FOUR FAITH

F2X16 Series IP MODEM

USER MANUAL

V2.0.1

Xiamen Four-Faith Communication Technology Co., Ltd.
https://en.four-faith.com

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Contents

Chapter 1 Brief Introduction of Product

1.1 General

F2X16 series IP MODEM is a kind of cellular terminal device that provides data transfer by public cellular network.

It adopts high-powered industrial 32 bits CPU and embedded real time operating system. It supports RS232 and RS485 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 low power consumption states in which the power consumption could be lower than 5mA@12VDC.

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.

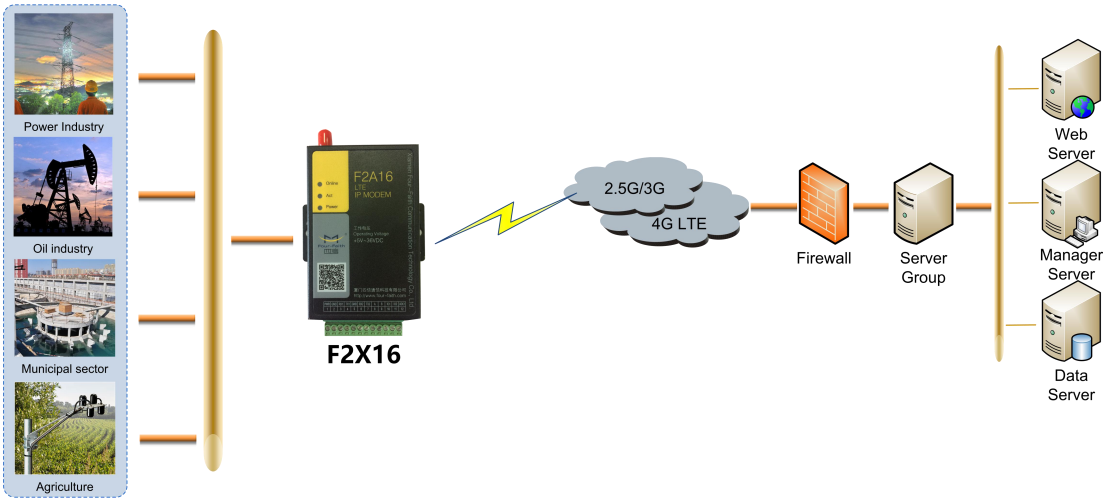


Figure 1-1 IP MODEM Application Topology

1.2 Features and Benefits

Design for Industrial Application

- High-powered industrial cellular module
- High-powered industrial 32 bits CPU
- Support low power consumption mode, including multi-sleep and trigger modes to reduce the power consumption
- Housing: iron, providing IP30 protection.
- Power range: DC 5~36V

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

- Adopt terminal block interface, convenient for industrial application
- Support standard RS232 and RS485(RS422 optional) port that can connect to serial devices directly
- TTL logic level RS232 interface can be customized
- Support intellectual mode, enter 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
- Supply 3 I/O channels, including 1 analog input(4-20mA) and 2 digital input/output
- 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 domain name and IP address as data center
- Design with standard TCP/IP protocol stack
- Support private APN

1.3 Working Principle

◆ The principle chart of the IP MODEM is as following.

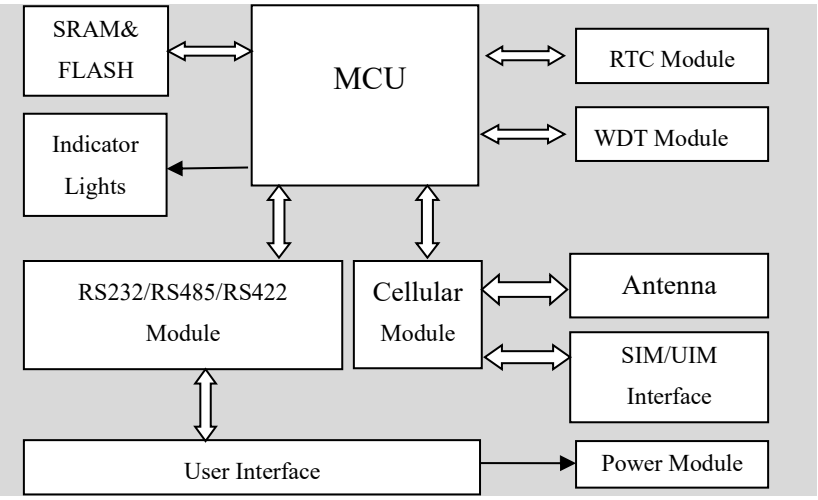


Figure1-2 IP Modem principle chart

1.4 Specifications

Cellular Specification

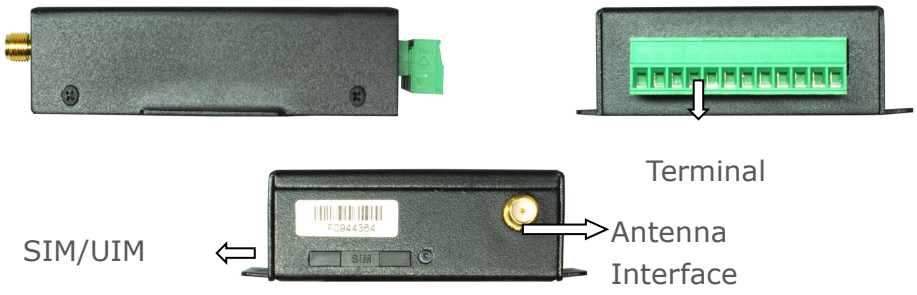
Item	Content
F2416 WCDMA IP MODEM	
Standard	UMTS/WCDMA/HSDPA/HSUPA/HSPA+ 850/1900/2100MHz, 850/900/1900/2100MHz(optional) GSM 850/900/1800/1900MHz GPRS/EDGE CLASS 12
Bandwidth	DC-HSPA+: Download 42Mbps, Upload 5.76Mbps HSPA+: Download 21Mbps, Upload 5.76Mbps HSDPA: Download 7.2Mbps, HSUPA: Upload 5.76Mbps UMTS: 384Kbps
TX power	<24dBm
RX sensitivity	<-109dBm
RX sensitivity	<-97dBm
F2816 FDD-LTE IP MODEM	
Standard	LTE/FDD 2600/2100/1800/900/800MHz, 700/1700/2100MHz(optional) DC-HSPA+/HSPA+/HSDPA/HSUPA/UMTS 850/900/2100MHz, 800/850/1900/2100MHz(optional) EDGE/GPRS/GSM 850/900/1800/1900MHz GPRS CLASS 10 GPRS CLASS 12
Bandwidth	LTE FDD: Download 100Mbps, Upload 50Mbps DC-HSPA+: Download 42Mbps, Upload 5.76Mbps HSPA+: Download 21Mbps, Upload 5.76Mbps HSDPA: Download 7.2Mbps, Upload 5.76Mbps UMTS: 384Kbps
TX power	<23dBm
RX sensitivity	<-93.3dBm

Hardware System

Item	Content
CPU	Industrial 32 bits CPU
FLASH	512KB(Extendable)
SRAM	256KB

Interface Type

Item	Content
Serial	2 RS232 and 1 RS485 , 15KV ESD protection Data bits: 5, 6 ,7, 8 Stop bits: 1, 1.5, 2 Parity: none, even, odd, space, mark Baud rate: 1200~230400 bps, (110~600bps optional)
Indicator	"Power", "ACT", "Online"
Antenna	Cellular: Standard SMA female interface, 50 ohm Lighting protection(optional)
SIM/UIM	Standard 3V/1.8V user card interface, 15KV ESD protection
Power	Terminal block interface, reverse-voltage and overvoltage protection



Power Input

Item	Content
Standard Power	DC 12V/0.5A
Power Range	DC 5~36V

Power Consumption

Working States	Power Consumption
Communication	45~165mA@12VDC (2G:45~55 mA3G:80~165 mA 4G:75~95mA) 105~365mA@5VDC (2G:105~115 mA 3G:165~365 mA 4G:150~200mA)
Standby	35~50 mA@12VDC 55~105 mA@5VDC
Sleep	3mA@12VDC 6mA@5VDC

Physical Characteristics

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

Environmental Limits

Item	Content
Operating Temperature	-35~+75ºC (-22~+167℉)
Storage Temperature	-40~+85ºC (-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	
Cellular Antenna	1	
Power adapter	1	
RS232 data cable	1	optional
RS485 data cable	1	optional
Manual CD	1	
Certification card	1	
Maintenance card	1	

Table 2-1 Encasement List

2.3 Installation and Cable Connection

Dimension: (unit: mm)

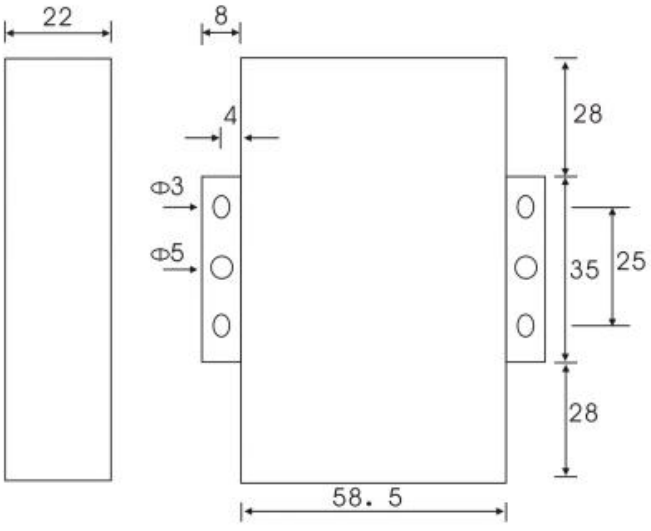


Figure 2-1 Installation Chart

Installation of SIM/UIM card

Firstly power off the IP MODEM, and press the 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!

User Interface Signal Definition

Pin NO.	Name	Function	Extensible Function
1	PWR	Power input anode	N/A
2	GND	Power Ground	N/A
3	RX1	RS232 RX	N/A
4	TX1	RS232 TX	N/A
5	GND	System Ground	N/A
6	RX2	RS232 RX	Reserved compatible ADC and RS232 RX (TTL logic level)
7	TX2	RS232 TX	Reserved compatible ADC and RS232 TX (TTL logic level)
8	A	RS485 anode	Reserved compatible ADC
9	B	RS485 cathode	Reserved compatible ADC
10	IO1	GPIO	Reserved compatible pulse wave input counter, ADC, and pulse output
11	IO2	GPIO	Reserved compatible pulse wave input counter, ADC, and pulse output
12	ADC1	ADC	N/A

Installation of cable

F2X16 adopts industrial terminal block interface.

The recommendatory cable is 28-16AWG.

The detail description of standard layout adapter and communication cables as is following:

Adapter（Rating Output 12VDC/0.5A）

Cable Color	Power Output Polarity
Black &White	Anode
Black	Cathode

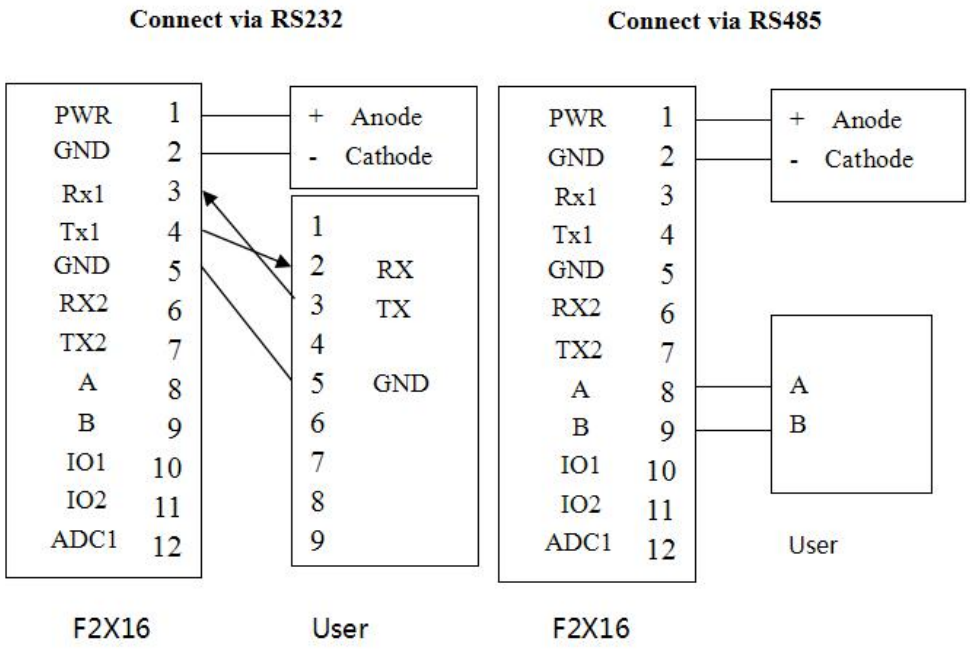
RS232 Cable

Cable Color	DB9-M Pin Number
Brown	Pin 2
Blue	Pin 3
Black	Pin 5

RS485 Cable

Cable Color	Signal definition
Red	RS485(A)
Black	RS485(B)

Power adapter and communication cable connection



2.4 Power

The power range of the IP MODEM is DC 5~36V
We recommend user to use the standard DC 12V/0.5A power adaptor.
Warning: When we use other power, we should make sure that the power

can supply power above 4W.

2.5 Indicator Lights Introduction

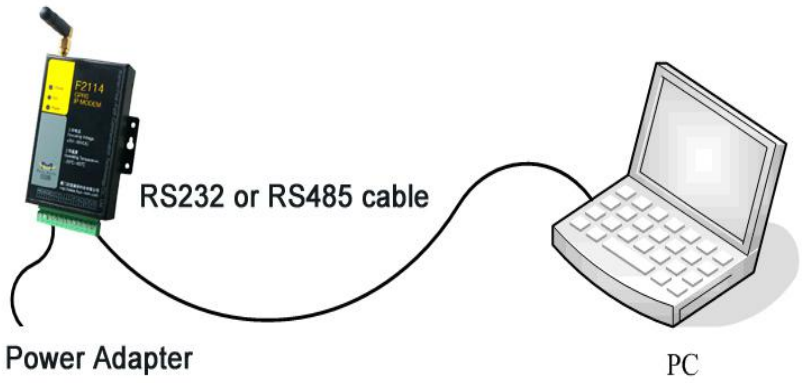
The IP MODEM provides three indicator lights: “Power”, “ACT”, “Online”.

Indicator	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 Connection

Before configuration, It's necessary to connect the IP MODEM with the 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:

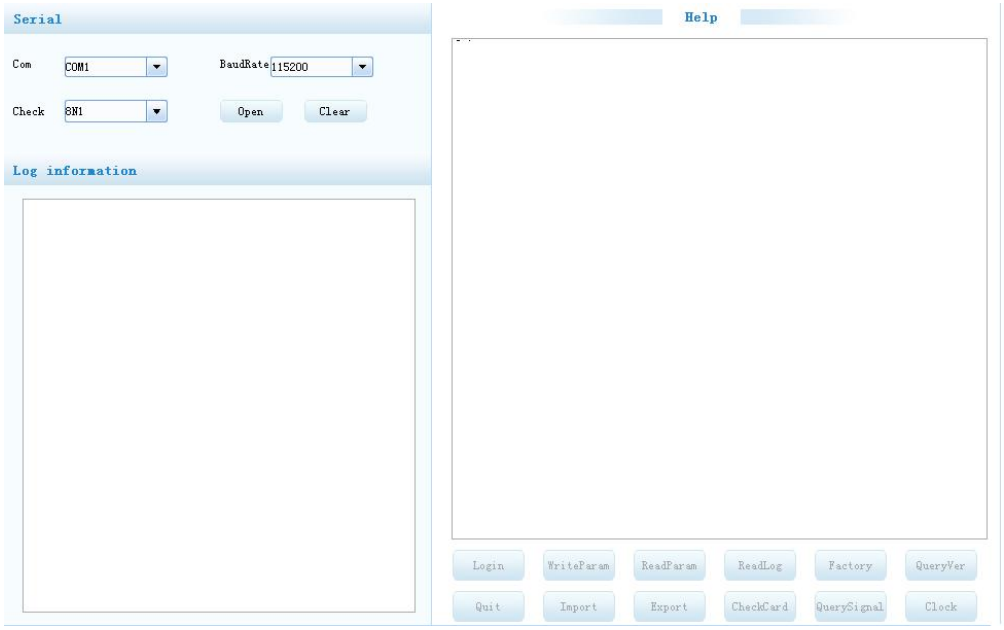
Configuration software tool:
All the settings are configured through the shipped software tool.
It's necessary to have one PC to run this tool.

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 IP Modem's Parameters Configuration

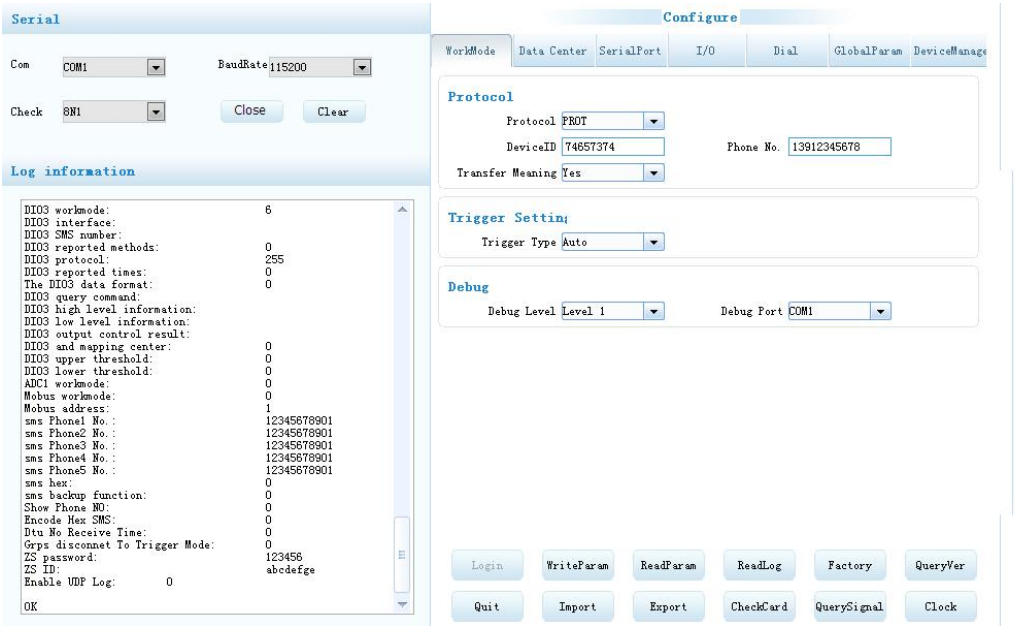
3.3.1 Run the Configure Tools



The "Serial" area shows the current serial port settings.
To configure IP MODEM, please choose the correct serial port which connects to IP MODEM, and the baud-rate 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..."

3.3.2 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.

Note：To enter configure state for 4G device may need more time. It is about 40 seconds.

3.3.3 Work Mode

3.3.3.1 App protocol

The IP Modem can be configured many communication protocols to adapt for different applications.

Note： The tool will show the reference parameters according to the communication protocols setting.

PROT

It uses TCP Protocol to send or receive data. In this mode, ID and phone number MUST be set.

Device ID	ID number for the device. 8 characters
Phone No.	Phone number
Character Escapes	This item is only valid when the Work Mode is PROT. If this item is set to No, 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 Yes, all the transmission is transparent.

DCTCP

This protocol is used in electric power field, with TCP protocol.

PhoneNo.	Phone number

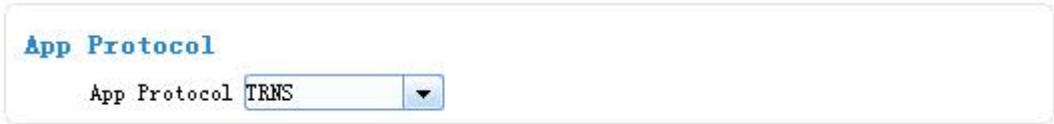
DCUDP

This protocol is used in electric power field, with UDP protocol

PhoneNo.	Phone number

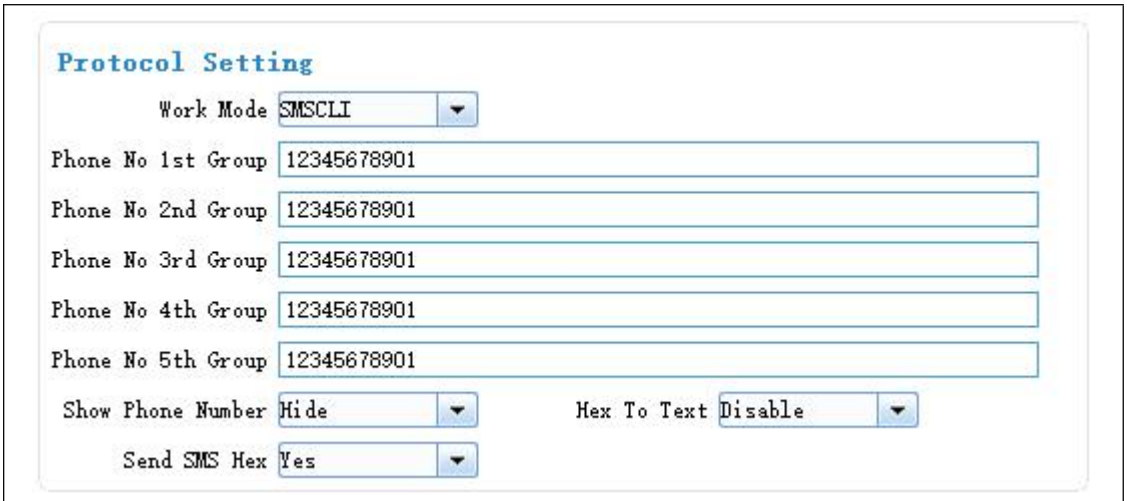
TRNS

The device work as MODEM for sending/receiving SMS, CSD and GPRS dialing.



SMSCLI

IP MODEM work as a SMS DTU. All data will send to binding phone number via SMS. The SMS from the binding phone number will send to Serial port.



Pone No 1st Group Pone No 2nd Group Pone No 3rd Group Pone No 4th Group Pone No 5th Group	Bind phone number. Max phone number is 5 for one group
Show Phone Number	If send phone number to serial port or not
Hex To Text	If convert HEX data to ASCII data or not
Send SMS Hex	If send SMS with Hex format or not

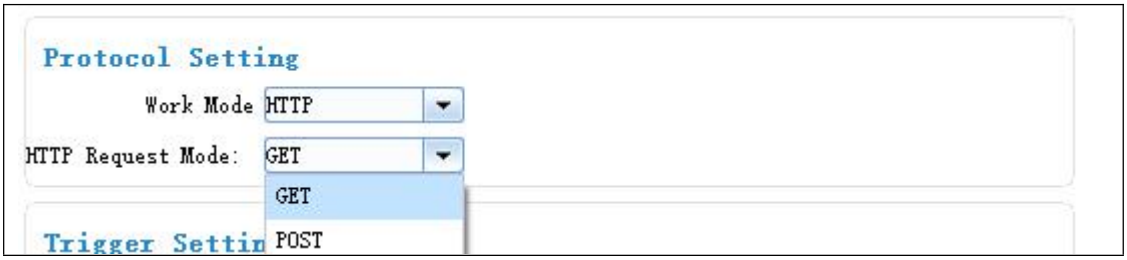
SMSSER

IP MODEM work as a SMS DTU. All the data paced with special format send to any phone number. The SMS from phone number will send to serial port.

Show Phone Number	If send phone number to serial port or not
Hex To Text	If convert HEX data to ASCII data or not
Send SMS Hex	If send data with Hex format or not

HTTP

When IP modem connected to the HTTP server address, serial port data will be packeted with Http format and sent to server.



HTTP Request Mode	Can select GET and POST Mode

MTCP/MRTU

IP MODEM will convert data from Modbus TCP to modbus RTU when recieve data from server,also will convert data from Modbus RTU to Modbus TCP when sending data to server via the serial port in device.

Device ID	ID number for the device. 8 characters
Hex To Text	If convert HEX data to ASCII data or not
Send SMS Hex	This item is only valid when the Work Mode is PROT. If this item is set to No, 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 Yes, all the transmission is transparent.

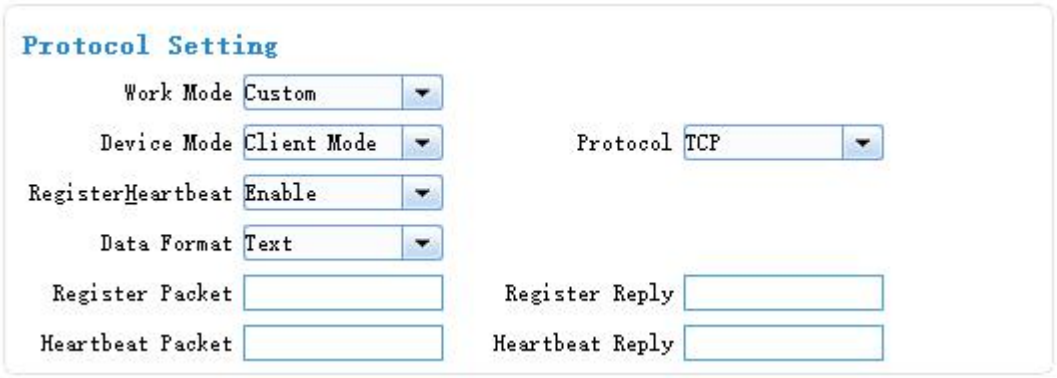
MQTT

IP MODEM will work as MQTT client,when configured and connected to MQTT server,it can communicate with other MQTT client.(you can check the test guide in the appendix.)

Client ID	ID of MQTT client,can be Configured to the required string
User name and password	The usename and password of server(if need)
Receive Topic	It should be configured with the send topic of another client
Send Topic	It should be configured with the recieve topic of another client

Custom protocol：Client mode

It support TCP and UDP protocol with custom heart and login packet.



Base Protocol	TCP or UDP
DeviceMode	Client Mode: the IP Modem work as a client.
Login&Heartbeat	Enable: custom login and heart packet Disable: no login and heart packet. The flowing items can be ignored.
Data Format	Text: the flowing items are Text format Hex：the flowing items are Hex format
Login Packet	Login packet
Login Reply	Login packet respond
Heartbeat Packet	Heart packet
Heartbeat Reply	Heartbeat packet respond

Custom protocol：Server mode

It supports TCP and udp server.

Base Protocol	TCP or UDP
Listen Port	Listen port for service

3.3.3.2 Trigger mode

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.
Any phone number's SMS can wake up IP Modem, if the trigger number is empty.
Otherwise only the trigger phone number's SMS can trigger the IP Modem.

SMS Phone No.	Trigger phone number. If it is empty, sms received from any phone no. can trigger the device
SMS Password	The content of SMS to trigger. If it is empty, any content of sms can trigger the device

CTRL

Make IP MODEM online through a phone call to IP MODEM.
Any phone number call can wake up IP Modem, if the trigger number is empty.
Otherwise only the trigger phone number call can trigger the IP Modem.
Note：if the trigger phone was set, the sim card in IP Modem Must have "caller ID display" function.

CALL Phone No.	Trigger phone number

DATA

Send special serial data to make IP MODEM online

Data Trigger On	If it was empty, any data form serial can trigger the IP Modem. The first frame data will be discarded because the IP modem was in deep sleep state. If it is not empty, only the data matching to the "online data" can trigger the IP Modem.
Data Trigger Off	If it was empty, the IP Modem kept online. If it is not empty, only the data matching to the "offline data" can made the IP Modem offline.
Trigger Port	Set the trigger data source from PORT1 or PORT2
Data Format	Format of the trigger data: Text or HEX

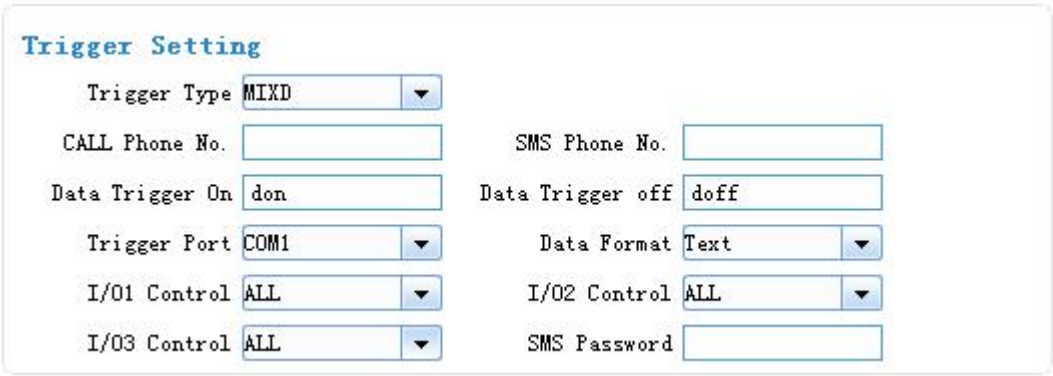
I/O：Sleep and Wake up

Made the IP Modem sleep or wake up via I/O level. If the I/O was in high level or suspend, the IP Modem was sleep. Otherwise, It would trigger the IP Modem wake up.

Sleep/Wakeup	Made the IP Modem sleep or wake up depended on the I/O state
I/O	Set I/O port to trigger the IP Modem to sleep or wake up

MIXD

The combination of SMSD, CTRL, DATA. IP MODEM will be online when meet one of these three trigger methods.



CALL Phone No.	Any phone number call can wake up IP Modem, if the trigger number is empty. Otherwise only the trigger phone number call can trigger the IP Modem.
SMS Phone No.	Any phone number's SMS can wake up IP Modem, if the trigger number is empty. Otherwise only the trigger phone number's SMS can trigger the IP Modem.
Data Trigger On	Online data
Data Trigger Off	Offline data
Trigger Port	Set the trigger data source from PORT1 or PORT2
Data Format	Format of the trigger data: Text or HEX

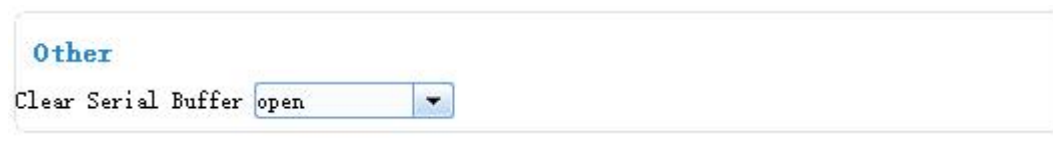
3.3.3.3 Debug Level

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

Debug Level	Close：no debug information output Level 1：simple prompt information output Level 2：detail debug information output
Debug Port	Port 1：debug info send to port 1 Port 2：debug info send to port 2 485：debug info send to RS485

3.3.3.4 Clear Serial Buffer

When open "clearing Serial buffer" function, serial port data before connecting to the network will not be sent to the center



3.4 Data Service Center Settings

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

3.4.1 Data Service Center

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

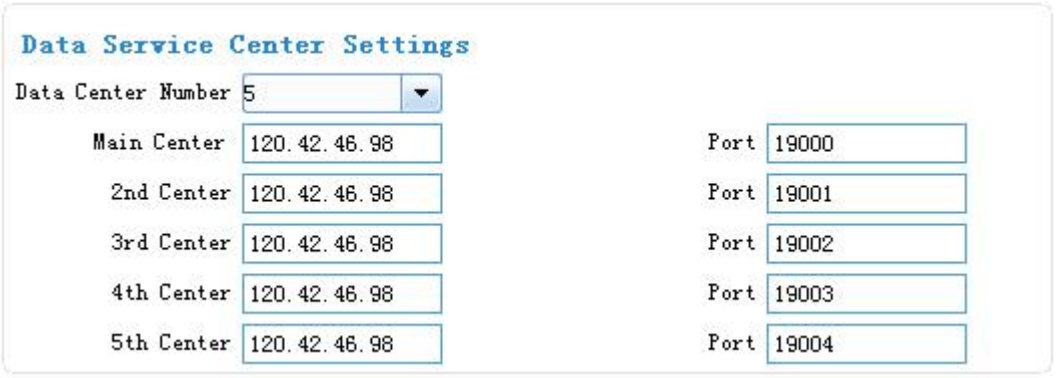
Note：If no Backup DSC exists, please configure the Backup DSC same as Main DSC.

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 .

Reconnect Int.(s)	reconnect time interval in second
Connect Retry Times	reconnect times
Back To Main Server	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.

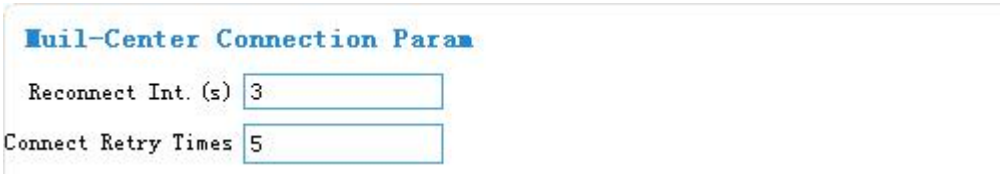
If the Data Center Number is 0,there is no DSC working.
If the Data Center Number is 1, IP MODEM work in Main and Backup DSC method.
When "Data Center Number" is greater than 1, IP MODEM works in Multi Data

Service Center method. The back center is invalid. The IP Modem will connect to mulit Data Center and transmit data.



3.4.2 Multi-Center Connection Check

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



Reconnect Int.(s)	reconnect time interval in second
Connect Retry Times	reconnect times

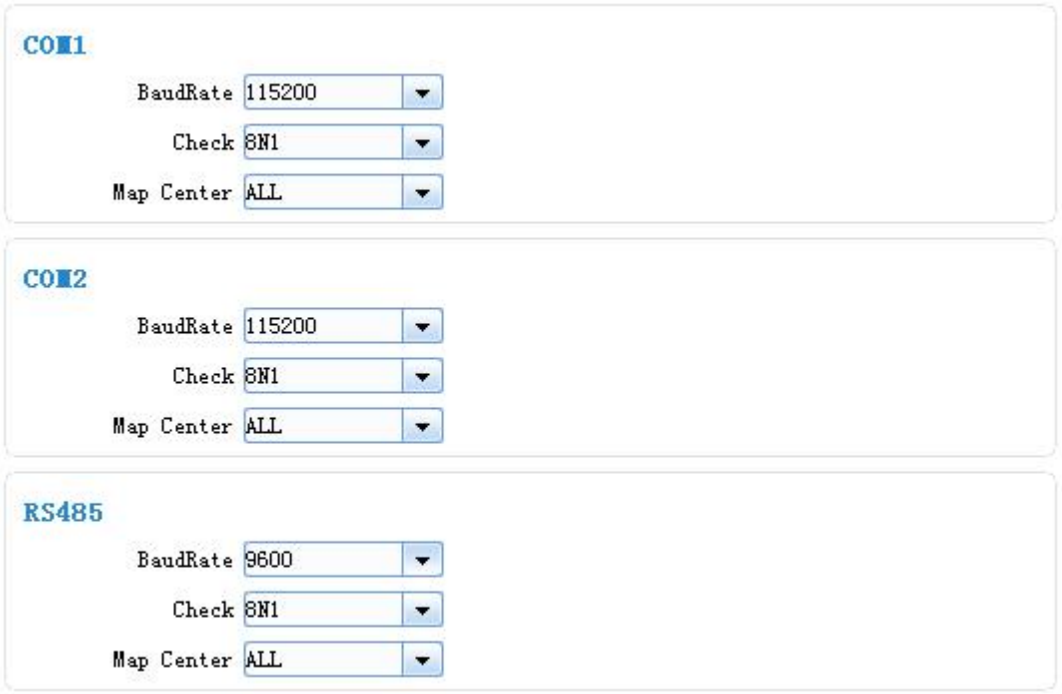
3.4.3 ICMP Link Check

ICMP link check send to server a icmp packet and wait reply to check the link status. If the reply is lost, it means that the link may be broken.

ICMP Check	Enable or Disable
Dest Address	The destination address of ICMP packet to send
Check Interval(s)	The interval should not be too small. 60 is recommended(in second)
Check Times	>= 3 times

3.5 Serial port

IP MODEM support three individual serial ports, Port1, Port2 and RS485. All the three ports can enter configuration state. The default parameters of the port with baudrate 115200, data property 8N1
The data from the three port can bind to Data center.

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td>COM1</td><td>baud：the baud rate of the PORT
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

Property：Databit, Parity, Stopbit
8N1 --- 8 Databit, No parity, 1 Stopbit
8E1 --- 8 Databit, Even parity, 1 Stopbit
8O1 --- 8 Databit, Odd parity, 1 Stopbit

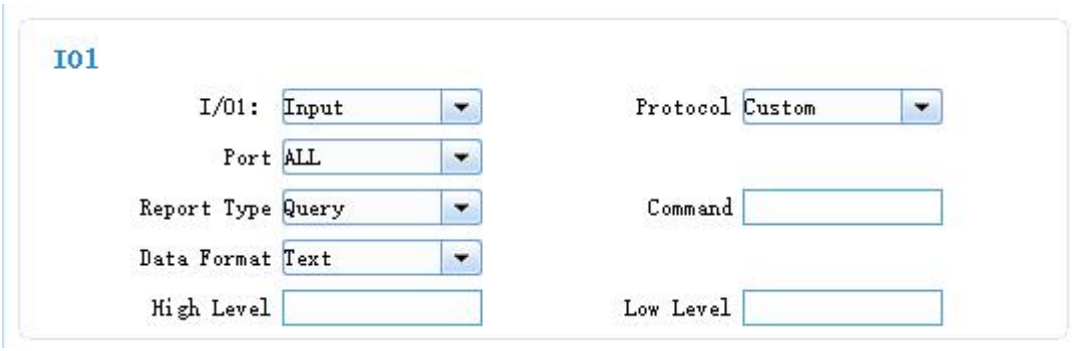
Bind：
Center1: the data from the port send to center 1</td></tr>
</table>

	Center2: the data from the port send to center 3 Center3: the data from the port send to center 3 Center4: the data from the port send to center 4 Center5: the data from the port send to center 5 ALL: the data from the port send to all centers Close: send to none
COM2	The same as above
RS485	The same as above

3.6 IO function

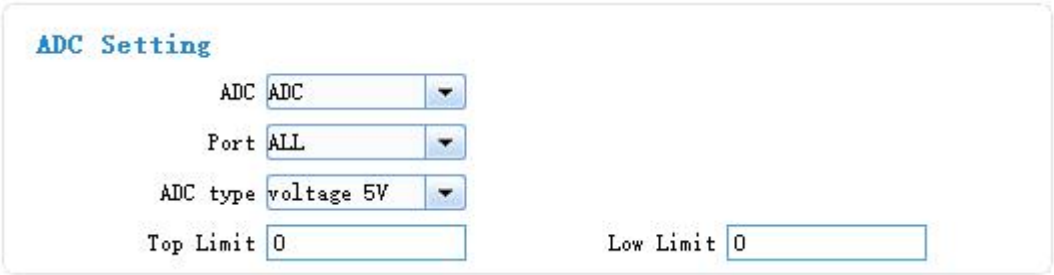
IP MODEM support 2 digital I/O and 1 Analog input,can custom data string to query data or trigger IO state.

3.6.1 Digital I/O



I/01	Input:work as digital input port Output:work as digital output port Indication:will output low level when IP Modem connect data center;output high level when disconnect from data center
Port	support COM/GPRS/ SMS
Protocol	Modbus:you can query or control IO status through modbus tcp command Custom:you can custom command to query IO status
Report Type	Query/Time/IO Trigger
Command	Random string
Data Format	Text or Hex
High leve	Status indicator string,when port is high level,will report it to DSC
Low level	Status indicator string,when port is low level,will report it to DSC

3.6.2 Analog input



ADC	Disable or enable ADC
Port	support COM/GPRS/ SMS
ADC type	Electricity:support 4~20MA current input Voltage:support 0~5V,can customize to support 10V/15V
Report Type	Query/Time/IO Trigger
Top Limit	Sensor measurement range upper limit
Low Limit	Sensor measurement range lower limit

3.7 Dial

3.7.1 PPP Dial

DialNo	Network	Dial number
	GPRS/WCDMA/LTE	*99***1#、*99#、*98*1#
	CDMA/EVDO	#777
APN	Network	APN
	GPRS/WCDMA/LTE	cmnet、uninet
	CDMA/EVDO	empty
Username/password	Network	User name/password
	GPRS/WCDMA/LTE	empty
	CDMA/EVDO	card/card
PPP Auth	AUTO,PAP and CHAP	
QueryNetMode	Search the network mode for the 4G network	

Net Mode	Net Mode AUTO EVDO WCDMA TD-SCDMA CDMA GSM

3.7.2 PPP Redial

Re-dial Interval(s)	The interval between ppp dial in second
Dial Retry Times	max times of ppp dial failure

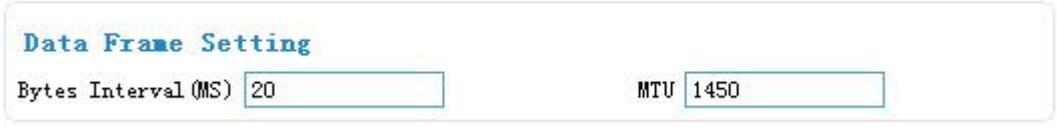
3.7.3 DNS Parameters

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.

Main DNS	The DNS server IP address(must be IP address）
Backup DNS	The DNS server IP address(must be IP address）

3.8 Global Parameters

3.8.1 Data Frame Parameters



Bytes Interval(MS)	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.(in milliseconds)
MTU	TCP Max packet length

3.8.2 Action for data send fail

When data send to server fail(there are not response from server),IP modem will take a failed action after setting delay.

Re-send int	The time interval if re-send fail
Re-Times	The max times of sending data failure
Fail Action	You can decide what action to take if sending data fail,including Dia again ,reconnect,reboot.
Delay before action	The time delay before Modem takes actions if sending data fail

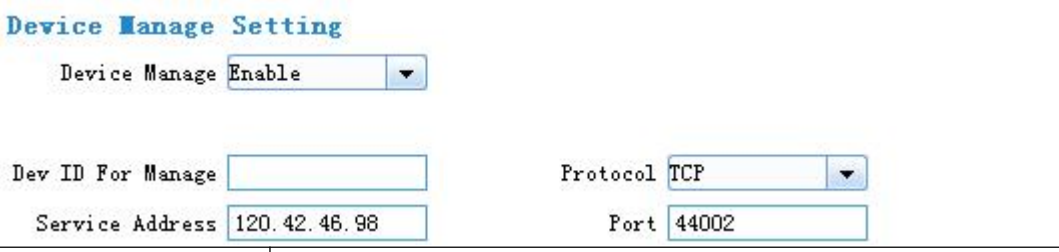
3.8.3 Other Parameters

SMS Center	The local SMS center number. It should set according to the local operation.
Heartbeat Int.(s)	Time interval sent heartbeat packet. (in second)

3.9 Device Manage

3.9.1 Device Manage Center Parameters

The IP Modem send device status information to the Device Manage Center. The information include network signal, network status, traffic flow and so on. The Device Manage Center also query and configure the device parameters.

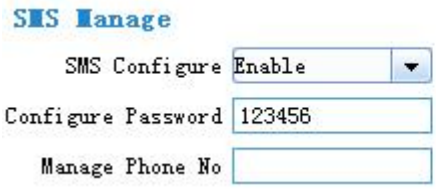


Device Manage	Enable or Disable
Dev ID For Manage	Device ID for manage center. 8 character

Protocol	TCP or UDP
Service Address	manage center server address
Port	manage center server port

3.9.2 Manage by SMS

Configure the IP Modem by SMS



SMS Configure	Enable or Disable
Configure Password	The password for SMS Configure
Manage Phone No.	If it is empty, any number can configure the IP Modem Parameters. Otherwise, only the “Administrator Number” can configure the IP Modem Parameters.

3.10 Operation

SIM Check	To check if simcard inserted or install ok?
Signal	Inquery the signal strength of simcard network
Time Setting	Synchronize local time
Log	Read log information of IP Modem
Factory	Factory the IP Modem’s parameters
Ver Info	Query the version of IP Modem
Reset	Reset modem to factory
IMEI	Inquery IMEI of IP Modem

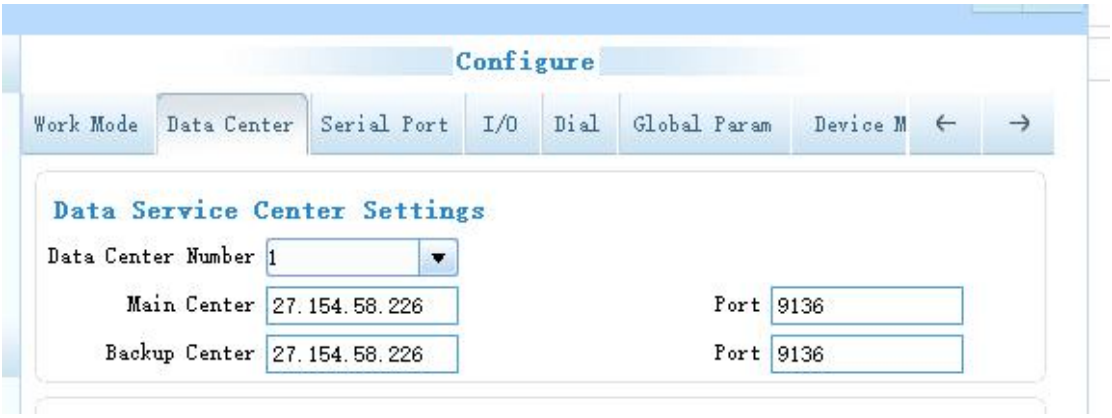
Chapter 4 Application Case

4.1 Modem connect to data center

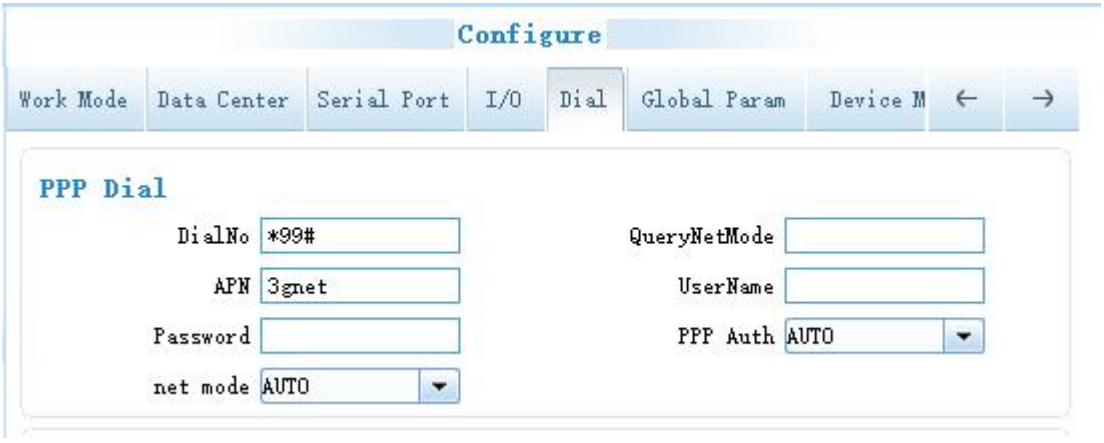
In this application,the client can communicate with the server side by gprs network.

IP modem configuration

Configure server IP and port：

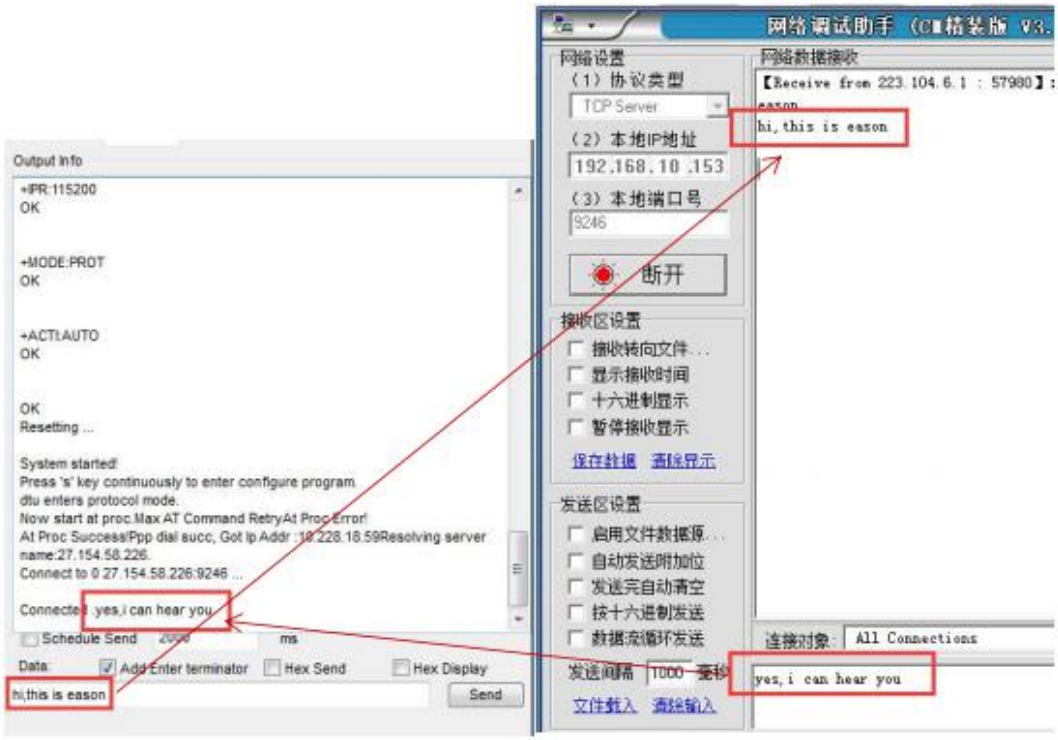


Fill in the APN from your simcard provider:



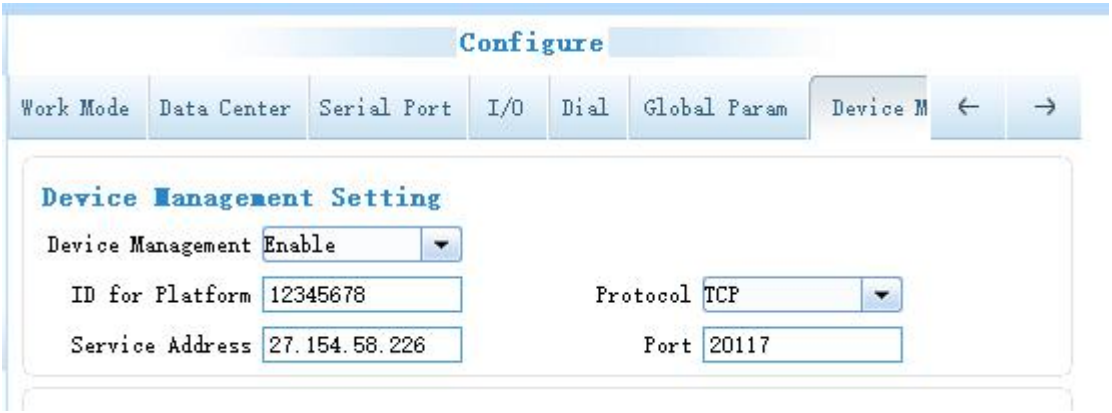
Repower modem,wait it connected to server.

Then you can send data to test the communication between modem with data sever(here use Netassit software to simulate data server)

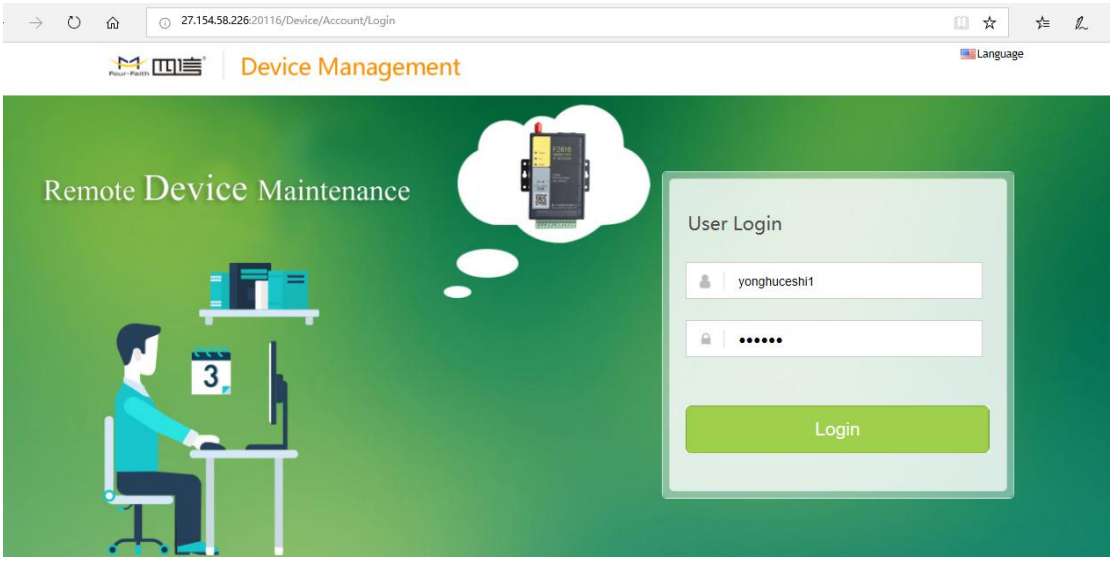


4.2 Remote management platform

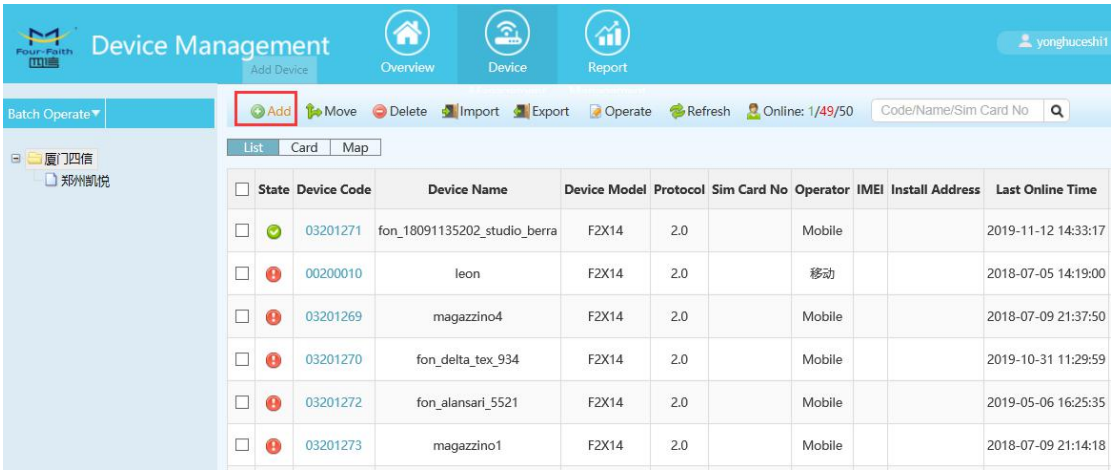
Four-Faith provide RMS for customer to manage device,you need enable Device management setting in modem,do simple configuration following the next picture (Note that ID for platform should be same with the Device code in platform)

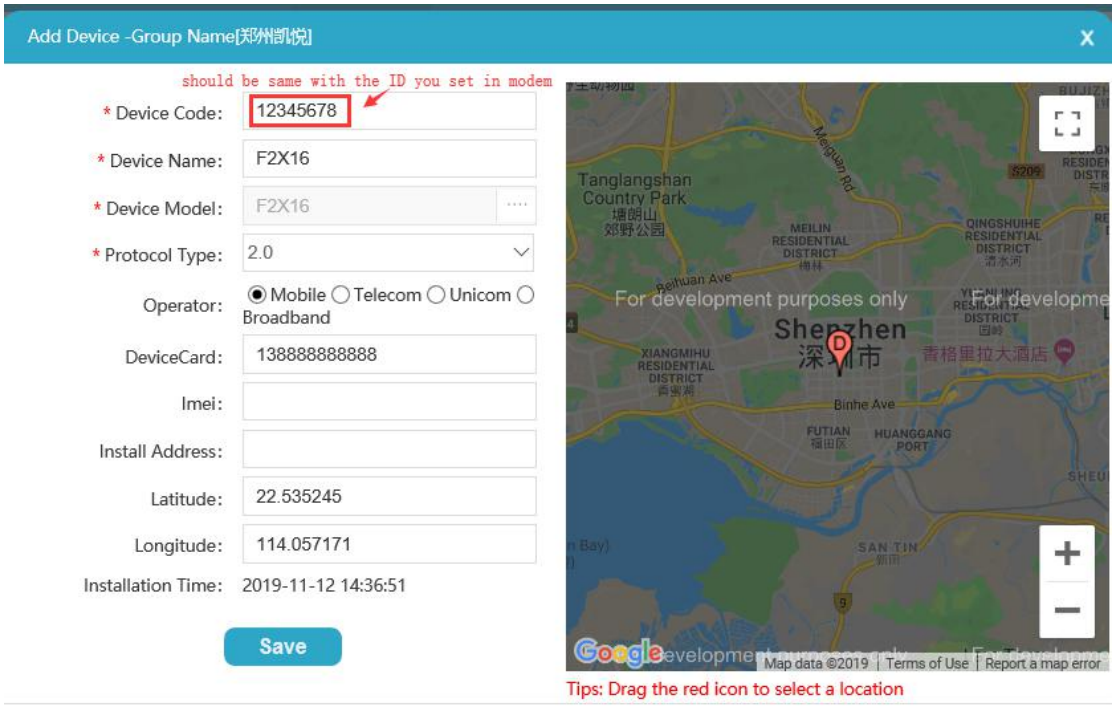


You can get platform account from Four-Faith:
DTU Platform address: http://27.154.58.226:20116（pls contact engineer from four faith to get your own account)
Fill in username and passform to login plafform:



In Device tab,you can add your device in platform,then repower device to wait to connected to platfrom.





4.3 SMS to configure modem

You can send SMS to configure modem via mobile phone

Step one
Enable SMS Manage function in modem：set SMS sender's phone number，the password is the one set in the modem.it can be digit or letter.

Step two
Send SMS according to the following format:
The message starts with the symbol '<' and ends with '>' and is without 'AT+'.
Example,AT command for the main center is AT+IPAD=120.42.46.98,and the corresponding SMS
configuration should be IPAD=120.42.46.98. Add ‘reset’ at the end.
SMS format：<123456;IPAD=120.42.46.98;PORT=5007;reset>
If set succesfully,you will receive a return SMS with Config OK：

Detail AT command pls check in Appendix 2.

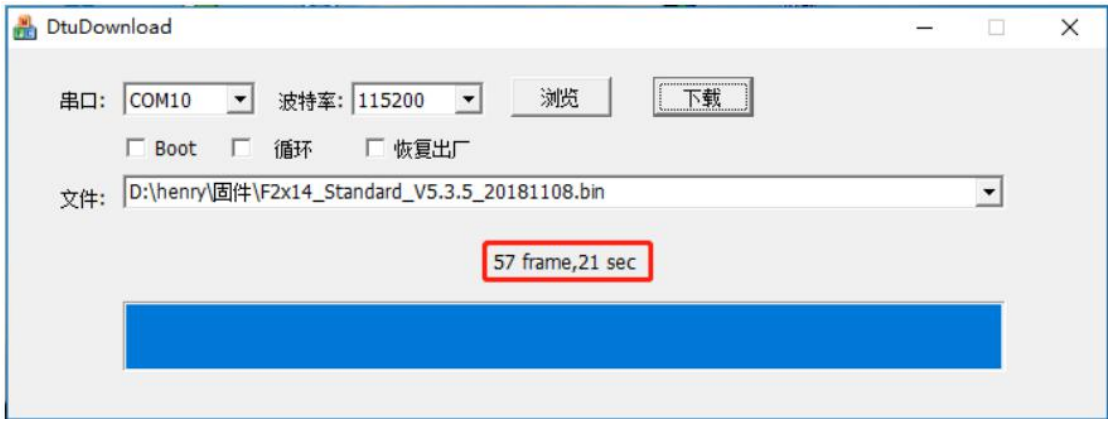
4.4 Update firmware via download tool

If you need upgarde firmware,pls contact Four-Faith sale or technical support to get the download tool and lattest firmware file.

Download tool：

Follow the steps to upgrade:
connect your laptop with modem via serial cable
choose the com and set correct baudrate，and find the firmware version you save in
your laptop, then click download，as the following show：

Finally,repower modem, you can see the download progress.

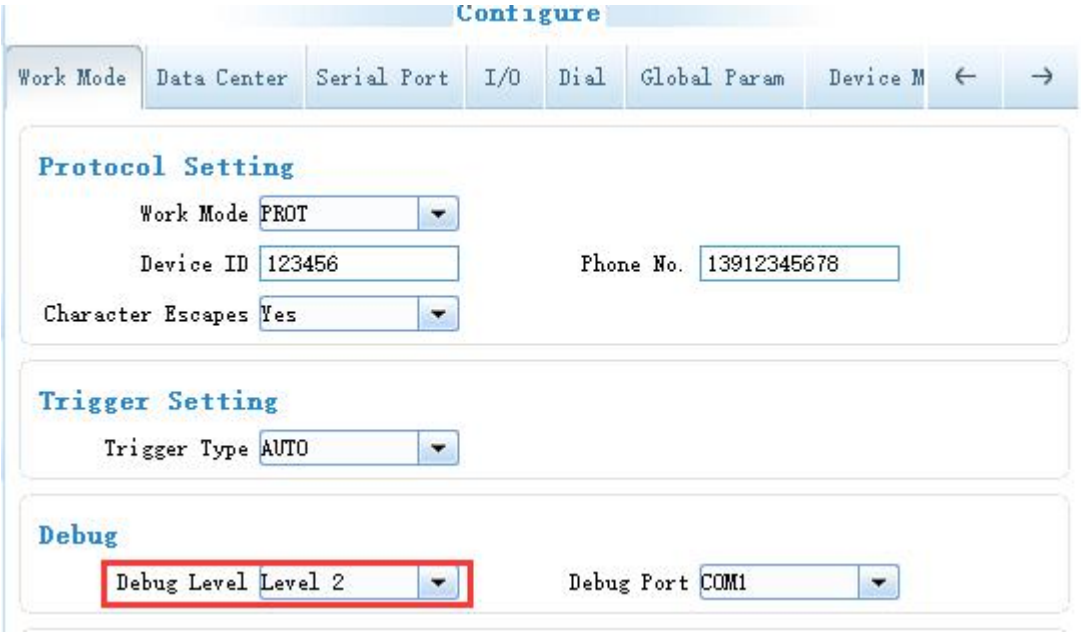


When download is complete, you will find the cost time (21 sec).

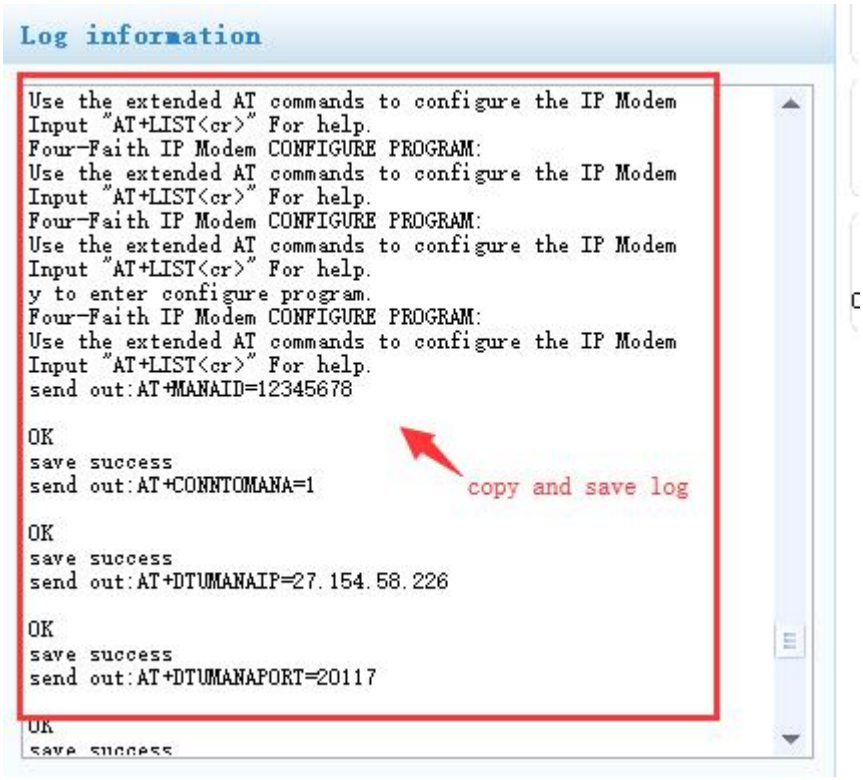
4.5 Save modem logs

When using modem and meet any problems,you can save logs and send it to Four-Faith technical support.

In order to get detail log information,you should set debug level to " level 2"first:



Then you can reproduce the problem and save the log to us:



4.6 Modbus Protocol for GPIO&ADC Acquisition

4.6.1 The Way of Cable Connection.

Analog input

a. Single-cable: Connect the analog output of the sensor to the analog input(ADC) of F2X16 directly.

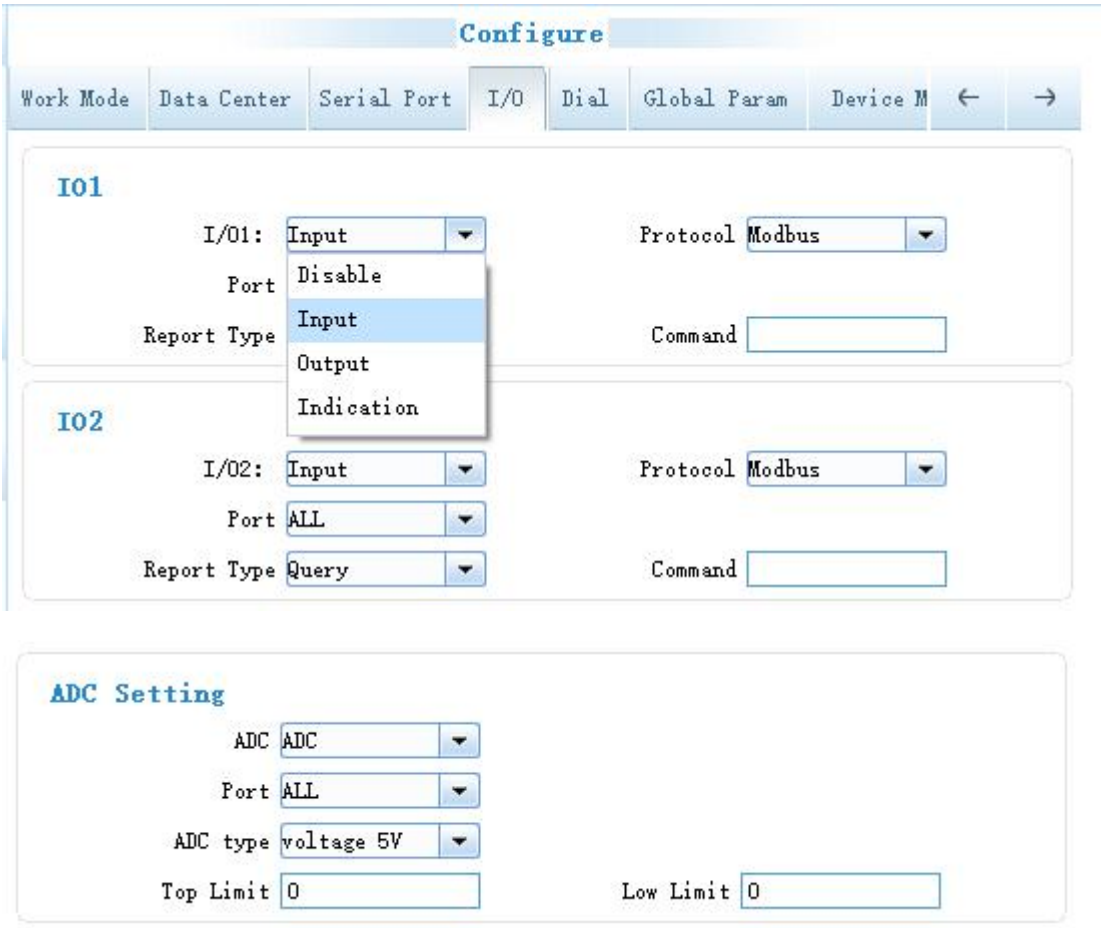
b. Double-cable: Connect the positive of analog output of the sensor to the analog input(ADC) of F2X16, and connect the ground wire to GND(PIN2) of F2114.

Digital input

a. Low level input：Connect the input of contact switch to GND of F2x16 and connect the output of contact switch to the digital output of F2X16(IO1/IO2).

b. High level input：Connect 3.3V voltage output to IO1/IO2, and connect the ground wire to GND of F2X16.

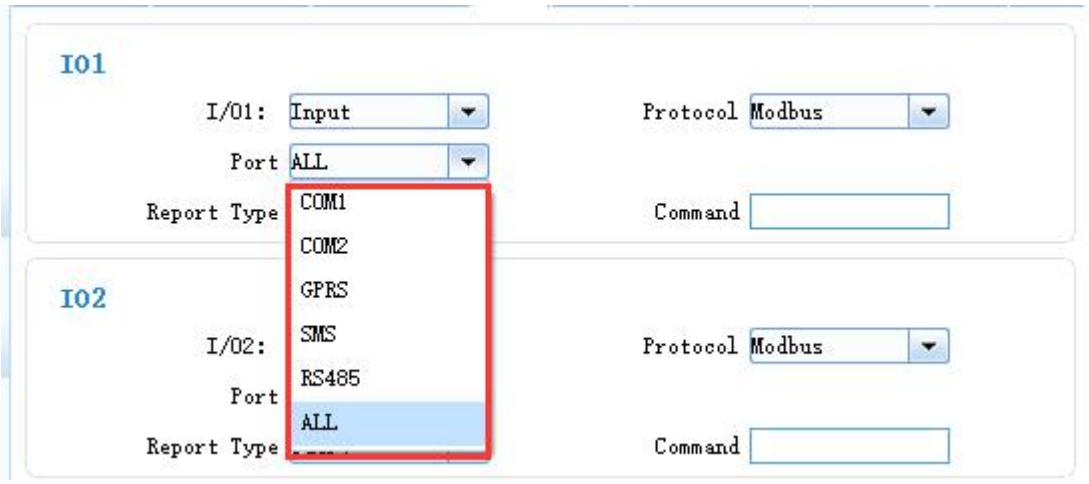
4.6.2 Modem setting:



IO1: Digital input/output 0---3.3V
IO2: Digital input/output 0---3.3V
ADC: current input 4--20MA
*Changes can be made in hardware to make ADC as voltage input.

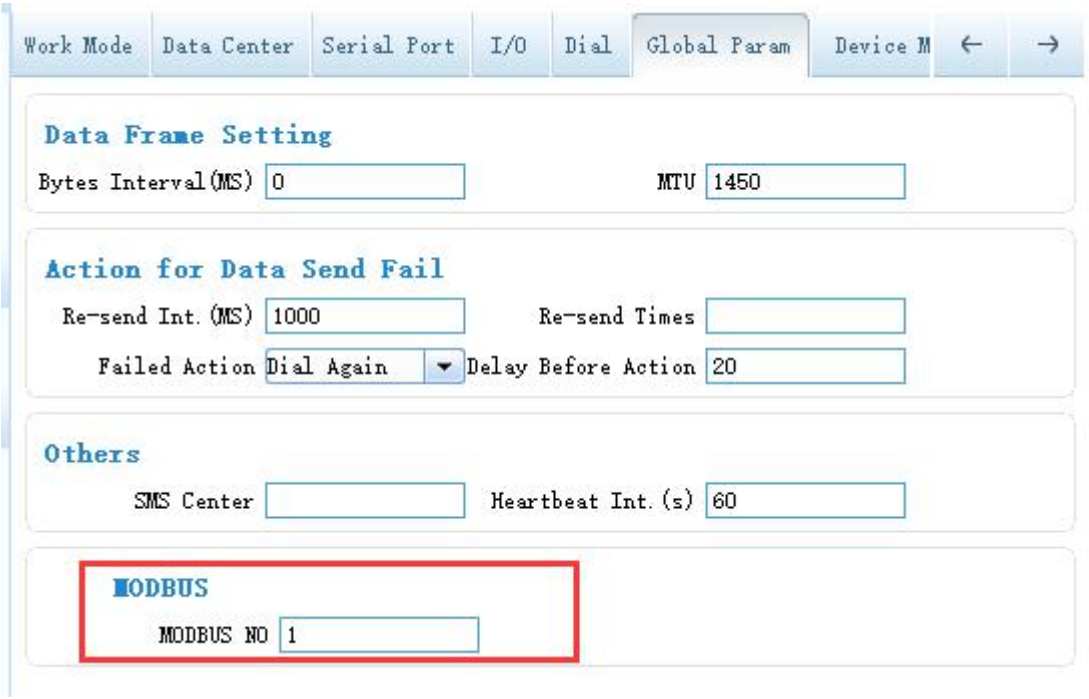
For IO1&IO2:
Disable---- Don't use IO port
Input--- Use IO as digital input port.
Output---Use IO as digital output port.
Indication---When connect to data center, it will output a high level to indicate data transmission

You can choose the port for each port:
RS232-1----The value will be sent to com1, you can check the value in RS232-1.
RS232-2----The value will be sent to com2, you can check the value in RS232-2.
GPRS----The value will be sent to net, you can check the value in data center.
SMS----The value will be sent as a sms.
RS485----The value will be sent to RS485 port, you can check the value in RS485



You can choose the protocol, and you also need set the query commands.
Modbus--you can use our modbus to query the value.
Custom---you can use the command of your own.

Set modbus address in Global param:



4.6.3 The modbus command for F2X16 IO& ADC:

Query digital Input

To read IO1 status(digital input)
Request: 01 02 00 00 00 01 B9 CA
Response:01 02 01 01 60 48 (IO1 is high level)
Response:01 02 01 00 A1 88 (IO1 is low level)

To read IO2 status(digital input)
Request: 01 02 00 01 00 01 E8 0A
Response:01 02 01 01 60 48 (IO2 is high level)
Response:01 02 01 00 A1 88 (IO2 is low level)

Notes of the modbus commands. Take the command 01 02 00 02 00 01 18 0A for example.

Modbus addr.	Function code	Register addr.		Register number		CRC checksum	
01	02	00	02	00	01	18	0A

Response 01 02 01 01 60 48

Modbus addr.	Function code	bytes	Register status	CRC checksum	
01	02	01	01(high level)	60	48
01	02	01	00 (low level)	A1	88

Set digital output

To set IO1 status(digital output)
Request：01 05 00 00 FF 00 8C 3A(set IO1 high level）
Response：01 05 00 00 FF 00 8C 3A
Request：01 05 00 00 00 00 CD CA(set IO1 low level）
Response：01 05 00 00 00 00 CD CA

To set IO2 status(digital output)
Request：01 05 00 01 FF 00 9C 0A(set IO2 high level）
Response：01 05 00 01 FF 00 9C 0A
Request：01 05 00 01 00 00 AC 0A(set IO2 low level）
Response：01 05 00 01 00 00 AC 0A

Notes of the modbus commands. Take the commmand 01 05 00 00 FF 00 8C 3A for example.

Modbus addr.	Function code	Register addr.		Set high/low level		CRC checksum	
01	05	00	00	FF	00	8C	3A
				00	00	CD	CA

Query ADC

To read ADC status(current input)

Request: 01 04 00 02 00 01 90 0A

Response:01 04 02 00 64 B8 DB

Notes of the modbus commands. Take the command 01 04 00 01 00 01 60 0A for example.

Modbus addr.	Function code	Register addr.		Register number		CRC checksum	
01	04	00	01	00	01	60	0A

Response 01 04 02 00 B8 B9 42

Modbus addr.	Function code	Bytes	Acquisition value		CRC checksum	
01	04	02	04	B8	B9	42

The acquisition value in HEX. You need to convert it to DEC and calculate with the formula below.

Current type: 3.3/1023 *acquisition value/150 *1000= (mA)

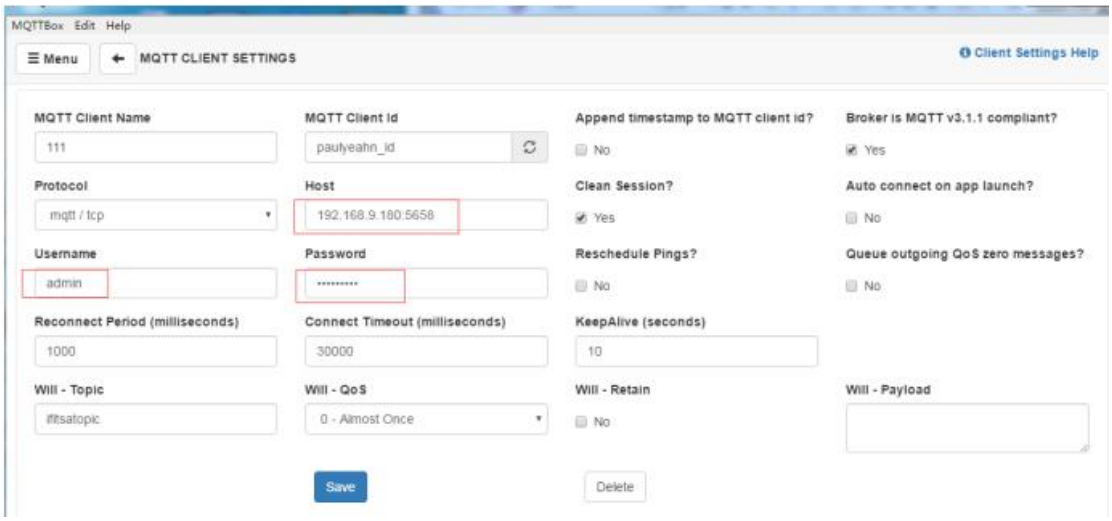
Voltage type: 3.3/1023 *acquisition value/12.1*20.16= （V）

(The acquisition value should be converted to DEC)

4.7 MQTT Test

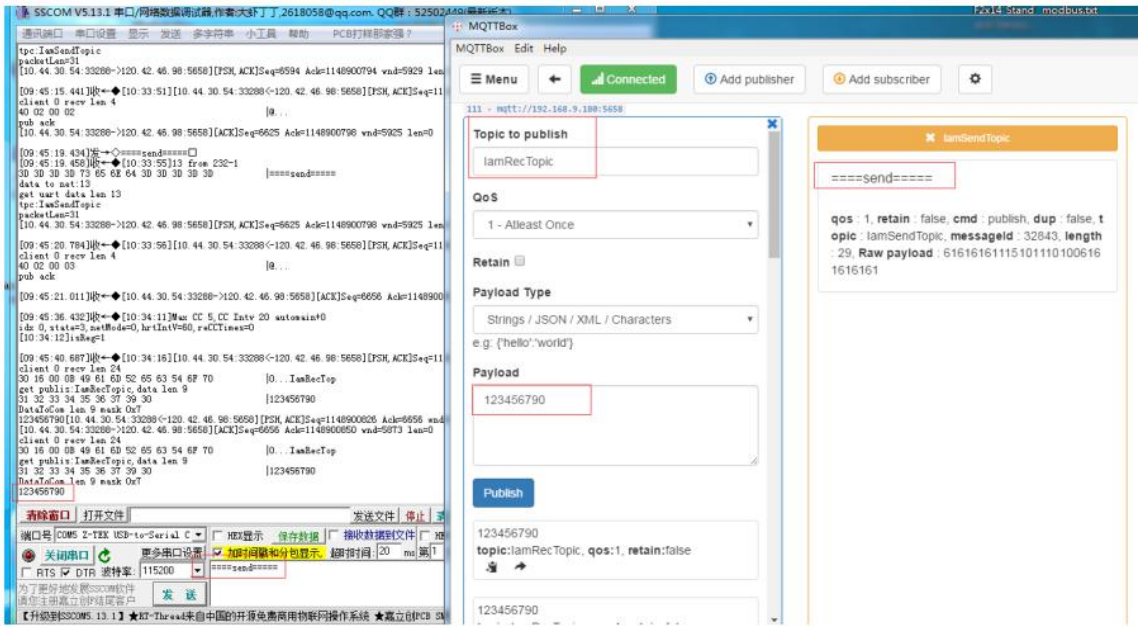
Modem can work as MQTT client.you need set work mode in MQTT,Client ID can be configured to the required string,username and password are from the MQTT server (some servers dont need). Receive topic is the Send topic in another MQTT client, Send topic is the Receive topic in another MQTT client,as shown in the figure:

You can download MQTTBox as another client, parametersconfiguration as the following:



Clients will connect to MQTT server if parameters are configured correctly,you can send data to test communication from MQTT Box：

The send topic of the MQTTBOX is set to the Receive topic of the terminal, and the Receive topic is set to the send topic of the modem, and data can be sent to each other at this time. As shown below:



4.8 MTCP/MRTU

When modem work in MTCP/MRTU mode,can support converting data from modbus RTU to modbus TCP. This working mode is based on PROT mode(transparent transmission)

Modbus RTU frame format:

Slave ID:

1 bytes, used to identify modbus frame transmitted on the TCP/IP stack

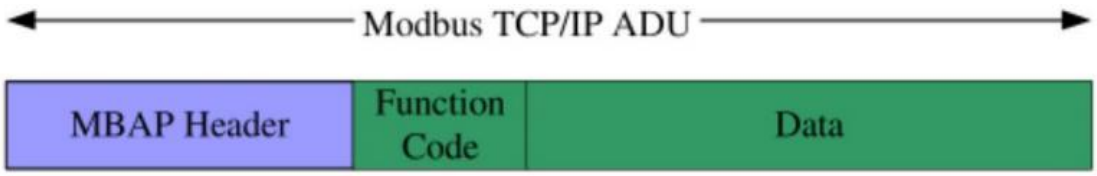
Function Code: 1 bytes, coding range 1-255

Data:

N*1 bytes, length and content are determined by the type of Function code

Error Check:
2 bytes, CRC check, used to check whether the received data is correct.

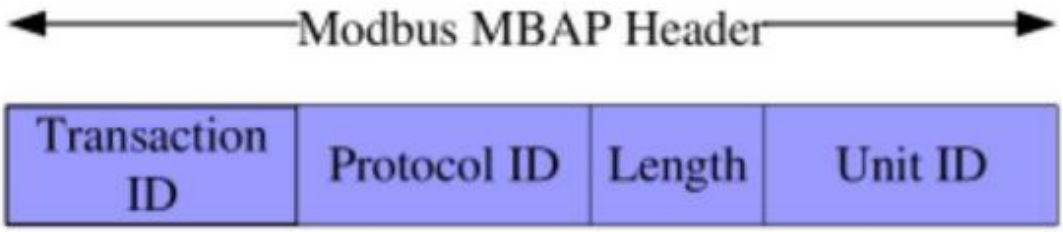
Modbus TCP frame format:



MBAP Header:
7 bytes, Modbus application protocol header. used to identify the modbus frame transmitted on the TCP/IP stack.

Function Code:
1 bytes, coding range 1-255
Data: N*1 bytes, based on the types of the function code.

MBAP Header:



Transaction ID:2 bytes, Modbus request/respond transaction identifier.
Protocol ID:2 bytes,0=Modbus protocol
Length: follow-up bytes, include Unit ID and data field
Unit ID:1 bytes, the ID of remote slave station

Example 1:
Modbus TCP(Data Center send to modem):
00 01 00 00 00 06 01 04 00 00 00 01 (06 length, 01 is modbus address, 04 is function code, 00 00 00 01 is the register start address 2 bytes + the number of registers 2 bytes)
Modbus RTU(recieve in serial port of modem):
01 04 00 00 00 01 31 CA（31 CA is CRC code）
Response data from serial:
01 04 02 00 B8 B9 42（02 is length，00 B8 is data）
Data center will recieve modbus TCP data:
00 01 00 00 00 05 01 04 02 00 B8 (05 is data length)

Example 2:

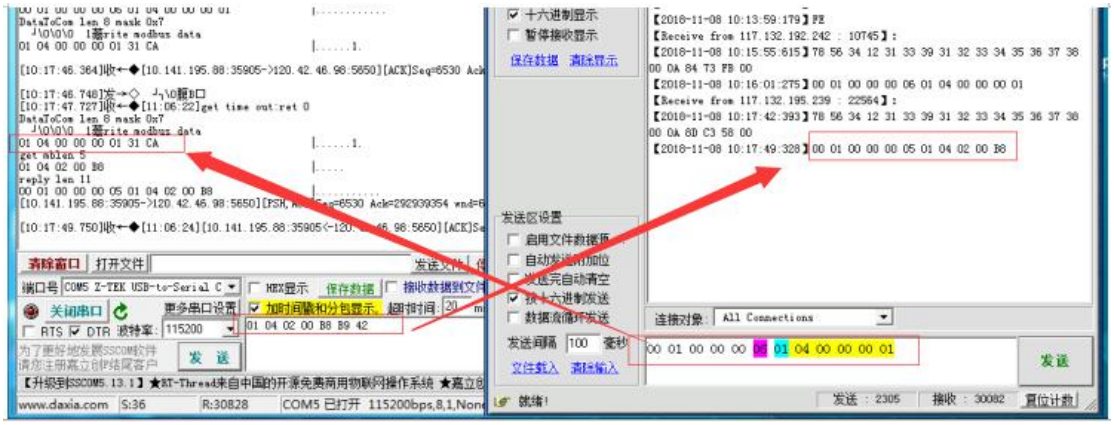
Data center send：00 01 00 00 00 06 01 04 00 08 00 01

Dispaly in serial： 01 04 00 08 00 01 B0 08

Response in serial： 01 04 04 00 08 00 B8 7A 34

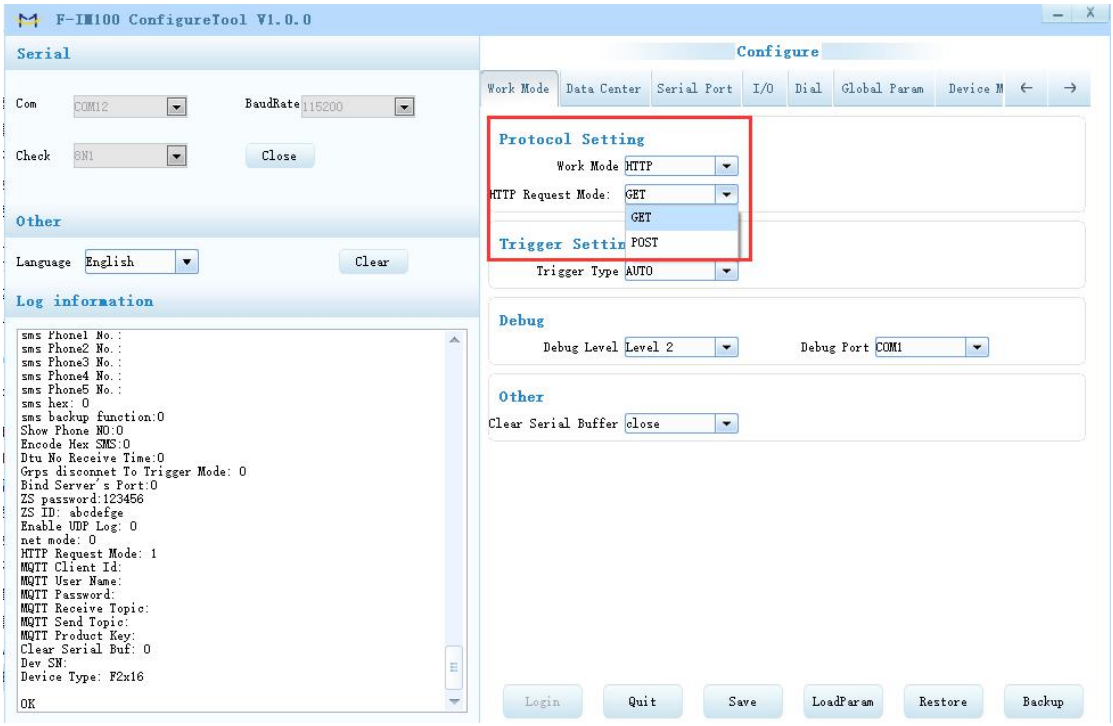
Data center recieve： 00 01 00 00 00 07 01 04 04 00 08 00 B8

The communication test as the below picture:



4.9 HTTP Protocol Test

Modem can work in HTTP mode,HTTP request mode you can choose GET or POST.as the following setting.
You need configure data center address before test.



POST mode:

If Modem dial successfully and connected to http server， Serial data will be packaged with HTTP format then sent to the server.
HTTP data：

```
POST  HTTP/1.1
Host: 120.42.46.98:5650
User-Agent: Go-http-client/1.1
Content-Length: 9
Content-Type: application/json

6666666
```

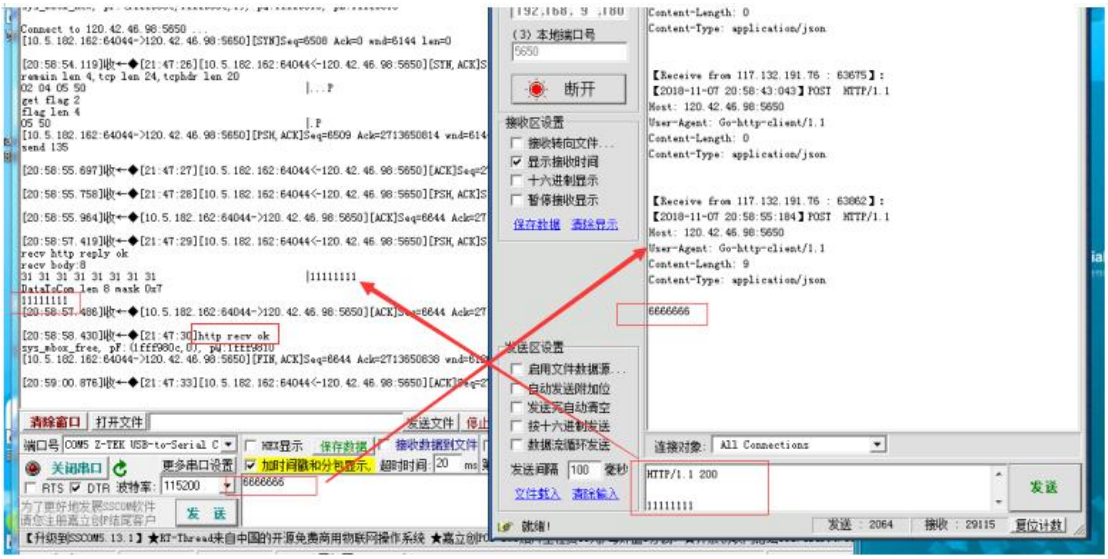
After sending data,modem should recieve response within 5 second,respond format as：

```
HTTP/1.1 200

OK
```

When modem recieve data,will transfer application data(OK) to serial port,as

the following figure show:



GET mode:

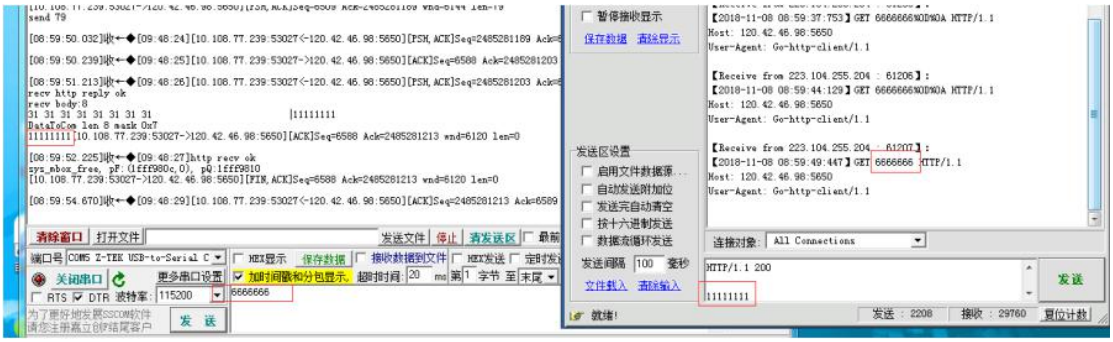
HTTP data:

GET 6666666 HTTP/1.1

Host: 120.42.46.98:5650

User-Agent: Go-http-client/1.1

If data send to server successfully,modem aslo will recieve”ok” in serail port,as the following figure show:



If no data is sent, modem will send an HTTP request packet according to configured interval. The format is the previous format, but the application data is missing. Such as:

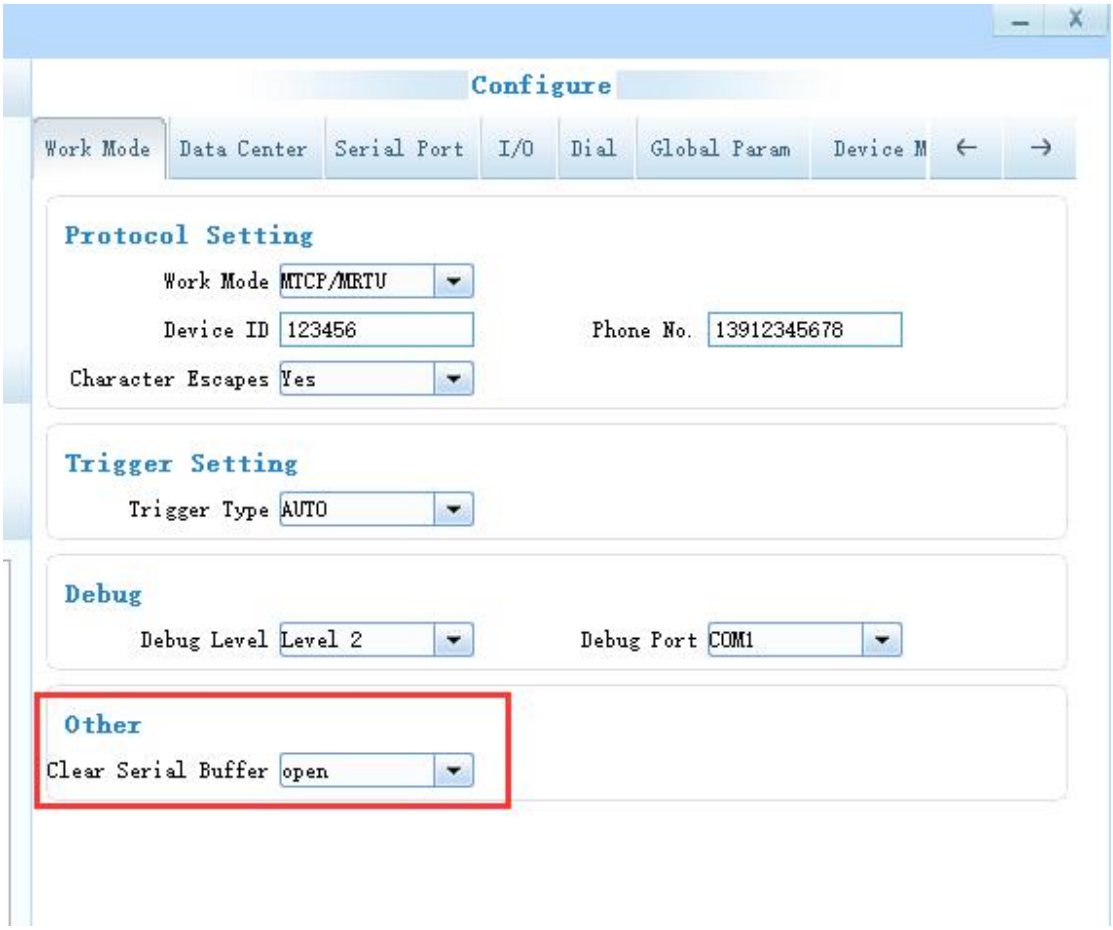
GET HTTP/1.1

Host: 120.42.46.98:5650

User-Agent: Go-http-client/1.1

4.10 Clear Serial Buffer

If enable Clear Serial Buffer function,the serial data will be cleared until modem connect to data ceneter.


Configure
Work Mode
Data Center
Serial Port
I/O
Dial
Global Param
Device M
Protocol Setting
Work Mode
MTCP/MRTU
Device ID
123456
Phone No.
13912345678
Character Escapes
Yes
Trigger Setting
Trigger Type
AUTO
Debug
Debug Level
Level 2
Debug Port
COM1
Other
Clear Serial Buffer
open

Appendix 1

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

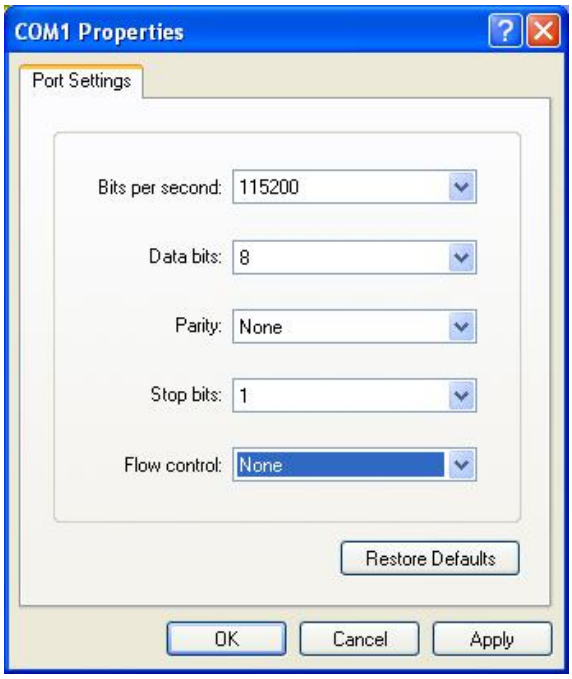
1. Press "Start"→"Programs"→"Accessories"→"Communications"→"Hyper Terminal"

2. Input connection name, choose "OK"

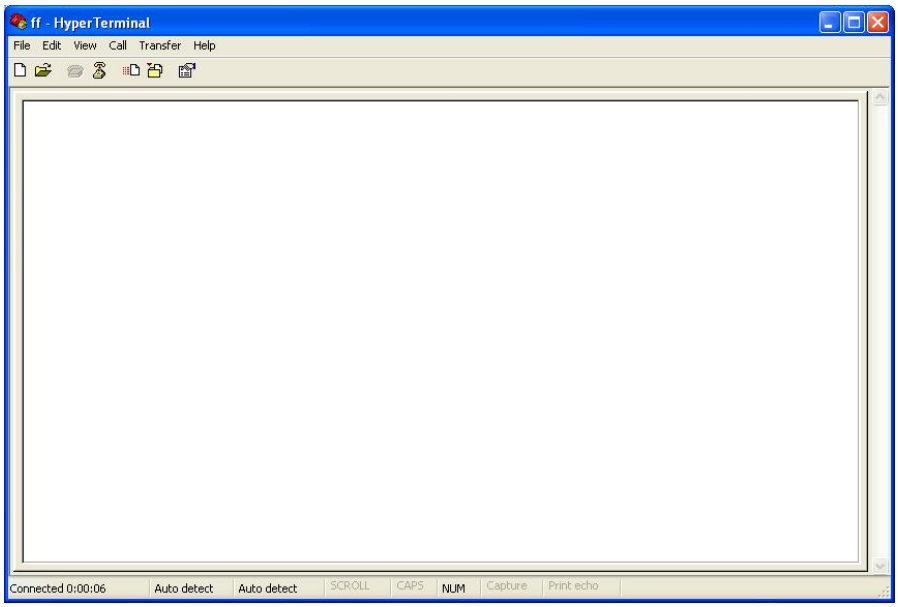
3. Choose the correct COM port which connect to IP MODEM, choose "OK"

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

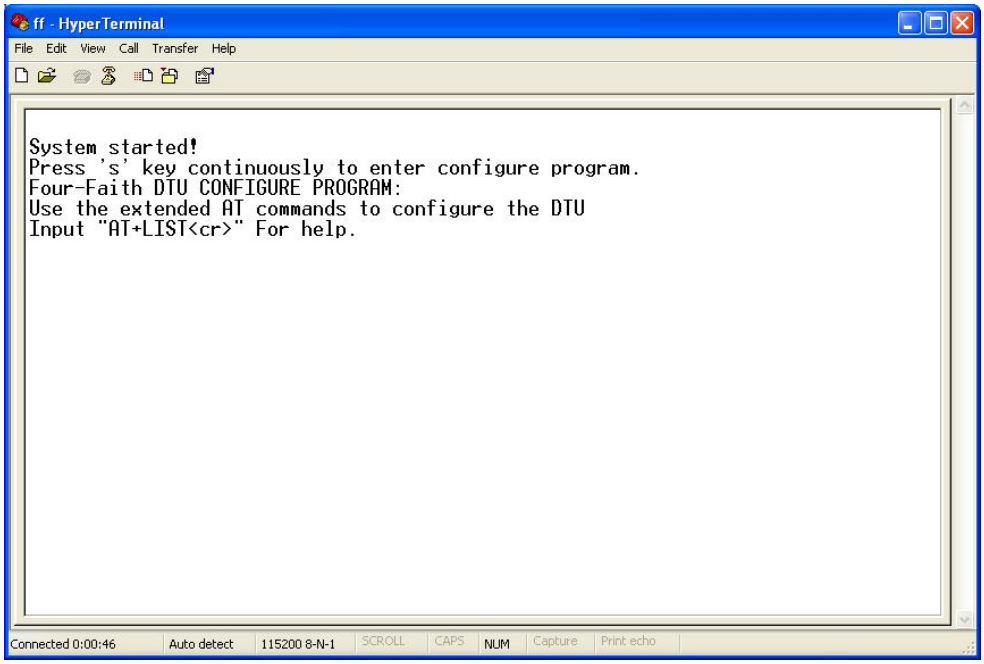
Bits per second: 115200
Data bits: 8
Parity: None
Stop bits: 1
Flow control: None



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.

Appendix 2

AT command for DTU setting:

AT+APN=<apn> Set Access Point Name
AT+CENT=<center no.> Set Center call number
AT+USERNAME=<user id> Set PPP Authentication User
Id
AT+PASSWORD=<password> Set PPP Authentication
Password
AT+SVRCNT=< Total Servers> Set Total Servers
AT+IPAD=<Server's Ip Address> Set Server's Ip or Domain
AT+IPADn=<Aux Server's Ip Address(n=1,2..4)> Set Other Server's Ip or
Domain
AT+PORT=< Server's Port> Set Main Server's Port
AT+PORTn=<Other Server's Port(n=1,2...4)> Set Other Server's Port
AT+IPSEC=<Secondary Server's Ip Addr.> Set Secondary Server's Ip
AT+PTSEC=<Secondary Server's Port> Set Secondary Server's Port
AT+IDNT=<8-digit Hex ID No.> Set modem's ID number
AT+MODE=<Work mode> Set Work mode
AT+DEBUG=0/1/2 Set modem's debug level
AT+POLLTIME=<Poll time seconds.> Set heartbeat poll time .
AT+DNSSVR=<Dns Server's Ip.> Set Dns Server's Ip.
AT+DNSSV2=<Second Dns Server's Ip.> Set Second Dns Server's Ip.
AT+DNSSVRn=<Dns(n) Server's Ip.> Set Dns(n) Server's Ip.
AT+TCPACT=<Tcp Conn Act Poll Seconds> Set Tcp Connection Act Poll
Seconds.
AT+CTRLNO=<Control Phone No.> Set Control Phone No.
AT+SMSDPSWD=<Smsd pasword.> Set Sms Daemon
Password.
AT+STRAIGHT=0/1 Set deliver server's data
directly.
AT+QUIT Quit the at command config
program.
AT+RESET Reset the system.
AT+FACTORY Load the factory setting.
AT+VER Check SoftWare Version.
AT+IPR Set Serial Port Baudrate.
AT+CONNRGST Set Custom Register info
AT+LINKRGST Set Custom Keep OnLine info