LINEAR™

AM-SEK

Serial-Ethernet Server

User Manual

IMPORTANT ANNOUNCEMENT

Published by Nortek Security & Control LLC. Toll-Free: (800) 421-1587. Website: www.nortekcontrol.com

This document is intended to provide customers with brief descriptions on the product and to assist customers to get started. For detail information and operations of the product, please refer to www.linear-solutions.com.

FCC NOTICE

We, Nortek Security & Control LLC of 5919 Sea Otter Place, Carlsbad, CA 92010, declare under our sole responsibility that the device, ACP00964 complies with Part 15 of the FCC rules.

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 generates, uses 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 expenses.

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 can be used.

Use only shielded cables to connect the device's RS-232 or RS-485 port.

Be cautioned that changes or modifications not explicitly approved by Nortek Security & Control could void your authority to operate the equipment.

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Figures

1. Introduction

The AM-SEK Ethernet Serial Server is a gateway between Ethernet (TCP/IP) and RS-232 or RS- 485/RS-422 communications. The information transmitted by AM-SEK is transparent to both host computers (Ethernet) and devices (RS-232 or RS-485/RS-422). Data coming from the Ethernet (TCP/IP) is sent to the designated RS-232 or RS-485/RS-422 port and data being received from RS-232 or RS- 485/RS-422 port is sent to the Ethernet (TCP/IP) transparently.

In the computer integration manufacturing or industrial automation area, the AM-SEK Ethernet Serial Server is used for field devices to directly connect to the Ethernet network. The terminal server (main control program run in AM-SEK) transforms whatever data received from RS-232 or RS-485/RS-422 to TCP/UDP port then connect devices to the Ethernet network via a single application program or multiple application programs.

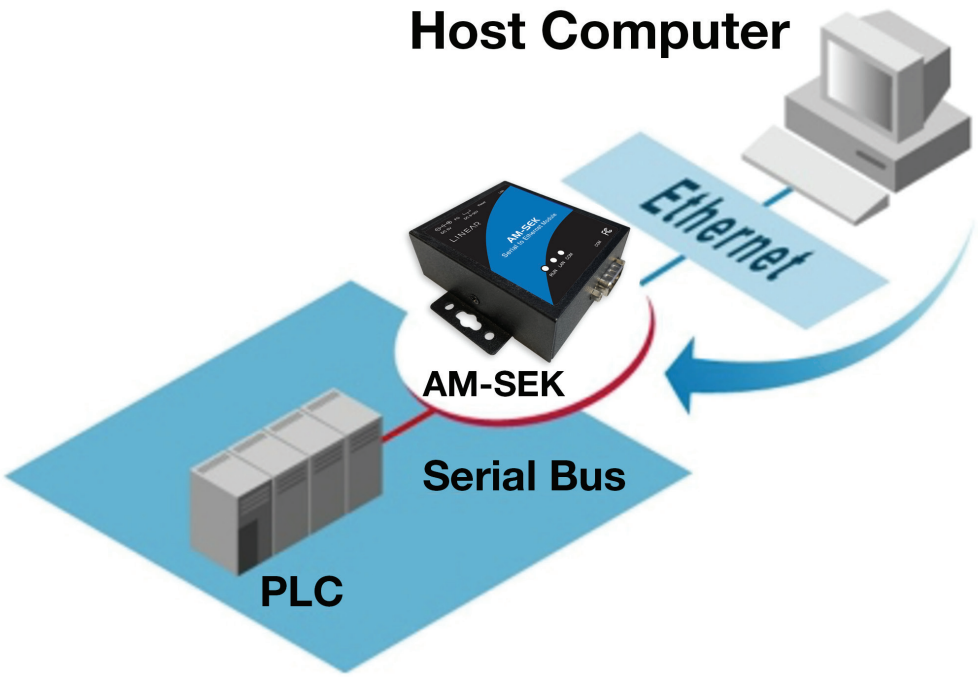
Many control devices provide the ability to communicate with hosts through RS-232 or RS-485/RS-422, however RS-232 or RS-485/RS-422 serial communication has its limitations. It is hard to transfer data through a long distance. With AM-SEK, it is possible to communicate with a remote device in the Intranet environment or even in the Internet, Therefore, this setup increases the communication distance dramatically.

AM-SEK offers one RS-232 or RS-485/RS-422 port, one RJ45 Ethernet and a Watch-Dog Timer.

1.1 Application Connectivity

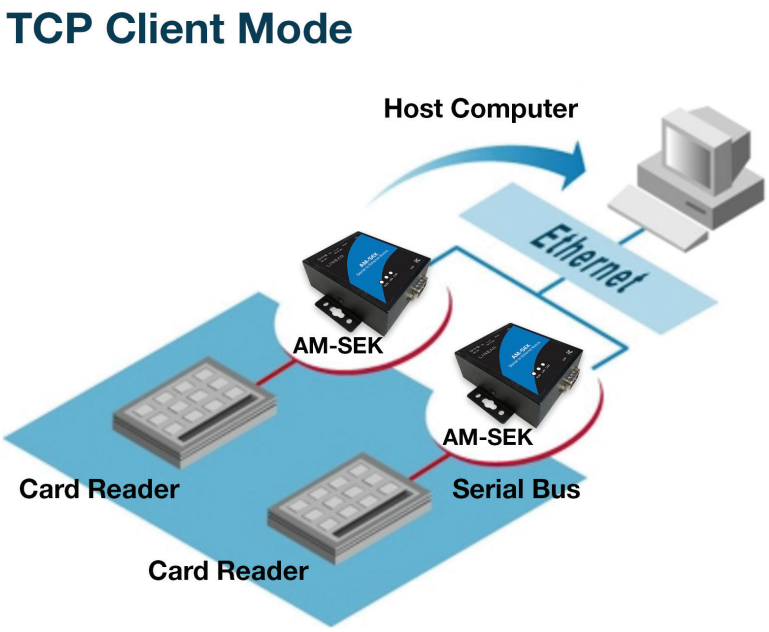
TCP Server Mode

The AM-SEK can be configured as a TCP server on TCP/IP Networks to wait for other applications (clients) in the host computer to establish a connection with the serial device. After the connection is established between serial device and the host computer, data can be transmitted in both directions.



TCP Client Mode

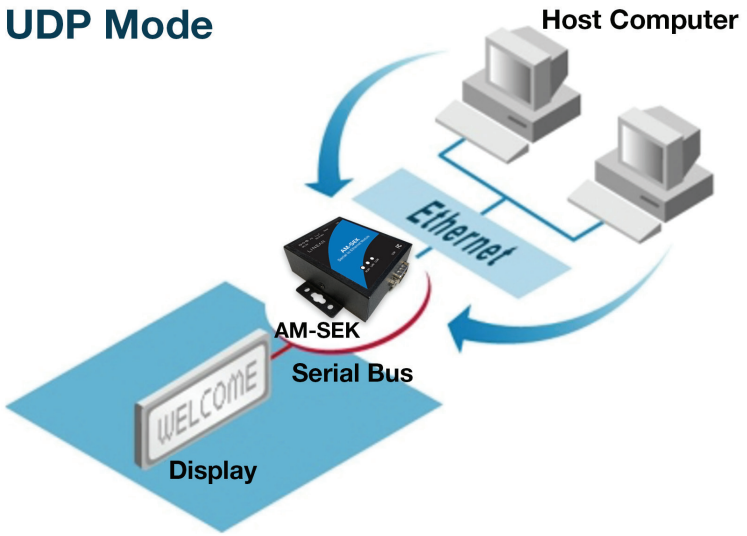
The AM-SEK can be configured as a TCP client on TCP/IP Networks to establish a connection with other applications (server) in the host computer. After the connection is established, data can be transmitted between serial device and the host computer in both directions.



UDP Mode

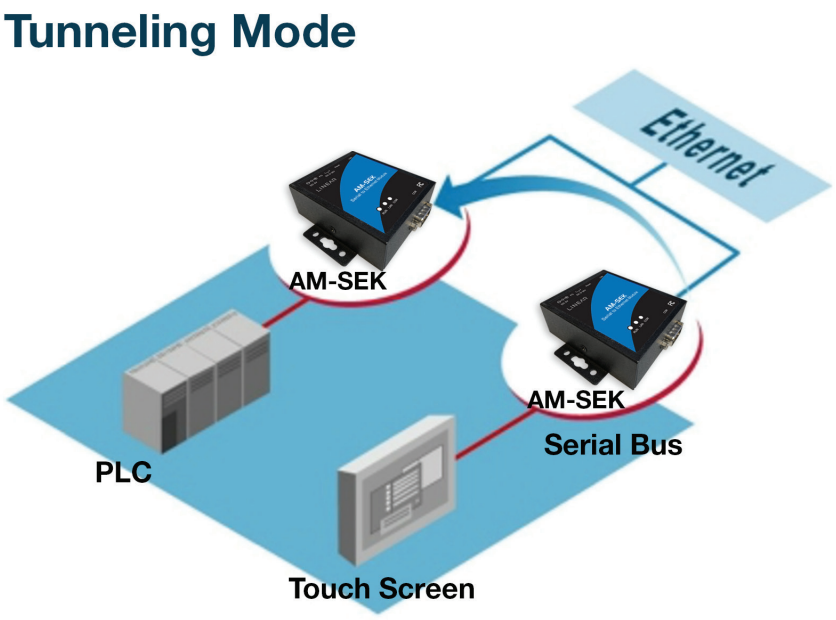
UDP is a faster, but it's a non-guaranteed datagram delivery protocol. AM-SEK can be configured in UDP mode on a TCP/IP Network to establish a connection using *unicast* or *multicast* data from the serial device to one or multiple host computers.

Data can be transmitted between the serial device and the host computers in both directions.



Tunneling Mode

The serial connection can be established with two or more AM-SEK devices to send data over TCP/IP Network. This helps nullify the 15-meter distance limitation normally imposed on an RS-232 interface.



2. Hardware Setup

NOTE:

1. Panel layout available in Appendix A.3.1
2. Press the reset button of AM-SEK to reset the settings to the default values (see Figure 2.1 below).

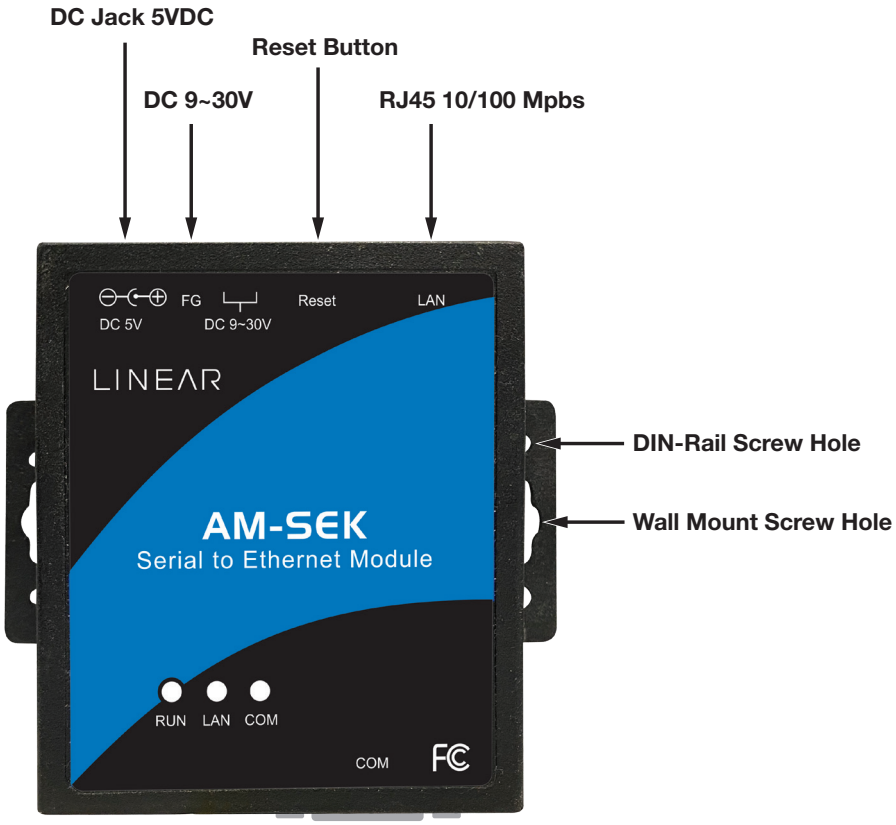


Figure 2.1 AM-SEK interfaces

2.1 LED Indicators

2.1.1 LAN LED

Message	Description
Off	Ethernet Disconnected
Blinking with Green	Data is transmitting on Ethernet for 100Mbps
Blinking with Orange	Data is transmitting on Ethernet for 10Mbps

Table 1. LAN LED Message

2.1.2 COM Port LED

Message	Description
Off	No data is transmitting on COM port
Blinking	Data is transmitting on COM port

Table 2. COM Port LED Message

2.1.3 RUN LED

Message	Description
On	Jumper JP1 Pin1 and Pin2 are shorted to disable AP firmware running
	AP firmware is running normally

Table 3. RUN LED Message

2.2 Installation Procedures

1. Connect AM-SEK to power source using 5VDC jack (or 9~30VDC terminal block power source).

Note: AM-SEK provides two power inputs that can be connected simultaneously to live DC power sources. If any one of the power inputs fails, the other live source acts as a backup to support power needs automatically. The redundant dual DC power inputs give one extra assurance of non-stop operation.

2. Connect AM-SEK to the Ethernet network. Use a standard straight-through Ethernet cable when connecting it to a hub/switch. It can also be connected to the PC's Ethernet port via a cross- over Ethernet cable for easy set up. However in this case, it's necessary to make sure the PC is in the same network sub-net as the AM-SEK.
3. Connect AM-SEK's serial port to a serial device.
4. **Placement options:** Mount AM-SEK to a wall/panel (mounting screws included) or Din-Rail rack (requires optional item model: Din-Rail-Kit DK-25).

3. Software Setup

AM-SEK Ethernet Serial Server is shipped with default settings shown in the following table:

Property	Default Value
IP Address	**10.0.50.100**
Gateway	**10.0.0.254**
Subnet Mask	**255.255.0.0**
Firmware 3.609 or Greater	
User Name	**admin**
Password	**default**
Firmware 3.605 or earlier	
User Name	**admin**
Password	**Null (leave blank)**
COM 1	9600, None, 8, 1, No flow control, buffer disabled, packet delimiter timer 2ms
Link 1	Type: TCP Server, Listen port 4660, Filter=0.0.0.0, Virtual COM disabled
SysName of SNMP	Name
SysLocation of SNMP	location
SysContact of SNMP	contact

3.1 Configuration by Monitor.exe Utility

3.1.1 Static IP

Use **monitor.exe** (available at www.linear-solutions.com) to configure the network parameters of AM-SEK. Click **Config** (see Figure 3.1), then enter static IP information (see Figure 3.2).

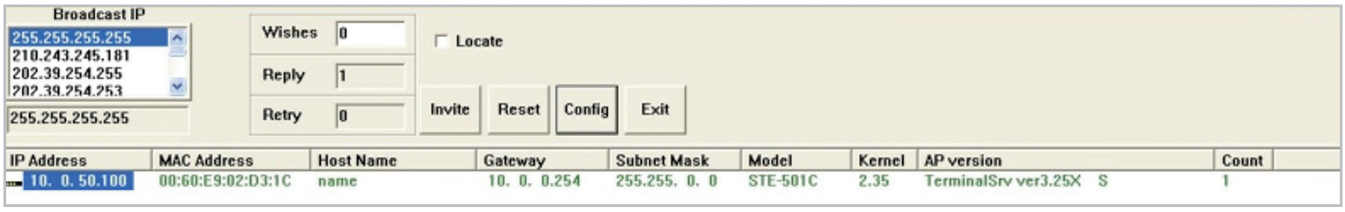


Figure 3.1 Configure by monitor.exe utility

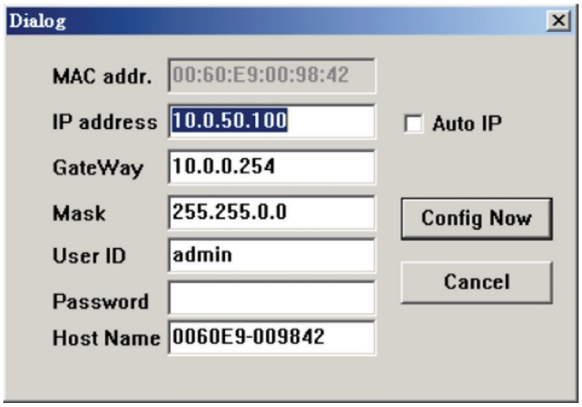


Figure 3.2 Static IP setup dialog window

3.1.2 Auto IP (Dynamic IP)

A DHCP server can automatically assign the IP address and network settings. AM-SEK supports the DHCP function. By default, the DHCP function on AM-SEK is disabled, so the **Monitor.exe** software can be used to search network information automatically using the following steps:

1. Execute Monitor.exe (see Figure 3.1).
2. Click the IP address of AM-SEK in monitor.
3. Click **Config** (the Dialog Window will be displayed).
4. Check **Auto IP**.
5. Click **Config Now**. The AM-SEK will restart, and the IP from DHCP server information is automatically entered.

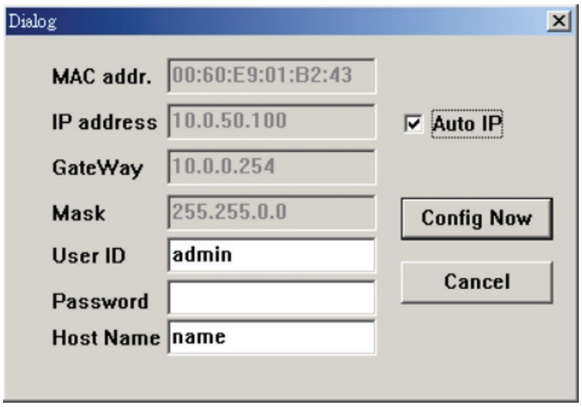


Figure 3.3 monitor.exe Auto IP Dialog Window

3.2 Configuration by Telnet Utility

One can use Telnet utility to change configuration settings of AM-SEK by following steps:

3.2.1 Login to the System

1. Open Ms-DOS command prompt window.
2. Telnet to AM-SEK using command **Telnet IP address**. (For example: Input **Telnet 10.0.50.100** in Ms-DOS command prompt window). Once connected to the AM-SEK, the system prompts for a password. The default password is the word **default** (see Figure 3.4 below).

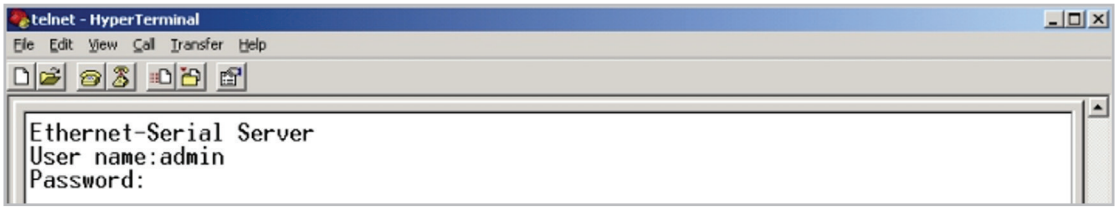


Figure 3.4 Login to the system

Note: One can press the default button of AM-SEK to reset the password to the default value.

3. After verifying the password, the following terminal screen appears:

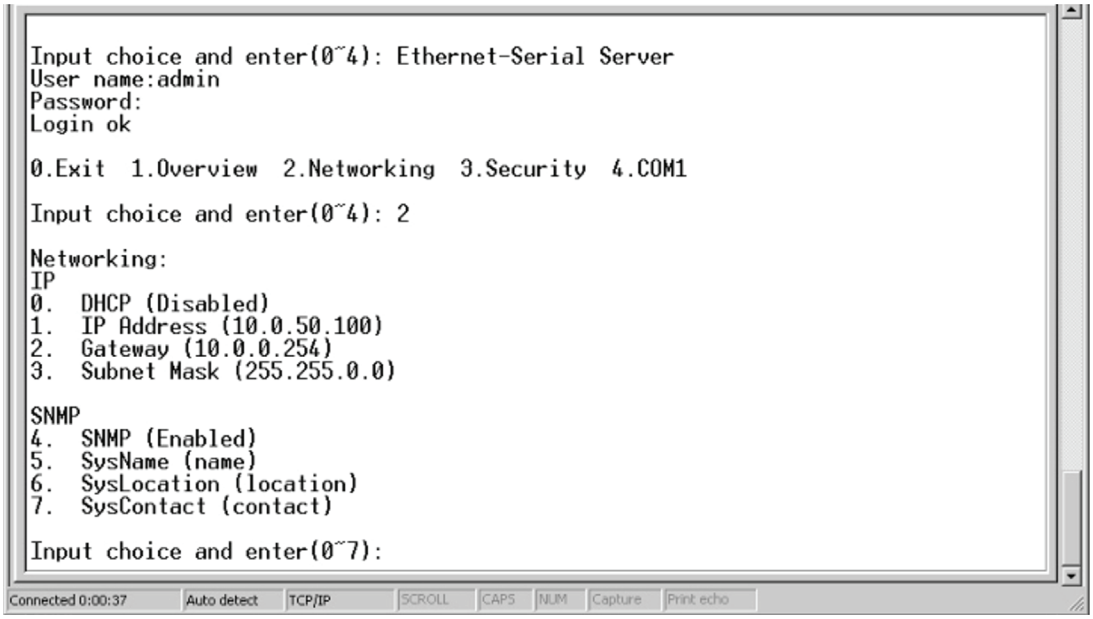


Figure 3.5 Main menu

Notes

- If the AM-SEK does not receive any command within 1 minute, telnet will be terminated automatically.
- The changes of the networking parameters will take effect only when the AM-SEK is exited and restarted.

4. Select 1 from **Input choice and enter (0~4)** to enter the overview page:

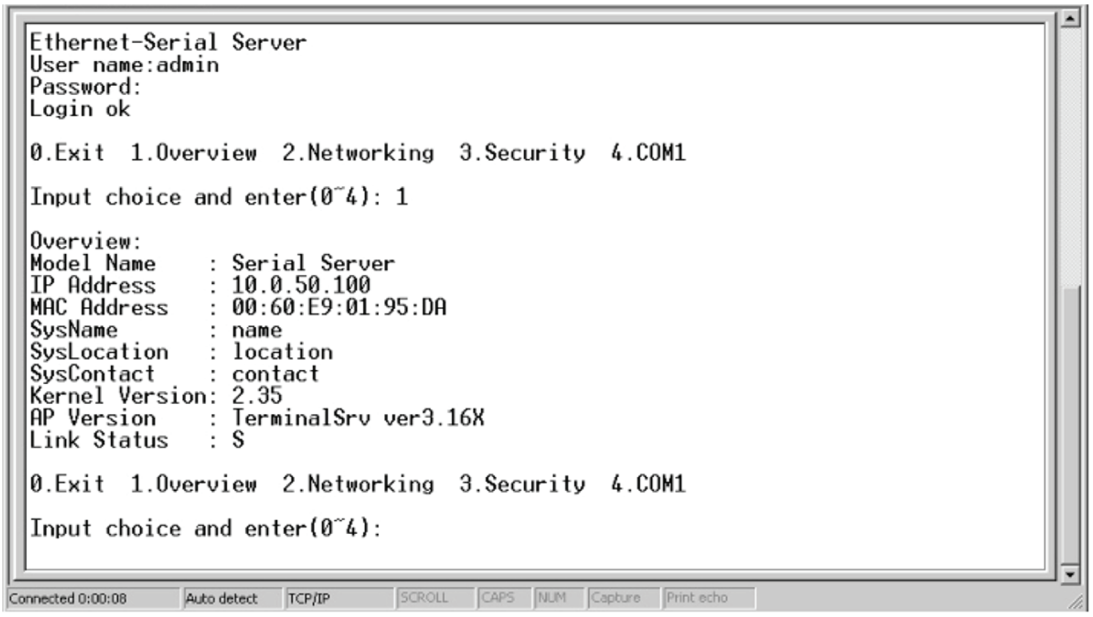


Figure 3.6 Overview

This page gives the general information of the AM-SEK including IP and MAC address, SNMP information, Kernel Version, AP Version, Link Status and the connection status of the device.

3.2.2 Networking

Select **2** from **Input choice and enter (0~4)** to enter the networking page:

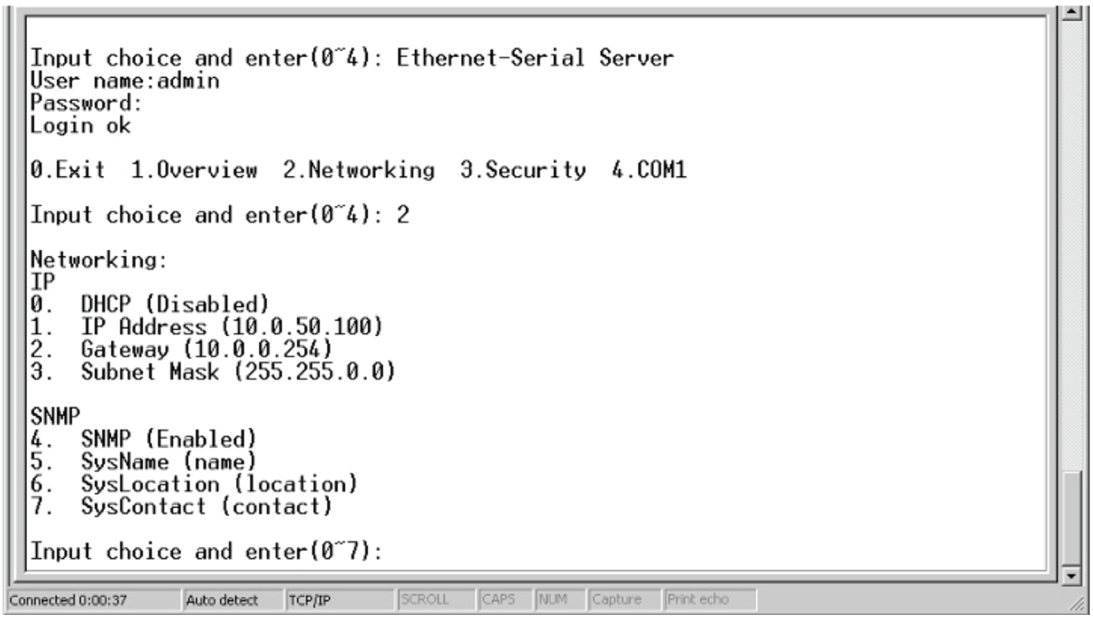


Figure 3.7 Network settings

This page allows a change of the network settings of the device including IP address, Subnet Mask, Gateway IP Address and SNMP Information of the AM-SEK. Please notice that any setting change made on this page won't take effect until one restart the device.

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

3.2.3 Change the Password

1. Select **3** from **Input choice and enter (0~4)**. The following screen appears:

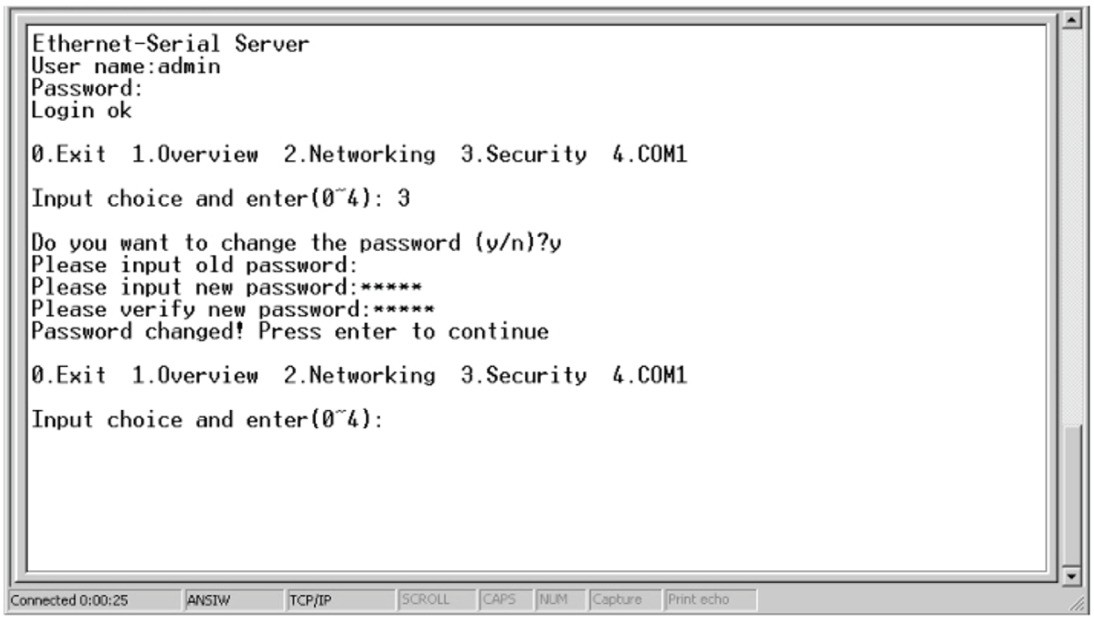


Figure 3.8 Change the password

To change the password, please type the old password in the **Please input old password** field. Type the new password in the **Please input new password** and the **Please verify new password** fields. Note: One can press the default key of product to reset password to the default value.

3.2.4 COM1 Setup

Select **4** from I**nput choice and enter (0~4)**: the following screen appears:

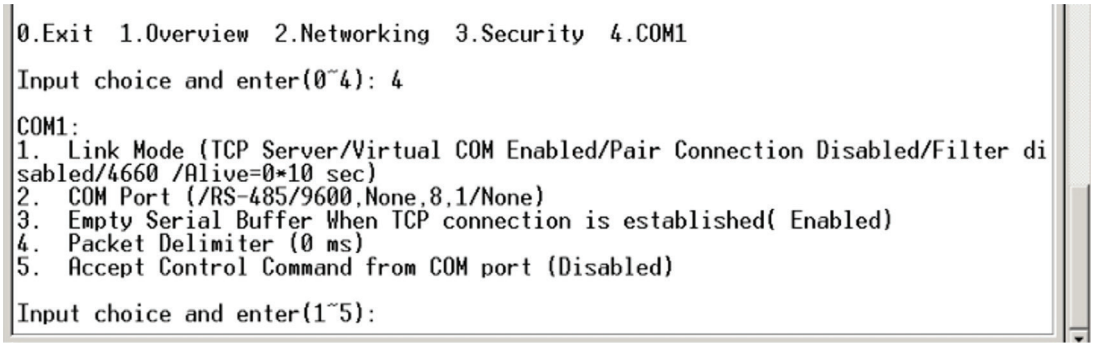


Figure 3.9 Com1 setup

The page gives the opportunity to configure parameters of COM1 setting which include COM1 working mode, port parameters, enabling or disabling serial buffer's data and setting packet delimiter.

LINK Mode Setup **Configure AM-SEK as TCP server** (Figure 3.10)**:**

1. Type **1** from **Input choice and enter (1~4)**.
2. Type **1** in the **Input choice (1~5)** and press **Enter**:
3. Input local port in the **Please input local port**:

A. To enable IP filter if desired:

1. Input **y** for option **Do one want to enable IP filter (y/n)?**
2. Input source IP in the **Please input Filter_IP**:
3. Double click the **Enter** key.

B. If user doesn't want to enable IP filter:

1. Input **n** in the **Do one want to enable IP filter(y/n)?**
2. Double click the **Enter** key.
3. Input idle time to the **Please input idle time to send TCP alive packet(4*10sec)** option. If the input is **2**, the *sending TCP keep alive packet period* will be changed to 2*10 sec.

Notes:

- IP filtering function is disabled if FILTER_IP is set to "0.0.0.0".
- By default, IP filter is disabled.
- If **IP filter** is enabled, only the source IP assigned can connect to AM-SEK.

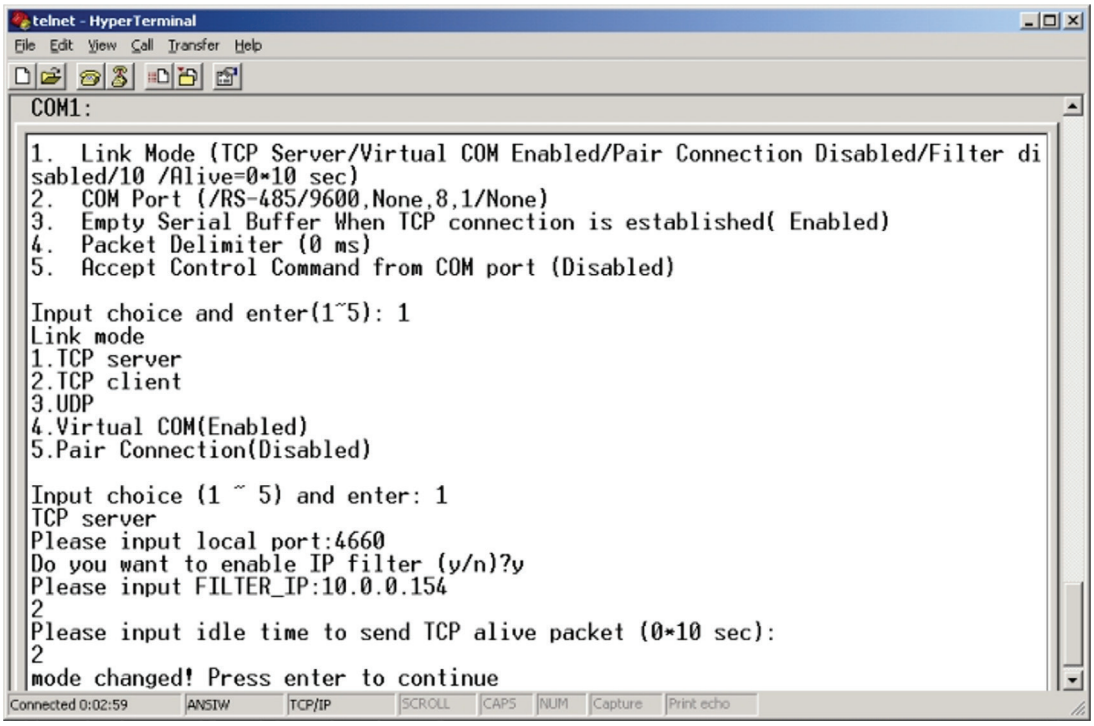


Figure 3.10 Link Mode-TCP server setup

3.2.5 Configure AM-SEK as TCP Client

1. Type **2** in the **Input choice (1~5) and enter** (see Figure 3.11 below).
2. Input the destination IP in the **Please input Destination IP** option.
3. Input the destination port in the **Please input Destination port** option.

A. Type **1** for **Connected always**:

1. Double click **Enter** key.
2. Input the idle time in **Please input idle time to send TCP alive packet(4*10sec)**. If the input is **2**, the *sending TCP keep alive packet period* will be changed to 2*10 sec).

B. Type **2** for *Trigger by receiving COM port*:

1. Input an idle time to disconnect in the **Please input idle time to disconnect (0sec, 1~255)**. If the input is **0**, the function is disabled; if the input is **2**, the serial inactivity beyond 2 sec will result in a disconnection.
2. Input error retrying time in "**Please input waiting time for error retrying (0 minute,1~255**)". If the input is **0**, the function is disabled; if the input is **2**, the serial inactivity beyond 2 sec will result in a disconnection.
3. Double click **Enter** key.
4. Input the idle time in **Please input idle time to send TCP alive packet (4*10sec)**. If the input is **2**, the sending TCP keep alive packet period will be changed to 2*10 sec.

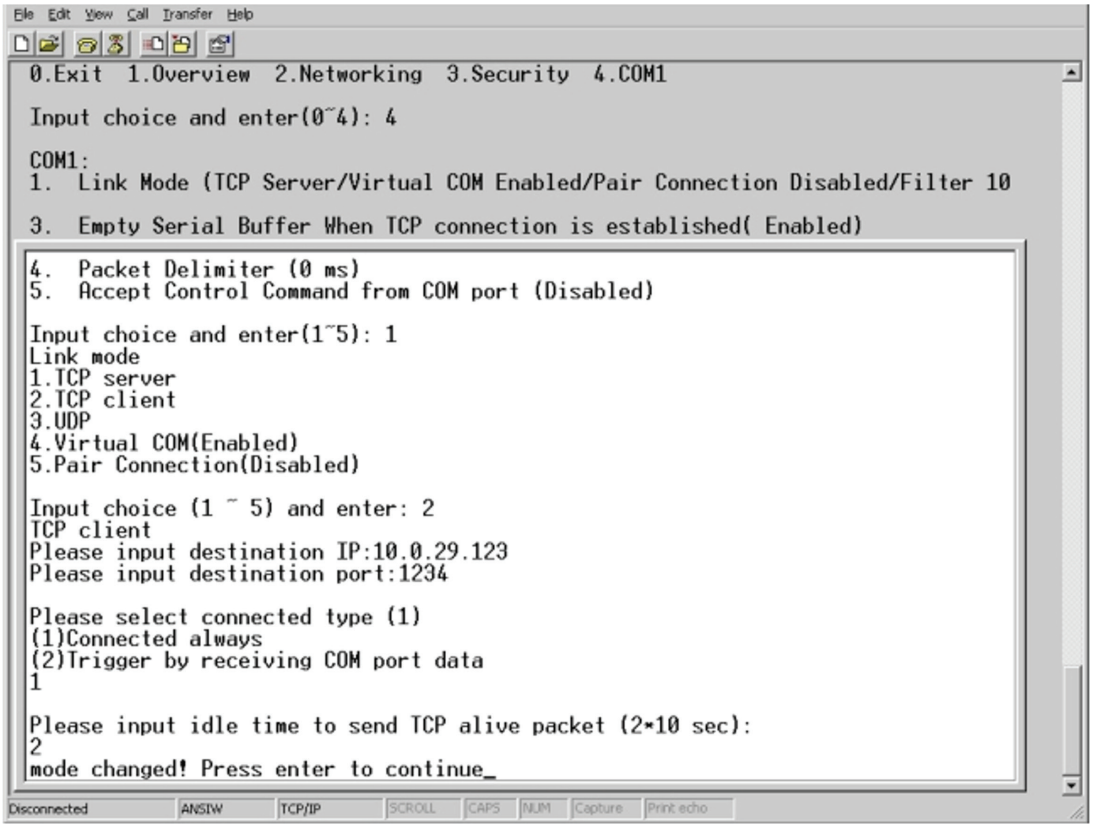


Figure 3.11 Link Mode-TCP client setup

3.2.6 Configure AM-SEK as UDP Client

For example, the local port is 4660, the destination IP is 10.0.29.254 and the destination port is 1234).

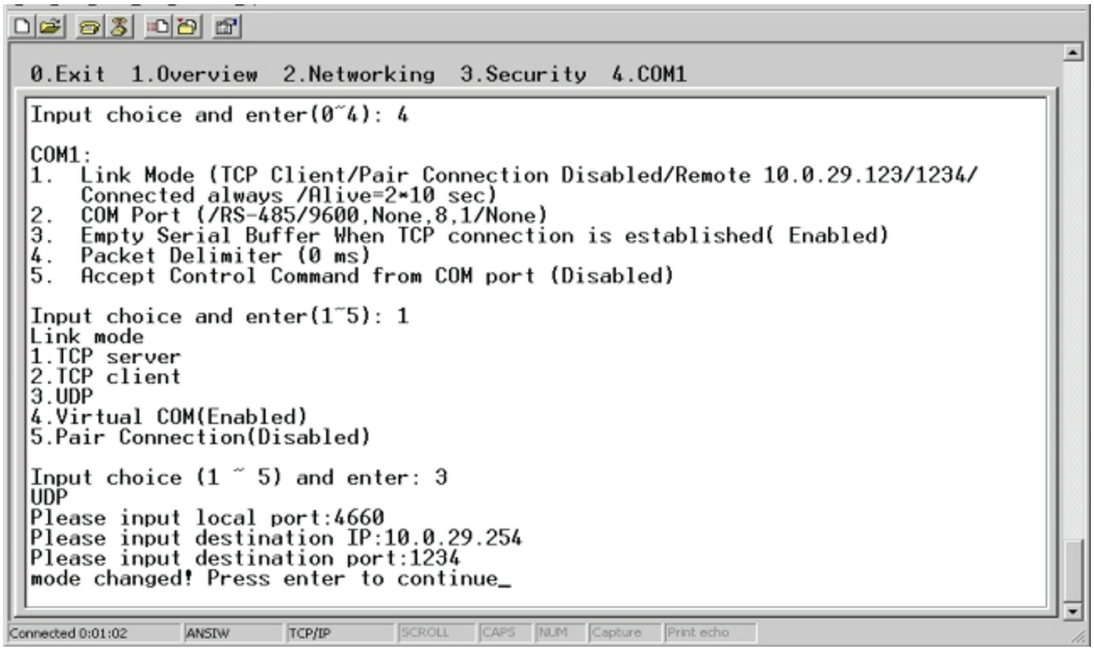


Figure 3.12 Link Mode-UDP client setup

3.2.7 COM Port Setting

Enter **2** for *Input choice and enter (1~4)* for COM1. The following screen appears. The COM port alias name can be given, the baud rate and parity can be set, the number of data bit and stop bit can be determined, the use of flow control and the type of flow control to be used can be decided.

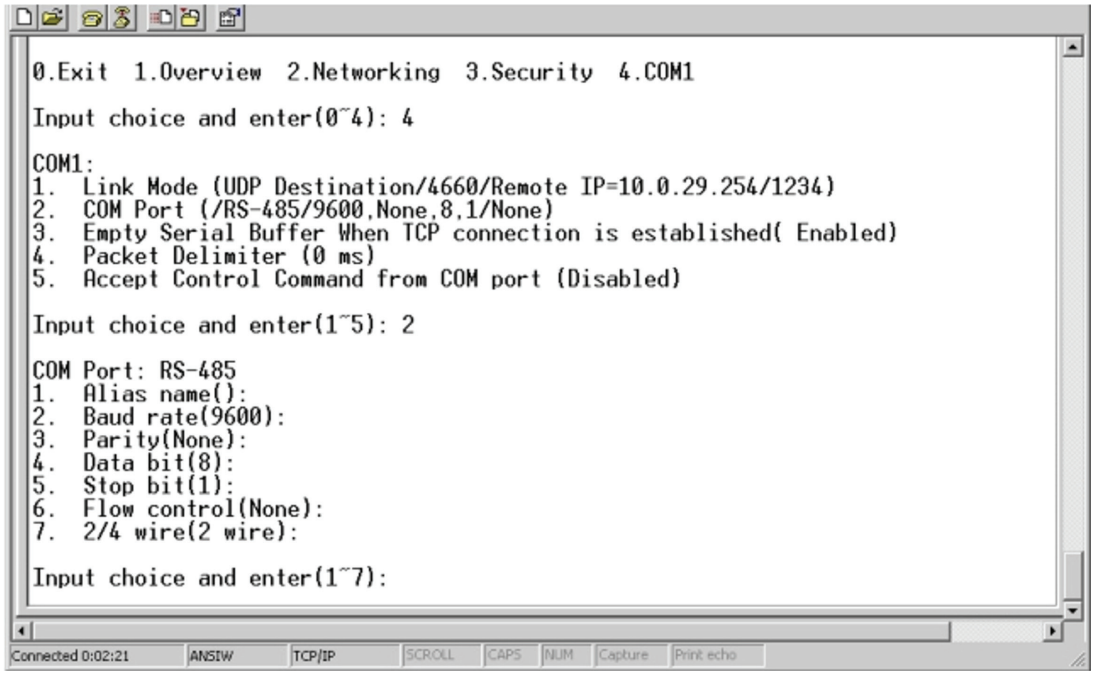


Figure 3.13 Com port setting

3.2.8 Enabling Serial Data Buffer

Type **3** from *Input choice and enter (1~4)* for COM1. By default, COM port serial data buffer is enabled. This means that when TCP/IP Ethernet connection is broken, serial data collected from serial device will be empty in AM-SEK once TCP/IP connection is resumed. The serial data will be sent through Ethernet connection, which can be disabled if desired.

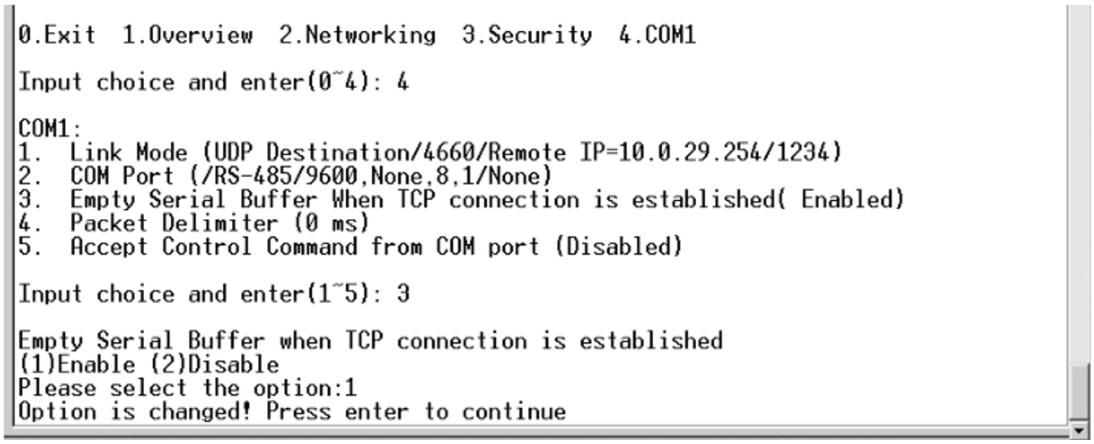


Figure 3.14 Com port-Enabling serial data buffer

3.2.9 Setting Packet Delimiter

Packet delimiter is a way of controlling packets within serial communication. It can prevent packets from being cut, thus keeping the packets complete. AM-SEK provides two ways of parameter setting as inter-character timer and terminator. By default, packet delimiter timer is 1 ms. The timer can be changed as displayed below.

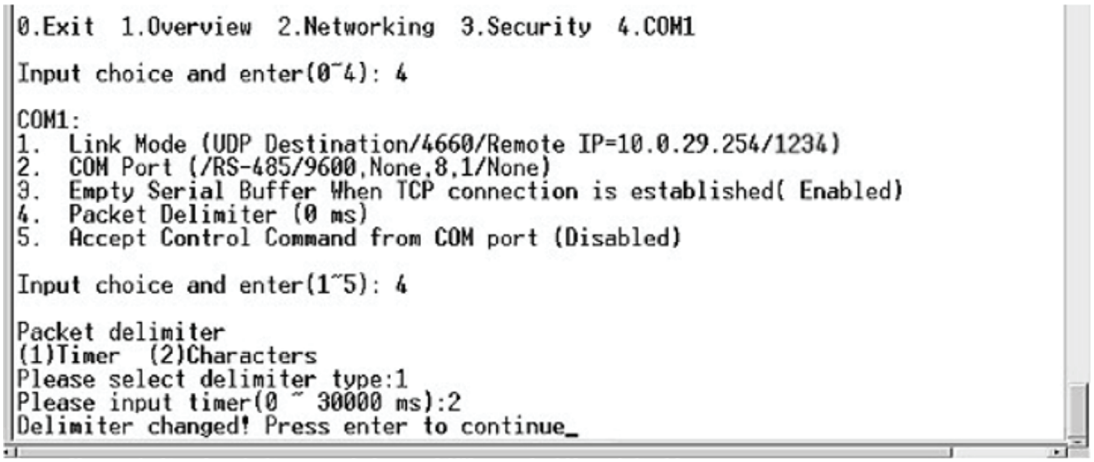


Figure 3.15 Setting packet delimiter timer

The character pattern can be chosen as the packet delimiter indicated below.

```
0.Exit  1.Overview  2.Networking  3.Security  4.COM1

Input choice and enter(0~4): 4

COM1:
1.  Link Mode (UDP Destination/4660/Remote IP=10.0.29.254/1234)
2.  COM Port (/RS-485/9600,None,8,1/None)
3.  Empty Serial Buffer When TCP connection is established( Enabled)
4.  Packet Delimiter (2 ms)
5.  Accept Control Command from COM port (Disabled)

Input choice and enter(1~5): 4

Packet delimiter
(1)Timer  (2)Characters
Please select delimiter type:2
Please input pattern(max 2 bytes, ex:0x0d0a):
```

Figure 3.16 Setting packet delimiter-character pattern

3.2.10 Accept Control Command from COM Port

AM-SEK can also accept serial control commands directly over the network following RFC2217 format. For more detail about this function, please contact Technical Support.

3.3 Configuration Using Web Browser

1. Confirm that the PC is located on the same network sub-net as AM-SEK
2. Open a web browser, then type in the IP address of AM-SEK to be configured. Default user name is **admin** and default password is **default** (password is blank for firmware versions 3.605 or earlier).
3. AM-SEK's network, link mode and COM ports settings can be configured in different web pages.
4. Click **Save Configuration** to save settings.
5. Click **Restart** 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 detailed in sections 3.3.1 to 3.3.6.

3.3.1 Log in to the System

1. From web browser, type in the IP address of AM-SEK in the URL. (Example: http://10.0.50.100)
2. The authentication screen appears (see Figure 3.17). Type in the *User Name* and *Password*, then click **OK**. The default user name and password are **admin** and **password**.

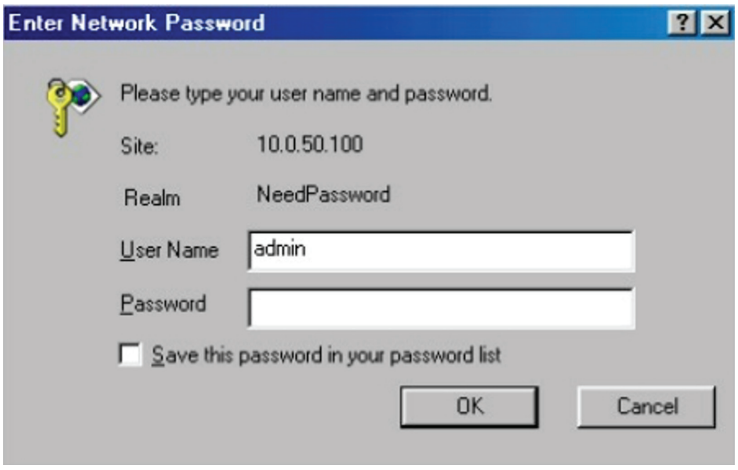


Figure 3.17 login the system via Web

3. The following overview page is displayed.

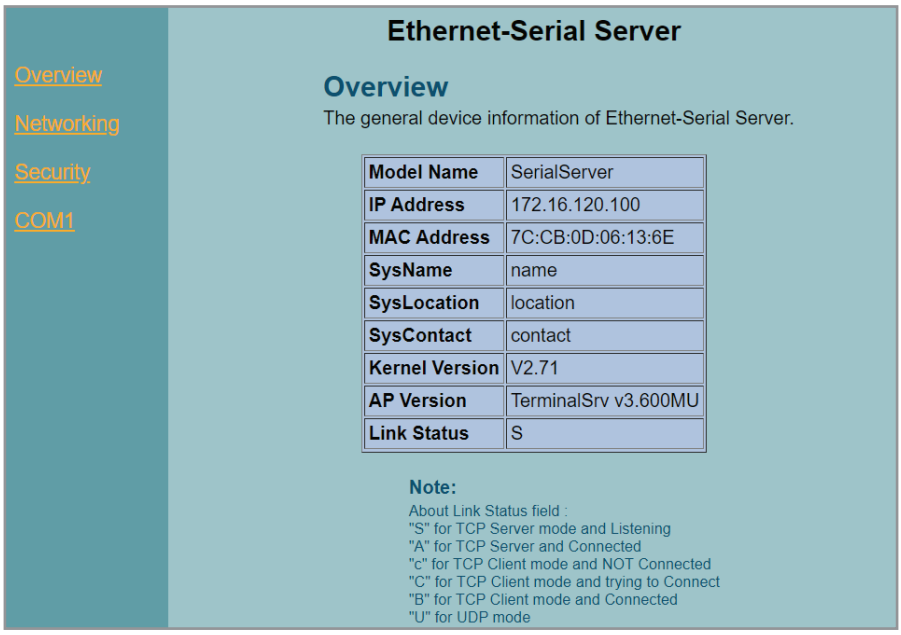


Figure 3.18 Overview

3.3.2 Change the password

1. Click the **Security** link, and the following screen is displayed.

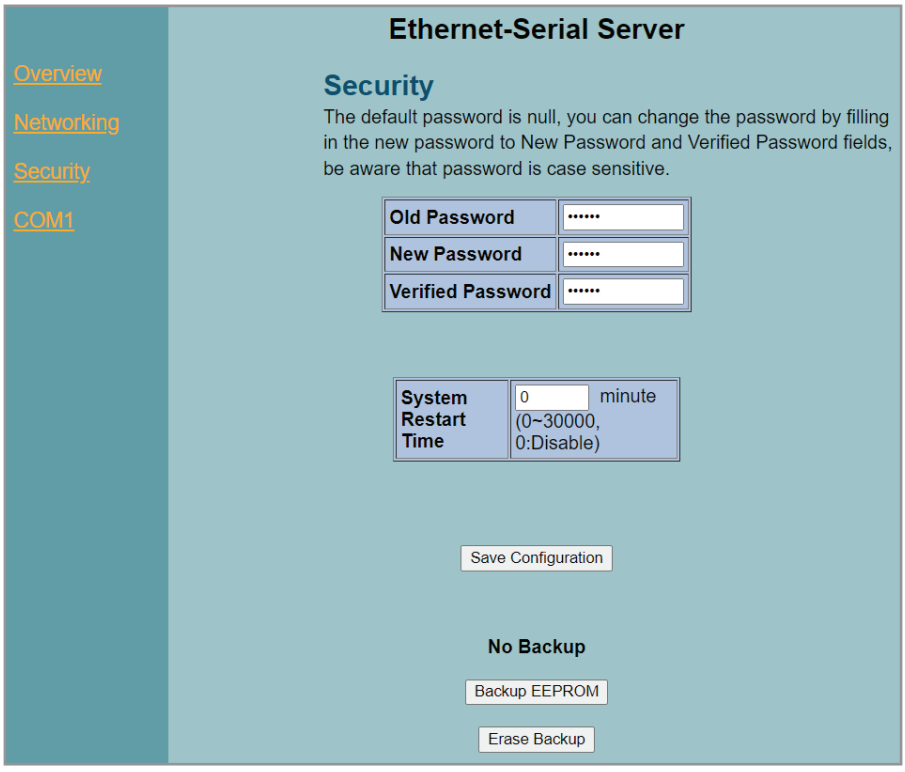


Figure 3.19 Change the password

- Input the current password in the **Old Password** field, input the new password in the **New Password** and **Verified Password** fields, and then click **Save Configuration** to update the password.

Note: Press the product's default key to reset the password to the default value.

3.3.3 Network Setup

1. Click the **Networking** option.
2. Enter IP information under the TCP/IP field. The Configuration can also be modified by clicking DHCP to obtain auto IP Address, Gateway and Subnet Mask information.
3. Enable SNMP by checking **Enable**. Fill in network identification information under the SNMP field.
4. Click the **Save Configuration** button to save the changes. Note that the setting will not become effective until the AM-SEK is restarted.

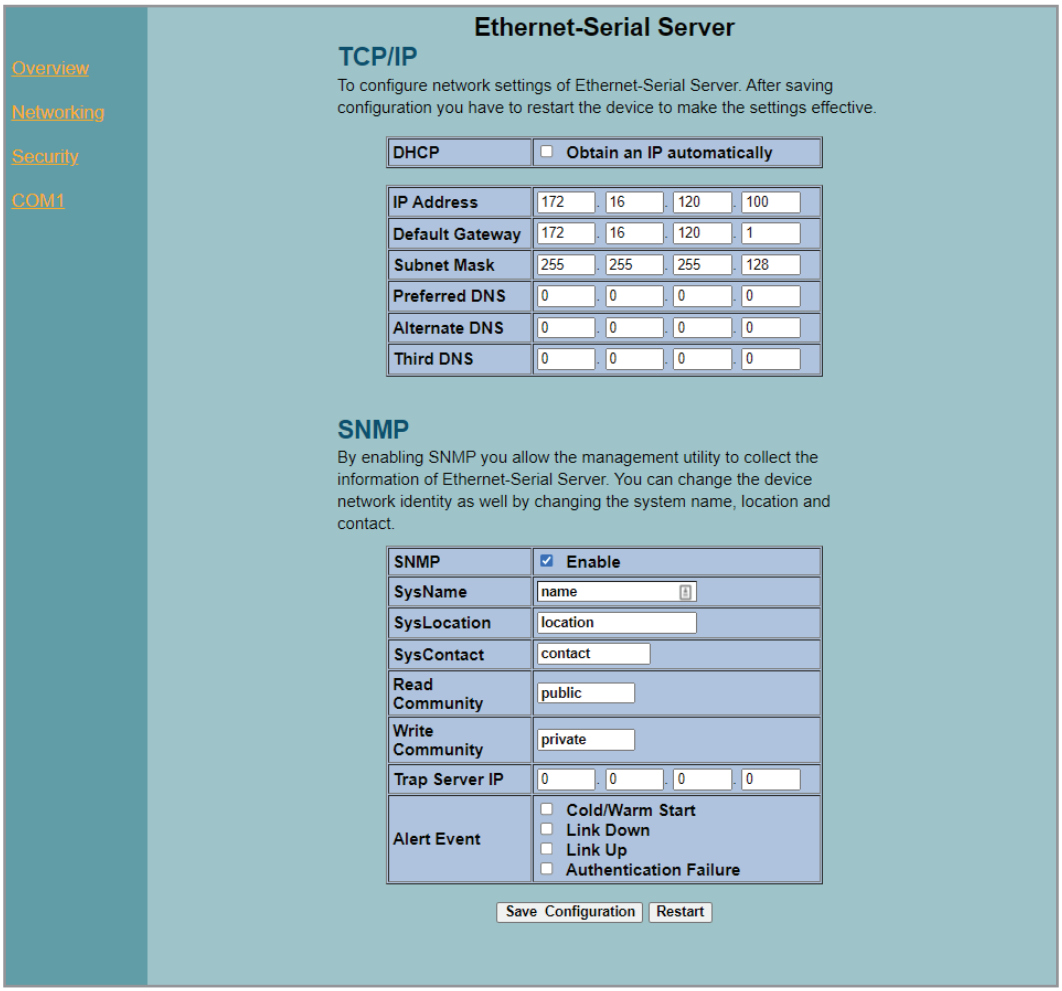


Figure 3.20 Network setup

3.3.4 Configure AM-SEK as TCP Server

By default, the AM-SEK can be configured as transparent mode.

1. Click the **COM1** link.
2. Configure AM-SEK as TCP server.
3. Input **4660** for the local listening port.

To enable IP filter (if desired)**:**

1. Check **IP filter**.
2. Input source IP in the Source IP.

If enabling IP filter is not desired:

1. Leave **IP filter** unchecked.
2. Input idle time in **Please input idle time to send TCP alive packet(sec)**: (If the input is **2**, the sending TCP keep alive packet period will be change to 2*10 sec).
3. Input TCP inactivity time in **TCP Inactivity Time Before Disconnect (sec)**: If the input is **2**, TCP inactivity beyond 2 sec will result in a disconnect.
4. Click the **Save Configuration** button to save the changes.

Notes:

- 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 AM-SEK.

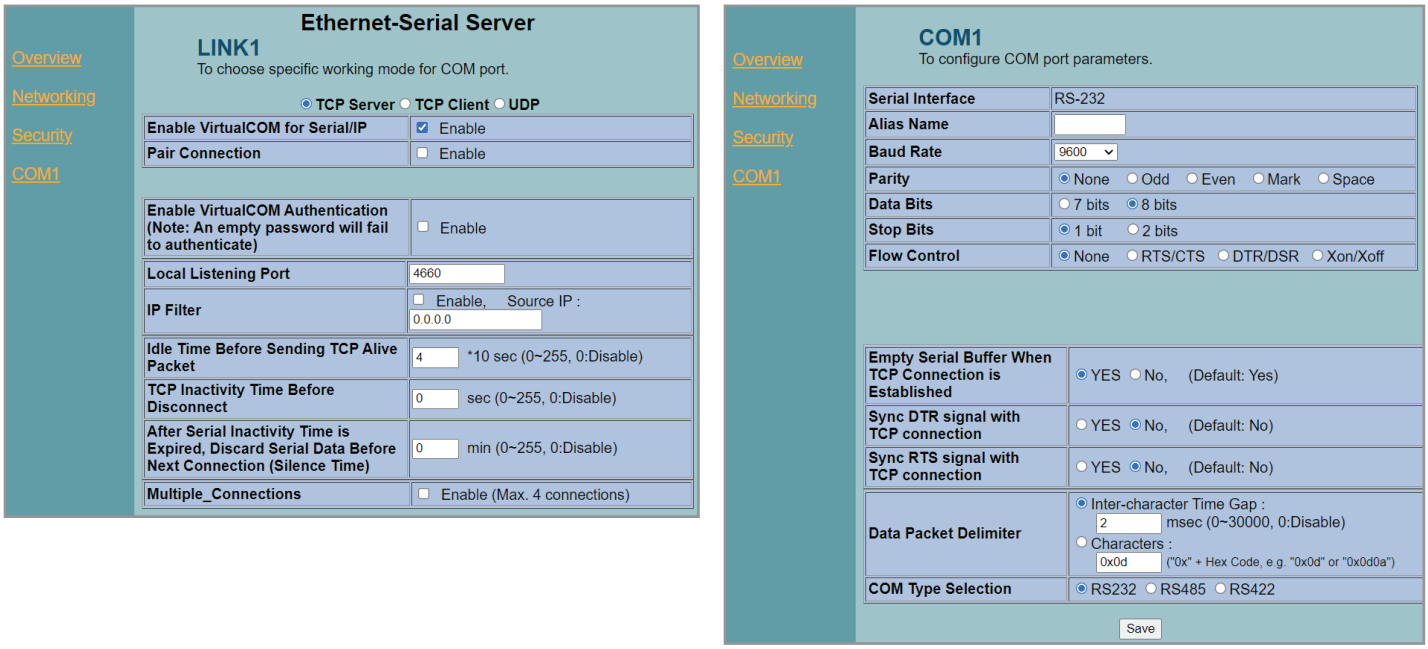


Figure 3.21 Com1 setup-TCP server

Note:

- Default port number of AM-SEK is 4660 and it is associated with serial port COM1 respectively. After the application program connects to the TCP port 4660 of AM-SEK, data being sent to this TCP connection from the application program are transparent to the COM1 of AM-SEK. Vice versa is also true.
- The serial interface will show different port interfaces according to the model of the serial server.

3.3.5 Configure AM-SEK as TCP Client

Configure AM-SEK as TCP client. For example, the destination IP is 10.0.29.11, and the destination port is **4660**.

1. Input destination IP **10.0.29.11**.
2. Input destination port in the **4660**.
3. Input an idle time in the **Idle time to send TCP alive packet** option. (If the input is **4**, the sending TCP keep alive packet period will be change to 4*10 sec)
   - Under *Connecting Rule of TCP Client*, select **TCP Connect On Power-on** to attempt to establish TCP connection after Power on.
   - Under *Connecting Rule of TCP Client*, select **TCP Connect On Any Serial Character** and the serial character will trigger to establish the TCP connection.
4. Input idle time to disconnect in the **Serial Inactivity Time before disconnect (0sec, 1~255)**: If the input is **0**, the function is disabled; if the input is **2**, the serial Inactivity beyond 2 sec will cause disconnect.
5. Input error retrying time in "**Waiting Time Between Re-connect Attempts (0 minute,1~255)**": If the input is **0**, the function is disabled; if the input is **2**, the serial Inactivity beyond 2 sec will cause disconnect.
6. Click the **Save Configuration** button to save the changes.

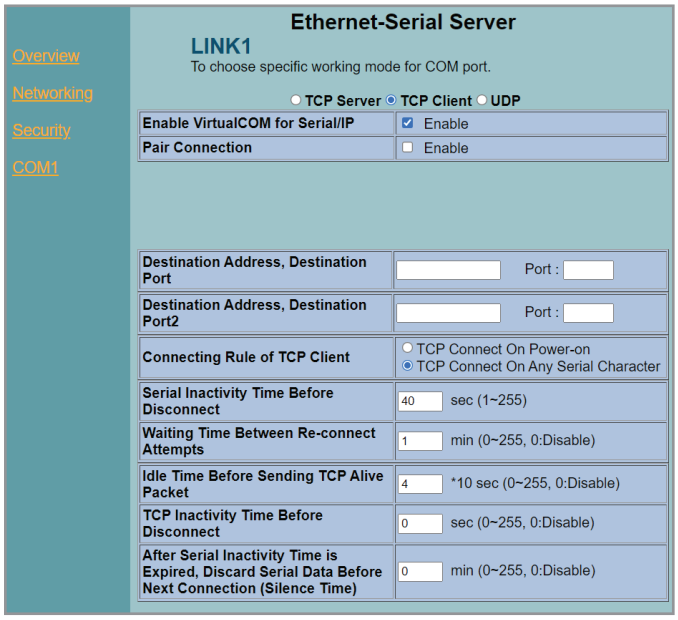


Figure 3.22 Com1 setup-TCP client

3.3.6 Pair Connection

For a serial connection established with two or more AM-SEK's to send data over an Ethernet network, "**pair connection**" can be set to **Enable**. It can be configure with any type of serial device.

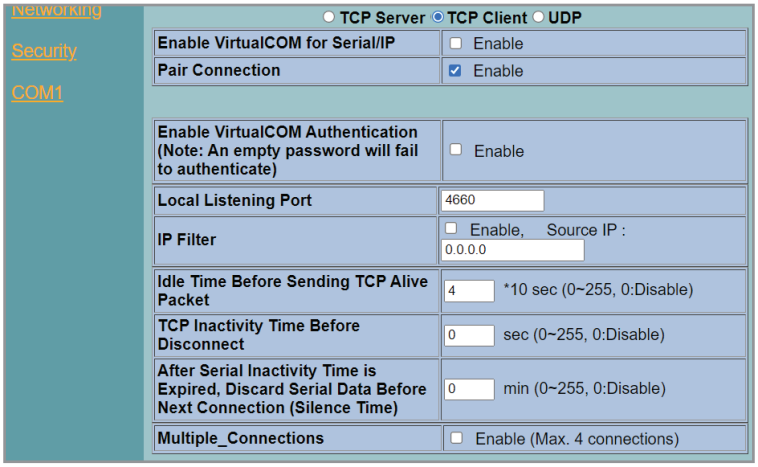


Figure 3.23 Com1 setup –pair connection

Configure AM-SEK as **UDP** mode. Local port should be set **4660**, the destination IP is **10.0.29.254** and the destination Port is **1234**.

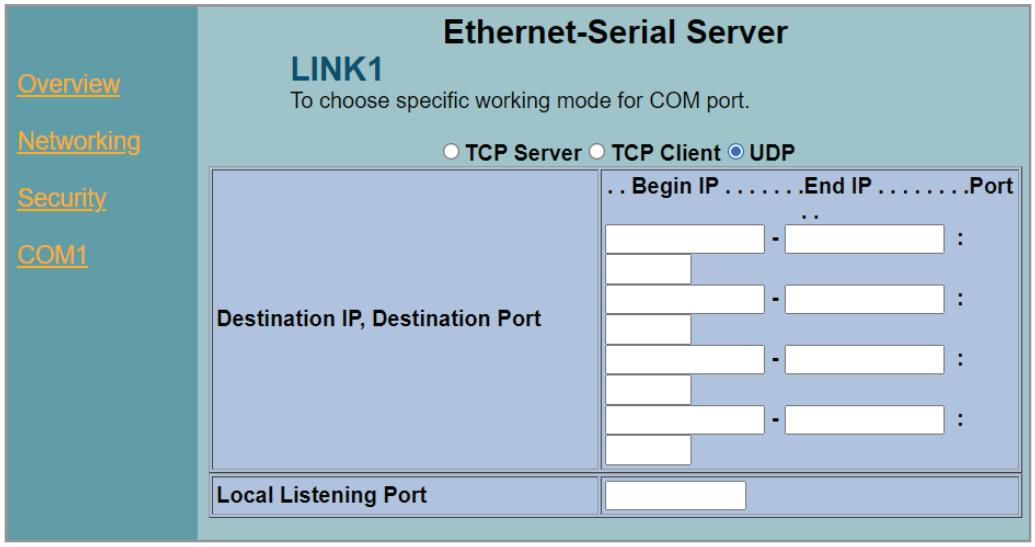


Figure 3.24 Com 1 setup –UDP mode

- Click **Save Configuration** to save the changes.
- If the update is successful, the following screen is displayed:

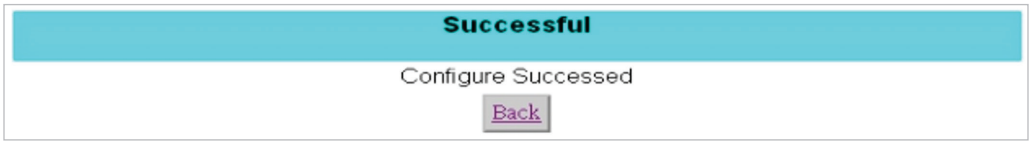


Figure 3.25 Configure success

3.4 Assign a New IP Address by ARP Command

Use ARP command to assign a static IP address of the AM-SEK using its hardware MAC address. The MAC address is printed on the rear side of device in this format: "0060E9-xxxxxx". The following example displays how to set this up using MS-DOS command prompt window.

(For example, change IP from **10.0.50.100** to **10.0.50.101**. The MAC address of AM-SEK is *00-60- e9-11-11-01*)

1. Add the new host IP to ARP table.
   a. Open Ms-DOS command prompt window.
   b. Input **arp -s 10.0.50.101 00-60-E9-11-11-01**

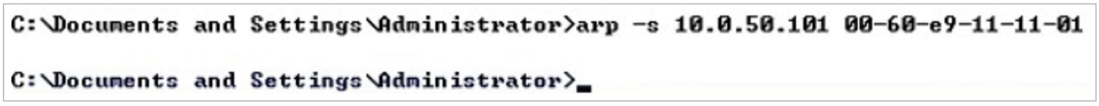


Figure 3.26. Ms-DOS command prompt window

2. Change to new IP via telnet port 1 (see Figure 3.27).
   a. Input telnet **10.0.50.101 1**

Note: If the telnet fails, the AM-SEK will be restarted automatically. After restart the IP address should be changed to 10.0.50.101.

3. Using new IP to configure AM-SEK via telnet
   a. Input telnet **10.0.50.101**

Note:

- When using this method to change IP address, PC's IP address and AM-SEK 's IP address must belong to the same subnet.
- The changed IP address must be legal, otherwise it will be changed back to the default value (10.0.50.100) after restart.

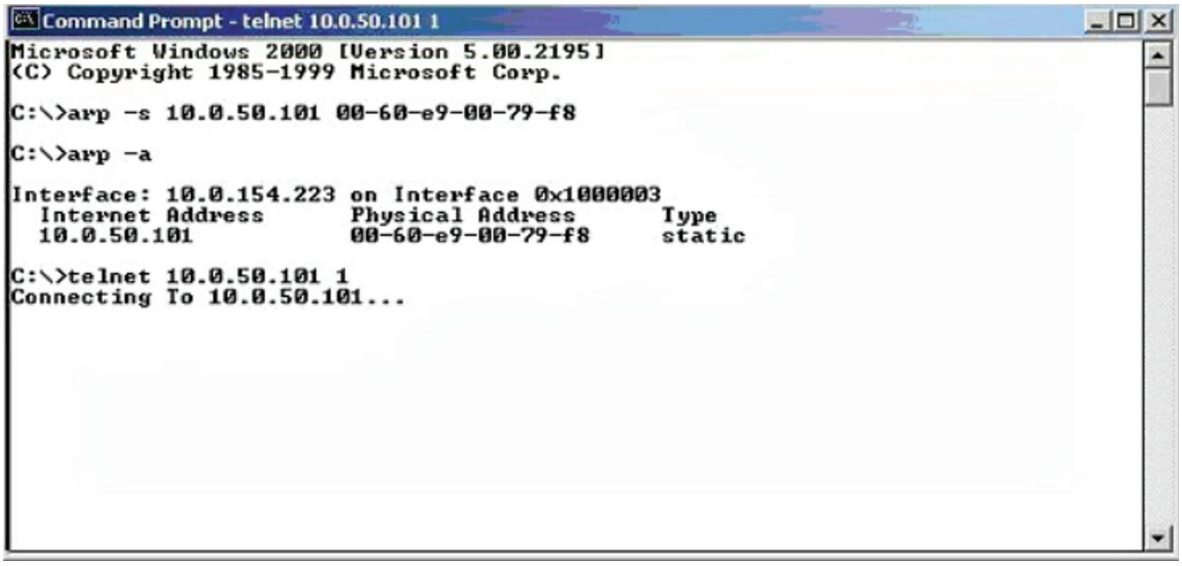


Figure 3.27. Assigning a new IP address by ARP command

4. Using Virtual COM

Virtual COM driver mode for windows converts COM data to LAN data to control the RS-232 port on a AM-SEK via the LAN. By creating virtual COM ports on the PC, the Virtual COM driver redirects the communications from the virtual COM ports to an IP address and port number on a AM-SEK that connects the serial line device to the network. The following figure is Virtual COM connection diagram.

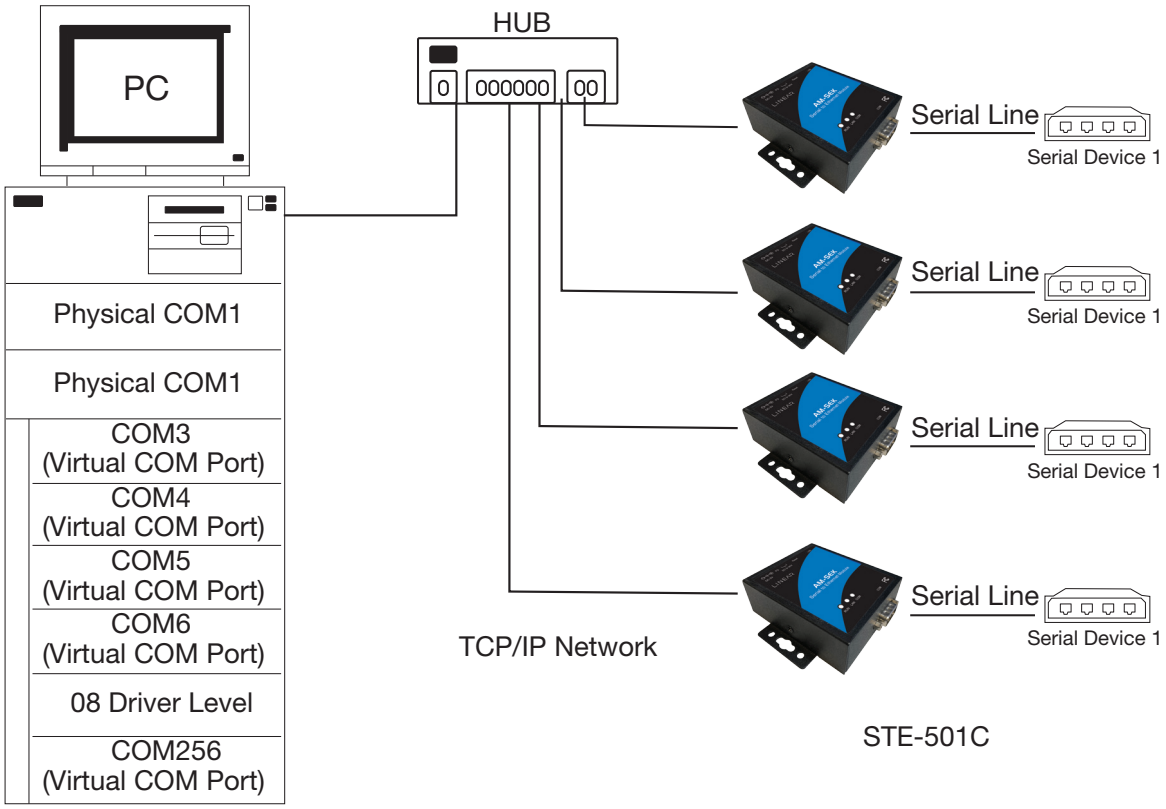


Figure 4.1 Virtual Com connection diagram

4.1 Setup of a Virtual COM Driver

4.1.1 Pre-installation Requirements

Please check that the operation system on the PC complies with the following requirements:

- **Processor:** Intel-compatible, Pentium class
- **Operation system:** Windows Server 2003, Windows XP, Windows 2000, Windows NT 4.0 SP5 or later, Windows Me, Windows 98, Windows 95, Microsoft NT/2000 Terminal Server, Citrix Meta Frame

4.1.2 Cautions on Use

The Virtual COM driver supports firmware AP v3.0 and later of the AM-SEK Serial-Ethernet Servers.

4.1.3 Limitation

The Virtual COM driver allows the user to select up to 256 COM ports as Virtual COM ports in a monitoring PC. The user can select them from a list of COM ports: COM1 to COM256.

4.1.4 Installation

Be certain all anti-virus software is turned off before installation begins. Run the Virtual COM setup file (available at www.linear-solutions.com) to install Virtual COM driver for the operating system.

At the end of the installation, please select one or two COM ports to become the Virtual COM ports.

4.1.5 Uninstalling

1. From Windows Start menu, select **Setting**, **Control Panel** and **Add/Remove Programs**.
2. Select **Serial IP** in the list of installed software.
3. Click the **Add/Remove** button to remove the program, or from Windows Start menu select **Programs**, **Serial IP** then **Uninstall Serial IP** to remove the program.

4.2 Virtual COM Communication

4.2.1 Enable Virtual COM on AM-SEK

From the web browser, access the AM-SEK (by typing its IP address) then click **COM1** link to access COM1 page. On the top half of the page, click **TCP Server** and selct the **Enable** button to enable Virtual COM. Next, type in the local port number in the **Local Port** field (see below):

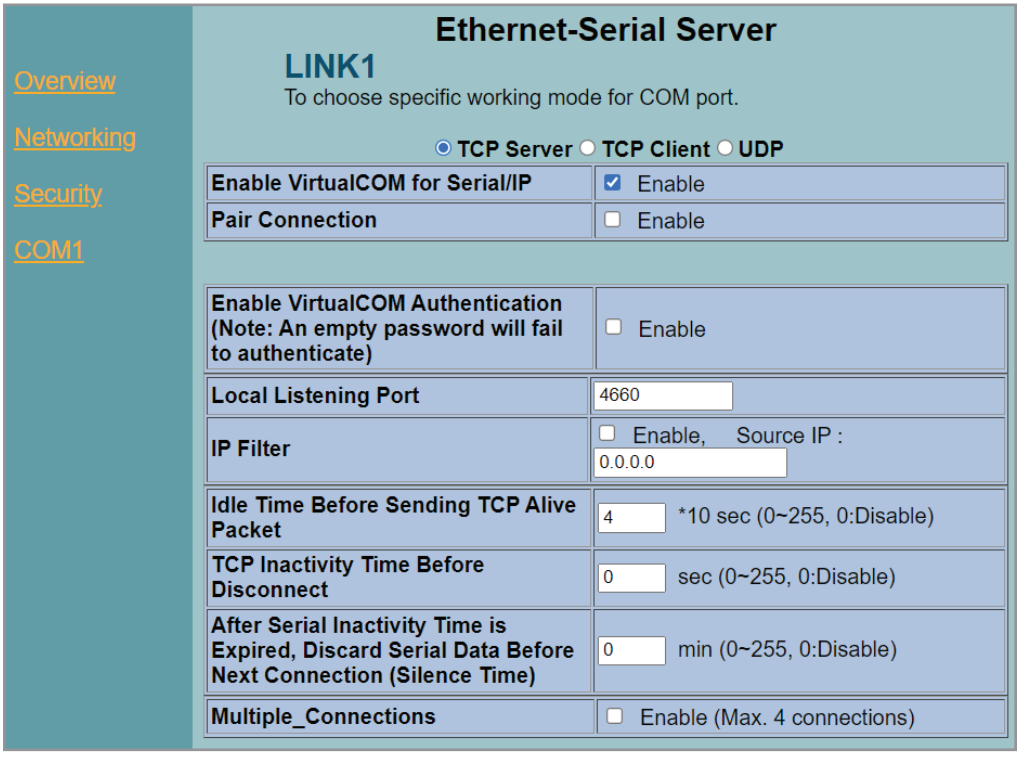


Figure 4.2 Enable Virtual Com

Virtual COM can also be enabled through telnet configuration by setting COM1 as a TCP server. Type in the local port number for COM1, then enable virtual COM as shown in the figure below.

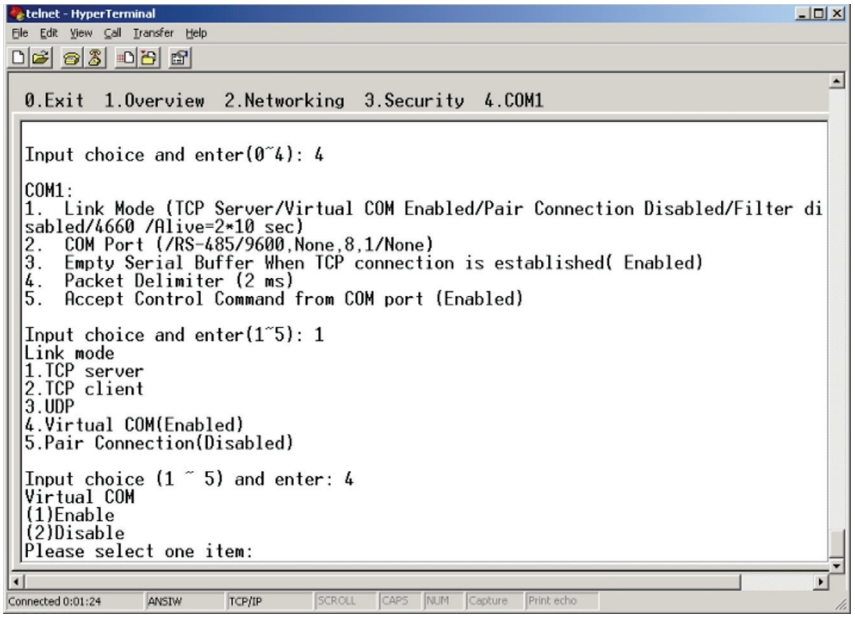


Figure 4.3 Enable Virtual Com via telnet

4.2.2 Run Serial/IP on Monitoring PC

In the Window Start Menu, select **Programs**, select **Serial/IP** then select **Control Panel**. When **Select Port** windows are displayed, select a serial port to configure. This configuration window will appear:

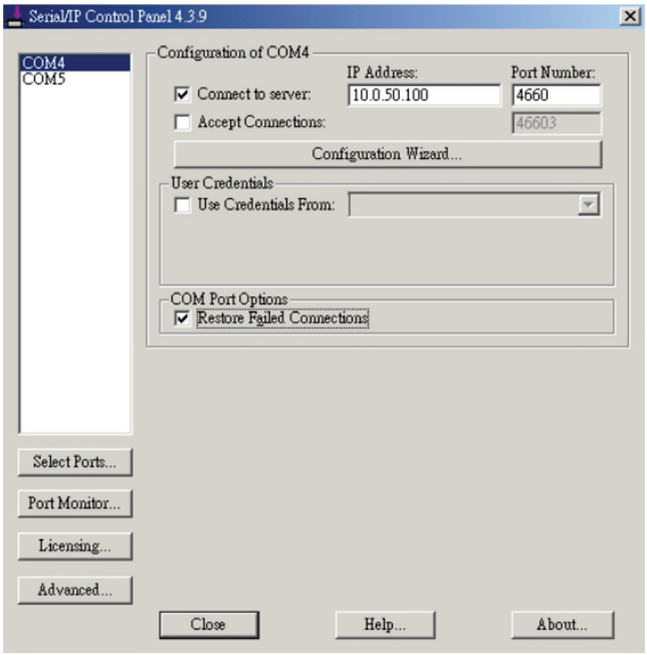


Figure 4.4 Serial/IP configuration

On the right side of *Figure 4.4*, there is a sample Virtual COM control panel window. On the left side, there is the list of the COM ports that have been selected (in the Select Ports window) for use by the Virtual COM Redirector. If it's desired to change which ports appear on this list, use the **Select Ports** button.

Each COM port has its own settings. When a COM port is selected, the control panel display changes to reflect the settings for that COM port.

Note: When a COM port's settings are changed, the changes are effective immediately. There is no separate confirmation dialog to confirm or cancel the changes.

4.3 Configuring Virtual COM Ports

Please configure each Serial/IP COM port as follows:

1. Select a COM port on the list.
2. For **IP Address of Server**, enter a numeric IP address for the serial server.
3. For **Port Number**, enter the TCP port number that the serial server uses to provide its serial ports to the network.
4. For **Server Credentials**, the default is **No Login Required**. If the serial server does require a login by the Virtual COM Redirector, the Virtual COM Redirector needs to provide a username and/or password every time an application tries to use the serial server.
5. Click the **Configuration Wizard** button, and then click the **Start** button that appears in the wizard window.

- This important step verifies that the Virtual COM Redirector can communicate with the serial server using the settings that the user has provided. If the Log display does not show errors, click the **Use Settings** button in the wizard. This makes the recommended settings effective and returns one to the control panel to continue with the following steps.

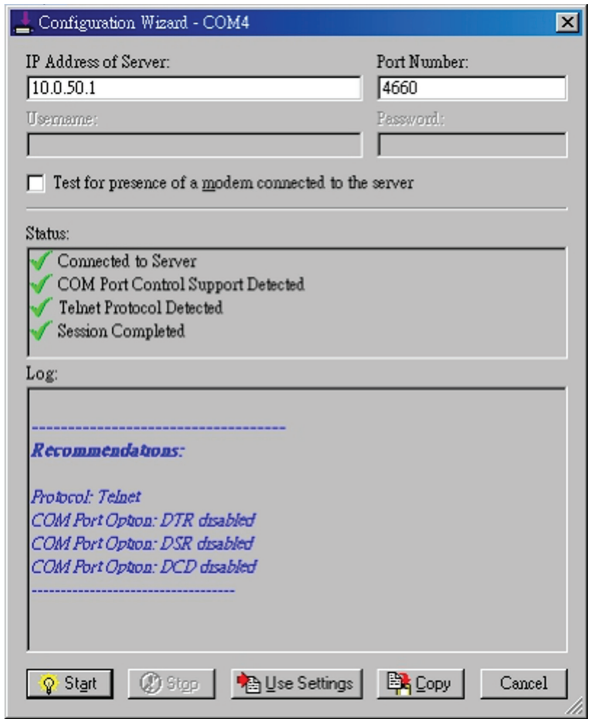


Figure 4.5 Configuration Wizard

6. For **Connection Protocol**, the setting must match the TCP/IP protocol that the serial server supports. The Configuration Wizard is usually able to determine the correct setting.
7. For **COM Port Options**, the settings must match the COM port behavior expected by the PC application that will use this COM port. The Configuration Wizard will recommend a combination of settings.

5. SNMP Setup

5.1 SNMP Network Management Platform

AM-SEK is an SNMP device that allows many popular SNMP Network management platforms (such as HP OpenView and SunNet Manager) to conduct monitoring on the device.

Depending on the network management tools that are being used, device AM-SEK information can be collected from running the management tools including IP address, DNS name, system descriptions and NIC information, etc.

6. Start Writing One's Own Applications

Before writing one's host applications or programs to interact with the AM-SEK, please make sure to have done the following:

6.1 Preparing the System

1. Properly connect AM-SEK hardware including power, Ethernet and serial cable.
2. Properly configure the parameters of AM-SEK including connection type, IP address, gateway IP address and network mask accordingly (see Chapter 3 Hardware Installation section).
3. Configure AM-SEK as TCP Server using default TCP port number 4660.
4. The host (PC) application program must be configured as a TCP client and connects to AM-SEK with designated TCP port number 4660 for COM1.
5. Make sure AM-SEK is running by checking the running status through **monitor.exe** configuration utility.

6.2 Running the Sample Program

Sample programs written in VB and VC++ included in the package are provided for reference. Source codes are also included. Test programs can be found at www.linear-solutions.com under the directory of **\sample\vb_ap** and **\sample\vc_ap** respectively.

There are two test programs. TCPTEST written in Visual Basic and TCPTEST2 written in Visual C++.

6.2.1 TCPTEST in Visual Basic

This sample program is written in Visual Basic 5.0 with Winsock Controls. It shows how to send and receive data between host (PC) and AM-SEK via Ethernet in two socket ports.

Run Visual Basic and open sample program *tcptest.vbp*, after the program is started successfully, one can start testing functions (see Figure 6.1). For more information, select **Help** in the program for details.

Note: Be certain the Microsoft Visual Studio family software is installed on the computer. Otherwise the sample program will not run.

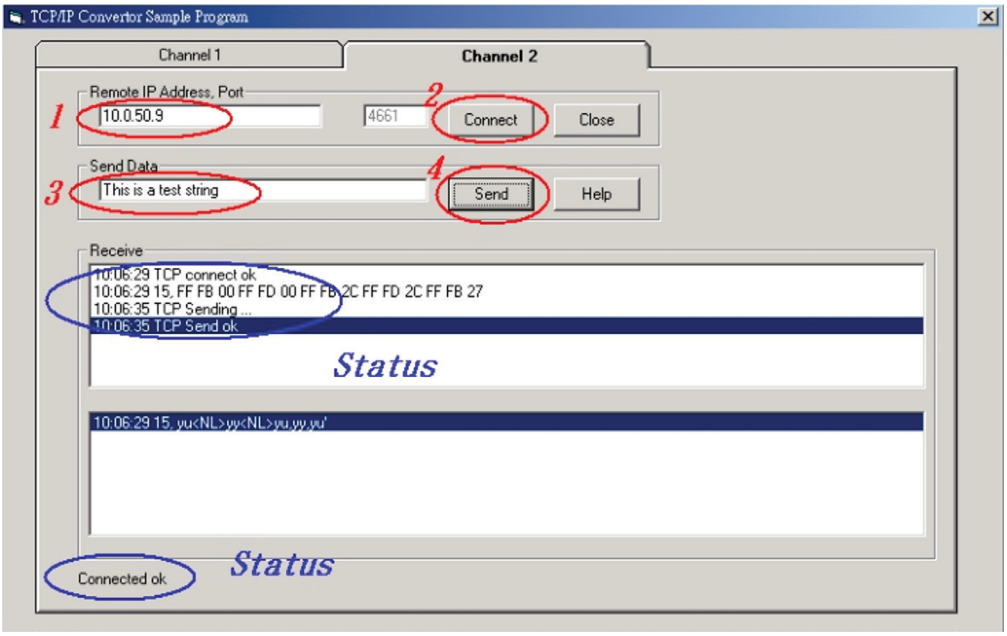


Figure 6.1 TCP test sample program in Visual Basic

6.2.2 TCPTEST2 in Visual C

To start the program, please type in the following command in the command line prompt: **TCPTEST2 IP_Address Port_Number**

Figure 6.2 TCP test sample program in Visual C

The command **tcptest2 10.0.50.100 4660** connects to a TCP server with IP address **10.0.50.100** and port number **4660**. The received data is displayed on the screen, and the data typed in is sent to the TCP server of the designated port number. Binary data can also be sent in hex format with a leading character "\". For example, "\00" and "\FF" represent ASCII code 0 and 255 respectively.

A modem can also be used to connect to the serial server. Command "**AT\Od**" sends standard AT commands to the modem which in return responds with "**OK\0D\0A**" message to the host application.

Always use **'='** then **Enter** key to exit the program.

7. Diagnostics

There are several ways to can check on the status and availability of the AM-SEK.

7.1 Use Standard TCP/IP Utility Ping Command

From Windows Start menu, select **Run** and type in ping **<TCP Server IP address>**

If the connection is established, the reply messages are displayed. Otherwise, it will indicate "Request timed ou".

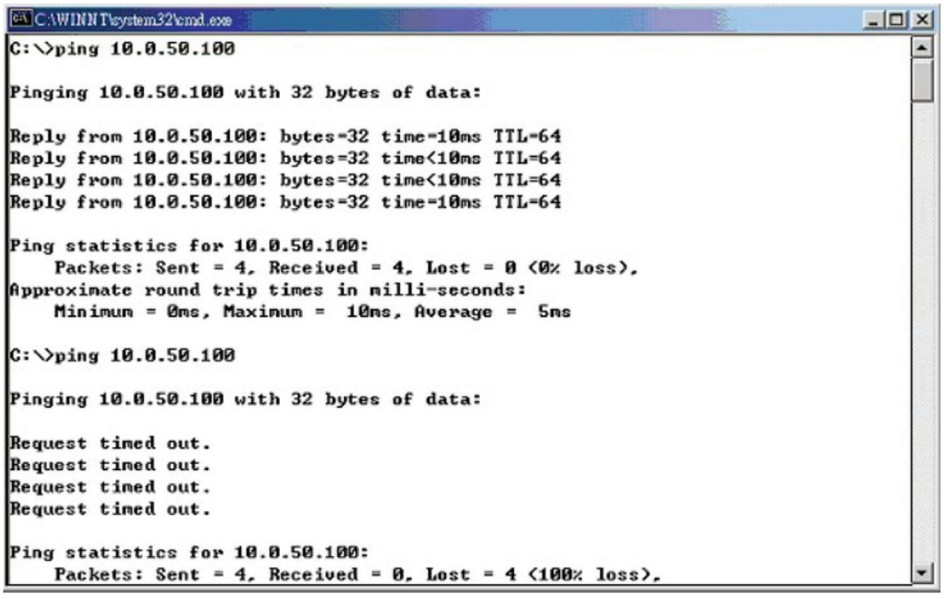


Figure 7.1 Standard TCP/IP utility ping command

7.2 Use Monitor.exe Configuration Utility Program

Use the **monitor.exe** configuration (available at www.linear-solutions.com) to check on the status of AM-SEK. The status can be read from **AP version** column of the tool.

Status	Descriptions
S	The system is configured as a TCP Server and Listing.
A	The TCP Server is connected.
C	The system is configured as a TCP Client and not yet connected.
C	The system is configured as a TCP Client and trying to Connect.
B	The TCP Client is connected.
U	The system is configured as an UDP Mode.

For example, '**S**' means that COM1 is server mode and is not connected (Figure 7.2).

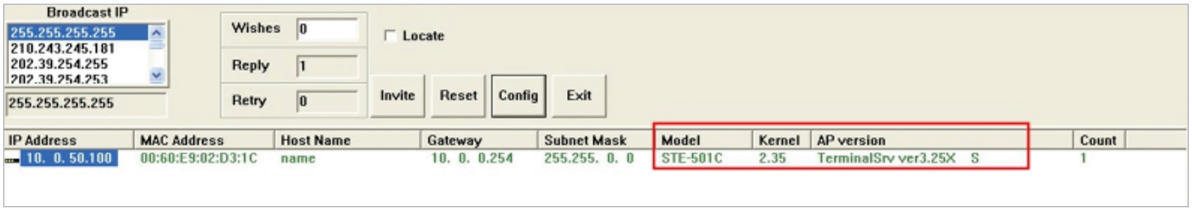


Figure 7.2 Monitor configuration utility

7.3 Use TCPTEST.exe or TCPTEST2.exe Sample Program

Use sample programs **TCPTEST.exe** and **TCPTEST2.exe** (available at www.linear-solutions.com) to check on the status of the AM-SEK. Please refer to Chapter 6.2 to run the sample programs.

Appendix A: Specifications

A.1 Hardware Specifications

Item	Specifications
CPU	• 16-bit Embedded CPU • 100MHz
Flash Memory	512K Bytes
SDRAM	512K Bytes
EEPROM	512K Bytes
Host Communication	• IEEE802.3 base band • TCP/IP, UDP, SNMP, HTTP, Telnet, ARP, BOOTP, DHCP, ICMP\
Rest	Built-in default key to restore factory default settings
Watch Dog Timer	• 1.34 second hardware auto reset • Power failure threshold: 4.75V
SerialPort Communication	• One RS-232 or RS-485/RS-422 selectable • RS-232: EIA-RS-232C standard, Full Duplex, DB9 • RS-485: 2/4 wires, Half/Full duplex, Terminal Block • RS-422: 4 wires, Half/Full duplex, Terminal Block • Parameters **1.** Baud-rate: 1200 bps ~ 230Kbps **2.** Parity: None, Even, Odd, Mark, Space **3.** Data bits: 7,8 **4.** Stop bits: 1,2 **5.** Packet Delimiter: by inter-character timeout, by characters delimiter **6.** Flow Control: None, Hardware CTS/RTS, Software Xon/Xoff
LED Indication	• RUN x 1 • LAN x 1 • COM port1
Power Requirement	5VDC Jack or DC +9~30V Terminal Block, 2.8 Watt Max
Temperature	• Operation: 32°F to 140°F (0°C to 60°C) • Storage: -4°F to 158°F (-20°C to 70°C)
Humidity	20%~90% non-condensing
Housing	65mm(L) x 78mm(W) x 28mm(H)

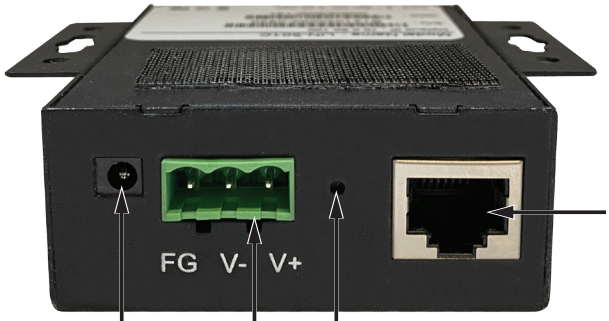
A.2 Software Specifications

Item	Specifications
Protocol	TCP/IP, UDP, HTTP, SNMP, ARP, Telnet, ICMP, BOOTP, DHCP, SMTP(Note)
Configuration	• Configuration information for both TCP/IP and serial ports is kept in theEEPROM. • Configuration utilities of Windows 95/98/2000/NT/XP/2003 are provided for configuring settings.
Internal Buffer Size	• TCP receiving buffer size = 8K bytes • TCP transmitting buffer size = 16K bytes • RS-232 or RS-485/RS-422 receiving buffer size = 4K bytes • RS-232 or RS-485/RS-422 transmitting buffer size = 4K bytes

A.3 Panel Layout and Connector Pin Assignments

A.3.1 Panel Layout - DB9 for AM-SEK

Rear Panel View



RJ45 10/100Mbps Ethernet Port

Reset Button

3 Pin Male Terminal Block For Power Input

DC Jack Power Input

Top Panel View

DIN-Rail Screw Hole

Wall Mount Screw Hole

Front Panel View

Male DB9 Serial Port

A.3.2 DB9 Pin Assignments

The pin assignments of DB9 connector on AM-SEK is shown in the following table:

Pin#	RS-232 Full Duplex for AM-SEK Model	RS-485 2-wire Half Duplex for AM-SEK Model	RS-422/RS-485 4-wire Full Duplex for AM-SEK Model
1	DCD	N/A	N/A
2	RXD	N/A	**TXD+**
3	TXD	**DATA+**	**RXD+**
4	DTR	N/A	N/A
5	SG (Signal Ground)	SG (Signal Ground)	SG (Signal Ground)
6	DSR	N/A	N/A
7	RTS	**DATA-**	**RXD-**
8	CTS	N/A	**TXD-**
9	N/A	N/A	N/A

A.3.3 Ethernet Port (RJ-45)

1. Category 5 UTP cable, 8 core wire.

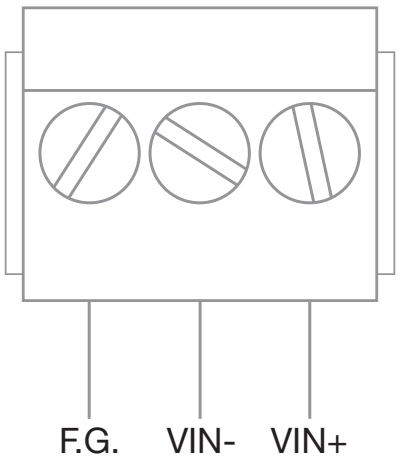
2. RJ45 Connector.

3. RJ45 Pin Assignment

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

Select either 568A or 568B definition. To make a crossover cable, use the 568A and 568B definition respectively in each terminal of a UTP cable.

A.3.4 Power Terminal Block Connector



Note: It could be reversed for the pin of VIN- and VIN+.

A.4 Buzzer/LED Message

A.4.1 Buzzer

“ ^ “ : Beep twice

“ = “ : Beep off

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

Table 1. Buzzer Message

A.4.2 LAN LED

Message	Description
LED Off	Ethernet Disconnected
LED blinking with Green	Data is transmitting on Ethernet for 100Mbps
LED blinking with Orange	Data is transmitting on Ethernet for 10Mbps

Table 2. LAN LED Message

A.4.3 COM Port LED

Message	Description
LED Off	No data is transmitting on COM port
LED blinking state	Data is transmitting on COM port

Table 3. COM Port LED Message

A.4.4 RUN LED

Message	Description
LED on	Jumper JP1 pin1 and pin2 are short to disable AP firmware in the flash memory.
LED blinking (rate: 0.5Sec)	AP firmware is running

Table 4. RUN LED Message

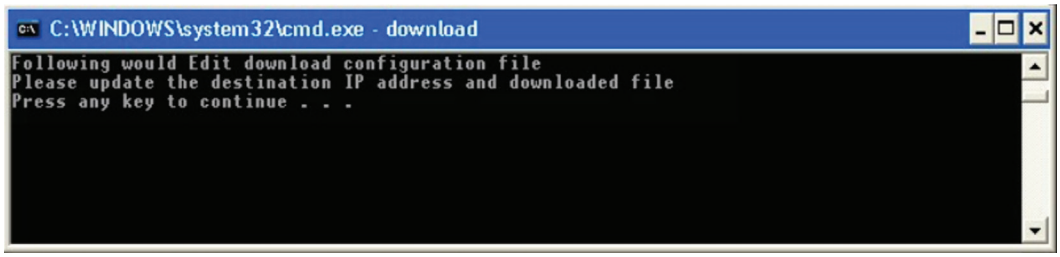
Appendix B: Upgrade System Firmware

New version of firmware can be downloaded from www.linear-solutions.com.

B.1 Upgrade Procedures

When a new software version becomes available, please follow the sequences below to upgrade the AM-SEK.

1. Connect a PC (Windows 95/98/NT/2000/XP) and AM-SEK to upgrade the firmware inthe same TCP/IP network. Use command **ping** or **monitor.exe** utility program to verify their availability.
2. Prepare the download tool, and press any key to edit its configuration file **dapdl.cfg**. The **dapdl.cfg** file can be found online at www.linear-solutions.com.

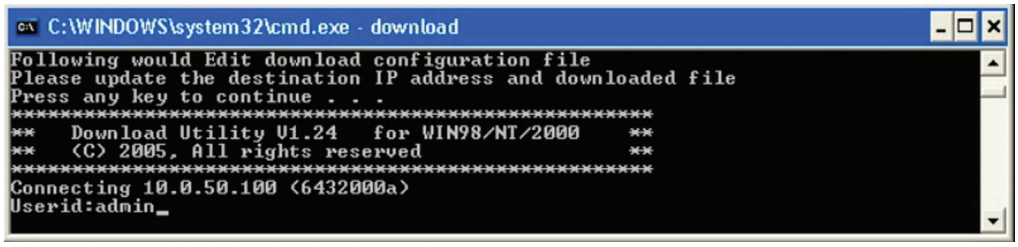


3. Edit the "**dapdl.cfg**" file to fit the system need. The content of the file looks like the following. Be sure to save the modifications after the change is made.

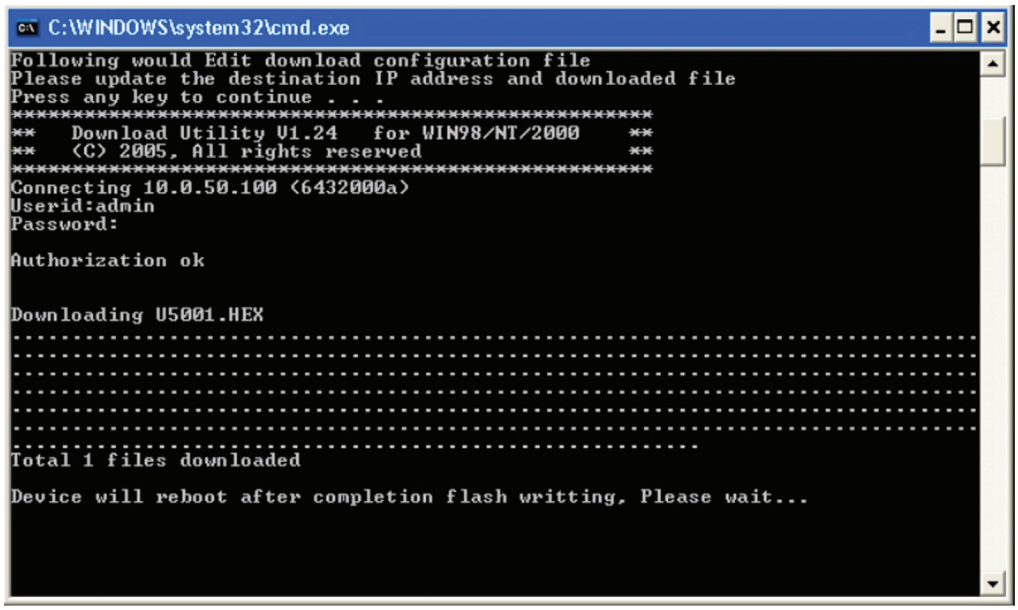
   Remote_IP **10.0.50.100**

   Load **U5001ap.hex**

   The first line identifies the IP address of AM-SEK, the second line identifies the firmware (.Hex file) name to be downloaded.
4. Execute the utility program **download.bat**. It can be found online at www.linear-solutions.com.
5. Input the user name and password credentials. The new firmware will then be downloaded.



6. AM-SEK will automatically restart each time the firmware is successfully downloaded.



B.2 Critical Issues of Upgrading

1. The upgrading process can always abort by pressing the **<Esc>** key from host PC during the upgrading process. AM-SEK will restart automatically and the system remains intact.
2. If AM-SEK does not receive any upgrading data within 30 seconds, the AM-SEK will restart automatically and the system remains intact.
3. After the upgrading process finishes, the AM-SEK will program the flash memory and buzzer beeps 6 times then restarts. Normally, it takes around 10 seconds to complete the programming process. If an error occurs during the programming process, the AM-SEK will clear the corresponding memory and the system remains intact of what it was.

B.3 Error Messages

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

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	
AM-SEK handshaking problem	AM-SEK ACK Start Address Error AM-SEK ACK Length Error AM-SEK Response Command Error	
Configuration file	Remote IP not found Open configuration file failure	

Appendix C: Disable System Firmware

The AP (application program) firmware of AM-SEK can be disabled. This function is used in the situation that one downloaded a wrong version of firmware that caused the system to crash.

To disable the current version of firmware and prevent it from executing:

1. Turn the power off, and open AM-SEK case.
2. Short pin1 and pin2 of jumper JP1 on the right-top corner from the main board to disable AP firmware.
3. Power on the AM-SEK.
4. Download the correct AP firmware to the AM-SEK.
5. Remove the pin 1 and pin2 of jumper JP1 to enable AP firmware.
6. Close the case and continue.

Appendix D: Using Monitor.exe Utility

The configuration utility **monitor.exe** is available online at www.linear-solutions.com is the main utility program to demonstrate and configure the AM-SEK's settings.

D.1 Run the utility

Start the program under Windows 95/98/NT/2000 environment and the following window appears:

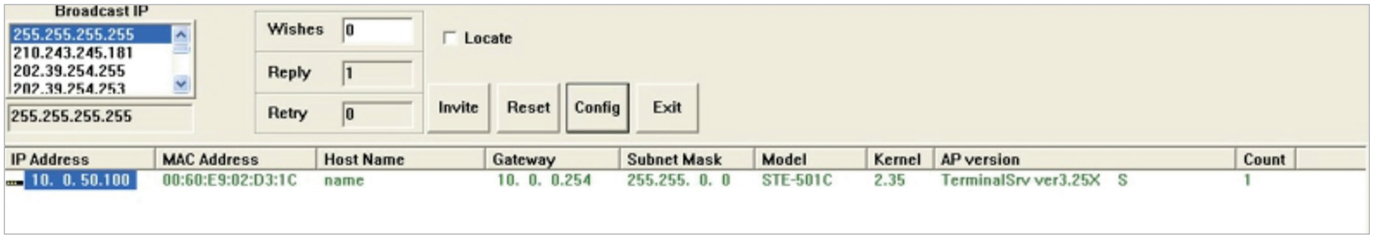


Figure D1. Main window of monitor.exe utility program

D.2 Detect Operational Devices

Do the following steps to detect devices currently available on the network.

1. Start **monitor.exe** utility program.
2. Select an item from the **Broadcast IP** list.
3. Specify a number in the **Wishes** box.
4. Click the **Invite** button. This will display all the devices information that has been requested.

D.3 Configure Devices

One may use **monitor.exe** configuration utility to configure the settings of devices on the network. Here's how:

1. Repeat the steps in the section of **D.2** to bring up the device's information.
2. Select the device to configure from the **IP Address** column. Click the **Config** button and a configuration window will pop up as shown in Figure D2.

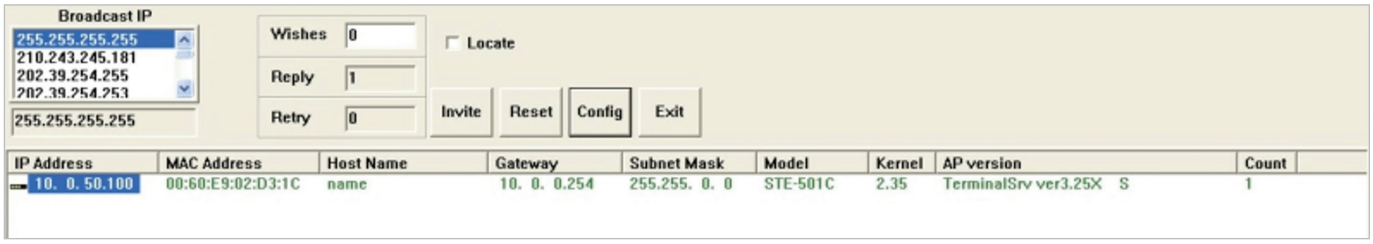
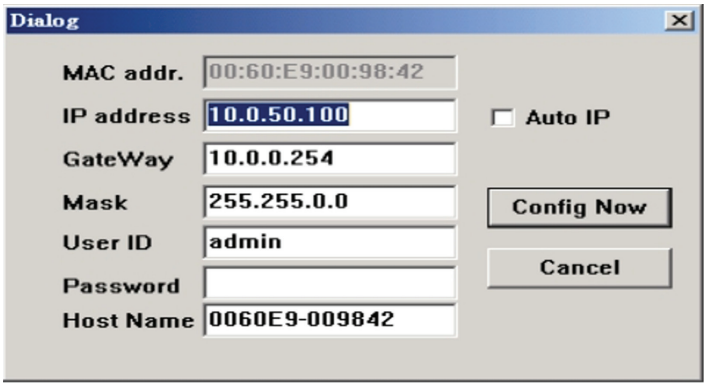
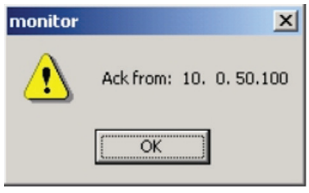


Figure D2. Configuration dialog box

3. After clicking the **Configure Now** button, the target device will return an ACK message indicating the modification is successful as shown in the following:





The following table lists the functional descriptions for all the fields.

Field Name	Field Descriptions
Broadcast IP	Except for the default IP 255.255.255.255, other items (IPs) are read from the file “seg.cfg”. This field specifies a detecting IP range. It may be a designated IP or a broadcast IP.
Wishes	Specifies minimum number of the devices desired to get replies from after sending an **Invite** request. If there are not as many devices responding to invitation, the system repeatedly sends an invitation until the request is fulfilled.
Reply	Indicates the actual number of devices this utility program detected.
Retry	Specify the number of times that an invite request is re-sent.
Locate	Locate the specified device.
Reset	Reset the selected device.
Config	Configure the selected device.
Exit	Exit this utility.
IP Address	Indicate the IP address of the device that replied to a request. • Leading tag “!” stands for IP address collision, possibly caused by duplicated IP addresses on the network. • Leading tag “?” stands for Mac address collision, possibly caused by duplicated Mac addresses on the network.
MAC Address	Indicates the MAC address of responding device.
Gateway	Indicates the IP address of the gateway.
Subnet Mask	Indicates the TCP/IP network mask.
OS	Indicates the OS version of the responding device.
AP Version	Indicates the AP version of the responding device.
Model	Indicates the model number of the responding device. This field is only available for **monitor.exe** version 1.0 and above.