CT2000<E>
Long Battery GPS Tracker
User's Manual

Version:3.0

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1.Introduction:

CT2000E is a terminal with GPS and GSM/3G/4G connectivity, which is able to determine the object's coordinates and transfer them via the GSM/3G/4G network. This device is perfectly suitable for semi-trailers tracking which is not with permanent power supply. CT2000E built-in 5000mAH battery with smart power saving technology can last from 2 weeks to months during time based on different position data updates interval.

1.1 Instruction of Safety:

Do not disassemble the device more than it is allowed. If the device is damaged, the power supply cables are not isolated or the isolation is damaged, before unplugging the power supply, do not touch the device.

All wireless data transferring devices produce interference that may affect other devices which are placed nearby.

The device may be fitted only by qualified personnel.

The device must be firmly fastened in the predefined location.

The device is susceptible to water and humidity in environment with IP class greater than IP67.

Use only batteries provided by ANBTEK. If wrong battery is used, the device may malfunction. ANBTEK takes no responsibility for device damage caused by third party batteries.

Any installation and/or handling during a lightning storm is prohibited.

Please use cables provided with CT2000E device. ANBTEK is not responsible for any harm caused by using wrong cables for PC <-> CT2000E connection.

ANBTEK reserves the right to change or modify the device in a way that feels is acceptable and is not in disagreement with terms and conditions.

Ensure that the batteries are not immersed in water. When stored, keep the device in a cool and dry place.

Ensure that device and batteries are not exposed to hot surfaces or direct sunlight.
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When transporting, ensure that batteries are safe from metal articles and do not keep it with metal rings, chains, etc.

Do not damage battery with sharp objects.

Do not try to charge the battery – this may lead to explosion and/or other harms

1.2 About document terms definition:

This document contains information about the architecture, mechanical characteristics, configuration and possibilities of the CT2000E device. Acronyms and terms used in document

- PC – Personal Computer.
- GPRS – General Packet Radio Service.
- GPS – Global Positioning System.
- GSM – Global System for Mobile Communications.
- SMS – Short Message Service.
- AC/DC – Alternating Current/Direct Current.
- Record – AVL data stored in CT2000E memory. AVL data contains GPS and I/O Information
- AVL packet - Data packet that is being sent to server during data transmission. AVL packet contains from 1 to 25 records.
- Profile – operating mode for CT2000E device. It consists of list of settings indicating how device should behave in certain situations.

1.3 Power and Battery:

CT2000E is with built-in 5000mAH rechargeable battery which can last for a expected time as defined. But it's also support to connect with an external power with range from 9V -36V DC for instant working and battery charging .

- Voltage: 7.4V DC
- Nominal capacity: 5000mAh
- Max pulse current not less than: 2000mA
- External Power connection: 9-24V DC @2.0A
- Battery recharging current with 1.5A recommended.

1.4 Package Contents:

The CT2000E device is supplied to the customer in a cardboard box containing all the equipment that is necessary for operation.

The package contains:

1. The CT2000E device.
2. Micro USB cable.
3. I/O cables with power+, ground and one digital input and one ADC analogue input.

| Strong Magnetic Kit | 12V Cigarette Power Jack | Door Sensor | Temperature Sensor |

Optional Accessories:

- Car Cigarette Power Jack for Power charging.
- Strong Magnetic Installation Kit
- Door sensor
- Temperature sensor

2. Characteristics:

2.1 Basic Characteristics:

- GSM / GPRS / 3G Parameter

General Features

Frequency Bands	**UC15-E** UMTS/HSDPA: 900/2100MHz GSM/GPRS: 900/1800MHz **UC15-A** UMTS/HSDPA: 850/1900MHz GSM/GPRS: 850/900/1800/1900MHz
HSDPA	Release 5 (category 6)
EDGE	DL only
GPRS	Multi-slot Class 12
UMTS	Release 99/5
GSM	Release 99/4
Supply Voltage Range	3.3V ~ 4.4V
Operation Temperature	-40 °C ~ +80 °C
Dimensions	29mm x 29mm x 2.5mm
Weight	Approx. 4.0g
Control via AT commands	3GPP TS27 007, 27 005 and other enhanced AT

Specifications

SMS		Point-to-point MO and MT SMS Cell Broadcast Text and PDU Mode
DATA	HSDPA	Max.3.6Mbps
	UMTS	Max.384 Kbps (DL)/Max.384 Kbps (UL)
	EDGE	Max.236.8 Kbps (DL)
	GPRS	Max.85.6 Kbps (DL)/Max.85.6 Kbps (UL)
	CSD	14.4 Kbps
Voice	Speech Codec Modes	HR, FR, EFR, AMR, AMR-WB
	Echo Arithmetic	Echo Cancellation Noise Reduction
Protocols		TCP/IP/UDP/PPP

- 4G Parameter

Frequency		EC25-E	EC25-EU	EC25-EUX	EC25-J	EC25-A	EC25-V	EC25-AF
LTE	LTE-FDD	B1/B3/B5/B7/B8/B20	B1/B3/B7/B8/B20/B28A	B1/B3/B7/B8/B20/B28A	B1/B3/B8/B18/B19/B26	B2/B4/B12	B4/B13	B2/B4/B5/B12/B13/B14/B66/B71
	LTE-TDD	B38/B40/B41	B38/B40/B41	B38/B40/B41	B41			
WCDMA		B1/B5/B8	B1/B8	B1/B8	B1/B6/B8/B19	B2/B4/B5		B2/B4/B5
GSM/EDGE		B3/B8	B3/B8	B3/B8				
Embedded GNSS		Optional	Optional	Optional	Optional	Optional	Optional	Optional
Wi-Fi/BT Interface		Y	Y	N	Y	Y	Y	Y
Region		EMEA/South Korea/ Thailand/India	EMEA/Thailand	EMEA/Thailand	Japan	North America	Verizon	North America FirstNet

- GPS Specification

- Skylab GPS Receiver
- Tracking sensitivity: -160dBm
- Accuracy:5Meter

- Advantages:

- 4G LTE/WCDMA network compatibility
- Smart profile switching (any element dependent)
- Highly configurable data acquisition and sending
- Multiple GEO areas configuration
- Real-time process monitoring
- Authorized number list for remote access
- Firmware update via USB
- Configuration update via SMS or USB port
- 10000 record storing
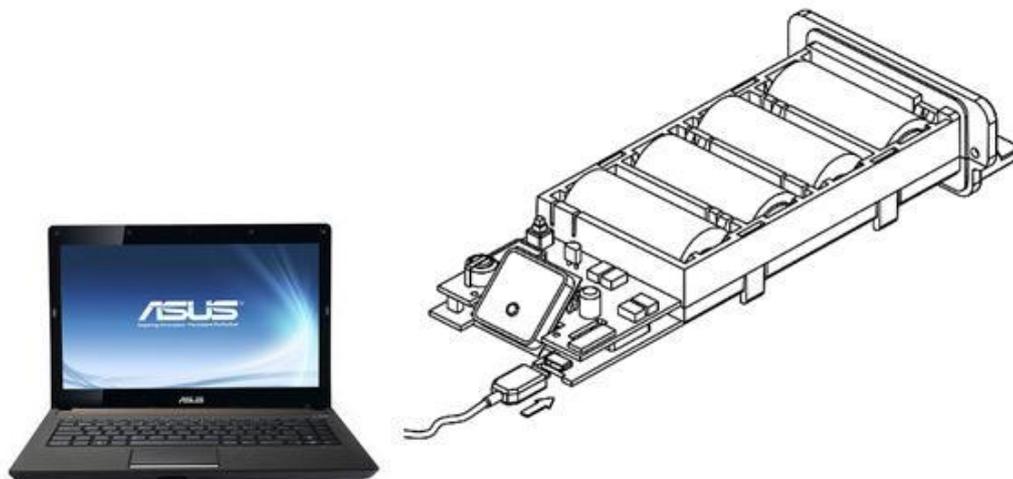- Extra long battery life time

- Mechanical Characteristics:
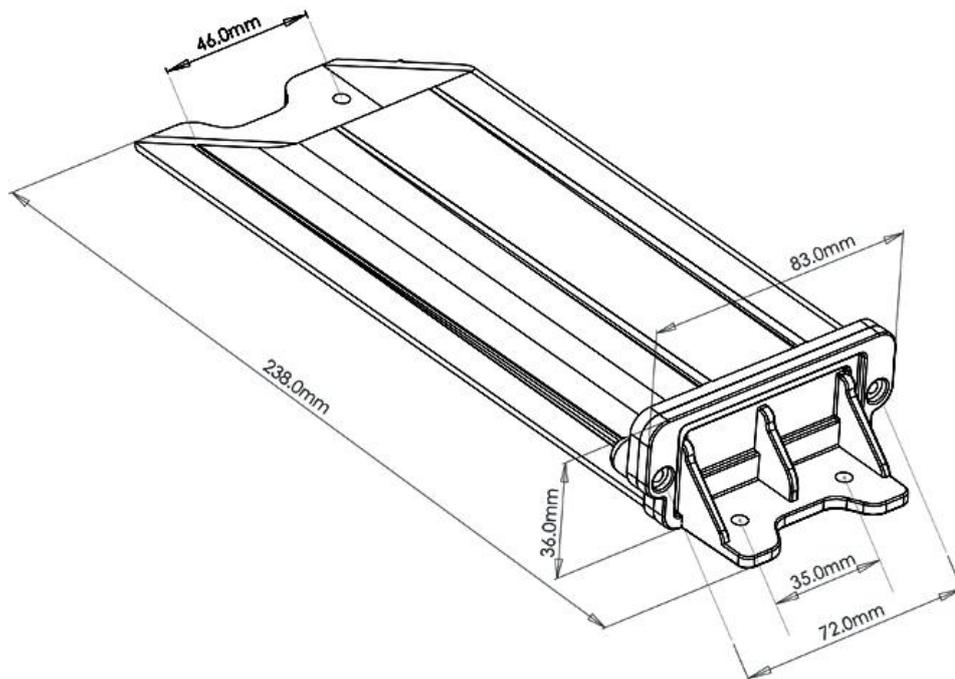
-SimCard Insert Scheme:
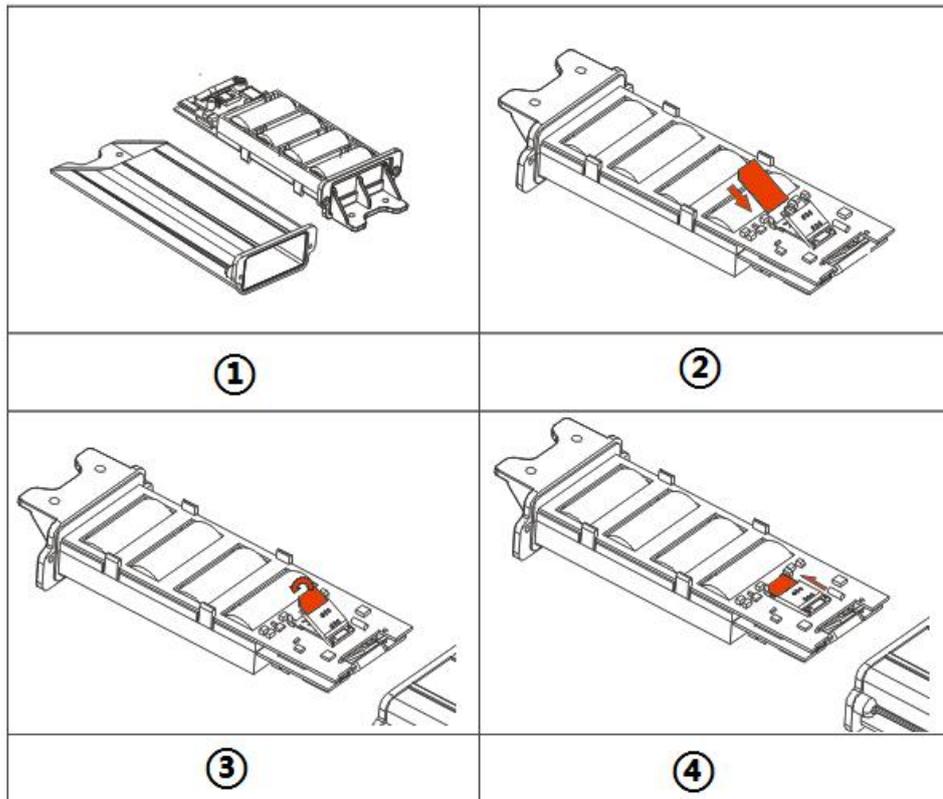
Operation Process:

① Open CT2000E Plastic Box by Screw Driver

② Open Simcard Slot lid and insert SIM

③ Close Simcard Lid

④ Push SIM card lid in the shown direction to lock it and assemble CT2000E

-Connect CT2000E with PC by Micro-USB:

-Electrical Characteristics:

CT2000E Device：

- Power Supply: 9-24V DC
- Working Temperature：-25℃-70℃

Batteries：

- Voltage：7.4V DC
- Nominal capability:5000mAH
- Max Pulse current not less than 2000mA

The battery lifetime of CT2000E is subject to configuration, coverage of GSM and GPS signals.

Expected battery lifetime depends on:

- Temperature;
- Humidity;
- GSM level
- GPS satellite visibility
- Configuration of device – additionally monitored parameters, etc.

Expected battery self discharging is 1-3% per year in normal humidity and 20°C.

3. Preparation:

3.1 Configuration Software Requirements:

- **OS Environment**

Windows XP SP2 or Higher version，Windows Vista ，Windows 7

- **Configurator Program and Driver**

Please download CT2000E driver from ANBTEK website support center:

http://www.anbtek.com/index.php?_m=mod_static&_a=view&sc_id=7

TS10 Configurator.rar	Download
TS20 Configurator.rar	Download
TS30 Configurator.rar	Download
TS100 Configurator.rar	Download
AS200 Configurator.rar	Download
AS201 Configurator.rar	Download
CT2000 Configurator.rar	Download

3.2 Configurator:

CT2000E configurator gets not necessary for installation. Just run the CT2000E Configurator.exe file inside the program folder:

Note:

- During driver installation, please keep CT2000E powered up and connected with PC by USB cable
- Select a correct ComPort for CT2000E device.

Silicon Labs CP210x USB to UART Bridge (COM3)

To find out which COM port is used follow these steps:

• Right-click on 'My Computer' and choose 'Properties';
• Go to 'Hardware' and click on 'Device Manager';
• Expand 'Ports (COM & LPT)' menu.

See COM port number near 'Silicon Labs CP210X USB to Uart Bridget'.

4. Device Working Principles:

4.1 Working Profiles:

In order to save the battery using fast, CT2000E is designed to stay in a sleep mode as long as possible. Device periodically wakes up for a very short time and checks states of static/Movement. And in preset wake up time will check all I/O parameters, if I/O event(s) state has changed, profile manager changes to profile according to logical sentences.

If there is no any profile compatible with current conditions, it will auto take P5 as the default profile.
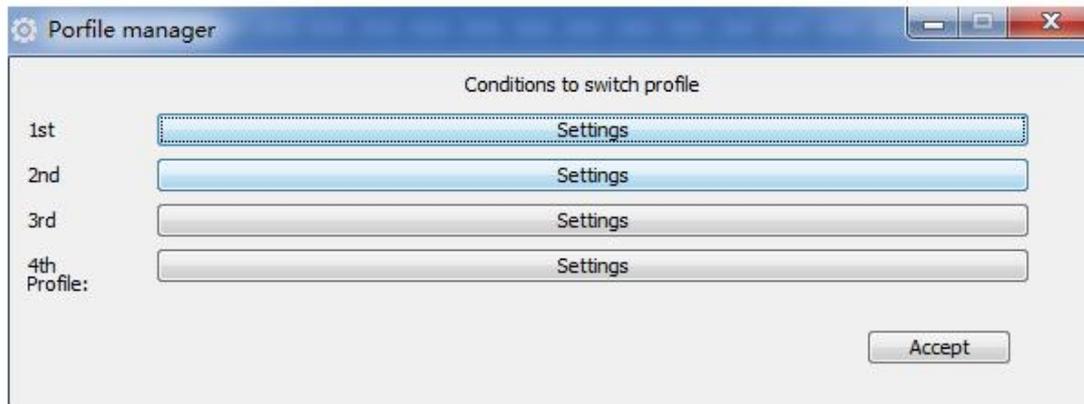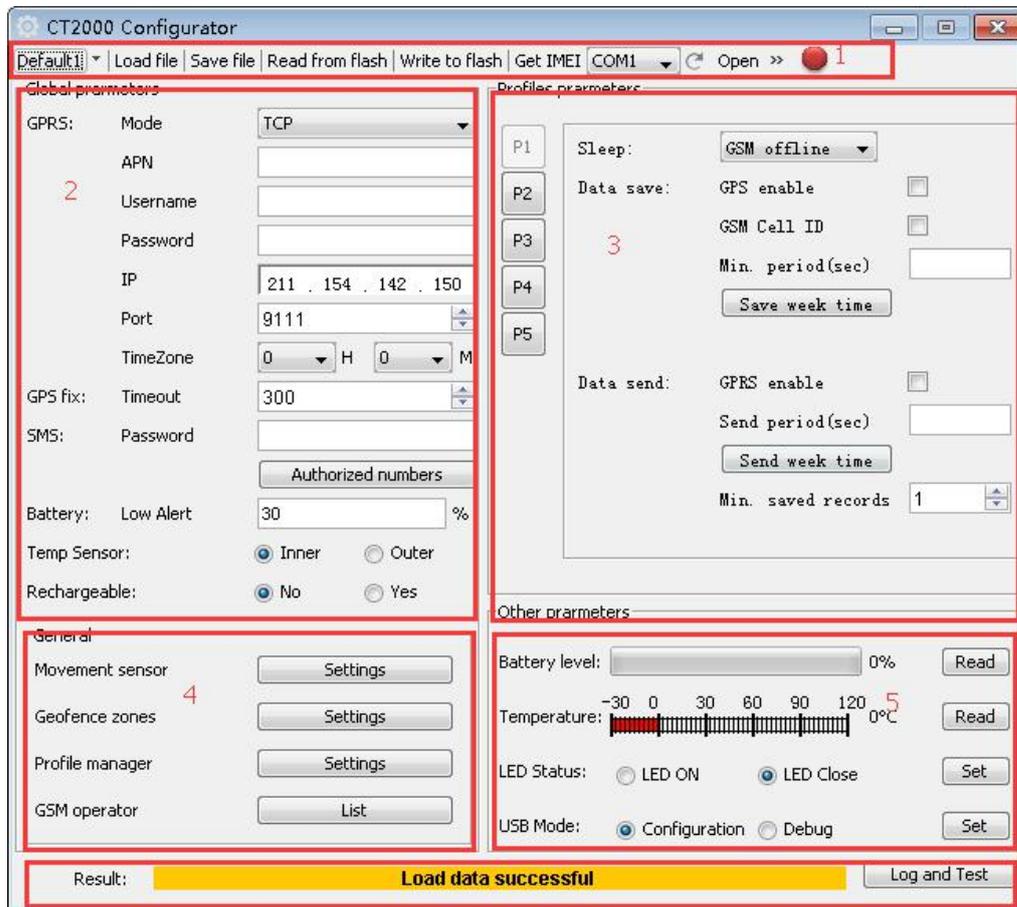
4.2 I/O Events:

CT2000E supported I/O events are
- Critical low Battery level
- GSM Network Roaming
- Power Connection source
- Door Status
- Temperature level
- Static/Movement status
- GEO Areas status(IN/OUT)

All these I/O events can be used for profile switching conditions.
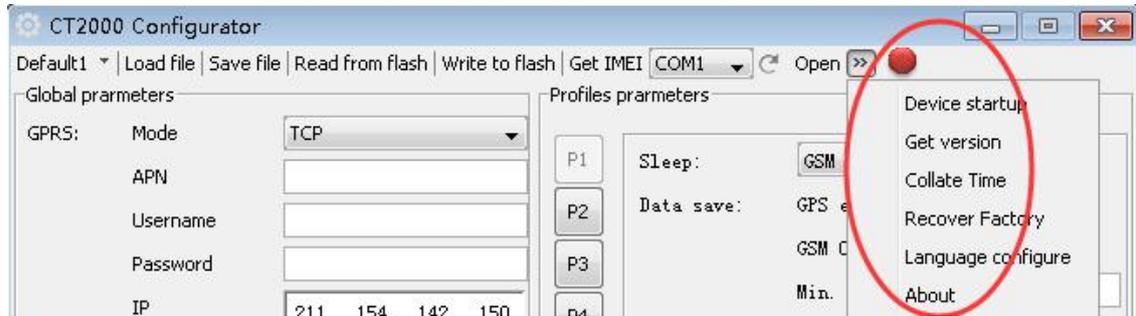
5. Configurator Operation:

Main CT2000E Configurator windows consist of:

1) Operation Menu

2) Basic Device Setting

3) General Setting

4) Profile Parameters Setting

5) Other Setting includes Battery level, LED light Switch ON/Off and USB working modes

5.1 Operation Menu:

Please find the Operation menus instruction as follows:

- **Default Data**

Inside the configurator, we build up total 5 default data based on typical application with different battery lifetime cases, which can help client to do quick configuration for CT2000E.

- **Load from file**

Click this button to load device settings from file which you have saved last time.

- **Save to File**

Click this button to save manually entered setting to a file.

- **Read from flash**

Read settings that are already stored in CT2000E device.

- **Write to flash**

Save the settings to CT2000E memory.

- **Get IMEI**

Read CT2000E modem IMEI number.

- **COM port**

Click this drop-down list to choose which COM port is used by CT2000E to connect to PC.

- **Refresh button**

Click it to refresh all available ports on PC. This button is used when you connect CT2000E to PC while Configurator software is already launched, but it did not detect Virtual COM Port yet.

- **Addition Functional Buttons**
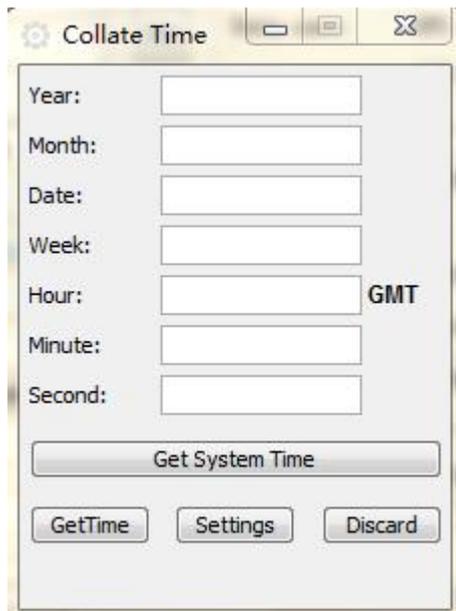
• Device startup:

Click this button to test data acquisition and data sending.

After this button was clicked, device will wake up from sleep, and open GPS to locate and send current location data once to remote server.

• Get Version:

To get device firmware version inside the CT2000E device

• Collate Time:

This collates time function is for the purpose to maintain a time clock when GPS time is not Available

- Recover Factory:
  By click this button to reset all CT2000E parameters to be factory default setting.
- Language Configure:
  Adjust Configurator language.

5.2 Basic Parameters:

- **GPRS Setting：**
- Mode: select data transfer mode for GPRS connection – TCP/IP or UDP/IP; CT2000E gets TCP/IP supported only now.
- APN: (Access Point Name) this is operator provided parameter and is used to open GPRS connection in GSM network. Please contact your GSM operator to find out your APN.
- Username: APN username used to open GPRS connection in GSM network. In some cases it is not required and field is left blank.
- Password: APN password used to open GPRS connection in GSM network. In some cases it is not required and field is left blank.
- IP: this is destination server IP address to which CT2000E is sending data using GPRS.
- Port: this is destination server port number to which CT2000E is sending data using GPRS.

- **GPS Fix**
- Timeout:
  In preset wake up time, CT2000E will wake up to get current location via GPS. But in some area, there is with very low signal, or not possible to get signal at all, in order to not use out the battery, we have to define a maximum signal searching time. Normally you can put as 3Minutes. If 3 Minutes passed, device will back to sleep no matter it gets valid or invalid signal.
- **SMS Setting**

- Password:

  Enter a password for all incoming SMS to the device. Device will discard all recieved SMS with

  passwords that do not match the entered one.

- Authorized numbers:

  A list of GSM numbers – CT2000E will read messages only from listed number and discard all messages from other numbers. If no numbers are entered, CT2000E will read messages from all numbers.

  The first number is server GSM number – it is used to send SMS to server modem.

  Numbers have to be entered in international format without '+' sign.

- **Critical Low Battery Alert Limit:**

  By this setting to get Alerts when battery goes to a critical level and which means you need to recharge the battery.

  Our suggested level is 30%. Because in our testing, we observed after the battery volume goes down to 30%, it works non-stable and capability goes down rapidly.

5.3 General Settings:

- **Movement Sensor Setting**
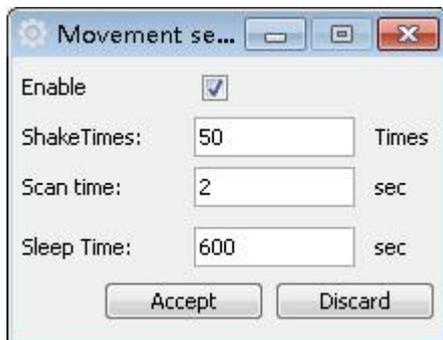
- **Enable/Disable:** If enable Movement sensor work
- **Shakes Time:** Means shaking times. If the shaking times in preset time breached this limit, it will generate a real movement.
- **Scan Time:** After device wake, how long time you want the processor to scan for this movement sensor. During this time period, it will keep MCU On which consumpts power either.
- **Sleep Time:** Means how frequently you want the processor to wake up to check movement status.

- **GEO fence zones**

  Geo fencing Frame border is measured in meters. Zone Border feature is specially used in order to specify certain region within which crossing will not be indicated as event until border is completely crossed (hysteresis-like principle).
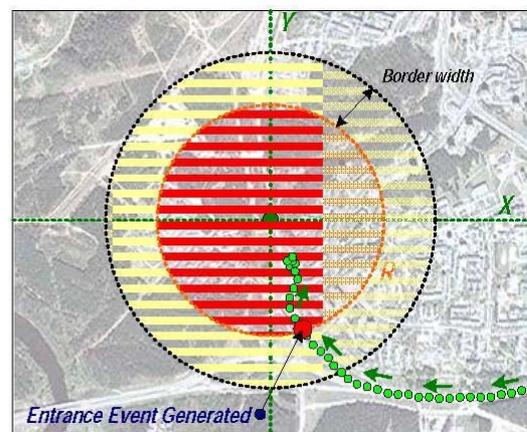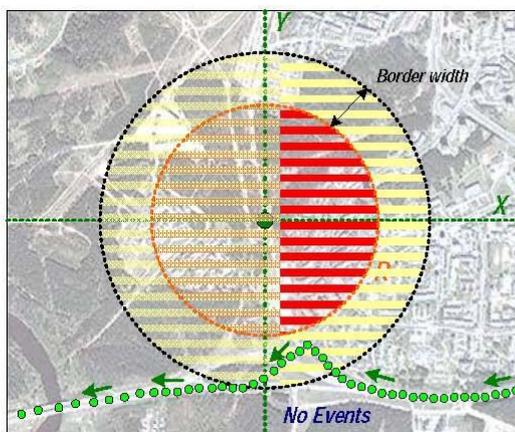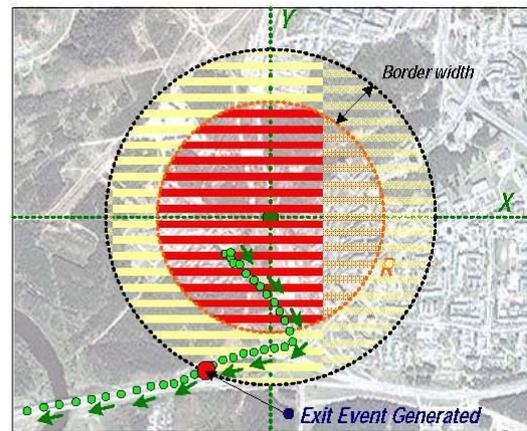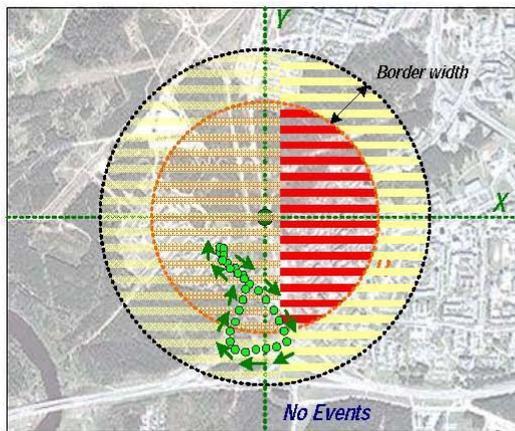
- Area Shape:

Individual GEO Zone shape selection. There are two shapes available: Circular or Rectangular.

- Priority:

N/A. Hold for future.

- Enter Event
- Exit Event
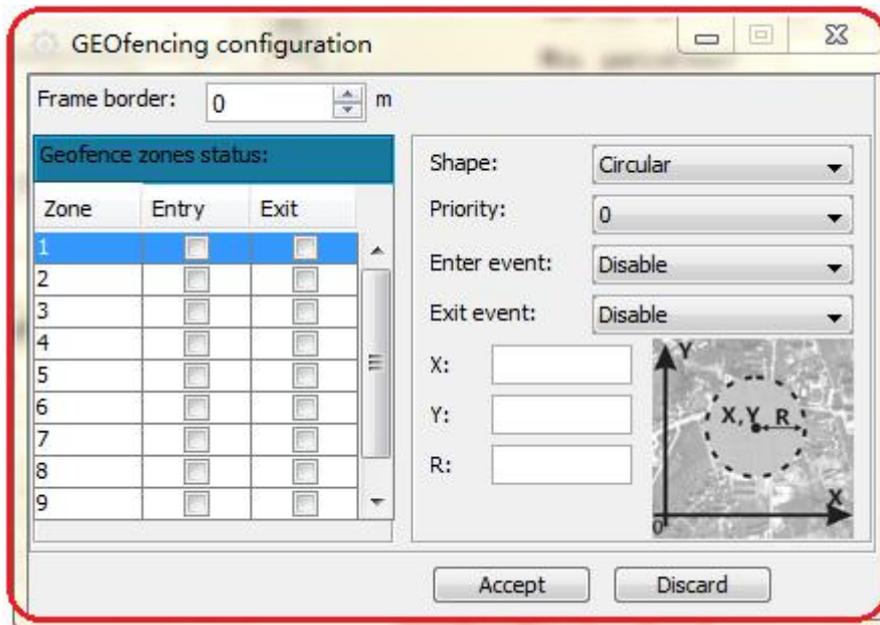
- **Profile Manager**

Managing between profiles was done via Profile Manager. If external circumstances are identical to those stated in logical sentence, profile switching occurs.

There are four sentences: getting from first to fourth profile. Switching to P5 profile occurs when there are no valid sentences which match all stated conditions.
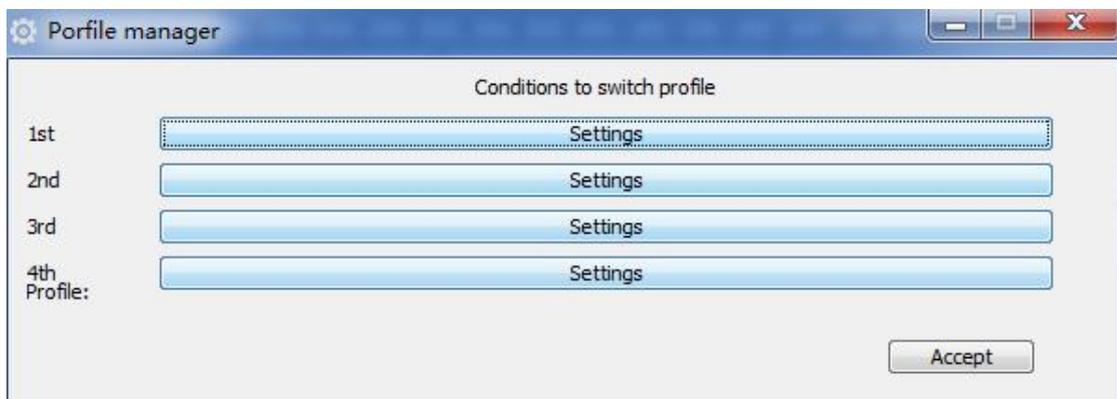
In this profile manager, you can create each profile "entering" conditions. Only selected all I/O are met, then the device will enter this profile.

If Profile 1 and profile 2 were setup as same conditions the device will follow the priorities from Profile 1-->> Profile 2-->> Profile 3-->> Profile 4-->> Profile 5->. Profile 1 will have the highest priority.

About exit profile, only the I/O conditions are not met, then device will leave the current mode.
For example, if Profile 1 and profile 2 are same conditions, but device currently working in profile 2, device will not exit profile 2.

- **GSM Operator List:**

Contain list of up to 200 accepted operator codes.

If device is in these operators network, device consider as Non-Roaming. Otherwise device consider as in Roaming.

If operator list left empty, device will not activate the detection for roaming or not.

List of GSM operator codes: http://en.wikipedia.org/wiki/Mobile_Network_Code

5.4 Profiles Parameters:

This set of parameters applies for device only when it is operating in appropriate profile. To choose a profile click on 'P1', 'P2', 'P3', 'P4' or 'P5' and enter desired values.

- **Profile Parameter Editor Window**
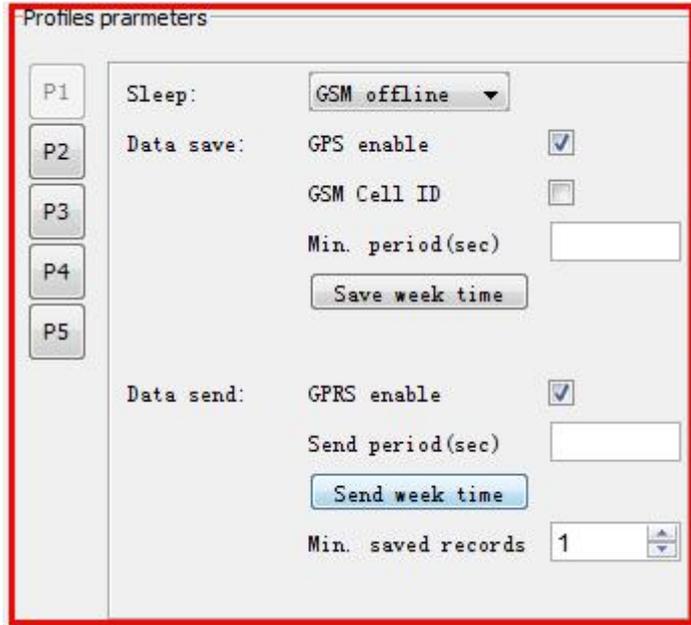
- **Sleep**

   GSM modem keep in Off/ON when device is in sleep mode

- **Data Save**

- GPS enable: Enables or disables GPS data acquisition in this profile.

- GSM Cell ID: Enables or disables ability to acquire GSM Cell ID

- Min. Period: time interval in seconds, when device is trying to establish its location
  and make a record.

- Save week time: if 'Min. Period' value is 0 or empty, then CT2000E uses this table
  when to make records.

- **Data Send**

- GPRS enable: enables or disable GPRS in this profile

- Send Period: time interval in seconds, when device is trying to send recorded data to
  the server.

- Send week time: if 'Send Period' value is 0 or empty, then CT2000E uses this table
  to send records.

- Min. Saved Records:

Every time CT2000E makes attempt to connect to the server, it checks if it has at least
predefined number of records to send. If it has less record than the value of this field, it
does not connect to the server and waits for next attempt after time.

5.5 Other Setting :
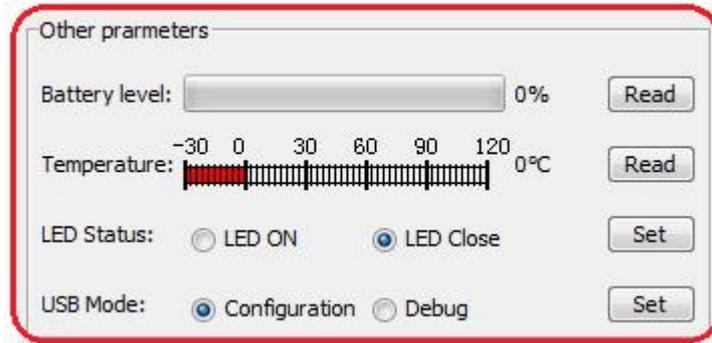
- **Battery Level**

CT2000E is able to monitor battery current level.

- **Temperature:**

Show current Temperature value from connected sensor.

- **LED Status:**

CT2000E gets 3 LED lights on the circuit board which is used to indicate the device working status.

Normally these 3Led lights are only used in testing or debug. After you have done the all the testing and configuration, please switch off these lights which will save concrete power consumption.

- **USB Mode**

When CT2000E is connected with PC via USB, its get two working mode:

• Configuration Mode

In this mode, you can do the configuration job by this configurator.

• Debug Mode

In this mode, it's used to monitoring device working behaviors by using the "Log and Test" window.

6. SMS Command List:

Command Name	Command Format	Device Reply
Change Device Password	*1234*E4321#	Password has been changed!
Setup GPRS Parameters	*1234*GPRS:211.154.142 .155,9008,0，CMNET,,#	GPRS Parameter:863070015806069,211.154.142.150,9114,0,CMNET,,
Query GPRS Parameter	*1234*QP#	GPRS Parameter:863070015806069,211.154.142.150,9114,0,CMNET,,
Working Profile Configuration	*1234*setpar:P1,OFF,ON, ON,3600,ON,3600,1#	P1,OFF,ON,ON,3600,ON,3600,1;P2,OFF,ON,ON,3600,ON,3600,1; P3,OFF,ON,ON,3600,ON,3600,1;P4,OFF,ON,ON,3600,ON,3600,1; P5,OFF,ON,ON,3600,ON,3600,1
Query Profile Setting	*1234*querypar#	P1,OFF,ON,ON,3600,ON,3600,1;P2,OFF,ON,ON,3600,ON,3600,1; P3,OFF,ON,ON,3600,ON,3600,1;P4,OFF,ON,ON,3600,ON,3600,1; P5,OFF,ON,ON,3600,ON,3600,1
Query Status	*1234*X#	Battery:xx%;Moving/Static;Door Open/Close;Temp:xx ℃;Inner/Outer Battery;GSM:xx;GPS:xx;2011-12-08 12:32:13;V;60Km/h;Heading:60;Lat:xx.xxxxx,Lon:xxx.xxxxx
Query Google Link	*1234*P#	Time:2014-10-08 12:32:13,V,60Km/H,Heading:60,LAC:2638,CID:0ECF; http://maps.google.com/maps?hl=en&q=22.537222,114.020948

7. Firmware Upgrading:

CT2000E only can do the firmware upgrading via USB port.
Details operation method please refer to other document which provided by ANBTEK team.

8. Quick installation Diagram: