



# Table of Contents

<b>Chapter 1</b>	<b>Introduction .....</b>	<b>1-1</b>
	Overview .....	1-2
	Package Checklist.....	1-2
	Product Features .....	1-2
	Product Specifications .....	1-3
<b>Chapter 2</b>	<b>Getting Started .....</b>	<b>2-1</b>
	Panel Layout.....	2-2
	Connecting the Hardware .....	2-2
	Connecting the Power.....	2-2
	Connecting to the Network.....	2-3
	Connecting to a Serial Device .....	2-3
	LED Indicators .....	2-3
<b>Chapter 3</b>	<b>Initial IP Address Configuration.....</b>	<b>3-1</b>
	Initializing 5110-N's IP Address.....	3-2
	Factory Default IP Address.....	3-2
	Device Server Administration Suite .....	3-2
	ARP .....	3-2
	Telnet Console .....	3-3
	Serial Console (19200, n, 8, 1) .....	3-6
<b>Chapter 4</b>	<b>Choosing the Proper Operation Mode .....</b>	<b>4-1</b>
	Overview .....	4-2
	Real COM Mode .....	4-2
	TCP Server Mode .....	4-3
	TCP Client Mode.....	4-4
	UDP Mode.....	4-4
	Pair Connection Mode.....	4-4
	Ethernet Modem Mode.....	4-5
	Reverse Telnet Mode .....	4-5
	Disabled Mode.....	4-5
<b>Chapter 5</b>	<b>Web Console Configuration .....</b>	<b>5-1</b>
	Opening Your Browser .....	5-2
	Basic Settings .....	5-4
	Network Settings .....	5-5
	Serial Settings.....	5-8
	Operating Settings .....	5-9
	Real COM Mode .....	5-10
	TCP Server Mode .....	5-13
	TCP Client Mode.....	5-16
	UDP Mode.....	5-20
	Pair Connection Mode .....	5-22
	Ethernet Modem Mode .....	5-24
	Reverse Telnet Mode.....	5-27
	Disabled Mode.....	5-28
	Accessible IP Settings.....	5-28
	Auto Warning Settings.....	5-29
	Auto warning: E-mail and SNMP trap .....	5-29

	Event Type.....	5-30
	Monitor .....	5-31
	Monitor Line.....	5-31
	Monitor Async.....	5-32
	Monitor Async-Settings.....	5-32
	Change Password.....	5-32
	Load Factory Default.....	5-33
<b>Chapter 6</b>	<b>Configuring Device Server Administrator.....</b>	<b>6-1</b>
	Overview .....	6-2
	Installing Device Server Administrator .....	6-2
	Configuration.....	6-4
	Broadcast Search .....	6-5
	Unlock Password Protection.....	6-6
	Configuring 5110-N .....	6-8
	Upgrading the Firmware.....	6-9
	Export Configuration .....	6-11
	Import Configuration .....	6-11
	Monitor .....	6-12
	Port Monitor .....	6-17
	COM Mapping.....	6-17
	On-line COM Mapping.....	6-18
	Off-line COM Mapping .....	6-22
	IP Location .....	6-23
<b>Chapter 7</b>	<b>IP Serial LIB .....</b>	<b>7-1</b>
	Overview .....	7-2
	IP Serial LIB Function Groups .....	7-3
	Example Program .....	7-3
<b>Appendix A</b>	<b>Pinouts and Cable Wiring.....</b>	<b>A-1</b>
	Port Pinout Diagrams .....	A-2
	Ethernet Port Pinouts .....	A-2
	Serial Port Pinouts .....	A-2
	Cable Wiring Diagrams .....	A-3
	Ethernet Cables.....	A-3
<b>Appendix B</b>	<b>Well Known Port Numbers .....</b>	<b>B-1</b>
<b>Appendix C</b>	<b>SNMP Agents with MIB II &amp; RS-232 Like Groups .....</b>	<b>C-1</b>
<b>Appendix D</b>	<b>Auto IP Report Protocol.....</b>	<b>D-1</b>

# 1

## Introduction

---

5110-N and 5110-T are advanced, 1-port RS-232 serial device servers that make it easy to network-enable serial devices.

The following topics are covered in this chapter:

- Overview**
- Package Checklist**
- Product Features**
- Product Specifications**

## Overview

5110-N serial device servers are designed to make your industrial serial devices Internet ready instantly, and are well-suited for POS security market applications. The compact size of 5110-N device servers makes them the ideal choice for connecting your RS-232 serial devices, such as card readers and payment terminals, to an IP-based Ethernet LAN, making it possible for your software to access serial devices located anywhere on a local LAN, or the Internet.

5110-N supports several operation modes, including TCP Server, TCP Client, UDP Server/Client, Pair Connection, and Ethernet Modem, ensuring the compatibility of network software that uses a standard network API (Winsock, BSD Sockets). In addition, 5110-N's Real COM drivers allow you to set up your COM port software to work over a TCP/IP network in no time. This excellent feature preserves your software investment and lets you enjoy the benefits of networking your serial devices instantly.

5110-N device servers support automatic IP configuration protocols (DHCP, BOOTP) and manual configuration via the handy web browser console. Both methods ensure quick and effective installation. With 5110-N's Windows Utility, installation is very straightforward, since all system parameters can be stored and then copied to other device servers simultaneously.

## Package Checklist

5110-N products are shipped with the following items:

### *Standard Accessories*

- 1 5110-N serial device server
- Quick Installation Guide
- 5110-N Documentation and Software CD-ROM
- Power Adaptor

### *Optional Accessories*

- DK-35A: DIN-Rail Mounting Kit (35 mm)

*NOTE: Notify your sales representative if any of the above items are missing or damaged.*

## Product Features

5110-N has the following features:

- Low cost, credit card size
- Makes your serial devices Internet ready
- Easy wall and DIN-Rail mounting
- Real COM driver for Windows
- Versatile socket operation modes: TCP Server, TCP Client, UDP, and Ethernet Modem
- Pair Connection mode for connecting two serial devices over a network without a PC
- Easy-to-use Windows Utility for mass installation
- Auto-detecting 10/100 Mbps Ethernet
- Built-in 15 KV ESD protection for all serial signals
- Supports SNMP MIB-II for network management
- Configuration via web/Telnet/serial console
- Configuration utility automatically finds 5110-N devices on the network
- Supports Reverse Telnet mode
- Displays uptime on the Overview web page of 5110-N Configurator

## Product Specifications

### LAN

Ethernet	10/100 Mbps, RJ45
Protection	Built-in 1.5 KV magnetic isolation

### 5110-N Serial Interface

Interface	RS-232
No. of Ports	1
Port Type	Male DB9
Signals	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
Serial Line Protection	15 KV ESD for all signals

### Power Line Protection

4 KV Burst (EFT), EN61000-4-4

2 KV Surge, EN61000-4-5

### Advanced Built-in Features

Watch Dog Timer

### Serial Communication Parameters

Parity	None, Even, Odd, Space, Mark
Data Bits	5, 6, 7, 8
Stop Bit	1, 1.5, 2
Flow Control	RTS/CTS, XON/XOFF, DTR/DSR
Transmission Speed	110 bps to 230.4 Kbps

### Software Features

Protocols ICMP, IP, TCP, UDP, DHCP, BOOTP, Telnet, DNS, SNMP, HTTP, SMTP

Utilities Device Server Administrator for Windows 95/98/ME/NT/2000/XP/2003

Real COM Drivers Windows 95/98/ME/NT/2000/XP/2003 Real COM driver

Configuration Web Browser, Serial/Telnet Console, or Windows Utility

### Power Requirements

Power Input	12 to 48 VDC
Power Consumption	128.7 mA@12V, 72 mA@24V

### Mechanical

Casing	Aluminum case (1 mm)
Dimensions (W × H × D)	50 × 80 × 22 mm (1.97 × 3.15 × 0.87 in)

### Environment

Operating Temperature	0 to 55°C (32 to 131°F), 5 to 95%RH, -40 to 75°C(-40 to 167°F) for “-T” versions
Storage Temperature	-20 to 85°C (-4 to 185°F), 5 to 95%RH

### Regulatory Approvals

EMC	FCC Class A, CE Class A
Safety	UL, CUL, TÜV
WARRANTY	5 years

# 2

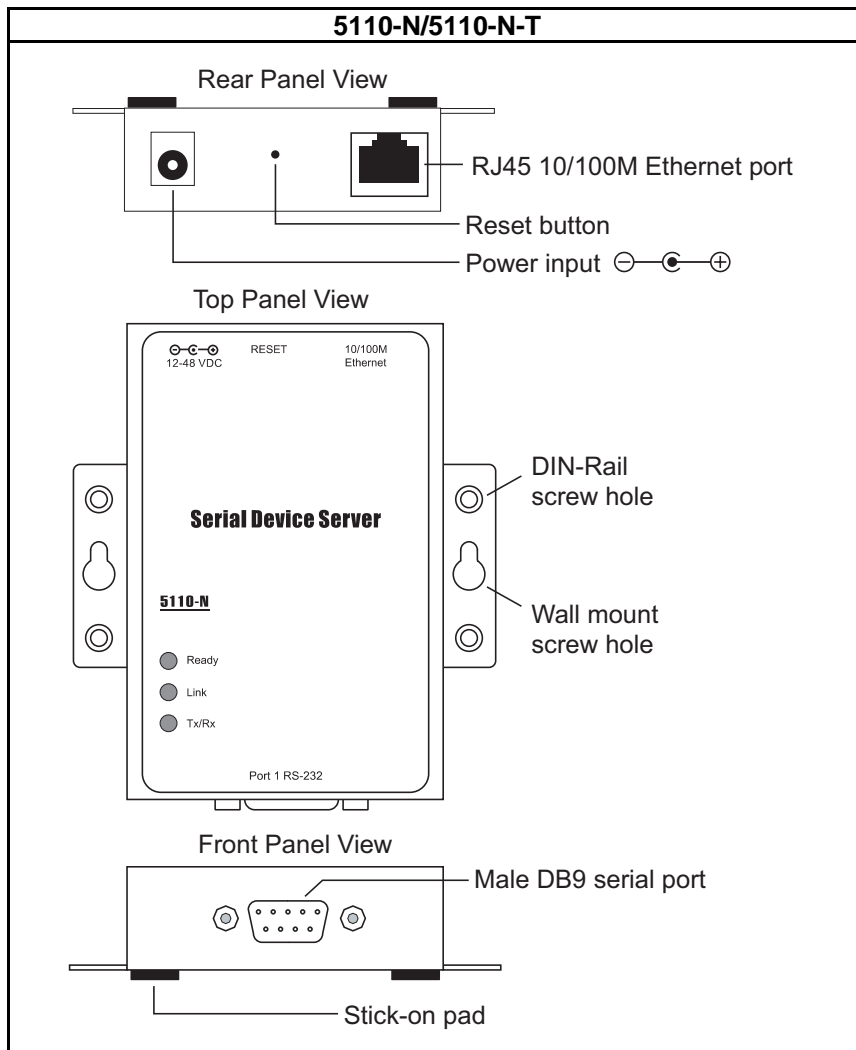
## Getting Started

---

This chapter includes information about installing 5110-N. The following topics are covered:

- ❑ **Panel Layout**
- ❑ **Connecting the Hardware**
  - Connecting the Power
  - Connecting to the Network
  - Connecting to a Serial Device
  - LED Indicators

## Panel Layout



## Connecting the Hardware

This section describes how to connect 5110-N to serial devices for testing purposes. We cover **Connecting to the Network**, **Connecting to a Serial Device**, and **LED Indicators**.

### Connecting the Power

Connect the 12-48VDC power cord with 5110-N's power input. If the power is properly supplied, the **Ready** LED will glow until the system is ready, at which time the **Ready** LED will glow green.

## Connecting to the Network

Connect one end of the Ethernet cable to 5110-N's 10/100M Ethernet port and the other end of the cable to the Ethernet network. 5110-N will indicate a valid connection to the Ethernet in the following ways:

- The Ethernet LED glows green when connected to a 100 Mbps Ethernet network.
- The Ethernet LED glows orange when connected to a 10 Mbps Ethernet network.
- The Ethernet LED will flash when Ethernet packets are being transmitted or received.

## Connecting to a Serial Device

Connect the serial data cable between 5110-N and the serial device. 5110-N's serial port uses the RS-232 interface to transmit data. The port uses a standard male DB9 pin assignment. Refer to Appendix A to see the signal definitions for the port.

## LED Indicators

5110-N has 3 LED indicators, as described in the following table.

LED Name	LED Color	LED Function
Ready	Red	Steady on: Power is on and 5110-N is booting up. Blinking: Indicates an IP conflict, or that the DHCP or BOOTP server did not respond properly.
	Green	Steady on: Power is on and 5110-N is functioning normally. Blinking: The device server has been located by Administrator's Location function.
	Off	Power is off, or power error condition exists.
Link	Orange	10 Mbps Ethernet connection
	Green	100 Mbps Ethernet connection
	Off	Ethernet cable is disconnected, or damaged.
Tx/Rx	Orange	Serial port is receiving data.
	Green	Serial port is transmitting data.
	Off	No data is being transmitted or received through the serial port.

## Initial IP Address Configuration

---

When setting up your 5110-N for the first time, you should first configure the device server's IP address. This chapter introduces the methods to configure the device server's IP address. For more details about network settings, see the *Network Settings* section from Chapter 5, *Web Console Configuration*.

This chapter includes the following sections:

- Initializing 5110-N's IP Address**
- Factory Default IP Address**
- Device Server Administration Suite ← recommended configuration method**
- ARP**
- Telnet Console**
- Serial Console (19200, n, 8, 1)**

## Initializing 5110-N's IP Address

1. Determine whether your 5110-N needs to use a Static IP or Dynamic IP (either DHCP or BOOTP application).
2. *If 5110-N is used in a Static IP environment*, you can use Device Server Administration Suite, ARP, Web Console, Telnet Console, or Serial Console to configure the new IP address.
3. *If 5110-N is used in a Dynamic IP environment*, you can use Device Server Administration Suite, Web Console, Telnet Console, or Serial Console to configure 5110-N to get an IP address dynamically with DHCP, DHCP/BOOTP, or BOOTP.



### ATTENTION

Consult your network administrator on how to reserve a fixed IP address for your 5110-N in the MAC-IP mapping table when using a DHCP Server or BOOTP Server. In most applications, you should assign a fixed IP address to your 5110-N.

## Factory Default IP Address

5110-N products are configured with the following default private IP address:

**Default IP address:** 192.168.127.254

(IP addresses of the form 192.168.xxx.xxx are referred to as private IP addresses, since it is not possible to access a device configured with a private IP address directly from a public network. For example, you would not be able to ping such a device from an outside Internet connection. 5110-N applications that require sending data over a public network, such as the Internet, require setting up the server with a valid public IP address, which can be leased from a local ISP.)

## Device Server Administration Suite

Device Server Administration Suite consists of useful utility programs that are used to configure and manage your 5110-Ns.

**See Chapter 5 for details on how to install Device Server Administration Suite, and how to use this suite of useful utilities to set up IP addresses and configure your 5110-N serial device servers.**

## ARP

You can make use of the ARP (Address Resolution Protocol) command to set up an IP address for your 5110-N. The ARP command tells your computer to associate the 5110-N's MAC address with the intended IP address. You must then use Telnet to access the 5110-N, at which point the device server's IP address will be reconfigured.

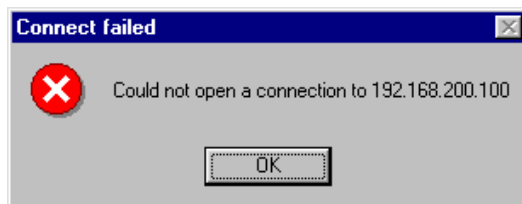


### ATTENTION

In order to use this setup method, both your computer and 5110-N must be connected to the same LAN. Or, you may use a cross-over Ethernet cable to connect the 5110-N directly to your computer's Ethernet card. Your 5110-N must be configured with the factory default IP address—192.168.127.254—before executing the ARP command, as described below.

Take the following steps to use ARP to configure the IP address:

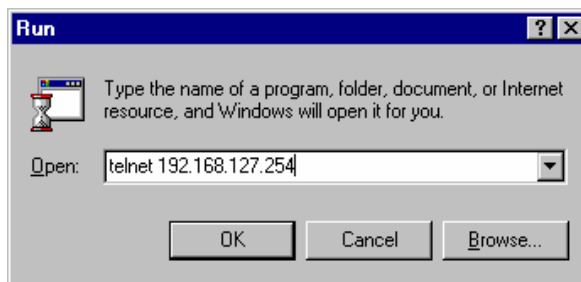
1. Obtain a valid IP address for your 5110-N from your network administrator.
2. Obtain 5110-N's MAC address from the label on its bottom panel.
3. Execute the 'arp -s' command from your computer's MS-DOS prompt by typing:  
***arp -s 192.168.200.100 00-90-E8-xx-xx-xx***  
where 192.168.200.100 is the new IP address and 00-90-E8-xx-xx-xx is the MAC address for your 5110-N (be sure to use the numbers determined in steps 1 and 2).
4. Next, execute a special Telnet command by typing:  
***telnet 192.168.200.100 6000***  
(be sure to use the IP determined in step 1)
5. After issuing this command, a **Connect failed** message will be displayed, as shown. After the 5110-N reboots, its IP address should be updated to the new address, and you can reconnect using Telnet, Web, or Administrator to check the success of the update.



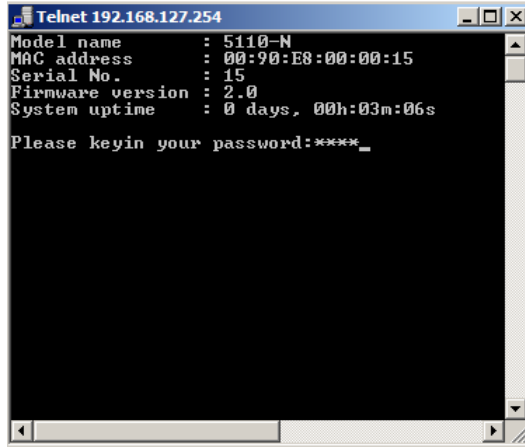
## Telnet Console

Depending on how your computer and network are configured, you may find it convenient to use network access to set up your 5110-N's IP address. This can be done using Telnet.

1. From the Windows desktop, click **Start** and then select **Run**.
2. Type `telnet 192.168.127.254` (use the correct IP address if different from the default) in the **Open** text input box, and then click **OK**.



- When the Telnet window opens, if you are prompted to input the **Console password**, input the password and then press **Enter**. Note that this page will appear only if the 5110-N is password protected.



- Type **2** to select **Network settings**, and then press **Enter**.

```
<< Main menu >>
(1) Basic settings
(2) Network settings
(3) Serial settings
(4) Operating settings
(5) Accessible IP settings
(6) Auto warning settings
(7) Monitor
(8) Ping
(9) Change password
(a) Load factory default
(v) View settings
(s) Save/Restart
(q) Quit
Key in your selection:
```

- Type **1** to select **IP address** and then press **Enter**.

```
<< Main menu->Network settings >>
(1) IP address
(2) Netmask
(3) Gateway
(4) IP configuration
(5) DNS server 1
(6) DNS server 2
(7) SNMP
(8) SNMP community name
(9) SNMP contact
(a) SNMP location
(b) Auto IP report to IP
(c) Auto IP report to TCP port
(d) Auto IP report period
(v) View settings
(m) Back to main menu
(q) Quit
Key in your selection:
```

6. Use the **Backspace** key to erase the current IP address, type in the new IP address, and then press **Enter**.

```
<< Main menu->Network settings >>
(1) IP address
(2) Netmask
(3) Gateway
(4) IP configuration
(5) DNS server 1
(6) DNS server 2
(7) SNMP
(8) SNMP community name
(9) SNMP contact
(a) SNMP location
(b) Auto IP report to IP
(c) Auto IP report to TCP port
(d) Auto IP report period
(v) View settings
(m) Back to main menu
(q) Quit

Key in your selection: 1
IP address: 192.168.127.253
```

7. Press any key to continue.

```
<< Main menu->Network settings >>
(1) IP address
(2) Netmask
(3) Gateway
(4) IP configuration
(5) DNS server 1
(6) DNS server 2
(7) SNMP
(8) SNMP community name
(9) SNMP contact
(a) SNMP location
(b) Auto IP report to IP
(c) Auto IP report to TCP port
(d) Auto IP report period
(v) View settings
(m) Back to main menu
(q) Quit

Key in your selection: 1
IP address: 192.168.127.253
Set IP address success

Press any key to continue...
```

8. Type **m** and then press **Enter** to return to the main menu.

```
<< Main menu->Network settings >>
(1) IP address
(2) Netmask
(3) Gateway
(4) IP configuration
(5) DNS server 1
(6) DNS server 2
(7) SNMP
(8) SNMP community name
(9) SNMP contact
(a) SNMP location
(b) Auto IP report to IP
(c) Auto IP report to TCP port
(d) Auto IP report period
(v) View settings
(m) Back to main menu
(q) Quit

Key in your selection: m
```

9. Type **s** and then press **Enter** to **Save/Restart** the system.

```
<< Main menu >>
(1) Basic settings
(2) Network settings
(3) Serial settings
(4) Operating settings
(5) Accessible IP settings
(6) Auto warning settings
(7) Monitor
(8) Ping
(9) Change password
(a) Load factory default
(v) View settings
(s) Save/Restart
(q) Quit

Key in your selection: s
```

10. Type **y** and then press **Enter** to save the new IP address and restart 5110-N.

```
Save change?
(y) Yes
(n) No

Key in your selection: y
```

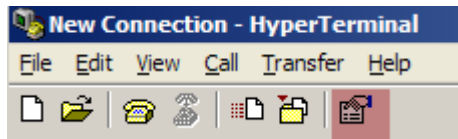
## Serial Console (19200, n, 8, 1)

You can use the RS-232 console port to set up the IP address for 5110-N. We suggest using PComm Terminal Emulator, which is available free of charge as part of the PComm Lite program suite (found on the Software CD that comes with the product), to carry out the installation procedure, although other similar utilities may also be used.

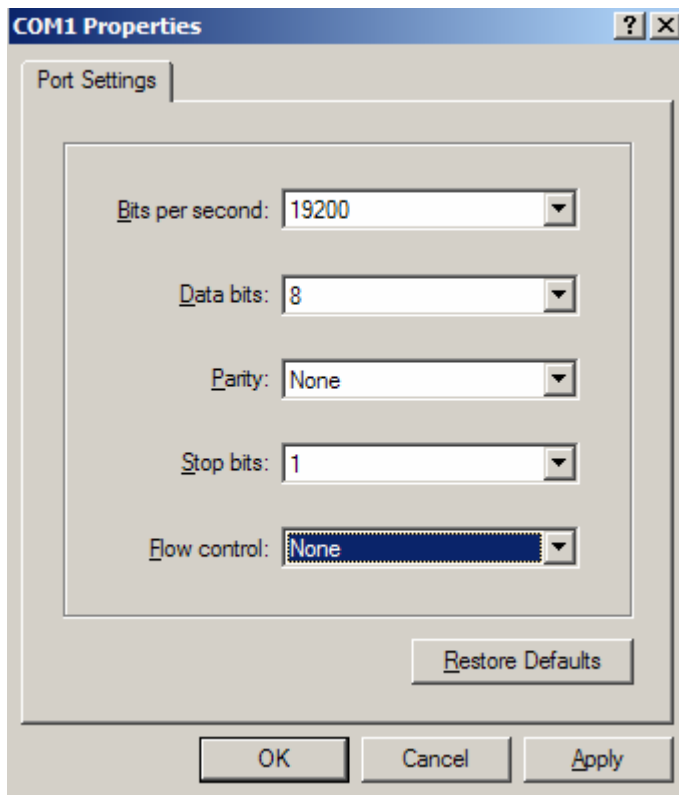
Before you start to configure the 5110-N via serial console, turn off the power and connect the serial cable from 5110-N to your computer's serial port.

1. Connect 5110-N's serial port 1 directly to your computer's male RS-232 serial port.
2. From the Windows desktop click **Start** → **Programs** → **Accessories** → **Communication** → **Hyperterminal**

- When the **Hyperterminal** window opens, first click the **Properties** icon and then click **Configure**.



- The **Property** window opens automatically. From the **Communication Parameter** page, select the appropriate COM port for the connection, **COM1** in this example, and **19200** for **Baud Rate**, **8** for **Data Bits**, **None** for **Parity**, and **1** for **Stop Bits**.

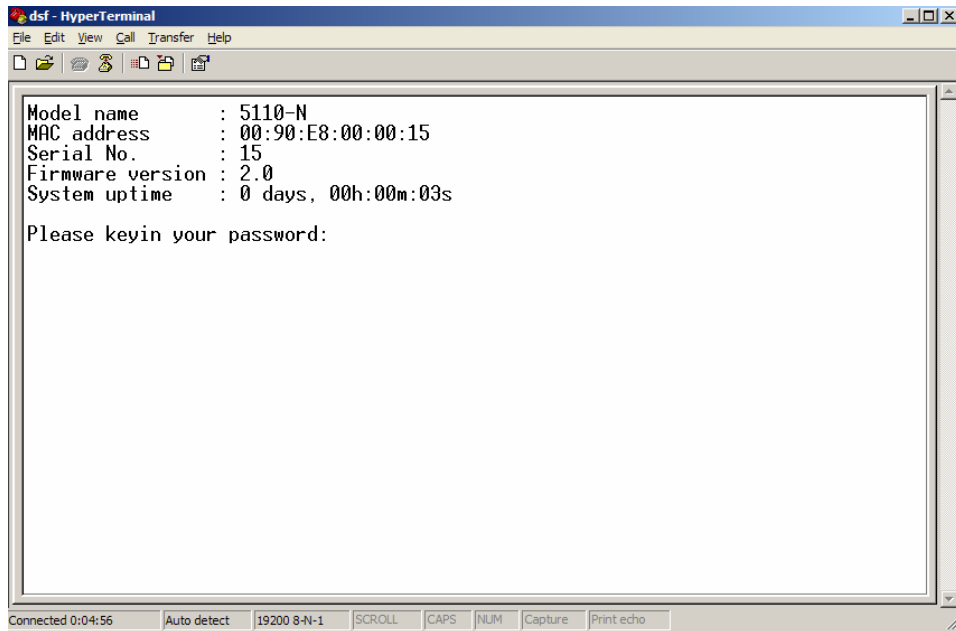


- From the Property window's **Terminal** page, select **ANSI** or **VT100** for **Terminal Type** and then click **OK**. If you select **Dumb Terminal** as the terminal type, some of the console functions—especially the **Monitor** function—may not work properly.
- Press the “`” key continuously and then power on the 5110-N.



- 5110-N will receive the “`” string continuously and then auto switch from data mode to console mode.

- Input the password when prompted. Note that the password page will appear only when the 5110-N has been set up for password protection.

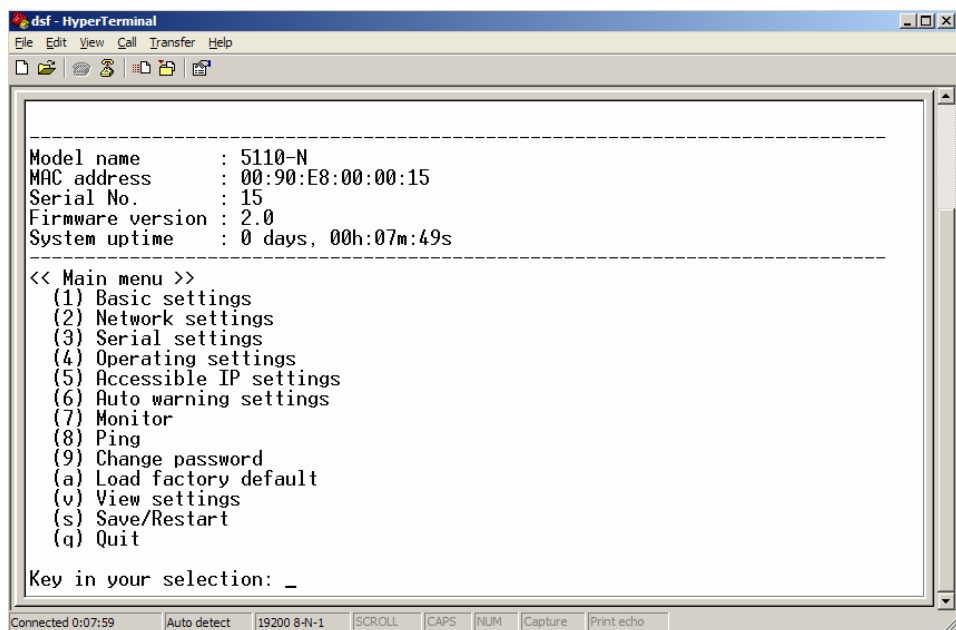


```
dsf - HyperTerminal
File Edit View Call Transfer Help
Model name      : 5110-N
MAC address     : 00:90:E8:00:00:15
Serial No.      : 15
Firmware version : 2.0
System uptime   : 0 days, 00h:00m:03s

Please keyin your password:

Connected 0:04:56  Auto detect  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

- Start configuring the IP address under **Network Settings**. Refer to step 4 in the **Telnet Console** section for the rest of the IP settings.



```
dsf - HyperTerminal
File Edit View Call Transfer Help
-----
Model name      : 5110-N
MAC address     : 00:90:E8:00:00:15
Serial No.      : 15
Firmware version : 2.0
System uptime   : 0 days, 00h:07m:49s
-----
<< Main menu >>
(1) Basic settings
(2) Network settings
(3) Serial settings
(4) Operating settings
(5) Accessible IP settings
(6) Auto warning settings
(7) Monitor
(8) Ping
(9) Change password
(a) Load factory default
(v) View settings
(s) Save/Restart
(q) Quit

Key in your selection: _

Connected 0:07:59  Auto detect  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

## Choosing the Proper Operation Mode

---

In this section, we describe the various 5110-N operation modes. The options include Real COM Mode, which uses a driver installed on the host computer, and operation modes that rely on TCP/IP socket programming concepts. After choosing the proper operation mode in this chapter, refer to Chapter 5 for detailed configuration parameter definitions.

- Overview**
- Real COM Mode**
- TCP Server Mode**
- TCP Client Mode**
- UDP Mode**
- Pair Connection**
- Ethernet Modem Mode**
- Reverse Telnet Mode**
- Disabled Mode**

## Overview

5110-N serial device servers network-enable traditional RS-232 devices, in which a serial device server is a tiny computer equipped with a CPU, real-time OS, and TCP/IP protocols that can bi-directionally translate data between the serial and Ethernet formats. Your computer can access, manage, and configure remote facilities and equipment over the Internet from anywhere in the world.

Traditional SCADA and data collection systems rely on serial ports (RS-232) to collect data from various kinds of instruments. Since 5110-N Serial Device Servers network-enable instruments equipped with an RS-232 communication port, your SCADA and data collection system will be able to access all instruments connected to a standard TCP/IP network, regardless of whether the devices are used locally or at a remote site.

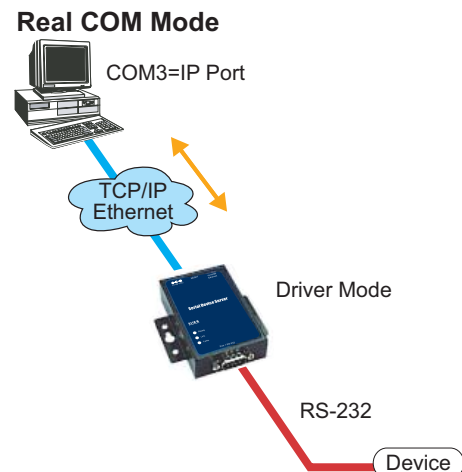
5110-N is an external IP-based network device that allows you to expand the number of serial ports for a host computer on demand. As long as your host computer supports the TCP/IP protocol, you will not be limited by the host computer's bus limitation (such as ISA or PCI), or lack of drivers for various operating systems.

In addition to providing socket access, 5110-N also comes with a Real COM driver that transmits all serial signals intact. This means that your existing COM-based software can be preserved, without needing to invest in additional software.

Three different Socket Modes are available: TCP Server, TCP Client, and UDP Server/Client. The main difference between the TCP and UDP protocols is that TCP guarantees delivery of data by requiring the recipient to send an acknowledgement to the sender. UDP does not require this type of verification, making it possible to offer speedier delivery. UDP also allows data to be unicast to only one IP address, or multicast to groups of IP addresses.

## Real COM Mode

5110-N comes equipped with COM drivers that work with Windows 95/98/ME/NT/2000/XP. The driver establishes a transparent connection between host and serial device by mapping the IP:Port of the 5110-N's serial port to a local COM port on the host computer. Real COM Mode also supports up to 4 simultaneous connections, so that multiple hosts can collect data from the same serial device at the same time.



**ATTENTION**

The driver used for Real COM Mode is bundled with Device Server Administrator. The driver is installed on your computer automatically when you install the Device Server Administration Suite.

One of the major conveniences of using Real COM Mode is that Real COM Mode allows users to continue using RS-232/422/485 serial communications software that was written for pure serial communications applications. The driver intercepts data sent to the host's COM port, packs it into a TCP/IP packet, and then redirects it through the host's Ethernet card. At the other end of the connection, the 5110-N accepts the Ethernet frame, unpacks the TCP/IP packet, and then sends it transparently to the appropriate serial device attached to one of the 5110-N's serial ports.

**ATTENTION**

Real COM Mode allows several hosts to have access control to the same 5110-N. The driver that comes with your 5110-N controls host access to attached serial devices by checking the host's IP address. Refer to the **Accessible IP Settings** section of Chapter 5 for more details.

## TCP Server Mode

In **TCP Server Mode**, 5110-N is configured with a unique IP:Port combination on a TCP/IP network. In this case, 5110-N waits passively to be contacted by the host computer. After the host computer establishes a connection with the serial device, it can then proceed with data transmission. TCP Server mode also supports up to 4 simultaneous connections, so that multiple hosts can collect data from the same serial device—at the same time.

As illustrated in the figure, data transmission proceeds as follows:

1. The host requests a connection from the 5110-N configured for TCP Server Mode.
2. Once the connection is established, data can be transmitted in both directions—from the host to the 5110-N, and from the 5110-N to the host.

