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Forwell wireless GPRS DTU Usermanual

Gavin

Forwell Wireless Co., Ltd.

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V1.10

New Exciting Product

D1 Series Cellular DTU

User Manual

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D1 Series DTU

User Manual

Content

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Chapter1

1 Prologue

This document is just suit for the following mode type; it helps you quickly to used D1 DTU function and resolves some common questions.

Type	Description
D12S211	GPRS DTU
D12Z111	GPRS DTU
D12H111	GPRS DTU
D13Z311	CDMA DTU
D13Z811	CDMA DTU
D13H221	CDMA DTU

1.1 Version

Version	Date	Description	Author
1.00	2008-08-27	Nearly complete	Gavin
1.10	2009-04-16	Format upgrade	Gavin

1.2 Referenced Documents

D12_Datasheet_Eng
D12_QuickStart_Eng
D13_Datasheet_Eng
D13_QuickStart_Eng

1.3 Notice

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Chapter2

2 Introduction

2.1 Brief

D1 Serials is a GPRS/CDMA DTU with TCP/IP Protocol embedded. It has two comparatively individual parts：IP module with TCP/IP, software interface is AT+I commands; and GPRS/CDMA module, supports all the AT Commands. All the standard AT Commands are transferred to GPRS/CDMA module via the transparent Mode of IP module.

D1 Serials is usually applicable to the Host, which has no TCP/IP but has serial interface, such as SCM Data Collection Transmission System.

2.2 Features

- Compact and easy to integrate into your solution;
- Multi-flexible and compact data interface, TTL, 232 and 485, TTL and 232 are reduced to Rx, Tx, GND;
- Supports more IP Protocol families;
- Data transmission via Serial NET Mode, enters transmission mode when power on;
- Multi-operating status LED;
- Optimized modularization design, easy to upgrade.

2.3 Specification

D12S211& D12Z111& D12H111 Radio Frequency

采用 GSM phase 2/2+标准

GSM (EGSM) 900MHz

DCS (GSM) 1800MHz

Output power： Class 4 (2 W) at EGSM900 Class 1 (1 W) atDCS1800

D13Z311& D13Z811& D13H221 Radio Frequency

TIA/EIA-95B, CDMA2000 1X

Band class 0: 800MHz

Band class 1: (USPCS 1900MHz)

Transmitting Frequency Range：824.64MHZ～848.37MHZ

Receiving Frequency Range： 869.94MHZ～893.37MHZ。

Sensitivity>-104DB

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D12S211 Power consumption:

Speech mode：300mA

Sleep mode： 3.5mA

Power down ：50µA

GPRS Modem average：360mA

D12Z111 Power consumption:

Speech mode: 250mA

Slepp mode: 4.0mA

Power down: 100mA

D12H111 Power consumption:

Speech mode: 250mA

Sleep mode: 3.8mA

Power down: 100mA

D13Z311 Power consumption:

Idle mode: 70mA

Data transfer status: 300~400mA

D13Z811 Power consumption:

Sleep mode: 70mA

Idle mode: 5.0mA

Data transfer status: 300~400mA

D13H221 Power consumption:

Speech mode: 250mA

Sleep mode: 4.0mA

Power down: 100mA

Dimension

Interface： RS-232/485/TTL DB9

antenna：50ohm/SMA/Female

input voltage： 5~25V (9V)

Operating voltage of SIM card： 3V/1.8V

Max speed rate of CSD： 14.4KBPS

Module reset：AT commands

Voice decode standards(three kinds of rate)：

Half-speed (ETS 06.20)

Full-speed (ETS 06.10)

Enhanced full-speed (ETS06.50/06.60/06.80)

Volume: 75*50/72*16mm

weight: 200g

Environment

Ambient temperature：–20oC to +60oC

Storage temperature： -30℃～85℃。

humidity： ≤90%

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Electromagnetic Compatible

Electrostatic Discharge (ESD):   3 classes

Radiated, radio-frequency, electromagnetic field immunity test: 3 class

2.4 Application

- Remote Data Monitor and Control
- Water, gas and oil flow metering
- AMR (automatic meter reading)
- Power station monitoring and control
- Remote POS (point of sale) terminals
- Traffic signals monitor and control
- Fleet management
- Power distribution network supervision
- Central heating system supervision
- Weather station data transmission
- Hydrologic data acquisition
- Vending machine
- Traffic info guidance
- Parking meter and Taxi Monitor
- Telecom equipment supervision (Mobile base station, microwave or optical relay station)

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Chapter 3

3 Getting Started

3.1 Panel introduction

Note：About Hardware description .please according to following file

M1_Modem_DTU_Hardware_Description_V600R.doc

3.2 The LED state

In order to check the module working state. Our product have three Led, pwr LED is power state, Ring LED is Ring state, Data LED is Data state。

	PWR	Ring	Data
Start-up	Lights up 3s，flashing 0.5s,wink 0.5s ,lights up0.5s	wink	Lights up 0.5s
Logon network	flashing	wink	flashing
Sleep state	Lights up 0.5s, wink 0.5s	wink	wink
date Transfer	Lights up 0.5s, wink 0.5s	wink	flashing

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No date transfer	Lights up 0.5s, wink 0.5s, Lights up 1s	wink	wink
Voice call	Lights up 0.5s, wink 0.5s	Lights up 1s, wink 4s	wink
reboot	After 5s. wink	wink	wink

3.3 Connect to products

Please connect antenna and cable with our products, make sure, the port is COM1 or COM2?
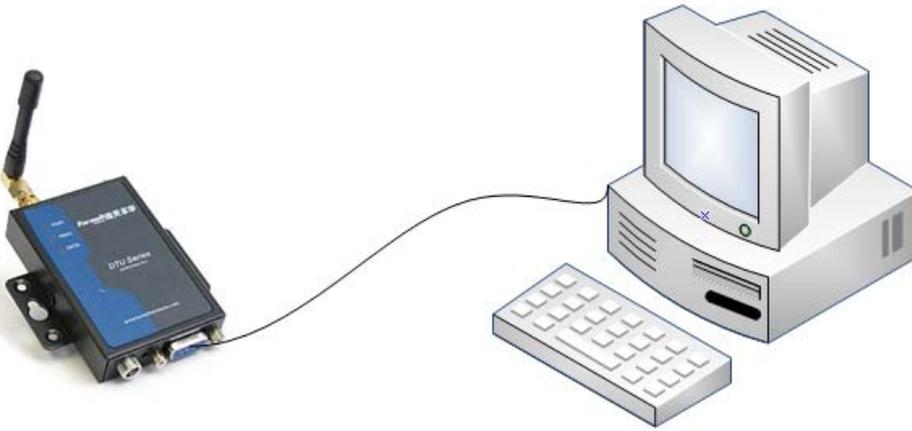
3.4 Insert SIM Card

Open the back cover. Insert into SIM card as follow

3.5 Note: Hyper Terminal

Open the HyperTerminal and input *** (any) as follows

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Choose a right port

The right configuration as following

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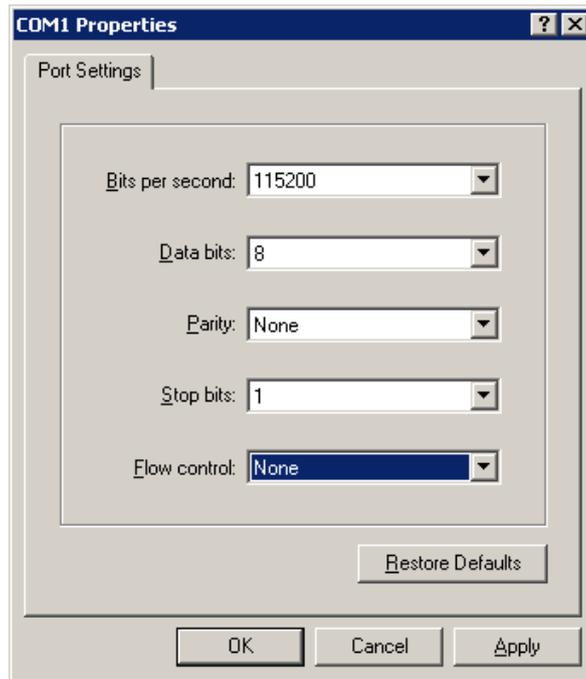
（图 3-3）

When your start-up Hyper Terminal, it is not connected really, you can see the red mark of follow picture without any number .And then, first Disconnect existing connection, second, Click the red arrowhead
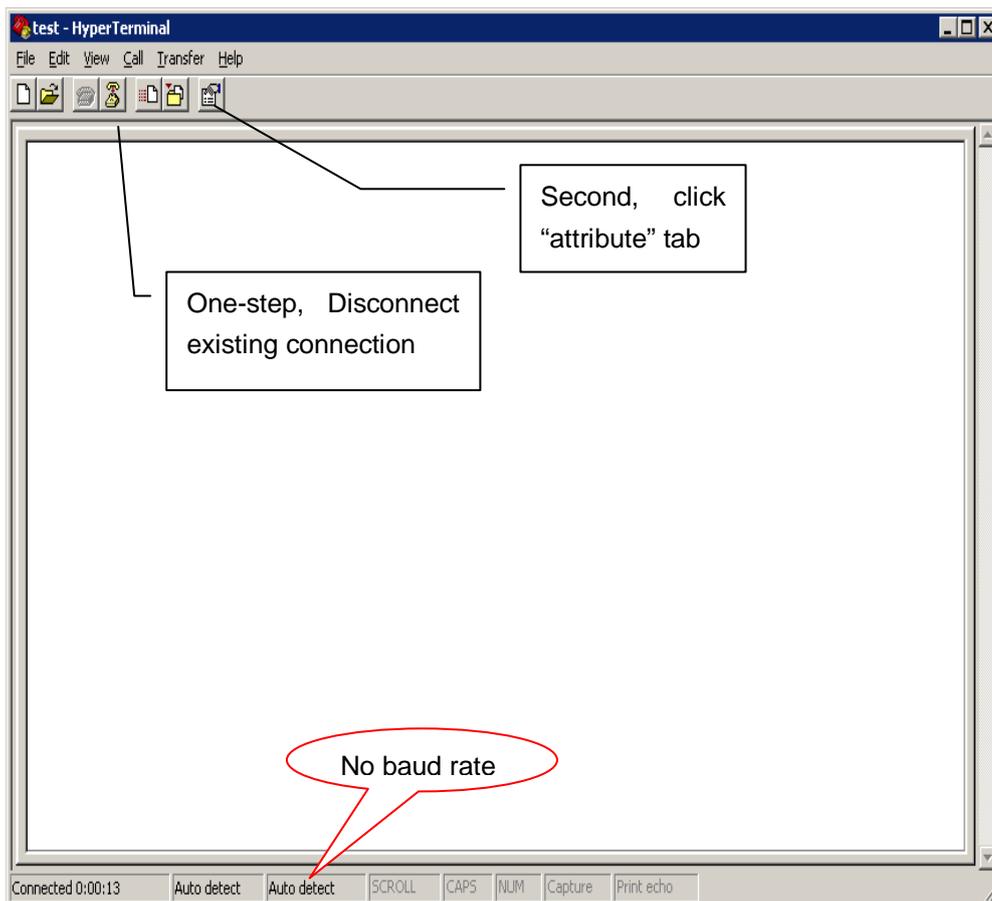
Click the "configure", and make sure again of you modify configure

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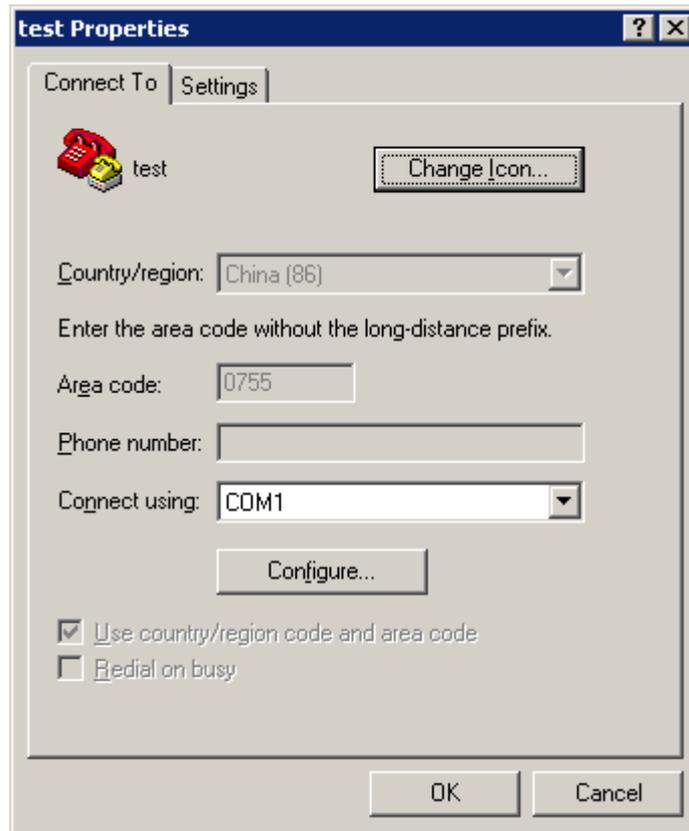
(图 3-5)

Make sure your modify configure again, click "OK"
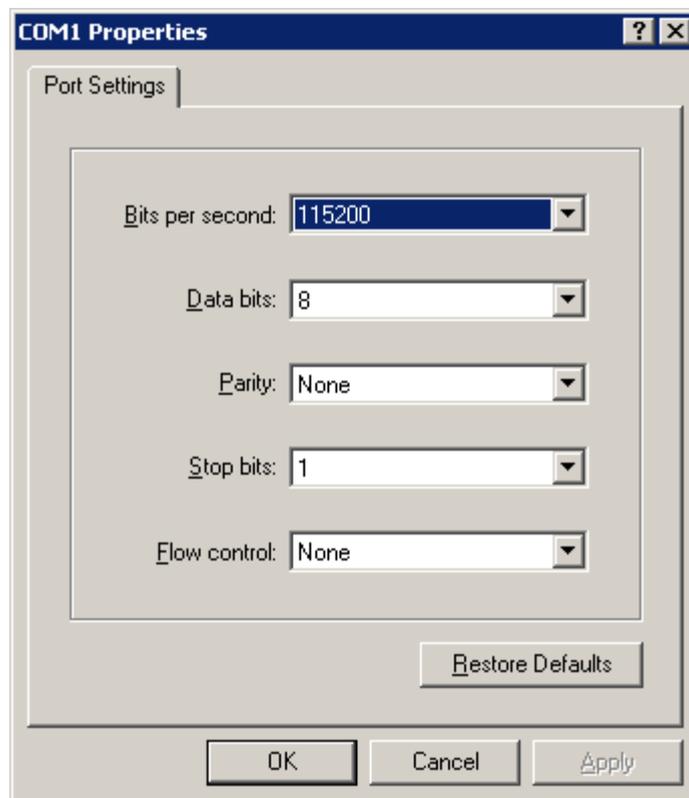
Then you can see it appeared baud rate on white label, then click the black label to make call

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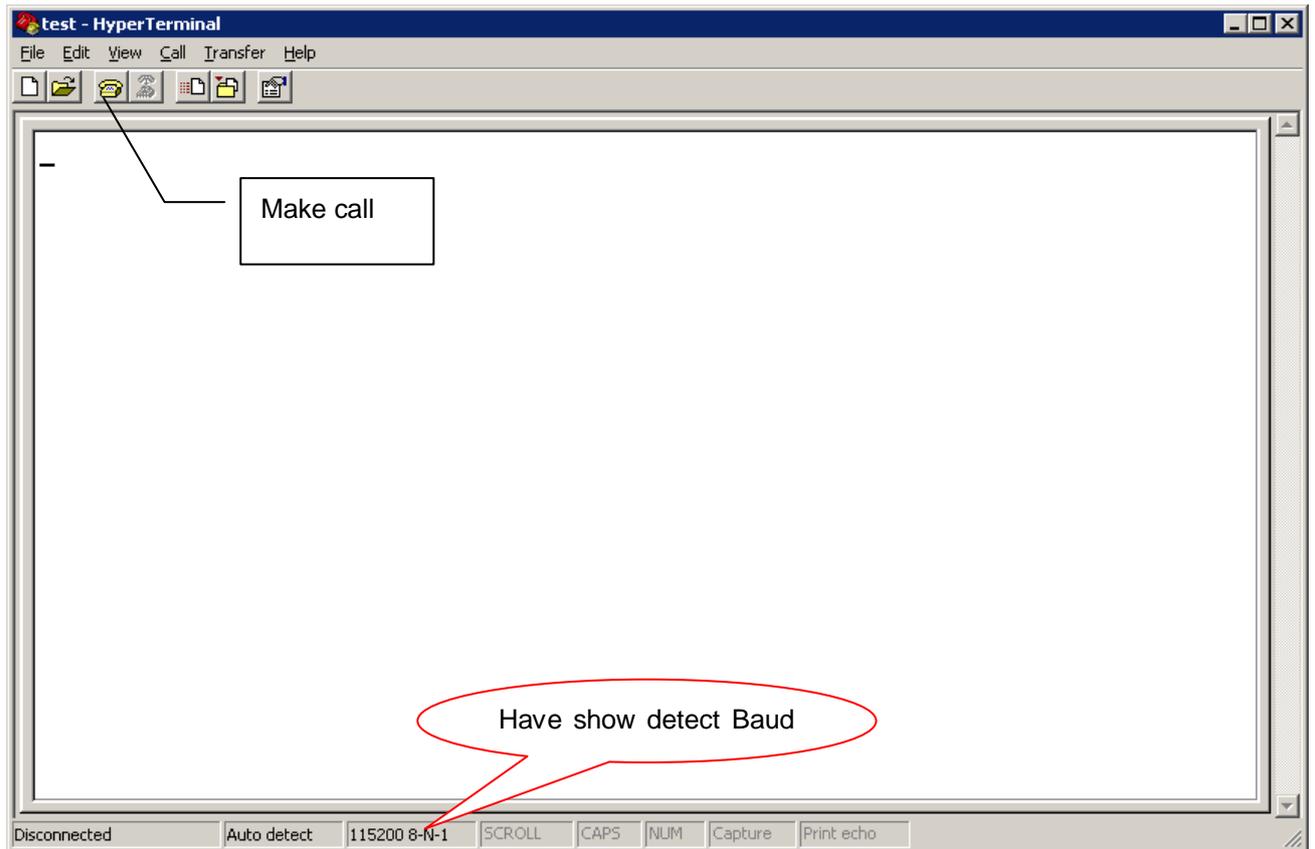
provide power supply with our products, you configured the Hyper Terminal successfully

3.6 Test command

Test AT command

AT<CF>   //Test "at "command

I/OK   //Response ok parameter if successfully connected, you can make
                          sure the module have no malfunction

AT+CSQ<CF>   // to check the Signal quality

+CSQ: **, ##   // ** Should be the number between 10 and 31, the signal quality
                          becomes better as the number grows.   ## should
                          be is 99, Or you should checking the equipment of antenna or SIM
                          card.

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Chapter4

4 Configure DTU by PC

4.1 TCP Client

4.1.1 SerialNet Mode

AT+iHSRV= ip : port   //set the server IP and port
AT+iTUP=2   //always online mode
AT+iPARS   //parameter save
AT+i! SNMD   //switch to SerialNet mode
……
……
……   //communication
……
……
+++   //exit SerialNet mode
AT+iTUP=0   //disable the always online mode, refer chapter 8 for detail
AT+iPARS   // parameter save

Note: our test server: 218.108.22.22: 80 it will send 1 "ok" to client per minute

4.1.2 SerialNet Mode with trigger up

AT+iHSRV=ip:port   // set the Server IP and port
AT+iIATO=n   //n=Integer, the DTU will offline when the connect no data
                           transport in (n) seconds
AT+iTUP=1   //set it to trigger up mode, refer chapter 8 for detail
AT+iPARS   // parameters save
AT+iSNMD   //switch to SerialNet mode
……
……
……   //communication
……
……
+++   //exit SerialNet mode

```
AT+iTUP=0                       //disable the trigger up function
AT+iPARS                        //parameters save
```

Note: our test server: 218.108.22.22: 80 it will send 1 "ok" to client per minute

4.1.3   Socket mode

```
AT+iSTCP:ip,port                //establish a tcp connection to the IP and port
I/(000)                         //000 is the Right connection handle
I/ERROR(075)                    //not logon cellular network，please checking Card and Signal quality
I/ERROR(207)                    //logon cellular network，But can't connecting to TCP server
                                programme，you should to check firewall, IP Port and port listen if
                                collide with them

AT+iSSND%:000, n:*******
                                //send a stream(******) to connect 000, length is (n),
AT+iSRCV: 000                   //receive data from connection 000
AT+iSCLS: 000                   //close the connection 000
```

Note: our test server: 218.108.22.22: 80 it will send 1 "ok" to client per minute

4.2 UDP Connect

4.2.1   SerialNet Mode

```
AT+iSTYP=1                      //set UDP mode
AT+iHSRV=ip:port                //set opposite IP and port
AT+iLPRT=port                   //set local port for listen
AT+iTUP=2                       //always online
AT+iPARS                        //parameters save
AT+i!SNMD                       //switch to SerialNET mode
……
……
……                             //communication
……
……
+++                             //exit SerialNet mode
AT+iTUP=0                       //disable always online function
AT+iSTYP=0                      //restore to tcp mode
AT+iPARS                        //parameter save
```

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4.2.2 SerialNet Mode with Trigger Up

AT+iSTYP=1	//set UDP mode
AT+iHSRV=ip:port	//set opposite IP and port
AT+iLPRT=port	//set local port for listen
AT+iIATO=n	//n=Integer, the DTU will offline when the connect no data transport in (n) seconds
AT+iTUP=1	//set it to trigger up mode, refer chapter 8 for detail
AT+iPARS	//parameters save
AT+i!SNMD	//switch to SerialNET mode
……	
……	
……	//communication
……	
……	
+++	//exit SerialNet mode
AT+iTUP=0	//disable always online function
AT+iSTYP=0	//restore to tcp mode
AT+iPARS	//parameter save

Note: change to SerialNet mode, the AT command don't have "!"

4.2.3 Socket Mode

AT+iSUCP:ip,port:lport	//establish a UDP connection by command. Send data to ip&port, receive data from lport
I/(000)	//000 is handle of the connection
AT+iSSND%:000,n:*******	
	//send a stream (******) to connect 000, length is (n),
AT+iSRCV: 000	//receive data from connection 000
AT+iSCLS: 000	//close the connection 000

4.3 DTU Point to Point Connecting Mode

Client setting is the same as above, server setting is below

Note: in china mainland, the point-to-point transmit ion mode is used to special network: VPDN,

4.3.1 TCP Server

AT+iHSRV=""	//clear the parameter

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```
AT+iLPRT=port              //setting the listen port
AT+iTUP=2                  //always online
AT+iPARS                   //parameters save
AT+i!SNMD                  //switch to SerialNET mode
……
……
……                         //wait for the connection establish
……
……
+++                        //exit SerialNet mode
AT+iTUP=0                  //disable always online function
AT+iPARS                   //parameter save
```

Note: TCP Server must use always online function, please put jumper to the pin of watch dog, refer chapter 7 for detail.

4.3.2 UDP Server

No especial setting

Note: UDP connection both sides is equal, so both sides is used the same settings as before.

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Chapter 5

5 Comom function

5.1 Ping Function

AT+iPDS1=220.192.32.103

//setting advanced destination for ping

AT+iPDS2=220.192.0.130

//setting backup destination for ping, when first destination reply time out

AT+iPDS1=www.sina.com   //Setting aim top-priority server，send PING package for cycle，
（ you can changed address with others）

AT+iPDS2=www.21cn.com   //setting backup server，in case top-priority servers have pro blem
（you can changed address with others）

AT+iPGT=10000   //setting timeout

AT+iPFR=n   //setting frequency to send ping packet

AT+iPARS   //parameter save

Note: The function is only for SerialNET mode, detect whether online by period sending ping packet. Redial up when be detected offline. In Chinese mainland, China Unicom filter the ping packet to Internet, so the user should set the destination to China Unicom' DNS.

5.1.1   Common China Unicom DNS

220.192.32.103
220.192.0.130

5.2 How to Change Baud Rate

D

5.2.1   Change CDMA Module Baud Rate

AT+iMCM   //switch to at command mode

AT+IPR？   //query current baud rate

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AT+IPR=n   //setting a new baud rate

Note: n=0/2400/4800/9600/19200/38400/57600/115200 (the factory default value is 9600）

5.2.2   Change TCP/IP Module Baud Rate

AT+i   //switch to AT+I command mode
AT+iBDRF=n   //below AT+I command should take effect after power down and
                                   on
AT+iBDRM=n
AT+iSNSI="n,8,m,1,0"   //m=n,o,e(no parity, odd parity, even parity), the parameters must
                                   use low case
AT+iPARS   //parameter save

5.2.3   The relation with parameter to baud rate

n=3   2400
n=4   4800
n=5   9600
n=6   19200
n=7   38400
n=8   57600
n=9   115200

Note: AT+IPR change the CDMA Module baud rate, AT+iBDRF, AT+iBDRM is TCP/IP Module baud rate for
command mode, AT+iSNSI is TCP/IP Module baud rate for SerialNET. To change baud rate, you must take the right
order, firstly CDMA Module, secondary TCP/IP Module

5.3 How to setup APN Or VPDN

5.3.1   Setting APN Configuration

AT+iMIS="at+cgdcont=1,ip,****"   //Setting network(APN), fit for D12S211
AT+iUSRN=****   // user name
AT+iPWD=***   // password
AT+iPARS   //save the parameter

5.3.2   Setting VPDN configuration

AT+iUSRN=****   //user name
AT+iPWD=***   // password

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AT+iPPP=1   //Setting network (VPDN)

AT+iATH=n   //n=1(PAP)，2(CHAP) Network certification mode , need to consult
                                for the UN

AT+iPARS   // Save parameter

5.4 AT+iTUP Function

AT+iTUP=0   //disable the function

AT+iTUP=1   //trigger up mode

AT+iTUP=2   //always online mode

Note1: AT+iTUP=2 is for common SerialNET, auto redial up when offline; AT+iTUP=1 is for SerialNET with trigger up, offline when no data transfer in a period (refer chapter 9 for detail), and trigger up by some signal list below: 1 detect data need to transfer in serial port. 2 detect a ring signal, such as the wireless module has been dialed.

Note2: When the DTU in the command mode, and AT+iTUP=2, power on, in about 20~30 seconds the DTU should auto dial up, do not respond any command, If you don't want to wait, press a stream "+", to abort the DTU operation.

5.5 Watch Dog
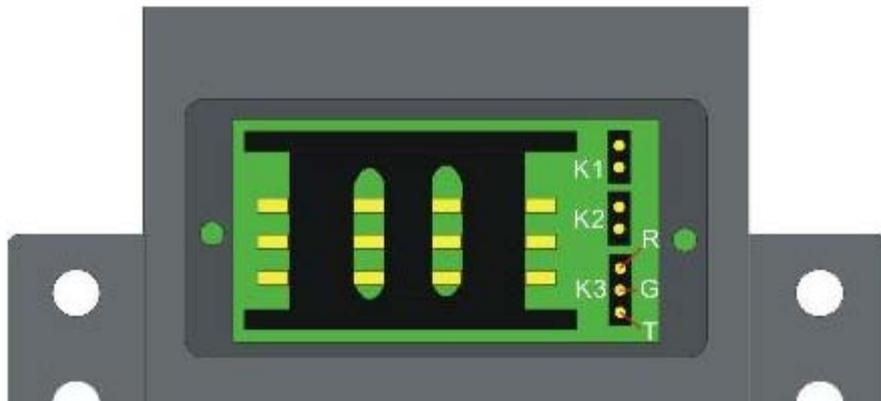
K1	K2	Monitor Timeout	
Open	Open	∞	
Open	Close	15 minutes(D22S211/Z111/Z311) 30 minutes(D22h11/C111)	
Close	Open	30 minutes(D22S211/Z111/Z311) 10 minutes(D22h11/C111)	
close	Close	5 minute	
	RG Close	GT Close	Open

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R●	Reserve	Monitor Host receive	Disable the Function
G●			
T●			

5.6 Flow Monitor

AT+iIATO=n   //n>60 (second), offline when no data transfer (both send & receive)
                                       in the setting time.

Note: In the common SerialNET mode and AT+iTUP=2, the DTU should re-online immediately.

In the SerialNET with trigger up and AT+iTUP=1, the DTU should be offline until be trigger up

Chapter 6

6 DTU Communication Guide

6.1 SOCKET Communication

D1-DTU has two operating modes, one is Command Mode, and the other is SerialNET Mode. Socket communication is implemented in Command Mode, when operating need commands to be sent.

6.1.1 Environment requests

You should be sure about the following test environment before starting the test
A computer online as application service center, which should have public network IP address. Assure that the application service center has no programming implementation at gateway, and no restriction to 1024 port.
Copy Server.exe (Download from www.forwellwireless.com) and implement in the computer.

Setup listening mode (Default one is 1024，user can setup another one according to his own requirement).

Get the IP address of the computer.

Note：Fit for the requirements, we need to upgrade the software sometimes, the version you download maybe different from the photo above. The photo above is V1.32.

6.1.2 Basic setting

AT+IISP1=*99***1#
AT+IDNS1=211.136.18.171
AT+IUSRN=WAP
AT+IPWD=WAP
AT+IMIS="AT+CGDCONT=1,ip,CMNET" //You can get the parameter from your local network
                          distributor.
AT+IXRC=0
AT+IMTYP=2

Note:You can omit this procedure if have set before.

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6.1.3 SOCKET Setting

The following is an example of setting TCP communication .Default port is 1024, user can setup another one according to his own requirement.

AT+ISTCP :xxx .xxx .xxx .xxx,<Port Number> <CR>
//Set SOCKET connection ,here xxx .xxx .xxx .xxx means IP address of the computer.<Port Number>means port number ,response I/xxx.xxx means handle number. The center shows the connection and gets the IP address of client if successfully connects. The center will display the detailed information, amount and speed as soon as the client transmits data. Generally, IP address of client will be cancelled by the center automatically once the client disconnects with the center via Socket command. Please note some unexpected situations, the center can't cancel its IP address if disconnects abnormally(eg.
power off), when client connects with the center again, it will shows that there exists two clients though there just one client connect with the center.

AT+ISSND%:xxx,<string Length>:<string> <CR>
//Transfer data, xxx means handle, <string length> is the string length of
The   transmission,<string> means the data. You can see the data from the terminal in the center.

AT+ISST:xxx<CR>

//Check Socket status, xxx means handle.
Response I/ <socketstat>
If <socketstat>≥0, means the number of the byte in Buffer; if <socketstat><0,means Socket error.

AT+ISRCV:xxx<CR>
//receive data，xxx means handle. Input characters and then press " enter", thus the data is transferred from the center to the terminal.

AT+ISCLS:xxx

  //Close Socket，xxx means handle

Please see Socket part of AT+I Command to get detailed information.

6.2 SerialNET Mode Communication

6.2.1 Description

D1-DTU has two operating modes, one is Command Mode, and the other is SerialNET Mode.

Socket communication is implemented in Command Mode, when operating need commands to be sent. While in SerialNET Mode, as long as you initialize its parameter, you can transfer data via the parameter directly. That's because SerialNET Mode helps the equipment connect to D1 set TCP/UDP Socket connection via serial link.

6.2.2   Environment Requests

You should be sure about the following test environment before starting the test:

- A computer online as SerialNET Mode server, which should have public network IP address.

- Assure that the application service center has no gateway programming implementation, and no restriction to 1024 port

- Copy Server.exe (Download from www.forwellwireless.com) and implement in the computer.

- Setup listening mode (Default one is 1024).

- Get the IP address of the computer.

- Another machine for communication between SerialNET Client server and server.。

- Open the hyper terminal of the client

6.2.3   Basic setting

AT+IISP1=*99***1#
AT+IDNS1=211.136.18.171
AT+IUSRN=WAP
AT+IPWD=WAP
AT+IMIS="AT+CGDCONT=1, ip, CMNET"
AT+IXRC=0
AT+IMTYP=2

Note: You can omit this procedure if have set before.

6.2.4   Initialization setting

Serial NET Mode is established by first defining all related parameters using AT commands. Once in Serial NET Mode, no additional AT commands may be sent, as the host serial link will be dedicated to data, any characters will be sent as data. In this mode, no response for any commands, it's normal.

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AT+IHSRV= xxx.xxx.xxx.xxx:< Port Number> <CR>

// Set Serial NET communication server IP, xxx.xxx.xxx.xxx means IP address, or name of the server, but it should be the one which DNS can read. <Port Number> means server listen port. If successfully sets, returns with I/OK.

AT+IDSTR=<string > <CR>

   //Set disconnection signal in SerialNET Mode. <String> means signal string. After the terminal receives the signal string, it will disconnect automatically.

<string> may be composed of any characters, unprintable ASCII character can be replaced by /Oxhh, here h mean hex number, 0..9 or A..F, that's to say hex number represents the character. For example:

AT+IDSTR=EEEEE

//the terminal will disconnect automatically as soon as it receives "EEEEE"

AT+IDSTR=PP\0x31

   // the terminal will disconnect automatically as soon as it receives "PP1"string.

Returns with I/OK if successfully sets.

AT+ISTYP=v <CR>

   //Set Socket communication type in Serial NET Mode.
   v=0|1 //0 Means TCP, 1 means UDP
Returns with I/OK if successfully sets

AT+ISNSI=<baud>, <data_bits>,<parity>,<stop_bits>,<flow> <CR>

   //Set communication interface parameter in SerialNET Mode.
   <baud>=3..9 //baud rate classification
   <data_bits>=7|8 // data bit
   <parity>=N|E|O //verification
   <stop_bits>=1 //stop bit
   <flow>=0|1 //flow control
   Default value: 8, 8,N, 1,0 //57600bps, 8 bits, doesn't need verify, one stop bit, doesn't need flow control.
Returns with I/OK if successfully sets.

AT+iIATO=n<CR>

//Set IATO parameter
n=0~65535, 1.2~1.5 heart-break cycle in common.
Returns with I/OK if successfully sets.

Chapter 7

7 Production list

name	unit	number	description	Sketch-map
Host	Entries	1	Standard supply	
power	Entries	1	Supply 9V	
antenna	Entries	1	Standard supply	
Production-CD	piece	1	Standard supply	