EBYTE

Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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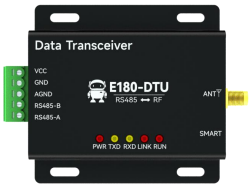
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1 Product Overview

1.1 Introduction

E180-DTU(Z20-485) is a wireless data transceiver based on ZigBee3.0 technology, with transparent transmission, protocol transmission, and other functions. As a communication medium, wireless data transceiver has a certain scope of application like optical fiber, microwave, and wire; It provides real-time and reliable data transmission of monitoring signals in private networks under certain special conditions, and has the advantages of low cost, easy installation and maintenance, strong diffraction ability, flexible network structure, and long coverage. It is suitable for occasions with many scattered points and complex geographical environments. It can also be connected with data terminals such as PLC, RTU, rain gauge, and liquid level gauge.



1.2 Function Features

★ All core components are imported with original packaging. Compared with the current similar imported digital radios, it has the most advanced functions, the smallest volume and the best price.

★ Multi-level transmitting power is available .

★ Working temperature: -40℃～+85℃, suitable for various harsh working environments, it is a real industrial grade product.

★ All aluminum alloy shell, compact size, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility, and strong anti-interference ability.

★ Power supply reverse connection protection, over-connection protection, antenna surge protection and other multiple protection functions greatly increase the reliability of the radio.

★ Powerful software function, all parameters can be set by programming: such as power, frequency, address ID, etc.

★ Built-in watchdog, with precise time layout, once an abnormality occurs, the module will automatically restart, and can continue to work according to the previous parameter settings.

1.3 Product Features

- Centralized network management: ZIGBEE 3.0 security standard centralized network access mechanism, with data security and reliability;
- Interoperability: Comply with zigbee 3.0 standard network mechanism, compatible with ZCL network protocol;
- Large capacity: 256K capacity flash, 32K capacity RAM, and the maximum number of network nodes can be expanded to 80;
- Role switching: the user can switch the device arbitrarily among the three types of coordinator, router and terminal through serial port commands ;

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- Support multiple network topologies: point-to-point, star network, MESH network;
- Network self-healing: If the middle node of the network is lost, a new Mesh topology is automatically formed, and the lost node is automatically retrieved after restarting;
- Automatic routing: the module supports the network routing function;
- Open and close network networking: The coordinator controls the opening or closing of the network. During the period of time when the network is open, devices that comply with the ZigBee3.0 standard can join the network. After the network is closed, no device can join. After the coordinator opens the network, if there is no operation to close it, it will automatically close after 180 seconds.
- One-click network addition: nodes do not need to set PANID and channel, but only need to trigger network addition within the window time when the coordinator opens the network.
- Automatic channel and PANID: The coordinator automatically creates a network on the optimal channel, and automatically assigns a PANID to avoid duplication with other coordinators.
- Automatically obtain the MAC address: the coordinator can obtain the MAC address and short address of the node when the node is connected to the network, without further processing on the device side.
- Address search: users can find the corresponding short address according to the MAC address (unique, fixed) of the node that has joined the network, and can also find the corresponding long address of each node in the network according to the short address of the node;
- Data security: Integrating ZIGBEE 3.0 security communication standard, the network contains multi-level security keys;
- Serial port configuration: The module has built-in serial port commands, and users can configure (view) the parameters and functions of the module through serial port commands;
- One-key recovery of baud rate: When the current baud rate of the radio is forgotten, the baud rate of the radio can be restored to 115200bps through the SMART key.
- Module reset: The user can reset the module through the serial port command.
- Restore the factory settings of the module through serial port commands or the "SMART" key.
- Over-the-Air Configuration: Users can remotely configure other devices in the network using air configuration commands.
- Multiple command formats: users can use hexadecimal format commands and AT commands to configure and control the module, realize networking, set transparent transmission, control lights and other operations.
- Possess a national invention patent certificate, invention name: a ZigBee3.0-based wireless transparent transmission module interconnection method, patent number: ZL 2019 1 1122430.X



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1.4 Device Type Introduction

There are three logical device types in the ZigBee network: Coordinator (coordinator), Router (router), and End-Device (terminal). ZigBee network consists of a Coordinator, multiple Routers and multiple Terminals.

1.4.1 Coordinator

It has the function of establishing and managing the network, controls whether other nodes are allowed to join the network, stores network information, and has all the functions of routing equipment. Its main task is to manage the network, record child node information, and forward messages. At the same time, the coordinator needs to identify the authority of the terminal requesting network access. After the coordinator is powered off, the network will not crash , and routers and terminals will work normally in the current network.

1.4.2 Router

It allows other nodes to connect with routing devices to expand the coverage of the network. Its main task is to forward messages, play the role of relay routing, and have all the functions of terminal devices. If there are multiple paths from one node to another node, when one of the paths fails, the network will automatically adjust to other optimal paths for transmission to ensure data arrival. A router can set up its own network, or join someone else's, and the router is always active, so it must be powered by mains power.

1.4.3 Terminal

The main task of the terminal device is to send and receive messages, and other terminal nodes are not allowed to connect to the terminal device. The terminal is always in working condition and can receive and send data at any time.

1.5 Application Scenario

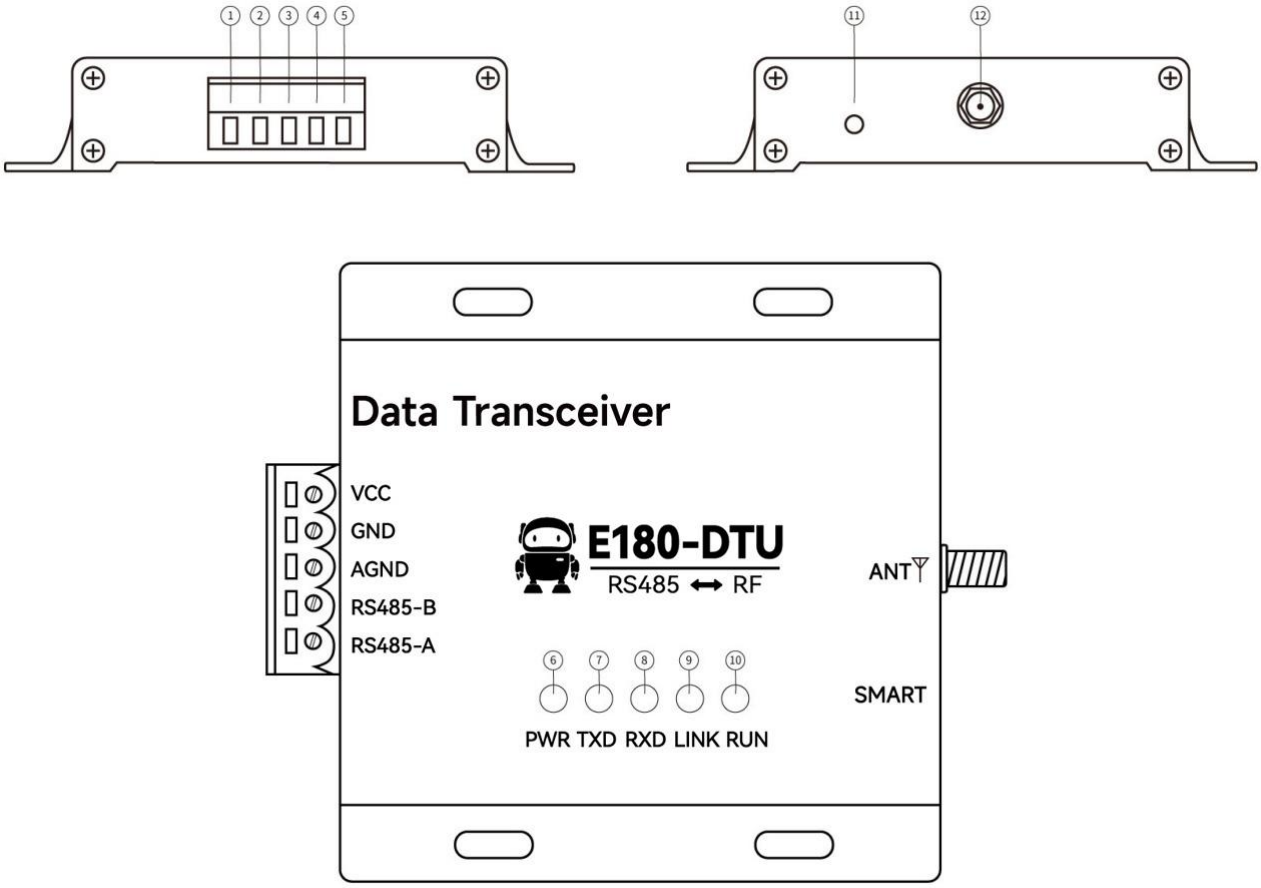
- Smart home and industrial sensors;
- Security system;
- Wireless remote control for games;
- Healthcare products;
- Advanced Meter Reading Infrastructure (AMI);
- Automotive industry applications;
- Building automation solutions;
- Agricultural greenhouse automation application.

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2 Mechanical Dimensions

2.1 Interface description



Interface Description:

Serial number	Name	Function	Remarks
1	VCC	Crimp type power interface, positive pole	DC 8~28V, 12V or 24V is recommended
2	GND	Crimp type power interface, negative pole	The negative pole of the power supply is connected to the system ground and the shell
3	AGND	common ground interface	It can be connected to the ground terminal of external equipment, or it can not be processed
4	RS485-B	Serial terminal	Connect to the B terminal of other RS485 devices;
5	RS485-A	Serial terminal	Connect to the A terminal of other RS485 devices;
12	Antenna interface	SMA-K interface	External thread and inner hole, length 8 mm, characteristic impedance 50Ω

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Indicator light description:

Serial number	Name	Function	Remarks
6	PWR-LED	Power Indicator	Red, always on when the power is on
7	TXD-LED	Send Light	Yellow, blinking when sending data
8	RXD-LED	Receive indicator	Yellow, blinking when receiving data

Serial number	Name	Radio status	LED status	Remarks
9	LINK-LED	Not networked	Turn off	
		Network provisioning - the coordinator or router opens the network	1Hz flickering	
		Network provisioning - a router or terminal that is not connected to the network joins the network	10Hz flashing	
		The router or terminal network joins successfully	2Hz flashes for 3 seconds and then stays on	
		The network connection is normal	Always on	
		Network establishment/join failure	Turn off	
		Terminal goes offline	5Hz flashing, 3 times per second	
serial number	name	Function	LED status	Remarks
10	RUN-LED	Automatic pairing mode	1Hz flickering	
		Reset	Always on	"SMART" button long press 5S
		Serial port baud rate recovery	Off → On → Off	For details, see the description of SMART function keys
		Standby/normal work	Turn off	

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Button function description:

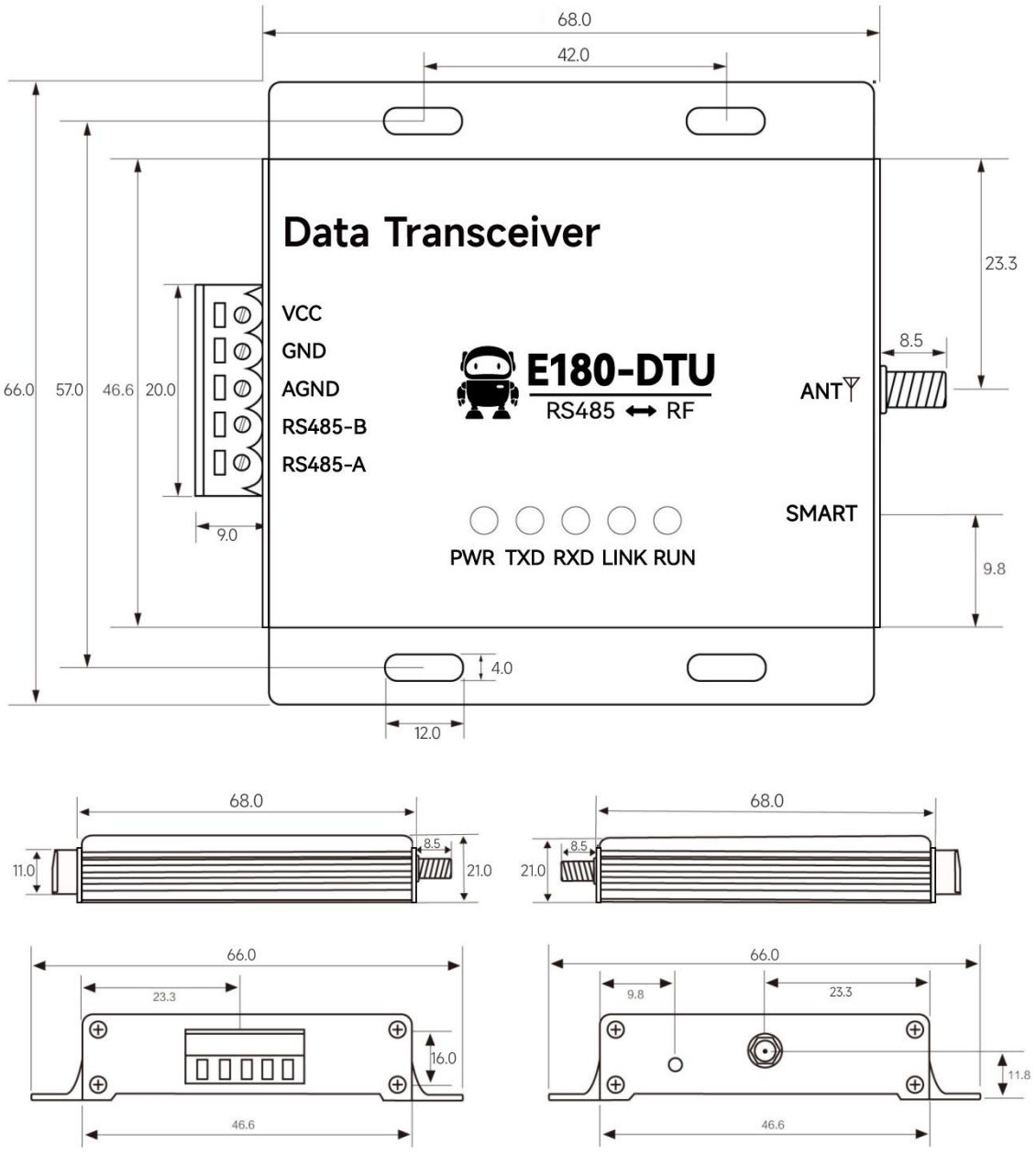
Serial number	Name	Station status	Function	Button action	LED status
11	SMART	The coordinator did not create the network	The coordinator creates the network	Shortly press	LINK light flashes at 10Hz
		The coordinator has created the network	Coordinator Open Network	Shortly press	LINK light flashes at 1Hz
		The router/terminal is not configured with a network	Start to configure the network	Shortly press	LINK light flashes at 10Hz
		The router/terminal has been configured with a network	enter auto pairing mode	Shortly press	RUN light flashes at 1Hz
		The router/terminal has been configured with a network	Clear the network (exit the current network)	Long press for 5 seconds	The RUN light is always on
		The router/terminal is not configured with a network	Restore Factory	Long press for 5 seconds	The RUN light is always on
		Any state	Serial port baud rate recovery (115200bps)	Press button “SMART” while the radio is powered on , wait for 5 seconds, and release the SMART button after the RUN light is on.	RUN light: off→on→off

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2.2 Product size

Serial number	Name	Description
1	Size	68*66*21mm
2	Weight	64g±5g



Unit : mm
Tolerance value:X.X±0.2mm

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2.3 Specifications

2.3.1 Working parameters

Main parameter	Unit	Value	Remarks
Working frequency	GHz	2.400 ~ 2.480	Support ISM frequency band
Transmit power	dBm	20	
Blocking power	dBm	0 ~ 10.0	Less chance of burning when used at close range
Serial baud rate	bps	9600、19200、38400、57600、115200	Default 115200bps
Matching impedance	Ω	50	Equivalent impedance
sending packet length	bytes	1~240	In multicast and broadcast mode, the maximum size is 75 bytes, and in unicast mode, the maximum size is 240 bytes.
Communication Range	Km	1.3	In clear and open air, the antenna gain is 5dBi , the height is 2.5 meters, and the air rate is 250kbps

2.3.2 Electrical parameters

Electrical parameter	Unit	Value	Remarks
Operating Voltage	V	+8 ~ +28V DC	12V or 24V power supply is recommended
Emission current	mA	78 @20dBm	
Operating temperature	℃	-40 ~ +85	industrial grade
Storage temperature	℃	-40 ~ +125	

2.3.3 Hardware parameters

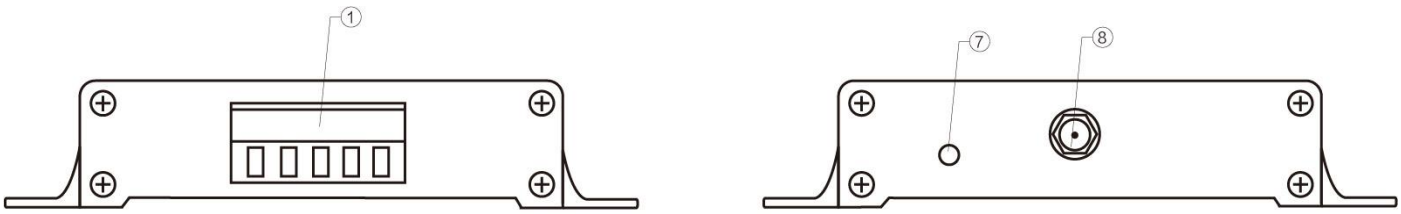
Main parameter	Value	Remarks
RF chip	EFR32MG1B	Original imported chip from Silicon Labs
Product Size	68*66*21mm	Without antenna
FLASH	256KB	
RAM	32KB	
Protocol	ZigBee3.0	
Communication Interface	RS485	3.81mm terminal block
Antenna interface	SMA-K	External thread inner hole

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3 Interface Definition

Users need to use the VCC terminal and GND terminal in ① to supply power. E180-DTU can use 8~28V DC power supply, and 12V or 24V DC power supply is recommended.



★ Note: When the radio is connected to multiple devices, the communication is not smooth, but there is no such phenomenon with a single device, please try to connect a 120Ω resistor in parallel between the 485_A terminal and the 485_B terminal.

4 Working Mode

4.1 Transmission mode

When the module enters the transmission mode, any data received by the serial port will be sent out wirelessly. The transmission mode is wireless communication between network nodes. The communication methods include unicast, broadcast, multicast, etc. There are 4 transmission modes:

The first is normal transmission. In this mode, "OK" will be returned if the transmission is successful, and errors such as "ERRO" or "FAIL" or "BUSY" will be returned if the transmission is lost or data error occurs. There is a system logo output when the module is disconnected or abnormal;

The second is no response transmission, in which there is no message returned when the transmission is successful, but when there is failure or error in the transmission, or the module is offline, an error reminder will be printed;

The third is no Printing mode, the module will send any data received by the serial port to the designated target when the connection is normal, and the module will not return any message when the transmission fails or the module is abnormal;

The fourth is the Modbus host mode, in which the first byte of the data frame received by the module serial port is ModbusID, and there will be no normal or abnormal print messages during transmission. In this mode, the ModbusID of the slave needs to be set, and the slave needs to be bound to the master. This mode is recommended used on coordinator or router only.

4.2 HEX command mode (configuration mode)

When the module enters the HEX command mode, the data received by the serial port defaults to the HEX command. If the serial port data sent does not conform to the HEX command format, it will be automatically filtered out by the device as a HEX command in the wrong format. In the HEX command mode, the data received by the module serial port is considered as HEX command. For details of the specific HEX command, you can download the "Ebyte ZigBee 3.0 Module HEX Command Standard Specification" from the official website.

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4.3 AT command mode

AT command mode is a special mode in transmission mode. If the device in transmission mode does not have a distribution network, it will enter AT command mode after being powered on again. And devices that successfully distribute the network in AT mode will automatically enter transmission mode after restarting.

4.4 Mode switching

The power-on initialization of the module defaults to the HEX command mode.

Switch from HEX command mode (configuration mode) to transmission mode:

When the module serial port receives the HEX format command “ 55 07 00 11 00 03 00 01 13 ”, the module enters the normal transmission mode, and returns the HEX format command “ 55 04 00 11 00 11 ” after entering the transmission mode successfully. If you need to enter the no-response transmission mode, enter the HEX format command “ 55 07 00 11 00 03 00 02 10 ”; For no printing mode, enter the HEX format command “ 55 07 00 11 00 03 00 03 11 ” . For the Modbus host mode, enter the HEX format command " 55 07 00 11 00 03 00 04 16 ".

Switch the transmission mode to HEX command mode (configuration mode):

In the transmission mode, when the serial port of the module receives the " +++ " character, it enters the configuration mode, and returns he system notification command "device start" after successfully entering the configuration mode.

4.5 Related parameters in transmission mode

The below parameters can be read and set through the HEX commands "read local attribute" and "set local attribute". The below parameters of the module can be read and modified remotely through the HEX command "ZCL command - read device attribute" and "ZCL command - modify device attribute". Note that remote modification is limited to items with "W" in "Operation".

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AttrID	Descriptor	name	type of data	operation	initial value
0x0000	Baud	baud rate	uint32	R	115200 (decimal)
0x0001	Target Addr	Transparent transmission target short address	uint16	RW	0xFFFF
0x0002	Target EP	Transparent transmission target port	uint8	RW	0xFF or 255
0x0003	Send Mode	Transparent mode	bool	RWP	0
0x0004	LP Level	low power mode	enum8	RP	0
0x0006	Modbus ID	Modbus number	uint8	RWP	0xFF
0x0010	User Attr 0	user-defined variable 0	uint32	RW	0x00000000
0x0011	User Attr 1	User-defined variable 1	uint16	RW	0x0000
0x0012	User Attr 2	User-defined variable 2	uint8	RW	0x00
0x0013	User Attr 3	User-defined variable 3	uint8	RW	0x00

Baud: Modify this parameter to set or query the current baud rate of the module.

targetAddr: The target address in the transmission mode, 0xFFFF is broadcast transmission, and 0xFFFE is sent to the binding target MAC.

targetEP: The target port in the transmission mode, set the value to 0xFF for broadcast sending or binding sending, set it to 0x01 for sending to the specified target short address, and set it to 0x00 for multicast sending.

send Mode: transmission mode setting, 0 - HEX command mode, 1 - normal transmission mode, 2 - no response mode, 3 - no printing mode, 4 - Modbus host mode.

target IEEE: bind the target MAC, this item is only for viewing. The module can bind multiple target MACs, and the heartbeat packet will be sent to all bound MACs in turn, but in the transmission mode, only the data is sent to the last binding target in the binding table.

Modbus ID: The module will send this parameter to the coordinator and the bound target MAC in the form of a heartbeat packet (once every 300 seconds). If the target device is a Modbus master, the Modbus master can find the zigbee network address of the slave according to the Modbus ID of the slave.

User-defined variables: There are one 32bit, one 16bit, and two 8bit, total 4 user-defined variables. These values can be set and queried through "Read Local Attributes" and "Set Local Attributes", remote setting and query are also supported to facilitate the status management of the module.

5 Quick Start

In order to allow users to quickly familiarize themselves with the radio, this section will guide users to build a ZigBee network through simple configuration with the host computer, including node type configuration, PANID setting, channel setting, and transmit power setting.

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5.1 Quickly build a ZigBee network

Combined with the host computer software to quickly and easily establish a ZigBee network, the specific steps are as follows:

(1) Connect the radio to the computer, open the host computer software "Ebyte ZigBee3.0 Setting", select the device type, select the serial port number, select the serial port baud rate (default 115200), and click to “Open Uart”.



(2) The module leaves the factory in HEX command configuration mode, click "Read Param", the message box prompts "Read succeed", the main network parameters include: long address, the default radio type is coordinator (if not, please set it to Coordinator), the network status is "not have" (if it is not, pls exit the network or restore the factory) . If failing to read parameters, it is possible that the module is currently in transmission mode, and you need to click "Setting mode", and a message box will prompt "Enter Configuration Status Successfully".

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（3）Click "Start Net" to coordinate and establish an open network. After the coordinator creates a new network, it will continue to open the network for 180 seconds. The LINK light flashes at 1Hz. Routers and terminals can join the network within this time.



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5.2 Quickly join a ZigBee network

(1) Open the host computer software "Ebyte ZigBee3.0 Setting", select the device type, select the serial port number, select the serial port baud rate (default 115200), click to "Open Uart". Then set the module type to "Router" or "Node", then click "Write Param", and then click "RST", at this time the role of the device is switched successfully.



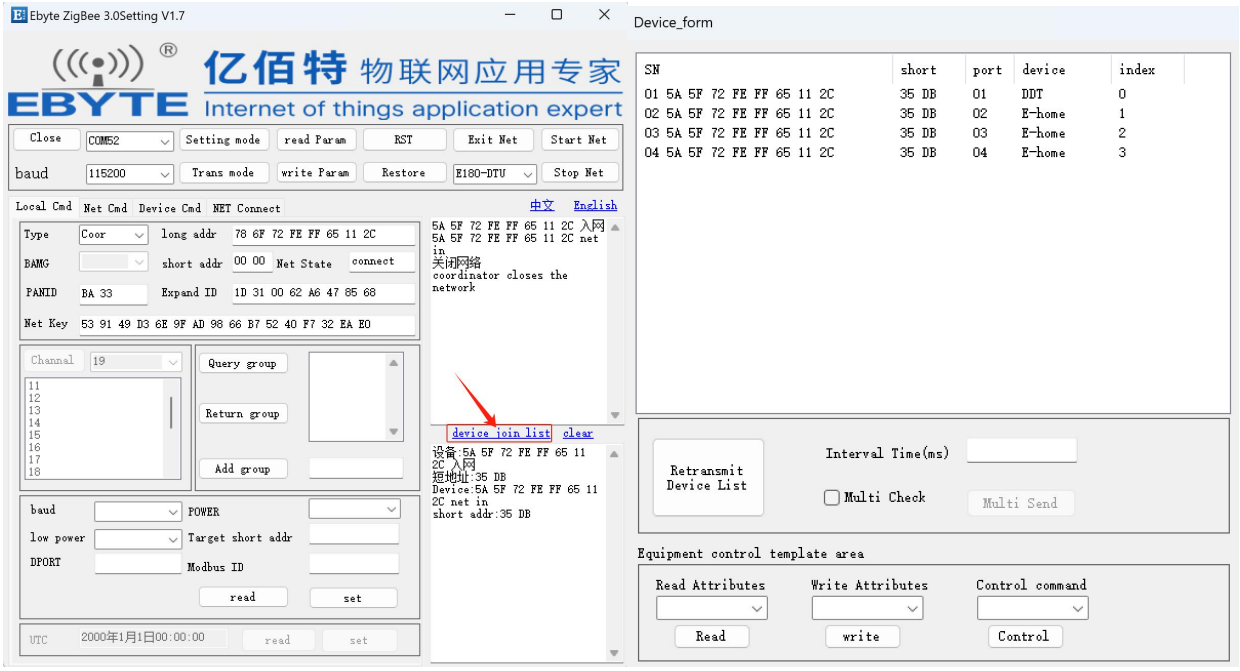
(2) Click "Start Net", and the LINK light of the DTU device flashes rapidly at 10Hz. At this time, it is necessary to ensure that the coordinator device is also in the “Start Net” state (see section 5.1). Wait for a while, the LINK light of the DTU becomes solid or flashes at 1Hz (router mode), click "Read Param", you can view the network access information of the device, and the “Net state” is "connect". If the LINK light turns off and the network status is "not have", the module fails to add the network, please check whether the coordinator device is in the “Start Net” state , and whether the distance between the coordinator device and the router/node is within a reasonable range .

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(3) Through the host computer interface of the coordinator device, you can view the information of other routers/nodes that have joined the coordinator device network, including MAC addresses and short addresses. Click the "device join list" on the host computer interface of the coordinator device to view the 9-byte SN number of the network-connected device (Note: a module may have multiple SN numbers, and each SN number represents a peripheral or function. The more functions module has, the more SN numbers are displayed), and the SN number can be used for device control and device binding transparent transmission targets.



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(4) On the host computer interface of the coordinator device, click "Device Cmd", click "Refresh", and you can see the MAC address and short address of the network-connected device.



According to this method, several routers and end nodes can be added to a coordinator network.

Precautions:

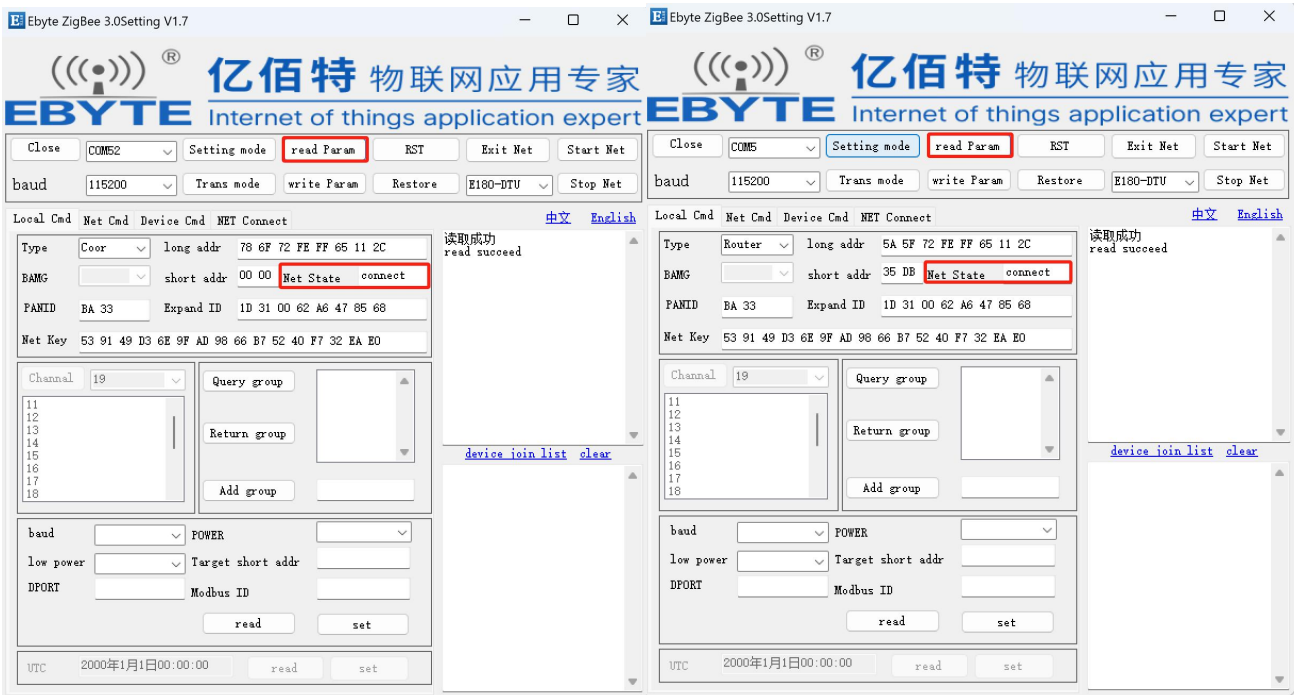
For routers or terminal nodes that have joined the network, if they need to switch to the network established by other coordinators, they need to operate "Exit Net" or "Restore", and then follow the process of 5.2 to set up again. Similarly, if a router that has joined the network needs to be changed to an end node, or an end node that has joined the network needs to be changed to a router, the operation of "Exit Net" or "Restore" is also required.

5.3 Data transmission

(1) Open the host computer software of the coordinator device and the network-connected device, click "Read Param", and confirm that the current "Net State" of the device is "connect", indicating that the device has been networked.

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Coordinator device Router device

(2) Click "read" to query the serial port configuration parameters of the device. The default serial port baud rate of the device is 115200, the short address of the transparent transmission target is 0xFFFF, and the target port is 0xFF (ie 255), that is, the device defaults to broadcasting in the transparent transmission mode.



(3) Then set the router device to transparently transmit data to the coordinator device in the form of on-demand, and the coordinator device uses broadcast mode to transparently transmit data. In the host computer interface of the router device, set the target short address to 00 00 (that is, 0x0000), set the target port to 01 (that is, 0x01 or 1), and

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then click "set". After setting, you can click "read" again to confirm whether the setting is successful.



(4) Enter the transparent transmission mode. After clicking "Trans mode" on the host computer interface of the coordinator device and the router device, both can enter the transparent transmission mode. One serial port inputs any data, and the other serial port can completely output the same data.



Coordinator device Router device

After entering the transparent transmission mode, close the host computer configuration software and open the

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serial port assistant. Input any data on either side, the other side will output the same data. The party that sends data will return "OK" after sending data each time , indicating that the sending is successful, while return "FAIL" or "ERRO" is to indicate failing to send.

5.4 Data transmission between network nodes

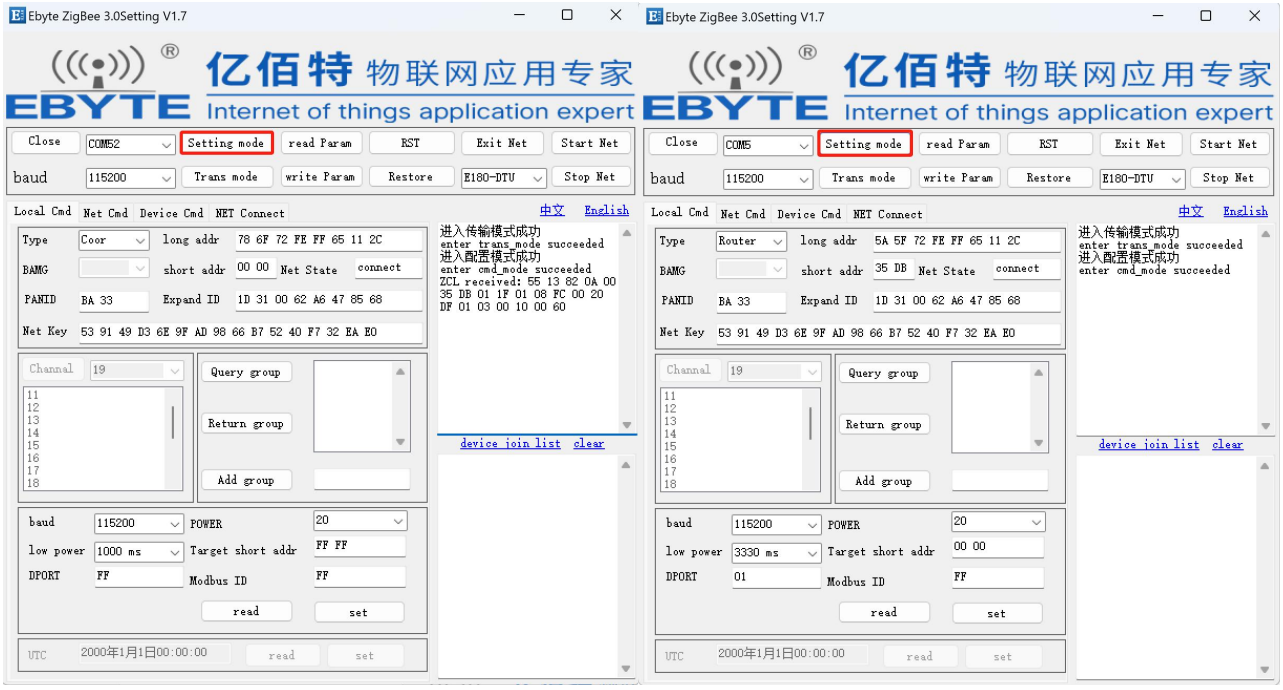
The coordinator of the ZigBee 3.0 data transmission module needs to undertake the network management function. If it works in the transparent transmission mode, it may miss important messages related to network changes. Therefore, we recommend that the coordinator work in the HEX command configuration mode when adding a large number of network nodes , and assign network nodes to transmit data between each other.

(1) Click "Setting mode" in the host computer interface, and the coordinator device and router device will return to the configuration mode. After the coordinator returns to the configuration mode, it will receive the heartbeat packets periodically reported by the network-connected devices.



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Coordinator device Router device

(2) The coordinator adds several network access nodes, sets a new device as a "node", clicks "write Param" → "RST", and adds the terminal node device to the coordinator device network (see Section 5.3).



(3) The new node device is successfully configured and connected to the network. Click "read Param" and check that the "Net State" is "connect", indicating that the terminal node device has joined the coordinator device network.

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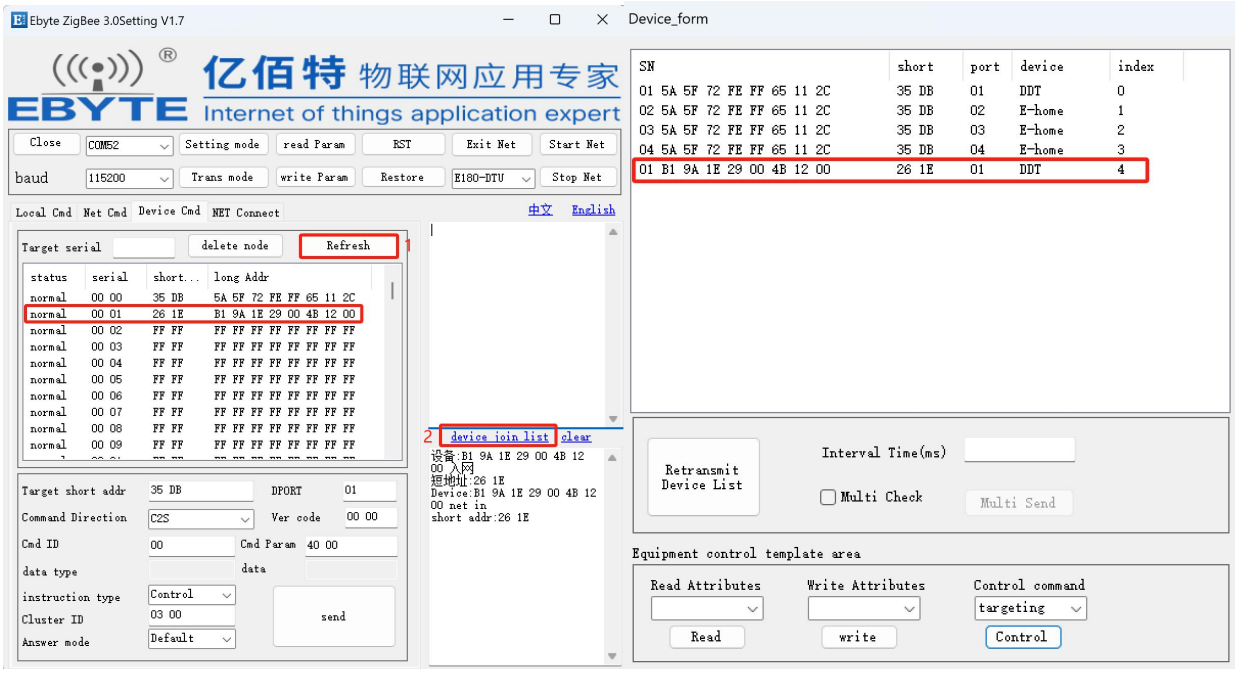
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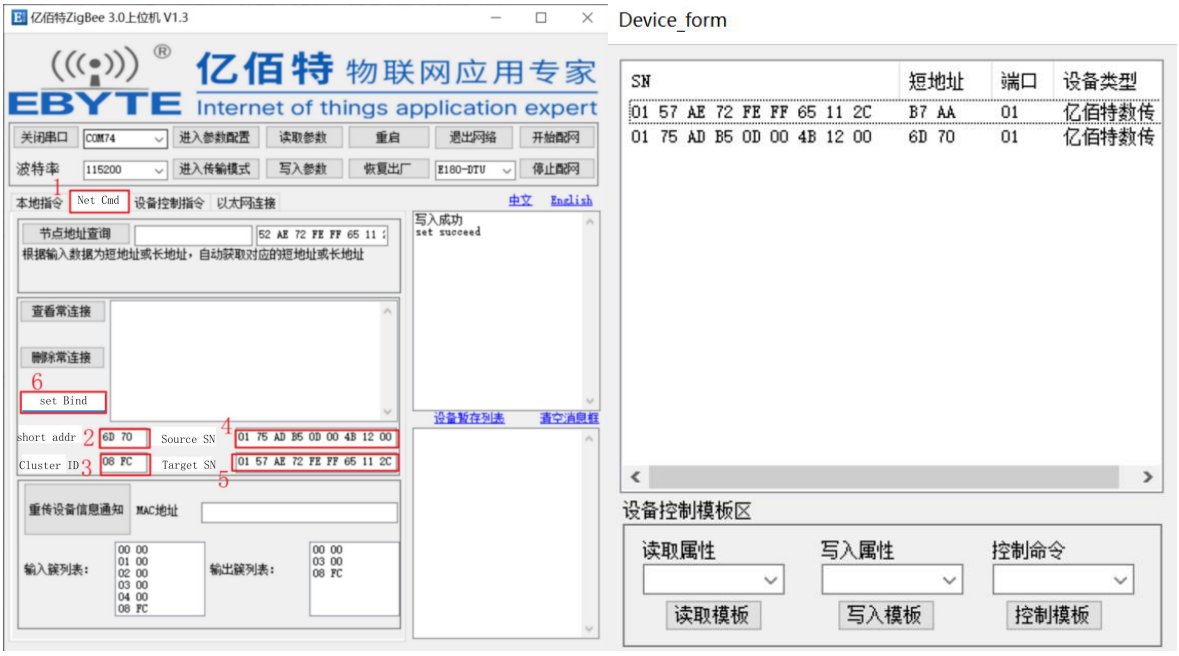
(4) On the host computer interface of the coordinator device, click "Refresh", you can see that new devices have entered the network, and click "device join list", and new device information is also available.

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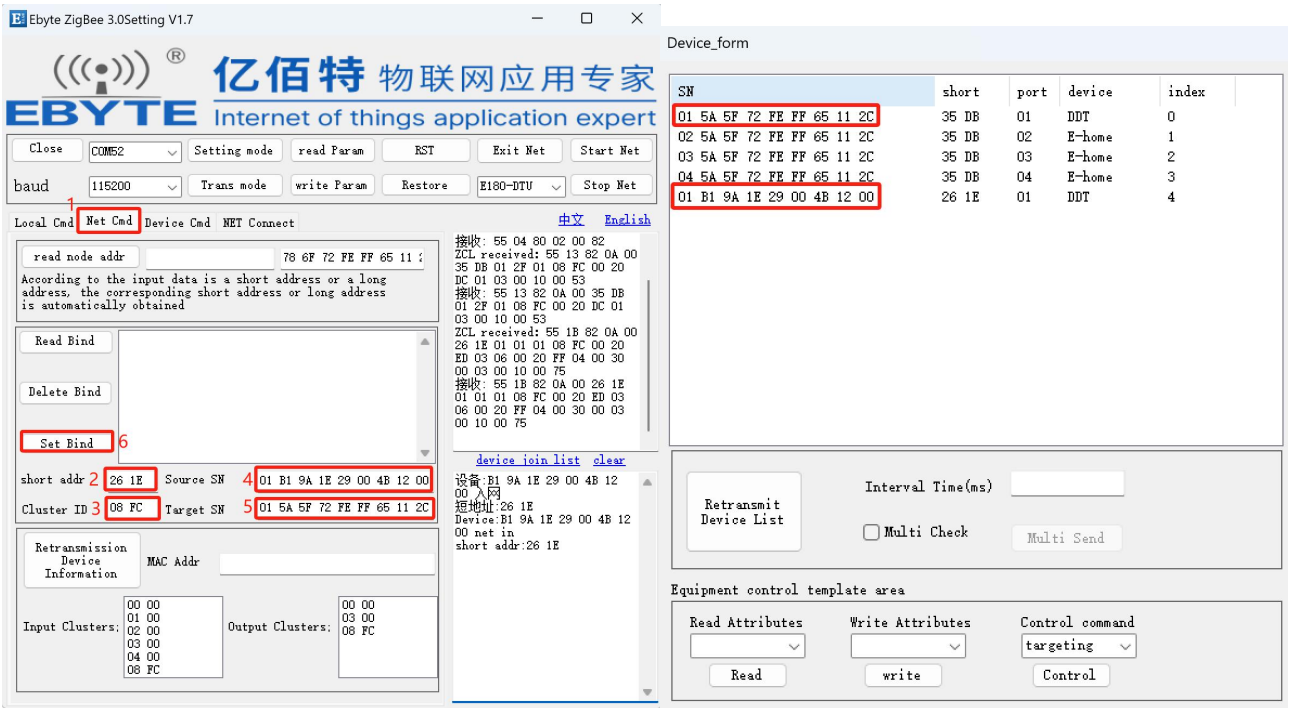


(5) On the host computer interface of the coordinator, set the terminal node device to bind the router device, so that the terminal node device can transparently transmit data to the router device . On the host computer interface of the coordinator device, click the "Net Cmd" menu, fill in the short address of the terminal device in the "device join list" into the "short addr", and fill in the SN number of the terminal device into the "Source SN" , fill in the "Target SN" for the SN of the router device, and fill in 08 FC for the "Cluster ID " (Ebyte follows the ZigBee Alliance official "ZigBee Cluster Library" specification to customize the data transmission cluster, see details in "Ebyte ZigBee3.0 Modules HEX Command Standard Specification") , and then click "Set Bind" .



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In order to ensure that the binding settings are valid, you can click "Read Bind" to confirm whether the binding is successful. As shown in the figure, there is a cluster ID 08 FC on the module, the Source SN is the terminal device, and the Target SN is the binding record of the router device, indicating that the binding setting is successful.



(6) On the host computer interface of the terminal device, set the "target short addr" to "FE FF" (0xFFFE is an invalid short address, after setting the target short address to an invalid short address, the device automatically defaults the transparent transmission target to bind Address), click "set". Then enter "01 00" in "Add Group", click

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"Add Group", add the terminal device to 0x0001 group , and then click "Trans mode".



(7) On the host computer interface of the router device, set the "DPORT" to "00" (the target port is set to 0x00, which means multicast mode), and then set the target short address to "01 00" (the target short address in multicast mode is Multicast address, here multicast to group 0x0001), click "set", the router will send transparent transmission packets to group 0x0001 multicast. Then click "Trans mode".

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Through the above configuration, the router device and the terminal device can transmit data to each other, and the coordinator no longer receives the data transmitted by them. The coordinator can add more devices and set them up to communicate with each other.

6 Sending and receiving methods

6.1 The way of sending data in transparent transmission mode

The data transmission mode in the transparent transmission mode includes **broadcast, unicast, and multicast.**

6.1.1 broadcast mode

In broadcast mode, the sending device sends the data received by the serial port to every node in the network, and all devices in the network will receive the data.

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6.1.2 Unicast mode

In unicast mode, the devices in the network communicate point-to-point through the network address, and the sending device sends the received serial port data to the target address device. In unicast mode, you can determine the transparent transmission target by setting the target short address and target port, or you can determine the transparent transmission target by setting the binding method.

6.1.3 Multicast mode

In the multicast mode, first set the group number (grouping) for the devices in the network, the sending device must specify the target group number, set the target short address and target port, and then the sending device sends the data received by the serial port to the network , devices with the same group number in the network will receive the data.

6.2 The way of sending data in HEX command mode

In the HEX command mode, any message (including transparent transmission data message, ZigBee control command, and other manufacturer's ZigBee device command) can be sent to the specified target device (unicast, multicast, broadcast), and the sending format can be found in "Ebyte ZigBee3.0 Module HEX Command Standard Specification"

7 Application Function

7.1 Function

7.1.1 Detailed explanation of LINK light

The LINK light is used to indicate the current network status of the module. After the device is successfully connected to the network, the LINK light is always on, and when the device has no network, the LINK light is off; in the coordinator mode, this pin indicates whether the module has established a network normally, and the LINK light of coordinator and router flashes at 1Hz during “OPEN net”; In the router/terminal node mode, the device enters the configure network mode, and the LINK light flashes at a frequency of 10Hz. After successfully connecting to the network, the LINK light will flash 6 times at 3Hz. If the router is successfully connected to the network for the first time, the LINK light will continue to 1Hz Blinking, indicating that the router can complete the relay function within the coverage of the coordinator, and the terminal node is always on. After the coordinator ends the open network, the LINK light of the router also keeps on . In the terminal node mode, if node is disconnected, the LINK light flashes 3 times per second at a continuous 5Hz..

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7.1.2 Detailed Explanation of RUN Light

The RUN light indicates the current working status of the device. The RUN light flashes at 1Hz in the marking mode of the device; press and hold SMART for a long time or press and hold SMART after power on, the RUN light is on to indicate that the button is active, and then the button can be released.

7.1.3 Detailed explanation of SMART key

Short press: Short press for unnetworked devices to configure the network, and short press for the coordinator to open the network. The networked routers or terminal nodes establish point-to-point transmission with each other after a short press.

Long press: Long press SMART on routers or terminals to exit the network, and long press SMART on unnetworked devices to restore the factory. As the coordinator does not support long press to exit the network, you need to press and hold this button for 5 seconds until the RUN light turns on and then release it.

Baud rate reset: The baud rate is restored to 115200bps: Power on the radio while holding down the SMART button until the RUN light is on and release it.

7.1.4 Automatic Pairing and Mark Adaptation (Identify) Mode

7.1.4.1 Mark Adaptation (Identify) mode

The Identify mode of ZigBee is a special state of ZigBee devices, and the ZigBee devices which support the ZCL protocol is able to use this mode . The mark adaptation mode can be entered by the device itself (such as a key trigger), or other devices send ZCL commands (belonging to the ZCL-Identify command set) to it.

ZigBee equipment mainly fulfills the following two purposes under mark adaptation:

1. Used to indicate its own installation position to the operator's

The ZigBee device enters the mark adaptation mode after receiving the mark adaptation command (ZCL command), and can expose its installation position through LED flashing or buzzer, motor and other peripherals, so that users can find the device conveniently.

2. For discovery or device binding between devices

The ZigBee device receives the mark adaptation command (ZCL command) or actively triggers to enter the adaptation mode, and other devices in the same network can broadcast and query (ZCL command) which devices are in the mark adaptation state. Then you can automatically bind the devices in the mark adaptation state, or perform a unified grouping operation on them.

Note: There is a timeout period for the device to enter the mark adaptation state. Usually, the local trigger enters the mark adaptation mode by default 180 seconds, and the timeout period is determined by the command initiator if using the ZCL command control enters the mark adaptation mode. The mark adaptation state can be terminated prematurely in either way.

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7.1.4.2 Automatic pairing

After pressing the Smart button, the DTU that has already configured the network will enter the mark adaptation mode, and at the same time it will look for other DTUs that are also in the mark adaptation mode. Then establish a point-to-point direct connection relationship with other DTUs through MAC address binding (SN number binding). This method is only applicable to routers and end nodes. The coordinator does not need to use this mode because it saves the MAC addresses of all network-connected devices. If there is a DTU and other ZigBee devices in the mark adaptation mode at the same time in the network, the paired DTU will filter the DTU device through the cluster (cluster ID) of the device.

7.2 Wireless remote configuration function

The module supports remote configuration function, use the ZCL protocol to configure the Attribute under cluster 0xFC08 (need to cooperate with Manufacture Code 0x2000), which can be modified.

AttrID	Descriptor	name	type of data	operation	initial value
0x0000	Baud	baud rate	uint32	R	115200 (decimal)
0x0001	Target Addr	Transparent transmission target short address	uint16	RW	0xFFFF
0x0002	Target EP	Transparent transmission target port	uint8	RW	0xFF or 255
0x0003	Send Mode	Transparent mode	bool	RWP	0
0x0004	LP Level	low power mode	enum8	RP	0
0x0006	Modbus ID	Modbus number	uint8	RWP	0xFF
0x0010	User Attr 0	user-defined variable 0	uint32	RW	0x00000000
0x0011	User Attr 1	User-defined variable 1	uint16	RW	0x0000
0x0012	User Attr 2	User-defined variable 2	uint8	RW	0x00
0x0013	User Attr 3	User-defined variable 3	uint8	RW	0x00

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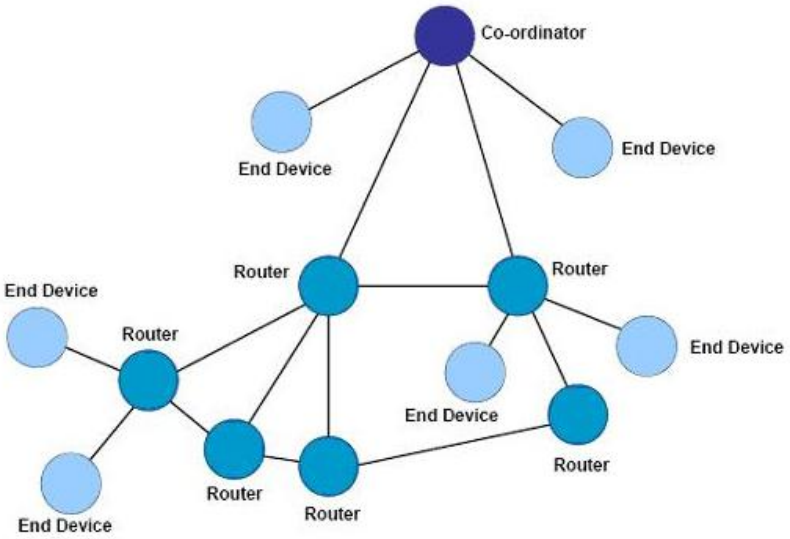
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8 User Notice

8.1 Network structure

The network structure of this module is a mesh network structure (MESH)
The network of MESH mesh network topology has powerful functions, and the network can communicate through "multi-level jumps"; this topology can also form an extremely complex network; the network also has self-organizing and self-healing functions;

Network structure diagram

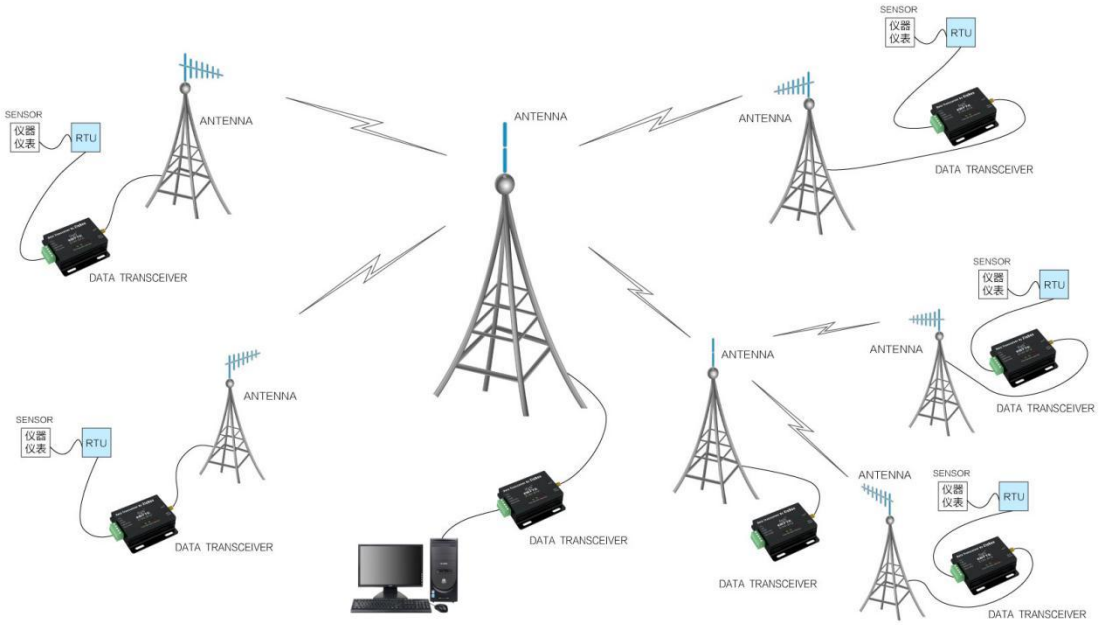


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9 Practical Application Fields

Ebyte digital radio is suitable for all kinds of point-to-point and point-to-multipoint wireless data transmission systems, such as smart home, Internet of Things transformation, power load monitoring, distribution network automation, hydrology and water regime monitoring, tap water pipe network monitoring, urban street lights Monitoring, air defense alarm control, railway signal monitoring, centralized control of railway water supply, oil and gas supply pipeline network monitoring, GPS positioning system, remote meter reading, electronic crane scale, automatic target reporting, earthquake forecasting, fire prevention and anti-theft, environmental monitoring and other industrial automation system, as shown below:



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10 Precautions for Use

1. Please keep the warranty card of this device properly. The warranty card contains the factory number (and important technical parameters) of the device, which is of great reference value for users to maintain and add new devices in the future.
2. During the warranty period, if the radio station is damaged due to the quality of the product itself rather than man-made damage or natural disasters such as lightning strikes, it will enjoy free warranty; please do not repair it yourself, and contact our company if there is a problem. Ebyte provides first-class After sales service.
3. Do not operate this radio near some flammable places (such as coal mines) or explosive dangerous objects (such as detonators for detonation).
4. A suitable DC stabilized power supply should be selected, which requires strong anti-high-frequency interference, small ripple, and sufficient load capacity; it is best to have over-current, over-voltage protection and lightning protection functions to ensure the normal operation of the digital transmission station. Work.
5. Do not use it in a working environment that exceeds the environmental characteristics of the data transmission station, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.
6. Don't let the digital radio continuously transmit at full capacity, otherwise it may burn out the transmitter.
7. The ground wire of the digital transmission station should be well connected with the ground wire of the external equipment (such as PC, PLC, etc.) and the ground wire of the power supply, otherwise the communication interface will be easily burned out; do not plug or unplug the serial port while the power is on.
8. When testing the digital radio station, it must be connected with a matching antenna or a 50Ω dummy load, otherwise the transmitter will be easily damaged; if the antenna is connected, the distance between the human body and the antenna should preferably exceed 2 meters to avoid injury Touch the antenna while transmitting.
9. Wireless data transmission stations often have different communication distances in different environments, and the communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment; in order to ensure stable communication, it is recommended to reserve more than 50% communication distance margin.
10. If the measured communication distance is not ideal, it is recommended to analyze and improve the communication distance from the quality of the antenna and the installation method of the antenna. You can also contact support@cdebyte.com for help .
11. When choosing a power supply, in addition to keeping a 50% current margin as recommended, you should also pay attention to its ripple not exceeding 100mV.

Revise history

Version	Revision date	Description	Issued by
1.0	2023/04/03	Initial version	Bin
1.1	2024/10/30	Content Revision	Bin

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