SE5002D

Serial Device Server

User's Manual

v. 1.2

October 2017

Important Announcement

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Preface

Purpose of the Manual

This manual supports you during the installation and configuring of the SE5002D Serial Device Server only, as well as it explains some technical options available with the mentioned product. As such, it contains some advanced network management knowledge, instructions, examples, guidelines and general theories designed to help users manage this device and its corresponding software; a background in general theory is a must when reading it. Please refer to the Glossary for technical terms and abbreviations (if any).

Who Should Use This User Manual

This manual is to be used by qualified network personnel or support technicians who are familiar with network operations; it might be useful for system programmers or network planners as well. This manual also provides helpful and handy information for first time users. For any related problems please contact your local distributor, should they be unable to assist you, please redirect your inquiries to www.atop.com.tw or www.atoponline.com .

Supported Platform

This manual is designed for the SE5002D Serial Device Server and that model only.

Warranty Period

We provide a **5 year limited warranty** for SE5002D Serial Device Server.

FCC WARNING

Class A for Serial Device Server (Model SE5002D)

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment uses, generates and radiates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect other devices to this equipment by RS-232 or RS-485 ports.

Be cautioned that changes or modifications not expressly approved by the party responsible for compliance could void ones' authority to operate the equipment.

Caution

Beginning from here there will be extreme caution exercised.

Never install or work on electrical or cabling during periods of lighting activity.
Never connect or disconnect power when hazardous gases are present.

WARNING: Disconnect the power and allow to cool 5 minutes before touching.

1.Introduction

1.1 Product Overview

The SE5002D Ethernet Serial device server acts as a gateway between Ethernet (TCP/UDP) and RS-232/RS-422/RS-485 communications. The information transmitted by SE5002D is transparent to both host computers (Ethernet) and serial devices (RS-232/RS-422/RS-485). Data coming from the Ethernet is sent to the designated RS-232/RS-422/RS-485 port and data received from RS-232/RS-422/RS-485 port is sent to the Ethernet transparently allowing bidirectional communication.

In the computer-aided manufacturing or industrial automation areas, SE5002D is used by field devices to directly connect to an Ethernet network. The user can then use a network application or use Virtual COM software to simulate a virtual COM port in the PC to fetch serial data from SE5002D remotely over Ethernet.

With SE5002D, it is possible to communicate with a remote serial device in the LAN or even in the internet, which dramatically increases reach in distance and scalability.

SE5002D Series Comparison

Table 1. 1

Model Name	Power Interface	Serial Interface	Network Interface
SE5002D-Fm	TB3	DB9	SC Multimode
SE5002D-Fs	TB3	DB9	SC Single mode
SE5002D-SFP	TB3	TB5	SFP (single and multimode)
SE5002D-Fm-TB	TB3	TB5	SC Multimode
SE5002D-Fs-TB	TB3	DB9	SC Single mode
SE5002D-SFP-TB	TB3	TB5	SFP (single and multimode)

Packaging

The package should contain the following items, Table 1. 2, Table 1. 3.

Table 1. 2

Item	Quantity
SE5002D Ethernet Serial device server	1
3-Pin 5.08 mm Lockable terminal block	1
5-Pin 3.81 mm Lockable terminal block (SE5002D-TB only)	2
DIN Rail kit (already mounted on device)	1
Installation guide	1
CD (User's manual/installation guide/Serial Manager Utility)	1

Table 1. 3

Optional Accessories		
Name	**Part Number**	**Description**
WMK-454-Black	70100000000043G	Black aluminum wall mount kit
ADP-DB9(F)-TB5	59906231G	Female DB9 to Female 3.81 mm TB5 converter
US315-12(US-Y)	50500151120009G	Y-Type (BT1-10V) power adaptor, 100-240VAC input, 1.25A@12VDC output, US plug
USE315-12(EU-Y)	50500151120019G	Y-Type (BT1-10V) power adaptor, 100-240VAC input, 1.25A@12VDC output, EU plug
LM38-A3S-TI-N	50708051G	SFP Transceiver, 155Mbps, 1310nmLED, Multi-mode, 2km, 3.3V, -40°C~85°C
LS38-A3S-TI-N	50708041G	SFP Transceiver, 155Mbps, 1310nmFP, Single-mode, 30km, 3.3V, -40°C~85°C

1.2 Application Connectivity

1.2.1 TCP Server Mode

SE5002D can be configured as a TCP server in a TCP/IP Network to listen for an incoming TCP client connection to a serial device. After the connection is established between the serial device server and the host computer, data can be transmitted in both directions. This also applies to Virtual COM running in the server mode, Fig. 1. 1.

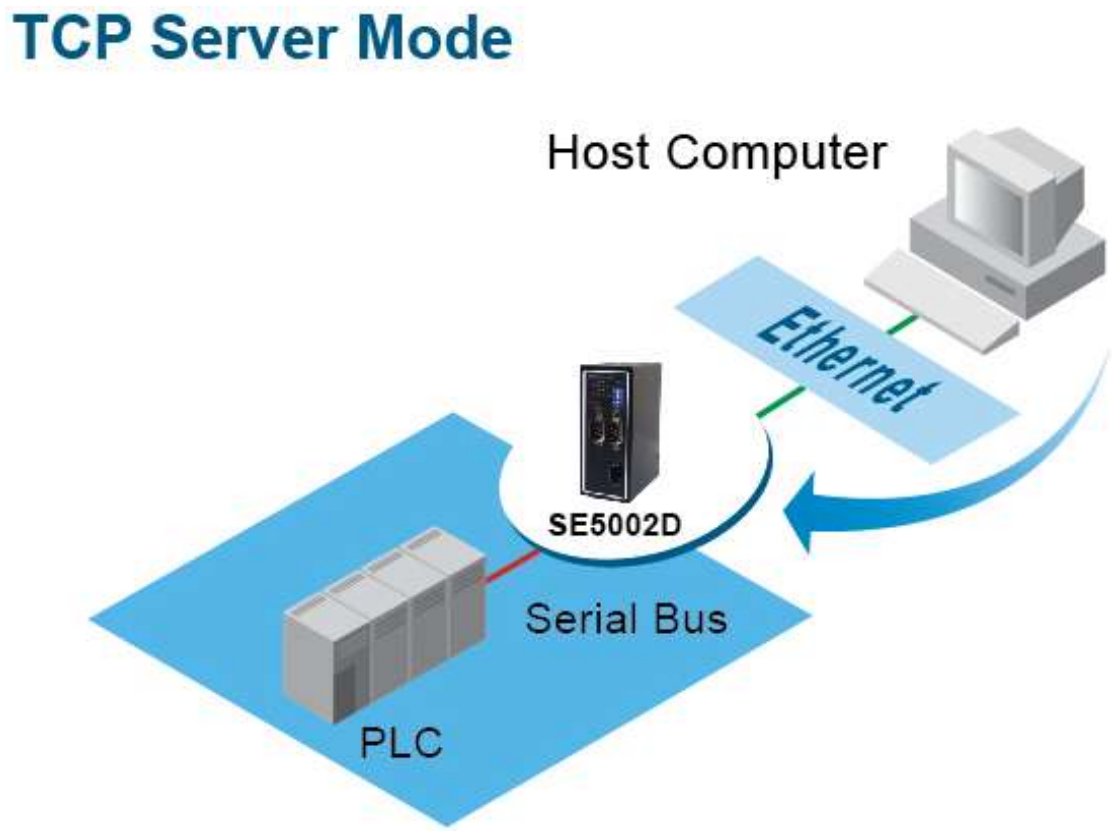


Fig. 1. 1

1.2.2 TCP Client Mode

SE5002D can be configured as a TCP client in TCP/IP Network to establish a connection with a TCP server in the host computer. After the connection is established, data can be transmitted between a serial device and a host computer in both directions. This also applies to Virtual COM running in the client mode, Fig. 1. 2.

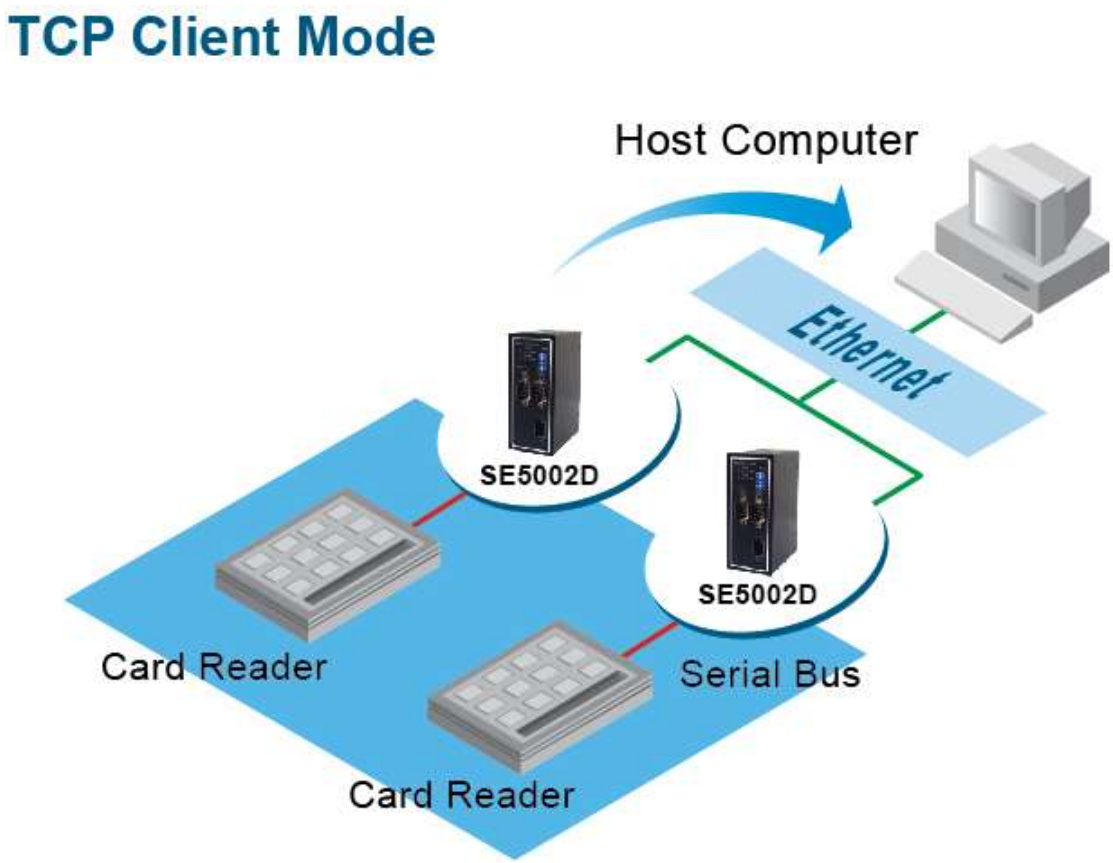


Fig. 1. 2

1.2.3 UDP Mode

UDP is a faster but connectionless network protocol. It does not guarantee the delivery of network datagrams. SE5002D can be configured to transfer data using unicast or multicast UDP from the serial device to one or multiple host computers. Data can be transmitted between serial device and host computer in both directions, Fig. 1. 3.

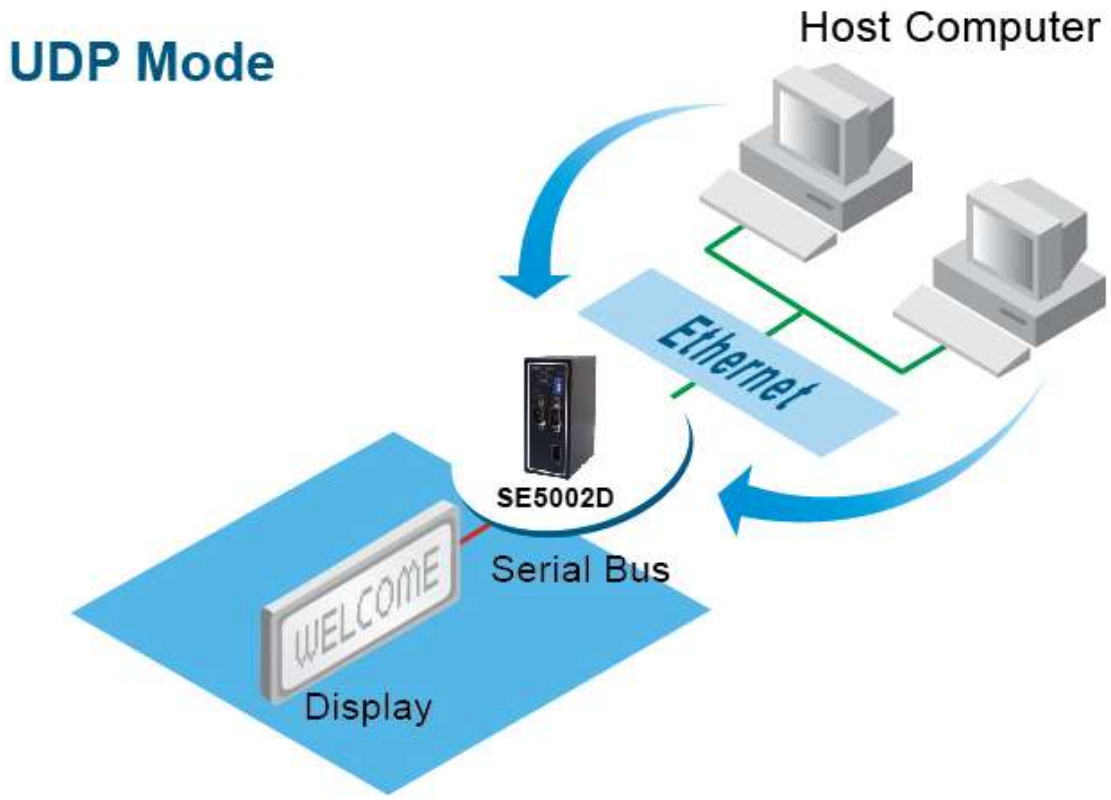


Fig. 1. 3

1.2.4 Tunneling Mode

In the case that the serial device needs to communicate with each other without a host computer, two SE5002D can be paired together (pair connection) to communicate over TCP or UDP transparently. The serial device would be unaware of the change in the communication medium, Fig. 1. 4.

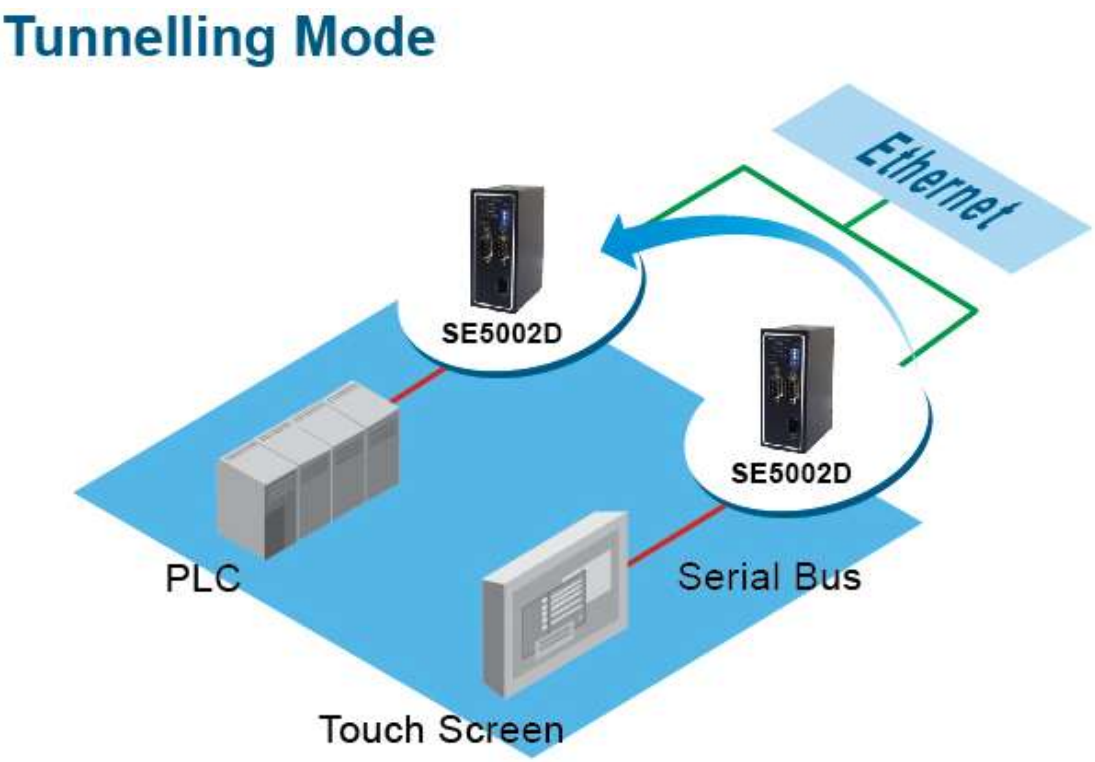


Fig. 1. 4

2.Getting Started

2.1 Hardware: Panel Layout

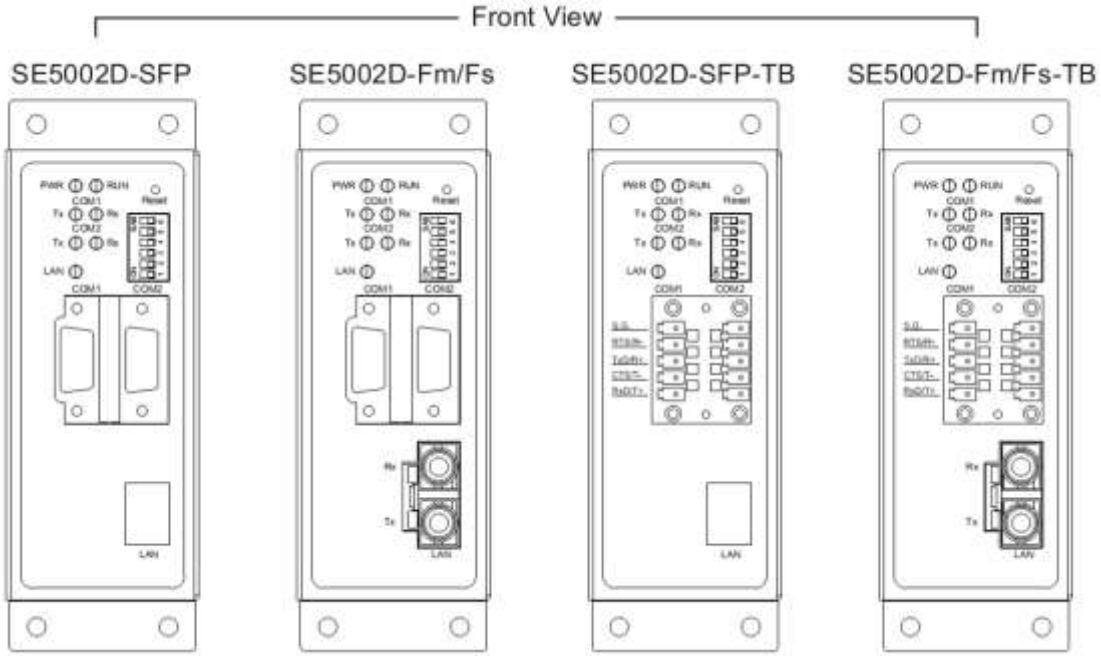


Fig. 2. 1

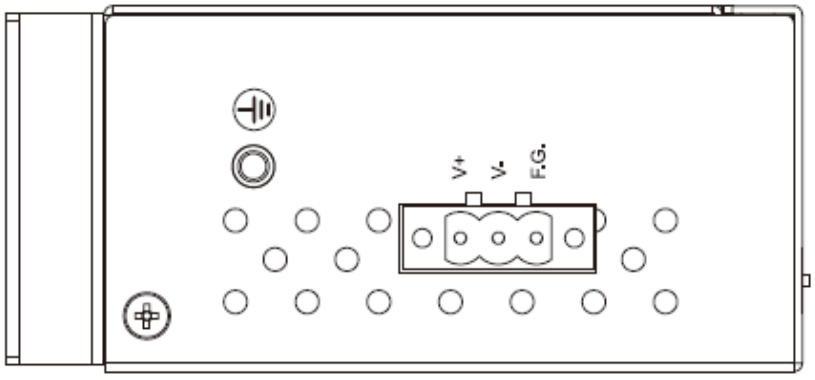


Fig. 2. 2

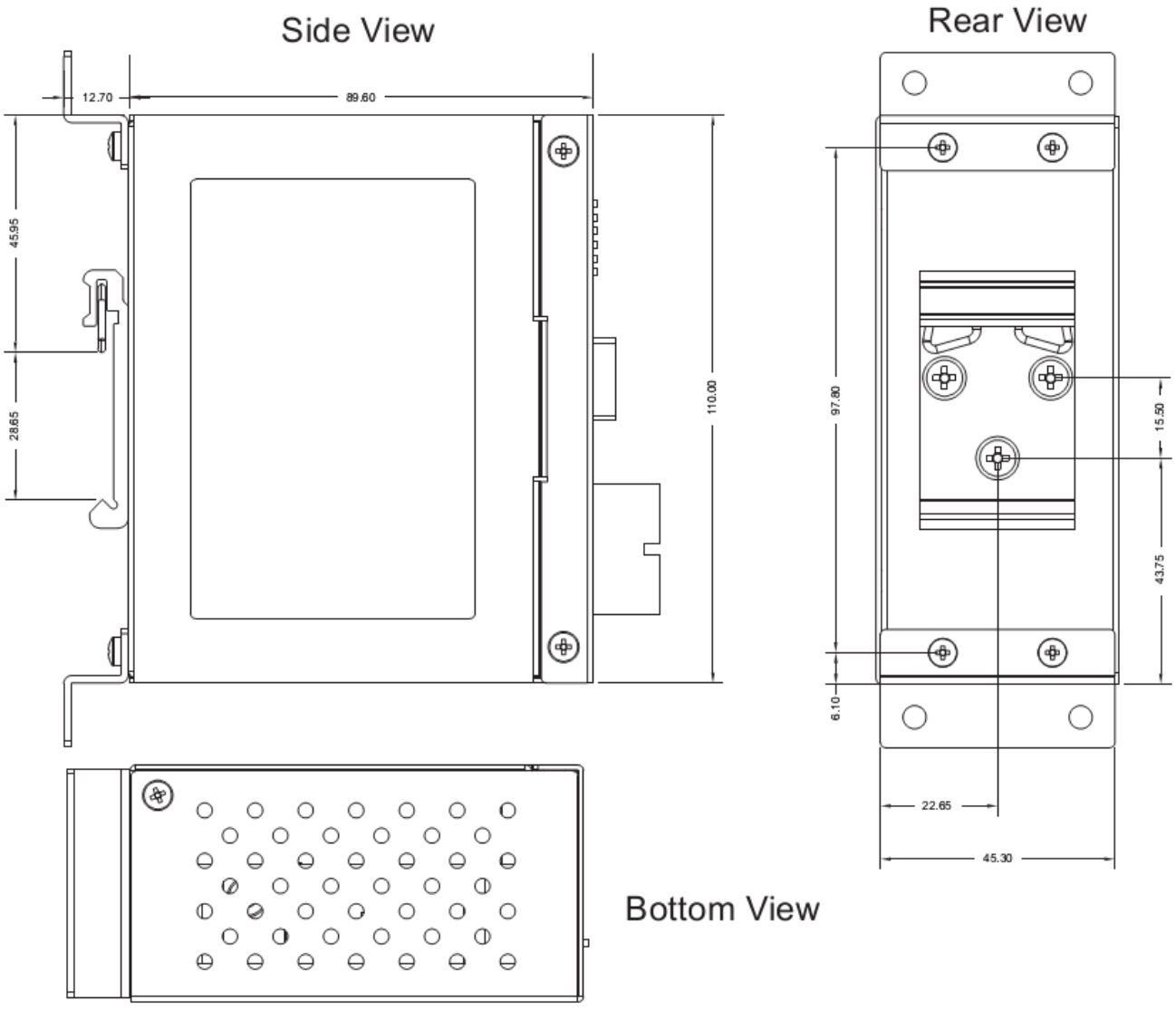
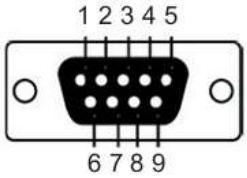

Side View
Rear View
12.70
89.60
45.95
28.65
110.00
97.80
15.50
43.75
6.10
22.65
45.30
Bottom View

Fig. 2. 3

2.2 Pin Assignments

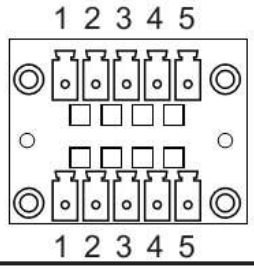
2.2.1 Serial Port

9-pin D-sub Connector for RS-232/422/485



Pin	RS-232	RS-422
1	DCD	N/A
2	RXD	TXD+
3	TXD	RXD+
4	DTR	N/A
5	SG	SG
6	DSR	N/A
7	RTS	RXD-
8	CTS	TXD-
9	RI	N/A

5-pin Terminal Block for RS-422/485



Pin	RS-232	4-W RS485 & RS42
1	RxD	T+
2	CTS	T-
3	TxD	R+
4	RTS	R-
5	SG	SG

Fig. 2. 4

2.2.2 Ethernet port

➔ Category 5 UTP Ethernet cable

Fig. 2. 5

➔ RJ45

Fig. 2. 6

2.2.3 RJ45 Pin Assignment

Table 2. 1

Pin Assignment	568A Definition	568B Definition
Pin 1	Green-White	Orange-White
Pin 2	Green	Orange
Pin 3	Orange-White	Green-White
Pin 4	Blue	Blue
Pin 5	Blue-White	Blue-White
Pin 6	Orange	Green
Pin 7	Brown-White	Brown-White
Pin 8	Brown	Brown

One can choose either 568A or 568B definition. If one wants to make a crossover cable, one should use 568A and 568B definition respectively in each terminal of a UTP cable.

2.3 Buzzer

“^” Beep twice

“=” Beep off

Table 2. 2

Message	Description
^===^===^===^===^===^===^…(1 sec)	Watchdog problem, return service is required
^^^^^^^^^^^^^^^^^^^^^…	Memory problem, return service is required
^==^========^^ (5 sec)	Startup OK but AP firmware is disabled
^==^========^^^ (5 sec)	Startup OK and AP firmware is enabled

2.4 LED Indicators

Name	LED	Status	Description
PWR	Green	On	Device is powered on
		Off	Power is not connected
RUN	Green	On	AP firmware is disabled
		Blinking	AP firmware is running
		Off	Kernel firmware is damaged
LAN	Green	On	Ethernet is connected
		Blinking	Data is transmitting
		Off	Ethernet is disconnected
COM (Tx/Rx)	Green	Blinking	Data is transmitting
		Off	Data is not transmitting

3.Software Setup

SE5002D Serial device server is shipped with default settings shown in the following table.

Table 3. 1

Property	Default Value
IP Address	**10.0.50.100**
Gateway	**10.0.0.254**
Subnet Mask	**255.255.0.0**
User Name	**admin**
Password	**default**
COM 1	9600, None, 8,1, No flow control, buffer disabled, packet delimiter timer 2ms
Link 1	Type: TCP Server, Listen port4660, Filter=0.0.0.0, Virtual COM disabled
SysName of SNMP	Name
SysLocation of SNMP	Location
SysContact of SNMP	Contact

3.1 Configuration by Device Management Utility

SE5002D could be configured by Device Management Utility, for more information, refer to Management Utility's User manual.

3.2 Configuration by Telnet Utility

You can use a Telnet utility to change configuration settings of SE5002D by following the steps:

3.2.1 Login to the System

➔ Open **MS-DOS command prompt window** or any other telnet application.

➔ Telnet to SE5002D using the command **"telnet IP_address".** (For example: **"telnet 10.0.50.100"** in MS-DOS command prompt window). After telnet into SE5002D, the system will prompt for a password. The default password is "default" Fig. 3. 1.

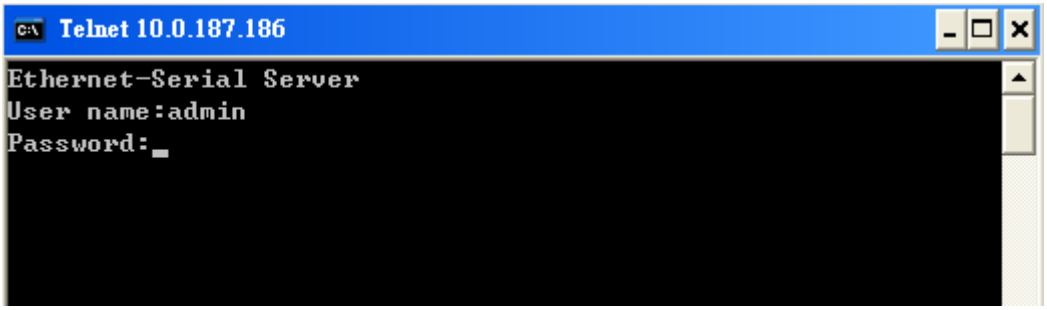


Fig. 3. 1

Note: Press the default button of SE5002D to reset the password to the default value.

➔ After verifying the password, the following terminal screen appears, Fig. 3. 2.

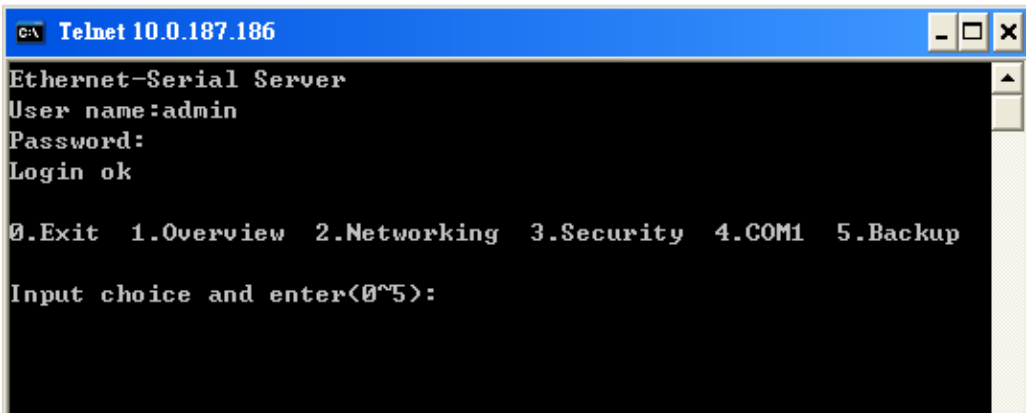


Fig. 3. 2

Note:

1. If SE5002D does not receive any commands within **1 minute,** Telnet connection will terminate automatically.
2. After "0.Exit" is selected; the console will ask the user to save the configurations.
3. Changes to networking parameters will take effect only once SE5002D is restarted.

➔ Select **"1"** from **"Input choice and enter (0~5):"** to enter **"Overview"**, Fig. 3. 3.

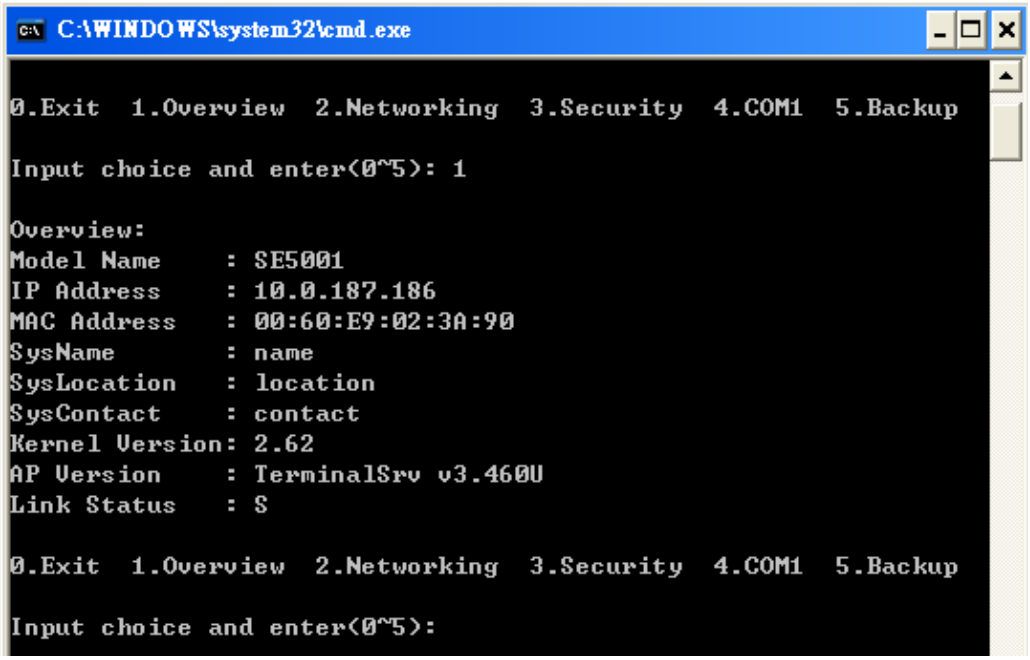


Fig. 3. 3

This page gives one the general information of SE5002D including IP and MAC address, SNMP information, kernel and AP version, and connection status of the device.

3.2.2 Networking

➔ Select **"2"** from **"Input choice and enter (0~5):"** to enter Networking page as following, Fig. 3. 4.

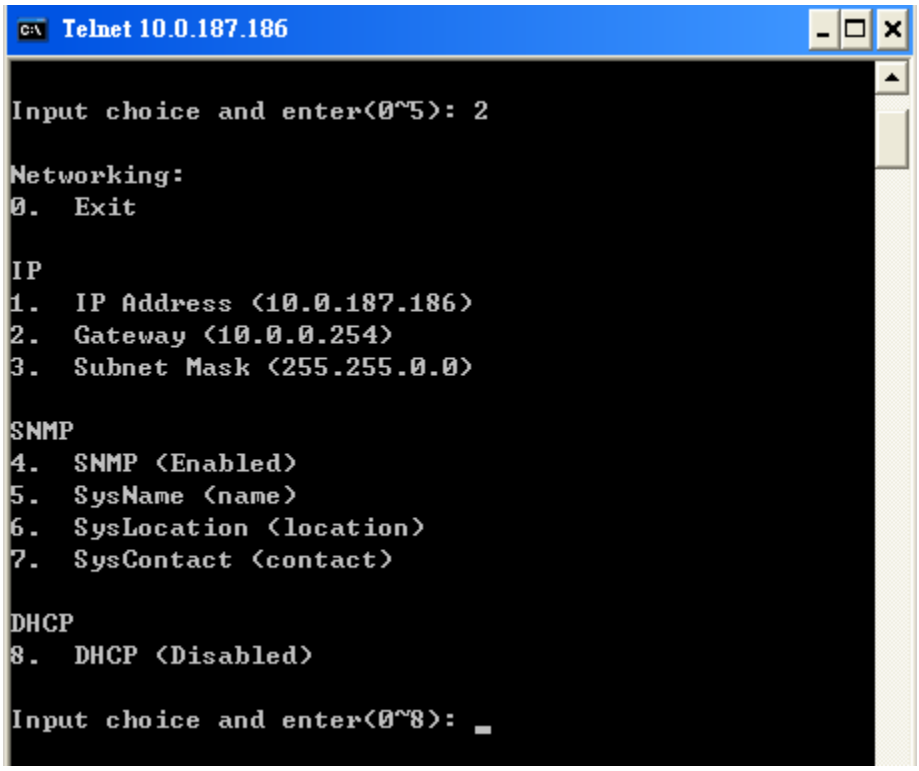


Fig. 3. 4

Change network settings of the device including IP address, subnet mask, gateway IP address and SNMP.

Note: Press "ESC" key to return to the previous menu.

3.2.3 Change the Password

Select **"3"** from **"Input choice and enter (0~5):"** the following screen appears, Fig. 3. 5.

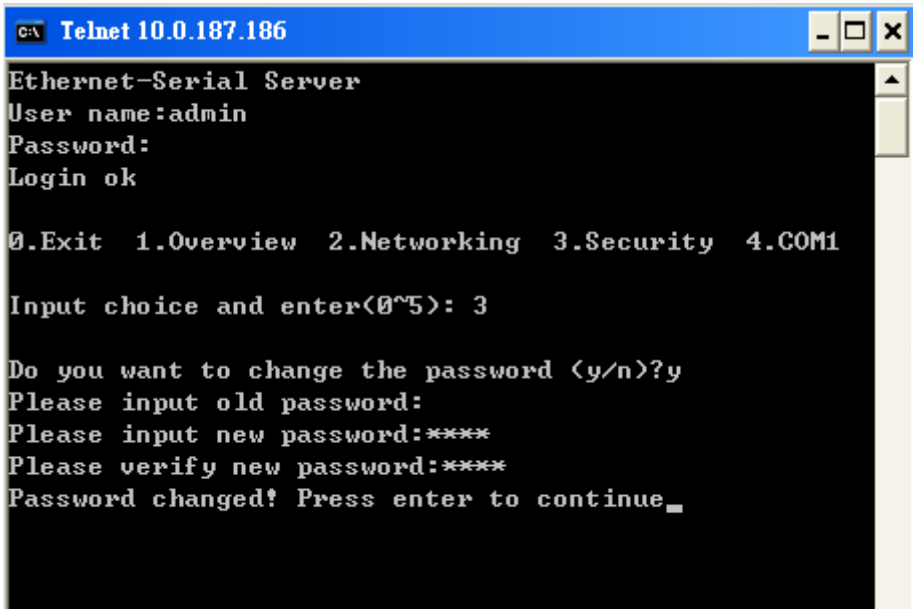


Fig. 3. 5

3.2.4 COM1 Setup

Select **"4"** from **"Input choice and enter (0~5):"** the following screen appears, Fig. 3. 6.

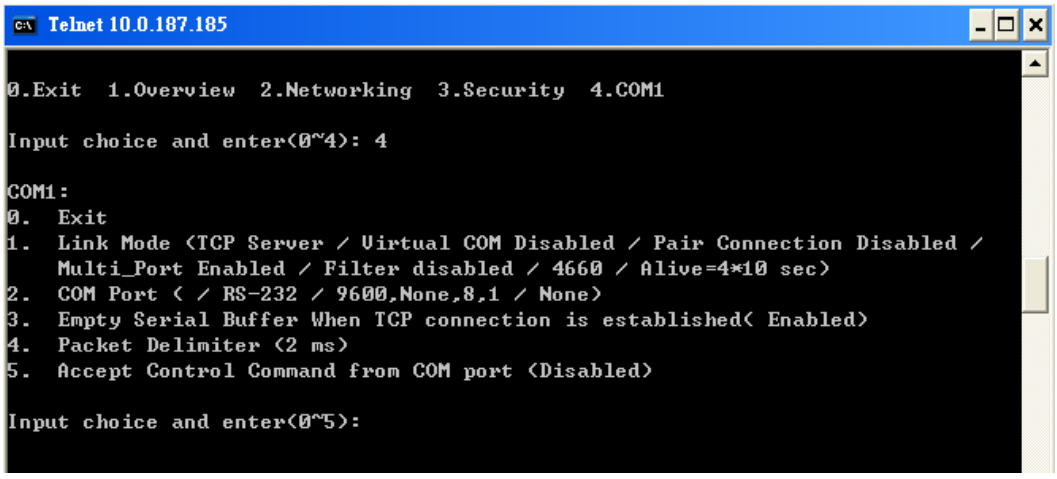


Fig. 3. 6

This page includes the option to configure different COM1 parameter, including link mode, serial port settings, serial buffer, packet delimiter, and advanced control commands.

3.2.5 Configure SE5002D as a TCP server

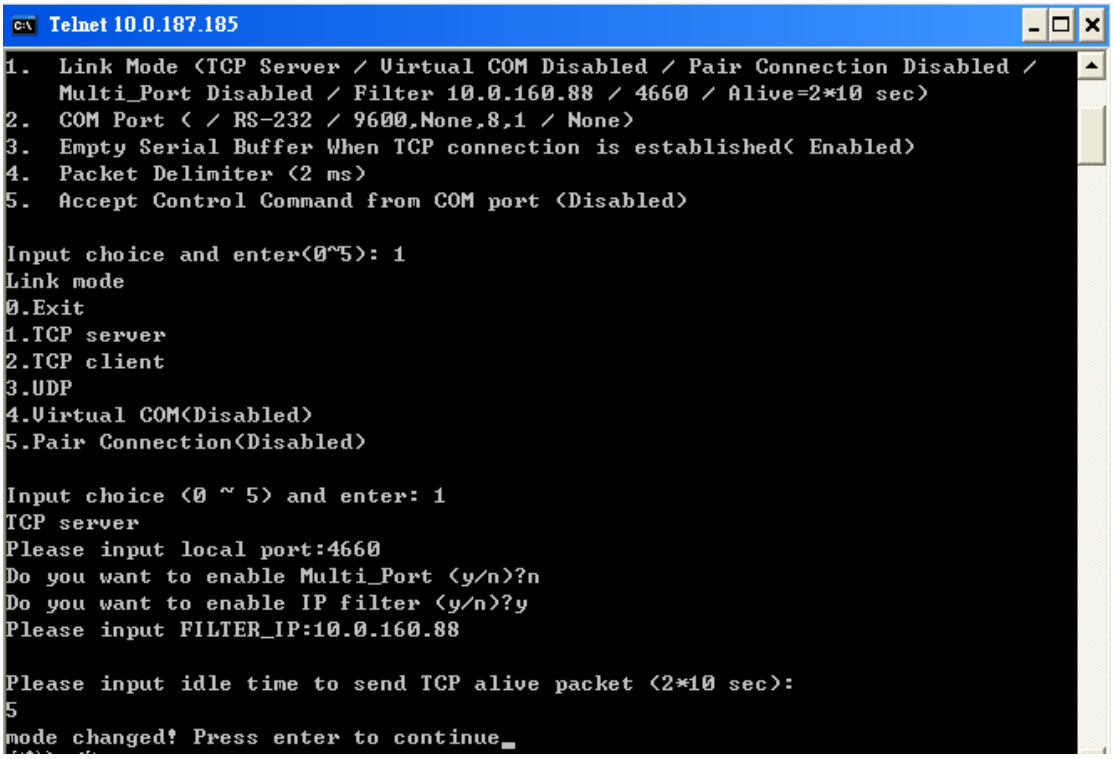


Fig. 3. 7

➔ Type **1 (Link Mode)** from **"Input choice and enter (0~5):"** for COM1

➔ Type **1 (TCP Server)** in the **"Input choice (0-5) and enter:"**

➔ Input local port in the **"Please input local port:"**

To Enable IP filter:

➔ Input **y** in the **"Do one want to enable IP filter (y/n)?"** to enable IP filter. Otherwise input **n**.

➔ Input source IP in the **"Please input Filter_IP:"**

➔ Press the **"Enter"** key two times.

➔ Input idle time in **"Please input idle time to send TCP alive packet (x*10sec):"** (ex. Input **2** to change the sending TCP keep alive packet period to 20 sec).

Note:

- IP filtering function is disabled if setting FILTER_IP to "0.0.0.0"
- IP filter is disabled by default.
- If IP filter is enabled, only source IP assigned can connect to SE5002D's COM
- If the multi-connection firmware is installed, SE5002D will prompt for **"Multi-Port",** meaning multiple connections.

3.2.6 Configure SE5002D as a TCP Client

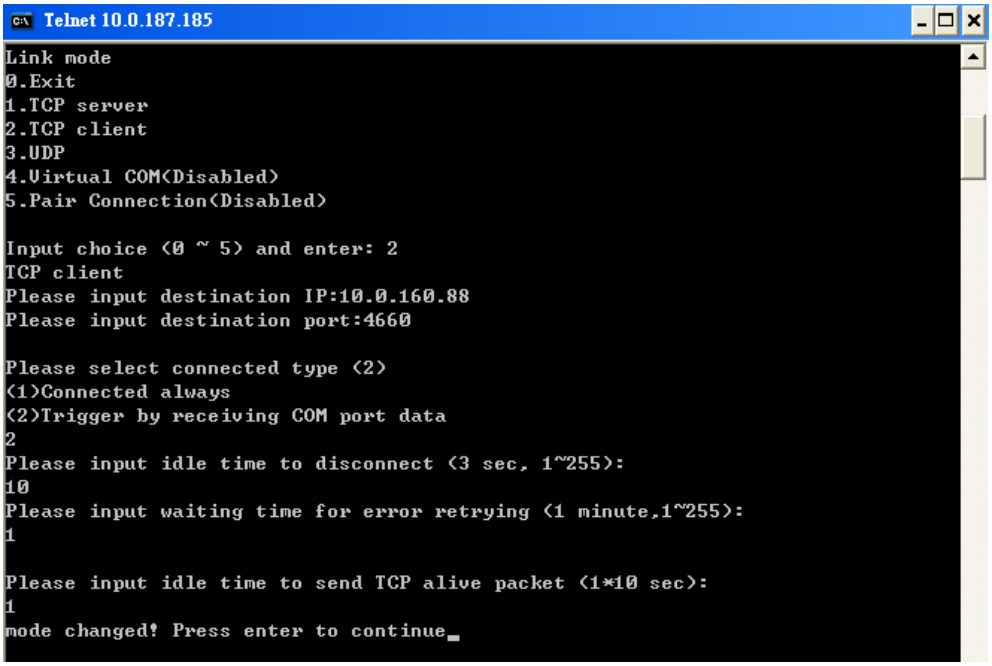


Fig. 3. 8

➔ Type **2** in the **"Input choice (1~5) and enter:"**

➔ Input destination IP in the **"Please input Destination IP:"**

➔ Input destination port in the **"Please input Destination port:"**

➔ Select TCP connection behavior: **1** for connect always, **2** for connect on serial data.

If **"2"** is selected, the console will prompt for additional configurations.

- ➔ Input idle time to disconnect in the **"Please input idle time to disconnect (0se, 1~255):"** (Input **0** to disable; input **2** to disconnect TCP connection after 2 seconds of serial inactivity).
- ➔ Input error retrying time in **"Please input waiting time for error retrying (0 minute, 1~255):"** (input 0 to disable; input 2 to try to connect to a TCP Server every 2 minutes).

➔ Input idle time in **"Please input idle time to send TCP alive packet (x*10sec):"** (input 2 to send TCP keep alive packet every 20 seconds).

3.2.7 Configure SE5002D as a UDP

UDP is a connectionless protocol. It is faster than TCP, but does not guarantee packet delivery to the remote host. The following figure (Fig. 3. 9), shows how to setup UDP.

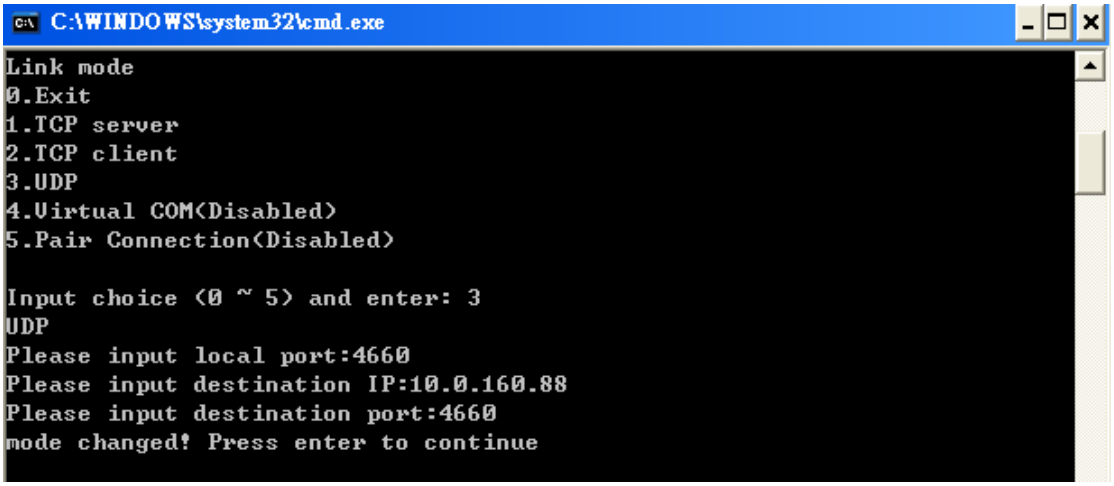


Fig. 3. 9

- ➔ Type **3** in the **"Input choice (1~5) and enter:"**
- ➔ Input SE5002D's local listening port in the **"Please input local port:"**
- ➔ Input remote device's IP in the **"Please input Destination IP:"**
- ➔ Input remote device's listening port in the **"Please input Destination port:"**

3.2.8 Enable/Disable Virtual COM

Enable or disable Virtual COM on this page. For more information on how to setup Virtual COM on different operating systems, please refer to Chap. 4, Using Virtual COM.

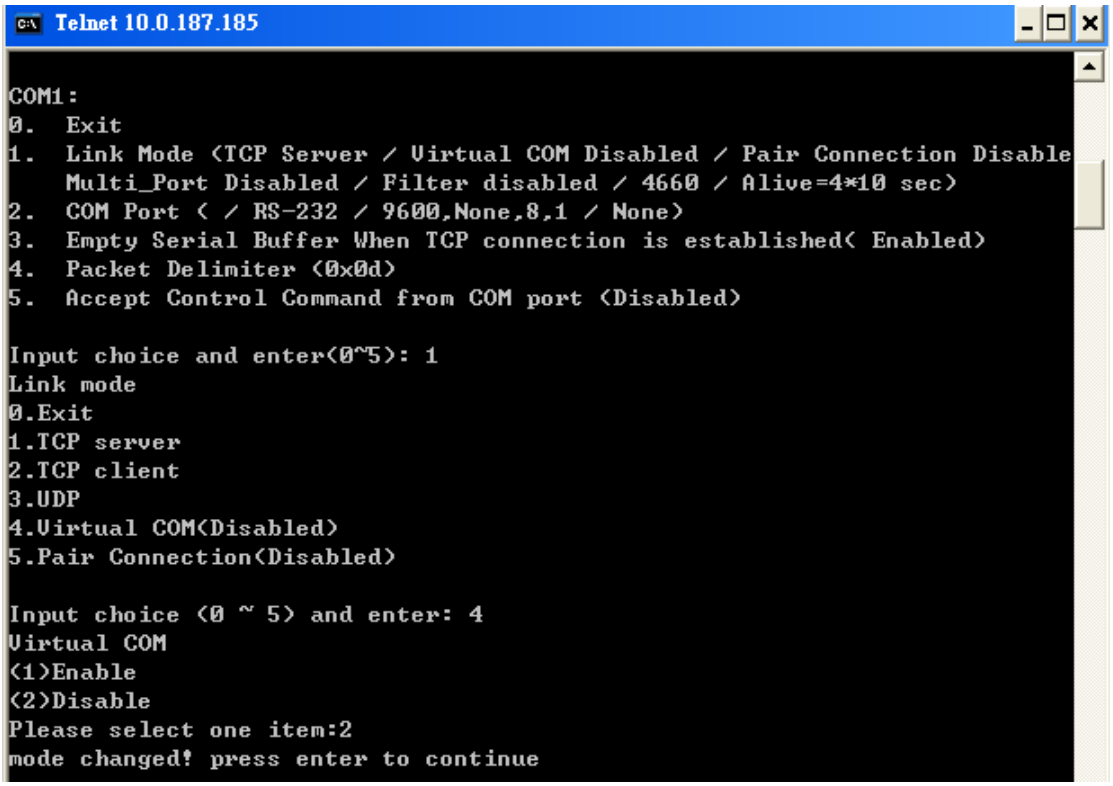


Fig. 3. 10

3.2.9 Enable/Disable Pair Connection

Enable or disable **"Pair Connection"** on this page. For more information on how to configure two serial device servers to work in pair connection, please refer to the pair connection section

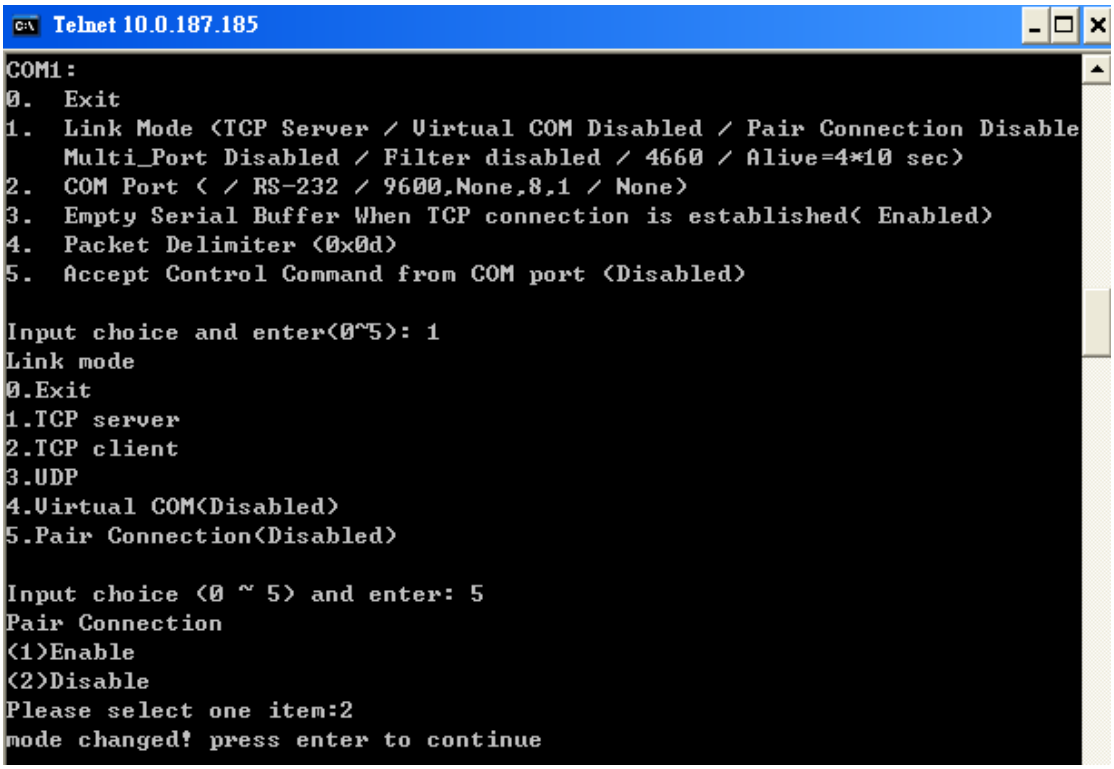


Fig. 3. 11

3.2.10 COM Port Setting

Type **2** from **"Input choice and enter (0~5):"** of COM1, the following screen appears. It is possible to give the COM port alias name, set the baud rate and parity, determine number of data bit and stop bit, and the type of flow control to use here, Fig. 3. 12.

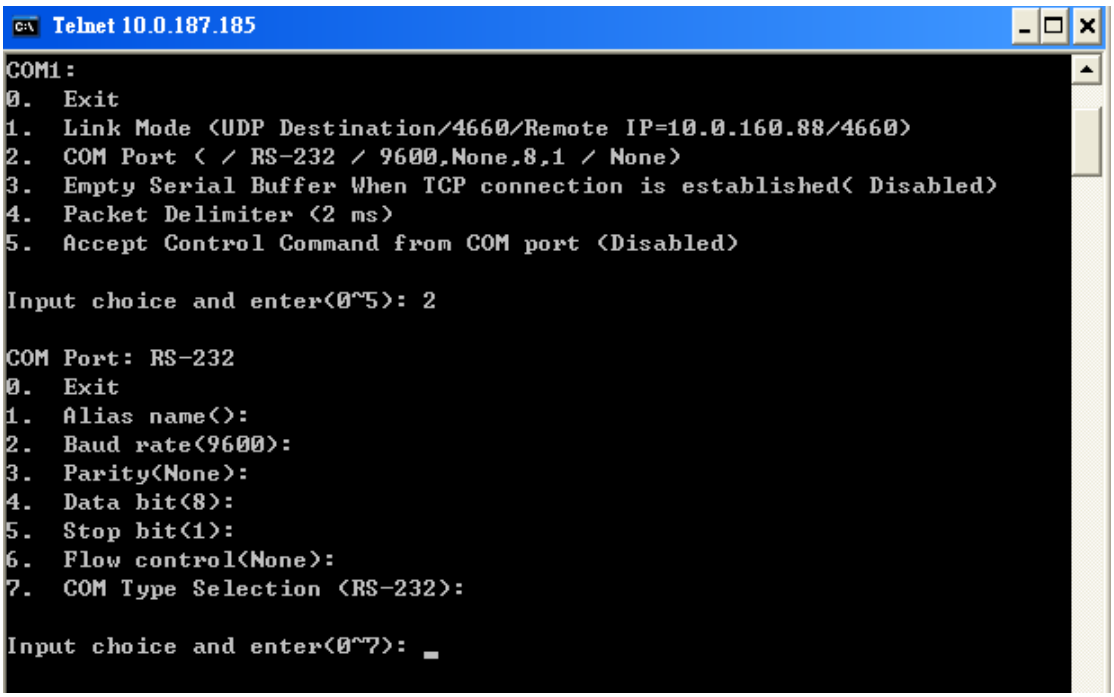


Fig. 3. 12

3.2.11 Emptying Serial Buffer

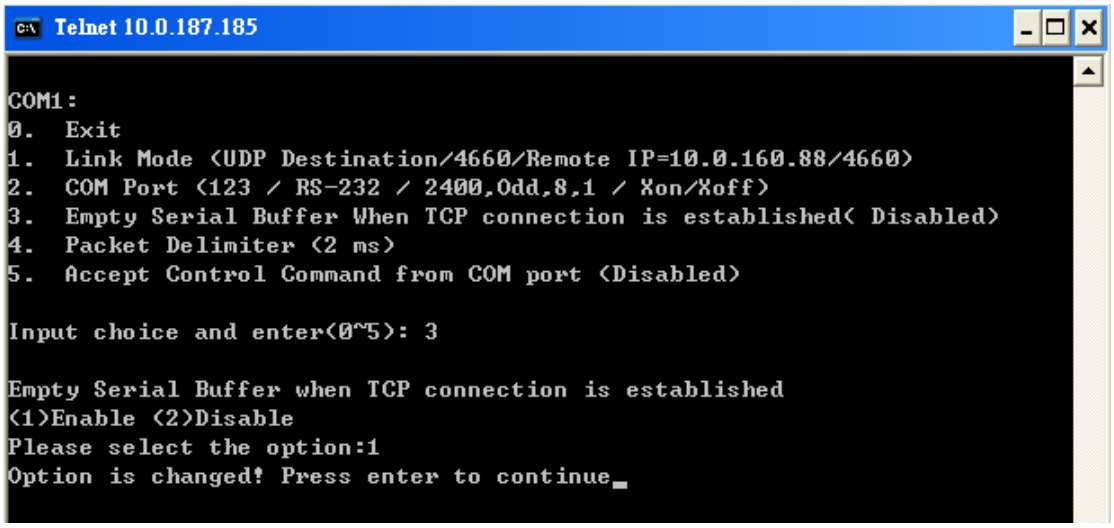


Fig. 3. 13

If you want to empty the Serial buffer while there is a TCP connection; type **3** from **"Input choice and enter (0~5):"** for COM1, by default COM port serial buffer is enabled meaning that once a TCP connection is established, old serial data received from serial device before the connection will be emptied. If this option is disabled, SE5002D will keep old serial data when the connection is broken, Fig. 3. 13.

3.2.12 Setting Packet Delimiter

Packet delimiter is a way for packaging serial data. It can prevent serial data from being truncated by packaging them in the same Ethernet packet. SE5002D provides two kinds of packet delimiter: Timer and Character. The default value for the timer is 2 ms (0 ms to disable this function). This means that if SE5002D does not receive new serial data within 2 ms, it will send out all the serial data in buffer in one packet over Ethernet. The way to change the delimiter timer is shown in the following figure, Fig. 3. 14.

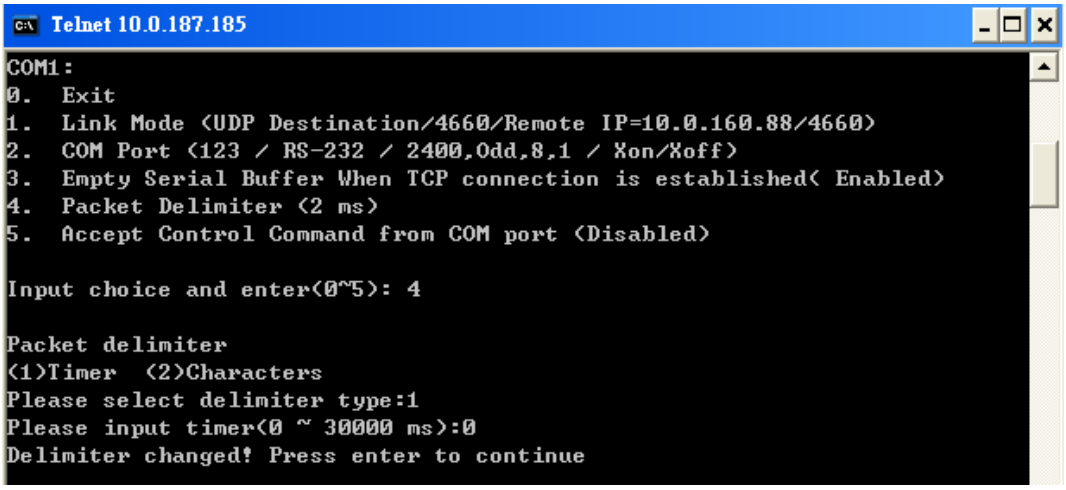


Fig. 3. 14

Another kind is character delimiter. If the character delimiter is set to 0x0d, this means SE5002D will send out all the serial data in buffer in one packet over Ethernet only if it reads 0x0d. The following figure (Fig. 3. 15), shows how to configure the character delimiter.

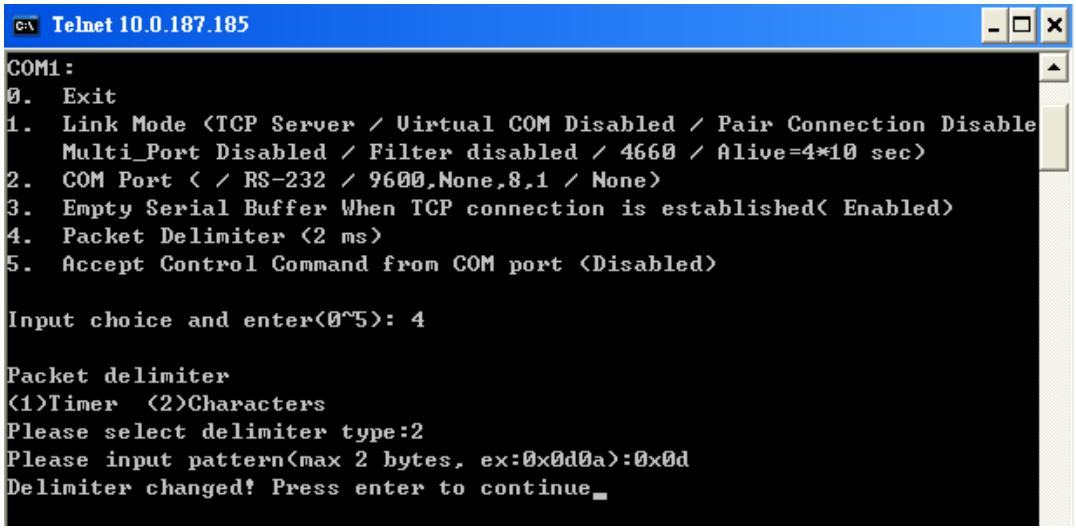


Fig. 3. 15

3.2.13 Accept Control Command from COM port

SE5002D can also accept serial control commands (RFC2217) directly from the COM port. You can enable this option by typing 5 from “Input choice and enter (0~5): for COM1. For more details and information about this function, please contact our Technical Support.

3.2.14 Backup EEPROM to Flash

Select **“5”** from **“Input choice and enter (0~5):”** the following screen should appear, Fig. 3. 16.

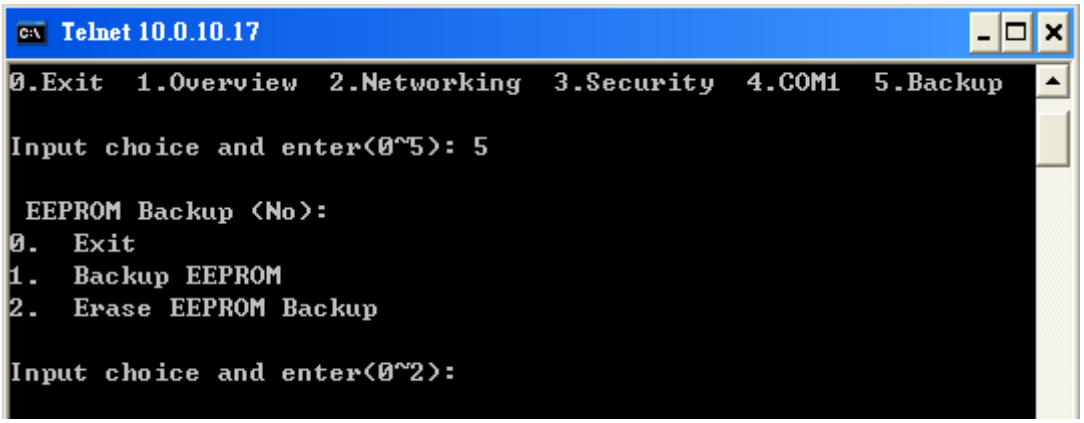


Fig. 3. 16

➔ Type **1** from **“Input choice and enter (0~2):”** to backup the settings from the EEPROM to the Flash. SE5002D would then show **“EEPROM Backup (Yes)”.**

➔ Type **2** from **“Input choice and enter (0~2):”** to erase the settings stored in the Flash. SE5002D would then show **“EEPROM Backup (No)”.**

3.3 Configuration Using Web Browser

➔ Make sure the PC is located in the same network sub-net as SE5002D.

➔ Open a web browser, then Enter SE5002D's IP address. Default username and password are **admin** and **default** respectively.

➔ SE5002D's **network, link mode** and **COM ports settings** can be configured in different web pages.

➔ Click on **"Save Configuration"** to save settings.

➔ Click **"Restart"** button in **"System"** link to make the change effective if necessary.

It is also possible to modify various settings through the web server interface. To do so, please follow the steps below.

3.3.1 Login to the System

➔ After opening the web browser, ex., Microsoft IE, Firefox or any other web browser, enter the SE5002D IP address in the URL bar. **Example: http://10.0.50.100.**

➔ The following authentication screen should appear. Enter the **username** and **password** (**admin** and **default** by default) then click on **"OK/Log In".**

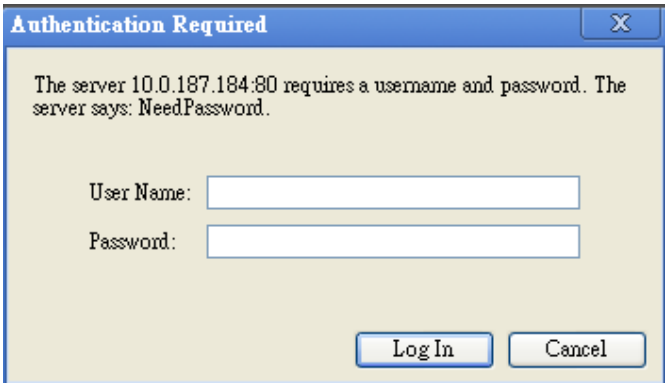


Fig. 3. 17

➔ The following overview page should show. Click on the links on the left to go to the different configuration pages which are **"Networking", "Security",** and **"COM".**

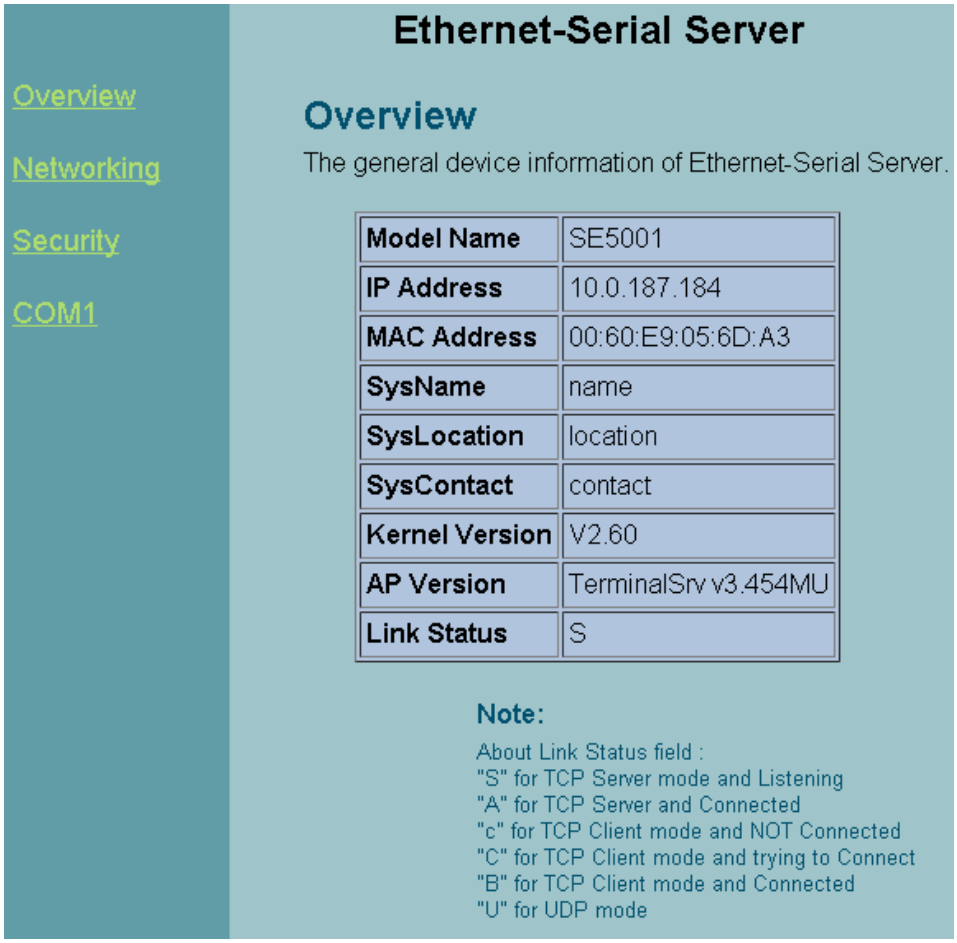


Fig. 3. 18

3.3.2 Networking Setup

Configure IP, SNMP, and alert settings on this page. Please fill in the IP information in the fields under the TCP/IP header. Alternatively, enable DHCP to obtain IP address, gateway and subnet mask from DHCP server automatically, Fig. 3. 19.

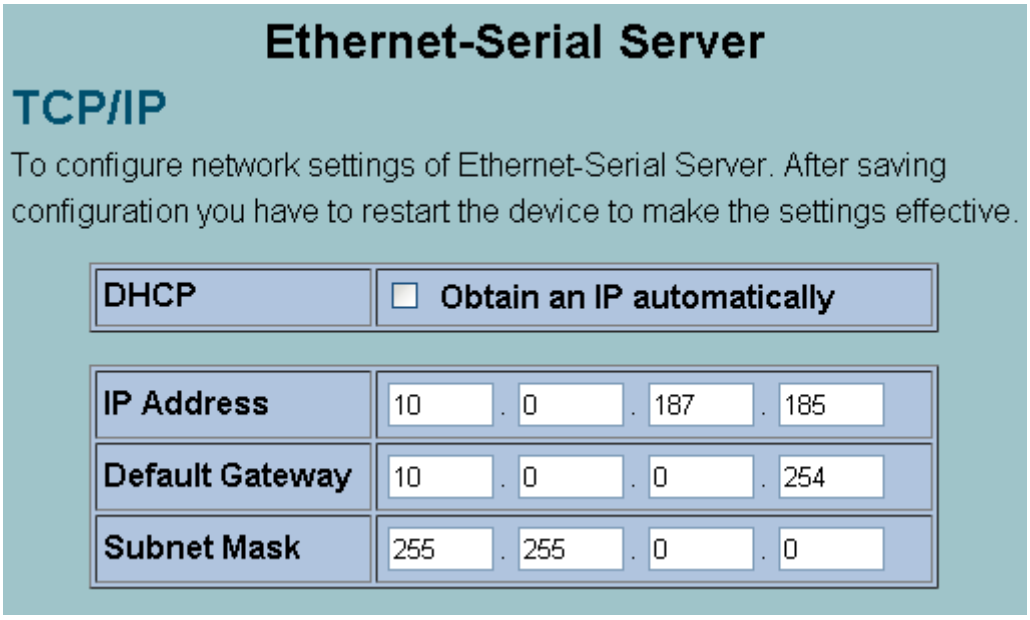


Fig. 3. 19

Enable SNMP and Alert Events by checking **"Enable",** Fig. 3. 20. Fill in SNMP information in the fields under the SNMP header. Enable different Alert Events to send these events to a SNMP Trap Server.

Cold/Warm Start	Triggers when the device is rebooted from the application level or physical level.
Link Down	Triggers when the TCP connection of the designated COM port is closed.
Link Up	Triggers when the TCP connection of the designated COM port is established.
Authentication Failure	Triggers when the username/password entered in the Telnet console or the WebUI is incorrect.

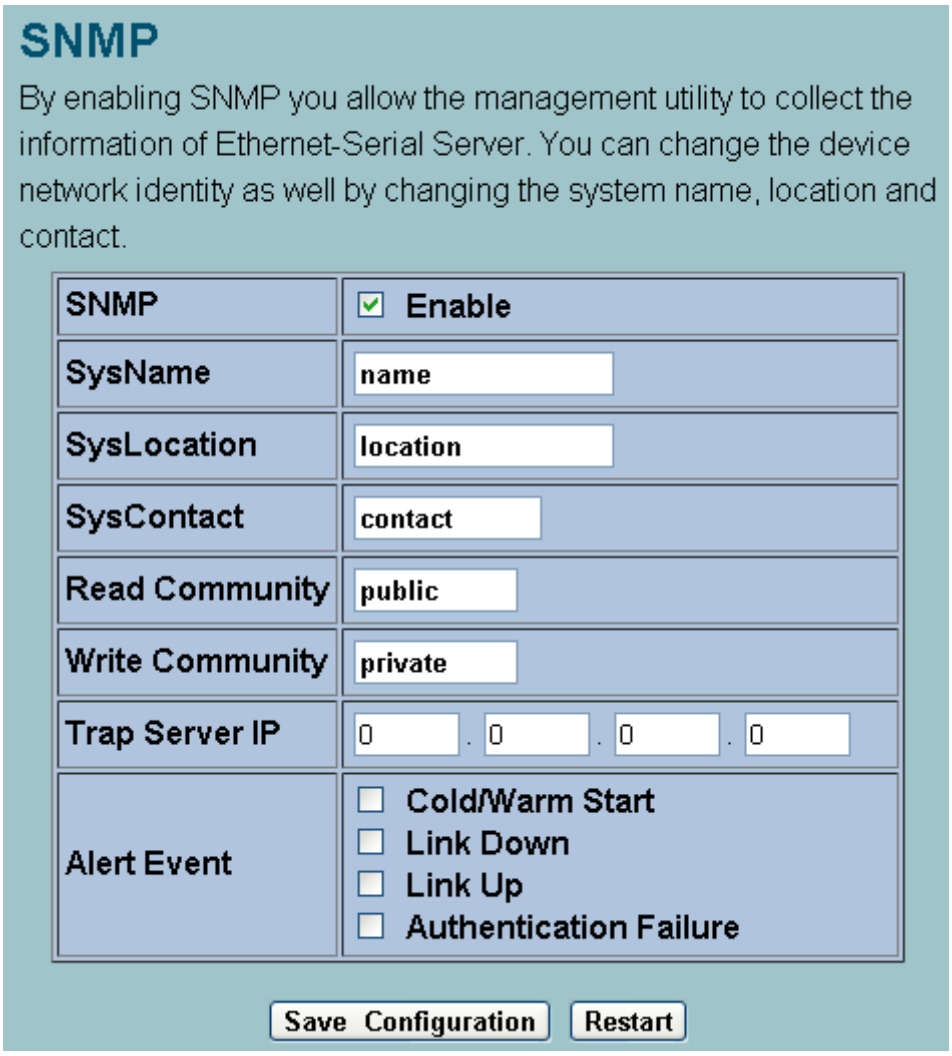


Fig. 3. 20

After all the settings are entered, please click on the **"Save Configuration"** button to save the changes. Note that the settings would become active only after SE5002D is restarted.

3.3.3 Security Setup

Change the login password on this page, Fig. 3. 21.

Fig. 3. 21

Please enter the old password in the **"Old Password"** field and enter the new password in the **"New Password"** and the **"Verified Password"** fields. Then click on the **"Save Configuration"** to save and apply the new password.

Note: Press the reset button to reset the settings back to default to the default values.

3.3.4 Backup EEPROM to Flash

This backup function could recover settings from the Flash to the EEPROM if the settings in the EEPROM are lost. If SE5002D detects that there is an EEPROM backup in the flash. It will compare the backup values in the Flash and EEPROM. If the values do not match, it will write the backup settings in the Flash to the EEPROM. To enable this function, go to the previous section.

➔ Click on **Backup EEPROM** to backup the settings from the EEPROM to the Flash. SE5002D would then show **Have Backup.**

➔ Click on **Erase Backup** to erase the settings stored in the Flash. SE5002D would then show **No Backup.**

3.4 Link Mode Configuration

SE5002Dsupports different Link Modes, which are TCP Server, TCP Client, and UDP, Fig. 3. 22. Under the three Link Modes, TCP Server can support Virtual COM, Pair Connection, or Reverse Telnet applications. TCP Client can support Virtual COM or Pair Connection applications. If none of the applications is enabled, the SE5002D will run in RAW mode. In the upcoming sections we will discuss how to setup different Link Modes properly.

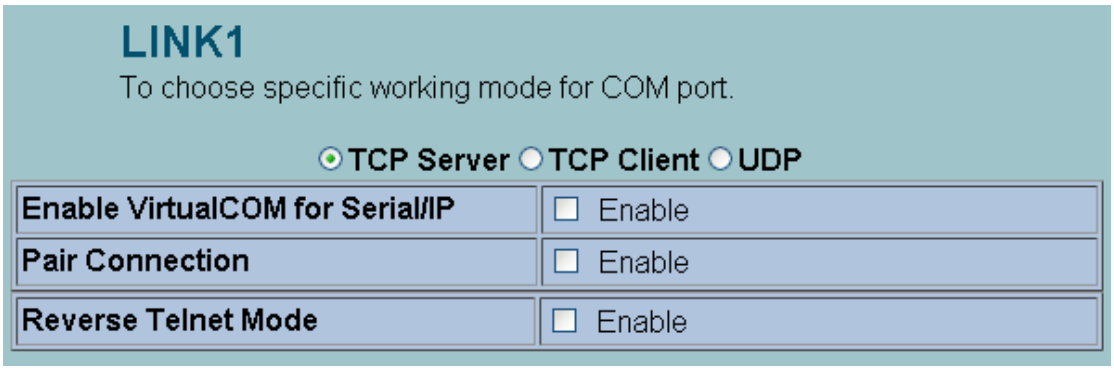


Fig. 3. 22

3.4.1 TCP Server

SE5002D is configured by default as TCP Server mode, there are additional connection settings that can be configured. By selecting the TCP Server mode, a TCP Client program should be prepared to connect to SE5002D.

- ➔ Click on **"COM1"** link on the left hand side.
- ➔ Select **TCP Server.** TCP Server is the default link mode.
- ➔ Enter the **Local Listening Port.** This is the port specified in the TCP Client program connecting to the serial device server. The default local port is **4660.**
- ➔ **IP Filter;** only the designated IP address will be able to access the COM port if this option is enabled. This option is disabled by default.
- ➔ **TCP Keep-Alive;** specify the interval in the **"Idle Time Before Sending TCP Alive Packet"** to force SE5002D to send TCP Keep-Alive packets in the set interval to prevent disconnection from the client. Note that this field has a 10 multiplier, so the default value 4 means to send Keep-Alive packets every 40 seconds.
- ➔ **TCP Inactivity Timeout;** specify the value in **"TCP Inactivity Time Before Disconnect"** to force SE5002D actively close a TCP connection after some specific inactivity time (no packets). The default value is 0, which means SE5002D would never actively close an established connection.

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Go to the Application Configuration section to apply Virtual COM, Pair Connection, or Reverse Telnet applications if necessary. Otherwise go to the COM Configuration for serial settings directly.

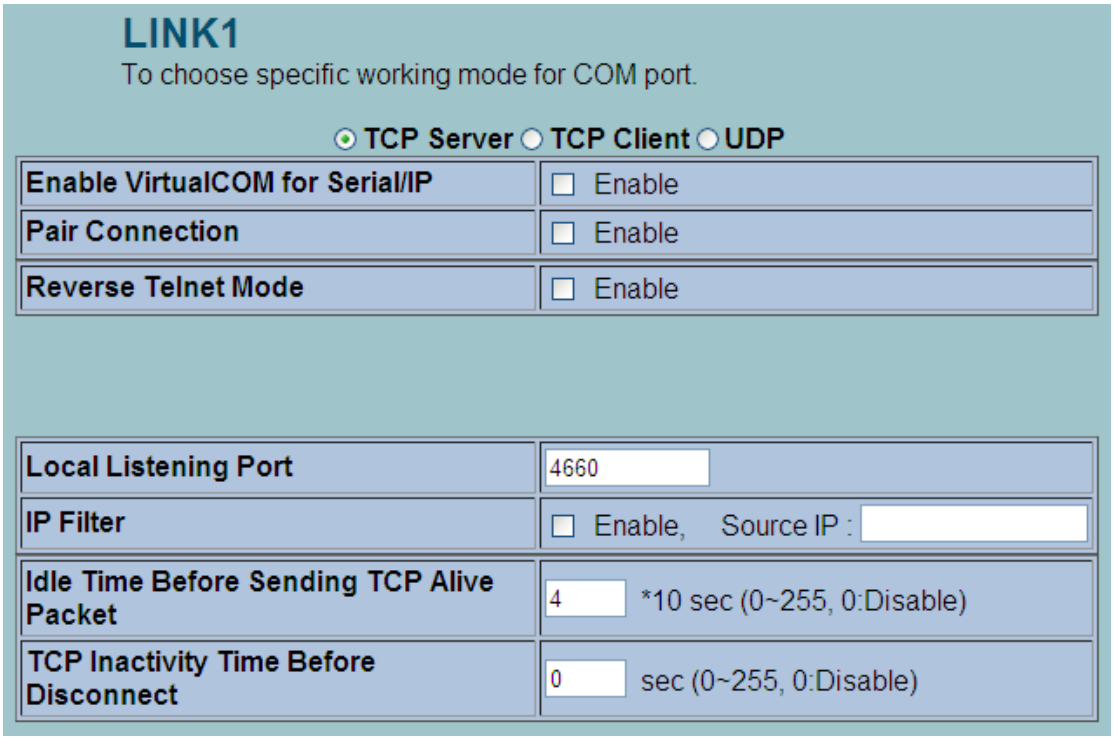


Fig. 3. 23

Note: LINK1 is associated with COM1; LINK2 is associated with COM2, and so on.

3.4.2 TCP Client

By selecting the TCP Client mode, it means that a TCP Server program should be prepared to connect to SE5002D. The following figure shows all the settings provided for the TCP Client.

- ➔ Click on the **"COM1"** link on the left hand side.
- ➔ Select **TCP Client.**
- ➔ Enter the preferred **Destination IP** and **Port.** This should match the IP settings of the TCP Server program.
- ➔ **Connect Rule;** decide how SE5002D should connect to the TCP Server here. If SE5002D should always keep the connection, select **TCP Connect on Power-on.** This means SE5002D would connect to the TCP Server program when SE5002D is powered on. By default, **TCP Connect on Any Serial Character** is selected. This means that SE5002D-Fx would only connect to the TCP Server program when it receives data from its serial interface. If **TCP Connect on Any Serial Character** is selected, there are two additional options to change, which are **Serial Inactivity Time Before Disconnect** and **Waiting Time Between Re-connect Attempts. Serial Inactivity Time Before Disconnect** determines how long SE5002D should wait before closing a TCP connection if there is no incoming serial data. The default value is 40 seconds. **Waiting Time Between Re-connect Attempts** determines the time SE5002D should wait before it tries to establish a connection with a TCP Server again if it fails to connect to the TCP Server. The default value is 1 minute.
- ➔ **TCP Keep-Alive;** Specifies the interval in the **"Idle Time Before Sending TCP Alive Packet"** to force SE5002D to send TCP Keep-Alive packets in the set interval to prevent disconnection from the client. Note that this field is has a 10 multiplier, so the default value 4 means to send Keep-Alive packets every 40 seconds.
- ➔ **TCP Inactivity Timeout;** Specifies the value in **"TCP Inactivity Time Before Disconnect"** to force SE5002D actively close a TCP connection after some specific inactivity time (no packets). The default value is 0, which means the SE5002D would never actively close an established connection.
- ➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Go to the Application Configuration section to apply Virtual COM, Pair Connection, or Reverse Telnet application if necessary. Otherwise go to the COM Configuration for serial settings directly.

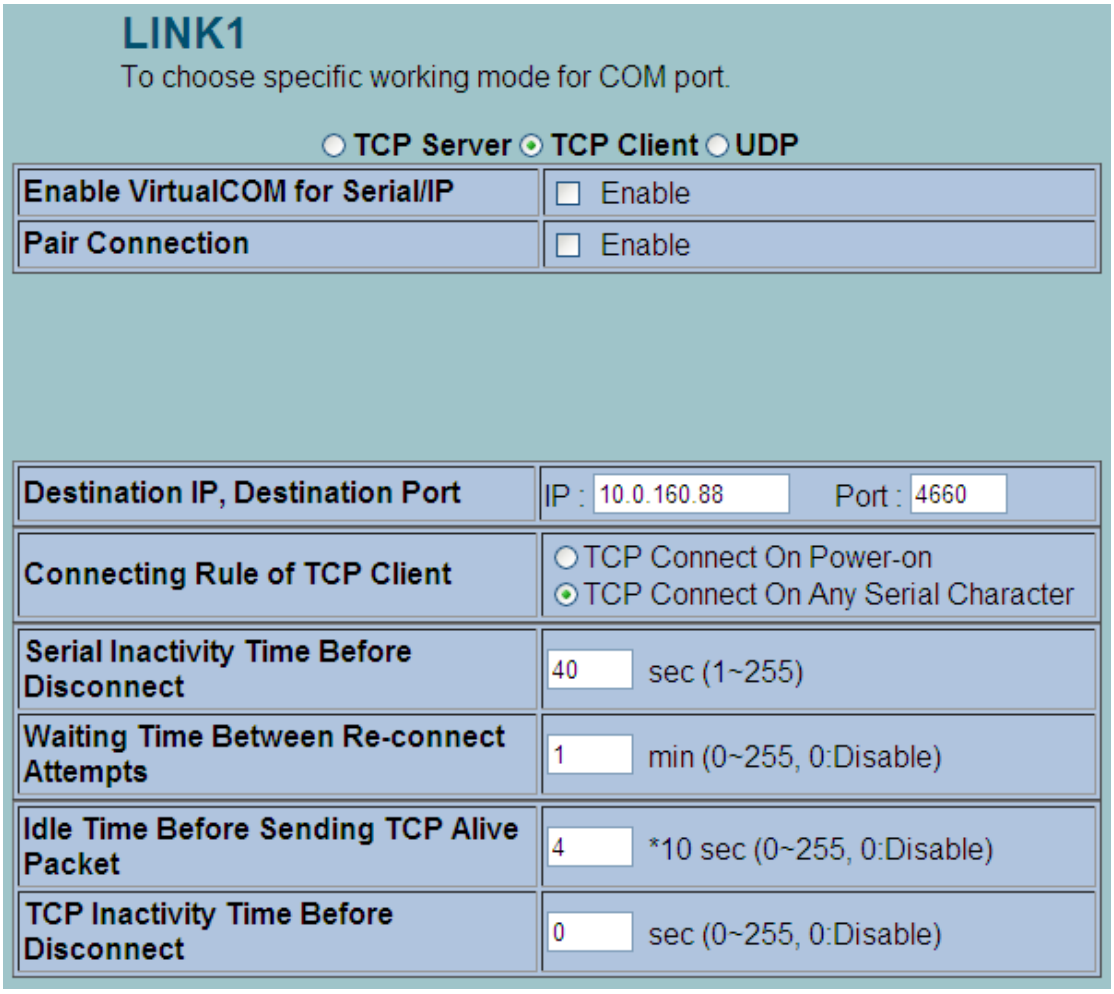


Fig. 3. 24

3.4.3 UDP

SE5002D also supports connectionless UDP protocol in contrast to the connection-oriented TCP protocol. Please be aware that even though UDP provides better efficiency in terms of response time and resource usage, it does not guarantee data delivery. It is recommended to utilize UDP only with cyclic polling protocols where each request is repeated and independent, such as Modbus Protocol. The following figure shows the UDP settings.

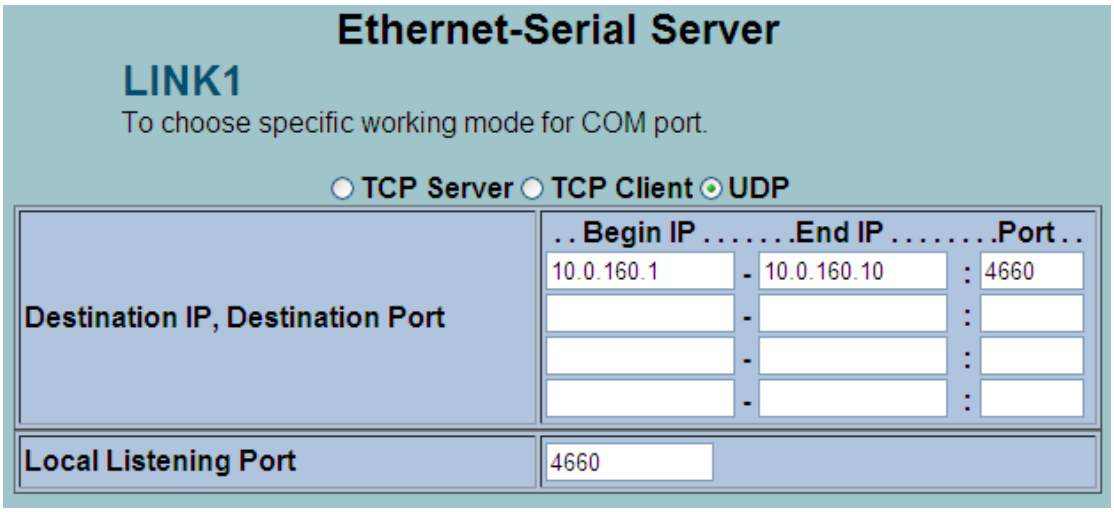


Fig. 3. 25

➔ Click on the **"COM1"** link on the left hand side.

➔ Select **UDP.**

➔ **Destination IP and Port;** specify the **Begin** and **End IP** here. Four groups of IP ranges are allowed. This is the IP address of the UDP program and the Port it is listening to. Note that the maximum number of UDP nodes that SE5002D can handle would highly depend on the traffic load. **We have tested that SE5002D can handle up to 32 UDP nodes (baud rate 9600 bps, request interval 100 ms, and data length of 30 bytes)**.

➔ Enter the **Local Listening Port.** This is the port that the SE5002D should listen to. Match this setting in the UDP program (usually called destination port in the UDP program).

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Go to Section 3.6.3 to apply Pair Connection application if necessary. Otherwise go to the COM Configuration for serial settings directly.

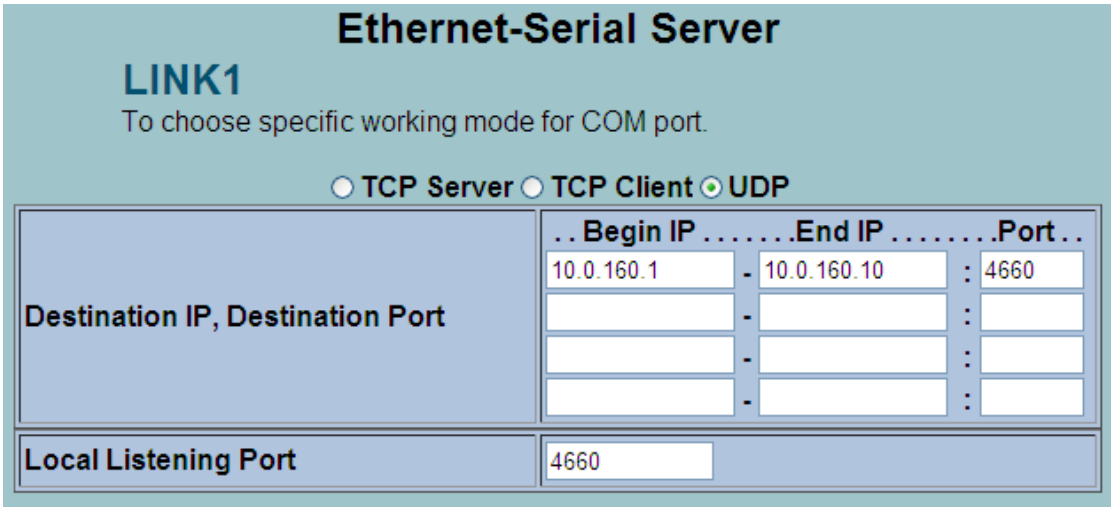


Fig. 3. 26

3.5 TCP Server Application

3.5.1 Enable Virtual COM

SE5002D will encapsulate control packets on top of the real data when Virtual COM is enabled. This will allow the Virtual COM port in the Windows/Linux system to access SE5002D's COM ports. The benefit of using Virtual COM is that rewriting an existing COM program to read IP packets is unnecessary. In other words, it is possible to keep your ordinary serial (COM) program. The conversion/virtualization of IP to COM is all done in the system driver transparently. The following figure (Fig. 3. 27), shows SE5002D in TCP Server mode with Virtual COM enabled.

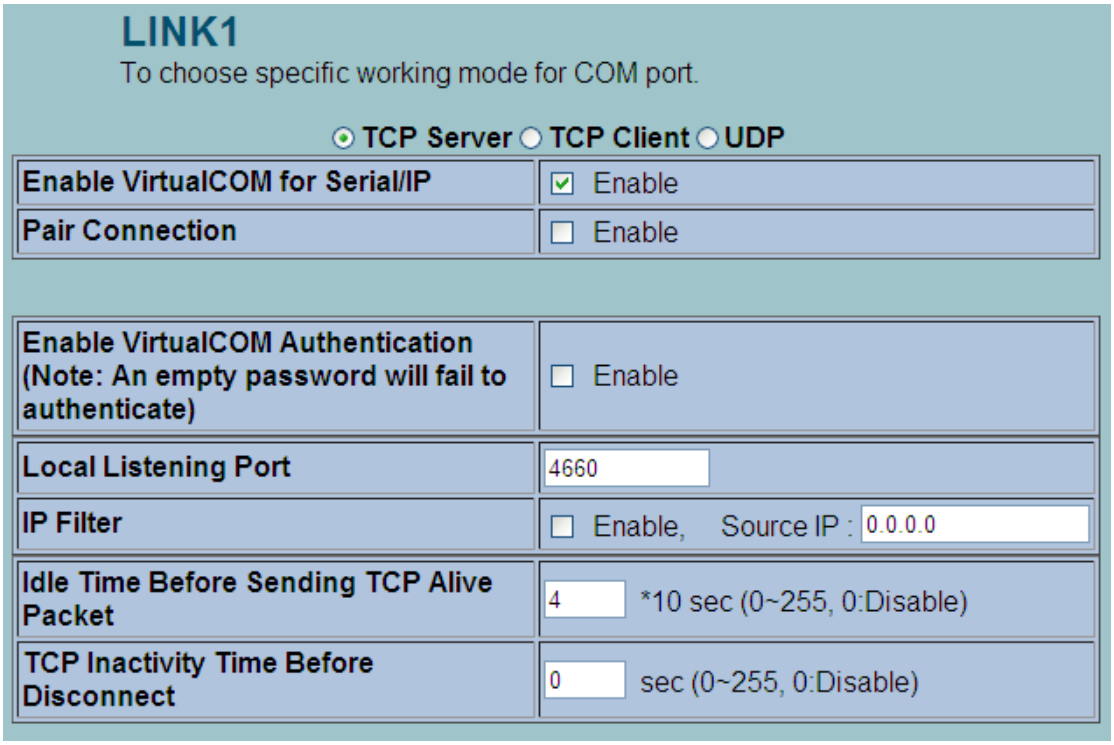


Fig. 3. 27

➔ Follow Sec 3.2.5 to configure SE5002D in TCP Server mode properly.

➔ Check **Enable Virtual COM for Serial/IP** to enable the Virtual COM application in SE5002D.

➔ Check **Enable Virtual COM Authentication (Note: an empty password will fail to authenticate)** to lockup Virtual COM access with SED5002D login password.

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Configure Virtual COM in your current OS. For Windows, refer to Using Virtual COM. Remember this SE5002D's IP address and the **Local Listening Port** here in order to enter this information in Serial/IP Virtual COM's Control Panel later.

3.5.2 Enable RFC 2217

The underlying protocol of Virtual COM is based on RFC 2217, the Telnet COM Control Option. Therefore, it is possible to use RFC 2217 with SE5002D in the TCP Server mode. To do so, refer to Sec. 3.5 to enable Virtual COM, so that SE5002D becomes aware of the commands. Note that there is no need to configure Virtual COM on the Operating System because Virtual COM ports would not be used.

3.5.3 SE5002D as a Pair Connection Master

Pair Connection is useful when pairing up two serial devices over the Ethernet or when it is impossible to install Virtual COM in the serial device. Pair connection does require two SE5002D to work in pair; one would be the Pair Connection Master and the other one would be the Pair Connection Slave.

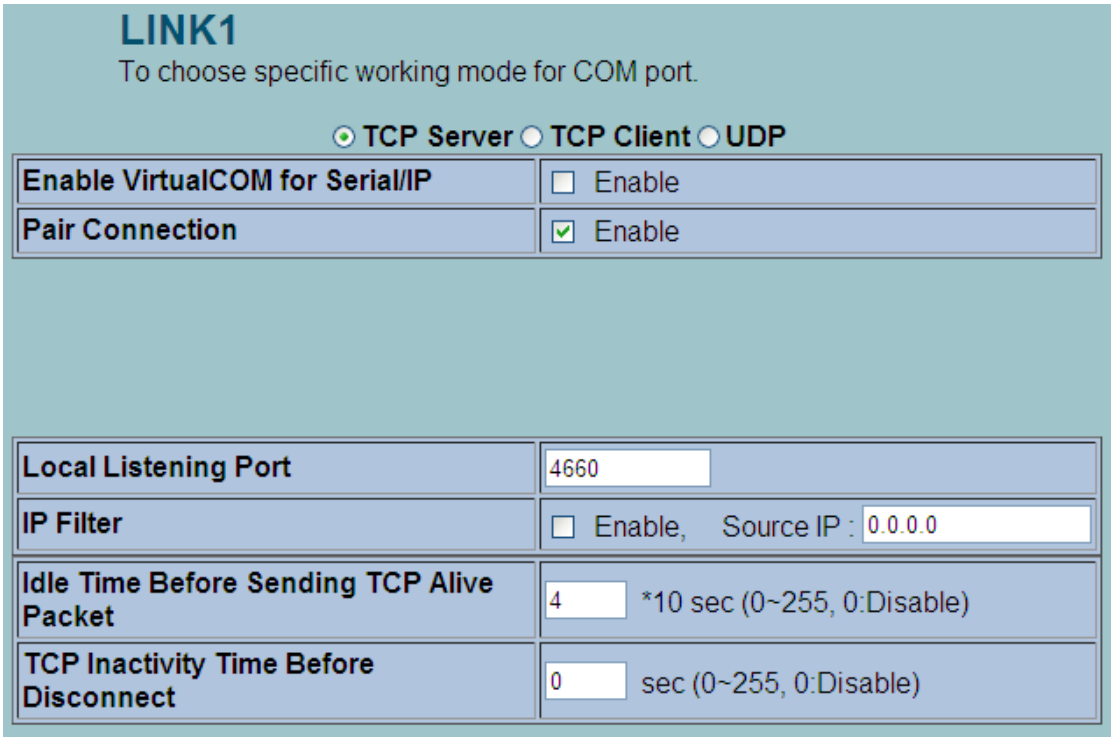


Fig. 3. 28

➔ Follow Sec. 3.2.5 to configure SE5002D in TCP Server mode properly.

➔ Check **Enable Pair Connection** to enable Pair Connection application in SE5002D.

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Go to the Pair Connection Slave Setup, remember this SE5002D's IP address and the **Local Listening Port** here in order to enter this information in the Pair Connection Slave later.

3.5.4 Enable Reverse Telnet

Reverse Telnet application is a useful telnet program used to connect to SE5002D and the SE5002D's serial interface when connected to a Terminal Server. Telnet programs in Windows/Linux usually require special handshaking to get the outputs and formatting show properly. SE5002D will interact with those special commands (CR/LF commands) if Reverse Telnet is enabled.

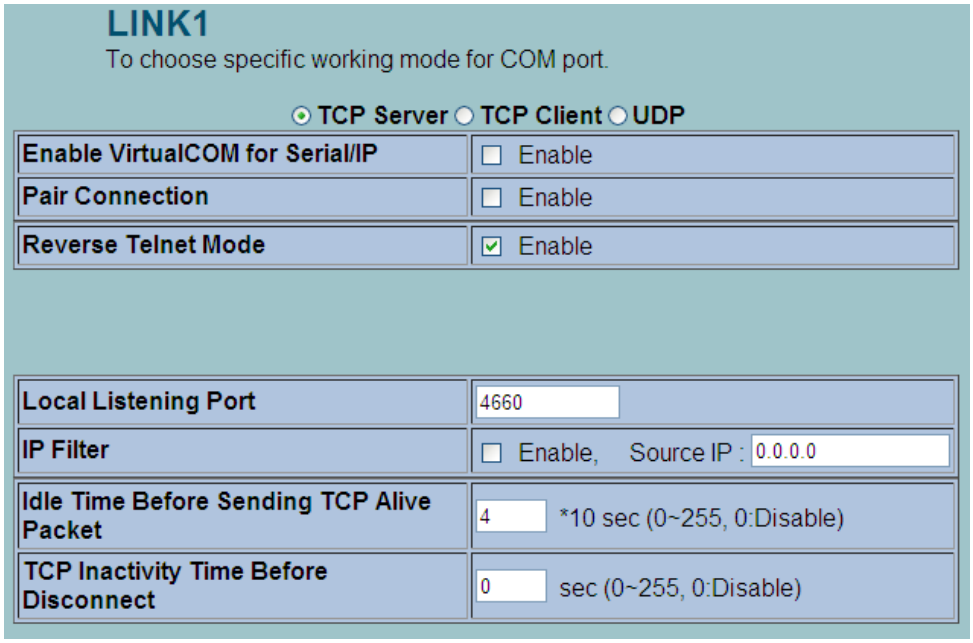


Fig. 3. 29

➔ Follow Sec. 3.2.5 to configure SE5002D in TCP Server mode properly.

➔ Check **Enable Pair Connection** to enable the Pair Connection application in SE5002D.

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

3.5.5 Multiple TCP Connections

To have more than one TCP Client connecting to SE5002D in TCP Server mode, contact Atop Technical Support to obtain a special multi-connection version firmware. After the firmware is uploaded to the SE5002D, the WebUI will have one additional option called "**Multiple_Connections**" as in Fig. 3. 30. The Multi-Connection option will allow up to a maximum of four TCP Client connections. SE5002D will broadcast serial data to all connected TCP Clients. Note that it is also possible to use this multi-connection feature in conjunction with other TCP Server applications, such as Virtual COM, Pair Connection, and Reverse Telnet. For example, enabling multi-connection along with Pair connection will result in Multi-Point Pair Connection in TCP mode as in Sec. 3.5.6.

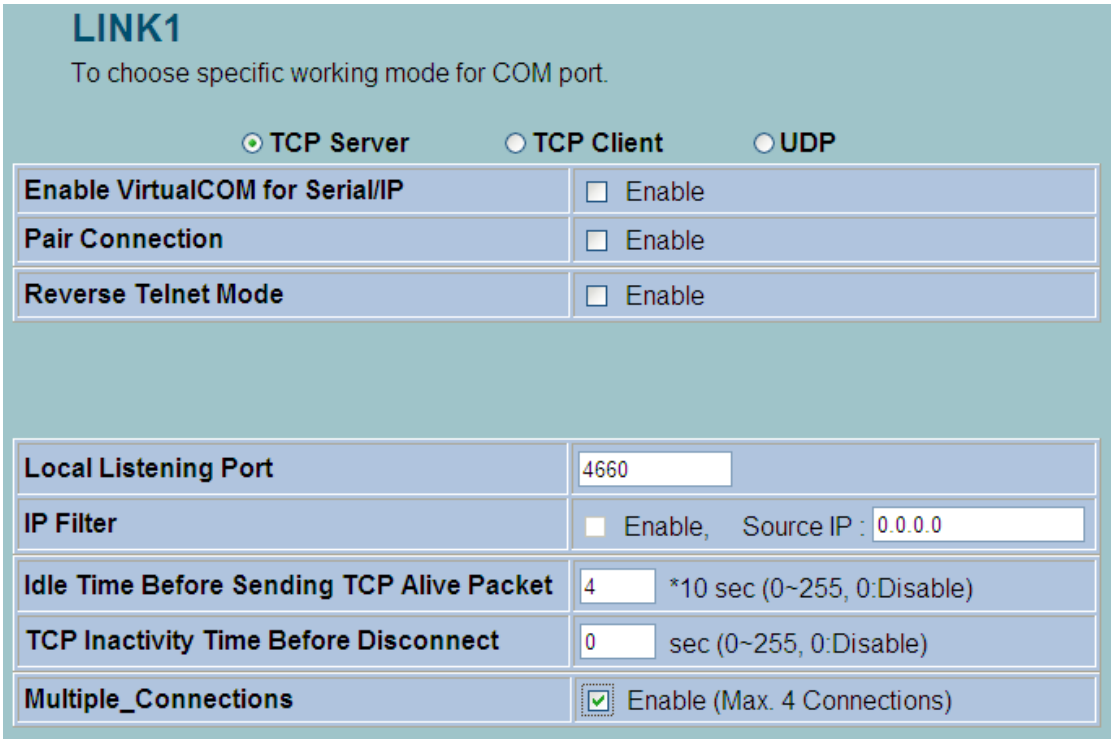


Fig. 3. 30

3.5.6 Multi-Point TCP Pair Connections

The difference between Multi-Point TCP Pair Connection and Multi-Point UDP Pair Connection is that the TCP implementation would also exchange flow controls pins of RS-232. However, the TCP Server is limited to a maximum of four connections. If there are than four serial devices and does not use flow control pins of RS-232, it is possible to setup pair connection in UDP mode, Sec. 3.6.3. After multi-connection is enabled in the WebUI, refer to the following table to setup Pair Connection as in Fig. 3. 31.

Table 3. 2

	IP Address	Link Mode	Local Listening Port	Destination IP	Destination Port
SE5002D Master COM1	10.0.50.100	TCP Server	5000	-	-
SE5002D Slave 1 COM1	10.0.50.200	TCP Client	-	10.0.50.100	5000
SE5002D Slave 1 COM2	10.0.50.200	TCP Client	-	10.0.50.100	5000
SE5002D Slave 2 COM1	10.0.50.201	TCP Client	-	10.0.50.100	5000
SE5002D Slave 2 COM2	10.0.50.201	TCP Client	-	10.0.50.100	5000

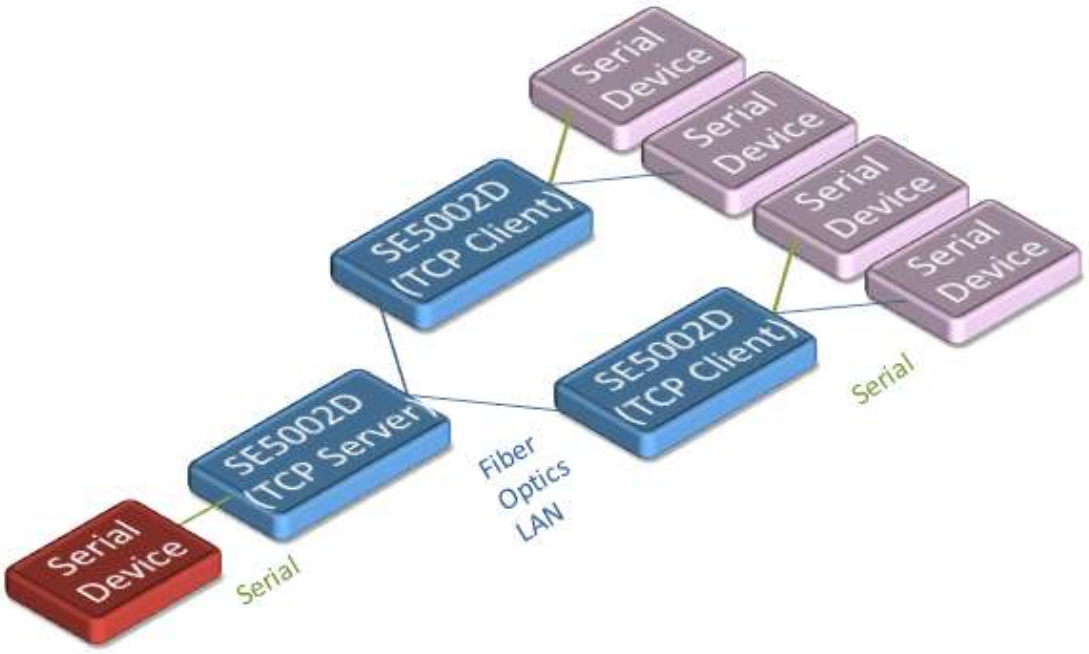


Fig. 3. 31

3.6 TCP Client Application

3.6.1 Enable Virtual COM

It is also possible to run Virtual COM in TCP Client mode, Fig. 3. 32. It is usually easier to use Virtual COM in the Client mode if SE5002D uses dynamic IP (DHCP) because setting a static IP address in Virtual COM's Control Panel is not possible.

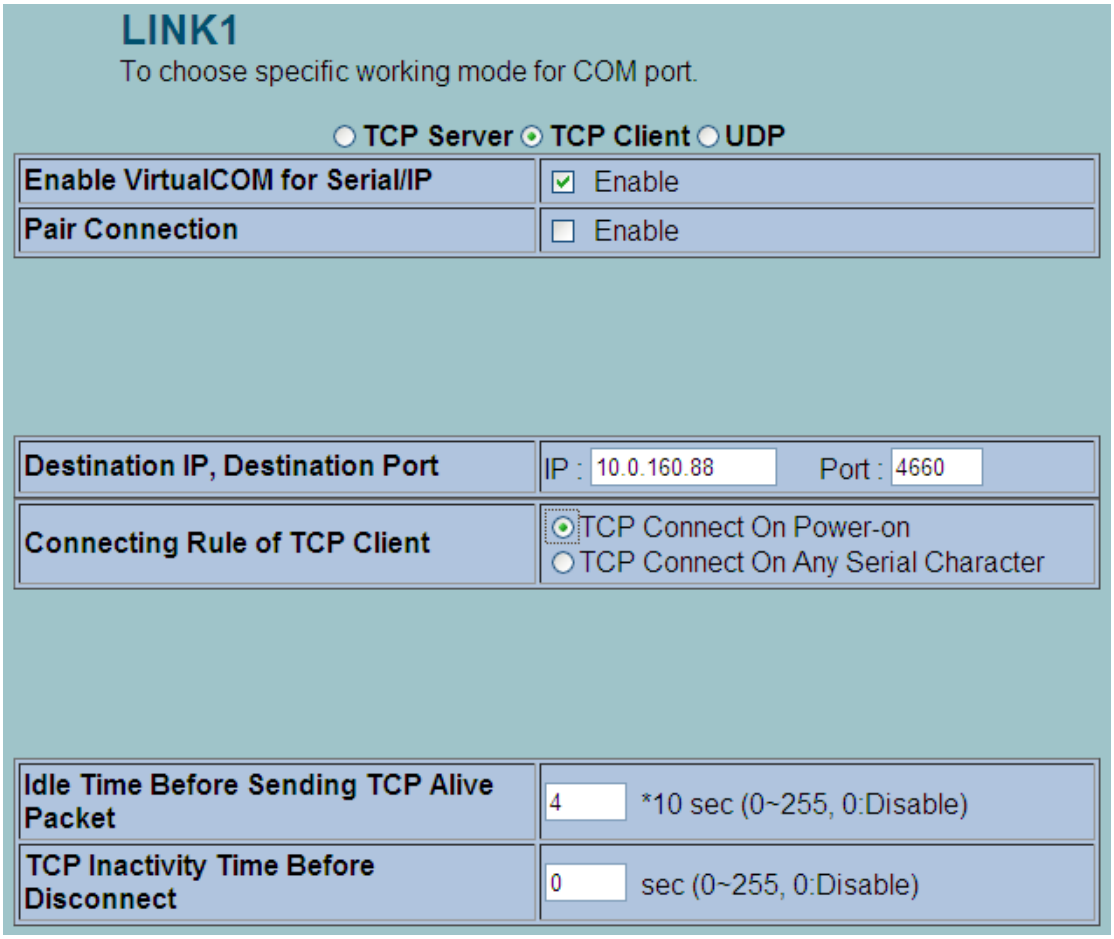


Fig. 3. 32

➔ Follow Sec. 3.2.6 to configure SE5002D in TCP Client mode properly.

➔ Check **Enable Virtual COM for Serial/IP** to enable Virtual COM application in SE5002D.

➔ Scroll to the bottom of the page and click on **"Save Configuration"** button to save the changes.

➔ Configure Virtual COM in the OS. For Windows, refer to Using Virtual COM. Remember this SE5002D's IP address and the **Local Listening Port** here in order to enter this information in Serial/IP Virtual COM's Control Panel later.

3.6.2 Enable RFC 2217

The underlying protocol of Virtual COM is based on RFC 2217, the Telnet COM Control Option. Therefore, it is possible to use RFC 2217 with SE5002D in the TCP Client mode. To do so, refer to Sec. 3.6 to enable Virtual COM, so that SE5002D becomes aware of the commands. Note that there is no need to configure Virtual COM on the OS because Virtual COM ports will not be used.

3.6.3 SE5002D as a Pair Connection Slave

A Pair Connection Slave (Fig. 3. 33) needs to pair up with a Pair Connection Master. Please make sure you already have a Pair Connection Master setup before proceeding.

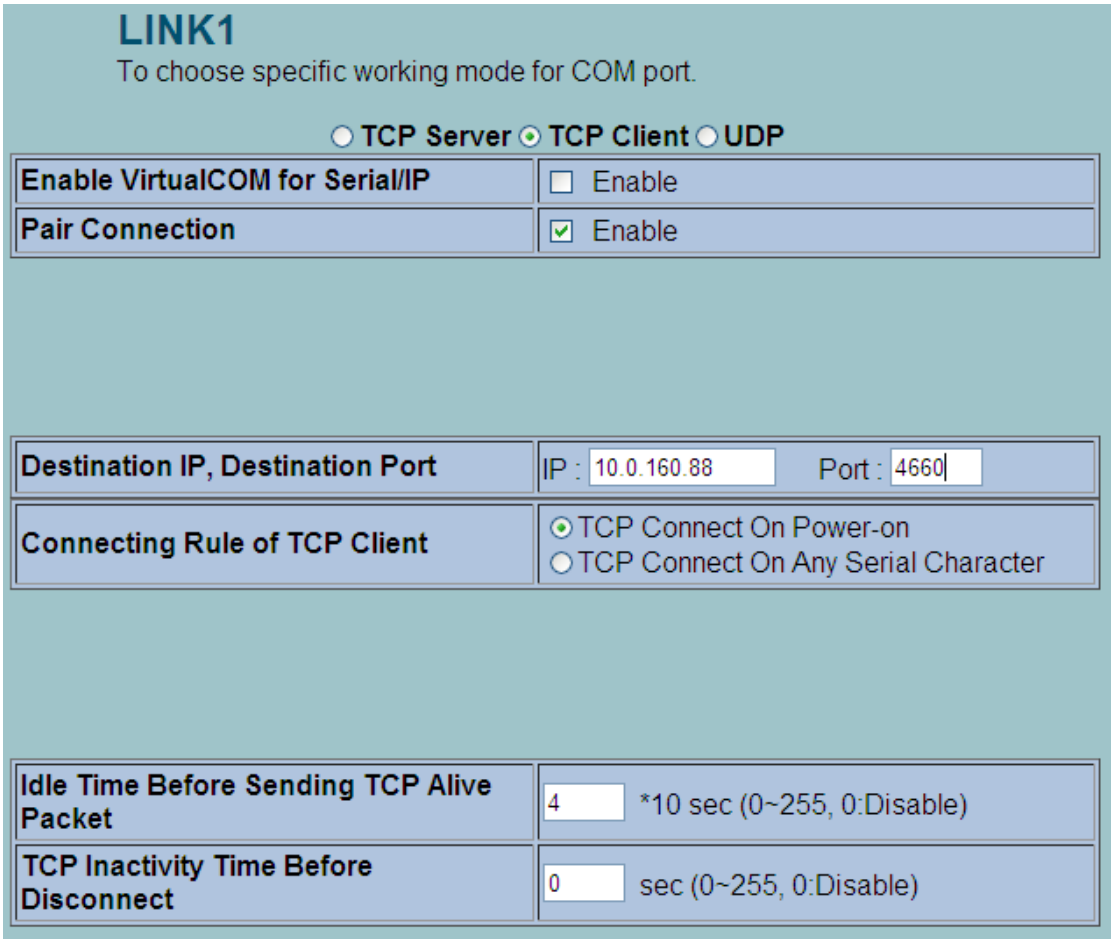


Fig. 3. 33

- ➔ Follow Sec 3.2.6 to configure SE5002D in TCP Client mode properly.
- ➔ Check Enable Pair Connection to enable Pair Connection application in SE5502D.
- ➔ Scroll to the bottom of the page and click on “Save Configuration” button to save the changes.
- ➔ Match the Destination IP and Port here with the settings for Pair Connection Master’s IP and Listening Port setup previously.

3.7 UDP Application: Multi-Point Pair Connection

It is also possible to setup a pair connection in UDP mode to have more than one Pair Connection Master or Slave to communicate with each other. For example, it is possible to setup one Modbus Master and six Modbus Slaves in UDP, Fig. 3. 34. Note again that UDP does not guarantee data delivery and **only data would be transmitted over Ethernet; other serial pings are not transmitted.** If you use RS-232 along with flow control, it is recommended to use Multi-Point Pair Connection in TCP, Sec. 3.5.6

Note: the Destination IP and Port for the Slaves need to be equal to the Master's IP and Port. Local Listening Port for the Slaves needs to be equal to the Master's Destination Port.

Sample Configurations

Table 3. 3

	IP Address	Link Mode	Local Listening Port	Destination IP	Destination Port
SE5002D Master COM1	10.0.50.100	UDP	5000	10.0.50.200~10.0.50.207	5000
SE5002D Master COM2	10.0.50.100	UDP	5001	10.0.50.200~10.0.50.207	5001
SE5002D Slave 1 COM1	10.0.50.200	UDP	5000	10.0.50.100	5000
SE5002D Slave 1 COM1	10.0.50.200	UDP	5001	10.0.50.100	5001
SE5002D Slave 2 COM1	10.0.50.201	UDP	5000	10.0.50.100	5000
SE5002D Slave 2 COM2	10.0.50.201	UDP	5001	10.0.50.100	5001
SE5002D Slave 3 COM1	10.0.50.202	UDP	5000	10.0.50.100	5000
SE5002D Slave 3 COM2	10.0.50.202	UDP	5001	10.0.50.100	5001

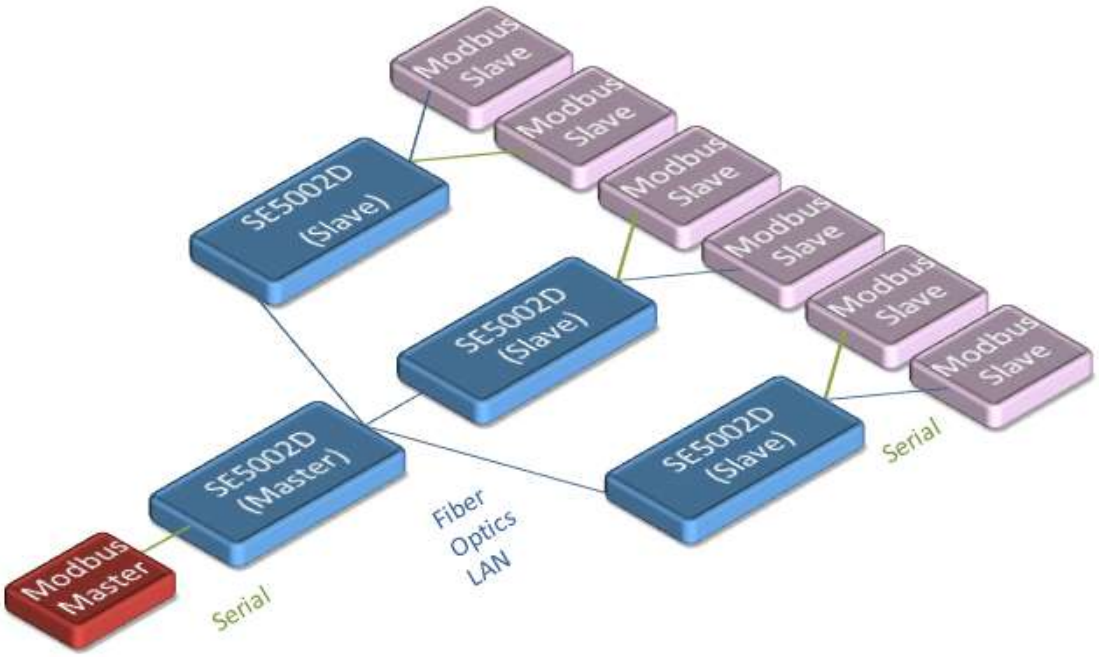


Fig. 3. 34

3.7.1 COM Configuration

Configure serial settings in this page, Fig. 3. 35. Note that these settings need to match the ones in the serial device.

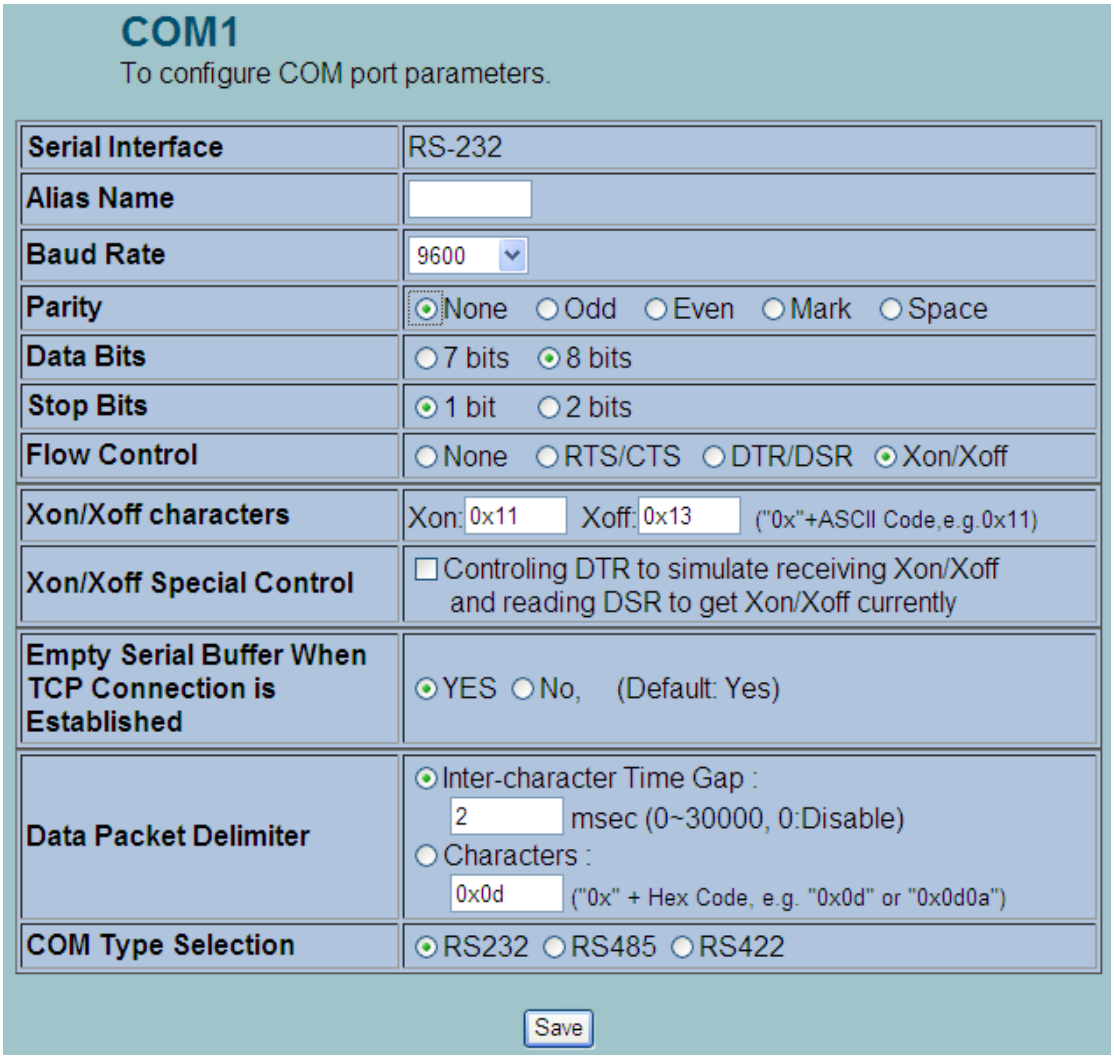


Fig. 3. 35

- **Alias Name,** this field is for identification purposes only.
- **Baud Rate,** Select one of the baudrates from the dropdown box, or select “Other” and then enter the desired baudrate in the input box. Baudrates higher than 230400bps are not supported.
- **Parity/Data Bits/Stop Bits,** configure them accordingly.

- **Flow Control,** Choose between No Flow Control, RTS/CTS (Hardware Flow Control), DTR/DSR, Xon/Xoff (Software Flow Control). If Xon/Xoff is selected, Xon and Xoff characters are changeable. Defaults are 0x11 for Xon and 0x13 for Xoff. If the serial device uses Xon/Xoff in conjunction with DTR/DSR, enable **Controlling DTR to simulate receiving Xon/Xoff and reading DSR to get Xon/Xoff currently.**
- **Empty Serial Buffer When TCP Connection is Established,** By default, SE5002D will empty its serial buffer when a new TCP connection is established. This means that the TCP application will not receive buffered serial data during a TCP link breakage. To keep the serial data when there is no TCP connection and send out the buffered serial data immediately after a TCP connection is established, set this option to **No.**
- **Data packet delimiter,** Packet delimiter is a way for packing data in serial communications. It is designed to keep packets in track. SE5002D provides two types of delimiters: Time Delimiter, and Character Delimiter. When the selected delimiter condition is met, SE5002D would transmit the serial data in its buffer over the network.
  - **Time Delimiter,** SE5002D will transmit the serial data in its buffer when the specified time interval has reached and no more serial data comes in. The default time is 2ms, which means SE5002D will push out its serial buffer if it does not receive any serial data within 2ms. This delimiter is selected by default.
  - **Character Delimiter,** will transmit the serial data in its own buffer when it sees the incoming data include a specified character (in HEX format). This field allows one or two characters. If it is set to 0x0d, SE5002D will push out its serial buffer when it sees 0x0d (carriage return) in the serial data.
- **COM Type Selection,** select between RS-232, RS-422 and RS-485. Note that RS-485 refers to 2-wire RS-485 and RS-422 is compatible with 4-Wire RS-485.

Click on **"Save Configuration"** button to save the changes.

4.Using Virtual COM

Virtual COM allows remote access of serial devices over TCP/IP networks through Serial/IP Virtual COM ports that work like local native COM ports. The following figure is a Virtual COM connection diagram, Fig. 4. 1.

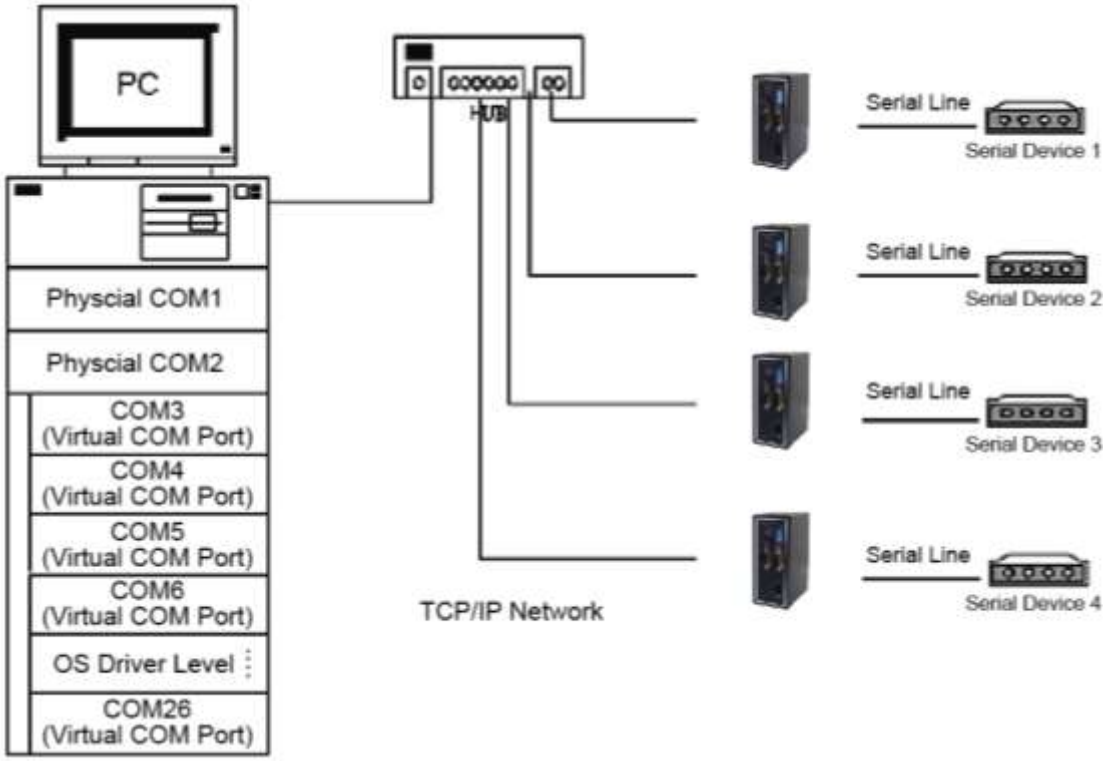


Fig. 4. 1

4.1 Virtual COM Driver setup

4.1.1 System Requirements

Windows 7, 2008, Vista, 2003, XP, 2000, NT 4.0, 9x, Microsoft NT/2000/2003 Terminal Server, Citrix MetaFrame Access Suite, native and virtual, 32 and 64-bit versions. Note that upgrading the operating systems to the latest Service Packs is required, especially for older Windows versions.

To run Virtual COM in Linux, there is a separate package called **TTYredirector** available for download on our website or in the product CD. The zipped package includes a binary file for installation and a manual for Linux systems.

4.1.2 Limitation

The Virtual COM driver allows up to 256 **Virtual COM ports** in a single PC. Selecting in the range from COM1 to COM4096 is allowed. Note that COM ports already occupied by the system or other devices will not be available.

4.1.3 Installation

Run the Virtual COM setup file included in the CD or download a copy from our website to install the Virtual COM driver for your OS. Turn off your antivirus software and try again if the installation fails. At the end of the installation, please select at least one Virtual COM port from the Serial/IP Control Panel.

4.1.4 Uninstalling

- From Windows Start Menu, select Control Panel, Add/Remove Programs.
- Select **Serial/IP Version x.x.x** in the list of installed software.
- Click the **Remove** button to remove the program.

4.2 Virtual COM

4.2.1 Enable Virtual COM in Serial Device Servers

Enable Virtual COM in our serial device servers by logging into our WebUI. It is located under COM configuration. Following figures show how to enable Virtual COM in SE5002D. For detailed Link Mode configuration with Virtual COM, please refer to the previous sections starting from Sec. 3.5 on Link Mode configurations.

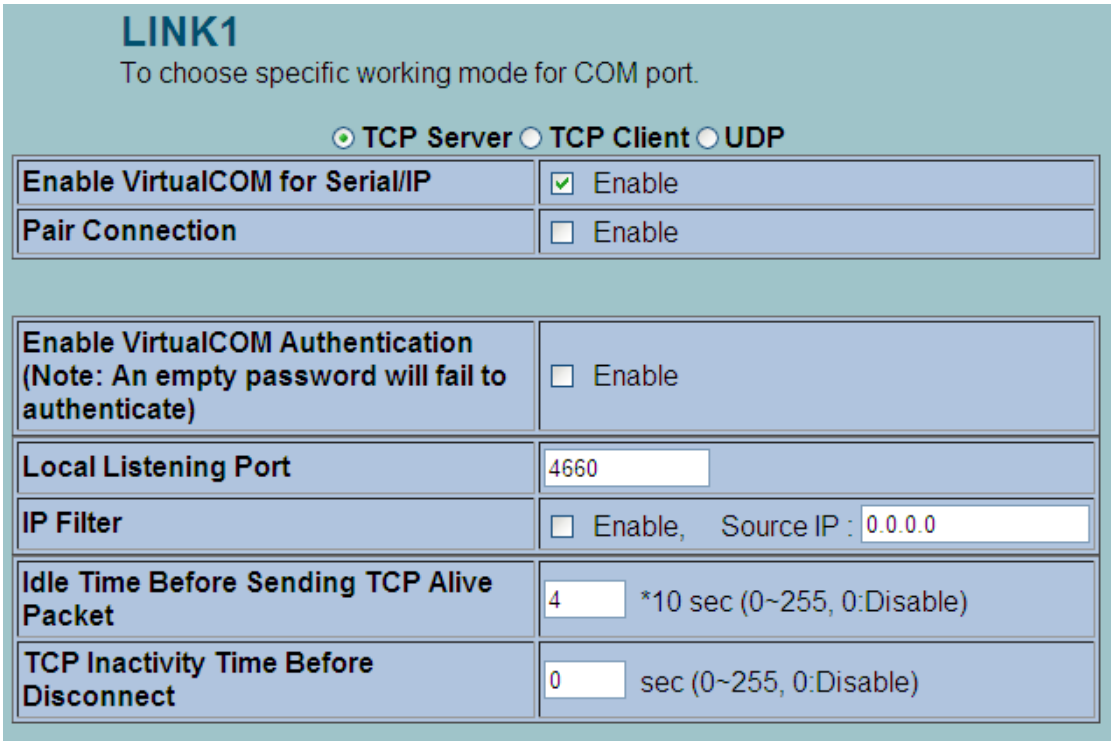


Fig. 4. 2

It is also possible to enable Virtual COM in serial device servers using Telnet. Please refer to the Sec. 3.2.8 on Telnet.

4.2.2 Running Serial/IP in Windows

Find the Serial/IP Control Panel from:

- **Start→All programs→Serial/IP→Control Panel**
- In the **Windows Control Panel,** open the **Serial/IP** applet.
- In the **Windows notification area,** Fig. 4. 3, right click on the **Serial/IP** tray icon and click on Configure to open the **Control Panel**

Fig. 4. 3

If no Virtual COM port is selected, a dialog will pop up and ask to select at least one port as the Virtual COM port before proceeding, Fig. 4. 4.

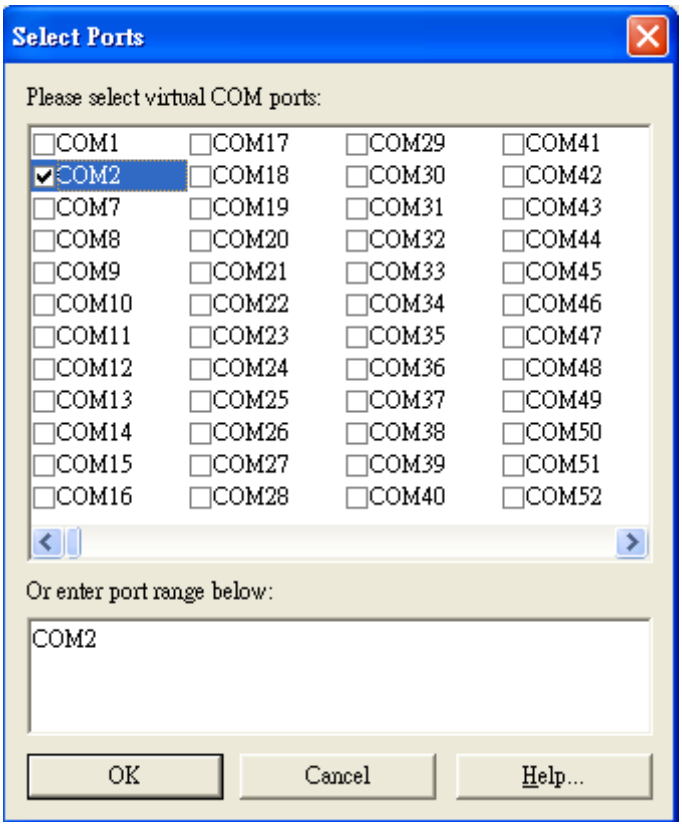


Fig. 4. 4

After at least one Virtual COM port is selected, the Control Panel will show, Fig. 4. 5.

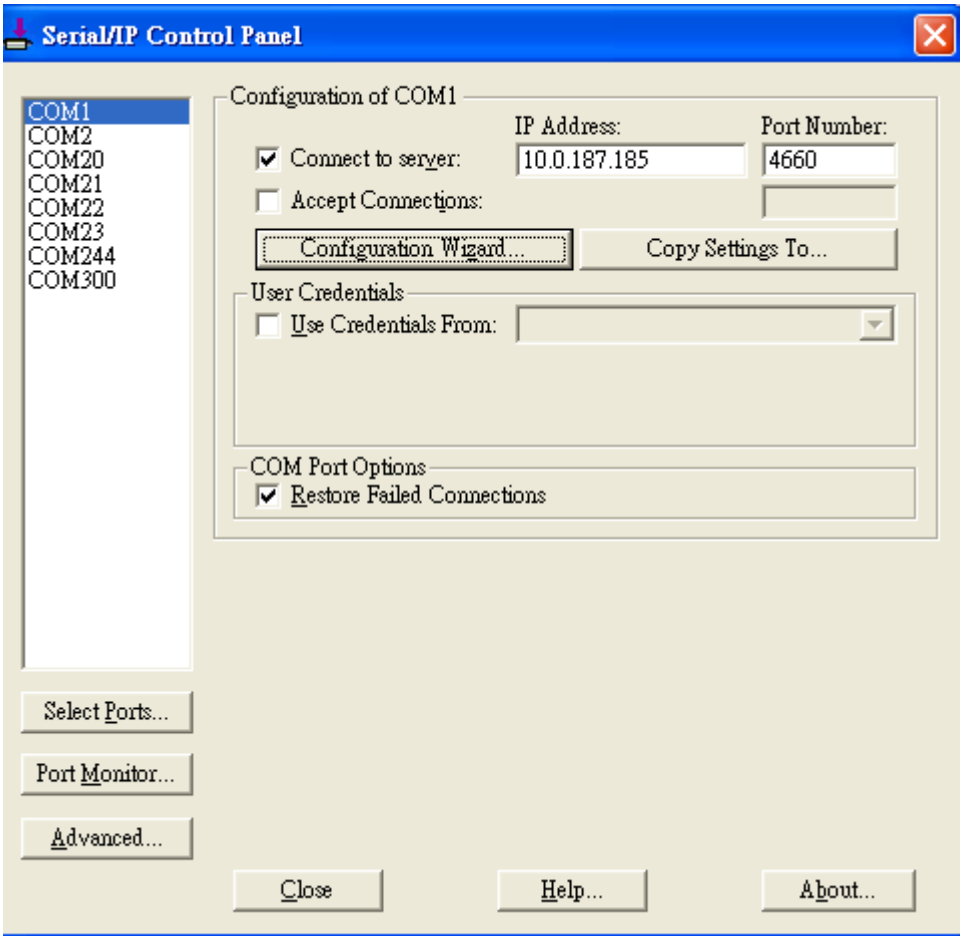


Fig. 4. 5

The left hand side of the Control Panel shows the list of selected Virtual COM ports. Click on **Select Ports** to add or remove Virtual COM ports from the list. The right hand side of the Control Panel shows the configurations of the selected Virtual COM port marked in blue. Each Virtual COM port can have its own settings.

Note: the changes to Virtual COM ports apply immediately, so there is no need to save the settings manually. However, if the Virtual COM port is already in use, it is necessary to close the Virtual COM port and open it after the TCP connection closes completely in order for the changes to take effect.

4.3 Configuring Virtual COM Ports

To Configure Virtual COM ports (Fig. 4. 5),

- ➔ If the serial device server is running in TCP Server mode (recommended), Serial/IP should be the TCP Client connecting to the serial device server. Enable **Connect to Server** and enter the **IP Address** of the serial device server with the **Port Number** specified. The **Port Number** here is the Local Listening Port for the serial device server.
- ➔ If the serial device server is running in TCP Client mode, Serial/IP should be the TCP server waiting for SE5002D to connect it. **Accept Connections** and enter the **Port Number**. The **Port Number** here is the **Destination Port** for the serial device server. Do not enable **Connect to Server and Accept Connections** together.
- ➔ If **Enable Virtual COM Authentication** is enabled in the serial device server (this is only available in limited serial device servers), it is necessary to enable **Use Credentials From** and select **Use Credentials** Below from the list. Enter the Username and Password for the serial device server in the respective fields.

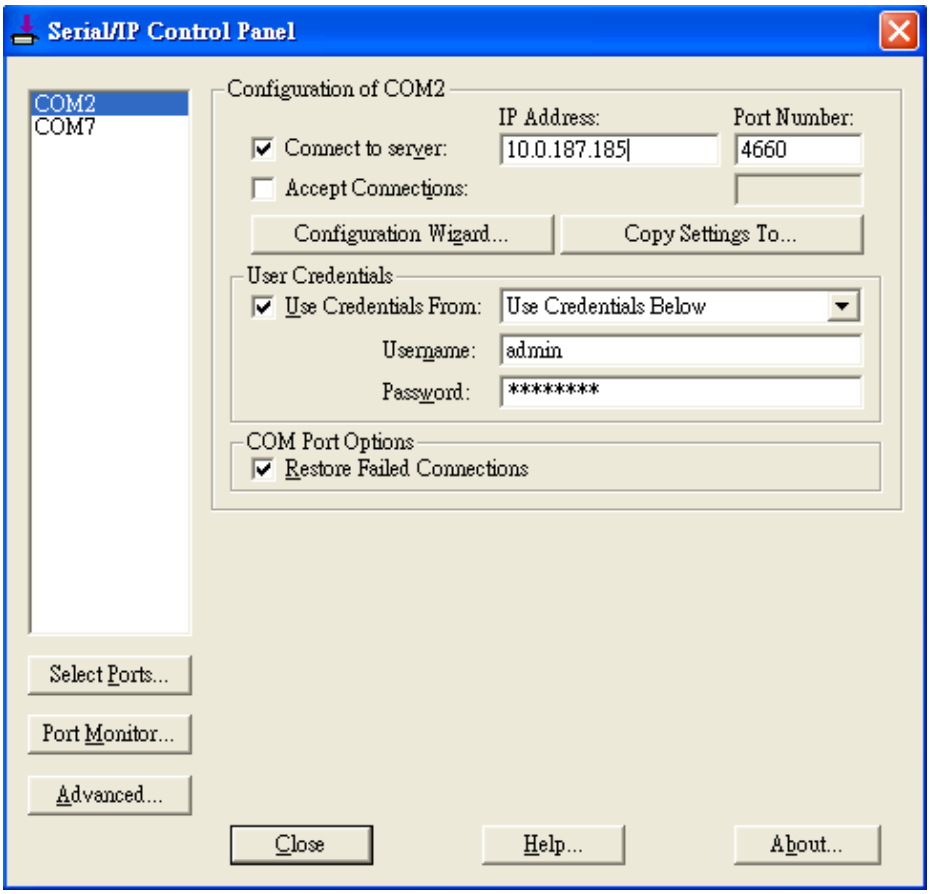


Fig. 4. 6

➔ Enable **Restore Failed Connections** to force Virtual COM to automatically restore failed connections with the serial device server in the case of unstable network connections.

➔ To test the Virtual COM connections, click the Configuration Wizard button and then click on Start button in the pop up window, Fig. If the test passes, all checks should b in green. To apply the changes in the Configuration Wizard window to the Control Panel, click on **Use Settings.** Click on **Copy** to copy the results to the system clipboard.

➔ To transfer the settings between Virtual COM ports, click on the **Copy Settings To** button.

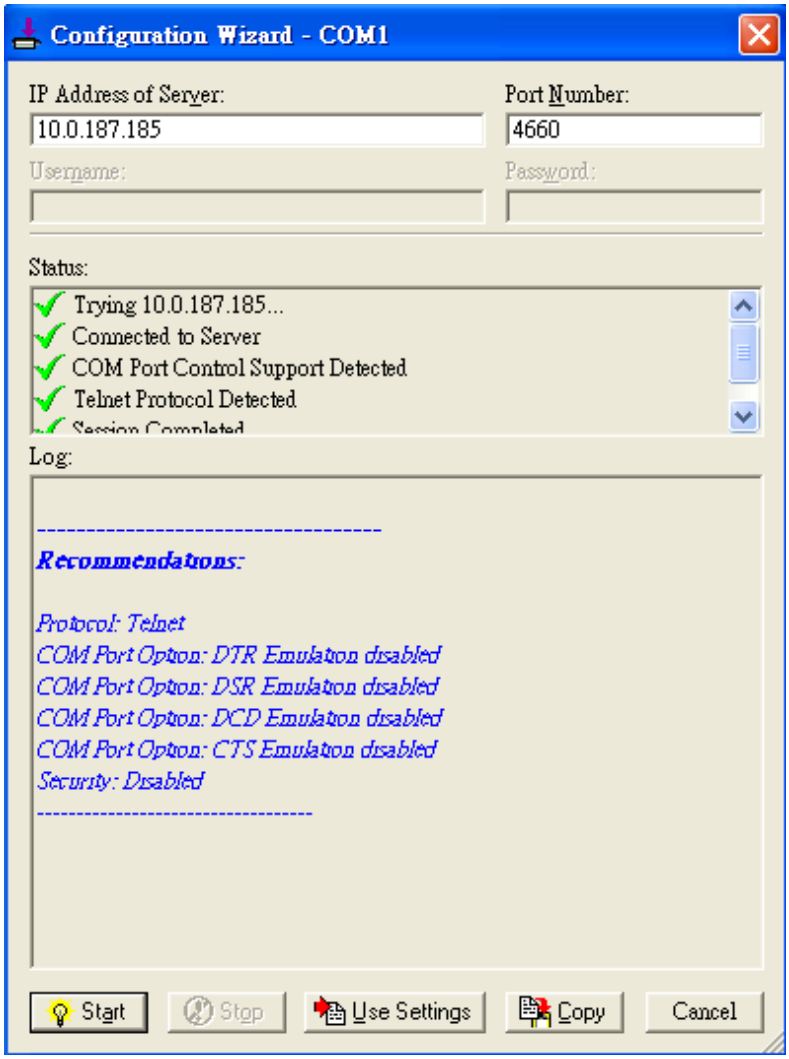


Fig. 4. 7

4.3.1 Exceptions

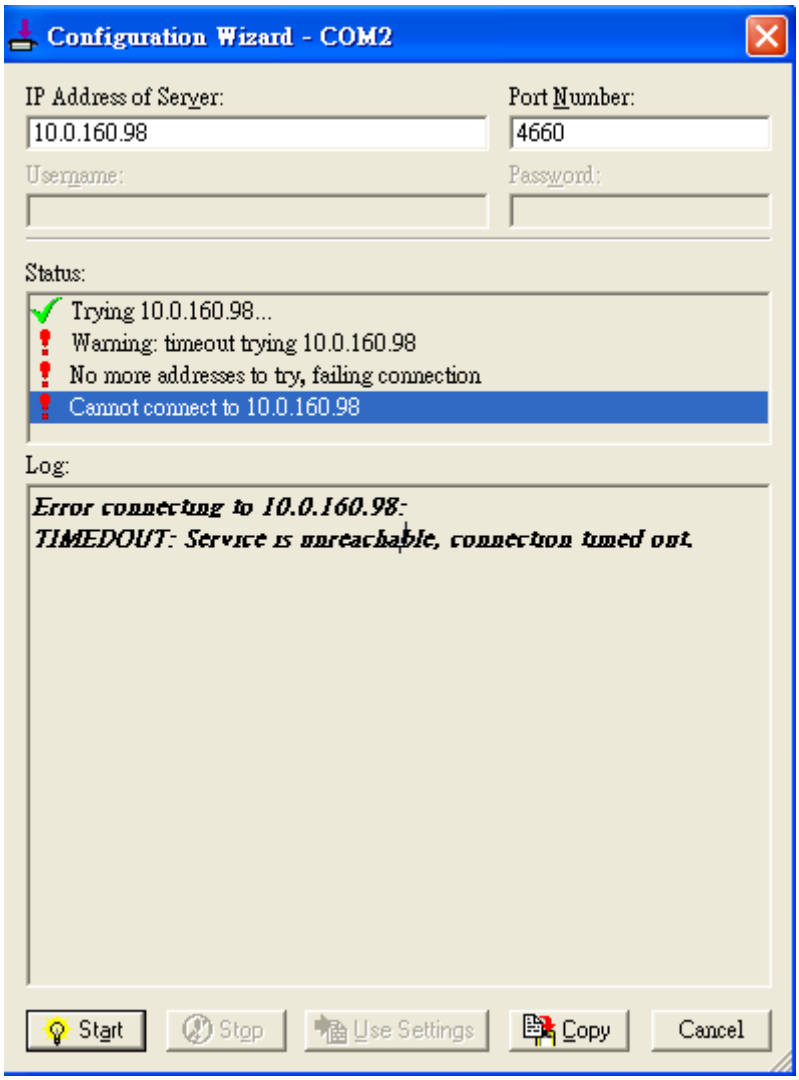


Fig. 4. 8

- If the exclamation mark begins with **Warning: timeout trying x.x.x.x** (Fig. 4. 8), recheck the Virtual COM IP and Port configuration or the PC's network configuration.

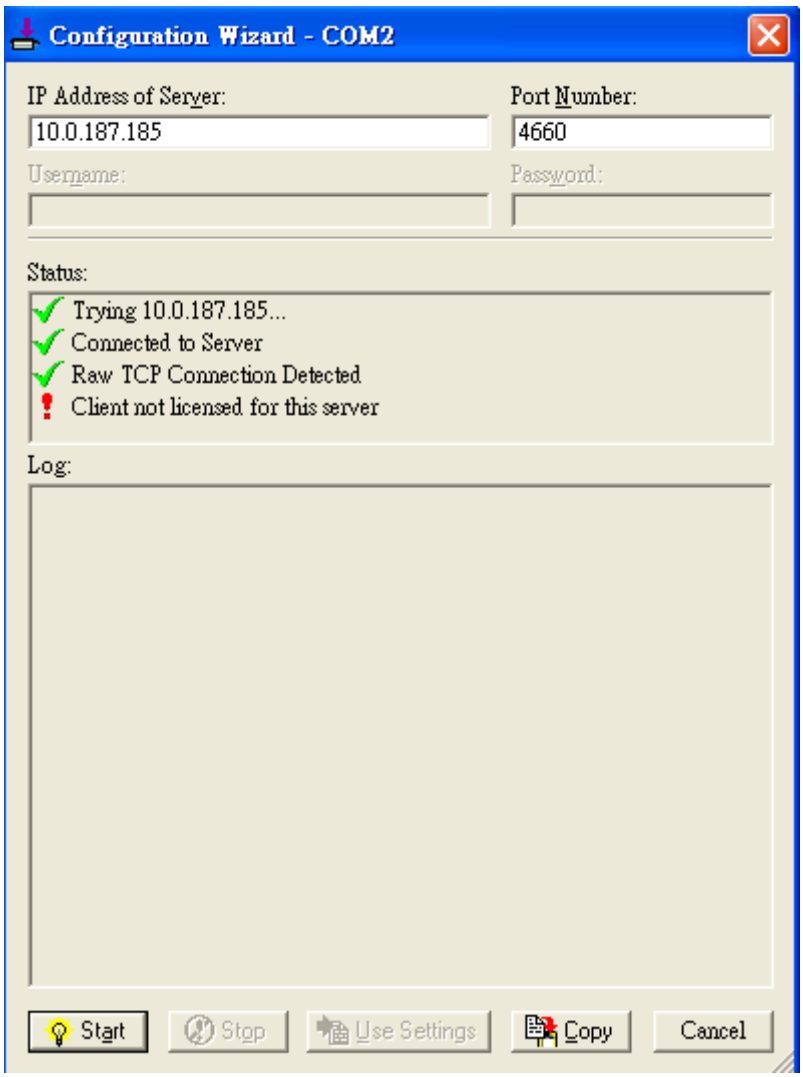


Fig. 4. 9

- If there is a check with **Raw Connection Detected** and an exclamation mark with Client not licensed for this server (Fig. 4. 9), enable Virtual COM in the serial device server.

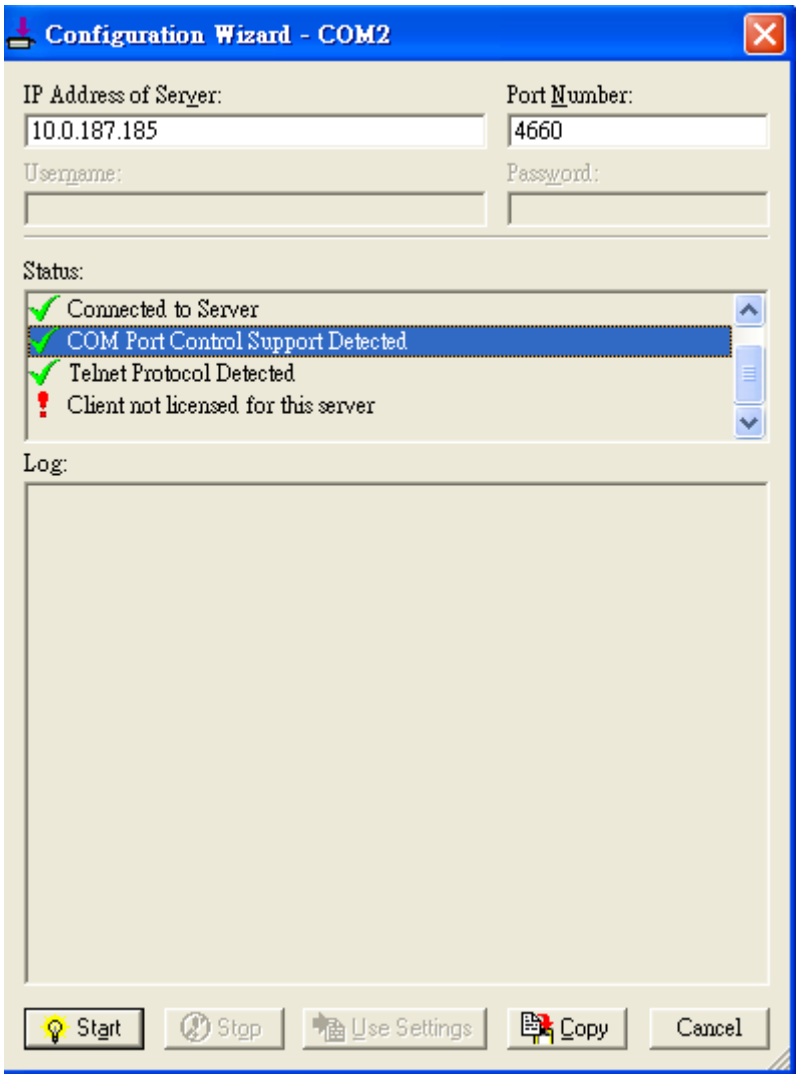


Fig. 4. 10

- If there is a check with **Telnet Protocol Detected** and an exclamation mark with **Client not licensed for this server** (Fig. 4. 10), this means that there is a licensing issue between the serial device server and Serial/IP. Please contact Atop technical support to obtain the correct Virtual COM software.

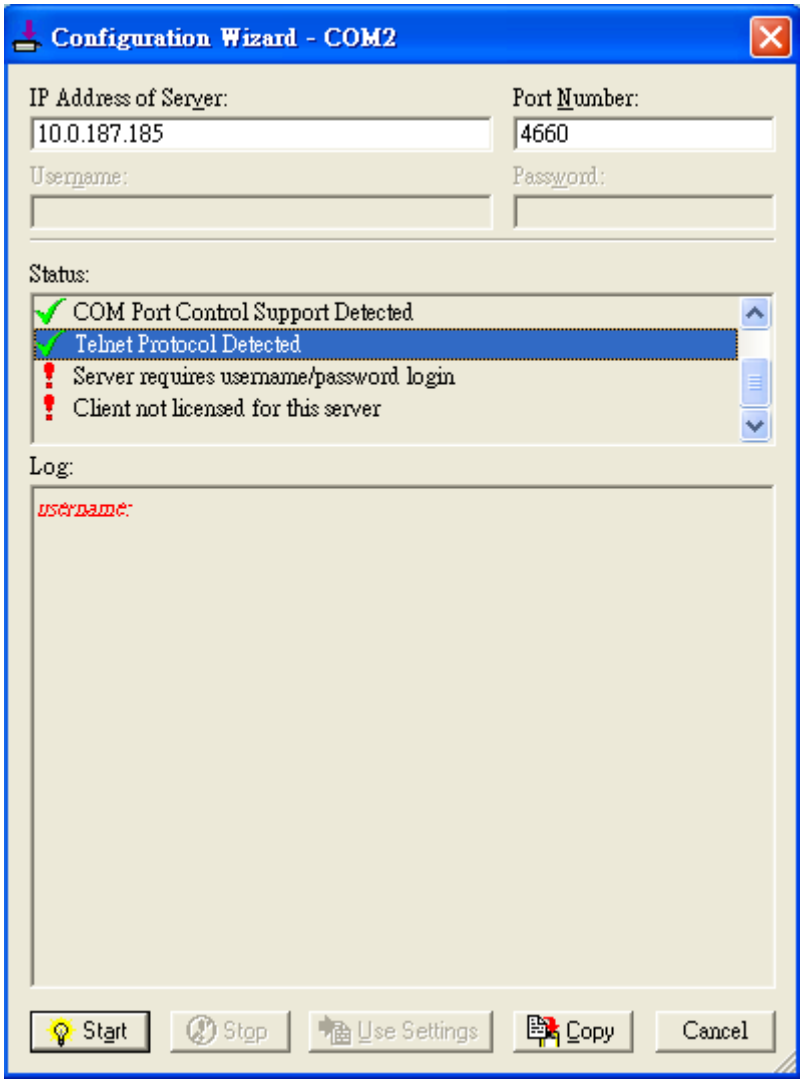


Fig. 4. 11

- If the exclamation mark begins with **Server requires username/password login** (Fig. 4. 11), it means Virtual COM Authentication in the serial device server is enabled, but credentials in the Serial/IP are not enabled.

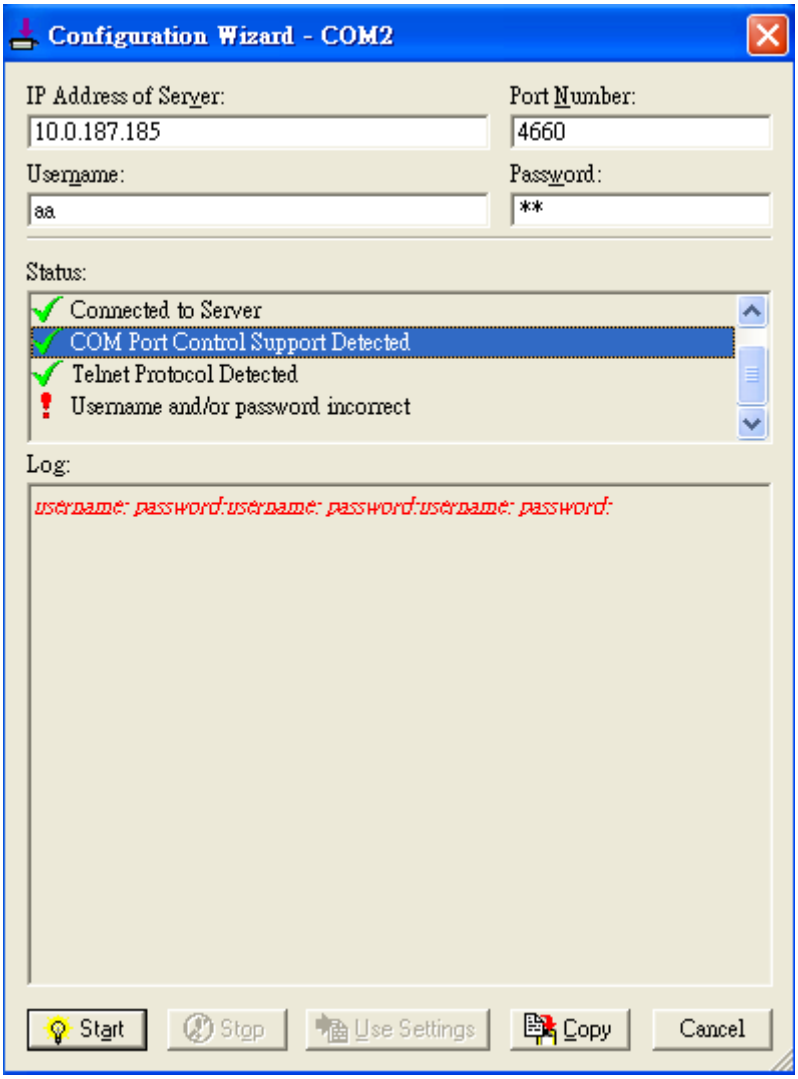


Fig. 4. 12

- If the exclamation mark begins with **Username and/or password incorrect** (Fig. 4. 12), this means the wrong username and/or password was entered and the authentication failed.

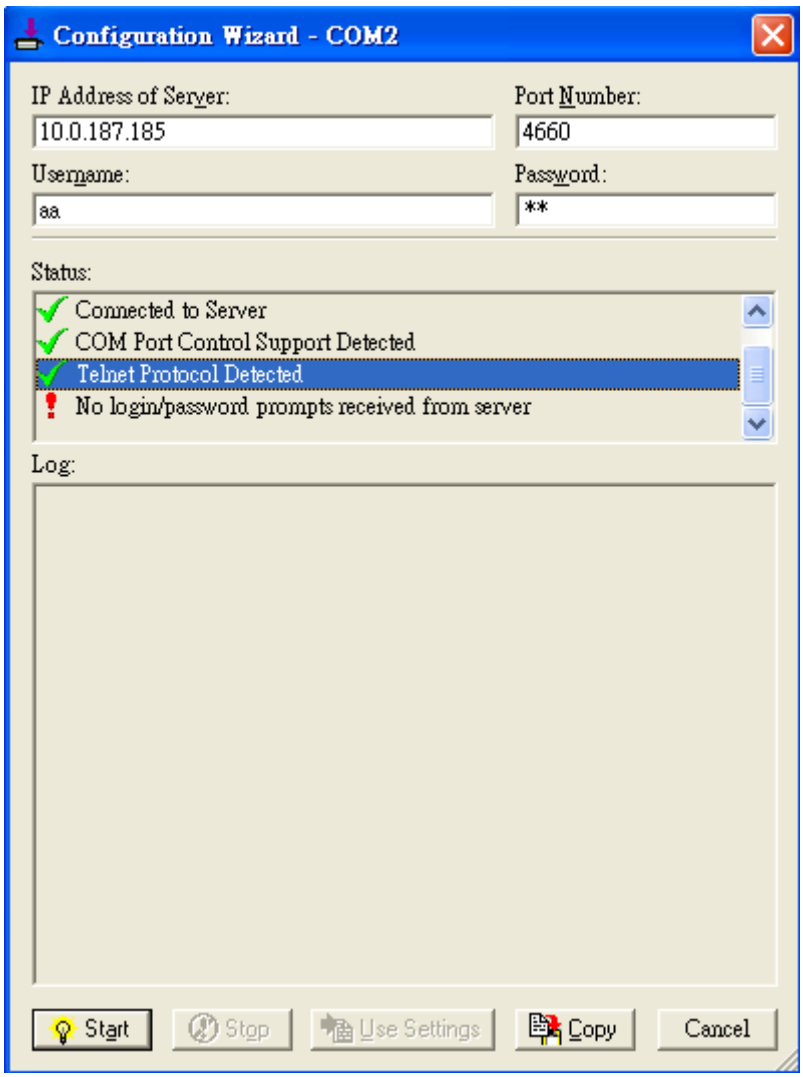


Fig. 4. 13

- If the exclamation mark begins with **No login/password prompts received from server** (Fig. 4. 13), it means credentials in the Serial/IP are enabled, but Virtual COM Authentication in the serial device server is not enabled.

4.4 Using Serial/IP port Monitor

4.4.1 Opening the Port Monitor

The Serial/IP Port Monitor can be opened by:

- Start→All Programs→Serial/IP →Port Monitor
- Double click the Serial/IP tray icon in the Windows notification area.
- In the Windows notification area (Fig. 4. 3), right click on the Serial/IP tray icon and click on **Port Monitor** to open the **Port Monitor.**
- Click on the **Port Monitor** button in the Serial/IP Control Panel.

4.4.2 The Activity Panel

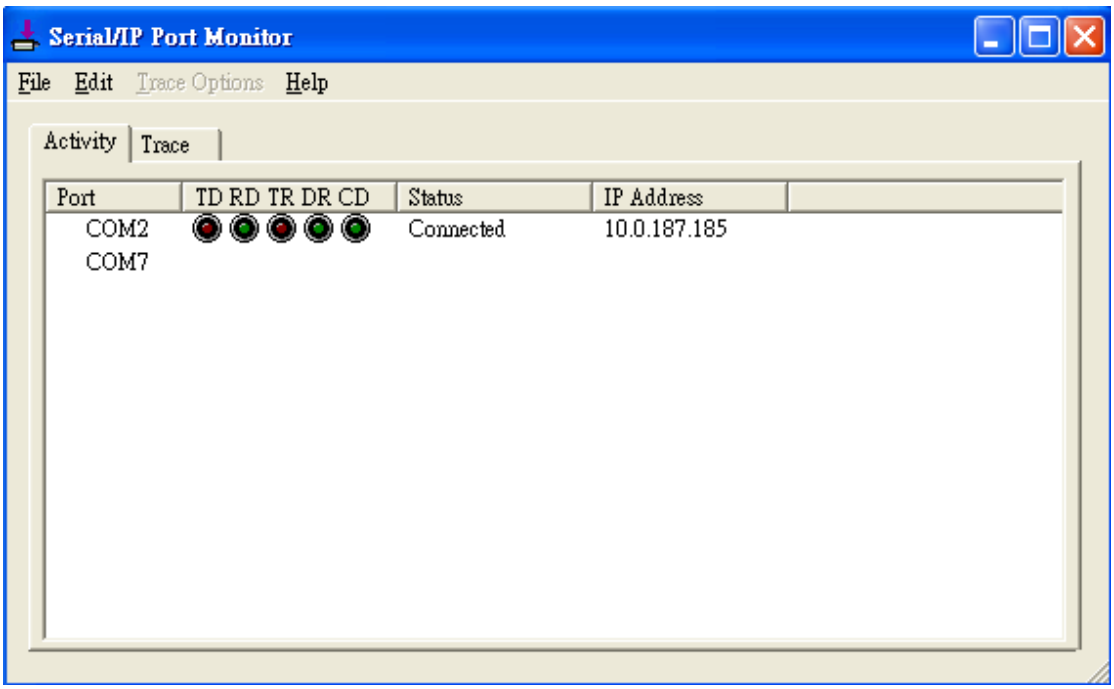


Fig. 4. 14

The Activity panel provides a real-time display of the status of all Serial/IP COM ports (Fig. 4. 14). If the Virtual COM Port is open and is properly configured to connect to a serial device server, the status would be **Connected.** If Serial/IP cannot find the specified serial device server, the status would be **Offline**.

4.4.3 The Trace Panel

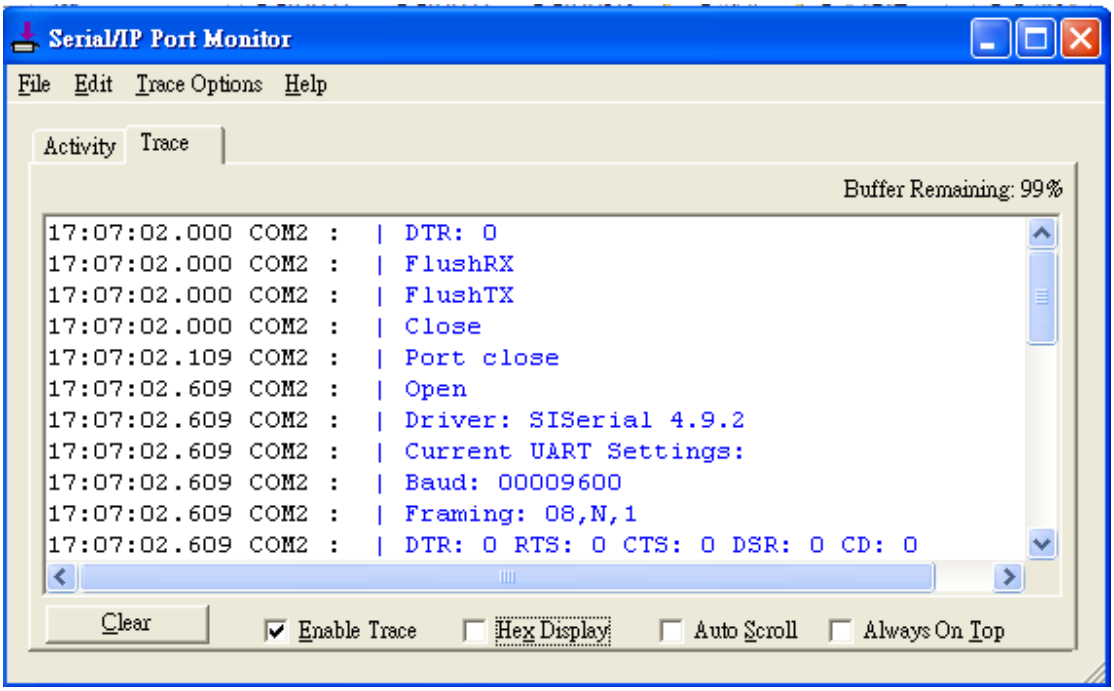


Fig. 4. 15

The Trace panel provides a detailed, time-stamped, real-time display for all **Serial/IP COM ports** operations (Fig. 4. 15). Click on **Enable Trace** to start logging Virtual COM communication. Click on File→Save As and send the log to Atop for analysis when problems arise with Virtual COM.

4.5 Serial/IP Advanced Settings

In the Serial/IP Control Panel, Click on the **Advanced** button to open Advanced Settings window, Fig. 4. 16. Click on **Use Default Settings** to load the default settings.

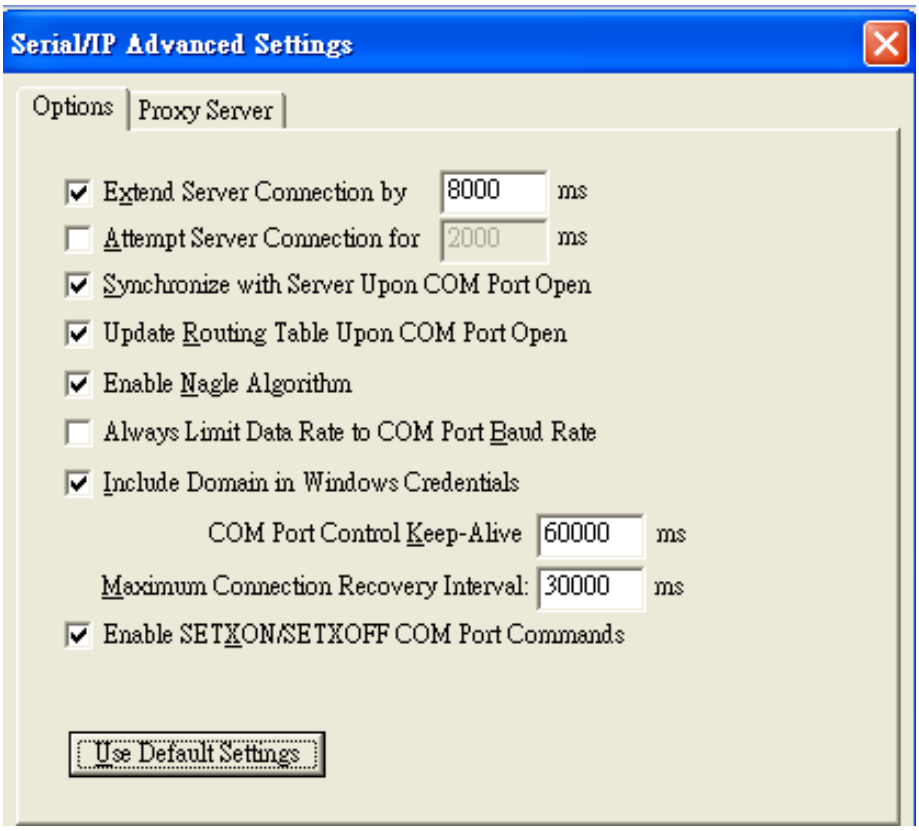


Fig. 4. 16

- **Extend Server Connection;** maintains the TCP connection for a specified amount of time after the COM port is closed.
- **Attempt Server Connection;** terminates pending connection attempts if they do not succeed in a specified amount of time.
- **Synchronize with Server Upon COM Port Open;** required by NT Systems (2000, XP, Vista, 7).
- **Update Routing Table Upon COM Port Open;** maintains IP route to a server in a different subnet by modifying the IP routing table.
- **Enable Nagle Algorithm;** provides better network efficiency by imposing a minor latency on the data stream while it waits to fill network packets.
- **Always Limit Data Rate to COM Port Baud Rate;** limits the data rate to the baud rate

that is in effect for the Virtual COM port.

- **Include Domain in Windows Creditentials;** if credential is set to Windows credentials, Virtual COM automatically adds the current Windows domain to the username.
- **COM Port Control Keep-Alive;** controls the interval at which Virtual COM will issue the keep-alive message while there is no activity.
- **Maximum Connection Recovery Interval;** controls the maximum time for “Restore Failed Connection”.
- **Enable SETXON/SETXOFF COM Port Commands;** this option enables additional negotiation of SETXON and SETXOFF commands and is only available for the “V” series serial device servers. If the application requires SETXON/SETXOFF feature, please contact Atop Tech Support.

4.6 Using Serial/IP with a Proxy Server

The Serial/IP Redirector supports TCP network connections made through a proxy server, which may be controlling access to external networks (such as the Internet) from a private network that lacks transparent IP-based routing, such as NAT. Find Proxy Server settings from the Advanced Settings windows and switch to the **Proxy Server** tab, Fig. 4. 17.

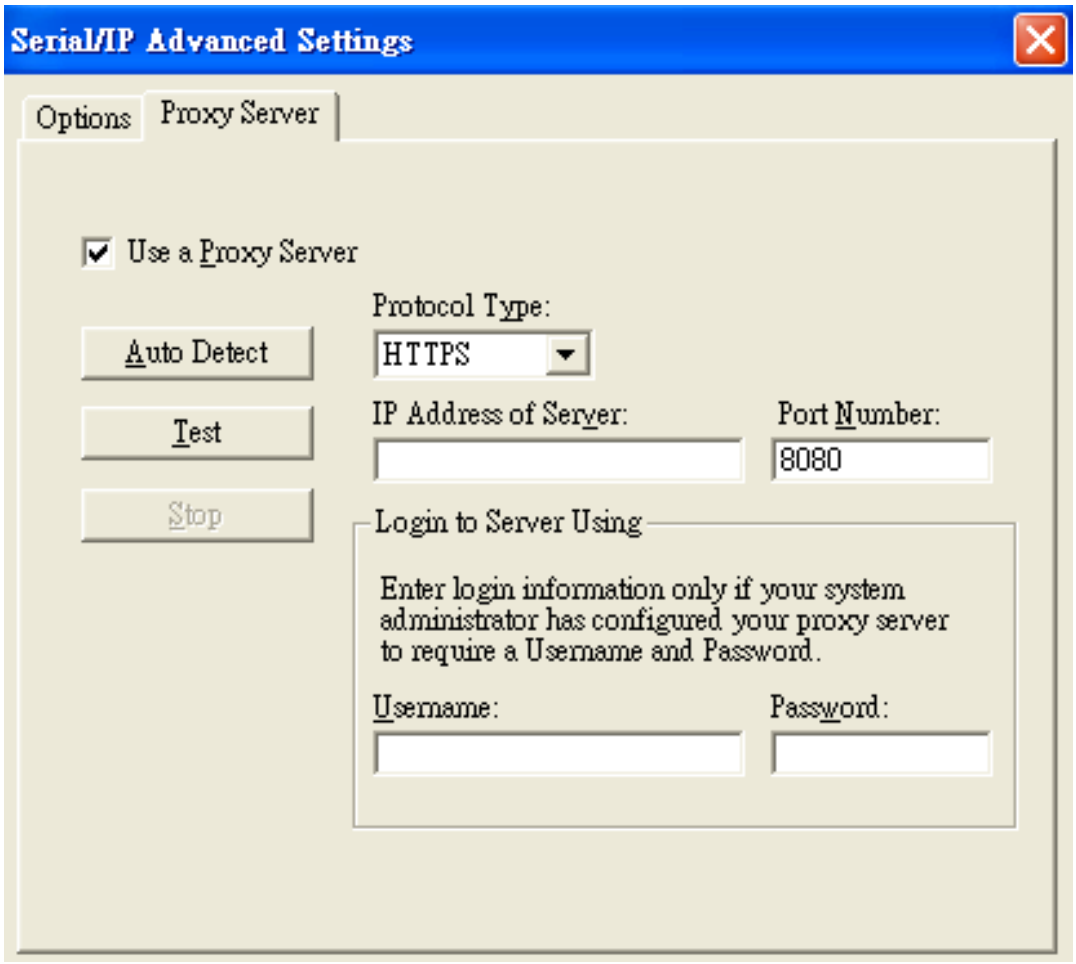


Fig. 4. 17

5.Diagnostics

There are several ways to check the status and availability of a serial device server.

Using Standard ping Command

From the Windows Start menu, select **Run** and type in **"ping<TCP Server IP address>".** If the serial device server can receive ping requests sent from the host, it will reply to the ping message, Fig. 5. 1. If the ping request cannot reach the serial device server, a timed out message will show instead, Fig. 5. 2.

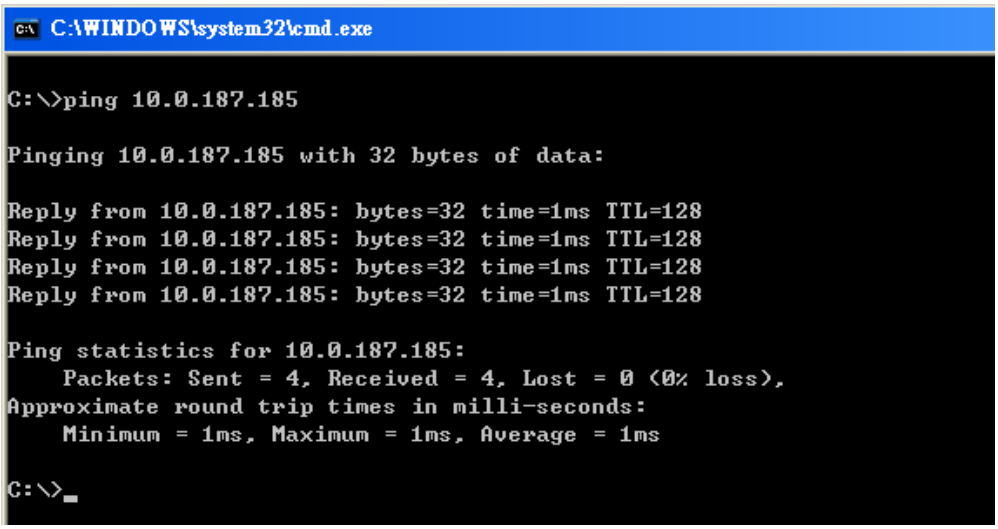


Fig. 5. 1

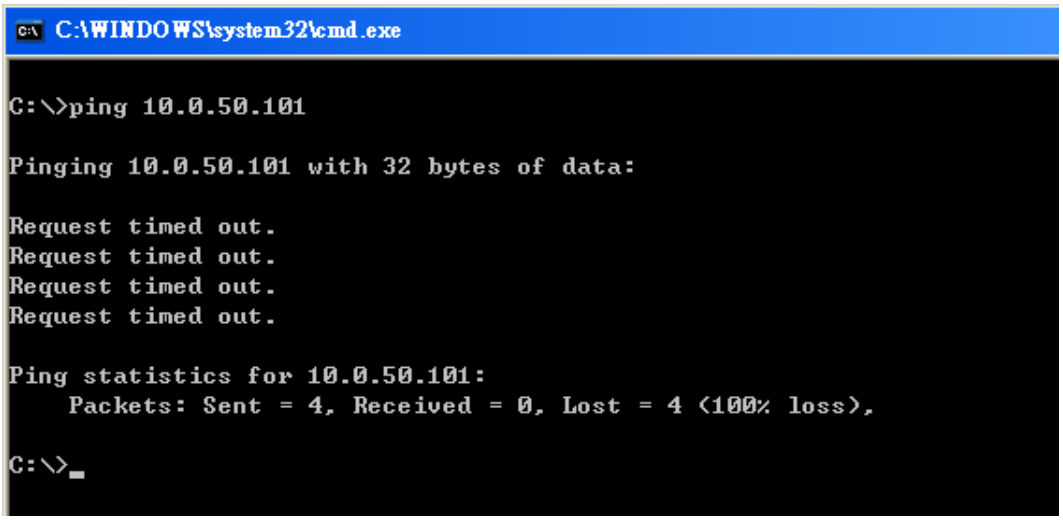


Fig. 5. 2

Using Device Management Utility Configuration Utility

Use the **Device Management Utility** configuration utility that comes with the product CD or download it from our website to check the serial device server's status. The status and version can be read from the tool. For example, **'S'** means that COM1 is in TCP Server mode and is not connected to a TCP Client, Fig. 5. 3. **'A'** means that COM1 is in the server mode and is connected to a TCP Client.

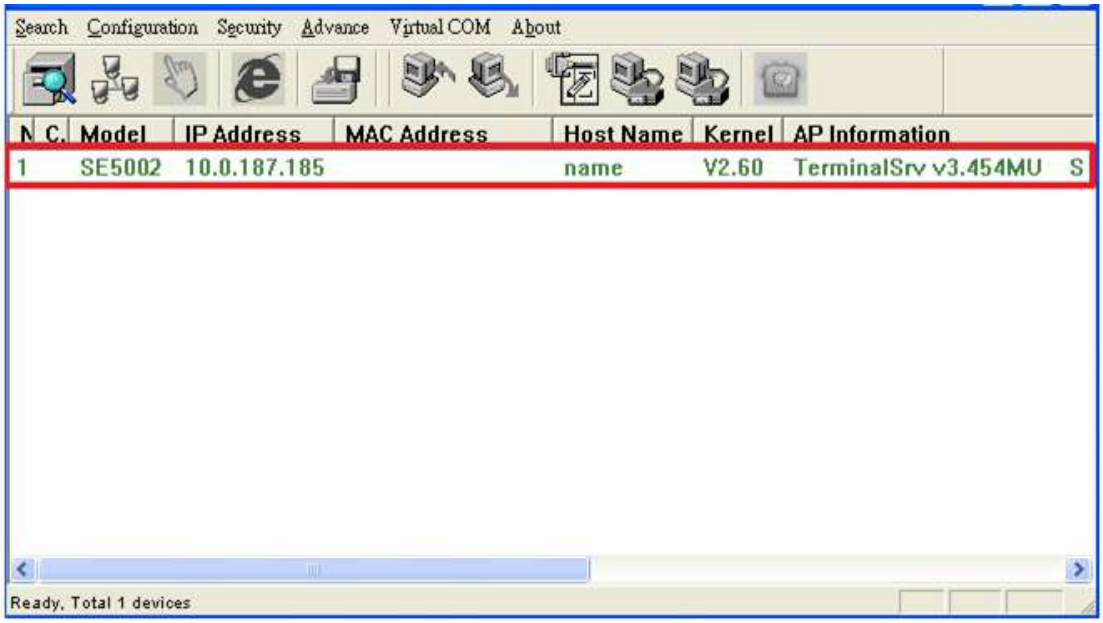


Fig. 5. 3

6.Specifications

Table 6. 1

SE5002D Specifications	
Network Interface	
Fiber Optics	802.3u 100BASE-FX
Connector	IEC 61754-4 Standard Connector (SC)
Serial Interface	
Connector	D-Sub9 RS-232/422/485 software selectable, 3.81mm TB5 RS-232/422/485 software selectable (TB models)
Ports	2 Port
Baud Rate	1200~230 kbps
Data Bits	7,8
Stop Bits	1,2
Flow Control	None, Xon/Xoff, RTS/CTS
Power Characteristics	
Input Voltage	9VDC-48VDC
Input Current (9VDC)	0.45 A
Power Consumption	Approx. 5.85 W (max)
Reverse Polarity Protection	Yes
Connector	5.08mm 3-pin Lockable Terminal Block
Mechanicals	
Dimensions	47 mm x 110 mm x 90 mm
Installation	DIN Rail, Wall Mount (optional)
Reset Button	Yes
Weight	400 g
Environmental Limits	
Operating Temperature	0°C~60°C (32°F~140°F)
Storage Temperature	-40°C~85°C (-40°F~185°F)
Ambient Relative Humidity	5~95% RH, (non condensing)

Software	
Protocols	IPv4, ICMP, TCP, UDP, DHCP Client, SNMP, HTTP, Telnet, RFC2217
Configuration	Device Management Utility, Web UI, Telnet
Virtual COM	Windows/Linux redirection software
Link Modes	
TCP Server	4 connectors, Virtual COM, or Reverse Telnet
TCP Client	Single destination or Virtual COM
UDP	Up to 4 IP ranges

Appendix

Upgrade System Firmware

Firmware is available for download from our Atop website. Subscribe to our RSS System to receive our latest firmware update automatically.

Upgrade Procedures

This section introduces the command line firmware upgrade utility included in the CD. Alternatively, use the GUI management utility Device Management Utility to upgrade the system firmware. Refer to Device Management Utility's manual to use it to upgrade the system firmware. After the new firmware is downloaded, follow the procedures below to upgrade SE5002D.

- ➔ Connect a PC (Windows) and the SE5002D to the same subnet. Use **ping** command or the Device Management Utility utility to verify its availability.
- ➔ Locate **dapdl.cfg** (configuration file), **gwdl.exe** (download executable utility), and **download.bat** (download batch file) in the **\SE5001A\Download_Tool** folder in the CD. Copy all these mentioned files to the system disk.
- ➔ Locate the new system kernel and/or AP firmware to download. Move them inside the copied directory.
- ➔ Double click on **download.bat** to start the firmware upgrade process.

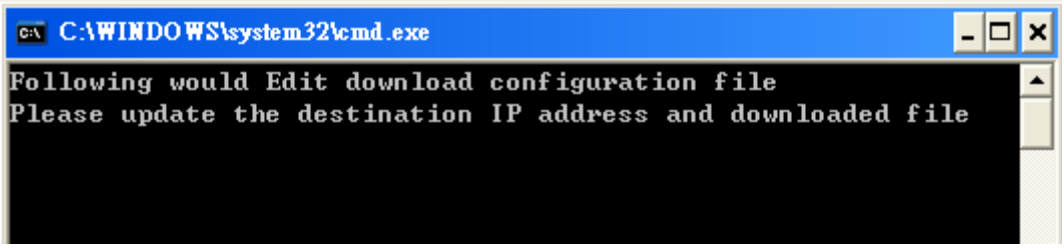


Fig. 1

Note: it is also possible to edit **dapdl.cfg** and run **gwdl.exe** manually without using the batch file **download.bat.**

➔ Press any key to continue.

➔ An editor will open **dapdl.cfg** automatically. Edit the content to match the SE5002D's IP address and the new firmware file name; **"dapl.cfg"** has the following structure.

Remote_IP	**10.0.50.100**
Load	**Firmware.hex**

The first line identifies the SE5002D's IP address, the second line indentifies the firmware's name (.hex) to be downloaded.

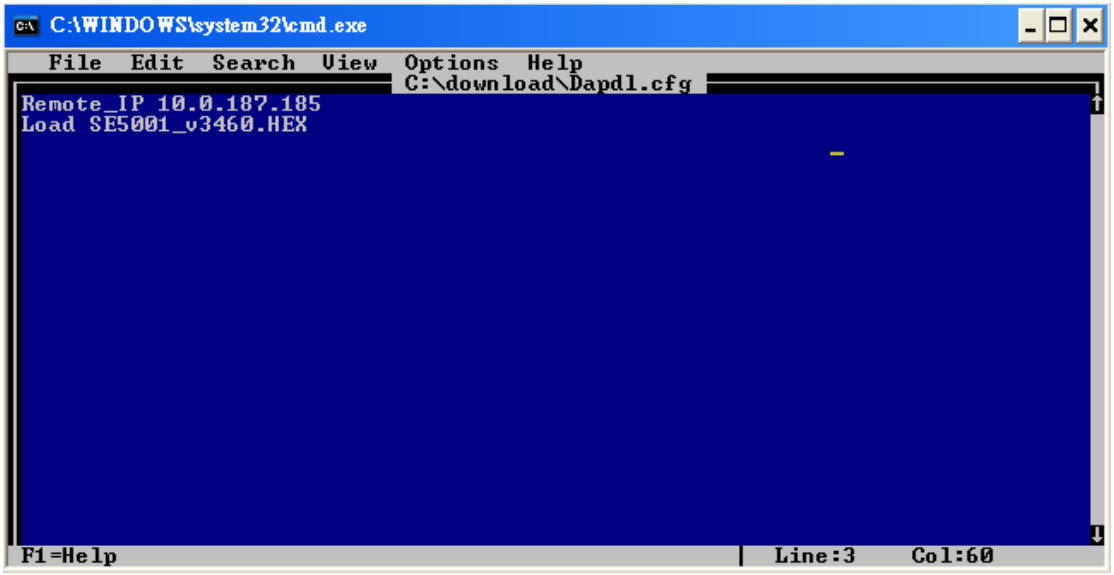


Fig. 2

➔ **File** → **Save** to save the file.

➔ **File** → **Exit** to exit the text editor.

➔ Enter the admin as the user ID and the password for SE5002D. If a password is not set, pres enter. The batch file will upgrade the system firmware. SE5002D will automatically restart after the new firmware is uploaded.

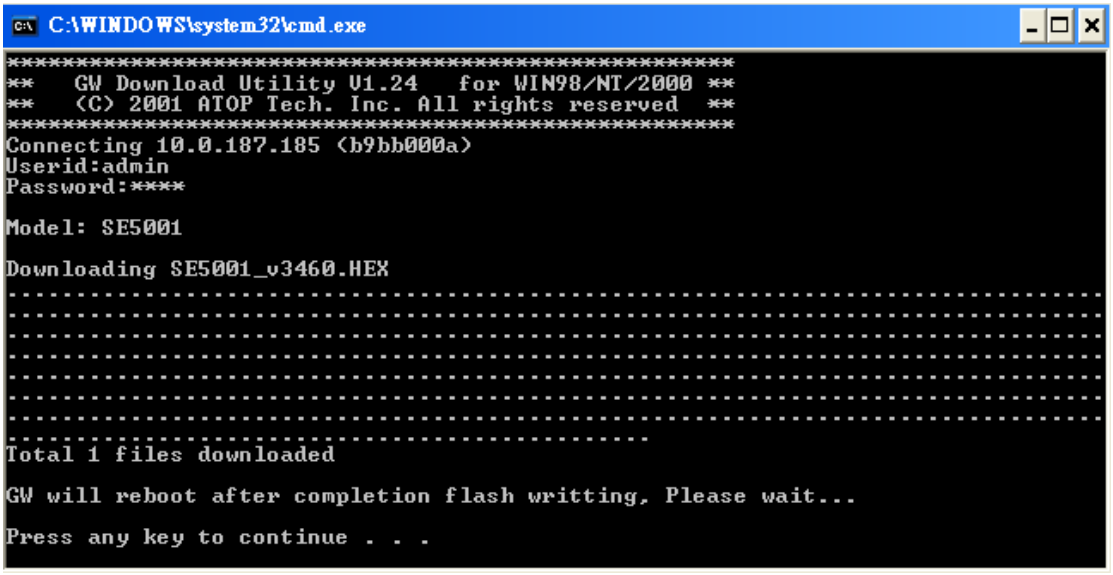


Fig. 3

➔ Repeat the above process again for kernels or AP firmware if necessary.

Note: after the upgrading process finishes, SE5002D will rewrite the flash memory and the buzzer will beep 6 times before restarting. Normally it takes around 10 seconds to complete this process. If there is an error during it, SE5002D will clear the corresponding memory and the system will remain intact as it was.

Error Messages

Firmware upgrade may not be successful if errors occur during the process.

Table 1

Error Cause	Message	Comments
Illegal Hex file format	■ Hex File text Error ■ Hex File Check-Sum Error ■ Hex File Format Error ■ Hex File End of Record Error	
SE5002D handshaking problem	■ SE5002D ACK Start Address Error ■ SE5002D ACK Length Error ■ SE5002D Response Command Error	
Configuration file	■ Remote IP not found ■ Open configuration file failure	

Emergency Firmware Recovery

The AP (application program) firmware for SE5002D can be disabled to restore the device to the proper firmware in case an incompatible firmware was downloaded and the system crashes while loading the AP.

To disable the AP firmware and prevent it from executing please do the following.

- ➔ Power off the device.
- ➔ While the reset button is pressed, power on the device.
- ➔ In Device Management Utility, SE5002D will show up with a default kernel firmware and no AP firmware.
- ➔ Download the correct AP firmware to SE5002D.
- ➔ The device will restart and recover to the downloaded firmware.

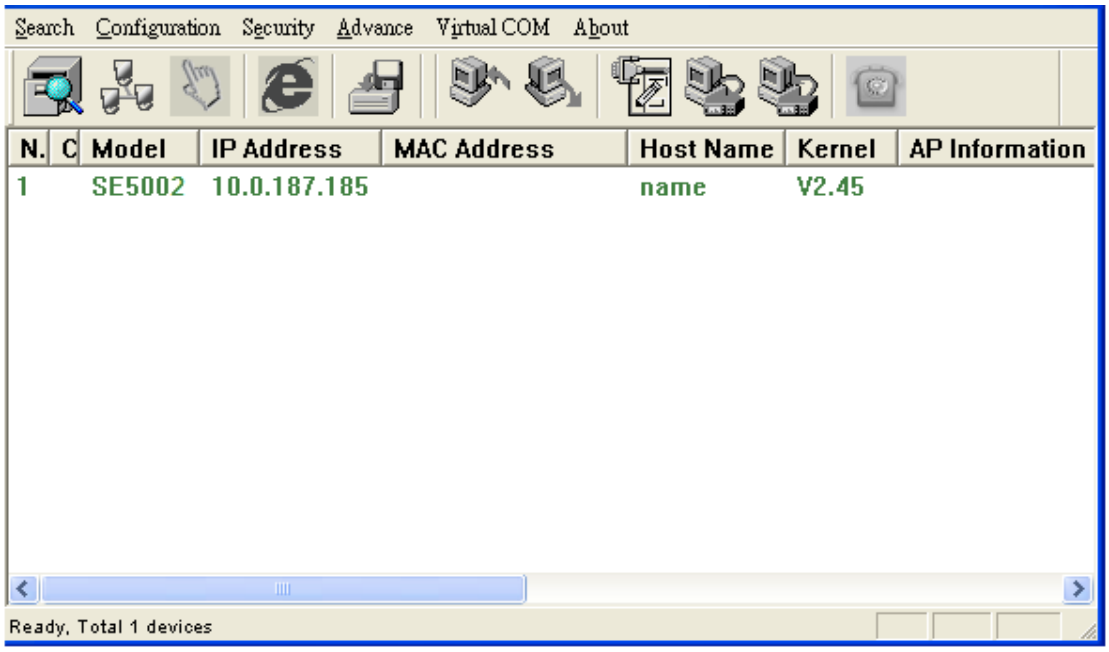


Fig. 4