



FOUR FAITH

F-IM100 Series IP MODEM

USER MANUAL

V1.0.0

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





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Chapter 1 Brief Introduction of Product

1.1 General

F-IM100 Series IP MODEM is a kind of cellular terminal device that provides data transfer function 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; it support 1 ADC and 2 I/O,compatible digital input/output channel, Analog input, input pulse counter and pulse wave output function.

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. The typical topology as the below figure 1-1;

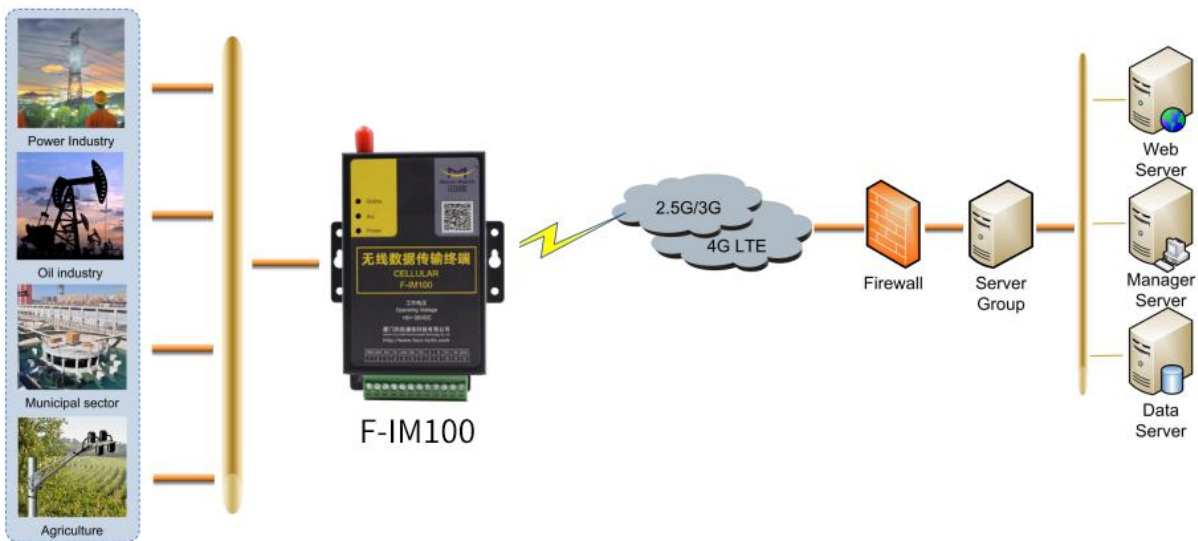


Figure 1-1 IP MODEM Application Topology

1.2 Working Principle

The principle chart of the IP MODEM is as following.

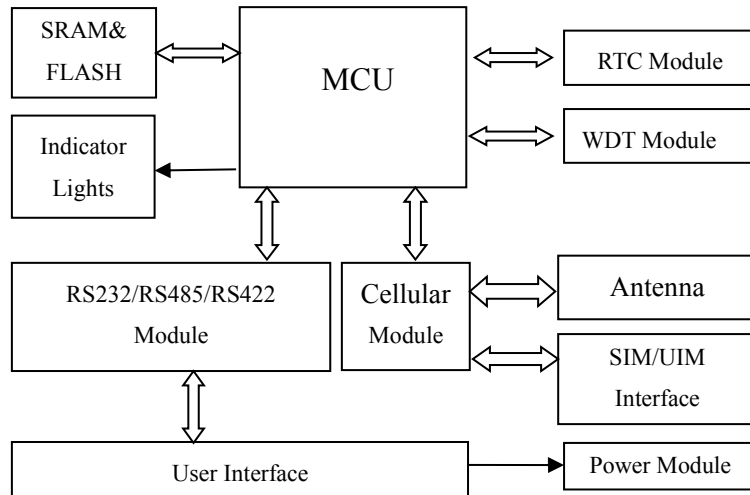


Figure1-2 IP Modem principle chart

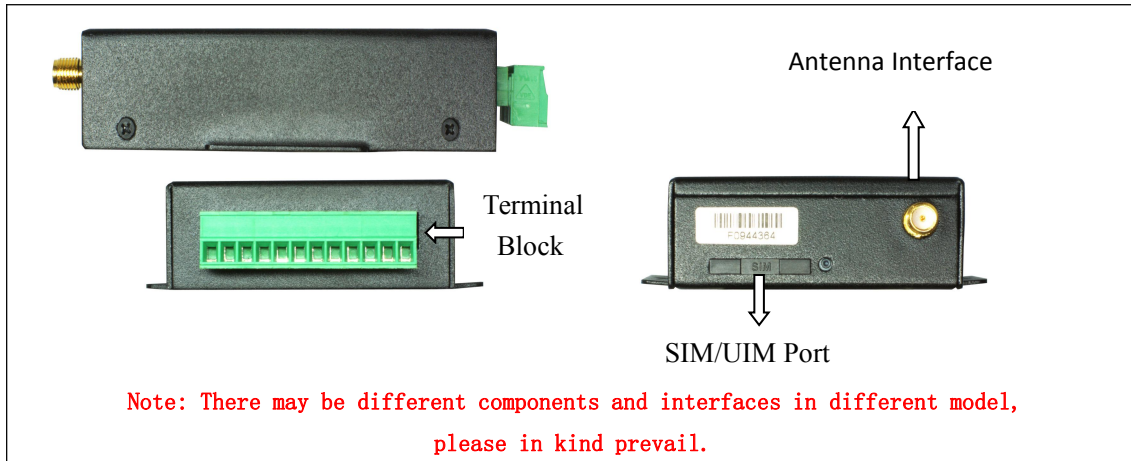
1.3 Specifications

Hardware System

Item	Content
CPU	Industrial 32 bits CPU
FLASH	512KB (Extendable)
SRAM	256KB
ADC	12 bit

Interface Type

Item	Content
Serial	1 RS232 port and 1 RS485(or 2 RS232) port, 15KV ESD protection Data bits: 5, 6, 7, 8 Stop bits: 1, 1.5, 2 Parity: none, even, odd, space, mark Baud rate: 600-115200 bps
Indicator	"Power", "ACT", "Online"
Antenna	Standard SMA female interface, 50 ohm
SIM/UIM	Standard drawer interface, support 3V/1.8V SIM/UIM card, 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 9~36V

Power Consumption

Working States	Power Consumption
Communication	20~65mA@12VDC(2G:20~40 mA 4G:20~65mA) 20~95mA@9VDC (2G:30~45 mA 4G:20~95mA)
Standby	15~30 mA@12VDC 20~40 mA@9VDC
Sleep	5~17mA@12VDC 6~22mA@9VDC

Physical Characteristics

Item	Content
Housing	Iron, providing IP30 protection
Dimensions	91x58.5x22 mm((excluding antennas and mountings))
Weight	205g

Environmental Limits

Item	Content
Operating Temperature	-35~+75° C (-22~+167°F)
Storage Temperature	-40~+85° C (-40~+185°F)
Operating Humidity	95% (unfreezing)

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	12V 0.5A
RS232 data cable	1	optional
RS485 data cable	1	optional
Manual CD	1	

Table 2-1 Encasement List

2.3 Installation and Cable Connection

Dimension: (unit: mm)

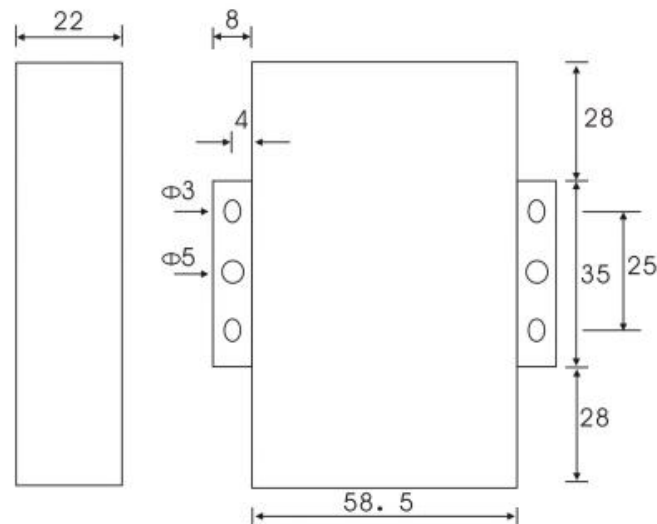


Figure 2-1 Installation Chart

Installation of SIM/UIM card:

Firstly power off the IP MODEM, and press the 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!

User Interface Signal Definition

Pin Number	Signal Name	Default 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 (The dry contact signal and the 3.3V switching signal can be detected. Can output 3.3V switch signal)	Reserved compatible pulse wave input counter, ADC, and pulse output
11	IO2	GPIO(The dry contact signal and the 3.3V switching signal can be detected. Can output 3.3V switch signal)	Reserved compatible pulse wave input counter, ADC, and pulse output
12	ADC1	ADC(current input 4~20ma)	N/A



Note:RS232 (RX2/TX2) and RS485 can only support one way online at the same time

Installation of cable:

F-IM100 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 Alternate	Anode
Black	Cathode

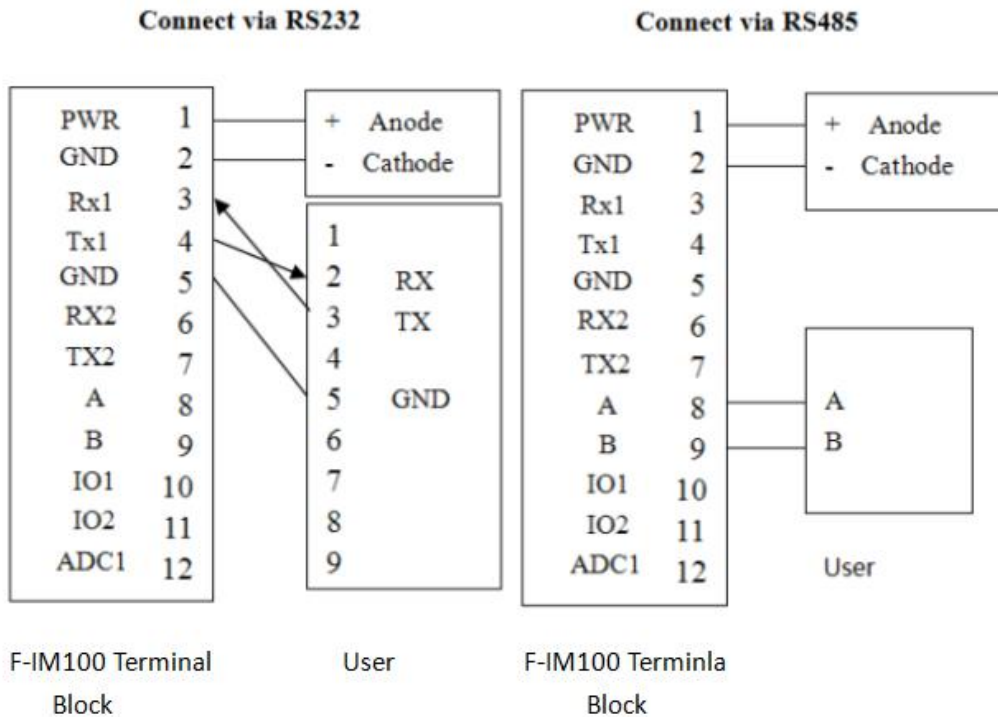
RS232 Cable:

Cable Color	Corresponding 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 chart as following,



2.4 Power

IP MODEM can be used in complex external environments. In order to adapt to the complex application environment and improve the stability of the system, IP MODEM uses advanced power technology. users can use the standard 12VDC/0.5A adapter to power the IP MODEM, or directly use the DC 9~36V power supply to power the IP MODEM. when used with an external power, the stability of the power supply must be ensured (the ripple is less than 300mV, and the instantaneous voltage does not exceed 36V), and the power supply is guaranteed to be greater than 4W.

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

2.5 Indicator Lights Introduction

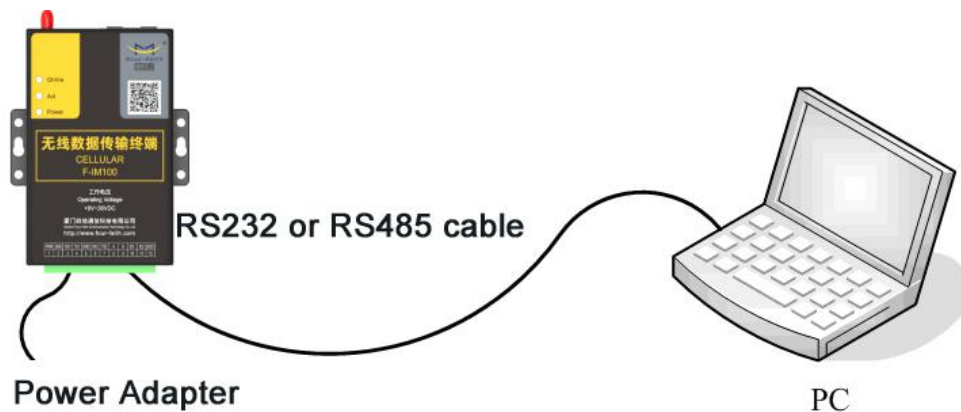
The IP MODEM provides three indicator lights: "Power", "ACT", "Online".

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:

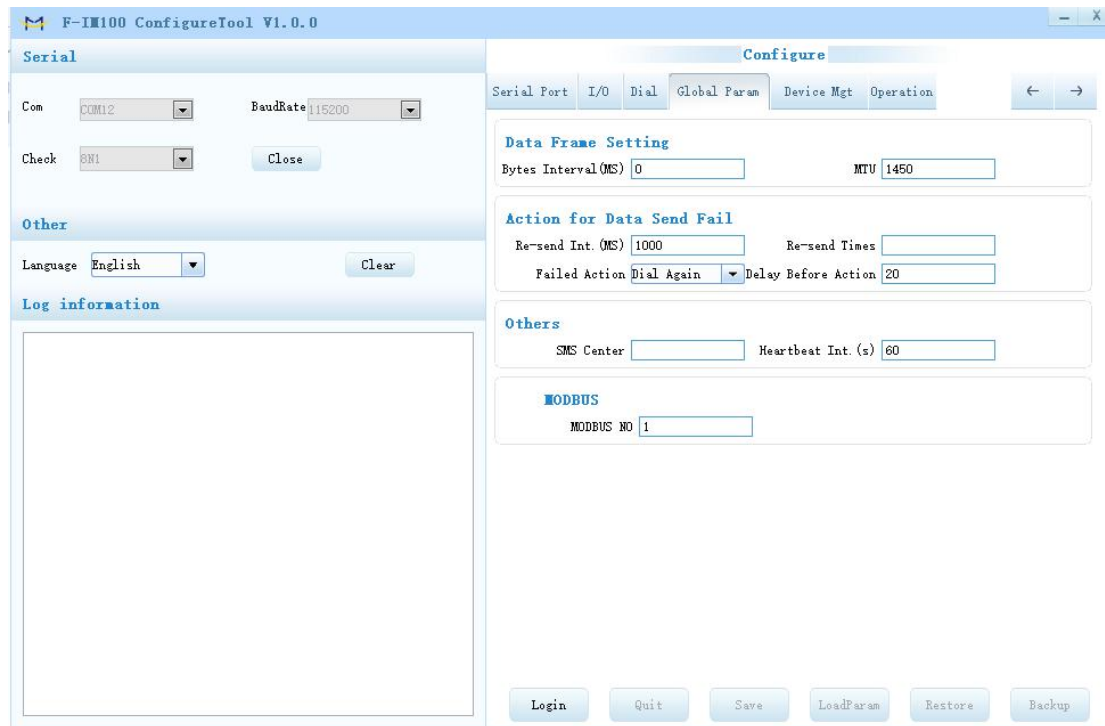
- ◆ Configuration software tool: All the settings are configured through the shipped software tool. It's necessary to have one PC to run this tool.
- ◆ Extended AT command: All the settings are configured through AT command, so any device with serial port can configure it. Before configuration with extended 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.

Note:For the extended AT command involved in parameter configuration, please refer to "F-IM100 Extension AT Command manual"

3.3 IP Modem's Parameters Configuration

3.3.1 Run the Configure Tools

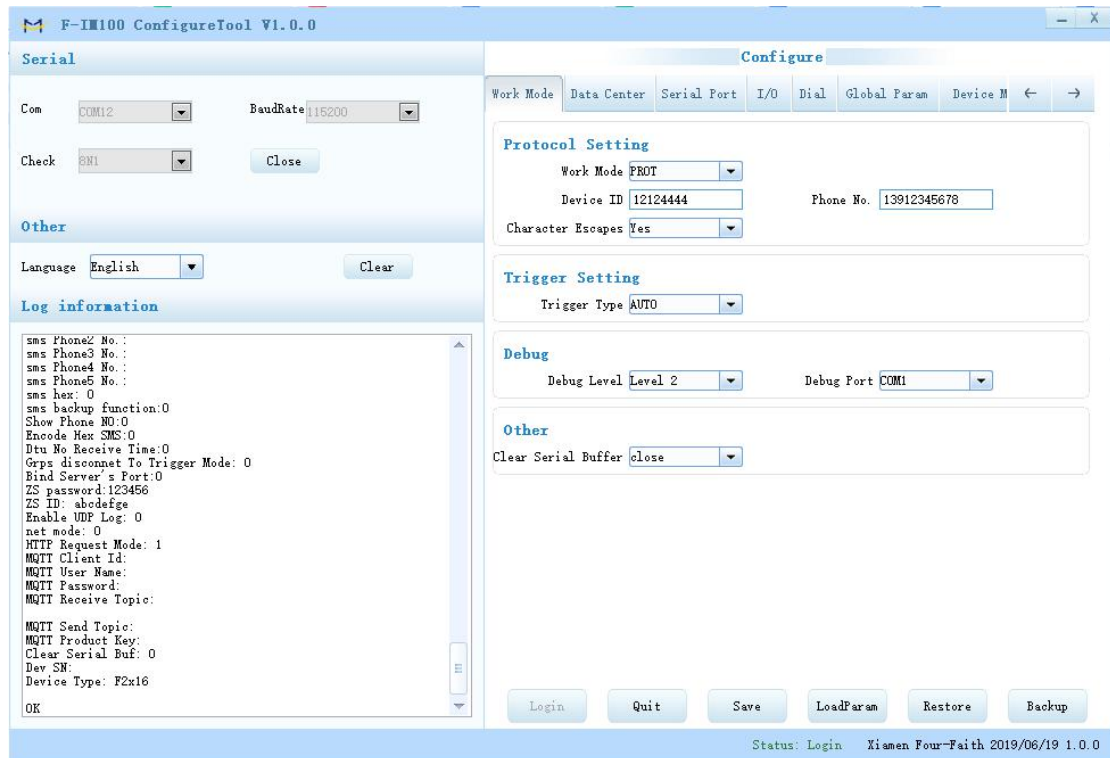


The “Serial” area shows the current serial port settings. To configure IP MODEM, please choose the correct serial port which connects to IP MODEM, and the baud-rate is 115200 with no parity, then open the serial port. If the button text is “Close”, it shows the serial port now has been opened. If the 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

The heartbeat packet uses the TCP protocol, the data communication also uses the TCP protocol, and the heartbeat packet and the data communication use the same TCP connection, and the 8-bit device ID number and the mobile phone number must be configured.

<p>Protocol Setting</p> <p>Work Mode <input type="text" value="PROT"/></p> <p>Device ID <input type="text"/></p> <p>Character Escapes <input type="text"/></p> <p>Phone No. <input type="text"/></p>	
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.

<p>App Protocol</p> <p>App Protocol <input type="text" value="DCTCP"/></p> <p>Phone No. <input type="text" value="13912345678"/></p>	
PhoneNo.	Phone number

DCUDP

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

<p>App Protocol</p> <p>App Protocol <input type="text" value="DCUDP"/></p> <p>Phone No. <input type="text" value="13912345678"/></p>	
PhoneNo.	Phone number

TRNS

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

<p>App Protocol</p> <p>App Protocol <input type="text" value="TRNS"/></p>	
--	--

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.

<p>Protocol Setting</p> <p>Work Mode <input type="text" value="SMSCLI"/></p> <p>Phone No 1st Group <input type="text" value="12345678901"/></p> <p>Phone No 2nd Group <input type="text" value="12345678901"/></p> <p>Phone No 3rd Group <input type="text" value="12345678901"/></p> <p>Phone No 4th Group <input type="text" value="12345678901"/></p> <p>Show Phone Number <input type="text" value="Hide"/> Hex To Text <input type="text" value="Disable"/></p>	
Pone No 1st Group Pone No 2nd Group Pone No 3rd Group Pone No 4th Group	Bind phone number. Max phone number is 5 for one group
Show Phone Number	If output the phone number to the specified interface
Hex To Text	If convert HEX data to ASCII data 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.

<p>Protocol Setting</p> <p>Work Mode <input type="text" value="SMSSER"/></p> <p>Show Phone Number <input type="text" value="Hide"/> Hex To Text <input type="text" value="Disable"/></p>	
Show Phone Number	If output the phone number to the specified interface
Hex To Text	If convert HEX data to ASCII data or not

Custom protocol: client mode

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

<p>Protocol Setting</p> <p>Work Mode <input type="text" value="Custom"/></p> <p>Device Mode <input type="text" value="Client Mode"/> Protocol <input type="text" value="TCP"/></p> <p>RegisterHeartbeat <input type="text" value="Enable"/></p> <p>Data Format <input type="text" value="Text"/></p> <p>Register Packet <input type="text"/> Register Reply <input type="text"/></p> <p>Heartbeat Packet <input type="text"/> Heartbeat Reply <input type="text"/></p>	
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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Protocol Setting</p> <p>Work Mode <input type="text" value="Custom"/></p> <p>Device Mode <input type="text" value="Server Mode"/> Protocol <input type="text" value="TCP"/></p> <p>Listen Port <input type="text" value="5001"/></p> </div>	
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

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="Auto"/></p> </div>

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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="SMSD"/></p> <p>SMS Phone No. <input type="text"/></p> <p>SMS Password <input type="text"/></p> </div>	
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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="CTRL"/></p> <p>CALL Phone No. <input type="text"/></p> </div>	
CALL Phone No.	Trigger phone number

DATA

Send special serial data to make IP MODEM online

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="DATA"/></p> <p>Data Trigger On <input type="text" value="don"/> Data Trigger off <input type="text" value="doff"/></p> <p>Trigger Port <input type="text" value="COM1"/> Data Format <input type="text" value="Text"/></p> </div>	
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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="I/O"/></p> <p>I/O type <input type="text" value="Sleep/Wakeup"/></p> <p>I/O Port <input type="text" value="I/O1"/></p> </div>	
--	--

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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Trigger Setting</p> <p>Trigger Type <input type="text" value="MIXD"/></p> <p>CALL Phone No. <input type="text"/> SMS Phone No. <input type="text"/></p> <p>Data Trigger On <input type="text" value="don"/> Data Trigger off <input type="text" value="doff"/></p> <p>Trigger Port <input type="text" value="COM1"/> Data Format <input type="text" value="Text"/></p> <p>I/O1 Control <input type="text" value="ALL"/> I/O2 Control <input type="text" value="ALL"/></p> <p>I/O3 Control <input type="text" value="ALL"/> SMS Password <input type="text"/></p> </div>	
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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Debug</p> <p>Debug Level <input type="text" value="Level 1"/> Debug Port <input type="text" value="COM1"/></p> </div>	
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

3.3.4 Data Service Center Settings

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

3.3.4.1 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 .

Data Service Center Settings

Data Center Number

Main Center Port

Backup Center Port

<div style="border: 1px solid #ccc; padding: 5px;"> <p>Main Backup Param</p> <p>Reconnect Int. (s) <input type="text" value="3"/></p> <p>Connect Retry Times <input type="text" value="5"/></p> <p>Back To Main Server <input type="text" value="No"/></p> </div>	
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.

Data Service Center Settings

Data Center Number

Main Center	<input type="text" value="120.42.46.98"/>	Port	<input type="text" value="19000"/>
2nd Center	<input type="text" value="120.42.46.98"/>	Port	<input type="text" value="19001"/>
3rd Center	<input type="text" value="120.42.46.98"/>	Port	<input type="text" value="19002"/>
4th Center	<input type="text" value="120.42.46.98"/>	Port	<input type="text" value="19003"/>
5th Center	<input type="text" value="120.42.46.98"/>	Port	<input type="text" value="19004"/>

3.3.4.2 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

Multi-Center Connection Param

Reconnect Int. (s)

Connect Retry Times

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

3.3.4.3 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

ICMP Check

Dest Address Check Interval (s)

Check Times

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

3.3.5 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.

<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>COM1</p> <p>BaudRate <input type="text" value="115200"/></p> <p>Check <input type="text" value="8N1"/></p> <p>Map Center <input type="text" value="ALL"/></p> </div>	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>COM2</p> <p>BaudRate <input type="text" value="115200"/></p> <p>Check <input type="text" value="8N1"/></p> <p>Map Center <input type="text" value="ALL"/></p> </div>	
<div style="border: 1px solid black; padding: 5px;"> <p>RS485</p> <p>BaudRate <input type="text" value="9600"/></p> <p>Check <input type="text" value="8N1"/></p> <p>Map Center <input type="text" value="ALL"/></p> </div>	
COM1	<p>baud: the baud rate of the PORT</p> <p>1200 --- 1200 bps</p> <p>2400 --- 2400 bps</p> <p>4800 --- 4800 bps</p> <p>9600 --- 9600 bps</p> <p>14400 --- 14400 bps</p> <p>19200 --- 19200 bps</p> <p>38400 --- 38400 bps</p> <p>56000 --- 56000 bps</p> <p>57600 --- 57600 bps</p> <p>115200 --- 115200 bps</p> <p>Property: Databit, Parity, Stopbit</p> <p>8N1 --- 8 Databit, No parity, 1 Stopbit</p> <p>8E1 --- 8 Databit, Even parity, 1 Stopbit</p> <p>8O1 --- 8 Databit, Odd parity, 1 Stopbit</p> <p>Bind: Center1: the data from the port send to center 1</p> <p>Center2: the data from the port send to center 3</p> <p>Center3: the data from the port send to center 3</p> <p>Center4: the data from the port send to center 4</p> <p>Center5: the data from the port send to center 5</p> <p>ALL: the data from the port send to all centers</p> <p>Close: send to none</p>
COM2	The same as above

RS485	RS485 port and COM2 use same UART,the same as above
-------	---

3.3.6 Dial

3.3.6.1 PPP Dial

<div style="border: 1px solid black; padding: 10px;"> <p>PPP Dial</p> <p>DialNo <input type="text" value="*99#"/> QueryNetMode <input type="text" value="WCDMA"/></p> <p>APN <input type="text" value="3gnet"/> UserName <input type="text"/></p> <p>Password <input type="text"/></p> <p>net mode <input type="text" value="AUTO"/> PPP Auth <input type="text" value="AUTO"/></p> </div>									
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		<table border="1"> <tr><td>Net Mode</td></tr> <tr><td>AUTO</td></tr> <tr><td>EVDO</td></tr> <tr><td>WCDMA</td></tr> <tr><td>TD-SCDMA</td></tr> <tr><td>CDMA</td></tr> <tr><td>GSM</td></tr> </table>	Net Mode	AUTO	EVDO	WCDMA	TD-SCDMA	CDMA	GSM
Net Mode									
AUTO									
EVDO									
WCDMA									
TD-SCDMA									
CDMA									
GSM									

3.3.6.2 PPP Redial

<div style="border: 1px solid black; padding: 10px;"> <p>PPP Re-dial</p> <p>Re-dial Interval(s) <input type="text" value="30"/></p> <p>Dial Retry Times <input type="text" value="2"/></p> </div>	
Re-dial Interval(s)	The interval between ppp dial in second
Dial Retry Times	max times of ppp dial failure

3.3.6.3 DNS Service

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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>DNS Setting</p> <p>Main DNS <input type="text" value="8.8.8.8"/></p> <p>Backup DNS <input type="text" value="8.8.8.8"/></p> </div>	
Main DNS	The DNS server IP address(must be IP address)
Backup DNS	The DNS server IP address(must be IP address)

3.3.7 Global Parameters

3.3.7.1 Data Frame Parameters

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Data Frame Setting</p> <p>Bytes Interval (MS) <input type="text" value="20"/> MTU <input type="text" value="1450"/></p> </div>	
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

3.3.7.2 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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Action for Data Send Fail</p> <p>Re-send Int. (MS) <input type="text" value="1000"/> Re-send Times <input type="text"/></p> <p>Failed Action <input type="text" value="Dial Again"/> Delay Before Action <input type="text" value="20"/></p> </div>	
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

3.3.7.3 Other parameters

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Others</p> <p>SMS Center <input type="text"/> Heartbeat Int. (s) <input type="text" value="60"/></p> </div>	
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)

3.3.8 Device Manage

3.3.8.1 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.

<div style="border: 1px solid #ccc; padding: 10px;"> <p>Device Manage Setting</p> <p>Device Manage <input type="text" value="Enable"/></p> <p>Dev ID For Manage <input type="text"/> Protocol <input type="text" value="TCP"/></p> <p>Service Address <input type="text" value="120.42.46.98"/> Port <input type="text" value="44002"/></p> </div>	
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

3.3.8.2 Manage by SMS

Configure the IP Modem by SMS

<div style="border: 1px solid #ccc; padding: 10px;"> <p>SMS Manage</p> <p>SMS Configure <input type="text" value="Enable"/></p> <p>Configure Password <input type="text" value="123456"/></p> <p>Manage Phone No <input type="text"/></p> </div>	
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.

3.3.9 Other Operation

Common operations					
SIM Check	Signal	TimeSetting	Log	Factory	Ver Info
Reset	IMEI				
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:

The screenshot shows a software interface titled 'Configure'. It has several tabs: 'Work Mode', 'Data Center', 'Serial Port', 'I/O', 'Dial', 'Global Param', and 'Device M'. The 'Data Center' tab is selected. Below the tabs, there is a section titled 'Data Service Center Settings'. It contains the following fields:

Data Center Number	1		
Main Center	27.154.58.226	Port	9136
Backup Center	27.154.58.226	Port	9136

Fill in the APN from your simcard provider:

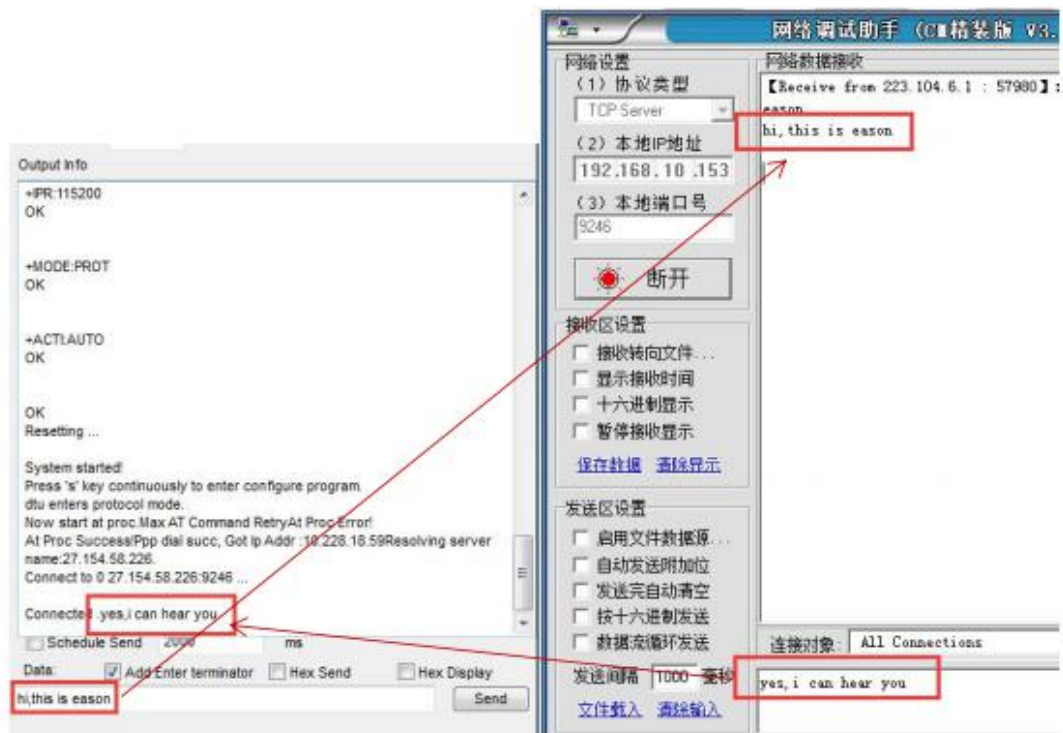
The screenshot shows the same 'Configure' window, but with the 'Dial' tab selected. Below the tabs, there is a section titled 'PPP Dial'. It contains the following fields:

DialNo	*99#	QueryNetMode	
APN	3gnet	UserName	
Password		PPP Auth	AUTO
net mode	AUTO		

Repower modem, wait it connected to server.



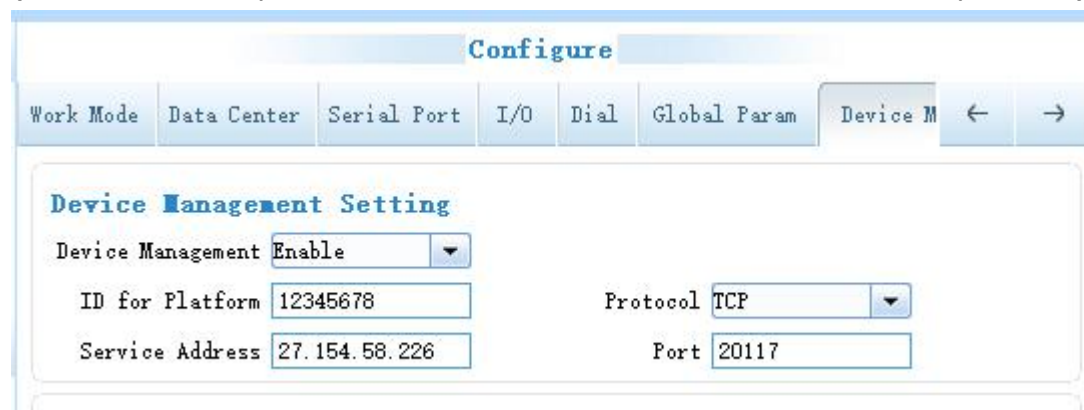
Then you can send data to test the communication between modem with data sever(here use Netassit software to simulate data server)



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 :

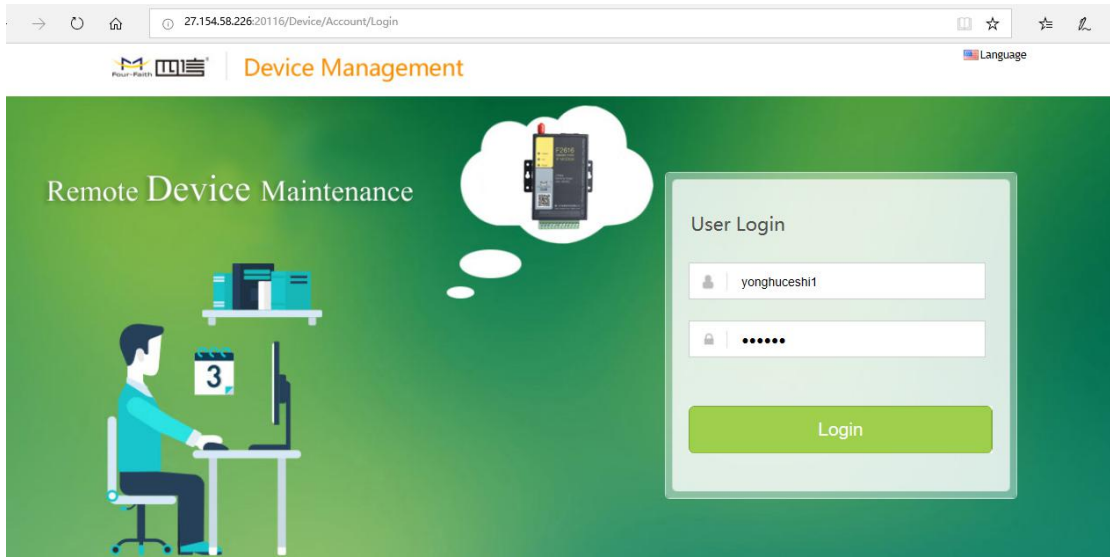
(Note that ID for platform should be same with the Device code in platform)



You can get platform account from Four-Faith:

DTU Platform address: <http://27.154.58.226:20116>

Fill in username and passform to login plattform:



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

State	Device Code	Device Name	Device Model	Protocol	Sim Card No	Operator	IMEI	Install Address	Last Online Time
✓	03201271	fon_18091135202_studio_berra	F2X14	2.0		Mobile			2019-11-12 14:33:17
!	00200010	leon	F2X14	2.0		移动			2018-07-05 14:19:00
!	03201269	magazzino4	F2X14	2.0		Mobile			2018-07-09 21:37:50
!	03201270	fon_delta_tex_934	F2X14	2.0		Mobile			2019-10-31 11:29:59
!	03201272	fon_alansari_5521	F2X14	2.0		Mobile			2019-05-06 16:25:35
!	03201273	magazzino1	F2X14	2.0		Mobile			2018-07-09 21:14:18

Add Device -Group Name [郑州凯悦]

should be same with the ID you set in modem

* Device Code: 12345678

* Device Name: F2X16

* Device Model: F2X16

* Protocol Type: 2.0

Operator: Mobile Telecom Unicom Broadband

DeviceCard: 138888888888

Imei:

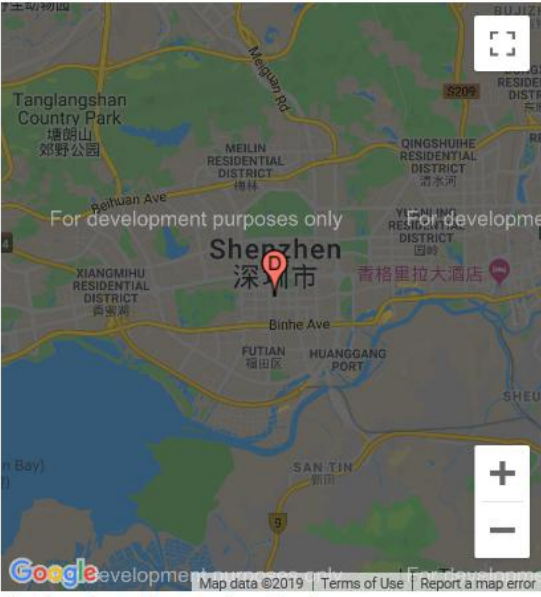
Install Address:

Latitude: 22.535245

Longitude: 114.057171

Installation Time: 2019-11-12 14:36:51

Save



Tips: Drag the red icon to select a location

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.

SMS Manage

SMS Configure: Enable

Configure Password: 123456

Manage Phone No: 13395014835

Secondly,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 upgrade firmware,pls contact Four-Faith sale or technical support to get the download tool and latest firmware file.

Download tool:  **DtuDownload.exe**

Download tool:

Follow the steps to upgrade:

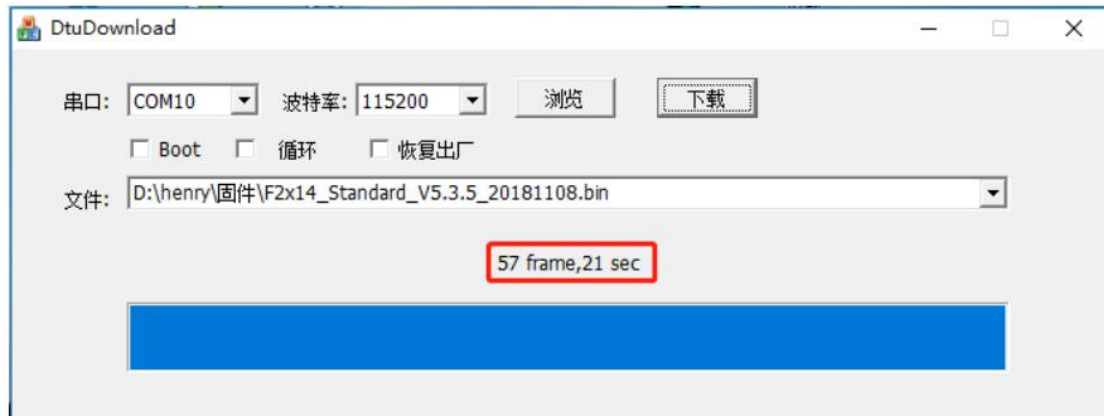
connect your laptop with modem via serial cable

choose the com and set correct baudrate, and find the firmware version you save in

your laptop, then click download, as the following show:



3、Repower modem, you can see the download progress.

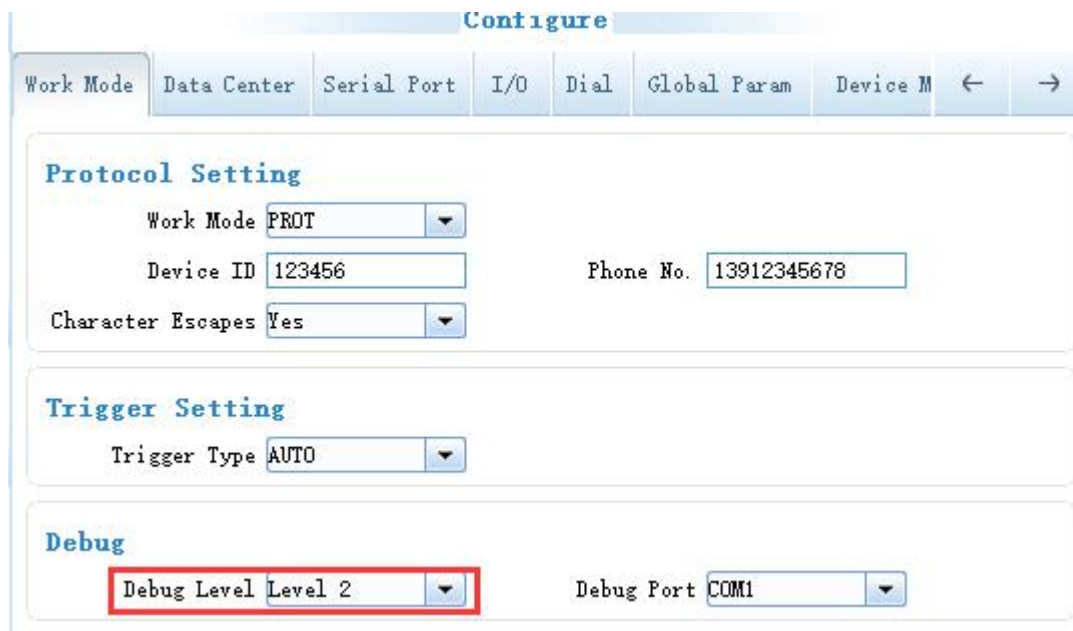


When download is complete, you will find the cost time (21 sec).

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 file to us:


```
Log information

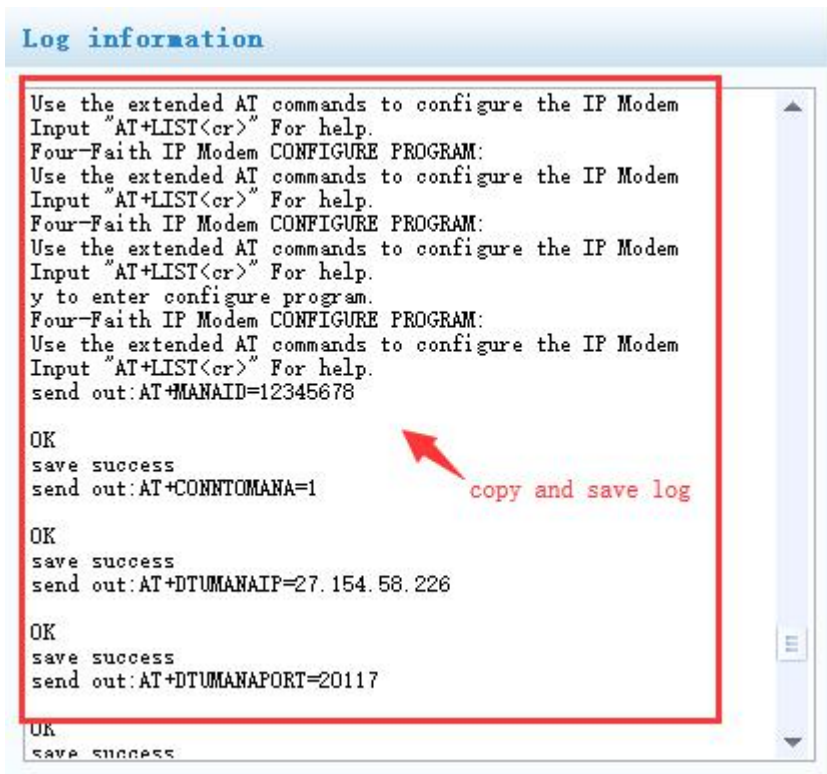
Use the extended AT commands to configure the IP Modem
Input "AT+LIST<cr>" For help.
Four-Faith IP Modem CONFIGURE PROGRAM:
Use the extended AT commands to configure the IP Modem
Input "AT+LIST<cr>" For help.
Four-Faith IP Modem CONFIGURE PROGRAM:
Use the extended AT commands to configure the IP Modem
Input "AT+LIST<cr>" For help.
y to enter configure program.
Four-Faith IP Modem CONFIGURE PROGRAM:
Use the extended AT commands to configure the IP Modem
Input "AT+LIST<cr>" For help.
send out: AT+MANAID=12345678

OK
save success
send out: AT+CONNTOMANA=1

OK
save success
send out: AT+DTUMANAIIP=27.154.58.226

OK
save success
send out: AT+DTUMANAPORT=20117

OK
save success
```



4.6 Modbus Protocol for GPIO&ADC Acquisition

4.6.1 The Way of Cable Connection.

Analog input

- Single-cable: Connect the analog output of the sensor to the analog input(ADC) of F-IM100 directly.
- Double-cable: Connect the positive of analog output of the sensor to the analog input(ADC) of F-IM100, and connect the ground wire to GND(PIN2) of F-IM100.

Digital input

- Low level input: Connect the input of contact switch to GND of F-IM100 and connect the output of contact switch to the digital output of F-IM100(IO1/IO2).
- High level input: Connect 3.3V voltage output to IO1/IO2, and connect the ground wire to GND of F-IM100.

4.6.2 Modem setting:

The screenshot shows a configuration interface with a top navigation bar containing 'Work Mode', 'Data Center', 'Serial Port', 'I/O', 'Dial', 'Global Param', and 'Device M'. Below this, there are three main sections:

- I01**: I/O1 is set to 'Input', Port is 'Disable', Report Type is 'Input', Protocol is 'Modbus', and Command is empty.
- I02**: I/O2 is set to 'Input', Port is 'ALL', Report Type is 'Query', Protocol is 'Modbus', and Command is empty.
- ADC Setting**: ADC is set to 'ADC', Port is 'ALL', ADC type is 'voltage 5V', Top Limit is '0', and Low Limit is '0'.

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

The screenshot shows two configuration sections, I/O1 and I/O2. I/O1 has I/O1: Input, Port: ALL, Report Type: (dropdown menu open), Protocol: Modbus, and Command: (empty). I/O2 has I/O2: SMS, Port: RS485, Report Type: (dropdown menu open), Protocol: Modbus, and Command: (empty). The dropdown menu for Report Type in I/O1 is highlighted with a red box and contains the following options: COM1, COM2, GPRS, SMS, RS485, and ALL. The ALL option is currently selected.

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:

The screenshot shows the Global Param configuration page with several sections: Data Frame Setting (Bytes Interval (MS) 0, MTU 1450), Action for Data Send Fail (Re-send Int. (MS) 1000, Re-send Times, Failed Action Dial Again, Delay Before Action 20), Others (SMS Center, Heartbeat Int. (s) 60), and MODBUS (MODBUS NO 1). The MODBUS section is highlighted with a red box.

4.6.3 The modbus command for IO& ADC:

4.6.3.1 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

4.6.3.2 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 command 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

4.6.3.3 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: $3.3/1023 * \text{acquisition value}/150 * 1000 = (\text{mA})$

Voltage type: $3.3/1023 * \text{acquisition value}/12.1 * 20.16 = (\text{V})$

(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:

Configure

Work Mode
Data Center
Serial Port
I/O
Dial
Global Param
Device M
←
→

Protocol Setting

Work Mode: MQTT

Client ID: IamClientId

User Name: admin

Password: paulyeahn

Receive Topic: IamRecTopic

Send Topic: IamSendTopic

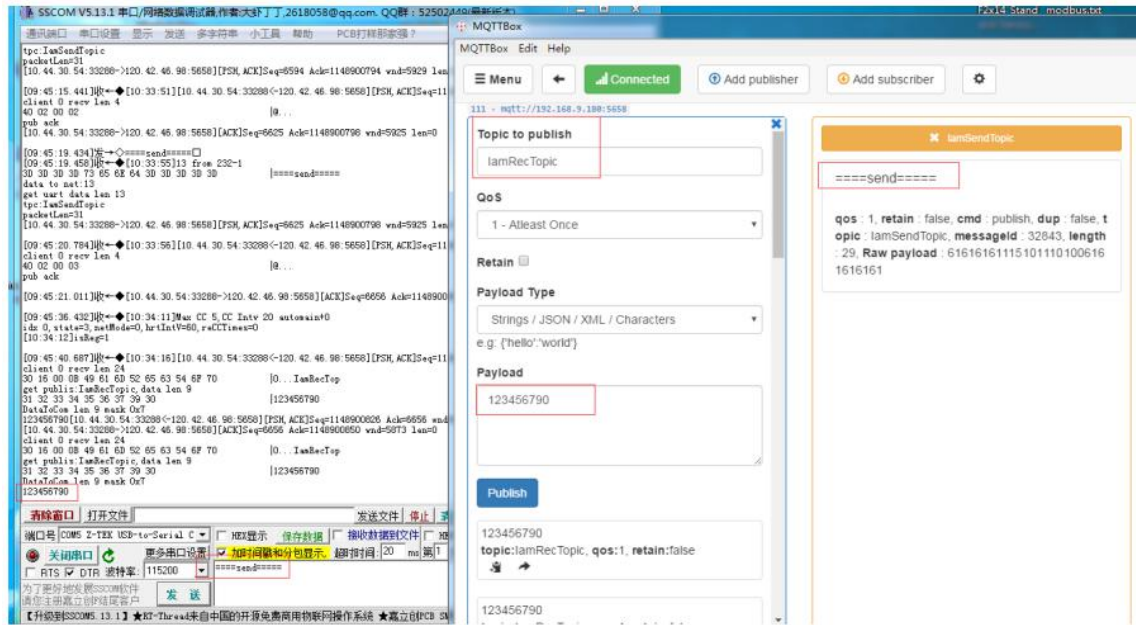
KEY:

You can download MQTTBox as another client, parameters configuration as the following:

MQTTBox Edit Help
MQTT CLIENT SETTINGS
Client Settings Help

MQTT Client Name <input type="text" value="111"/>	MQTT Client Id <input type="text" value="paulyeahn_id"/>	Append timestamp to MQTT client id? <input type="checkbox"/> No	Broker is MQTT v3.1.1 compliant? <input checked="" type="checkbox"/> Yes
Protocol <input type="text" value="mqtt / tcp"/>	Host <input type="text" value="192.168.9.180:5658"/>	Clean Session? <input checked="" type="checkbox"/> Yes	Auto connect on app launch? <input type="checkbox"/> No
Username <input type="text" value="admin"/>	Password <input type="password" value="*****"/>	Reschedule Pings? <input type="checkbox"/> No	Queue outgoing QoS zero messages? <input type="checkbox"/> No
Reconnect Period (milliseconds) <input type="text" value="1000"/>	Connect Timeout (milliseconds) <input type="text" value="30000"/>	KeepAlive (seconds) <input type="text" value="10"/>	Will - Payload <input type="text"/>
Will - Topic <input type="text" value="/ftsatopic"/>	Will - QoS <input type="text" value="0 - Almost Once"/>	Will - Retain <input type="checkbox"/> No	

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



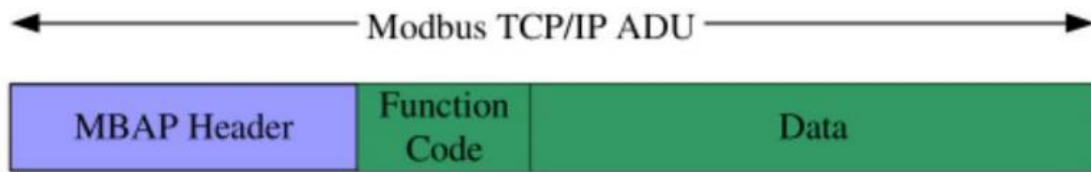
Slave ID: 1 bytes, used to identify modbus frame transmitted on the TCP/IP stack

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:

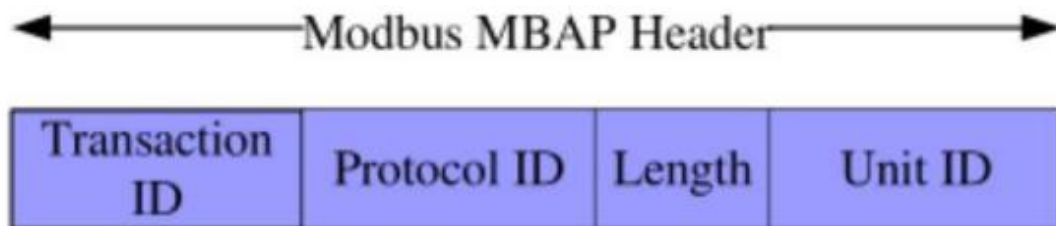


MBAP Header: 7 bytes, Modbus application protocol header. used to identify the modbus frame transmitted on the TCP/IP stack.

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(receive 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 receive modbus TCP data:

00 01 00 00 00 05 01 04 02 00 B8 (05 is data length)

Example 2:

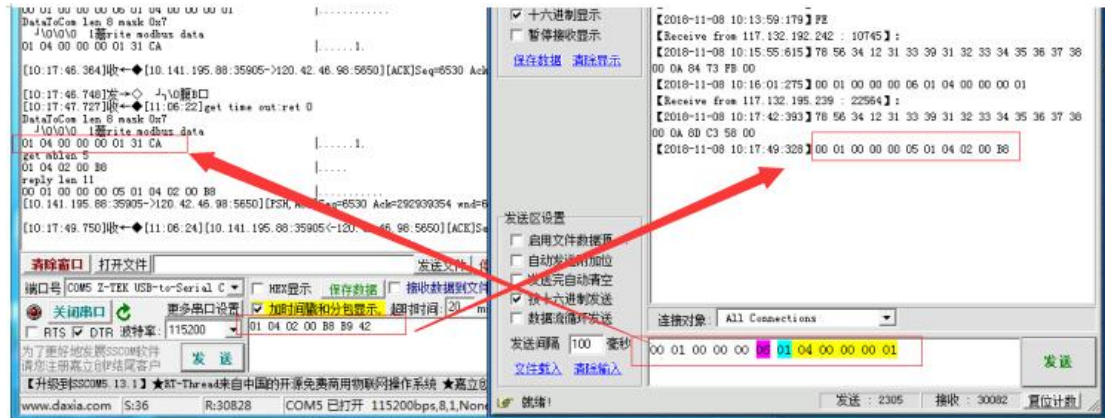
Data center send: 00 01 00 00 00 06 01 04 00 08 00 01

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

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

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

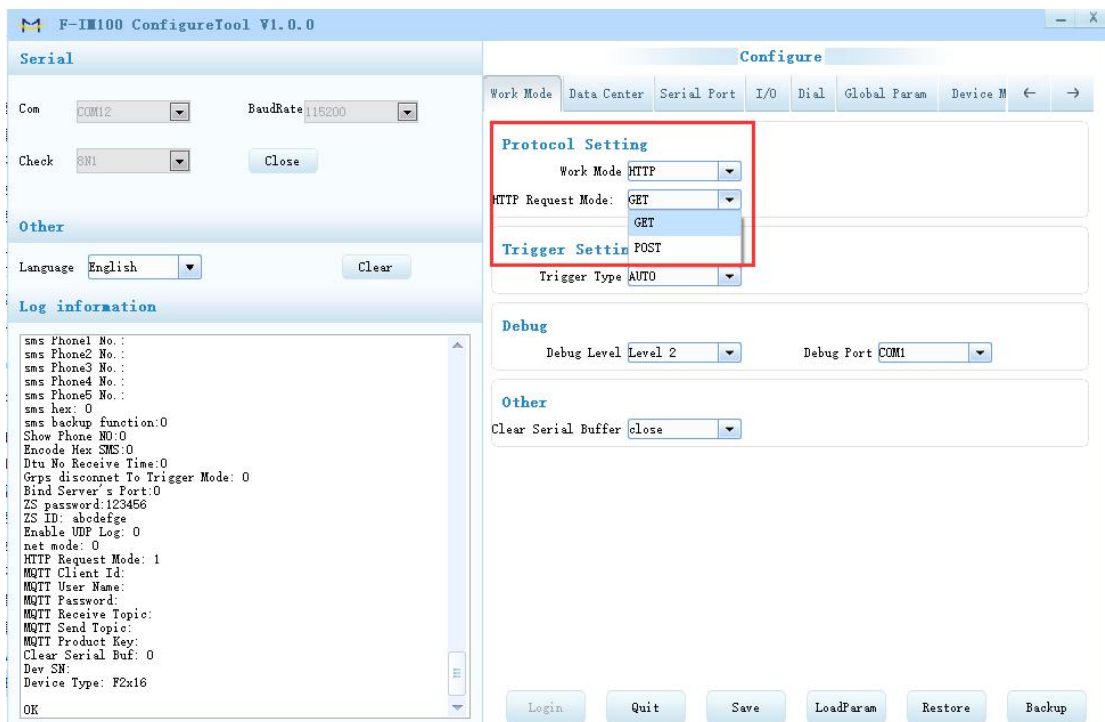
The communication test as the below picture:



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.



4.9.1 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

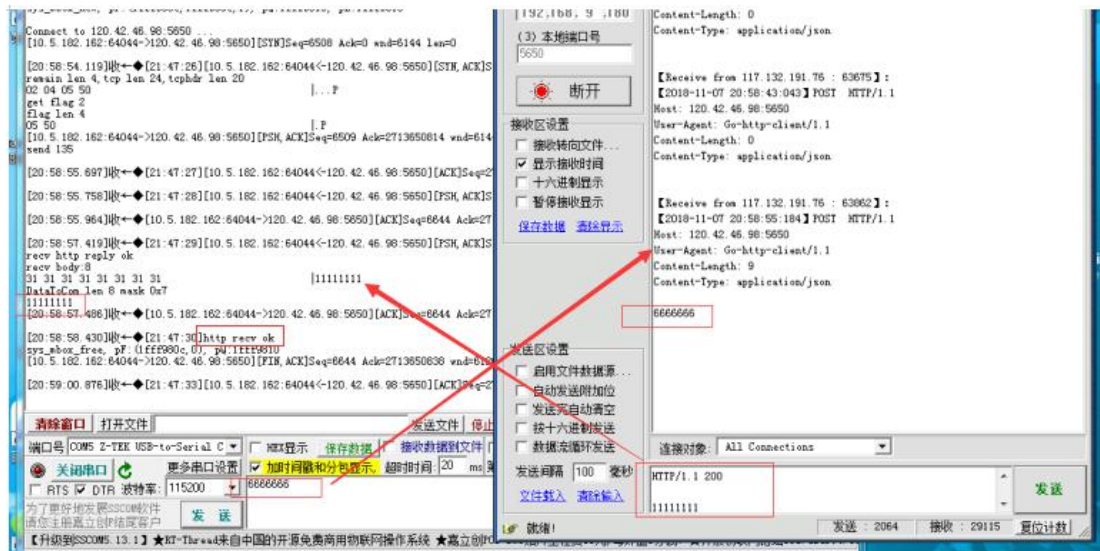
6666666

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

HTTP/1.1 200

OK

When modem receive data, will transfer application data(OK) to serial port, as the following figure show:



4.9.2 Get Mode:

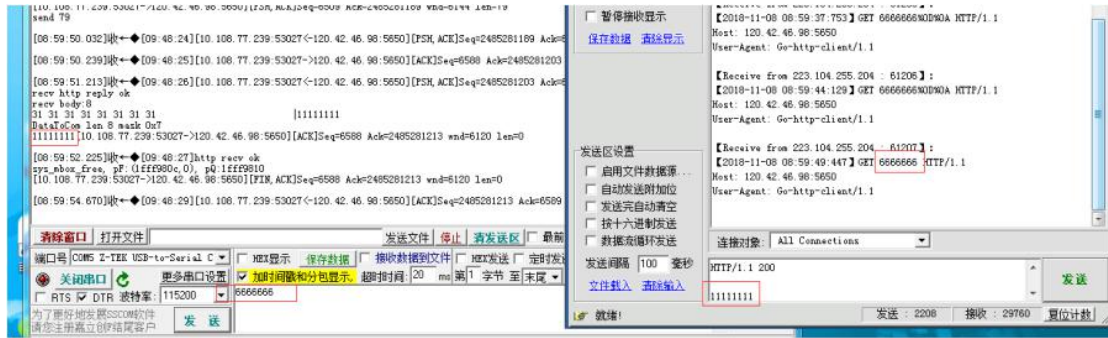
HTTP data:

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 also will receive "ok" in serial port, as the following figure show:

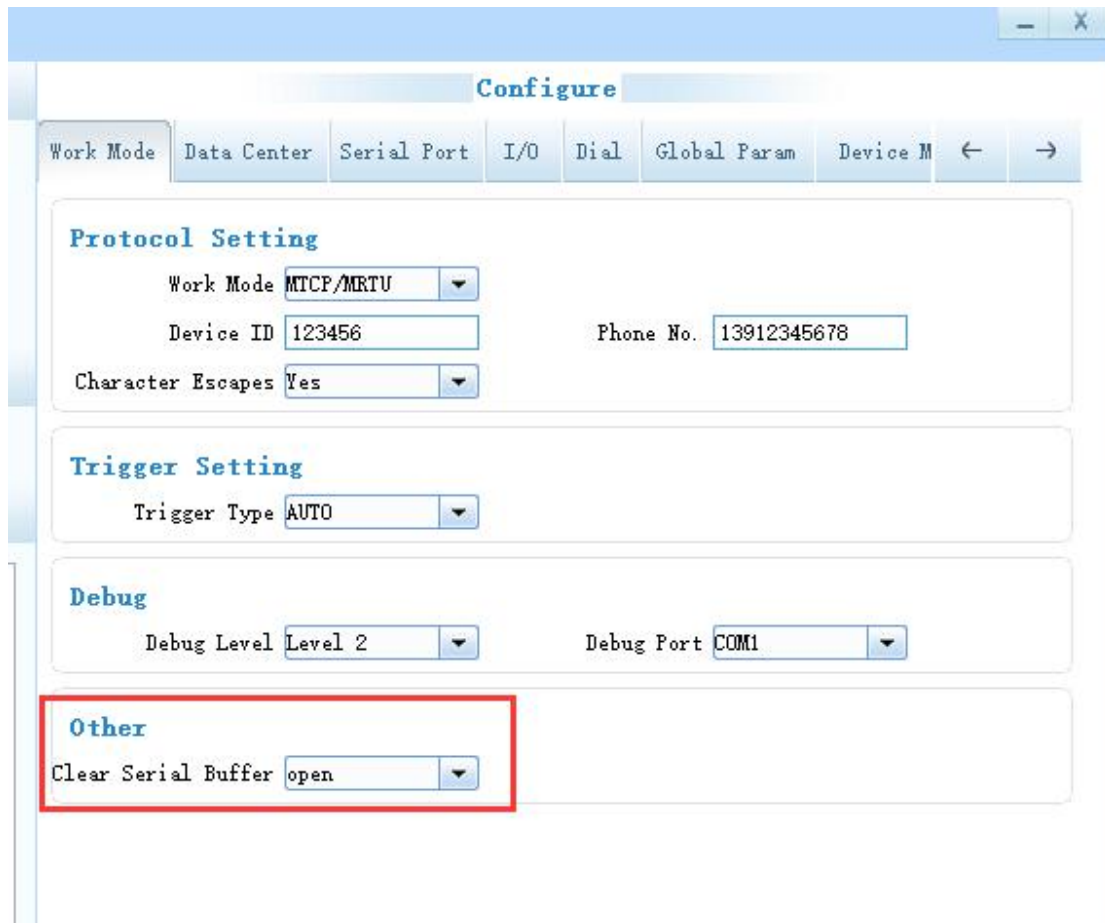


If no data is sent, modem will send an HTTP request packet according to configured interval. The format is the previous format, but the application data is missing. Such as:

```
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 center.



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”

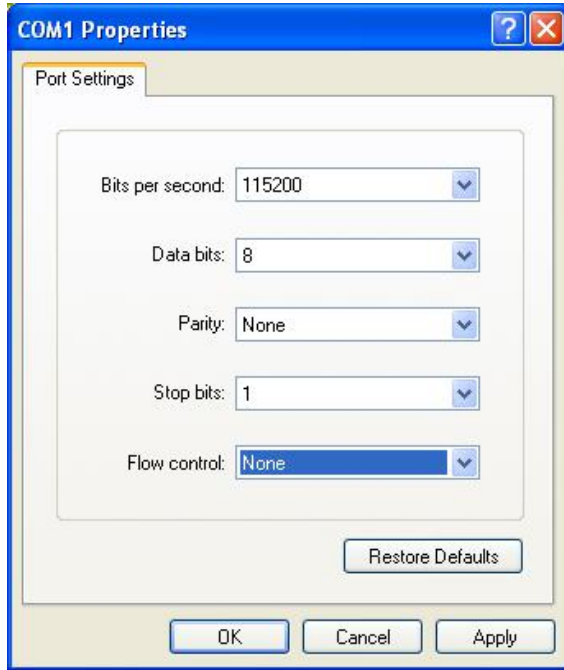
Bits per second: 115200

Data bits: 8

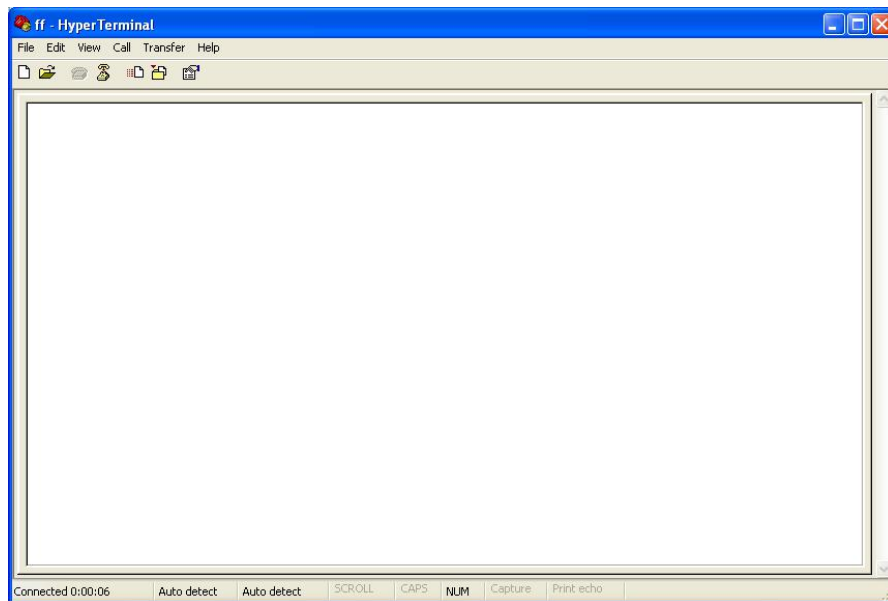
Parity: None

Stop bits: 1

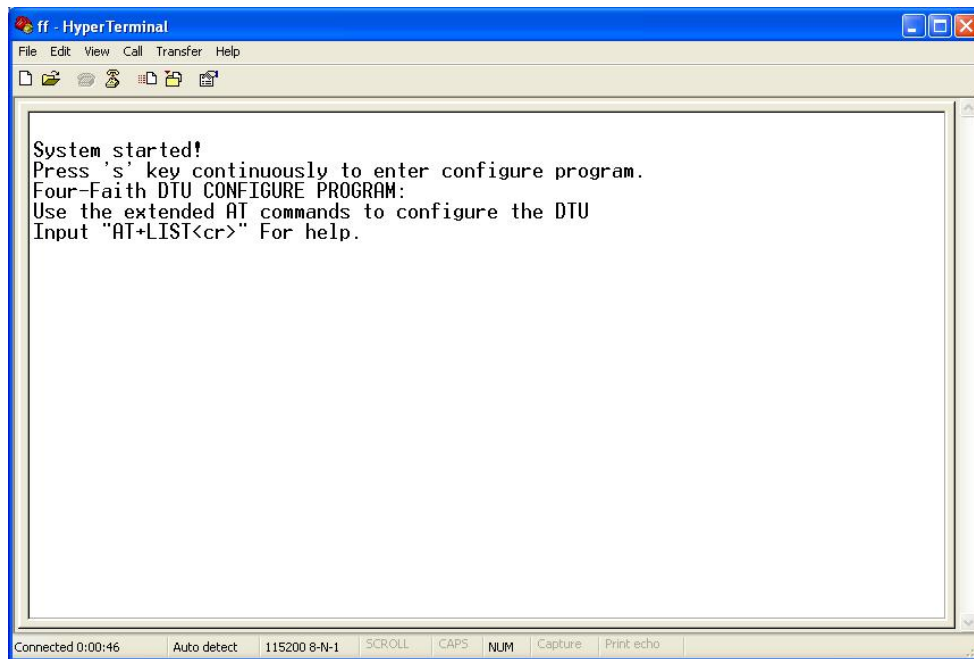
Flow control: None



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+CENr=<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