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Chapter 1

Getting Started

Chapter Overview

This chapter introduces and describes the basic steps involved in using NCSA Telnet for the Macintosh:

- invoking the program
- opening and closing a telnet connection
- copying, pasting, and printing the contents of session windows
- exiting the program

The chapter assumes that your system or network administrator has installed NCSA Telnet on your system, assigned an IP address to your Macintosh, and given you a login name and password for the computer to which you want to connect. For information regarding installation and customization procedures, refer to Chapter 8, "System Administration Information."

In addition, the chapter assumes that you know how to click and drag using the mouse, move and resize windows, and select items from menus. If you are unfamiliar with the Macintosh user interface or need additional information regarding these procedures, please refer to your Macintosh user's guide.

Beginning a Telnet Session

Figure 1.1 Telnet Program Icon

Invoke NCSA Telnet by double-clicking on the NCSA Telnet file or application icon. The NCSA Telnet application icon is shown in Figure 1.1.

A startup dialog box appears to introduce NCSA Telnet, then disappears.

Opening a Connection

To open a connection to a telnet host:

1. Select Open Connectionfrom the File menu, shown in Figure 1.2. A connection dialog box, shown in Figure 1.3, appears.

2. Enter as the session name the name of the telnet host to which you want to connect. The session name can be any host name, IP address, or an Alias.

3. Enter any name for the session window as the window name. This is an optional feature that is not necessary with single connections, but very useful when you have multiple connections.

4. Click OK or press RETURN.

5. If you want to connect as an FTP client, select FTP Session by clicking the appropriate box. For information

regarding the FTP client, please see Chapter 5, "File Transfer."

6. If you want to start either a serial or SLIP session, cleck the appropriate box. For information regarding SLIP and serial communications, please see Chapter 9, "Serial Communications."

NCSA Telnet attempts to connect to the host you specified, a process that generally takes only a few seconds. When a connection has been established, a session window appears. The name you specified for the window appears in the title bar of the session window, and under the Connections menu.

Figure 1.2 File Menu

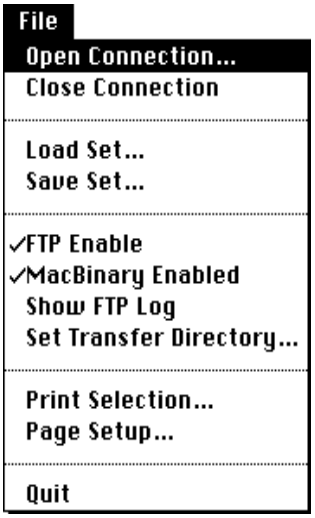
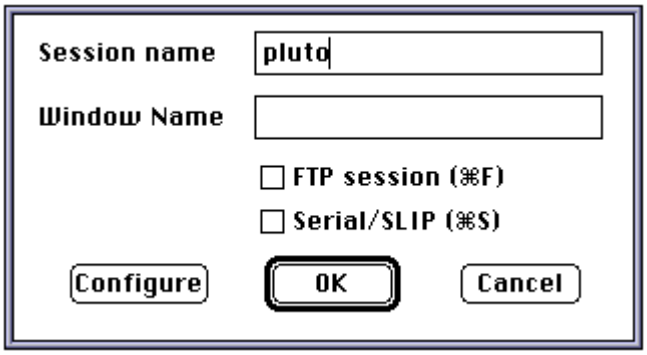


Figure 1.3 Connecti on Dialog Box



For information regarding alternative ways to open a connection, session names other than the hostname, and working with multiple sessions, see Chapter 4, "Advanced Features." A discussion of the purpose and function of the Configure button is contained in Chapter 3, "Customizing the Environment."

Logging in to Your Host

The session window indicates the name and type of your host machine and prompts you to enter your login name. For example, if you attempt to connect to a Sun system dubbed pluto, the login prompt may look like this:

```
SunOS UNIX (pluto)

login:
```

To log in:

1. Enter your login name at the login prompt and press RETURN. The host prompts you to enter your password.

2. Enter your password and press RETURN.

From this point on, NCSA Telnet operates as a VT102 terminal remotely connected to the host.

NOTE: The response time of the host may vary. If the remote host is heavily loaded it may take a few minutes after the connection has been opened for the host to prompt you to log in.

Setting a Terminal Type

NCSA Telnet emulates a VT102 terminal. When you log on to a host, the host operating system does not always know what type of terminal you are using. For instructions on setting the terminal type, consult the operating system manual for the host you will be using.

Try setting the terminal type to VT100 or VT102. For systems that do not support VT102 (such as many UNIX systems), use VT100 or tab132 (compatible with VT102 emulators). Telnet 2.5 can also let you set the terminal type to VT200.

The following examples show how to set the terminal type for two popular operating systems and hosts—UNIX (using the C shell) and VAX/VMS.

UNIX (C–Shell)

```
pluto% set term=vt100;tset            (for vt100)
pluto% set term=vt200;tset            (for vt200)
```

VAX/VMS

```
B$ set term /inq
```

Closing a Connection

To close a connection to your host, use the logout procedure specific to that system. For example, you would enter the UNIX logout command (logout) at the command line prompt:

```
pluto%  logout
```

If you are unable to log out in this manner, select Close Connection from the File menu. A dialog box appears to confirm that you want to forcibly close the connection. Click OK or press RETURN. A sample message the Close Connection dialog box might display is shown in Figure 1.4.

Figure 1.4 Sample Close Connection Dialog Box

After you have logged out, the session window disappears. You can now safely quit the NCSA Telnet application.

Cutting, Copying, Pasting, and Printing

NCSA Telnet allows you to cut, copy, paste, and print the contents of your session windows. To cut, copy, paste, or print, first select a region of text from the window.

To cut a selected region from a window, select Cut from the Edit menu. The selection is removed from the window and placed on the Clipboard.

To copy a selected region of a window "as is," select Copy from the Edit menu.

To copy a selected region of a window as a table, choose Copy Table from the Edit menu. White spaces in the selected region are replaced by tabs according to the setting of the Copy Table Threshold in the Preferences dialog box, so that you can paste the table into a word processing or spreadsheet program such as Microsoft Excel.

To paste the contents of the Clipboard into a session window, select Paste from the Edit menu.

To print a selected region:

1. Choose Page Setup from the File menu, specify the desired printing parameters in the dialog box that appears, and click OK or press RETURN.

2. Choose Print Selection from the File menu. Specify the number of copies, printer feed, and other parameters in the Print dialog box appears, and click OK or press RETURN.

For more information regarding the Page Setup or Print dialog boxes, refer to your Macintosh user's guide.

NOTE: Copying and Pasting are also discussed in Chapter 6, "Tektronix 4014 and 4105 Emulation," and Chapter 7, "Interactive Color Raster Graphics." The Copy Table Threshold is discussed in the section entitled "Using the Preferences Dialog Box" in Chapter 3.

Exiting NCSA Telnet

To exit NCSA Telnet, select Quit from the File menu.

NOTE: Telnet allows you to quit the application at any time during the program's execution; however, to avoid loss of data or other complications, you should close connections to each system before quitting NCSA Telnet, whenever possible. If you do attempt to quit the application before closing the current connections, a dialog box appears to confirm that you want to forcibly close the connections. If you do, click OK or press RETURN; otherwise, click Cancel.

Chapter 2

Using the Keyboard

Chapter Overview

This chapter discusses the special keyboard features of NCSA Telnet. It explains, for example, how to use command key equivalents of menu commands; set the functions of the BACKSPACE (or DELETE), OPTION, and Backquote keys; use the Macintosh keyboard to emulate a VT102 keyboard; and define your own macros. It also supplies some information about emulation a VT200 terminal, which is a new feature in this version of Telnet.

Using Keyboard Commands

NCSA Telnet understands both menu and key commands. Some key commands are optional equivalents of menu commands; others are equivalent to key commands on a VT102 terminal. The following sections discuss keyboard options and list the keyboard commands understood by NCSA Telnet.

Emulating Menu Commands

If you want to be able to use command key equivalents for menu commands:

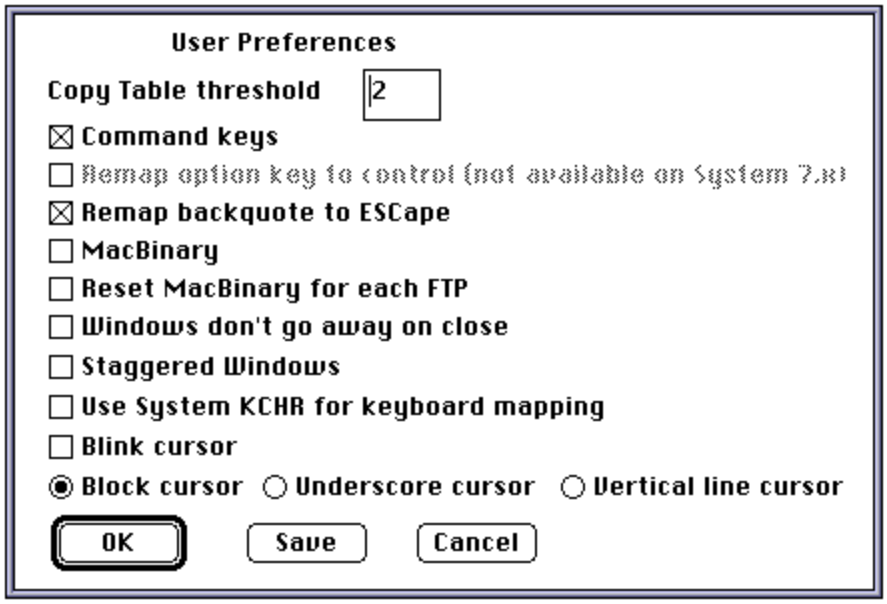
1. Select Preferences from the Edit menu. The Preferences dialog box appears (Figure 2.1).

2. Check the box labeled Command keys by clicking on it. When the Command keys option is checked, the command keys appear in the menus next to their corresponding menu commands.

3. Click OK or press RETURN to activate the command keys option for the current telnet session only. Click Save if you want the option to be activated every time you invoke NCSA Telnet.

For more detailed information about the Preferences dialog box and the options it contains, refer to the section,"Using the Preferences Dialog Box," in Chapter 3.

Figure 2.1 Preferences Dialog Box



Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote

NCSA Telnet lets you change the functions of the BACKSPACE (or DELETE), OPTION, and Backquote keys to accommodate your needs or preferences—a feature you may find especially useful if you are using a Macintosh Plus keyboard.

BACKSPACE (or DELETE)

NCSA Telnet automatically translates BACKSPACE keypresses into delete codes, for compatibility with systems that prefer delete to backspace. If you find that your backspaces are not being accepted, the host you are using may only accept backspace codes.

To test this possibility, change the setting of the BACKSPACE (or DELETE) key to backspace according to the instructions below. This action resets the default translation, so that the key sends a backspace code. If your backspaces are accepted, then the host prefers backspace codes.

There are four ways to set the function of the BACKSPACE (or DELETE) key to backspace when you open a connection.

- the Configuration dialog box
- the Backspace and Delete options in the Session menu
- a saved set that includes your preferred setting
- the keyword `erase` in your configuration file

To use the Configuration dialog box:

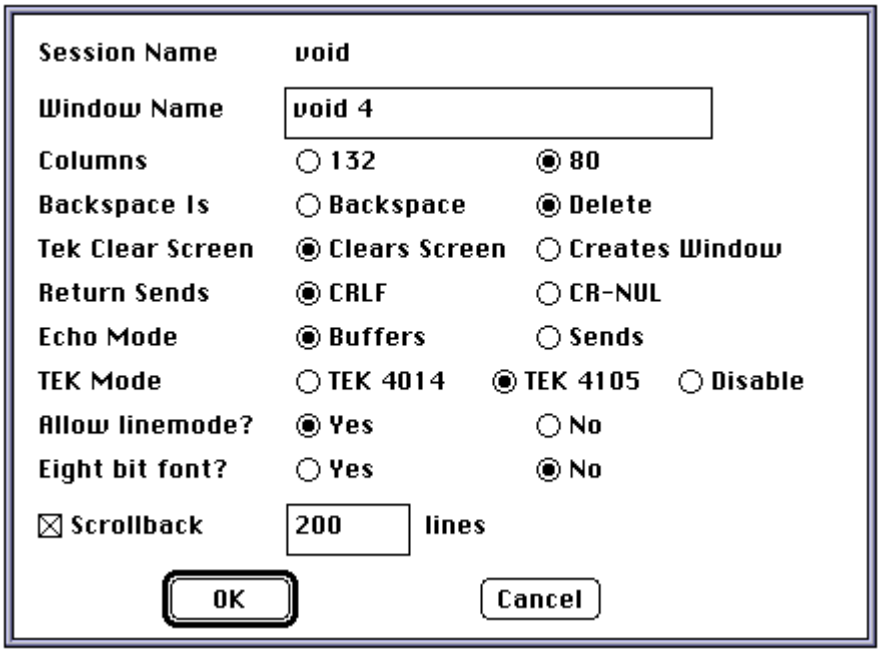
1. Click the Configure button in the Connection dialog box that appears when you first open a connection. The Configuration dialog box appears (Figure 2.2).

2. Click the radio button labeled Backspace in the row Backspace Is.

3. Click OK or press RETURN.

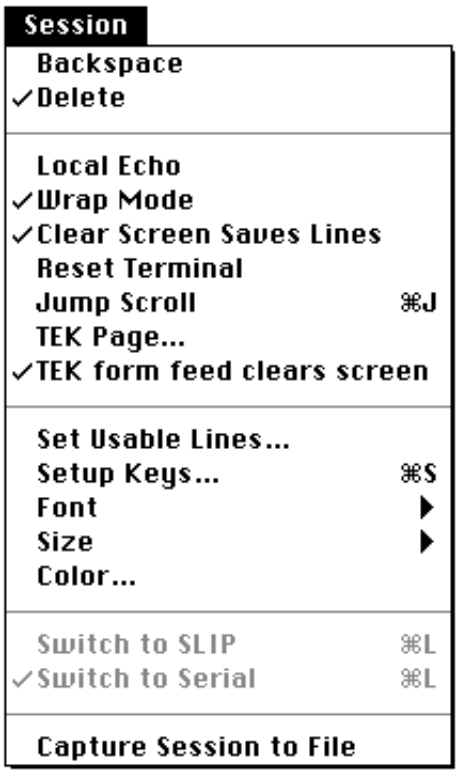
For information regarding the other options contained in the Configuration dialog box, refer to "Using the Configuration Dialog Box" in Chapter 3.

Figure 2.2 Configuration Dialog Box



You can also set the function of the BACKSPACE (or DELETE) key by enabling the Backspace or Delete option in the Session menu. A checkmark appears in the menu beside the active function (see Figure 2.3). In this manner, you can change the function of the BACKSPACE (or DELETE) key during a telnet session.

Figure 2.3 Session Menu



If you use this host frequently, you may want to save your BACKSPACE (or DELETE) setting according to the instructions presented in the section entitled "Saving Session Characteristics" in Chapter 4. Then, whenever you load the saved set, the function of the BACKSPACE (or DELETE) key is automatically set to your preference. Alternatively, your system administrator can "permanently" reset the Backspace function for this session or for all sessions, using the configuration file as instructed in Chapter 8, "System Administrator Information."

OPTION

In some instances, you may need to be able to use the OPTION key as a substitute for the CONTROL key—for example, if you are using a Macintosh Plus, whose keyboard has no CONTROL key.

NOTE: This option is not permitted under System 7.0.

To set the OPTION key as a substitute for the CONTROL key, and are not using System 7.0:

1. Select Preferences from the Edit menu.

2. Check Remap option key to control.

3. Click OK or press RETURN if you want the setting to apply to this telnet session only. Click Save to make this the default setting for the OPTION key.

NOTE: If you are working on a Macintosh Plus and want to use the Command keys option, you should also check the Remap option key to control option; otherwise, you will not be able to generate control characters.

If you have a CONTROL key on your keyboard, it is not recommended that you use the Remap option key to control option because it changes the standard Macintosh key assignments.

NOTE: When the Command keys option is disabled, the key may also be used as the CONTROL key.

Backquote

If you want to substitute the Backquote key (Figure 2.4) for ESC; that is, if you want the Backquote key to send the ASCII character ESC:

1. Select Preferences from the Edit menu.

2. Check Remap backquote to ESCape.

3. Click OK or press RETURN if you want the setting to apply to this telnet session only. Click Save to make this the default setting for the Backquote key.

Figure 2.4 Backquote Key

NOTE: When you check the Remap backquote to ESCape option, the only way you can send the ASCII character backquote (`) is to press -Backquote or OPTION-Backquote. The capability of SHIFT-Backquote to send a tilde is unaffected by the setting of this option.

Emulating a VT102 Terminal

When NCSA Telnet is running, the Macintosh appears to the host as a VT102 terminal. NCSA Telnet transmits keystrokes for keys common to the Macintosh and VT102 keyboards without modifying them; however, the VT102 keyboard has some keys that the Macintosh keyboard does not have, and treats or labels other keys differently. In addition, many VT102 keys have special meanings when they are transferred to the host.

You can use the Macintosh keyboard to provide full VT102 functionality. Table 2.1 lists the Macintosh keys commands that correspond to key commands on a VT102 terminal. Note that the numeric keypad on the Macintosh is identical in position to that

of the VT102, although the labels differ. If you are accustomed to typing on a VT102 keypad, you can ignore the Macintosh labels and type as usual.

Table 2.1 Macintosh Keys Used for VT102 Terminal Emulation

VT102 Key	Equivalent Keystroke on Macintosh Plus Keyboard	Equivalent Keystroke on Apple Desktop Bus Keyboard
Backquote	-Backquote or OPTION-Backquote †	-Backquote or OPTION-Backquote †
ESC††	Backquote	ESC or Backquote
DELETE†††	BACKSPACE	DELETE or DEL
BACKSPACE†††	-BACKSPACE or † OPTION-BACKSPACE	-DELETE or † OPTION-DELETE
LINE FEED	CONTROL-J	CONTROL-J
PF1	Clear on keypad	Clear on keypad (or F1)
PF2	\ on keypad	\ on keypad (or F2)
PF3	= on keypad	= on keypad (or F3)
PF4	* on keypad	* on keypad (or F4)
CONTROL-SPACE(NUL)	OPTION-SPACE	CONTROL-SPACE or OPTION-SPACE
Keypad keys	Keypad keys	Keypad keys

† Use of or OPTION depends on setting of Command keys option in the Preferences dialog box.
†† Use of Backquote as ESC is governed by the setting of the Remap backquote to ESCape option in the Preferences dialog box.
††† See the discussion of backspace and delete in the section entitled " Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote."

Emulating a VT200 Terminal

Telnet 2.5 has the new feature of being able to emulate a VT200 terminal. That gives Telnet the ability to send VT200 esacpe codes with the Mac keyboard. For an overview of these escape codes, please see Appendix E, "VT200 Escape Codes."

Changing the Assigned Keys for Interrupt, Suspend, and Resume

NCSA Telnet uses certain key combinations for the telnet functions Interrupt, Suspend, and Resume functions, which are discussed in the following sections.

To change any of the key combinations assigned to these functions:

1. Select Setup Keys from the Session menu, as shown in Figure 2.5. The Setup Keys dialog box appears (see Figure 2.6).

2. Change the key assignments for the functions to any other control characters by typing the character(s) in the appropriate box, or disable a function altogether by deleting the entry in its respective box.

3. Click OK or press RETURN.

You may also set the key assignments to Interrupt, Suspend, and Resume in the configuration file (see Chapter 8).

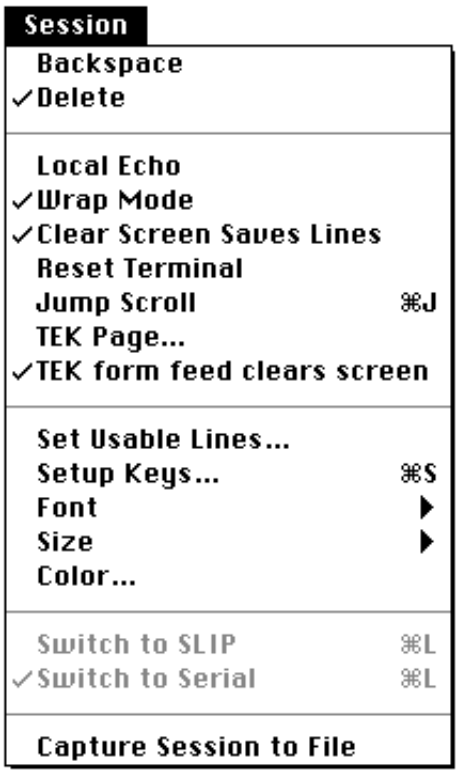
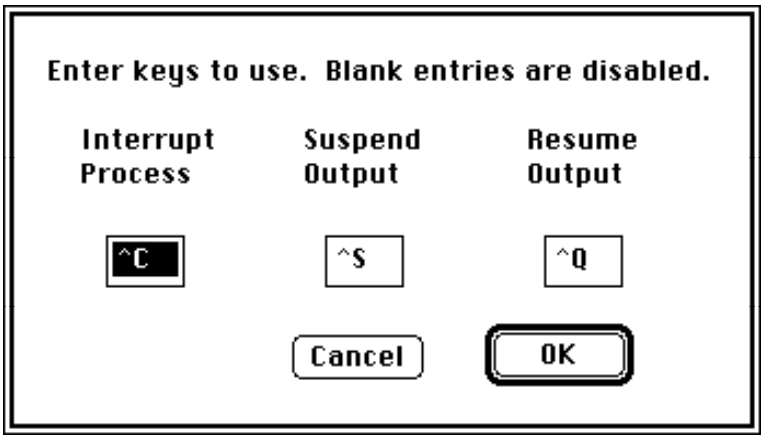


Figure 2.5 Session Menu

Figure 2.6 Setup Keys Dialog Box



The initial key assignments for Interrupt, Suspend, and Resume and their functions correspond to the traditional interpretation of the ASCII character, as described in the following sections.

Interrupt (CONTROL-C)

Interrupt sends a telnet interrupt process character, equivalent to the Interrupt Process command in the Network menu (see "Network-Related Commands" in Chapter 4). The host implementation of telnet is required to listen for and interrupt the current application when this option is received.

Interrupt also does a *timing mark* operation. In many implementations of telnet, you press CONTROL-C and often wait several minutes before the text stops scrolling on your screen. This occurs because the TCP protocol has buffered up to 16K or even 32K bytes of data, which is waiting in the pipeline to be delivered even before you press CONTROL-C. To remedy this situation, NCSA Telnet initiates a process known as timing mark flush when you issue an interrupt command.

To do timing mark processing, NCSA Telnet sends a special character to the host which the host echoes back. While waiting for the host to echo, all characters for that session are thrown away. It appears that the session pauses for up to 15 seconds and then resumes as usual. During the pause, NCSA Telnet is throwing away all of the buffered data so that you do not have to wait for it to be displayed.

Suspend(CONTROL-S)

Suspend instantly interrupts all output coming from the network. The current session will not produce any more characters on the screen until you issue the Resume command.

Resume (CONTROL-Q)
Resume allows character printing to resume to the current session. Resume does nothing unless a Suspend command is in effect.

Defining Macros

NCSA Telnet allows you to use the key combinations -0 through -9 as macro keys. You can program these keys to send from 0 to 255 characters.

To define a macro:

1. Select Set Macros from the Edit menu or press -M. The Macro Configuration dialog box that appears is shown in Figure 2.7 with several sample macro definitions.

2. Click the button of the command key you wish to define, or select the box next to that button.

3. Enter the appropriate macro key sequence as instructed in the following section.

4. Click OK to activate the new macros, or click Cancel to invalidate the additions or changes you made. When you click OK or Cancel, you are returned to the application.

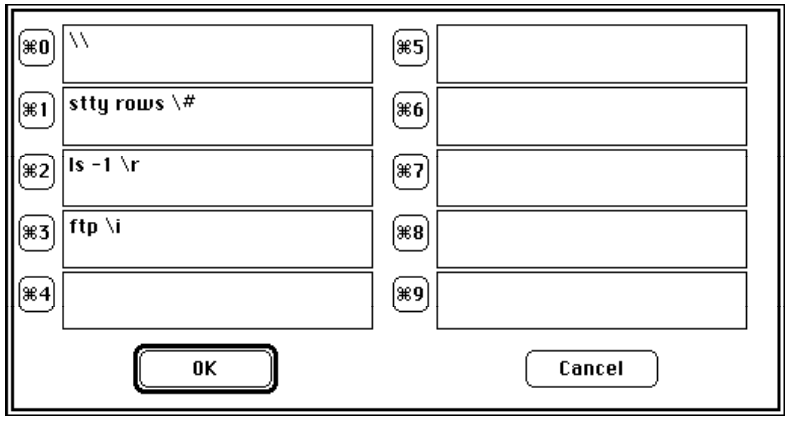


Figure 2.7 Macro Configuration Dialog Box

NOTE: Your macros are saved when you save your set as instructed in the section entitled "Saving Session Characteristics" in Chapter 4.

Reverting to the Previous Macro Definitions

While you are working in the macro configuration dialog box, you can undo changes you made to a macro and revert the associated command key to its previous setting by clicking the button that corresponds to that command key. For example, if you want to undo changes to the definition for -2, click the button labeled 2. If you want to simultaneously abandon all of the changes that you have made, click Cancel.

Entering Macro Key Sequences

The key sequences used to generate special control characters in a macro may seem somewhat strange, unless you are familiar with the C programming language. To define a special character, you must first enter a backslash (\). Indicate non-typable control characters with octal numbers. Table 2.2 shows some special characters you might enter.

Table 2.2 Common Macro Key Combinations

Desired Character	Definition
Backslash (\)	`\\`
TAB	`\t`
ESC	`\033`
CONTROL-C	`\003`
CONTROL-D	`\004`
CONTROL-E	`\005`
CONTROL-H or BACKSPACE	`\010`
Size of current window†	`\#`
Internet number of this Macintosh††	`\i`

† pertains to setting the number of usable lines in a session window (see the section entitled "Using the Session Menu" in Chapter 3).

†† see also the discussion of the Show Network Numbers command contained in "Network-Related Commands" in Chapter 4, and of the Send IP Number command contained in "Transferring Files" in Chapter 5.

Chapter 3 Customizing the Environment

Chapter Overview

NCSA Telnet allows you to customize the environment to suit your special needs and habits. This chapter covers some more advanced aspects of the NCSA Telnet working environment. It describes how to change the configuration settings, set the characteristics of session windows, and customize other NCSA Telnet operations using the Preferences dialog box and the Session menu.

Using the Configuration Dialog Box

NCSA Telnet allows you to specify certain configuration characteristics from within the application, right before you open a particular connection. For example, you can change the window name for a connection, set the function of the BACKSPACE (or DELETE) key, and specify whether Tektronix graphic images are displayed in separate windows.

To configure a telnet session:

1. Choose Open Connection from the File menu or press – O. The Connection dialog box shown in Figure 3.1 appears.

2. Specify a session name.

3. Click Configure. The Configuration dialog box appears (Figure 3.2).

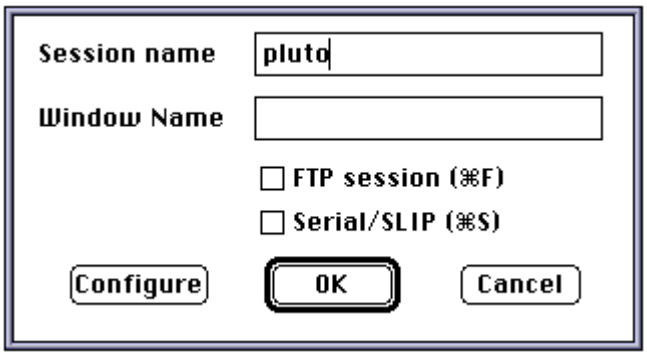


Figure 3.1 Connection Dialog Box

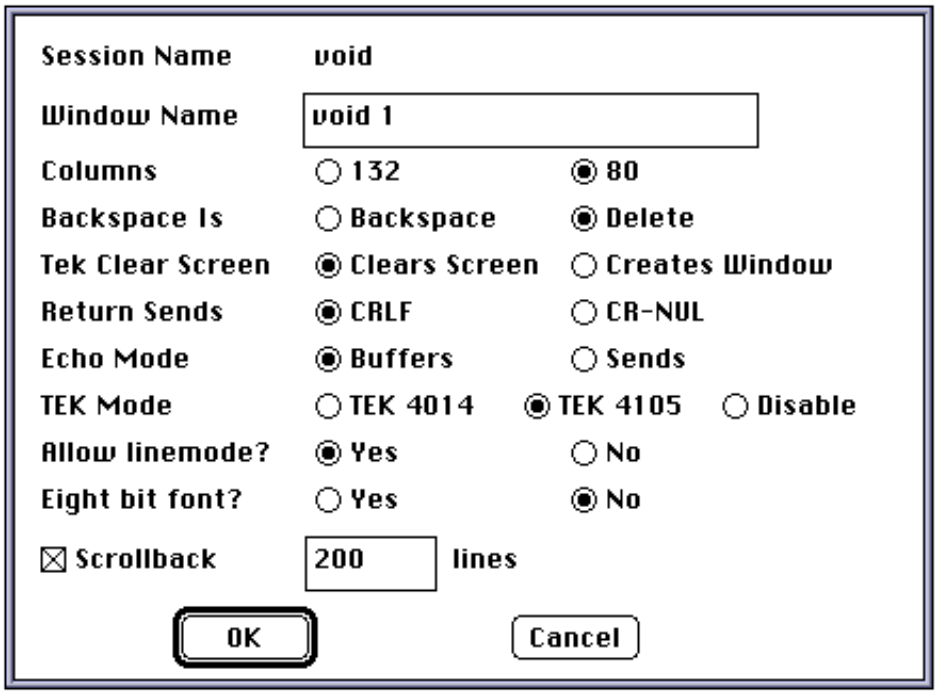


Figure 3.2 Configuration Dialog Box

Window Name

The session name serves as the window name and appears in the session window's title bar, unless you designate a different window name. To designate a window name, enter the desired name in the Window Name box. (You may also specify the window name by entering the name in the Window Name box of the Connection dialog box.)

Columns

A session window may contain either 80 or 132 columns. Specify the number of columns to be displayed in your session window by clicking the appropriate radio button in the row labeled Columns.

For information regarding changing the number of lines displayed in a session window, see the section of this chapter entitled "Set Usable Lines."

NOTE: When you specify 132 columns, you may not be able to see all of the columns in a session window at one time. You can resize the session window and use the horizontal scrollbar to view obstructed columns.

Backspace Is

The BACKSPACE (or DELETE) key may be used to send backspace or delete codes. To assign the function you prefer to this key, select either Backspace or Delete in the row labeled Backspace Is. For more information regarding the BACKSPACE (or DELETE) key, see "Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote" in Chapter 2.

Tek Clear Screen

The default setting for this option is Clears Screen. The Tek Clear Screen setting applies while you are operating in the Tektronix drawing mode. By default, when a clear screen code is received and you generate a new image, the screen is cleared; that is, any drawing on the screen is overwritten with a new image.

If you change the default by selecting the Creates Window option, and then generate a new image, a new window is created for the image and the contents of the active screen are not overwritten. Each new screen created in this way has as its name the session name and time. For more information regarding Tektronix drawing mode and the clear screen code, refer to Chapter 6, "Tektronix 4014 and 4105 Emulation."

Return Sends

This option allows you to change the type of end-of-line marker sent by the Macintosh and establish compatibility with some 4.3 BSD UNIX systems. The default for this option is CRLF. When CRLF is active, NCSA Telnet sends a carriage return followed by a line feed. Select CR-NUL to instruct NCSA Telnet to send a carriage return followed by NUL, if that is needed by your host.

Echo Mode

You can set NCSA Telnet to operate in either of two echo modes: local or remote. In local echo mode, characters are copied to the screen immediately as you type them. In remote echo mode, the characters are sent to the host, which sends them back to be printed. The Echo Mode option only applies when you are operating in local echo mode.

To enter local echo mode, also known as line mode, enable the Local Echo option in the Session menu. The menu item appears checked when local echo mode is active.

You can use the Echo Mode option in the Configuration dialog box to configure Local echo mode to work in either of two ways: the characters you type can be buffered locally and sent when you press RETURN, or they can be sent immediately as you type. To specify the former, select the Buffers option in the Configuration dialog box. To specify that each character be sent immediately as you type it—a process known as *half duplex*—select Sends.

NOTE: Keystrokes that include control characters, including tab and return, are always sent immediately as they are typed. Some hosts force local echo mode automatically. If local echo mode is not forced by your host, you may still want to enable it to improve keyboard response time. Local echo mode should be used carefully, because it is incompatible with most full-screen editors.

TEK Mode

You can specify the default TEK emulation type, either 4014 , 4105, or none. with this control. If you select "none," then Telnet will not allow TEK displays on screen. Your system administrator can also set the initial value within the configuration file.To do this, see chapter 8, "System Administrator Information." After you open a session, The specified TEK Mode becomes the default.

Scrollback

Check the box labeled Scrollback to activate the scrollback feature.

To change the number of lines that NCSA Telnet saves and allows you to view by scrolling, type the desired integer in the text box. The default is usually 200 lines, although this may have been changed by your system administrator in the configuration file. If you reset the number of scrollback lines and then save this configuration using Save Set, the setting is saved as part of that set (see "Saving Session Characteristics" in Chapter 4).

NOTE: The scrollback feature gradually consumes memory for the number of scrollback lines that you specify, so be sure to watch your memory consumption if you specify a high number of scrollback lines.

Linemode

NCSA Telnet supports the Telnet Linemode Option, developed by the Internet Engineering Task Force-Telnet Linemode Working Group, and which is being implemented by Cray. In previous versions of NCSA Telnet, the program would send out data one character at a time, which resulted in a large amount of network overhead for large multi-user systems.

Now when you enable the linemode option, NCSA Telnet sends data to the host machine a line at a time rather than a character at a time, thus greatly reducing network traffic.

NOTE: Even if linemode is set for enable, NCSA Telnet can only use linemode if the host machine supports it. Therefore, the use

of the linemode feature is ultimately decided by the connected host's capabilities.

Eight Bit Font

Telnet now has the ability to pass through characters with the high-bit set. If you choose the Eightbit option, visible characters with the high bit set will be handled properly. If not, Telnet strips the high bit off of such charaters, as it did in all previous versions.

Using the Preferences Dialog Box

The options contained in the Preferences dialog box are described in the following sections.

To use the Preferences dialog box:

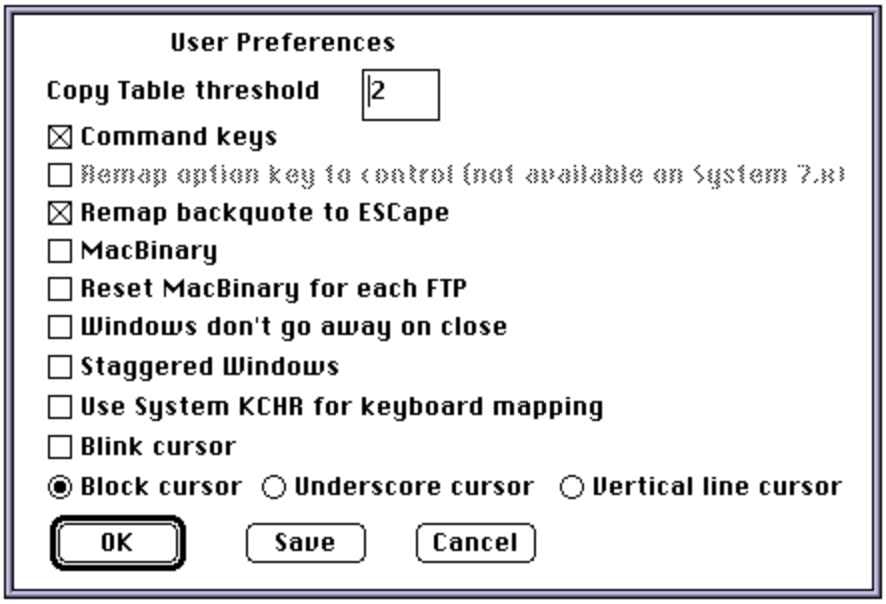
1. Select Preferences from the Edit menu. The Preferences dialog box that appears contains a check box for each option available. The Preferences dialog box is shown in Figure 3.3.

2. Specify a Copy Table Threshold by clicking within its box and entering the desired number by typing on your keyboard.

3. Select or deselect an option by clicking the box that appears before it. The box becomes checked or unchecked to indicate that the option is activated or deactivated, respectively.

4. Click OK or press RETURN to apply the selected options. Click Save to save the specifications as the default, so that next time you invoke NCSA Telnet, these options are activated automatically. Click Cancel to undo any changes you have made. When you click one of these buttons or press RETURN, you are returned to the application.

Figure 3.3 Preferences Dialog Box



Copy Table Threshold

The Copy Table Threshold value determines the number of spaces which, at a minimum, are replaced by tabs when you issue the Copy Table command from the Edit menu or press -T. Instead of using the standard Copy command, you can use the Copy Table command to copy tables of data from the NCSA Telnet screen onto the Clipboard.

When you use the Copy Table command, all strings of contiguous spaces that are greater than the threshold are turned into tabs before being placed on the Clipboard. This produces a format that can be pasted into most spreadsheets and graphing programs without losing data or requiring additional formatting.

Command Keys

By checking the Command keys option in the Preferences dialog box, you obtain access to command key equivalents for commands listed in the individual menus. This option also determines whether the -key functions as the CONTROL key. When the Command keys option is checked, the command key equivalents are listed beside their corresponding items in the menus and does not translate to CONTROL. For more information regarding command keys, see "Using Keyboard Commands" in Chapter 2.

Remap Option Key to Control

Select Remap option key to control if you want the OPTION key to substitute for the CONTROL key. This option is most useful on machines such as the Macintosh Plus, which has no control key of its own. However, it is not available under Operating System 7.

NOTE: If you are working on a Macintosh Plus and want to use the Command keys option, you should only do so in conjunction with the Remap option key to control option; otherwise, you will not be able to generate control characters.

For more information regarding changing the function of the OPTION key, see "Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote" in Chapter 2.

Remap Backquote to ESCape

Select Remap backquote to ESCape when you want to use the Backquote key as the ESC key. When this option is checked, pressing the Backquote key, sends an ASCII ESC character. For more information regarding this option, refer to "Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote" in Chapter 2.

MacBinary

The MacBinary option controls the default setting for the MacBinary Enabled option in the File menu. When this option is checked, the MacBinary Enabled option (and consequently MacBinary mode) are activated by default when the application is started. See Chapter 5, "File Transfer," for more information on MacBinary mode.

Reset MacBinary for Each FTP

The Reset MacBinary for each FTP option controls whether the MacBinary mode setting is to be returned to its default state upon the initiation of an FTP session. The default state of MacBinary is whatever you last set for the MacBinary option (see the preceding section,"MacBinary").

NOTE: "Each FTP" corresponds to establishing the FTP command connection and not the individual file transfer.

Windows Don't Go Away on Close

Select Windows don't go away on close if you want the session window to be displayed on the screen even when its associated connection has been terminated.

This feature allows you to read, copy, and print text that is in a window whose connection has been closed. To close such a window, click in its close box.

Staggered Windows

When you've selected the Staggered Windows option, the program staggers multiple windows by a whole title bar, allowing you to see each window's title. Otherwise, NCSA Telnet only staggers the windows by a few pixels.

System KCHR

Telnet 2.5 has the ability to map characters from the System KCHR resource instead of KCHR built into Telnet. This allows users to have all the keys mapped by the system, instead of each particular application. If this feature is desired, select this option.

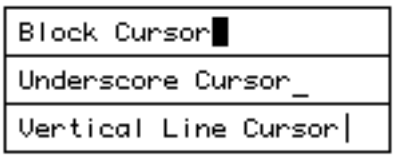
Blink Cursor

Click the "Blink Cursor" button if you want the cursor to blink during a Telnet session.

Cursor Selection

You can now select what kind of cursor Telnet uses for text display. Click the appropriate button to choose either a block cursor, underscore cursor, or vertical bar cursor. See figure 3.4 for an example of each cursor type.

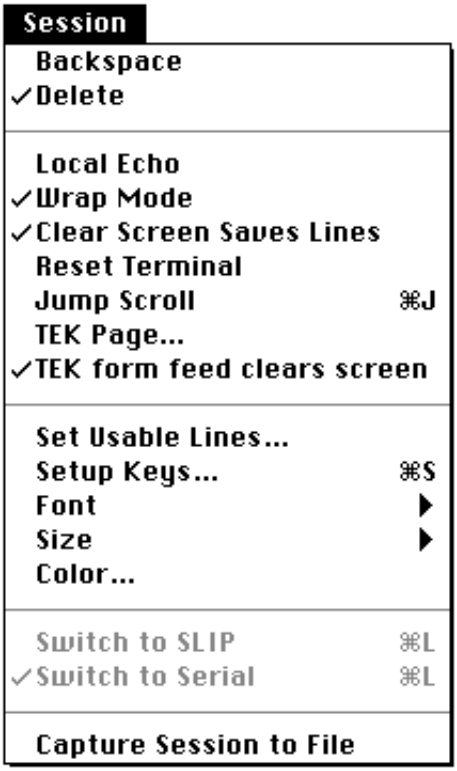
Figure 3.4 Cursor Typos



Using the Session Menu

The items in the session menu, depicted in Figure 3.5, are described in the following sections. For more information, however, you may want to refer to chapter 4, "Advanced Features."

Figure 3.5 Session Menu



Backspace

Enable the Backspace option to set the function for the BACKSPACE (or DELETE) key to backspace. When you enable the Backspace option, the option appears checked in the menu. For more information, see "Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote" in Chapter 2.

Delete

Enable the Delete option to set the function for the BACKSPACE (or DELETE) key to delete. When you enable the Delete option, the option appears checked in the menu. For more information, see "Setting the Functions of BACKSPACE (or DELETE), OPTION, and Backquote" in Chapter 2.

Local Echo

Enable the Local Echo option to enter local echo mode, which is described in this chapter's section,"Echo Mode." When you enable the Local echo mode, the option appears checked in the menu.

Wrap Mode

Enable the Wrap Mode option to activate wrap mode. In NCSA Telnet, wrap mode controls the status of the wrap setting. When you enable the Wrap Mode option, it appears checked in the menu.

The VT102 terminal maintains an internal setting to determine whether characters printed off the right hand side of the screen cause the terminal to wrap or not. If you set the terminal to wrap, the new characters appear on the next line of the screen and the screen is scrolled if necessary. If you disable wrap mode, each new character replaces the last character on the current line and the cursor neither moves right nor onto the next line. You may also set the wrap mode in the configuration file (see Chapter 8 for details). Whenever you select the Reset Terminal command in the Session menu, wrap mode is disabled.

NOTE: Host software commonly sets the wrap mode, overriding this setting.

Clear Screen Saves Lines

This option toggles between saving lines and erasing lines when the clear screen code is received. If you check the option, all lines currently displayed on the screen are scrolled into the scrollback region before the screen is cleared. If you do not check it, the cleared lines are permanently disposed when the screen is cleared.

Reset Terminal

Select Reset Terminal to reset the VT102 screen, for example, when a host program accidentally sets graphics mode or fails to leave graphics mode. The Reset Terminal command resets all VT102 mode settings—disabling wrap mode, resetting graphics mode, resetting the keypad mode to the default, and resetting tabs to every eight spaces.

Jump Scroll

Select Jump Scroll to skip to the end of the local buffer.

The Jump Scroll option causes the screen to pause and then jump ahead over scrolling text. The text is placed into scrollback, but the screen update advances to the end of the local network buffer instead of printing every line on the screen.

The purpose of this feature is to save time. For example, when you enter a command that produces a great deal of output, you can use Jump Scroll to avoid waiting for the output to scroll by.

TEK Page

Select TEK Page to quickly create or clear a Tektronix emulation window without requiring intervention from host software.

Normally the emulation window appears automatically when the clear screen command sequence is received from the host. But the TEK Page command creates the window immediately. To clear the

current session window, use the TEK Page command the same way you would use the Page key on a real Tektronix terminal. For more information regarding the clear screen command and Tektronix emulation, refer to Chapter 4, "Advanced Features."

TEK Form Feed Clears Screen

Another new feature in Telnet 2.5 is the ability to supress Telnet from clearing the screen during TEK emulation. Often TEK images include a form-feed command at the end of them, and that causes the TEK screen to be immediately cleared upon reaching the end of the image. However, this makes it hard to see the final image of the TEK file.

Therefore you can now set this option to false, in which case Telnet will not clear the TEK window when it encounters a form–feed command. If this option is set to true, then Telnet acts just as it normally would.

Set Usable Lines

Select this option to increase or decrease the number of lines displayed per screen in a session window.

NCSA Telnet session windows initially display 24 lines per screen by default, because the actual VT102 terminal screen has room for exactly 24 lines of text. Some host systems, allow you to define a VT102-like terminal type which has more or fewer than 24 lines.

To increase or decrease the number of lines displayed per screen in a session window:

1. Select Set Usable Lines from the Session menu. The Set Lines dialog box appears, showing the current number of lines displayed (Figure 3.6).

2. Enter a value from 10 to 200 to specify the desired number of lines.

3. Click OK or press RETURN to return to your session window or click Cancel to abort the change.

After you change the number of lines for a screen, the size of the window changes to accommodate the new number of lines.

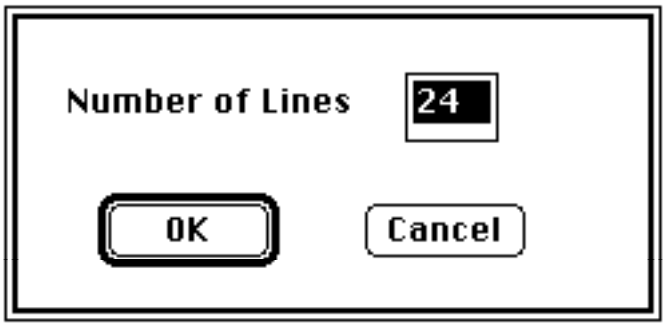


Figure 3.6 Set Lines Dialog Box

Shortcut

To quickly change the number of lines displayed per screen in a session window, hold down OPTION while adjusting the size of the window using the size box. As the window changes size, NCSA Telnet recalculates the number of lines in the window. When you release the mouse button, the number of usable lines in the window exactly fills the window. This method is equivalent to using the Set Usable Lines command.

WARNING: If you do not have a good working knowledge of how your host system makes us of terminals with greater than 24 lines, you are recommended to use only 24-line windows. The following warnings and suggestions assume knowledge of UNIX–based software to control the number of lines for the terminal. Consult your host system documentation or system administrator for more information.

Warnings and Suggestions

The termcap file, (found in UNIX systems only), is commonly located in `/etc/termcap`, and can be set up to include the number of lines on the terminal. The default VT100 termcap includes an explicit setting of 24 lines, so even if you enlarge your NCSA Telnet window, the host uses only the top 24 lines. You can create special termcap entries by editing the `/etc/termcap` file. Copy the VT100 entry to a new name and change the number of lines to your preferred screen size.

Berkeley UNIX-based systems have a special feature in the `stty` program. The number of rows in a session window can be set to any value, and applications programs such as vi learn your window size from the `stty` setting. The following command line sets the window size to 33 lines.

```
stty rows 33
```

Using the special macro variable #, you can create a macro that issues this command and automatically substitutes the number of lines for the current window. For example, you could define the macro for -0 as the following.

```
stty rows \#
```

Now, you can set the window size by pressing -0 and then RETURN. The sequence \# is replaced with the proper number of lines.

See "Defining Macros" in Chapter 2 for information about creating and saving macros.

NAWS

Telnet 2.5 features "Negotiations About Window Size," or NAWS. Some UNIX hosts allow the client to send information regarding the Telnet user's window size. Consequently, when the user changes the number of useable lines by using the "Set Usable Lines" dialog box, this new information is sent over the network to the host. In this case, the user does not need to use the stty rows operation. The host knows how big the window is, which straightens out a lot of problems for screen-oriented applications such as vi. NOTE: this feature is not present on all UNIX machines. If the host does allow NAWS, then Telnet handles this feature automatically -- the user does NOT need to do anything extra.

Setup Keys

Select Setup Keys to select which keys issue the telnet commands Interrupt, Suspend, and Resume (see "Changing the Assigned Keys for Interrupt, Suspend, and Resume" in Chapter 2.)

Font

The submenu contained under the Font command contains the fonts that you may use to display text in a session window. When you select a font from this submenu, the current window is resized to contain the text and the selected font is used to display all text in the current window.

NOTE: Fonts which are proportionally spaced (most fonts except Courier and Monaco) display slowly and appear spread out.

Size

This option allows you to change the size of text in the current window. The submenu contained under the Size command contains the point sizes that you may use to display text in a session window. The submenu lists all available sizes, displays a check–mark next to the current size, and outlines all sizes present in your system. When you select a size from this submenu, the current window is resized to contain all the resized text and the text is redrawn according to be the specified point size.

NOTE: Sizes which do not appear outlined in the menu must be scaled by the system software and therefore may be slow and not as sharply defined as the non-scaled sizes.

Color

The color option only applies to Macintoshes that are color–equipped. Select Color to change the foreground and background colors of the current window for both normal text and blinking text. The Color Selection dialog box appears (Figure 3.7).

To assign a color to text or the background of a session window:

1. Click the box next to the item to which you wish to assign a color: Normal Text, Normal Background, Blinking Text, or Blinking Background. Click OK, or double-click the appropriate box to call up the Color Wheel dialog box, shown in Figure 3.8.

2. Select a new color by clicking in the color wheel. The color you select appears in the top rectangle under the heading Choose a color.

3. Click OK or press RETURN to enable the color change and return to the Color Selection dialog box. The box next to the item you selected in Step 1 reflects the color you chose from the Color Wheel dialog box.

4. Repeat Steps 1 through 4 to assign colors to other items in the Color Selection dialog box.

5. Click OK when you have finished choosing colors. The colors you selected are applied to your current session window.

For additional information on using the color wheel dialog box, refer to your Macintosh System Software User's Guide.

Figure 3.7 Color Selection Dialog Box

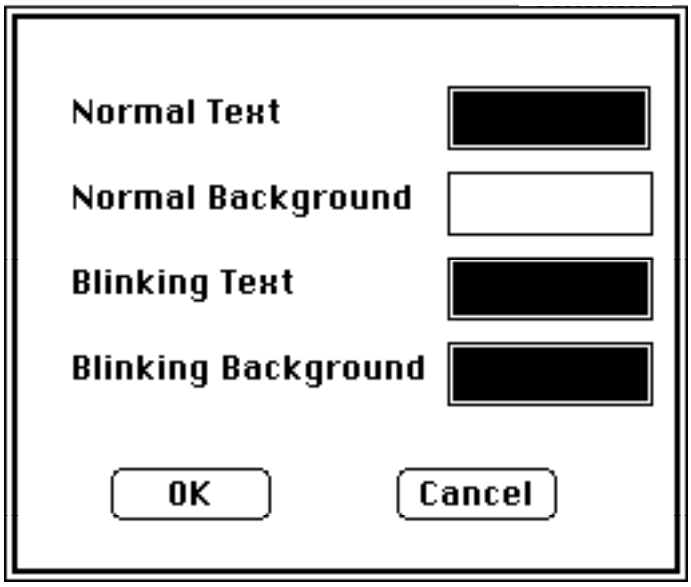
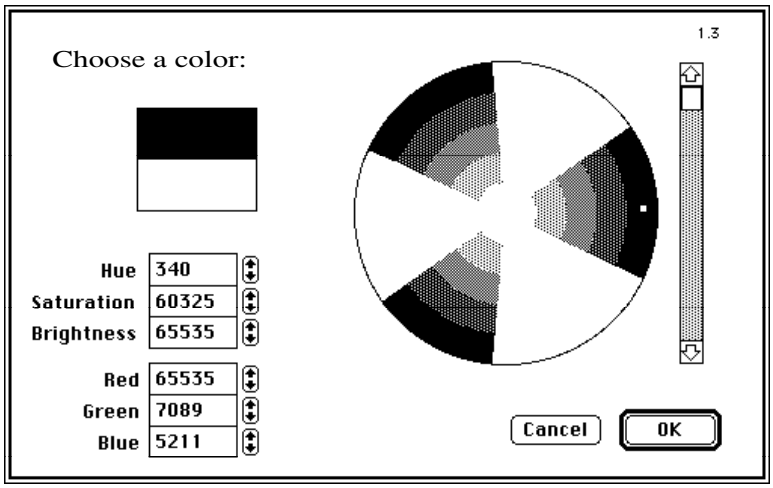


Figure 3.8 Color Wheel Dialog Box



Switch to SLIP

This option allows Telnet to use SLIP for serial connections. For more information about SLIP and serial connections, please see chapter 9, "Serial Communications." Note this item only effects connections that are through the serial port.

Switch to Serial

When this option is selected, Telnet will use normal serial connections instead of SLIP. Once again, this option is strictly

for serial connections, and does not effect normal telnet connections.

Capture Session to File

Telnet 2.5 has the new feature of being able to save text from a session to a file. When this option is selected, all normal text output that appears on the screen will also be saved to a file that the user can specify. This functionality turns on when the user selects this menu item, and turns off when the user deselects the menu item. As is standard with Telnet, a check will appear in the menu when this option is selected, to inform the user that the text from that session is being captured. For information on how to change the name of the capture file, please see chapter 4 under the heading "Network-Related Commands: Configure Network."

Chapter 4

Advanced Features

Aliases

Setting Aliases

Chapter Overview

This chapter covers some more advanced aspects of the NCSA Telnet working environment. It describes how to change the configuration settings, use saved sets, open multiple sessions, and use telnet options and network-related commands.

Saving Session Characteristics

NCSA Telnet makes it easy for you to begin a telnet session quickly and efficiently. So that you can login and get right to work without resetting the special characteristics and configuration of a connection each time you startup, NCSA Telnet Version 2.4 allows you to save and load sets.

A *set* is your current configuration. For example, a set consists of the current macro settings and each session's window location and size, connected host, window name, scrollback setting, color, font, font size, and backspace/delete setting.

Saving a Set

To save a set:

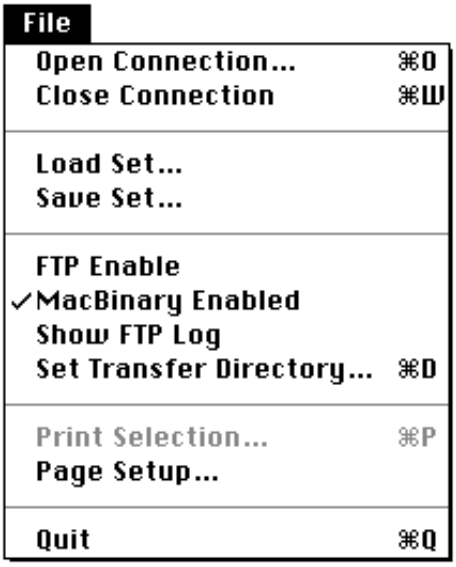
1. Log in to the desired host as instructed in Chapter 1, "Getting Started."

2. Customize the session by moving the session window to an ideal location on the screen, specifying a background or text color, choosing a font and font size, setting the desired number of scrollback lines, and choosing the backspace or delete function for the BACKSPACE (or DELETE) key.

3. Select Save Setfrom the File menu, shown in Figure 4.1. A directory dialog box appears and prompts you to name the set.

4. Name the set and click Save to implement the current settings.

Figure 4.1 File Menu



Using a Saved Set

By using sets, you can bypass the startup procedure introduced in Chapter 1, "Getting Started." Specifically, you do not need to select Open Connection from the File menu or press -O to open a connection, nor do you need to specify the connection host or window name. These operations are performed automatically when you load a set.

After loading a set, the session window automatically appears for the specified host, at the specified location on the screen, with the specified window name, scrollback setting, color and other characteristics. The following characteristics are saved in a set:

- session name
- hostname
- port number
- window size and location
- scrollback setting
- backspace/delete setting
- macro definitions
- command key setting
- number of columns
- Tek clear screen setting
- font and font size
- color characteristics
- assigned keys for Interrupt, Suspend, and Resume

Figure 4.2 Set Icon

To load a set from the Finder, double-click on the set icon or file. This automatically invokes NCSA Telnet. Figure 4.2 depicts the set icon for the sample set named Setup One. To load a set from within the NCSA Telnet application, select Load Set from the File menu. In the directory dialog box that appears, select and open the set.

NOTE: You can edit a set datafile using any editor that can edit files even if they are not of operating system type TEXT.

Opening Multiple Connections

NCSA Telnet allows you to have multiple connections to a single host or to several different hosts. To open another connection, just repeat the procedure for opening a connection (presented in Chapter 1, "Getting Started") or load a set as instructed in the section above.

The connection with which you are currently working is the active session. Generally, its session window appears frontmost on your desktop.

To switch between active sessions and make the active session window frontmost, click the session window for the desired connection or select the associated session name from the Connections menu (Figure 4.3).

Figure 4.3 Connections Menu

To activate the next session, select Next Session from the Connections menu. If you are using command key mode, you can activate the next session on your desktop by pressing -N (for next). Doing so activates the session window directly beneath the current session window.

NOTE: If you want to make a session active without having its window frontmost on your desktop, hold down the OPTION key while selecting the session name from the Connections menu.

When opening multiple sessions, NCSA Telnet opens new windows on the screen relative to the number of windows currently opened. You can specify for these windows to be staggered by just a few pixels or by the whole window title bar. Activate the latter option by choosing Preferences from the Edit menu and enabling the staggered windows box. (See Chapter 3, "Staggered Windows," for more information).

Rules forSession Names

When you have multiple connections to a single host, it is useful to specify session names for the connections other than the hostname. NCSA Telnet allows you to use any of the following for session names:

- the full Internet number of the host, such as 192.17.22.20.
- any session name that is in your configuration file. (See your system administrator for the complete list.)
- any name that can be resolved by the domain-based nameserver, such as sri-nic.arpa. (See your system administrator, who can configure NCSA Telnet to use the domain-based nameserver to look up hostnames.)
- the pound sign (#) followed by the host number the host uses on your Ethernet, when the destination machine is on the same Ethernet as the Macintosh (EtherTalk) or the gateway (LocalTalk). For example, if your Macintosh were machine 192.17.22.20 you could access host 192.17.22.30 by entering #30. (See your system administrator, who can determine the host number by the class of addressing and the subnet mask.)

For information about creating customized sessions or specifying multiple session names for a given host, refer to Chapter 8, "System Administrator Information."

NOTE: Some systems do not use the standard telnet port number 23, MFENET for example. If you need access via the telnet protocol to a different port number, enter the port number after the session name when you enter it in the Connection dialog box. The session name and port number must be separated by one or more spaces. For example, to open a connection to port 23 of myhost.network.arpa, you would enter the following in the text box labeled Session Name.

```
myhost.network.arpa
```

The following example demonstrates what you would enter to open a connection to port number 911 of the same host.

```
myhost.network.arpa  911
```

In this release of NCSA Telnet, the MacTCP resolver performs the domain-name lookup. In this way, NCSA Telnet conforms to the TCP standard, and simplifies many internal processes. This feature also allows you to use NCSA Telnet with other TCP products simultaneously and without conflicts.

The Connections Menu

You can specify titles other than session names for your session windows. Doing so allows you to easily distinguish between multiple sessions and session windows.

To specify a window title, type the name in the Window Name box that appears in the Connection dialog box when you open a connection, or enter the name in the Window Name box of the Configuration dialog box.

NOTE: If you leave the window name blank when opening a connection, NCSA Telnet automatically numbers the session. Each time you open a session, the number increases regardless of how many sessions are currently open. This algorithm is the same one used by Microsoft Word and most other commercial packages.

The Connections menu contains the window names for current connections and relays information about the status of each session. For example, a checkmark ( ) appears next to the window name of the active session and a diamond (♦) or a circle (•) appears next to a session name for a connection that you attempted to make, but which has not yet been successfully opened.

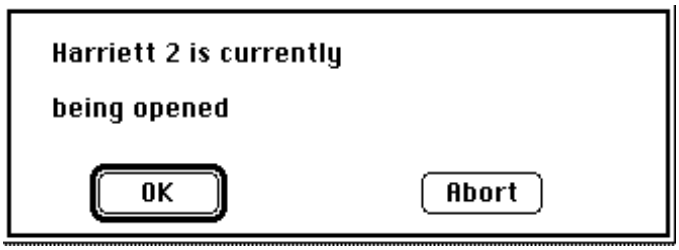
Specifically, the diamond indicates that NCSA Telnet is checking the nameserver, trying to find the session name or hostname. The circle means NCSA Telnet is trying to open the session. When the connection is established, the diamond or circle next to the session name goes away and the session window appears.

Figure 4.4 shows how window names may appear in the Connections menu and explains the notations used.

Figure 4.4 Connections Menu Symbols

NOTE: If you do not remember the meaning of the symbols used in the Connections menu, just select the connection in question from the Connections menu. The Connection Status dialog box appears and reports the name and status of the connection (see Figure 4.5). After reading the message, click OK or press RETURN to proceed opening the connection. Click Abort to cancel the attempt.

Figure 4.5 Connection Status Dialog Box



Aborting Connection Attempts

To abort a connection attempt:

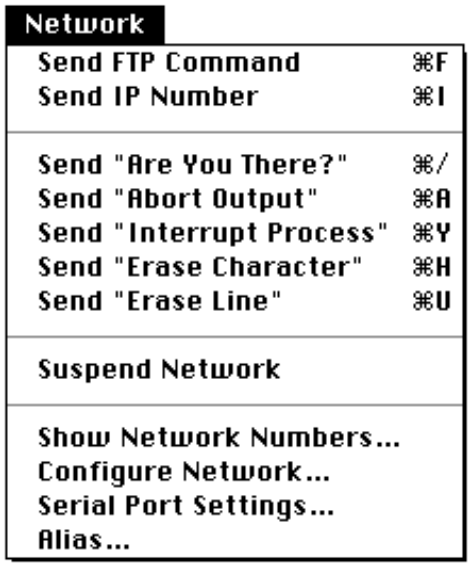
1. Select the connection in question from the Connections menu. The Connection Status dialog box appears and reports the name and status of the connection (see Figure 4.5 above).

2. Click Abort.

Telnet Options

Five of the telnet options provided by NCSA Telnet are contained in the Network menu, shown in Figure 4.6, and are discussed in the following sections. The Internet standard telnet protocol defines several special commands which NCSA Telnet supports. Each host telnet implementation treats these commands differently, but the commands are supposed to have the functions described in the following sections.

Figure 4.6 Network Menu



The Interrupt process command and the other telnet options, Suspend and Resume, have been assigned special keys which may

be changed using the Setup Keys command in the Session menu (see "Changing the Assigned Keys for Interrupt, Suspend, and Resume" in Chapter 2).

Note that command key equivalents for these commands are only available if you have selected the Command Keys option in the Preferences dialog box (see "Using Keyboard Commands" in Chapter 2).

A new option in the NCSA Telnet 2.4 version concerns File Transfer Protocol (FTP) commands. NCSA Telnet will not use the FTP -n option if you hold down the shift key while pressing -f. Instead, it will FTP without the -n (see Chapter 5, "File Transfer," for more information about FTP commands).

Send "Are You There?"

Every once in a while, perhaps because the host is bombarded with incoming information or tied up by a great number of users, it seems as if the host is not responding to your commands. When this happens and your terminal appears to have locked up, you can verify that you are still connected to the host by selecting Send "Are You There?" from the Network menu or by pressing -/.

The host is supposed to respond, if able, with a readable message. Some machines answer [Yes]; others answer with more informative messages. Use this command whenever you are unsure whether the network and host are up.

Send "Abort Output"

The Send "Abort Output" command is supposed to throw away all output from the currently running process and resume when there is a pause. Very few hosts implement this command correctly.

Send "Interrupt Process"

Available on nearly every telnet host, the Interrupt Process command stops the current process and throws away all pending data for the connection. The Interrupt Process command is equivalent to CONTROL-C on most UNIX systems. NCSA Telnet also maps CONTROL-C to Interrupt Process. You can change this mapping using the Setup Keys command in the Session menu (see "Changing the Assigned Keys for Interrupt, Suspend, and Resume" in Chapter 2).

Send "Erase Character" and Send "Erase Line"

While entering commands, you can erase the last character or the current line by issuing the Send "Erase Character" and Send "Erase Line" commands, respectively. Many hosts do not implement these commands, but use their own special characters instead.

Network-Related Commands

Three of NCSA Telnet's network-related commands appear in the Network menu, shown in Figure 4.6—Suspend Network, Show Network Numbers, and Configure Network. The other, Reset Terminal, appears in the Session menu.

Suspend Network

To temporarily suspend all network communications, select Suspend Network from the Network menu. This action disables all of the receive functions. All of your connections are kept alive, but you do not see any incoming text.

NOTE: Generally, you will use the Suspend and Resume commands discussed in the section entitled "Changing the Assigned Keys for Interrupt, Suspend, and Resume" in Chapter 2, rather than the Suspend Network command.

Show Network Numbers

If you need to see your AppleTalk address, IP number, Network Mask, or (for those using EtherTalk) your Ethernet address, select Show Network Numbers from the Network menu. This command displays the information in a dialog box, as shown in Figure 4.7; it does not transmit these numbers. Click on the message box to remove it.

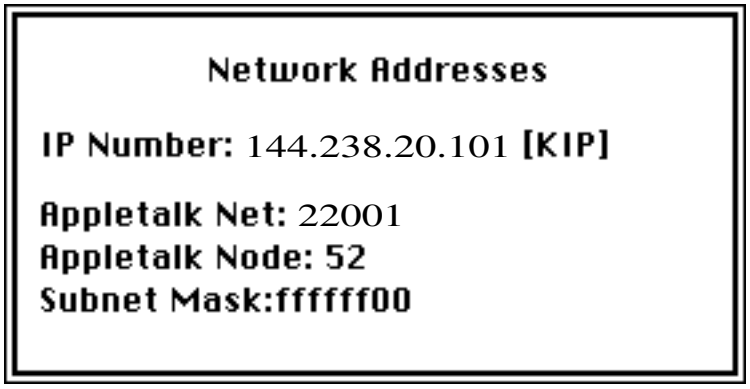


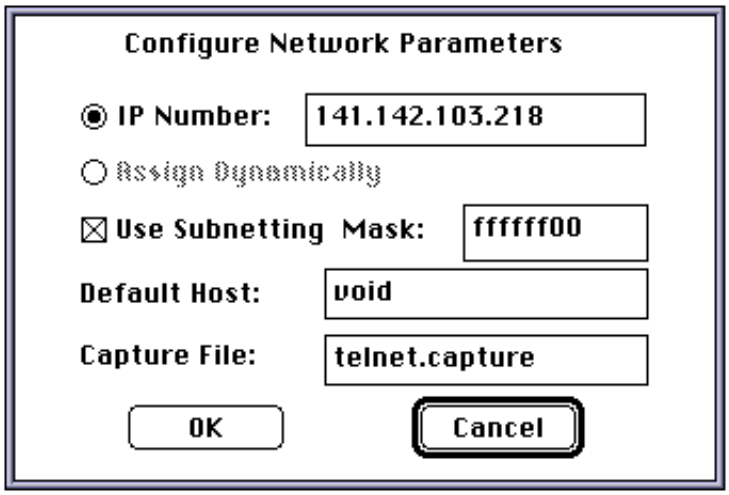
Figure 4.7 Network Numbers Dialog Box

Configure Network

The Configure Network command is intended to be used by system administrators and knowledgeable users. It is only available when there are no active connections; that is, no connections are open, none are pending, and you are not using FTP. Otherwise, the command appears dimmed and cannot be selected.

Select Configure Network from the Network menu to see the Configure Network dialog box, which is used when you first configure the program (Figure 4.8). For more information regarding configuring the network using the Configure Network dialog box, consult Chapter 8, "System Administrator Information."

Figure 4.8 Configure Network Dialog Box



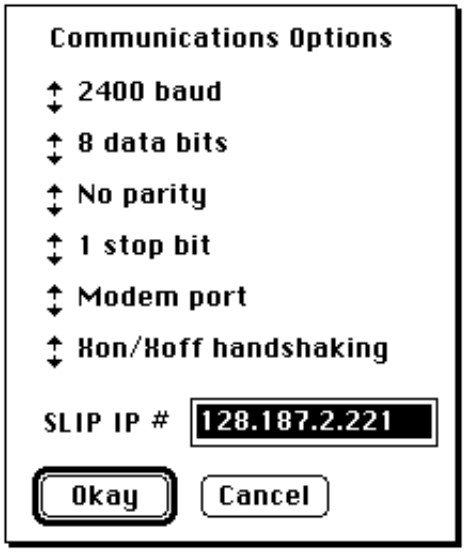
Reset Terminal

Some host programs can accidentally set graphics mode or fail to leave graphics mode. If this occurs, select Reset Terminal from the Session menu. The reset terminal command resets all VT102 mode settings. These settings include disabling wrap mode, resetting graphics mode, setting the keypad mode back to the default, and resetting tabs to every eight spaces. To reset the VT102 screen, select Reset Terminal.

Serial Port Settings

To use the serial port, you must configure it for proper use. To do this, select the "Serial Port Setting" menu item from the Network menu. After doing that, you should see the Serial Settings dialog box, as in Figure 4.9.

Figure 4.9 Serial Settings Dialog Box



Baud

The baud rate specifies how fast data is transmitted through the serial line. You will usually want to set this to the maximum baud of the modem that you are using, which will allow for maximun speed of data transfer. Select the proper speed by clicking on the up/down arrows.

Data Bits

Change this control if you want to change the amount of data bits that Telnet expects for incoming serial data. Older protocols often specified 5 or 6 data bits, which allowfor faster transmission of data, but a smaller character set that can be used. Newer systems typically use 8 data bits, which gives many more possible characters that can be transmitted. You will need to set this value to correspond to the number of data bits the host machine is transmitting.

Parity

This option describes the parity checking scheme that Telnet uses. The default is "no parity" in which case Telnet does no internal error checking of the incoming data. The other options available are to use either an Even scheme, or an Odd scheme, to check the incoming data for errors. The setting for this will probably vary depending on the site that you are communicating with. You will want to set the parity to be the same as the transmitted data.

Stop Bits

The number of stop bits controls the start/stop synchronization of data transfer in serial communication. This setting most often depends on the number of data bits. If the data bit setting is for 5 bits, then typically the user will need to set the stop bits value to 1.5. Other possible values are for 1 or 2 stop bits.

Port

You can establish serial connections out of either the modem port, or the printer port. Set the port you wish to use by setting this item accordingly.

Handshaking

Handshaking is a protocol for controlling the flow of data from sender to receiver. If no handshaking is present, the sender just keeps sending data regardless of how well the receiver is handling the data, and there is no real synchronization of data transfer. Telnet offers another protocol, XON/XOFF handshaking, which is a very simple protocol for data flow control. Use this option ONLY when the sender is also using this protocol, or various transmission problems will result.

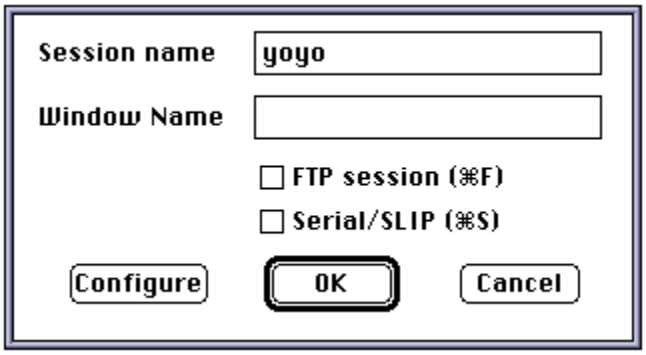
SLIP IP#

To use SLIP, you must have an IP number, and you can set this number in the SLIP IP# text box.

Aliases

Telnet 2.5 features the ability to specify an alias instead of a full UNIX hostname, when prompted with the Open Connection dialog box, as shown in Figure 4.10.

Figure 4.10 Connection Dialog Box



In this case, you can enter an alias such as "yoyo" instead of typing the full name "yoyodyne.ncsa.uiuc.edu." To preset aliases, you must use the Alias menu option in the Network Menu (as diagramed below).

When any name is entered as the "Session Name," this list of aliases is searched first. If that alias is found, the host name and port information is automatically registered, and the domain name lookup continues from there. If no alias is found, then Telnet just continues with its normal domain name lookup precudures. In other words, Telnet will always first check to see if the Session Name is an alias before the connection is opened.

Setting Aliases

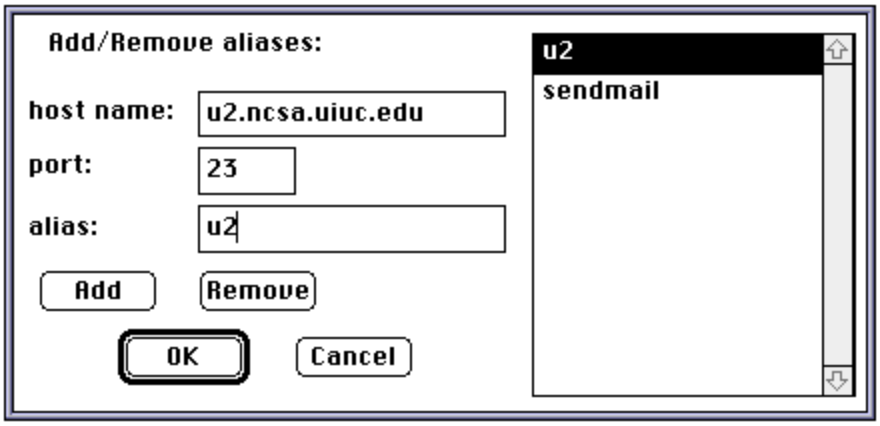
To set aliases, choose the Alias menu item from the Network Menu, which displays the "Add/Remove Aliases" dialox box, as shown in figure 4.11. To set an alias, specify the full UNIX hostname in the "host name" space, the port number to connect to in the "port" space, and finally the alias that you desire in the "alias" space. This alias will be added to Telnet after you click the Add button. To remove an alias, click on the name of the alias in the alias list, which highlights the name, and then hit the Remove button. The appropriate alias is then removed from the list.

When all desired aliases are specified, click OK to save all of the current aliases to Telnet. If Cancel is hit, no changes take place,

and the Aliases will remain as they were before the user selected the Alias menu item.

NOTE: This feature allow you to specify the port number to connect to very easily. This number is just tacked on to the end of the hostname when Telnet tries to open the session. For instance, if the alias "sendmail" specifies a host of "yoyodyne" and a port number of "25", then this is exactly like opening a connection to "yoyodyne 25" from the Open Connection dialog box -- with the exception that it saves a lot of keystrokes and does not require the memory of various port numbers!

Figure 4.11 Add/Remove Alias Dialog Box



Chapter 5 File Transfer

FTP Client

Logging in to the FTP Client

Chapter Overview

This chapter discusses the various features NCSA Telnet provides for transferring Macintosh-specific and other files, and describes the most common File Transfer Protocol (FTP) commands.

Terminology

The following terms are frequently used in this chapter's discussions concerning file transfer procedures.

ASCII File

An *ASCII,* or text, file is one that you can read; it can be used with standard editors on the Macintosh or host. When text files are transferred, they are translated to a format appropriate for the receiving machine.

Binary File

A *binary*, or image, file cannot be read by standard text editors. Unlike text files, binary files are not changed in any way when transferred.

Client/Server

The *client* is the system that requests services and the server is the system that provides them. The client is not always your Macintosh, despite appearances. When you use NCSA Telnet to connect to a host, your Macintosh is the telnet client. When you request a file transfer from your Macintosh, the transfer is actually initiated on the host, making the host the FTP client and your Macintosh the FTP server. So the Macintosh can be both a telnet client and an FTP server at the same time.

File Transfer

In a *file transfer*, the contents of a file are copied to a file on another computer.

MacBinary File

A *MacBinary file* is a file that has been encoded in the MacBinary file format. This means that the file contains all of the information contained in a normal Macintosh file and therefore can be used for transferring applications and other Macintosh–specific files. These files are virtually useless on any other machine, but are in a format that will allow them to be stored for downloading to a Macintosh later.

About FTP

NCSA Telnet has an internal File Transfer Protocol (FTP) server that allows reliable file transfers between a Macintosh and any FTP host on the network. File transfers are initiated from the FTP host. Features of the NCSA Telnet implementation of FTP permit:

- Stream transferring files in text (ASCII) or binary (image) format
- Changing the directory (by means of menu option or remote command line)
- Showing the name of the current directory
- Listing files in the current directory (with wildcard specifications)
- Sending and receiving multiple files with one command, using wildcards

NOTE: File transfers are processed in the background. Therefore, while a file transfer is in progress you can perform other NCSA Telnet activities, such as switching sessions, adding new sessions, or changing parameters. While one FTP connection is active, requests for another are ignored.

Transferring Files

Before attempting to transfer files using FTP, make sure the following conditions are met.

- Your host system supports FTP file transfer. If you do not know whether it does, see your system administrator.
- You have not disabled the file transfer capability of NCSA Telnet. Two conditions inform you that the FTP capability is disabled: (1) the FTP Enable command appears unchecked in the File menu, and (2) your machine will not respond to the FTP command when you attempt to start up FTP. You can select FTP Enable, so that the command appears checked. Your system administrator can also enable FTP in the configuration file.

Invoking FTP on the Host Computer

FTP is initiated by the remote host, so the FTP commands vary, depending on the host system. For full documentation of FTP and commands within FTP, refer to the manuals for the host computer. With UNIX systems, you can access online documentation by entering:

```
man ftp
```

Issuing the FTP Command

On most systems, you enter the FTP command at the prompt, with the name or IP address of the target machine. You can enter the FTP command in one of three ways. For example, if your Macintosh is named "mymachine" and your IP address is 192.17.20.22, any of the following procedures invokes FTP.

- Enter:

  `ftp  mymachine`

  or

  `ftp  192.17.20.22`

  and press RETURN.

- Select Send FTP Command from the File menu or press -F. NCSA Telnet types the FTP command and issues a RETURN.

- Enter **`ftp`**, press the spacebar, select Send IP Number from the Network menu, and press RETURN. The Send IP Number Command types your IP address for you.

Use whichever method of invoking FTP with which you feel comfortable. Your host computer may not accept FTP commands as described here, so you may have to try some variations to find the easiest method for your site.

Regardless of the method you use to invoke FTP, most FTP clients generate a response like this:

```
Connected to 192.17.20.22.
220 Macintosh Resident FTP server, ready
Name (192.17.20.22:timk):
```

Most FTP clients prompt you for your username and password. If NCSA Telnet is configured for passwords (see Chapter 9), then these are required. Otherwise, just press RETURN to bypass the prompts. If you are not prompted for a username and password, assume that you are logged in, and continue to enter your FTP commands at the FTP prompt.

Figure 5.1 File Transfer Cursor

NOTE: When an FTP connection is active, the cursor changes to a small file icon (Figure 5.1). When the FTP connection terminates, the file icon changes back to the standard cursor, or I-beam.

Using Telpass

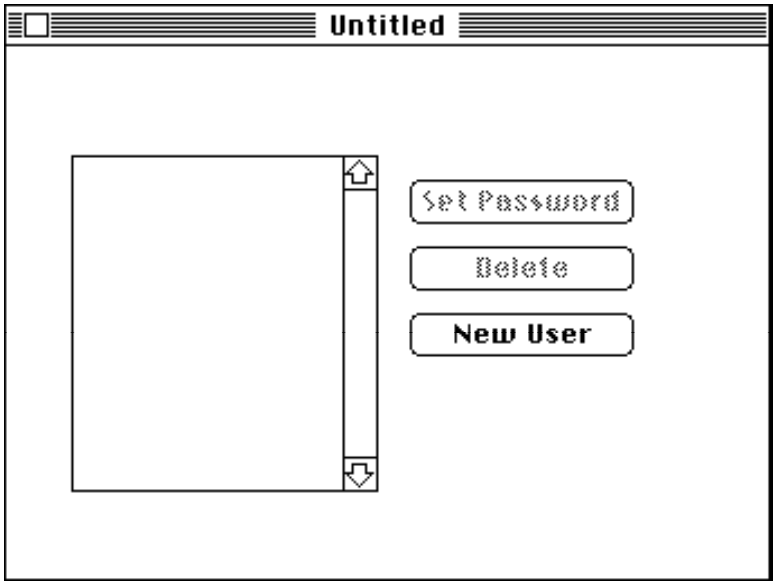
When you enable FTP (`ftp=yes` in the configuration file), anyone can FTP to your computer unless you create a password file. We recommend you create a password file with Telpass, which is included in the NCSA Telnet distribution package. *Telpass* is a program that allows you to create an encrypted password file.

To invoke and use the Telpass application:

Figure 5.2 Telpass Icon

1. Double-click the Telpass application icon (Figure 5.2). An untitled dialog box (Figure 5.3) appears on the screen.

Figure 5.3 Telpass Dialog Box



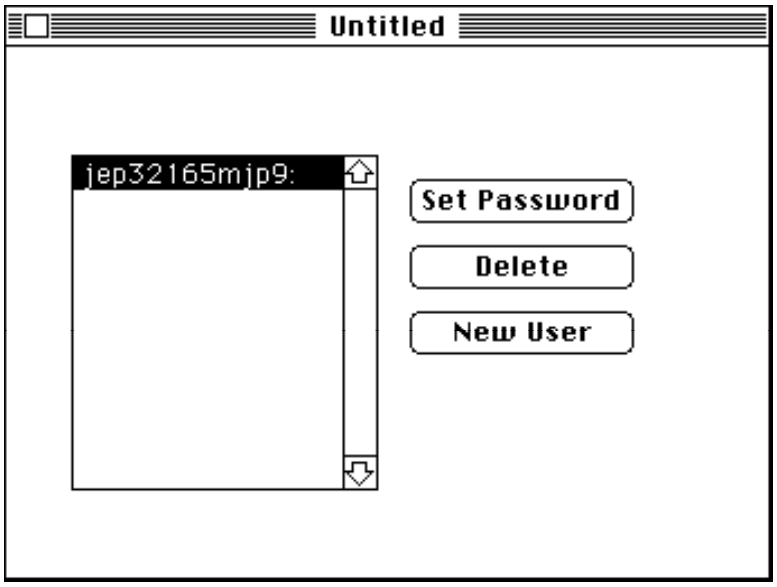
2. Click the New User button. A dialog box stating Enter new username appears.

3. Type in a username consisting of 1-12 alphanumeric characters.

4. Click OK. The untitled dialog box reappears, this time containing your alphanumeric username followed by a colon.

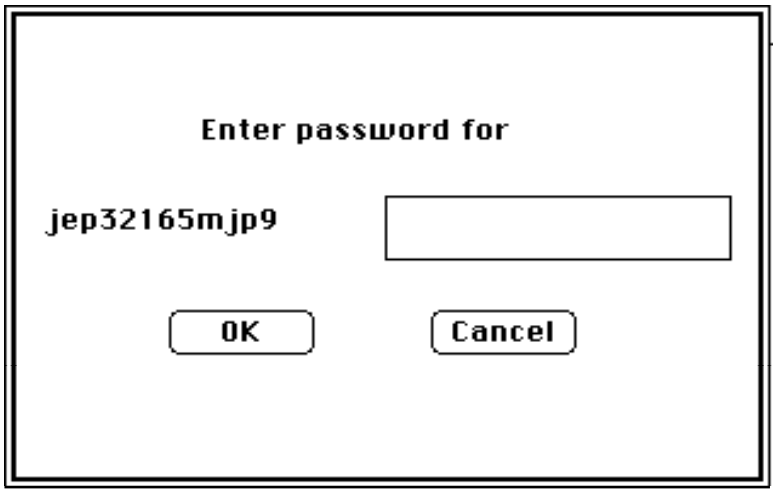
5. Select the username. Notice that the Set Password and Delete buttons become activated (Figure 5.4).

Figure 5.4 Sample Telpass Entry



6. Click the Set Password button. A new dialog box appears and asks you to enter a password (Figure 5.5).

Figure 5.5 Password Dialog Box



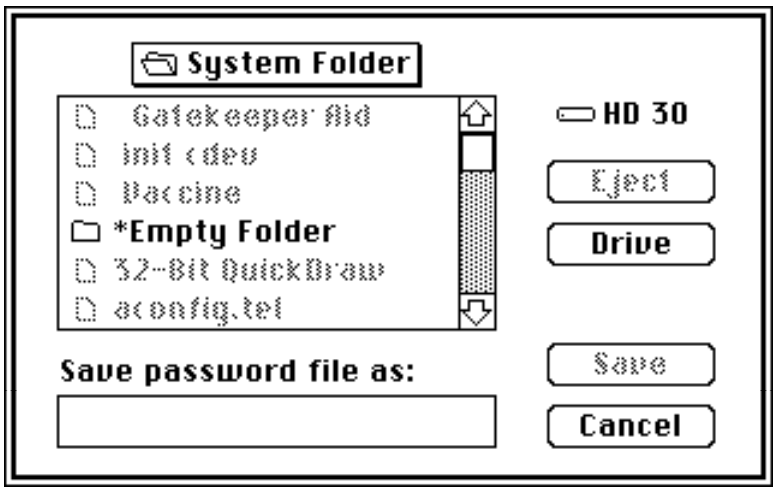
7. Type a password consisting of 1-12 alphanumeric characters.

8. Click OK. The untitled dialog box appears again. Notice a triangle, representing your password, appears after the username.

9. Repeat steps 2-8 to enter additional usernames and passwords.

10. Select Save As from the File menu. A directory dialog box appears (Figure 5.6). Enter your password filename in the box labeled Save password file as, and click Save.

Figure 5.6 Directory Dialog Box



11. Include the following in your configuration file:

```
ftp=yes
passfile="filename"
```

where ***filename*** is the name of the encrypted file created in Telpass.

If the passfile is not located in your System Folder, you must include the filename as a full path name. For example:

```
passfile="hd40:NCSA Telnet:filename"
```

NOTE: Editing the config.tel file while the program is running has no effect on the program's operation. To activate the changes, you must restart NCSA Telnet.

To test your password file:

1. Log on to a host that runs software that supports the FTP command.

2. Invoke FTP (on most systems) by entering the FTP IP number of your MacIntosh (or press COMMAND-F).

3. Type any command such as 'ls'. You'll receive the message:

```
USER and PASS required to activate me
```

4. Enter the word user, then enter your username and password from the Telpass file.

The following is an example of a sample session (where username and password were in the Telpass file as a username and password, respectively):

```
yoyodyne_51%  ftp -n 128.174.221.167
Connected to 128.174.221.167
220 Macintosh Resident FTP server, ready
ftp> ls
530 USER and PASS required to activate me
530 USER and PASS required to activate me
ftp> user username password
331 password required
230 User logged in
ftp> quit
221 Goodbye
yoyodyne_52%
```

NOTE: If you don't want someone to read your password, do not enter the password on the first line. A 'Password required' prompt appears. You can then type in your password and the machine will not echo it back.

Once you finish entering and testing usernames by using Telpass, you can continue with FTP commands.

FTP Commands

After FTP has been invoked and passwords have been checked, most FTP clients prompt you for individual FTP commands. These commands are documented in the manuals for the host computer. Most FTP implementations have similar commands because they are modeled after the Berkeley UNIX version of FTP.

FTP commands that are common to most implementations are listed in Table 5.1 and are described in the following sections. Once you are in FTP, you can access online help for a list of available commands.

Table 5.1 Common FTP Commands

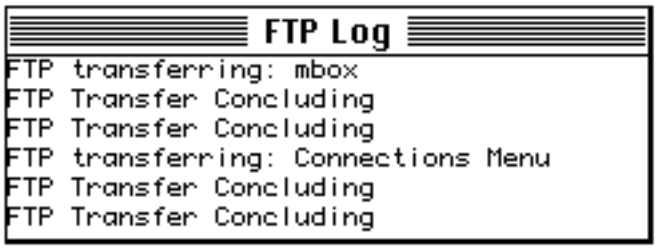
Command	Action
ascii	set mode to ASCII transfer mode (default)
binary	set mode to binary (image or I) transfer mode
cd	change directory on your Macintosh
dir	show filenames in Macintosh's default directory
get *filename*	get file from Macintosh, send it to the host
help	show online list of FTP commands
put *filename*	send file from the host to the Macintosh
pwd	show the current Macintosh directory name

The boldface type in Table 5.1 represents user entries.

FTP Log

To help you keep track of file transactions, NCSA Telnet shows current and past transactions in the FTP log, shown in Figure 5.2. To view the log, select Show FTP Log from the File menu.

Figure 5.7 Sample FTP Log



Setting the Transfer Mode

The default mode for FTP transfers is ASCII format. To transfer graphic or binary data files, you must change the transfer mode to binary format before using the put or get commands. To set the transfer mode to binary, enter the command **`binary`** or **`bin`**.

If you intend the file you are transferring to be used with a Macintosh-specific application, you may also need to enable the MacBinary Enabled option in the File menu by selecting it. The command appears checked in the menu when it is enabled (see this chapter's section, "Transferring MacBinary Files").

To set or reset the transfer mode to ASCII format, enter the command **`ascii`**.

For example, Figures 5.3 and 5.4 in this chapter's section, "Transferring Files to the Macintosh," shows an FTP transaction with an ASCII file and binary file, respectively.

Changing the Default Directory

FTP transfers files to the default directory on the local disk. To change the directory, issue the cd command from FTP or select Set Transfer Directory from the File menu and locate the directory in the dialog box that appears. For more information regarding using directory dialog boxes to locate files and change directories, refer to your Macintosh user's guide.

The cd command from FTP, as shown in Table 5.1, has the identical effect as the Set Transfer Directory command, though you specify a directory by manually entering a path rather than using a dialog box. To specify a directory using the cd command, use the colon (:) or the forward slash (/) to separate folder names, as the Macintosh requires. For example, to change the default directory to myfolder on your local Macintosh disk hd20, you would enter one of the following commands at the FTP prompt (ftp>).

```
cd ":hd20:myfolder"
  or
cd "/hd20/myfolder"
```

To find out what directory is set as your default transfer directory, enter **`pwd`** at the FTP prompt. For example, if you enter pwd after issuing the sample cd command above, the return is:

```
"/hd20/myfolder" is the current directory
```

Transferring Files to the Macintosh

Even though you seem to be initiating the transfer from the Macintosh, the transaction actually operates from the host's side. The practical effect of this arrangement makes the commands seem intuitively "backward." For example, to transfer a file from the host to your Macintosh, you do not use a get command as you might expect, but a put command of the following form.

put *filename.ext*

Figure 5.3 shows an example of using the put command to transfer the file `temp2` from a host to a local Macintosh. The boldface type represents user entries.

Figure 5.8 Transferring an ASCII File to the Macintosh

```
newton_45% ftp -n 192.17.20.124
Connected to 192.17.20.124.
220 Macintosh Resident FTP server, ready
ftp> put temp2
200 This space intentionally left blank <  >
150 Opening connection
226 Transfer complete
262145 bytes sent in 32.61 seconds (7.8 Kbytes/s)
ftp> quit
221 Goodbye
newton_46%
```

NOTE: Do not exit the program while a file transfer is in progress, or the file transfer will fail.

Transferring Files to the Host

A request to send a file from the Macintosh to the host requires a get command of the following form.

get *filename.ext*

Figure 5.4 shows a get operation used to transfer a binary file named `bridge.pic` from a local Macintosh to the remote host. Note that the file was in the directory /HD20/pictures, and the cd command was used to locate that directory. Again, the boldface type represents user entries. If you were to send a text file after this sample transfer is complete, you would have to reset the transfer mode to ASCII by first entering **ascii**.

Figure 5.9 Transferring a Binary File from the Macintosh to a Remote Machine

```
newton_41% ftp -n 192.17.20.124
Connected to 192.17.20.124.
220 Macintosh Resident FTP server, ready
ftp> bin
200 Type set to I, binary transfer mode
ftp> cd "/hd20/pictures"
250 Chdir okay
ftp> get bridge.pic
200 This space intentionally left blank < >
150 Opening connection
226 Transfer complete
262144 bytes received in 9.22 seconds (28 Kbytes/s)
ftp> quit
221 Goodbye
newton_42%
```

Transferring Multiple Files

Some versions of FTP enable you to transfer multiple files sequentially with one command, either `mput` or `mget`, used with wildcard characters.

WARNING: If you transfer multiple binary files using a UNIX host, note that there is a bug in `mget` as implemented on some systems (especially 4.2 BSD UNIX). When used in binary mode, `mget` adds a carriage return to the filenames as they are transferred. The files themselves are not affected. Use a UNIX utility to remove the carriage return from the filename. In ASCII mode, `mget` causes no problem.

The trick to using wildcards in FTP get commands is to enclose the get commands in quotes, for example, `get "*.image"`. Do not use quotes with put commands.

Transferring MacBinary Files

Sometimes it may be necessary to upload Macintosh-only files to non-Macintosh hosts and later download them without losing any of the Macintosh-specific data, such as icons and the creation date.

To transfer Macintosh-only files (such as applications and most data files) to an intermediate host while retaining any Macintosh-specific information contained in the files:

1. Enable the MacBinary Enabled option in the File menu. A checkmark appears next to the command when it is enabled. You can alternately enable and disable MacBinary by selecting this option. (Since MacBinary is a binary-only transfer protocol, it is only available when FTP is in binary mode.) Now, all get and put commands transfer Macintosh files in MacBinary format.

2. Set the file transfer mode to binary by entering `binary` or `bin` at the FTP prompt.

NOTE: If you are writing host-based scripts to download or upload to a Macintosh in MacBinary mode, you can use the `quote`

`MACB ENABLE` and `quote MACB DISABLE` commands from the host's FTP client to enable and disable MacBinary mode, respectively.

Resetting MacBinary for Each FTP

NCSA Telnet can save you the trouble of tracking whether the MacBinary Enabled option is checked or unchecked in the File menu each time you want to transfer files. To set MacBinary mode to return to the default setting of your preference, enabled or disabled, whenever you begin a new FTP session:

1. Select Preferences from the Edit menu. The Preference dialog box appears.

2. Enable the option Reset MacBinary for each FTP.

3. Enable or disable the MacBinary option to indicate whether you want MacBinary mode to be reset to enabled or disabled, respectively, whenever you begin an FTP session. Doing so ensures that for each new FTP session that you initiate, MacBinary mode is set to your preference by default, regardless of how you set the mode in a previous FTP session.

   NOTE: "Each FTP" corresponds not to the individual file transfer, but to establishing the FTP command connection.

4. Click OK or press RETURN to apply these options only to the current session with NCSA Telnet. Click Save to save the specifications as the default, so that next time you invoke NCSA Telnet, it activates the option automatically.

FTP Client

Telnet 2.5 includes the ability to connect directly to the FTP port of a host machine, allowing the user to transfer a file directly between the host machine and Macintosh. To transfer a file from a remote machine to a Macintosh, normally the user need to:

1. Log into any UNIX account

2. Transfer the file from the remote host to the user's UNIX account via FTP.

3. Transfer the file from the user's UNIX account to the Macintosh via FTP.

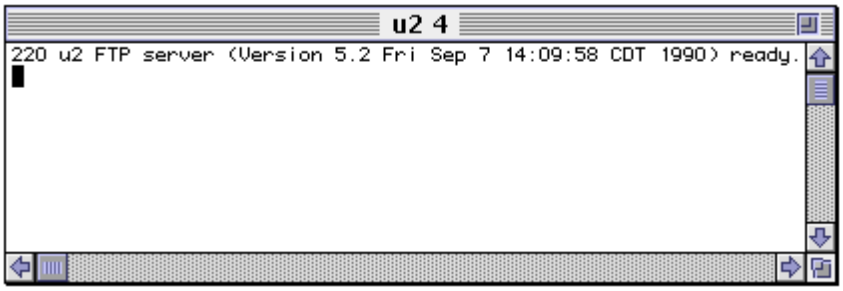
This procedure obviously necessitates the need for the direct transfer of files from a UNIX host to the Macintosh. This removes the need to log into any secondary UNIX account, which is used as a temporary go-between for FTP.

Logging in to the FTP Client

To start an FTP client session, select the "FTP Session" button in the Open Connection dialog box. A window will open up displaying a connection message, similar to that of Figure 5.10.

NOTE: Selecting the "FTP Session" button is the exact same as opening a connection to the UNIX machine on port 21, which is the FTP port. Therefore, the user can set up an alias to a machine with port 21, and all sessions opened to that alias will be ftp clients. For more information about aliases, please see Chapter 4.

Figure 5.10 FTP Client Connection



To use the FTP client, you must first log into the server.

1. Enter "user" followed by your login name, and press RETURN. The host will send a message prompting you to enter your password. Example:

`user` *`name`* RETURN

2. Enter your password and press RETURN.

3. If you are logged in, the host will send back a message saying that you are connected properly.

Once logged in, you can use the FTP client in the same way as you would normally use an FTP session.

Chapter 6 Tektronix 4014 and 4105 Emulation

Chapter Overview

This chapter describes the scope of NCSA Telnet's Tektronix 4014 and 4105 emulation capabilities, and explains how to conduct Tektronix graphics emulation sessions and operations in graphics windows.

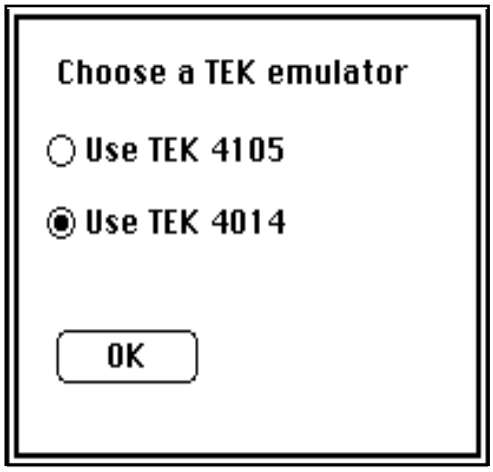
Tektronix Graphics Emulation

NCSA Telnet can emulate the Tektronix 4014 and 4105 terminals. This emulation includes text modes, Tektronix 4014 or 4105 text sizing, zoom, and pan. The use of Tektronix graphics with NCSA Telnet depends on host programs that can produce graphic images. When these programs run and produce Tektronix 4014 or 4105 graphics commands, NCSA Telnet automatically switches into graphics mode, opens a graphics window, and does the drawing.

Getting Started

The tektype field in the config file can be set to either 1 for 4105 or 0 for 4014. If this field does not exist in the config file, then you will be presented with a dialog box (figure 5.1) whenever you either select TEK page or begin to receive Tek codes from the network.

Figure 6.1 TEK Dialog Box



NOTE: If you wish to change the specified tektype, you must select the TEK mode from the Configuration dialog box when you first open a session.

A host program generates the Tektronix clear screen character sequence (ESC, FF) over a currently open connection. When NCSA Telnet receives this command, a graphics window opens. All graphics output from this session is redirected into that window until you close it or the TEK end command is sent.

Using TEK Page

The TEK Page command in the Session menu provides a quick way to create a Tektronix emulation window without requiring intervention from host software. Normally the emulation window appears automatically upon receiving the clear screen command sequence from the host. You can, however, select the TEK Page command to create the window immediately.

Moreover, just as you would use the Page key on a real Tektronix terminal to clear the window for the current session, you can select TEK Page to clear a graphics window.

Graphics Window Operations

NCSA Telnet allows you to detach, delete, zoom, print, and copy graphics windows as described in the following sections.

Detaching a Graphics Window

To detach a graphics window, click on the text window for that graphic's connection. To click on a window without detaching its corresponding graphics window, hold down the OPTION key while you click. When a window is detached its title no longer contains the (•) character that identifies it as the active output window.

The window may be detached under the control of host software, also. The CAN character (dec 24), when received, resets the terminal to the VT102 screen emulation.

Deleting a Graphics Window

To remove a graphics window, click on its close box.

Zooming/Unzooming a Graphics Window

To magnify a portion of the drawing in a graphics window, drag a selection rectangle around the area to be viewed more closely. When you release the mouse button, the selected section of the drawing expands to take up the entire window. The selections always maintain the aspect ratio of the TEK window. This requirement prevents the distortion or stretching of the TEK image.

To return the magnification to zero (and thus see the entire drawing), double-click anywhere in the window. Figures 6.2 and 6.3 show pictures of the same drawing in windows at normal and zoomed magnification, respectively.

You can copy and print the contents of zoomed or unzoomed windows. (When you copy or print a zoomed window, only the visible portion of the window is copied or printed.)

Figure 6.2 Normal Tektronix Image

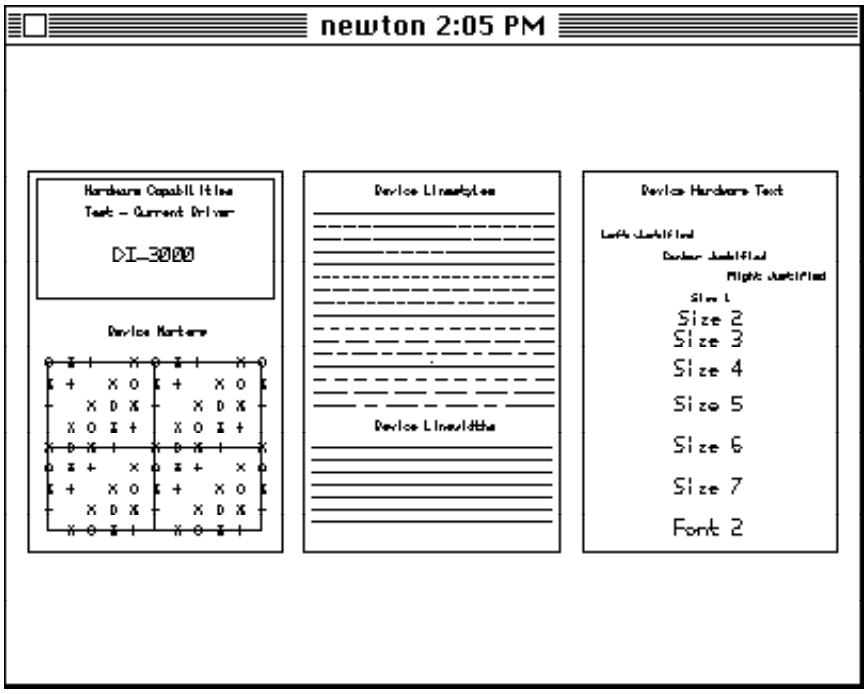
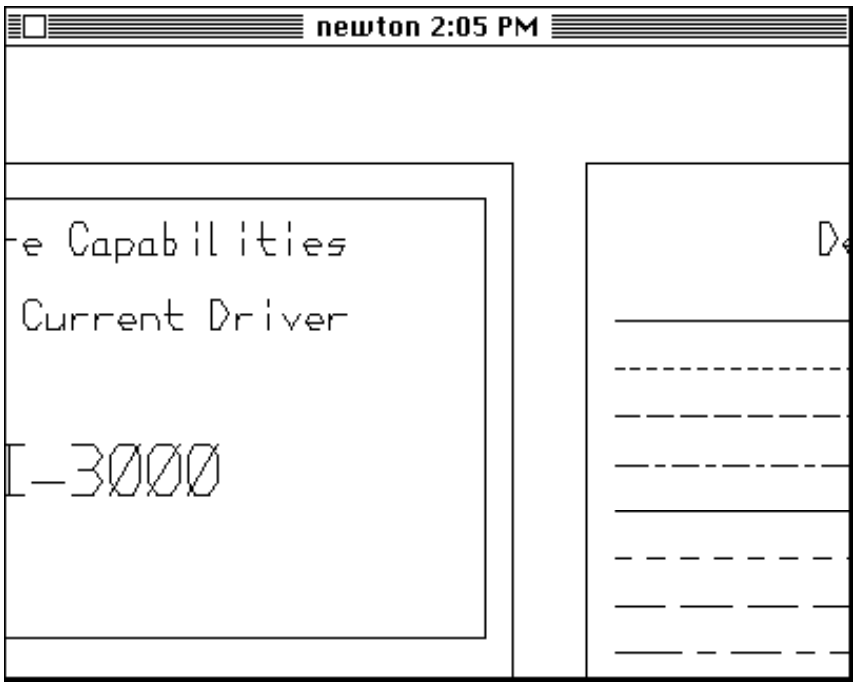


Figure 6.3 Zoomed Tektronix Image



Copying a Graphics Window

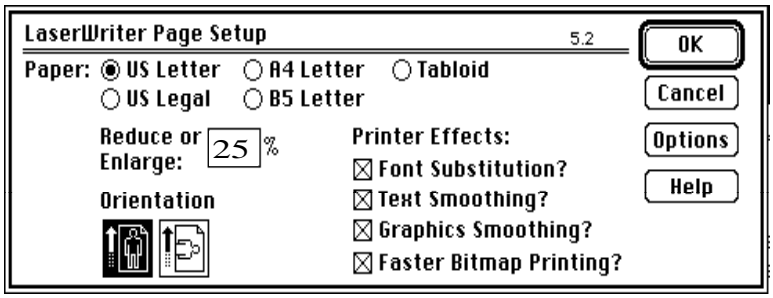
To copy the contents of a graphics window onto the Macintosh Clipboard, activate the window by clicking on it and choose Copy from the Edit menu. Now you can paste the graphic into another Macintosh application.

Printing a Graphics Window

To print the contents of a graphics window on a local printer or a printer on the AppleTalk network, activate the window by clicking on it and choose Print Selection from the File menu.

NCSA Telnet centers and scales all graphics to fit the page. To achieve the greatest resolution on a LaserWriter, set the Reduce or Enlarge option in the Page Setup dialog box to 25 percent (Figure 6.4). This setting does not change the size of the image, but makes the lines thinner. For more information about the Page Setup dialog box, refer to your Macintosh user's guide.

Figure 6.4 Page Setup Dialog Box



Chapter 7 Interactive Color Raster Graphics

Chapter Overview

This chapter introduces the Interactive Color Raster (ICR) protocol and describes how you may use this protocol in your programs to display color graphics with NCSA Telnet. In addition, the chapter describes how to control raster graphics windows, and display and manipulate color images. The chapter includes an example program that you may use as a template for designing programs that use the ICR protocol.

Interactive Color Raster Graphics

Interactive Color Raster (ICR) is a protocol for displaying raster graphics on your workstation screen. The ICR protocol controls its own windows through NCSA Telnet. It shares characteristics of the Tektronix graphics terminal emulation protocol. For example, escape sequences are used to control the display.

Using ICR, you can write mainframe programs to display color images in their own windows on your Macintosh screen, and you can apply the full range of 256 colors out of a palette of 16 million colors to your graphics displays. The ICR protocol is intended for use on a Macintosh with 256-color capability.

Starting and Quitting ICR Graphics Emulation

To use ICR, you need a program that runs on the remote, or host, computer which gives all of the appropriate commands to conduct the ICR graphics emulation. To create an ICR program, work from the protocol description contained in this chapter's section, "Using the ICR Protocol" and the example program contained in the section, "Example Program for ICR in C."

When the protocol command for creating a window arrives from the host, NCSA Telnet creates a Macintosh window for it. All human-readable text continues to go to the VT102 window and the graphics commands are sent to the proper graphics window.

The ICR program on the remote computer may choose to take the window away itself. If it does not, you can dispose of a graphics window by clicking in the close box, which is located in the upper-left corner of the window's title bar. If you exit NCSA Telnet while some windows remain open, the windows close automatically.

Using the ICR Protocol

To use ICR, you write a program that issues graphics commands to NCSA Telnet. NCSA Telnet receives these commands, interprets them, creates or destroys windows, sets the color environment, or displays raster graphics as the program directs.

To ensure that NCSA Telnet can determine the difference between regular text and ICR graphics, begin all ICR graphics sequence commands with the escape sequence ESC^ (escape, caret).

Description of the Protocol

Each ICR command has the form:

ESC^X; ***parameters*** **^** ***data***

where

- X is one of the command characters listed in Table 7.1 and fully described in Table 7.2.
- ^ is the caret character (ASCII 94).
- *parameters* is one or more of the parameters of X. The parameters for each command are listed in Table 7.1.
- the command is terminated with a caret (^).
- each command may be followed by a data stream which goes with it.

The parameters are determined by the command character that is used (Table 7.2). If your program omits the parameters, then NCSA Telnet supplies default values for the parameter values. Parameters are always printable ASCII and are delimited by ';'. For commands that require data, the data follows the command.

Table 7.1 ICR Commands

Command	Operation
W	Creates a window
D	Destroys a window
M	Loads a color map palette of up to 256 colors from
a	24-bit palette into the graphics window
R	Indicates that run-length encoded data follows
P	Indicates that pixel data follows
I	Indicates that IMCOMP compressed data (4:1 compression) follows

Table 7.2 Commands and Command Parameters Described

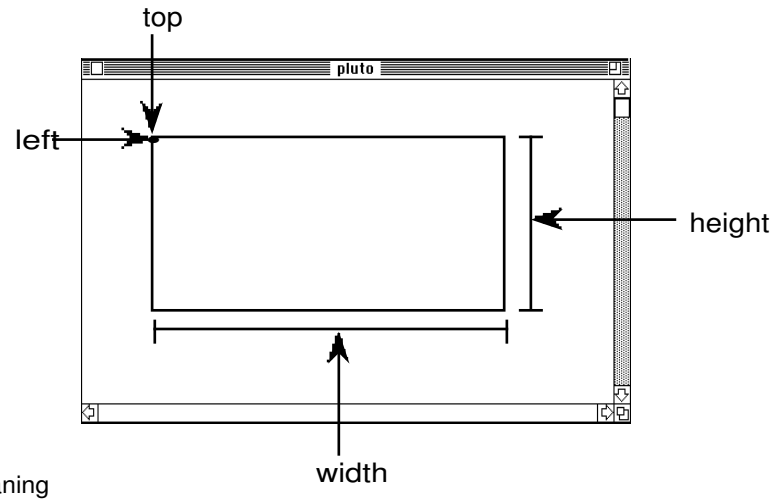
Command	Parameters	Description
W	left; top; width; height; display; windowname	Creates a window at the given location on the screen, where 0, 0 is the upper-leftmost corner of the screen. • Left, top, width, and height are integers specifying a location and size on the screen (see Figure 7.1). • Display is an integer indicating the hardware screen number (for machines with more than one screen—the parameter is not applicable for Macintoshes). • Windowname is a string used to distinguish multiple windows. The windowname assigned to a window is used by all of the other commands to specify which window to use.
D	windowname	Destroys a window by physically removing it from the screen and memory. • Windowname is the unique name assigned to a window when it is created by the W command.
M	start; length; count; windowname	Loads a color map or portion of one into the display hardware. NCSA Telnet assumes that palette entries are 8-bit R, G, and B, 3 bytes per entry, in that order. The default palette is a straight grey-scale ramp, where 0=black and 255=white. (See the section entitled "Color Maps.") • Start is an integer indicating the first entry to change. • Length is an integer indicating the number of entries to change. • Count is an integer indicating the total number of bytes that are in the data portion. Count is followed by the data for the command.
R	x; y; expand; length; windowname	Specifies that the data to follow is run-length encoded. (See the section entitled "Run-Length Encoding Format.") • x, y are integers indicating the point where the raster line starts and the data follows for length bytes of encoded data. • Expand is an integer indicating the number of times each dimension is to be expanded on the local screen. For example, an expand value of 2 makes the picture four times larger. • Length is an integer indicating the encoded length of the data, in bytes.

P	x; y; expand; length; windowname	Specifies that the data to follow is pixel data. • x, y are integers indicating the point where the raster line starts and the data follows for length bytes of pixel data. • Expand is an integer indicating the number of times each dimension is to be expanded on the local screen. For example, an expand value of 2 makes the picture four times larger. • Length is an integer indicating the length of data, in bytes, which is the same as the number of pixels to be displayed.

Table 7.2 Commands and Command Parameters Described (Continued)

Command	Parameters	Description
I	x; y; expand; length; windowname	Specifies that the data to follow is encoded with the IMCOMP compression scheme. The M command MUST be used before the picture displayed with the I command will appear correctly. • Length is an integer indicating the number of pixels per line, though one 'I' call represents four lines of data. The IMCOMP compression is a 4x4 SQUARE compression scheme, so each "line" of data will appear as four lines of pixels on the screen. • Y is required to increment the line numbers by fours: 0, 4, 8, 12, 16, etc.

Figure 7.1 Meaning of the Left, Top, Width, and Height Parameters



Integer	Meaning
left	the pixel value of the horizontal, or x, location of the upper-left corner of the graphics
top	the pixel value of the vertical, or y, location of the upper-left corner of the graphics wi
height	the number of pixels that comprise the vertical height of the graphics window
width	the number of pixels that comprise the horizontal width of the graphics window

ASCII Encoding

NCSA Telnet assumes that all of the parameter values are printable ASCII except ESC, which is an allowable exception on most login data streams. This means that the parameters require no special encoding, but the data values need help.

Your ICR program must encode 8-bit data values into printable ASCII for transmission. When possible, the values that fall in the printable ASCII range are passed untouched and all values outside that range are encoded as two bytes.

The following encoding works for all characters 0–255, as shown in Table 7.3.

Input:	realchar
Transmission:	specialchar followed by transchar
Encoding:	specialchar=realchar div 64 + 123 transchar=realchar mod 64 + 32
Decoding:	realchar=(specialchar – 123)*64 + (transchar – 32)

Table 7.3 Encoding Data Values into Printable ASCII

Special	Range
123	0–63
124	64–127
125	128–191
126	192–255

Because all encoded characters are preceded by a char in the range 123–126, all regular characters that are 32–122 (inclusive) can be sent without encoding.

Warning: On CTSS, trailing spaces are trimmed. Consequently, the values 0, 32, 128, and 192 should be avoided, because they code to <special> <space>.

NOTE: In the specifications, all data lengths and counts refer to the protocol data, not the ASCII encoded data. The length fields for R, P, and M all reflect the length of the data on the originating machine before it is encoded.

Run-Length Encoding Format

The data for the run-length encoded line is first run-length compressed and then ASCII encoded. The process for deciphering, therefore, is first to decode the ASCII to binary and then to decode the run-length binary data.

Using all eight bits of the byte stream which represents the pixels in a given RLE line, start with the control character. (*n*) is the low seven bits of the byte. The high bit represents whether the following (*n*) characters are reproduced exactly (high bit=0) or whether the following single character is reproduced (*n*) times (high bit=1).

Input: 1 1 1 1 23 23 23 234 112 33 44 55 42 42 42 42
Tokenized: (128+4) 1 (128+3) 23 (5) 234 112 33 44 55 (128+4) 42
Alternate count, data, count,data

After coding into this tokenized form, the data length for the R command is known. (The length is 12 in this example). Even though the ASCII encoding takes place after this step, use the length value from this step.

ASCII result: 125 36 123 33 125 35 123 55 123 37
126 74 112 33 44 55 125 36 42

Color Maps

You can manipulate the color table for the local display with the M command. The format for the color map data is a series of color map entries. Each color map entry is three bytes, one Red, one Green, one Blue. For example, to set entries 3 through 7 of the color table, the following M command might be used:

ESC^M;3;4;12;wind^*RGBRGBRGBRGB*

where the RGBRGB... data is the list of byte values for the new entries in RGB order. The actual data transmitted over the line still has to be ASCII encoded, but the data starts out in this form. Note that the count field, which is 12 in this example, is always exactly three times the length value, which is 4 in this example.

ICR Graphics Windows

Raster graphics windows require a lot of memory—one byte for each pixel in each graphics window on the screen. If there is insufficient memory remaining to open a new window, NCSA Telnet informs you with an alert dialog and does not create the window.

Allocating Memory

If you are using MultiFinder, you can set NCSA Telnet's allocated memory size to a larger value to prevent running out of memory. For example, if you need space for two 256x256 image windows, you need to increase the memory for NCSA Telnet by 128K—256 bytes times 256 bytes (or 64K) for each window.

Copying a Graphics Window

You can copy the contents of an ICR window onto the Macintosh Clipboard, and paste it into a program that is capable of pasting color images.

To copy the contents of a graphics window:

1. Click in the graphics window to make it frontmost.

2. Choose Copy from the Edit menu. Now you can paste the graphic into another Macintosh application.

System Color Problems

Image windows utilize the colors available for display on your Macintosh screen. When you close graphics windows, the system does not always restore the color environment to its original state, causing other windows to appear with incorrect colors. We are currently working to minimize the effects of NCSA Telnet and ICR graphics on your system's color table.

NOTE: Pressing CONTROL-C, or other methods of interrupting ICR commands, may make NCSA Telnet appear to "lock up" (see also "Telnet Options" in Chapter 4). When this occurs, press RETURN several times or enter commands until the VT102 window resumes activity. It may help to remember that when a drawing command is issued, NCSA Telnet expects an influx of a certain number (often hundreds) of bytes of image data to be used to finish drawing the current line.

Example Program for ICR in C

The sample program shown in Figure 7.2 is included on the distribution disk. It produces a test pattern on your screen if you are running an active ICR-equipped NCSA Telnet. If you do not have ICR, it produces thousands of encoded characters on your display.

Figure 7.2 Sample C Program

```
/*   icrtest
*
*  Produces a test pattern on an ICR compatible display. Demonstrates and provides example
*  code for writing ICR programs.
*
*  National Center for Supercomputing Applications
*  University of Illinois, Urbana-Champaign
*
*  by Tim Krauskopf
*  This program is in the public domain.
*
*/
#include <stdio.h>

int
       xdim=0,ydim=0;               /* size of image on disk */


char
       *malloc(),
       *testimage,
       rgb[768];                    /* storage for a palette */


main(argc,argv)
       int argc;
       char *argv[];
       {
       register int i,j;
       register char *p;

       puts("Creating test pattern");

       xdim = 150;
       ydim = 100;

       if (NULL == (testimage = malloc(xdim*ydim)))
              exit(1);

/*
```

Figure 7.2 Sample C Program (Continued)

```
*  Make the test image in a strange pattern.
*/
       p = testimage;

       for (i=0; i<ydim; i++)
              for (j=0; j<xdim; j++) {
                     *p++ = 50 + (((i & 0xfffffff8) * (j & 7))>>2);
       }

       puts("Displaying test pattern with the Interactive Color Raster protocol");

       rimage(0);            /* display remote image with [palette] */

}


/*************************************************************************/


/*  rimage
*  Remote display of the image using the ICR.
*  Just print the codes to stdout using the protocol.
*/

rimage(usepal)
       int usepal;
       {
       int i,j,newxsize;
       char *space,*thisline,*thischar;
       register unsigned char c;


/*
*  Open the window with the W command.
*/

(void)printf("\033^W;%d;%d;%d;%d;0;test window^",0,0,xdim,ydim);

/*
*  If a palette should be used, send it with the M command.
*/
       if (usepal) {
              (void)printf("\033^M;0;256;768;test window^");  /* start map */

              thischar = rgb;
              for (j=0; j<768; j++) {
                     c = *thischar++;
                     if (c > 31 && c < 123) {
                            putchar(c);
                     }
                     else {
                            putchar((c>>6)+123);
                            putchar((c & 0x3f) + 32);
                     }
              }
       }

/*
```

Figure 7.2 Sample C Program (Continued)

```
*  Send the data for the image with RLE encoding for efficiency.
*  Encode each line and send it.
*/
       space = malloc(ydim+100);
       thisline = testimage;

    for (i = 0; i < ydim; i++) {
        newxsize = rleit(thisline,space,xdim);
              thisline += xdim;                          /* increment to next line */

        (void)printf("\033^R;0;%d;%d;%d;test window^",i,1,newxsize);

        thischar = space;
        for (j = 0; j < newxsize; j++) {


/*********************************************************************/


/*  Encoding of bytes:
*
*  123 precedes #'s 0-63
*  124 precedes #'s 64-127
*  125 precedes #'s 128-191
*  126 precedes #'s 192-255
*  overall:  realchar = (specialchar - 123)*64 + (char-32)
*            specialchar = r div 64 + 123
*            char = r mod 64 + 32
*/


/*********************************************************************/


                      c = *thischar++;      /* get byte to send */

                      if (c > 31 && c < 123) {
                             putchar(c);
                      }
                      else {
                             putchar((c>>6)+123);
                             putchar((c & 0x3f) + 32);
                      }
        }
       }

       free(space);
}


/*********************************************************************/


/*  rleit
*
*  Compress the data to go out with a simple run-length encoded scheme.
*
*/
```

Figure 7.2 Example C Program (Continued)

```
rleit(buf,bufto,len)
        int len;
        char *buf,*bufto;
        {
        register char *p,*q,*cfoll,*clead;
        char *begp;
        int i;

        p = buf;
        cfoll = bufto;                          /* place to copy to */
        clead = cfoll + 1;

        begp = p;
        while (len > 0) {                   /* encode stuff until gone */

                q = p + 1;
                i = len-1;
                while (*p == *q && i+120 > len && i) {
                        q++;
                        i--;
                }

                if (q > p + 2) {            /* three in a row */
                        if (p > begp) {
                                *cfoll = p - begp;
                                cfoll = clead;
                        }
                        *cfoll++ = 128 | (q-p);             /* len of seq */
                        *cfoll++ = *p;              /* char of seq */
                        len -= q-p;                 /* subtract len of seq */
                        p = q;
                        clead = cfoll+1;
                        begp = p;
                }
                else {
                        *clead++ = *p++;      /* copy one char */
                        len--;
                        if (p > begp + 120) {
                                *cfoll = p - begp;
                                cfoll = clead++;
                                begp = p;
                        }
                }

        }
/*
*  fill in last bytecount
*/
        if (p > begp)
                *cfoll = 128 | (p - begp);
        else
                clead--;                                    /* don't need count position */

        return((int)(clead - bufto));       /* how many stored as encoded */
}
```

Chapter 8 System Administrator Information

Chapter Overview

This chapter contains information for system administrators and other experienced users to use in installing and customizing a system. Specifically, the chapter discusses the Configure Network Parameters dialog box, the config.tel file, the domain name lookup feature, passwords for FTP, and compatibility issues.

NCSA Version and MacTCP Version

In versions 2.3 and 2.4, NCSA Telnet was split into two versions—the MacTCP version and NCSA version. The MacTCP version is dependent on the Apple MacTCP drivers for its networking capabilities. The NCSA version, on the other hand, has all of the networking built into the application. Reliance upon MacTCP drivers is important for the growth of TCP/IP use on the Macintosh for two reasons: (1) it places the responsibility of networking code where it belongs—as part of the manufacturer's system software efforts, and (2) it allows much more flexibility for applications designers. By relying upon MacTCP drivers, developers can split applications into more manageable pieces that all run under MultiFinder. For example, a client News Reader application can now be run under MultiFinder along with NCSA Telnet.

Starting with this release of Telnet, the two versions are contained in one single module. This alleviates the need for having and supporting two separate versions of essentially the same program. Therefore we will still continue to support our own TCP/IP drivers in the new version of NCSA Telnet, along with the MacTCP drivers -- all in one program.

The minor differences in configuration for the two drivers are documented throughout this chapter. Since the two versions are now bundled as one single program, all other features of NCSA Telnet remain identical.

Configuring Network Parameters

To use the NCSA Telnet Configure Network Parameters dialog box (shown in Figures 8.1 and 8.2) to set up copies of NCSA Telnet for each Macintosh on the network:

1. Copy the software to the hard disk or floppy disk where it will be run for each machine.

2. Set up the networking parameters for each Macintosh.

When you run NCSA Telnet for the first time, the Configure Network Parameters dialog box should appear automatically; if it does not, select Configure Network from the Network menu.

If you are using the NCSA drivers, you should enter the IP number for the machine, the subnet mask, and the default host. For the MacTCP drivers, just set the default host in the Configure Network Parameters dialog box. Set up the other networking parameters using the Control Panel item for MacTCP. You must correctly set these up before NCSA Telnet will work.

NOTE: The setting of built-in AppleTalk versus EtherTalk in the Control Panel does not affect NCSA Telnet; however, you must install the EtherTalk-compatible driver in the system file for the Ethernet device to be used.

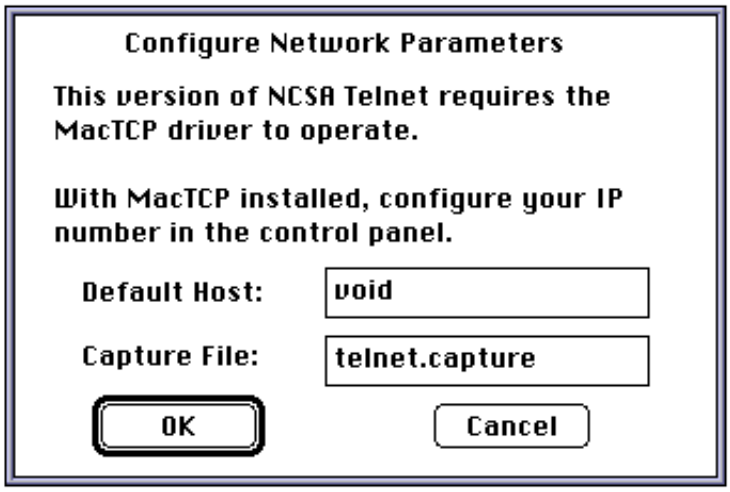


Figure 8.1 Configure Network Parameters Dialog Box (MacTCP Drivers)

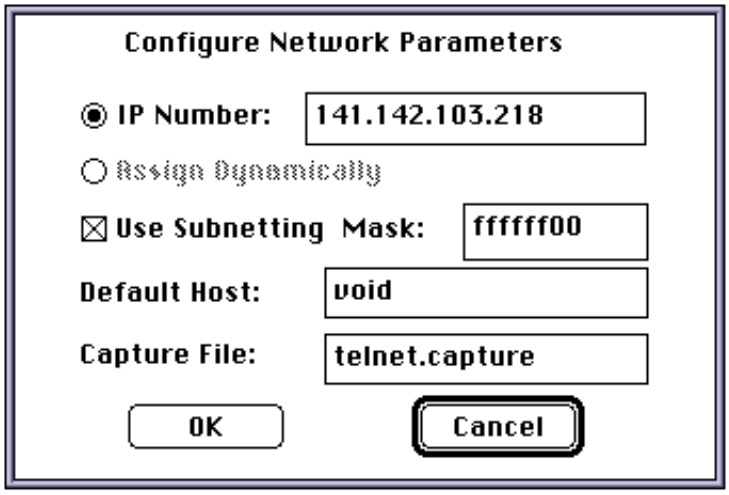


Figure 8.2 Configure Network Parameters Dialog Box (NCSA Drivers)

Assigning an Internet Number (NCSA Drivers)

For the NCSA drivers, the first step in configuring your copy of NCSA Telnet is setting the IP number. You should assign the IP number in one of the four ways described in the following sections, depending on two factors: (1) whether the serving gateway is using direct Ethernet (via EtherTalk), the Croft gateway software, or the Kinetics gateway software, and (2) whether dynamic numbers or static numbers are to be used.

Static IP Numbers (EtherTalk, Croft, or Kinetics)

To use static IP numbers on an EtherTalk, Croft, or Kinetics network configuration:

1. Select the radio button labeled IP Number.

2. Enter your four-byte internet address with a period (.) between each of the decimal numbers (for example, 192.17.20.10) in the text box labeled IP Number.

3. Click OK.

The specified address is saved as the IP number in the NCSA Telnet Settings file in your System Folder. You need only change the IP number when your machine's internet address changes (which it should not do frequently).

Dynamic IP Addressing

This section covers dynamic IP addressing for EtherTalk, Croft, and Kinetics gateway software.

RARP (EtherTalk)

NCSA Telnet for the Macintosh is capable of retrieving assigned IP numbers from a network administration machine running the Remote Address Resolution Protocol (RARP) daemon. The RARP daemon is documented in the manuals for the host which is running the RARP server, and the protocol is documented in RFC903. Their availability is dependent upon your network configuration and the software running on the hosts on your network. If you have a UNIX host, you will find the RARP documentation under the name rarpd in section 8 of the manual.

If you have a machine that can provide RARP service, just enter the Ethernet address of the Macintosh and its corresponding IP number into the RARP database and your server should be ready.

NOTE: If you are using a UNIX RARP daemon, you need to make sure that the Ethernet numbers are not zero-filled. For example, 8:0:89:f0:5:0 is appropriate; 08:00:89:f0:05:00 is not.

If your network uses RARP dynamic IP addressing, then select the radio button labeled Assign Dynamically in the Configuration dialog box.

To view the IP address, choose Show Network Numbers from the Network menu (see "Network-Related Commands" in Chapter 6).

Administered (Croft)

The Croft gateway software (which runs in the Kinetics FastPath and is also known as the KIP software) and the K-Star gateway software from Kinetics allow for administered dynamic IP assignment. The assignment can either be unique to each copy of the program and for each machine or can be dynamic.

If your network uses dynamic IP addressing, select the radio button labeled Assign Dynamically in the Configuration dialog box.

AppleTalk-Based (Croft or Kinetics)

To address the IP number dynamically using the AppleTalk address as a basis:

1. Select the button labeled IP Number.

2. Type in the IP number in the normal location, substituting the codes presented in Table 8.1 where appropriate.

Table 8.1 Dynamic IP Codes

Code	Meaning
`h`	High-order byte of the network number (Net Number/256)
`l`	Low-order byte of the network number (Net Number mod 256)
`n`	AppleTalk node number

For example, Table 8.2 demonstrates the results of substituting codes in three sample addresses.

Table 8.2 Sample Dynamic IP Assignment

IP #	AppleTalk #		Resultant IP#
128.174.h.n	Net: 1230	Node: 35	128.174.4.35
128.174.20.n	Net: 1230	Node: 35	128.174.20.35
128.h.l.n	Net: 1230	Node: 35	128.4.206.35

NOTE: This method of dynamic addressing is expressly prohibited on EtherTalk, because AppleTalk is not initialized by NCSA Telnet when running over EtherTalk.

Internet Subnetting

If your site uses a subnetted network (as specified in RFC950: Internet Subnetting):

1. Check the box labeled Use Subnetting Mask in the Configuration dialog box.

2. Enter the subnet mask in the neighboring text box, in hexadecimal. The format of the subnet mask is eight hexadecimal digits with no periods; for example, enter ffffff00 for 24 bits for network, 8 bits for host.

Default Host

Telnet allows you to specify the default machine to connect to. Every subsequent attempt to open a connection will give this host name as the default entry. To specify a machine, type in the internet address. If you do not want any machine as the default, then just leave this field blank.

Capture File

Version 2.5 of Telnet has the feature of being able to save text from a telnet session into a text file. If the user selects this feature, all text that is output to the screen will also be dumped into a file. To name the file that text is dumped to, enter a valid file name here. When Telnet is used to capture the text from a session, Telnet will append a unique number to the end of the specified capture file name. This is done so that text from multiple sessions can be saved at the same time, without any kind of ambiguity.

NCSA Telnet Settings File

All of the user-selectable settings for NCSA Telnet (Configure Network parameters, Preferences selections, and all Aliases) are stored in the NCSA Telnet Settings file, which is placed in the System Folder upon creation.

Configuration File

The configuration file (config.tel) contains information regarding local operating parameters, plus a list of commonly accessed hosts and optional network tuning parameters for each of these hosts. config.tel is a text file that can be edited with any text editor, such as TeachText.

The configuration file is accessed once when the program is initiated and is not used again. All of the machine names are read into memory, so it saves memory to limit the number of machine names you specify in the file.

NOTE: Editing the config.tel file while the program is running has no effect on the program's operation. To effect the changes, you must restart telnet.

Placing the Configuration File

For ease of use, place the config.tel file either in your System Folder or in the folder containing NCSA Telnet. If NCSA Telnet does not find the configuration file in either of these places, or if there is an error in the file, the following error message appears:

```
cannot find or open configuration file.
```

This message is described in Appendix A.

Entry Syntax

The configuration file is a list of keywords and legal values. The overall requirement for the entries in the file is that they alternate—keyword, value, keyword, value, and so forth.

Many different formats using any of the allowable delimiters are possible. The delimiters are the colon (:), semicolon (;), equal sign (=), and any of the whitespace characters. To include delimiters in a value field, enclose the field in double quotes. Quotes cannot be a part of any value field. Wherever a pound sign (#) is found, everything from # to the end of line is treated as a comment.

Though multiple formats can be used in the same file, you will probably want to find and keep a consistent format. For example, the entries in Figure 8.4 specify the same information.

Figure 8.3 Same Information in Different Entry Formats

```
name=nic    # comment field to end of line ->
host=sri-nic.arpa
hostip=10.0.0.51
scrollback=300
contime=60

       - - - - - -Example #1- - - - - - - - -


name=nic; host=sri-nic.arpa; hostip="10.0.0.51";
scrollback=300; contime=60


       - - - - - -Example #2- - - - - - - - -

name
nic
host sri-nic.arpa : hostip=10.0.0.51; scrollback=300;
contime:60


       - - - - - -Example #3- - - - - - - - -
```

Entering Macintosh Information

The first entries in the configuration file are the Macintosh environment entries. These specify what types of hardware are to be used and other parameters. In this list, sample values are included after the equal (=) signs to indicate the correct format.

Table 8.3 Macintosh Information Entries

Entry	Specification
arptime=5	†Time in seconds to continue trying to reach a host on the local wire. A value of 5 works fine for the network at NCSA, but larger values may be needed for hosts that are slow to respond. Smaller values are more convenient to use.
domaintime=2	Time in seconds to wait between the first domain lookup and the second. If you only have one nameserver, then this is the same as a simple timeout. If you want to rotate nameservers quickly—for example, because the first one may be down—set this to a smaller number.
domainretry=4	Number of times to query domain nameserver(s). Each time a retry is sent, the timeout value (domaintime) is doubled. Each time a retry occurs, NCSA Telnet tries the next nameserver, wrapping around to the first nameserver when there are no more.
domain="ncsa.uiuc.edu"	Default root for domain lookups. If a domain request does not contain a period (.), then this domain suffix is appended to the request before it is sent to the nameserver.
ftp=yes	Default FTP serving. Access to your Macintosh can be controlled by the FTP password file. To disable FTP serving by default, change this line to ftp=no. **NOTE**: This setting can be toggled in the File menu as well (see "Transferring Files" in Chapter 5).
passfile="ftppass"	The file in which FTP usernames and passwords can be found. There is no default name for this file. If the file is specified, then FTP will prompt for the username and password for all FTP attempts. If the file is not specified, then there is no password checking for FTP. For more

	information, consult the section of this chapter entitled "FTP Password Protection."

Table 8.3 Macintosh InformationEntries (Continued)

Keyword	Specification
timeslice=3	Amount of time you are willing to wait between processing information. This option is useful only when you are using MultiFinder, as it lets you run other programs in the background. The default is three Macintosh clock ticks. You should increase this number if the background operations are more important or decrease it if Telnet operations are more important.
hardware=AppleTalk	Ethernet device. NCSA Telnet can support several different kinds of Ethernet devices. AppleTalk is the most common configuration, used with AppleTalk to Ethernet gateways. For direct Ethernet users, consult the section of this chapter entitled "Hardware Options" to determine the correct setting. Note that this option is also used to switch between the NCSA drivers and MacTCP drivers, and is also used to specify is the user wants Serial connections.
termtype="dec-vt100"	The string to be returned by NCSA Telnet in response to the telnet terminal type negotiation command. The default value for this field is DEC-VT100. Because many host systems do not have a record for this terminal type, you may wish to change it to VT100.

`zone="KIPzone"`	†Zone containing the desired gateway. In some situations, an AppleTalk to Ethernet gateway may be used even if that gateway is not in the local AppleTalk zone. If you specify a particular zone name here, the query to find the gateway is directed to that particular zone. This option only works when running KIP-compatible software in the gateway; it is not compatible with all networking configurations.

Table 8.3 Macintosh Information Entries (Continued)

Keyword	Specification
`block=120`	Size of block of text characters to be read from the network. CONTROL-C, the Interrupt Process command, and all other keypresses are handled only between blocks. For faster turnaround on typed commands and CONTROL-C, set this value to a lower number. For better overall throughput to the screen, set this value to a higher number. The parameter for this command can range from 100 (good response time) to 4000 (fast throughput). Note that setting your color screen to two-color mode can improve throughput and scrolling speed also.

†Ignore these items when using the MacTCP driver version.

Entering Host-Specific Parameters

After the Macintosh configuration options, you may have zero or more hosts, with host-specific information for each. Typically, the first host listed will be name=default, which stores the default values for the other hosts. Any keyword listed under later hosts overrides the default setting for that host.

NOTE: The keyword `name` is special because it separates entries.

The parameters following `name` up to the next keyword `name` are all associated with the session name. The parameters are installed whenever a connection is opened with that session name.

Table 8.4 Host-Specific Parameters

Entry	Specification
name=nic	The primary name associated with a list of parameters. It is common to have more than one session name for a host, each with different parameters, perhaps with different colors or amounts of scrollback. A name keyword is required for each session entry because it separates entries.
host=sri-nic.arpa	Hostname or alternate name. If you want to associate both a session name and a hostname with a particular set of parameters, you may include both. Note that the name parameter is required, while the host parameter is optional. The rule of thumb is: When you have only a hostname, insert it as name=*hostname*. If you have both a session name and a hostname, enter both name=*sessionname* and host=*hostname*. When you want to open a new connection, either the hostname or sessionname works.

Table 8.4 Host-Specific Parameters (continued)

Entry	Specification
hostip=10.0.0.51	The IP address of the host. If this is not present, the domain nameserver must be queried to get the IP number of the host. For efficiency, include the IP addresses of all commonly accessed hosts. IP addresses of gateways and nameservers are required to be in the configuration file.
gateway=1	†The gateway precedence for this host. To reach hosts not connected to your local network, you must have at least one gateway entry. The hostip keyword must be present for this host. Gateway numbers must start at 1 and increase by ones. Gateway 1 has the highest precedence, but the first gateway to respond to an ARP will be used. ICMP redirects can affect how gateways are used, but not permanently.
nameserver=1	The nameserver precedence for this host. NCSA Telnet uses UDP to query domain

	nameservers for machine names that are not in the configuration file. Each machine that is to be used as a nameserver must have this keyword listed. The hostip keyword must be present for this host. Nameserver 1 has the highest precedence. Nameserver numbers must start at 1 and increase by ones. **NOTE:** This is only for the NCSA version. The TCP version uses the TCP resolver for all domain-name lookup, making this line unnecessary.
localkeys=off **localkeys={a,b,c}**	Local interpretation and default key assignment of Interrupt, Suspend, nad Resume (see "Changing the Assigned Keys for Interrupt, Suspend, and Resume" in Chapter 2). localkeys=off inhibits local interpretation of these commands, passing all keys directly to the host. localskeys="{a,b,c}" assigns the commands to specified keys, where 1 is CONTROL-A, 26 is CONTROL-Z, and the defaults are 3(CONTROL-C) for Interrupt, 19 (CONTROL-S) for Suspend, and 17 (CONTROL-Q) for Resume.
scrollback=100	The number of lines of scrollback for this session. Be aware that scrollback occupies at least 86 bytes per line saved. There can be a different number of lines of scrollback for each session. Plan your use of scrollback wisely unless you have memory to spare.
erase=delete	The backspace translation for this host. Some hosts prefer the BACKSPACE key to send delete and some prefer the BACKSPACE key to send backspace. Set this value erase=delete or erase=backspace.

Table 8.4 Host-Specific Parameters (continued)

Entry	**Specification**
crmap=4.3bsdcrnul	End of line character. This example is a special compatibility option for 4.3 BSD UNIX. There is now an official UNIX bug fix to take care of the problem, but some hosts may still want crnul to be used for end-of-line. The default is crmap=CRLF, which sends CRLF when you press RETURN. In line mode, CRLF is always used.

duplex=half	Echo mode setting. This parameter only applies to hosts that negotiate non-echoing mode but do not expect local line editing. If set to half, all character keys are sent and echoed to the screen immediately, otherwise the characters are echoed locally and queued until a RETURN or CONTROL character is sent. This parameter has no effect in echo mode; that is, when local echo is off.
contime=10	†The connection timeout in seconds. When you are making a connection attempt, NCSA Telnet gives up on opening the connection and deletes the window after this amount of time has elapsed. For congested or slow networks, this value should be made larger.
retrans=25	†The initial retransmission timeout in 60ths of a second. Increasing the value of this parameter may help in reducing the initial burst of retries that is typical of connections with high round-trip times.
mtu=512	†The largest amount of data to put in the packets that are sent. If you are sending to the ARPANET, you should use mtu=512. If you are sending to local hosts and are using EtherTalk, you should use mtu=1024. **NOTE**: Do not set mtu to be greater than 512 if you are using an AppleTalk gateway.
tektype=4105	Type 4105, or 4014 depending on which emulation typs is desired. You can also specify "none", in which case TEK displays are not allowed. If the tektype keyword is not present, Telnet will always prompt the user for a TEK type each time a TEK operation is performed.
forcesave=n	A value of "y" forces Telnet to always save the contents of the screen to the scrollback buffer. This option is ONLY for users of full screen VMS environments such as DEC All-In-One, in which case the value should be "y". The value of "n" is default, and recommended.

Table 8.4 Host-Specific Parameters (continued)

Entry	**Specification**
eightbit=0	Type 0 to disallow processing of 8-bit fonts. In that case, the 8-th bit of incoming data will be stripped, as in previous versions of NCSA

	Telnet. Type 1 to allow 8-bit characters to be passed.
linemode=N	Type N to disable line-mode negotiations. Type Y to enable Telnet to enter line-mode. This option is obviously meaningful only on hosts that support the line-mode protocol.
maxseg=512	†The largest segment that can be received. This value can control the size of packets that are sent over the connection. Reducing this value can eliminate IP fragmentation that we cannot reassemble. A value of maxseg=512 should force the sending host to never fragment. As with the mtu setting, do not set it larger than 512 if you are using an AppleTalk to Ethernet gateway.
rwin=512	†Receive window size. Unfortunately, some of the popular Ethernet hardware cannot handle receiving back-to-back packets. This requires us to limit the TCP receive window that we advertise to other hosts. For communicating to slower hosts or when using high performance hardware, a larger window (4096 is the maximum) may work better.
port=23	The TCP port number to use when connecting for this session. The default telnet port is 23, the Internet standard port number for the telnet protocol. Some networks—for example, MFENET (port=911)—use other port numbers, so this option should be specified for hosts on those networks.
nfcolor={0,0,0}	Normal, foreground color
nbcolor={0,0,0}	Normal, background color
bfcolor={0,0,0}	Blink, foreground color
bbcolor={0,0,0}	Blink, background color
	These options can be used to specify default colors for Macintosh computers which can handle color sessions. The format of the color specifier is {*red*, *green*, *blue*}, where red, green, and blue are the integer numbers corresponding to the requested colors (as shown in the standard Macintosh Color Wheel dialog box, shown in Figure 3.7). These options have no effect on non-color Macintosh computers, and their presence is harmless.

Table 8.4 Host-Specific Parameters (continued)

Entry	Specification
vtwrap=yes	Wrap mode setting. The VT102 terminal maintains an internal setting to determine whether characters printed off of the right hand side of the screen causes the terminal to wrap or not. If the terminal is set to wrap, the new characters appear on the next line of the screen (scrolling if necessary). If wrap mode is off, each new character replaces the last character on the current line and the cursor does not move. Set this option to yes or no to indicate the initial setting for this session. **NOTE**: Host software commonly sets the wrap mode, overriding this setting. You may also override this setting in the Session menu (see "Using the Session Menu" in Chapter 3).
vtwidth=132	Screen width. When a session is opened, memory is allocated for a screen width of 80 or 132 characters, depending upon the setting of vtwidth. These correspond to the two legal screen widths for a VT102 terminal.
clearsave=yes	Whether or not to save the screen when a clear screen command is received. Scrollback is now updated when the screen is cleared. When clearing the screen, all of the visible lines are saved into the scrollback region. If you prefer not to have the text saved when the screen clears, specify clearsave=no. In the case of host programs which clear the screen one line at a time, the lines are never saved into the scrollback region.
font="Monaco"	Default font for each session. The font name is a text string and must exactly match the name of the desired font in your System File.
fsize=9	Default font size (in points) for each session.
vtlines=24	Number of lines of text to appear in the VT102 emulation window. When the connection opens, NCSA Telnet creates the appropriate size window for the the font type and size and the number of lines to display.

NOTE: The VT102 terminal has exactly 24 lines. If you create a window larger or smaller, your host system may not be able to correctly update the screen. If you have problems, reset your screen to 24 lines with the Set Usable Lines command in the Session.

Table 8.4 Host-Specific Parameters (continued)

Entry	Specification
`copyfrom=nic`	Setting of unspecified parameters. The copyfrom parameter is probably the most important—it causes all unspecified parameters to be copied from a previous entry. Note that the entry to copy from must appear above the entry to copy to. For machines of a similar type, only one entry has to be customized and the rest include copyfrom commands. For a given host, parameters that are specified along with a copyfrom command override the copyfrom directive.

Converting UNIX /etc/hosts Files

Included with the distribution of NCSA Telnet is an awk script called newh. The script is also listed in Appendix C. Used with the following command under 4.XBSD UNIX, the scripts converts the /etc/hosts file into a format compatible with NCSA Telnet's configuration file. Note that domain name lookup should make this operation obsolete, or make it apply to only a small subset of your /etc/hosts file. At the prompt enter:

```
awk –f newh /etc/hosts >config.temp
```

After creating this new file, prepend the Macintosh-specific information and download it to the Macintosh.

Hardware Options (NCSA Drivers)

This section discusses the various hardware options available if you are using NCSA Telnet with the NCSA drivers.

Combined Network Drivers

All of the network drivers are combined into one application. You must use the hardware entry in the configuration file to inform NCSA Telnet which method of Ethernet connection you are using. Choose from the list in Table 8.6.

NOTE: If you have MacTCP, the network is configured for the MacTCP drivers. To specify this, you need to specify hardware=MacTCP in the configuration file. You may also leave out the hardware= line entirely, since MacTCP is the default.

Table 8.5 Ethernet Values for Hardware Options Supported by NCSA Telnet

Value	Ethernet Connection
Ether	Attempt to figure out which device and (if applicable) slot
Ether9	EtherTalk board or other EtherTalk compatible Ethernet board in slot 9
Ethern	EtherTalk board or other EtherTalk compatible Ethernet board in slot n
EtherSC	SCSI Ethernet device
EtherSE	Mac SE internal Ethernet board
AppleTalk	AppleTalk network (default value)
MacTCP	Use MacTCP drivers
Serial	Use serial drivers

AppleTalk and EtherTalk

NCSA Telnet works best over an Ethernet interface. The term EtherTalk has two referents: AppleTalk protocols on Ethernet and a device independent way of using Ethernet for applications. AppleTalk protocols on Ethernet allow fast access to Appleshare servers, and so forth. NCSA Telnet does not require these protocols, so the setting of built-in AppleTalk versus EtherTalk in the Control Panel does not affect NCSA Telnet. NCSA Telnet does require you to install EtherTalk to use an Ethernet device, but you do not have to enable AppleTalk for that device.

If you do not have an Ethernet device, you must have an Ethernet to AppleTalk gateway in order to run NCSA Telnet (see the hardware list in Table 8.1). In such situations, NCSA Telnet communicates with the gateway using TCP/IP encapsulated in AppleTalk packets.

Performance Tuning

You must correctly set the values of maxseg, mtu, and rwin in the configuration file to get maximum data transfer throughput between machines. Here are some rules of thumb to use when setting these values.

- The maximum reasonable values for these parameters are:
  rwin=4096
  mtu=1024
  maxseg=1024

- The setting required for users running NCSA Telnet over AppleTalk protocols, and any other troublesome network situation, also the most conservative setting, is:
  rwin=512

mtu=512
maxseg=512

- The best setting for local network use with an Ethernet board is:
  rwin=4096
  mtu=1024
  maxseg=1024

- The best setting for ARPANET use (or any situation with a lot of unknown gateways, but with an Ethernet board) is:
  rwin=4096
  mtu=512
  maxseg=512

rwin specifies how much data the other computer is allowed to send you at any one time, so it depends mostly upon your local Ethernet board. If the board can handle it, always specify rwin=4096.

maxseg is used to avoid fragmentation. If you ever get fragmented packets, lower the value of maxseg for that host until fragmentation stops occurring.

Domain Name Lookup (NCSA Drivers)

When NCSA Telnet cannot find a name in the configuration file, it may still find the IP number if you are running a domain nameserver. At least one nameserver entry is required in the configuration file, but there may be more. If one nameserver fails to respond, the one with the next higher precedence is queried. As soon as a response is received, NCSA Telnet attempts to open a telnet connection.

Domain Search Order

When you enter a name to open a connection, there is a specific domain search order:

1. The name is looked up as a session name from the configuration file.

2. The name is looked up as a hostname from the configuration file.

3. The name is sent as a domain query to the first nameserver.

4. The query is repeated if the domain request times out, but to another nameserver. This is repeated until the maximum number of retries is reached or a response is received.

With the domain nameserver, the number of hosts in the configuration file can be kept to a minimum. Each host in the configuration file will be a commonly used computer. The IP addresses for rarely used hosts will be accessible if the domain name retrieval system can resolve those hosts.

Default Domain

NCSA Telnet can append a default root domain if desired. To enable this feature, use the domain=keyword (as discussed in the section entitled "Configuration File") to specify the root domain that you want appended. If a hostname which is not in the Configuration File is requested and that name does not contain a period (.), the domain request is made with the default domain appended to that name.

Domain Name Lookup (MacTCP Drivers)

If MacTCP drivers are specified to handle domain name resolving, then the MacTCP domain name resolver handles all name lookup. By doing so, NCSA Telnet conforms to the TCP standard, as well as simplifies many internal processes. This feature also allows you to use NCSA Telnet with other TCP products simultaneously and without conflicts. It also leaves all name-serving specific code where it belongs -- outside of the application.

FTP Password Protection

The presence of the passfile keyword in the configuration file enables FTP password protection. If you include the password file keyword, FTP will not allow any FTP connections to open without a correct username and password. In order to use the FTP server to access any folder on your local disk, you should include the password file name as a full path name. For example,

```
passfile="hd40:NCSA Telnet:mypassfile"
```

You can have several usernames and individual passwords for each user. The passwords are encrypted, but not with a secure encryption system. Only trusted users should have access to the password file. Use the program Telpass (included with the NCSA Telnet distribution) to encode passwords (see "Using Telpass" in Chapter 5 for more information).

Compatibility

Ping

NCSA Telnet responds to ping (ICMP echo) requests. This request may be used by other hosts to determine whether your Macintosh is online.

VT102

The VT102 emulator is nearly complete. VT102 features not emulated are double width and double height characters, and VT52 mode.

ICMP Redirects

Some gateway configurations, do not support ICMP redirects. ICMP redirects currently work only with the EtherTalk-based configurations.

Trailers

Trailers were invented for an old version of Berkeley UNIX and have been haunting us ever since. NCSA Telnet does not support trailers. Your host machine must have trailers turned off for NCSA Telnet to work with your host. Some versions of ULTRIX from Digital Equipment Corporation have been shipped with trailers left on by default. If NCSA Telnet hangs up when you type out large text files, check the trailers setting for that host's ifconfig.

FTP

The FTP server in NCSA Telnet is close to the DARPA specification for the minimum implementation. Exceptions are:

- The command connection does not perform telnet negotiation.
- Block mode of FTP is not supported.
- Some error conditions may display as command not understood instead of returning more appropriate messages.

Telnet

The standard Telnet protocol has several potential options that can be invoked if both parties of the telnet connection agree. NCSA Telnet refuses most of these options, but accepts echo (option 1); suppress go ahead (option 3); and terminal type (option 23). There are some obscure features of the telnet specification that are not supported in this implementation: out-of-band interrupts are not available, go ahead signals do nothing, and telnet acknowledge signals are not acknowledged. If there are any problems with the limitations of NCSA Telnet, please submit a bug report using the form provided at the end of this manual.

Chapter 9

Serial Communications

Chapter Overview

This chapter is meant to be a brief introduction to serial communications, and how they are implemented in NCSA Telnet version 2.5. The format of this chapter will first include a general introduction to serial communication, and then focus on how to use this with Telnet. Also included is an overview of SLIP.

What is Serial Communication?

Normally NCSA Telnet connects to host machines through the ethernet cable. All the data is transmitted through this ethernet line in a very fast, efficient way. However, that normally necessitates needing a direct ethernet connection in order to communicate with host machines via Telnet.

Fortunately there is another way to communicate with host machines, and that is through the phone line. By using a modem, it is possible to transfer data from your computer over the phone. This is exactly what serial communication is. For people who do not have the option of using ethernet, it is easy and practical to use the phone line to connect to a remote host, and this new version of Telnet has this feature.

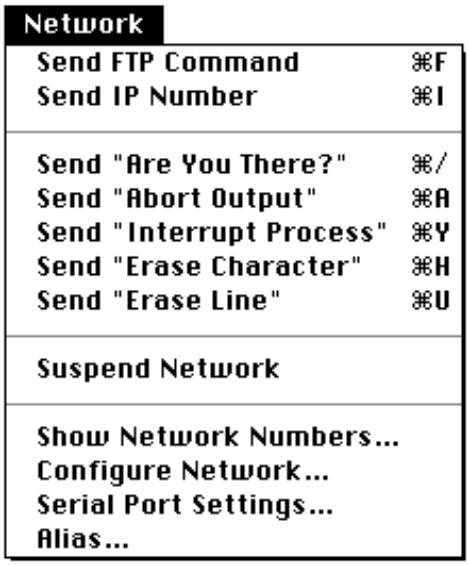
Setting Everything Up

To use the serial communication feature, you will need to do several things. A modem is going to be a necessary piece of equipment, since it is the device that is able to encode and decode the serial data from the phone line. Obviously you are going to want the data connection to be as fast as possible, so it is naturally advantageous to have a fast modem. Another modem feature that is going to be handy is the ability for the modem to auto dial -- that will make the job of connecting a lot easier.

The modem is going to have to be connected to a phone line, so that there is a path for data transfer going to the rest of the world. Similarly, the modem is also going to be connected through a serial port on the computer. This can be either the modem port, or the printer port

Now that your hardware is set up properly, you must configure Telnet to recognize how data is going to be transferred. This is done by configing the Serial Port Setting. To do this, choose the item Serial Port Settings from the Network Menu, shown in Figure 9.1 for reference. For more information about how to configure the Serial Port, please see Chapter 4, in the section "Serial Port Settings."

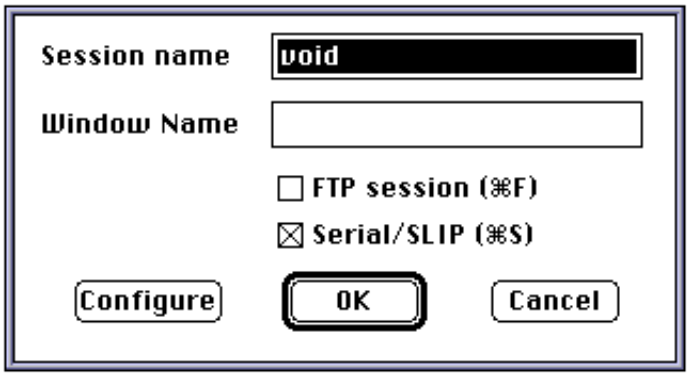
Figure 9.1 Network Menu



Connecting

Now that everything is properly set up, you can proceed to make a connection over the phone line. Try opening a session, which brings up the Open Connection Dialog Box, shown again below in Figure 9.2.

Figure 9.2 Open Connection Dialog Box



This time select Serial/SLIP by either clicking in the appropriate box, or by hitting Command-S. This will tell Telnet to use this connection through the serial port. When you do this, a blank window should open up, awaiting further commands. At this point, you will need to properly use your modem to connect.

NOTE: Not all modems are compatible, and therefore there is not one de-facto standard for connecting. You are probably going to want to read your Owners Manual to become familiar with its operations.

At this point, there is an open line for data transfer, but no actual connection. To connect, you need to have the modem dial the number of a Terminal Server. A Terminal Server is a machine that allows a modem to connect to it. Through this server you are allowed to remotely log in to hosts around you.

Connection Example

Perhaps the easiest way to illustrate the process of opening a serial connection is to give a concrete example. This example is exactly how to open a connection at NCSA, and perhaps this will give you an idea of how things work elsewhere.

1. Start opening a connection by bringing up the Open Connection Dialog Box, and select Serial/SLIP connection as in Figure 9.2 above.

2. A blank window opens up. From here it is time to dial the number. Using a Hayes SmartModem 1200, you can give a direct command to auto-dial. For that particular modem, you can type:

   ATDT 244-0662

   ATDT tells the modem to dial the following number, and 244–0662 is the phone number of a Terminal Server here.

   The modem should respond with dial tones, and then some connection sounds.

3. At this point, the screen should respond with an opening message to tell you that you are connected. This display should look somewhat similar to Figure 9.3, "Serial Session Window." You are still not connected to your host however, so from here you will still need to log in.

4. Remotely log into your host. Once again, this could perhaps vary somewhat depending on your site, and what protocols are available. At NCSA, it is possible to log in with:

   rlogin yoyodyne.ncsa.uiuc.edu

5. If you have specified a proper machine to telnet to, then you should be asked for a login and password. From there, the connection will proceed exactly as if you were just using a standard ethernet connection.

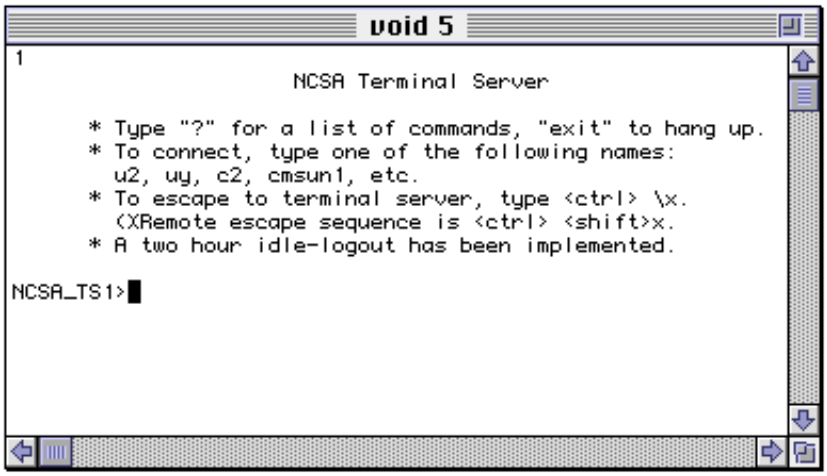


Figure 8.3 Serial Session Window

SLIP Overview

Besides the ability to make a serial connection over a phone line, this version of Telnet also has the feature of being able to make a SLIP connection over a phone line. SLIP is a protocol that allows a modem to act as an actual ethernet connection, and therefore circumvent the need to dial a Terminal Server and remotely log in elsewhere. Instead, SLIP allows the user to just specify directly the IP address of the host machine, and connection proceeds as it would for a normal ethernet session.

Setting Things Up for SLIP

Unfortunately, using SLIP requires quite a bit of initial configuration. First, you need a way to identify your macintosh to the rest of the network. This is done by setting up the SLIP IP# of your macintosh. To do this, once again select Serial Port Settings from the Network Menu, shown in Figure 9.1. When the Serial Port Settings dialog box comes up, you will need to specify the IP number that SLIP will use for your macintosh. For more information about setting this value, please see Chapter 4, in the section "Serial Port Settings," and Appendix D, "Getting SLIP to Work."

NOTE: Telnet 2.5 does not currently support BOOTP, which allows dynamic IP number assignment with SLIP. It is for that reason that you must statically assign a SLIP IP# for your macintosh.

There are a few other items that need to be properly configured on the host end, for SLIP to work. To do this, please refer to Appendix D, "Getting SLIP to Work." You will probably need to get your System Administrator to set everything up properly on the host end.

Making a SLIP Connection

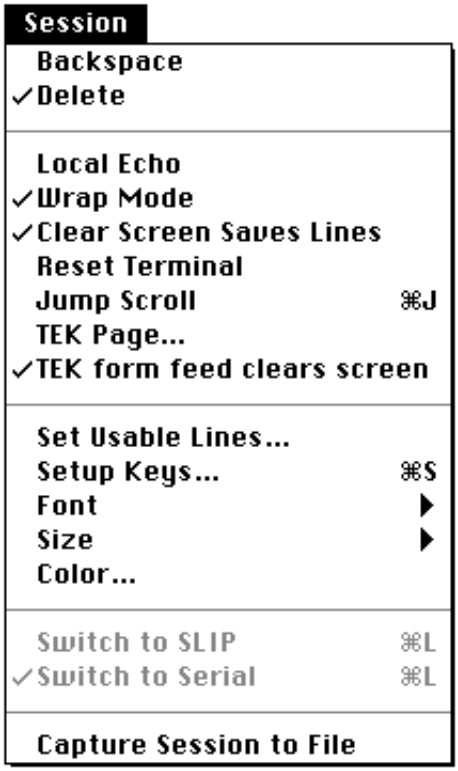
Once SLIP is properly configured, it is very easy to open a SLIP connection from Telnet.

1. Open up the Connection Dialog box just as you always would for making a connection.

2. Select the Serial/SLIP option by clicking on the appropriate box. This will open a blank session window, just as if you were going to attempt to open a normal serial connection.

3. At this point, you may go into the Session Menu, as shown in Figure 9.4, and select the Switch to SLIP menu item.

Figure 8.3 Session Menu



The session menu will then disappear, and the Open Connection Dialog Box will once again appear. This time, however, you are going to be connecting through the serial line. You may type in a valid IP address, and the connection will continue just as if you were connecting directly over ethernet. However, you are not connecting over ethernet, but rather the phone line.

Appendix A Error Conditions

Overview

Most of the error conditions in NCSA Telnet are nonfatal. The most important and common error messages are listed here with a short summary of the symptoms and causes.

Common Errors

The following messages may appear on your screen during the operation of NCSA Telnet. Any other messages that appear are protocol-specific messages that may require additional diagnosis from the system administrator. If a message that is not documented here occurs repeatedly, please contact your system administrator first. If you cannot find a solution, please submit a bug report using the form provided at the end of this manual.

```
AppleTalk initialization failed; couldn't install listener
```

or

```
EtherTalk initialization failed; couldn't install listener
```

Cause:
NCSA Telnet is having difficulty conversing with AppleTalk or EtherTalk, respectively. There are a number of possible causes for this, such as the use of conflicting and improperly coded AppleTalk or EtherTalk programs.

Solution:
If you are concurrently using another AppleTalk product, try running NCSA Telnet without it. Otherwise:

1. Reboot.

2. Check that AppleTalk is connected in the Control Panel or Chooser desk accessory, if you are using AppleTalk.

   Check whether your configuration file contains the specification hardware=ether (see Chapter 8).

3. Try running NCSA Telnet again.

```
Cannot find or open configuration file
```

Cause:
NCSA Telnet normally operates with a configuration file. This file could not be found.

Solution:
A dialog box, shown in Figure A.1, appears on your screen. Click on this error dialog box to continue. A dialog box appears from which you may elect to quit the program and return to the Finder, or find a suitable configuration file elsewhere on your disk.

Figure A.1 Missing Configuration File Dialog Box

If you choose to find a different file, NCSA Telnet displays a standard directory dialog box from which you can select the text file to use as your configuration file. This does not permanently change the name or place that NCSA Telnet looks for its configuration file. To prevent the error dialog box from being displayed again, put your configuration file into the folder containing NCSA Telnet or the System Folder.

```
ICMP:  Destination unreachable
```

Cause:
Another machine—probably the gateway—has determined that your message cannot reach its destination from your system.

Solution:
Check the IP address in your configuration file. Notify your system administrator that the gateway cannot connect you to the destination you want to reach. There may be a problem with the gateway.

```
Local Host or gateway not responding
```

Cause:
Possible reasons this error occurs are: network problems, a configuration file problem, the computer you want to connect to is down, or the gateway that you need is down.

Solution:
If the computer is on your local network, check to see that the network is up and running. If the computer is not on your local network, check to see if the gateway is up and running. Ask the system administrator to check the specification of the gateway in your configuration file. Check the IP number of the computer to which you are trying to connect. Check to make sure that your computer is attached to the network. Check the integrity of the network cable. Check any Ethernet devices' configuration of thick versus thin Ethernet.

```
not enough memory left to open
```

Cause:
Your system ran out of memory. This is the most common barrier to opening more sessions.

Solution:
Log off of some of your sessions or provide more memory in which NCSA Telnet can run. Providing more memory may mean buying more or allocating more memory under MultiFinder.

```
No internal TCP ports available
```

Cause:
You are trying to do too many activities at the same time, or some combination of your activities has not closed the TCP sessions correctly. This will happen if you open too many sessions to other computers.

Solution:
Close some of your existing sessions. If necessary, exit the program by logging off all of the other computers and restart NCSA Telnet.

```
unable to open resolver
```

Cause:
You are trying to run the MacTCP version of NCSATelnet when you don't have MacTCP installed. This message signals that NCSA Telnet couldn't open the MacTCP domain name resolver.

Solution:
If you do not have MacTCP installed, you should either install MacTCP, or change the hardware line in config.tel to either Appletalk, ether, or some other appropriate option.

If you have MacTCP installed, try the following:

1. Delete the 'MacTCP Prep', and 'MacTCP DNR' files from the System Folder, and restart your Mac.

2. Make sure the IP number in MacTCP is correct (if obtaining manually).

3. Make sure you have the correct option under Obtain Address in MacTCP.

4. Verify that you have the correct class network option chosen in MacTCP.

```
Error opening TCP drivers
```

Cause:
A configuration problem.

Solution:
If you are using MacTCP, check the following in your MacTCP control panel:

1. Verify the Obtain Address option is set correctly.

2. Make sure your IP number is properly set.

3. Make sure that the subnet mask is correct for your network.

```
Possibly no dynamic addressing
```

Cause:
Your network options in MacTCP are not configured correctly.

Solutions:
If you are using MacTCP, check the following options in your MacTCP control panel:

1. Make sure that your Obtain Address option is set correctly. Telnet is possibly reporting an error with the way your IP number is assigned.

2. Verify that the IP number is correct, if obtaining the IP address manually.

3. Check that the subnet mask is correct for your network.

```
host not on file or on server
```
or
```
host or gateway not responding
```

Cause:
Telnet is unable to resolve the host's address that you are trying to connect to.

Solutions:
If you are using MacTCP, check the following options in your MacTCP control panel:

1. Make sure that the domain Name Server Info Box is filled out properly, and the default name server is specified.

2. Delete the 'MacTCP Prep' and 'MacTCP DNR' files from your System Folder, and restart the Macintosh.

3. Verify the correct Ethernet/Ethertalk option is chosen.

4. Make sure that the gateway is properly specified.

5. Make sure that the correct Obtain Address option is selected.

6. Verify that the subnet mask is correct for your network.

Appendix B Code to Convert /etc/hosts Files

Overview

This appendix explains how to convert UNIX /etc/hosts files to the new configuration file format.

Converting Files

Below is the contents of the awk script newh, which converts UNIX /etc/hosts files. To convert the files, use:

```
awk -f newh /etc/hosts > newfile
```

```
 {
 if (substr($0,1,1) != "#") {
  if (substr($2,1,1) == "@") {
       print "name=" $3 " ; hostip=" $1
       j = 4
  }
  else {
       print "name=" $2 " ; hostip=" $1
       j = 3
  }
   for (i=j; i<=NF; i++) {
       print "name=" $i " ; copyfrom=" $(j-1)
  }
}
}
```

Appendix C Obtaining NCSA Software

Overview

This appendix uses NCSA Telnet to outline the procedures for obtaining NCSA software via FTP, an archive server, or by regular mail.

Obtaining NCSA Software

FTP

If you are connected to Internet (NSFNET, ARPANET, MILNET, etc.) you can download Telnet software and documentation, along with other software, at no charge from an anonymous file transfer protocol (FTP) server at NCSA. The steps you should follow to do so are enumerated below. If you have any questions regarding the connection or procedure, consult your local system administrator or network expert.

1. Log on to a host at your site that is connected to Internet and is running software supporting the FTP command.

2. Invoke FTP on most systems by entering the Internet address of the server:

   ```
   % ftp ftp.ncsa.uiuc.edu
   ```

   or

   ```
   % ftp 141.142.20.50
   ```

3. Log in by entering **anonymous** for the name.

4. Enter your name for the password.

5. Enter **get README.FIRST** to transfer the instructions file (ASCII) to your local host.

6. Enter **quit** to exit FTP and return to your local host.

7. Review the README.FIRST file for complete instructions concerning the organization of the FTP directories and the procedures you should follow to download the README files specific to the application you want.

Your login session should resemble the following sample, where the remote user's name is *smith* and user entries are indicated in boldface type.

```
harriet_51%  ftp ftp.ncsa.uiuc.edu
Connected to zaphod.
220 zaphod FTP server (Version 4.173 Tue Jan 31 08:29:00 CST
1989) ready.
Name (ftp.ncsa.uiuc.edu: smith):  anonymous
331 Guest login ok, send ident as password.
Password:  smith
230 Guest login ok, access restrictions apply.
ftp>  get README.FIRST
200 PORT command successful.
150 Opening ASCII mode data connection for README.FIRST (10283
bytes).
226 Transfer complete.
local:  README.FIRST  remote:  README.FIRST
11066 bytes received in .34 seconds (32 Kbytes/s)
ftp>  quit
221 Goodbye.
harriet_52%
```

The README.FIRST file instructs you to copy the Telnet README file to your directory and read it before proceeding. Your FTP session should resemble the one listed below:

```
ftp>   cd Mac/Telnet
250 CWD command successful.
ftp>   get README
200 PORT command successful.
150 Opening ASCII mode data connection for README (10283 bytes)
226 Transfer complete.
local:  README       remote:  README
2080 bytes received in .14 seconds (15 Kbytes/s)
ftp>   quit
221 Goodbye.
harriet_52%
```

The Telnet README file explains how to copy the contents of the Telnet directory to your home directory via remote login or anonymous FTP. The precise file transfer procedure varies according to the type of operating system you use.

Archive Server

To obtain NCSA software via an archive server:

1. E-mail a request to:

   archive-server@ncsa.uiuc.edu

2. Include in the subject or message line, the word "**help**."

3. Press RETURN.

4. Send another e-mail request to:

archive-server@ncsa.uiuc.edu

5. Include in the subject or message line, the word "**index**."

6. Press RETURN.

For example, if you use the UNIX mailing system, your login session should resemble the following sample, where user entries are indicated in boldface type.

```
yoyodyne_51% mail archive-server@ncsa.uiuc.edu
Subject:  help

.
EOT
Null message body; hope that's ok
yoyodyne_52% mail archive-server@ncsa.uiuc.edu
Subject:  index
.
EOT
Null message body; hope that's ok
```

The information you receive from both the help and index commands will give you further instructions on obtaining NCSA software. This controlled-access server will e-mail the distribution to you one segment at a time.

Mail

NCSA Telnet software and manuals are available for purchase—either individually or as part of the anonymous FTP reel or cartridge tapes—through the NCSA *Technical Resources Catalog*. Orders can only be processed if accompanied by a check in U.S. dollars made out to the University of Illinois. To obtain a catalog, contact:

NCSA Documentation Orders
152 Computing Applications Building
605 East Springfield Avenue
Champaign, IL 61820
(217) 244-0072

Appendix D Getting SLIP to Work

Overview

This appendix describes the actions necessary to get SLIP up and running with NCSA Telnet. It is the step by step procedure that was used to set up SLIP on an ULTRIX workstation. This is intended to be done ONLY by the system administrator, since it involves some changes in the system's configuration.

Setting Up SLIP

You can establish connections from NCSA Telnet to a DecStation 5000 after configuring the DecStation for SLIP. To do this, the following procedures must be followed.

NOTE: This procedure involves changing some configuration parameters on the host machine's system, and is therefore only intended to be followed by the system administrator.

1. You must reconfigure the Ultrix kernel to include the SLIP driver.

2. Create an entry in "/etc/hosts" for the host slip1 to give it an IP number -- this provides static IP assignment since Telnet does not currently handle bootp dynamic addressing. Add a line similar to the following:

128.187.2.221 slip1

3. Make two entries in "/etc/sliphosts" for "slip1" which is used by "slattach" and specifies some ifconfig parameters for the slip connection. These lines can be as follows:

jim jim.cs.byu.edu 128.187.9.50 255.255.0.0. any /dev/tty
slip slip1.cs.byu.edu dbms 255.255.0.0 any /dev/tty

4. Create an account called "slip1", but do not specify the standard "/bin/csh" login shell. Instead, you need to specify the SLIP interface"/usr/new/slattach." You will need to have a password entry similar to the following:

slip1:password:105:10:Logan:/usr/staff/loganj:/usr/new/slattach

5. Finally, you need to create the proper network routing for the "slip1" host, so that network traffic intended for "slip1" would be directed to the ethernet address of the DecStation 5000. This can probably done on your system in your "etc/rc.local" file with the "arp" command.

/usr/etc/arp -s 128.187.2.221 8:0:2b:1d:2a:f8 pub

That is all for the Ultrix setup. At this point it is possible to establish a serial connection using NCSA Telnet to the Ultrix host, and login as slip1.

For more information on how to open SLIP and serial connections, please see Chapter 9, "Serial Communications."

Appendix E VT200 Escape Codes

Overview

This appendix describes briefly the escape codes that are sent by Telnet with vt200 emulation.

The Codes

Telnet 2.5 has the new feature of being able to emulate a VT200 terminal. This, therefore, is intended to be a bried listing of escape codes that Telnet sends when acting as a VT200 keyboard.

NOTE: This is not in any way intended to be the de-facto reference for vt200 emulation. If a full, descriptive reference for vt200 emulation is needed, you might want to get an actual manual for this emulation.

The remainder of this appendix just describes the keyboard mapping that Telnet uses.

F1 to F4 are the top four keys on the Mac keypad(clear = / *). F6 to F20 are mapped to F1 to F15 on the Mac extended keyboard. F5 is not mapped because it performs VT200 local function only.

The escape sequences (in decimal) generated by the Mac keyboard are as follows:

Table E.1 Macintosh escape codes used for VT200 emulation

Mac Key	VT200Key	Non Keypad Mode Esacpe Sequence	Keypad Mode Escape Sequences
clear	PF1	27 79 80	same
=	PF2	27 79 81	same
/	PF3	27 79 82	same
*	PF4	27 79 83	same
help	Find	27 91 49 126	same
home	Insert Here	27 91 50126	same
page up	Remove	27 91 51 126	same
del	Select	27 91 52 126	same
end	Prev Screen	27 91 53 126	same
page down	Next Screen	27 91 54 126	same
F1	F6	27 91 49 55 126	same
F2	F7	27 91 49 56 126	same
F3	F8	27 91 49 57 126	same
F4	F9	27 91 49 48 126	same
F5	F10 (help)	27 91 49 49 126	same
F6	F11 (do)	27 91 49 51 126	same
F7	F12	27 91 49 52 126	same
F8	F13	27 91 49 53 126	same
F9	F14	27 91 49 54 126	same
F10	F15	27 91 49 56 126	same
F11	F16	27 91 49 57 126	same
F12	F17	27 91 49 49 126	same
F13	F18	27 91 49 50 126	same
F14	F19	27 91 49 51 126	same
F15	F20	27 91 49 52 126	same
arrow up		27 91 65	27 79 65
arrow down		27 91 66	27 79 66
arrow right		27 91 67	27 79 67
arrow left		27 91 68	27 79 68

Bugs and Suggestions

Please notify us of any bugs you have found in our software and any suggestions you have for future releases or products.

Using the report form below, mail user feedback, bugs, or software suggestions via U.S. mail to:

NCSA Software Tools Group
152 Computing Applications Bldg.
605 East Springfield Avenue
Champaign, IL 61820

Send reports regarding bugs, software suggestions or comments via electronic mail to:

mactelnet@ncsa.uiuc.edu
mactelnet@ncsavmsa.bitnet

Name:_____

Institution:_____

Address (Electronic):_____

Address (U.S. Mail):_____

_____

_____

Telephone: (_____)_____–_____.

Version of NCSA Telnet:_____**Type machine:**_____

Version of system software:_____

Suggestion or description of problem:

_____

_____

_____

_____

Place
Stamp
Here

NCSA Software Tools Group
Telnet
152 Computing Applications Building
605 East Springfield Avenue
Champaign, IL 61820