

LAN Gate Series

# **OPERATION MANUAL**



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# **1.0 Introduction**

The **STE-10** Serial Access Unit is a low cost, compact, serial access server or terminal server for connecting asynchronous serial devices (RS-232) over Ethernet (10Base-T) using a TCP/IP protocol stack. The **STE-10** may operate in either a client mode or as a server, allowing connection of serial data directly over a LAN or WAN. Configuration may be performed either via the DB25 pin RS-232 port with an ASCII terminal or via Telnet and Ethernet connection on the RJ-45 LAN port. The serial port is DTE, which allows direct connection to DCE equipment such as Modems. For connection to other DTE equipment such as a PC or terminal, a NULL Modem or crossover cable is required. One is provided with the unit.

# **1.1 Features**

- Low cost, compact design.
- Serial connection over Ethernet.
- Operates in either server or client mode.
- Complete TCP/IP protocol stack (OSI Network Layer 3).
- Provides packetization of serial data.

# **1.2 Specifications**

### Hardware

•	CPU	Intel® 80188
•	ROM	256K bytes Flash
•	RAM	256K bytes DRAM
•	LAN Interface	IEEE802.3 10Base-T Ethernet, RJ-45
		connector, DTE connection straight to HUB
•	Serial interface	EIA RS-232 ASYNC, DB25M connector
•	Baud rates	1200, 2400, 4800, 9600, 19200, 38400,
		57600, 115200, 230400, or 460800
•	Data length	5, 6, 7, or 8 bits
•	Parity	None, Odd, or Even
•	Stop bits	1 or 2 bits
•	Handshaking	None, RTS/CTS, or Xon/Xoff

#### Software

•	Flash ROM	Boot without network host; provision for easy	
		software upgrades	
•	Protocols	TCP/IP, ARP, ICMP protocols	
•	Functions	Telnet / Reverse Telnet	
•	Configuration	Telnet or ASCII terminal direct or via Dial-in	
•	LED indicators	Power, LAN Tx/Rx, Serial Tx and Rx	

#### Chapter 1: Configuration and Operation



# **1.3 Configuration**

Before any Ethernet connection is made to the **STE-10**, the device must have a valid IP address, which is accessible through the network. Initial IP setting is accomplished with a terminal connection to the RS-232 serial port. Connect a serial terminal to the RS-232 port of the **STE-10** at 9600 baud, 8 bits, no parity and 1 stop bit. Since the **STE-10** is DTE and a terminal is also DTE, please use the provided crossover cable. Set the configuration switch on the **STE-10** to "SETUP" and apply power.

If a serial terminal is not available, a PC with Windows® may be used along with the HyperTerminal<sup>™</sup> program. To start and configure HyperTerminal<sup>™</sup> follow these simple steps:

Using your mouse, browse to HyperTerminal; Start =>Programs =>Accessories =>Communications =>HyperTerminal.

Double-click the "Hypertrm.exe" icon. Enter a name (such as STE-10) and choose an icon for the connection. When the "Connect to" dialogue box appears, click the down arrow on the "Connect using:" pull-down tab and select "Direct to COMx" where "x" is the COM port number that will connect to the **STE-10**.

Click the "OK" button and set the COM port parameters for; 9600 baud, 8 bits, no parity, 1 stop bit and no flow control. Refer to the following page graphic.

COM1 Properties	? ×
Port Settings	
	1
<u>B</u> its per second: 9600 ▼	
Data bits: 8	
Parity: None	
<u>S</u> top bits: 1	
Elow control: None	
Advanced <u>R</u> estore Defaults	5
OK Cancel Ap	рlу

Example of port setting under HyperTerminal<sup>TM</sup> .

An initial message like the one below will be displayed while the port checks whether it is connected to a modem, followed by the main configuration menu display.

```
CHECKING MODEM ABOUT 10 SECOND
AT&C1V1
```

If your connection is a direct one, your terminal should display the first menu for the **STE-10**.

SERIAL DEVICE SERVER

- a). DEVICE SETTINGS
- b). UPGRADE FIRMWARE
- c). GENERAL DIAGNOSTIC

SELECT:

Main configuration menu, terminal mode.

Select option a): Device Settings

DEV	ICE SETTINGS	
a>.	DEVICE IP ADDRESS	<192.168.2.1>
b>.	DEVICE SUBNET MASK	<255.255.255.0>
c).	DEVICE NAME	<ste-10></ste-10>
d>.	DEVICE PASSWORD	$\diamond$
e).	MODE SETTINGS	<raw server=""></raw>
f).	GATEWAY ADDRESS	<0.0.0.0>
g>.	LOAD DEFAULT SETTINGS	
h۷.	APPLY AND SAVE SETTINGS	

q). PREVIOUS MENU

SELECT:

At this point you may set the various STE-10 parameters.

**a**) Sets the IP address of the **STE-10**. Set the IP in the domain where you will place the device. Please make sure the address does not conflict with another device on your network.

**b**) Sets the subnet mask. If you are not sure, please ask your network administrator. In most cases, a class "C" network will have a subnet mask of 255.255.255.0.

**c**) Sets the device name used for IAC Do Send Location requests. From the factory, the name will be set "STE-10".

**d**) Sets a device password to secure access to the configuration screen from both a telnet host and a serial login. There is no password set from the factory.

e) Selects the mode of operation of the **STE-10**. This will be explained in detail later.

**f**) Sets the Gateway IP to access hosts not in the local domain. If your network has Internet Access, this IP will be your IP router's address. Please check with your network administrator if you are not sure. If you will not be accessing a device outside your LAN, you may leave this entry all zeroes.

g) Resets the STE-10 to the factory default parameters.

**h**) Stores the current settings into Flash memory for operation after rebooting.

**q**) Sets the user back to the initial configuration menu.

# **1.4 Configuration with Telnet**

Once the **STE-10** has a valid IP address on your network, configuration may also be accomplished by opening a telnet connection to the **STE-10**.



The same entries apply as with configuration via the serial port.

### 1.5 Raw Data Server Mode

In Raw Data Server mode, the **STE-10** accepts network connections to the serial port with no Telnet IAC interpretation. This mode provides a clean 8 bit data path from the host session to the serial port. This mode is typically used for connection to data acquisition devices. You may also use this mode to connect a Telnet device to communicate to a serial port of a host computer, replacing a traditional serial terminal. This example shows configuration via terminal on the RS-232 port of the **STE-10**.

From the Device Settings menu, select (e),

MODE SETTINGS

- a). RAW DATA SERVER MODE
- b>. TELNET IAC DATA SERVER MODE
- c). TERMINAL SERVER MODE
- d). AUTO CONNECT AFTER POWER UP MODE
- q>. PREVIOUS MENU

SELECT:

Select a) RAW DATA SERVER MODE

SERVER PARAMETER PORT SETTINGS

a).	TCP PORT NO	<1998>
b).	BAUDRATE	<96 <b>00</b> >
ς).	DATA LENGTH	<8 BITS>
d>.	PARITY	<none></none>
e).	STOP BITS	<1 BIT>
	ACATAL BART BRATAGA	

f). SERIAL PORT PROTOCOL

q). PREVIOUS MENU

SELECT:

The SERVER PARAMETER PORT SETTINGS page provides configuration parameters to set the TCP port number that you wish to assign to the serial port and the characteristics of the serial port. A normal Telnet connection will connect to TCP port number 23. This is the method for configuration of the STE-10 via Ethernet. By default, the TCP port number for connection to the RS-232 port is 1998.

Select a) TCP PORT NO

Modify the TCP port number if required.

Select b) BAUDRATE

SERIAL BAUDRATE SETTING

- a). 1200
- b). 2400
- c). 4800
- d). 9600
- e). 19200
- f). 38400
- g). 57600
- h). 115200
- i). 230400
- j). 460800

#### SELECT:

Set the communication speed parameter to suit your requirements.

Continue to set the remaining communication parameters. The data length may be set to 5,6,7, or 8 bits. Parity may be set to even, odd or none. The stop bits may be set to 1 or 2 bits.

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When selecting "f", the serial port protocol may be set as follows.

SERIAL PORT PROTOCOL a). FLOW CONTROL <NONE> b). RECEIVE DATA ONLY WHEN DSR ON <DISABLED> q). PREVIOUS MENU

SELECT:

From the SERIAL PORT PROTOCOL menu select "a".

FLOW CONTROL

- a). NONE
- b). RTS/CTS
- c). XON/XOFF

SELECT:

Select between RTS/CTS and Xon/Xoff handshaking, or none. Then, from the SERIAL PORT PROTOCOL menu select "b".

RECEIVE DATA ONLY WHEN DSR ON a). DISABLE b). ENABLE

SELECT:

If this parameter is enabled, data reception is possible only when there is a valid connection and DSR is provided.

This completes the configuration of the serial port for raw server mode.

Select q) to return to the previous menu Select q again) to return to the Device Settings menu Select h) to initiate FLASH update

```
UPDATE EEPROM DATA:

STEP 1: PREPARE DATA... SUCCESS !

STEP 2: FLASH ERASE... SUCCESS !

STEP 3: WRITE EEPROM DATA TO SERVER...

SUCCESS! <<PRESS ANY KEY... >>
```

Press any key to return to the main menu, set the switch to "Normal" mode and reboot (power off/on). You can now establish a TCP connection to the assigned IP address and port number. This may be done from a DOS prompt or from within the Telnet application.

C:\>telnet 192.168.2.230 1998

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Windows® includes a Telnet application that may be started by clicking "Start" and selecting "Run". Type in the name "telnet.exe" and click "OK". The Telnet application will start. From the Telnet window select Connect => Remote System, a dialogue box will appear. Set the IP address and Port number. Refer to the example below.

After entering the IP address and Port number, click the "Connect" button. The Telnet terminal will now connect to the serial port and display just as if it were a serial terminal. If the serial device is a data acquisition device, a host may access the device with a Telnet connection directly.



#### **RAW vs. IAC Telnet mode**

The host initiates a TCP connection to IP address:socket number. This may be a typical UNIX session or a Winsock application for Microsoft Windows<sup>®</sup> NT or 98/95 host. The host session is then connected to the serial port of the **STE-10**. In RAW mode, the path is a clean 8 bit data path. In IAC mode, Telnet IAC interpretation is negotiated between the **STE-10** and the host.

# 1.6 Telnet IAC Data Server Mode

At the Device Settings menu Select e) Mode Settings Select b) TELNET IAC DATA SERVER MODE

Enter the parameter settings in the Server Parameter Port Settings Menu for TCPIP Port number and serial port parameters. The menus and setup are exactly the same as for Raw Data Server mode. Please refer to section 1.5 for details of the Raw Data Server settings.

```
Select q) To return to the mode setting menuSelect q) Previous Menu to return to the Device Settings menuSelect h) Apply and Save SettingsThe following screen will advise you of successful completion.
```

```
UPDATE EEPROM DATA:

STEP 1: PREPARE DATA... SUCCESS !

STEP 2: FLASH ERASE... SUCCESS !

STEP 3: WRITE EEPROM DATA TO SERVER...

SUCCESS! <<PRESS ANY KEY... >>
```

You may now change the switch to "Normal" mode and reboot (power off/on). The **STE-10** will boot in Telnet IAC Server Mode and you may establish a connection from a host that will undertake Telnet IAC interpretation.

# 1.7 Terminal Server Mode



The client terminal can telnet to the host from the command line or the **STE-10** may be setup in Auto Client mode to automatically establish a telnet connection to the host upon power up. In Terminal Server Mode a serial device, such as HyperTerminal<sup>TM</sup> on a PC, may establish a telnet connection to a host through the **STE-10**. The host may be a Unix server or even another **STE-10** serial port.

At the Device Settings menu:

Select e) Mode Settings ==> Select c) Terminal Server Mode

The Async Port Settings menu will be displayed.

ASY	NC PORT SETTING	
a).	BAUDRATE	<96 <b>00</b> >
b).	DATA LENGTH	<8 BITS>
ς).	PARITY	<none></none>
d>.	STOP BITS	<1 BIT>
e>.	SERIAL PORT PROTOCOL	
q).	PREVIOUS MENU	

-

#### SELECT:

Modify the port settings to suit your requirements. The Serial Port Protocol menu includes two extra items, "Logout When DSR Off" and "Data Mode". The "Logout" enabled will provide for automatic disconnection when the serial DSR is off. For "Data Mode", you may select between Raw or IAC mode data.

SERIAL PORT PROTOCOL

a).	FLOW CONTROL	<none></none>
b>.	RECEIVE DATA ONLY WHEN DSR ON	<disabled></disabled>
ς).	LOGOUT WHEN DSR OFF	<disabled></disabled>
d>.	DATA MODE	<iac mode=""></iac>

q). PREVIOUS MENU

#### SELECT:

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When your settings are correct:

Select q) Previous Menu to return to the Mode Setting menu. Select q) again to return to the Device Settings menu Select h) Apply and Save Settings

You will get confirmation that the settings have been saved. Press any key to return to the Device Settings menu.

After configuration, set the switch to "Normal" and reboot (power off/on). The **STE-10** will boot in terminal server mode and offer a command line prompt to any attached terminal. *Help* will show the available commands. *Show Status* will show the current settings.

```
STE-10>help
telnet
                   help
                                   ?
                                                       save
                   change parity change stopbits
change speed
                                                       change charsize
                   change gateway change netmask
change ipaddress
                                                       show status
STE-10>show status
              <9600>
speed
parity
              <NONE PARITY>
stopbits
             <1 STOP BIT>
charsize
              <8 BITS>
ipaddress
              <192.168.2.230>
              <192.168.2.254>
gateway
              <255.255.255.0>
netmask
STE-10>telnet 192.168.2.2
FreeBSD/i386 (FreeBSD.ctcu.com.tw) (ttyp1)
login:
```

In our example, we have made a telnet connection to a UNIX host. The **STE-10** will even access a host on a different network if the "gateway" has been set.

# 1.8 Auto Connect After Power Up Mode

This mode is an automatic terminal server mode. In this mode the **STE-10** will automatically establish a telnet connection to the specified IP address:socket number upon power up. When paired with another **STE-10** in "Raw" mode, a transparent RS-232 connection may be made over Ethernet.



In the above application example, the "RAW" mode **STE-10** will establish an Ethernet link to the host's RS-232 port. The **STE-10** in "AUTO TELNET" mode will automatically establish a Telnet connection to the "RAW" server. The result is a transparent RS-232 path over Ethernet.

Assume that we have already configured one **STE-10** in "RAW" mode with IP Address 192.168.2.230, and have connected our host's serial port to the LAN network. Now configure a second **STE-10** with IP Address 192.168.2.111. Then, from the Mode Setting menu:

Select d) Auto Connect After Power Up Mode

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CLIENT PARAMETER PORT SETTINGSa). REMOTE IP ADDRESS<0.0.0>b). REMOTE PORT NO<0>c). BAUDRATE<9600>d). DATA LENGTH<8 BITS>e). PARITY<NONE>f). STOP BITS<1 BIT>g). SERIAL PORT PROTOCOL

q). PREVIOUS MENU

#### SELECT:

The Client Parameter Port Settings menu will then allow you to specify the remote IP address and port number that you wish to connect to as well as the serial port settings. Enter the IP address of the remote "RAW" server and its Port number. Configure the serial parameters accordingly and exit to the previous menu. Apply and save the settings. Switch the device to "Normal" mode and reboot (power off/on). The **STE-10** will now automatically login a Telnet connection to the remote **STE-10** to establish your RS-232 connection over Ethernet.

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# 2.0 Application Examples



#### 2.1 Raw Data Mode Application, control serial port of ETU01-A

In the above example, the **STE-10** provides Telnet access to the ETU01-A's RS-232 serial control port. Using this method, the ETU01-A may be controlled remotely through an Ethernet connection and remote telnet terminal.

The configuration settings for the **STE-10** are very straight forward. Configure the **STE-10** from the serial port to set IP address, mask, gateway, etc. Set the mode to Raw Data Server and set the data port to 9600,8,N,1 with no handshaking. Then connect the device as shown in the above figure. The ETU01-A's control port is DCE. Therefore, the **STE-10** is connected with a straight serial connection with DB25 to DB9 adapter. The next page shows an example of the Telnet screen display when connected to the ETU01-A.

🛃 Teinet - 192.168.2.230			
Connect Edit Terminal Help			
THE ACCOUNT OF THE ACTION OF THE ACCOUNT OF THE ACC			
<ol> <li>Display System Status.</li> <li>Define System Parameter.</li> <li>Test Function Parameter.</li> <li>Passuord</li> <li>Reset Data to Default.</li> <li>EXIT</li> <li>DATE : 1999/04/03 TIME : 03:33:21</li> </ol> Enter 1-6 to select function.			

View of ETU01-A Terminal Mode via telnet connection and STE-10.

#### **2.2 Terminal Server Application**



Terminal Server, allows Telnet connection via serial terminal.

Refer to the configuration setup for terminal server mode starting in Section 1.7.

The **STE-10** is assigned an IP address for the domain and the serial port is configured according to the requirements of the serial terminal. In our example, we used a PC with Windows®, running HyperTerminal<sup>TM</sup> and a serial connection on COM1. The port settings were 9600, 8 bits, no parity, one stop bit, and no flow control. The **STE-10** provides a prompt on the terminal screen. A telnet connection to the UNIX host is initiated. Below is the screen captured.

En En Yen (a )	anstes Help 20 22				
STE-10>help teinet change speed change ipadd STE-10>show speed pority stopbits charsize ipaddress Oateway netmask STE-10>telne FreeBSD/i386 login:	ress status t 192.1 (Free	help change parity change gateway <9600> <nowe parity=""> &lt;1 STOP BIT &gt; &lt;8 BITS&gt; &lt;192.168.0.230&gt; &lt;192.168.0.254&gt; &lt;255.255.255.0&gt; 68.0.2 SSD.ctcu.com.tw)</nowe>	? change stopbits change netmask (ttyp1)	save charge charsize show status	
Convected 0.08:37	AN SI	Sector Scholl	CAPS ININ Capture Print and	10	:

STE-10 Terminal Server mode, serial access to telnet.

The Raw Server mode can be used in conjunction with another **STE-10** unit running in Auto Telnet mode to provide a transparent serial connection over TCPIP. This is the next application we will explore.

#### 2.3 Auto Telnet Mode Application

The application provides a very transparent connection for RS-232 over Ethernet using the TCPIP protocol stack. In our example, we are again connecting to an ETU01-A control port for management. The ETU01-A side will have one **STE-10** configured in Raw Mode and connected to Ethernet. The remote terminal side will have another **STE-10** connected to Ethernet and configured to "auto" telnet to the ETU01-A side's **STE-10**. The next figure is a simple example of this application.



Auto Telnet and Raw Mode Access provides transparent connection.

The right side **STE-10** unit is configured in Raw Mode, set an IP address and port number, with serial port configured for the ETU01-A (9600,8,N,1 no handshaking). The left side **STE-10** Terminal Server is configured in auto Telnet mode, pointing to the right side's IP address and port number. Its serial port is configured for the serial terminal (9600,8,N,1 no handshaking).

When connected together and powered on, the Terminal Server will automatically Telnet to the Raw mode access server. A transparent RS-232 link is established over the Ethernet medium. How's that for RS-232 extention!! Using an Internet connection, your remote serial device could be anywhere in the world.



Terminal display with serial connection over Ethernet.

So now we leave it up to you. If you have serial devices and Ethernet, then the **STE-10** may provide just the solution you've been dreaming of. This page left blank intentionally.

# A.1 RS-232 Port Pin Definition

#### V.24/RS-232 INTERFACE PIN ASSIGNMENT

PIN	CIRCUIT	FUNCTION	DIRECTION	EIA
1	FGND	Protective GND		AA
2	TD	Transmit data	OUT	BA
3	RD	Receive data	IN	BB
4	RTS	Request to send	OUT	CA
5	CTS	Clear to send	IN	CB
6	DSR	Data set ready	IN	CC
7	GND	Signal ground		AB
8	DCD	Carrier detect	IN	CF
15	TC	Transmit clock	IN	DB
17	RC	Receive clock	IN	DD
20	DTR	Data term ready	OUT	CD
24	XTC	DTE xmit clock	OUT	DA

## A.2 RJ-45 Ethernet Pin Definition

- 1 Tx (+)
- 2 Tx (-)
- 3 Rx (+)
- 4 NC
- 5 NC
- 6 Rx (-)
- 7 NC
- 8 NC

# A.3 Null Modem Cable Pinout



note: This cable supplied with unit. Use it to connect **STE-10** to DTE device, such as PC's COM port.



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