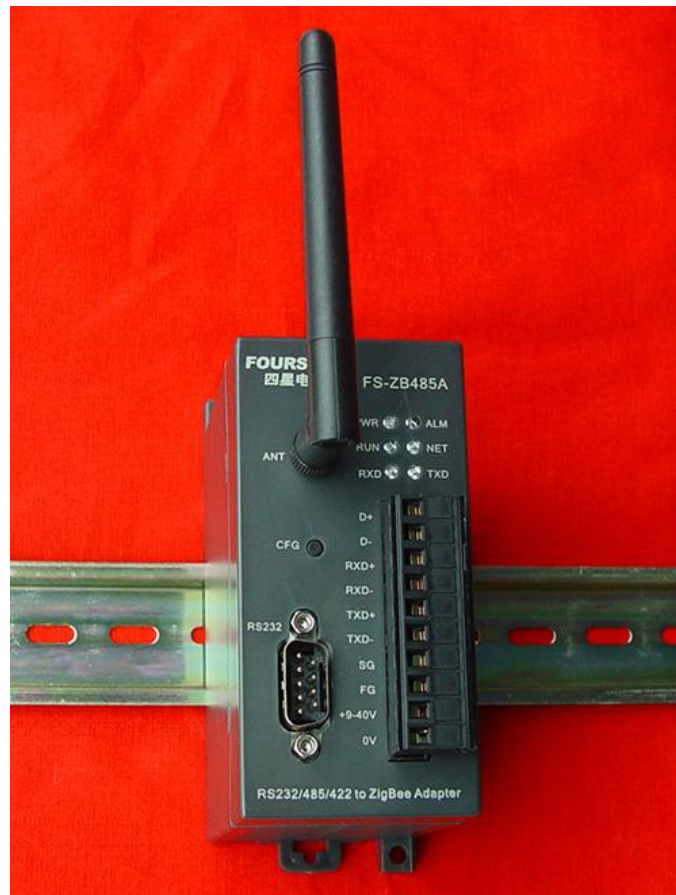


Industrial RS232/RS485/RS422 Serial Port to Wireless Zigbee Adapter

FS-ZB485A

User's Manual



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Preface

This Manual provides guidance for users using industrial serial port to wireless ZigBee adapter (model: FS-ZB485A), application methods of this product are detailed in this Manual. FS in the model is abbreviation of registered trademark of FOURSTAR Electronic Technology Co., Ltd.

Please operate in accordance with the technical specifications and parameters provided in this User's Manual, no property loss or personal injury liability caused by user's improper operation shall be assumed by our Company.

Our Company has the right to amend contents and product functions prescribed herein as required by technical development before statement.

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Version information

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Revision History of Document and Product

Version	Revised on	Reasons
V2.0	2014.06	Create document
	2014.08	Add pictures

Users are advised to read the following related documents:

ZigBee Technology Introduction

FS-ZB485A Testing Guidelines

Application Test of Industrial Serial Port to ZigBee Adapter FS-ZB485A on Various PLCs

Guidance for the Installation and Usage of Industrial Wireless Communication Products

Package Includes

1. FS-ZB485A adapter, 1
2. Serial port cable, 1 string, 1meter.
3. CD 1 (including User's Manual, this product generally needs no software or device driver)

1. Overview

ZigBee is low power personal area network protocol specially designed for industrial control based on IEEE802.15.4 standard. It is a short distance and low power consumption industrial wireless communication technology. This name comes from bees' zigzag dance. As bees tell their peers pollen location by flying and zig dance, that is to say, bees formulate a group communication network in this way. Its features are short distance, low complexity, self-organization, low power consumption, and low data rate. It is mainly applicable to automatic control and remote control.

ZigBee protocol is divided into PHY level, MAC level, TL, NWK level and APL from bottom to top. PHY level and MAC level comply with IEEE 802.15.4. Major characteristics of ZigBee network are low

power consumption, low cost, low speed, support mass nodes, various network topologies, low complexity, fast, reliable, safe, and easy to amplify wireless signal route and relay. Theoretically, it expands wireless signal coverage indefinitely (products by different manufacturers have limitation on “hopping” number). Equipment in ZigBee network is classified into coordinator, Router and End Device.

Features of FOURSTAR serial port to ZigBee adapter FS-ZB485A (hereinafter referred to as adapter):

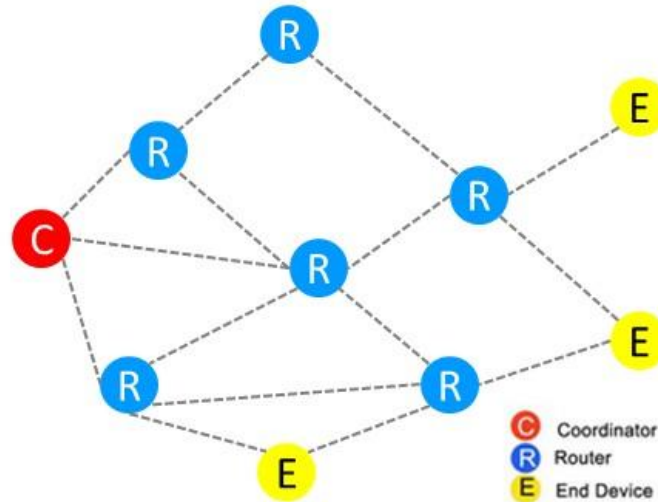


Figure 1-1 ZigBee network topology structure

Figure 1-1 shows Mesh formulated by FOURSTAR FS-ZB485A adapter, which features the following:

- Automatic networking. It enables long distance wireless communication, convenient for upgrading existing wired serial port connection data acquisition and control system to wireless transmission system without changing original hardware and software. It supports 15 hopping to the most. Point-to-point wireless communication distance is up to 2km, supersize long distance network can be built.
- Automatic route. Suppose communication distance between node A and node B is beyond permissible range, which results in failure to normal communication, install just one or several relay route nodes (R), this node provides route or relay automatically for A and B.
- Automatic route restoration. If network route is destroyed (certain relay route node (R) is broken or outage), network finds new route path by calculation automatically and re-link with other relay route node nearby to restore route path automatically, ensure accessible network and improve reliability of communication network.

- Flexible setting of node type. Coordinator (C), Route (R) and End node (E) can be set up at will, Route node has both route and end node functions.
- Strong anti-interference ability. DSSS (direct sequence spread spectrum) technology is adopted. Control carrier wave phase by compound code generated from combination of high speed fake noise code sequence and information code sequence (multiply wave form) to obtain direct sequence spread spectrum signal. That is, turn original high power and narrow frequency into low power frequency with broadband so as to obtain satisfactory anti-noise jamming performance in wireless communication field.
- Channel detection reduces data collision. CSMA/CA channel detection protocol is adopted. Before sending data, monitor media status, wait until nobody uses the media for certain time, then keep waiting for random time and still nobody uses the media, send out data. Before sending data, send a small request for message transmission to target end, only start sending when target end replies. Make sure no collision occurs during the following document transmission by RTS-CTS (handshake) program.
- Support change RS232/RS485/RS422 serial port of industrial control equipment to wireless communication. Its data transmission speed is faster than other wireless communication equipment such as Bluetooth, WiFi, and 433Mhz radio frequency. The following table shows comparison between times spent by two serial ports adopting different serial port to wireless adapter to send 20KB text document when baud rate is 9600bps.

Connection type between serial ports	File size	Baud rate	Transmission time (s)
Direct cable connection	20KB	9600bps	20.4
ZigBee	20KB	9600bps	20.8
BlueTooth	20KB	9600bps	23.3
WiFi	20KB	9600bps	25.6

- RS232/RS485/RS422 serial port and power port has isolation and surge over current protection.
- -40°C ~ +85°C industrial operating temperature.
- Install by DIN35mm standard guide rail.
- Detachable antenna, easy to lead antenna out of control cabinet by sucker antenna.

Why wireless?

- Requirements for controlling mobile or rotary equipments;
- Requirements for signal transmission in areas where wire laying is inconvenient or dangerous;
- Communication of equipments at two sides of river, channel, road or railway, and equipments at the area with complex terrain;
- Requirements for rapid, simple installation and start-up;
- Quick access to existing control system;

Serial port communication of this product transparently transmit data according to UART asynchronous serial port communication protocol, applicable to RS232, RS485, RS422 communication protocols which observe UART asynchronous serial port communication protocol, such as free port communication protocol of various PLCs and MODBUS protocol (RTU/ASCII) .

As for some field buses, such as PROFIBUS, MPI, PPI, CC-Link, PC-Link, although their physical communication ports are RS485 ports, they don't observe UART asynchronous serial port communication protocol. So, they are inapplicable to this product.

2. Features and main technical parameters

Table 2-1 FS-ZB485A Basic parameters

Category	Item	Parameters
Wireless network	Wireless standard	IEEE802.15.4
	Frequency range	2.405GHz-2.480GHz
	Addressing mode	Comply with IEEE802.15.4/ZigBee standard address
	Network ID	00-FF
	Modulation system	DSSS (Direct Sequence Spread Spectrum)
	Receiving sensitivity	-105dBm
	Emitted power	+25dBm
	Wireless channel	16个
	Antenna	2.4GHz, 3dBm, SMA male foldable rod antenna
	Wireless transmission distance	2000m (antennas are mutually visible, no obstacles)
Hardware parameters	RS232/RS485/RS422 serial port	Baud rate: 1200bps—115200bps
		Date bit: 7/8
		Parity: None/Odd/Even/Mark/Space
		Stop bit: 1/2
		RS232 maximum transmission distance: 30m
		RS485/422 maximum transmission distance: 1200m
	Working voltage and power consumption	9—40VDC, 3W
	Interface isolation	Power-serial port are totally isolated from each other.
	Interface protection	RS485 connector, 500W, anti-lightning surge protection, RS232 and RS422 connector, 5W, surge protection.
	Working temperature	-40℃~+85℃
Dimension	85mm×49mm×100mm(L×W×H)	
Weight	190g	
Installation	Installed by DIN35mm standard guide rail	
Software parameters	Collision avoidance	CSMA-CA and CSMA-CA of GTS
	Network topology	Mesh, Star, Line and Peer
	Node type	Coordinator, route and terminal node can be set up at will.
	Sending mode	Broadcast or target address sending can be set up.
	Data transmission mode	Transparent transmission mode or order format transmission can be set
	Network capacity	255 network IDs at most, each network has 65535 nodes.
	Hopping	15 hopping, 2000m sight distance at most between point and point.

3. External Structure and Description of Parts




Figure 3-1 External structure and description of parts for FS-ZB485A

3.1 RS232 port: RS232 port is connected by DB9M male connector, valid signals are RXD


(receiving), TXD (sending), GND (ground), its signal definition is the same with computer standard RS232 port, with built-in surge protector. Please see Table 3-1 for definition of signal.

Table 3-1 Definition of RS232 port signal

Outline	Pin	Signal name	Function	Type
	1	NC	Not used	-
	2	RXD	Receive RS232signal	Input
	3	TXD	Send RS232signal	Output
	4	DTR	Get terminal ready	Output
	5	GND	RS232 signal grounding	-
	6	NC	Not used	-
	7	RTS	Request for sending	Output
	8	NC	Not used	-
	9	NC	Not used	-

3.2 RS485/422 terminal and power terminal: this product's input power voltage: any DC power between 9 and 40VDC, the internal is isolated by DC/DC. So, power of this product can be supplied by any equipment, no need to consider shared grounding. The RS485/422 port is internally isolated and installed with anti-lightning surge protector. Please see Table 3-2 for definition of signal.

Table 3-2 Definition of RS485/422 terminal and power terminal signal

Outline	Pin	Signal	Function	Type
	1	D+	RS485 signal positive	Input/output
	2	D-	RS485 signal negative	Input/output
	3	RXD+	RS422 signal receiving positive	Input
	4	RXD-	RS422 signal receiving negative	Input
	5	TXD+	RS422 signal sending positive	Output
	6	TXD-	RS422 signal sending negative	Output
	7	SG	RS485/422 signal grounding	-
	8	FG	shielded grounding (housing grounding)	-
	9	+9-40V	Externally connect to anode of DC power	Input
	10	0V	Externally connect to cathode of DC power	Input

Please correctly install terminating resistor in accordance with RS485/422 standard:

- When RS485 port is used, if FS-ZB485A is at the terminal of RS485 bus, 120Ω terminating resistor shall be connected at D+, D- terminals in parallel; if FS-ZB485A is not at the terminal of bus, terminating resistor is not required to be installed in parallel.
- When RS422 port is used, if FS-ZB485A is at the terminal of RS422 bus, 120Ω terminating resistor shall be connected at RXD+, RXD- terminals in parallel; if FS-ZB485A is not at the terminal of bus, terminating resistor is not required to be installed in parallel.

Note: user can choose RS232, RS485 and RS422 port freely without switch or jumper selection. But these ports can't be used at the same time.

3.3 Antenna: standard antenna configured to this product is 2.4GHz, 3db, SMA inner thread inner pin connector. Users can replace it with other high-gain antenna. If FS-ZB485A is installed inside control cabinet, sucker antenna is required to connect antenna to outside of control cabinet.

As feeder has relatively large attenuation coefficient, in order to reduce feeder attenuation to signal, when selecting feeder and sucker antenna, it is recommended that feeder length should be controlled within 3 meters.

3.4 CFG Button: this is parameter configuration button for adapter. Press and hold this button for 3 seconds, ALM and NET light flash at the same time, adapter enters parameter configuration status.

3.5 Indicator: there are 6 LED indicators on the panel for indicating working state, as shown in Table 3-5.

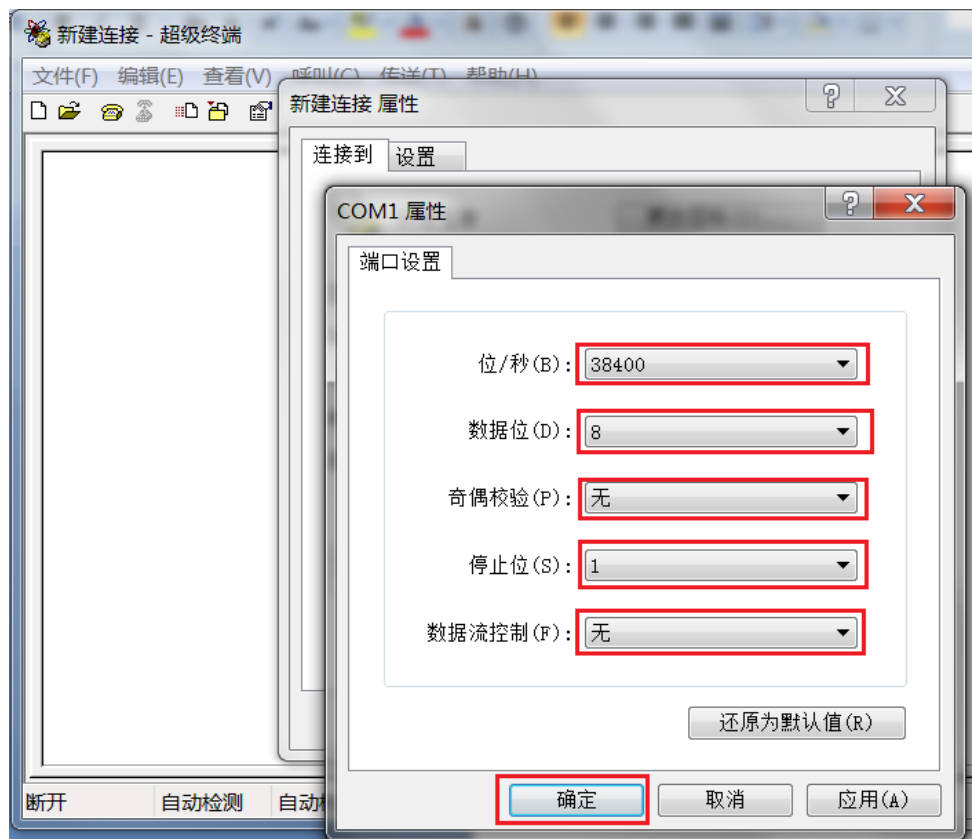
Table 3-5 Descriptions of LED indicators

Indicator	Normally on	Blink	Off
PWR	Power is normal	Failure	Failure or power off
ALM	Alarm indication	Configuration state	Work normally
RUN	Failure	Work normally	Failure
NET	With network connection	Configuration state	No network connection
RXD	Failure	Serial port is receiving data	No data transmitted at serial port
TXD	Failure	Serial port is sending data	No data transmitted at serial port

4. Descriptions of Parameter Setting

Connect RS232 port of FS-ZB485A to RS232 port of computer by serial port cable attached to the product. If your computer has no RS232 port, one USB/RS232 converter should be installed.

Turn hyper terminal of computer (Start-->all programs-->attachment-->communication-->hyper terminal) or hyper terminal software on product DC on, select serial port number connected with adapter, attribute/configuration/port settings: **baud rate 38400, data bits 8, verification NONE, stop bit 1, flow control: none.**



User can click “File/Save” to save port set up parameters into a file. Just click this file for the next use to avoid resetting of port parameter.

4.1 Enter parameter setting interface:

- Power on adapter;
- Press CFG key and hold for 3 seconds;
- Alarm (ALM) indicator and network (NET) indicator flicker at the same time.
- Adapter enters configuration status, the screen prompts language selection;
- Select Chinese or English, and input password ZBEE, press Enter key, parameter setting image appears, as shown in Figure 4-1.



Figure 4-1 Interface of adapter parameter setting

Useful keys:

Press Enter or E key under main menu to display current configuration parameters;

Type in serial number under main menu to enter corresponding submenu;

Press Enter under submenu to return to main menu without revising parameters.

Press D under main menu, adapter will restart and run new parameters, which has the same effect as power on adapter, therefore, you have to press D to restart or power on adapter again after finishing parameter configuration to make new parameters effective.

When set up parameters, adapter saves parameter real time.

Adapter can exit configuration mode automatically. If there is no effective operation on key in a minute continuously, system will exit configuration mode automatically and enter normal operation mode. If you want to enter configuration mode again, re-press and hold CFG key for 3 seconds. Advantage of this design is that, in normal operation, if operator press CFG by mistake, adapter will restore to normal operation mode in a minute automatically.

4.2 Setup parameter:

4.2.1 Node address (MAC_Addr) :

Each adapter has an only address. No nodes have the same address in the same network system.

Address should be indicated by 2 digit address. Coordinator address is always 0000.

MAC_Addr options	Address range	Setting up
MAC_Addr	0000-FFFE	Address of each node in the same network should be different. Address of coordinator is always 0000.

4.2.2 Node name (Node_name) :

Create a desired name for adapter by 8 English characters or 4 Chinese characters.

4.2.3. Node type (Node_Type) :

Node_Type options	Node type	Setup instruction
PAN_Coord	Coordinator	Data center, fixed address is 0000.
PAN_Coord_BackUp	Backup center	Serve as backup center, has the same function as center node. Address is 0000. It can be used for double center hot standby system.
Router	Relay route	It has relay, route and terminal node function.
END_Device	End node	

4.2.4 Network type (Net_Type) :

Net_Type options	Network type	Setup instruction	
Mesh	Mesh	Master-slave network which must have a unique coordinator.	Network type of nodes in the same network should be the same, otherwise communication will not be possible.
Star	Star		
Line	Line		
Peer	Peer	Non-master slave network, no coordinator.	

We recommend users to adopt Mesh or Star.

Topology structure of Mesh is shown in Figure 4-2:

This is the most frequently used network topology structure with the most distinctive ZigBee feature. It

self-organizes network by coordinator coordination, relay route node select optimal route path automatically. If network route is destroyed (certain relay route node (R) is broken or outage), network finds new route path by calculation automatically and re-link with other relay route node nearby to restore route path automatically, ensure accessible network and improve reliability of communication network.

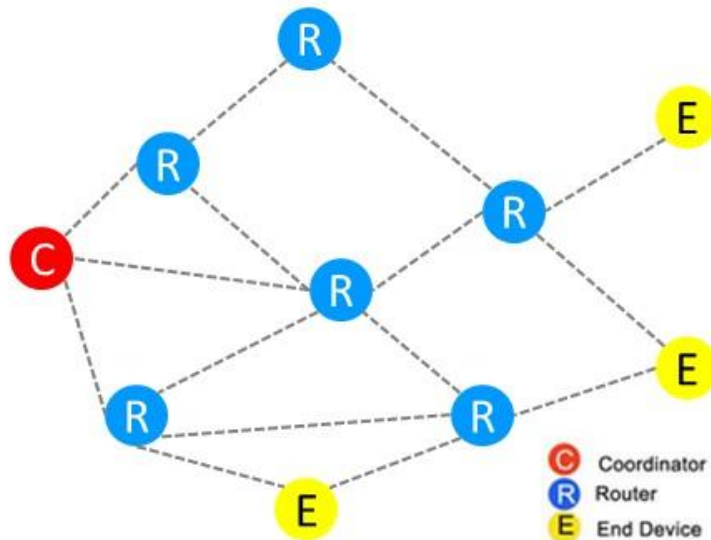


Figure 4-2 Mesh

Topology structure of Star is shown in Figure 4-3:

In star topology structure, communication is carried out between equipment (terminal node and relay route) and a coordinator. In real RS485 communication network, coordinator is usually considered as master station and other nodes are considered as slave stations.

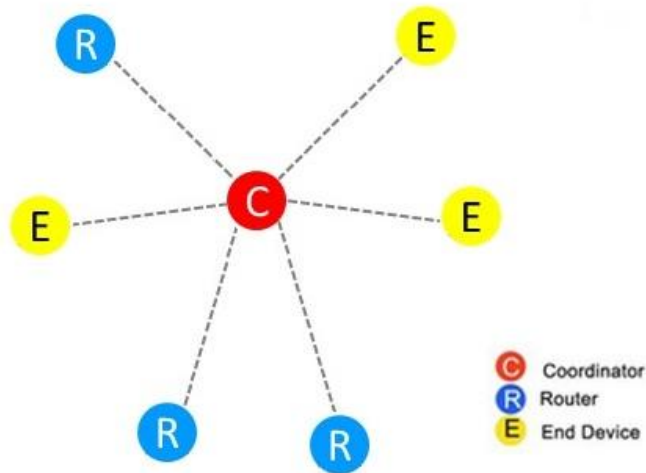


Figure 4-3 Star

Topology structure of Line is shown in Figure 4-4:

Line topology connects all nodes in the network in series and with the beginning and the end open. It is like bus topology RS485 network which is economical, as shown in Figure 4-4.



Figure 4-4 Line

Peer topology structure is shown in Figure 4-5:

Difference between peer network and star network is that for any node in the network, as long as it is in communication range of other nodes, these nodes can communicate directly without transfer by center node. Message sent by a node in the network reaches any other node by multi-hop relay route.

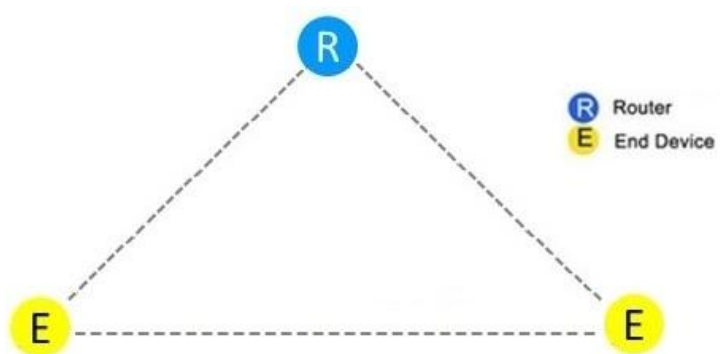


Figure 4-5 Peer-to-peer network

4.2.5 Net ID (Net_ID) :

Net_ID options	ID range	Setup instruction
Net_ID	00-FF	Node in the same network should have the same ID, otherwise communication will not be possible.

4.2.6 Wireless frequency point (Channel) :

Channel options	Frequency point range	Setup instruction
0-F	0 : 2.405GHz 1 : 2.410GHz 2 : 2.415GHz 3 : 2.420GHz 4 : 2.425GHz 5 : 2.430GHz 6 : 2.435GHz 7 : 2.440GHz 8 : 2.445GHz 9 : 2.450GHz A : 2.455GHz B : 2.460GHz C : 2.465GHz D : 2.470GHz E : 2.475GHz F : 2.480GHz	<p>All nodes in the same communication network should have the same operation frequency point, otherwise communication will not be possible.</p> <p>It is recommended to use 4, 9, E, F frequency point to avoid WiFi interruption.</p>

4.2.7 Address coding (Data_Type) :

Data_Type options	Data type	Setup instruction
ASCII	ASCII code	Either address type is ok.
HEX	hexadecimal number system	

4.2.8 Sending mode (TX_Dst) :

TX_Dst options	Sending mode	Setup instruction
Broadcast	Broadcast	No need of target address. Data sent by any node will be received by other nodes.
Master-Slave	Master-slave	Coordinator does not need target address. Non-central node needs no target address, send to coordinator by default. Target address is 2-bytes MAC address, just add it before data package.
Point-Point	Point-point	Send data to node at designated target address. Target address is 2-bytes MAC address, just add it before data package.

4.2.9 (Baud_Rate) :

Baud rate (bps)	Setup instruction
1200 2400 4800 9600 19200 38400 57600 115200	Serial port parameters of adapter (baud rate, data bit, parity bit and stop bit) must be the same with that of equipment connected with it, otherwise, communication will be impossible.

4.2.10. Parity (Parity) :

Data_Parity options	Parity type	Setup instruction
None	None	Serial port parameters of adapter (baud rate, data bit, parity bit and stop bit) must be the same with that of equipment connected with it, otherwise, communication will be impossible.
Even	Even	
Odd	Odd	
Mark	Mark	
Space	Space	

4.2.11. Data bit (Data_Bit) :

Data_Bit options	Data bits	Setup instruction
7+1+1	7 data bits+1 parity bit+1 stop bit	Serial port parameters of adapter (baud rate, data bit, parity bit and stop bit) must be the same with that of equipment connected with it, otherwise, communication will be impossible.
8+0+1	8 data bits+ no parity +1 stop bit	
8+1+1	8 data bits+1 parity bit+1 stop bit	
8+0+2	8 data bits+ no parity +1 stop bit	

Note: this setting is a combination of data bit + parity bit + stop bit. Select by combining with parity bit setting up.

4.2.12. Data source (Src_Add) :

Src_Add options	Data source address	Setting up
None	No output of data source address	No output by default.
ASCII	ASCII output	
HEX	hexadecimal number system output	

Summary of parameter setting:

- Coordinator address is always 0000, other node address (relay route, end node) is 0001-FFFE, which can be set up at will. But address of each node in the same network should not be same, otherwise, communication will not be possible.
- Each node in the same network should have the same network type, network ID and frequency point, otherwise, communication will not be possible.
- Serial port parameter of adapter (baud rate, data bit, parity bit and stop bit) should be the same as that of equipment connected with it, otherwise, communication will not be possible.

5. Application of serial port to wireless ZigBee adapter FS-ZB485A

FOURSTAR serial port to wireless ZigBee adapter FS-ZB485A is industrial designed product which is applicable to RS232/RS485/RS422 serial port to ZigBee wireless communication of industrial control equipment. Software and hardware of original industrial control equipment need no modification, it can be upgraded to wireless data transmission system directly. The following text introduces several frequently used configuration schemes.

5.1 Transparent transmission:

The sending end sends original data sample to receiving end just like direct cable connection. After simple setup, adapter replaces original cable transmission with wireless mode, no need to modify communication protocol and software of original equipment. Figure 5-1 shows data collection and control system which uses RS485 (e.g. MODBUS) and be transformed to ZigBee wireless communication program, as shown in Figure 5-2.

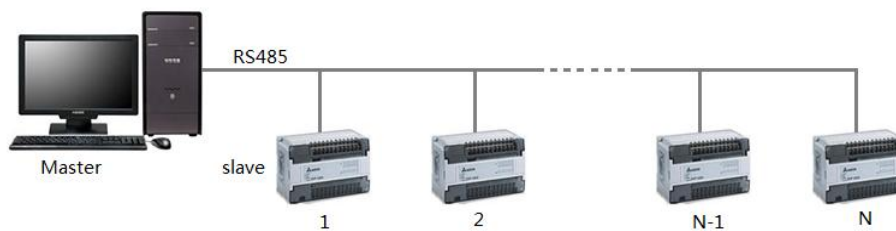


Figure 5-1 Typical RS485 data acquisition control system

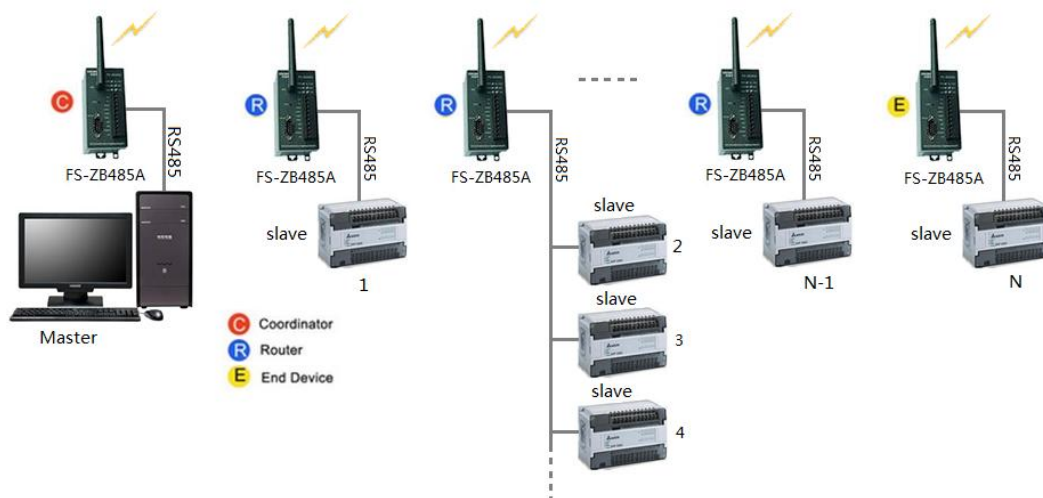


Figure 5-2 ZigBee wireless data acquisition control system

In Figure 5-2, parameter setting of each FS-ZB485A adapter is as below:

- Node type: FS-ZB485A adapter connecting to master station computer is set as coordinator (C), adapters connecting to other slave station is set as relay route (R) and the last one can be set as End node.
- Node address (MAC_Addr) : coordinator adapter address is 0000, address of other adapters is any number among 0001-FFFE, as long as numbers are different.
- Node name: name each adapter to facilitate system maintenance.
- Net type (Net_Type) : it can be set as Mesh, Star, and Line, it is recommended to use Mesh featuring ZigBee the most. Each adapter should be set up to have the same net type.
- Net ID (Net_ID) :any number among 00-FF, each adapter should be set up to have the same network ID.
- Wireless frequency point (Channel): each adapter should be set up to have the same frequency point. It is recommended to use 4, 9, E and F frequency point to avoid WiFi signal interruption.
- Address coding (Data_Type) : hexadecimal number system (HEX) is normally used for data coding.
- Baud rate (Baud_Rate), Parity (Parity), data bit(Data_Bit) : it must be the same as baud rate, parity and data bit of serial port of equipment it connected to.
- Data source address (Src_Add) : no source address output (None).
- Sending mode (TX_Dst) : as for the transparent data transmission method, there are two setting up options:
 - Set up sending mode of coordinator (connect master station, e.g. computer) to Broadcast, other adapters connecting to slave station are set as Master-Slave. Data sent by master station can be received by all slave stations, while data sent by slave station will only be received by master station. Data can't be transmitted among slave stations.
 - All adapter nodes are set as Broadcast which does not differentiate master station and slave station. Data sent by any node of master station or slave station will be received by other nodes. It is the same as RS485 cable connection.

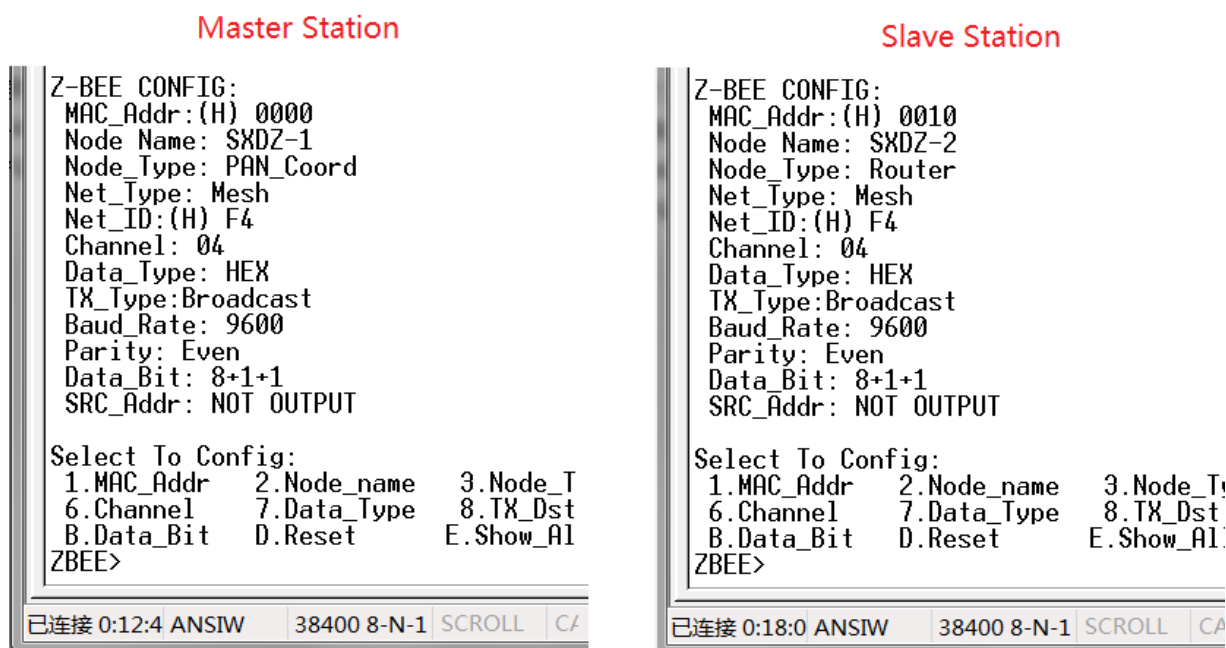


Figure 5-3 Screenshot of transparent transmission setup

5.2 Transfer by target address:

Some users' equipment, such as instrument and data acquisition equipment with RS232 or RS422 interface has no communication address, it only supports one-to-one communication between host station (e.g. computer) and the equipment. When master station needs to communicate with more than one of such equipment, it is unable to determine which equipment will data be sent to, as slave equipment will receive the same data and make response at the same time which certainly will cause communication chaos. Adoption of master/salve mode target address transmission will solve this issue.

Master station setup: node type is coordinator, and sending mode is master-slave.

Slave station setup: node type is relay route or terminal node. Sending mode is master-slave.

As for other parameters, please refer to settings mentioned above.

In this mode, data sent to slave station by master station must be at target address of two bytes before data. Whether this address and data should be hexadecimal number system or ASCII code depends on address coding setup as mentioned before. Data received by slave station serial port does not include target address, it has valid data only. Slave station sends data to master station, it is unnecessary to add address before data. It will always send to master station.

In this way, only slave station with consistent target address will receive data sent by master station and

make response, therefore, when user equipment fail to tell which data received from users' equipment is sent to which user equipment, this mode can be adopted. Differentiate data receiver by FS-ZB485A adapter.

FOURSTAR RS232/RS485/RS422 serial port to wireless ZigBee adapter FS-ZB485A can set up various practical and special transmission modes, refer to FS-ZB485A Testing Guidelines.

5.3 Precautions for installation:

For installation of FS-ZB485A adapter, please refer to *Guidance for the Installation and Usage of Industrial Wireless Communication Products* by FOURSTAR. Here below is some factors which may affect wireless communication distance.

- Unstable power supply, insufficient supply voltage, or insufficient output current. Operating voltage of FS-ZB485A is any voltage among 9~40VDC, power should be above 3W.
- There is obstacle in the middle, no visual distance. As it is 2.4GHz frequency band, wave length is short, basically it is straight line transmission, penetrability is weak, therefore, wall, road gradient and obstacle have huge impact on the transmission distance.
- Improper placement of adapter:
 - If antenna is less than 50cm from ground, microwave is easy to be absorbed by the ground. Therefore, distance to ground should be noted. We suggest distance to ground should not be lower than 2m.
 - Two modules must be on the same level, height difference will impact wireless communication distance.
 - Antenna should be installed vertically (antenna is vertically polarized), horizontal placement and inclined placement are different. Distance varies from antenna gain. In theory, the bigger antenna gain, the longer transmission distance.
- Same frequency interference can be set up as other frequency point to avoid same frequency interference.
- Impact by high-voltage power line and phone base station.
- Other uncertain factors.

6. FAQ

6.1 What kind of serial port equipments are supported by serial port of serial port to ZigBee adapter FS-ZB485A?

All RS232, RS485, RS422 serial ports which observe UART asynchronous serial port communication protocol, such as free port communication protocol of various PLCs and MODBUS (RTU/ASCII) protocol.

As for many field buses, such as PROFIBUS, MPI, PPI, CC-Link, PC-Link, although their physical communication ports are RS485 ports, they don't transmit data under UART asynchronous serial port mode. So, they are inapplicable to this product.

6.2 How to set terminating resistor when using RS485 or RS422 port of FS-ZB485A?

When using RS485 and RS422 ports, it is required that correctly set 120Ω terminating resistor at bus cable's beginning and end. Please refer to documents about RS485 or operation manual for various RS485 port products formulated by FOURSTAR.

6.3 What are the reasons for serial port receiving unreadable code? How to simply and rapidly check whether FS-ZB485A works normally?

The reason is that serial port parameters of FS-ZB485A, such as Baud rate, data bit, Parity, stop bit, are not compatible with serial port parameters of connected equipment. This problem can be solved by resetting to get them compatible with each other. Before install FS-ZB485A on the equipment, it is better to test by serial port test software to make sure product functions well and adapter setting is correct. User's equipment should have communication by wired connection before installing wireless adapter.

6.4 If FS-ZB485A is installed inside a metal cabinet, transmission of wireless signal is interrupted. How to solve this problem?

Change to sucker antenna (2.4GHz). Get antenna installed outside cabinet and make antennas accessible with each other.

6.5 Industrial production environment always is very complicated. How to correctly install and use FS-ZB485A adapter in different environment?

Please refer to *Guidance for the Installation and Usage of Industrial Wireless Communication Products* formulated by FOURSTAR.

6.6 Why is FS-ZB485A able to conduct communication normally on certain PLC, but unable on certain PLC?

As for industrial equipment, such as PLC, HMI, DCS, VVVF, if their RS485/422/232 ports are in line with UART asynchronous serial port protocol, they support FS-ZB485A, such as free port communication protocol of Siemens PLC and MODBUS protocol.

If RS485 port is a special field bus port, FS-ZB485A can't be used, such as PROFIBUS, MPI, PPI, CC-Link, and PC-Link.

Users can refer to *Application Test of Industrial Serial Port to ZigBee Adapter FS-ZB485A on Various PLC* formulated by FOURSTAR.

6.7 Whether power supply of FS-ZB485A adapter needs independent power supply of not?

Operating supply voltage of FS-ZB485A is 9 ~ 40VDC, its power input port and adapter RS232/RS485/RS422 port are isolated internally. Both have no electrical connection, therefore, power supply can be offered by any equipment without consideration that power and signal ground will destroy equipment.

6.8 What the meaning of ZigBee multi-hopping?

When coordinator---end node can't communicate due to long distance, add one relay route in the middle is called 1 hopping (level 1 route); when coordinator---relay route---terminal node can't communicate again due to long distance, add another relay route between relay route and terminal node is called 2 hopping (level 2 route), so on. Figure 6-1 shows network topology of 3 hopping.

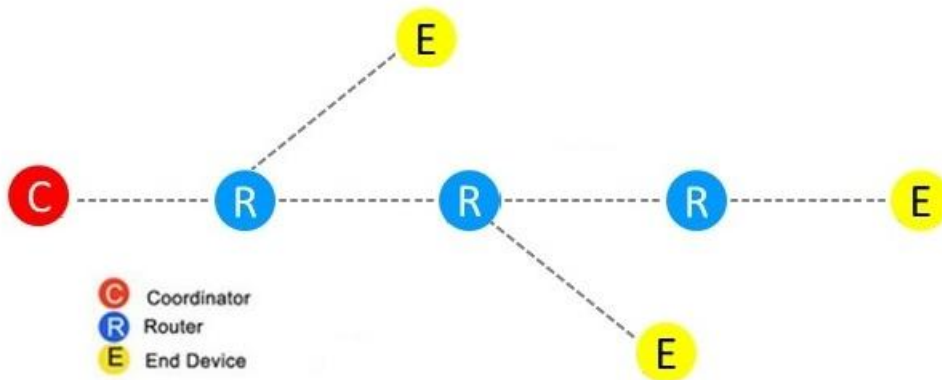


Figure 6-1 3-hop ZigBee network topology

6.9. How to connect ZigBee network into Ethernet?

Industrial serial port RS232/RS485/RS422 has advantages by adopting ZigBee wireless communication. By connecting it to Ethernet, powerful data management function of Ethernet can be used to realize integration of site acquisition control data and IT information.

One simple approach is to use a serial port to Ethernet server, e.g. FOURSTAR FS-WF485IE and FS-ETH485A adapter to connect its serial port with FS-ZB485A. interworking between ZigBee network and Ethernet is formulated by serial port so that ZigBee network is connected to local area network, Wifi, and internet, as shown in Figure 6-2. In this program, data sent by master station computer or laptop will be received by PLC of every slave station. Data sent by PLC of each slave station can also be received by master station computer or laptop. It is should be noted that ZigBee and WiFi should not have the same frequency to avoid channel interruption.

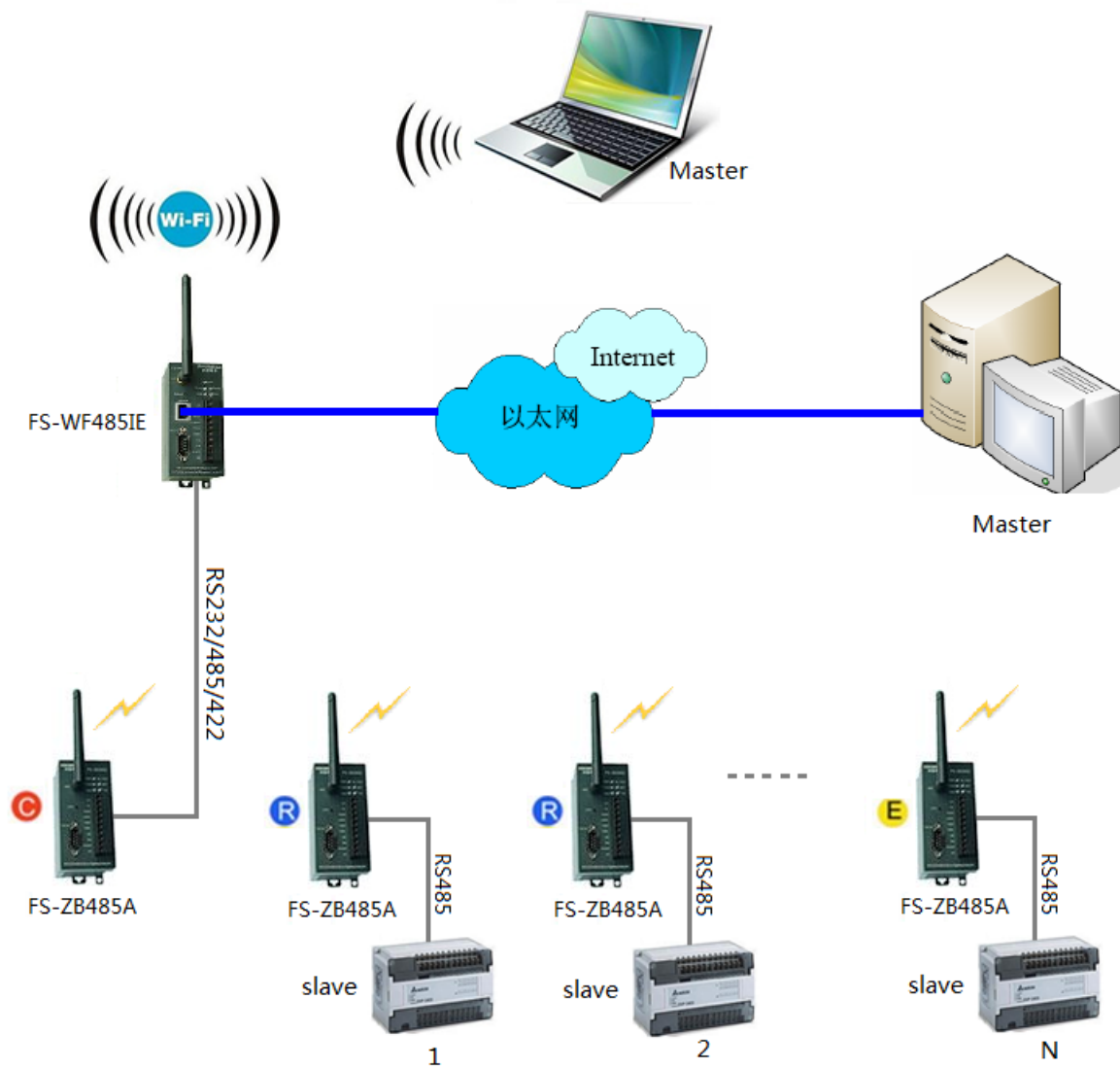


Figure 6-2 Connect ZigBee to Ethernet

7. Order information

Product name Industrial RS232/RS485/RS422 serial port to wireless ZigBee adapter

Product model: FS-ZB485A

Note

This Manual provides guidance for users using serial port to wireless ZigBee adapter (model: FS-ZB485A). We have already checked that contents provided in this Manual are in line with described hardware and software. We can't guarantee their complete consistency for errors are hard to avoid. We will always check data and contents provided in this Manual and conduct necessary updating in the subsequent versions. Product functions shall be subject to the functions on the actual device due to rapid development of new technology. FOURSTAR Electronic Technology reserves the right to revise this Manual without any prior notice.

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