# F2303 EDGE DTU

# USER MANUAL

# Contents

# Chapter 1 Brief Introduction of Product

## 1.1 General

F2303 EDGE DTU is based on public EDGE network, and it provides customers with high speed, "always online", transparent data transfer channel. It has been widely used on finance, electric power, environment protection, transportation fields and so on.It also supports APN to meet the need of customers.

## 1.2 Product Features

- ✧ Industrial MCU, 100M
- ✧ Design with standard TCP/IP protocol stack
- ✧ Adopt smart online keeping technology to make sure that DTU is always online.
- ✧ Support double data centers, one main and another backup
- ✧ Support multi data centers, It can support 5 data centers at the same time
- ✧ Support dynamic domain name(DDNS) and IP access to data center
- ✧ Support several work modes
- ✧ Support hardware and software WDT
- ✧ Easy to upgrade firmware
- ✧ Support remote configure and control
- ✧ Support RS232/RS485
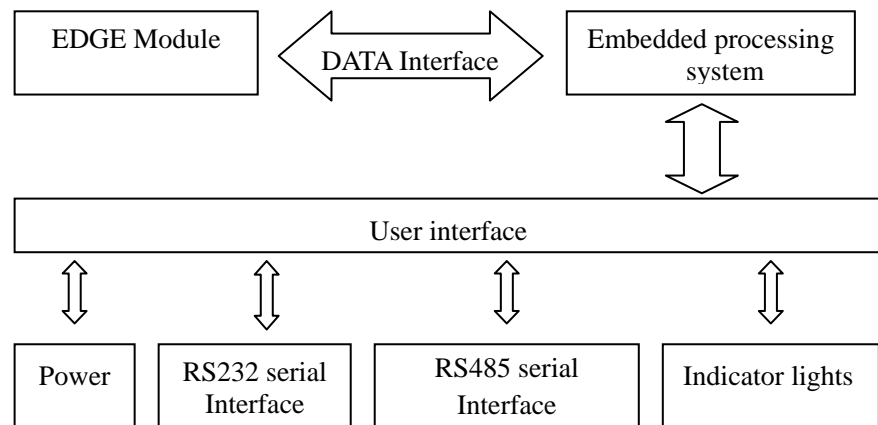- ✧ Power range: DC 5~35V

## 1.3 System Component

The DTU is composed of the following parts mainly:

- ✧ Industrial MCU, 100M
- ✧ 256KB Sram & 512KB Flash
- ✧ Industrial EDGE module

## 1.4 Working Principle

The principle chart of the DTU is as following:

## 1.5 Technical Specification

**Wireless specification:**
- ✧ GSM850/900/1800/1900MHz
- ✧ Multi-slot class 10
- ✧ Compliant to GSM phase 2/2+
- ✧ Support SMS and data function

**Interface:**
- ✧ RS232/485 serial port, rates: 110~230400bits/s
- ✧ Indicator lights: "Power", "ACT", "Online"
- ✧ Antenna interface: standard SMA female interface, 50 ohm
- ✧ SIM/UIM interface: standard user card interface
- ✧ Power interface: standard 3-PIN power jack

**Power supply:**
- ✧ Standard power: DC 12V/0.5A
- ✧ Power range: DC 5~35V

**Others:**
- ✧ Operation temperature:-25~+65℃
- ✧ Storage temperature: -40~+85℃
- ✧ Humidity: 95% (unfreezing)

# Chapter 2 Installation Introduction

## 2.1 General

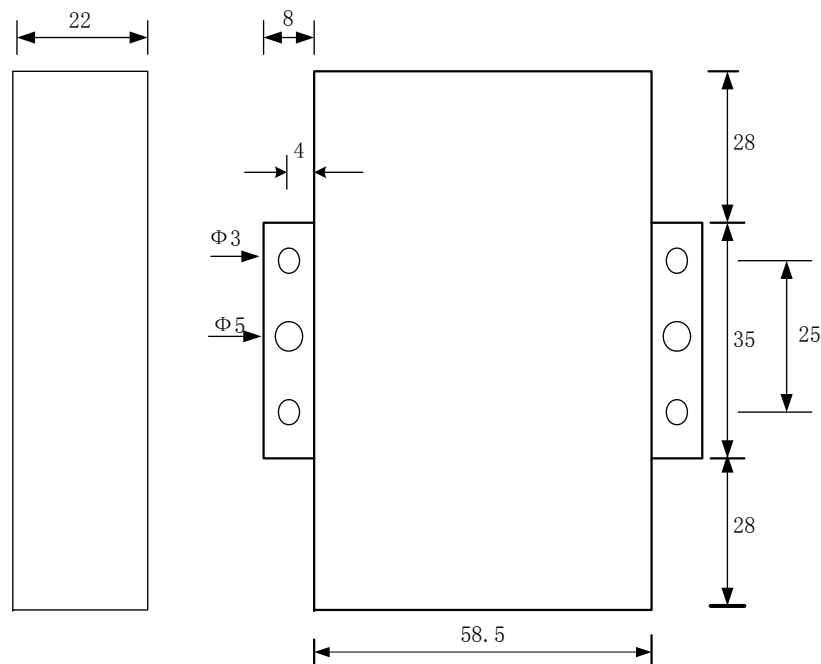The DTU must be installed correctly to make it work properly.

Warning: Forbid to install the DTU when powered!

## 2.2 Encasement List

| Name | Quantity | Remark |
|------|----------|--------|
| DTU host | 1 | |
| Antenna | 1 | |
| Power adapter | 1 | |
| RS232 data cable | 1 | optional |
| RS485 data cable | 1 | optional |
| Manual CD | 1 | |
| Certification card | 1 | |
| Maintenance card | 1 | |

## 2.3 Installation and Cable Connection

**Dimension**: (unit: mm)



**Installation of SIM/UIM card:**

Firstly power off the DTU, and press the out button of the SIM/UIM card outlet with a needle object. Then the SIM/UIM card sheath will flick out at once. Put SIM/UIM card into the card sheath (Pay attention to put the side which has metal point

outside), and insert card sheath back to the SIM/UIM card outlet.

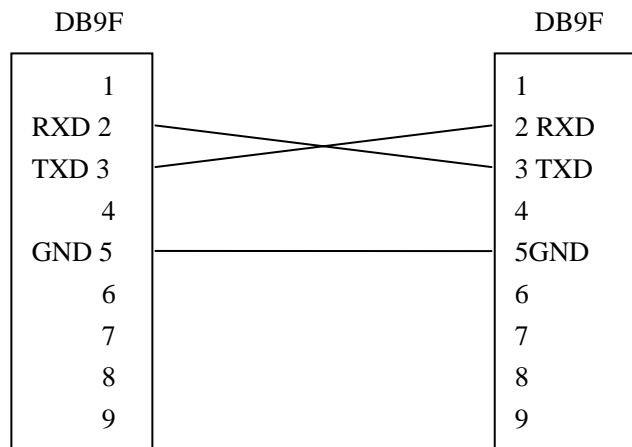**Warning:** Forbid to install SIM/UIM card when powered!

## Installation of antenna:

Screw the SMA male pin of the antenna to the female SMA outlet of the DTU tightly. Warning: The antenna must be screwed tightly, or the singal quality of antenna will be influenced!
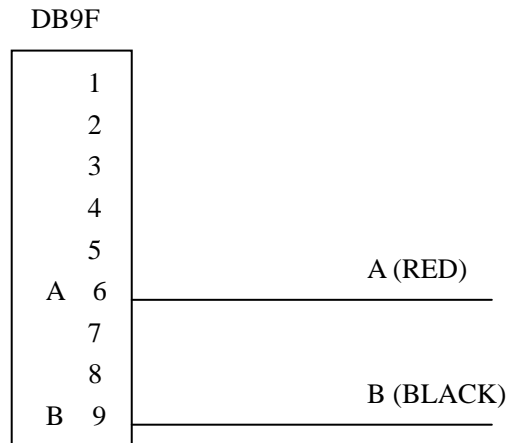
## Installation of cable:

Insert DB9F end of the RS232/RS485 data cable into the DB9M interface of DTU, and connect the other end with user's device.

The signal connection of the RS232 data cable is as follows:

DB9F                    DB9F

```
   1                      1
RXD 2                   2 RXD
TXD 3                   3 TXD
   4                      4
GND 5                   5GND
   6                      6
   7                      7
   8                      8
   9                      9
```

RS232 data cable

The signal connection of the RS485 data cable is as follows:

DB9F

```
   1
   2
   3
   4
   5
A  6 ————————— A (RED)
   7
   8
B  9 ————————— B (BLACK)
```

RS485 data cable

## 2.4 Power

The power range of the DTU is DC 5~35V.

Warning: When we use other power, we should make sure that the power can supply power above 4W.

We recommend user to use the standard DC 12V/0.5A power adaptor.

## 2.5 Indicator Lights Introduction

The DTU provides three indicator lights: "Power", "ACT", "Online".

| Indicator Light | State | Introduction |
|---|---|---|
| Power | Bright | DTU is powered on |
| | Dark | DTU is powered off |
| ACT | Twinkle | Data is communicating |
| | Dark | No data |
| Online | Bright | DTU has logged on network |
| | Dark | DTU hasn't logged on network |

# Chapter 3 Configuration

## 3.1 Configuration Connection

Before configuration, It's necessary to connect the DTU with the configure PC by the shipped RS232 or RS232-485 conversion cable as following.
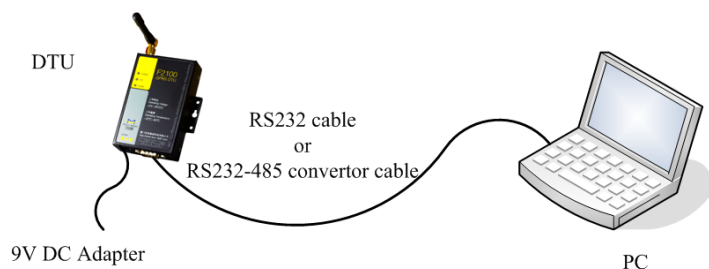


## 3.2 Configuration

There are two ways to configure the DTU:

Configuration software tool: All the settings are configured through the shipped software tool. It's necessary to have one PC to run this tool.

Extended AT command: All the settings are configured through AT command, so any device with serial port can configure it. Before configuration with extended AT command, you should make DTU enter configure state. The steps how to make DTU enter configure state, please refer to appendix.

The following describes how to configure DTU with the configure software tool. At the same time, it gives out the corresponding AT command of each configuration item.

**3.2.1 Run the configure Tool FfDtuCfgTool-En.exe**
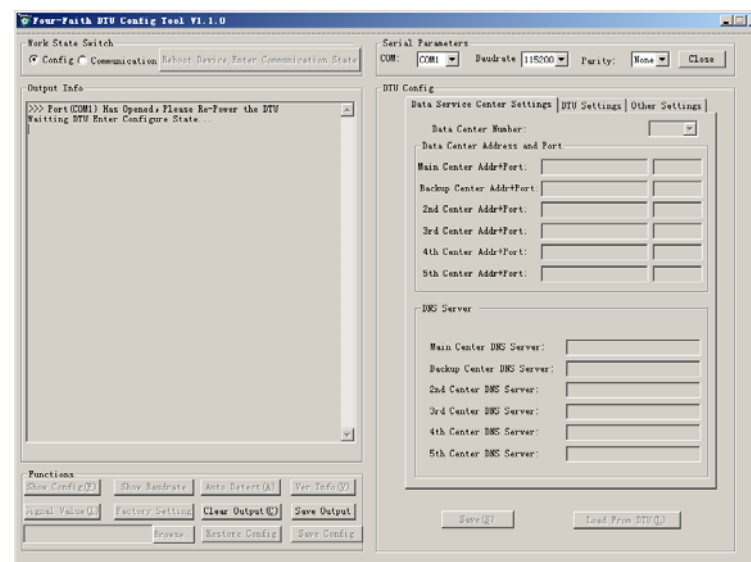


The "Serial Parameters" column shows the current serial port settings. To configure DTU, please choose the correct serial port which connects to DTU, and the baudrate is 115200 with no parity, then open the serial port. If the button text is "Close", it shows the serial port now has been opened. If the text is "Open", you should open the port first. When the port opened, the "Output Info" column will display

"Port(COM1) Has Opened，Please Re-Power the DTU,

Waitting DTU Enter Configure State..."

## 3.2.2 Re-power DTU
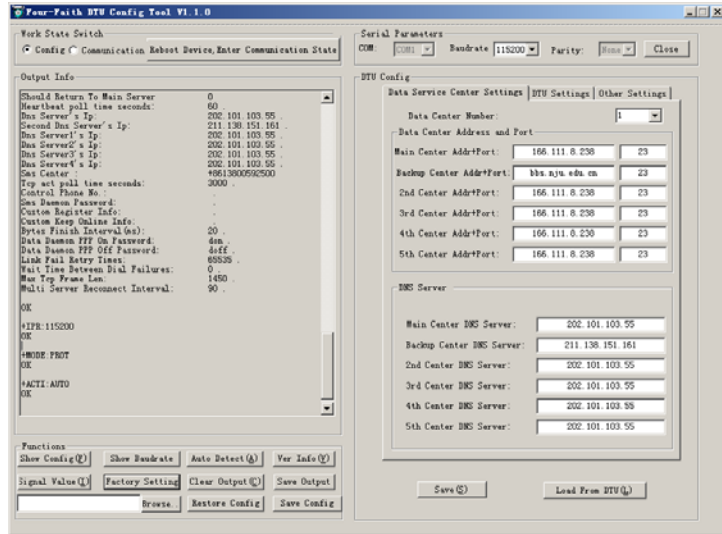


After Re-power DTU, The configure tool will make it enter configure state. At the same time, the software will load current settings from DTU and displays on the right configure columns. It's now ready to configure.

## 3.2.3 Start Configuration

3.2.3.1 Data Service Center Settings

Settings on this page are the parameters related to Data Service Center(DSC).

◆Data Center Number

DTU support two Data Service Center methods to transmit data.

Main and Backup: DTU always tries to connect with the Main DSC. If fails to connect with Main DSC, it will connect with Backup DSC at once

Note：If no Backup DSC exists, please configure the Backup DSC same as Main DSC.

Multi Data Service Center: DTU can connect with at most five DSC at the same time. All the multi DSC can receive the same application data .



If the Data Center Number is 1, DTU work in Main and Backup DSC method.

When "Data Center Number" is greater than 1, DTU works in Multi Data Service Center method
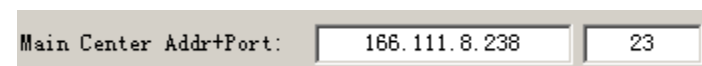
AT command:
    AT+SVRCNT=x
    x: Data Service Center number
Note: every AT command is terminated with a enter character.

◆Main Center Addr+Port:

IP Address and Port of the Main DSC, It's better to set the port greater than 1024.

AT command of the Main DSC IP address or domain name:

    AT+IPAD=xxx

      xxx: The IP address or domain name.

AT command of the Main DSC port:

    AT+PORT=xxx

    xxx: The port value

◆Backup Center Addr+Port:

IP address and port of the Backup DSC

| Backup Center Addr+Port: | bbs.nju.edu.cn | 23 |
|---|---|---|

AT command of the Backup DSC IP address or domain

    AT+IPSEC=xxx

      xxx: The IP address or domain name

AT command of the Backup DSC port

    AT+PTSEC=xxx

    xxx: The port value

◆Multi DSC Configuration

| 2nd Center Addr+Port: | 166.111.8.238 | 23 |
|---|---|---|
| 3rd Center Addr+Port: | 166.111.8.238 | 23 |
| 4th Center Addr+Port: | 166.111.8.238 | 23 |
| 5th Center Addr+Port: | 166.111.8.238 | 23 |

When "Data Center Number" is greater than 1, this setting is valid. For example，

setting the "Data Center Number" as 3, Main Center, 2nd Center, 3rd Center work as these three DSC

AT Command of the 2~5 DSC IP address or domain name

    AT+IPADn=xxx

      n is 1~4 correspond to center 2~5

      xxx: The IP address or domain name

AT Command of the 2~5 DSC port

    AT+PORTn=xxx

      n is 1~4 correspond to port of center 2~5

      xxx: The port value

Example:

  Set IP address of center 3 as 166.111.8.238, and port 5001, the AT command is as following:

      AT+IPAD2=166.111.8.238

      AT+PORT2=5001

◆ Main and Backup Center DNS Server

| Main Center DNS Server: | 202.101.103.55 |
|---|---|
| Backup Center DNS Server: | 211.138.151.161 |

When the DSC Internet access uses domain name, It's necessary to set DNS server resolving the DSC domain name. When the Data Center Number is 1, Main and

Backup Center DNS Server is used to resolve the Main center and Backup center correspondingly.

AT command of Main Center DNS server:

AT+DNSSVR=aaa.bbb.ccc.ddd

aaa.bbb.ccc.ddd: The DNS server IP address(must be IP address）.

AT command of Backup Center DNS server:

AT+DNSSV2=aaa.bbb.ccc.ddd

aaa.bbb.ccc.ddd: the DNS server IP address

◆ Center 2~5 DNS Server

| | |
|---|---|
| 2nd Center DNS Server: | 202.101.103.55 |
| 3rd Center DNS Server: | 202.101.103.55 |
| 4th Center DNS Server: | 202.101.103.55 |
| 5th Center DNS Server: | 202.101.103.55 |

When the DTU work in Multi Data Service Center method and the centers use domain name, 2~5 DNS server is used to resolve center 2~5 correspondingly.

AT command of 2~5 DNS Server

AT+DNSSVRn=aaa.bbb.ccc.ddd

n is 1~4 correspond to center 2~5 DNS server.

aaa.bbb.ccc.ddd is the DNS server IP address

3.2.3.2 DTU Settings

◆ DTU WorkMode

| | |
|---|---|
| WorkMode: | PROT ▼ |

According to different application requirements, there are several protocol workmode to choose.

PROT：Heartbeat packet with TCP protocol, Data transmission with TCP protocol, heartbeat packet and application data transmission are in the same TCP connection.

TRNS：DTU work as a common EDGE MODEM, It can be used in SMS, CSD, Dial-up applications.

TTRN：Heartbeat packet with UDP protocol, Data transmission with TCP protocol

TLNT：DTU work as a telnet client

LONG：Heartbeat packet with UDP protocol, Data transmission with TCP protocol, It can transmit at most 8192 bytes data one time through extra application protocol.

LNGT：Heartbeat with UDP protocol, Data transmission with TCP protocol, It can transmit at most 8192 bytes data one time through extra application protocol.

TUDP：Heartbeat with UDP protocol, Data transmission with UDP protocol, Heartbeat packet and application data are in the same UDP connection.

TCST：User can set custom register and heartbeat string, Data transmission with TCP protocol.

AT command:

　　　AT+MODE=xxxx

　　　xxxx:　one of the above workmode

◆　Trigger Type

Trigger Type(Default Auto):　[ AUTO ▼ ]

Normally, DTU always keeps online and always be ready for data transmission. But in some circumstances, it's important to reduce wireless data flow. To realize this function, the software can makes DTU into sleep state in idle time. When there is application data to transmit, DTU can be triggered online ready for data transmission. There are total five methods to make DTU online:

AUTO: DTU always keeps online

SMSD: send a special short message to make DTU online

CTRL: make DTU online through a phone call to DTU

DATA: send special serial data to make DTU online

MIXD: the combination of SMSD, CTRL, DATA. DTU will be online when meet one of these three trigger methods.

AT Command:

AT+ACTI=xxxx

xxxx:　one of the above trigger methods

◆　Debug Level

Debug Level（0/1/2）:　[ 1 ▼ ]

Debug information is used to debug software when there is software problem.

　　0 --- no debug information output

　　1 --- simple prompt information output

　　2 --- detail debug information output

AT Command:

　　AT+DEBUG=x

　　x :　the debug level value

Note: Only there is some problem to the DTU, It's necessary to set this value as 2, In normal applications, this value should set to 0 or 1, the default value is 1.

◆　Databit, Parity, Stopbit

Databit,Parity,Stopbit:　[ 8N1 ▼ ]

8N1 ---   8 Databit, No parity, 1 Stopbit

8E1 ---   8 Databit, Even parity, 1 Stopbit

8O1 ---   8 Databit, Odd parity, 1 Stopbit

AT Command:

AT+SERMODE=xxx

xxx: one of the above serial mode

◆ Communication Baudrate

| Communication Baudrate: | 115200 ▼ |
|---|---|

| 110 | --- 110 bps |
|---|---|
| 300 | --- 300 bps |
| 600 | --- 600 bps |
| 1200 | --- 1200 bps |
| 2400 | --- 2400 bps |
| 4800 | --- 4800 bps |
| 9600 | --- 9600 bps |
| 14400 | --- 14400 bps |
| 19200 | --- 19200 bps |
| 38400 | --- 38400 bps |
| 56000 | --- 56000 bps |
| 57600 | --- 57600 bps |
| 115200 | --- 115200 bps |

AT Command:

AT+IPR=xxx

xxx : one of the above baudrate

◆ Auto Back To Main Server

| Auto Back To Main Server (1/0 - Yes/No) | 0 ▼ |
|---|---|

0 --- No

1 ---Yes

This item is only valid when you set "Data Center Number" as 1. In this mode, DTU will switch to backup center when main center have problems. If this item is set to 1 , DTU will check whether the main center work fine timely. When it detects the main server work fine, it will return back to the main server at once.

AT Command:

AT+RETMAIN=x

x : 0 or 1

◆ Device ID

| Device ID ( 8 Bytes Hex-Decimal Characters ) : | 74736574 |
|---|---|

The identity number of DTU, the value should be 8 bytes hex-decimal characters.

AT Command:

   AT+IDNT=aabbccdd


   aabbccdd: the identity number of DTU


◆ SIM Card No

| SIM Card No（11 Bytes) | 13912345678 |

The phone number of the SIM card .

AT Command:


   AT+PHON=xxxxxxxxxx
   xxxxxxxxxxx: the SIM card phone number


◆ Bytes Interval

| SIM Card No（11 Bytes) | 13912345678 |

The time interval used to determine whether the serial data frame transmission has completed, DTU will send the serial data to the center when two bytes transmit time interval larger than this item value.

AT Command:

   AT+BYTEINT=xxx
   xxx: bytes interval time value（millisecond）

◆ Custom Register String

| Custom Register String: | |

This item is only valid when the WorkMode is TCST. It's the self defined register string. It can be empty, the maximum length is 70 bytes.

AT Command:

   AT+CONNRGST=xxx
   xxx：self defined register string

◆ Custom Heartbeat String

| Custom Heartbeat String: | |

This item is only valid when the WorkMode is TCST. It's the self defined heartbeat string, It can be empty, the maximum length is 70 bytes.

AT Command:

    AT+LINKRGST=xxx

    xxx：self defined heartbeat string

◆ Connect Retry Times, Reconnect Time Interval



In normal applications, DTU will always try to connect with the center even if the center has problems or closed. To reduce these unnecessary wireless data flow, you can configure the "Connect Retry Times" and "Reconnect Time Interval" items. When DTU fail to connect to the center with the configured Retry Time, It will sleep "Reconnect Time Interval" time, then start next retry.

"Connect Retry Times" AT Command:

    AT+RETRY=xxx

    xxx：times try to connect to the center

"Reconnect Time Interval" AT Command:

    AT+RDLWT=xxx

    xxx：the sleep time until next retry.

◆ Transfer meanning



    0 --- Yes, enable transfer meaning
    1 --- No, disable transfer meaning

This item is only valid when the WorkMode is PROT. If this item is set to 0, DTU will transfer meaning to 0xfd and 0xfe. To know detail transfer meaning method, please refer <<DTU Transfer Meaning Explanation In the PROT work mode>>. If this item is set to 1, all the transmission is transparent.

AT Command:
    AT+STRAIGHT=x
    x：0 or 1

3.2.3.2 Other Settings

◆ Network

APN:           access point name.

Username:     username to login the ISP network.

Password:     password to login the ISP network

Call Center:    the call center phone number

AT Command of APN:

    AT+APN=xxxx

     xxxx: access point name

AT Command of Username:

     AT+USERNAME=xxx

     xxx：  username

AT Command of Password:

     AT+PASSWORD=xxx

     xxx：  password

AT Command of Call Center:

     AT+CENT=xxx

     xxx: call center phone number of   ISP

◆  SMS Center

SMS Center ( +86 )          +8613800592500

Your local SMS center number

AT Command:

 AT+SMSC=xxx

 xxx: your local SMS center number

◆  Heartbeat Interval

Heartbeat Interval (31 ~ 65534):          60

Time interval sent heartbeat packet. (unit is second)

AT Command:

   AT+POLLTIME=xxx

    xxx: heartbeat packet time interval

◆  Call Trigger Phone No

Call Trigger Phone No:

This item is only valid when the "Trigger Type" is CTRL or MIXD. In this trigger type, DTU will keeps in idle state until it receives the trigger phone call, then it will

connect to the center.

AT Command:

　　AT+CTRLNO=xxx

　　xxx : trigger phone number

◆ SMS Trigger Password

| SMS Trigger Password(4 Bytes): | |
|---|---|

This item is valid only when the "Trigger Type" is SMSD or MIXD, DTU will keeps in idle state until it receives the trigger short message, Then it will connect to the center.

AT Command:

　　AT+SMSDPSWD=xxx

　　xxx : SMS content to trigger DTU online

◆ Data Trigger Password

| Data Trigger On Password: | don |
|---|---|
| Data Trigger Off Password: | doff |

This item is valid only when the "Trigger Type" is DATA or MIXD, DTU will keeps in idle state until it receives the trigger on data, then it will connect to the center, It will

return to the idle state when receives trigger off data.

AT Command of Data Trigger On Password:

　　AT+DONPSWD=xxx

　　xxx : data trigger on password

AT Command of data trigger off password:

　　AT+DOFFPSWD=xxx

　　xxx :data trigger off password

◆ TCP MTU

| TCP MTU(Bytes): | 1450 |
|---|---|

The maximum transmission unit of TCP packet

AT Command:

　　AT+TCPMTU=xxx

　　xxx : the MTU value

◆ Multi Center Reconnect Interval

| Multi Center Reconnect Interval: | 90 |
|---|---|

This item is valid only when the "Data Center Number" is greater than 1. When one of the configured data center lost connection, DTU will try to reconnect

after the configured reconnect interval

AT Command:

AT+MCONTIME=xxx

xxx : reconnect time interval (unit is second)

## 3.3 Functions

◆ Clear Output



Clear the output information

◆ Version Display



Show the software and hardware version

◆ Signal Value



Display current wireless signal value

◆ Factory setting



Restore to factory settings

◆ Show Config



Show current DTU settings

◆ Show Baudrate



Display the communication baudrate

◆ Auto Detect



Simple way to determine whether DTU work fine
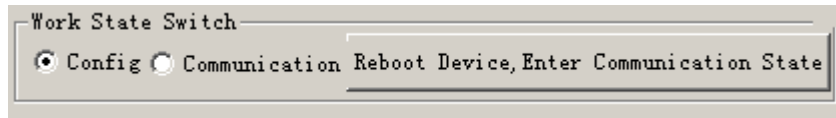
◆ Save Output



Save the output info to a file

◆ Save Config



Save the current settings to a file, you can restore it from this file later

◆ Restore Config



Restore settings from a previous saved configure file

Add：J1-J2, 3rd Floor, No. 44, GuanRi Road, SoftWare Park, XiaMen, China    18
Tel：+86 592-6300320, +86 592-6300321, +86 592-6300322  Fax：+86 592-5912735

Zip Code：361008
http://www.four-faith.com    www.fourfaith.com

## 3.4 Work State Switch



This tool can work in two states, "Config" and "Communication"

Config:

    This state is used to configure parameters of DTU.

Communication:

    This state is used as a common serial communication tool

Reboot Device, Enter Communication State:

    This function button is used to reboot DTU and make the software switch to

Communication state

# Chapter 4 Appendix

The following steps decribe how to make DTU enter configure state with the Windows XP Hyper Terminal.

1.  Press "Start"→"Programs"→"Accessories"→"Communications"→"Hyper Terminal"



2.  Input connection name, choose "OK"

3.  Choose the correct COM port which connect to DTU, choose "OK"



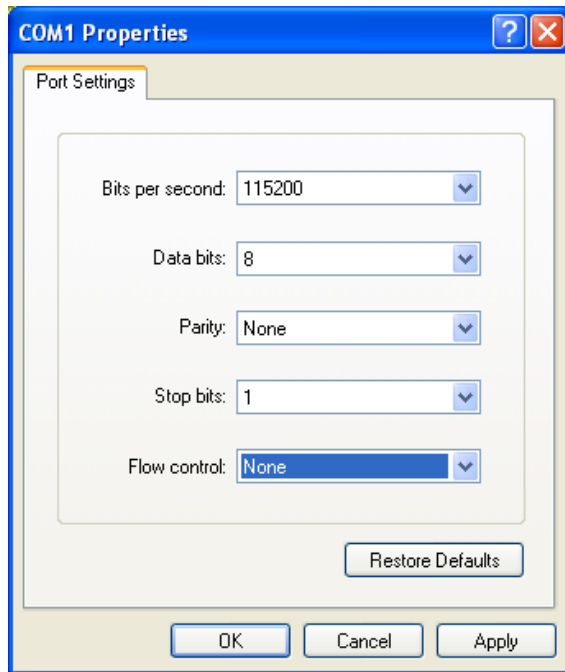4.  Configure the serial port parameters as following, choose "OK"
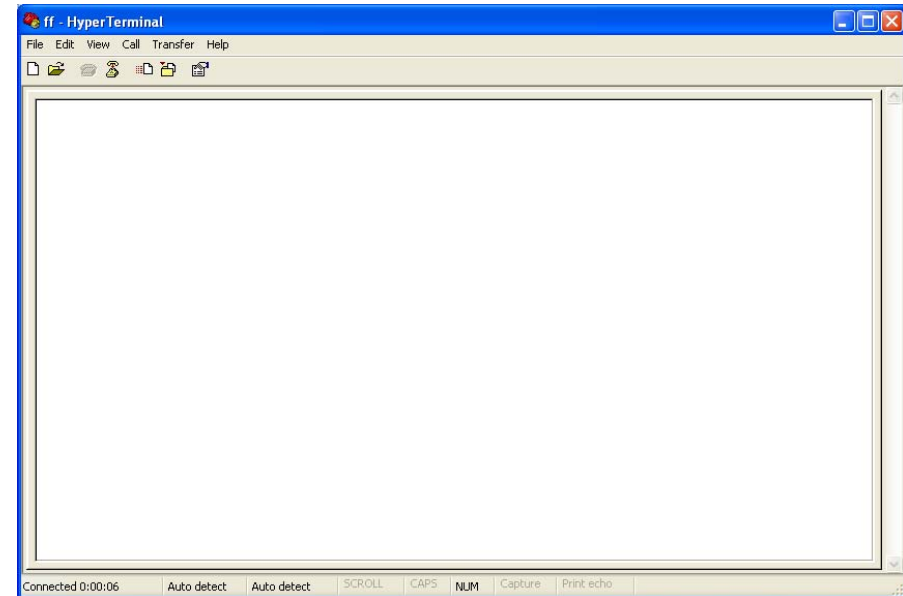
> Bits per second: 115200
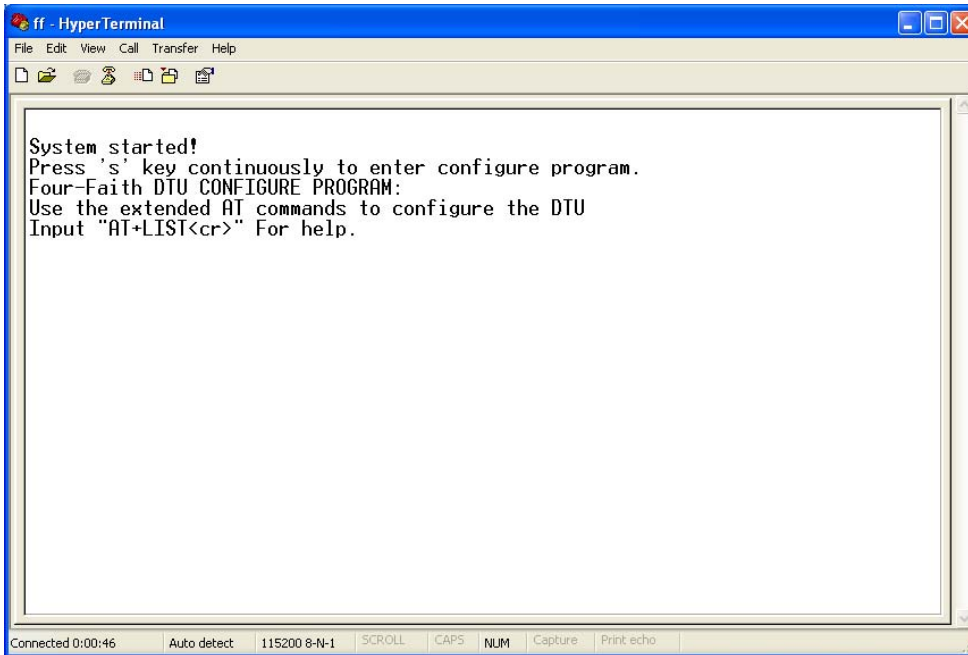> Data bits: 8
> Parity: None
> Stop bits: 1
> Flow control: None

5. Complete Hyper Terminal operation, It runs as following



6. Re-power DTU, put mouse focus on the Hyper Terminal and press "s" key continuously until DTU enter configure state as following

7. DTU has entered configure state, you can configure the parameters through AT command.