

**Feature:**

- 1, NetWork creation automatically: after power on, the Zigbee network can create automatically and the net can repair by itself.
- 2, Data transmitter simply: the are two different methods to send data, first is clarity transeive, second is point to point.
- 3, Simply used: customer can use it as UART cable and ignore ZigBee protocol.
- 4, UART Interface (TX & RX) to Zigbee
- 5, Built-in RS485 direction control
- 6, High power module,the distance can reach 1600M
- 7, Customer can use it with ZigBee USB mother board as follow

**Electronic Parameters:**

Input voltage Standard : DC3.3V Range: DC 2.6-3.6V

Temperature range: -40C~85C

Serial port rate: 38400bps(Default), 9600bps, 19200bps, 38400bps, 57600bps, 115200bps

Radio frequency: 2.4G(2460MHz), Can changed(2405MHz - 2480MHz,Step:5MHz)

Wireless protocol: Zigbee2007

Distance Visual distance: 1600 Meters

Working current Sending: 110mA(Max) 50mA(Average) Receiving:35mA(Max) Standby: 40MA(Max)

Receiver sensitivity: -110 dBm

Chip: CC2530F256,256KFLASH

Configurable Point: Can be configured as Coordinator,Router

Default:Router,PAN ID=0x199B,Radio Channel=22(2460MHz)

Interface UART 3.3V (TX & RX)

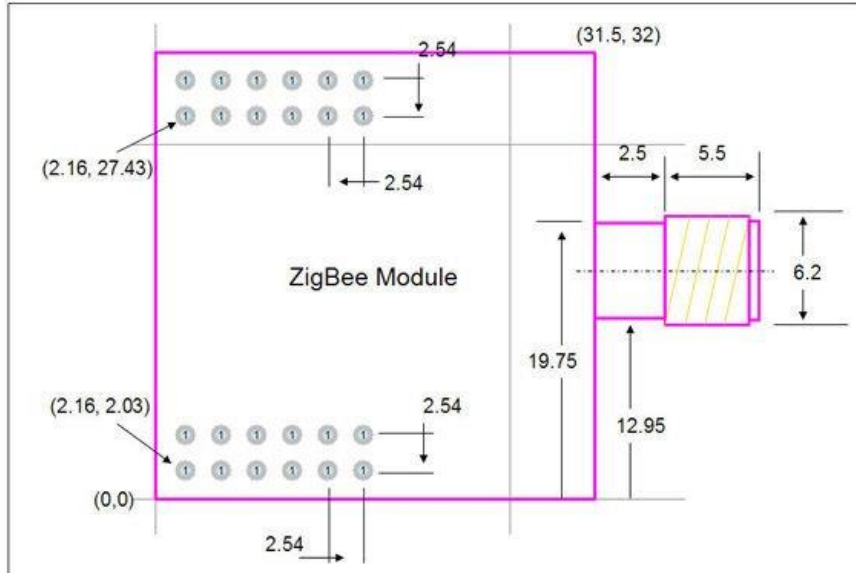
Built-in RS485 direction control, RS485 chip can directly drive

RS232 chip can directly drive

Direct USB to RS232 chip driver

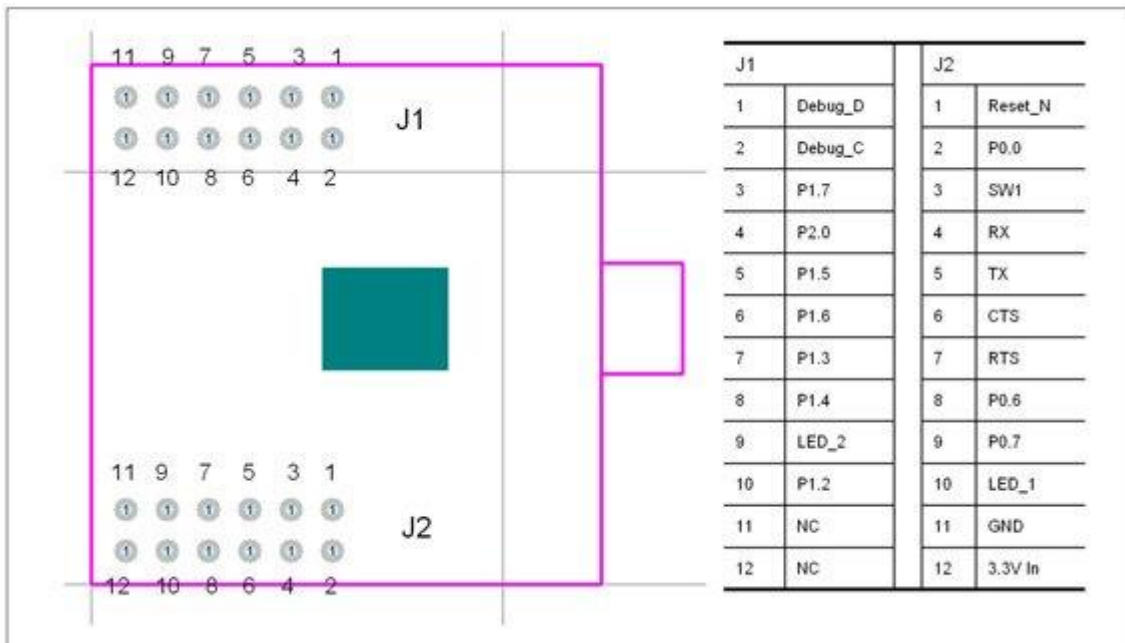
**Mechanical parameters:**

(Top View, Uint:mm)

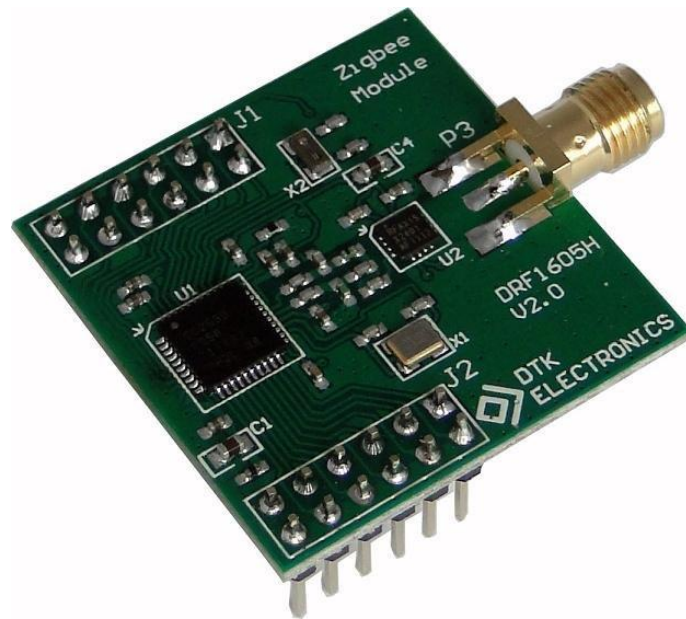


**Internal Structure and the Pin:**

(Top View )



**Appearance:**



**Connections :**

DRF1605H fully compatible with DRF1605 pin, can be connected to USB baseboard, RS485 baseboard. Customers needn't to change any design, can be used directly DRF1605H replace DRF1605.

**Zigbee Module's Network**

Zigbee network node has three network forms: Coordinator, Router, End Device.

**Coordinator:** used to create a Zigbee network, when a node joins, the assigned address to the child node, Coordinator usually defined as a device does not power down, no low-power state for the module DRF1601, DRF1602, DRF1605. Each Zigbee network needs and only needs a Coordinator, different networks PAN ID (network ID) should not, if there is room for two in the same Coordinator, PAN ID if they are the same as the original, and the latter on the power of the Coordinator of PAN ID will automatically add one to avoid PAN ID conflict.





### **Network nodes:**

1 Coordinator + n Router, supports a total of 9331 nodes:

### **Zigbee MESH (mesh) is characterized by**

- 1, the network consists of a Coordinator + n Router
- 2, each node both send and receive data, can also act as a router, forwarding data
- 3, the network can be any communication between nodes, even if all other nodes off (including the Coordinator), these two nodes can communicate
- 4, each node within the network (Coordinator, Router) are maintained with the network function, as long as one node is running, the new node can join the network by this node
- 5, node joins, the automatic distribution of the Zigbee network address, and keep the same address
- 6, route calculation is automatic forwarding of data does not depend so join the network node through which

### **Zigbee network networking and network testing**

#### **Basic concepts:**

Zigbee module has two types of nodes, namely Coordinator (master) and Router (from node)

Each Zigbee network consists of a Coordinator (master) and N-Router (from node)

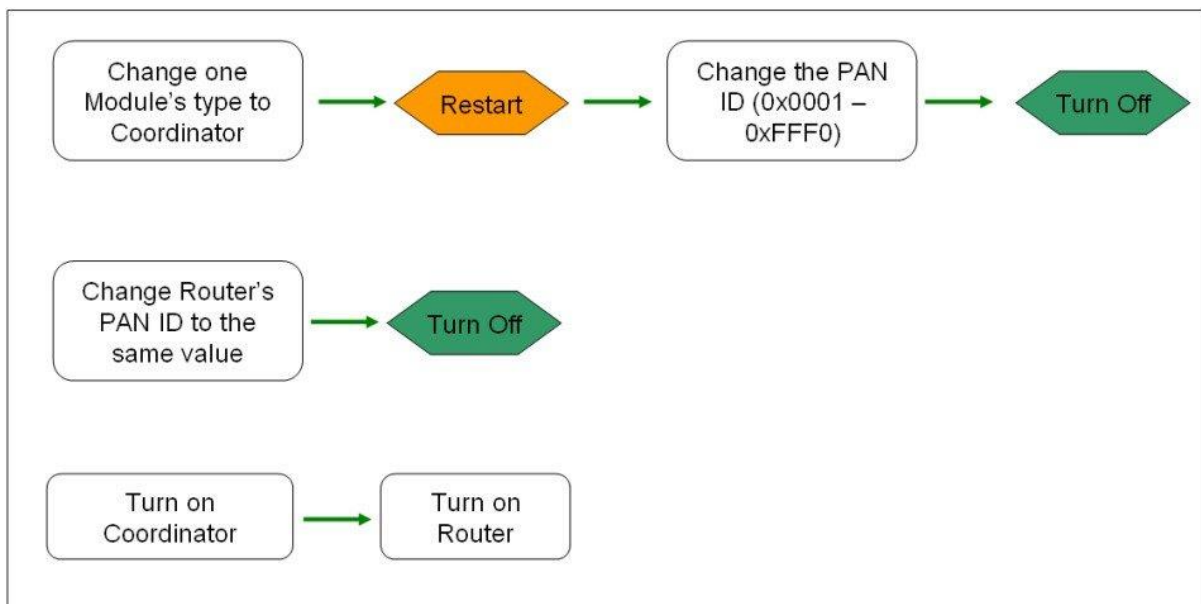
With a Zigbee network, all nodes must have the same channel and PAN ID (network ID)

#### **Module factory default configuration:**

Module factory all of the node type Router (from node), PAN ID = 0x199B, channels = 22 (2460MHz)

**First use process:**

1. Choose one module and change it to Coordinator (using the configuration software), then restart it
2. Change the Coordinator's PAN ID to your set of values (such as 0x1234) (range: 0x0001 - 0xFF00), mainly to prevent conflicts with the default values (default is 0x199B), then power off it.
3. Change the Router's PAN ID to the same value (just look for the network with the same PAN ID) (or to 0xFFFF, automatically search for any network), then power off it.
4. Turn on the Coordinator first (a long bright light, a light flash)
5. Then open the other Router's power supply (two lights flash), about 3 seconds, can automatically join the network (two long bright light)



### Change the network:

1, if you want the Router to join a new network, change the Router's PAN ID to new (same as Coordinator or

0xFFFF), then restart it, it can join new network automatically.

2, Do not try to be a Coordinator to join an existing network, even if you can join the network is not strong,

Coordinator may withdraw from power-down after reboot network;

3, when a network is running properly, do not try to re-set the Coordinator's PAN ID, even if the same PAN ID,

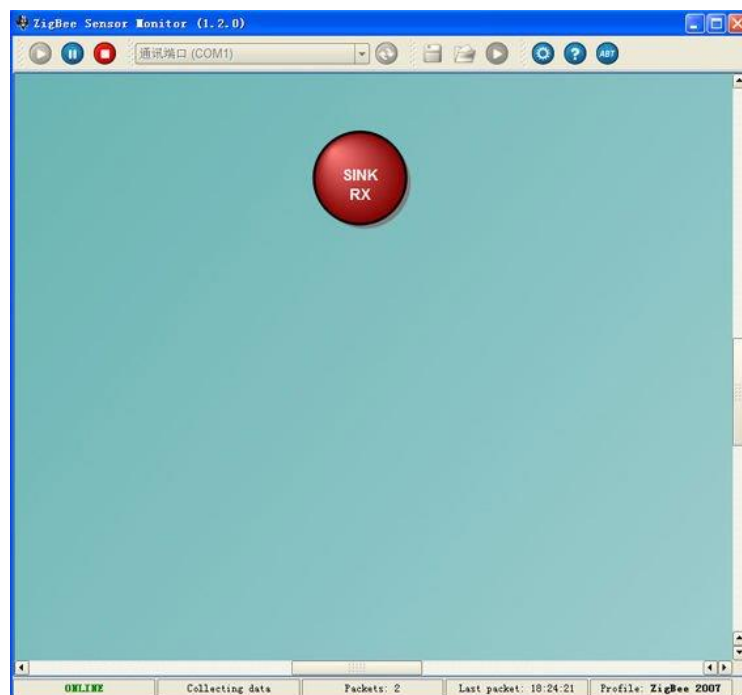
because the Coordinator after the restart, scan to the same PAN ID of the network, its PAN ID will automatically +1 to avoid PAN ID conflict.

**In order to visualize the process of ZigBee network building, DRF1601/1602/DRF1605/DRF1605H set compatible with TI's Sensor Monitor software, through TI's Sensor Monitor software to monitor and test the module's network connection.**

(1), Take a Coordinator connect to PC through the serial port, open the Sensor Monitor Software and click the

RUN icon QQ.jpg to run, then you can see that the icon turns red Coordinator, said the Coordinator and the PC

successful connection. (Note: TI Sensor Monitor software only supports serial baud rate of 38400)

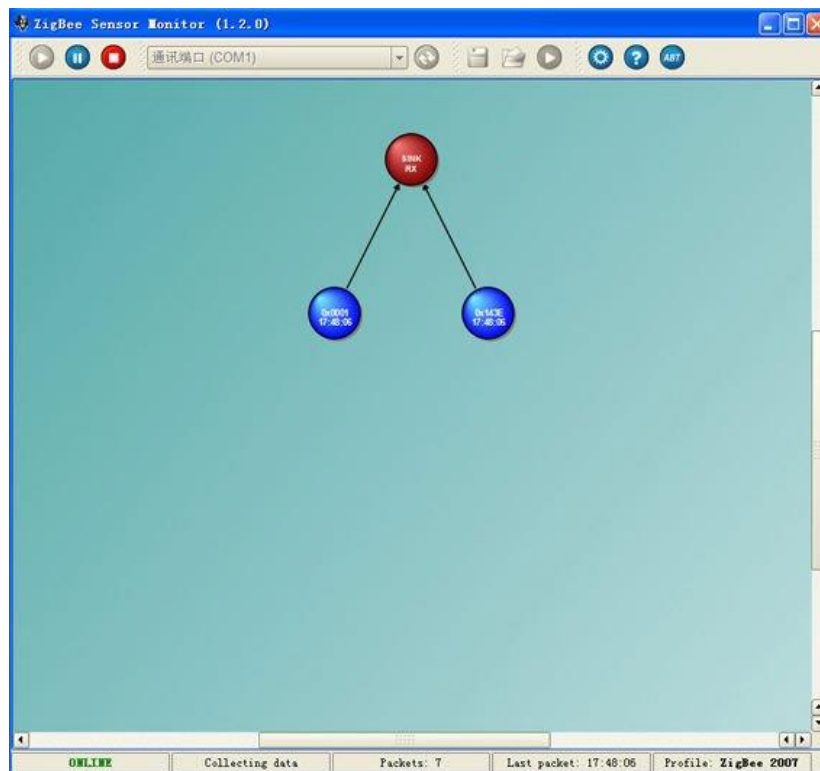


(2), Take a Router module and power on, click the TEST button, this time, Router module sends an test data

to Coordinator, Coordinator will send the data via the serial port to the PC, and TI Sensor Monitor software will

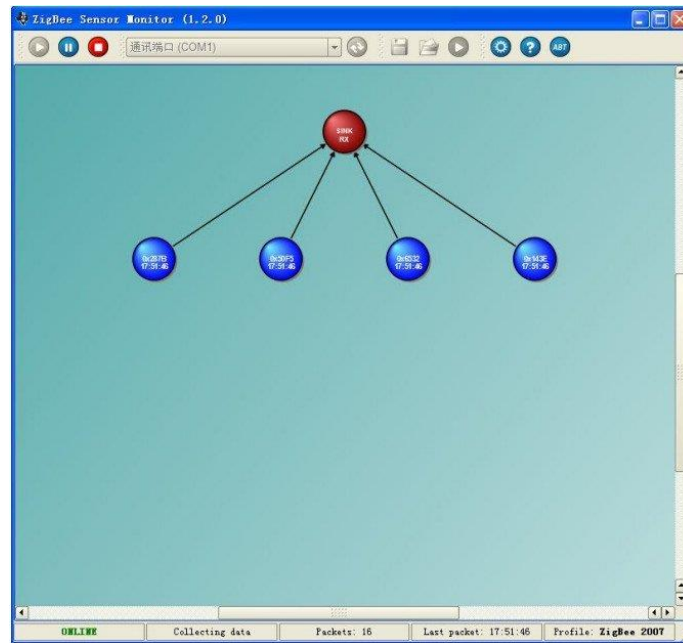
display this Router point, as shown:

(DRF1605 / DRF1605H the TEST button is J2- Pin3 (SW1), short it with grand)



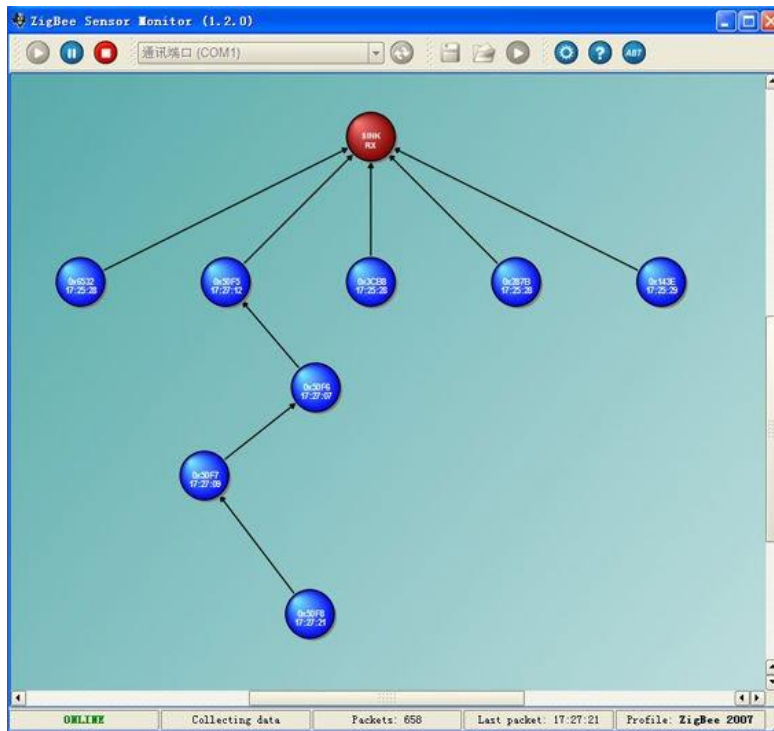


(3) Similarly, take others Router module power on, they will automatically find and join the network, press the TEST button, after the network is structured as follows:



(4), Coordinator can directly assign six Router's address, after it, other Routers can join network through the

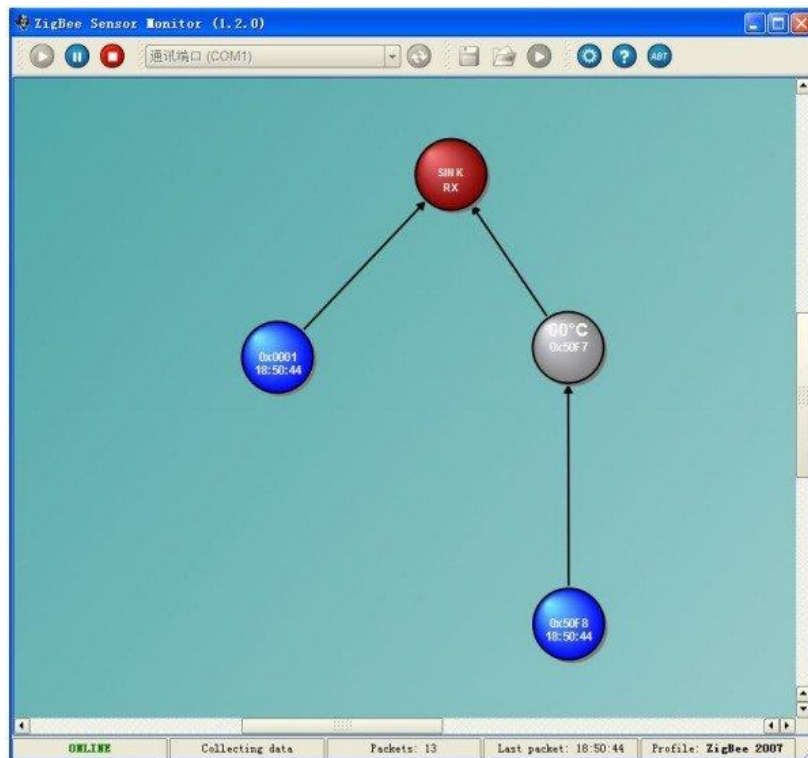
first 6 points, each of Router can assign 6 address to other Routers and allow them to join network.



F8)

These Routers which assigned address by front Routers, not affect by the front Routers, don't care them is in

power on or power off, all Router can calculate data path automatically.



## Zigbee Modules Data Transmission

There are two method to send data:

(1), transparent data transmission:

Just need the first byte is not transmitted 0xFE, 0xFD or 0xFC, then automatically enter transparent data

transmission mode;

Coordinator from the serial data received will be sent automatically to all nodes;

A node receives the data from the serial port will be automatically sent to the Coordinator;

(2), point to point data transmission:

Zigbee network between nodes within any, can be point to point transfer instructions, to transmit data;

Format: 0xFD + destination address + data length + data

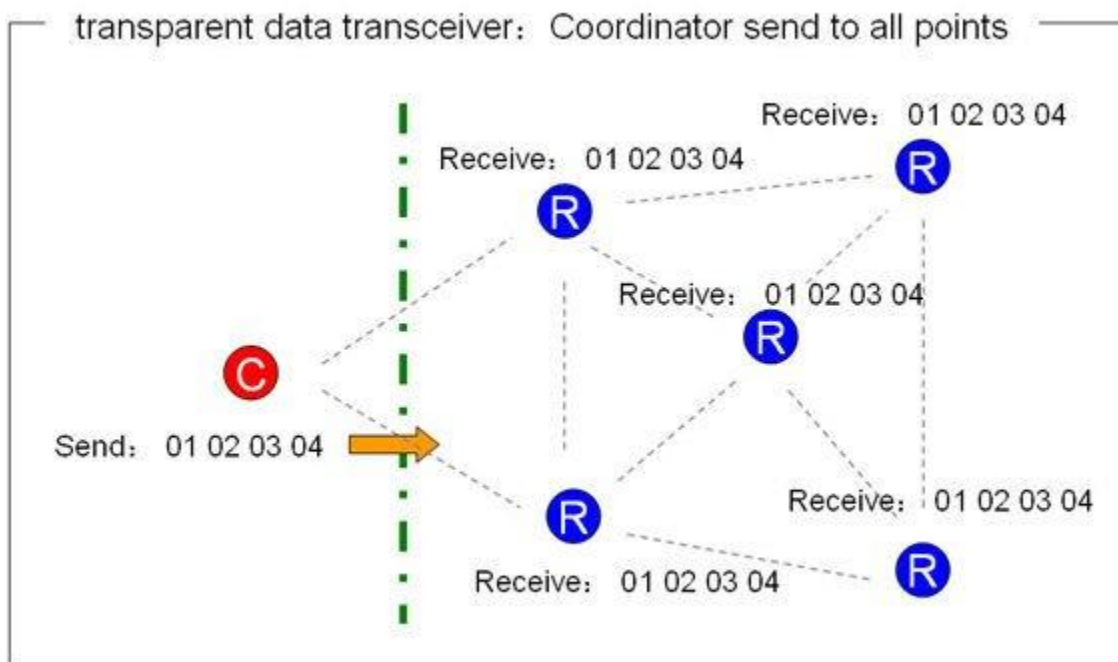
**1, transparent data transmission:** (Are the most important functions for DRF1600 series Zigbee module)

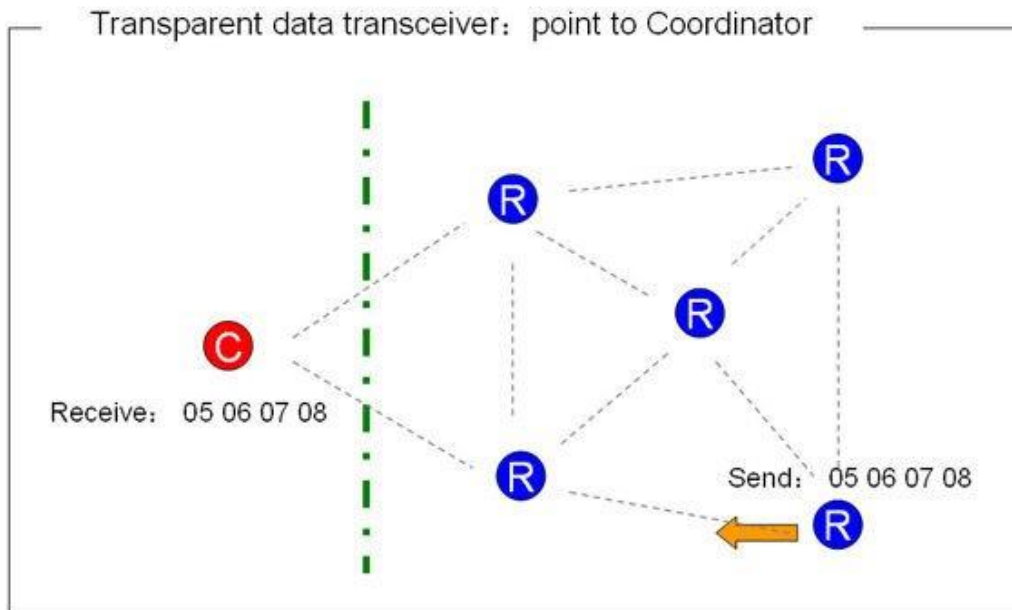
(1), if the first byte is not 0xFE, 0xFD or 0xFC, then automatically enter transparent data transmission mode;  
(Extension: the packet header and not the same as instruction set, also as a transparent data transmission,  
but suggested that when the user using data transparent transmission function, the first byte of data packets set a non 0xFE, 0xFD, or 0xFC, such as 0xA7)

(2), Coordinator of the data received from the serial port will be automatically sent to all nodes; a node receives the data from the serial port will be automatically sent to the Coordinator;

(3), between any node and Coordinator, similar to the cable connected directly (in most cases, a Coordinator and a Router can instead of a RS232 cable directly;

(4), to support variable-length packets (without setting), the maximum does not exceed 256 bytes / packet, the packet is generally recommended that each application within 32 bytes.





Transparent data transmission performance:

Direction	Length of Data Package	Fastest Interval
Router → Coordinator	16 Bytes	20 ms
	32 Bytes	20 ms
	64 Bytes	20 ms
	128 Bytes	50 ms
	256 Bytes	200 ms
	> 256 Bytes	Can't Send
Coordinator → Router	16 字节	100 ms
	32 Bytes	100 ms
	64 Bytes	100 ms
	128 Bytes	200 ms
	256 Bytes	500 ms
	> 256 Bytes	Can't Send

Test conditions:

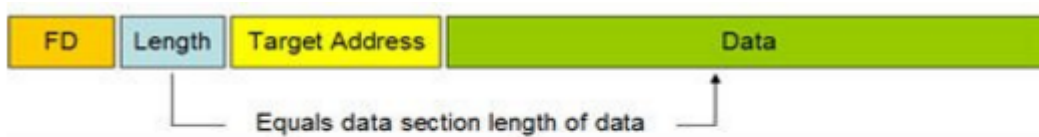
- 1, room temperature, laboratory conditions
- 2, inter-module distance of 2 meters, a good signal
- 3, 38400 baud rate (the most preferred baud rate)
- 4, continuous send, receive, 100K bytes, error-free, continuous testing 10 times
- 5, test software: serial debugging assistant SSCOM3.2

With the increase of the distance between modules, the transfer rate will be reduced  
 Coordinator sends to Router is broadcast, transmit rate will be slower  
 General application, recommended that each packet of 32 bytes each transfer interval  
 200-300ms

## 2, point to point data transmission:

### Send Format:

Data transfer instructions (0xFD) + data length + destination address + data (up to 32 Bytes)



Example:

**FD 0A 14 3E 01 02 03 04 05 06 07 08 09 10**

FD: Data transfer instructions

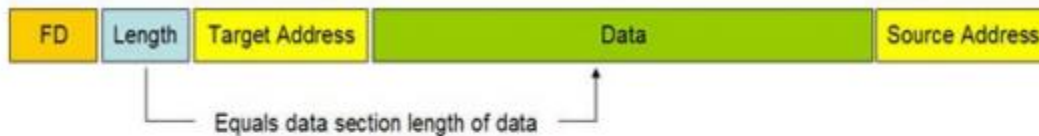
0A: Data Length, 10 Bytes

14 3E: Destination Address

01 02 03 04 05 06 07 08 09 10: Data

### Receive data format:

Receive all the data that from the sender, and add two bytes at the last for source address



Example:

**FD 0A 14 3E 01 02 03 04 05 06 07 08 09 10 50 F5**

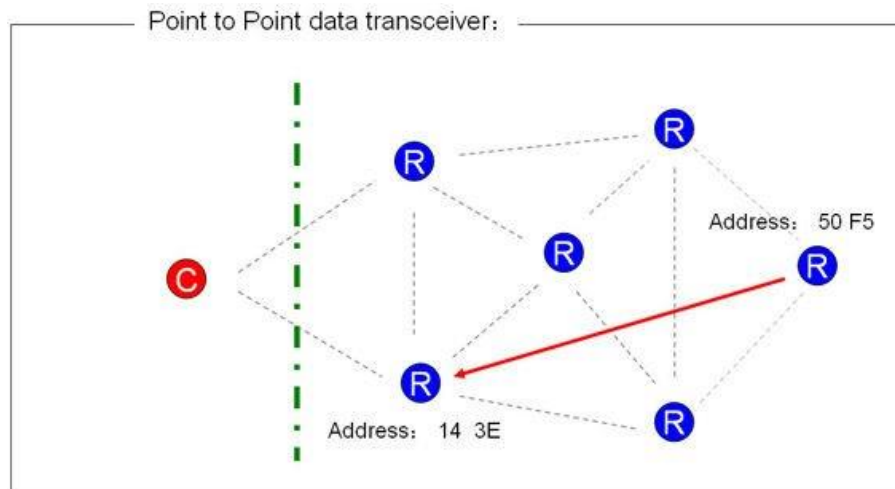
FD: Data transfer instructions

0A: Data Length, 10 Bytes

14 3E: Destination Address for sender and the self address for receiver

01 02 03 04 05 06 07 08 09 10: Data

50 F5: Source address



**Point to point data transmission can be send between any points in the network:**

1. Even Coordinator power off, the point to point data transmission also can send between Routers.
2. After Router joined the network, the address (Short Address) will not change;
3. Length of the byte data area must be equal to the length of the data, or data transmission errors (as a transparent transmission, sent to the Coordinator);
4. Up to 32 bytes of data area, or data transmission errors (as a transparent transmission, sent to the Coordinator);
5. Destination address = 0xFF 0xFF, was broadcast transmission, will be sent to all nodes within the network;
6. Destination address = 0x00 0x00, then sent to the Coordinator

Point to point data transfer performance:

Direction	Length of Data Package	Fastest Interval
Router → Router	32 Bytes	40 ms
Coordinator → Router	32 Bytes	40 ms
Router → Coordinator	32 Bytes	40 ms

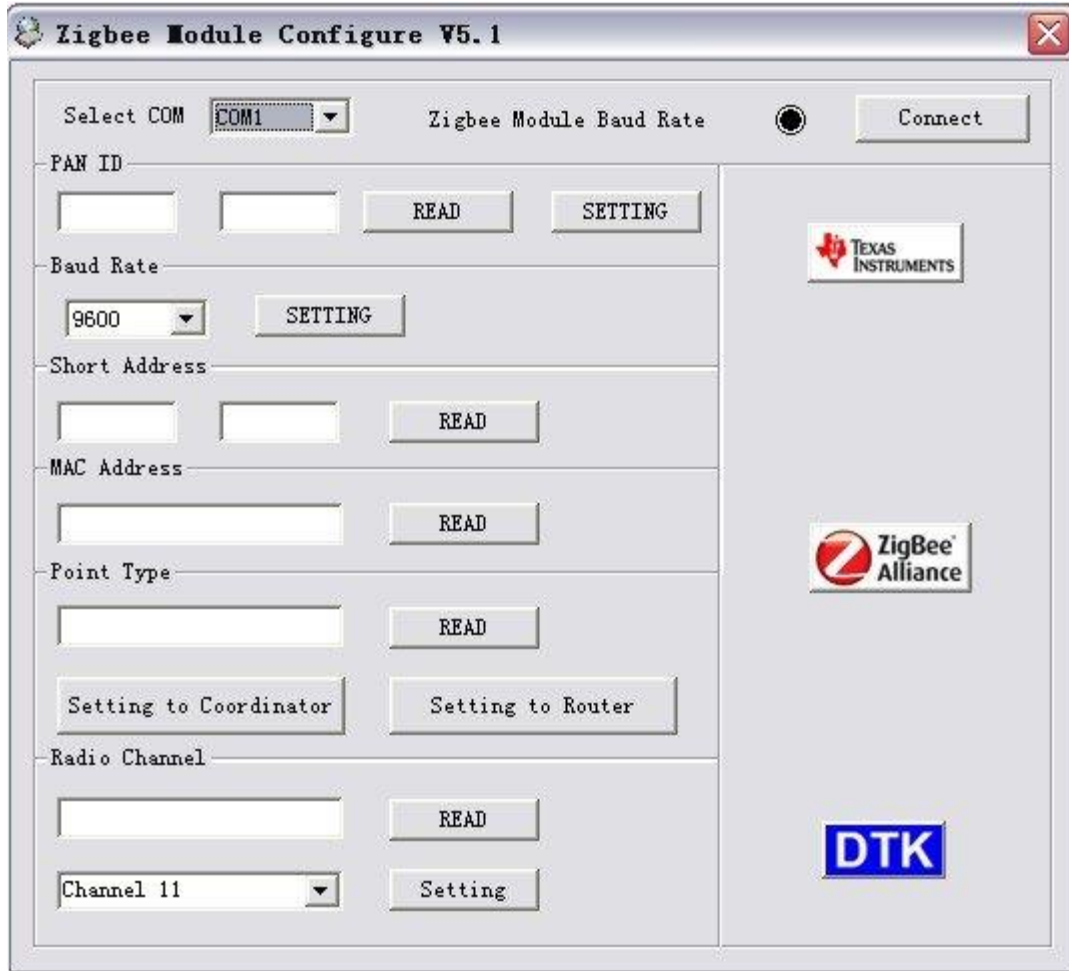
Test conditions:

- 1, room temperature, laboratory conditions
- 2, inter-module distance of 2 meters, a good signal
- 3, 38400 baud rate (the most preferred baud rate)
- 4, continuous send, receive, 100K bytes, error-free, continuous testing 10 times
- 5, test software: serial debugging assistant SSCOM3.2

### Setting Instruction for DRF1600 Series Zigbee Module

(Commands are seeing User Guide)

User also can use Zigbee Module configure software to Setting Zigbee Module



The screenshot shows the 'Zigbee Module Configure V5.1' software window. The interface includes the following elements:

- Select COM:** A dropdown menu currently set to 'COM1'.
- Zigbee Module Baud Rate:** A radio button selection area.
- Connect:** A button to initiate the connection.
- PAN ID:** Two text input fields for entering the PAN ID, with 'READ' and 'SETTING' buttons to the right.
- Baud Rate:** A dropdown menu set to '9600' and a 'SETTING' button.
- Short Address:** Two text input fields for entering the short address, with a 'READ' button to the right.
- MAC Address:** A single text input field for entering the MAC address, with a 'READ' button to the right.
- Point Type:** A text input field for entering the point type, with a 'READ' button to the right. Below this are two buttons: 'Setting to Coordinator' and 'Setting to Router'.
- Radio Channel:** A text input field for entering the radio channel, with a 'READ' button to the right. Below this is a dropdown menu set to 'Channel 11' and a 'Setting' button.

On the right side of the window, there are three logos: Texas Instruments, ZigBee Alliance, and DTK.