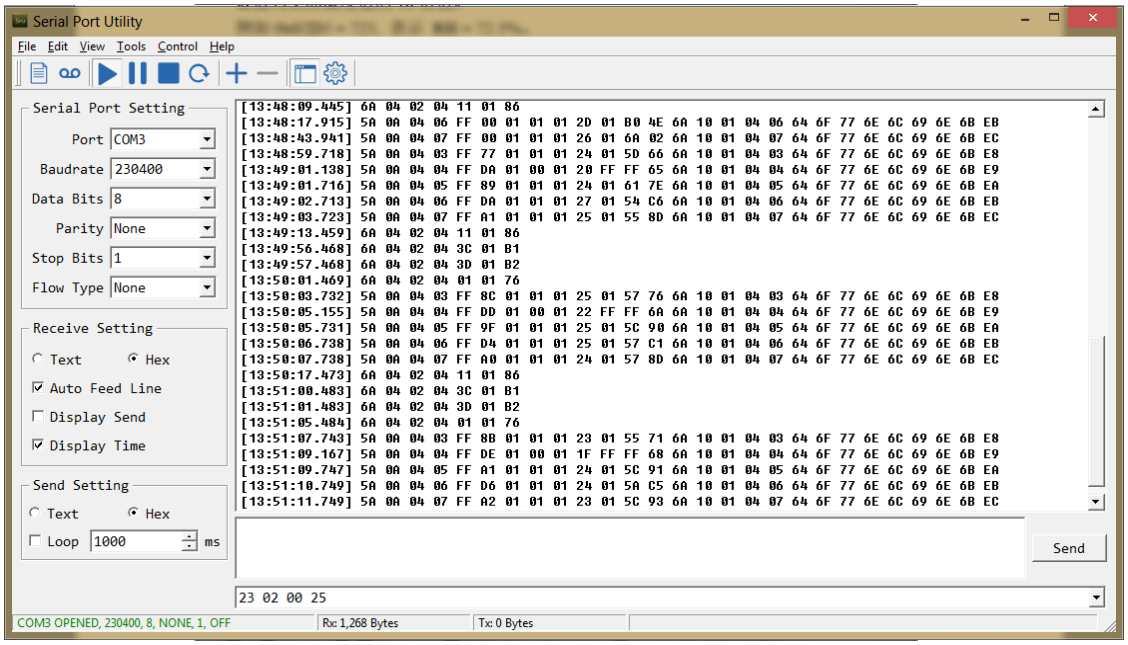
2.1 Open the serial assistant and set the serial to 230400,8,N,1



After opening the serial port, you can modify the parameters of the gateway by sending a setting command according to "IOT-G010 configuration and communicate protocol v1.0".

2.2 View received data

Power on IOT-THS010. After the node is working normally, the measured sensor data will be uploaded regularly according to the set interval.



Note: When using IOT-N010, it needs to send uplink data to IOT-N010 during wake up period so that gateway can output uplink data. If there is no data, gateway will output nothing.

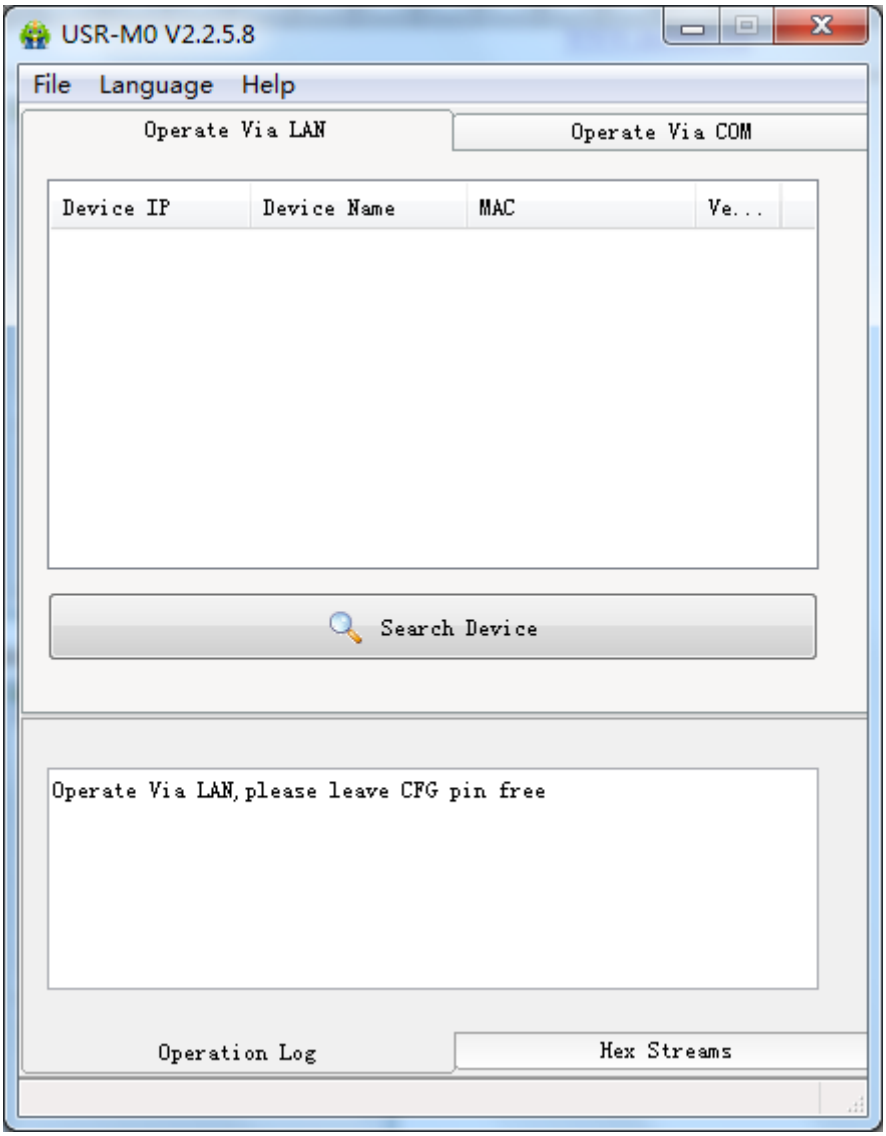
3. When using RJ45 interface as data input and output path.

3.1 Set gateway information (just set once)

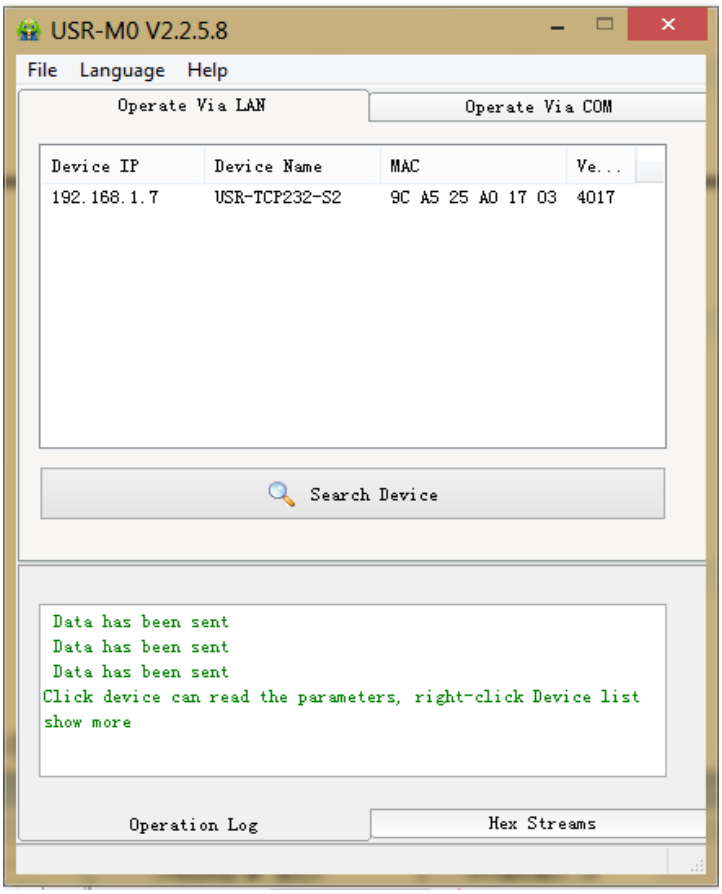
Open the software USR-M0_V2.2.5.8.exe ;



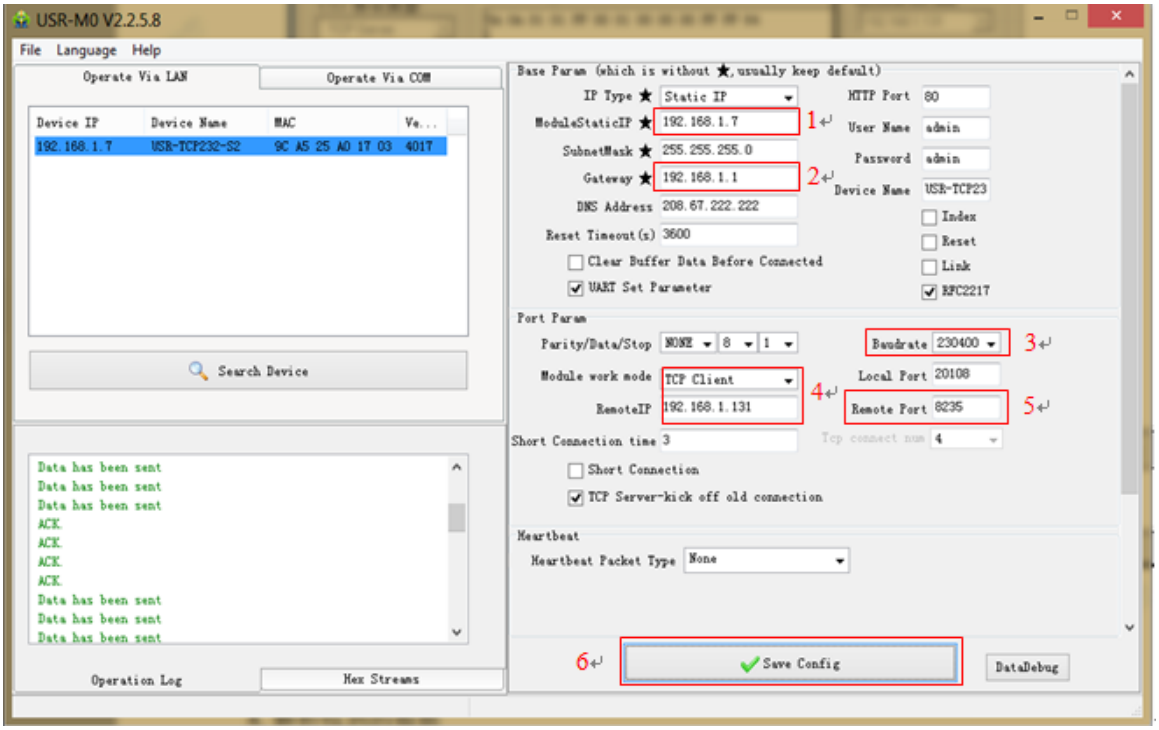
After opening as shown below：



Click Search Device



After clicking the searched device, modify the following parameters:



a) Set ModuleStaticIP of the module (be careful not to conflict with other hosts in the LAN).
b) Set gateway IP (set according to the LAN).
c) Set Baudrate to 230400.
d) Set Module work mode to TCP Client, the RemoteIP is the target address of server to be connected.

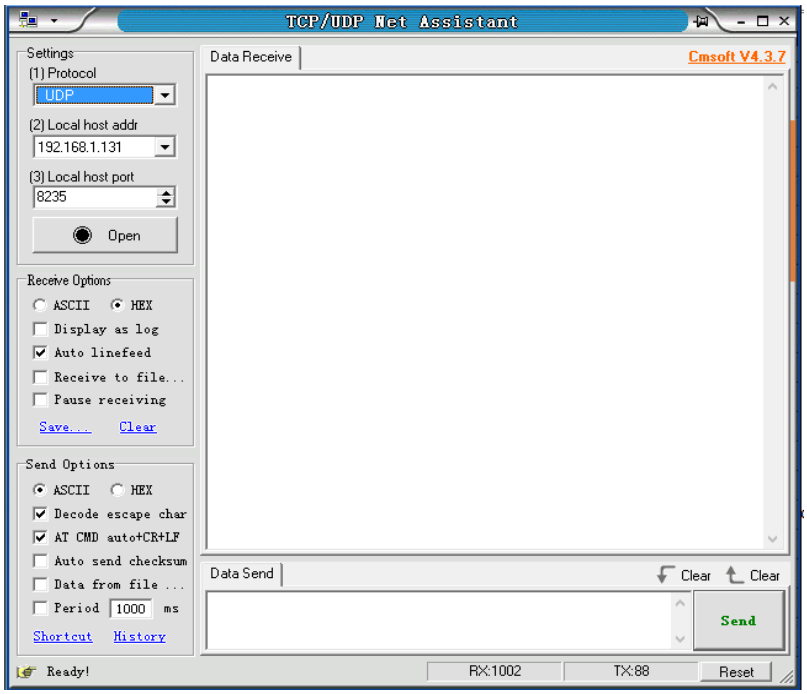
e) Set the Remote Port.

3.2 Use network debugging assistant as server

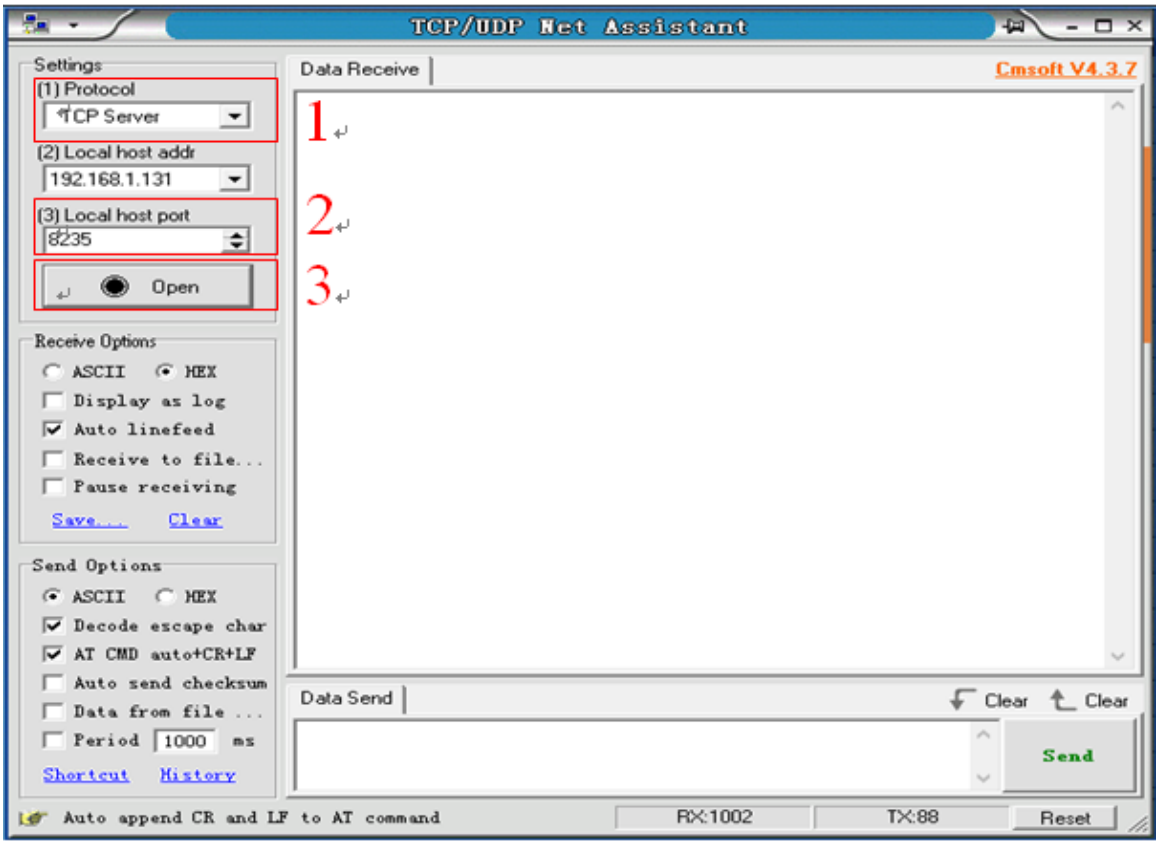
Open network debugging assistant



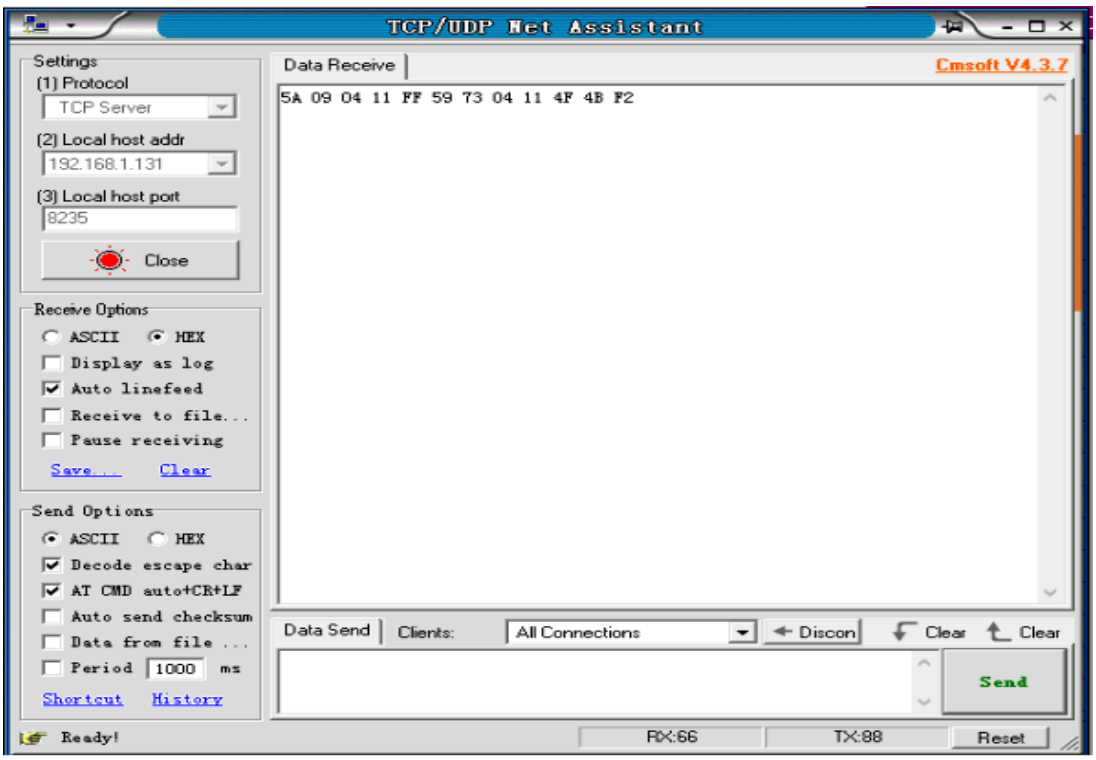
After opening as shown below：



Select TCP Server in Protocol, keep Locol host IP as default, and set Locol host port to Remote Port set in the gateway.



After opening, the received node data output is as follows:



4. The Protocol of received data

The more details could be seen in document "IOT-G010 configuration and communicate protocol v1.0".

B. IOT_THS010 uplink communication data protocol (this item is only valid for node IOT_THS010)

Data Format: 0x5A + length(1byte) + GW_ID(1byte) + node_ID(1byte) + 0xFF + latch_rssi(1byte) + payload(6bytes) + checksum(1byte)

0x5A: Frame header, fixed at 5A;

length(1byte): Data length, the length indicated is the number of data bytes after the length byte and before the Checksum (not including the length itself and the checksum);

GW_ID(1byte):Gateway ID of the node to which the frame data belongs;

node_ID(1byte): The node ID of the node which sent this packet.

latch_rssi: The received signal strength indication received by the corresponding node last time.

The formula to convert the signal strength value to dBm is: RF_Input_dBm = (latch_rssi / 2) − 64 − 70

payload(6bytes): format: Hall switch state(1byte) + sensor type(1byte) + Temperature value(2bytes) + Humidity value(2bytes).

Hall switch state(1byte):

0:Magnetic

1:No magnet

Sensor type(1byte):

0x00: Temperature SensorDS18B20;

0x01: Temperature and humidity sensorSHT20;

Temperature value(2bytes):

The high byte comes first, and the low byte comes after.

The highest bit represents the sign, 0 represents a positive value, and 1 represents a negative value.

The values other than the sign bit are 10 times the actual temperature value.

For example:0x010B = 267, which means 26.7°C.

The highest bit of 0x800A is 1 which means negative value, except that the value of the sign bit is 10, which means -1.0℃.

Humidity value(2bytes):

Only valid when the sensor type = SHT20, otherwise it is fixed to 0xFFFF.

The high byte comes first, and the low byte comes after.

The value is 10 times the actual humidity value.

For example: 0x02D5 = 725, which means RH = 72.5%

Checksum(1byte):The checksum is calculated as the sum of all bytes before the byte.

5. Add nodes to the gateway

The formation of a network is determined by three parameters, frequency channel (rf_channel), RF rate (data_rate) and gateway ID (GW_ID). Only when these three parameters of the node are same with the gateway, node can communicate with the gateway. So if node and gateway share with same frequency channel, RF rate and gateway ID, that means node has joined this network.

In order to distinguish each node in the network, it is also necessary to set a unique ID for each node which named Node_ID.

5.1 Set the frequency channel (rf_channel), RF rate (data_rate) and gateway ID (GW_ID) of the gateway to create a new subnet.

Set the gatewayID(GW_ID)

Send (HEX): 24 84 01 01 AA

Reply(HEX): 24 84 02 4F 4B 44

Set RF channel(rf_channel)

Send (HEX): 24 85 01 01 AB

Reply(HEX): 24 85 02 4F 4B 45

Set RF rate(data_rate)

Send (HEX): 24 86 01 01 AC

Reply(HEX): 24 86 02 4F 4B 46

Description: Refer to " IOT-G010 configuration and communicate protocol v1.0" for specific protocol.

a) Set the node's frequency channel (rf_channel), RF rate (data_rate) and gateway ID (GW_ID) to join the gateway.

Long press the SET button on the node for 3 seconds to enter the setting mode, and send the following commands through the gateway.

3. GW_ID

3.1 Write

Send :0x23 + 0x83 + length(1byte) + GW_ID(1byte) + checksum(1byte)

Reply:0x23 + 0x83 + 0x02 + 'O' + 'K' + checksum(1byte)

Description:

GW_ID: Gateway ID which node belongs to. Range 1~40. Default: 1

Example:

Send (HEX): 23 83 01 01 A8

Reply (HEX): 23 83 02 4F 4B 42

3.2 Read

Send :0x23 + 0x03 + length(1byte) + checksum(1byte)

Reply:0x23 + 0x03 + length(1byte) + GW_ID(1byte) + checksum(1byte)

Example:

Send (HEX): 23 03 00 26

Reply(HEX): 23 03 01 01 28

4. Node_ID

4.1 Write

Send :0x23 + 0x84 + length(1byte) + Node_ID_new(1byte) + checksum(1byte)

Reply:0x23 + 0x84 + 0x02 + 'O' + 'K' + checksum(1byte)

Description:

Node_ID_new: New node ID. Range 1~255.Default:1

Example:

Send (HEX): 23 84 01 01 A9

Reply (HEX): 23 84 02 4F 4B 43

4.2 Read

Send :0x23 + 0x04 + length(1byte) + checksum(1byte)

Reply:0x23 + 0x04 + length(1byte) + Node_ID_new(1byte) + checksum(1byte)

Read:

Send (HEX): 23 04 00 27

Reply (HEX): 23 04 01 01 29

5. RF_channel

5.1 Write

Send :0x23 + 0x85 + length(1byte) + rf_channel(1byte) + checksum(1byte)

Reply:0x23 + 0x85 + 0x02 + 'O' + 'K' + checksum(1byte)

Description:

rf_channel: RF channel. Range 0~39. Default:1(424.92MHz)

rf_frequence = 424.42 + rf_channel*0.5 MHz

Example:

Send (HEX): 23 85 01 02 AB

Reply (HEX): 23 85 02 4F 4B 44

5.2 Read

Send :0x23 + 0x05 + length(1byte) + checksum(1byte)

Reply:0x23 + 0x05 + length(1byte) + rf_channel(1byte) + checksum(1byte)

6. Data_rate

6.1 Write

Send :0x23 + 0x86 + length(1byte) + data_rate(1byte) + checksum(1byte)

Reply:0x23 + 0x86 + 0x02 + 'O' + 'K' + checksum(1byte)

Description:

data_rate: Wireless rate.Range 0~10.Default:9(500k bps)

0: 1200 bps
1: 2400 bps
2: 4800 bps
3: 9600 bps
4: 19200 bps
5: 38400 bps
6: 57600 bps
7: 115200 bps
8: 250k bps
9: 500k bps
10: 1M bps

Example:

Send (HEX): 23 86 01 02 AC

Reply (HEX): 23 86 02 4F 4B 45

6.2 Read

Send :0x23 + 0x06 + length(1byte) + checksum(1byte)

Reply:0x23 + 0x06 + length(1byte) + data_rate(1byte) + checksum(1byte)

Long press the SET button on the node again for 3s to let the node exit the setting mode. After exiting the setting mode, the node will work according to the newly set parameters.

b) Modify the total number of nodes (nodes_total) and polling interval(poll_interval)
The network will allocate communication time to each node according to nodes_total and poll_interval. The interval of each node must last at least 1 second. So the nodes_total should coordinate with poll_interval to ensure that the interval between two nodes is at least 1 second. For example, if poll_interval = 64 and nodes_total = 64, the interval between node 1 and node 2 is 1 second. When poll_interval = 128 and nodes_total = 64, the interval of node 1 and node 2 is 2 seconds.

8. Poll_interval

8.1 Write

Send :0x24 + 0x88 + length + poll_interval(2bytes) + checksum(1byte)

Reply:0x24 + 0x88 + length(1byte) + 'O' + 'K' + checksum(1byte)

Description:

poll_interval: Polling interval of each node. Range 1~65535. Default: 64. Unit :1s

Example:

Send (HEX): 24 88 02 00 40 EE

Reply(HEX): 24 88 02 4F 4B 48

8.2 Read

Send :0x24 + 0x08 + length(1byte) + checksum(1byte)

Reply:0x24 + 0x08 + length(1byte) + poll_interval(2bytes) + checksum(1byte)

Example:

Send (HEX): 24 08 00 2C

Reply(HEX): 24 08 02 00 40 6E

c) The command to modify the total number of nodes (nodes_total) is：

9. Nodes_total

9.1Write

Send :0x24 + 0x89 + length(1byte) + nodes_total(1byte) + checksum(1byte)

Reply:0x24 + 0x89 + length(1byte) + 'O' + 'K' + checksum(1byte)

Description:

nodes_total: Maximum number of nodes under one gateway. Default: 60.

Example:

Send (HEX): 24 89 01 02 B0

Reply(HEX): 24 89 02 4F 4B 47

9.2 Read

Send :0x24 + 0x09 + length(1byte) + checksum(1byte)

Reply:0x24 + 0x09 + length(1byte) + nodes_total(1byte) + checksum(1byte)

Example:

Send (HEX): 24 09 00 2D

Reply(HEX): 24 09 01 40 6E

After these two parameters are set, the node will be synchronized to gateway at the next communication interval. If you want to speed up the process, you can power on the node again, and the node will communicate with the gateway once after power on.

NOTE: These two parameters of all nodes in the same network are the same, and are synchronized to all nodes by the gateway automatically. It is no need to modify these two parameters of each node separately. It will be overwritten by the value set on the gateway.

6. Gateway firmware upgrade

If you need to upgrade the firmware of the gateway, please refer to the document "How to upgrade gateway and node firmware".