



Network Station Manager Version 2

ASCII Terminal Emulation

RS/6000 Advanced Technical Support
RS/6000 America's Marketing
August 1999



Objectives/Contents



- **What's new in ASCII terminal emulation at V2R1?**
- **Overview of emulation modes in NSTERM.**
- **Network Station Manager options.**
- **Command line options.**
- **Using the keyboard mapping utility.**
- **Font selection and limitations.**
- **Color capabilities**
- **UNIX termcap and terminfo**
- **Alternative ASCII terminal emulation solutions.**



This topic of this presentation is the new ASCII terminal emulation client called nsterm available with the Network Station Manager Version 2 Release 1 (V2R1) code.

The objective of this presentation is to provide information about the capabilities and features of the nsterm VT terminal emulator. A secondary objective is to provide information for the system administrator in setting up the nsterm for users and customizing it to meet application requirements.

Topics that will be covered include

- features of the emulator
- Emulator options and how they can be set
- Keyboard and font customization
- Information on using color with the nsterm emulator
- Keys to using nsterm with UNIX
- and Alternative solutions to providing ASCII terminal emulation.

ASCII terminal emulator overview



- Provides a emulator that runs native on the IBM Network Station.
- Allows telnet to any TCP/IP port on a UNIX or other server.
- Displays ASCII text and allows ASCII text input.
- Based on the UNIX standard dtterm from CDE.
- Allows selection of terminal emulation type
- Provides application support for function keys and keypad keys.
- Background, foreground and cursor colors are selectable
- Uses standard X fonts with default set selectable from menu.
- Supports standard window sizes.

Notes



The nsterm emulator provides access to UNIX and other ASCII based hosts through a telnet connection. The emulator runs native on the Network Station providing a direct connection between the Network Station and the application host as opposed to using aixterm or dtterm which move all traffic back through the X client system.

NSTERM is based on the standard CDE dtterm emulator with added features to support DEC VT terminal function key capabilities and supports standard DEC functions such as software switching between 80 column and 132 column windows and support for DEC "application keypad mode".

The colors of the emulator window and text can be selected through NSM, command line flags, or under software control as described later in this talk.

Because nsterm is a motif X application, it uses standard X fonts. This means that additional fonts beyond the ones shipped with the Network Station code can be used to solve special problems.

What's new in the V2R1 nsterm?



The image shows a screenshot of a 'VT Emulator' window. The window title is 'VT Emulator' and it has a menu bar with 'Command', 'Edit', 'Option', 'Control', 'Print', and 'Help'. The main area contains a list of features:

- **New code based on UNIX dtterm emulator.**
- **Keyboard mapping through GUI utility.**
- **Default function key definitions fit standard.**
- **Screen print supported by print utility.**
- **PC clipboard style cut, copy, and paste**
- **Euro Monetary support**
- **IBM control of source code**

Notes



What's new in the V2R1 NSTERM?

This emulator is a total rewrite from the one shipped in earlier releases of IBM Network Station code and is based on the standard dtterm emulator in use for years in the UNIX environments with enhancements to support the features available in the earlier Network Station ASCII terminal emulator.

Probably the most significant enhancement to the code is to use the graphical keyboard mapping tool that has been available with the 3270 and 5250 emulators in earlier Network Station code. In addition, the function key definitions are linked to emulation types. This is a switch from the Version 1 emulator where keyboard mapping remains xterm mapping and must be manually customized for other VT emulation modes.

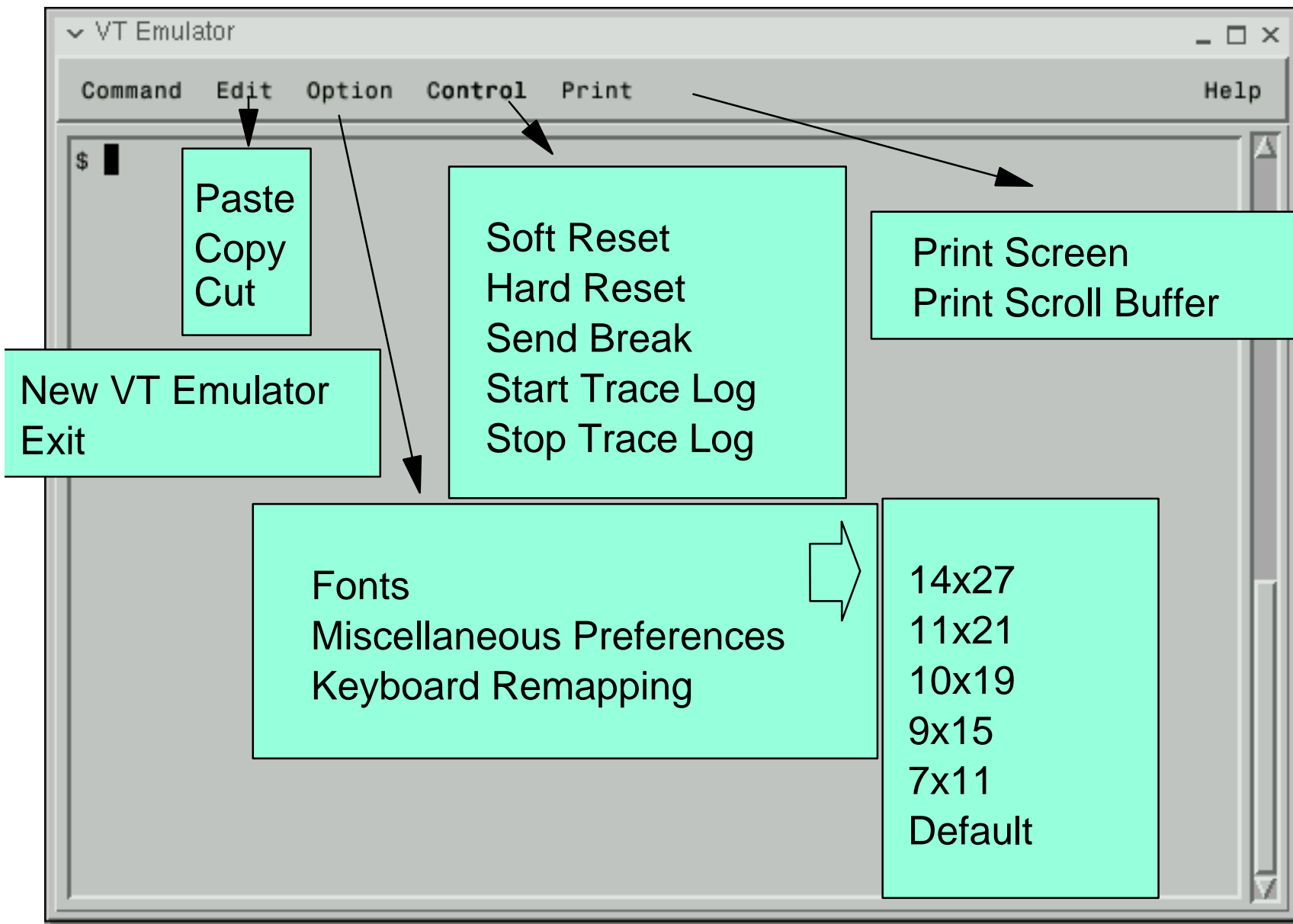
Printing is also significantly improved in this version with support for both PCL and PostScript output using the standard IBM Network Station printing utility.

The copy, cut, and paste functions work in both the standard X method as well as in the PC clipboard style with menu pulldowns to move the text to and from the clipboard.

National Language support has been added including support for the Euro symbol.

Because this code is completely controlled by IBM development, the opportunity for future enhancements is also increased over earlier code.

VT Emulator Menu Options



Notes



The VT emulator dropdown menu's are shown on this slide. The ability to display or remove these from the window are controlled through Network Station Manager by the administrator

The Command menu can be used to start a new window or to exit the emulator.

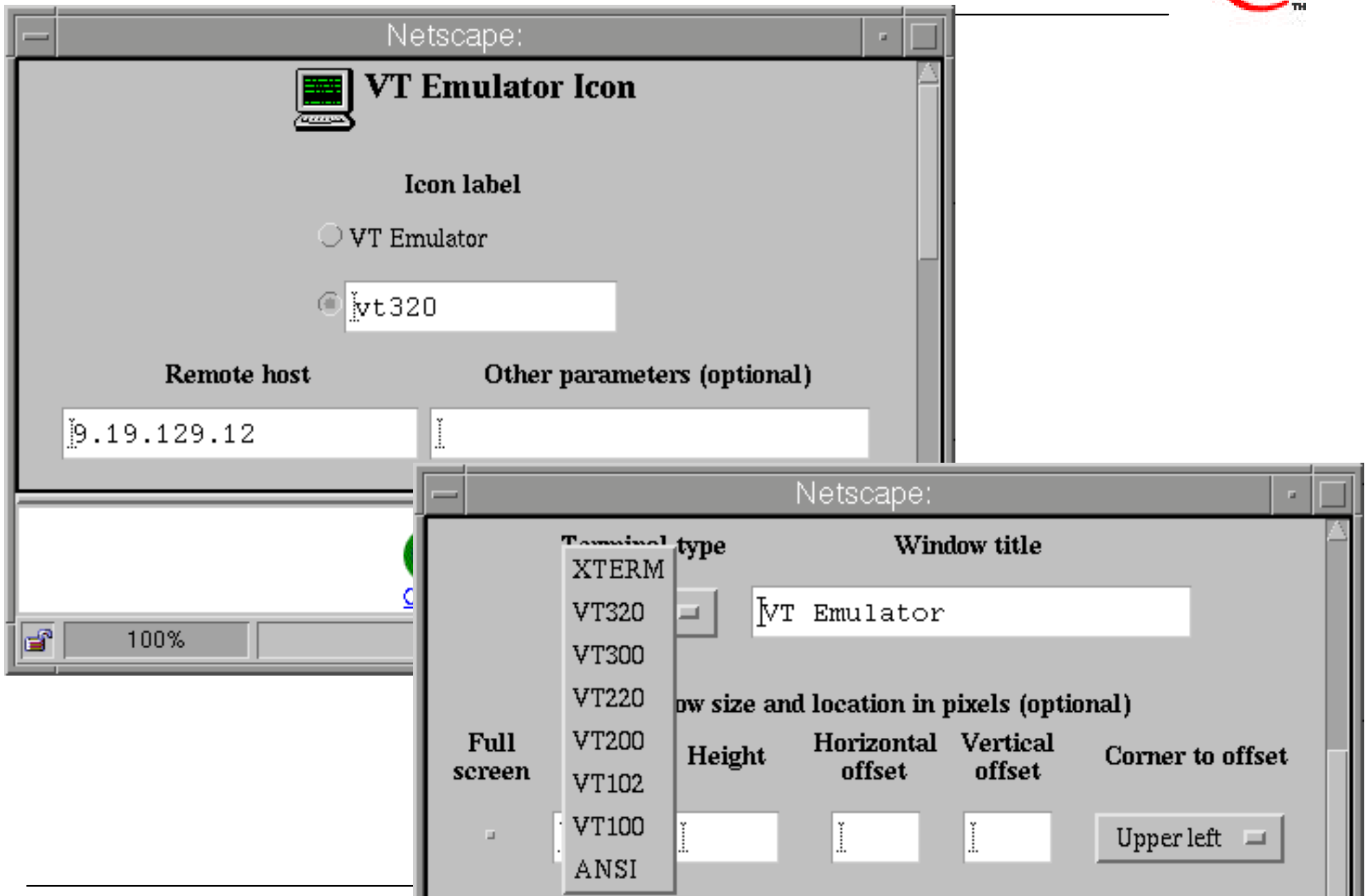
The Edit menu allows users to copy text to and from the clipboard.

The Option menu allows you to select fonts, make miscellaneous preferences such as changing the scrollbar or cursor, and choose the Keyboard Remapping utility when it has been enabled.

The Control Menu allows you to send break and control characters to the emulation session as well as to start and stop tracing emulator data to a file.

The print menu lets you select to print the screen as shown or everything in the scroll buffer to the system print utility. This lets you print to either a local or remote printer.

Network Station Manager session options





Network Station Manager allows setting options for individual sessions.

Icons can be setup in the Network Station desktop folder to start nsterm windows to selected hosts.

When adding a new emulator session to the desktop, NSM allows you to enter the

- Icon label which is also the session title by default
- The remote host to be connected to when nsterm starts
- Other parameters which are used as command line flags to nsterm. Examples are setting colors, scroll bars, and nonstandard fonts and keyboard mapping files.
- The emulator type can also be selected from xterm and ANSI as well as vt100, vt102, vt200, vt220, vt300, and vt320. When the emulator type is selected here, the function keys automatically will be mapped to match the emulation
- The size and location of the window can also be set, including an option for a full screen emulator.

Network Station Manager global options



Netscape: IBM Network Station Manager

File Edit View Go Communicator Help

aix4prt.dsc.ibm.com

Setup Tasks

- Hardware
- Applications
 - 5250
 - 3270
 - VT Emulator
 - Netscape Communicator
 - Applet Viewer
 - ICA Remote Application Manager
- Desktop
- Environment
- Administration

VT Emulator Settings for guest

Keyboard:

Key remapping capability: Enabled

Default keyboard files: (None)

Allow use of:

Command menu: Default

Edit menu: Default

Option menu: Default

Print menu: Default

Help menu: Default

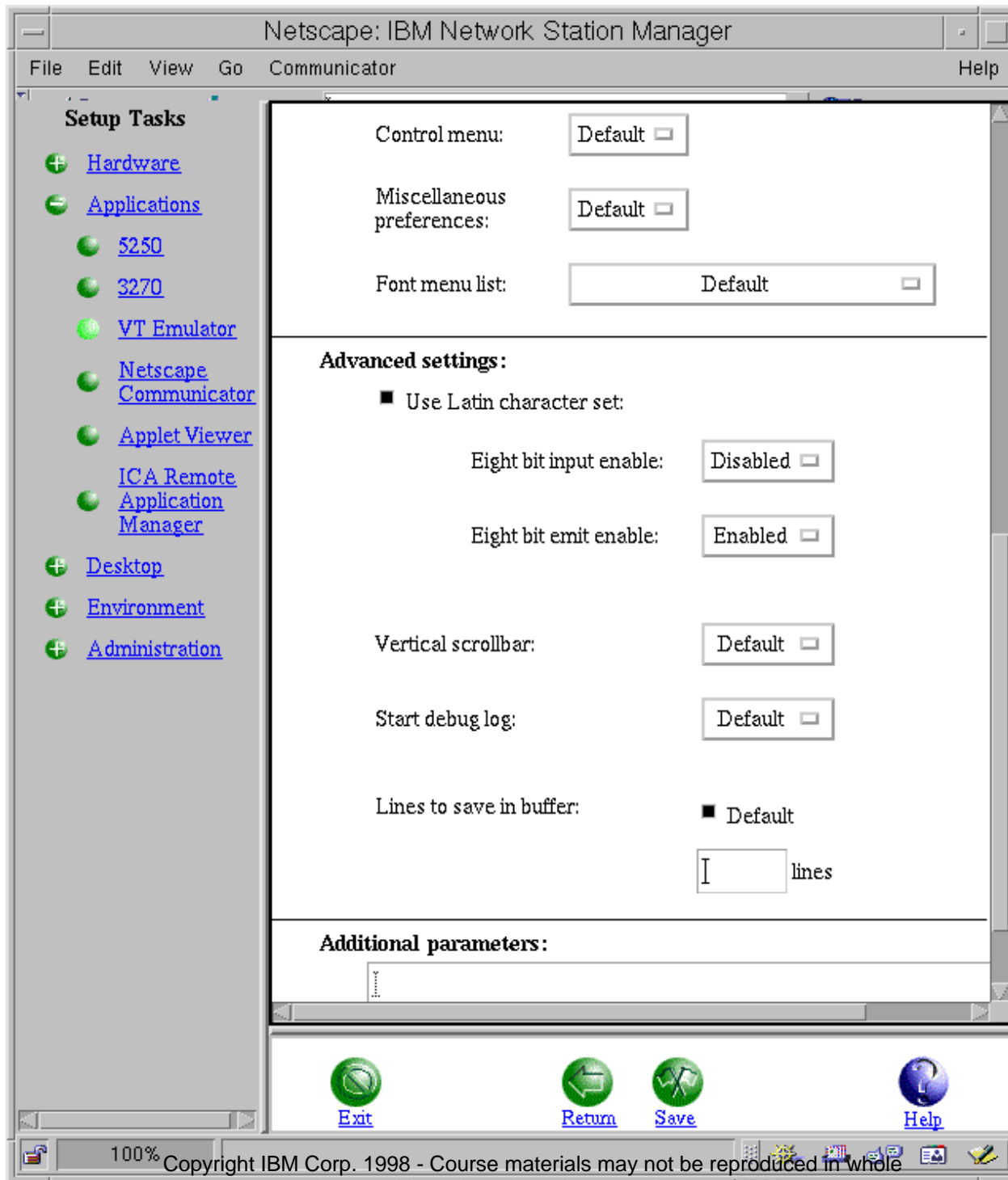


Network Station Manager also allows setup of parameters that are global to all NSTERM sessions.

Under the Network Station Manager Applications tasks, the VT Emulator options used by all VT sessions can be setup.

Functions that can be mapped globally through NSM are:

- The ability for a user to use the keyboard map facility and be assigned a nonstandard keyboard map file
- The ability to turn off the VT emulator window menu's such as the command menu, the edit menu, the option menu, the print menu and the help menu.



Notes



Other menu options that can be disabled are the control menu, miscellaneous preferences and the ability to select fonts through the fonts menu.

For users to display characters such as the Euro, French Franc, and British Sterling characters, the 8-bit character mode for both keyboard input and screen output can be turned on.

A vertical scroll bar can be turned on or off.

Users can be given the option to save debug logs during their VT emulation sessions for special debugging.

The additional parameters section allows the administrator to put in X resource parameters for the Network Station VT emulator such as colors other parameters specified in the help section of NSM.

Netscape: IBM Network Station Manager

File Edit View Go Communicator Help

Contents

[About](#)

[Overview](#)

[Getting Started](#)

[How to...](#)

Hardware:

- [Workstations](#)
- [Printers](#)
- [Serial Devices](#)

Applications:

- [5250](#)
- [3270](#)
- [VT Emulator](#)
- [Netscape](#)
- [Applet Viewer](#)
- [ICA Remote](#)
- [Application Manager](#)

Desktop:

- [Display](#)
- [Launch Bar](#)

Environment:

- [General](#)
- [Network](#)
- [Language](#)




Administration:

Help for Applications: VT Emulator Settings

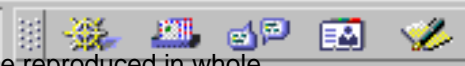
The IBM Network Station VT Emulator Settings panel lets you change VT Emulator settings.

You can work with the following VT Emulator settings:

- **Keyboard settings:**
 - [Key remapping capability](#)
 - [Default keyboard files](#)
- **Allow use of settings:**
 - [Command menu](#)
 - [Edit menu](#)
 - [Option menu](#)
 - [Print menu](#)
 - [Help menu](#)
 - [Control menu](#)
 - [Miscellaneous preferences](#)
 - [Font menu list](#)
- **Advanced settings:**
 - [Use Latin character set](#)
 - [Use Vertical Scrollbar](#)
 - [Start Debug Log](#)
 - [Lines to save in buffer](#)

 [Back](#)  [Next](#)  [Close](#)

100%



Notes



When making changes in NSM, there is extensive help as shown on this slide.

This provides information on parameters that can be supplied in other parameters for both a session and global nsterm settings.

In addition to this help, help is also provided in the VT terminal emulator window for using the pulldown menus.

Common command line flags



- **-bg color** **Set the background window color**
- **-fg color** **Set the foreground window color**
- **-cr color** **Set the text cursor color**
- **-ms color** **Set the mouse pointer color**
- **-rv** **Set reverse video**
- **-euro** **Use the Euro character**
- **-fn font** **Use a different font**
- **-geometry value** **Set size and location of window**
- **-numLock** **Sets NumLock row of colors**

Notes



This slide shows some of the command line flags that can be used to customize individual sessions.

As can be seen, each window can have it's own color and fonts in addition to the information selected from the pulldown menu's in Network Station Manager or when running nsterm from the advanced diagnostics session.

One of the interesting flags is the -numLock flag. Remember to use the capital L. When this is used, the keypad keys are set to their numeric functions and the Num Lock, slash, asterisk and - keys are set to F1-F4 like the original VT100.

Using the keyboard mapping utility



- **Enable in NSM**
- **Select from the Control pulldown menu**
- **Select the key with a mouseclick on keyboard shown**
- **Select action on "Available action" from on bottom left**
- **Assign action in "Key/Action" frame on bottom right**
- **Save changes to new keyboard name**
- **Assign new keyboard from NSM**

Notes



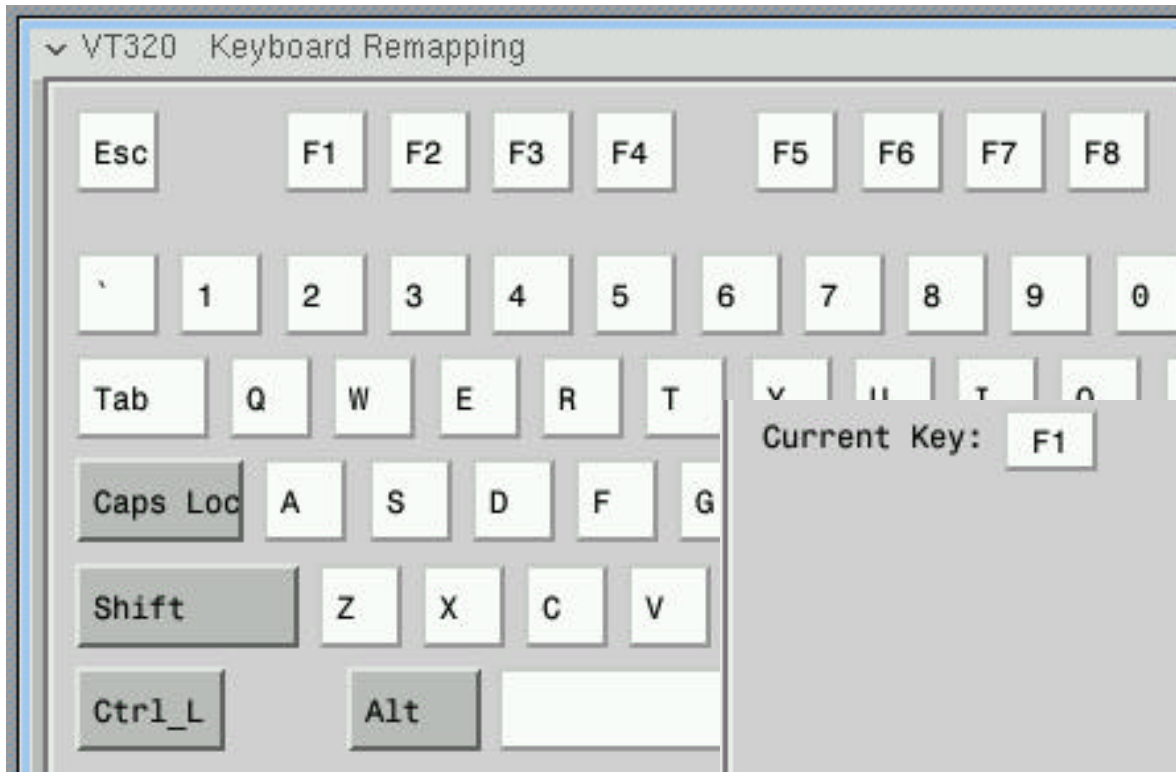
The keyboard mapping utility is disabled by default for the VT terminal emulator. It is turned on using NSM as shown earlier.

To use the keyboard mapping utility, simply pull down the Control menu and select "Keyboard Mapping". This will provide a full screen GUI interface as shown on the next two screens.

This interface consists of a full keyboard map at the top of the page, a set of keyboard actions on the bottom left, and the activities to be assigned to the currently active key are shown in the bottom right window.

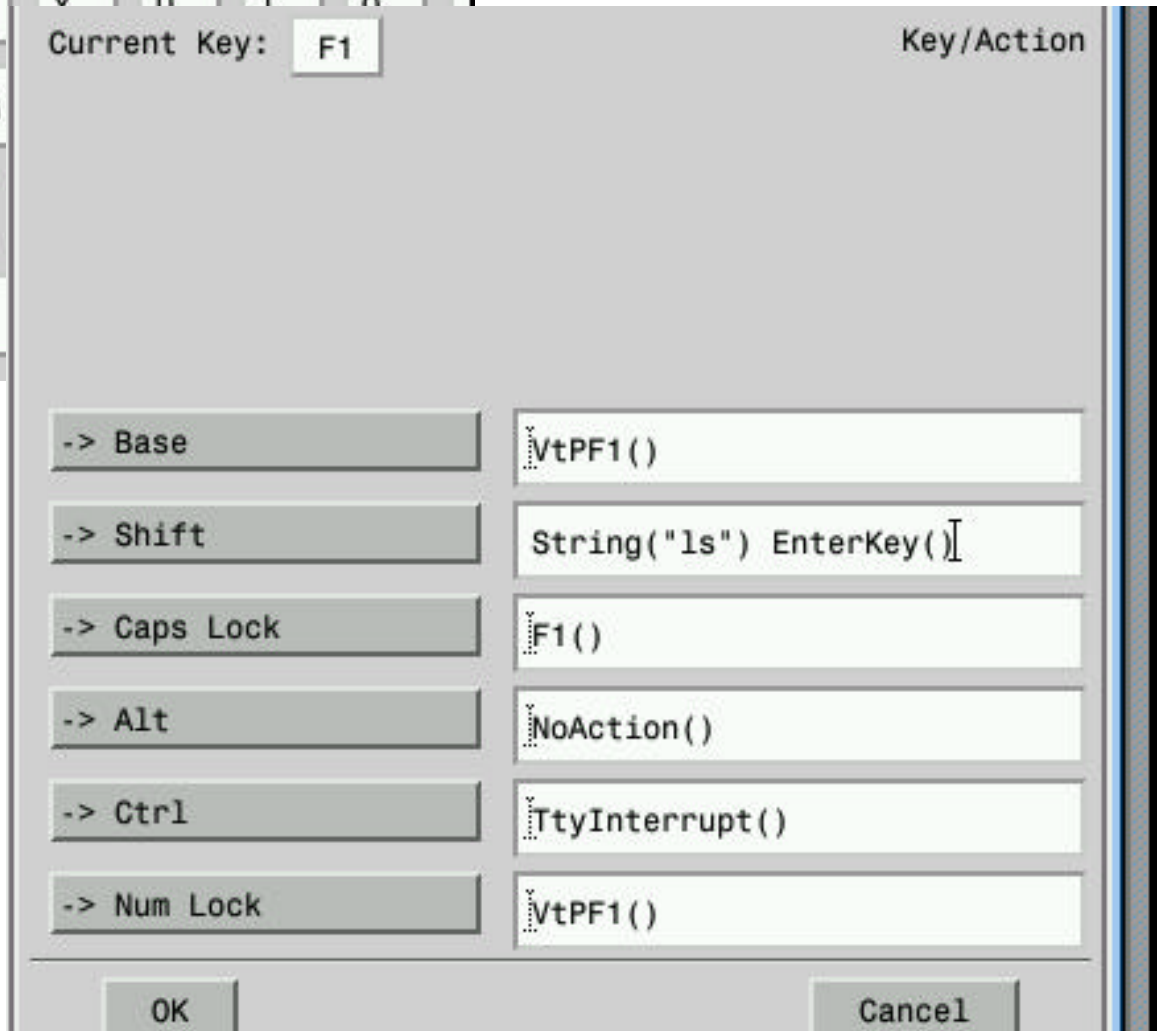
For keys to be mapped and saved so that they can be used by the system, the keyboard mapping must be done by one of the system administrators who is in the NSMAdmin group.

In the next few screens we will step through the keyboard mapping process.



Choose Key

Assign
Action



Notes



This screen shows a portion of the top window which displays the keyboard and the bottom right window which shows the currently active key and the actions assigned to each of the key press modifiers.

The first thing that you do when you map a key is to select the key by using the mouse to click on the key icon in the top window of the page and making sure that the active key in the bottom right changes to that key. Select the appropriate modifier in the lower right or "current key" window and watch the change to that window as the key is assigned.

Assigning Actions or Text to Keys

Available Actions List:

- BeginingOfBuffer()
- CopyClipboard()
- CursorDown()
- CursorLeft()
- CursorRight()
- CursorUp()
- CutClipboard()
- EndOfBuffer()
- EnterKey()
- EscapeCharacter()
- F1()

Character List:

	!	"	#	\$	%	&	'	(
ı	ç	£	¤	¥	ı	§	"	©

Current Key: **F1** Key/Action

Modifier	Action
-> Base	VtPF1()
-> Shift	String("ls") EnterKey()
-> Caps Lock	F1()
-> Alt	NoAction()
-> Ctrl	TtyInterrupt()
-> Num Lock	VtPF1()

OK Cancel

Save Delete Apply Changes to Session Restore Exit

01/31/00 V2r1term.PRZ Copyright IBM Corp. 1998 - Course materials may not be reproduced in whole or in part without the prior written permission of IBM.

Notes



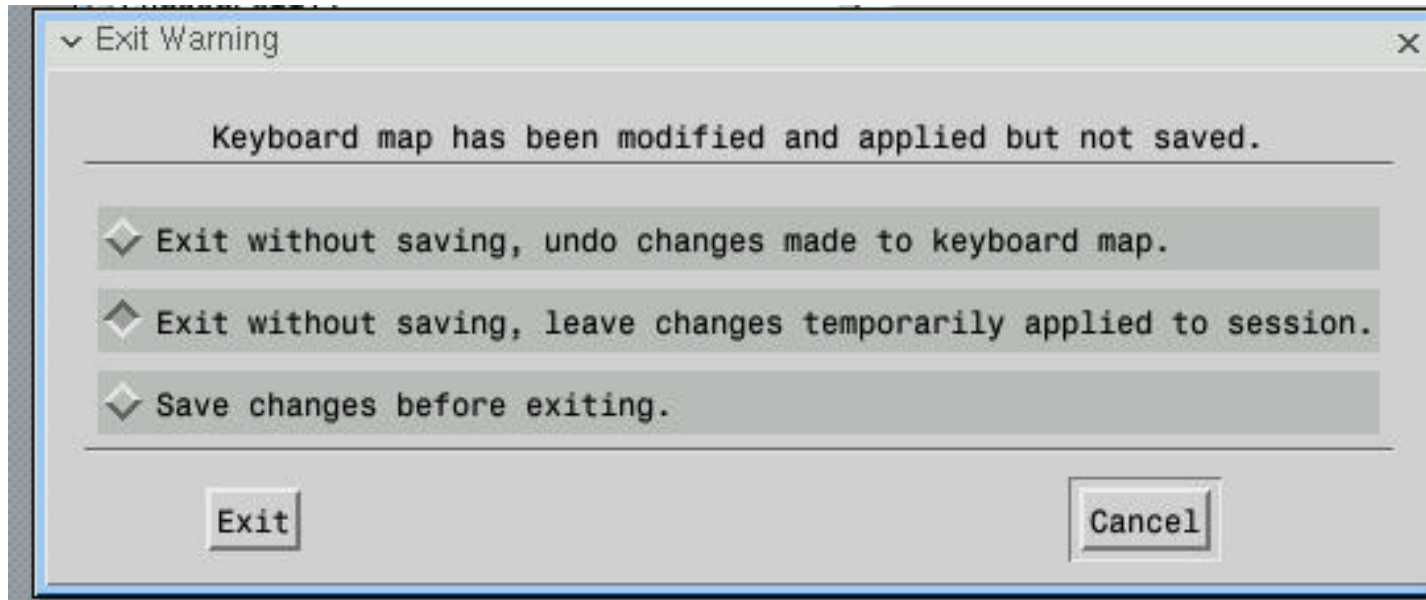
Next select the desired action from the "available actions list" in the bottom left window by scrolling the window until you find the desired action and selecting that action with a mouse press.

After the action has been selected, decide if you want that action assigned to the base key with no modifiers, or if you want to assign the action when the shift, control, or alt key is pressed in conjunction with the key.

To assign a string of characters to a keystroke, you can type the word "String" with a capital "S" followed by the string you want to assign to the key inside of parentheses and double quotes as shown on this slide. To add the enter function to the key after typing this in, you can select the enter action from the left side and click on the modifier button on the right window as shown here. In this case, I typed in the string assignment for "ls", and then selected "EnterKey" from the available actions and then clicked the mouse on the "Shift" button.

Some special characters are also available in the "available actions" window and can be selected the same way as actions. By this I mean click on the character, and then on the modifier in the "current key" window.

Save the Keyboard Map File



Assign Keyboard from NSM

Notes



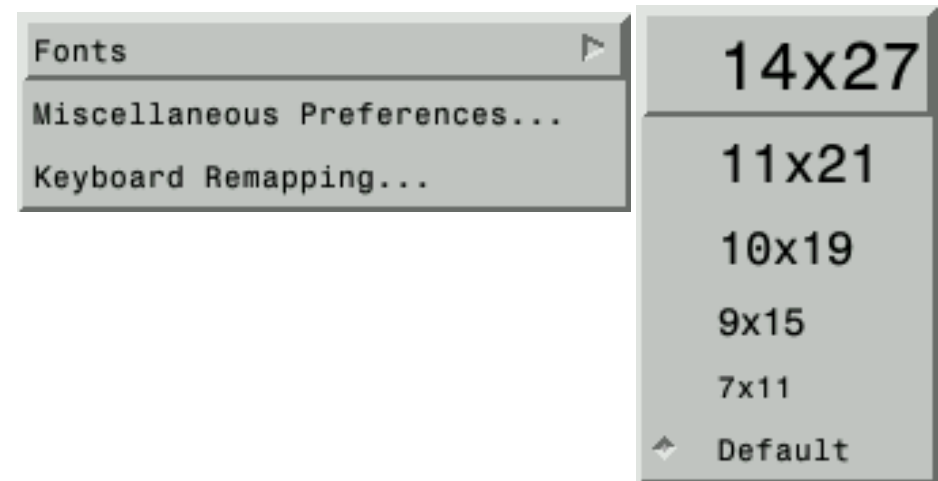
Once you have made all the changes to the keyboard map, select to save the file or use it for the current session.

The file is saved to the user directory on the server. If the user is in the NSMAdmin group, when that user runs NSM, he can assign that keyboard to other users by selecting it in NSM.

Font selection and limitations



- Fonts selection from nsterm Options Menu



- **Optional change the default with -fn flag from NSM Other parameters**

- Must be a fixed font available to the Network Station
- Check fonts available with "xlsfonts -display <nc_name>:0.0"

- **Eight bit characters available by setting 8-bit in NSM**

- **No ANSI SCO (PC style) line drawing characters in default fonts**

Notes



Even after the default font is selected, you always have the options of the font sizes shown on this slide. The actual size that each displays on the screen depends on the screen resolution of the Network Station monitor.

The ability to select different fonts can be turned off in Network Station Manager.

When creating a new window from NSM or with the advanced diagnostics shell, you can select any font that is available to the Network Station for use with the VT emulator. I would warn you that if you select a proportional font such as helvetica that the screen will not look very good, but any fixed size font should work quite well.

The xlsfonts command on AIX can be used to display the fonts that are available. In addition this command is also available on the Network Station. You can also use xfd to display fonts as a preview.

Non of the fonts that come with the Network Station are PC-850 codepage. This means that you will not be able to use SCO ANSI emulation and expect to display the fonts normally used by many of their applications to draw lines and boxes without using your own fonts.

Color capabilities



- **Selectable with command line flags: -bg, -fg, -ms, & -cr**
- **Selectable in NSM Other Parameters field**
 - NSTerm*background: color
 - NSTerm*foreground: color
 - NSTerm*cursorColor: color
 - NSTerm*pointerColor: color
- **Colors are selectable with escape sequences**
 - Foreground colors use Esc[30m to Esc[37m
 - Background colors use Esc[40m to Esc[47m
 - Selects black, red, green, yellow, blue, magenta, cyan and white
- **To use with some UNIX applications**
 - Add escape sequences directly to application output
 - Modify terminfo settings to support colors



The nsterm VT emulator supports colors in all emulation mode.

Colors for the foreground, background, and text and pointer cursors can all be set from NSM or the command line.

Individual characters on the screen can be displayed in different colors using escape sequences. These are the standard sequences supported for VT emulation as well as dtterm and aixterm in AIX.

The actual escape sequences for background color range from Esc[40m to Esc[47m.

In AIX, the terminfo files that control terminal screen attributes do not contain color definitions by default, but these can be added to dec.ti using the aixterm colors shown in /usr/lib/terminfo/ibm.ti for VT emulation.

Many applications use colors by sending escape sequences directly to the screen from the application.

UNIX termcap and terminfo



- **Termcap or terminfo databases define terminal capabilities**
- **Used with UNIX curses library programs**
- **Can select attributes from command line with "tput" command**
- **Dependent on the TERM variable in UNIX**
- **Set keyboard input parameters such as function key definitions**
- **Set screen output capabilities such as bold, underline & reverse**
- **Examples**
 - tput blink - sets blink (actually uses reverse video on NSTerm)
 - tput bold - sets bold characters
 - tput smul - sets underline
 - tput sgr0 - reset to default characters



When using ASCII emulation with UNIX systems such as AIX, the escape sequences for applications are stored in terminal attribute databases such as terminfo or termcap. These databases allow programs written with the "curses" programming library to be terminal independent. This means that a "well written" UNIX application will behave nearly the same on any terminal or terminal emulation with minor exceptions for functions not supported.

The section of the terminal database that is used is dependent on the UNIX TERM environment variable. When you set the emulation type for the nsterm emulator in NSM, it negotiates with the UNIX host during the telnet connection and the TERM variable is set automatically allowing applications like "smit" to work regardless of terminal emulation type set.

The terminal database has attributes defined for different functions such as kf1 for function key one, kend for the End key, and knp for Page Down, and kcud1 for the down arrow key. In addition, the screen output has attribute names like blink, bold, and rev for reverse.

The UNIX command "tput" or terminfo put can be used to output these commands. For example to test bold text use "tput bold". To reset to plain text use "tput sgr0". To see what the terminfo database has assigned to an attribute use "tput kf1 | od -c". By piping to the OD command you can see non-printing control characters. These values will change as you change the TERM type with commands like "export TERM=vt320".

Alternative ASCII emulation solutions



- **aixterm, xterm from AIX using -display <nc_name>:0.0**
- **Advanced diagnostics shell (xterm)**
 - telnet to UNIX host
- **PC emulators with ICA clients**
- **Java based terminal applications**
 - Crosstie emulation (add wyse and 3151 emulation)
 - From Tridia Corporation
 - Teemworld emulator (add wyse, 3151, VT420, Tandem, Tektronix)
 - From Pericom Software



Some software developers don't use the UNIX curses library and include escape sequences directly into the application or use their own terminal databases to define keys. When this is done, sometimes you are forced to use a specific emulation like IBM 3151 or Wyse 60 that is not supported by the Network Station VT emulator.

Some solutions for providing other terminal emulation modes are to use a standard X application such as aixterm running on AIX, but displaying to the Network Station, using PC based terminal emulators in ICA mode, or using a Java based terminal emulator that runs using the Network Station JVM or Java Virtual Machine.

Two Java emulators that people have used with the IBM Network Station are the crosstie emulator from Tridia corporation and the Teamworld emulator from Pericom software. Both of these emulators provide both 3151 and wyse emulation as well as solutions for some other terminals. Their only drawback is that usually they have slower performance than the default terminal emulator or an X based emulator.

In the order of performance I would rank aixterm running on AIX fastest, the Network Station terminal emulator slightly slower, and the Java based emulators as the slowest solutions. PC emulators may offer the most flexibility, but usually add cost and aren't always high performers.

Where to Find Additional Information



- **Help screens in VT emulator and NSM**
- **SC41-0690**
 - Using IBM Network Station Manager V2R1
- **SG24-5844 NSM V2R1 redbook**
- **IBM Network Station Advanced Information**
 - on the Network Station home Web site
- **AIX documentation**
 - http://www.rs6000.ibm.com/doc_link/en_US/a_doc_lib/aixgen/
- **X Window System User's Guide**
 - O'Reilly & Associates, Inc.

Notes



Help screens provide ready information both when using and configuring the VT emulator on the Network Station.

Configuring the Network Station with Network Station manager is the same on AIX as on other server platforms and is covered in **Using IBM Network Station Manager V2R1**.

The **NSM V2R1 redbook** gives actual hands on experiences from IBM specialists working with the Network Station during pre-announcement. This type of information tends to fill the gaps in standard documentation and often provides more detailed examples.

For administrators who want to stretch the envelope when using Network Stations to provide kiosk and other nonstandard environments, the **IBM Network Station Advanced Information** available from the internet provides additional examples and detailed information.

I would also recommend a knowledge of X fonts and UNIX terminfo databases. Both of these are described in AIX manuals and books from O'Reilly and associates. The O'Reilly book also includes information on xterm escape sequences for doing things like setting titles under software control.

Thank you for you attention.