REXENSE ZIGBEE/3G Gateway (RD5000)

Instruction

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VERSION HISTORY

V1.0.0	2015/01/12	1st issue of preliminary document

Content

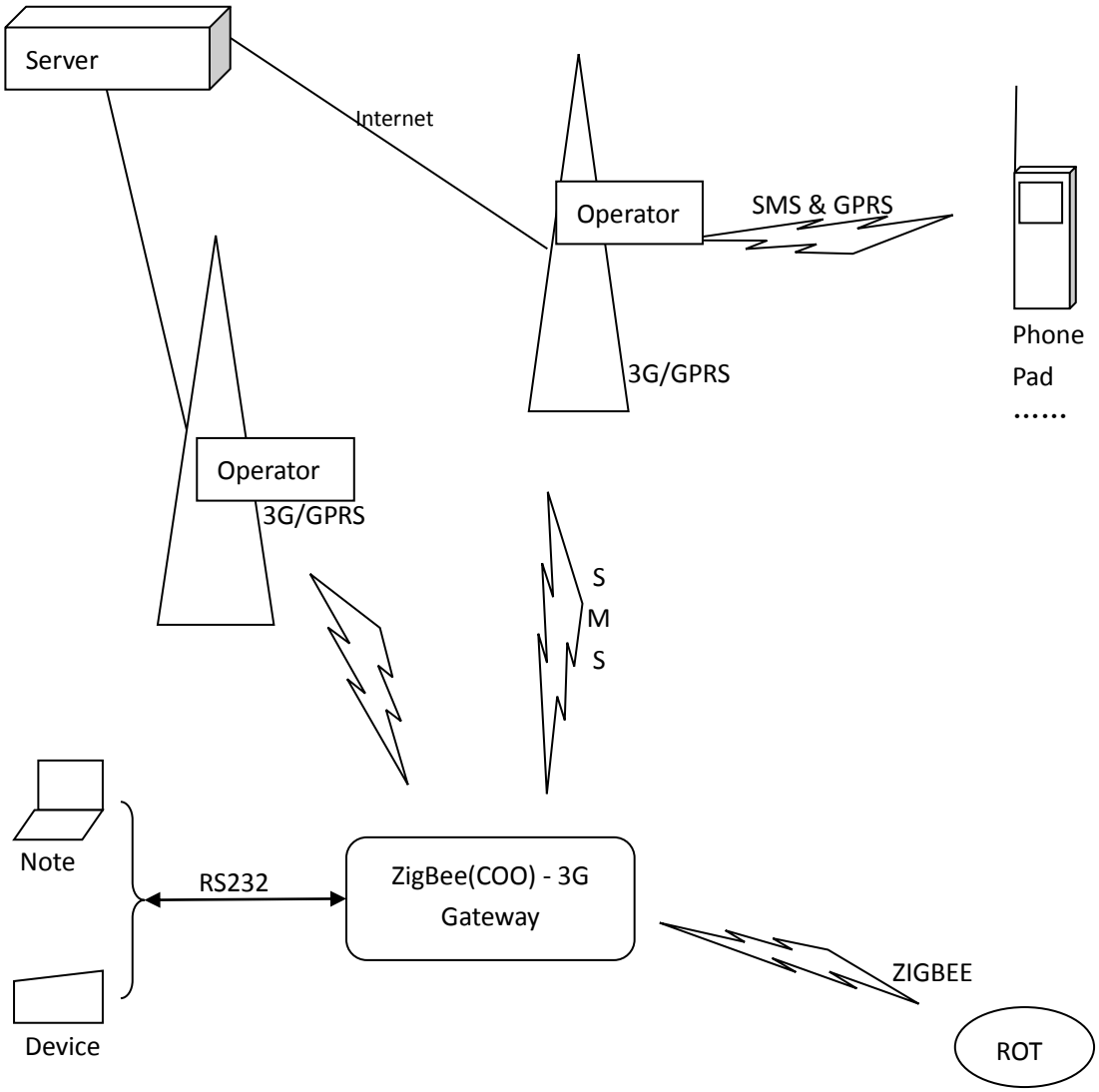
1. Overview

RD5000 is used for data transmission between 3G and Zigbee, it’ s multiple function gateway. The device is widely applicable to many M2M fields, such as smart traffic, smart grid, industrial automation, remote control, POS machine, water supply, weather monitoring, etc.

2. Application

- Remote data collecting
- Industry automation
- AMR/AMI
- Smart building system
- Smart traffic system
- Smart street light
- Mining security monitoring
- Remote medical monitoring

2.1 Application example



3. Character

- The core of Zigbee module is ARM Cortex-M3, which obeys IEEE 802.15.4.
- The Zigbee module has a Zigbee stack of Rexense.
- Mesh network
- Support data transmission between Zigbee and GPRS/WCDMA.

- Wireless terminal supports UMTS/HSDPA 900/2100MHz
- Wireless terminal supports GSM/GPRS/EDGE 850/900/1800/1900MHz
- Support TCP "transparent" data transmission.
- Automate working mode after correct configuration
- Independent exterior watchdog, to make sure system working stable.
- Smart Heartbeat packet technology, link inspection, interval setting.
- Automatic re-dialing when disconnection.
- Support remote configuration and failure diagnosis
- Support remote updating of firmware

4. Detail character

4.1 Electric character：

Power	+5V ~ +35V
Interface	Standard RS232 connector x1
	Standard SIM x1
Antenna interface	SMA female

4.2 Equipment Info：

ZIGBEE/3G transformer speed	Max 115 kbps (baud rate 115200)

4.3 ZIGBEE RF character:

MAC	IEEE 802.15.4
Frequency	2400MHz – 2483.5MHz
Channel quantity	16
Channel interval	5MHz
Channel NO.	0B – 1A （Hex）
TX power	20dBm（100mW）
RX sensitivity	< -104dBm
Link budget	122dB
Max speed	250 kbps
Max range	1000M（visual distance）
Network	Point to point/star/mesh
Security	AES-128

4.4 GPRS/WCDMA RF character:

Net type	3G（WCDMA）、2G（GSM）
Frequency	UMTS/HSDPA 900/2100MHz GSM/GPRS/EDGE 850/900/1800/1900MHz

RX sensitivity	< -106dBm
WCDMA version	WCDMA 3GPP release 5
GPRS rank	EDGE multi-slot class 12 GPRS multi-slot class 12
Net speed	HSDPA down3.6Mbps WCDMA down384Kbps/up384Kbps EDGE down236.8Kbps/up118Kbps GPRS down85.6Kbps/up42.8Kbps GSM down & up 14.4Kbps

4.5 Environment character：

Storage Temp.	-60°C ~ +120°C
Working Temp.	-40°C ~ +80°C
Relative humidity	≤80%

4.6 Size：

Volume	126 * 65 * 28mm
Weight	178g (not including antenna)
Housing	Black aluminum shell

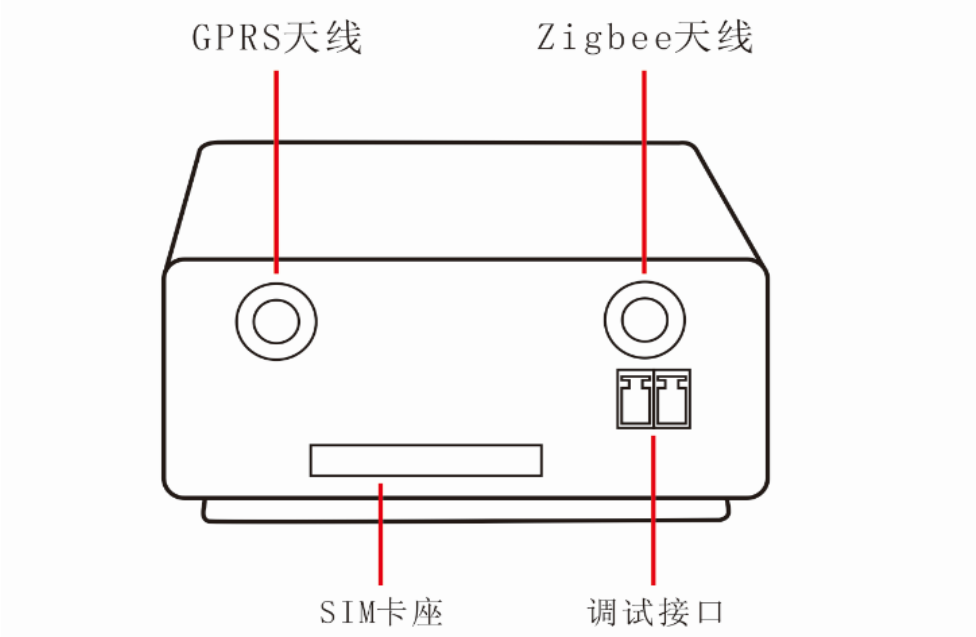
4.7 Accessories：

Packing list	Power adaptor x1	
	GPRS antenna x1	ZigBee antenna x1
	Manual x1	
	Guarantee card x1	

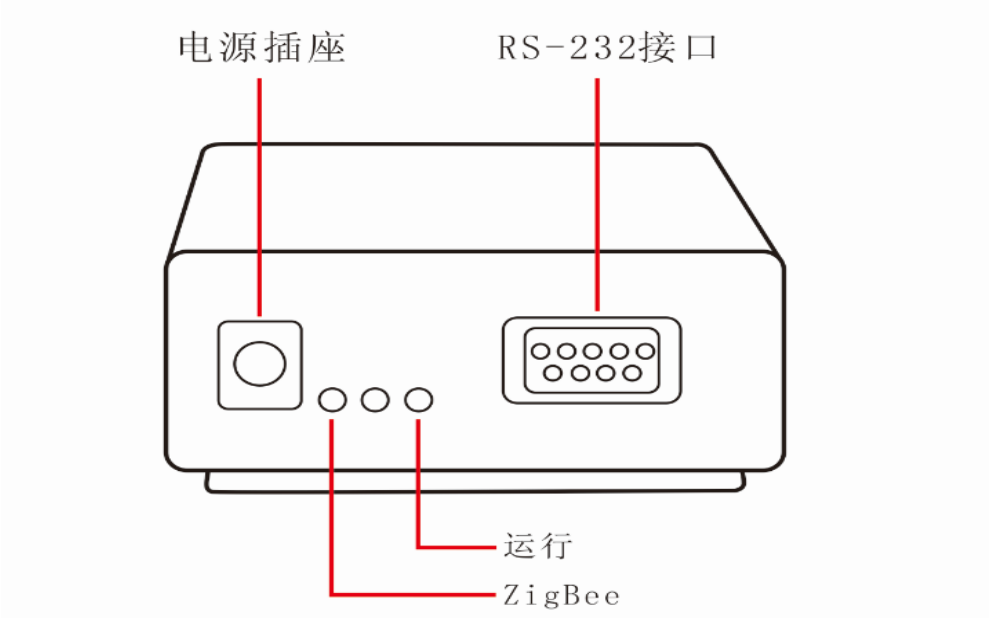
5. Installation：

RD5000 supports WCDMA/GPRS standard SIM card.

1、Insert SIM card when power off, keep sure the power is off, otherwise the SIM will be broken.



2、Power on.



3、RD5000 support TXD, RXD, GND three lines of communication, and it also has RS232 interface.

LED indicates:

Indication	Green LED
A：SMS mode	Flash 1 time per 1 sec.
B：GPRS client mode	Flash 3 times per 2 sec.
C：GPRS online	Flash 1 time per 0.5 sec.

Indication	Red LED
A： power on	Keep illuminating
B： deep sleeping status	Light off
C： No SIM card, or haven’ t input PIN code, or in network building procedure	Illuminate 0.1 sec. per 1 sec.
D： network built, IDLE status	Illuminate 0.1 sec. per 3 sec.
E： GPRS data is transmitting	Illuminate 0.1 sec. per 0.125 sec.
F： calling	Keep illuminating

6. Configuration：

6.1 Parameter configuration way

Parameter can be configured by RS232 serial port, other Zigbee node, mobilephone APP or computer APP, or Zigbee network AT command. Please refer to our Rexense communication instruction.

6.1.1 Paramter conifguration

RD5000 should be configured for the first time using, parameter refer to appendix A.

Command format: *SET + password + command=content&command=content&...#, input ‘&’ between parameter , default password 999999.

Example: set the IP of center station to ‘10.216.10.245’, commands as below：

*SET999999DCIP=010216010245#

Example： set the IP of center station to '10.216.10.248', communication port to '6088', command as below：

*SET999999DCIP=010216010245&DCPT=6088#

If parameter configured successfully, then it will return *SETOK#->>xxxxxx, (xxxxxx is gateway' s ID); if the command is wrong or the gateway is abnormal, then nothing will return. The gateway will initialize after configured successfully, the procedure needs about seconds.

Attention：

1）、The gateway should be configured to GPRS client mode.

2）、Set local GPRS supplier（APN：access point name）

3）、Under GPRS client mode, the IP(DCIP), domain name and port(DCPT) must be configured correctly.

4）、Under GPRS client mode, the service procedure of center station must be running, and monitor relative port.

5）、Set suitable interval of heartbeat to keep correct connection, suggest value is less than 15 minutes.

6）、When the gateway send login info to server, the main station must give a reply to build connection, otherwise the connection will be disconnect.

6.1.2 Parameter reading

1. The format of parameter reading command is *GET + password +

command=content&command=content&...#, use '&' between command name, default password is 999999.

Example: read IP of main station, command as below

*GET999999DCIP#

Example：read IP and communication of main station, command as below

*GET999999DCIP&DCPT#

2. When reading parameter, the report of gateway will use format *GET + Name=value&name=value&...#.

Example： send below to gateway

*GET999999WKMD&DCIP&DCPT#

The gateway will return：

*GETWKMD=1&DCIP=010216010245&DCPT=6088#

3. Read current running status, so as to analyze, diagnose current running condition.

Example：send below to gateway

*GET999999STA#

The gateway will return:

*GETSTA->>Sg=31Rg=15Ln=1Wm=1Fc=0Lf=0Hb=2Ap=3GNETIp=115236093187Pt=10001Tm=12345678Un=Up=Tp=1Pr=Rer=Vr=SM13#

Meaning：

- Sg=31 :indicates the strength of current GSM signal is 31, Sg value range is 0~31.
- Rg=15：the first number indicates the registration status of current gateway' s

SIM card：

1 indicates GPRS registered successfully；

0、2、3、4 indicates registered failed or GPRS function is not available or SIM card is arrearage.

The second number indicates the network status of current gateway:

0 –No service；1 –GSM；2 –GPRS；3 –EDGE；

4 –WCDMA； 5 –HSDPA；6 –HSUPA；7 –HSPA

- Ln=1： indicates whether current GPRS is online, 1 means online, 0 means offline.
- Wm=1： indicates working mode, 0 means GSM，1 means GPRS（CLIENT），2 means SMS，3 means GPRS（SERVER）.
- Fc=0： indicates connection failed time.
- Lf=0： indicates login failed time.
- Hb=2： indicates heartbeat interval(minute).
- Ap=3GNET： indicates network access point APN, China mobile is CMNET, China Unicom is 3GNET.
- Ip=115236093187：If it’s GPRS client, then it indicates IP of current main station is 115.236.93.187；if it’s GPRS server, then it indicates IP of current gateway is allocated by mobile station (dynamic or binding static)
- Pt=10001： if it’s GPRS client, then it indicates the port number of current main station；

If it’s GPRS server, then it indicates the current monitor port number of

gateway.

- Tm=12345678：indicates terminal ID or terminal identify number.
- Un= Reserve
- Up= Reserve
- TP=1： indicates terminal transmission protocol, o means UDP, 1 means TCP.
- Pr=R： indicates software protocol of gateway.
- Er=8： indicates fault code of current GPRS, used for remote dynamic.
- Vr=SM13： indicates the type of gateway, and software version of gateway V1.3.

6.2 GPRS client mode

When RD5000 under GPRS client mode, the parameter WKMD=1 (refer to the Appendix), it can connect or login main station server according to parameter of access point' s name (GAPN), IP of main station (DCIP), port number (DCPT), network protocol (NTPC). Main station server will build the GPRS channel after giving reply to login request. After GPRS connection built, the RD5000 can send data to main station server.

Under GPRS mode, RD5000 has heartbeat function to keep communication link normal. User can set the heartbeat interval of gateway (HBCY), value range (0~255 minutes, 0 is no heartbeat), suggest to set time less than 15 minutes. RD5000 will send transmit data according to the heartbeat interval to check the link, if there is no heartbeat feedback, the link will disconnect, and check the communication link

again. If the communication link doesn’ t has any data for some time, the gateway or main station will disconnect the link automatically, then keep itself in standby mode, and won’ t connect main station initiatively.

When RD5000 has data which needs to be sent to main station server initiatively or receive data from other Zigbee nodes which needs to be sent to main station server, and there should be no data transmitting within 30 seconds at least, the gateway will save the data temporary, and then it will send heartbeat data to check whether the link is normal, if the link is normal, then send the temporary data to server by GPRS; if the link is abnormal, it will disconnect automatically, and re-connect to main station in every 5 seconds, if it connect to main station failed after tried 30 seconds, the connection time to main station will be increased by the gateway, so as to control the GPRS flow. If there is no data within 8 hours, the RD5000 will reset. The gateway will connect to main station server automatically when it power on or reset.

6.2.1 Simple configuration

Normally, just need to set simple configuration as below

1． Set IP or domain for main station (IP will be invalid after domain is available)：

Disable domain and set main station’ s IP:

*SET999999EDNS=0&DCIP=xxx.xxx.xxx.xxx# xxx.xxx.xxx.xxx is main station’ s IP.

Enable domain and set main station’ s domain：

*SET999999EDNS=1&DNSN=xxx.xxx.xxx# xxx.xxx.xxx is main station’ s

domain.

2．Set main station’ s port：

*SET999999DCPT=xxxx# xxxx is main station’ s port value

If user need to set parameter of backup IP/Port, please refer following configuration.

3.2.2 Detail configuration

Detail configuration command as below：

1. Input *GET999999STA# check gateway’ s current status
2. *SET999999WKMD=1# set it to GPRS client mode
3. *SET999999DCIP=xxx.xxx.xxx.xxx# set main station’ s IP to xxx.xxx.xxx.xxx
4. *SET999999DCPT=xxxx# set main station’ s port to xxxx
5. *SET999999BKIP= xxx.xxx.xxx.xxx# set backup IP to xxx.xxx.xxx.xxx
6. *SET999999BKPT=xxxx# set main station’ s port to xxxx
7. *SET999999GAPN=xxxx# set name of access net APN, domestic customer can ignore this, foreign customer need to ask local supplier.
8. *SET999999NTPC=1# set net protocol, only support TCP now
9. *SET999999SIMC=xxxxxxxxxxx# set gateway’ s ID to xxxxxxxxxxx
10. *SET999999HBCY=x# set heartbeat interval, x is minutes, suggest 15 min.
11. *SET999999AUSR=xxx# set GPRS authorized user name, 配 domestic customer can ignore this, foreign customer need to ask local supplier.
12. *SET999999APSW=xxx# set GPRS authorized password, domestic customer

can ignore this, foreign customer need to ask local supplier.

13. *SET999999SBR1=x# set RS232' s baud rate, default x is 5(9600), other value refer to appendix.
14. *SET999999SDB1=x# set serial port' s data bit, default x is 2(8)
15. *SET999999SPR1=x# set serial port' s odd-even check , default x is 0 (no parity)

Appendix A: ZIGBEE/3G parameter configuration

Parameter	command	Description
Work mode	WKMD	Work Mode，1 byte 0 –GSM（CSD）; 1 –GPRS（CLIENT）; 2 –SMS ; 3 –GPRS（SERVER）
Main station IP	DCIP	Server IP，12 bytes Every 3 bits ASCII indicate a number 0~255，if each number is less than 3 bits, high bit will be replaced by 0, example:218.1.22.33，format 218001022033
Main station port	DCPT	Server Port, 5 ASCII at most. range：1024---65535
Backup IP	BKIP	Backup Server IP，12 bytes Every 3 bits ASCII indicate a number 0~255，if each number is less than 3 bits, high bit will be replaced by 0, example:218.1.22.33，format 218001022033
Backup port	BKPT	Backup Server Port，5 ASCII at most. range：1024---65535
Access point name	GAPN	Access Point Name，32 ASCII at most.
Network protocol	NTPC	TCP/UDP ，1 byte 0 –UDP ; 1 –TCP (UDP is not available temporary)

RD5000’ s ID	SIMC	SIM number can be gateway’ s ID, 16 bytes ASCII at most. Example：12345678910
Terminal address	TMID	Gateway’ s ID, 8 bytes at most, equal to SIMC’ s 8 letter
Heartbeat interval	HBCY	Heart Beat Cycle，3 bytes ASCII at most. range：0 – 255 minutes
GPRS authorized name	AUSR	Authentication User，32 bytes ASCII at most
GPRS authorized password	APSW	Authentication Password，16 bytes ASCII at most
Serial port baud rate	SBR1	RS232’ s baud rate 1 byte 0 -300；1 -600；2 -1200；3 -2400；4 -4800； 5 -9600；6 -19200；7 -38400；8 -57600；9 -115200； Default baud rate 9600, data bit 8 bits, 1 stop bit, no parity
Serial port data bit	SDB1	RS232’ s data bit, 1 byte 1 -7bit ；2 -8bit
Serial port parity	SPR1	RS232’ s parity, 1 byte 0 –no parity；1 –odd；2 –even
ZigBee & GPRS baud rate	SBR2	Baud rate between ZigBee & GPRS 1 byte. 0 -300；1 -600；2 -1200；3 -2400；4 -4800； 5 -9600；6 -19200；7 -38400；8 -57600；9 -115200； Default baud rate 57600, data bit 8bits, 1stop bit, no parity
ZigBee & GPRS data bit	SDB2	Data bit between ZigBee & GPRS 1 byte 1 -7bib ；2 -8bit
ZigBee & GPRS parity	SPR2	Parity between ZigBee & GPRS 1 byte 0 –no parity；1 –odd；2 –even
Status info	STA	Working status info, only suitable for *GET

		commands
Enable dynamic domain	EDNS	Enable or disable dynamic domain: main station IP and backup IP will be invalid after enabled, port NO. is main station’ s port, 1 byte 0 –disable ; 1 –enable
Dynamic domain setting	DNSN	Can get IP address by DNS after configured, 32 bytes ASCII at most.

Attention: only support GPRS client mode for this moment.