Zigbee USB
Serial Adapter

TinyBee™

Firmtech

FCC Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is con-nected.

• Consult the dealer or an experienced radio/TV technician for help.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

IMPORTANT NOTE:

FCC RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FIRMTECH Co., Ltd. 2005

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What is zigbee?

1. Features of Zigbee

1) Objectives of Zigbee : To realize Personal Wireless Communication for short distance and slow speed with Low Power consumption and Low Cost, which is based on IEEE 802.15.4 Standard.

2) Frequency in Use : To use ISM(Industrial, Scientific, Medical) Band which does not require any permission to use.
- 868 ~ 870 MHz: 1 channel, 868MHz in Europe (No.0 channel)
- 902 ~ 928 MHz: 10 channels, 915MHz in the U.S.A (No.1 ~ 10 channel)
- 2.400 ~ 2.4835 GHz: 16 channels in all nations (No.11 ~26 channel)

3) Transmission Rate
- 868 ~ 870 MHz: 20Kbps
- 902 ~ 928 MHz: 40Kbps
- 2.400 ~ 2.4835 GHz: 250Kbps

4) Tx Power and working distance
- 1mW (0dBm) Inside: 30m, Outside: 100m
- Over 100m with 1mW
- Tx Power is subject to change depending on manufacturers.

5) Configuration
- Zigbee device is configured of Coordinator, Router and End Device.
- Coordinator configures Network
- Router expands Network
- End device participates in Network
- With 64bit address, can configure a maximum of 65536 Networks connected

6) Reliability
- Supports Network level and Device level using Authentication-Network Key and Link Key.
- Supports encrypted packet transmission using 128bit AES Encryption.
- Guarantees data reliability on the application layer using ACK option in APS Packet
- Guarantees data reliability on the physical layer using ACK option in MAC Packet.

2. Zigbee operation
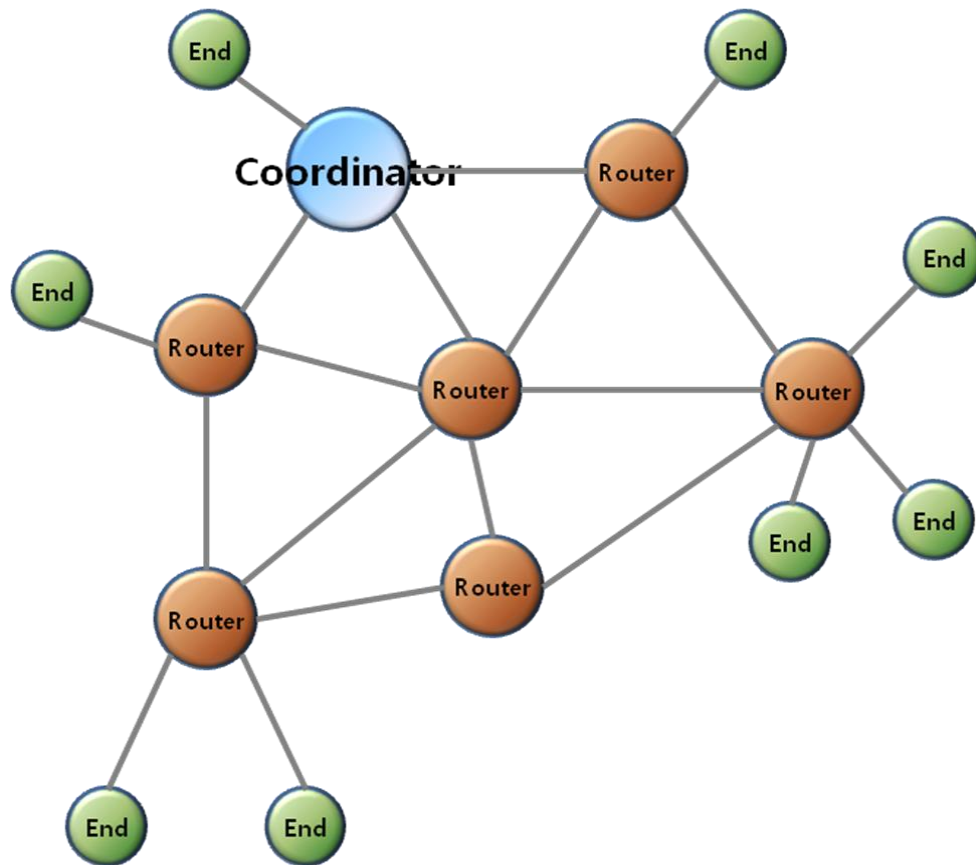
< Zigbee Mesh network configuration>

1) Coordinator configures the Zigbee Network.

   Coordinator communicates with Router and End Device.

2) Router expands Network by connecting Coordinator or other Routers.

3) End Device participates in Zigbee network and communicates with Router or Coordinator.

Introduction

Zigbee networks using Zigbee stacks can be set up by using the FZ200BS, serial data communication can also be enabled by using a USB interface.

The FZ200BS can also be used interlocking with FZ100BS/FZ750BS/FZ750BC.

< Major features of FZ200BS>

1. Zigbee 2006 support

2. Mesh network support

3. Since it is configured as a USB Interface, users can easily input or output serial data after USB Driver install.

※ **Since the FZ200BS is exclusively used for serial data transmission or reception, smooth transmission or reception of KEY/ADC/GPIO data may not be achieved, but input or output of KEY/ADC/GPIO data can be done by using the socket inside the rubber cover at the back side of the FZ200BS.**

4. Supports AT command, and control Devices by using the AT command.

5. Can check whether data is successfully transmitted or not by using ACK option.

6. By using Key Option, can obtain new Zigbee Network Routes so that data re-transmission is possible even if finding the communication route is failed for the first time.

7. Use 2.400 ~ 2.4835 GHz(ISM Band) 15 channels (No.11 ~25 channel)

   11 (0x0B): 2405MHZ, **12** (0x0C): 2410MHZ, **13** (0x0D): 2415MHZ,

   14 (0x0E): 2420MHZ, **15** (0x0F): 2425MHZ, **16** (0x10): 2430MHZ,

   17 (0x11): 2435MHZ, **18** (0x12): 2440MHZ, **19** (0x13): 2445MHZ,

   20 (0x14): 2450MHZ, **21** (0x15): 2455MHZ, **22** (0x16): 2460MHZ,

   23 (0x17): 2465MHZ, **24** (0x18): 2470MHZ, **25** (0x19): 2475MHZ,

※ **We request the new users of FZ200BS to read the information on this description carefully before they start to use the products.**

※ **Please consult Firmtech.co., Ltd if you want to configure Zigbee Network using more than 30 devices of FZ200BS**

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FZ200BS Overview

(1) To configure the Zigbee network, set each device (FZ200BS) to Coordinator, Router and End Device.

 The initial factory set value of FZ200BS is set to Router.

(2) Do not use Broadcast accompanied by a lot of traffic in the Zigbee network unless it is vital to be used.

It is not recommended to make a lot of traffic in the Zigbee network because it causes lots of trouble when transmitting data and bothers to set the new route toward target devices.

(3) Do not set short time for data transmission in the Zigbee Network. The more nodes the Zigbee Network has, the longer time for transmission time should be set.

Example.1) Zigbee Network Contribution using 10 FZ200BSs,
Set a time space to 2seconds for data transmission between FZ200BSs.
(set 2sec minimally per 10 FZ200BSs)
Example.2) Zigbee Network Contribution using 20 FZ200BSs,
Set a time space to 4seconds for data transmission between FZ200BSs.
(set 2sec minimally per 10 FZ200BSs*2=4sec)

It is not recommended to make a lot of traffic in the Zigbee Network.

It is not recommended to make a lot of traffic in the Zigbee network because it causes lots of trouble when transmitting data and bothers to set the new route toward target devices.

(4) Coordinator and Router can configure child nodes up to 8
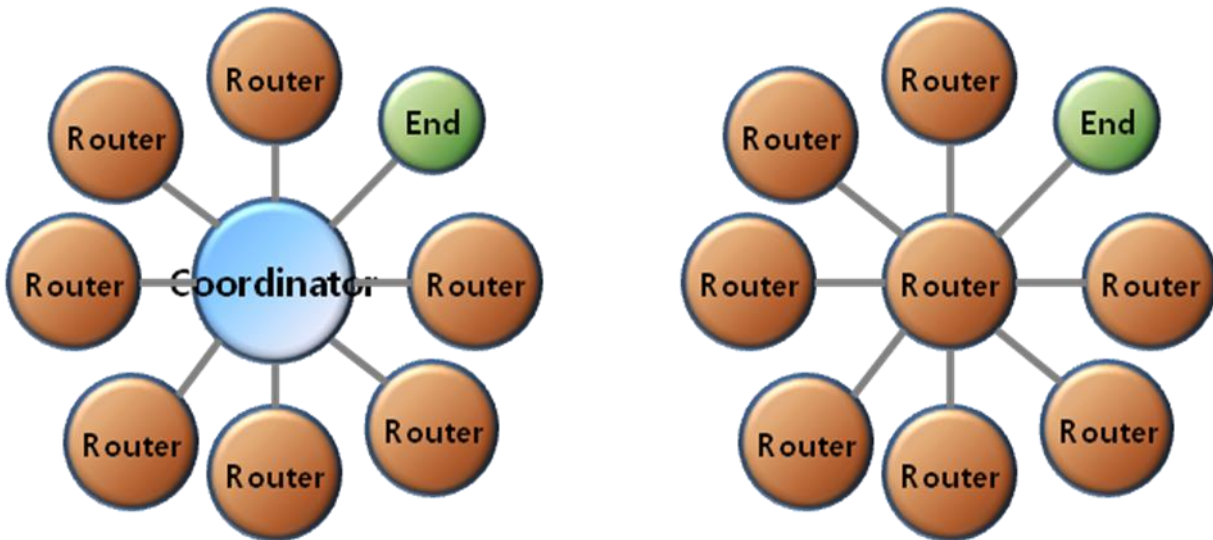
(5) **End Devices cannot configure Child nodes**

Since the FZ200BS is exclusively used for serial data transmission or reception, it may not perform smooth operation as end devices, but it can be also used as an end device by setting it as an end device by using the AT Command.

Key data input as a way of wake up can be done by using the socket inside the rubber cover at the back of the FZ200BS.

Setting FZ200BS to End Devices should be prior to the Zigbee Network Configuration. If you want to change the device type of FZ200BS from Router to End Device in the Zigbee Network, you had better re-configure the whole Zigbee Network in advance.

FZ200BS can configure Child nodes after they are set to Routers and participated in the Zigbee Network. Also, other devices can participate in the Zigbee Network by setting the FZ200BS set to Routers to their parent nodes, as well. If you change the FZ200BS set to parent nodes to End Devices, the current End Devices cannot configure child nodes. In this situation, it is possibly can happen that other devices set the Routers to their parent nodes before the Routers are changed to End devices.

FZ200BS supports mesh network, so you can expect the stable Zigbee Network. However, in order to make sure of proper Zigbee Network configuration, FZ200BS of child nodes had better save FZ200BSs set to Router (or coordinator) as their parent nodes.

Thus, you had better set the type of each Device (especially End Device) before the Zigbee Network Configuration.
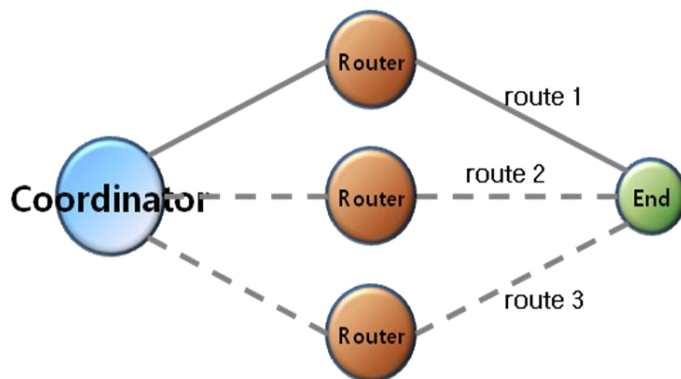
(6) FZ200BS can configure the Zigbee Network up to 4 Depth.
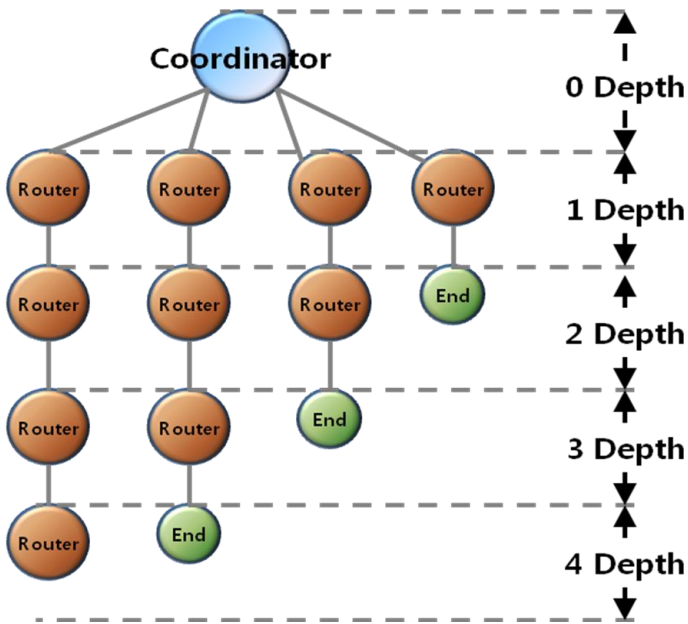
(7) FZ200BSC configures the Zigbee Network with one Coordinator.

(8) FZ200BS can transmit data by multipath because it supports mesh network.

   Contribute the Zigbee Network which has multipath.

(9) If you input Serial data into FZ200BS, It transmits the Serial data to its target device.

(10) FZ200BS has STATUS LED for showing the status of the Device.

   The Status LED shows the overall status of the FZ200BS.

   The OK LED shows OK status of the FZ200BS.

   The ERROR LED shows the ERROR status of the FZ200BS.

(11) **When you transmit data by using FZ200BS, you need to check the result value for the transmission through the OK/ERROR LED.**

(12) **The FZ200BS is a device used exclusively for transmission or reception of serial data.**
The FZ200BS can be set up for transmission of KEY/ADC/GPIO data by using the AT Command. But in actual use, it is not easy to input KEY/ADC/GPIO data.
So, it is recommended that users use it only for transmission/reception of serial data.

(13) **The FZ200BS is a device for exclusive use for coordinators or routers.**
The FZ200BS can be setup for an end device by using the AT Command, but in actual use, it is difficult to input KEY data as one of the means to wake up the end device. It can be used as an end device when using it for wake-up by set time but user's arbitrary wake-up can not be easy to be used.

Being difficult to use as an end device has the same meaning as being difficult to use the Low Power mode. We recommend that you use it only for a coordinator or a router.

(14) FZ200BS has an IEEE ADDRESS and a NETWORK ADDRESS.

　　64 Bit IEEE ADDRESS is a physical address of FZ200BS.

　　Every device has its own IEEE ADDRESS and the IEEE ADDRESS is not changeable.

　　FZ200BS set target devices by using IEEE ADDRESS.

　　In conclusion, **"target device set-up"** is an inquiry using IEEE ADDRESS for NETWORK ADDRESS of its target devices

　　FZ200BS has a 16 Bit of NETWORK ADDRESS for the Zigbee Network communication.

　　NETWORK ADDRESS is given when FZ200BS participates in the Zigbee Network.

　　NETWORK ADDRESS can be changed depending on the Zigbee Network Configuration.

　　NETWORK ADDRESS cannot be shown unless FZ200BS participates in the Zigbee Network.

　　FZ200BS performs data transmission by using NETWORK ADDRESS.

(15) If you configure the Zigbee Network and perform data transmission, the result value is shown as **[volume of received data > volume of transmitted data]**.
FZ200BS on a MAC layer automatically re-transmits data depending on the Zigbee Network Configuration.
In case of using ACK option, FZ200BS on an application layer automatically re-transmits data depending on the Zigbee Network Configuration. Thus, **Received data could be more than 2 depending on the Zigbee network configuration even if only one data is transmitted.**

※ < Routing table update of FZ200BS >

Routing table is assigned to each FZ200BS after the Zigbee Network Configuration.

Below is the Zigbee network status when data is transmitted from Router2 to Router1 to Coordinator.
Data is input into Router2, the Router2 transmits the data to Router1, and then the Router1 transmits the data to Coordinator. Consequently, the data inputted into Router2 is transmitted to Coordinator by routing table belonging to Router2 and Router1
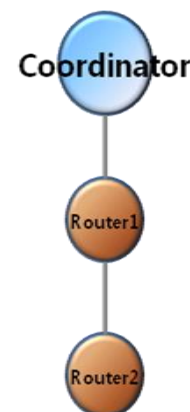
If Router 1 is in abnormal status in the Zigbee Network, Router2 cannot transmit data, and shows its error status through ERROR port.
When ACK Option is disabled (NACK communication) of FZ200BS, Device is automatically reset and Router2 creates a new routing table if the Router2 happens to show its error status 5times successively through the error port because of the abnormal Router1. Multipath set-up is required ahead of the time to update the routing table.
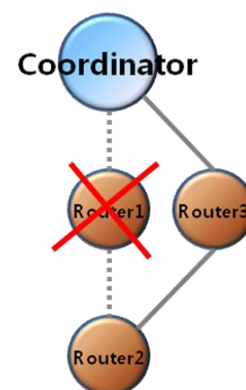
When the ACK Option of FZ200BS is enabled (ACK communication), users should control the routing table directly to update it. If the data transmission is successively failed, users need to reset its target device's address (same as the existing one) and the Device.
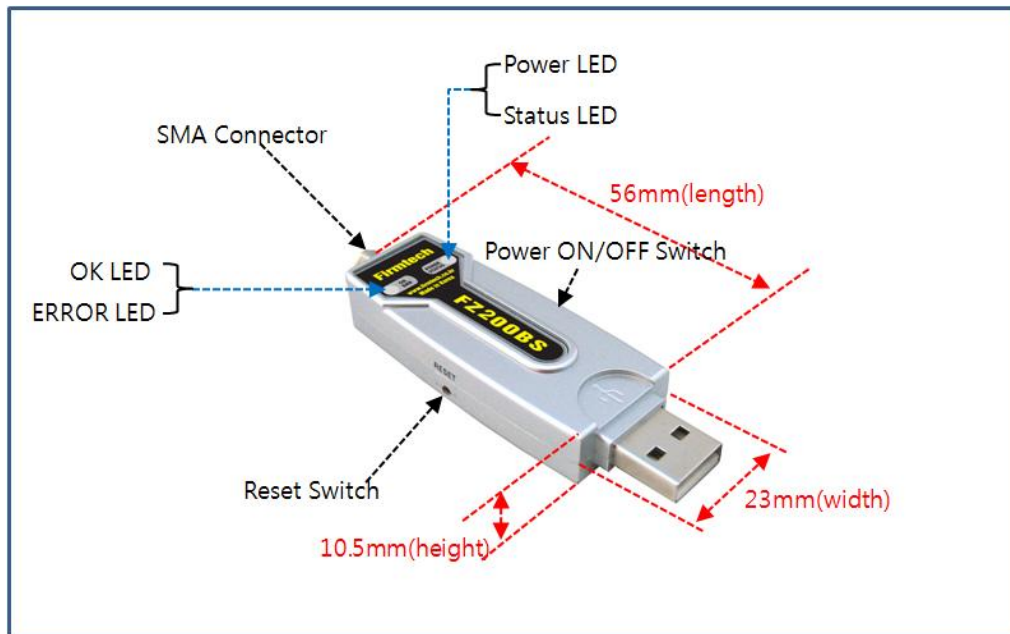
■ List of contents

1. Product components

Model Name	Pictures	Q'ty
FZ200BS		1EA
FBA004DA		1EA
CD		1EA

※ If you find any of above components is defective, or not included in the package, please contact the seller you purchased.

2. Product Appearance

< Figure 2 Details and Dimension of FZ200BS >

SMA Connector - Connector to attach the antenna.

Power LED – shows the power status.

Status LED – shows the action status.

OK LED - shows the action status.

ERROR LED - shows the action status.

USB Input – connects the USB cable.

Reset Switch – Switch for product reset

Power ON / OFF Switch – Power Supply Switch.

3. USB Interface

※ **The FZ200BS is connected to a _virtual serial port_ by using an USB.**

※ **As the FZ200BS uses a virtual COM Port, the virtual COM Port has to be operated normally to use it in the HOST (PC).**

Signal Name	Description
STATUS (DCD)	Status Indication
TX	Transfer Data(Data Output)
RX	Received Data(Data Input)
GND	Ground
ERROR (DTR)	Status Indication
OK (RTS)	Status Indication

4. Dip Switch & Interface Socket

Dip Switch   Interface Socket
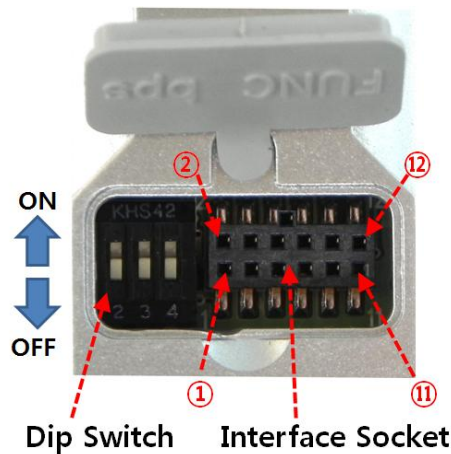
No	Function	ON	OFF	Basic Setting
1	Not in use	-	-	-
2	Not in use	-	-	-
3	Select firmware download	Firmware download mode	Basic operation mode	OFF
4	Select the environment setting mode	Environment setting mode	Basic operation mode	OFF
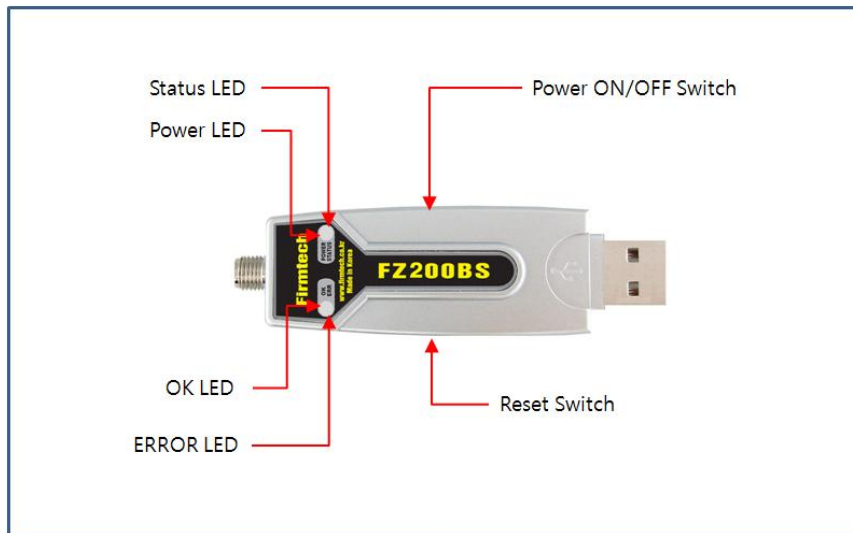
<Table 4-1 Features of Dip Switch >

NO.	Port	Description
1	VCC(3.3V)	**3.3V Output Port**
2	ADC	Analog Data Input Port
3	GPIO_0	Digital Data Input / Output Port
4	GPIO_1	Digital Data Input / Output Port
5	GPIO_2	Digital Data Input / Output Port
6	GPIO_3	Digital Data Input / Output Port
7	GPIO_4	Digital Data Input / Output Port
8	GPIO_5	Digital Data Input / Output Port
9	GPIO_6	Digital Data Input / Output Port
10	GPIO_7	Digital Data Input / Output Port
11	GND	Ground
12	KEY	Digital Data Input Port

< Table 4-2 Features of Interface Socket >

5. LED Indication / Reset Switch

LED Type		State	Description
Power LED		Power input	Red Power LED is turned on.
STATUS LED	Status LED	Showing if the network is newly formed or is already part of the network	The status LED blinks in every other second when network is newly formed or is already part of the network
			The status LED blinks fast when the network is not formed or not a part of the network.
		Showing if the target is set	The status LED is turned on if the target is set.
			The status LED blinks in every second when the target is not set.
		confirming of operation mode	The status LED is turned off in case of the AT Command mode
	OK LED	Confirming of data transmission	The OK LED blinks once when the data transmission is completed.
		Confirming of the operation mode	The OK LED is on in case of the AT Command mode.
	ERROR LED	Confirming of data transmission	The ERROR LED blinks once when the data transmission is not completed.
		Confirming of the Operation mode	The ERROR LED is on in case of the AT Command mode

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6. Product Performance

List	Specification
Zigbee Spec.	Zigbee 2006 Specification Support
Communication Distance	120 M
Frequency Range	2.4 GHz ISM Band
Sensitivity	-98 dBm
Transmit Power	6 dBm
Size	23.00 mm X 56.00 mm X 10.50 mm
Input Power	5V
Current Consumption	60 mA (Max)
Operating Temperature	-20 ℃ - +50 ℃
Max Operating Temperature	-30 ℃ - +80 ℃
Communication Speed	9,600 bps ~ 230,400 bps
Antenna	Dipole Antenna (4 dBi)
Interface	USB

7. Current consumption

Device type		Current Consumption	
		Low Power Consumption mode	Data transmission
Coordinator		-	50mA
Router		-	50mA
End Device	Wake-up	-	50mA
	Low power consumption mode1	12mA	-
	Low power consumption mode2	12mA	-
	Low power consumption mode3	12mA	-

Testing Environment: 115200bps

8. Set value of Product

List	Initial set value
Device Name	FZx00 Vx.x.x
Device Type	ROUTER
Device Channel	0B
Device Transmit Power	00
UART (baud rate-data bit-parity bit-stop bit)	115200 (8, N, 1 fixed)
KEY Option	0(Disable)
ADC Option	0(Disable)
Count Option	0(Disable)
GPIO Option	0(Disable)
Internal Time	10
ACK Option	0(Disable)
Retry Option	9
Power Mode	1
Reset Option	0(Disable)
Target Device Address	0000000000000000
Link Quality Option	0(Disable)
Start Message Option	1(Enable)
Debug Message Option	0(Disable)
Battery Low Option	0(Disable)
Quick Low Power Entry	0(Disable)

To change the set values of FZ200BS, use PC Software (Window HyperTerminal, Firmtech configuration program) after connecting FZ200BS to PC with AT Command.

Note: Please, refer to the contents in "9. Uses Guide" or "FZx00_Appendix_2_GUI" for further information on Set-up Modification.

9. USES GUIDE

Users have to perform "① Zigbee network setting, ② Target setting" to send or receive data by using the FZ200BS.

Note : As the FZ200BS uses a virtual COM Port, the virtual COM Port has to be operated normally to use it in the HOST (PC).

Target setting will not be processed if the Zigbee network setting has not been done.

If Zigbee network setting is done and the target is not set, sending or receiving of data by using the FZ200BS cannot be made.

For establishing a Zigbee network using the FZ200BS, each device has to be set as a coordinator, router or an end device.

The following is a procedure for FZ200BS Set-up using Serial communication (HyperTerminal) Program.

The signal speed of FZ200BS is basically 115200bps.

9-1. Serial Communication (Hyper Terminal) Program Execute

Turn on the power supply of the FZ200BS. As the FZ200BS uses a virtual COM Port by using an USB, power of device has to be on in advance to run the hyper terminal.
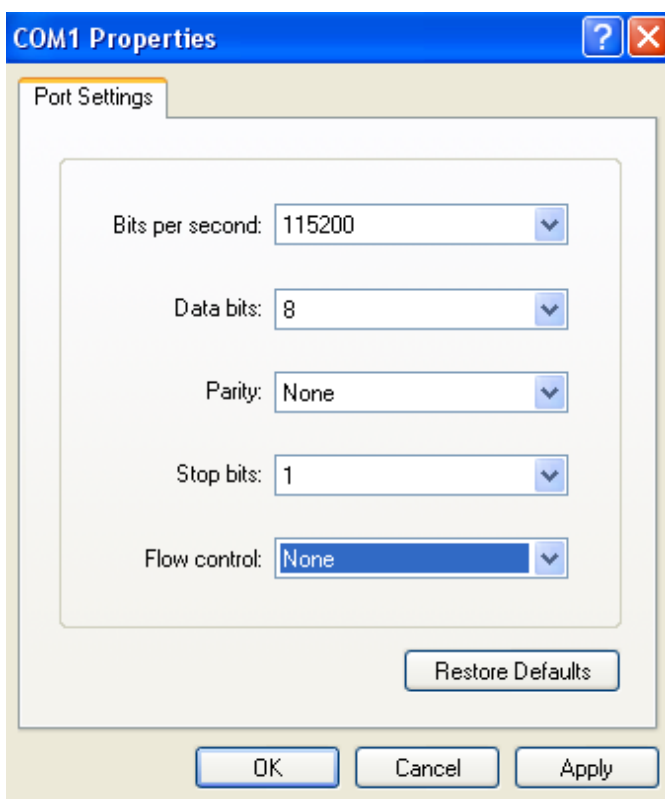
Select **[Start]→[All Programs]→[Accessories]→[Communication]→[Hyper Terminal]** in order, and then a window for Connection Set-up comes up. Put a name in the name blank, and click the OK button.

When a window for Connection target comes up, select COM ports connected to FZ200BS, and click the OK button.
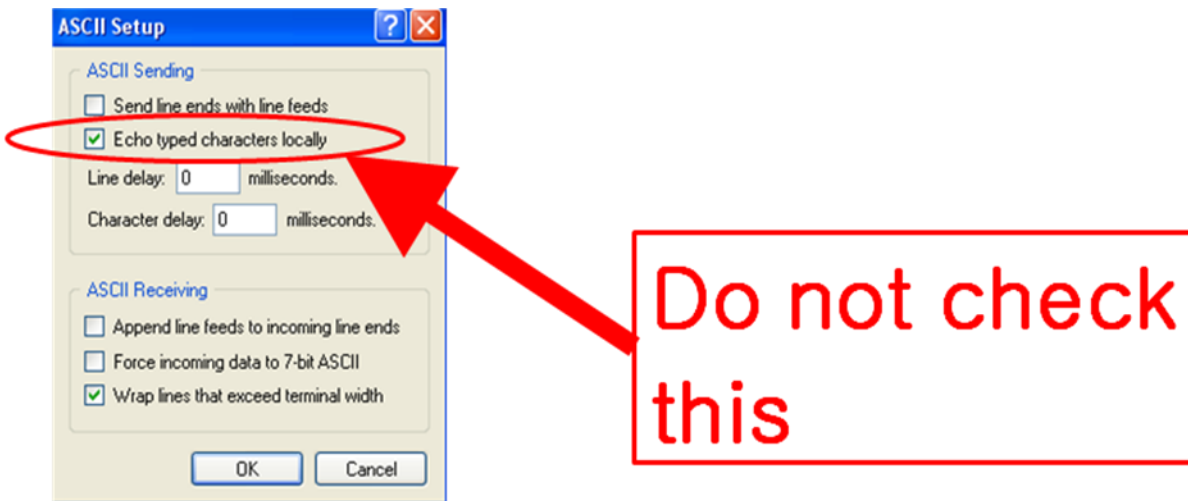

Select each blank as below **"Bit/sec: 115200, data Bit: 8, Parity: None, Stop Bit: 1, Flow Control: None"**, and click the OK button. Hyper Terminal is executed.

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Hyper Terminal simply does not show any letters inputted.

If you check on "Echo typed characters locally" to get to know what letters are inputted, the Recommends between FZ200BS and Hyper Terminal are mixed up. <u>**Do not check this.**</u>

9-2. Set-up FZ200BS Device Type

Zigbee Device is classified as Coordinator, Router, and End Device by objective of its operation.

There should be Coordinator in the Zigbee Network. A Coordinator should exist in a Zigbee Network.

Coordinator manages the Network in the Zigbee Network.

Router extends the Network in the Zigbee Network.

End Device participates in the Zigbee Network using low power consumption.

Since the FZ100BS is exclusively used for serial data transmission or reception, it may not perform smooth operation as end devices, but it can be also used as an end device by setting it as an end device by using the AT Command.

Router and End Device are automatically participated in the Network once Coordinator configures the Zigbee Network.

Note : Please, refer to the following when you try to configure the Zigbee Network.

1. Do not turn the power of the Device set to Coordinator ON before all devices' types are set.

2. If you already set the rest type of each Device and operate them with the Coordinator that the power is turned on, execute Factory Reset for the devices set to Coordinator and Router.
Before the Factory reset, the power of the Coordinator and the Router should be turned OFF. After the Factory reset is done, set each Device to Coordinator and Router, and turn on the power of all devices. The Zigbee Network shall be properly configured.

3. Do not change the Device Type of FZ200BS once the Zigbee Network is configured.

※ It is better to set Coordinator and Router again(Factory Reset) if the Device Type of FZ200BS is changed after the Zigbee Network is already configured.

※ See if the Zigbee Network is configured before resetting FZ200BS to initial set value. The FZ200BS reset automatically participates in the Zigbee Network if the Zigbee Network still exists there.
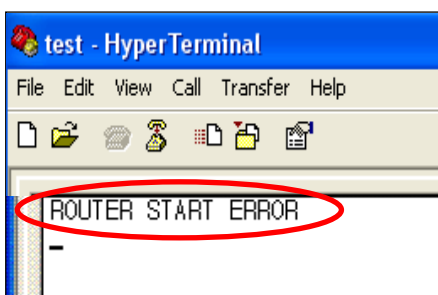
9-2-1. FZ200BS End Device Set-up

Since the FZ100BS is exclusively used for serial data transmission or reception, it may not perform smooth operation as end devices, but it can be also used as an end device by setting it as an end device by using the AT Command.
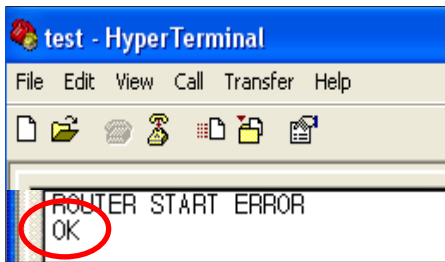
Another Zigbee network should not be established and run nearby it.

If a Zigbee network is run nearby it, all Zigbee products should be powered off and the FZ200BS should be set as an end device.
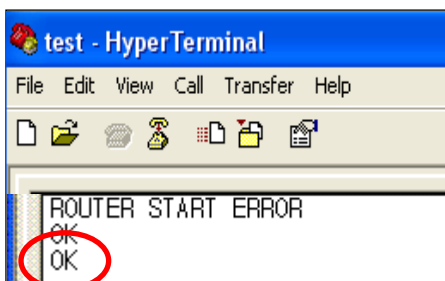
(1) The Initial set value of FZ200BS is ROUTER.

(2) Connect the FZ200BS device to a PC and turn on the power. After executing the hyper terminal program and reset of the FZ200BS, it will output **"ROUTER START ERROR"** to the serial port. "ROUTER START ERROR" means that The Zigbee Network Participation is failed. "ROUTER START OK" is output if the Zigbee Network is configured.
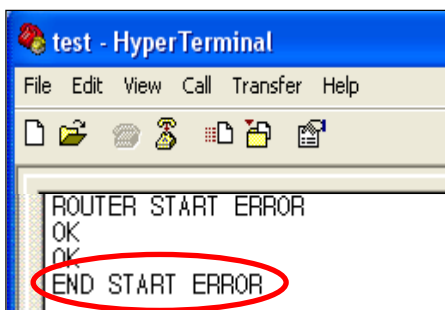
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(3) Input **"+++"** in Hyper Terminal.

(4) If **"OK"** is outputted from FZ200BS, AT-Command can be used from then.

If "OK" is not output even after inputting "+++", press "Enter" key and input "+++" again, or reboot the device and input "+++".

(5) After inputting **"AT+SETEND"** into Hyper Terminal, press Enter Key.

(6) If **"OK"** is output from FZ200BS, reboot FZ200BS by inputting **"ATZ"**.

(7) **"END START ERROR"** is output at the moment when FZ200BS is rebooted.

"END START OK" is output if the Zigbee Network is successfully configured.

(8) Now, End Device of FZ200BS set-up is completed.

As the FZ200BS uses a virtual COM Port by using an USB, you have to turn off the hyper terminal before you turn off the device. If you turn off device without turning off the hyper terminal, the hyper terminal will not operate normally.

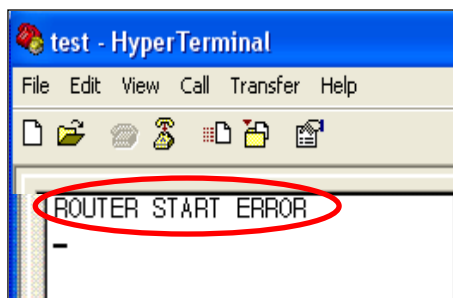**Turn the Power of the End Device OFF, and set other devices.**

9-2-2. FZ200BS Router Set-up

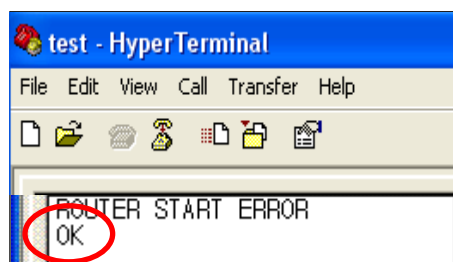**Another Zigbee network should not be established and run nearby it.**

If a Zigbee network is run nearby it, all Zigbee products should be powered off and the FZ200BS should be set as a router device.

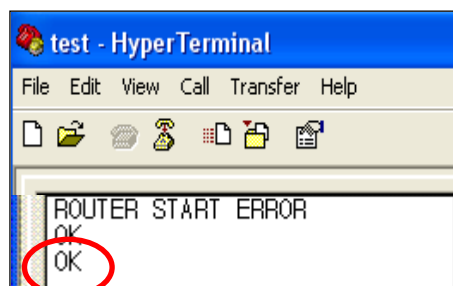(1) The initial set value of Device is ROUTER.

※ However, Device originally operates as Router without intentional setting.
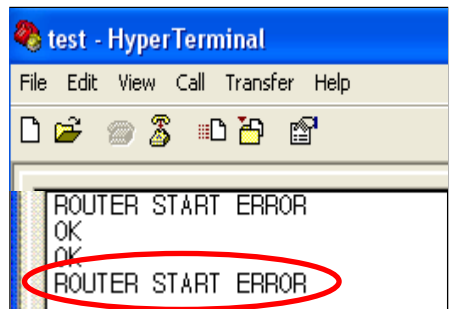
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(2) Connect the FZ200BS device to a PC and turn on the power. After executing the hyper terminal program and reset of the FZ200BS, it will output **"ROUTER START ERROR"** to the serial port.

"ROUTER START ERROR" means that the Zigbee Network participation is failed.

"ROUTER START OK" is output if the Zigbee is successfully configured Network.

(3) Input **"+++"** into Hyper Terminal.

(4) If **"OK"** is output from FZ200BS, AT-Command can be used from then.

If "OK" is not output even after inputting "+++", press "Enter" key and input "+++" again, or reboot the device and input "+++".

(5) Input **"AT+SETROUTER"** through Serial port of PC and press "Enter" key.

(6) If **"OK"** is output from FZ200BS by inputting **"ATZ",** reboot FZ200BS.

(7) **"ROUTER START ERROR"** is output at the moment when FZ200BS is rebooted.

"ROUTER START OK" is output if the Zigbee Network is successfully configured.

(8) Now, Router of FZ200BS Set-up is completed.

As the FZ200BS uses a virtual COM Port by using an USB, you have to turn off the hyper terminal before you turn off the device. If you turn off device without turning off the hyper terminal, the hyper terminal will not operate normally.
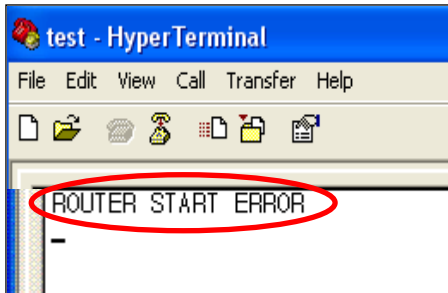
Turn the Power of the End Device OFF, and set other devices.

9-2-3. FZ200BS Coordinator set-up

Another Zigbee network should not be established and run nearby it.
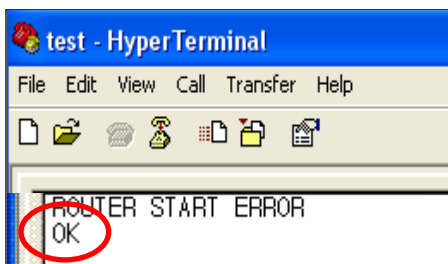
25

If a Zigbee network is run nearby it, all Zigbee products should be powered off and the FZ200BS should be set as a coordinator device.

(1) The initial set value of FZ200BS is ROUTER.

(2) Connect the FZ200BS device to a PC and turn on the power. After executing the hyper terminal program and reset of the FZ200BS, it will output **"ROUTER START ERROR"** to the serial port. "ROUTER START ERROR" means that the Zigbee Network participation is failed.
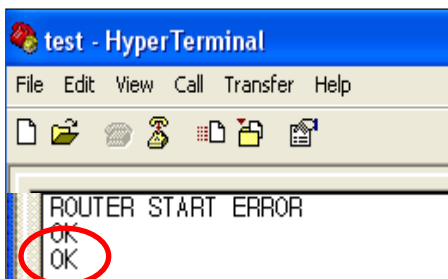
"ROUTER START OK" is output if the Zigbee Network is successfully configured.
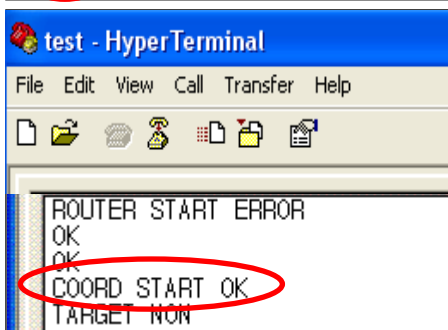
(3) Input **"+++"** into Hyper Terminal.

(4) If **"OK"** is output from FZ200BS, AT-Command can be used from then.

If "OK" is not output even after inputting "+++", press "Enter" key and input "+++" again, or reboot the device and input "+++".

(5) Input **"AT+SETCOORD"** through Serial port of PC and press "Enter" key

.

(6) If **"OK"** is output from FZ200BS by inputting **"ATZ",** reboot FZ200BS.

(7) **"COORD START OK"** is output at the moment when FZ200BS is rebooted.

(8) Now, Coordinator of FZ200BS Set-up is completed, and the Zigbee Network is successfully configured.

As the FZ200BS uses a virtual COM Port by using an USB, you have to turn off the hyper terminal before you turn off the device. If you turn off device without turning off the hyper terminal, the hyper terminal will not operate normally.
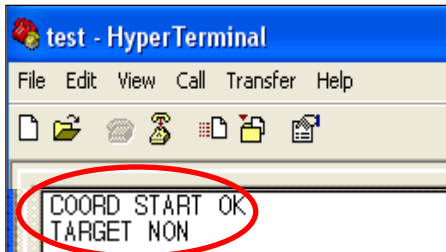
9-3. The Zigbee Network Configuration

Try to configure the Zigbee Network after setting the Type for each Device.

9-3-1. The Zigbee Network configuration

Coordinator leads the Zigbee Network Configuration.

Coordinator manages the Zigbee Network.

(1) **Turn on** the device set as coordinator. After running the hyper terminal, reset the FZ200BS.

(2) "**COORD START OK**" and "**TARGET NON**" are output.

"TARGET NON" means that FZ200BS has yet to set its target device.

(3) Zigbee Network is configured by Coordinator.

(4) From then, Zigbee Network Participation and Extension is possible by Router and End Device.
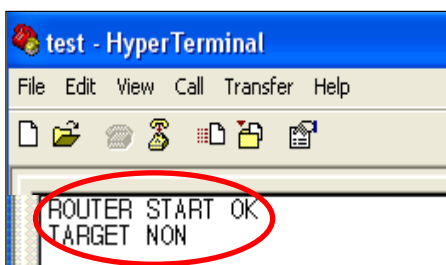
(5) Coordinator can transmit Data.

9-3-2. Zigbee Network Extension

Router performs the Zigbee Network Extension.

Communication distance and route can be extended because of the Zigbee Network Extension by Router.

The number of End Device which participates in the Zigbee Network can be increased because of the Zigbee Network Extension by Router.

Router also transmits data in the Zigbee Network, as well.

(1) **Turn on** the device set as router. After running the hyper terminal, reset the FZ200BS.

(2) "**ROUTER START OK**" and "**TARGET NON**" are output.

"TARGET NON" means that FZ200BS has yet to set its target device.

If "ROUTER START ERROR" is output, which means that no Zigbee Network is around, reset the Device or check if the Coordinator's status is okay.

(3) Router participates in the Zigbee Network and extends the Zigbee Network.
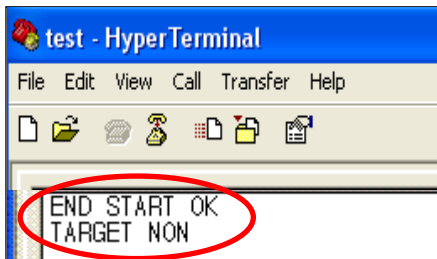
(4) Router can transmit Data.

9-3-3. Zigbee Network Participation

End Device participates in the Zigbee Network.

End Device performs data transmission in the Zigbee Network.

End Device supports Low power consumption mode.

(1) Turn the Power of the Device set to End Device ON.

(2) **"END START OK"** and **"TARGET NON"** are output.

"TARGET NON" means that FZ200BS has yet to set its target device.

If "END START ERROR" is output, which means that no Zigbee Network is around, reset the Device or check if the Coordinator's status is okay.

(3) End Device participates in the Zigbee Network, and is ready to transmit Data.

Since the FZ200BS is exclusively used for serial data transmission or reception, it may not perform smooth operation as end devices, but it can be also used as an end device by setting it as an end device by using the AT Command.

If the FZ200BS is set as an end device and target device is set, it will enter the Low Power mode automatically.

The end device that entered the Low Power mode can be waken up by internal set time (by using Low Power mode1 or 2) or by pushing the Reset Switch. In other words, users can not arbitrarily wake up the device from the host.

To wake up an end device that entered the Low Power mode, users either by use the internal set time or push the **Reset Switch or by data entry into the KEY port (0V) inside the rubber cover at the back of the FZ200BS.**

9-4. Target device set-up

To transmit Data, setting a target device, which is supposed to receive the Data, is required in terms of the Zigbee Network using FZ200BS.
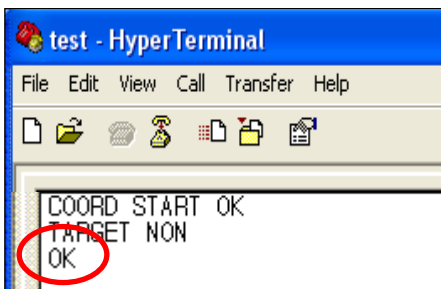
With no target device, data transmission cannot be done even if data is inputted.

To set a target device, you need to know an IEEE ADDRESS of the Device.
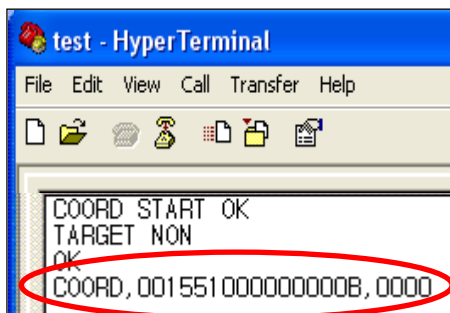
Set a coordinator as a router target.

When you say the router target is a coordinator is that data is sent to the coordinator when serial data (USB) is input to the router.

9-4-1. Searching for an IEEE ADDRESS of Coordinator

(1) Input **"+++"** through Serial port of PC while a Device operates. With Inputting **"+++"**, the mode of FZ200BS (Coordinator) switches from operation mode to AT-command mode.

Data transmission becomes possible when FZ200BS is in an operation mode. Users can control FZ200BS when the device is in an AT-command mode.

(2) **"OK"** is output from FZ200BS, input **"AT+GETLOCAL"** through Serial port of PC and press Enter Key.

(3) **"COORD,001551000000000B,0000"** is output from the Device.

COORD : It is the Device Type of FZ200BS.

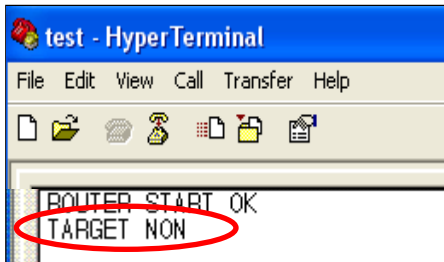**001551000000000B** : It is an IEEE ADDRESS of FZ200BS.

0000 : It is a NETWORK ADDRESS.

(4) The IEEE ADDRESS **"001551000000000B"** is required for the target device set-up.

(5) Reset the FZ200BS (coordinator) by entering **"ATZ".** The FZ200BS (coordinator) operates in the Operation Mode where you can send/receive data.
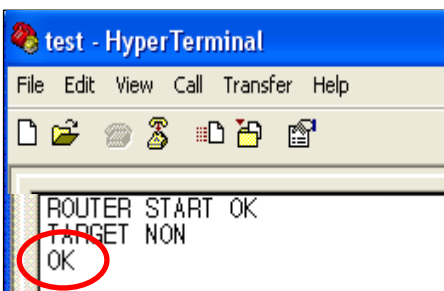
9-4-2. Target device set-up

Now, set the router's target device by using the IEEE ADDRESS of the target device (coordinator) mentioned above.
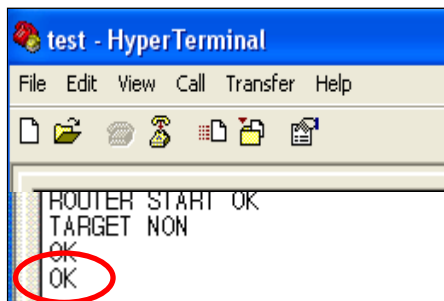

(1) Reset the FZ200BS (router) while the device is operating.

(2) FZ200BS outputs a message **"TARGET NON",** which means that its target device is not set.

(3) Input **"+++" through Serial port of PC while** FZ200BS operates. **"OK"** is output. From then, its target device set-up is possible with AT Command.

(4) After **"OK"** is output from FZ200BS **"AT+SETTARGET 001551000000000B"** through Serial of PC and press "Enter" Key.

AT+SETTARGET : It is a command to save the target device's address.

001551000000000B : It is the target device's IEEE ADDRESS

(5) **"OK"** is output from FZ200BS which means that the command for saving target device is cognized. If "ERROR" is output, the command inputted is wrong.

(6) Re-start FZ200BS by inputting a command **"ATZ"** or turn the power of FZ200BS off and on, again.

(7) FZ200BS is re-started and outputs a message **"TARGET OK"**. (The Coordinator that is set as the target device, has to be powered on.)

Now, the target device set-up using its address is completed.

If **"TARGET ERROR"** is output, FZ200BS which has an IEEE ADDRESS "001551000000000B" does not exist in the Zigbee Network or the address saved is wrong.

9-5. Serial Data Transmission

When you have perform "①Zigbee network setting, ②Target setting" using the FZ200BS, the serial (USB) data will be sent to the target device by entering the input serial data (USB) and press "Enter".

In case you set the router target as the coordinator (above example), if you press "ENTER" after input of serial data to the router device, the data will be sent to the coordinator.
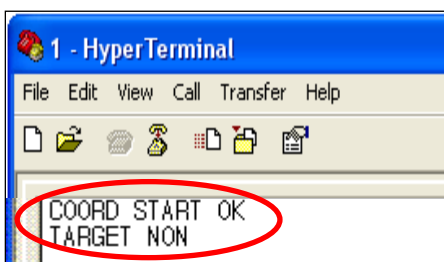
To send data from the coordinator, users have to set the target device for the   coordinator, and likewise, to send the data from the end device, you have to set the target device for the end device.

In the above example, since you did not set a target device for coordinator and end device, after you input serial data (USB) into the coordinator and the end device, data will not be sent to them.

Data transmission is done in the Zigbee Network.

Data (of router) is transmitted to the target device (coordinator) "001551000000000B" that is set on the previous page.

IEEE ADDRESS of the Device (Router) which is supposed to transmit the data is 0015510000000005.

(1) **Turn on** the device set as coordinator. After running the hyper terminal, reset the FZ200BS.

The Zigbee Network is configured by Coordinator.

(2) **Turn on** the device set as router. After running the hyper terminal, reset the FZ200BS.

The Device participates in the Zigbee Network.

Its target device is automatically set.

A message "**TARGET OK**" is output.

   If, "TARGET NON" or "TARGET ERROR" is output, its target device is not set.

   Do the "9-4-2.Target device set-up", again.

(3) Input "**1234567890**" into Hyper Terminal (Router) and press "Enter (**0x0D**)" key.

FZ200BS transmits data (1234567890) inputted, Carriage Return (0x0D), and Line Feed (0x0A) at the same time. (**Do not input 0x0A. 0x0A is automatically added by FZ200BS.**)

(4) Serial Data"**1234567890**" is output. (Coordinator)

Carriage Return (0x0D) and Line Feed (0x0A) are output simultaneously, but they are not seen on the hyper terminal.

※ Input Serial data of Serial port of FZ200BS.

※ After inputting the serial data, press "Enter" key.

※ **53 bit including "Enter" key is a maximum length of Serial data can be transmitted by FZ200BS.**

※ The Serial data sent from a Device is output through Serial port of its target device.

※ **To transmit the other forms of data after Serial data transmission, you should wait until you get the Serial Data's result value. In other words, the other data transmission becomes possible after OK LED or ERROR LED shows its status.**

10. FZ200BS Management TIP

Refer to the following to configure Zigbee Network properly in terms of data transmission and Controls.

10-1. FZ200BS Device Type Set-up

(1) End Device Set-up

Set FZ200BS to End Device before Coordinator and Router is set. (**AT+SETEND**)

Turn the power of the FZ200BS OFF.

(2) Router Set-up

Set FZ200BS to Router before Coordinator is set. (**AT+SETROUTER**)

Turn the power of the FZ200BS OFF.

(3) Coordinator Set-up

Set FZ200BS to Coordinator. (**AT+SETCOORD**)

Turn the power of FZ200BS OFF.

10-2. Zigbee Network Configuration

(1) Turn the power of FZ200BS set to Coordinator ON.

(2) Turn the power of Router and End Device which are supposed to make 1 Depth ON.

   - You can create Devices in 1 Depth up to 8.

(3) Turn the power of Router and End Device which are supposed to make 2 Depth ON.

   - You can create Devices in 2 Depth up to the number of Router in 1 Depth * 8.

   - Devices are automatically created in 1 Depth if any seats are available in 1 Depth.

(4) Turn the power of Router and End Device which are supposed to make 3 Depth ON.

   - You can create Devices in 3 Depth up to the number of Router in 2 Depth * 8.

   - Devices are automatically created in 1/2 Depth if any seats are available in 1/2 Depth.

(5) Turn the power of Router and End Device which are supposed to make 4 Depth ON.

   - You can create Devices in 4 Depth up to the number of Router in 3 Depth * 8.

   - Devices are automatically created in 1/2/3 Depth if any seats are available in 1/2/3 Depth.

10-3. [Set-up] target device & traffic

Set target device of each Device after the Zigbee Network is configured.

Save an IEEE ADDRESS of target device by using a command **"AT+SETTARGET"**
Reset the Device so that its target device set-up can be processed.

< It is not recommended that there is a lot of traffic in the Zigbee Network. >

Refer to the meanings of **Traffic** in terms of Zigbee Network.
The Traffic is caused by **"Zigbee Device which performs data transmission in the Zigbee Network"**, **"Zigbee Device which performs data transmission to get its target device"**, **"Zigbee Device which transmits data to its target device" "ACK data for checking if Zigbee Device transmits data its target device properly"**, and **"Transmitted data for checking if the Zigbee Network works properly."**

There is no traffic in case of Coordinator and Router unless they are turned ON again.
Coordinator and Router are always turned ON because they intermediate Devices.

In case of End Device, a lot of traffic is caused because the power of End Device is turned ON and OFF repeatedly.

If there are a lot of Nodes in the Zigbee Network, set the space of time longer for data transmission between the Nodes,
Especially, in case of End Device, great caution is required.
(**A space of data transmission per 10 Devices: minimum 2seconds**)
The Shorter the space of data transmission is, the more traffic in the Zigbee Network is caused.

Do not change target device too often. When you set or change a target device, data for transmission is more created to get its route. The more data there is in the Zigbee network, the more traffic is caused.

In case thatEnd Device receives ACK data after data transmission, (For control using MICOM and data re-transmission) set ACK data transmission receipt to be enabled by using a command **AT+SETACK1**.
In this situation, more traffic in the Zigbee Network is caused in comparison.

If ACK data recipe is not required after data transmission using End device (For data transmission only), set ACK data receipt to be disabled by using a command **AT+SETACK0**.
In this situation, less traffic in the Zigbee Network is caused in comparison.
Do not set target device to FFFFFFFFFFFFFFFF(Broadcast) when performing data transmission.

If data is transmitted by Broadcast, all Routers in the middle transmit the data to all nodes again.

The more Devices using Broadcast data exist and the more Routers in the middle exist, the more traffic is caused in the Zigbee Network.

Do not use Broadcast data transmission unless it is essential.

When FZ200BS performs a command to get information on Nodes participated in the Zigbee Network, a lot of traffic in the Zigbee Network is caused.

Because Router cannot save information on all nodes in the Zigebee Network, the inquired data is mostly transmitted by broadcast.

Broadcast data increase traffic in the Zigbee Network.

In case of you need, use AT command to inquire information on nodes in the Zigbee Network.

A lot of traffic in the Zigbee Network bothers data transmission and target device set-up

10-4. START MESSAGE

(1) START MESSAGE

It means that FZ200BS starts to operate.

START MESSAGE is output as Serial data through Serial port.

If you don't want a Device to output the START MESSAGE, input AT command (AT+SETSTAMSG0).

(2) Sorts of START MESSAGE

COORD START OK

: A Device starts as Coordinator and the Zigbee Network is configured properly.

Thus, data transmission is possible.

COORD START ERROR

: A Device starts as Coordinator, and the Zigbee Network Configuration is failed.

In this situation, a normal Zigbee Network cannot be configured.

After initializing the Device to factory set value (**AT&F**) and set the Device to Coordinator again,

Change the Channel used.

ROUTER START OK

: A Device starts as Router and the Zigbee Network is configured properly.

Thus, Zigbee Network Extension and data transmission is possible.

ROUTER START ERROR

: A Device starts as Router, and the Zigbee Network Configuration is failed.

See if there is Coordinator around.

See if there is Router participated in the Zigbee Network configured by Coordinator.

See if there is channel which is the same as the one Coordinator use.

END START OK

: A Device starts as End Device and the Zigbee Network is configured properly.

Thus, data transmission is possible.

END START ERROR

: A Device starts as Router, and the Zigbee Network Configuration is failed.

See if there is Coordinator around.

See if there is Router participated in the Zigbee Network configured by Coordinator.

See if there is Coordinator which has 8 child nodes.

See if there is Router which participates in the Zigbee Network and has 8 child nodes.

TARGET NON

: There is no IEEE ADDRESS of target device saved.

In this case, data transmission is not possible.

Set a target device to process data transmission.

TARGET OK

: Target Set-up is properly done by using an IEEE ADDRESS of target device.

Data transmission is possible.

TARGET ERROR

: Target Set-up using IEEE ADDRESS of target device is failed.

See if there is the target device in the Zigbee Network.

If there is the target device participated in the Zigbee network, check if the IEEE ADDRESS of the target device is correctly saved.

OK

: The message "OK" is output from FZ200BS when a Device switches its mode from operation mode to AT command mode.

－ Use a command **+++** to make the Device switches its mode from operation mode to AT command mode.

The massage "OK" is also output when a Device switches its mode from AT command mode to operation mode.

－ Use a command **"ATO"** to make the Device switches its mode AT command mode to operation mode.

10-5. RESET OPTION

(1) RESET OPTION

FZ200BS operates properly in the Zigbee Network.

Once the power of FZ200BS is turned ON, the device automatically participates in the Zigbee Network. After the Zigbee Network Participation, the Device outputs **"ROUTER START OK"** or **"END START OK"**. Target device Se-up is possible afterwards.

FZ200BS outputs **"ROUTER START ERROR"** or **"END START ERROR"** if there is no Zigbee Network around or the Device cannot participate in the Zigbee Network.

Target device set-up is prior to data transmission.

Turn the power of FZ200BS ON, and then the Device is participated in the Zigbee Network. If FZ200BS has its target device's Address, FZ200BS searches if its target device is participated in the Zigbee Network.

If the target device of FZ200BS is participated in the Zigbee Network and the target device is properly set, **"TARGET OK"** is output. Data transmission becomes possible from then.
If the target device of FZ200BS is not participated in the Zigbee Network and the target device is failed, **"TARGET ERROR"** is output.

When RESET OPTION is set to be enabled with a command AT+SETRESET1 , FZ200BS fails to participate in the Zigbee Network and its target device is not properly set, FZ200BS is reset.

When RESET OPTION is set to be disabled with a command AT+SETRESET0 , FZ200BS fails to participate in the Zigbee Network and its target device is not properly set, FZ200BS is put on standby for a handle by users.

※ References

Appendix_1: FZx00_AT Command

Appendix_2: FZx00_GUI

Appendix_3: FZx00_End Device & ADC/KEY/GPIO