

# NET101

*RS232 / RS422 / RS485 to Ethernet Converter*

## **User's Manual**

Version 1.2

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## CONTENTS

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<b>Chapter 1: Introduction</b>	<b>1</b>
Section 1. Features	1
Section 2. Networking with NET101	2
Section 3. Package Contents	3
Section 4. NET101 Description	3
Section 5. NET101 DB-9 Pin Assignment	4
Section 6. NET101 Indicators	5
<b>Chapter 2: Installation Procedure</b>	<b>6</b>
<b>Chapter 3: Hardware Installation</b>	<b>7</b>
Section 1. Installation Procedure	7
<b>Chapter 4: Using Netility to Setup IP &amp; Update Firmware</b>	<b>9</b>
Section 1. Installing Netility	9
Section 2. Using Netility	9
2.1 Network Selection	9
2.2 Configure	10
2.2.1 IP Address	10
2.2.2 Advanced	11
2.3 Upgrade Firmware	11
2.4 About	12
2.5 Refresh	12
<b>Chapter 5: Configure NET101 by WEB Browser</b>	<b>13</b>
Section 1. Introduction	13
Section 2. NET101 Web Manager Interface	13
2.1 Information	14
2.1.1 System Information	14
2.1.2 Network Status	14
2.2 Configuration	14
2.2.1 Network	15
2.2.2 WEB / Telnet	18
2.2.3 System Time	19
2.2.4 Connection	20
2.3 Help	21
2.3.1 About	21
<b>Appendix A: Update NET101 Firmware</b>	<b>23</b>
<b>Appendix B: NET101 Virtual COM Port</b>	<b>26</b>

## **Chapter 1: Introduction**

### **Section 1. Features**

NET101 is one of the smallest RS232/RS422/RS485 Ethernet Converter in the market. This device provides the means to transfer serial data over the Internet without having to make changes to your existing hardware/software. That is done by connecting two NET101 in Master mode and Slave mode. Alternatively, a virtual driver can be installed to control the facility over Internet.

The NET101 also could be used as a MODBUS gateway. It could convert transaction between the MODBUS on Serial Bus and MODBUS on TCP/IP. Please refer to the specification of MODBUS for detailed specification on MODBUS.

Some of the main features of this device are;

#### *Firmware:*

- Built-in Web Server
- Support RS232 / 422 /485 (Half/Full Duplex) physical bus
- Auto-detection of Ethernet bus type
- Support Virtual COM port drivers from Microsoft Windows platform
- Support One-on-One communication mode
- Support Virtual COM port mode
- Gateway between MODBUS Serial and MODBUS on Ethernet
- Configuration via telnet, Web or Netility (freeware)
- PPPoE and DDNS protocol for xDSL broadband connection
- Serial data transfer rate up to 115kbps (19.2kbps for continuous transmit/receive).
- Connects serial device to 10/100Mbps Fast Ethernet Network Access
- Support any Web Browser for configuration
- Network Protocol: HTTP server, TCP/IP, UDP, SMTP, PPPoE, Dynamic DNS, DNS Client, SNTP, BOOTP, DHCP, FTP Server, SNMP

#### *Hardware:*

- 32-Bit 50MHz RISC ARM7 TDMI CPU
- System clock: 25MHz or 50MHz
- Flash Memory: 512KB / 1MB / 2MB / 4MB / 8MB
- Dynamic Memory: 2MB / 8MB / 16MB
- LCD display shows the IP address, Subnet Mask and Gateway
- Power supply: 4.8V to 7.0V, 250mA maximum.
- Operating Voltage: 3.3 volts
- Operating Temperature: 0°C ~ 60°C
- Operating Humidity: 5% ~ 90%
- Dimensions: 48mm x 63mm x 21m
- Weight: 75g
- For Indoor Use. Protective housing required for outdoor use

### Section 2. Networking with NET101

NET101 gives the user two options when it comes to Network connection. The user may choose to manage and control the various serial devices over Internet using windows Virtual COM port function (refer to Fig 1). In this configuration, a NET101 is connected to a serial device. The user can then manage and control each of these serial devices over LAN.

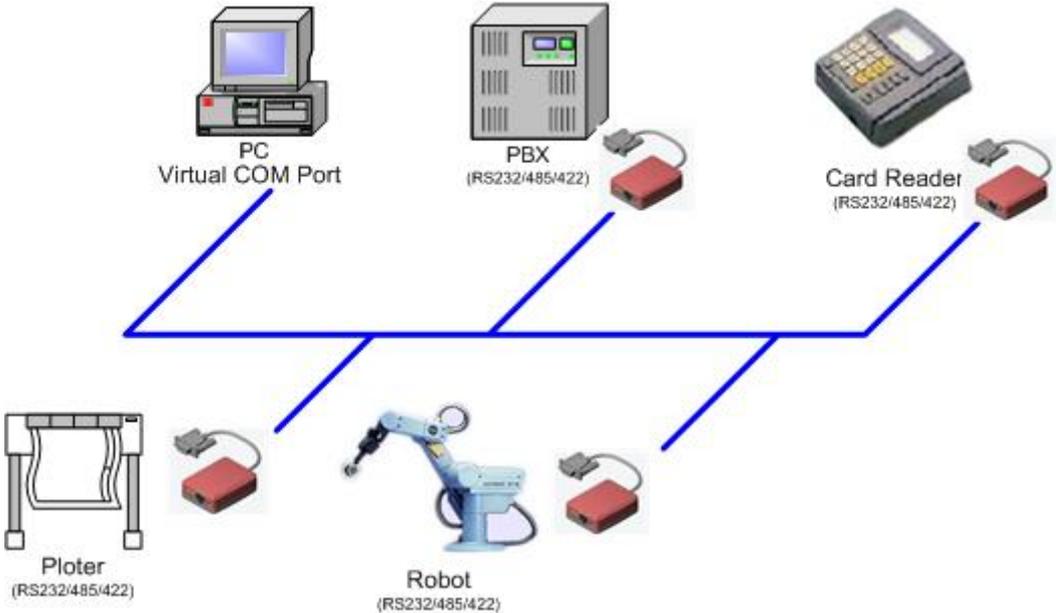


Fig.1 NET101 using a Virtual COM Port in Windows mode

To extend this further, the user may opt to have a One-on-One configuration (refer to Fig. 2). One of these 2 NET101 needs to be configured in Master mode, and the other is configured in Slave mode.

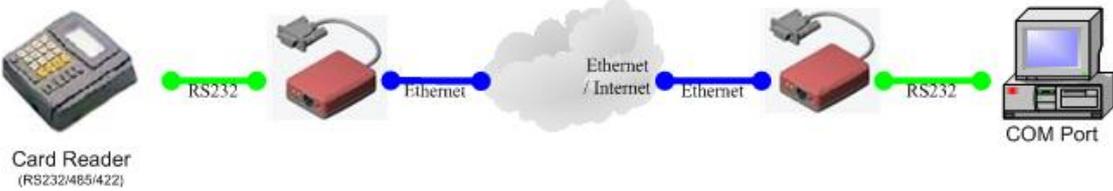


Fig.2 NET101 a One-on-One Communication Diagram

### Section 3. Package Contents

A standard package should contain these items;

	One NET101 module
	One Utility CD which contains; 1. Netility: to configure IP address and update the firmware. 2. Time Server: Time adjustment utility. 3. Adobe Acrobat 5.0 Reader. 4. User Manual
	One Power Adaptor (European / USA)

### Section 4. NET101 Description

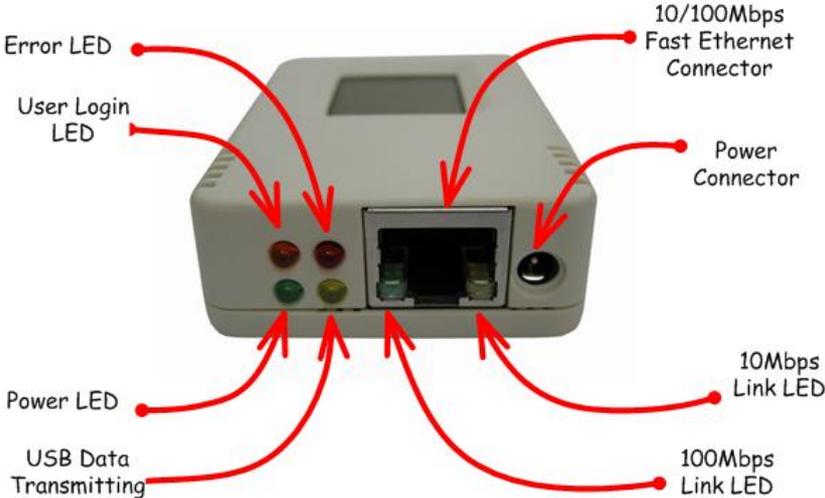


Fig.3 NET101 Front View

**Section 5. NET101 DB-9 Pin Assignment**

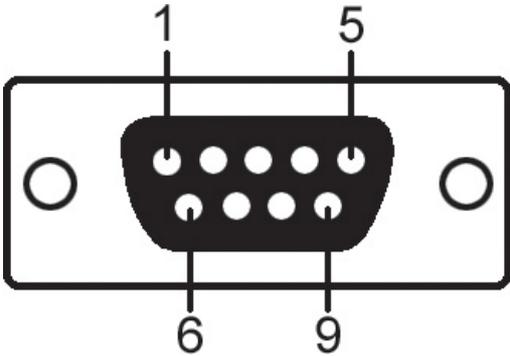


Fig.4 DB-9 Male

NET101 DB-9 PIN Assignment				
DB-9 Pin No.	RS-232	RS-422	RS-485 Full Duplex	RS-485 Half-Duplex
1	DCD	RxD-	RxD-	
2	RxD	RxD+	RxD+	
3	TxD	TxD+	TxD+	TxD+ / RxD+
4	DTR	TxD-	TxD-	TxD- / RxD-
5	GND	GND	GND	GND
6	DSR			
7	RTS			
8	CTS			
9	RI			

Fig.5 NET101 DB-9 PIN assignment

## Section 6. NET101 Indicators

NET101 LED Status Indicators		
Color	Signal Definition	Condition / Description
Green	Power state	On: Normal power
Red	Error Condition	On: Error condition occurred
Orange	Logon state	On: When there is Master or Driver logon and receive the image.
Yellow	Data activity	Flash when there is data transmission / receive by DB-9.

Fig.6 NET101 Status LED Indicator

NET101 LAN Port LED Light indicators	
Color	Condition / Description
Green	On: Internet correspond speed is 100M Flash: Data transmitting / receiving
Yellow	On: Internet correspond speed is 10M Flash: Data transmitting / receiving

Fig.7 NET101 LAN LED Indicator

## Chapter 2: Installation Procedure

Before you start using NET101, you will need to set-up both the hardware and software. The following is a flow chart on the installation procedure:

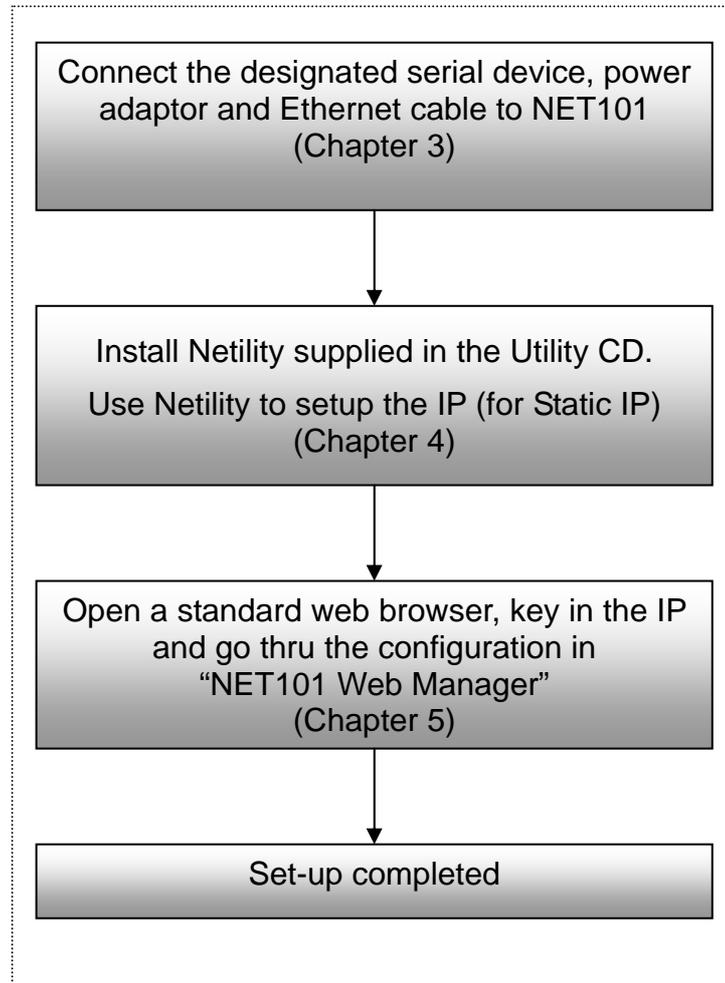


Fig.8 NET101 installation flowchart

## Chapter 3: Hardware Installation

The following details the installation procedure for NET101.

### Section 1. Installation Procedure

Step 1:

Connect the DB-9 to either a RS232 / 422 or 485 serial port of the device.



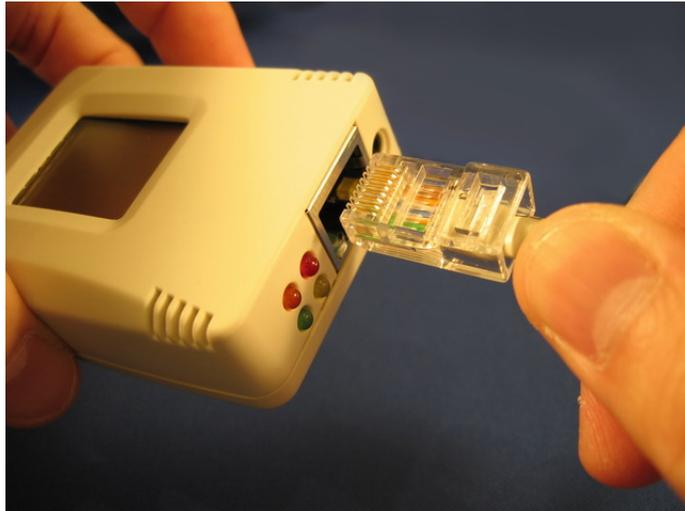
Step 2:

Connect one end of the Ethernet cable to a hub / router.



**Step 3:**

Connect the other end of the Ethernet cable to NET101 Ethernet port.



**Step 4:**

Connect the DC adapter power output into NET101 socket, and plug the DC adaptor into the wall socket



**Step 5:**

The LCD will display the IP, Subnet Mask and Gateway IP. Use a WEB browser to login into the IP address.



**Warning:**

Please make sure the input Voltage and Frequency of the DC power adapter (DC 5.3V) is correct before plugging into the power outlet!

## Chapter 4: Using Netility to Setup IP & Update Firmware

### Section 1. Installing Netility

1. Insert the Utility CD into the CD-ROM drive and execute Netility.exe
2. After installation is completed, 'Netility' group will appear in Windows 'Start' → 'Program Group'.



Fig.8 Netility Group

3. Click "Netility" to start the program.

### Section 2. Using Netility

The Netility main menu is shown below. The selection menu is located on the left. The device, hardware, firmware and IP address connected to a LAN are displayed on the right.

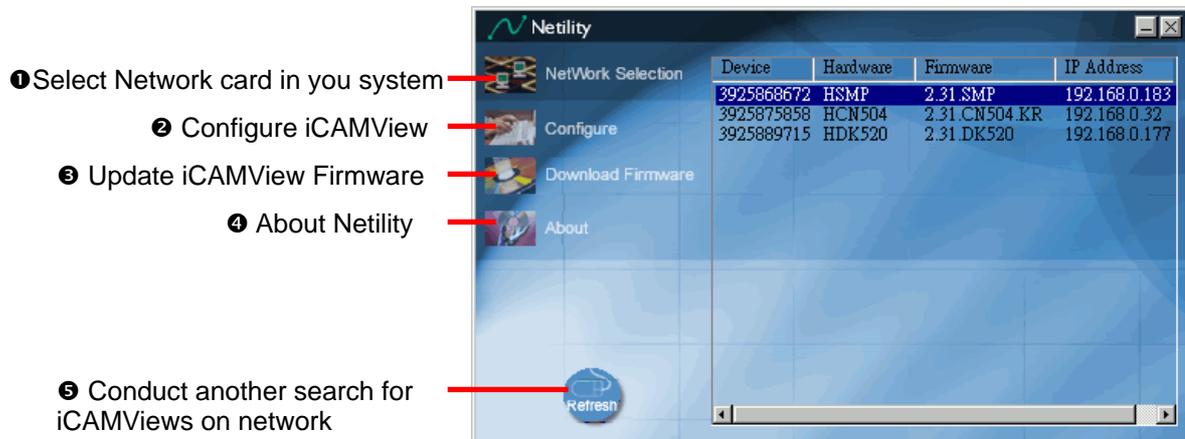


Fig.9 Netility Main Menu

#### 2.1 Network Selection

Once Netility starts-up, it will automatically search for the computer's Network card (If not, click on "Network Selection" on the main menu to start the search). A pop-up window will show the available Network Adapter.

Next, select the Network Adapter, which is connected to the LAN, and click 'OK' to return to the main menu. NET101 will now appear in the main menu display area.

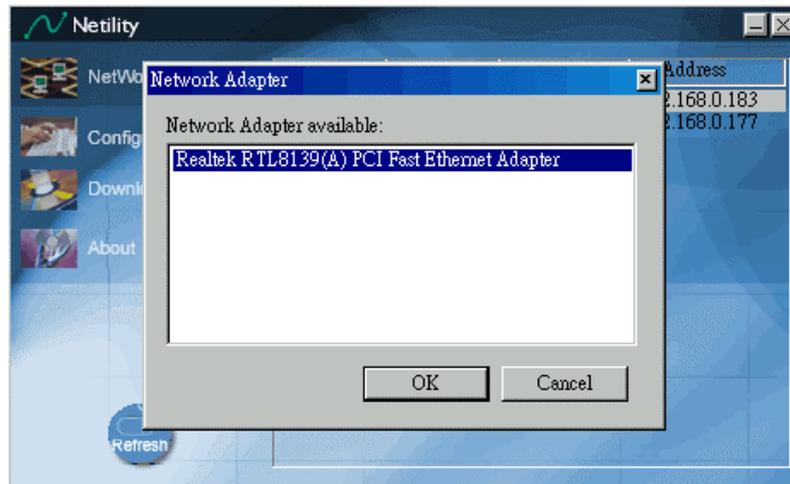


Fig.10 Netility: Network Selection

## 2.2 Configure

Select NET101 on the right display screen, and then click “Configure”. This will bring up the IP Address Configuration window. Here, the user can set;

- IP Address
- Advanced (for port setting configuration)

### 2.2.1 IP Address

This section sets an IP Address for NET101. Enter your IP Address if you have a Static IP otherwise choose Obtain an IP address by DHCP.

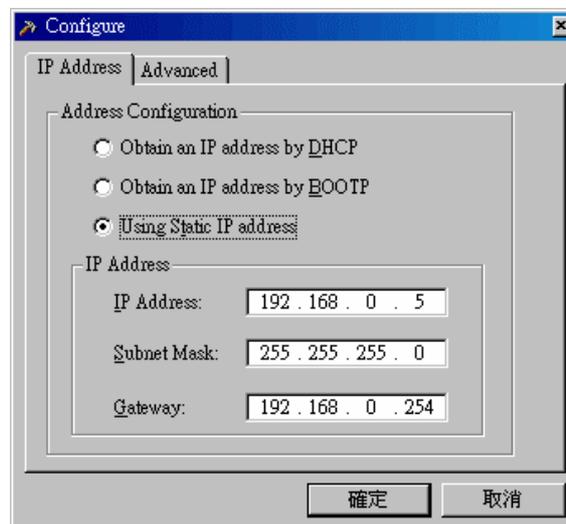


Fig.11 Netility: Set an IP Address for NET101

Once the IP address is set, you will be able to connect to the NET101 webpage from a standard browser.

Obtain an IP address by DHCP or BOOTP – the IP address, Subnet Mask and Gateway is acquired automatically by the system.

## 2.2.2 Advanced

In order to increase security of NET101, Netility offers two additional security features:

### i. Netility Password

Use this to set an access password for Netility.

#### **WARNING:**

Do not lose this password. If the password is lost, Netility will not be able to perform future firmware upgrades.

### ii. Management Protocol (This function is disabled for NET101)

## 2.3 Upgrade Firmware

Netility offers a convenient firmware upgrade. To upgrade your firmware follow the following procedure.

Download the latest firmware;

1. Open internet explorer and browse to;  
<http://www.megatec.com.tw/CustomerService/Download/csdownload.htm>  
Make sure that you choose "NET101" (Downloading the wrong firmware may permanently damage NET101).
2. Check if the latest firmware has been released.
3. Click  to download and save the file to your local hard drive.

Upgrade NET101 firmware;

1. Open Netility,
2. Click "Download Firmware" from the Netility main menu,
3. Click , and browse to the location where you save the firmware earlier.
4. Select the new firmware file (\*.bin) and,
5. Click "Start".

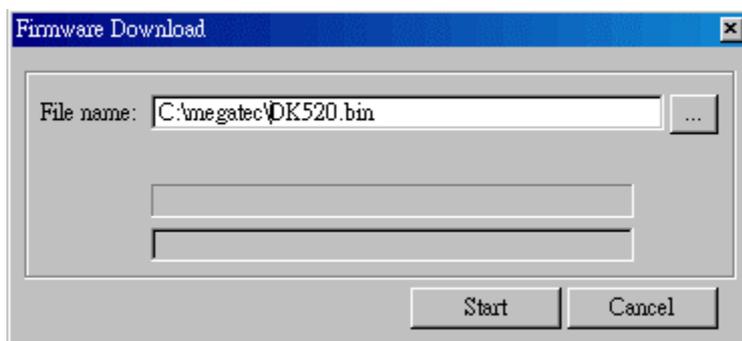


Fig.12 Netility: Update NET101 firmware

The NET101 red and yellow LED will flash alternately to indicate that firmware upgrading is in progress. Once completed, NET101 will reboot.

**NOTE:**

If the downloading / upgrade process is interrupted or the data is corrupted, NET101 will keep its default firmware to avoid complete data loss. If this happens, repeat the above firmware upgrade procedure.

## 2.4 About

This section displays the current Netility version.



Fig.13 Netility version examined

## 2.5 Refresh

Normally, Netility will automatically search for any NET101 connected to the LAN. However, the user can do a manual search by click the "Refresh" icon.



Fig.14 Netility: Manually search for NET101

## Chapter 5: Configure NET101 by WEB Browser

### Section 1. Introduction

After you have setup the hardware and set an IP address for NET101, you will then be able to go to NET101 web site to monitor, manage and control the serial devices. All you have to do is enter the new IP address into any standard web browser.

To do this;

1. Start the Web Brower (Netscape or Internet Explore)
2. Enter NET101 IP Address that was set earlier using Netility (e.g. 211.21.67.51) and press [ENTER]



Fig.15 Enter NET101 IP address

3. A login screen will appear, press [ENTER]. By default the username and password is left blank.

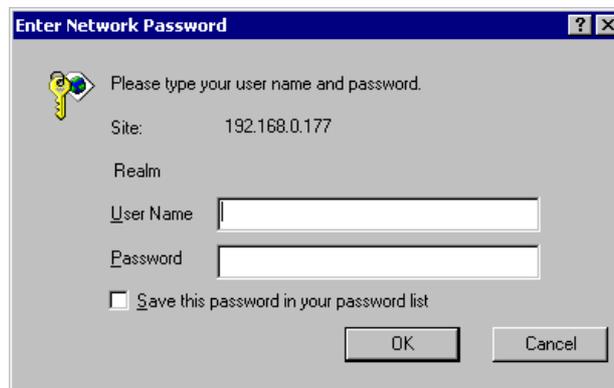


Fig.16 NET101 Login screen

### Section 2. NET101 Web Manager Interface

NET101 webpage main menu is divided into two sections. The selections menu on the left and display menu on the right. The selection menu consists of the following options:

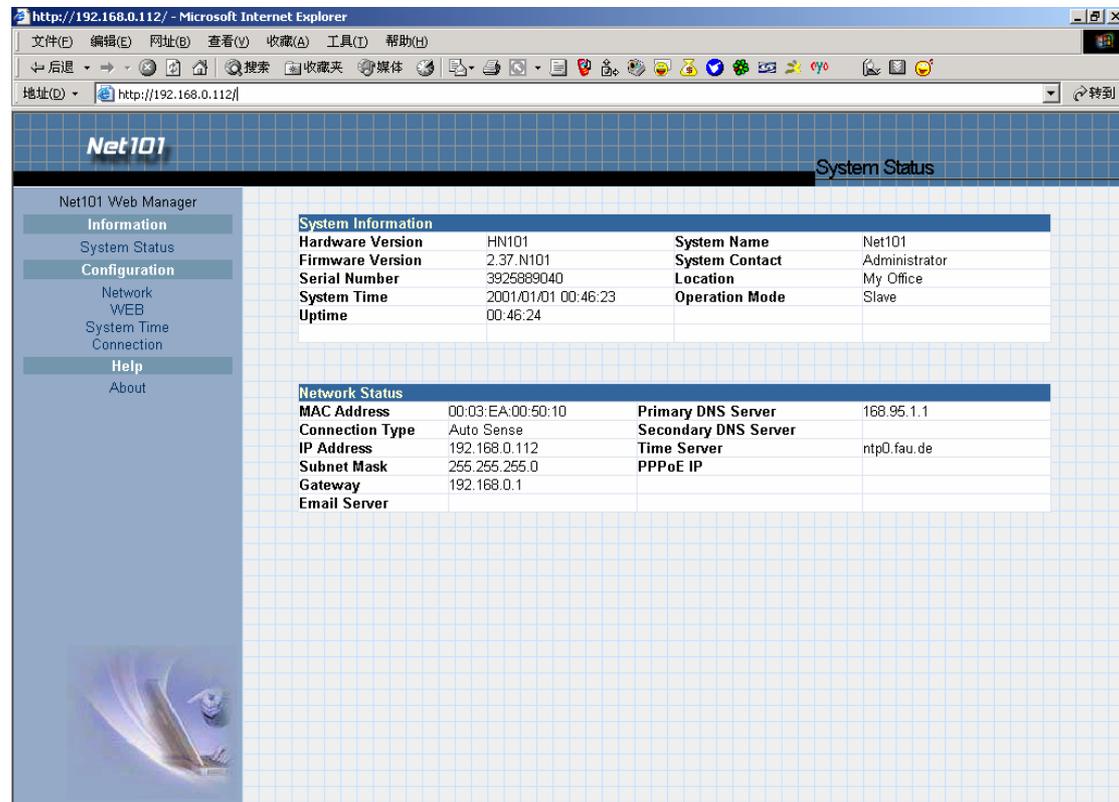
#### 2.1 Information

#### 2.2 Configuration

#### 2.3 Help

## 2.1 Information

Click on “System Status” to display the System Information and Network Status. The information and values here are either provided by NET101 or were set by the users in the “Configuration” section earlier on.



The screenshot shows the NET101 Web Manager interface in Microsoft Internet Explorer. The browser address bar shows <http://192.168.0.112/>. The page title is "System Status". On the left is a navigation menu with the following items: Information, System Status, Configuration, Network, WEB, System Time, Connection, Help, and About. The main content area displays two tables:

System Information			
Hardware Version	HN101	System Name	Net101
Firmware Version	2.37.N101	System Contact	Administrator
Serial Number	3925889040	Location	My Office
System Time	2001/01/01 00:46:23	Operation Mode	Slave
Uptime	00:46:24		

Network Status			
MAC Address	00:03:EA:00:50:10	Primary DNS Server	168.95.1.1
Connection Type	Auto Sense	Secondary DNS Server	
IP Address	192.168.0.112	Time Server	ntp0.fau.de
Subnet Mask	255.255.255.0	PPPoE IP	
Gateway	192.168.0.1		
Email Server			

Fig.17 NET101 Information Menu

### 2.1.1 System Information

This section shows NET101 System Information such as the Hardware and Firmware Version, the serial number, current / local System Time, the system name, contact, location and uptime. These values are either provided by NET101 or set by user.

### 2.1.2 Network Status

This section shows NET101 Network settings. The MAC address is unique to every NET101. All the other values are set by the user in the Configuration page.

## 2.2 Configuration

Please ensure that each of the following option is set correctly. Otherwise, NET101 may not work properly.

### 2.2.1 Network

### 2.2.2 WEB (User Account)

### 2.2.3 System Time

### 2.2.4 Connection

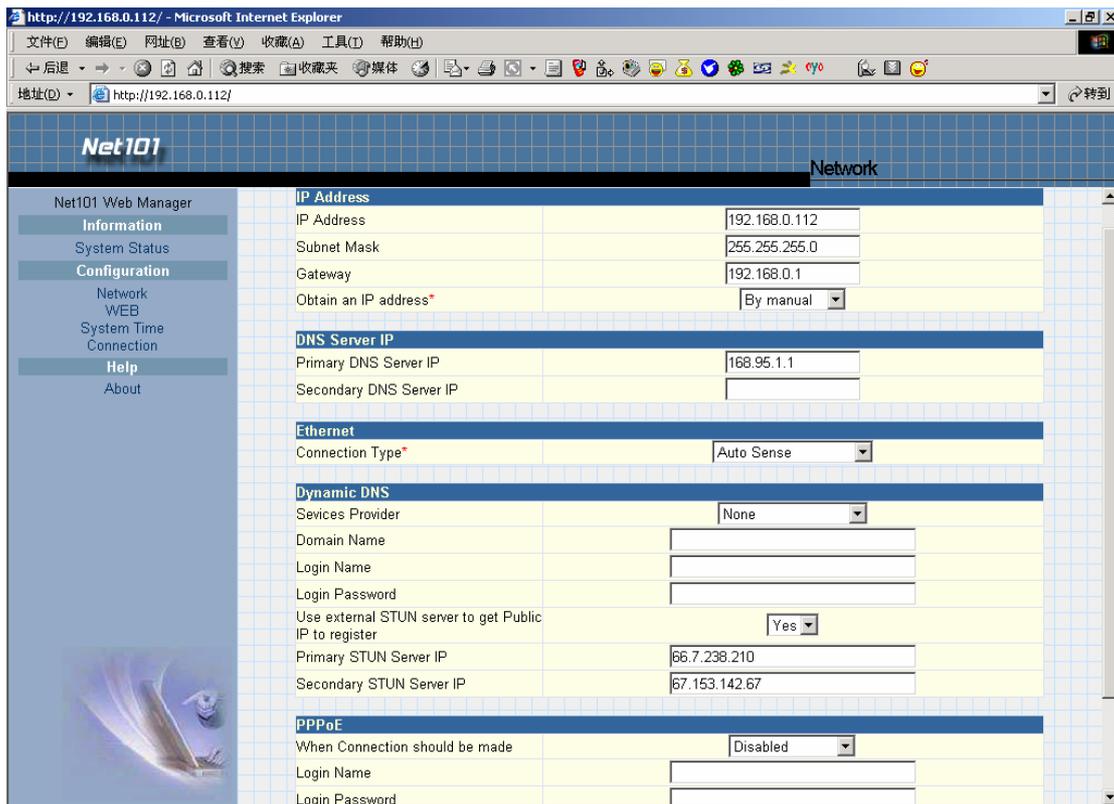


Fig.18 NET101 Configuration Menu

## 2.2.1 Network

This option determines NET101 Network settings.

### i. IP Address

IP Address	
IP Address	192.168.0.30
Subnet Mask	255.255.255.0
Gateway	192.168.0.1
Obtain an IP address*	By manual

Fig.19 NET101 IP Address Settings

#### IP Address

If you want to fix the IP address, enter your chosen IP address here. Otherwise go to “Obtain an IP address” and choose “via DHCP”

#### Subnet Mask

This item sets NET101 Subnet Mask. The value is normally 255.255.255.0

#### Gateway

This item is to set NET101 Gateway.

#### Obtain an IP address

This allows the user to choose either to set NET101 IP Address manually or via DHCP. The above items can be set in Netility as well. NET101 will reboot after the above settings have been changed.

## ii. DNS Server IP

DNS Server IP	
Primary DNS Server IP	192.168.0.1
Secondary DNS Server IP	

Fig.20 NET101 DNS Server IP

### Primary DNS Server IP

This item sets NET101 primary DNS Server IP address. Enter a value here if you have a DNS Server IP.

### Secondary DNS Server IP

This item sets NET101 secondary DNS Server IP address. NET101 will use the secondary DNS Server IP address if the Primary DNS Server IP address is not working.

## iii. Ethernet

Ethernet	
Connection Type*	Auto Sense

Fig.21 NET101 Ethernet Settings

### Connection Type

This item sets the communication speed between NET101 and the Network. Choose "Auto Sense" to let NET101 automatically decide on the appropriate connection speed. NET101 will reboot if this setting is changed.

## iv. Dynamic DNS

Dynamic DNS	
Services Provider	None
Domain Name	
Login Name	
Login Password	
Use external STUN server to get Public IP to register	Yes
Primary STUN Server IP	66.7.238.210
Secondary STUN Server IP	67.153.142.67

Fig.22 NET101 Dynamic DNS Settings

### Service Provider

For users with a Dynamic IP, NET101 can be configured to point the current IP (as provided by your ISP, upon each successful dial-up to the internet) to a dynamic DNS provider. This will enable you to locate NET101 every time the IP changes due to an ADSL connection redial.

To enable this function, you will first have to register with either one of these three service providers;

- None (Choose this only if you have a Static IP)
- 3322.org
- dhs.org
- DynDNS(Dynamic)
- DynDNS(Custom)
- Myddns.com
- Zive.org

#### Domain Name

Enter the Domain Name you have created from one of the three websites.

#### Login Name

Enter your login name for the above domain name. You should have this when you register with the above DDNS provider.

#### Login Password

Enter your password. You should have this when you register with the above DDNS provider.

#### Use external STUN server to get Public IP to register

Enable/disable using the external IP for DDNS server registration. If this function is enabled, the NET101 will get the external IP by the help of STUN server, and then use this IP to register the IP of the DDNS server.

#### Primary STUN Server IP

Input the primary STUN server IP. The NET101 will use this server's help to get the external IP address. The default IP is 66.7.238.210.

#### Secondary STUN Server IP

Input the secondary STUN server IP. The NET101 will use this server's help to get the external IP address when the primary STUN server has no respond. The default IP is 67.153.142.67.

### v. PPPoE

Use this option to allow NET101 to connect to the internet using your xDSL modem. Once set-up, NET101 will be able connect to the Internet directly without going thru a PC.

PPPoE	
When Connection should be made	Disabled
Disconnect xDSL when	Never
Login Name	<input type="text"/>
Login Password	<input type="password"/>

Fig.23 NET101 PPPoE setting

#### When Connection should be made

The user has a choice of;

Disabled : Default setting.

Connect always : NET101 will automatically dial up the ISP.

Login Name

Enter your login name as provided by your ISP.

Login Password

Enter your password as provided by your ISP.

## 2.2.2 WEB/Telnet

This section allows you to set up to eight (8) User account for NET101. Once set, a valid username and password will have to be entered to access NET101.

### i. User Account

User Name

Enter a user name here.

Password

Set a password for the account.

Permission

Determine the permission to Read/Write (Administrator) or Read only.

**WARNING:** You **MUST** set at least one User Account permission to Read/Write (Administrator) **BEFORE** setting a Read Only. Failure to do so will result in you being locked out of NET101 Web Manager!

IP Filter

To increase security, the Administrator can specify the IP address of the user logging in. Leave "\*"\*.\*.\*)" to allow the user to login from any place.

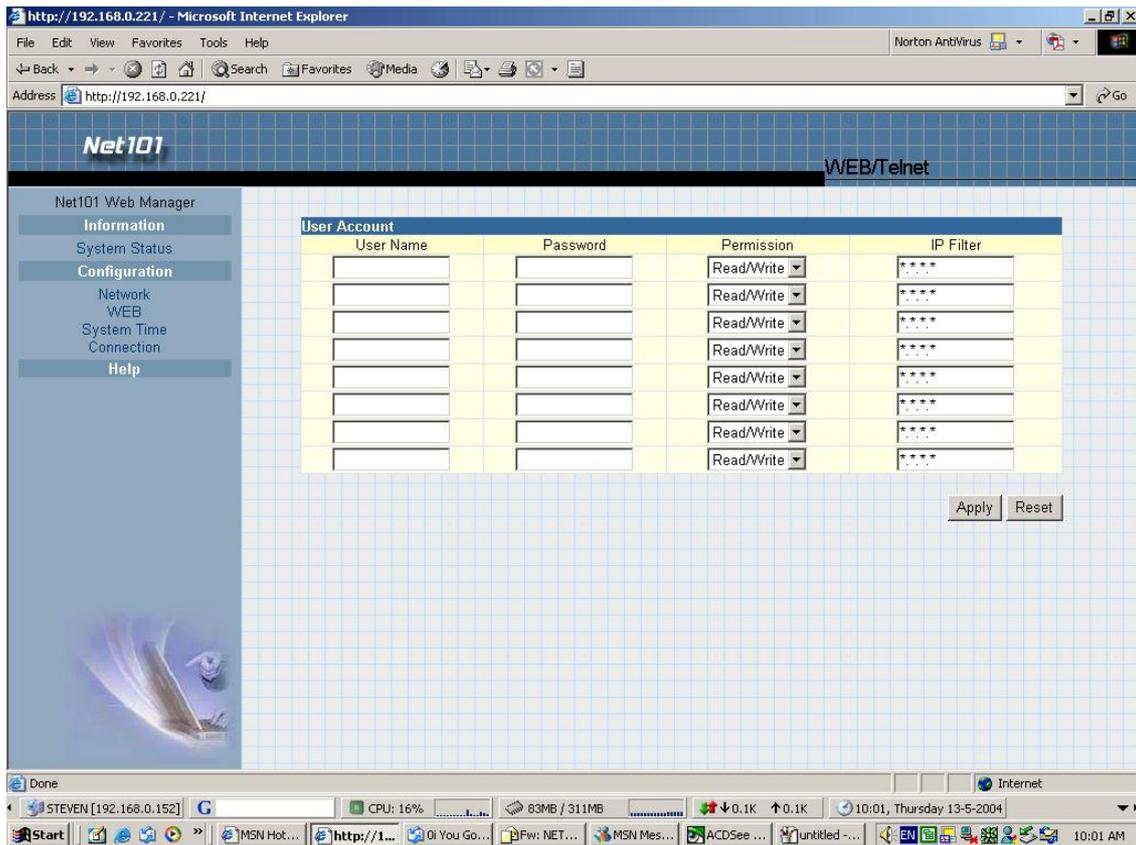


Fig.24 NET101 WEB / Telnet Settings

### 2.2.3 System Time

This section is to set and synchronize NET101 System Time with your chosen time server.

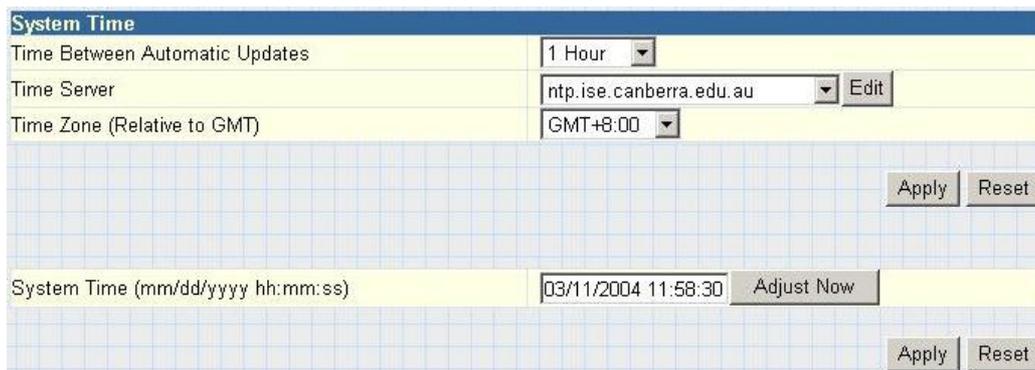


Fig.25 System Time

#### Time Between Automatic Updates

This section is to set an interval for time synchronization. Select either; 1, 3, 12 hours or 1, 10 & 30 days.

#### Time Server

Choose the nearest Time Server to your NET101 location.

#### Time Zone (Relative to GMT)

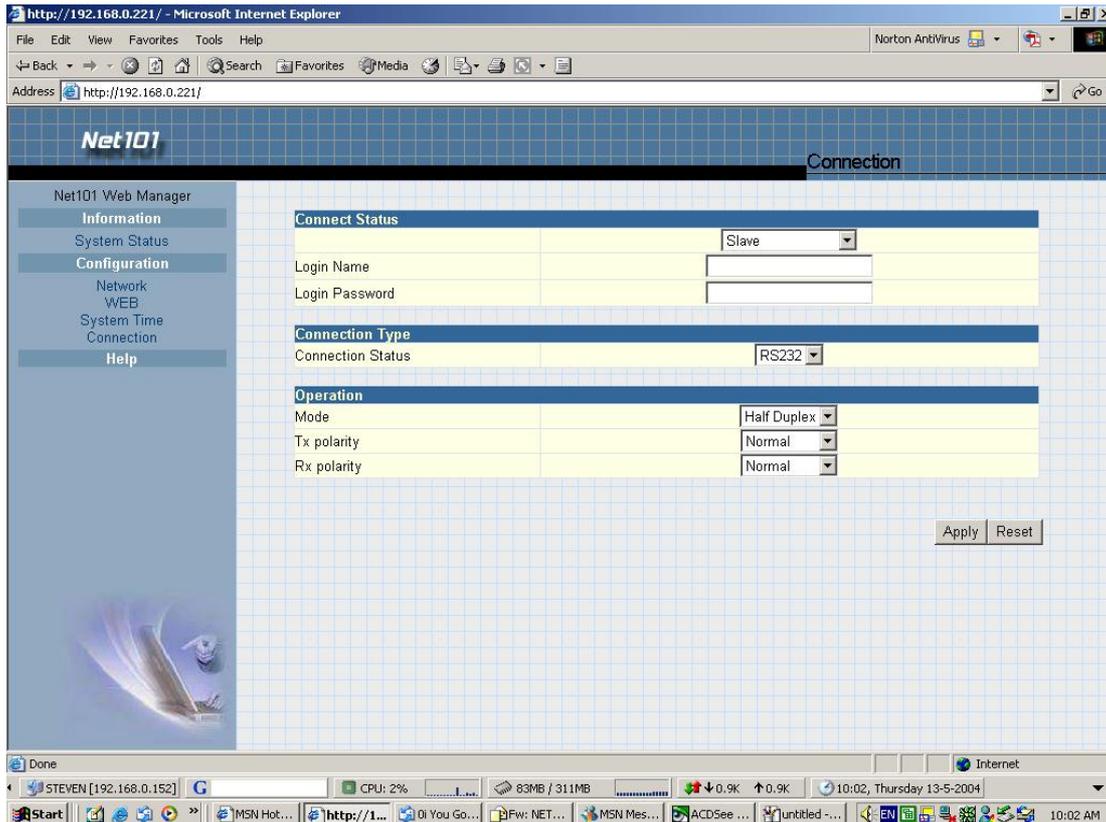
Select the appropriate time zone for your area.

### System Time (mm/dd/yyyy hh:mm:ss)

This section is to set NET101 System Time manually. The format is pre-determined to: mm/dd/yyyy hh:mm:ss

## 2.2.4 Connection

This section determines the connection type for NET101.



### i. Connect Status

Choose a mode for the current NET101.

Mode	Description
Master	Master mode is selected when the NET101 is used in a one-on-one configuration with another NET101. The master NET101 will define the communication baud rate, data length, stop bit, etc. The slave NET101 will have the same exact communication mode as the Master NET101.
Slave	Slave mode is selected when NET101 is used in a one-on-one configuration with the master NET101 or when connecting to the virtual COM port driver. The communication baud rate, data length, stop bit and others will all follow the instructions from the Master NET101 or the virtual COM driver.
MODBUS gateway	MODBUS gateway is selected when NET101 is used as a gateway between the MODBUS on serial and the MODBUS

on TCP/IP. For detailed information about MODBUS gateway, please refer to the specifications of MODBUS.

#### Login Name

Enter the login name here when using NET101 in the Slave mode. Either the Master NET101 or the Virtual COM port driver has to know the account and password to use the slave NET101. The account / password is to protect against unauthorised use of NET101 to access the serial communication data.

#### Login Password

Enter a login password here when using the NET101 in the Slave mode.

### ii. Connection Type

Connection Status	Description
RS232	To select the DB9 serial port signalling in RS232 mode.
RS422	To select the DB9 serial port signalling in RS422 mode.
RS485	To select the DB9 serial port signalling in RS485 mode.

### iii. Operation Mode

Mode Type	Description
Half Duplex	To select the RS485 communication in Half Duplex mode.
Full Duplex	To select the RS485 communication in Full Duplex mode.

#### Tx Polarity

Mode Type	Description
Normal	To set the transmit data polarity in normal mode.
Invert	To set the transmit data polarity in Invert mode.

#### Rx Polarity

Choose	Description
Normal	To set the receive data polarity in normal mode.
Invert	To set the receive data polarity in invert mode.

Click "Apply" to confirm selection, otherwise click "Reset"

## 2.3 Help

### 2.3.1 About

Displays the following information about NET101;

The screenshot displays the 'About Net101' section with the following information:

<b>Net101 Firmware Version</b>	2.37.N101
<b>Net101 Hardware Version</b>	HN101
<b>Net101 Serial Number</b>	3925889040

Below this is the 'Restore Settings' section, which includes a 'Reset to factory default' button and a 'Reset' button.

At the bottom right, the contact information for Mega System Technologies, Inc. is provided:

**Mega System Technologies, Inc.**  
Tel: +886-2-87922060 Fax: +886-2-87922066  
E-mail: [netagent@megatec.com.tw](mailto:netagent@megatec.com.tw)  
<http://www.megatec.com.tw>

Fig.26 Event Log

**NET101 Firmware Version**

Display NET101 firmware version details.

**NET101 Hardware Version**

Show the hardware version.

**NET101 Serial Number**

Shows the serial number

**Manufacturers Details**

Display the manufacture's contact details.

## Appendix A: Update NET101 Firmware

You can update NET101's firmware using any of the following methods.

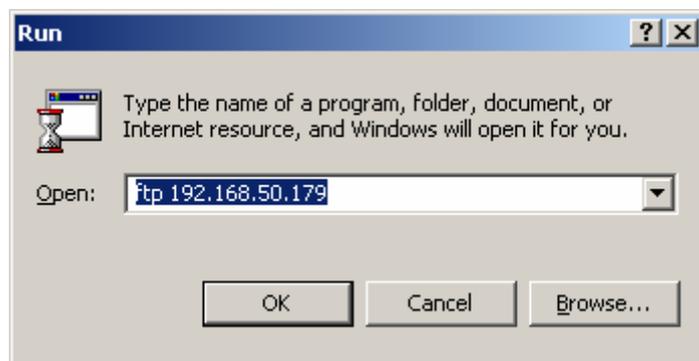
### Method 1: Using Netility

- (1) Use "Download Firmware" function under Netility to update it. (refer to Section ...)

### Method 2: Using FTP

Windows FTP is another way to upload the latest firmware into NET101. You can also use other FTP client software to do this. In the following example, NET101 IP address is 192.168.50.179

- (1) Click "Start" on Windows taskbar, then "Run..", type in "ftp 192.168.50.179"
- (2) Click "OK"



- (3) The systems will requests for your User Name and Password. Enter "admin" for User Name and press "Enter". The default password is left blank.

Once the User Name and Password is verified, the server will response with "230 OK" to indicate that Login is successful.

If you enter the wrong Username or Password, the server will response with "530 Not Logged in".

- (4) FTP commands:  
ls : This command request the server to list all files and sub-file in the current menu. User may finds out the firmware version of the NET101 of its IP.

put <client's file route> : This command ask the client to copy its specific file route to the Server point. Use this to upload the latest firmware to your NET101

quit : This command allow the user to logout and close the FTP connection.

Illustration: The picture shows, that the latest NET101 firmware file uploaded from the local computer located in (c:\work\netagent\prjs\nag\2.32.DK520.bin) to the NET101 with an IP address 192.168.50.179

```

C:\WINDOWS\system32\ftp.exe
Connected to 192.168.50.179.
220 Service ready for new user
User (192.168.50.179:(none)): admin
331 need password
Password:
230 OK
ftp> ls
200 Port command successful.
150 Opening ASCII mode data connection for file list.
2.32.DK520.bin
226 Transfer complete.
ftp: 16 bytes received in 0.00Seconds 16000.00Kbytes/sec.
ftp>
ftp> put c:\work\netagent\prjs\nag\2.32.DK520.bin
200 Port command successful.
150 Opening data connection for 2.32.DK520.bin
226 file received ok.
ftp: 1040384 bytes sent in 3.28Seconds 317.00Kbytes/sec.
ftp> quit
same version new type OK
    
```

### Method 3: Using IE Browser

This method uses IE to update the latest firmware. Open IE, then type in the account, password and NET101 IP address to be updated in the following format, ftp://<username>:<password>@<NET101 IP address>.

Once logged in, the current firmware and version will be displayed. Copy the latest firmware to here to complete the updating process.

There are two method to log in:

**(a) ftp://admin:password@192.168.50.179**

Enter the password that was set earlier using Netility. Otherwise, enter NET101's default value:

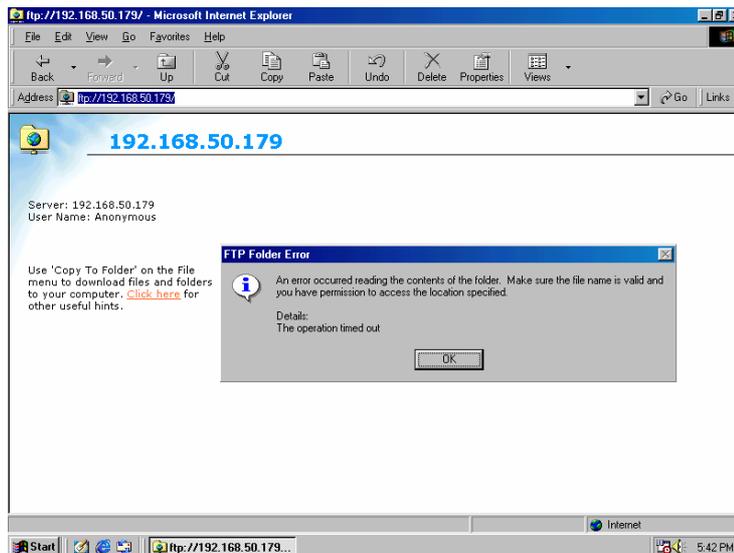
Username: admin

Password: <blank>

(example: ftp://admin:@192.168.50.179)

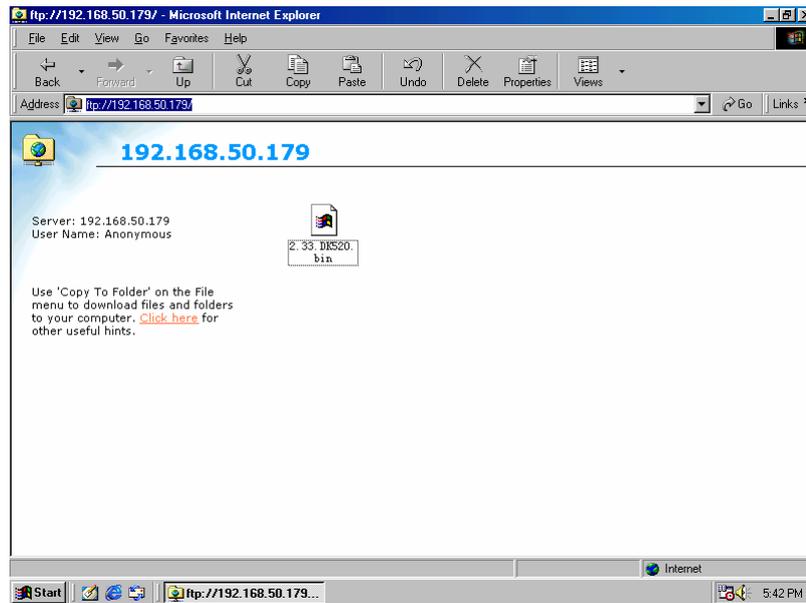
**(b) ftp://192.168.50.179/**

The follow error message will show, when the above is entered. Ignore it and select "Enter Identity" at the top left corner of file menu. Then enter "admin" as the User Name and <blank> Password to re-enter.



Once the connection has been established, the following window will be

display. The user may then transfer the latest firmware here in order to complete the updating steps.

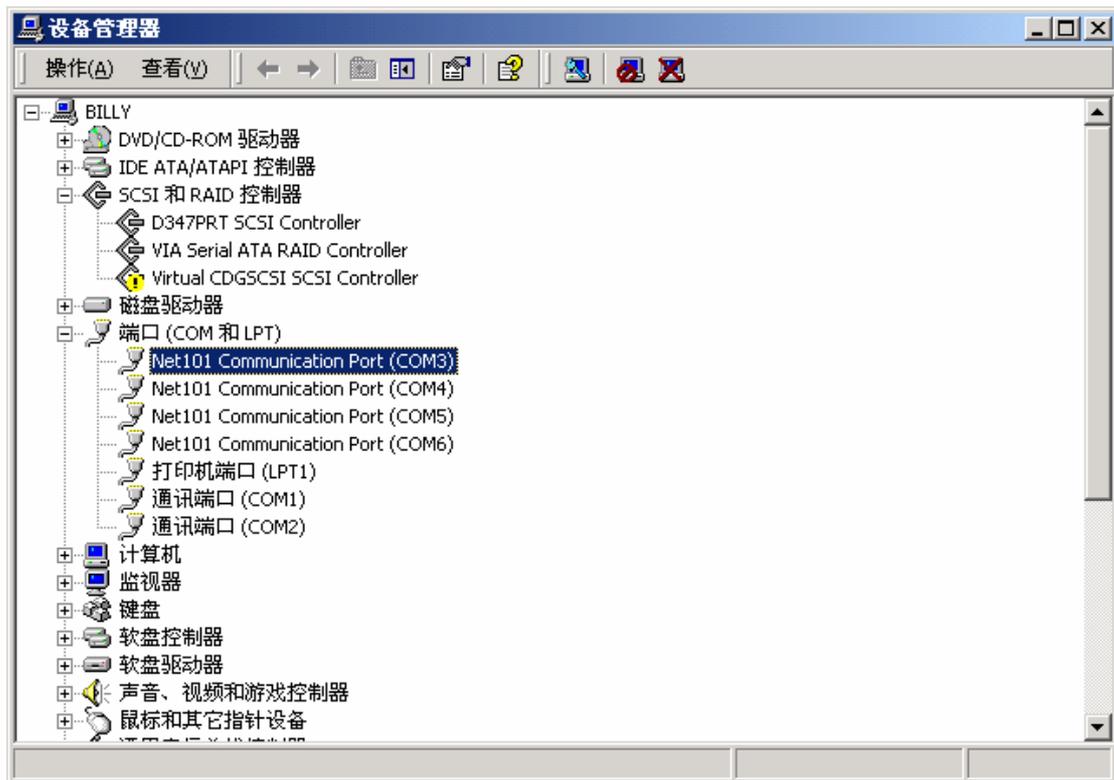


## Appendix B: NET101 Virtual COM Port

The NET101 could be used as a virtual COM port on your Windows system. The virtual COM port driver is supported on the Windows2000, Windows2003 and Windows XP. After installation the virtual COM port driver, the NET101 will be act like a remote COM port of your system.

The installation procedure is here followed:

1. Execute the 'Net101.exe' in the "Net101 driver" subdirectory of the CD.
2. Open the "Device Manager" on your system.



3. Open the property of the 'Net101 Communication Port'. In the 'System Configuration', input the NET101's IP. And set an unused COM port name in the 'COM port number'



4. Now you could use the remote NET101 as a COM port of you computer.