

# **GPRS Data Terminal**

## **TNC-G121 USER'S MANUAL**

**Doc Rev 1.0**  
**7 Dec 2007**

TNC-G121 User Manual

<b>1. Introduction</b> .....	4
<b>2. Modem and M2M unit in one device</b> .....	4
<b>3. Specification</b> .....	6
<b>4. Layout and Connections</b> .....	7
<b>5. Installation &amp; Configuration</b> .....	9
<b>6. APPENDIX</b> .....	14

**Revision History**

29 Jan 2008	1.0	Release	Lewis Ong
2 Jan 2008	0.05 RC1	For Release	Lewis Ong
Date	Version	Status	Author

## 1. Introduction

The TNC-G121 M2M data unit from Taiko provides a high speed, always online, transparent virtual lease line between remote site and host network. These units are designed for M2M connection with variety of devices such as RTU, weather station, remote power meters, vending machines and traffic control, etc.

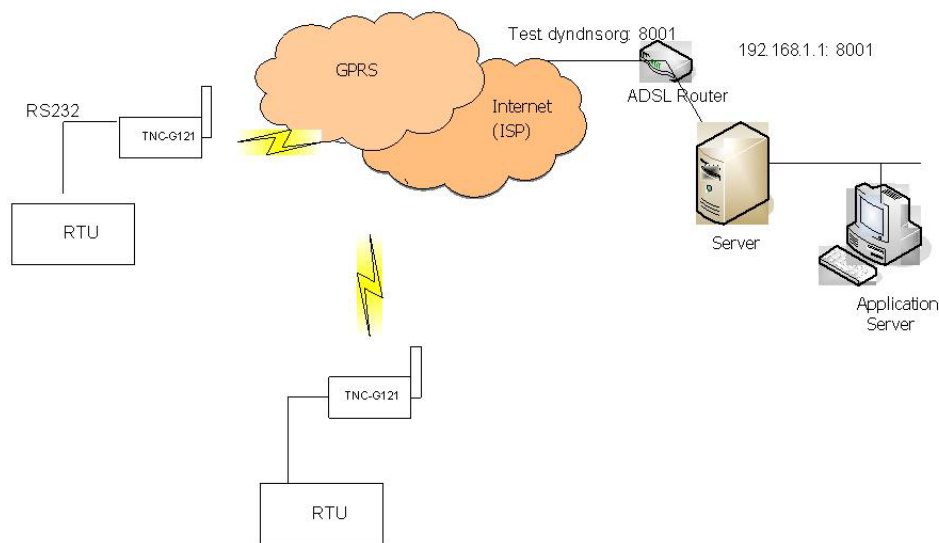
The TNC-G121 M2M Data Unit is the ideal solution for those seeking to develop M2M wireless applications based on GSM/GPRS technology.

This manual shows how to install TNC-G121 and the correct use of it. Please read the manual in details before use.

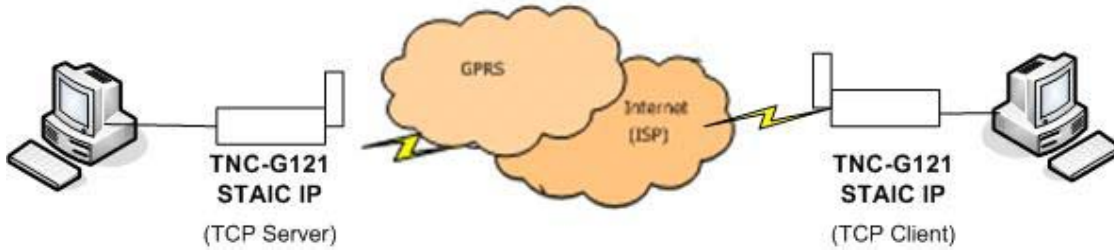
## 2. Modem and M2M unit in one device

TNC-G121 can function as a modem or in M2M device. When switched to AT mode it becomes a modem and supports standard GSM/GPRS functions. When switched to M2M mode, it becomes a GPRS data terminal.

### 2.1 GPRS M2M Applications



### Connection to RTUs to Data Center



Connection point to point

### 3. Specification

#### Product Feature :

- Wavecom GSM/GPRS chipset embedded
- Quad-band GSM/GPRS module
- GSM 850/900/1800/1900MHz
- Compliant with GSM Phase 2+ standard
- Packetization time
- Host Name or IP connection
- Keep Alive
- Support TCP/UDP and ICMP
- Auto GPRS reconnect
- Remote Configuration

#### Hardware / Software Interface:

- Antenna Interfaces
- SMA (50ohm) RF connector
- Connector Interface including:
  - RS232 (DB15-F)
  - SIM Holder
- Power supply connection
- Modem Status LED
- AT command set according to GSM 07.05,07.07

#### Serial Interface :

- RS-232 DTE
- Male DB-9 Connector
- Full serial and modem signals
- Speed 300~460800
- Data bit 7 or 8
- Stop bits 1 or 2
- Parity None, Even, Odd
- Flow control – None, RTS/CTS
- Protection – 15KV ESD and short circuit

#### GPRS Packet Data:

- Quad Band
- GPRS Class B
- GPRS Multi-slot Class 10
- 3 slot downlink (85.6kbps), 1 slot uplink
- (42.8kbps), max 4 slot
- Coding Schemes: C1 to CS4

#### General Information:

- Dimension (H x W x D): 63 x 90 x 36 mm
- Weight: 200 g
- Operating Temperature: - 15 ~ + 55 °C

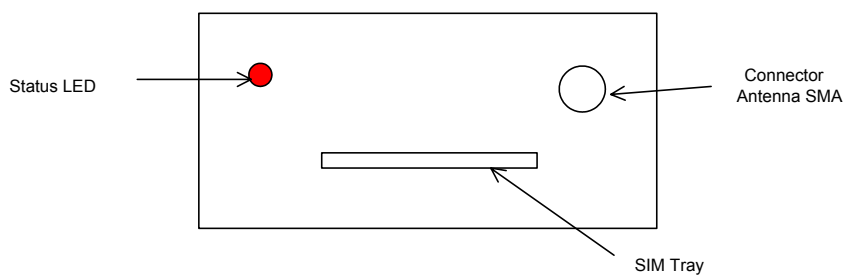
- Storage Temperature: - 20 ~ + 65°C
- Power supply : 9~32Vdc
- 1-5W power consumption

### Software Features:

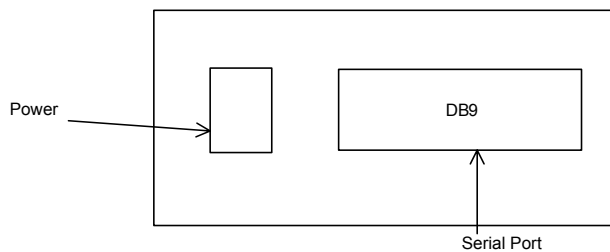
- TCP/UDP, IP
- Server/Client Connection
- Remote Configuration
- Ping ( health check )
- AT Mode and Telemetry Mode

## 4. Layout and Connections

LEFT VIEW



RIGHT VIEW



# TNC-G121 User's Manual

## GPRS Data Terminal



### Front View Interface Ports

Ports	Description	
LED, red	Blink Slowly	Connected to GSM
	Blink Fast	Data Transfer
	Solid On	Searching for GSM
	Off	Power off
SIM Card Holder	Slide entry tray	
Antenna Connection	50ohm/SMA female connector	

### Rear View Interface Ports

Port	Description		
Power	+9~36Vdc		
Serial Port	RS232, DB15 Female	RS232	2: RX
			3: TX
			5: GND
			7: RTS(OUT)
			8: CTS(IN)
			4: DSR
			6: DTR
			9: CI
			1: RI

## 5. Installation & Configuration

This section describes the installation and configuration of the TNC-G121

### Accessories requirements:

1. GPRS SIM Card
2. RS232 straight cable ( Male end – Female end ) for serial port connection. If serial device is not a DCE than a RS232 cross cable is required ( Female end – Female end )
3. SMA connector 50ohm antenna

### Steps

1. Insert SIM card into SIM card slot
2. Connect the Serial Port using the RS232 cable
3. Connect the antenna to the SMA connector
4. Connect the power and power up

### Preparation

1) Before configuration, it is good to prepare the following information

#### Server Provider Information

- APN
- Dial Code
- PPP user name ( if any)
- PPP password ( if any)

#### Data Center Information

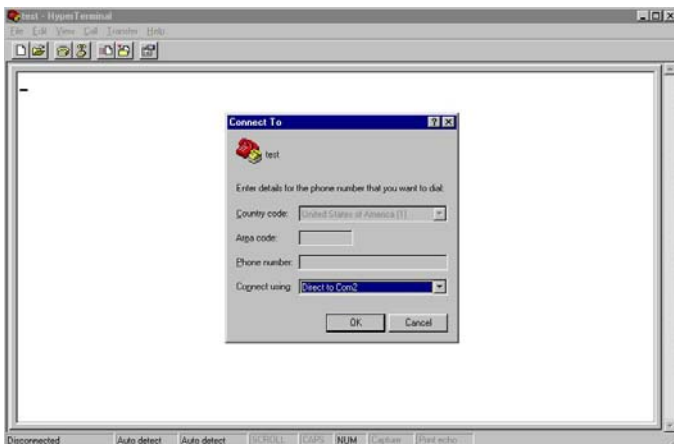
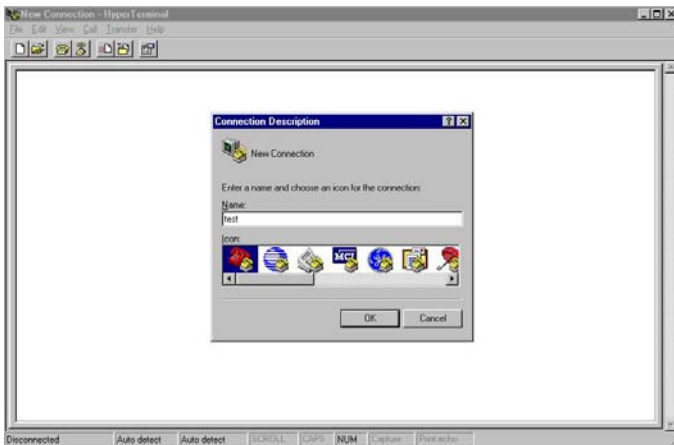
- Data Center IP address or Name
- Data Center Port
- Local Port

## Configuration

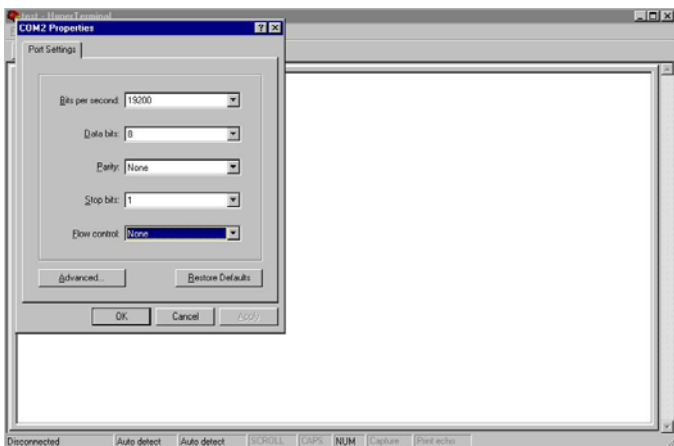
5.1 Run HyperTerminal on Client PC. Configure the following setting below.

# TNC-G121 User's Manual

## GPRS Data Terminal



Select COM PORT that Client PC is using.



# TNC-G121 User's Manual

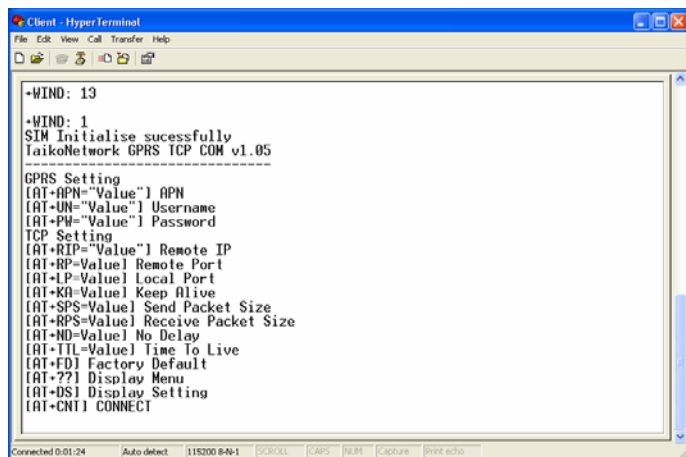
## GPRS Data Terminal



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

5.2 Connect Power Adapter, Antenna and Serial Cable to TNC-G121.

5.3 Power on the unit. Upon Power on, the HyperTerminal on Client PC will prompt User to Configure Setting. If 'AT' key press is not detected after 15 seconds, it will attempt to connect to GPRS. To Configure Setting, enter any setting from the main menu.



There are GPRS Setting and TCP Setting on the display menu. The GPRS Setting is used to connect to GPRS network and TCP Setting is used to configure the Remote IP Address and Port of the Client PC. Refer to the table below to configure GPRS and TCP Setting.

### GPRS Setting

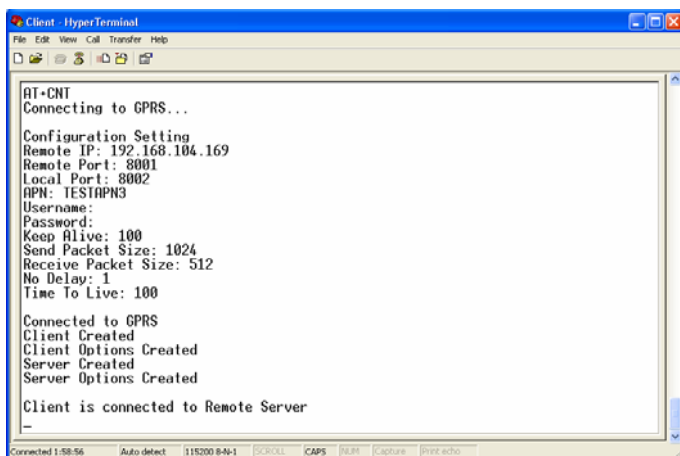
Configure	Field	Description
AT+APN	APN ( example INTERNET)	Access Point Name given by service provider to connect to GPRS network
AT+UN	PPP Username ( if any)	Username given by service provider to connect to GPRS network
AT+PW	PPP Password (if any)	Password given by service provider to connect to GPRS network

### TCP Setting

Configure	Field	Description
AT+RIP	Remote IP/Domain Name (AT+RIP=192.168.104.199)	IP/Domain Name of Remote Server
AT+RP	Remote Port (AT+RP=8001)	Port of Remote Server
AT+LP	Local Port (AT+LP=8002)	Port of TNC-G121 when act as Server
AT+KA	Keep Alive	The Time in (secs) to keep the connection

	(AT+KA=100)	alive
AT+SPS	Send Package Size (AT+SPS=1024)	The size(bytes) of transmission buffer for the spawned socket
AT+RPS	Receive Package Size (AT+RPS= 512)	The size(bytes) of receive buffer for the spawned socket
AT+ND	No Delay (AT+ND=1)	Packet delay send out time (secs). If this is set to 1 then data is sent immediately.
AT+TTL	Time To Live (AT+TTL=100)	The Time (secs) for which the data is valid
AT+FD	Factory Default	Load Factory Default
AT+??	Main Menu	Load Main Menu
AT+DS	Display Setting	Display Configuration Setting
AT+CNT	Connect	Connect to GPRS
AT+WOPEN	(AT+WOPEN=0 : AT Mode) (AT+WOPEN=1: M2M Mode)	Switch between AT Modem or M2M Mode

5.4 Once all the Settings have been configured, Enter AT+CNT to connect to GPRS. The Configuration Setting will be displayed. Upon successful connection to GPRS, it will show Connected to GPRS and it will try to connect to remote server and at the same time it also act as a server waiting for remote client to connect. Once connected to remote server, it will show Client is connected to Remote Server.

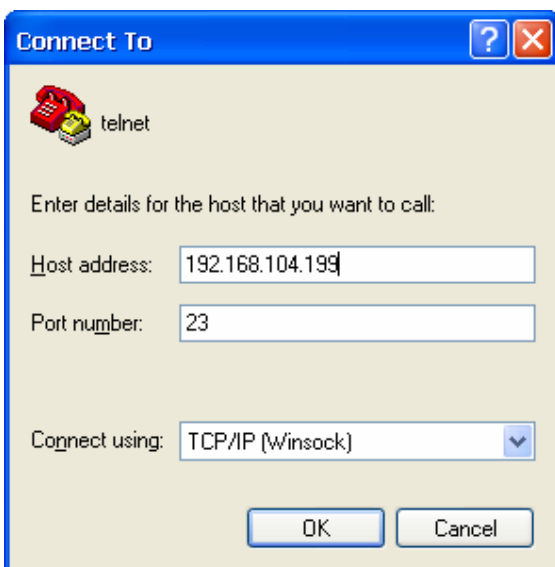


```

Client - HyperTerminal
File Edit View Call Transfer Help
[Icons]
AT+CNT
Connecting to GPRS...
Configuration Setting
Remote IP: 192.168.104.169
Remote Port: 8001
Local Port: 8002
APN: TESTAPN3
Username:
Password:
Keep Alive: 100
Send Packet Size: 1024
Receive Packet Size: 512
No Delay: 1
Time To Live: 100
Connected to GPRS
Client Created
Client Options: Created
Server Created
Server Options: Created
Client is connected to Remote Server
    
```

### 5.5 Remote Configuration

Belows are the parameters that are allowed to be configured remotely. To remote configuration, use Telnet <ip address of the TNC-G121>



RAT+KA	Keep Alive (RAT+KA=100)	The Time in (secs)to keep the connection alive
RAT+SPS	Send Package Size (RAT+SPS=1024)	The size(bytes) of transmission buffer for the spawned socket
RAT+RPS	Receive Package Size (RAT+RPS= 512)	The size(bytes) of receive buffer for the spawned socket
RAT+ND	No Delay (RAT+ND=1)	Packet delay send out time (secs). If this is set to 1 then data is sent immediately.
RAT+TTL	Time To Live (RAT+TTL=100)	The Time (secs) for which the data is valid
RAT+PING	Health Check (RAT+PING)	Check status of UART comm Check status of GPRS comm Check IP address ('ping')

### 5.6 Switching between AT mode and M2M mode

By default TNC=G121 is in M2M mode.

Upon power on of TNC-G121, the unit will attempt to connect to GPRS after 15 secs

Using the HyperTerminal on Client PC connected to the M2M unit. Enter 'AT' within 15 secs to prevent the unit connect to GPRS.

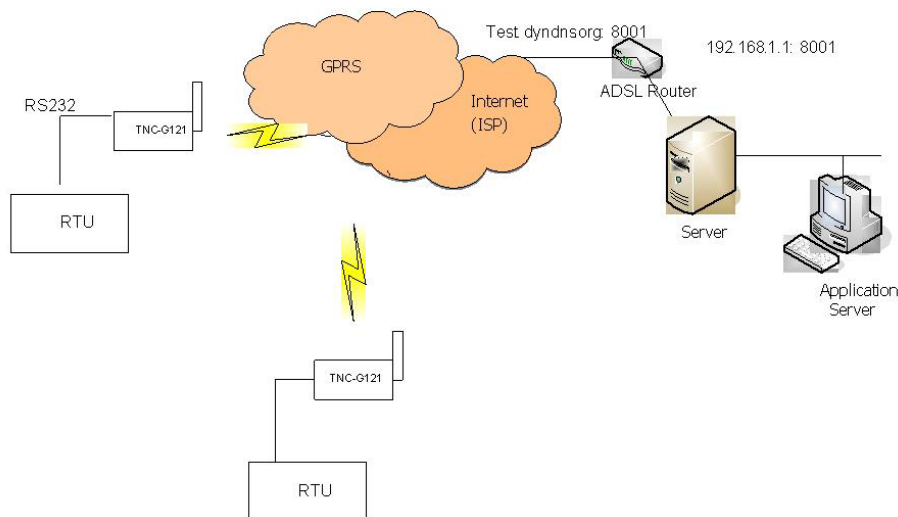
Next enter AT+WOPEN=0. The Unit will reset and goes into AT mode

To switch back to M2M mode.

Enter AT+WOPEN=1. The unit will switch to M2M mode.

## 6. APPENDIX

### EXAMPLE 1 : Setup a Point to Multipoint configuration



#### Step 1 : Setting up Remote Server IP or DNS address and virtual COM

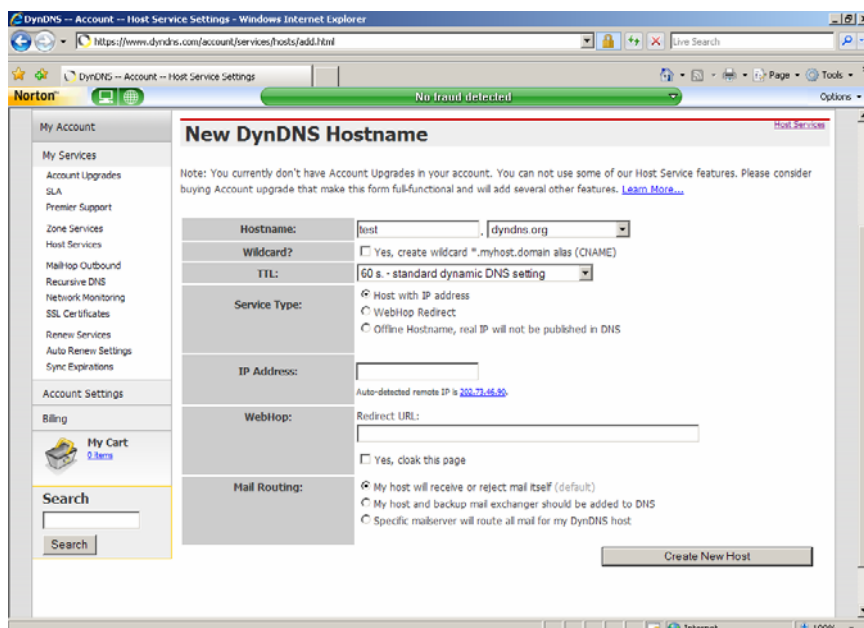
#### Step 2: Setting up TNC-G121 ( Refer manual above )

#### Step 3: Run the application on the server and the RTU

1.1. Assign an IP address to your application server that is connected to a ADSL modem/router which is be pointed to a dynDNS server.

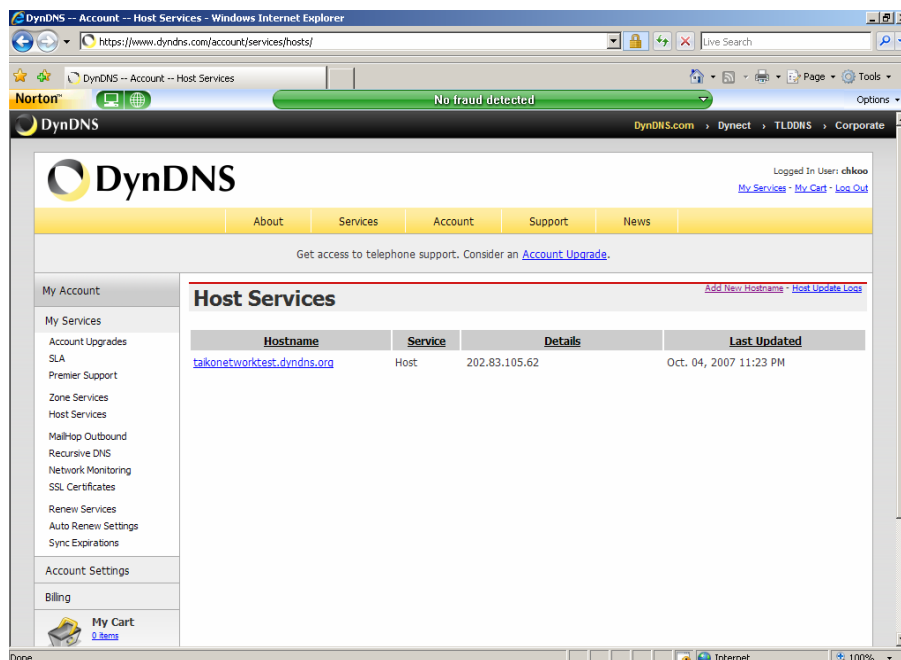


1.2. Go to [www.dyndns.com](http://www.dyndns.com) and create an account and login to create a dyndns domain. Go under “Services” -> “Dynamic DNS” -> “Add New Host”



The screenshot shows the 'New DynDNS Hostname' form in Internet Explorer. The browser address bar shows 'https://www.dyndns.com/account/services/hosts/add.html'. The form includes a sidebar with navigation links like 'My Account', 'My Services', and 'Account Settings'. The main form fields are: Hostname (test), Wildcard? (checkbox), TTL (60 s.), Service Type (radio buttons for Host with IP address, WebHop Redirect, and Offline Hostname), IP Address (Auto-detected remote IP is 202.73.46.50), WebHop (Redirect URL), and Mail Routing (radio buttons for My host will receive or reject mail itself, My host and backup mail exchanger should be added to DNS, and Specific mailserver will route all mail). A 'Create New Host' button is at the bottom right.

1.3. Fill in the required parameters. As for the IP address, use the current ADSL router IP. This IP can be static IP (paid service ) or dynamic IP. Note most of ADSL modem/router comes in dynamic IP.



1.4. After creation, click host services to view the current dyndns host services available.

### 1.5 Configure the ADSL Modem/Router

Two services in the ADSL modem/router need to be configure.

a) DDNS service. – configure the name of the ddns name that was setup in item 2.2~2.4 This helps to bring to your ADSL modem dynamic IP connection. Ensure to configure for daily update of dynamic IP address of the ADSL modem/router to dynamic name server.

b) Port forwarding ( NAT )

Depending the number of ports ( or virtual com port to be created later ), forward the modem/router IP to a internal fixed IP ( ie the application server IP ). For example port 8001~8111.

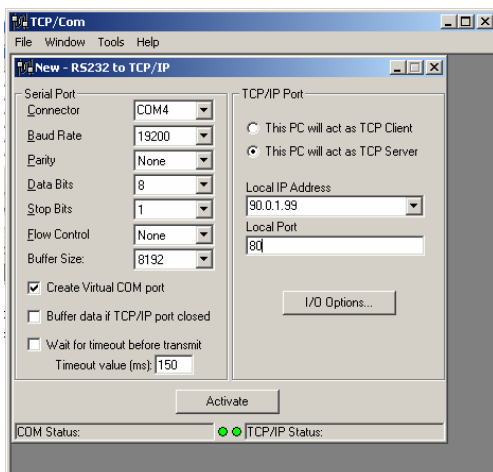
Example

Test.dyndns.org:8001 forward to 192.168.0.1:8001

Where 192.168.0.1 is the internal fixed IP.

### Setup up VirtualCom port using a software call TCP/Com

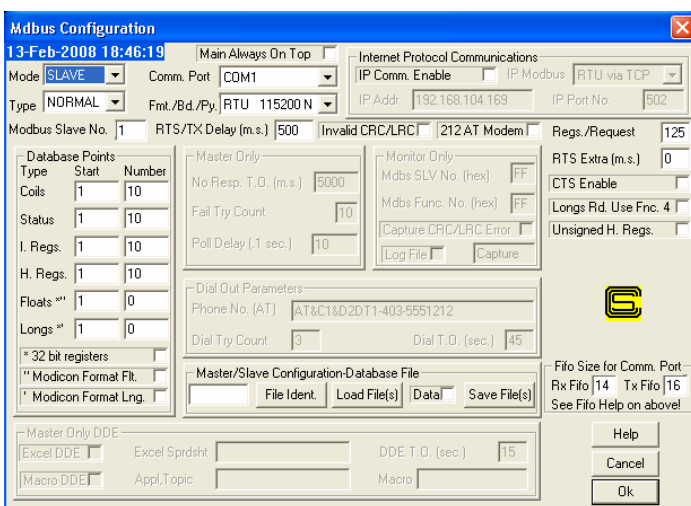
You may purchase this software from the website



1.6. After the network has been setup properly to point to the dyndns domain( including the port to accept incoming connection), user may choose to run tcp/com or to use a serial to ethernet device to listen on the specific IP/port for any incoming connection. Any data that might be send through the specific IP/port will be converted to serial input.

### Example2 : Test Run Modbus Application over Example 1 setup

2.1 Run the Modbus 32 Simulator on Client PC. Click Configuration from the menu and configure the setting as shown below.



Mode : Slave

IP Comm. Enable : Disable

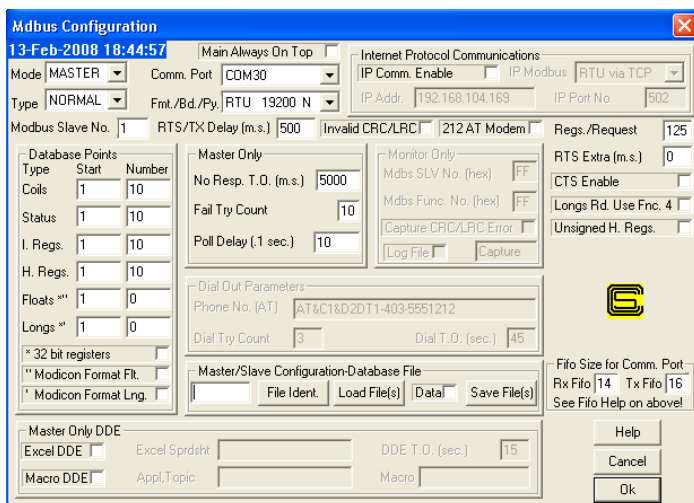
# TNC-G121 User's Manual

## GPRS Data Terminal



Comm. Port : COM1 (Client PC Com Port)  
Fmt./Bd./Py. : RTU 115200 N  
RTS/TX Delay(m.s.) : 500  
Coils : Start 1 Number 10  
Status : Start 500 Number 10  
I. Regs. : Start 1 Number 10  
H. Regs. : Start 1 Number 10  
Floats : Start 1 Number 0  
Longs : Start 1 Number 0

2.2 Run the Modbus 32 Simulator on Server PC. Click Configuration from the menu and configure the setting as shown below.



Mode : Master  
IP Comm. Enable : Disable  
Comm. Port : COM30 (Virtual Port used in TCPCOM)  
Fmt./Bd./Py. : RTU 19200 N  
RTS/TX Delay(m.s.) : 500  
Coils : Start 1 Number 10  
Status : Start 500 Number 10  
I. Regs. : Start 1 Number 10  
H. Regs. : Start 1 Number 10  
Floats : Start 1 Number 0  
Longs : Start 1 Number 0  
No Resp. T.O. (ms) : 5000  
Fail Try Count : 10  
Poll Delay (.1 sec) : 10

# TNC-G121 User's Manual

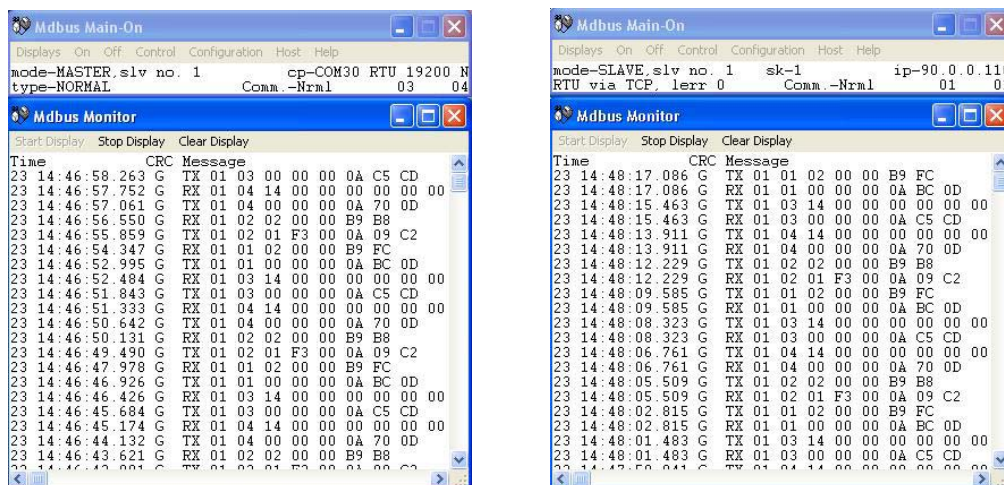
## GPRS Data Terminal



2.3 On Client PC select On from the Modbus Menu and select Displays->Monitor.

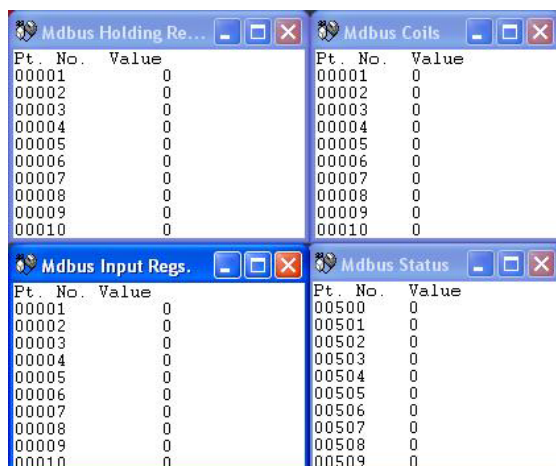
2.4 On Server PC select On from the Modbus Menu and select Displays->Monitor.

2.5 Server PC will start to poll the status of Coils, Status, I. Regs., and H. Regs. from the Client PC as shown below.

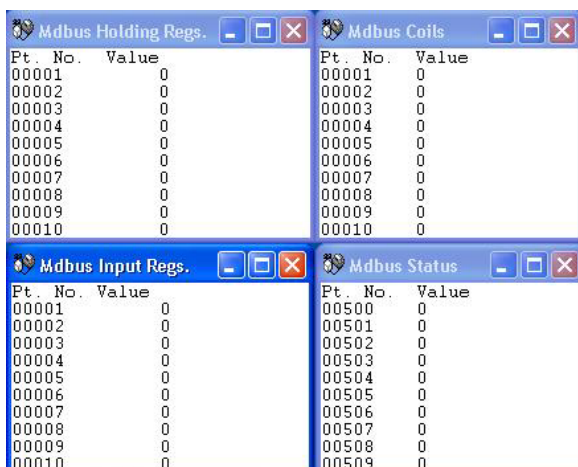


2.6. Data Monitoring on Modbus 32 Simulator

On the Server PC, select Displays->Coils, Status, Input Regs, Holding Regs from the Modbus menu.



2.7 On the Client PC, select Displays->Coils, Status, Input Regs, Holding Regs from the Modbus menu.

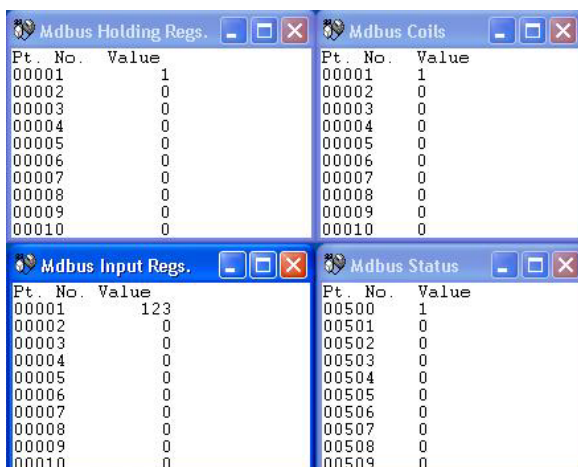


Mdbus Holding Regs.		Mdbus Coils	
Pt. No.	Value	Pt. No.	Value
00001	0	00001	0
00002	0	00002	0
00003	0	00003	0
00004	0	00004	0
00005	0	00005	0
00006	0	00006	0
00007	0	00007	0
00008	0	00008	0
00009	0	00009	0
00010	0	00010	0

Mdbus Input Regs.		Mdbus Status	
Pt. No.	Value	Pt. No.	Value
00001	0	00500	0
00002	0	00501	0
00003	0	00502	0
00004	0	00503	0
00005	0	00504	0
00006	0	00505	0
00007	0	00506	0
00008	0	00507	0
00009	0	00508	0
00010	0	00509	0

2.8 On the Client PC, click on the Pt. No. 00001 for Coils, Status, Holding Regs and Input Regs. Set the Coils, Status, Holding Regs value to 1 and Input Regs value to 123.



Mdbus Holding Regs.		Mdbus Coils	
Pt. No.	Value	Pt. No.	Value
00001	1	00001	1
00002	0	00002	0
00003	0	00003	0
00004	0	00004	0
00005	0	00005	0
00006	0	00006	0
00007	0	00007	0
00008	0	00008	0
00009	0	00009	0
00010	0	00010	0

Mdbus Input Regs.		Mdbus Status	
Pt. No.	Value	Pt. No.	Value
00001	123	00500	1
00002	0	00501	0
00003	0	00502	0
00004	0	00503	0
00005	0	00504	0
00006	0	00505	0
00007	0	00506	0
00008	0	00507	0
00009	0	00508	0
00010	0	00509	0

2.9 The status of the Coils, Status, Holding Regs and Input Regs will be updated on the Server PC.

# TNC-G121 User's Manual

## GPRS Data Terminal



Mdbus Holding Re...		Mdbus Coils	
Pt. No.	Value	Pt. No.	Value
00001	1	00001	1
00002	0	00002	0
00003	0	00003	0
00004	0	00004	0
00005	0	00005	0
00006	0	00006	0
00007	0	00007	0
00008	0	00008	0
00009	0	00009	0
00010	0	00010	0

Mdbus Input Regs.		Mdbus Status	
Pt. No.	Value	Pt. No.	Value
00001	123	00500	1
00002	0	00501	0
00003	0	00502	0
00004	0	00503	0
00005	0	00504	0
00006	0	00505	0
00007	0	00506	0
00008	0	00507	0
00009	0	00508	0
00010	0	00509	0