F2103 GPRS IP MODEM

USER MANUAL

Contents

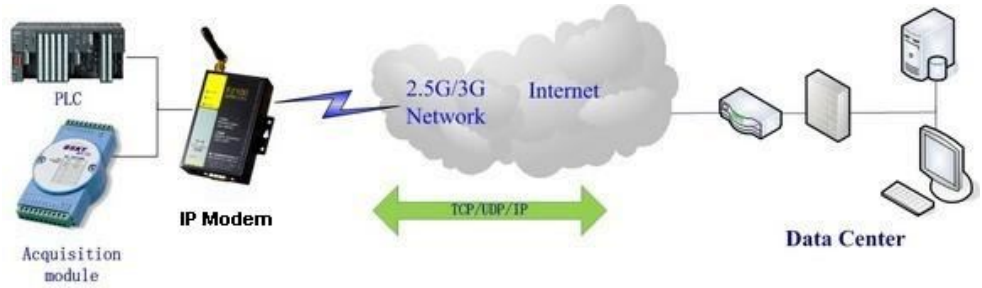
Chapter 1 Brief Introduction of Product

1.1 General

F2103 GPRS IP MODEM is a kind of cellular terminal device that provides data transfer function by public GPRS network.

It adopts high-powered industrial 16/32 bits CPU and embedded real time operating system. It supports RS232 and RS485 (or RS422) port that can conveniently and transparently connect one device to a cellular network, allowing you to connect to your existing serial devices with only basic configuration.

It has been widely used on M2M fields, such as intelligent transportation, smart grid, industrial automation, telemetry, finance, POS, water supply, environment protection, post, weather, and so on.



1.2 Features and Benefits

Design for Industrial Application

- High-powered industrial cellular module
- High-powered industrial 16/32 bits CPU
- Support low-consumption mode, including sleep mode, scheduled online/offline mode, scheduled power-on/power-off mode(optional)
- Housing: iron, providing IP30 protection.
- Power range: DC 5~35V

Stability and Reliability

- Support hardware and software WDT
- Support auto recovery mechanism, including online detect, auto redial when offline to make it always online
- RS232/RS485/RS422 port: 15KV ESD protection
- SIM/UIM port: 15KV ESD protection
- Power port: reverse-voltage and overvoltage protection
- Antenna port: lightning protection(optional)

Standard and Convenience

- Support standard RS232 and RS485(or RS422) port that can connect to serial devices directly
- Support intellectual mode, enter into communication state automatically when powered
- Provide management software for remote management
- Support several work modes
- Convenient configuration and maintenance interface

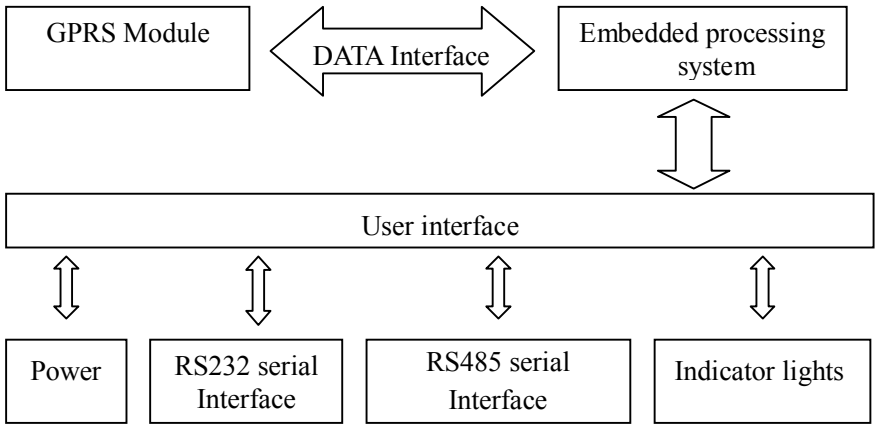
High-performance

- Support TCP server and support multi TCP client connection(optional)
- Support double data centers, one main and another backup
- Support multi data centers and it can support 5 data centers at the same time
- Support multi online trigger ways, including SMS, ring and data. Support link disconnection when timeout
- Support dynamic domain name(DDNS) and IP access to data center
- Design with standard TCP/IP protocol stack

◆ Support APN/VPDN

1.3 Working Principle

The principle chart of the IP MODEM is as following:



1.4 Specifications

Cellular Specification

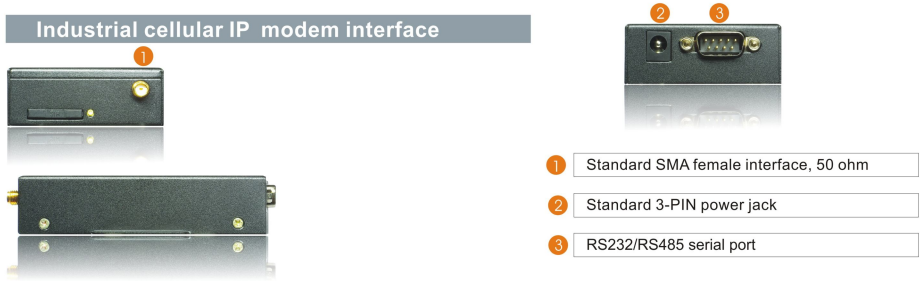
Item	Content
Cellular Module	Industrial cellular module
Standard and Band	EGSM900/GSM1800MHz, GSM850/900/1800/1900MHz(optional) Compliant to GSM phase 2/2+ GPRS class 10, class 12(optional)
Bandwidth	85.6Kbps
TX power	GSM850/900: <33dBm GSM1800/1900: <30dBm
RX sensitivity	<-107dBm

Hardware System

Item	Content
CPU	Industrial 16/32 bits CPU
FLASH	1MB(Extendable)
SRAM	512KB(Extendable)

Interface Type

Item	Content
Serial	1 RS232 port and 1 RS485(orRS422) port, 15KV ESD protection Data bits: 5, 6 ,7, 8 Stop bits: 1, 1.5, 2 Parity: none, even, odd, space, mark Baud rate: 110~230400 bps
Indicator	"Power", "ACT", "Online"
Antenna	Standard SMA female interface, 50 ohm, lighting protection(optional)
SIM/UIM	Standard 3V/1.8V user card interface, 15KV ESD protection
Power	Standard 3-PIN power jack, reverse-voltage and overvoltage protection



Power Input

Item	Content
Standard Power	DC 12V/1.5A
Power Range	DC 5~35V
Consumption	<250mA (12V)

Physical Characteristics

Item	Content
Housing	Iron, providing IP30 protection
Dimensions	91x58.5x22 mm
Weight	205g

Environmental Limits

Item	Content
Operating Temperature	-25~+65℃（-13~+149℉）
Extended Operating Temperature	-30~+75℃（-22~+167℉）
Storage Temperature	-40~+85℃（-40~+185℉）
Operating Humidity	95% (Non-condensing)

Chapter 2 Installation Introduction

2.1 General

The IP MODEM must be installed correctly to make it work properly.

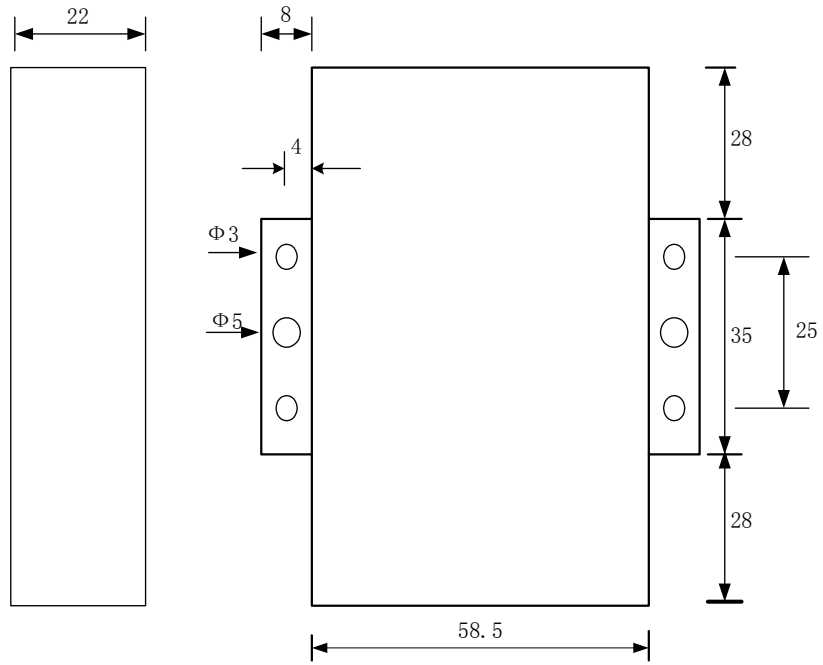
Warning: Forbid to install the IP MODEM when powered!

2.2 Encasement List

Name	Quantity	Remark
IP MODEM 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 IP MODEM, 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!

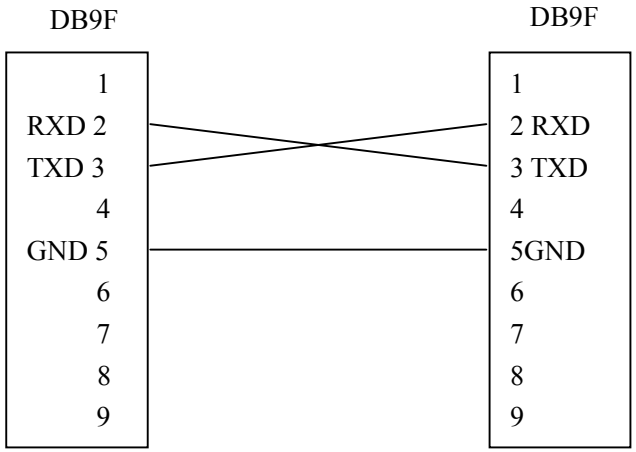
Installation of antenna:

Screw the SMA male pin of the antenna to the female SMA outlet of the IP MODEM tightly. Warning: The antenna must be screwed tightly, or the signal quality of antenna will be influenced!

Installation of cable:

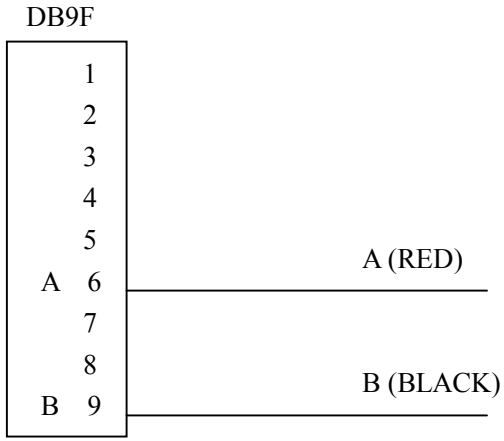
Insert DB9F end of the RS232/RS485 data cable into the DB9M interface of IP MODEM, and connect the other end with user's device.

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



RS232 data cable

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



RS485 data cable

2.4 Power

The power range of the IP MODEM 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

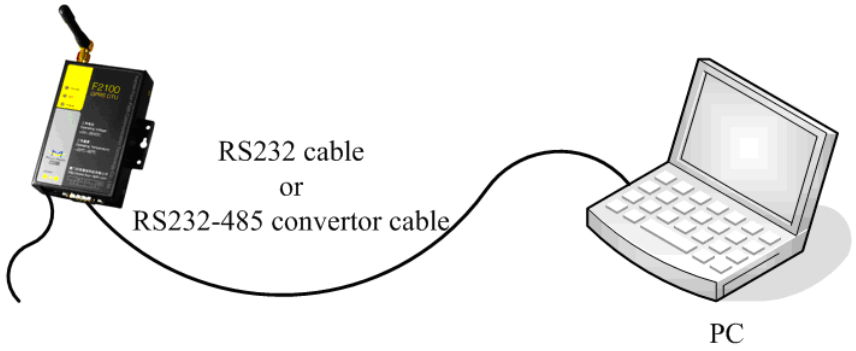
The IP MODEM provides three indicator lights: “Power”, “ACT”, “Online”.

Indicator Light	State	Introduction
Power	ON	IP MODEM is powered on
	OFF	IP MODEM is powered off
ACT	BLINK	Data is communicating
	OFF	No data
Online	ON	IP MODEM has logged on network
	OFF	IP MODEM hasn’t logged on network

Chapter 3 Configuration

3.1 Configuration Connection

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



3.2 Configuration Introduction

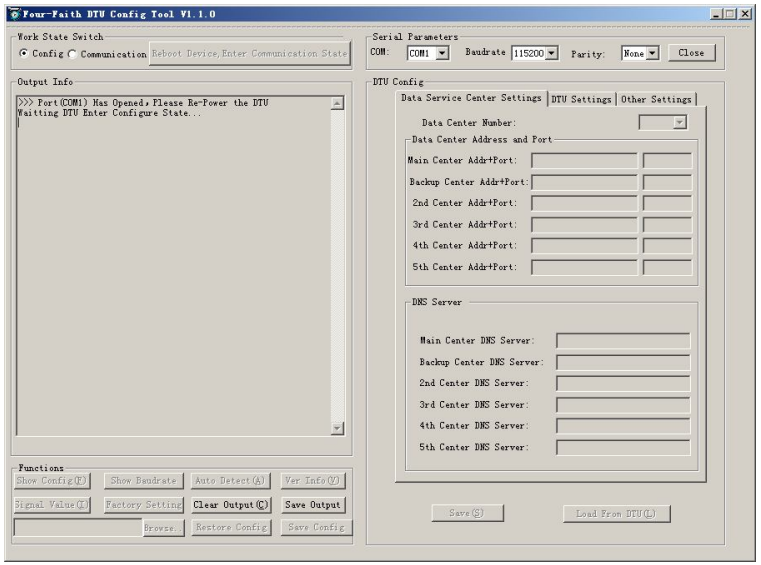
There are two ways to configure the IP MODEM:

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 IP MODEM enter configure state. The steps how to make IP MODEM enter configure state, please refer to appendix.

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

3.3 Run the configure Tool: IP Modem Configure.exe

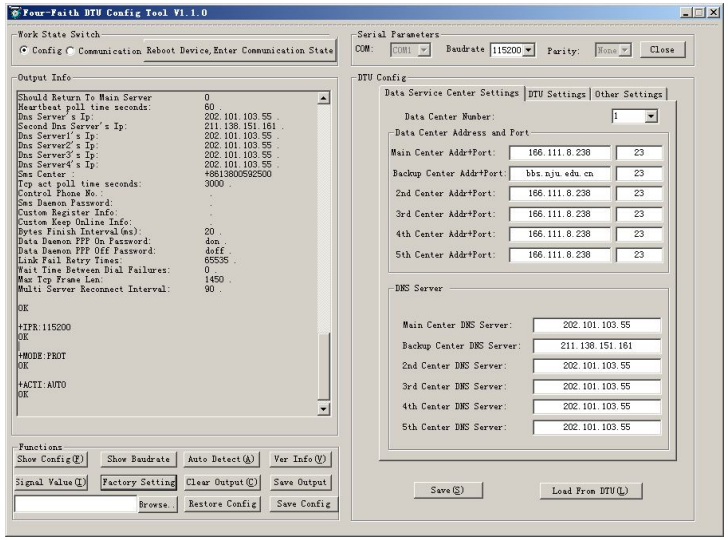


The "Serial Parameters" column shows the current serial port settings. To configure IP MODEM, please choose the correct serial port which connects to IP MODEM, and the baudrate is 115200 with no parity, then open the serial port. If the button text is "Close", it shows the serial port now has been opened. 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 IP MODEM,

Waiting IP MODEM Enter Configure State...”

3.4 Re-power IP MODEM



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

3.5 Configuration

3.5.1 Data Service Center Settings

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

◆Data Center Number

IP MODEM support two Data Service Center methods to transmit data.

Main and Backup: IP MODEM 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: IP MODEM 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, IP MODEM work in Main and Backup DSC method.

When “Data Center Number” is greater than 1, IP MODEM works in Multi Data Service Center method

AT command:

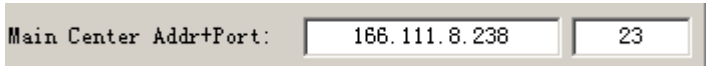
AT+SVRCNT=x

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

AT command of the Backup DSC IP address or domain

AT+IPSEC=xxx

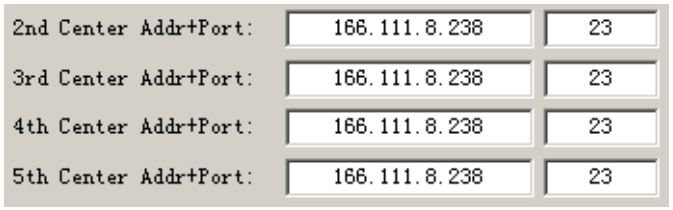
xxx: The IP address or domain name

AT command of the Backup DSC port

AT+PTSEC=xxx

xxx: The port value

◆Multi DSC Configuration



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

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

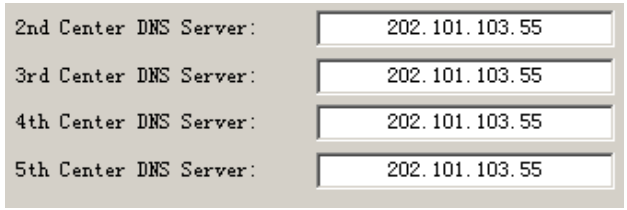
aaa.bbb.ccc.ddd: The DNS server IP address(must be IP address）.

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



When the IP MODEM 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

3.5.2 IP MODEM Settings

◆ IP MODEM WorkMode

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：IP MODEM work as a common GPRS MODEM, It can be used in SMS, CSD, dial-up applications.

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

TLNT：IP MODEM 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.

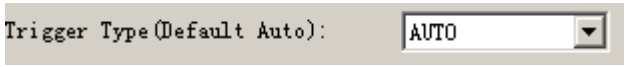
TCST：User can set custom register and heartbeat string, Data transmission with TCP protocol.

AT command:

AT+MODE=xxxx

xxxx: one of the above workmode

◆ Trigger Type



Normally, IP MODEM 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 IP MODEM into sleep state in idle time. When there is application data to transmit, IP MODEM can be triggered online ready for data transmission. There are total five methods to make IP MODEM online:

AUTO: IP MODEM always keeps online
SMSD: send a special short message to make IP MODEM online
CTRL: make IP MODEM online through a phone call to IP MODEM
DATA: send special serial data to make IP MODEM online
MIXD: the combination of SMSD, CTRL, DATA. IP MODEM 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 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 IP MODEM, 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

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

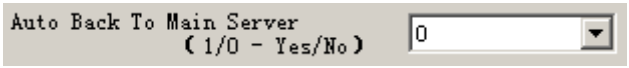
110 --- 110 bps
300 --- 300 bps
600 --- 600 bps
1200 --- 1200 bps
2400 --- 2400 bps
4800 --- 4800 bps
9600 --- 9600 bps
14400 --- 14400 bps
19200 --- 19200 bps
38400 --- 38400 bps
56000 --- 56000 bps
57600 --- 57600 bps
115200 --- 115200 bps

AT Command:

AT+IPR=xxx

xxx : one of the above baudrate

◆ Auto Back To Main Server



0 --- No

1 ---Yes

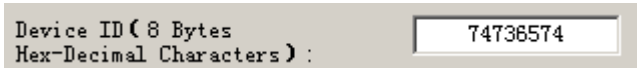
This item is only valid when you set “Data Center Number” as 1. In this mode, IP MODEM will switch to backup center when main center have problems. If this item is set to 1 , IP MODEM will check whether the main center work fine timely. When it detects the main server work fine, it will return back to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

AT Command:

AT+RETMAIN=x

x : 0 or 1

◆ Device ID



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

AT Command:

AT+IDNT=aabbccdd

aabbccdd: the identity number of IP MODEM

◆ SIM Card No

The phone number of the SIM card .

AT Command:

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

◆ Bytes Interval

The time interval used to determine whether the serial data frame transmission has completed, IP MODEM 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

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

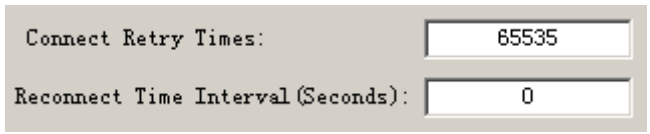
◆ Custom Heartbeat String

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, IP MODEM 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 IP MODEM 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

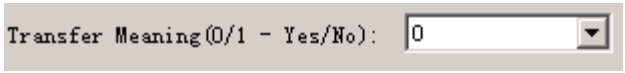
xxx：times try to connect to the center

“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, IP MODEM will transfer meaning to 0xfd and 0xfe. To know detail transfer meaning method, please refer <<IP MODEM Transfer Meaning Explanation In the PROT work mode>>. If this item is set to 1, all the transmission is transparent.

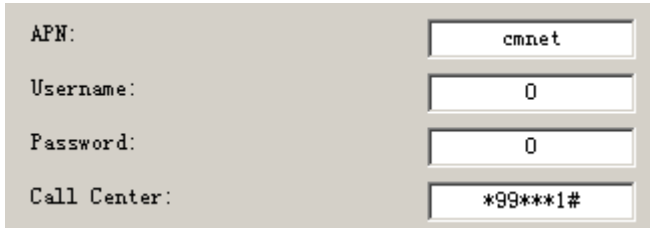
AT Command:

AT+STRAIGHT=x

x：0 or 1

3.5.3 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

Your local SMS center number

AT Command:

AT+SMSC=xxx

xxx: your local SMS center number

◆ Heartbeat Interval

Time interval sent heartbeat packet. (unit is second)

AT Command:

AT+POLLTIME=xxx

xxx: heartbeat packet time interval

◆ Call Trigger Phone No

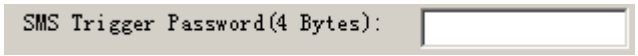
This item is only valid when the “Trigger Type” is CTRL or MIXD. In this trigger type, IP MODEM will keeps in idle state until it receives the trigger phone call, then it will connect to the center.

AT Command:

AT+CTRLNO=xxx

xxx : trigger phone number

◆ SMS Trigger Password



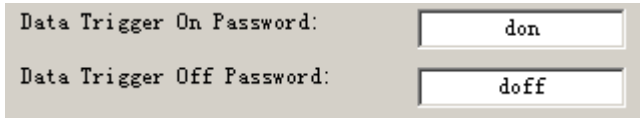
This item is valid only when the “Trigger Type” is SMSD or MIXD, IP MODEM will keeps in idle state until it receives the trigger short message, Then it will connect to the center.

AT Command:

AT+SMSDPSWD=xxx

xxx : SMS content to trigger IP MODEM online

◆ Data Trigger Password



This item is valid only when the "Trigger Type" is DATA or MIXD, IP MODEM 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

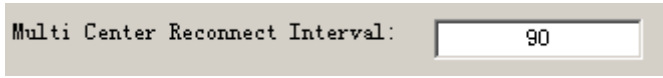
The maximum transmission unit of TCP packet

AT Command:

AT+TCPMTU=xxx

xxx : the MTU value

◆ Multi Center Reconnect Interval



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

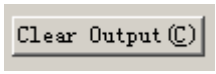
AT Command:

AT+MCONTIME=xxx

xxx : reconnect time interval (unit is second)

3.6 Functions

◆ Clear Output

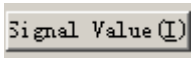


Clear the output information

◆ 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 IP MODEM settings

- Show Baudrate

Display the communication baudrate

- Auto Detect

Simple way to determine whether IP MODEM work fine

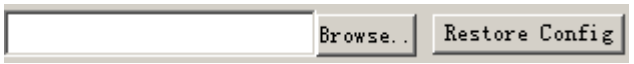
- Save Output

Save the output info to a file

- Save Config

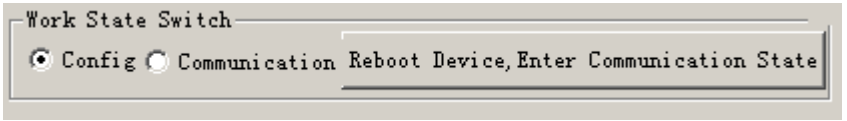
Save the current settings to a file, you can restore it from this file later

- Restore Config



Restore settings from a previous saved configure file

3.7 Work State Switch



This tool can work in two states, “Config” and “Communication”

Config:

This state is used to configure parameters of IP MODEM.

Communication:

This state is used as a common serial communication tool

Reboot Device, Enter Communication State:

This function button is used to reboot IP MODEM and make the software switch to Communication state

Appendix

The following steps describe how to make IP MODEM enter configure state with the Windows XP Hyper Terminal.

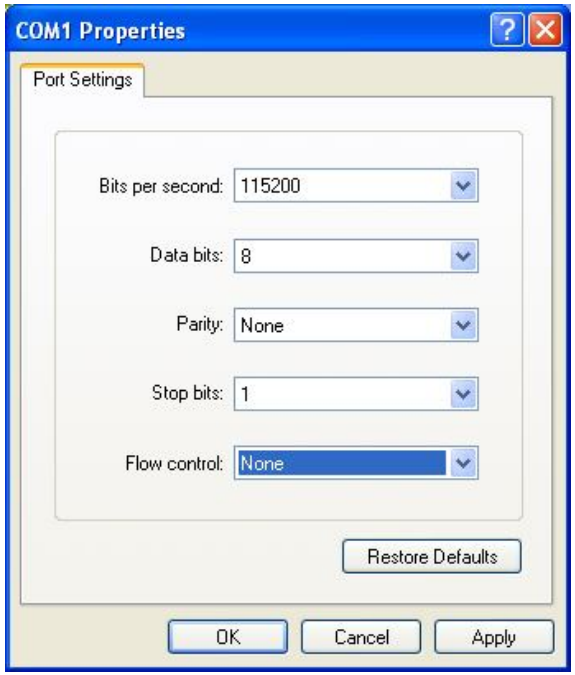
1. Press "Start"→"Programs"→"Accessories"→"Communications"→"Hyper Terminal"

2. Input connection name, choose "OK"

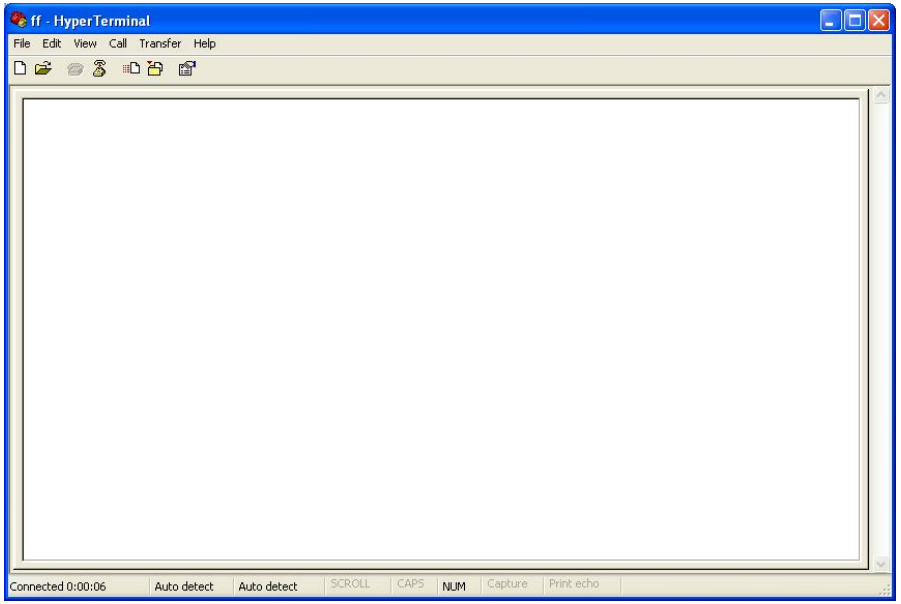
3. Choose the correct COM port which connect to IP MODEM, choose "OK"

4. Configure the serial port parameters as following, choose "OK"

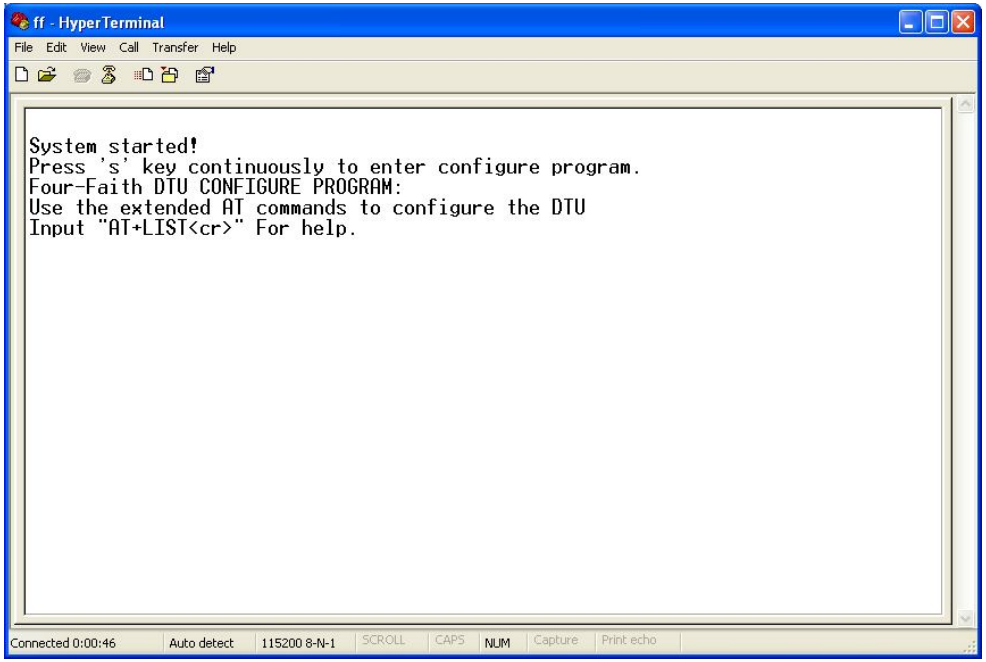
Bits per second: 115200
Data bits: 8
Parity: None
Stop bits: 1
Flow control: None



5. Complete Hyper Terminal operation, It runs as following



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



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