Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

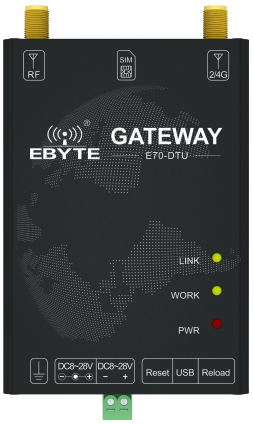
User Manual

E70-DTU (433NW30-GPRS)

Content

1.Overview

1.1 Introduction



E70-DTU (433NW30-GPRS) is a wireless modem to GPRS network server, which realizes the transparent transmission of Sub-1G and GPRS network data. The star network module integrates the host (coordinator) and the terminal into one, and includes long-distance and high-rate transmission modes. One host (coordinator) supports up to 200 nodes to communicate with it, without having to deal with cumbersome networking. The agreement solves a series of problems caused by the inability of concurrent 433MHz wireless data transmission. At the same time, the module has built-in power amplifier (PA) and low noise amplifier (LNA), the measured communication distance can reach 6.5km. On the GPRS network side, the radio supports LTE-FDD/LTE-TDD/WCDMA/TD-SCDMA/CDMA/GSM wireless communication data transmission, supporting LTE-FDD, LTE-TDD, DC-HSDPA, HSPA+, HSDPA, HSUPA, WCDMA, TD-SCDMA, CDMA, EDGE and GPRS network data connections.

E70-DTU (433NW30-GPRS) can be directly connected to the computer host computer through USB cable and parameter configuration. User-defined parameters can be easily changed without installing a driver. This chapter is a quick introduction to the E70-DTU (433NW30-GPRS) product. It is the easiest hardware environment to test the E70-DTU (433NW30-GPRS) network transmission function, which is to realize the two-way transparent transmission of data from the RF module to the network server.

1.2 Features

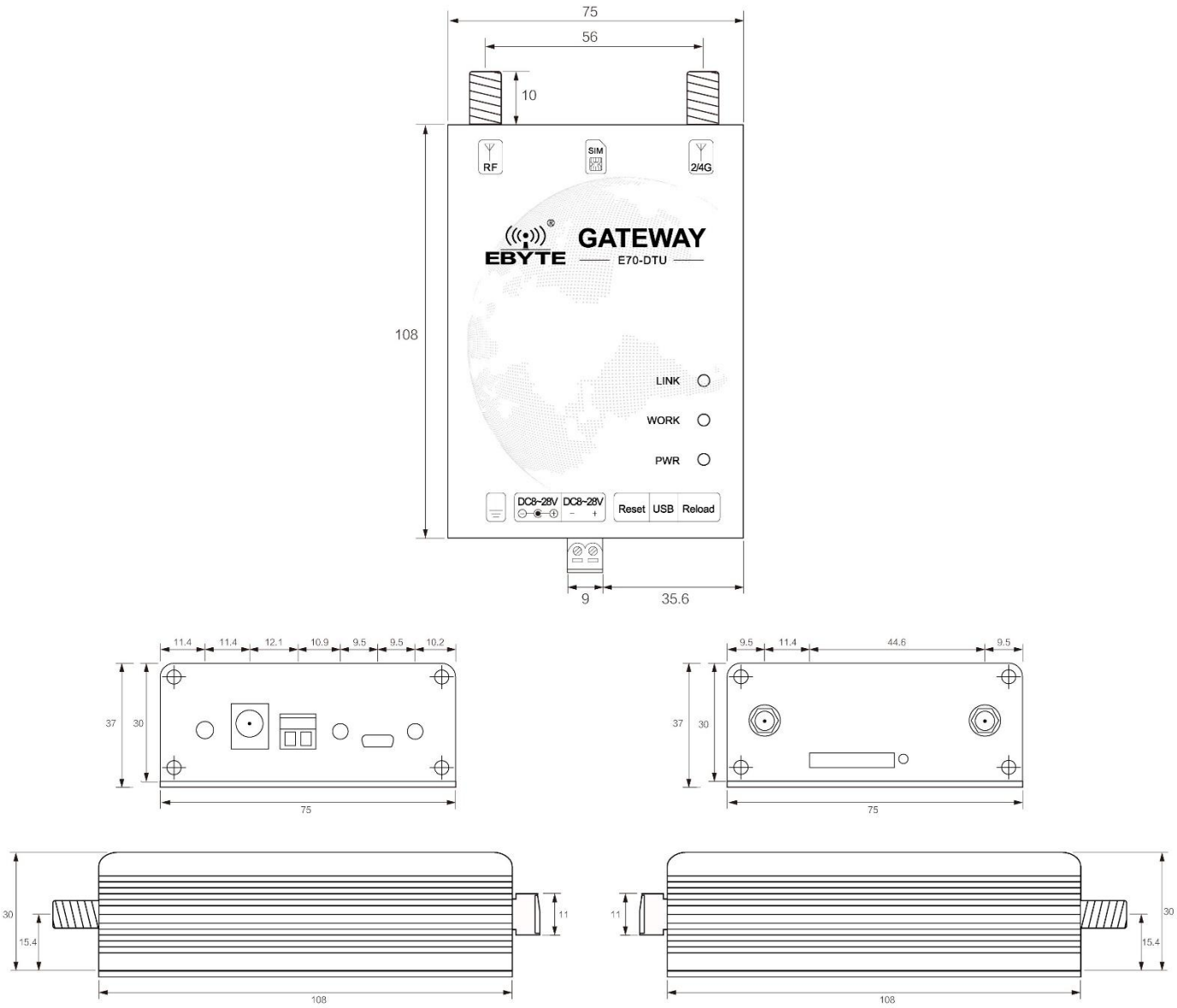
- Meet almost all M2M application needs;
- Support data transparent transmission, TCP, UDP network protocol, and heartbeat package, registration package;
- Serial port caching is supported. The serial port data can be cached locally before the server is connected;
- The maximum downlink rate of GPRS data is 85.6 kbps, and the maximum uplink rate is 85.6 kbps;
- Software/hardware double-gate design, stable system, never crash;
- Sub-1G radio frequency;
- CSMA/CA is supported, which can effectively avoid conflicting carrier multi-channel interception technology;
- Supports up to 200 nodes concurrently, without having to deal with cumbersome networking protocols, no need to network via polling;
- AES128 data encryption to ensure the reliability of data packets;
- Support DSSS spread spectrum technology, similar to LoRa anti-interference, better than traditional GFSK;
- Under ideal conditions, the RF radio communication distance can reach 6.5km;
- Maximum transmission power 1W, software multi-level adjustable;
- Support the global license-free ISM 433MHz band;
- Support 5k, 50kbps data transmission rate;
- Industrial grade standard design, support for long-term use from -40 to +85 °C;
- Use USB to connect to the computer, no need to install the driver, connect to the computer to configure the parameters;
- Support 8~28V wide voltage supply, using DC power supply and terminal power supply;
- The power supply has good functions such as over-current, over-voltage, and anti-reverse connection.

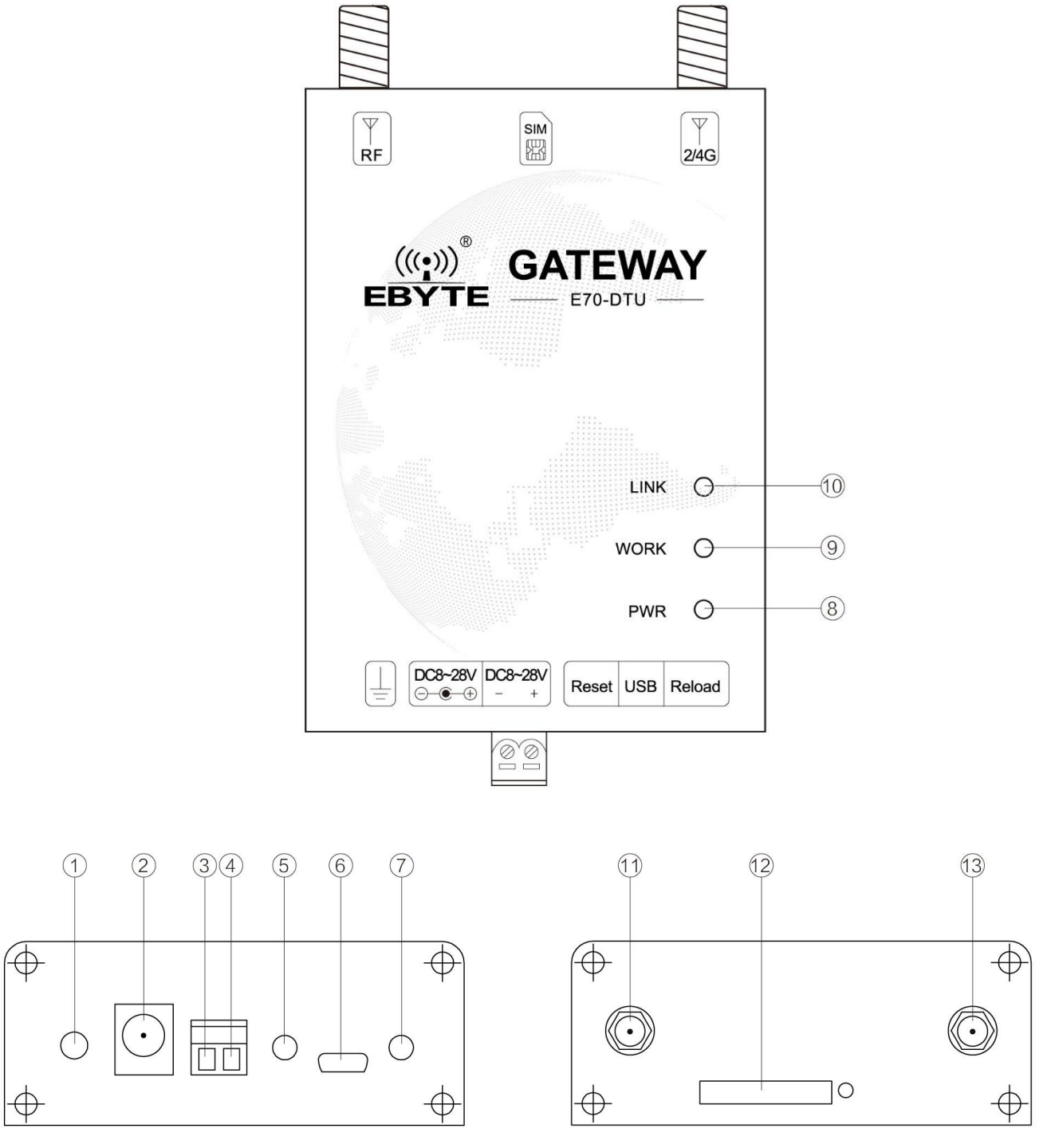
1.3 System parameters

Parameter type	Parameter Name	The parameter value	Description
NET Characteristic parameters	Support Frequency	Quad-frequency: GSM850, EGSM900, DCS1800, PCS1900 Module can automatically search frequency Frequency selection can be set with the AT command Conform to GSM Phase 2/2+	-
	GPRS Connection characteristics	GPRS multi-slot class 12 (default) GPRS multi-slot class 1~12 (configurable) GPRS mobile station class B	-
	GPRS Data features	GPRS data downlink transmission: up to 85.6 KBPS GPRS uplink data transfer: up to 85.6 KBPS Coding formats: cs-1, cs-2, cs-3 and cs-4 Supports the PAP (password verification protocol) protocol commonly used for PPP connections Support for protocols commonly used for CHAP (query handshake authentication protocol) The built-in protocols: TCP/UDP/FTP/PPP/HTTP/NTP/MMS/SMTP/PING, etc. Support for unstructured supplementary data services (USSD)	-
	The antenna interface	SMA interface, NET signal output, 50ohm characteristic impedance	-
	Transmission Power	Class 4 (2W)： GSM850 and EGSM900 Class 1 (1W)： DCS1800 and PCS1900	-
RF characteristic parameters	Working mode	coordinator/common node	Can be configured as a coordinator, common node
	Input format	Broadcasting	Default broadcast, configurable as broadcast, short address + data, long address + data
	Transmission mode	Long distance	Default long distance, configurable for long distance, standard transmission
	Transmission power	Extreme high	The default is extremely high and can be configured to be extremely high, high, medium and low
	Concurrent performance	High	Default high, configurable to low, medium, high, and very high
	Output format	Valid data（transparent）	Default valid data (transparent), configurable as valid data + long address, valid data + short address, valid data + RSSI, valid data + long address + short address, valid data + long address + RSSI, valid data + short address +RSSI, valid data + long address + short address + RSSI
	Restart parameter	60	Default 60, configurable to 0 or 60--65535, decimal
	PANID	65535	Default 65535, configurable to 0-65535, decimal
	Sleep time	6	Default 6，can be set to 2--60
	Baud rate	115200 bps	Cannot be changed
	Antenna	SMA	RF signal output，50 ohm impedance
System parameters	Current consumption（Typical）	43.1392mA@12V	In idle, no transmission
	Working temperature	-30℃~+70℃	Extending -40℃~+85℃
	Working voltage	DC 8~28V	Recommend 12V/24V
	Size	108*75*37mm	Average（antenna not included）

3GPP	1 Timeslot	2 Timeslot	4 Timeslot
CS-1	9.05kbps	18.1kbps	36.2kbps
CS-2	13.4kbps	26.8kbps	53.6kbps
CS-3	15.6kbps	31.2kbps	62.4kbps
CS-4	21.4kbps	42.8kbps	85.6kbps

1.4 Dimension and interface definition





1.5 Interface definition

NO.	Name	Function
1	Grounding screw	Ground connection
2	DC8~28V	Power adapter interface, power supply range 8~28V, recommended 12V/24V
3	DC8~28V-	Power reference ground
4	DC8~28V+	Power input, power supply range 8~28V, 12V/24V is recommended
5	Reset	System reset button
6	USB	Micro USB：parameter configuration interface

7	Reload	Press 4~10s to restore the factory Settings
8	PWR	Red: power indicator
9	WORK	Yellow: data transmission indicator light; The light flashes when there is data transmission
10	LINK	Yellow: network indication, always on when in network
11	NET	4 G/GPRS antenna interface (SMA - K external thread hole, 50 Ω characteristic impedance)
12	SIM	SIM card slot
13	RF	RF antenna interface (SMA - K external thread hole, 50 Ω characteristic impedance)

Note: It is recommended to connect the housing to the ground with a grounding screw.

2 Quick start

2.1 Hardware preparation and communication testing

Before the test, connect the power supply, USB cable, SIM card (insert the gap outwards), antenna and other hardware according to the recommended circuit. If the power cable is successfully connected, the PWR indicator will always be on.

E70-DTU (433NW30-GPRS) and E70-433NWxx

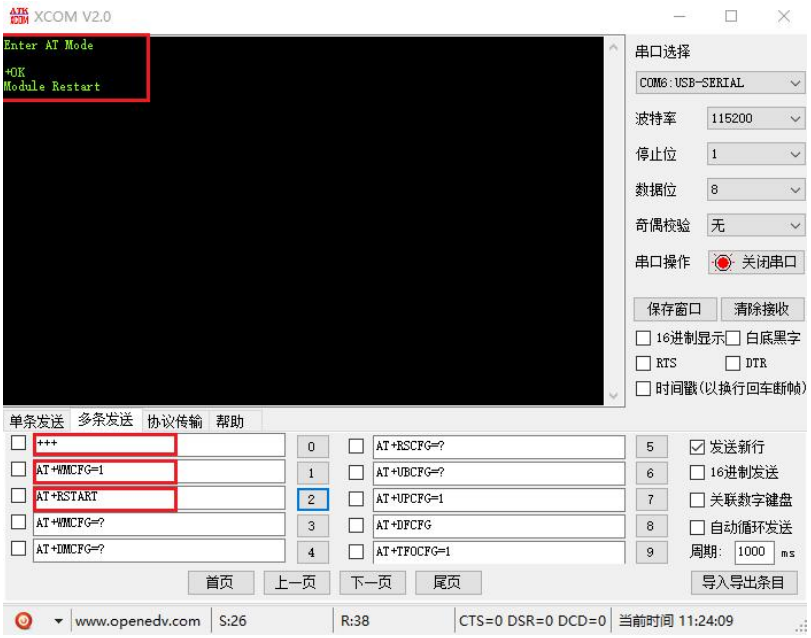
5V—20V power adaptor

USB to TTL test board and USB cable

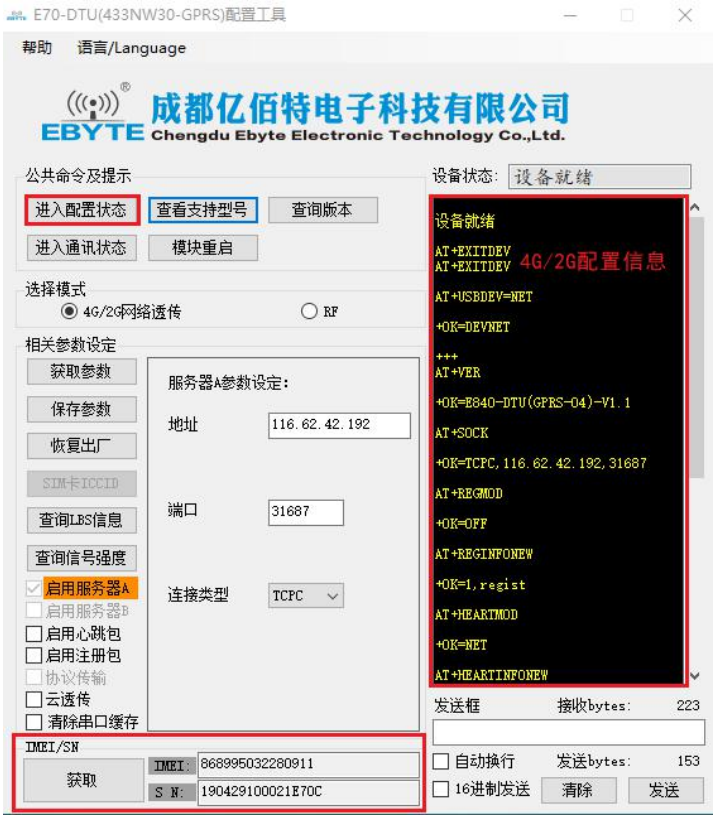
GPRS/LTE sucker antenna

Access the official website of Chengdu Ebyte: www.ebyte.com, download the latest E70-DTU (433NW30-GPRS) series product configuration tool, serial port assistant. (This article uses XCOM), install USB to 232/485 driver, run software!

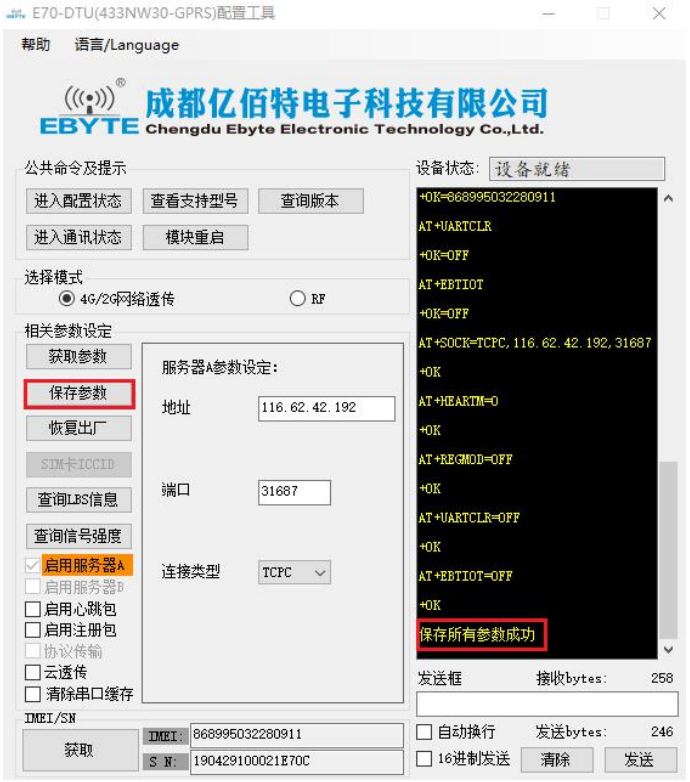
1. After connecting the E70-433NWxx module to the USB to TTL module, open the serial port assistant XCOM and send “+++” (do not send new line) module to reply “Enter AT Mode\r\n” to enter the AT configuration state. ; then send "AT+WMCFG=1" (send new line), the module replies "\r\n+OK\r\n", indicating that the E70-433NWxx module is configured as normal node mode successfully; finally sends "AT+RSTART" (send New line), the module replies with "Module Restart\r\n" and restarts the module.



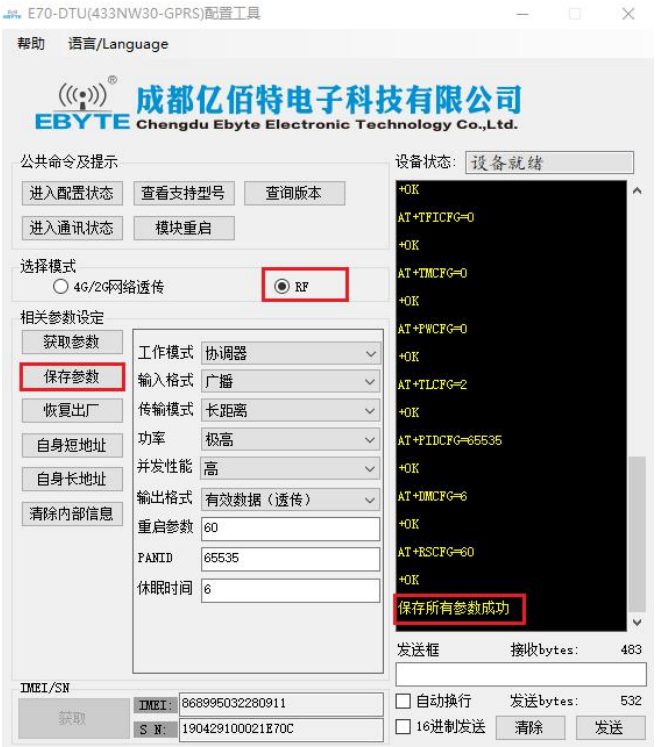
2. 2. Open the official E70-DTU (433NW30-GPRS) configuration tool. If the USB is properly connected, the message box on the right will prompt “Device Ready”. Click the “Enter Configuration Status” button in the “Common Commands and Prompts” box. , that is, enter the 4G/2G network transparent transmission configuration mode, the current message box will display the current 4G/2G configuration information one by one, and automatically obtain the IMEI code and SN code of the 4G/2G network transparent transmission module.



3. After entering the 4G/2G network transparent transmission configuration mode, you can configure the parameters of the 4G/2G module in the Related Parameter Settings box. After the configuration is complete, click the “Save Parameters” button and the host computer will prompt “Save all”. The parameter was successful." After completion, as shown below:



4. Switch from "4G/2G Network Transparent Transmission" to "RF", and the related information such as the device model will be displayed in the message box on the right. The user configures the RF module in the "Related Parameter Settings". After the configuration is completed, click the "Save Parameters" button. After completion, as shown below:



5. After the module parameters are configured, click the “Module Restart” button in the “Common Commands and Prompts” box to make the modified 4G/2G parameters and RF parameters take effect and the system automatically enters the communication state. After completion, as shown below

6. After entering the communication state, if the LINK indicator is always on and the AUX indicator of the USB to TTL module is off within 30 seconds, it means that E70-DTU (433NW30-GPRS) is connected to the server, and E70-433NWxx module and E70- The DTU (433NW30-GPRS) connection is successful, and the network can be transparently transmitted at this time.

7. The mobile phone pays attention to the “Ebyte Internet of Things Application Expert” WeChat public ID, enter the page, click: Customer Support->Device Test, the screenshot of the mobile phone is as follows:

8. Use the serial port assistant to send data to the E70-433NWxx module. If the E70-DTU (433NW30-GPRS) receives the data

sent by the E70-433NWxx, the WORK indicator flashes and the received data is sent to the server.

The communication test result as shown below:

(a) E70-DTU (433NW30-GPRS) receives the data sent by E70-433NWxx, and then transparently transmits the data to the server.

(b) The E70-DTU (433NW30-GPRS) receives the data sent by the server and forwards the data to the E70-433NWxx module.

2.2 Working mode and function

1. The working mode is divided into: communication mode and configuration mode, and the configuration mode is subdivided into 4G/2G network transparent transmission configuration mode and RF configuration mode.

   (a) Communication mode: After power-on, the radio works in communication mode by default, and automatically starts the network connection. When the connection is established with the server, any data received by the station will be transparently transmitted to the server. At the same time, it can also receive data from the server. After receiving the server data, the module will directly output through the RF module. The maximum length of data supported by this module is 128 bytes.

(b) 4G /2G network transparent transmission configuration mode: In this mode, the user can configure the radio 4G/2G network transparent transmission parameters.

(c) RF configuration mode: In this mode, the user can configure the radio RF parameters.

(d) Mode switching: Use the official E70-DTU (433NW30-GPRS) to configure the host computer for mode switching and parameter configuration. Note that after using the host computer to enter the configuration state, the system is in the configuration mode. At this time, click the “module restart” button or “enter the communication button”, the system will switch to the communication mode; when entering the configuration state, the USB cable will be unplugged, the system It will also automatically switch to communication mode. If you do not click the "Save Parameter" button and the "Module Restart" button in advance, the modified parameters will not take effect.

2. Base station positioning function;

The E70-DTU (433NW30-GPRS) supports the base station positioning function. Users can use the official E70-DTU (433NW30-GPRS) configuration software. In the 4G 2G network transparent transmission configuration mode, click the “Query LBS Information” button to read the current LBS information of the device.

3. Query the signal strength of the network module and the base station. Users can use the official E70-DTU (433NW30-GPRS) configuration software. In the 4G/2G network transparent transmission configuration mode, click the “Query Signal Strength” button to get the current signal strength information.

4. Network function

a) Registration package: The registration package is closed by default. The user can configure 4 types of registration packages. You can choose to send physical addresses when connecting, send custom data when connecting, and add physical addresses before each packet of data. Each packet is added before the data. Define data. The maximum length of the custom registration packet is 40 bytes (when set to HEX format, the maximum length is 20 bytes).

b) Heartbeat packet: In the idle state of network communication, the heartbeat packet is used for network state maintenance. The heartbeat period can be set from 0 to 65535 seconds, and the maximum length of the heartbeat packet is 40 bytes (when set to HEX format, the maximum length is 20 bytes). Supports two heartbeat types: network heartbeat and serial heartbeat. When the network heartbeat is selected, the communication idle time starts, and the heartbeat data packet is sent to the server according to the configured heartbeat period. Select the serial port heartbeat, start timing with communication idle, and send heartbeat packets to the serial port according to the configured heartbeat period.

c) Clear the cache: Before the connection to the server is established, the data received by the serial port will be cached. When the connection with the server is established, you can choose whether to clear the cached data. By default, the cache is cleared. The maximum packet length of the local cache is 256 bytes.

5. Ebyte IoT platform cloud transparent transmission function

Users can use the official E70-DTU (433NW30-GPRS) configuration software. In the 4G/2G network transparent transmission configuration mode, click the “Cloud Transparent Transmission” option to enable the transparent transmission function of the module. User-configured heartbeats, registration packets, and other information will be invalid. Users only need to go to the platform to set the forwarding relationship of the corresponding device to achieve transparent data transmission between devices. For specific operations, please refer to the "Ebyte Cloud Platform Transparent Transmission Guide".

6. RF function

(1) Radio frequency RSSI: the signal strength indication function. The radio internal radio module supports the packet signal strength output. Can be used to evaluate radio frequency signal quality, improve communication networks, and ranging.

(2) Networking function: This station can be equipped with E70-433NWxx same frequency series module or E70-DTU (433NW30-xxx) series radio to realize star networking and build a real Internet of Things model. For details, please refer to “Application Model”. Introduction to the chapter.

(3) Query its own short address: The upper computer selects the RF mode, and clicks the “self short address” button to query its own short address.

(4) Query its own long address: The upper computer selects the RF mode, and clicks the “long address” button to query its own long address.

(5) Clear internal information: The upper computer selects the RF mode and clicks the “clear internal information” button. After the network is cleared, the module cannot communicate and the network needs to be re-established (this command can clear all information when the number of coordinator node devices reaches 200).

(6) Work mode switching: The supporting device acts as a coordinator or a common node. The default is the coordinator mode. There must be one and only one coordinator in one network.

(7) Data input format: Support multiple data input formats, the default is broadcast transmission.

Broadcast transmission: When the coordinator is set to transparent transmission, the coordinator will send a broadcast message. At this time, all non-sleep nodes on the whole network receive data.

Short address transmission: used to send data to the specified node.

	进制	摘要
协调器短地址发送格式为：短地址+有效数据；00 00 或者 FF FF 为广播地址；		
协调器	16 进制	发送：00 01 AA BB CC
A 节点地址 00 01	16 进制	接收：AA BB CC
B 节点地址 00 02	16 进制	接收：无
C 节点地址 00 03	16 进制	接收：无
协调器	16 进制	FF FF AA BB CC
A 节点地址 00 01	16 进制	AA BB CC
B 节点地址 00 02	16 进制	AA BB CC
C 节点地址 00 03	16 进制	AA BB CC

- 长地址发射：用于发送数据给指定节点。

	进制	摘要
协调器长地址发送格式为：长地址+有效数据 00 00 00 00 00 00 00 00 或者 FF FF FF FF FF FF FF FF 为广播地址；		
协调器	16 进制	发送：0A 01 AA 45 65 13 12 44 AA BB CC
A 节点地址 0A 01 AA 45 65 13 12 44	16 进制	接收：AA BB CC
B 节点地址 0D 55 18 42 1A 27 29 64	16 进制	接收：无
C 节点地址 A4 78 02 46 B5 1C 5A 02	16 进制	接收：无
协调器	16 进制	FF FF FF FF FF FF FF FF AA BB CC
A 节点地址 0A 01 AA 45 65 13 12 44	16 进制	AA BB CC
B 节点地址 0A 01 AA 45 65 13 12 44	16 进制	AA BB CC
C 节点地址 0A 01 AA 45 65 13 12 44	16 进制	AA BB CC

(8) Transmission mode switching: support long distance and standard distance transmission, the default is long distance transmission.

(9) Power configuration: The power has low, medium, high and very high speeds. The default is very high power.

(10) Concurrency performance: Concurrency performance is low, medium, high, and extremely high. The default is high.

(11) Output format:

- The output format has valid data (transparent)
- Valid data + long address
- Valid data + short address
- Valid data + RSSI
- Valid data + long address + short address
- Valid data + long address + RSSI
- Valid data + short address + RSSI
- Valid data + long address + short address + RSSI

There are eight formats to choose from, the default is valid data (transparent).

(12) Restart parameter: The setting range of the restart parameter is 0 or 60~65535 seconds (s). This parameter can be used for node disconnection detection. It is recommended to enable. The default parameter is 60.

(13) PANID: The PANID of the device can be set from 0 to 65535, and the default is 65535. Note: A node can only join the same

network as its PANID (you can join any network when configured as 65536).

7. Restore the factory function

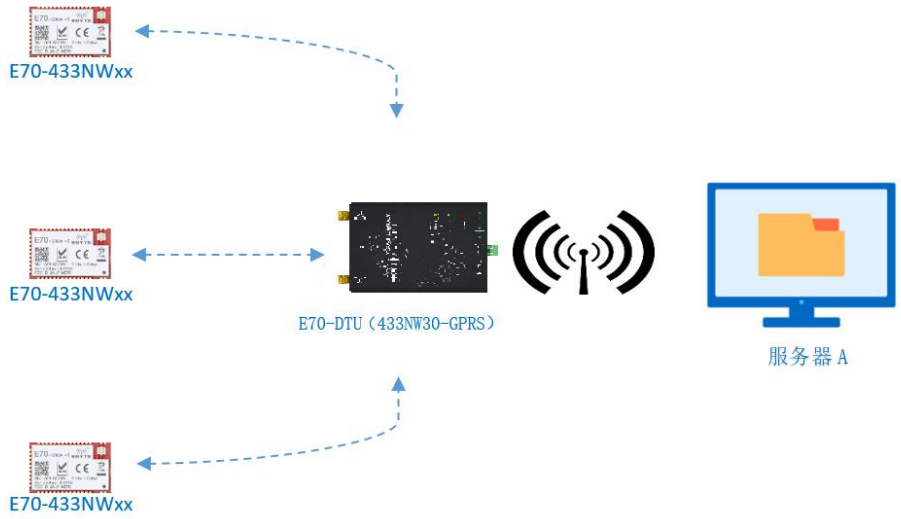
There are two ways to restore the factory:

a. Software recovery from the factory: Users can use the official E70-DTU (433NW30-GPRS) configuration software to reset 4G in the 4G/2G network transparent transmission configuration mode and RF configuration mode by clicking the “Restore Factory” button. 2G module and RF module. Note that if you click the "Restore Factory" button in the 4G/2G network transparent transmission configuration mode or RF mode, after all the modified parameters are completed, you need to click the "Module Restart" button again to restore the factory or configured 4G/2G. The network transparent transmission parameters take effect.

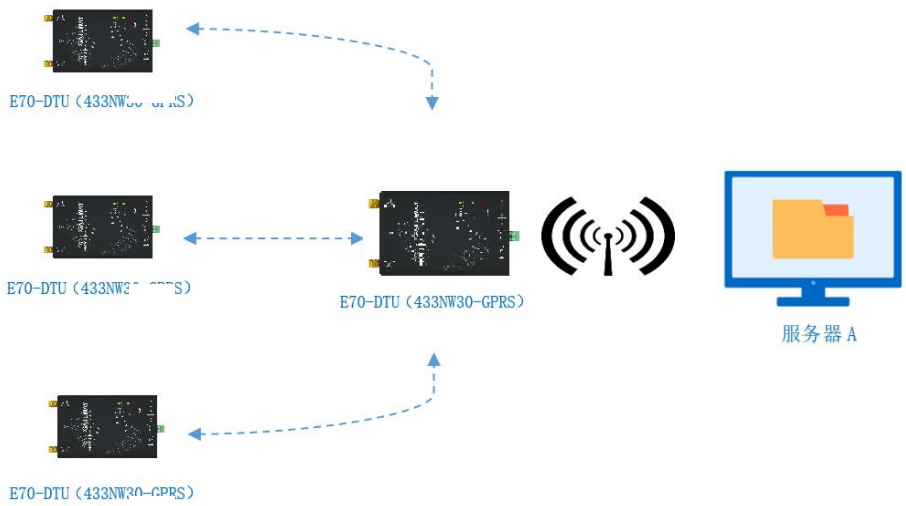
b. Hardware recovery factory: Users can press the Reload button on the side of the radio and continue to release after 4~10S. If the WORK light flashes, the factory settings will be restored successfully. At this time, the system will automatically switch to communication mode. The status needs to be re-clicked on the "Enter Configuration Status" button.

3 Application model

（ 1 ）E70-433NWxx+ E70-DTU (433NW30-GPRS)+ Server A

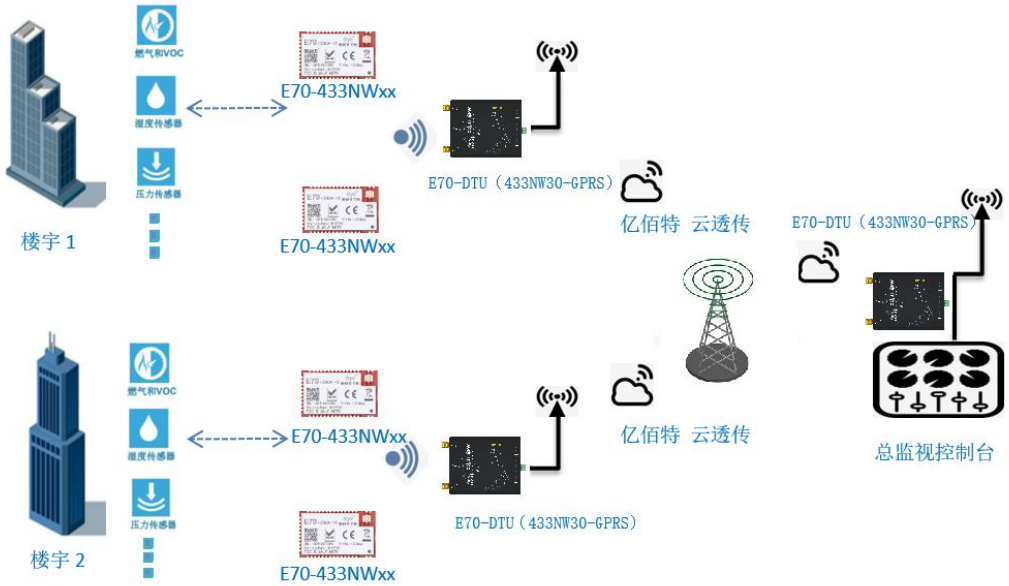


（ 2 ）E70-DTU (433NW30)+ E70-DTU (433NW30-GPRS)+ Server A



（ 3 ）Ebyte cloud transparent transmission

（ 4 ） Smart building



4 Note

- PC click "to enter configuration mode", the system in the configuration state, press the Reload button 4 ~ 10 s, products will be back to factory Settings, and automatically switch to a communication status, "choice mode", the switch at this time the upper machine message box will pop up "parameter error \ r \ n try click enter configuration status button" message, at this time to enter the configuration state, the "public order and prompt" click on the upper machine box "to enter configuration mode" button, if you want to keep communication, do not click the "enter configuration mode" button.
- If the upper computer prompts wrong parameters or the module fails to respond, please try to solve the problem by pressing the Reset button, re-entering the configuration state, checking whether the USB connection is correct, and checking whether the module is powered on normally.
- Enter the configuration state, check whether the USB connection is correct, check whether the module is powered on normally.
- The status bar of the upper computer device shows "no valid device found". Check whether the USB cable and power cord are connected correctly. If they are connected, try to press the Reset button, re-plug the power cord or re-plug the USB.
- Server A of this product is always open. After successful initialization, it will automatically establish connection

with the configured network server.

- After the product is powered on, it has been unable to be successfully initialized, that is, the State indicator light of more than 30 seconds has no indication. At this time, it should check whether the module installation is normal, whether the SIM card is inserted normally and whether the SIM card has been invalid.
- Heartbeat function is used to maintain the connection after the successful establishment of connection between the product and the server. In the network, if the client and the network server successfully establish a connection and there is no data transmission for a long time, the Socket link may appear "dead", that is, the link exists, but the data cannot be sent or received. Therefore, in practical use, it is recommended to enable heartbeat packet function to ensure the reliability of network links.
- In practice, it is normal that there are differences in data delay between two communications.

Version history

Version	Date	Revision note	By.
1.00	2019/05/21	Original version	Li Zhibing

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