KB8010 4G DTU
User Manual

Shenzhen Kingbird Network Technology CO.,LTD

Add: RM 1315-1316, Haosheng Business Center ,Nanshan District,Shenzhen China

TEL:+86-755-82556825   **Fax：+86-755-82556825 EXT: 8012**

Web：http://www.kingbirdnet.com   **EMAIL：sales@kingbirdnet.com**

1 Brief Introduction

Thanks for you to use our products!

1.1 Brief Introduction

KB8010 4G DTU (Data Terminal Unit) is wireless data transmitting terminal of 4G/SMS.

Based on the public net, KB8010 4G DTU transmit widely, stably and reliably, KB8010 4G DTU is widely used in unattended operation device, remote data acquisition, remote scheduling and so on. Due to this product is designed for industry integrated, we adopt special designs in the temperature scope, shaking, EMC and interface multiform and so on, to keep it good stability in the severe atmosphere, ensure high quality for your device.

Aim at different scope user's requirements to supply different define 4G Terminal unit, it needs taking industry characteristics for developing on hardware & software and system integration. 4G mobile net can supply TCP/IP connection; 4G DTU can be use for internet connection, data transmitting application and so on. KB8010 4G DTU (Data Terminal Unit) is special 4G wireless device that send the data from COM port through 4G mobile data network.

KB8010 4G DTU is used in electric power automatic system, industry monitoring, traffic management, atmosphere, pro-environment, pipe network monitoring, finance, securities departments and so on. Consider the networking request from different application scope, achieve Virtual data private network in network structure. It is applicable to small and medium data transmitting of the Center to multi-points, multi-points scatter.

1.2 Product Feature

- Standard industrial products, EMC anti-jamming design, strong adaptiveness.
- Independent research and developing.
- Embedded Watchdog chip, provide multiple Reset mechanism, can be controlled by software, achieve industrial security mechanism perfectly.
- Support wirless romote update program, you can update DTU program via server FTP;
- Advanced and strict data communication protocol, with the function of correction and encryption. Never lose package when data transmission, can achieve pictures over than 100K and Flash animation files transmission, no Mosaic happened.
- Automatical IP register mechanism, can achieve various server modes, build complete super large SCADA system.
- Remote sleep and awake: User can use appointed cell phone number to dial or send message can sleep or awake DTU, it is convenient for user to save a lot of 4G Flow Fee when no need to use DTU.

- Remote modify DTU parameters: Support that SMS and data service center modify DTU parameters.
- IO switching value function: Two switch inputs, two switch outputs.Through 4G network to control the state of the switch input or query switch input.Remotely turn on the alarm,set the input alarm mode(4G alarm) and alarm threshold(low level alarm or high level alarm),the user also can customize the alarm information content.
- Powerful communication backup function:if you open an alternate service functions,the main server and backup server connection can antomatically switch,and antomatically connect to the backup server once the main server problems.
- Strong server software support, application for many years, strong function.
- Support fixed IP and DDNS, dedicated APN.
- Support up to four servers synchronizztion function,if open 4G server synchroniztion function,KB8010 4G DTU can register four servers at the same time,and to communicate with each other.
- Working temperature range: -40℃-80℃, communication is not effected at -40℃.

1.3 Safe Use

KB8010 4G DTU Completely complied with national radio product safety technical regulations.

Warm Tip: You must not touch the antenna with your hands or body. During 15 seconds after KB8010 4G DTU started, Please keep away from the antenna. If the antenna is damaged, you must replace it in time, assorted and qualified cable and antenna.

1.4 EMI

Now most electric device all has electromagnetic pulse hardening, but some old device may have no, under RF power radiation, it may go wrong. When you use KB8010 4G DTU, please check the device nearby have electromagnetic pulse hardening or not.

1.5 Appearance and Interface

KB8010 4G DTU has three physical interfaces:

. The first is 10 pins main interface: RS232/RS485/TTL (5V)/CMOS (3.3V), Power supply, Modem COM port

. The second is SMA RF interface: For the antenna

. The third is embed SIM socket: For SIM card

. Size: 82mm(L)*59mm(W)*25.2mm(H)
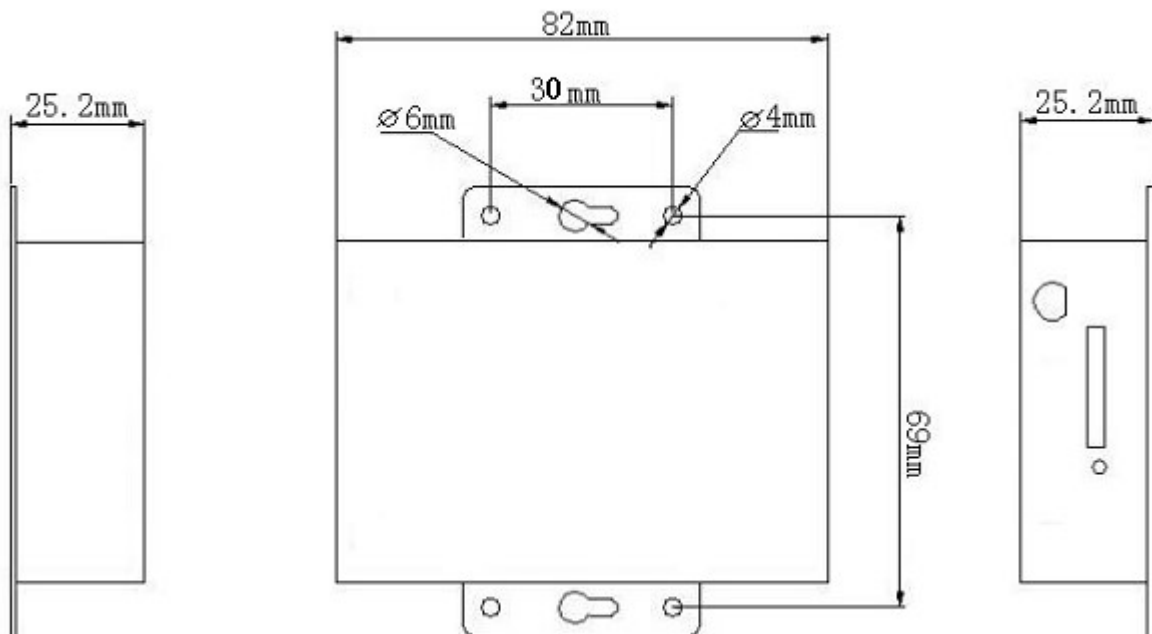
2 Technical Specification

2.1 GSM/4G:

Frequency Band: LTE-TDD:B38/B39/B40/B41
　　　　　　　　LTE-FDD: B1/B3/B5/B8
Upload/Download speed:
　　　　　　　　LTE-TDD:maximum 150Mbps(DL)/ maximum 50Mbps(UL)
　　　　　　　　LTE-FDD:maximum 150Mbps(DL)/ maximum 50Mbps(UL)
Output Power:
　　　　　　　　Working mode:1.5A(maximum)
　　　　　　　　Off mode:20uA
　　　　　　　　Sleep mode:3mA(average)
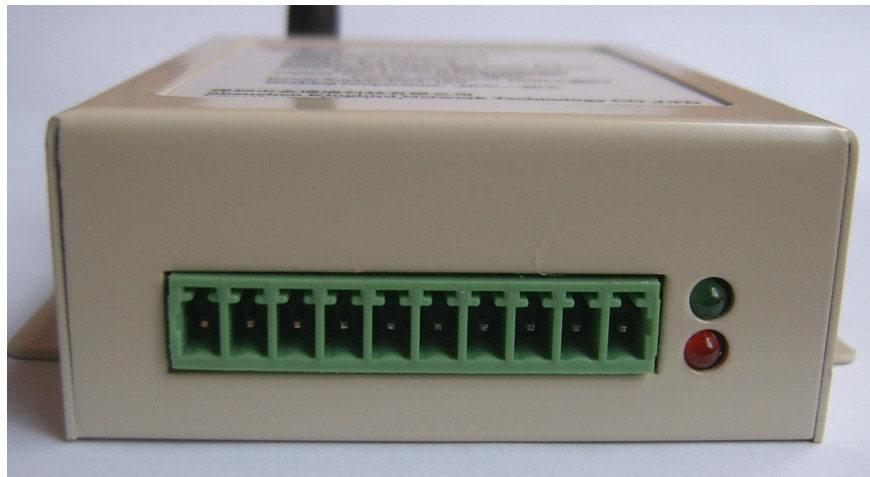Sensitivity: <-96 dBm (typ.)

2.2　　Basic Function:

Embed TCP/IP Protocol
Embed standard AT command（GSM07.05 and 07.07）
Support extend command

Transparent data transmitting
Support IP address or domain name
Support special APN

2.3   User Interface

1.   User Interface: Interface as follow (From left to right):

1	2	3	4	5	6	7	8	9	10
VCC	GND	UTXD/A	URXD/B	Output1	Input1	UGND	Output2	Status	SW

Pin No.	Definition	Description	For User
1	VCC	Power: DC5~24V	
2	GND	Ground	
3	UTXD	TXD（DTU COM/RS485: A）	RS232,TTL:RXD; RS485:A
4	URXD	RXD（DTU COM/RS485: B）	RS232,TTL:TXD; RS485:B
5	Output1	Output NO.1 of IO; User can set it as RTS hardware flow control port (Default: Output1)	
6	Input1/RST	Input No.1 of IO; User can set it as RST reset pin (Default: Input1)	
7	UGND	Ground (COM)	RS232,TTL, RS485:Data groud
8	Output2	Output No.1 of IO; User can set it as CTS hardware flow control port (Default: Output2)	
9	Status	Online is high,offline is low	
10	Input2	Input 2 of IO	

Red LED: power indicator light will be lit after power-on.

Green LED: communication indicator light, the green light will flash slowly 1S if network is not successful registration, when the DTU successfully registered the remote server, the green light will be from slow flashing to lit,user can transmit and receive data,when users need to send text messages,the green light flashes quickly 0.5S,after the transmission is completed,then return to normal brightness condition.

2．SIM Card Interface

SIM Card Interface is on the side of the antenna. When you plug in the SIM card, please note the direction and front /back side. First please push the point nearby, the drawer socket will go out automatically. Then take out the drawer socket and put the SIM card into it, at last push the whole drawer socket(IC side of SIM card face down) into the hole of DTU. Just as below picture:

Notes: Please don't plug or move SIM card after power-on, if you need to plug and move, please put equipment blackouts first.

2.4　Electric Specificity

Work Voltage: 5V～24V DC   (7-60V can be custom made)
Power:
    Standby: < 40mA@5V
    Communicating: < 180mA@5V
    Peak point current: 1.5A@5V

2.5   Circumstances Specificity

Working Temperature: -40℃～80℃
Storage Temperature: -45℃～125℃
Relative Humidity：   20%~ 95%（No Condensation）

3 Terminal Setting

3.1 Overview

KB8010 4G DTU must correct installation just can achieve design functions, usually equipment installation must be approved in our company under guidance of qualified engineers.

Note: please don't charged when install KB8010 4G DTU

3.2 Unpack

For transportation safety, usually KB8010 4G DTU needs reasonable packaging, when you please keep unpacking packaging materials used for future need transshipment. KB8010 4G DTU includes the following parts:

KB8010 4G DTU   1Unit (Packaging depend on order quantity)
Electronic instructions (CD-ROM)   1 copy
Small chuck antenna or club-shaped antenna (SMA interface)   1 root
5V / 2A industrial power adapter   1
KB8010 4G DTU special cable   1

When unpacking the case, check the specific items according to the packing of user's ordering contract.

3.3 Antennas and SIM card installed

Antenna support SMA female pedestal, spin the left from DTU and lock it.

Insert SIM card from the antenna side of KB8010 4G DTU, please note that SIM card metal surface outwards, make sure insert the SIM card to drawer with stuck feeling, to avoid SIM card fall off when SIM card not insert in place or handling equipment vibration. Remove SIM card, click the left little point of SIM card with pointed thing, SIM seats can pop up.

Note: Please don't charged operation when connection with the antenna and install SIM card, please don't power-on KB8010 4G DTU first.

3.4 Serial cable connection

KB8010 4G DTU
The cables interface type and connections of KB8010 4G DTU as figure 3.2 show:

KB8010   User's termianl
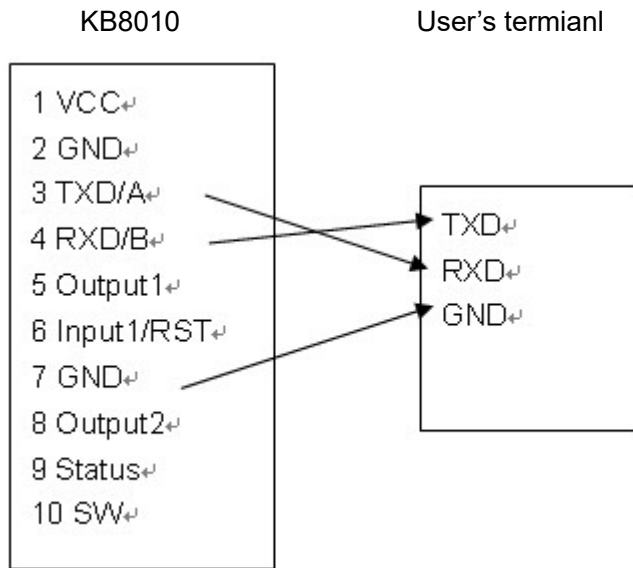
3.2 Serial connection schemes

KB8010 4G DTU user data interface cable connectors is green connectors, spacing: 3.5 mm, 10Pin.

3.5 Inspect network situation

Connect cable and antenna, insert into effective SIM card, power-on KB8010 4G DTU, the power light of DTU will flash, after 10 seconds later, the power light will always light, it means KB8010 4G DTU into a normal work condition and connect with network successfully.

Note:

Before power-on, must confirm KB8010 4G DTU connect with cable correct;

Before power-on, make sure to connect the antenna, to avoid RF impedance mismatch and damage module.

4 Configuration DTU Parameters

KB8010 4G DTU configuration parameters basic mode include two kinds:Serial, and 4G network.

4.1 Serial mode modify the 4G part parameters

Through the serial port to configure parameter of KB8010 4G DTU,first you need to obtain the serial port configuration software(4G_DTU.exe) from our company(when delivery goods along with this software to you),the start of the software default parameters to

configure the DTU.

   Operation steps:
1.   KB8010 4G DTU serial port(here refers to the rs232 interface of the device,if the purchased is not rs232 interface products,please put converter interface type to rs232 interface to connect) connected to a PC serial port.
2.   Run configuration software 4G_DTU.exe(software version upgrade ceaselessly,you can get the latest version of the configuration software from our website or our company personnel., tips are as follows:
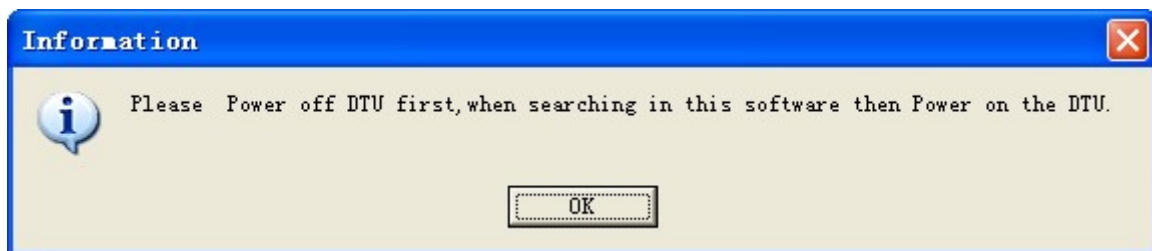

Click OK, and enter the interface configuration software, as follows:
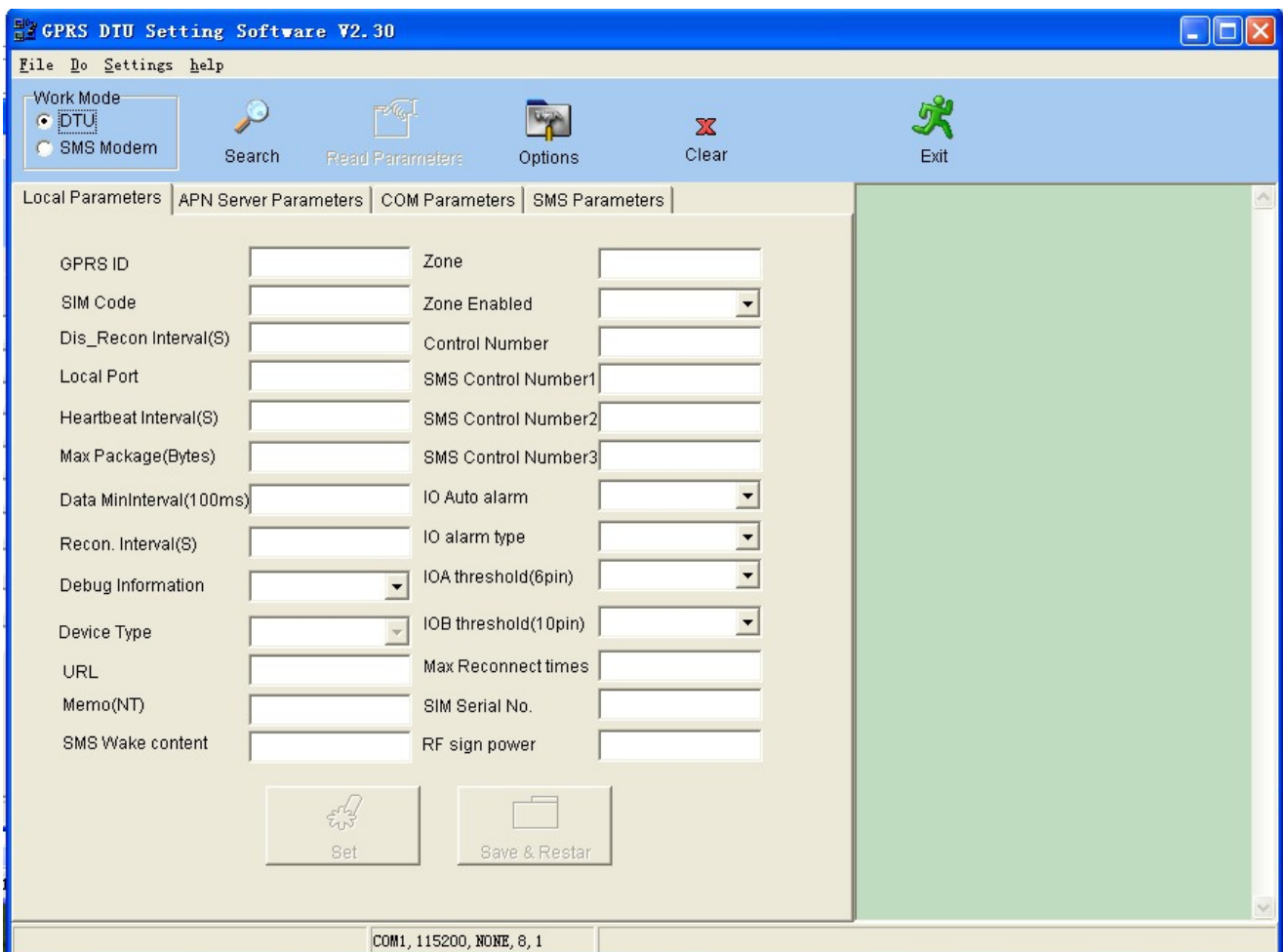
3. This software will automatically open corresponding serial search DTU, processing, please confirm whether the serial port which opened by software is the serial port connected with KB8010 4G DTU, if not, please click the "stop" button in toolbars in the menu options from the file, then change information in COM parameters settings window. (Note: configuration parameters are fixed by 38400bps)

4. Connect the KB8010 4G DTU to the power supply, the system will prompt that search DTU successfully in 5 seconds,and the user can obtain the current product firmware library verion information through the pop-up dialog box information(a new version of the configuration software to support this feature). As shown below:
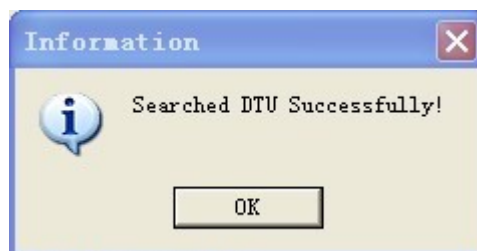
5. Click Read in toolbars, the software will read the parameters, and the display the parameter of DTU. Specific parameters doesnot enumerate here,the user can open the configuration software to view.

Local parameter:

4G ID: 4G DTU the only mark, important at communication.

SIM Code: The SIM card number is only for user record.

Dis_Reconnection interval: The interval of DTU re-connects with backup server or the Main server when DTU connection error or disconnected with Main server or backup server.

Local port: DTU local TCP or UDP port.

Heartbeat interval: The interval of server with DTU's heartbeat for units in seconds, scope: 0-300S.

Max package: To send data packet maximum DTU data bytes (optional 512 bytes) or 1024 bytes.

Data Mininterval: The smallest interval packets (0-1000ms) serial receives data between two value is less than this if a packet, 1~10 units for 100ms.

Recon. Interval:No Response reconnection cycle, if it do not received answer from server for some time, DTU will reconnect with the server. The value scope: 0-3600s. If you set this parameter to Zero, DTU will not reconnect.

Debug information: You can set DTU output its working state information or not. None: DTU will not output working state information; Normal: DTU will not output Sample working state information; Detail: DTU will output detailed working state information. When you connect DTU with your device, please set this parameters value to NONE, in order to avoid output information affect users of the equipment.

Device type: Three types as DTU, Modem, SMS. User can change this parameter to change the working mode. DTU is for 4G data transmission, SMS Modem is data transmission by SMS (type A and type B), When set to Modem, through AT instructions users can achieve dialing, Internet, making phone calls, use of messages and so on. (Note: Modem can't switch by this way; it only can switch through AT command when power on)

Zone: The working code DTU belongs. Generally we just use this parameter when networking.

Zone Enabled: The enabled or disabled working code which DTU belongs to.

Control Number: The phone number which control sleep or awake DTU and amend the parameters of DTU by SMS, user can dial this number to control DTU sleep or awake, sleep mode can save a lot of 4G Flow Fee, DTU will be sleep or awake by any call if this value is none, so user is advised to set a phone number.

SMS control number: This number works When DTU working as SMS Modem, it can be set three numbers, after set the number, only these three numbers can message DTU, if no number, then any phone number can message it.

Automatic alarm: When set it "ON", it will send alarm signal to server automatically, otherwise, it won't

IOA threshold (6 pin): When the IO automatic alarm is opening, set the situation of IOA as high level or low level, the DTU interface is the sixth terminal from left to right.

IOB threshold (10 pin): When the IO automatic alarm is opening, set the situation of IOB as high level or low level, the DTU interface is the tenth terminal from left to right

MAX reconnection times: DTU will restart when it can not connect in how many times.

APN Parameter And Server Parameter:

APN: Name of 4G Access Point.   In China: cmnet

User name: Name of login 4G account. When using VPN networking, user name must be input.

Password: the password when DTU login 4G.

Main server IP: IP Address of main server connected with 4G DTU.

Main server port: Port of main server connected with 4G DTU.

Network Protocol: The protocol of Main server connected with 4G DTU, include two types as TCP & UDP.

User Protocol: Single, Normal, Transparent, normally set it as "Single" if no special requirement, user is forbidden to change.

Backup server IP: IP Address of Backup server connected with 4G DTU. User can set this parameters same as main server's.

Backup server port: Port of Backup server connected with 4G DTU. User can set this parameters same as main server.

COM Parameter:

**Baud Rate**: The speed of 4G DTU adopted, support from 300 to 115200bps.
Data bits: The data bits of 4G DTU COM data, support four kinds of bits as 5/6/7/8.
Stop bits: The stop bits of 4G DTU COM data, support three kinds of bits as1/2/1.5, generally the stop bits is 1bit.
Verify: The way of checking 4G DTU COM data, Classify it to None, Even, Odd, Mark, Space, etc.
Flow Control: Com data transmission classify to none flow control, hardware flow control, software flow control. None flow control is in genaral.
Notice: After choose or import parameters, and click Set button, software will prompt:
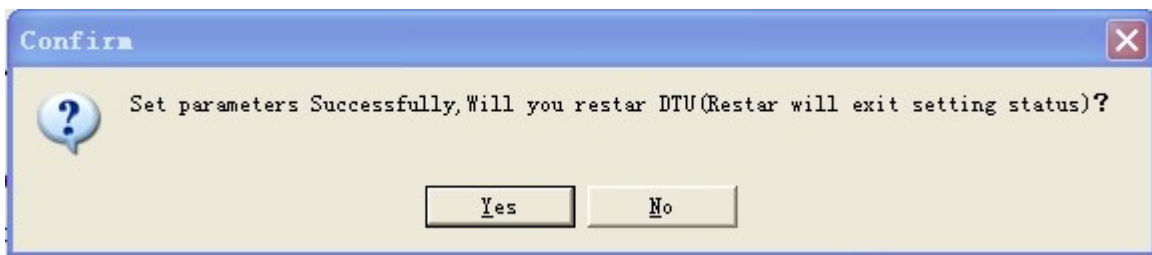
Now, if you need to change others parameter, please choose NO, after changed others parameter, then click Set, will prompt it again, DTU will restart, and exit the Parameters configuration state after choose Yes, If you need to change parameter again, you should to outage DTU and re-search after Power-on.

4.2 Wireless mode modify DTU parameters

In order to meet the needs of different customers,KB8010 4G DTU also support Wireless mode for remote modification of DTU basic parameters,but the premise of using the function is product work in the conventional protocol of the 4G Wireless mode,and server-side or client side support for remote modify DTU basic parameters of the agreement. If customers use our company server,all support this function,if not, you can contact our company related personnel access to the configuration or SDK to use this function.

5．IO Control—Reading And Setting

User can send instruction to DTU through server, to read and control the IO flow.

5.1 IO Input state Reading

1．Read：Server➔DTU

Head	4G ID	Zone	FUNCTION CODE	Zone enabled	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x06 (1byte)	0x00 OR 0x01	CheckSum 1byte

State: CheckSum is a accumulation data form FH to PARITY, if the data greater than 255, then choose 256 pattern, (The Remainder by divided 255)

For example: A8 81 30 30 30 30 30 30 30 30 30 30 31 30 30 30 31 06 01 02, represent that reading the DTU's(4G ID: 00000000001, Zone: 0001, Zone enabled: true.) IO status.

2. Reply: DTU➜Server(or active report all this format when IO state response and change input interface)

Head	4G ID	Zone	FUNCTIONCODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x07 (1byte)	0x00 or 0x01	2bytes	CheckSum 1byte

Notice:

1. IO Port State: High Level: ox01, Low level: ox00, in proper order is 6, 10.

2. When set the DTU IO automatic alarm Open, and the input terminals 6, 10 feet of DTU is to the corresponding threshold, DTU will sent alarm information to server automatically, alarm information is this format.

5.2 Output state of IO flow settings

1. Setting: Server➜DTU

Head	4G ID	Zone	FUNCTION CODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	04 (1byte)	0x00 或 0x01	2bytes	CheckSum 1byte

State: Ouput port state: high level: ox01, low level:ox00

2. Reply: DTU➜Server

Head	4G ID	Zone	FUNCTION CODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x05 (1byte)	0x00 或 0x01	2bytes	CheckSum 1byte

State: Output port state: high level: ox01, low level: ox00

6．KB8010 4G DTU Application Guide

6.1 Operation Steps:

(1)．Plug in SIM card;
(2)．Connect the antenna;
(3)．Set DTU Parameters;

Connect the data cable. DTU's user interface is 10PIN socket, If DTU is RS232 interface, you can connect it with DB9 of COM port, if DTU is RS485 interface, and you can use one converter of RS232-RS485 to connect it with DB9 of COM port.

Run the configuration software, choose and open all the COM port that DTU connected;

Connect with the Power. The power adaptor(5V) is One of the enclosures，first you can plug the power adaptor into the power socket, then connect the male into the female socket of the power cable. DTU can get power. KB8010 4G DTU Setting Software will list the menu of configuration. You can choose different menu to set different parameters, such as server IP, port, baud rate and so on. (Baud rate and Verify must be same with the device), then save the parameters and reset DTU.

(4)．Connect DTU with the device

Connect DTU with the device according to the interface define of DTU. If DTU is RS232 interface, you can connect it with the device of RS232, If the DTU is RS485 interface, you can connect it with device of RS232.

(5)．Star the control center software or the SCADA software to collect the remote device's data.

6.2 User utility software R&D and server planning

Users need planning on R&D software which in 4G application, user can choose fixed IP servers or dynamic domain mode. Based on dynamic DNS is unstable, User is not advised to adopt this way. Here is the explain for the planning on software R&D based on fixed IP servers

Fixed IP server user can rent or hosting ISP Internet service provider, or can apply special line to our server.

Generally speaking, user's monitoring software can divide into two modes:

One is the user monitoring software and Data center software (Data center) integration. Namely the user monitoring software is installed on the Server, and its working mode as Server, it communicate with and manage every scene DTU directly, the advantage of this way is communication directly, no data transfer, Disadvantage is that the flexibility for application is not strong, server must be in the user's master-control room (special line). So that users just can monitor and data collect in that server only.

Another is the user monitoring software and Data Center software (Data Center) separation, Data Center dedicated to Data transfer and each machine DTU's management, monitoring software only in charge of the customer's business logic processing, it communicate with Data Center software through network, and it with Data Center software is C/S architecture, the monitoring software working mode as Client, and Data center as Server. The advantage of this way is very flexible application, user no need

special line, only need place the server in ISP service provider, and install Data center software into server. User can manage it only by user's monitoring software, and when monitoring software install into a computer which connect with internet, it can achieve communication even in company or on business trip outside. The disadvantage of this mode is data need to transfer, monitoring software is not communicate with DTU directly, But communicate with data center software first, and then forward data to scene DTU.

Users can plan the whole 4G application system according to user's request. Normally, users are suggested using the second modem, our company's server and server software is available to offer a lot of support when user debugging and trial in the early time. If users develop software completely, Our company can offer SDK or Demo program when user monitoring software work as the server (when user monitoring software and data center software is integration) or Client (when user monitoring software and data center software is separation).