HP-UX TN3270 Administration Guide

Edition 2

Customer Order Number: J2656-90037

HP 9000 Networking

Manufacturing Part Number: J2656-90037
E06/01

United States

Legal Notices

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Warranty. A copy of the specific warranty terms applicable to your Hewlett- Packard product and replacement parts can be obtained from your local Sales and Service Office.

Restricted Rights Legend. Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 for DOD agencies, and subparagraphs (c) (1) and (c) (2) of the Commercial Computer Software Restricted Rights clause at FAR 52.227-19 for other agencies.

HEWLETT-PACKARD COMPANY 3000 Hanover Street Palo Alto, California 94304 U.S.A.

Use of this manual and flexible disk(s) or tape cartridge(s) supplied for this pack is restricted to this product only. Additional copies of the programs may be made for security and back-up purposes only. Resale of the programs in their present form or with alterations, is expressly prohibited.

Contents

Contents

Preface

The *HP-UX TN3270 Administrators Guide* describes how to install, configure, and manage TN3270.

Intended Audience

This book is intended for administrators responsible for installing, configuring, using, and maintaining TN3270 on a computer that uses the HP-UX operating system.

About This Book

This section explains how informatoin is organized and presented in this book.

Organization of This Book

This book is organized as follows:

Chapter 1, “Understanding TN3270.”

> Provides conceptual information to help you understand how to configure and manage TN3270 and lists the administration tasks you need to perform

Chapter 2, “Installing TN3270.”

> Lists the hardware and software requirements, describes the installation process, and provides some guidelines for tuning after installation

Chapter 3, “Configuring TN3270.”

> Explains how to set up the TN3270 configuration file

Chapter 4, “Using TN3270 Log Messages.”

> Describes events that TN3270 logs, the format of log messages, how to maintain log files, and how to interpret log messages

Chapter 5, “Using TN3270 Tracing Facilities.”

> Describes how to trace HLLAPI applications and the TN3270 program, how to control the amount of trace data generated, and the format of the trace file

Appendix A, “Required and Recommended Functions in the terminfo Database.”

> Describes the recommended and required HP-UX terminal functions when using the TN3270 program

Appendix C, “Migrating from Earlier Versions of TN3270.”

> Describes how to migrate from TN3270 Release 4 to Release 5 and Release 5 to Release 6

Typographic Conventions

Table 1, “Typographic Conventions,” shows the typographic styles used in this document.

Table 1 Typographic Conventions

Special Element	Sample of Typography
Document title	*HP-UX SNAplus2 3270 & TN3270 HLLAPI Programmers Guide*
File or path name	`com.cfg`
Directory name	`/opt`/sna/
Program or application	`tncfgtcp`
Command or HP-UX utility	`vi`
Option or flag	`TRON`
Parameter	*`tn3270_support`*
Name of a TN3270 configuration record	`host` record
Constant	`IBM-DYNAMIC`
Return value	`System limit`
Variable representing a supplied value	*`devicename`*
Environment variable	`PATH`
User input	**`file1.trc:file2.trc`**
Computer output	`3270  Message 0-26, Subcode:0`
Descriptive phrase about a line of code	`12:17:28 GMT 11 Nov 1996` *`Timestamp`*
Function	`Set Session Parameters`
Hexadecimal value	`0x20`
3270 key	ENTER

Table 1 **Typographic Conventions**

Special Element	Sample of Typography
Keyboard keys	**Up**

TN3270 Manual Set

The TN3270 product provides the following documentation:

HP-UX TN3270 Administrators Guide

Explains how to install, configure, and manage TN3270. It describes the requirements for installing the TN3270 software, how to set up configuration information for using 3270 emulation, and how to use the product's diagnostics tools to resolve problems.

HP-UX TN3270 Users Guide

Explains how to use 3270 emulation, including the following tasks:

- Start and stop 3270 emulation.
- Transfer files.
- Use customization features such as remapping your keyboard and display colors.
- Interpret status-line information.
- View response times.

HP-UX *SNAplus2 3270 & TN3270 HLLAPI Programmers Guide*

Contains the conceptual and detailed reference information needed to write application programs using high-level language application program interface (HLLAPI).

Related Publications

For additional information about IBM 3270 Information Display System Products, refer to the following publications:

- *IBM 3270 Information Display System:*
  - — *3274 Control Unit Description and Programmer's Guide*, GA23-0061
  - — *Color and Programmed Symbols*, GA33-3056
  - — *3274 Control Unit Display Station: Operator's Guide* , GA23-0023
  - — *3174 Control Unit Functional Description*, GA23-0218
- The following Internet Requests for Comments (RFCs):
  - — *854: Telnet Protocol Specification*
  - — *855: Telnet Option Specifications*
  - — *856: Telnet Binary Transmission*
  - — *860: Telnet Timing Mark Option*
  - — *885: Telnet End of Record Option*
  - — *1041: Telnet 3270 Regime*
  - — *1091: Telnet Terminal Type Option*
  - — *1123: Requirements for Internet Hosts—Application and Support*
  - — *1576: TN3270 Current Practices*
  - — *1646: TN3270 Extensions for Luname and Printer Selection*
  - — *1647: TN3270 Enhancements*

1 Understanding TN3270

Overview

This chapter provides an overview of the TN3270 product and describes the responsibilities of the TN3270 administrator. The administrator is responsible for installing, configuring, and managing the TN3270 software.

What Is TN3270?

TN3270 is a software product that enables HP-UX computer terminals to connect over a TCP/IP network and emulate 3270 terminals connected to a host computer. Two versions of the TN3270 program, with different user interfaces, are available: a character-based version that runs on standard text terminals and a Motif graphical user interface.

The TN3270 program can connect directly to a host computer that supports TN3270 access over TCP/IP or to a communications product that provides the TN Server function. The standard SNAplus2 product provides the TN Server function; therefore, the TN3270 programs can access a host over the SNA communications links provided by SNAplus2.

You can configure the TN3270 program to grant different user permissions for the following options:

- Controlling TN3270 sessions
- Customizing TN3270 emulation features such as key mappings and display attributes
- Transferring files between the local and host computers
- Viewing a chart of host response times
- Running HLLAPI applications

Each user's copy of the TN3270 program can access up to ten TN3270 sessions to the same host or to different hosts.

For information about using the TN3270 software, refer to the *HP-UX TN3270 Users Guide*.

TN3270 Features

TN3270 provides the following additional features:

HLLAPI support

The high level language application program interface (HLLAPI) enables you to develop application programs that communicate with the TN3270 program to perform tasks, such as entering data and searching the screen for specific messages, that are normally done by

a TN3270 user. Using this API enables you to automate frequently used TN3270 emulation tasks, such as host application startup.

For more information about the functions provided by HLLAPI, refer to the *HP-UX SNAplus2 3270 & TN3270 HLLAPI Programmers Guide*.

TN3270 style files

The TN3270 program enables you to customize TN3270 emulation parameters such as color mappings, HP-UX terminal keys used to represent host 3270 keys, and HLLAPI session IDs for TN3270 sessions. The details of this customization are stored in a style file that is loaded when the TN3270 program is started. You can set up a standard style for all your TN3270 users, or you can allow users to customize these settings individually and create their own style files.

Configuration file

A single configuration file contains the following details of your TN3270 configuration:

- Host computers you want to access
- TN3270 emulation functions available to individual TN3270 users
- Files used to record TN3270 diagnostics information

You can create and modify the configuration file as a simple text file using any standard ASCII text editor, such as `vi`. The TN3270 `tncfgtcp` program validates the configuration and generates a binary configuration file for use by TN3270 components.

Diagnostics support

The following log and trace files can help you diagnose TN3270 errors, events, and system problems:

Error log file

A single file that contains a record of any errors that TN3270 detects. The name of this file is specified in the configuration file.

Audit log file

A single file that contains a record of all significant system events. The name of this file, and the level of detail recorded in it, are specified in the configuration file.

Trace files

One or more optional trace files record the data transferred between the TN3270 program and the host, or between a HLLAPI application and the TN3270 program. You can use these files to help you debug specific problems. Tracing is normally disabled because it degrades system performance.

All these files are simple text files; you can view them with any ASCII text editor, such as `vi`.

TN3270 Features Supported

The TN3270 product supports both the standard TN3270 features and the extended TN3270E features that are described in the Internet RFCs listed in “Related Publications”. TN3270E supports all the standard TN3270 features and the following additional features:

- LU type 1 and LU type 3 printing
- Access to specific display and printer LUs
- Access to printer LUs associated with display LUs
- Access to the SSCP-LU session
- Support for the ATTN and SYSREQ keys
- Negotiation of which enhancements to use on each connection

The TN3270E features are supported only if the directly connected host, or the communications product that provides the TN Server function, also supports the TN3270E features. When the connection is established, the host or communications product negotiates with the TN3270 product to determine the level of support.

You can configure the level of support that you desire for the TN3270 product by specifying a value for the *`tn3270_support`* field in the `host` record. You can determine the level of support that was negotiated by looking at the Control Display Sessions dialog box or the Control Printer

Sessions dialog box. For more information about these dialog boxes, refer to the TN3270 Users Guide.

TN3270 does not provide support for the following functions that are described in the various RFCs that are supported:

- The device type `IBM-DYNAMIC`. The device type that corresponds to the configured display model is used instead.
- Keep-alive messages, although it does respond to them. If a TCP/IP connection is lost, the loss is detected when the user presses a key that causes data to be sent to the host.
- The SYSREQ key on non-TN3270E connections.
- Renegotiation of device type, LU, or TN3270E functions on a connection that is already open.

What Are the TN3270 Administrator Responsibilities?

As the TN3270 administrator, you have the following responsibilities:

1. Installing the TN3270 software.

   For more information about the hardware and software requirements for TN3270 and about installing the software, see Chapter 2, “Installing TN3270.”

   For additional information about installing TN3270, see Appendix A, “Required and Recommended Functions in the terminfo Database.”

   If you have a previous version of TN3270 installed and are upgrading to this version, see Appendix C, “Migrating from Earlier Versions of TN3270.”

2. Creating the TN3270 configuration file. This file describes the host TN3270 facilities available, the TN3270 users on your system and the facilities available to them, and the files used to store diagnostic information.

   For more information about creating the TN3270 configuration file, see Chapter 3, “Configuring TN3270.”

3. Setting up standard TN3270 style files, if necessary.

   Refer to the *HP-UX TN3270 Users Guide* for information about creating, modifying, and saving style files.

4. Monitoring and troubleshooting any problems that may arise during TN3270 operation.

   For more information about monitoring the TN3270 error and audit log files and understanding their contents, see Chapter 4, “Using TN3270 Log Messages.”

5. Using TN3270 facilities, if necessary, to diagnose specific problems.

   For information about controlling TN3270 tracing facilities and interpreting the generated trace files, see Chapter 5, “Using TN3270 Tracing Facilities.”

2 Installing TN3270

Overview

This chapter desribes the installation procedure used to install the TN3270 software.

Loading the Product Files

After determining that you have the hardware, software and host requirements for the TN3270 product, you will need to load the TN3270 product file, as follows:

Step 1. Ensure that you have a CD-ROM drive attached to your system to read the product file. This drive should be configured on your system with an entry in the `/dev` directory.

Step 2. Use the HP-UX tool `swinstall` to load the TN3270 product (load J2636BA for Series 800 Systems or J2637BA for Series 700 Systems). Refer to the man pages of the HP-UX system for instructions on how to do this.

Step 3. Once you have loaded the TN3270 product file, you can use the `swverify` command to:

- verify whether TN3270 is compatible with the hosts on which the software was installed
- verify that all dependencies (prerequisites) are being met for installed software
- report missing files and check all file attributes including permissions, files types, siz, checksum, mtime, link source and other major/minor attributes.

The command syntax for `swverify` is:

```
swverify [-f file] [-s source] [-t target]
```

Only use the `swverify` command through the command line interface.

3 Configuring TN3270

Overview

This chapter describes how to configure TN3270 and the information you need.

Overview of the Configuration Process

TN3270 uses a single configuration file to hold the following details of your TN3270 configuration:

- The host computers you can access
- The TN3270 emulation functions available to individual TN3270 users
- The files used to record TN3270 diagnostics information

You create this single binary configuration file by first defining a configuration text file and then using the `tncfgtcp` program to convert the text file to a binary file.

Creating a Configuration Text File

The configuration process begins with a simple text file that contains the configuration information. A sample configuration text file, `tnsample.txt`, is included with TN3270. The sample file is located in subdirectory `/opt/tn3270/samples`. You can use any standard ASCII text editor (for example, vi) to modify a copy of the sample file to include the information you need or to create a new configuration file.

When you have created the configuration text file, name it `/opt/tn3270/samples/com.txt`. For more information about the configuration text file, see “Understanding the Configuration Text File Records”.

Creating a Binary Configuration File

TN3270 uses the configuration text file as input to the `tncfgtcp` program, which validates the configuration and generates a binary configuration file for use by TN3270 components. Following is the syntax of the `tncfgtcp` program:

`tncfgtcp` *`filename`*`.txt`

The name of the text file to be converted to binary is *`filename`*`.txt`. This file name must have the extension `.txt`. Include the directory path if the file is not in the current directory.

If the `tncfgtcp` program detects an error, such as an invalid file name or

a syntax error in the text file, it writes a message to standard error and does not create a binary configuration file. For syntax errors, the program continues to parse the text file and writes a separate message for each error it finds. Correct the errors and run `tncfgtcp` again.

If no errors are found, TN3270 creates the binary configuration file in the same directory as the text file. The binary configuration file has the same name as the text file but with the extension `.cfg` instead of `.txt`.

Specifying the Path for the tncfgtcp Program

The `tncfgtcp` program is stored with all other executable programs in a directory specific to TN3270, `/opt/tn3270/bin`. Specify the path to this directory in one of the following ways:

- Add the directory to your `PATH` environment variable in your `.login` or `.profile` file before initially running the programs.
- Include the directory name each time you run the programs, as follows:

  ```
  /opt/tn3270/bin/tncfgtcp newfile.txt
  ```

NOTE The sample command lines shown in this guide assume that you have added the directory to your `PATH` environment variable. Therefore, they do not include the directory name.

Creating Multiple Configuration Files

When a user starts the TN3270 program, TN3270 obtains its configuration information from the file `/etc/opt/tn3270/com.cfg`. This file is known as the running configuration file..

You can create several different TN3270 configurations and save them in different configuration files. To use a particular configuration, copy its binary configuration file to `com.cfg` in the appropriate subdirectory. Also copy the text configuration file to `com.txt` in the same subdirectory so that you can easily check details of the current configuration.

It is possible to write a new configuration directly to the running configuration file `/etc/opt/tn3270/com.cfg` by using the file `/etc/opt/tn3270/com.txt` as input. However, any active copies of the

TN3270 emulation program continue to run with the previous configuration and are not affected by the change. For example, if you change the parameters that control whether audit or exception messages (or both) are recorded, any active TN3270 emulation programs continue to use the previous settings. Users must stop and restart the TN3270 emulation program for the new settings to take effect.

Understanding the Configuration Text File Records

The configuration text file contains the following types of configuration records:

`host` record

Specifies the following information about a host that can be accessed using TN3270:

- Either the host's symbolic domain name or Internet Protocol (IP) 32–bit dotted-decimal address
- TCP/IP port used to access the host
- 3270 screen model that the host supports

The configuration file contains at least one `host` record for each host that you can access. If a host can support more than one screen model, the configuration file has multiple `host` records for that host (one record for each screen model supported).

The `host` record may correspond either to a host computer that supports direct TN3270 access over TCP/IP or to another computer's communications product that provides the TN Server function. The standard SNAplus2 product provides TN Server function, which provides an intermediary function that connects to terminals over TCP/IP and to the host over SNA communications links.

`user` record

Specifies the following information about a TN3270 user:

- User's HP-UX login name
- User's default TN3270 style file
- Hosts (identified by the *name* field of `host` records) that the user can use

The configuration file contains one `user` record for each

HP-UX user who has permission to use TN3270 emulation. Instead of configuring each user explicitly, you can set up a default `user` record to be used by any HP-UX user.

`diagnostics` Record

Specifies the following information about diagnostics:

- Files used to hold TN3270 audit and error log information
- Types of information logged
- Boundaries used to classify Response Time Monitor (RTM) information

The configuration file must contain one and only one `diagnostics` record, which may contain only the record header `[diagnostics]` or the record header and values. If only the `[diagnostics]` record header is present, default values for the fields are used.

General Record Format

The specific formats for `host`, `user`, and `diagnostics` records are described in the following sections. Each record has the following general format:

Example 3-1 General Record Format

```
[record_name]
field_name     = value
               .
               .
               .
field_name     = value
```

Each *`record_name`* or *`field_name`* entry must be on a separate line. The *`record_name`* must be in square brackets and must have a value of `host`, `user`, or `diagnostics`. Each record consists of one or more field names and the values assigned to the field names. Valid field names for each record type are described in the section that describes that record. The allowed values for each field name depend on which of the following field types are described by the field name:

record

A name that identifies the individual record. The value assigned must not match the name of any other record of the same type. The following characters are valid: A–Z, 0–9, @, #, and $. (The characters a–z are also accepted but are converted to uppercase.)

The value chosen is for the System Administrator's use only; it has no relevance outside of the TN3270 system. Choose a name that identifies the resource.

text

Text string of any printable characters. The string is case sensitive and is not converted to uppercase.

file

HP-UX file name, which can be the file name only or can include a full path (do not use a relative path). Ensure that the file name and path are valid; TN3270 does not check for validity of path and file name.

number

A numeric value interpreted as one of the following:

- Decimal by default
- Hexadecimal if the value begins with “0x”
- Octal if the value contains a leading 0 (zero) character

flag

No value is assigned to a flag field. The inclusion of a flag field in a record implies that the option described by the flag is allowed. If the flag field is not included in a record, the corresponding option is not allowed.

choice

A choice among a group of values. The valid values are specified in the notes for the field.

The sections that follow describe the specific record formats for `host`, `user`, and `diagnostics` records. A table shows the following field attributes for each record type:

- Which field type is expected for the field name.

- Range of allowed values. The value shown in the table depends on the field type:
  - — For record, text, and file fields, range indicates the minimum and maximum number of characters allowed in a string.
  - — For number fields, range indicates the minimum and maximum numeric values for the field.
  - — For flag and choice fields, range is not used.
- Whether the field is required or optional.
- The default value used for any optional (non-flag) fields that do not have a value specified. No value, default or specified, is used for flag fields.

Note also the following conditions about the configuration text file:

Order of Records and Fields

In general, the `host`, `user`, and `diagnostics` records within a configuration file can appear in any order. Similarly, the individual fields within a record can be in any order. However, the following restrictions apply:

- A `host` record must be defined before any `user` record that refers to it.
- A TN3270 user's sessions are assigned to the *`host`* fields in a `user` record in the order in which `host` records appear in the configuration file. For example, if you configure two *`host`* fields, the user's first session is assigned to the host described by the first *`host`* field, and the user's second session is assigned to the host described by the second *`host`* field.

Blank space

Field values cannot contain blank spaces; each value is a single continuous text string. All other blank spaces in the text file are ignored. Thus, any combination of spaces and tabs or completely blank lines is ignored.

Comments

The semi-colon (;) character indicates a comment string. If you include this character at any point on a

line, any text following it (to the end of the line) is treated as a comment and ignored.

Format of a host Record

The host record provides information about a session with a TCP/IP host.Table 3-1, "Summary of host Parameters," summarizes the parameters in a host record.

Table 3-1 Summary of host Parameters

Field_name	Type	Range	Req/Opt	Default
name	record	1–8 characters	Required	-
domain	text	1–100 characters	Required	-
model	choice	-	Optional	2
override	flag	-	Optional	-
port	number	1–65535	Optional	23
tn3270_support	choice	-	Optional	TN3270E
lu_name	record	1–8 characters	Optional	-
printer_name	record	1–8 characters	Optional	-

Specify values for *name*, *domain*, and any desired optional fields as described in the following list:

name

Specify the name of the TN3270 host record. Use 1–8 characters from the following set: A–Z, a–z, 0–9, @, # and $ (characters a–z are converted to uppercase).

The value chosen is for the System Administrator's use only; it has no relevance outside of the TN3270 system. Choose a name that identifies the resource.

domain

Specify either the symbolic domain name or the 32-bit dotted-decimal Internet Protocol (IP) address of the TN3270 host. Use 1–100 of any printable, case-sensitive characters. For examples, see “Example of a host Record Using a Symbolic Domain Name” and “Example of a host Record Using a 32-Bit Dotted-Decimal IP Address”.

The `host` record may correspond to either of the following:

- A host computer that supports direct TN3270 access over TCP/IP.
- Another computer's communications product that provides the TN Server function. The standard SNAplus2 product provides TN Server function. The TN Server function provides an intermediary function that connects to terminals over TCP/IP and to the host over SNA communications links.

`model`

Specify one of the following values:

`2`

This session with a TN3270 host uses a 3270 screen model 2.

`3`

This session with a TN3270 host uses a 3270 screen model 3.

`4`

This session with a TN3270 host uses a 3270 screen model 4.

`5`

This session with a TN3270 host uses a 3270 screen model 5.

`PRINTER`

This session with a TN3270E host uses a printer.

`override`

Include this field with no value if a TN3270 user can override the screen model (can change the TN3270 session customization to use a different model).

port

Specify the TCP/IP port number that the host uses for TN3270 data.

tn3270_support

Specify the level of TN3270 support desired. Possible values are:

TN3270

Only basic TN3270 protocols are supported. Even if the host supports TN3270E protocols, only TN3270 protocols will be used on the session.

TN3270E

Both basic TN3270 protocols and enhanced TN3270E protocols are supported. However, if the host does not support TN3270E, only TN3270 protocols will be used on the session.

lu_name

Specify the name of a specific display or printer LU. If this field is blank, a generic display or printer LU is used.

printer_name

Specify the name of a printer session associated with a display session. This field is ignored if the value of the *tn3270_support* field is TN3270 or if the value of the *tn3270_support* field is TN3270E and the value of the *model* field is PRINTER. If this field is blank, the display session has no associated printer session. The default value is blank.

Following are two examples of host records:

Example 3-2 Example of a host Record Using a Symbolic Domain Name

```
[host]
name            = hostrec1
```

```
domain          = remote.host.addr
model           = 4                         ; model 4: 43 x 80
override                                    ; user can override screen model
lu_name         = TNLU1                     ; use LU specified
tn3270_support  = TN3270E                   ; use enhanced TN3270E
protocols
```

Example 3-3 Example of a host Record Using a 32-Bit Dotted-Decimal IP Address

```
[host]
name           = hostrec2
domain         = 123.123.123.123
model          = 4                          ; model 4: 43 x 80
override                                    ; user can override screen model
port           = 3270
tn3270_support = TN3270E                    ; use enhanced TN3270E protocols
```

Format of user Record

The user record specifies the details of a TN3270 user. Table 3-2, "Summary of Parameters," summarizes the parameters in a user record.

Table 3-2 Summary of Parameters

Field_name	Type	Range	Req/Opt	Default
name	text	1–20 characters	Required	-
host	record	1–8 characters	Optional	See field description
style_file	text	1–8 characters	Optional	See field description
modify_style	flag	-	Optional	-
view_rtm	flag	-	Optional	-
change_domain	flag	-	Optional	-

Specify values for *name* and any desired optional fields as described in the following list:

name

Specify the name of the TN3270 user. Use 1–20 of any printable, case-sensitive characters. This value must match the HP-UX login ID of a user on the TN3270 computer.

You can also set up a default TN3270 user record, using the name <DEFAULT> (in uppercase letters and surrounded by angle brackets, as shown). The <DEFAULT> record allows any HP-UX user to use TN3270 emulation. If the user's HP-UX login ID does not match the *name* field in any user record, TN3270 uses the <DEFAULT> configuration record when the user starts TN3270 emulation.

host

Specify the name of the host record that describes the session to be used. Use 1–8 characters from the following set: A–Z, a–z, 0–9, @, # and $ (characters a–z are converted to uppercase). This name must match the name of a host record in this configuration file.

Specify a separate *host* field for each session that the user can access (maximum of 10 sessions).

If you do not configure at least one *host* field, the user will not be able to use the TN3270 emulation program.

style_file

Specify the name of the default TN3270 style file for this user. Use 1–8 of any printable, case-sensitive characters. This style file is used if the TN3270 user does not specify a style file when starting the TN3270 emulation program.

If no file name is specified, the TN3270 emulation program uses its own default settings.

Do not include an extension for the file name specified for this field because TN3270 adds the extension automatically. For example, if you enter the name newsty, TN3270 uses the file newsty.stu.

TN3270 searches for this file in the directory /etc/opt/tn3270. However, if you give the user

permission to modify the default style by including the *modify_style* field, TN3270 first searches for a file of the same name in the user's home directory. If you are setting up a standard style for all your users, store the file in /etc/opt/tn3270 and do not give users write access to this file. If you give a user permission to modify the default style, the user should save the modified version in the user's home directory with the same file name as the file in /etc/opt/tn3270. This ensures that the correct file is found when the TN3270 emulation program is started.

modify_style

Include this field with no value to give the TN3270 user permission to change the TN3270 customization (either by using the TN3270 emulation program's menu interface or by loading a different style file).

view_rtm

Include this field with no value to give the TN3270 user permission to view Response Time Monitor (RTM) data of host response times on each TN3270 session. To configure the boundaries by which response times are classified, see “Format of user Record”.

change_domain

Include this field with no value to give the TN3270 user permission to specify an alternative domain and port for a particular session. For more information about host domains and ports, refer to the TN3270 Users Guide.

In the following example, the user has three sessions: two sessions that use hostrec1 and one session that uses hostrec2:

Example 3-4 Example of a user Record

```
[user]
name            = <DEFAULT>
host            = hostrec1
host            = hostrec1
host            = hostrec2
style_file      = stdsty    ; this is /etc/opt/tn3270/stdsty.stu
                          ; modify_style not set - users can't use own style file
```

```
view_rtm                    ; users can view RTM data
change_domain               ; users can override domain and port field in host
records
```

Format of diagnostics Record

The diagnostics record specifies the files used for audit and error logging and specifies the default logging level. The configuration text file must contain only one diagnostics record. Table 3-3, "Summary of diagnostics Parameters," summarizes the parameters in a diagnostics record.

Table 3-3 Summary of diagnostics Parameters

Field_name	Type	Range	Req/Opt	Default
error_file	file	5–49 characters	Optional	/var/opt/tn3270/sna.err
audit_file	file	5–49 characters	Optional	/var/opt/tn3270/sna.aud
audit	flag	-	Optional	-
exception	flag	-	Optional	-
rtm_bdy_1	number	5–1000	Optional	5
rtm_bdy_2	number	5–1000	Optional	10
rtm_bdy_3	number	5–1000	Optional	20
rtm_bdy_4	number	5–1000	Optional	50

Specify values for any desired optional fields as described in the following list:

error_file

Use 5–49 characters to indicate the full path and file name of the error log file, which is used to record exception and problem messages. The file extension must be either .log or .err.

If you want to send both error and audit messages to

the same file, use the file extension `.log` and specify the same value for this field and for the *audit_file* field.

audit_file

Use 5–49 characters to indicate the full path and file name of the audit log file, which is used to record audit messages. The file extension must be either `.log` or `.aud`.

If you want to send both error and audit messages to the same file, use the file extension `.log` and specify the same value for this field and for the *error_file* field.

audit

Include this field with no value to enable audit messages, or do not include this field to disable audit messages. Audit messages record normal system events.

exception

Include this field with no value to enable exception messages, or do not include this field to disable exception messages. Exception messages record abnormal events that do not necessarily indicate problems.

Problem messages are always enabled. For more information about the three types of log messages, see Chapter 4, “Using TN3270 Log Messages.”

rtm_bdy_n

The four *rtm_bdy* values specify the boundaries, in tenths of seconds, by which host response times on TN3270 sessions are classified. If you give TN3270 users permission to view RTM data, they can view (for each session) a chart of the percentage of host response times in each of the time intervals specified by these boundaries. For example, if you specify *rtm_bdy_1* through *rtm_bdy_4*, users can view the percentage of responses below boundary 1, between boundaries 1 and 2, between boundaries 2 and 3, between boundaries 3

and 4, and above boundary 4.

Specify the boundaries as decimal numbers, from 5–1000, representing tenths of seconds. A value of 10 represents 1 second. The boundaries must not overlap. Boundary 4 must be greater than boundary 3, boundary 3 must be greater than boundary 2, and boundary 2 must be greater than boundary 1.

Following is an example of a diagnostics record:

Example 3-5 Example of a diagnostics Record

```
[diagnostics]
error_file     = /var/opt/tn3270/current.err
audit_file     = /var/opt/tn3270/current.aud
exception                                  ; problem and exception messages are
logged,
                                             ; but not audit messages
rtm_bdy_1      = 10                          ; 1 second
rtm_bdy_2      = 20                          ; 2 seconds
rtm_bdy_3      = 50                          ; 5 seconds
rtm_bdy_4      = 100                         ; 10 seconds
```

4 Using TN3270 Log Messages

Overview

This chapter provides information about how to control the logging and format of TN3270 log messages and explains what types of actions you can take based on information in the messages.

Overview of TN3270 Logging

TN3270 logs messages for the following event categories:

Problem event

An abnormal event that degrades the system in a way that is easily perceived by a user. An example is abnormal termination of a session.

TN3270 always logs these events. You cannot choose to disable logging of these events. By default, TN3270 logs these events to the file `sna.err` in the `/var/opt/tn3270` subdirectory. You can specify a different file name in the `diagnostics` configuration file record.

Exception event

The following are categories of exception events:

- Abnormal system events that degrade system performance but are not immediately perceived by a user. An example is a resource shortage.
- Events that do not degrade system performance but may indicate the cause of later exceptions or problems. An example is receiving an unexpected message from the remote system.

You can choose to disable logging of these events by not including the *`exception`* flag in the `diagnostics` configuration file record. By default, TN3270 logs these events to the file `sna.err` in the `/var/opt/tn3270` subdirectory. You can specify a different file name in the `diagnostics` configuration file record.

Audit event

A normal system event. An example is starting a session.

You can choose to disable logging of these events by not including the *`audit`* flag in the `diagnostics` configuration file record. By default, TN3270 logs these events to the file `sna.aud` in the `/var/opt/tn3270`

subdirectory. You can specify a different file name in the `diagnostics` configuration file record.

If you prefer, you can specify that TN3270 log all messages to the same file by specifying the name of that file with the extension `.log` in both the *`exception`* and *`audit`* fields of the `diagnostics` configuration file record.

For more information about the `diagnostics` configuration file record, see Chapter 3, “Configuring TN3270.”

Backing Up and Resetting a Log File

TN3270 provides a backup mechanism to prevent log files from becoming too large and consuming disk resources. When a log file reaches 1 megabyte, TN3270 copies its current contents to a backup file and then clears the log file. If error and audit information is logged in one file, a maximum of 2 megabytes of log information is stored. If error and audit information is logged in separate files, a maximum of 4 megabytes of log information is stored.

The backup file has the file name bak and the same file extension as the file it is backing up. The backup file is created in the same directory as the audit or error log file from which it is copied. If you need to keep the information, rename this file or copy it to a different directory so that it is not overwritten the next time the log file reaches 1 megabyte.

Format of Log Messages

This section explains the information given in the log file for each message. The following example shows a typical log message with notes on the information shown on each line:

Example 4-1 Log Message Sample

```
12:17:28 GMT  11 Nov 1996 -  Timestamp
3270     Message 0-26, Subcode: 0                  Component, Message #, Subcode
Log category: PROBLEM   Cause Type: Config           Log category, Cause type
System: tnbox                                        System name
Process ID: 12345 (tn3270)                           Process ID and name


There are no sessions configured for 3270 user abc.  Message text, including
parameters


Cause:  The user has tried to start the 3270 emulation        Message cause
program, but no sessions are configured for this user in the
configuration file.
Action: If this user is to be permitted to use the 3270       Message action
emulation program, at least one session must be configured
for the user.
```

Each message contains the following information:

Timestamp

The time and date the message was logged.

Component

The TN3270 component that logged the message. The value `3270` indicates that the TN3270 emulation program logged the message.

Message number

An identifier for the message.

Subcode

A unique identifier that indicates the point within TN3270 at which the message was logged. This subcode is used only by support personnel.

Log category

The event category of the log message. Possible values are Problem, Exception, or Audit events.

Cause type

A summary of the cause of the message. Possible values are:

`Internal`

Internal error in the TN3270 software. Report errors of this type to your TN3270 support personnel.

`System limit`

An internal limiting value in the TN3270 software.

`External`

A cause external to TN3270.

`Resource`

Resource shortage (for example, insufficient memory on the HP-UX computer).

`User`

User error (for example, the user has entered invalid parameters on the TN3270 emulation program command line).

`SNA`

SNA protocol violation by the host system, or interoperability problem with the host system's SNA implementation.

`Config`

Error in the TN3270 configuration, or mismatch between the TN3270 configuration and the host system.

`Audit`

A normal event, reported for information only.

System name

The name of the computer where the condition that

caused the message was detected.

Process ID and name

The HP-UX process ID and executable name of the process that logged the message.

Message text

Text describing the condition being logged. This field may include a number of variable parameters relating to this particular occurrence of the message. For example, a message reporting failure to start a TN3270 session may include the TN3270 user name and the session number.

Message cause

Additional information about the cause of the condition being logged. This field may not be included if the message text contains all the required information. This field is generally not used when the cause type specifies Internal.

Message action

Recommended action as a result of the message. For more information, see “Recommended Actions for Log Messages”. For audit messages, which provide accounting and progress information instead of reporting error conditions, this field is not included because no action is required.

Recommended Actions for Log Messages

The *Message action* field for a logged message describes the recommended action. In some cases, no action is required. For example, an exception message may not indicate an error, but it may provide background information that helps to identify the cause of a later problem message.

Common recommended actions include the following:

- Check the TN3270 configuration, and add or modify resources.
- Check the HP-UX computer's resources, such as memory or hard disk space.
- Contact support personnel for the host system with which TN3270 is communicating to resolve configuration mismatches between TN3270 and the host system configuration.
- Contact the developer of a HLLAPI application if the application is making invalid API calls.
- Report the error condition to your TN3270 supplier if the *Cause type* field indicates an internal error in the TN3270 software.

The following sections provide more information about some of these actions.

Contacting Support Personnel

The *Message action* field may recommend that you contact one of the following types of support personnel:

Support personnel for the remote system

: Support personnel at the host system with which TN3270 is communicating.

Support services

: Support personnel at the company from which you bought TN3270.

Sending Log and Trace Files to Support Personnel

If the recommended action for a message includes sending the log files and trace files to support services, provide the error and audit log files created when the error occurred. If tracing was enabled, provide the trace files as well.

If you were running TN3270 with audit logging or exception logging (or both) disabled, attempt to reproduce the problem with all categories of logging enabled. If you reproduce the problem, provide the new log files that include all event categories.

Your configuration files may contain information that you do not want to make available to a third party. If the recommended action asks you to send the configuration file to third-party support services, you may want to remove some information before sending the file. Modify or blank out the parameters instead of removing them completely, and provide a note explaining which parameters have been modified when you send the file.

Operating System Return Codes

The return code from an operating system call is sometimes returned in the *Message text* field. The return code may be shown either as a symbolic name or as a numeric value. Check numeric values in the `errno.h` file on the computer where the error occurred to find the corresponding symbolic name. The symbolic names are listed in your operating system documentation.

5 Using TN3270 Tracing Facilities

Overview

This chapter explains how to use TN3270 trace facilities to collect diagnostics data and how to produce trace output.

Overview of TN3270 Tracing

TN3270 supports the following types of tracing:

HLLAPI tracing

Traces all the parameters that the HLLAPI application supplies to the HLLAPI library and all the parameters that the HLLAPI library returns to the application. For more information, see “Controlling Tracing of HLLAPI Applications”.

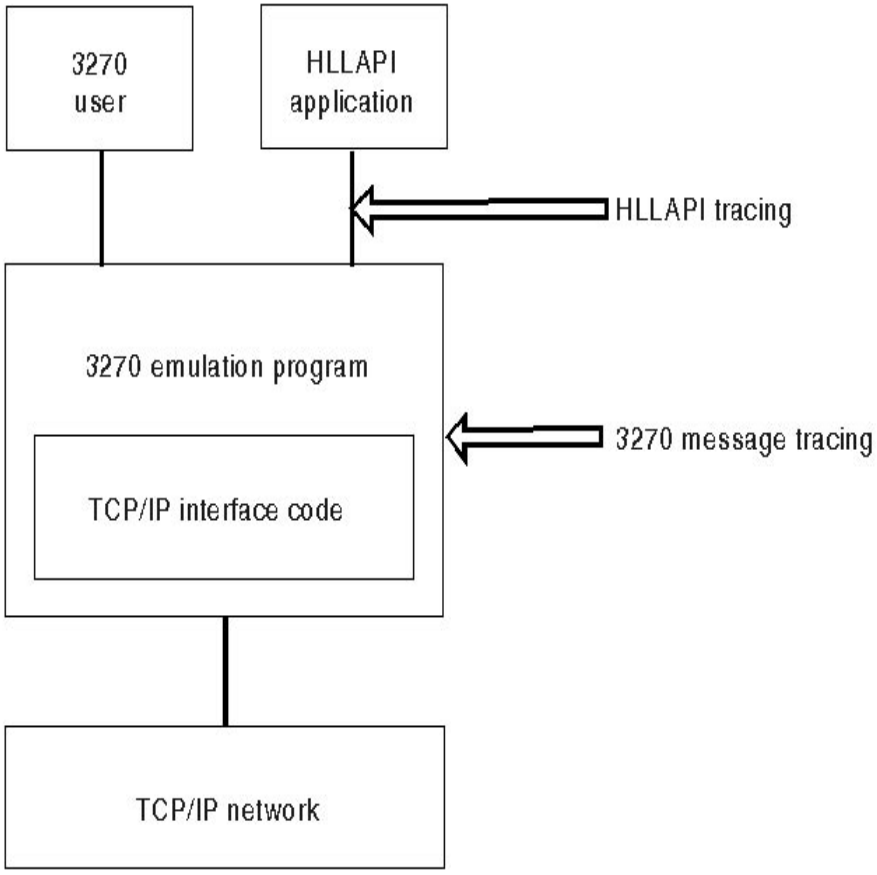
TN3270 Message tracing

Traces all the data sent from the host to the TN3270 emulation program and from the TN3270 emulation program to the host. This tracing can also include TN3270 internal control messages. For more information, see “Controlling Tracing of the TN3270 Program”.

The relationship between TN3270 components and the boundaries between components at which tracing can be activated is shown in Figure 5-1, “Relationship between TN3270 Components and Tracing Boundaries.”

Figure 5-1 Relationship between TN3270 Components and Tracing

Boundaries


3270
user
HLLAPI
application
HLLAPI tracing
3270 emulation program
3270 message tracing
TCP/IP interface code
TCP/IP network

Controlling Tracing

This section describes how you can start and stop tracing, how you specify the names of trace files, and how you can control the size of trace files.

Controlling Tracing of the TN3270 Program

The SNAMSG environment variable controls tracing the TN3270 program. The syntax for SNAMSG is:

file1 [: *file2*]

Specify the following parameters in the SNAMSG environment variable:

file1

Name of the trace file.

file2

Optionally included name of a second trace file. Use a colon to separate the two file names. If you specify two trace files, when one file has reached the maximum size (as specified by the SNATRACESIZE environment variable), trace data is written to the second file. When the second file has reached the maximum size, trace data is written again to the first file.

SNAMSG tracing is always active if the environment variable is set. Tracing cannot be turned on and off while the program is running.

Trace data must always be written to text files. Do not specify the name of a device (such as /dev/tty) or a print spooler as a trace filename. If you do not specify a full path for the trace file or files, TN3270 uses the directory from which you start the application.

Controlling Tracing of HLLAPI Applications

The SNATRC environment variable and the HLLAPI Set Session Parameters function control HLLAPI application tracing. To use the Set Session Parameters function, always set the SNATRC environment variable before starting the application program.

Specifying Trace Files for a HLLAPI Application

The SNATRC environment variable specifies one or two files to hold trace data and indicates whether to activate tracing when the application starts. The syntax for the SNATRC environment variable is:

file1 [: [*file2*] [:]]

Specify the following parameters in the SNATRC environment variable:

file1

Name of the trace file.

file2

Optionally included name of a second trace file. Use a colon to separate the two file names. If you specify two trace files, when one file has reached the maximum size (as specified by the SNATRACESIZE environment variable), trace data is written to the second file. When the second file has reached the maximum size, trace data is written again to the first file.

Final colon (:)

The final colon indicates that tracing is active as soon as the application is started. If tracing is not active when the application is started, it can be activated from within the application using the HLLAPI function `Set Session Parameters`. (For more information, see "Controlling Tracing from Within a HLLAPI Application".) If you specify only one file name, use two colons to make tracing active as soon as the application is started.

If you specify only one file name, the size of the trace file has no limit. If you specify two file names, the maximum size of each trace file is specified by the SNATRACESIZE environment variable. For more information, see "Controlling the Amount of Trace Data". Using two files extends the trace period and limits the disk space usage to twice the value specified in SNATRACESIZE.

Trace data must always be written to text files. Do not specify the name of a device (such as `/dev/tty`) or a print spooler as a trace filename. If you do not specify a full path for the trace file or files, TN3270 uses the directory from which you start the application.

The following examples illustrate the SNATRACESIZE environment variable:

file1.trc:file2.trc

Trace to file1 and file2. Tracing is inactive when the HLLAPI application is started.

filea.trc::

Trace to one file (filea.trc). Tracing starts when the HLLAPI application is started.

Controlling Tracing from Within a HLLAPI Application

The TRON and TROFF options of the HLLAPI Set Session Parameters function enable you to trace the specific section of a HLLAPI program where a problem is being encountered (without having to trace the whole application). Tracing can be activated at the start of this section and deactivated at the end of it. Refer to the *HP-UX SNAplus2 3270 & TN3270 HLLAPI Programmers Guide* for more information.

To use this facility, the SNATRC environment variable must be set before the application program is started. For more information, see "Controlling Tracing of HLLAPI Applications". When setting this environment variable, set tracing to be active or inactive when the HLLAPI application is started and then activate it or deactivate it from within the application as required.

You can disable the TRON and TROFF options by using the SNACTL environment variable.

Disabling the Application's Control of Tracing

The SNACTL environment variable overrides the TRON and TROFF options of the HLLAPI Set Session Parameters function so that the application cannot control its own tracing. You can use SNACTL to force the tracing of an application program that normally turns tracing off for some functions, or to prevent tracing for an application program that normally uses it.

If the SNACTL variable is set before the application program is started, any TRON and TROFF tracing control requests from within the application program are ignored, although the return code indicates a successful completion. If tracing is on, it remains on; if tracing is off, it remains off.

To use SNACTL, set it to any non-blank string. To cancel it, set SNACTL to a blank character.

Controlling the Amount of Trace Data

The following environment variables control the amount of data stored in trace files:

SNATRUNC

Specifies the maximum length in bytes of each entry in a trace file. This variable applies both to HLLAPI trace files (specified by the SNATRC environment variable) and to TN3270 emulation program tracing (specified by the SNAMSG environment variable).

Set this variable to a decimal number. If a message has more characters than this value, the excess characters are truncated. For example, setting SNATRUNC to 70 limits tracing to 70 bytes of data per entry. By default, the length of internal messages is limited to a maximum of 256 bytes.

SNATRACESIZE

Specifies the maximum size in bytes of each trace file when using two files. This value applies both to HLLAPI trace files (specified by the SNATRC environment variable) and to TN3270 emulation program tracing (specified by the SNAMSG environment variable), but only when tracing to two files. If you are tracing to one file, the size of the trace file has no limit.

Set this environment variable to a decimal number. When TN3270 is writing a message to one of the trace files and the maximum file size is reached, TN3270 clears the other trace file and continues tracing to that file. This ensures that the maximum amount of disk space taken up by a pair of user-space trace files is approximately twice the value of SNATRACESIZE.

If you do not set SNATRACESIZE, the default is 1 megabyte. To cancel the SNATRACESIZE setting and return to the default, set SNATRACESIZE to a blank character.

Resetting Trace Files

The SNATRCRESET environment variable controls whether a trace file is reset when an application first writes to it. Normally, the file is reset and its contents discarded when an application writes its first trace message to the file. If you are tracing two or more applications to the same file, or if you want to trace two or more runs of the same application to the same file, you can prevent the file from being reset by setting the SNATRCRESET environment variable to NO.

If you are tracing to two files, the files continue to be reset as normal when the maximum file size is reached, but they will not be reset when an application starts tracing for the first time. If you are tracing to one file, setting SNATRCRESET to NO means that the file will never be reset automatically. To avoid taking up too much disk space, delete it manually from time to time.

To cancel the setting of SNATRCRESET and return to the default setting so that the file is reset when an application first traces to it, set SNATRCRESET to YES.

Trace File Formats

This section provides examples and information about how to interpret the trace output for the different trace types.

Common File Information

The trace data for a single message can occupy more than one line in the trace file. Each individual message is preceded by a horizontal line indicating the time at which the trace entry was made. The following information is common to both TN3270 emulation program tracing and HLLAPI tracing:

- The 5-digit process ID of the component being traced appears at the start of each line. The process ID is followed by an indicator of the type of component being traced (`EHLL` for a HLLAPI application, or `3270` for the 3270 emulation program).
- Message data is shown in the following formats in separate columns to ensure that a character string in the message data appears as readable text in either the EBCDIC or the ASCII column according to its character set:
  - — Hexadecimal
  - — Interpreted as EBCDIC
  - — Interpreted as ASCII

File Information for TN3270 Message Tracing

TN3270 provides the following types of message tracing for the TN3270 program:

Internal

Traces messages internal to TN3270. These messages are used primarily by TN3270 support personnel, who may ask you to provide trace files to assist them in diagnosing problems with TN3270.

TCP/IP data

Traces the messages sent over TCP/IP to the host in

the format in which they flow over the network. These messages are useful for investigating network problems.

FMI data

Traces data transferred between TN3270 and the host in the format in which they are represented inside TN3270. These messages can be useful for investigating local problems and problems with remote systems.

The start of each trace entry shows the type of message being traced and a decoded version of some of the header information. The header information and message data is then traced.

The header information in trace messages uses the following abbreviations:

Table 5-1 Abbreviations Used in Trace Message Headers

+RSP	Positive response
-RSP	Negative response
BBI	Begin bracket indicator
BCI	Begin chain indicator
CEB	Conditional end bracket
DAF	Destination address field
DR1,DR2	Definite response 1 and 2 indicators
EBI	End bracket indicator
ECI	End chain indicator
ERI	Exception response indicator
OAF	Origin address field
ODAI	OAF/DAF indicator
RH	Request header or response header
RU	Request unit or response unit

Table 5-1 Abbreviations Used in Trace Message Headers

SC	Session control
TH	Transmission header

File Information for HLLAPI Tracing

The following parameters for each HLLAPI function are traced when the function is issued and again when it returns.

func_number

This parameter is shown in parentheses after the name of the function.

data_length and *ps_position/return code*

These parameters are always shown following *func_number*.

data_string

This parameter is traced only if it is used by this function.

A Required and Recommended Functions in the terminfo Database

Overview

This chapter describes how to define the required or recommended functions in the `terminfo` database.

Defining Functions in terminfo

To allow HP-UX terminals to use the screen interface of the TN3270 program, define the following required or recommended functions in the `terminfo` database. To alter the `terminfo` database, use the `tic` and `infocmp` programs provided with your HP-UX operating system. Refer to the terminfo man page for your operating system for more information about `terminfo` database, and the `tic` and `infocmp` programs. The `termcap` names are shown in the `terminfo` entries that refer to them.

Required functions

Terminals without the following functions cannot be used with the TN3270 program, unless the TN3270 program is running in the background. They can, however, be used for other TN3270 functions such as running HLLAPI application programs or creating configuration files.

Screen size

The screen size defined in `terminfo` (the *`cols`* and *`rows`* entries) must be at least 80 columns by 24 rows.

Cursor addressability

Menus and dialog boxes cannot be drawn without this function.

F1 function key: kf1

This key is used to invoke the online help facility.

Up and **Down** arrow Keys: kcuu1 and kcud1

These keys are used to move within list boxes and to select buttons from radio groups.

Recommended functions

The following functions make the screen interface easier to use, but the interface can be used without them.

Alternate character mode: *`acsc`*, *`enacs`*, *`smacs`*, *`rmacs`*

Used to draw the menus and dialog boxes. If the

HP-UX terminal does not support drawing menus and dialog boxes, it can still use the menu interface, but the menus and dialog boxes will be drawn with characters such as - and + instead of solid lines.

The TN3270 program with the international option uses the ISO 8859 character set instead of the PC character set. In this case, whether you can display the box drawing characters depends on your version of HP-UX and its curses library. You may be able to use them by modifying the acsc mapping, or you may have to remove the acsc mapping and use the - and + characters.

F2. . . **F12** function keys: kf2 . . . kf12

Used in TN3270 emulation to represent the 3270 keys PF2 to PF12. Some of these keys are also used as accelerators in the menu interface to provide a "short-cut" to certain dialogs or functions. If you do not have these keys, you can remap the 3270 keys to different keystrokes. The accelerator keys cannot be remapped, but it is possible to reach the same dialogs or functions by using the main screen menus.

Left and **Right** arrow keys: kcub1 and kcuf1

Used for moving within edit boxes and for selecting buttons from radio groups. If you do not have these keys, you can replace text in edit boxes instead of modifying it, and you can use the **Up** and **Down** arrow keys or accelerator keys to select buttons from radio groups.

PageUp: kpp or ka3 and **PageDown**: knp or kc3

Used to move quickly within a listbox. The **Up** and **Down** arrow keys can be used instead, but are slower. Either of the termcap names can be used.

Home: ka1 or khome and **End**: kc1

Used to move quickly to the first or last entry in a listbox. The **Up** and **Down** arrow keys or **PageUp** and **PageDown** can be used instead, but are slower.

Backtab: kcbt

Used for moving backwards through the sequence of items in a dialog box. If **Backtab** is not available, the keystroke **Ctrl+B** can be used instead. (These keystrokes are equivalent only in the menu interface.) In TN3270 emulation, the default key mapping for the 3270 BACKTAB key is **Backtab**; remap this to **Ctrl+B** or any other suitable keystroke if you do not have the **Backtab** key.

Insert, **Delete**, and **Backspace**: kich1, kdch1, and kbs

Insert and **Delete** are used in the TN3270 emulation program as defaults for the 3270 INSERT and DELETE keys. If **Insert** and **Delete** are not available, the 3270 keys can be remapped to different keystrokes. **Delete** and **Backspace** can be useful for modifying information in an edit box. (On some terminal types, such as the Wyse 60, **Backspace** is interpreted as a **Left** arrow key.)

Color support: colors, pairs, setb, setf

The TN3270 menu interface can be run without color support, but it will use color if your terminal supports it. This applies particularly when communicating with host TN3270 programs that support color.

Attribute support: blink, bold, dim, rev, smul, rmul, sgr0

The TN3270 display screen can be run without attribute support, but if your terminal provides attribute support, attribute support displays underline, reverse and blinking characters sent by the host.

Blinking characters do not display as blinking on Motif displays.

Access to terminal's status line: hs, fsl, tsl

If your terminal's hardware supports a status line to which user programs can write, you can customize TN3270 sessions to write the 3270 status line to the terminal's status line. If this feature is not available, the TN3270 emulation program uses the last line of the screen to display the status line. Depending on the TN3270 screen model and the terminal's screen size,

this may mean that the last line of the screen is shared between the TN3270 display and the status line.

The TN3270 program's default keyboard mapping (the mapping between keystrokes on the HP-UX terminal and the 3270 keys they represent) assumes that the HP-UX terminal's keyboard has all the keys included in both the Required and Recommended lists. However, you can remap a 3270 key to a different keystroke if your HP-UX terminal does not have the same key. Refer to the *HP-UX TN3270 Users Guide* for more information.

Include in the `terminfo` database any additional keys on the terminal's keyboard if you want to use them in the TN3270 program to represent 3270 keys. For example, if you have the function keys **F13**–**F24**, map the 3270 keys PF13– PF24 to these keys.

In some cases you may need to alter the `terminfo` database to include the functions shown. For example, if the keyboard has the **PageUp** and **PageDown** keys, but its `terminfo` entry does not include them, edit the `terminfo` entry to include them.

To use the Motif menu interface, the HP-UX computer requires (X11 Release 5 and Motif Version 1.2, and an X display terminal. All of the required or recommended keys are generally available with this hardware and software.

The required and recommended keys in this section (such as function keys and cursor keys) are required or recommended for the Motif interface as well as the character-based interface. The other functions (such as screen size and alternate character mode) do not apply to the Motif interface.

B Using Shared Memory and Semaphores

This appendix describes how to define the amount of shared memory and semaphores required by TN3270 on the HP-UX computer.

Tuning System Parameters

Normally, the default values for these parameters are suitable for typical TN3270 configurations. In some cases, it may be necessary to tune some of these parameters. Tuning should only be done once TN3270 has been successfully installed and started using the defaults. The parameters should be set to large enough values to accommodate both the TN3270 requirements and the requirements of any other programs on the system.

If you need to change any of these values, refer to your HP-UX documentation for information about how to set them. Following are the tuning parameters and their recommended values:

`SHMMNI`	1 + (number of concurrent copies of the TN3270 emulation program) + (total number of sessions configured for HLLAPI)
`SEMMNI`	(2 x number of concurrent copies of the TN3270 emulation) + (total number of sessions configured for HLLAPI)
`SEMMNS`	(2 x number of concurrent copies of the TN3270 emulation program) + (2 x total number of sessions configured for HLLAPI)
`SEMMAP`	Half the value of `SEMMNS`
`SEMMNU`	(2 x number of concurrent copies of the TN3270 emulation program) + (total number of sessions configured for HLLAPI)
`SHMSEG`	2 + (maximum number of sessions configured for HLLAPI for a single user)

NOTE

You can run more than one TN3270 emulation program at a time using different HLLAPI session identifiers, and therefore, can have more HLLAPI sessions configured than a single emulation program can support. These parameters must be large enough to support all of these sessions, even if you do not access all of them from a single HLLAPI application.

C Migrating from Earlier Versions of TN3270

Overview

This appendix explains how to migrate from an earlier version of TN3270 to the current version.

Summary of Migrating from TN3270 Release 4 to TN3270 Release 6

The following summary helps you determine the migration steps that you need to take. Depending on the TN3270 functions that you use, you may not need to perform all of the steps. To migrate from TN3270 Release 4 to TN3270 Release 6, perform the following steps:

Step 1. Use the configuration migration program `tnmigrate` to modify the running TN3270 configuration file `/etc/opt/tn3270/com.cfg` and any other TN3270 configuration files that you use. Migrating the configuration files enables you to use the new log message types in TN3270 Release 6.

To learn how to run the configuration migration program and to understand the changes it makes to the configuration file, see "Modifying Configuration Files".

Step 2. Because the `tnmigrate` program changes the existing configuration text files, run the `tncfgtcp` program to convert them to TN3270 Release 6 binary configuration files. For more information about the `tncfgtcp` program, see "Creating a Binary Configuration File".

Step 3. Review any tools or processes that you have developed for use with TN3270 log or trace files to determine if they need modification to reflect changes in the TN3270 log file format. To understand how the log file format has changed from Release 4 to Release 6, see "Log Messages and Log File Format", and "Trace File Format".

Modifying Configuration Files

TN3270 Release 6 classifies log messages into three categories (audit, exception, and problem) and allows you to specify in your configuration file whether audit or exception (or both) logs are recorded. For more information about these three log message types, see Chapter 4, "Using TN3270 Log Messages." TN3270 Release 4 classifies log messages by level (6, 8, 10, 12, and 16) and allows you to specify the minimum level to record.

Before using an existing Release 4 configuration file with Release 6, you need to modify it to take account of this change. TN3270 provides a

migration program to make the necessary modifications to the configuration file. For more information about the configuration file format, see Chapter 3, "Configuring TN3270."

Running the Configuration Migration Program

To run the migration utility, use the following command:

`tnmigrate` [`-c`] *`oldfilename newfilename`*

The command contains the following parameters:

`oldfilename`

Name of the Release 4 text configuration file. Specify a full path if it is not in the current directory. The configuration migration program adds the filename extension `.txt` if you do not specify it.

`newfilename`

Name of the Release 6 text configuration file to be created. The configuration migration program creates the file in the current directory if no path is specified and adds the filename extension `.txt` if no filename extension is specified.

`-c`

Specifies that the program should generate the Release 6 binary configuration file in addition to the text file. The file is given the same name as the output text file but with the extension `.cfg` instead of `.txt`. If you do not use this option, you must use the `tncfgtcp` program to create the binary configuration file. For more information about the text and binary configuration files and about converting between these two file formats, see Chapter 3, "Configuring TN3270."

Changes Made by the Configuration Migration Program

The only record in the configuration file that the configuration migration program modifies is the `diagnostics` record. The configuration migration program modifies this record to remove the *`audit_level`* field and to add the new *`audit`* and *`exception`* fields, if appropriate. The settings of *`audit`* and *`exception`* are based on the value of *`audit_level`*,

as follows:

Table C-1

***audit_level*(Release 4)**	**Release 6 field**
(omitted)	*exception*
10	*exception*
8	*audit*, *exception*
6	*audit*, *exception*

For more information about the *audit* and *exception* fields, see Chapter 4, “Using TN3270 Log Messages.”

Log Messages and Log File Format

The following are changes in error and audit logging for Release 6:

- The format of log message files is changed so that the header information for each message is now more easily readable. The files are still ASCII text files that can be viewed using a standard ASCII text editor.
- All information related to a log message, including cause and action, is included in the log file. Chapter 4, “Using TN3270 Log Messages,” explains how to interpret the information in the file (but no longer includes a listing of the cause and action information for each message).
- The log message levels used in Release 4 (16, 12, 10, 8, 6) have been replaced by three log message types (Problem, Exception, and Audit).
- Many of the messages used in Release 4 have been discontinued and replaced by new messages. In addition, message numbers have been reassigned so that each component has a well-defined range of numbers. Therefore, do not search Release 6 log message files for a particular message that was used in Release 4 (either by searching for the message number or by searching for specific message text).

  For more information about TN3270 log messages, see Chapter 4, “Using TN3270 Log Messages.”

Trace File Format

The format of trace files has changed slightly. In addition to the hexadecimal listing, message data is now interpreted both as EBCDIC and as ASCII in two separate columns rather than being interpreted character-by-character as either ASCII or EBCDIC.