

ZB-2550(P)/ZB-2551(P)

User Manual

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning!

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1. Introduction

ZigBee is a specification based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). ZigBee operates in the ISM radio bands and its focus is to define a general-purpose, inexpensive, self-organizing, mesh network that can be used for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation, home automation, and domotics, etc.

At present, the ICP DAS ZigBee converter ZB-2550 and ZB-2551, supports the [RS-232](#) and [RS-485](#) interfaces. The main design goal is limited data communication using [wireless transmission](#), so may [provide a better solution for environments where wiring is difficult](#).

1.1 More Information

The ZB-2550 and the ZB-2551 are small-sized wireless ZigBee converters based on the IEEE 802.15.4 standard. They allow [RS-485/RS-232](#) interfaces to be converted to a ZigBee wireless network. Only one [ZB-2550 \(Host\)](#) is allowed in a ZigBee network and is used to initialize and manage the data transmission routes. The [ZB-2551 \(Slave\)](#) ZigBee router is responsible for transmitting/receiving data from its child/parent router or the host. ICP DAS ZigBee products are designed for low data rates. The main benefit of ICP DAS ZigBee products is that they can be used to define a [general-purpose, self-organizing mesh network](#), which can be highly advantageous for industrial control.

The typical transmission range of the ICP DAS Zigbee ZB-2550/ZB-2551 converter is 100m, and the [ZB-2550P/ZB-2551P](#) is 700m.

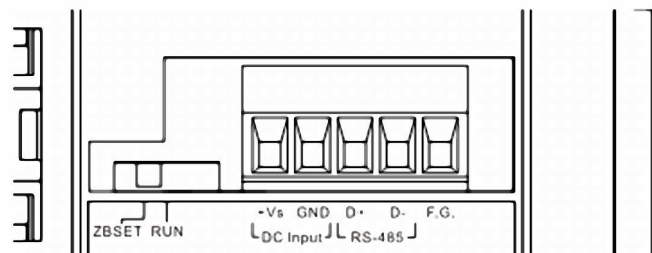
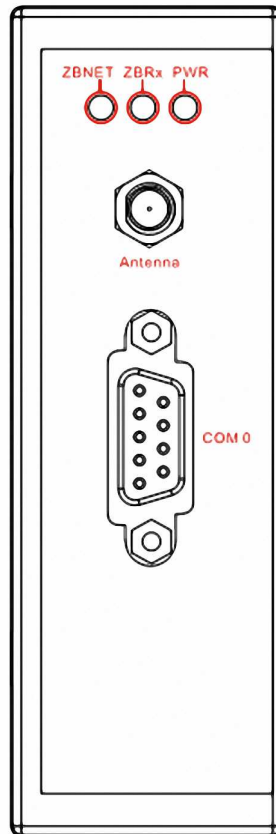
The transmission frequency range of the ZigBee converter is between 2.405 GHz and 2.48 GHz, separated into 5 MHz sectors, and provides 16 channels, and 65536 PAN IDs (65535 network groups can be set).

The ZigBee converter includes a repeater module that can be used to increase communication range or prevent data loss if the connection is interrupted or becomes unstable. Please refer to ZigBee converter other document for more information as following links:

http://ftp.icpdas.com/pub/cd/usbcd/napdos/zigbee/zigbee_converter/

1.2 Pin Assignment

ZB-2050(P)/ZB-2051(P)



1.3 Specifications

Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
Wireless				
RF channels	16			
Receive sensitivity	-102 dBm			
Transmit power	12 dBm	18 dBm	12 dBm	18 dBm
Network Topology support	Star, Mesh and Cluster tree			
Certification	TUV(ZCP)			
Antenna	2.4GHz - 3dBi Omni-Directional antenna			
Transmission Range	100m	700m	100m	700m

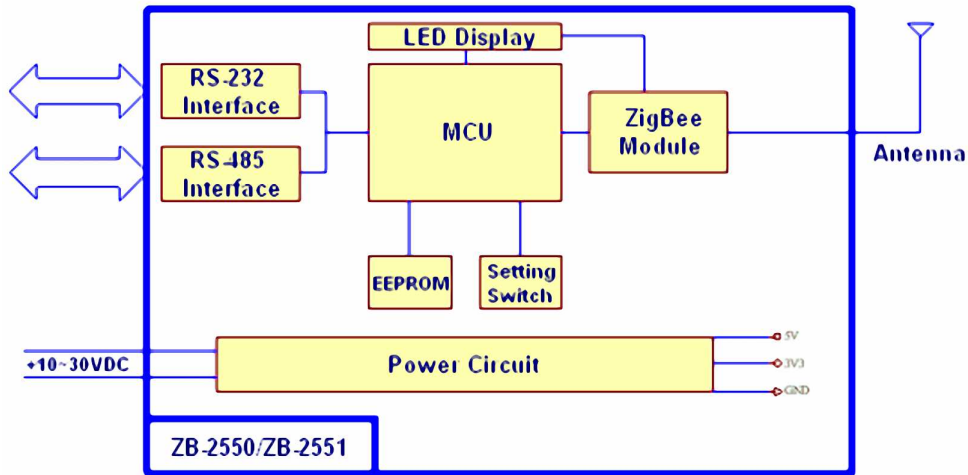
Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
General				
CPU	8-bit microcontroller			
Module Type	Host	Host	Slave	Slave
Communication Interface				
COM 0	RS-232 (TXD, RXD and GND); D-SUB9 Female, Non-isolated		RS-232 (TXD, RXD and GND); D-SUB9 Male, Non-isolated	
	RS-485 (D+, D-; internal ASIC self-tuner); Non-isolated			
COM 0 Settings				
Data Bit	8			
Parity	Even, Odd, None			
Stop Bit	1, 2			

LED Indicators	
ZigBee Net State	Green
ZigBee RxD	Yellow
Power	Red

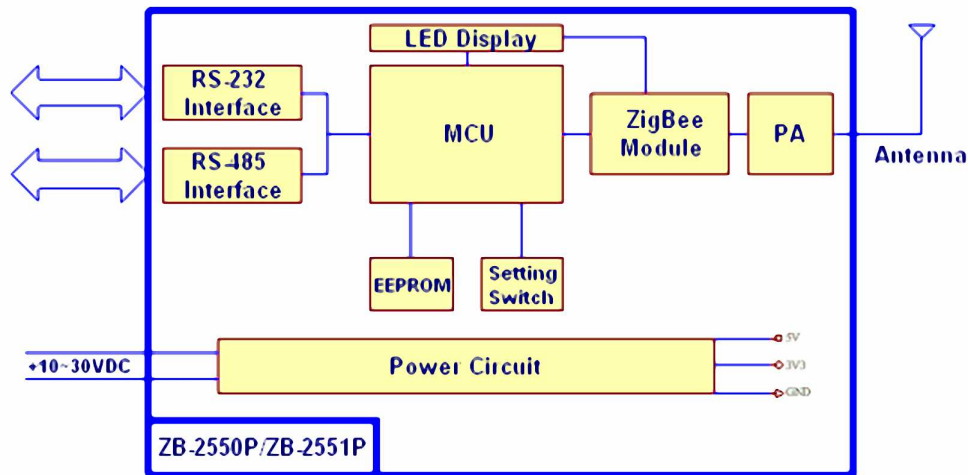
Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
Power				
Protection	Power reverse polarity protection			
EMS Protection	ESD, Surge, EFT			
Required Supply Voltage	+10 VDC ~ +30 VDC			
Power Consumption	0.5W	2W (max)	0.5W	2W (max)
Connection	5-Pin 5.08 mm Removable Terminal Block			
Mechanical				
Casing	Plastic			
Flammability	UL 94V-0 materials			
Dimensions	33 mm x 78 mm x 107 mm (W x L x H)			
Installation	DIN-Rail			
Environment				
Operating Temperature	-25 °C ~ +75 °C			
Storage Temperature	-40 °C ~ +80 °C			
Relative Humidity	5 ~ 95% RH, non-condensing			

1.4 Block Diagram

ZB-2050/ZB-2551



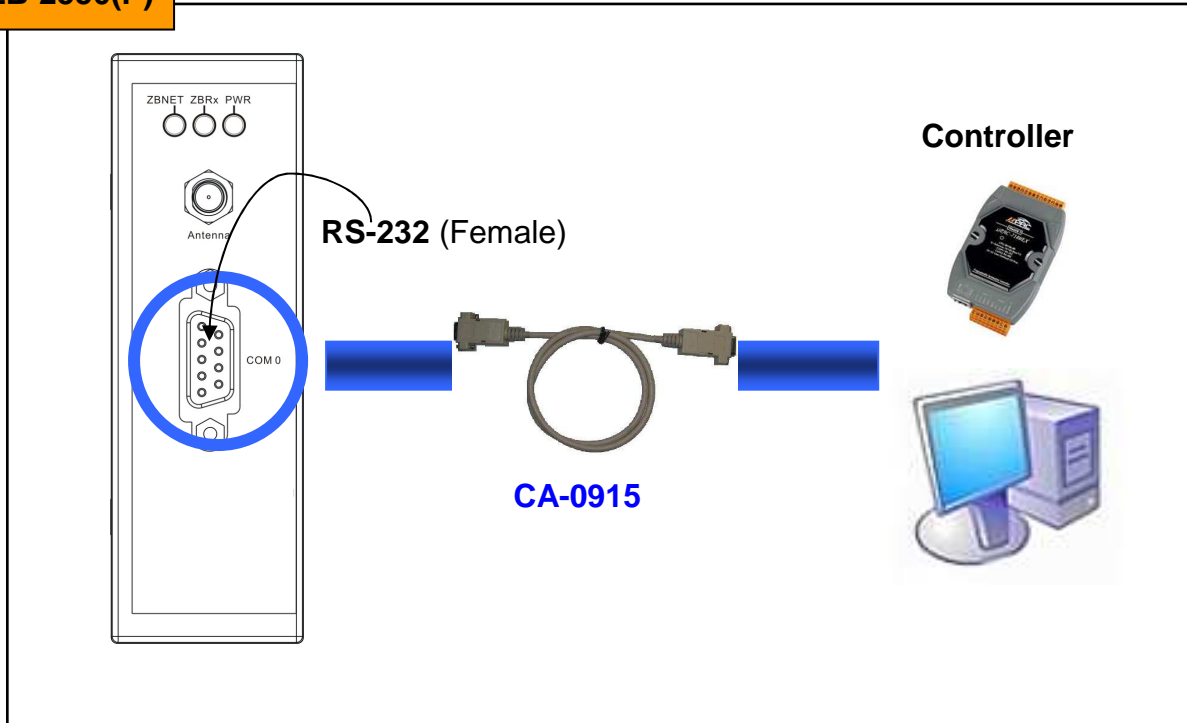
ZB-2050P/ZB-2551P



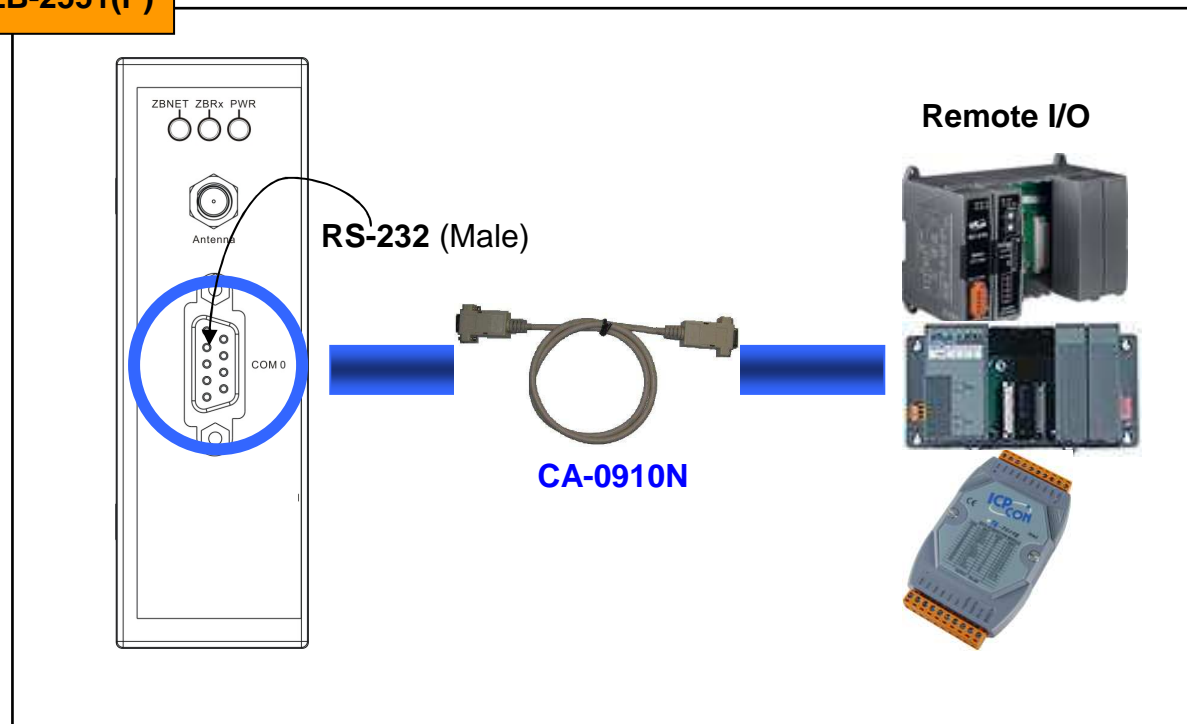
1.5 Wire Connection

Serial Port - RS-232

ZB-2550(P)

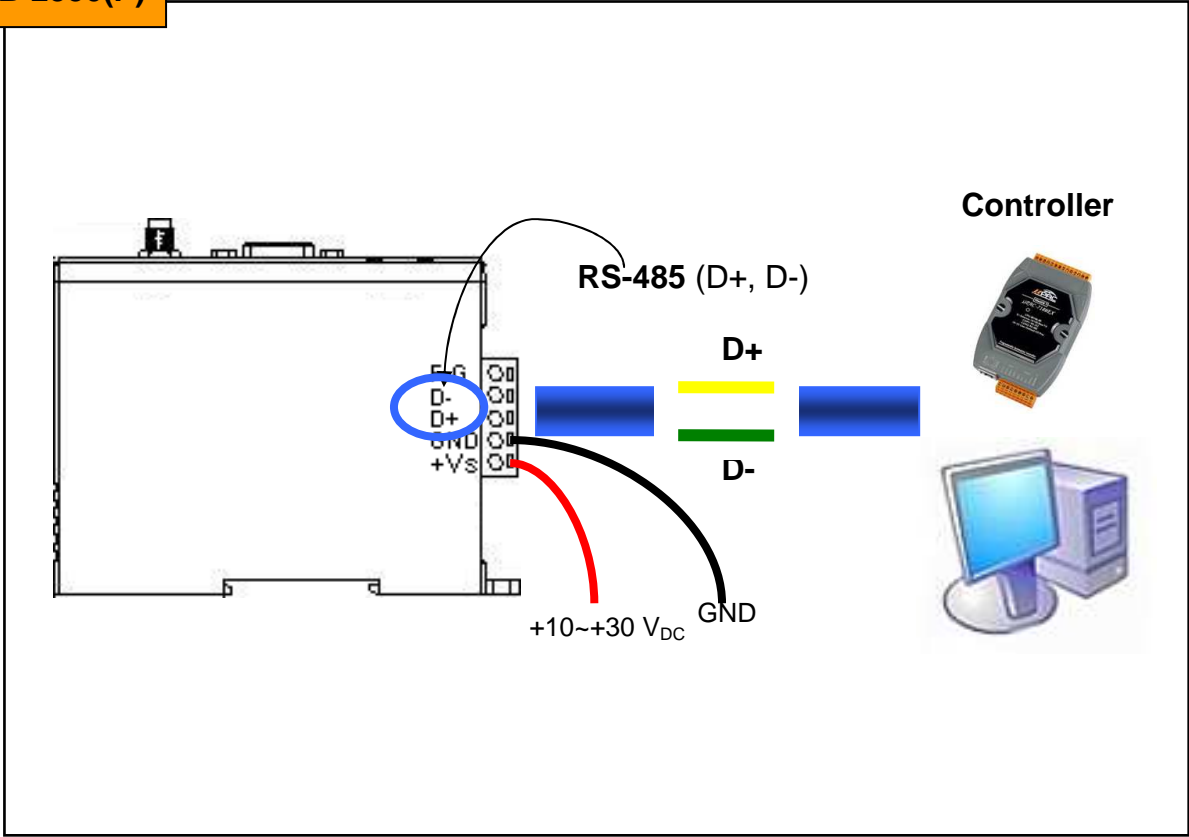


ZB-2551(P)

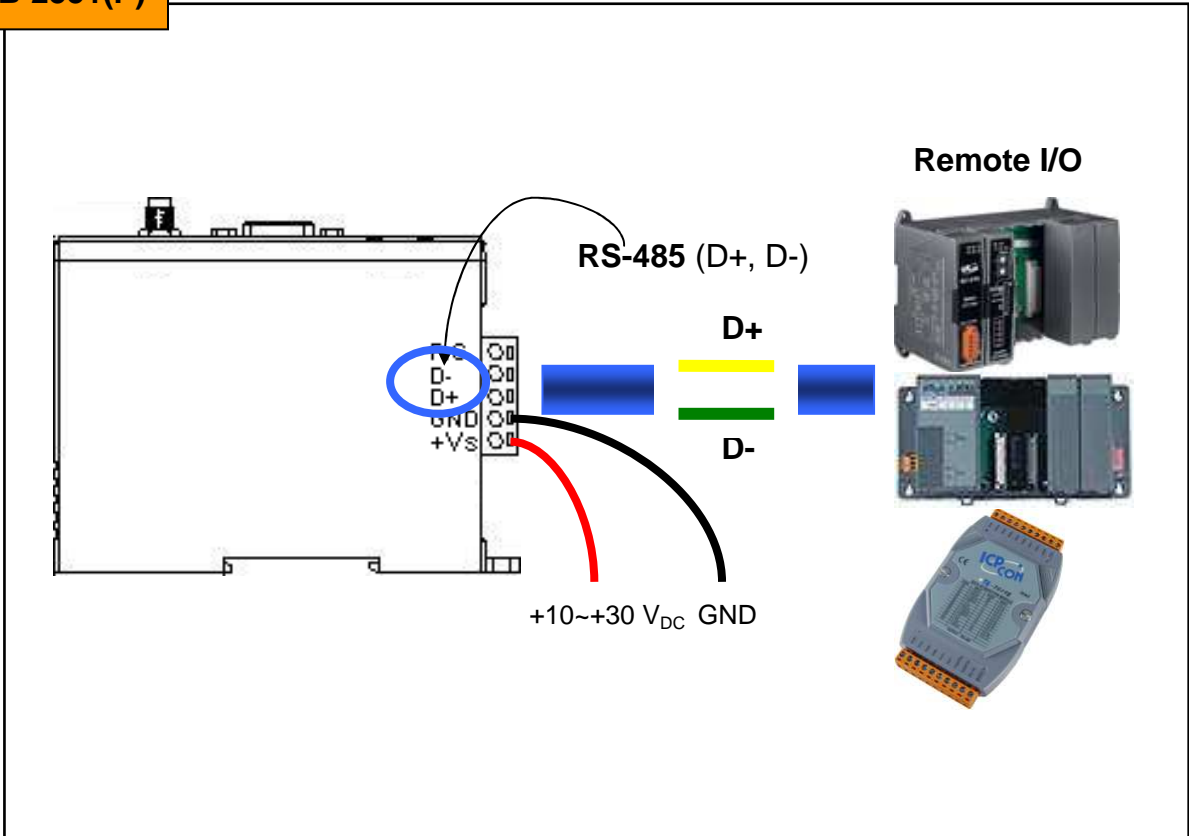


Serial Port - RS-485

ZB-2550(P)

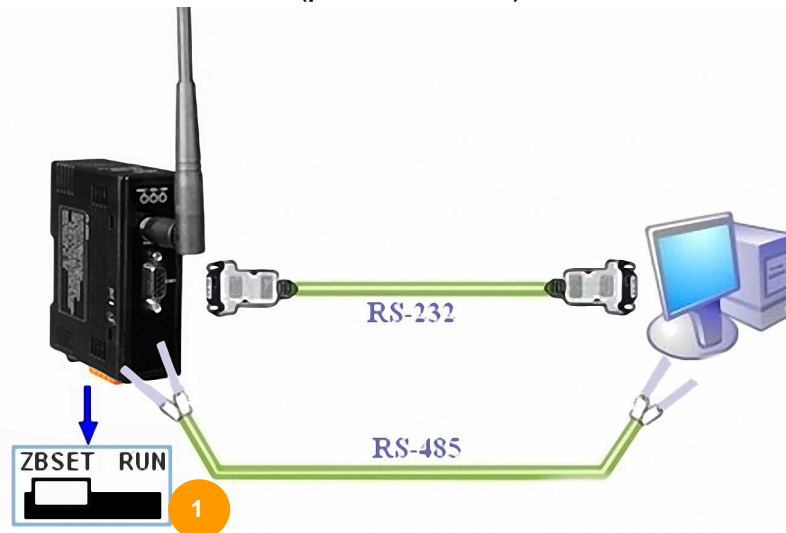


ZB-2551(P)

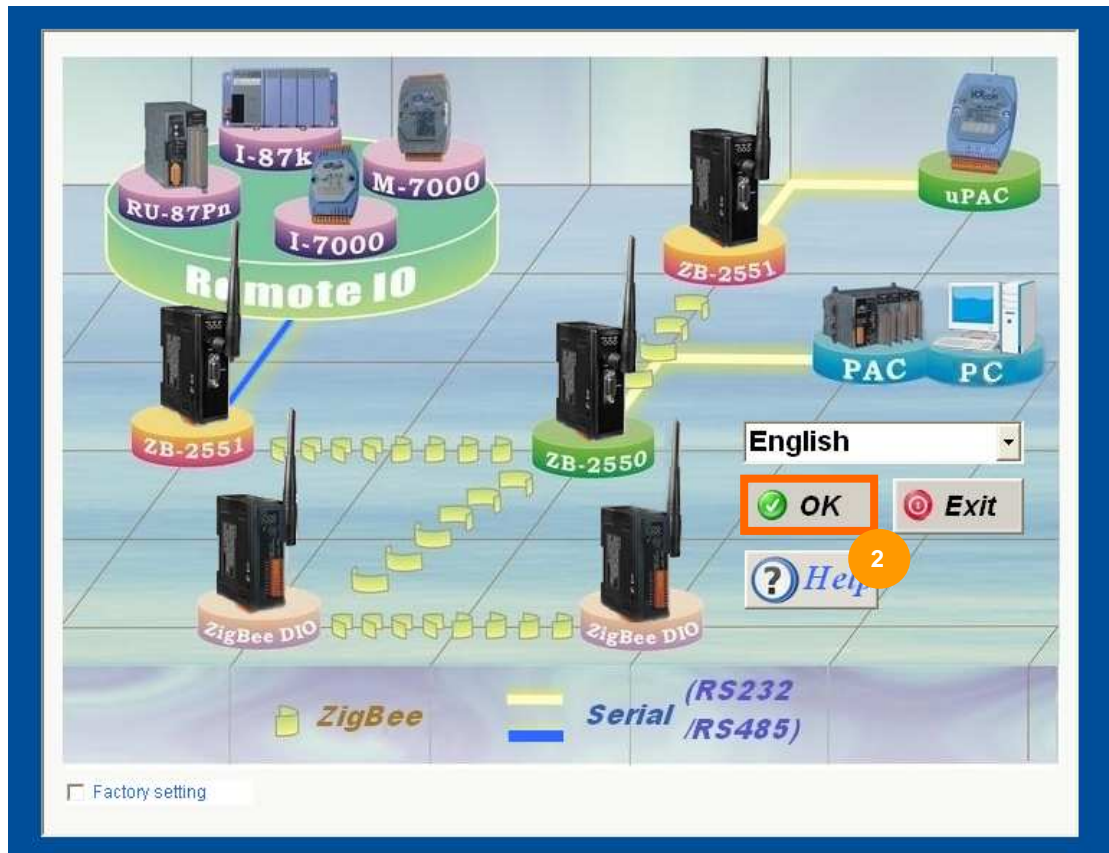


1.6 Quick Start

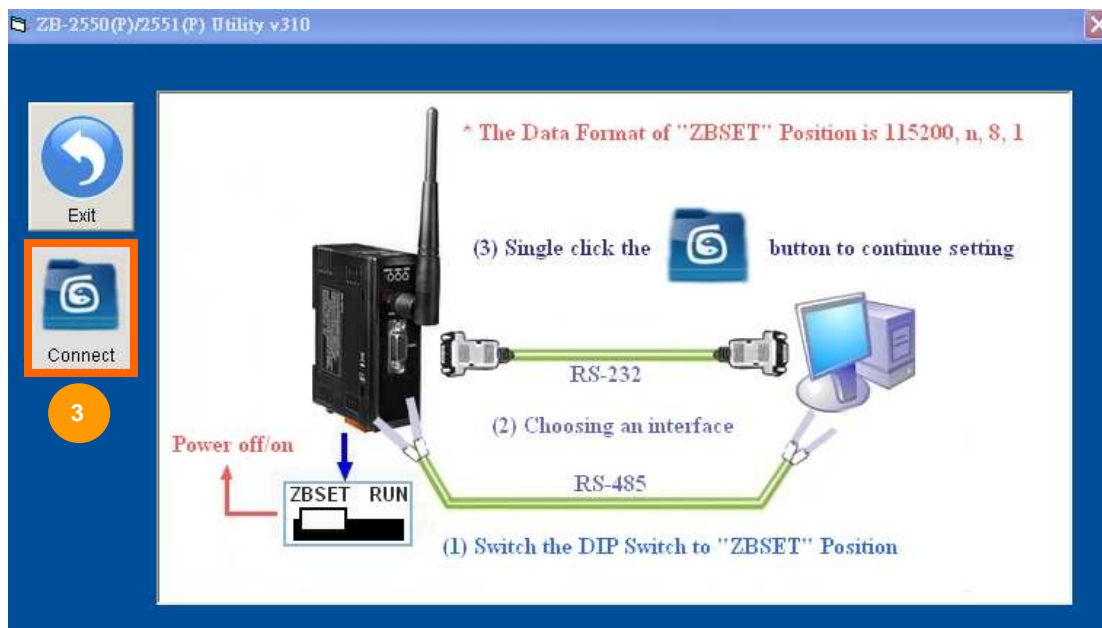
1. Before configuring the ZigBee converter, adjust the switch to the **ZBSET** position then re-boot (power off/on) the module. After configuration is complete, adjust the switch to the **RUN** position then re-boot (power off/on) the module.



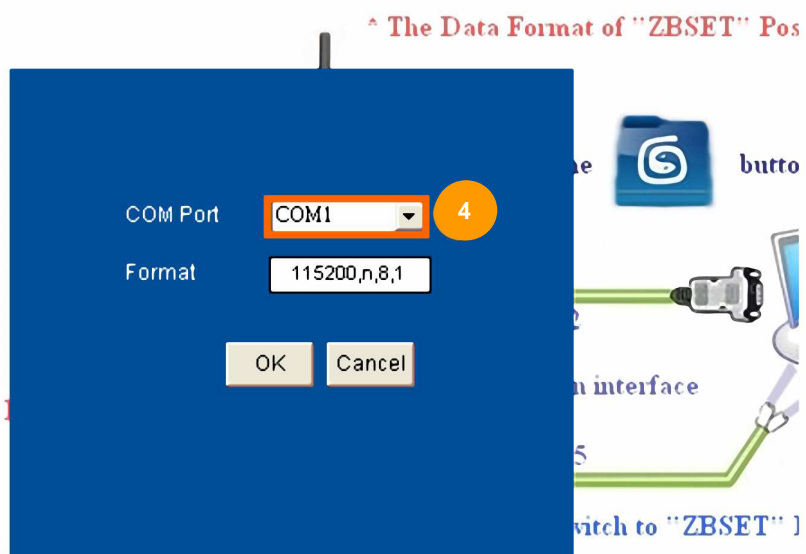
2. When the following screen is displayed, click on the **OK** button



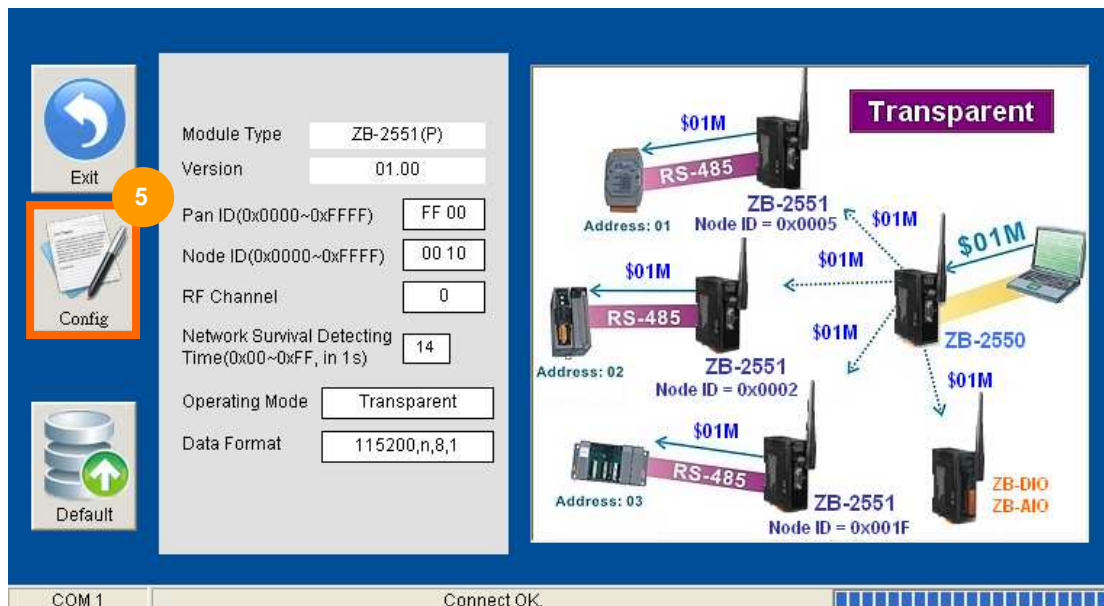
3. Click on the **Connect** button



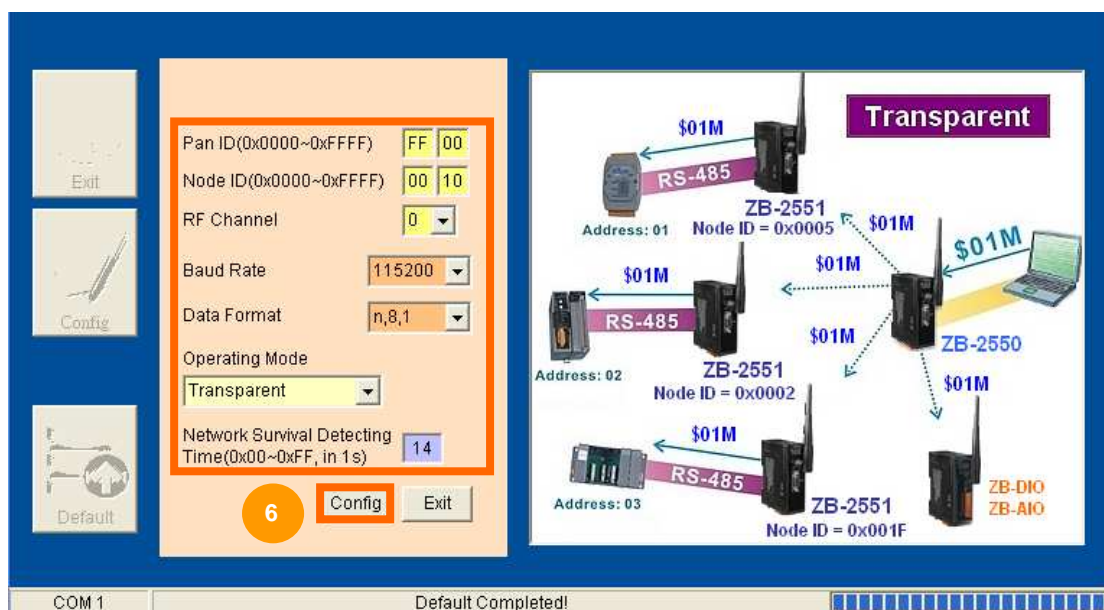
4. Please select the **COM Port** on your PC



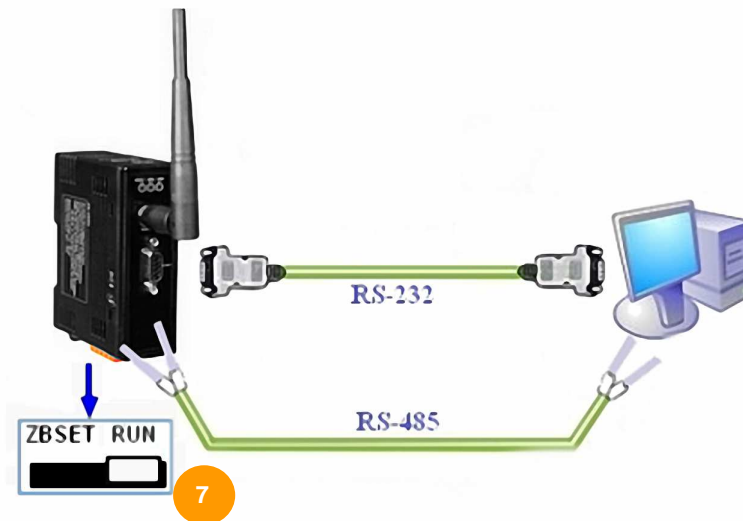
- Click on the **Config** button to configure setting for the ZigBee Converter - ZB-2550(P)/ZB-2551(P). e.g. : ZB-2551(P)



- Click on the **Config** button for set the new ZigBee setting.



- After ZigBee module configuration has been successfully established. Now, **adjust the switch to the RUN position then re-boot (power off/on) the module**. Leverage the power of your data. Make it work for you.



- Click **Default button** to load factory default parameters if you want to load factory default setting of ZigBee Module

The screenshot shows the configuration software interface for a ZigBee module. The 'Default' button is highlighted with a circled number '8'. The interface displays the following configuration parameters:

Module Type	ZB-2551(P)
Version	01.00
Pan ID(0x0000~0xFFFF)	FF 00
Node ID(0x0000~0xFFFF)	00 10
RF Channel	0
Network Survival Detecting Time(0x00~0xFF, in 1s)	14
Operating Mode	Transparent
Data Format	115200,n,8,1

The network diagram on the right shows three ZB-2551 modules connected to a ZB-2550 module via RS-485 cables, and a ZB-DIO/ZB-AIO module connected to the ZB-2550 module via RS-485 cables. The network is labeled 'Transparent'.

Zigbee Addressing and Identifiers

- **Node ID (0x0000~0xFFFF)**

A 16-bit address that describes a Zigbee node
Randomly assigned during network join
ZB-2570(P)/ZB-2550(P) always uses 0x0000
ZB-2571(P)/ZB-2551(P) ranges 0x0001~0xFFFF
ZB-DIO/ZB-AIO ranges 0x0001~0x001F
Resolve by stack in case of collision
Included in all message to identify node
 - **PAN ID (0x0000~0xFFFF)**

A 16-bit ID to identify the network
Included in every packet
A “logical” way to separate Zigbee networks running on same RF channel
Defined during network formation by ZB-2570(P)/ZB-2550(P)
ZB-DIO/ZB-AIO always uses 0xFF00 or 0xFF01
 - **RF Channel**

1 of 16 RF channels
Defined during network formation by ZB-2570(P)/ZB-2550(P)
- Note :** A Work Network - Running on the same **PAN ID** and **RF Channel**
- **Network Survival Detecting Time**

ZB-2551(P) will connect with Parent (ZB-2550(P)) periodically to confirm the survival of network. If it detects unsuccessfully, and it process initialize network again to find a new parent.

1.7 Default Settings

Default settings for the ZB-2550(P) are as follows :

ZB Node ID :	0x0000
ZB PAN ID :	0xFF00
ZB Channel (RF Channel) :	0x00
ZBSET Data Format :	115200,n,8,1
Operating Mode :	Transparent

Default settings for the ZB-2551(P) are as follows :

ZB Node ID :	0x0020
ZB PAN ID :	0xFF00
ZB Channel (RF Channel) :	0x00
ZBSET Data Format :	115200,n,8,1
Operating Mode :	Transparent
Network Survival Detecting Time :	20 second (0x14)

2. Applications

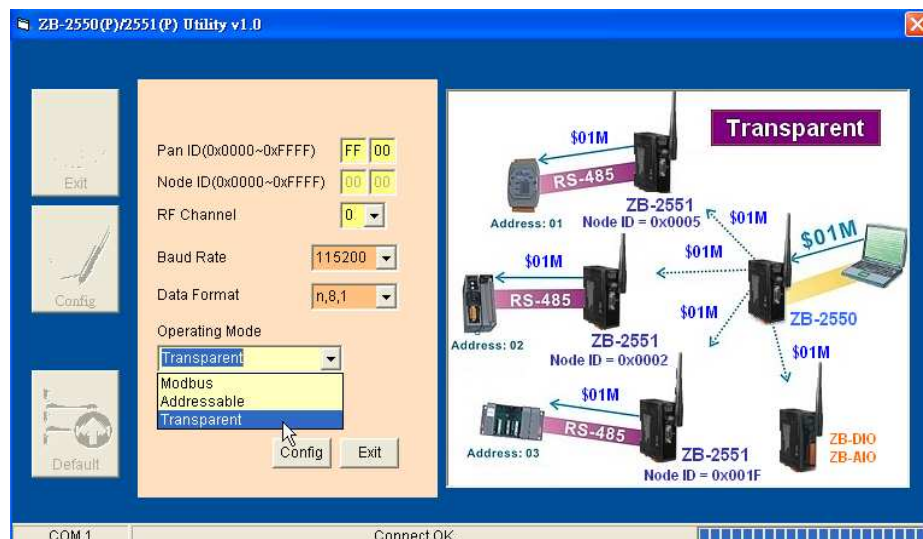
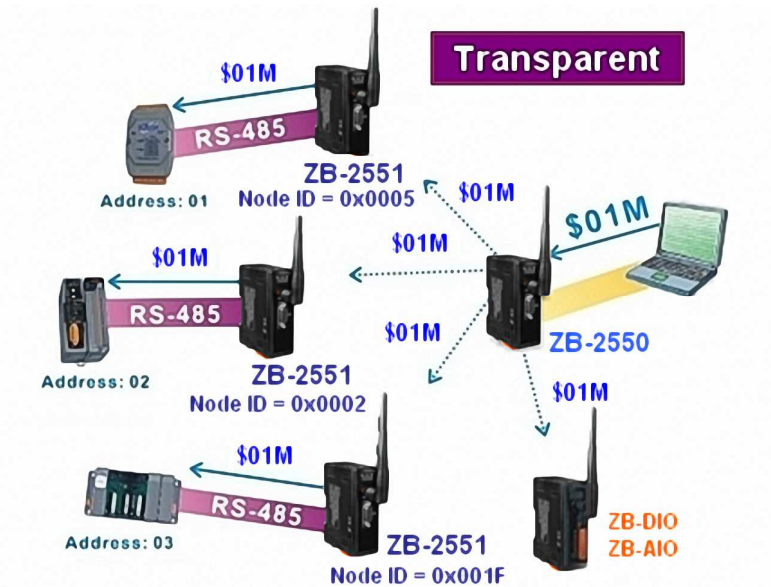
2.1 Operating Modes

Interface	Operating Modes	
Serial Port (RS-232/RS-485)	Operating Mode 1	Transparent
	Operating Mode 2	Modbus
	Operating Mode 3	Addressable

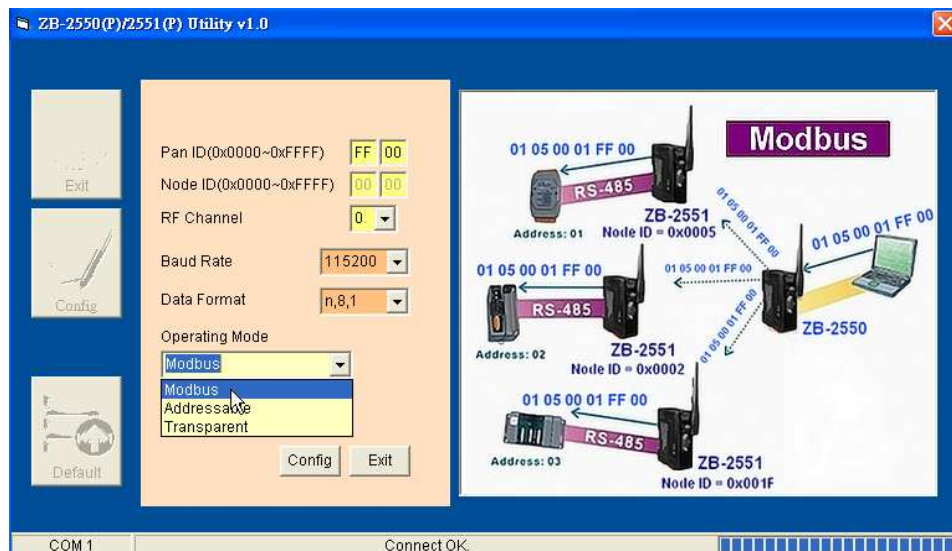
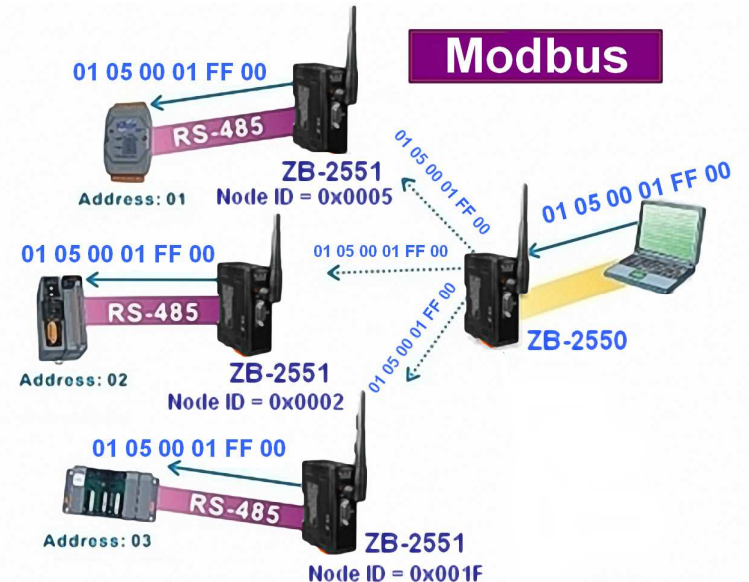
Operating Mode

- **Transparent (Original data will be broken down into many small data, each small data is 50 Byte)**

Transparent mode lets you use the ZB-2550(P)/ZB-2551(P) module like a router. (Maximum original data size is 200 Byte. Original data must not more than 200 Byte, e.g. "\$01M" = 4 Byte)



- **Modbus(Original data won't be broken down into small data)**
It is like Transparent mode. If original data size is greater than 50 Byte most of the time, Operating Mode Modbus is the most suitable.
(Maximum original data size is 200 Byte. Original data must not more than 200 Byte, e.g. "\$01M" = 4 Byte)



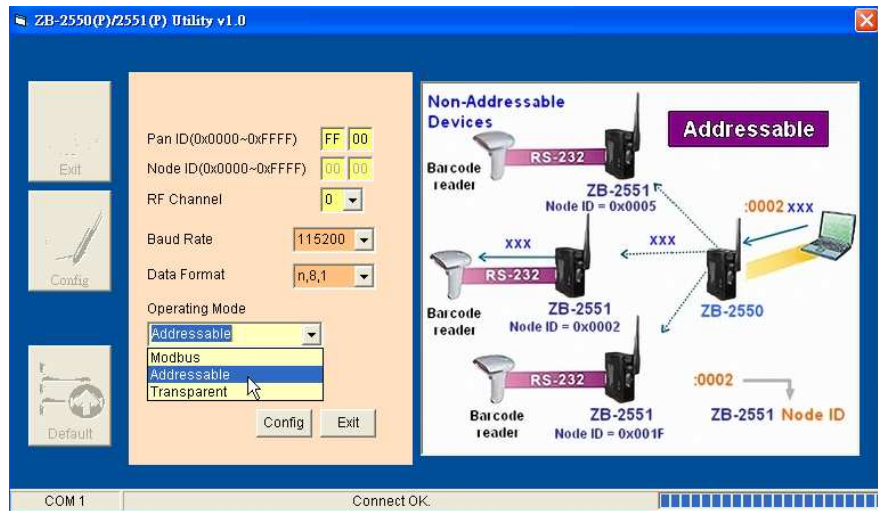
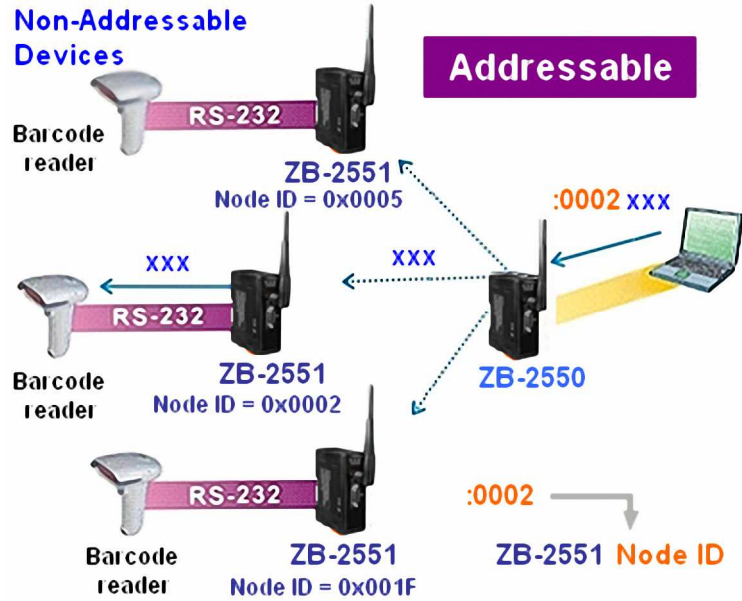
- **Addressable**

(Original data won't be broken down into small data)

For **Non-Addressable Device**, such as barcode reader.

Syntax, **:ADDRxxx**, the **ADDR** is your ZB-2551(P) Node ID.

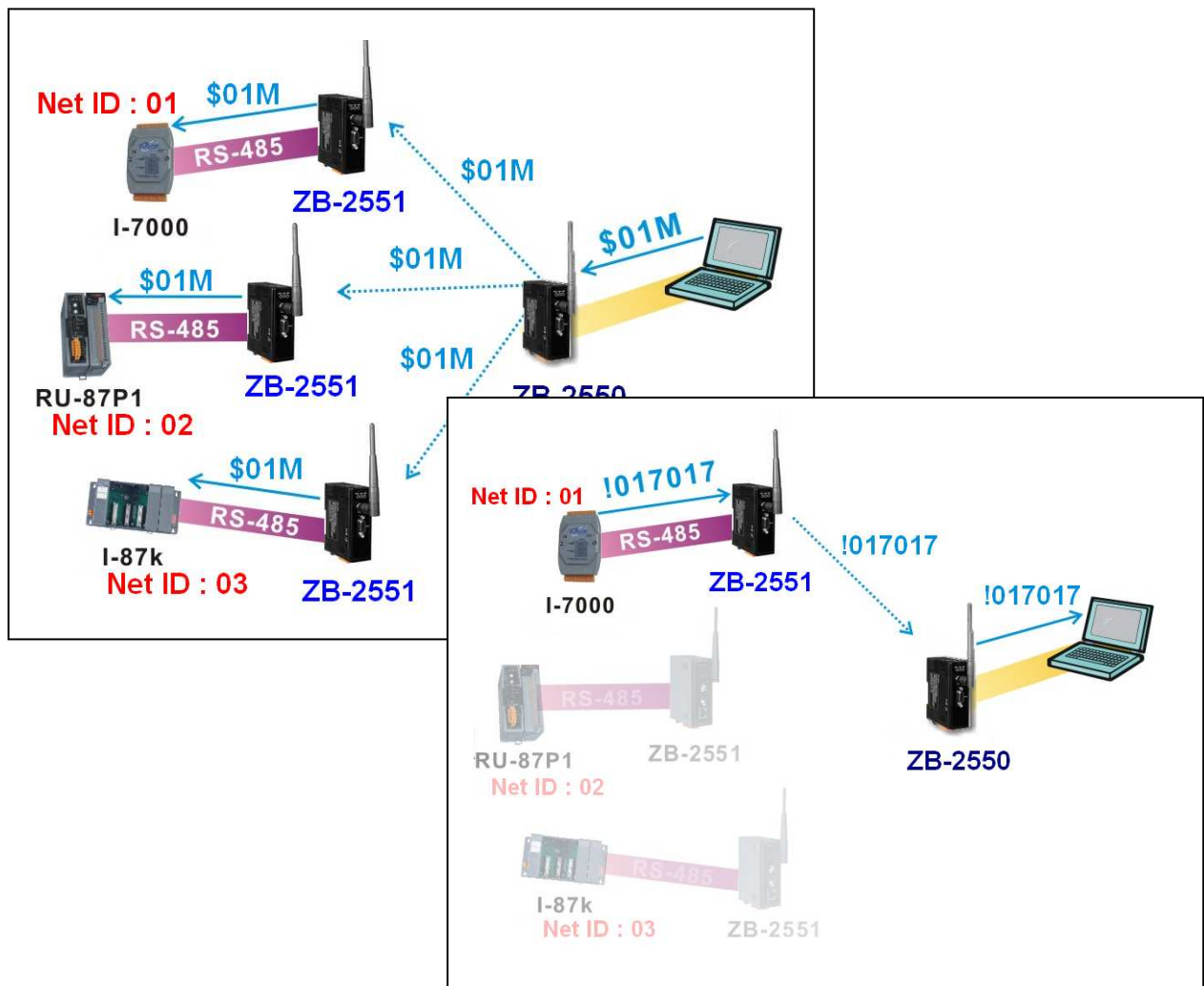
(Maximum original data size is 200 Byte. Original data must not more than 200 Byte, e.g. "xxx" = 3 Byte)



2.2 Application Example

Operating Mode 1 : Transparent

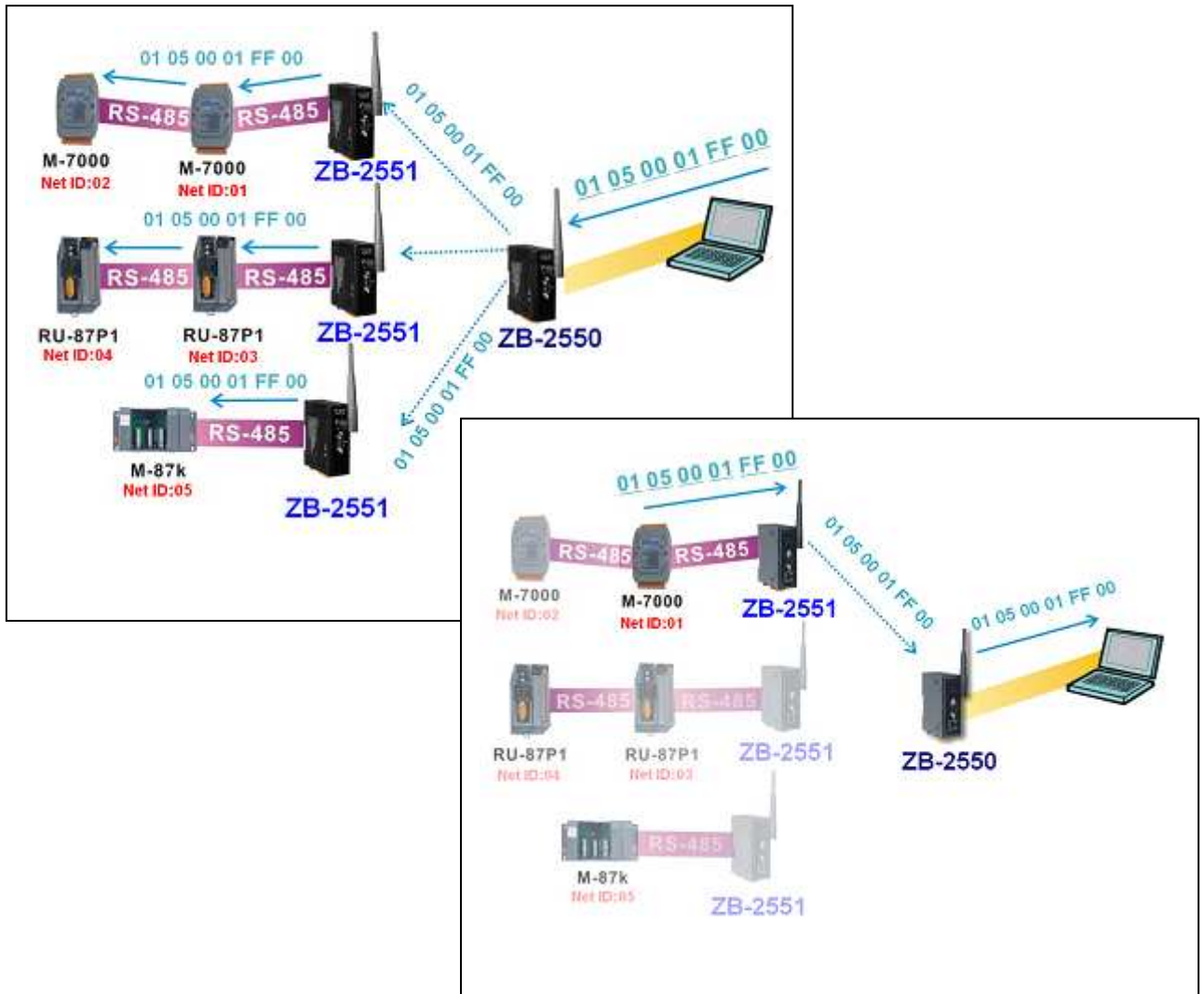
If you want the addressable RS-232/RS-485 interface device convert to ZigBee Wireless Networks, such as the ICPDAS I-7000/M-7000/I-87k remote I/O modules, you can use the ZB-2551 (slave) to connect to these I/O modules and use the ZB-2550 (host) to connect to your controller or PC. **If original data size is less than 50 Byte most of the time, this Mode is the most suitable.**



In some applications where the host controller needs to broadcast data to all RS-232/RS-485 devices and these devices receive data only (no response), you can also use this mode.

Operating Mode 2 : Modbus

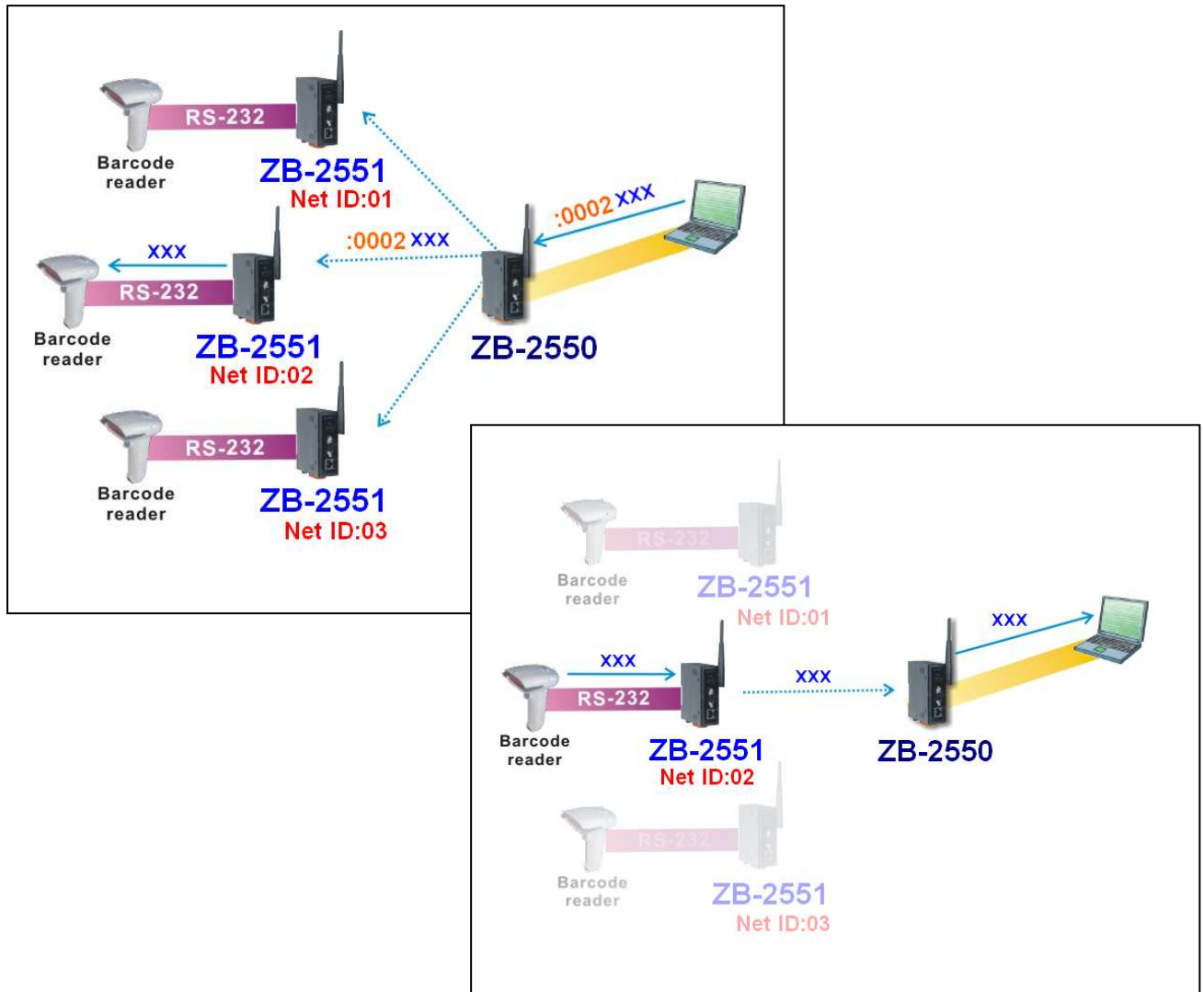
If you want the addressable RS-232/RS-485 interface device convert to ZigBee Wireless Networks, such as the ICPDAS I-7000/M-7000/I-87k remote I/O modules, you can use the ZB-2551 (slave) to connect to these I/O modules and use the ZB-2550 (host) to connect to your controller or PC. **If original data size is greater than 50 Byte most of the time, this Mode is the most suitable.**



In some applications where the host controller needs to broadcast data to all RS-232/RS-485 devices and these devices receive data only (no response), you can also use this mode.

Operating Mode 3 : Addressable

If the RS-232/RS-485 interface modules aren't addressable. Add 5 ASCII characters to the header of the original request data from your controller, then the remote device with the correct address will respond to it. This mode is similar to that used in ICPDAS I-752N products.



Syntax:

:ADDRxxx

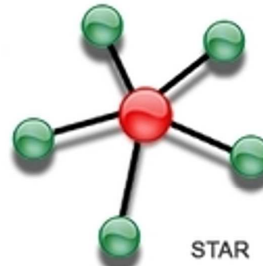
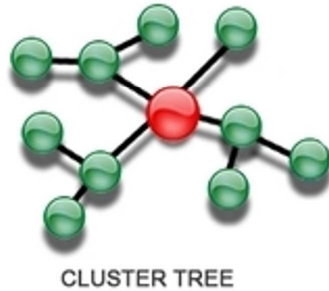
: Delimiter character

ADDR The ADDR is your ZB-2551(P) Node ID


xxx xxx is your original data

2.3 ZigBee Network Groups

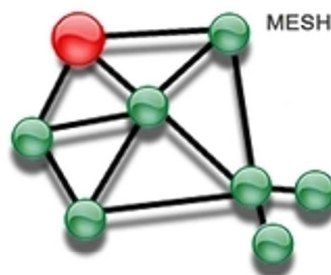
Pan ID : 0xFF00
RF Channel : 0x00



Pan ID : 0xABCD
RF Channel : 0x0F

 **ZB-2570/ZB-2550**

 **ZB-2571/ZB-2551/ZB-2510**
/ZB-DIO/ZB-AIO



Pan ID : 0xAABB
RF Channel : 0x04

**A Work Network - Running on the same
Pan ID and RF Channel**



- original data > 50 Byte** => **No Delay**
- original data > 50-100 Byte** => **Delay 50ms**
- original data > 100-150 Byte** => **Delay 100ms**
- original data > 150-200 Byte** => **Delay 150ms**
- original data > 200 Byte** => **N/A**

-  **ZB-2550**
-  **ZB-2551**

If original data size is **less than 50 Byte most of the time**, **Operating Mode Transparent** is the most suitable.

If original data size is **greater than 50 Byte most of the time**, **Operating Mode Modbus** is the most suitable.

If you want to transmit more than **200 Byte one data** or high-speed rate, please order an advanced ZigBee Converter ZB-2570 and ZB-2571

- **Technical Support**

If you have problems about using the ZB-2000 series modules, please contact ICP DAS Product Support.

Email: Service@icpdas.com