



OpenAir Linux Reference

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Production

This manual was written, edited, and produced by:

Connect, Inc.
1701 Quincy Avenue,
Suites 5 & 6
Naperville, IL 60540
www.connectrf.com

Printed in the U.S.A.

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Chapter 1 • Getting Started

Product Overview

PowerNet products are devoted exclusively to making wireless networks as useful, efficient, and reliable as possible. PowerNet routes data from any portable RF terminal to any host computer quickly, efficiently, and without fail, often by placing the processing load on a server. Many (240+) wireless terminals can operate in a real-time environment without special hardware or customized operating systems.

PowerNet supports:

- All of the most popular 2.4 GHz and 900 MHz wireless systems
- All major network media, including Ethernet and Serial
- All major transport protocols, such as TCP/IP
- All common legacy terminal emulators, including VT100, VT220, 3270, and 5250
- Multiple dissimilar hosts, using your existing applications and networks
- Multiple RF LANs, allowing a single controller to support multiple locations, covering such large areas as airport terminals and distribution centers
- Multiple portable terminal models of AML, Casio, Citadel, Compsee, Datalogic, Denso, Fujitsu, Hand Held Products, Intelligent Instrumentation, Intermec/Norand, LXE, Monarch, PSC, Psion Teklogix, Symbol, Telxon, and Unitech (with more being added every day).

The PowerNet family of products works with almost all architectures, providing users the ability to change host computers and options as network requirements grow.

- OpenAir Linux - runs on Linux and Windows.
- OpenAir Windows - runs on Windows NT/2000.
- OpenAir 400 - a version of OpenAir Windows that loads directly on a customer's AS400 host.
- PowerNet TwinClient - software for virtually all makes and models of wireless data collection terminals. Supports all common terminal emulations and client/server applications.

PowerNet OpenAir provides the user with a fully-integrated hardware Box with either OpenAir Linux or PowerNet for Windows software already integrated and installed, ready to plug in and use.

PowerNet AirLinc provides the user with the ability to develop complete wireless data collection applications that operate with any ODBC compliant database.

Related Documents

PowerNet TwinClient Reference Manual - Configuration, integration, and operation of the client software for wireless terminal devices.

PowerNet Spectrum One Reference Manual - Configuration and operation of Symbol Spectrum One wireless networks on OpenAir IX and NT platforms.

PowerNet Screen Formatter Reference Manual - Description and use of the screen formatting integration tool.

PowerNet Scan Editor Reference Manual - Description and operation of the scan editor integration tool.

In This Manual

Chapter 1 provides an overview of this manual, a description of related PowerNet documents, and describes the documentation conventions used within this manual.

Chapter 2 provides instructions for installing OpenAir Linux software on customer-supplied Linux and UNIX hardware. Instructions for accessing the administrative menus, as well as the general structure and operation of the menu system, are presented here.

Chapter 3 describes the OpenAir system and its configuration for TCP/IP network support. The criteria for model selection and the physical characteristics of the hardware is also included.

Chapter 4 describes how to configure OpenAir Linux for the management of networks of wireless access points.

Chapter 5 describes how to setup the VT/HP (VTERM) emulator for connection to telnet and serially-connected host applications. A full description of the configuration and integration options is also presented.

Chapters 6 and 7 describe how to setup the 3270 and 5250 emulators, respectively, for telnet hosts supported with OpenAir.

Chapter 8 describes network management and monitoring functions, diagnostic tools, tracing facilities, and a description of performance measurement, reporting, and analysis facilities.

Chapter 9 describes the objects and object editors that are part of the integration tool suite for terminal emulation. Related tools for screen formatting and scan editing are described in separate manuals.

Chapter 10 contains information regarding a TN3270E update.

Chapter 11 covers information on an RFC1205 update.

Chapter 12 is the ISO-8859-1 character table. This is the basis for all 8-bit international character set processing in PowerNet products.

Chapter 13 is the MIB for SNMP.

Chapter 14 provides an overview of Ethereal, an open source packet sniffer.

Chapter 15 provides an overview of TightVNC, the client/server software package allowing remote network access to graphical desktops.

Conventions

The following table describes the typographical conventions for this manual:

Convention	Description
Small capital letters	Identifies keyboard keys. Example: Press TAB to move between fields. Press CTRL ALT DEL to reboot the terminal.
Title case	Identifies names of files, directories, and drives. Examples: C:\Tax\April99 MsAcc20.ini Also identifies the names of modules and programs in text. Examples: Microsoft Access, QuickBooks
Title case, bold	Identifies names of buttons, menus, commands, and options. Examples: Click the Start button, point to Programs , and then click Windows Explorer .
Title case, italics	Identifies names of manuals or books. Examples: <i>OpenAir Linux Reference</i> ; <i>The American Heritage Dictionary</i>
Title case, in quotation marks	Identifies chapter titles. Example: See Chapter 2, “TN Configuration Utility”
Bold; italic	Identifies information that you must type, in bold, and you must supply, in italics. Example: Type c:\msmail\msmail.mmf password
Monospace	Identifies code samples, keywords, variables, and user-defined program elements within text and as samples. Example: <code>compar 9, >, 10, err_loop;</code>

Note: All Linux and UNIX operating systems are case-sensitive, so type or enter data exactly as it appears in this manual. For example, the login name `tec` is not the same as `TEC`.

Quick Start

The following list of questions is a quick guide to the chapters and sections of this manual that contain the procedures for installing and configuring OpenAir Linux.

- Is the system a factory-built OpenAir system? If yes, review:
 - Chapter 3, Setup and Logon
 - Chapter 2, Menu System
 - Chapter 3, TCP/IP Network Setup
- Is the system a customer-supplied UNIX/Linux system? If yes, review Chapter 2.
- Are wireless access points supported? If yes, review all of Chapter 4.
- Are TCP/IP hosts supported? If yes:
 - Does the host support VT/HP emulation? If yes, review Chapter 5, Telnet Setup.
 - Does the host support TN3270 emulation? If yes, review Chapter 6, Telnet Setup.
 - Does the host support TN5250 emulation? If yes, review Chapter 7, Telnet Setup.

Chapter 2 • Installation

This chapter describes how to install OpenAir Linux software on customer-supplied hardware, how to use the menu system, and how to verify and authorize the system. Readers with OpenAir systems should review the first section of Chapter 3, “Setup and Logon”, and then return to “Using the Menu System” in this chapter.

Software

OpenAir Linux is distributed on CD-ROM in TAR archive format files. The precise instructions for extracting the archive from CD-ROM are system- and hardware-dependent, so the reader is referred to local system documentation for those instructions. After the appropriate archive file has been located on the Connect CD-ROM and copied to the target system, the installation instructions are uniform for all systems.

Selecting an Archive File

The following table shows the installation archive files on the Connect CD-ROM. Each archive file contains all of the OpenAir Linux software as it relates to each of the supported operating systems.

Operating System	Archive Filename
Linux (Debian 2.0.XX)	lixs

Choose the correct archive file for your operating system.

Check the file’s size and compare it to your system’s size, ensuring that your file system has at least twice as much disk space as the archive file.

Copy the archive file to a temporary directory on your file system.

Resource Requirements

System memory and disk space requirements vary slightly, depending on the operating system, PowerNet options installed, and number of wireless terminals supported. The following table provides worst-case guidelines that can be applied generally.

System Resource	Requirement
System Memory	1,500 Kbytes
System Memory, additional per terminal session	300 Kbytes
Hard Disk Space	10 Mbytes
Hard Disk Space, additional per terminal session	100 Kbytes

Due to the event-driven nature of the software, CPU utilization required by PowerNet is a function of terminal communication activity. A precise measurement can be obtained for any system using the Systest utilities described in Chapter 8.

Terminal Sessions	CPU Utilization
16	3%
32	6%
64	15%
104	25%
240	65%

Note: The results shown above were obtained on a Linux Debian 2.0.33 system with 64Mbytes of RAM, a Pentium II processor, and a per-terminal transaction rate of 1/second over a TN5250 connection to an AS/400. The test was driven by a similarly configured Linux system.

Extracting the Archive

1. Become super-user.
2. Select an installation directory on a file system with sufficient space to support the installed OpenAir Linux software.
3. If a prior version of OpenAir Linux is currently installed on the system, ensure that it is not in use.
4. Extract the software modules by typing `# tar xvf archivename` and pressing **ENTER**. The following list is the TAR output.

Access_Point	Setup.sh
Base_CS	Spectrum_One
Base_System	TCP+IP-CS
Base_TCP+IP	TCP+IP-STEP
Formatter	TN3270
SAB_Emulation	TN5250
Sbld.sh	VTERM
Scan_Editor	rmpnet.sh

Backing Up and Removing the Previous Installation

If PowerNet 6.0 or an earlier release of Connect/RF software was installed previously, this utility will detect and remove all existing OpenAir Linux or Connect/RF files and subdirectories. It will also backup existing configuration information for restoration later.

5. Run `rmpnet.sh`. Depending on the operating system, the SMI device driver may also be removed which results in a prompt to rebuild the kernel.
6. In these cases, perform the kernel rebuild.

Building the System

The following commands are used for building the OpenAir Linux software installation. The purpose of this utility is to build the menu system according to the installed software options.

7. Type the build command `#!/Sbld.sh` and press **ENTER**.
The utility prompts for each software module prior to installation.
 - a. In the case of Linux, the SMI Driver is dynamically loaded and so is included in the Base System package. The first prompt on those systems is
Install PN 6SS-CCCC-01 Base System (y/n)?
 - b. The first two parts of the part number vary depending on the operating system (SS) and a code related to the product release (CCCC). The third part of the number denotes the specific software package.
Type **y** and press **ENTER** to install the base system.
2. The utility prompts you to rebuild the operating system. This must be performed.
Rebuild the operating system (y/n)?
3. Type **y** and press **ENTER** to start rebuilding the operating system.

The remaining queries and packages are self-explanatory and correspond to the desired connectivity and emulation, with the exception of `Base_TCP+IP` and `Base_CS`.

- The `Base_TCP+IP` module is required for all connectivity and emulator options, unless `SAB_Emulation` is the only connectivity to be installed.
- `Base_CS` is required only if `SAB_Emulation`, `TCP+IP-CS`, or `TCP+STEP` is being installed.

The software module dependencies are summarized below.

Option	Base TCP+IP Required	Base CS Required
Access Point	Yes	No
Spectrum One	No	No
TN3270	Yes	No
TN5250	Yes	No
VTERM	Yes	No
SAB Emulation	No	Yes
TCP+IP-STEP	Yes	Yes
TCP+IP-CS	Yes	Yes

4. On systems in which a kernel rebuild was performed, reboot the system before continuing.

After all desired modules have been installed, the menu system is ready to be accessed for configuration of the software.

Using the Menu System

Only users with Root privileges may access the OpenAir Linux menu system. Readers with OpenAir systems are referred to the Setup and Logon procedure described in Chapter 3. Others are referred to documentation specific to the customer-supplied equipment.

1. Log on as root.
2. Type **crfadmin** and press **ENTER**. The Main Menu appears.

```
Linux                               OpenAir Linux
Main Menu
* 1 Operations
  2 Access Point
  3 TCP/IP
  4 VTERM
  5 TN3270
  6 TN5250
  7 Object Editors
  8 Utilities
<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

The system menu map, below, shows the submenus to the **Main Menu** with a reference to the chapter or document that describes the menu. Note that some options shown here may not appear, depending on the options you selected during installation.

System Administration	Network Management	Device Management
<i>Operations</i> (3,4,8)	<i>Access Point</i> (4)	<i>VTERM</i> (5)
Wireless View (8)	Server Setup	Port Setup
Access Point Startup (4)	AP Discover	Serial Setup
Access Point Shutdown (4)	AP Setup	VT100 Emulation
Spectrum One Startup ♦	MAC/IP List	VT220 Emulation
Spectrum One Shutdown ♦	Host List	HP700-92 Emulation
<i>Object Editors</i> (9)	Performance Report	Emulator
Keyboard/Mapping	<i>Spectrum One</i> ♦	<i>TN5250</i> (7)
Keyboard/Macros	Port Setup	Setup
Scanner/Data Mapping	Network Setup	Emulator
Scanner/Data Editing	Terminals	
Scanner/Decoder Control	Transceivers	Controllers
Display/mapping	Host List	Status
Printer/Init	Diagnostics	LU Mapping
Dialog	Activity Report	Emulator
Failover ♦	Performance Report	
<i>Utilities</i> (2,3,8)	Loader	Controllers
Verify (2)	<i>TCP/IP</i> (3)	Status
Authorize (2)	Addresses	LU Mapping
Cleanup (8)	Local Setup	Emulator
Transfer (8)	Apply Changes	
Reboot (3)	Adapter Status	Setup
Shutdown (3)	Network Status	Status
<i>Hot Spare</i> ♦	Ping Test	LU Mapping
Setup		Emulator
Startup	Setup	<i>SAB Emulation</i> ♠
Shutdown	Status	Setup
HADAX Status	Line Trace	Startup
	Adapter Test	Shutdown
	Driver Test	<i>TCP/IP-CS</i> ♠
		Setup
		Startup
		Shutdown
		<i>TCP/IP-STEP</i> ♠
		Setup
		Startup
		Shutdown

Key:

- (n) Chapter number in this manual
- ♦ PowerNet Spectrum One Reference Manual
- ♠ PowerNet Custom Interface Reference Manual

Navigating the Menu

Choose a menu option by moving the cursor to the option, and then pressing **ENTER**. There are several ways to move the cursor to an option:

- Pressing the **ARROW** keys to move the cursor
- Typing the number of the option
- Typing the first character of the option

The selected option is highlighted and an asterisk (*) is displayed to the left of the number. Pressing **ENTER** executes the option.

Executing a **Main Menu** option results in the display of a submenu which overlays most of the **Main Menu**. Only the most recently selected menu is active.

Use the **ESC** and **BACKSPACE** keys to back out of a submenu, and also to exit the **Main Menu**.

Initial Setup

The first two options on the **Utilities** menu, **Verify** and **Authorize**, must be exercised before continuing further with the configuration of the system. (The remainder of the options on this submenu is described in Chapters 3 and 8).

```
Linux                               OpenAir Linux
Main Menu
1 Operations
  Utilities
    *1 Verify
    2 Authorize
    3 Snapshot
    4 Cleanup
    5 Transfer
<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

Note: The Utilities menu on OpenAir platforms contains two additional options for system shutdown and reboot, both of which are discussed in Chapter 3.

Checking Installed Software

- Select **Verify** to check installed software. Each component of the installed packages is compared to a release database containing a 32-bit CRC of all files. Deviations, including authorized software patches, are reported. **Verify** may take up to 30 seconds to analyze the system before displaying information on the screen.

```

Software Verification
      Scanning ...
Jun 25 16:03 1999   Page 1
PowerNet(tm) 6.0.0
VERIFICATION DATABASE LOADED:
  18 package entries, 171 file entries, 0 errors
PACKAGE SCAN
VERIFIED PACKAGES:
  Base System 6.0.0
  Access Point 6.0.0
  Base TCP/IP 6.0.0
  SMI 6.0.0
  VTERM 6.0.0
  TN3270 6.0.0
  TN5250 6.0.0
  Formatter 6.0.0
  Scan Editor 6.0.0

      Report is in "xfer/vfy062599"
      Press ENTER to continue

```

Examining Authorizations

- Select **Authorize** to examine the authorized number of users and software options. This menu option also permits resubmission of the authorization code when software and/or hardware is added or removed from the system. All OpenAir systems are shipped from the factory authorized for the number of users and software options purchased.

```

              Authorization

      Machine ID [2CF055995      ]
      Authorization Code [226D-2209-5B8F]

      New Authorization Code [      ]

      Users [16 ]
      Spectrum One [no ]
      Access Point [yes]
      VTERM [yes]
      3270 [yes]
      5250 [yes]
      Client Streaming [no ]
      Scan Editor [yes]
      Formatter [yes]
      <ESC>=QUIT

```

Note: In the case of OpenAir Linux installed on customer-supplied hardware, the authorization code is provided by your PowerNet reseller or supplier. Each OpenAir Linux Server software installation *must* have an authorization code to run. An unauthorized PowerNet system will operate for about one hour before shutting down.

You may use the Authorization Fax Form below to authorize your software.

Authorization FAX Form

Please Fill out this page and Fax to Connect, Inc. (630) 717-7243.

Machine ID from the on-screen Authorization menu:

[_____]

Your Company Name (please print): _____

Location (City, State, Province, Country): _____

Your first and last name (please print): _____

Your fax number with country code / area code: () _____ - _____

Your phone number with country code / area code: () _____ - _____

New authorization code to be supplied by Connect on a return fax.

[_____ - _____ - _____]

If you cannot enter the new authorization code into your system, call (630) 717-7200.

Connect, Incorporated, Customer Satisfaction Survey:

To provide feedback to our improvement process, please answer the questions below.

Please write down the date the software was downloaded at your facility. _____

Were you able to download successfully? (circle one): Yes No

(If no, please describe problem.) _____

Are you satisfied with the performance of this product? (circle one): Yes No

(If no, please describe.) _____

Would you like us to phone you about any problems with this product? (circle one): Yes No

Summary

The OpenAir Linux software is now installed, verified, and authorized. The next step is to configure the network connections and terminal interfaces as described in the following chapters.

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Chapter 3 • OpenAir

This chapter describes the integrated OpenAir system with OpenAir Linux installed. The instructions for the initial setup of the hardware and logon are followed by a description of the standard and optional hardware configurations. The chapter ends with a description of the criteria used to select the appropriate OpenAir model and the physical specifications for each model.

Before Setting Up the System

Checking for Damage

1. Check for shipping damage. Each system is shipped with a stress indicator attached to the inside of the shipping container (or, in the case of rack-mounted systems, attached to the interior side-panel of the rack).
2. Contact your technical support representative before proceeding if you suspect damage.

Checking the Power Supply

- For systems delivered outside the United States, check that the power-supply switch, located on the rear of the unit, is set correctly for your country's power.

Hardware Setup

OpenAir systems are delivered in three basic models, distinguished by the number of terminal devices supported and the number of network media interfaces that can be installed. The models may also be delivered mounted in racks with additional failsafe options. In any case, all of the required hardware and software has been installed, verified, authorized, and tested.

Hardware Not Supplied

A display terminal, laptop, or PC with a modem is required and not supplied. Equipment and cables *external* to the network adapter are also not provided. The necessary equipment is specific to the local environment. Refer to the following pages for a discussion of equipment that you will need to provide in order to complete a successful setup.

Computer characteristics

If a laptop or PC is used, it should be capable of emulating an ANSI or VT100 terminal. Microsoft Windows Terminal and ProComm by Datastorm Technologies are examples, and both can also be used for the dialup, service port, or telnet connections.

Note: In the case of ProComm, ensure that the BS-Translation (backspace) parameter is set to NON-DEST (non-destructive) and Line Wrap is set to OFF.

OpenAir Hardware Supplied

All OpenAir models are supplied with the following hardware:

Service Port	Configured as COM1 with a male DB-9 connector, set for administrative logins at 9600 baud, 8 data bits, 1 stop bit, and no parity.
Serial Port	Configured as COM2 with a male DB-9 connector. May be configured for serial connections up to 38,400 baud.
Modem	Configured as COM3 with an RJ-11 receptacle marked either Wall or To Jack.
Ethernet Adapter	10 Mbps with UTP and BNC connectors.
Video Adapter	Monitor not supplied.
Keyboard Jack	Keyboard not supplied.

The following hardware may be also present, depending on the connectivity options you have ordered:

Multi-port Serial Adapter	Adapter with up to 64 serial ports for use with Spectrum One networks and direct serial VT/HP connections.
----------------------------------	--

Administrative Access Methods

Select one of the four administrative access methods described below to set up and connect your system.

- **Dialup modem:** Requires connection of the RJ-11 receptacle, located on the rear of the OpenAir unit and marked either Wall or To Jack, to a telephone line. A display terminal, laptop, or PC with a modem is required and not supplied.
- **Service port:** Requires the serial connection of a display terminal, laptop, or PC to the male DB-9 connector on the rear of the unit labeled COM1. The service port is configured for 9600 baud, 8 data bits, 1 stop bit, and no parity. The DB-9 cable and the display terminal, laptop, or PC is not supplied.
- **Telnet:** Requires connection of a hub to either the BNC or UTP interface located on the rear of the unit. The system is shipped set to a TCP/IP address in the range of 206.183.67.190 to 206.183.67.200 with a netmask of 255.255.255.128. The hub is not supplied.

- **Console:** Requires connection of a video monitor to the video adapter marked on the rear of the unit, and connection of a keyboard to the jack also located on the rear of the unit. The monitor and keyboard are optional and may not be supplied.

Note: The following is information on a LINUX console error message about unmounting. Every week on some system, a background task is run to mirror the first hard drive to a second hard drive. In doing so, it sets off a counter, which is defaulted to 25, that produces a console warning message about unmounting and running `e2fsck`. To correct this issue, run the following commands as root:

```
tune2fs -c 0 /dev/hda2
tune2fs -c 0 /dev/hda3
mount /dev/hdb2 /mnt
tune2fs -c 0 /dev/hdb2
umount /mnt
mount /dev/hdb3 /mnt
tune2fs -c 0 /dev/hdb3
umount /mnt
```

Then from the console when the system is idle as root run:

```
init 1
e2fsck -y /dev/hda2
e2fsck -y /dev/hda3
init 0
```

Links to command descriptions:

<http://www.die.net/doc/linux/man/man8/tune2fs.8.html>

<http://www.die.net/doc/linux/man/man8/e2fsck.8.html>

Setting Up the TCP/IP Network

All OpenAir platforms are supplied with TCP/IP Ethernet, which is shipped set to factory test values. These default values must be changed to match your local environment.

Equipment and cables *external* to the network adapter are **not** provided. The necessary equipment is specific to the local environment. Depending upon options you have ordered, the system may have up to two adapters and can be connected to a maximum of two separate TCP/IP networks.

Ethernet NIC

Your options for connecting are as follows. Necessarily, you must provide all cables for your setup.

1. Connect the Ethernet NIC to the network using either thin Ethernet cable or unshielded twisted pair wire (UTP).
2. Use the adapter, which provides a BNC connector for thin coaxial cable and an RJ-45 plug for UTP. No switches are present on the adapter.

Applying Power to the System

After the method of access has been selected and the physical connection completed, use the following steps to apply power to the system.

1. Log in and type the password.

Prompt	Response
login:	tec ENTER
Password:	tec123 ENTER

Sign-on information is then displayed, including the last successful login and version information.

2. Type the following to use a VT-100 terminal or VT-100 terminal emulation.
(A choice suggested by Connect.)

Prompt	Response
TERM=	vt100 ENTER

3. Type the following to access the OpenAir Linux software, become superuser and start the menu system.

Prompt	Response
\$	su ENTER
Password:	root123 ENTER
#	crfadmin ENTER

The **Main Menu** appears. The submenu options may vary, depending on the installed connectivity options.

```
Linux                               OpenAir Linux

Main Menu
* 1 Operations
  2 Access Point
  3 TCP/IP
  4 VTERM
  5 TN3270
  6 TN5250
  7 Object Editors
  8 Utilities

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

Shutting Down the System

To shut down the system, exit from the **crfadmin** menus to a Linux prompt. If you are not already the superuser, become it by typing the following:

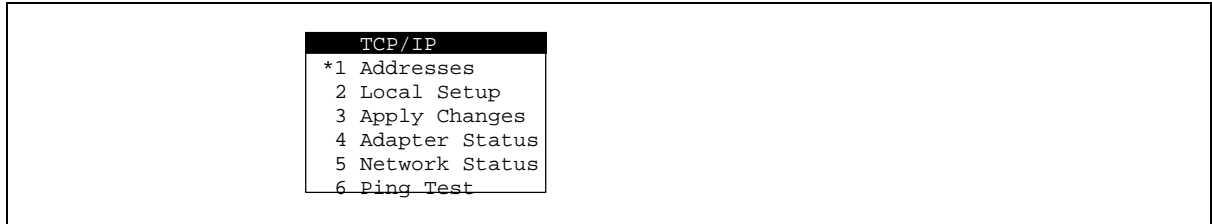
Prompt	Response
\$	su ENTER
Password:	root123 ENTER
#	crfadmin ENTER

At a Linux prompt, type “shutdown -h now” and press **ENTER**. This will shut down the system in an orderly manner, displaying a number of messages. When complete, the system will then display the message “System halted” at which point the system can be powered down.

Using the TCP/IP Menu

The **TCP/IP** submenu option provides access to setup, configuration, test and status options that are summarized below.

- Select **TCP/IP** from the **Main Menu**. The **TCP/IP** menu appears.



Addresses IP addresses of OpenAir, application hosts, and routers on the TCP/IP network

Local Setup IP and interface adapter information

Apply Changes Applies all changes and resets the TCP/IP interface

Adapter Status Checks the status of network interface adapters

Network Status Checks the status of the TCP/IP network

Ping Test Checks network connectivity between OpenAir and the other IP addresses set in the Addresses menu option

Establishing Connections

About IP Addresses

The IP address is obtained from your local TCP/IP network administrator. It is a 32-bit binary number and is displayed as four octets expressed in decimal, separated by periods. Each octet ranges in value from 0 to 255. This address identifies the network and each device, or node, attached to the network.

Three *classes* of network addressing schemes are possible. These are class A, B, and C which are defined by the maximum number of nodes the network will support. The following table defines the IP Address Classes.

Class	Nodes	Address Ranges	Address Usage
A	1677216	1.0.0.1 - 126.255.255.254	aaa.nnn.nnn.nnn Network Identifier = First Octet Node Identifier = Last 3 Octets
B	65534	128.0.0.1 - 191.255.255.254	aaa.aaa.nnn.nnn Network Identifier = First 2 octets Node Identifier = Last 2 Octets

Setting up Interface Adapters

To set up the IP and interface adapter information for your system, use the following steps.

1. Select **Local Setup** from the **TCP/IP** submenu to display the Local TCP/IP Setup form.

Local TCP/IP Setup		
	Interface 0	Interface 1
State	[ON]	[OFF]
Adapter	[eth0]	[]
Node Name	[oalix]	[]
Address	[206.183.67.190]	[]
Netmask	[255.255.255.128]	[]
Broadcast	[206.183.67.255]	[]
Router Name	[gateway]	[]
<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE		

State The link may be set to either ON or OFF.

Adapter Factory set and automatically detected.

Node Name Names are derived from those entered with the TCP/IP Network Addresses form. Select the name that corresponds to the IP address assigned for the OpenAir system.

Address Automatically filled with the IP address of the name selected in the Node Name field above. This field is provided for informational purposes only and cannot be changed here.

Netmask The netmask provided by the local TCP/IP Network Administrator. If this field is left blank, it is automatically set for a class C address.

Broadcast The broadcast address provided by the local TCP/IP Network Administrator.

Router Name This is an optional field for a server that maintains subnet IP addresses routing tables. The local TCP/IP Network Administrator provides this information. (The name is set in the TCP/IP Addresses form.)

2. Type the address information supplied by the TCP/IP Network Administrator.
3. Press **ESC** when you are finished entering data. If you have made changes to the form, a confirmation prompt appears.
4. Press **Y** to save the changes.

Applying Changes to TCP/IP Setup

Although the setup has been saved, it has not been applied to the OpenAir TCP/IP stack.

1. Select **Apply Changes** from the **TCP/IP** submenu to display the screen to implement the changes.
2. All current telnet connections are terminated by using this option.

Checking Adapter Status

- Select **Adapter Status** from the **TCP/IP** submenu to display the screen and check the status of the adapter(s). The format of the display resembles the following.

```
eth0      Link encap:10Mbps Ethernet  Hwaddr 00:E0:29:3A:8E:46
inet addr: 206.183.67.190  Bcast:206.183.67.255  Mask: 255.255.255.128
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:29979 errors:0  dropped:0  overruns:0
TX packets:202 errors:0  dropped:0  overruns: 0
Interrupt: 11 Base address: 0xe400
```

- Inet addr, Bcast, and Mask** Must match the IP, Broadcast, and Netmask values respectively, that were entered in the Local TCP/IP Setup form.
- RX packets** Verify that packets are being exchanged by noting that the number is non-zero.
- Errors** Verify that errors are zero. If non-zero and more than a few percent of the *RX packets* value, there may be a hardware or setup problem. In this case, re-check the physical connections and setup information.

Viewing Network Status

- Select **Network Status** from the **TCP/IP** submenu to display the Kernel Interface table and check the status of the network.

```
Kernel Interface table
Iface  MTU Met RX-OK RX-ERR RX-DRP RX-OVR TX-OK TX-ERR TX-DRP TX-OVR Flags
lo     3584 0   56     0     0     0   56     0     0     0 BLRU
eth0   1500 0 31023     0     0     0   224     0     0     0 BRU

Press ENTER to continue
```

- Iface** Corresponds to the Adapter name in the Local TCP/IP Setup form.
- Mtu** Maximum transmission unit in bytes.
- RX-OK and TX-OK** Error-free received and transmitted packets, respectively. If both are zero, check the physical connection.
- RX-ERR, RX-DRP, and RX-OVR** Receive errors. If non-zero and greater than a few percent of the RX-OK value, check the physical connection and address setups.
- TX-ERR, TX-DRP, and TX-OVR** Transmit errors. If non-zero and greater than a few percent of the TX-OK value, check the physical connection and address setups.

Checking Connectivity with the Ping Test

The Ping Test checks for network connectivity between OpenAir and other IP addresses by sending IP packets to the selected node and listening for a return.

1. Select **Ping Test** from the **TCP/IP** submenu to display the Current Hosts for Ping Test screen.

CURRENT HOSTS FOR PING TEST:

```
127.1          localhost
206.183.67.190 oalix
206.183.67.129 gateway
206.183.67.5   as400
```

```
Host name: as400
```

2. Type the host name and press **ENTER**. A successful ping is indicated by results similar to those following.

```
Host name: as400
PING as400 (206.183.67.5): 56 data bytes
64 bytes from as400 (206.183.67.5): icmp_seq=0 ttl=255 time=22.2 ms
64 bytes from as400 (206.183.67.5): icmp_seq=1 ttl=255 time=2.9 ms

--- as400 ping statistics ---
7 packets transmitted, 7 packets received, 0% packet loss
round-trip min/avg/max = 0/0/0 ms

Press ENTER to continue
```

bytes An unsuccessful ping result indicates an addressing error in the setup procedure, or possibly a problem on the target node.

icmp

packets transmitted, received

3. Press **DEL** (or, **CTRL+C**) to halt the test.

AS/400 Setup

The following table provides examples of AS/400 configurations for TCP/IP Ethernet network connections. An example of a 5250 Workstation Controller Description follows.

Ethernet Line Description Parameters

Name	Parameter	Value
Line description	LIND	PNETLINE
Option	OPTION	*BASIC
Category of line		*ELAN
Resource name	RSRCNAME	PNETR SRC
Online at IPL	ONLINE	*Yes (or *No)
Vary on wait	VRYWAIT	*NOWAIT
Network controller	NETCTL	*ETHERNET
Local adapter address	ADPTADR	(12 digit MAC address)

Exchange identifier	EXCHID	*SYSGEN
Ethernet standard	ETHSTD	*ETHV2
Maximum controllers	MAXCTL	1
Error threshold level	THRESHOLD	*Off
Text	TEXT	Wireless network

5250 Device Description Parameters

Name	Parameter	Value
Device description	DEVD	WTERM00
Device class	DEVCLS	RMT
Device type	TYPE	5251
Device model	MODEL	11
Local location address	LOCADR	00
Online at IPL	ONLINE	*Yes (or No)
Attached controller name	CTL	PNETCTL
Keyboard language type	KBDTYPE	*SYSVAL
Drop line at signoff	DROP	No
Character identifier	CHRID	*KBDTYPE
Allow blinking cursor	ALWBLN	*Yes
Authority	AUT	*Change
Text	TEXT	Wireless terminal

Utilities Menu

The Utilities menu on OpenAir includes two options in addition to those discussed in Chapter 2: **Reboot** and **Shutdown**.

```

Linux                               OpenAir Linux
Main Menu
1 Operations
  Utilities
    1 Verify
    2 Authorize
    3 Snapshot
    4 Cleanup
    5 Transfer
    *6 Reboot
    7 Shutdown

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

Rebooting

This option performs an orderly system shutdown, and then automatically reboots the system.

1. Select **Reboot** from the **Utilities** submenu. The system prompts:
Are you sure you want to reboot this system (y/n)
2. Type **y** to reboot the system.

Note: If this selection is started remotely, the remote session is disconnected and requires re-connection after the reboot has completed.

Shutting Down Power

Selecting this option tells the system to shutdown in an orderly fashion. Once this has completed, the system can then be powered off. It is permissible to simply remove power, but using the shutdown option makes the next system startup faster since the cleanup programs do not have to run.

1. Select **Shutdown** from the **Utilities** submenu. The system prompts:
Are you sure you want to shut down this system (y/n)
2. Type **y** to shut down the system.

CAUTION: Do not select this option during a remote support session. Doing so disconnects the active support session and prevents the automatic restart that would permit remote access to the server without human intervention.

Model Selection Criteria

The factors that determine which OpenAir model is best suited for a specific installation are:

- Number of wireless terminal devices to be supported.
- Number of network media to be supported.
- Failsafe operation requirements.

The maximum number of terminals and host connectivity options supported by each model is described below.

OpenAir Model Specifications		
Model	Maximum Network Media Options	Maximum Terminal Sessions
500	1	8
1000	2	32
2002	2	104
2502	3	240

Maximum Terminal Sessions

When considering the maximum number of terminals sessions required, the concurrent number of active host sessions is important. The *hot key* feature allows each terminal to maintain up to four host sessions at one time. These hot key sessions incur the same overhead and must be included in the calculation if use of the hot key feature is planned.

Maximum Network Media Options

When considering the maximum number of network media options, keep in mind that an Ethernet adapter is included with each OpenAir system. The maximum number of network media options listed represents the available options *in addition* to Ethernet.

- TCP/IP Ethernet
- Multi-port Serial Async
- POTS/PBX Interface Adapter

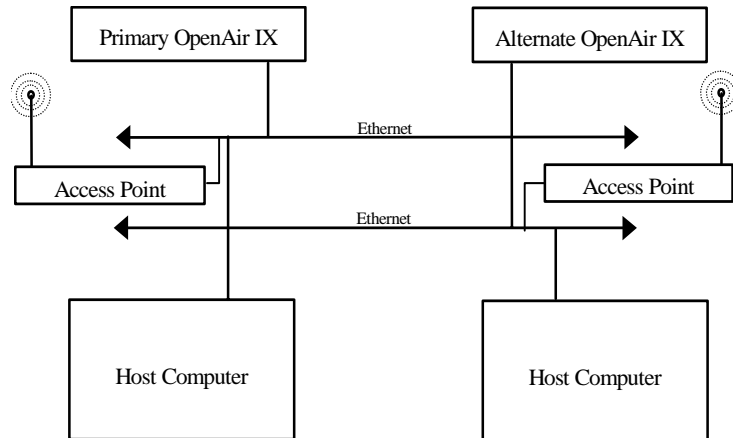
Note: Each model is limited to one adapter of each type.

Access Points

Each OpenAir platform will support a maximum of 256 access points. Refer to the manufacturers' documentation for load and throughput limitations, as well as configuration and environmental requirements.

Failsafe Options

Failsafe operation is achieved through redundancy. The 2002 and 2502 models are available in a rack-mounted dual configuration for this purpose. The PowerNet TwinClient terminal software can be configured to automatically switch to the operational system in the event of a failure.



Wireless systems supporting only TCP/IP Telnet applications may additionally rely on the PowerNet Twin Client terminal software for redundancy. In the event of an OpenAir platform failure, the terminals can access the host application directly.

Physical Characteristics

Single Unit Models 500, 1000, 2002

Weight	11 kg (24 pounds)
Dimensions	Width: 42.5 cm (16.75 inches) Height: 13.8 cm (6.15 inches) Depth: 41.3 cm (16.25 inches)
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Storage Humidity	8% to 80% relative, non-condensing at 40 °C (104 °F)
Operating Temperature	10 °C to 40 °C (40 °F to 104 °F)
Operating Humidity	15% to 80% relative
Power Supply	Input Voltage: 100 to 127 VAC and 220 to 240 VAC Input Frequency: 50/60 Hz Maximum Output Power: 145W continuous
Power Consumption	Operating without input/output: < 30W Standby: < 30 W
115V/60Hz	
Power Consumption	Operating without input/output: < 30W Standby: < 30 W
230V/50Hz	

Regulatory, Europe	Carries CE-marking in compliance with the following Directives: EMC 89/336/EEC
Regulatory, Canada	Class B digital apparatus that meets Interference-Causing Equipment Regulations
Regulatory, U.S.A	Complies with limits for a Class B digital device pursuant to Part 15 of the FCC Rules.

Single Unit Models 2502

Weight	15kg (33 pounds)
Dimensions	Width: 19.2 cm (7.56 inches) Height: 43.8 cm (17.24 inches) Depth: 44cm (17.32 inches)
Storage Temp'ture	-40 °C to 70 °C (-40 °F to 158 °F)
Storage Humidity	8% to 80% relative, non-condensing at 40 °C (104 °F)
Operating Temperature	10 °C to 40 °C (40 °F to 104 °F)
Operating Humidity	15% to 80% relative
Power Supply	Input Voltage: 100 to 127 VAC and 220 to 240 VAC Input Frequency: 50/60 Hz Maximum Output Power: 145W continuous
Power Consumption	Operating without input/output: < 36W Standby: < 30 W
115V/60Hz	Off: < 1.6 W (power applied)
Power Consumption	Operating without input/output: < 36W Standby: < 30 W
230V/50Hz	Off: < 1.6 W (power applied)

Regulatory, Europe	Carries CE-marking in compliance with the following Directives: EMC 89/336/EEC amended by 93/68/EEC, The Low Voltage Directive 73/23/EEC
Regulatory, Canada	Class B digital apparatus that meets Interference-Causing Equipment Regulations
Regulatory, U.S.A	Complies with limits for a Class B digital device pursuant to Part 15 of the FCC Rules.

Rack Mount Cabinets

Style	Width	Depth	Height	Weight
A	61 cm (24 in.)	76 cm (30 in.)	71 cm (28 in.)	55 kg (120 lbs)
B	63.5 cm (25 in.)	66 cm (26 in.)	122 cm (48 in.)	64 kg (140 lbs)
C	63.5 cm (25 in.)	66 cm (26 in.)	153.3 cm (60 in.)	84 kg (185 lbs)
D	63.5 cm (25 in.)	66 cm (26 in.)	182.8 cm (72 in.)	114 kg (250 lbs)

Feature Summary

Performance Optimization - Operating in conjunction with TwinClient software on the terminal devices, all terminal emulations and protocol processing loads are transferred from the terminal to the OpenAir platform. All communications with the TwinClient terminal are optimized, resulting in the fastest possible response times and minimum network loading.

Wire LAN/WAN Connectivity - All major wire networks media and protocols are supported. OpenAir IX can be configured to support up to 4 different wire media concurrently, including Ethernet (standard) and Serial Async. Standard LAN and WAN networking protocols such as TCP/IP are supported.

Wireless LAN Connectivity - All IP-addressable wireless network devices are supported. Extensive additional network management features are provided for SNMP-capable access points. IEEE 802.11 compliant devices are supported but not required.

Fail Safe Operation: Orderable in a redundant hardware configuration. All non-redundant OpenAir platforms are shipped with a fully-configured backup hard drive to simplify maintenance requirements and minimize downtime.

Diagnostics - In addition to SNMP, sophisticated diagnostic tools are available to remote support technicians via telnet and/or the dialup modem built-in to all OpenAir platforms. Tracing and logging facilities are available for all of the wireless LAN components.

Network Management - Sophisticated tools for managing terminal configuration, network security, and network performance.

Ease of Use - The menu-driven administrative interface requires no operating system expertise.

Spectrum One - Orderable with support for up to 32 Spectrum One networks through direct serial connection or over TCP/IP network

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Chapter 4 • Access Points

This chapter describes the procedures for configuring OpenAir Linux to manage networks of wireless access points and the wireless terminal devices they support. A summary of the setup procedure described in the subsequent sections follows:

- Shut down Access Point network.
- Complete the Access Point setup.
- Start Access Point network.
- Select **AP Discovery** menu option.

Note that the TCP/IP network must be configured and active before configuring the Access Point network. The TCP/IP configuration procedure for OpenAir is described in Chapter 3. For OpenAir Linux installed on customer-supplied equipment, consult the appropriate system documentation for instructions on TCP/IP configuration.

Shutting Down the Access Point Network

Before setting up the network, you must shut it down if it is running.

```
Linux                               OpenAir Linux

  Main Menu
* 1 Operations
  2 Access Point
  3 TCP/IP
  4 VTERM
  5 TN3270
  6 TN5250
  7 Object Editors
  8 Utilities

<ESC>=QUIT  <ARROWS>=MOVE  <ENTER>=SELECT
```

1. Select **Operations** from the **Main Menu**. The **Operations** menu appears.

```
Linux                               OpenAir Linux

  1 Wireless View
  2 Access Point Startup
*3 Access Point Shutdown

<ESC>=QUIT  <ARROWS>=MOVE  <ENTER>=SELECT
```

2. Select **Access Point Shutdown**. The following appears on the screen.
Are you SURE you want to shut down the AP network (y/n):
3. Type **y** and press **ENTER**. The following message appears.
Are you SURE you want to shut down Hot Key (y/n):

```

Are you SURE you want to shut down the AP network (y/n): y
AP Network Shutdown
Status check ...
Terminal check ...
AP Server ...
Status check ...
Are you sure you want to shutdown Hot Key (y/n)? y
Hot Key Shutdown ...
Deactivating Hot Key ...

Press ENTER to continue
    
```

4. Type **y** and press **ENTER**. The following message appears.
Press **ENTER** to continue
5. Press **ENTER** and the screen displays the **Operations** menu.
6. Press **ESC** to return to the **Main Menu**.

Setting Up the Server

1. Select **Access Point** from the Main Menu.

```

Linux                               OpenAir Linux

Main Menu
1 Operations
  Access Point
    *1 Server Setup
    2 AP Discover
    3 AP Setup
    4 MAC/IP List
    5 Host List
    6 Terminal Control
    7 Diagnostics
    8 Performance Report

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
    
```

2. Select **Server Setup** from the **Access Point** submenu to enter server setup information provided by the local network administrator.

```

Access Point Server Setup

Status [ON ]

Node Name [oalix      ]
IP Address [206.183.67.190 ]
IP Port [1800]

Log Level [0]
SAC Interval [0      ]

Direct Interface
Port      Host Name          Port      Host Name
[  ] [  ]          [  ] [  ]
[  ] [  ]          [  ] [  ]
[  ] [  ]          [  ] [  ]
[  ] [  ]          [  ] [  ]

<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE
    
```

- Status** Enables or disables the access point network connectivity. ON enables this function while OFF disables the connection.
- Node Name** Sets the IP address of the OpenAir Linux system. On customer-supplied systems, the values for this field are derived from the /etc/hosts file.
- IP Address** The IP Address corresponding to Node Name entered in the previous input field. This value is used by the PowerNet Twin Client terminals to access OpenAir Linux (see *PowerNet Twin Client Configuration* manual).
- IP Port** The default value is 1800 and must match the settings on the PowerNet Twin Client terminals.
- Log Level** Ten logging levels are available and are described in detail in Chapter 7. For the purposes of initial setup, a value of 1 is recommended.
- SAC Interval** [Text Field] The SAC interval value is in seconds, and sets the System Accounting sampling interval. (The use of this option is described in Chapter 7) For the purposes of initial setup, a value of 0 is recommended.

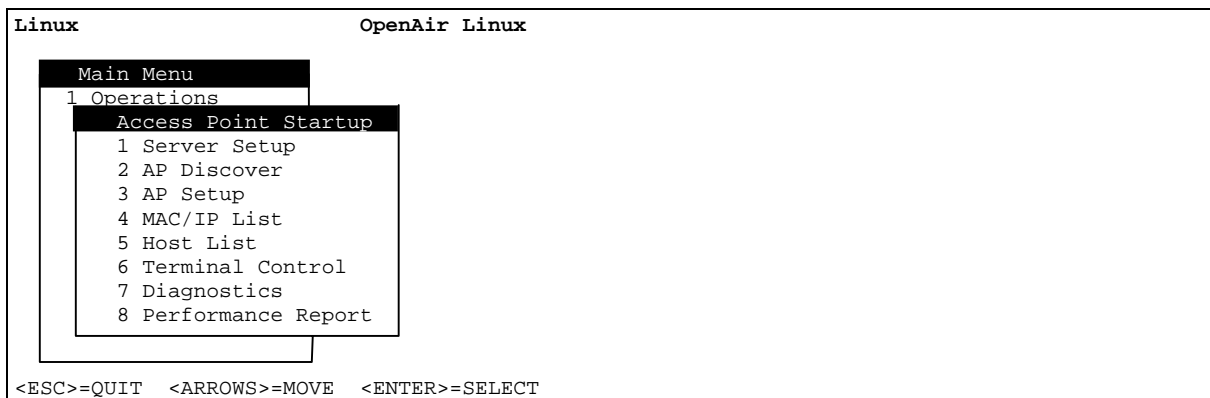
Direct Interface Fields

The configuration of these fields is described in the *OpenAir Linux Custom Interface Reference Manual*. This facility is used by custom-developed TCP/IP client-server applications, Symbol Technologies' multiplexed STEP for TCP/IP, and Symbol Technologies' Serial Access Bridge Emulation (SAB Emulation) applications.

Starting the Access Point Network

Once the Access Point Service Setup form has been completed, the Access Point Network is ready to be started.

1. Select **Operations** from the Main Menu.



2. Select **Access Point Startup** from the **Operations** menu. The following appears.

- To see the last two octets of the IP address of those devices, select **Wireless View** from the **Operations** submenu. The **Wireless View** screen appears.

```
Linux                               Wireless View                               6/19 15:30.21

----- TOPOLOGY ----- UNIT STATISTICS -----
067.172 067.179
**1 **2 3 4
1 | | | |
2 | | | |
3 | | | |
4 | | | |
5 | | | |
6 | | | |
7 | | | |
8 | | | |
9 | | | |
10 | | | |
11 | | | |
12 | | | |
13 | | | |
14 | | | |

Access Point: 206.183.67.179
MAC Addr: 00A0F80070B8
Network ID: 101
Load: 0
Known Stations: 0
Tx KBps: 0
Rx KBps: 0

[UNIT] [CONTROL] [LOG] [NETWORK] [HELP] [QUIT]
```

The access point network is now configured and operational.

Configuring Terminal Devices

This option accesses a series of screen forms that perform two functions, creating a host list menu and tailoring the handler for each item.

Creating the Host List Menu

The **Host List** menu displays on the PowerNet Twin Client terminal at the start of a session. It allows the terminal operator to select hosts and emulators as required.

- Select **Access Point** from the **Main Menu**.

```
Linux                               OpenAir Linux

Main Menu
1 Operations
  Access Point
    1 Server Setup
    2 AP Discover
    3 AP Setup
    4 MAC/IP List
    *5 Host List
    6 Terminal Control
    7 Diagnostics
    8 Performance Report

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

- Select **Host List** from the **Access Point** submenu. The **Host List Setup** screen appears. It provides access to the setup forms that are used to tailor the operation of the Handler assigned to each Host List entry.

Restricting Menu Selections by Terminal

The **Terminal Control** menu option is useful when it is necessary to restrict host list Menu Name access to specific terminal types. For example, if a terminal emulation application is designed to operate with a specific terminal type, but several different terminal types are in use, you can use Terminal Control to restrict access to only the correct terminals.

1. Select **Access Point** from the **Main Menu**.

```
Linux                               OpenAir Linux

Main Menu
1 Operations
  Access Point
    1 Server Setup
    2 AP Discover
    3 AP Setup
    4 MAC/IP List
    5 Host List
    *6 Terminal Control
    7 Diagnostics
    8 Performance Report

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Terminal Control** from the **Access Point** submenu. The **Host List Terminal Setup** screen appears. (Terminals listed may vary, according to the authorization code and terminal types currently supported.)

```
Host List Terminal Setup

Menu Name
[Shipping    ]
[Receiving   ]
[Picking     ]

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

3. Use the **ARROW** keys to select the **Menu Name** that requires a restriction.
4. Press **ENTER**. A **Terminal Types** setup form appears. By default all terminal types are unrestricted.
5. To restrict one or more types of terminal, use the **ARROW** keys to move the cursor to the terminal type.
6. Press the **SPACE** bar to toggle the value from yes to no.

Mapping Terminal Addresses

Use this menu option to map all known terminal IP addresses to a corresponding MAC address.

1. Select **Access Point** from the **Main Menu**.

```
Linux                               OpenAir Linux
Main Menu
1 Operations
  Access Point
    1 Server Setup
    2 AP Discover
    3 AP Setup
    *4 MAC/IP List
    5 Host List
    6 Terminal Control
    7 Diagnostics
    8 Performance Report
<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **MAC/IP List** from the **Access Point** submenu. The result indicates that a terminal with an IP address of 206.183.67.169 has an Ethernet MAC address, represented in hexadecimal bytes separated by colons, of 00:20:16:31:D7:AF.

```
00:20:A6:31:D7:AF=206.183.67.169;
(EOF):
```

Diagnostics

This menu option provides a quick pass/fail test of the connection to each access point that has been discovered on the network. The standard TCP/IP ping utility is used. More extensive network diagnostic tools are described in Chapter 8.

Performance Reports

The System Accounting interval (refer to Setting up the Server earlier in this chapter) controls the collection of response time and transaction volume information. The Performance Reports option is used to generate reports from this data. An in-depth discussion of this valuable tool is included in Chapter 8.

Chapter 5 • Terminal Emulations

VTERM is the name of the emulation handler that performs VT100, VT220, and HP700/92 terminal emulations. The first two sections of this chapter describe how to set up the VTERM handler with VT/HP emulation for a connection to a Telnet host. A detailed description of the many optional features and capabilities is provided in subsequent sections.

Setting Up the VTERM Handler

All configuration parameters for the emulation are accessed from the Host List option on the Access Point main menu entry.

1. Select **Access Point** from the Main Menu.

```
Linux                               OpenAir Linux

Main Menu
1 Operations
  Access Point
    1 Server Setup
    2 AP Discover
    3 AP Setup
    4 MAC/IP List
    *5 Host List
    6 Terminal Control
    7 Diagnostics
    8 Performance Report

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Host List** from the **Access Point** submenu to access all configuration parameters for the emulation. The **Host List Setup** screen appears.

```
Host List Setup

Menu Name      Handler  Active  Custom Options
[Shipping     ] [VTERM  ] [yes] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [
[              ] [NONE   ] [no ] [

<ESC>=QUIT <ARROWS>=MOVE
```

Menu Name Up to 12 alphanumeric characters to be displayed on the Twin Client terminal screen as part of the Host List menu.

Handler Specifies the operating characteristics of the program that processes terminal session traffic. VTERM is the VT/HP emulator.

Active Specifies whether or not the handler is available to the Twin Client terminal.

Custom Options This field is used for special emulator startup options. Refer to Release Notes.

3. Move the cursor to the VTERM handler field using the **ARROW** keys. Press **ENTER** to display page 1 of the **VTERM Handler Setup** form.

```
[Shipping      ]      VTERM Handler Setup - EXPRESS      Page 1

      Keyboard                      Alarm                      Formatter
      End Key [pf10  ]      Mode [bell  ]      Object [    ]
      Hot Key [noop  ]      Volume [hi  ]      Alt. Key [noop]
      Auto Send Key [noop ]      Duration [150 ]      Dialog
      Key Click [on  ]      Frequency [0  ]      Object [    ]
Case Conversion [none ]      Scan Duration [300 ]      Timers
      Scanner                      Scan Frequency[0  ]      Radio [120]
      Send Key [enter ]      Allow Multiple[yes]      Power [300]
      Scan Ahead [1  ]      Printer                      Backlight [10 ]
      Display                      Type [none  ]
      Quadrant Mode [on  ]      Init Object [    ]
      Lock Row [0  ]
      Lock Column [0  ]
      Scroll Mode [full]
      Wait Message [on  ]
Host Interface
      Emulation [vt100]
      Application [ /bin/sh ]
      Arguments [ ]

<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL><B>=PGUP <CTRL><F>=PGDN
```

Setting up Telnet

Only two setup options require modification to enable Telnet sessions between a PowerNet Twin Client terminal and a host system. The **Hostname** must correspond to a name defined in the **TCP/IP Addresses Setup** form as described in Chapter 3. In the case of OpenAir Linux on customer-supplied equipment, the name must match one found in the **/etc/hosts** file.

1. Using the **ARROW** keys, move the cursor to the Host Interface field on the VTERM Handler Setup screen.
 - a. Type after Application a name from the **/etc/hosts** file.
 - b. Type after Arguments the name of a host defined in the TCP/IP Addresses Setup.

```
Host Interface
  Emulation [vt100]
  Application [ /usr/bin/Telnet ]
  Arguments [hostname ]
```

- After the changes have been made, press **ESC** and save the changes. A PowerNet Twin Client terminal may now establish a Telnet session with the host.

VTERM Handler Setup Options - Express

The following tables describe the options on page 1 of the VTERM Handler Setup screen. Note that not all options are supported by all terminal types. Refer to the *Release Notes* and *PowerNet Supported Equipment Reference Manual* for exceptions.

Keyboard Options Group

- End Key** The key that, when transmitted by the terminal, terminates both the host connection and the wireless session. Default value is **F10**.
- Hot Key** Key that allows the user to transfer between sessions. Default value is `noop`, which disables Hot Key processing.
- Auto Send Key** The key that is generated automatically when an input field on the terminal is filled with keyed input (as opposed to scanned input). The default value is `noop`, which disables key generation. If the Length Check option in the Scanner Options Group is set to `on`, this function is disabled.
- Key Click** Enables/disables key clicks on the terminal. Default value is `on`.
- Case Conversion** Controls conversion of keyboard input to upper or lower case. Applications may be case-sensitive or case-insensitive. Select the required case, `upper` or `lower`, and all alphabetic characters sent from the terminal are in that case. Select `none`, if the application is case-insensitive. The default value is `none`, meaning no conversion takes place.

Scanner Options Group

- Send Key** Select the key function that is sent to the host after a bar code is scanned. The key is not pressed, but is sent automatically after the scanned data. The default value is `enter`. This function is disabled by setting the value to `noop`.
- Scan Ahead** Sets the number of scans that is buffered in the terminal. Values for this field are 0 - 24. The default is 1.
Set to 0, scan ahead is disabled and you cannot scan again until the host response has been received. Set to 1, there is no scan ahead limit.
Set to 2 and above, and the software will let you scan that many times until a host response is received. So if you set it for 3, it will allow you to scan only 2 more times before the host responds to the first scan.

Display Options Group

- Quadrant Mode** *Quadrant* refers to the division of the application display area (normally 24-by-80) into terminal-size windows aligned with the upper-left corner of the application. For example, a 12-by-40 terminal display would result in 4 quadrants.
- Off:** Disables quadrant processing. The window is positioned vertically centered on the cursor row and horizontally on the cursor column, favoring placement near the left margin of the terminal display. Manual viewing keys are enabled.
- On:** Enables quadrant processing, except when an input field is detected and crosses a quadrant boundary, in which case the display is shifted horizontally to include as much of the input field to the right of the starting

position as possible. Manual viewing keys are enabled. This is the default value.

Soft: Enables quadrant processing without exception. Viewing keys are enabled.

Hard: Enables quadrant processing without exception. Viewing keys disabled.

Lock: Disables quadrant processing. The terminal window is locked to specified row and column coordinates (see *Lock Row* and *Lock Column* below). Viewing keys are disabled.

Lock Row Defines the Y coordinate for display position locking Range is zero (0) to the maximum number of rows on the host screen. Default value is zero (0). Effective only when Quadrant Mode is set to `lock`.

Lock Column Defines X coordinate for display position locking. Range is zero (0) to the maximum number of columns on the host screen. Default value is zero (0). Effective only when Quadrant Mode is set to `lock`.

Scroll Mode Defines scrolling method used when using the viewing keys. A value of `half` means that the terminal display is moved in half screen increments. A value of `full` means that the terminal display is moved in full screen increments. When `full` is selected for a 4 by 16 screen, the screen scrolls up/down 4 rows. If `half` is selected, it scrolls up/down 2 rows. For left/right, `full` scrolls 16 columns and `half` scrolls 8. Default value is `full`.

Wait Message Enables/disables the display of the `WAITING FOR DATA` message on the terminal after the time period set for the Radio in the Timer Options Group. The default value is `on`.

Host Interface Group

Emulation Sets the emulation mode to `vt100`, `vt220`, or `hp700`. The default is `vt100`.

Application The application program to be invoked by the handler at session startup. The default value is `/bin/sh`. Entering `/usr/bin/Telnet` invokes the internal Telnet protocol processor in the handler rather than the system utility program.

Arguments The arguments to the application. The default value is `blank`.

Alarm Group

Mode Defines the operation of the audible alarm and scanner light on the terminal. The default value is `bell`.
Off - disables the audible alarm.
Bell - enables the audible alarm as a double beep.
Flash - enables the scan indicator light as the alarm with no audible alarm.
Both - enables the double beep and the scan indicator light as the alarm.
Spec1 - enables the audible alarm as a single beep.
Spec2 - enables a single beep and the scan indicator light as the alarm.

Volume Defines the volume of the audible alarm on the terminal. Default value is `hi`.

Duration Defines the duration of the audible alarm on the terminal in milliseconds. The alarm mode must be set to `spec1` or `spec2` for duration to take effect.

The default value is 150.

- Frequency** Defines the frequency of the audible alarm on the terminal in Hertz. The alarm mode must be set to `spec1` or `spec2` for frequency to take effect. The default value is `zero (0)`, which represents the factory set default frequency considered to be optimum for the particular model of terminal.
- Scan Duration** Defines the duration of the audible alarm generated by a scan operation on the terminal, in milliseconds. The alarm mode must be set to `spec1` or `spec2` for scan duration to take effect. The default value is 300.
- Scan Frequency** Defines the frequency of the audible alarm on the terminal in Hertz. The alarm mode must be set to `spec1` or `spec2` for frequency to take effect. The default value is `zero (0)`, which represents the factory set default frequency considered to be optimum for the particular model of terminal.
- Allow Multiple** Enables/disables processing of multiple alarm commands.

Printer Group

- Type** Defines the type of printer attached to the terminal. Default value is `none`. Values are `none`, `ps1000`, `ps1001`, `ps1004`, `monarch`, `pddumb`, `comtec`, `codewriter`, `comtec(s)`, and `rascal`.
- Init Object** Associates an object that contains printer commands for transmission to the terminal immediately after the terminal establishes a session with the handler. If the printer type is set to `none`, the object is not sent to the terminal. The default value is `blank`. Field values are limited to the available printer objects created.

Note: This object limited to a maximum of 4,000 characters.

Formatter Group

- Formatter Object** Associates an object created with the Screen Formatting utility. The default value is `blank`. Field values reflect the objects created by the screen formatter.
- Alternate Key** Defines the key to be transmitted with a scanner operation when associated with a formatter object.

Dialog Objects

- Dialog Object** Defines the dialog object. The default value is `blank` and values for this field are created through the Dialog Object editor.

Timers Group

- Radio** Defines the time, in seconds, that the terminal waits for a response from the host application. After the time is exceeded, an error message is displayed on the terminal. The default value is 120.
- Power** Defines the time, in seconds, in which inactivity results in a power saving shutdown of the terminal power. The default value is 300.
- Backlight** Defines the time, in seconds, that the display back light remains on after keyboard or scanner input. The default value is `zero (0)`.

VTERM Handler Setup Options - Advanced

The following tables describes the options on page 2 of the VTERM Handler Setup screen. Note that not all options are supported by all terminal types. Refer to the *Release Notes* and *PowerNet Supported Equipment Reference Manual* for exceptions.

VTERM Handler Setup - ADVANCED			Page 2
[Shipping]			
Keyboard		Display	Relocation
Mapping Object [sample1]		Mapping Object []	Source [0]
Macro Object []		Language [english]	Destination [0]
Scanner		Reverse Video [on]	Row Count [0]
Length Check [off]		Cursor [hard]	Move Blank [no]
Truncation [off]		Attribute Mask [16]	Log Levels
Stripping [off]		Field Mask [255]	General [9]
Binary-128 [off]		Blink Mask [8]	Display [9]
Scanner Type [Laser]		Double High [no]	Formatter [9]
Scanner Objects		Double Wide [no]	Dialog [9]
Data Mapping []		RF Polling	
Data Editor []		Initial [0]	
Decoder Control []		Final [10]	
Host Interface		Switch [11]	
Mode [block]		AP Polling	
Serial [no]		Primary/Min [2]	
Local Key Proc [yes]		Max [0]	
Half Duplex [off]		Algorithm [0]	
Collection Time [100]			
Answerback []			
<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL>=PGUP <CTRL><F>=PGDN			

Use the following values to make any changes.

Keyboard Objects Group

Mapping Object Associates a keyboard mapping object.

Macro Object Associates a keyboard macro object.

Scanner Options Group

Length Check Enables/disables local terminal field length checking. A value of `on` causes an error message to be generated locally at the terminal if scanned input is greater than the length of the field or if an attempt to enter a non-control key (enter, tab, arrows, function keys, etc.) is made after the field is filled. A value of `on` also disables “Auto Send” key operation (See Keyboard Options Group) and the Truncation option. The default value is `off`.

Truncation Enables/disables the truncating of scanned inputs to the length of the input field. This option is not applicable if the Length Check option is set to `on`. The default value is `off`.

Stripping Strips trailing spaces and/or underscore characters from scanned input. The default value is `off`. The options are `off`, `space`, `score`, and `both`.

Binary-128 Enables/disables the processing of binary code 128 bar codes on the terminal. The default value is `off`.

Scanner Type Defines scanner type. Available values are `Laser`, `Contact/P`, `Contact/NP`, `Auto/P`, `Auto/NP`, or `WandSim`.

Scanner Objects Group

Data Mapping Associates a scanner data mapping object.

Data Editor Associates an object created with the Scan Editor (see PowerNet Scan Editor Reference Manual).

Decoder Control Associates a scanner decoder control object.

Host Interface Options Group

Mode Sets the communications mode. The options are `block` or `char`. When set to `char`, the terminal transmits on each keystroke. When set to `block`, the terminal transmits only when a control key is pressed. Control keys are **ENTER**, **TAB**, **PF** keys, or other keys as defined in the keyboard mapping object as `xmit` functions. The default value is `block`.

Serial Enables/disables serial line connection to host (refer to Serial Connection Setup later in this chapter). The default value is `no`.

Local Key Proc Enables/disables local processing of editing keys, such as backspace. The default value is `yes`. The value should be set to `no` if `Mode` is set to `char`.

Half Duplex Enables local echo of keypad and scanner input. Default value is `off`.

Collection Time Specifies milliseconds handler waits for host application to settle before assembling a transmission to the terminal. Default value is 100. Should be set to 50 if `Mode` is `char`.

Answerback Specifies response to answer-back request (CTRL-E). Octal escape sequences (`\nnn`) may be used to represent non-graphic characters. The sequence `"$1"` substitutes the terminal IP address.

Display Options Group

Mapping Object Associates a display mapping object

Language Defines the character set used for terminal error message displays. The default value is `English`. Available selections for this field originate from the file `u_msgs.txt` (refer to Chapter 8).

Reverse Video Enables/disables the display of the reverse video attribute on the terminal display. The default value is `on`.

Cursor Defines how the cursor is displayed on the terminal. The default value is `hard`, which displays a blinking block cursor. A value of `hide` eliminates the cursor, and `soft` results in a software generated cursor, which displays the current keyboard state (shifted, control pressed, etc.).

- Attribute Mask** Specifies a decimal value used to mask the character attributes converted to reverse video. The value represents the decimal equivalent of the appropriate bit pattern. The decimal equivalents for each video attribute are as follows: Bold=1 Dim=2 Underline=4 Blink=8 Reverse=16. For example, a value of 6 indicates underline and dim attributes. The default value is 255, which means any video attribute encountered is displayed as reverse video.
- Field Mask** Specifies a decimal value used to mask character attributes for the purpose of defining input fields for block mode operation (See Host Interface Options Group). The default value is 255, which means that any video attribute encountered at the current cursor position is to be treated as an input field. The length of the field is the number of consecutive columns with the video attribute.
- Blink Mask** Specifies a decimal value used to mask character attributes that result in blinking on the terminal display. Default is zero (0).
- Double High** Enables/disables double high display of characters on the terminal. Default is no.
- Double Wide** Enable/disables double wide display of characters on the terminal. Default is no.

RF Polling Options Group (Spectrum One only)

- Initial** Defines the initial rate, in DOS clock ticks, between polls immediately following a wireless transmission from the terminal. The default value is 4 (approximately 75 milliseconds). Larger values increase battery life and response times.
- Final** Defines the final rate, in DOS clock ticks, between polls after a transmission from the terminal. The default value is 32 (approximately 2 seconds).
- Switch** Defines the time, in seconds, for switching between the *Initial* and *Final* poll rates. The default value is 10 (10 seconds).

AP Polling Options Group (Access Point Networks)

- Primary/Min** Defines the initial time between polls immediately following a transmission from the terminal, in 100ms increments. The default value is 2 (200 milliseconds).
- Max** Defines the maximum poll rate, in 100ms increments, between polls after a transmission. Only applies if a polling algorithm is applied. The default value is 0.
- Algorithm** Defines the access point beacon algorithm. Beacons are broadcast every 100ms, so a value of 1 selects 10 polls per second. When the field is set to 0, it uses the value *Primary/Min* as the poll rate. 1 provides best performance where 10 provides the best power saving.

A value of 11 or above selects a dynamic algorithm that varies from the value set in the `Primary/Min` field to the `Max` fields as defined above. When set to 11, the terminal uses the `Primary/Min` value as the beacon poll rate when there is network traffic for the terminal and `Max` as the rate when there is none. Default is `zero (0)`. Value should not exceed the manufacturer's recommended value.

Relocation Group

- Source** Defines the starting row (zero-based) in the host display that is relocated to the `Destination` row of the host display. The default value is `zero (0)`.
- Destination** Defines the starting row (zero-based) in the host display where the starting `Source` row is located. The default value is `zero (0)`.
- Row Count** Specifies the number of host display rows to be relocated, starting with the row defined by the `Source` option and continuing from top to bottom of the display. A value of 0 disables row relocation, which is the default.
- Move Blank** Enables/disables row relocation based on the absence of non-blank data in the host display area to be relocated. Blank data is defined as null or space characters.

Log Level Group

- General** Defines the general logging level. There are 10 log levels, from 0 to 9, with a level of 9 collecting the most information. The default value is 1.
- Display** Defines the level of logging for host and terminal display logging. A level higher than 7 results in a hex dump of the displays. The default value is `zero (0)`.
- Formatter** Defines the level of logging for the screen formatting routines. The default value is `zero (0)`.
- Dialog** Defines the level of logging for dialog routines. The default value is `zero (0)`.

Setting Up a Serial Connection

The VT/HP emulation may be configured to access a host system via direct serial connections. In the case of OpenAir systems, one of the multi-port adapters must be present because the available serial ports are pre-set according to the characteristics of the installed multi-port adapter.

The setup procedure consists of 3 steps:

- Set the `VTERM Handler Serial` option to `yes` on the `VTERM Handler Setup` screen. (Refer to `Setting up the VTERM Handler` in this chapter.)
- Access the `Port Setup` option of the `VTERM` submenu and define the serial ports.
- Access the `Serial Setup` option of the `VTERM` submenu and assign terminal addresses to the serial ports.

1. Select **VTERM** from the Main Menu.

```
Linux                               OpenAir Linux

Main Menu
1. Operations
  VTERM
    1 Port Setup
    2 Serial Setup
    3 VT100 Emulation
    4 VT220 Emulation
    5 HP700-92 Emulation

<ESC>=QUIT  <ARROWS>=MOVE  <ENTER>=SELECT
```

2. Select **Serial Setup** from the **VTERM** submenu to access all configuration parameters for the emulation. The Port Setup screen appears.

```
Port Setup Page 1

Port  Type  Device                               Port  Type  Device
P1   [COM]  [/dev/ttyila ] P17  [DIGI][none ]
P2   [COM]  [/dev/ttyilb ] P18  [DIGI][none ]
P3   [COM]  [/dev/ttyilc ] P19  [DIGI][none ]
P4   [COM]  [/dev/ttyild ] P20  [DIGI][none ]
P5   [COM]  [/dev/ttyile ] P21  [DIGI][none ]
P6   [COM]  [/dev/ttyilf ] P22  [DIGI][none ]
P7   [COM]  [/dev/ttyilg ] P23  [DIGI][none ]
P8   [COM]  [/dev/ttyilh ] P24  [DIGI][none ]
P9   [DIGI][none ] P25  [DIGI][none ]
P10  [DIGI][none ] P26  [DIGI][none ]
P11  [DIGI][none ] P27  [DIGI][none ]
P12  [DIGI][none ] P28  [DIGI][none ]
P13  [DIGI][none ] P29  [DIGI][none ]
P14  [DIGI][none ] P30  [DIGI][none ]
P15  [DIGI][none ] P31  [DIGI][none ]
P16  [DIGI][none ] P32  [DIGI][none ]

<ESC>=QUIT  <SPACE>=CHANGE  <ARROWS>=MOVE  <CTRL><B>=PGUP  <CTRL><F>=PGDN
```

Port Values of P1 to P64, representing a maximum of 64 ports.

Type Set to COM for the purposes of serial VTERM. OpenAir systems set to DIGI, indicating Digiboard multi-port adapter.

Device Serial device as installed on the system in the /dev directory.

3. Type the device names (Installation of multi-port adapters on customer-supplied systems requires reference to the manufacturer's documentation for device names.)

After the ports have been defined, the last two octets of the terminal IP address must be associated with a specific serial port.

4. Type the last 2 octets of the terminal IP address under Terminal.

```

                                VTERM Serial Port Setup

Port Terminal Speed DPS      Port Terminal Speed DPS
[P1 ][67.169 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P2 ][67.170 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P3 ][67.171 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P4 ][67.172 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P5 ][67.173 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P6 ][67.174 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P7 ][67.175 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[P8 ][67.176 ][19200][8N1]  [OFF][          ][9600 ][8N1]
[OFF][          ][9600 ][8N1]  [OFF][          ][9600 ][8N1]
[OFF][          ][9600 ][8N1]  [OFF][          ][9600 ][8N1]
[OFF][          ][9600 ][8N1]  [OFF][          ][9600 ][8N1]
[OFF][          ][9600 ][8N1]  [OFF][          ][9600 ][8N1]
[OFF][          ][9600 ][8N1]  [OFF][          ][9600 ][8N1]

<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE

```

Port Values of P1 to P64.

Terminal Last 2 octets of the terminal IP address.

Speed Baud rate ranging from 300 to 38,400.

DPS Databits (7-8), Parity (Odd,Even,None), Stopbits (1,2).

Formatting Screens

The screen capture emulators are used to capture host screens for use with the screen formatter.

1. Select **VTERM** from the Main Menu.

```

                                OpenAir Linux

Main Menu
1 Operations
2 Access Point
  VTERM
    1 Port Setup
    2 Serial Setup
    *3 VT100 Emulation
    4 VT220 Emulation
    5 HP700/92 Emulation

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

2. Select one of the **Emulations** from the **VTERM** submenu. After selecting an emulation, a message appears at the bottom of the screen showing the terminal emulation selected, along with the key to press for emulator functions. A sample of this screen is shown below.

```

Full screen "vt100" emulation
Use <CTRL><Y> for pop-up menu

Press ENTER to continue

```

3. Press **ENTER** to continue. The emulator session begins with a system prompt.

4. Type **Telnet**, **rlogin**, or the local application execution as needed. The following example shows an application (rscan) and the window that results by pressing **CTRL+Y**.

```
RF SCAN DEMO
-----
Q-to quit
```

Object	
* 1	Snapshot
2	Object
3	Help
4	sHell
5	sTatus
6	eXit

2. Choose the **Object** option to specify an object to store the captured screens for later use with the screen formatter.
3. Choose the **Snapshot** option to capture screens.
4. Choose the **eXit** option to terminate the emulation and return to the **VTERM** submenu.

Chapter 6 • 3270 Terminal Emulation

The first two sections of this chapter describe how to set up the 3270 handler for connection to a Telnet host. A detailed description of the setup options is provided in the following sections.

Setting Up the TN3270 Handler

1. Select **Access Point** from the **Main Menu**.

```
Linux                               OpenAir Linux

Main Menu
Access Point
  2 AP Discover
  3 AP Setup
  4 MAC/IP List
  *5 Host List
  6 Terminal Control
  7 Diagnostics
  8 Performance Report

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Host List** from the **Access Point** submenu to access all configuration parameters for the emulation. The **Host List Setup** screen appears.

```
Host List Setup

Menu Name      Handler  Active  Custom Options
[Shipping      ] [TN3270 ] [yes] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [

<ESC>=QUIT <ARROWS>=MOVE
```

- Menu Name** Up to 12 alphanumeric characters to be displayed on the Twin Client terminal screen as part of the Host List menu.
- Handler** Specifies the operating characteristics of the program that processes terminal session traffic. TN3270 is the 3270 emulator for Telnet connections.
- Active** Specifies whether or not the handler is available to the Twin Client terminal.
- Custom Options** This field is used for special emulator startup options. Refer to Release Notes.

3. Move the cursor to the TN3270 handler field using the **ARROW** keys. Press **ENTER** to display page 1 of the **3270 Handler Setup** form.

```

      [Shipping  ]      3270 Handler Setup - EXPRESS      Page 1

Keyboard                      Alarm                      Formatter
  End Key [pf10 ]      Mode [bell ]      Object [      ]
  Hot Key [pf1  ]      Volume [hi  ]      Alt. Key [noop ]
Auto Send Key [tab ]      Duration [150 ]      Dialog
  Key Click [on  ]      Frequency [0   ]      Object [DFLT ]
Case Conversion [none ]  Scan Duration [300 ]  Timers
Scanner                      Scan Frequency [0   ]  Radio [120]
  Send Key [enter ]  Allow Multiple [yes]  Power [300]
Length Check [off]      By Attribute [off]  Backlight [0  ]
Truncation [off]        Protected [no  ]      TN3270
LXE Option [off]        Unprotected [no ]  Host Number [0]
Scan Ahead [1]          Printer
Display                      Type [none  ]
Quadrant Mode [on  ]      Init Object [      ]
  Lock Row [0  ]          Flag Byte [0  ]
  Lock Column [0 ]        Flag Row [0  ]
  Scroll Mode [full]      Flag Column [0 ]
Wait Message [on  ]      Clear Key [noop ]

<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL><B>=PGUP <CTRL><F>=PGDN

```

Setting up Telnet

The default 3270 handler configuration requires no changes to establish a host connection. However, a host name must be associated with the TN3270 Host Number field shown at the bottom of the last column in the **3270 Handler Setup** screen. The field value can be in the range of 0 to 7, allowing for up to eight associations. The association between the number and a host name is accomplished from the **TN3270** submenu.

1. Select **TN3270** from the **Main Menu**.


```

Linux                               OpenAir Linux

Main Menu
1 Operations
2 Access Point
TN3270
*1 Setup
2 Emulator

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

2. Select **Setup** from the **TN3270** submenu to access the TN3270 Setup screen.

```

                               TN3270 Setup

                               Hosts
0 [as400      ] 4 [          ]
1 [          ] 5 [          ]
2 [          ] 6 [          ]
3 [          ] 7 [          ]

```

The **Hostname** must correspond to a name defined in the **TCP/IP Addresses Setup** form as described in Chapter 3. In the case of OpenAir Linux on customer-supplied equipment, the name must match one found in the `/etc/hosts` file.

3. Using the **ARROW** keys, move the cursor to the **Hosts** field on the **TN3270 Setup** screen.
4. Type a host name after 0.
5. Press **ESC** and save the changes.

Testing the Connection

The full-screen 3270 emulator is used to test the connection.

```

Linux                               OpenAir Linux

Main Menu
1 Operations
2 Access Point
TN3270
1 Setup
*2 Emulator

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

1. Select **Emulator** from the **TN3270** submenu to access the **Select Emulator** screen.

```

                               Select Emulator

1. Diagnostic
2. Standard
Selection: 1
Enter Host Number (0-7): 0

Emulator help key is CTRL-Y. Press ENTER to continue

```

2. Select the **Diagnostic** emulator and Host Number 0.
3. Use the help key, **CTRL+Y**, to find 3270 keyboard mapping information for the diagnostic emulator.

4. Press **ENTER** to save the information you have entered.
5. Type **CTRL+X** to terminate the emulator session and return to the TN3270 submenu.

After successfully accessing the **Host Signon** screen, the system is now ready to establish Telnet 3270 sessions for PowerNet Twin Client terminals.

TN3270 Handler Setup Options - Express

The following table describes the setup fields on page 1 of the 3270 Handler Setup screen. Note that not all options are supported by all terminal types. Refer to the Release Notes and *PowerNet Supported Equipment Reference Manual* for exceptions.

Keyboard Options Group

- | | |
|------------------------|--|
| End Key | The key that, when transmitted by the terminal, terminates both the host connection and the wireless session. Default value is F10 . |
| Hot Key | Key that allows the user to transfer between sessions. Default value is <code>noop</code> , which disables Hot Key processing. |
| Auto Send Key | The key that is generated automatically when an input field on the terminal is filled with keyed input (as opposed to scanned input). The default value is <code>noop</code> , which disables key generation. If the Length Check option in the Scanner Options Group is set to <code>on</code> , this function is disabled. |
| Key Click | Enables/disables key clicks on the terminal. Default value is <code>on</code> . |
| Case Conversion | Controls conversion of keyboard input to upper or lower case. Applications may be case-sensitive or case-insensitive. Select the required case, <code>upper</code> or <code>lower</code> , and all alphabetic characters sent from the terminal are in that case. Select <code>none</code> , if the application is case-insensitive. Default value is <code>none</code> , meaning no conversion takes place. |

Scanner Options Group

- | | |
|---------------------|---|
| Send Key | Select the key function that is sent to the host after a bar code is scanned. The key is not pressed, but is sent automatically after the scanned data. The default value is <code>enter</code> . This function is disabled by setting the value to <code>noop</code> . |
| Length Check | Enables/disables local terminal field length checking. A value of <code>on</code> causes an error message to be generated locally at the terminal if scanned input is greater than the length of the field or if an attempt to enter a non-control key (ENTER , TAB , ARROWS , function keys, etc.) is made after the field is filled. A value of <code>on</code> also disables “Auto Send” key operation (See Keyboard Options Group) and the Truncation option (see below). The default value is <code>off</code> . |
| Truncation | Enables/disables the truncating of scanned inputs to the length of the input field. This option is not applicable if the Length Check option is set to <code>on</code> . The default value is <code>off</code> . |
| LXE Option | Enables/disables compatibility with applications designed to use the LXE rule for generating the Send Key. That is, if an EBCDIC hexadecimal value of 5C (asterisk) is present within 4 character positions from the end of an input field, then the 3270 AID key ENTER is automatically |

generated when data is scanned into the field. Default value is `off`.

Scan Ahead Sets the number of scans that is buffered in the terminal. Values range from 0 to 24. The default is 1. Set to 0, scan ahead is disabled and you cannot scan again until the host response has been received. Set to 1, there is no scan ahead limit. Set to 2 and above, and the software will let you scan that many times until a host response is received. So if you set it for 3, it will allow you to scan only 2 more times before the host responds to the first scan.

Display Options Group

Quadrant Mode Quadrant refers to the division of the application display area (normally 24-by-80) into terminal-size windows aligned with the upper-left corner of the application. For example, a 12-by-40 terminal display would result in 4 quadrants.

Off: Disables quadrant processing. The window is positioned vertically centered on the input field or cursor row and horizontally on the cursor column or beginning of the input field, favoring placement near the left margin of the terminal display. Manual viewing keys are enabled.

On: Enables quadrant processing, except when an input field is detected and crosses a quadrant boundary, in which case the display is shifted horizontally to include as much of the input field to the right of the starting position as possible. Manual viewing keys are enabled. This is the default value.

Soft: Enables quadrant processing without exception. Viewing keys are enabled.

Hard: Enables quadrant processing without exception. Viewing keys disabled.

Lock: Disables quadrant processing. The terminal window is locked to specified row and column coordinates (see Lock Row and Lock Column below). Viewing keys are disabled.

Lock Row Defines the Y coordinate for display position locking. Range is zero (0) to the maximum number of rows on the host screen. Default value is `zero (0)`. Effective only when Quadrant Mode is set to lock.

Lock Column Defines X coordinate for display position locking. Range is zero (0) to the maximum number of columns on the host screen. Default value is `zero (0)`. Effective only when Quadrant Mode is set to lock.

Scroll Mode Defines scrolling method used when using the viewing keys. A value of `half` means that the terminal display is moved in half screen increments, it scrolls up/down 2 rows, and left/right 8 columns. A value of `full` means that the terminal display is moved in full screen increments, and if selected for a 4 by 16 screen, the screen scrolls up/down 4 rows and left/right 16 columns. Default value is `full`.

Wait Message Enables/disables the display of the `waiting for data` message on the terminal after the time period set for the Radio in the Timer Options Group. The default value is `on`.

Alarm Options Group

Mode Defines the operation of the audible alarm and scanner light on the terminal. The default value is `bell`.

Off disables the audible alarm.

Bell enables the audible alarm as a double beep.

Flash enables the scan indicator light as the alarm with no audible alarm.

Both enables the double beep and the scan indicator light as the alarm.

Spec1 enables the audible alarm as a single beep.

Spec2 enables a single beep and the scan indicator light as the alarm.

- Volume** Defines the volume of the audible alarm on the terminal. Default value is `hi`.
- Duration** Defines the duration of the audible alarm on the terminal in milliseconds. The alarm mode must be set to `spec1` or `spec2` for duration to take effect. The default value is `150`.
- Frequency** Defines the frequency of the audible alarm on the terminal in Hertz. The alarm mode must be set to `spec1` or `spec2` for frequency to take effect. The default value is `zero (0)`, which represents the factory set default frequency considered to be optimum for the particular model of terminal.
- Scan Duration** Defines the duration of the audible alarm generated by a scan operation on the terminal, in milliseconds. The alarm mode must be set to `spec1` or `spec2` for scan duration to take effect. The default value is `300`.
- Frequency** Defines the duration of the audible alarm generated by a scan operation on the terminal, in milliseconds. The alarm mode must be set to `spec1` or `spec2` for scan duration to take effect. The default value is `300`.
- Allow Multiple** Enables/disables processing of multiple alarm commands.

Printer Options Group

- Type** Defines the type of printer attached to the terminal. Default value is `none`. Values are `none`, `ps1000`, `ps1001`, `ps1004`, `monarch`, `pddumb`, `comtec`, `codewriter`, `comtec(s)`, and `rascal`. The default value is `none`.
- Init Object** Associates an object that contains printer commands for transmission to the terminal immediately after the terminal establishes a session with the handler. If the printer type is set to `none`, the object is not sent to the terminal. The default value is `blank`. Field values are limited to the available printer objects created.
- Note:** This object is limited to a maximum 4,000 characters.
- Flag Byte** Decimal value of the ASCII character that, if present on the display at the location indicated by Flag Row and Flag Column, initiates output to the printer port on the terminal. All characters following the flag byte and up to, but not including the next occurrence of the flag byte, are transmitted to the printer port. For example, the EBCDIC display character for 9 is hexadecimal 'F9' and is translated to the ASCII hexadecimal '39', which converts to a decimal value of 57. The default value is `zero`, which disables this facility.
- Flag Row** Zero-based row location of Flag Byte. Range is 0-23.
- Flag Column** Zero-based column location of Flag Byte. Range is 0-79.
- Clear Key** Defines 3270 AID key to be sent after the print data has been extracted from the host presentation screen and sent to the printer.

Formatter Objects Group

- Formatter Object** Associates an object created with the Screen Formatting utility. The default value is `blank`. Field values are limited to the available formatter objects created using the screen formatter utility.
- Alternate Key** Defines the key to be transmitted with a scanner operation when associated with a formatter object.

Dialog Objects

- Dialog Object** Defines the dialog object. The default value is `blank` and values for this field are created through the dialog object editor.

Timers Options Group

- Radio** Defines the time, in seconds, that the terminal waits for a response from the host application. After the time is exceeded, an error message is displayed on the terminal. The default value is `120`.
- Power** Defines the time, in seconds, in which inactivity results in a power saving shutdown of the terminal power. The default value is `300`.
- Backlight** Defines the time, in seconds, the display backlight remains on after keyboard or scanner input. The default value is `zero(0)`.

TN3270 Option

- Host Number** Associates this host list entry with a TCP/IP node defined in the TN3270 submenu, Setup option.

TN3270 Handler Setup Options – Advanced

The following tables describe the options on page 2 of the TN3270 Handler Setup screen.

[Shipping]		3270 Handler Setup Advanced		Page 2
Keyboard		Display		Relocation
Mapping Object []		Mapping Object []		Source [0]
Auto EOF [off]		Language [english]		Destination [0]
Attribute Key		Reverse Video [on]		Row Count [0]
Key [noop]		Default Data [off]		Move Blank [no]
Scan Field [off]		Cursor [hard]		Keepalive
Keyed Field [off]		Double High [no]		Minutes [30]
Last Field Keys		Double Wide [no]		Send Key [noop]
Scanned Input [noop]		RF Polling		Log Levels
Keyed Input [noop]		Initial [4]		General [4]
Multiple Fields [yes]		Final [32]		Display [0]
Scanner		Switch [10]		Formatter [3]
Stripping [off]		AP Polling		Dialog [0]
Binary-128 [off]		Primary/Min [2]		Datastream [0]
Scanner Type [Laser]		Max [0]		
Scanner Objects		Algorithm [0]		
Data Mapping []				
Data Editor []				
Decoder Control []				
<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL>=PGUP <CTRL><F>=PGDN				

Keyboard Options Group

- Mapping Object** Associates a keyboard mapping object.
- Auto EOF** Enables/disables automatic generation of the EOF key prior to entry of new data into an input field. Default is `off`.

Attribute Key Options Group

- Key** Specifies the keystroke generated by scanned or keyed input when the field attribute (see below) is present and enabled. The selections are `pf1-pf24`, `pa1-pa3`, `enter`, `tab`, `baktab`, `clear`, `sysreq`, `e_eof`, `reset`, `noop` and `attn`. The default value is `noop`, which disables this function.
- Scanned Field** Specifies the 3270 field attribute that causes **Key** to be generated for scanned input. The default value is `off`. Available values for this field are `off`, `pen`, `num`, and `hi`.
- Keyed Field** Specifies the 3270 field attribute that causes **Key** to be generated for keyed input. The default value is `off`. Available values for this field are `off`, `pen`, `num`, and `hi`.

Last Field Keys Options Group

- Scanned Input** Specifies the keystroke generated when the current field is the last field (ordering is left to right, top to bottom) and input is from the scanner. The default value is `noop`, which disables this function. The selections are `pf1-pf24`, `pa1-pa3`, `enter`, `tab`, `baktab`, `clear`, `sysreq`, `e_eof`, `reset`, `noop` and `attn`.
- Keyed Input** Specifies the keystroke generated when the current field is the last field (ordering is left to right, top to bottom) and the input is from the keypad. The default value is `noop`, which disables this function. The selections are `pf1-pf24`, `pa1-pa3`, `enter`, `tab`, `baktab`, `clear`, `sysreq`, `e_eof`, `reset`, `noop` and `attn`.
- Multiple Fields** A value of `yes` specifies that last field processing takes place when multiple input fields are present, in which case the ordering for last field determination is left to right, top to bottom. A value of `no` specifies that last field processing is disabled when more than one input field is present. The default value is `yes`.

Scanner Options Group

- Stripping** Strips trailing spaces and/or underscore characters from scanned input. The default value is `off`. The options are `off`, `space`, `score`, and `both`.
- Binary-128** Enables/disables the processing of binary code 128 bar codes on the terminal. The default value is `off`.
- Scanner Type** Defines scanner type. Available values are `Laser`, `Contact/P`, `Contact/NP`, `Auto/P`, `Auto/NP`, **or** `WandSim`.

Scanner Objects Group

- Data Mapping** Associates a scanner data mapping object.
- Data Editor** Associates an object created with the Scan Editor (see PowerNet Scan Editor Reference Manual).
- Decoder Control** Associates a scanner decoder control object.

Display Options Group

- Mapping Object** Associates a display mapping object
- Language** Defines the character set used for terminal error message displays. The default value is `english`. Available selections for this field originate from the file `u_msgs.txt` as described in Chapter 8.
- Reverse Video** Enables/disables the display of the reverse video attribute on the terminal display. The default value is `on`.
- Default Data** Enables/disables the display of the reverse video attribute on the terminal display. The default value is `on`.
- Cursor** Defines how the cursor is displayed on the terminal. The default value is `hard`, which displays a blinking block cursor. A value of `hide` eliminates the cursor, and `soft` results in a software-generated cursor, which displays the current keyboard state (shifted, control pressed, etc.).
- Double High** Enables/disables double high display of characters on the terminal. Default is `no`.
- Double Wide** Enable/disables double wide display of characters on the terminal. Default is `no`.

RF Polling Options Group (Spectrum One)

- Initial** Defines the initial rate, in DOS clock ticks, between polls immediately following a wireless transmission from the terminal. The default value is 4 (approximately 75 milliseconds). Larger values increase battery life and response times.
- Final** Defines the final rate, in DOS clock ticks, between polls after a transmission from the terminal. The default value is 32 (approximately 2 seconds).
- Switch** Defines the time, in seconds, for switching between the Initial and Final poll rates. The default value is 10 (10 seconds).

AP Polling Options Group (Access Point Networks)

- Primary/Min** Defines the initial time between polls immediately following a transmission from the terminal, in 100ms increments. The default value is 2 (200 milliseconds).
- Max** Defines the maximum poll rate, in 100ms increments, between polls after a transmission. Only applies if a polling algorithm is applied. The default

value is 0 .

Algorithm Defines the access point beacon algorithm. Beacons are broadcast every 100ms, so a value of 1 selects 10 polls per second. When the field is set to 0, it uses the value Primary/Min as the poll rate. 1 provides best performance where 10 provides the best power saving. A value of 11 or above selects a dynamic algorithm that varies from the value set in the Primary/Min field to the Max fields as defined above. When set to 11, the terminal uses the Primary/Min value as the beacon poll rate when there is network traffic for the terminal and Max as the rate when there is none. Default is 0. Value should not exceed the manufacturer's recommended value.

Relocation Options Group

- Source** Defines the starting row (zero-based) in the host display that is relocated to the Destination row of the host display. Default value is zero (0) .
- Destination** Defines the starting row (zero-based) in the host display where the starting Source row is located. The default value is zero (0) .
- Row Count** Specifies the number of host display rows to be relocated, starting with the row defined by the Source option and continuing from top to bottom of the display. A value of 0 disables row relocation, which is the default.
- Move Blank** Enables/disables row relocation based on the absence of non-blank data in the host display area to be relocated. Blank data is defined as null or space characters.

Keepalive Options Group

The 3270 host system may be configured to deactivate terminal sessions following a period of inactivity. The Keepalive function is used to automatically generate activity.

- Minutes** Specifies the period of inactivity, in minutes, after which the Send Key is automatically generated. Valid data entries are 0-99 minutes. The default value of zero (0) disables this function.
- Send Key** Specifies the keystroke generated automatically after a period of inactivity specified by the Minutes parameter. The default value is `noop`, which disables the Keepalive function. The selections are `pf1-pf24`, `pa1-pa3`, `enter`, `tab`, `baktab`, `clear`, `sysreq`, `e_eof`, `reset`, `noop` and `attn`.

Log Levels Options Group

All terminal handler software routines write error messages to a log file, and all are capable of generating informational messages (see Chapter 8). Although the output format is uniform, the detail and volume of these messages increases as the log level increases. Ten levels (0 to 9) are available. Levels greater than 6 result in the inclusion of communications data in hexadecimal format. A level of 0 limits output to error messages only.

- General** Defines the message detail for general purpose routines, such as session startup and shutdown. The default value is 1.
- Display** Defines the message detail for host and terminal display routines. The default value is zero (0).
- Formatter** Defines the message detail for the screen formatting routines. The default

value is zero (0).

Dialog Defines the message detail for dialog object handling routines. The default value is zero (0).

Datastream Defines the message detail for datastream parsing routines. The default value is zero (0).

The following tables describe the options on page 3 of the TN3270 Handler Setup screen.

```
[Shipping      ]      3270 Handler Setup Advanced      Page 3

Printer
  Start [          ]
  End [          ]
Start Convert [          ]
  End Convert [          ]
VT100 Extension
  Start [          ]
  End [          ]
Printer Convert
  Flag Byte [0    ]
  Conversion [crnl]
  Data Stream
  Send All MDT [yes]
  Send NULL [no  ]

<ESC>=QUIT  <ARROWS>=MOVE  <CTRL><B>=PAGEUP  <CTRL><F>=PAGEDN
```

Printer Group

Start Specifies a unique character sequence that, when encountered in the host display area, indicates that all subsequent characters up to but not including the End character sequence are to be transmitted to the print device. The default value is blank, which disables this print function.

End Specifies a unique character sequence that terminates collection of data from host display area for transmission to the printer attached to terminal.

Start Convert Specifies a unique character sequence within the print data collected with the Start and End options that indicates the subsequent character pairs are hexadecimal values that are converted to binary. The default value is blank, which disables this conversion function.

End Convert Specifies a unique character sequence that terminates binary conversion.

VT100 Extension Group

Start Specifies a unique character sequence that, when encountered within the host display, indicates that all subsequent characters up to but not including the End sequence, are to be interpreted as VT100 Extended Commands (see Chapter 9). The default value is blank, which disables the VT100 Extension function.

End Specifies a unique character sequence that terminates the VT100 Extended Command.

Printer Convert Group

Flag Byte Specifies the ASCII value, in decimal, of a character in the print data (see Printer Group) that will be converted as specified below prior to transmission to the printer. Default value is 0, which disables the function.

Conversion Values are cr (carriage return), lf (linefeed), and crnl .

Data Stream Group

Send All MDT Enable/disable the transmission to the host of all fields with the Modified Data Tag bit set, including protected fields. Note that unprotected (input) fields for which the MDT bit is set are always transmitted. Default is yes.

Send NULL Enable/disable the transmission of NULL (0) characters to the host when they occur within an unprotected (input) field. The default value is no, which disables such transmissions.

Chapter 7 • 5250 Terminal Emulation

The first two sections of this chapter describe how to set up the 5250 handler for connection to a Telnet host. A detailed description of the setup options is provided in the following sections.

Setting Up the TN5250 Handler

1. Select **Access Point** from the **Main Menu**.

```
Linux                               OpenAir Linux

Main Menu
Access Point
  2 AP Discover
  3 AP Setup
  4 MAC/IP List
  *5 Host List
  6 Terminal Control
  7 Diagnostics
  8 Performance Report

<ESC>=QUIT  <ARROWS>=MOVE  <ENTER>=SELECT
```

2. Select **Host List** from the **Access Point** submenu to access all configuration parameters for the emulation. The **Host List Setup** screen appears.

```
Host List Setup

Menu Name      Handler  Active  Custom Options
[Shipping      ] [TN5250 ] [yes] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [
[               ] [NONE   ] [no ] [

<ESC>=QUIT  <ARROWS>=MOVE
```

- Menu Name** Up to 12 alphanumeric characters to be displayed on the Twin Client terminal screen as part of the Host List menu.
- Handler** Specifies the operating characteristics of the program that processes terminal session traffic. TN5250 is the 5250 emulator for Telnet connections.
- Active** Specifies whether or not the handler is available to the Twin Client terminal.

Custom Options This field is used for special emulator startup options. Refer to Release Notes.

3. Move the cursor to the TN5250 handler field using the **ARROW** keys. Press **ENTER** to display page 1 of the **5250 Handler Setup** form.

```

[Shipping ]          5250 Handler Setup - EXPRESS          Page 1

Keyboard
  End Key [pf10 ]
  Hot Key [pf1 ]
  Auto Send Key [tab ]
  Key Click [on ]
Case Conversion [none ]
Scanner
  Send Key [enter ]
  Scan Ahead [1]
Display
  Quadrant Mode [on ]
  Lock Row [0 ]
  Lock Column [0 ]
  Scroll Mode [full]
  Wait Message [on ]

Alarm
  Mode [bell ]
  Volume [hi ]
  Duration [150 ]
  Frequency [0 ]
  Scan Duration [300 ]
  Scan Frequency [0 ]
  Allow Multiple [yes]
  Printer
  Type [none ]
  Init Object [ ]
  Flag Byte [0 ]
  Flag Row [0 ]
  Flag Column [0 ]
  Clear Key [noop ]

Formatter
  Object [ ]
  Alt. Key [noop ]
  Dialog
  Object [DFLT ]
  Timers
  Radio [120]
  Power [300]
  Backlight [0 ]
  TN5250
  Host Number [0]

<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL><B>=PGUP <CTRL><F>=PGDN

```

Setting Up Telnet

The default 5250 handler configuration requires no changes to establish a host connection. However, a host name must be associated with the TN5250 Host Number field shown at the bottom of the last column in the **5250 Handler Setup** screen. The field value can be in the range of 0 to 7, allowing for up to eight associations. The association between the number and a host name is accomplished from the **TN5250** submenu.

1. Select **TN5250** from the **Main Menu**.

```

Linux          OpenAir Linux

Main Menu
1 Operations
2 Access Point
TN5250
*1 Setup
2 Emulator

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

2. Select **Setup** from the **TN5250** submenu to access the TN5250 Setup screen.

```

                                TN5250 Setup

                                Hosts
0 [as400           ] 4 [           ]
1 [           ] 5 [           ]
2 [           ] 6 [           ]
3 [           ] 7 [           ]

```

The **Hostname** must correspond to a name defined in the **TCP/IP Addresses Setup** form as described in Chapter 3. In the case of OpenAir Linux on customer-supplied equipment, the name must match one found in the `/etc/hosts` file.

- Using the **ARROW** keys, move the cursor to the **Hosts** field on the **TN5250 Setup** screen.
- Type a host name after 0.
- Press **ESC** and save the changes.

Testing the Connection

The full-screen 5250 emulator is used to test the connection.

```

Linux                               OpenAir Linux

Main Menu
1 Operations
2 Access Point
  TN5250
    1 Setup
    *2 Emulator

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

- Select **Emulator** from the **TN5250** submenu to access the **Select Emulator** screen.

```

                                Select Emulator

1. Diagnostic
2. Standard
Selection: 1
Enter Host Number (0-7): 0

Emulator help key is CTRL-Y. Press ENTER to continue

```

- Select the **Diagnostic** emulator and Host Number 0.
- Use the help key, **CTRL+Y**, to find 5250 keyboard mapping information for the diagnostic emulator.
- Press **ENTER** to save the information you have entered.
- Type **CTRL+X** to terminate the emulator session and return to the TN5250 submenu.

After successfully accessing the **Host Signon** screen, the system is now ready to establish Telnet 5250 sessions for PowerNet Twin Client terminals.

TN5250 Handler Setup Options - Express

The following table describes the setup fields on page 1 of the 5250 Handler Setup screen. Note that not all options are supported by all terminal types. Refer to the Release Notes and

PowerNet Supported Equipment Reference Manual for exceptions.

- End Key** The key that, when transmitted by the terminal, terminates both the host connection and the wireless session. Default value is **F10**.
- Hot Key** Key that allows the user to transfer between sessions. Default value is `noop`, which disables Hot Key processing.
- Auto Send Key** The key that is generated automatically when an input field on the terminal is filled with keyed input (as opposed to scanned input). The default value is `noop`, which disables key generation. If the Length Check option in the Scanner Options Group is set to `on`, this function is disabled.
- Key Click** Enables/disables key clicks on the terminal. Default value is `on`.
- Case Conversion** Controls conversion of keyboard input to upper or lower case. Applications may be case-sensitive or case-insensitive. Select the required case, `upper` or `lower`, and all alphabetic characters sent from the terminal are in that case. Select `none`, if the application is case-insensitive. The default value is `none`, meaning no conversion takes place.

Scanner Options Group

- Send Key** Select the key function that is sent to the host after a bar code is scanned. The key is not pressed, but is sent automatically after the scanned data. The default value is `enter`. This function is disabled by setting the value to `noop`.
- Scan Ahead** Sets the number of scans that is buffered in the terminal. Values range from 0 to 24. The default is 1. Set to 0, scan ahead is disabled and you cannot scan again until the host response has been received. Set to 1, there is no scan ahead limit. Set to 2 and above, and the software will let you scan that many times until a host response is received. So if you set it for 3, it will allow you to scan only 2 more times before the host responds to the first scan.

Display Options Group

- Quadrant Mode** Quadrant refers to the division of the application display area (normally 24-by-80) into terminal-size windows aligned with the upper-left corner of the application. A 12-by-40 terminal display would result in 4 quadrants.
- Off:** Disables quadrant processing. The window is positioned vertically centered on the input field or cursor row and horizontally on the cursor column or beginning of the input field, favoring placement near the left margin of the terminal display. Manual viewing keys are enabled.
- On:** Enables quadrant processing, except when an input field is detected and crosses a quadrant boundary, in which case the display is shifted horizontally to include as much input field to the right of the starting position as possible. Manual viewing keys are enabled. This is the default.
- Soft:** Enables quadrant processing without exception. Viewing keys are enabled.
- Hard:** Enables quadrant processing without exception. Viewing keys disabled.
- Lock:** Disables quadrant processing. The terminal window is locked to specified row and column coordinates (see Lock Row and Lock Column

below). Viewing keys are disabled.

- Lock Row** Defines the Y coordinate for display position locking. Range is zero (0) to the maximum number of rows on the host screen. Default value is zero (0). Effective only when Quadrant Mode is set to lock.
- Lock Column** Defines X coordinate for display position locking. Range is zero (0) to the maximum number of columns on the host screen. Default value is zero (0). Effective only when Quadrant Mode is set to lock.
- Scroll Mode** Defines scrolling method used when using the viewing keys.
A value of `half` means that the terminal display is moved in half screen increments, it scrolls up/down 2 rows, and left/right 8 columns.
A value of `full` means that the terminal display is moved in full screen increments, and if selected for a 4 by 16 screen, the screen scrolls up/down 4 rows and left/right 16 columns. Default value is `full`.
- Wait Message** Enables/disables the display of the `waiting for data` message on the terminal after the time period set for the Radio in the Timer Options Group. The default value is `on`.

Alarm Options Group

- Mode** Defines the operation of the audible alarm and scanner light on the terminal. The default value is `bell`.
Off disables the audible alarm.
Bell enables the audible alarm as a double beep.
Flash enables the scan indicator light as the alarm with no audible alarm.
Both enables the double beep and the scan indicator light as the alarm.
Spec1 enables the audible alarm as a single beep.
Spec2 enables a single beep and the scan indicator light as the alarm.
- Volume** Defines the volume of the audible alarm on the terminal. Default value is `hi`.
- Duration** Defines the duration of the audible alarm on the terminal in milliseconds. The alarm mode must be set to `spec1` or `spec2` for duration to take effect. The default value is `150`.
- Frequency** Defines the frequency of the audible alarm on the terminal in Hertz. The alarm mode must be set to `spec1` or `spec2` for frequency to take effect. The default value is `zero (0)`, which represents the factory set default frequency considered to be optimum for the particular model of terminal.
- Scan Duration** Defines the duration of the audible alarm generated by a scan operation on the terminal, in milliseconds. The alarm mode must be set to `spec1` or `spec2` for scan duration to take effect. The default value is `300`.
- Frequency** Defines the duration of the audible alarm generated by a scan operation on the terminal, in milliseconds. The alarm mode must be set to `spec1` or `spec2` for scan duration to take effect. The default value is `300`.
- Allow Multiple** Enables/disables processing of multiple alarm commands.

Printer Options Group

- Type** Defines the type of printer attached to the terminal. Default value is `none`. Values are `none`, `ps1000`, `ps1001`, `ps1004`, `monarch`,

pddumb, comtec, codewriter, comtec(s), and rascal. The default value is none.

Init Object Associates an object that contains printer commands for transmission to the terminal immediately after the terminal establishes a session with the handler. If the printer type is set to none, the object is not sent to the terminal. The default value is blank. Field values are limited to the available printer objects created.

Note: This object is limited to a maximum 4,000 characters.

Flag Byte Decimal value of the ASCII character that, if present on the display at the location indicated by Flag Row and Flag Column, initiates output to the printer port on the terminal. All characters following the flag byte and up to, but not including the next occurrence of the flag byte, are transmitted to the printer port. For example, the EBCDIC display character for 9 is hexadecimal 'F9' and is translated to the ASCII hexadecimal '39', which converts to a decimal value of 57. The default value is zero, which disables this facility.

Flag Row Zero-based row location of Flag Byte. Range is 0-23.

Flag Column Zero-based column location of Flag Byte. Range is 0-79.

Clear Key Defines 5250 AID key to be sent after the print data has been extracted from the host presentation screen and sent to the printer.

Formatter Objects Group

Formatter Object Associates an object created with the Screen Formatting utility. The default value is blank. Field values are limited to the available formatter objects created using the screen formatter utility.

Alternate Key Defines the key to be transmitted with a scanner operation when associated with a formatter object.

Dialog Objects

Dialog Object Defines the dialog object. The default value is blank and values for this field are created through the dialog object editor.

Timers Options Group

Radio Defines the time, in seconds, that the terminal waits for a response from the host application. After the time is exceeded, an error message is displayed on the terminal. The default value is 120.

Power Defines the time, in seconds, in which inactivity results in a power saving shutdown of the terminal power. The default value is 300.

Backlight Defines the time, in seconds, the display backlight remains on after keyboard or scanner input. The default value is zero (0) .

TN5250 Option

Host Number Associates this host list entry with a TCP/IP node defined in the TN5250 submenu, Setup option.

TN5250 Handler Setup Options – Advanced

The following tables describe the options on page 2 of the TN5250 Handler Setup screen.

[Shipping]	5250 Handler Setup Advanced	Page 2
Keyboard	Display	Relocation
Mapping Object []	Mapping Object []	Source [0]
Allow Cursor [yes]	Language [english]	Destination [0]
Scanner	Reverse Video [on]	Row Count [0]
Length Check [off]	Default Data [off]	Move Blank [no]
Truncation [off]	Cursor [hard]	Keepalive
Stripping [off]	Double High [no]	Minutes [30]
Binary 128 [off]	Double Wide [no]	Send Key [noop]
Scanner Type [Laser]	Alarm	Log Levels
Scanner Objects	Alternate [off]	General [4]
Data Mapping []	Row [0]	Display [0]
Data Editor []	Column [0]	Formatter [3]
Decoder Control []	RF Polling	Dialog [0]
	Initial [4]	Datastream [0]
	Final [32]	
	Switch [10]	
	AP Polling	
	Primary/Min [2]	
	Max [0]	
	Algorithm [0]	
<ESC>=QUIT <SPACE>=CHANGE <ARROWS>=MOVE <CTRL>=PGUP <CTRL><F>=PGDN		

Keyboard Options Group

Mapping Object Associates a keyboard mapping object.

Auto EOF Enables/disables automatic generation of the EOF key prior to entry of new data into an input field. Default is `off`.

Scanner Group

Length Check Enables/disables local terminal field length checking. A value of `on` causes an error message to be generated locally at the terminal if scanned input is greater than the length of the field or if an attempt is made to enter a non-control key (**ENTER, TAB, ARROWS, FUNCTION KEYS**, etc.) after the field is filled. A value of `on` also disables Auto Send key operation (See Keyboard Options Group) and the Truncation option (see below). The default value is `off`.

Truncation Enables/disables the truncating of scanned inputs to the length of the input field. This option is not applicable if the Length Check option is set to `on`. The default value is `off`.

Stripping Strips trailing spaces and/or underscore characters from scanned input. The default value is `off`. The options are `off`, `space`, `score`, and `both`.

Binary-128 Enables/disables the processing of binary code 128 bar codes on the terminal. The default value is `off`.

Scanner Type Defines scanner type. Available values are `Laser`, `Contact/P`, `Contact/NP`, `Auto/P`, `Auto/NP`, or `WandSim`.

Scanner Objects Group

- Data Mapping** Associates a scanner data mapping object.
- Data Editor** Associates an object created with the Scan Editor (see PowerNet Scan Editor Reference Manual).
- Decoder Control** Associates a scanner decoder control object.

Display Group

- Mapping Object** Associates a display mapping object
- Language** Defines the character set used for terminal error message displays. The default value is `english`. Available selections for this field originate from the file `u_msgs.txt` as described in Chapter 8.
- Reverse Video** Enables/disables the display of the reverse video attribute on the terminal display. The default value is `on`.
- Default Data** Enables/disables the display of the reverse video attribute on the terminal display. The default value is `on`.
- Cursor** Defines how the cursor is displayed on the terminal. The default value is `hard`, which displays a blinking block cursor. A value of `hide` eliminates the cursor, and `soft` results in a software generated cursor, which displays the current keyboard state (shifted, control pressed, etc.).
- Double High** Enables/disables double high display of characters on the terminal. Default is `no`.
- Double Wide** Enable/disables double wide display of characters on the terminal. Default is `no`.

Alarm Group

- Alternate** Enable/disable audible alarm based upon a single digit displayed at a row and column position specified below. The value of the digit defines the number of audible alarms. The default value is `no`, which disables this function.
- Row** Zero-based row number (0-23)
- Column** Zero-based column number (0-79)

RF Polling Options Group (Spectrum One)

- Initial** Defines the initial rate, in DOS clock ticks, between polls immediately following a wireless transmission from the terminal. The default value is 4 (approximately 75 milliseconds). Larger values increase battery life and response times.
- Final** Defines the final rate, in DOS clock ticks, between polls after a transmission from the terminal. The default value is 32 (approximately 2 seconds).
- Switch** Defines the time, in seconds, for switching between the Initial and Final poll rates. The default value is 10 (10 seconds).

AP Polling Options Group (Access Point Networks)

- Primary/Min** Defines the initial time between polls immediately following a transmission from the terminal, in 100ms increments. The default value is 2 (200 milliseconds).
- Max** Defines the maximum poll rate, in 100ms increments, between polls after a transmission. Only applies if a polling algorithm is applied. The default value is 0.
- Algorithm** Defines the access point beacon algorithm. Beacons are broadcast every 100ms, so a value of 1 selects 10 polls per second. When the field is set to 0, it uses the value Primary/Min as the poll rate.
 1 provides best performance
 10 provides the best power saving.
 11 or above selects a dynamic algorithm that varies from the value set in the Primary/Min field to the Max fields as defined above. When set to 11, the terminal uses the Primary/Min value as the beacon poll rate when there is network traffic for the terminal and Max as the rate when there is none. Default is 0. Value should not exceed the manufacturer's recommended value.

Relocation Options Group

- Source** Defines the starting row (zero-based) in the host display that is relocated to the Destination row of the host display. Default value is zero (0).
- Destination** Defines the starting row (zero-based) in the host display where the starting Source row is located. The default value is zero (0).
- Row Count** Specifies the number of host display rows to be relocated, starting with the row defined by the Source option and continuing from top to bottom of the display. A value of 0 disables row relocation, which is the default.
- Move Blank** Enables/disables row relocation based on the absence of non-blank data in the host display area to be relocated. Blank data is defined as null or space characters.

Keepalive Options Group

The 5250 host system may be configured to deactivate terminal sessions following a period of inactivity. The Keepalive function is used to automatically generate activity.

- Minutes** Specifies the period of inactivity, in minutes, after which the Send Key is automatically generated. Valid data entries are 0-99 minutes. The default value of zero (0) disables this function.
- Send Key** Specifies the keystroke generated automatically after a period of inactivity specified by the Minutes parameter. The default value is `noop`, which disables the Keepalive function. The selections are `pf1-pf24`, `pa1-pa3`, `enter`, `tab`, `baktab`, `clear`, `sysreq`, `e_eof`, `reset`, `noop` and `attn`.

Log Levels Options Group

All terminal handler software routines write error messages to a log file, and all are capable of generating informational messages (see Chapter 8). Although the output format is uniform, the detail and volume of these messages increases as the log level increases. Ten levels (0 to 9) are available. Levels greater than 6 result in the inclusion of communications data in hexadecimal format. A level of 0 limits output to error messages only.

- General** Defines the message detail for general purpose routines, such as session startup and shutdown. The default value is 1.
- Display** Defines the message detail for host and terminal display routines. The default value is zero (0).
- Formatter** Defines the message detail for the screen formatting routines. The default value is zero (0).
- Dialog** Defines the message detail for dialog object handling routines. The default value is zero (0).
- Datastream** Defines the message detail for datastream parsing routines. The default value is zero (0).

The following tables describe the options on page 3 of the TN5250 Handler Setup screen.

[Shipping]	5250 Handler Setup Advanced	Page 3
Printer			
Start	[]	
End	[]	
Start Convert	[]	
End Convert	[]	
VT100 Extension			
Start	[]	
End	[]	
<ESC>=QUIT <ARROWS>=MOVE <CTRL>=PAGEUP <CTRL><F>=PAGEDN			

Printer Group

- Start** Specifies a unique character sequence that, when encountered in the host display area, indicates that all subsequent characters up to but not including the End character sequence are to be transmitted to the print device. The default value is blank, which disables this print function.
- End** Specifies a unique character sequence that terminates collection of data from the host display area for transmission to the printer attached to the terminal.
- Start Convert** Specifies a unique character sequence within the print data collected with the Start and End options that indicates the subsequent character pairs are hexadecimal values that are converted to binary. The default value is blank, which disables this conversion function.
- End Convert** Specifies a unique character sequence that terminates binary conversion.

VT100 Extension Group

- Start** Specifies a unique character sequence that, when encountered within the host display, indicates that all subsequent characters up to but not including the End sequence, are to be interpreted as VT100 Extended Commands (see Chapter 9). The default value is `blank`, which disables the VT100 Extension function.
- End** Specifies a unique character sequence that terminates the VT100 Extended Command.

This page is intentionally blank.

Chapter 8 • Administration

This chapter describes the operation and use of the PowerNet wireless network administration and diagnostic tools. The Wireless View screen and its utilities are used for analyzing and changing the access point network and connected terminal devices.

Using Wireless View

1. Select **Operations** from the **Main Menu**.

```
OpenAir Linux

Main Menu
* 1 Operations
   Operations
   * 1 Wireless View
   2 Access Point Startup
   3 Access Point Shutdown

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Wireless View** from the **Operations** submenu to access the main screen of the **Wireless View** utility.

```
Linux                               Wireless View                               6/17 14:30.45

----- TOPOLOGY -----                               ----- UNIT STATISTICS -----
067.172 067.179
**1 **2 3 4
1 -067.233
2
3
4
5
6
7
8
9
10
11
12
13
14

Known Stations: 0
Tx KBps: 0
Rx KBps: 0

[UNIT] [CONTROL] [LOG] [NETWORK] [HELP] [QUIT]
```

The **Wireless View** screen is divided into four sections, each of which is dynamic in its own right. The **ESC** key returns to the **Main Menu** from any menu option.

- Top: Machine name on the left; date and time in MM/DD HH:mm:ss format on the right. The time and network information are updated automatically every 5 seconds, or whenever a key is pressed.
- Left: Network **Topology** window contains the last two octets of the IP address of the active access points across the top row. Terminals attached to an access point are displayed in the column below it. Use the arrow keys to slide this window.

- Right: **Unit Statistics** are displayed for the currently selected access point or terminal. The format of this section varies according to the type of device selected for analysis.
- Bottom: **Menu** options - These are selected by pressing the first letter of the option, followed by the **ENTER** key. For example, to select the Unit option, the key sequence is **U+ENTER**.

Reviewing Operating Statistics

The **Unit** menu selection from the **Wireless View** screen allows the system administrator to select a specific Access Point or terminal for a review of its current operating statistics.

1. Type **U** and press **ENTER** to select **Unit**. The **Unit** submenu appears.

```

Linux                               Wireless View                               6/17 13:16.07
-----
                                TOPOLOGY
067.132  067.135  067.179  067.209
**1     **2     **3     **4
-----
1      066                -067.233
2
3
4      Unit
5      1 Terminal
6      *2 Access Point
7
8
9
10
11
12
13
14
-----
                                UNIT STATISTICS
                                Terminal: 206.183.067.233
Tx Host Pkts: 0
Tx Bytes: 0
Rx Host Pkts: 0
Rx Bytes: 0
-----
                                <ESC>=QUIT

```

Selecting Access Points

Access points are selected for examination using the Access Point option of the Unit submenu, and then by entering the last two octets of the IP address. A screen similar to the following, showing access point unit statistics, appears.

```

----- UNIT STATISTICS -----
Access Point: 206.183.067.135
MAC Addr: 00A0F88070B8
Network ID: 101
Load: 2
Known Stations: 9
TX Kbps: 0
Rx Kbps: 0

```

- Access Point** IP address
- MAC Addr** Media Access Control (MAC) address
- Network ID** Network ID (vendor-specific)
- Load** Number of wireless terminals connected

Known Stations Number of wireless terminals that the access point has contacted since its activation on the network

TX Kbps Transmit rate in kilobytes-per-second

RX Kbps Receive rate in kilobytes-per-second

Selecting Terminals

1. Select a terminal for examination using the **Terminal** option of the **Unit** submenu.
2. Type the last two octets of the IP address. A screen similar to the following, showing terminal unit statistics, appears.

```
----- UNIT STATISTICS -----  
Terminal: 206.183.067.235  
Tx Host Pkts: 0  
Tx Bytes: 0  
Rx Host Pkts: 0  
Rx Bytes: 0
```

Terminal IP address

Tx Host Pkts Packets received from terminal and sent to host

Tx Bytes Bytes received from terminal and sent to host

Rx Host Pkts Packets sent to terminal

Rx Bytes Bytes sent to terminal

Control Menu

The **Control** menu selection from the **Wireless View** screen allows the system administrator to _____?

1. Type **C** and press **ENTER** to select **Control**. The **Control** submenu appears.

```

Linux                               Wireless View                               06/15 13:22.07
-----
                TOPOLOGY
S0-62      067.135  067.179  067.209
**1      **2      **3      **4
1         066          -067.233
2
3
4         Control
5         *1 Access Point Log Level
6         2 Terminal Log Level
7         3 Reload Host List
8         4 Ping Test
9         5 Set Location
10
11
12
13
14
-----
                                UNIT STATISTICS
                                Terminal: 206.183.067.233
Tx Host Pkts: 0
Tx Bytes: 0
Rx Host Pkts: 0
Rx Bytes: 0
-----
                                <ESC>=QUIT

```

Using the Access Point Log Option

Access Point log records activity on the access point network. The log is erased and restarted automatically whenever it reaches 1,000 lines. Logging can be set for 10 levels of detail. The lowest, 0, (the default setting) records only exceptional events, such as network startup time and error messages. Logging may be set to a higher value, with 9 providing the most information. Setting log levels at 6 or higher is for engineering purposes only and may degrade system performance.

Note: Log levels on production systems should be set to zero for normal operation to minimize the impact of disk logging on system performance.

Using the Terminal Log Option

Before using this option, use the **Unit** menu to select the desired terminal. A log file is generated for each connected terminal device. The log level for a specific terminal log can be changed while the terminal is active with the **Terminal Log Level** option.

Note: Each time the terminal is reconnected, the log level reverts to its original setting as specified in the **Host List** setup.

Reloading Host List

This option applies changes made with the Host List setup form to the network (see Chapter 4 for a description of the **Host List** setup form).

Using a Ping Test

This option is used to verify the connection to an access point identified by the last 2 octets of its IP address.

```
Linux                               Wireless View                               6/15 13:33.07
-----
      TOPOLOGY
S0-62  067.135  067.179  067.209
-----
**1    **2    **3    **4
1      066          -067.233
2
3
4      Control
5      1 Access Point Log Level
6      2 Terminal Log Level
7      3 Reload Host List
8      4 Ping Test
9      *5 Pin
10     6 Set LAN-Trans or AP:
11
12
13
14
-----
UNIT STATISTICS
Terminal: 206.183.067.233
Tx Host Pkts: 0
Tx Bytes: 0
Rx Host Pkts: 0
Rx Bytes: 0
-----
<ESC>=QUIT
```

Results of the Ping test are displayed in a format similar to that shown below. Press the **DEL** or **CTRL+C** key to stop the test.

```
Press Delete to Return to Screen
PING 206.183.67.135 (206.183.67.135): 56 data bytes
64 bytes from 206.183.67.135: icmp_seq=0 ttl=10 time=680 ms
64 bytes from 206.183.67.135: icmp_seq=1 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=2 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=3 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=4 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=5 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=6 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=7 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=8 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=9 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=10 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=11 ttl=10 time=0 ms
64 bytes from 206.183.67.135: icmp_seq=12 ttl=10 time=0 ms
```

Setting a Location for an Access Point

The **Set Location** assigns a brief description of the physical location of a given access point. Once a location for a device is set, the location name for that device appears in the **Unit Statistics** area of the **Wireless View** screen.

Note: Locations cannot be assigned to terminals.

Using the Logs Menu

All RFSupernet programs, including most of the interactive programs, provide event logging for performance evaluation and trouble analysis. In addition, the programs maintain log levels for specific library routines, such as presentation space management, datastream parsing, and formatting.

The **Logs** menu option invokes a utility for viewing up to 4 logs simultaneously in real-time. In addition, the log viewer allows capturing snapshots of viewed log files that can be saved and reviewed a later time.

The **Log View** utility allows system administrators to review network activity from several perspectives – communications to/from the wireless device, communications to and from application hosts, and data manipulations performed by OpenAir Linux middleware.

Accessing the Log Viewer

1. Select **Operations** from the **Main Menu**.

```

OpenAir Linux

Main Menu
* 1 Operations
Operations
* 1 Wireless View
  2 Access Point Startup
  3 Access Point Shutdown

<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT

```

2. Select **Wireless View** from the **Operations** submenu to access the main screen of the **Wireless View** utility.

```

Linux                               Wireless View                               6/17 14:30.45

----- TOPOLOGY -----                               ----- UNIT STATISTICS -----
067.172  067.179
**1 -----**2 -----3 -----4 -----
1 |                                     | Access Point: 206.183.67.179
2 |                                     | MAC Addr: 00A0F80070B8
3 |                                     | Network ID: 101
4 |                                     | Load: 0
5 |                                     | Known Stations: 0
6 |                                     | Tx KBps: 0
7 |                                     | Rx KBps: 0
8 |                                     |
9 |                                     |
10 |                                     |
11 |                                     |
12 |                                     |
13 |                                     |
14 |                                     |

[UNIT] [CONTROL] [LOG] [NETWORK] [HELP] [QUIT]

```

3. Type **L** and press **ENTER** to select from the menu bar near the bottom of the screen the **Log** option.

```

Linux                               Wireless View                               6/18 10:54.22
-----
                                TOPOLOGY
067.172 067.135 067.179 067.209
**1    **2    **3    **4
1      066.137          -067.233
2
3
4      Logs
5      * 1 Access Point Network
6      2 Terminal Handler
7
8
9
10
11
12
13
-----
                                <ESC>=QUIT

```

Log Viewing Methods

Select either **Access Point Network** or **Terminal Handler** from the menu. Once selected, the system prompts with a second-level menu for the desired log viewing method - either Trail (real-time) or Browse (to review the current file).

Select either Trail or Browse as the log viewing mode.

- Trail = all currently-displayed log files are updated to the screen as records are written to the files.
- Browse = screen updates are locked and all log files can be navigated through using the arrow keys.

```

                                Access Point Log
                                * 1 Trail
                                2 Browse

```

Using the Logs Utility

The following subsections describe the content of the log files and the use of this utility.

Log Levels

Log levels range from a minimum level of 0 to a maximum of 9, where each level includes the logging of all levels below it. For example, level 6 includes all messages from 0 to 5. In general, log levels conform to the following conventions:

- Level 0** Exception events only
- Level 1** Data transmit and receive size
- Level 2-6** Engineering debug messages
- Level 7** Data in hex format
- Level 8-9** Engineering debug messages

Log Format

All log file entries adhere to the following format:

```
MM/DD hh:mm:ss msec [ message ]
```

```
MM Month DD Day of month
```

- hh = Hour
- mm = Minute
- ss = Second
- msec = Milliseconds since previous log event
- When level 7 (or higher) is set, data is logged in hexadecimal format as follows:
HH HH HH HH HH HH HH HH HH HH HH HH HH HH HH AAAAAAAAAAAAAAAAAA
- Non-graphic characters are represented in the ASCII portion as a period (.)
- By default, all processes “wrap” the log file at 1000 lines, which translates into roughly 60,000 bytes.

Terminal Log

The terminal process log file is created using the following naming convention:

rf<NNN>.<NNN>.log, where NNN represents the last two octets of the terminal's IP address. Each terminal emulation handler process provides one or more of the following log levels in addition to the standard debug log level:

Dialog	Dialog script
PS	Presentation space
Formatter	Screen formatter
Datastream	Emulation datastream

Keys

1. Use **TAB** or **ARROW** keys to move the cursor over the current active item – either a file view window (view panel) or a menu bar option.
2. The log viewer has several special keys active during the viewing of log files. A list of keys can be viewed by selecting the **HELP** option from the log viewer menu bar.

TAB	Move the cursor to next menu option or viewing panel.
ARROWS	Move cursor between menu options or up/down log file within view panel
ENTER	Select the current menu option.
CTRL+L	Go to the last page of the log displayed in the current view panel window.
CTRL+U	Go up one page within a selected view panel.
CTRL+D	Go down one page within a selected view panel.
CTRL+N	Search for the next occurrence of a find string.

Log Viewer Menu Bar Options

Select Viewer menu bar options by using the **TAB** or **ARROW** keys to move the cursor over the desired option. Various options are defined below.

FILE Select a log file to view. (Up to four log file viewing “windows” can be open at a time. Using this function allows you to open and close selected log files.

VIEW Select the log viewer viewing mode (Trail or Browse). While in browse mode, screen updates are locked and all log files can be navigated through using the arrow keys. While the view mode is set to Trail, all currently displayed log files are updated to the screen as records are written to the files.

SNAP Copy currently viewed log files to the snaps subdirectory for browsing. This procedure is handy when looking for a captured event without having to be concerned with log files being erased and re-written when file size limits are met.

FIND Find a specified string in currently displayed file.

PICK Display only those lines within a log view containing specified string.

ALIGN Align all file panels to time in current file panel.

HELP Display the help screen.

QUIT Exit the log viewer application and return to the wireless view screen.

Network Menu

The **Network** selection displays a summary screen of all wireless network components, including terminals (active and inactive), and access points. Terminal activity history is also indicated.

```

Linux                               Wireless View                               6/19 15:52.12
-----
      TOPOLOGY                               UNIT STATISTICS
      067.135 067.179                       Access Point: 067.135
      **1-----**2      3      4           MAC Addr: 00A0F80070B8
1 -067.233
2
3
4
5
6
7
8
9
10
11
12
13

```

Network Summary

LANS: 2
Active Terminals: 2
Inactive terminals: 0

ACTIVE TERMINAL TRAFFIC

Minutes	Count	Code
0 - 1	0	**
2 - 5	0	*
6 - 10	0	++
11 - 30	0	+
31 - up	1	-

```

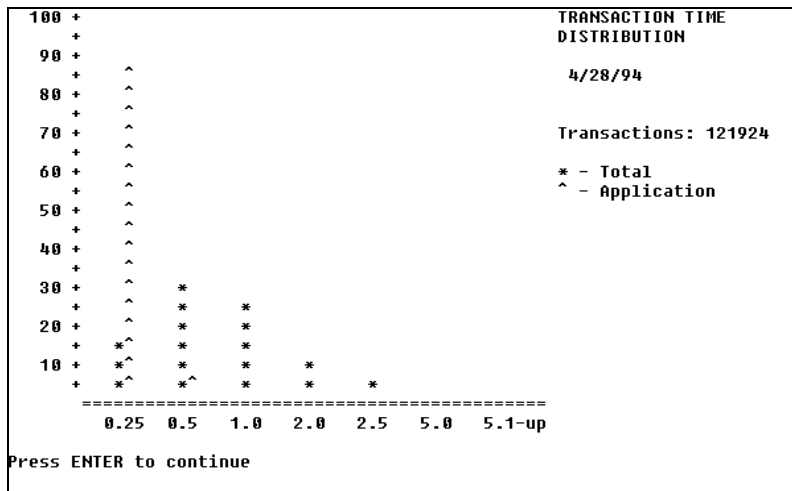
Network ID: 101
Load: 1
n Stations: 23
Tx KBps: 1
Rx KBps: 1
<ENTER>=CONTINUE

```

Performance Reports

The reporting utility processes the response time and transaction volume data collected by the System Accounting facility (see Chapter 4, Server Setup). The data can be displayed in graphical and tabular formats.

The graphical report format is shown below in a Transaction Time Distribution graph format.



The unit for the Y-axis is transactions in percent of the total. The X-axis is response time in intervals from .025 seconds to 5.1 seconds and greater. The real (or total) time value is indicated by the asterisk, and the application portion of the time is indicated by the circumflex.

The same data is shown in tabular format in the following real-time and application time figures.

Volume and Real Time Distribution

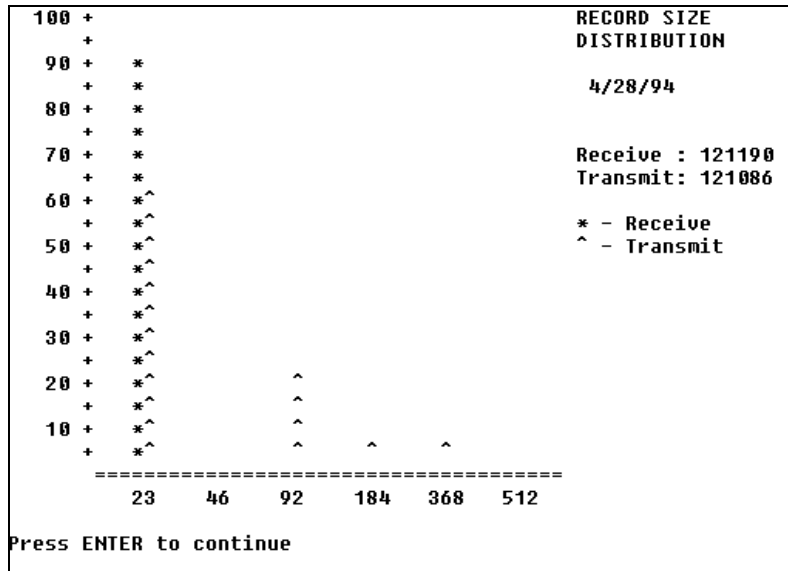
TRANSACTION VOLUME AND REAL TIME DISTRIBUTION BY PERCENTAGE 4/28/94								
Time	Total Transactions	+-----+ Range In Seconds -----+						
		0.00 to 0.25	0.26 to 0.50	0.51 to 1.00	1.01 to 1.50	1.51 to 2.00	2.01 to 5.00	5.01 and up
1:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6:00am	72	23.6	36.1	11.1	16.7	8.3	4.2	0.0
7:00am	10083	18.8	30.8	25.7	14.6	6.7	3.0	0.2
8:00am	11159	19.3	29.8	24.8	15.8	6.6	3.5	0.2
9:00am	10128	20.7	31.5	26.5	11.3	7.1	2.8	0.2

Volume and Application Time Distribution

TRANSACTION VOLUME AND APPLICATION PROCESSING TIME DISTRIBUTION BY PERCENTAGE 4/28/94								
Time	Total Transactions	+-----+ Range In Seconds -----+						
		0.00 to 0.25	0.26 to 0.50	0.51 to 1.00	1.01 to 1.50	1.51 to 2.00	2.01 to 5.00	5.01 and up
1:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:00am	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6:00am	67	98.5	0.0	0.0	0.0	0.0	1.5	0.0
7:00am	9923	86.5	10.4	1.8	0.6	0.2	0.4	0.1
8:00am	11112	88.8	8.4	1.0	1.4	0.2	0.2	0.1
9:00am	10067	90.0	6.3	1.4	1.7	0.2	0.2	0.1
10:00am	9936	88.2	8.0	2.1	1.2	0.2	0.2	0.1
11:00am	9257	87.8	7.1	2.0	2.5	0.3	0.2	0.1

The distribution of transaction record sizes is also included in the report, and is shown in graphical format in the following figure.

Record Size Distribution



The Y-axis indicates the percentage of the total transactions, and the X-axis indicates the approximate transaction record size in 6 groups, ranging from 23 bytes or less and 512 bytes or more. Packets received from the wireless network are indicated by the asterisk, and packets transmitted to the wireless network are indicated by the circumflex.

The same information is represented in the following tabular format in Received Record Size and Transmitted Record Size.

Received Record Size Distribution

RECEIVED RECORD SIZE DISTRIBUTION BY PERCENTAGE 4/28/94							
Time	Total	Size Range in Bytes					
		0-23	24-46	47-92	93-184	185-368	369-512
1:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
2:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
3:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
4:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
5:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
6:00am	67	89.6	10.4	0.0	0.0	0.0	0.0
7:00am	9936	95.2	4.3	0.4	0.0	0.0	0.0
8:00am	11117	95.3	4.2	0.4	0.0	0.0	0.0
9:00am	10069	93.7	5.9	0.4	0.0	0.0	0.0
10:00am	9945	94.6	4.5	0.8	0.0	0.0	0.0
11:00am	9264	93.3	6.0	0.7	0.0	0.0	0.0
12:00pm	3319	91.8	6.9	1.2	0.0	0.0	0.0
1:00pm	11922	93.9	4.8	1.3	0.0	0.0	0.0
2:00pm	9931	94.5	4.9	0.6	0.0	0.0	0.0

Transmitted Record Size Distribution

TRANSMITTED RECORD SIZE DISTRIBUTION BY PERCENTAGE 4/28/94							
Time	Total	Size Range in Bytes					
		0-23	24-46	47-92	93-184	185-368	369-512
1:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
2:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
3:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
4:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
5:00am	0	0.0	0.0	0.0	0.0	0.0	0.0
6:00am	67	55.2	0.0	32.8	6.0	6.0	0.0
7:00am	9923	62.4	0.1	14.9	8.0	14.6	0.0
8:00am	11112	64.0	0.1	15.0	5.8	15.1	0.0
9:00am	10067	62.8	0.1	22.0	7.3	7.8	0.0
10:00am	9936	63.2	0.1	21.8	8.6	6.2	0.0
11:00am	9257	62.8	0.2	19.7	10.2	7.0	0.0
12:00pm	3318	58.0	0.0	20.2	14.7	7.0	0.0
1:00pm	11916	63.1	0.2	20.0	7.4	9.2	0.0
2:00pm	9928	63.1	0.0	21.6	7.4	7.9	0.0

1. After all of the reports have been displayed, the system prompts you to save the reports to a file, **prf.rep**.
2. Confirm to save and then press **ENTER**.

The **apbase.dat** file, from which the reports are derived, can be imported into a spreadsheet program for further analysis. The field definitions are as follows:

<u>Field</u>	<u>Description/Value</u>
1	Sequence Number
2	Elapsed Time in Seconds
3	Unit Number
4	End-End Transaction Times 0ms to 250ms (Note 1: Year)
5	End-End Transaction Times 251ms to 500ms (Note 1: Month)
6	End-End Transaction Times 501ms to 1000ms (Note 1: Day)
7	End-End Transaction Times 1001ms to 1500ms (Note 1: Hour)
8	End-End Transaction Times 1501ms to 2000ms (Note 1: Minute)
9	End-End Transaction Times 2001ms to 5000ms (Note 1: Second)
10	End-End Transaction Times over 5001ms
11	Application Transaction Times 0ms to 250ms
12	Application Transaction Times 251ms to 500ms
13	Application Transaction Times 501ms to 1000ms
14	Application Transaction Times 1001ms to 1500ms
15	Application Transaction Times 1501ms to 2000ms
16	Application Transaction Times 2001ms to 5000ms
17	Application Transaction Times over 5001ms
18	Receive Records Size 0-23 bytes
19	Receive Records Size 24-46 bytes
20	Receive Records Size 47-92 bytes
21	Receive Records Size 93-184 bytes
22	Receive Records Size 185-368 bytes
23	Receive Records Size 369-512 bytes
24	Transmit Records Size 0-23 bytes
25	Transmit Records Size 24-46 bytes
26	Transmit Records Size 47-92 bytes
27	Transmit Records Size 93-184 bytes
28	Transmit Records Size 185-368 bytes
29	Transmit Records Size 369-512 bytes

Note: Field content when Unit Number (field 3) is zero.

Snapshot

Select Snapshot to create an image of the current status of the system. All log files and system status information (such as process and network status) is copied to the snaps subdirectory and, at the user's discretion, may create a compressed archive file for subsequent transfer using the Transfer menu option.

1. Select **Utilities** from the **Main Menu**.

```
Linux                               OpenAir Linux
Main Menu
1 Operations
  Utilities
    1 Verify
    2 Authorize
    *3 Snapshot
    4 Cleanup
    5 Transfer
<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Snapshot** from the **Utilities** menu. The **Snapshot Utility** appears.

```
Snapshot Utility
    Log files ...
Activity and Performance data files ...
    Site configuration files ...
    Process info ...
    Disk info ...
    Console messages ...
    Hardware configuration ...
    TCP/IP network info ...

    Archive Format
    1 TAR
    2 CPIO
    3 ZIP
    q Quit

    Selection: 1
    Enter archive filename: junk
    Creating compressed TAR format archive ...
    Archive is "/home/crf/xfer/junk.Z"
    Snapshot files in "snaps"
Press ENTER to continue
```

Note: Snapshot may take 30 to 45 seconds to complete and for all information to appear on the screen.

Use of the archive format is self explanatory. When prompted for the archive format, select the type of archive the system should create in which to save all of the snapshot files. If no archive is to be created, simply select **q** when prompted for the archive format. All snapped files are then saved in the **snaps** subdirectory without creating an archive file in the **xfer** subdirectory.

Cleanup

Use **Cleanup** to remove the OpenAir activity and performance database files, system message (`/usr/adm/messages`) file, garbage files in `/lost+found` that result from non-graceful shutdowns, and wireless terminal handler logs. All of these files are purged automatically on a weekly basis by the **cron** utility.

1. Select **Utilities** from the **Main Menu**.

```
Linux                               OpenAir Linux

Main Menu
1 Operations
  Utilities
    1 Verify
    2 Authorize
    *3 Snapshot
    4 Cleanup
    5 Transfer

<ESC>=QUIT  <ARROWS>=MOVE  <ENTER>=SELECT
```

2. Select **Cleanup** from the **Utilities** menu. The Cleanup Utility appears, showing the possible files to be removed.

```
Cleanup

Clear console messages file (y/n)?: n
Clear /lost+found (y/n)?: y
Removing files in /lost+found
Clear handler logs (y/n)?: y
Clear packet logs (y/n)?: y

Cleanup complete.  Press ENTER to continue
```

3. Respond to each suggestion with either a **y** or **n** response.
4. After the cleanup process is complete, press **ENTER** to return to the **Utilities** submenu.

Transferring Files and Archives

The **Transfer** utility is designed to ease the task of transferring files and archives via modem and diskette. It is also the tool used to create a backup of all site-specific files and configurations.

1. Select **Utilities** from the **Main Menu**.

```
Linux                               OpenAir Linux
Main Menu
1 Operations
  Utilities
    1 Verify
    2 Authorize
    3 Snapshot
    4 Cleanup
    *5 Transfer
<ESC>=QUIT <ARROWS>=MOVE <ENTER>=SELECT
```

2. Select **Transfer** from the **Utilities** menu. The **File Transfer Manager** appears.

```
File Transfer Manager
/home/crf/xfer
[.]
vfy092596
ss25Sep.Z
backup1.zip
bckup2.zip

Diskette      Communications      Archive
[DOS] [TAR] [CPIO]  [ZMODEM]                [BACKUP] [RESTORE] [QUIT]
[ZIP] [TAR] [CPIO]

<ESC>=QUIT <ENTER>=DIRECTORY <CTRL-D>=PGDN <CTRL-U>=PGUP <ARROWS>=MOVE
```

General Operation

The **File Transfer Manager** is dynamic in that as the cursor is navigated around the screen, the it assumes one of the three basic functions of the **File Transfer Manager**:

- **Directory Selection** - When the cursor is next to a directory name, the directory selection mode allows navigation to the selected directory by pressing the **ENTER** key.
- **File Selection** - When the cursor is next to a file name, the file selection mode allows selection of files to be acted on by marking them with the **ENTER** key.
- **File Management** - When the cursor is at the available selections along the bottom of the screen, file management functions can be selected.

The current subdirectory and its contents are displayed in the left-hand panel of the File Transfer Manager screen. A file or directory is selected, or “marked,” by using the **ARROW** keys to move the cursor to the name and then pressing the **SPACE** bar. The name then appears in boldface.

Directory Selection Mode

Names shown between square brackets represent directories; all other names are files. The directory name [...] represents the parent of the current directory. When a directory is selected, the files in that directory are displayed.

When in the **Directory Selection** mode, as shown below, the **File Transfer Manager** allows the system administrator to navigate through the available system directories in order to view the file lists associated with each directory.

```

File Transfer Manager
-----
/home/crf/xfer
[.]
vfy092596
ss25Sep.Z
backup1.zip
bckup2.zip

-----
Diskette      Communications      Archive
[DOS] [TAR] [CPIO]  [ZMODEM]      [BACKUP] [RESTORE] [QUIT]
                [ZIP] [TAR] [CPIO]

<ESC>=QUIT  <ENTER>=DIRECTORY  <CTRL-D>=PGDN  <CTRL-U>=PGUP  <ARROWS>=MOVE

```

1. Select the desired directory with the **ARROW** keys by moving the cursor next to the directory name.
2. Press **ENTER** to display the contents of the selected directory.

File Selection Mode

When in the **File Selection** mode, as shown below, the **File Transfer Manager** allows the system administrator to mark files to be acted on in the File Management mode.

```

File Transfer Manager
-----
/home/crf/xfer
[.]
vfy092596
ss25Sep.Z
backup1.zip
bckup2.zip

-----
Diskette      Communications      Archive
[DOS] [TAR] [CPIO]  [ZMODEM]      [BACKUP] [RESTORE] [QUIT]
                [ZIP] [TAR] [CPIO]

<ESC>=QUIT  <ENTER>=DIRECTORY  <CTRL-D>=PGDN  <CTRL-U>=PGUP  <ARROWS>=MOVE

```

1. Select the desired file(s) with the **ARROW** keys by moving the cursor next to the directory name. (The sample shows 3 files marked by highlighting for action.)
2. Press **ENTER** to highlight the file(s) for action when the File Transfer utility is in File Management mode.

File Management Mode

When in File Management mode, the **File Transfer Manager** allows the system administrator to act on the selected files.

```

File Transfer Manager
-----
/home/crf/xfer
[.]
vfy092596
ss25Sep.Z
backup1.zip
bckup2.zip
-----
Diskette      Communications      Archive
[DOS] [TAR] [CPIO]  [ZMODEM]          [BACKUP] [RESTORE] [QUIT]
                [ZIP] [TAR] [CPIO]
Copying /home/crf/xfer/ss25Sep.Z to a:ss25Sep.Z . . .
<ESC>=QUIT <ENTER>=DIRECTORY <CTRL-D>=PGDN <CTRL-U>=PGUP <ARROWS>=MOVE

```

1. Move the cursor with the **ARROW** keys to the function area near the bottom of the screen to invoke **File Management Mode**.
2. Select the desired file action by moving the cursor within the action field.
3. Press **ENTER** to start the action.

Note: When file management is in process, status messages appear on the screen. Although each status message is not described here, these messages provide useful information regarding the status of the selected file management operation.

Diskette Operations

- [DOS] Transfer marked file to and from DOS format diskettes.
- [TAR] Transfer marked files from diskettes written in TAR format and to create a TAR format diskette with marked files.
- [CPIO] Transfer marked files from a diskette written in CPIO format, and to write marked files in CPIO format to diskette.

Communications Operations

- [ZMODEM] Transfers marked files from the PowerNet system to the user's system via Z-modem. If no files are marked, Z-modem enters the receive mode and waits for 60 seconds to begin receipt of a file from the user's system.

Archive Operations

- [BACKUP] Creates a backup of all site-specific files and configurations. The user is prompted for the desired archive format (ZIP, TAR, or CPIO). Subsequently the archive may be transferred to diskette or downloaded using one of the communications facilities.


```

Backup Options
1 ALL site specific files
2 Selected subsystem files
q Quit
Enter Selection:

```

If **ALL site specific files** is selected from this menu, the system archives all configurations. The following sample shows a list of files backed up by the system.

```

Backup Options

1 ALL site specific files
2 Selected subsystem files
q Quit

Enter Selection: 1

Installation configuration ... 2 file(s)
Serial port configuration ... 2 file(s)
RF network and menu system configuration ... 25 file(s)
RF handlers
  configuration ... 8 file(s)
  keyboard mapping objects ... 16 file(s)
  keyboard macro objects ... 22 file(s)
  dialog objects ... 13 file(s)
  formatter objects ... 109 file(s)
  scan editor objects ... 28 file(s)
  scan data mapping objects ... 2 file(s)
  scan decoder control objects ... 2 file(s)
  printer initialization objects ... 4 file(s)
  display mapping objects ... 2 file(s)
Hot spare configuration ... 1 file(s)
  failover objects ... 3 file(s)
TCP/IP network configuration ... 25 file(s)
System startup files (/etc/rc2.d) ... 2 file(s)
System TCP/IP configuration files ... 4 file(s)
System CRON files ... 9 file(s)

Total files:      304

Archive Format

1 TAR format and COMPRESS
2 CPIO format and COMPRESS
3 ZIP

Selection:

```

Note: Files listed and file counts in the example may differ depending on the OpenAir model and OpenAir Linux configuration.

If **Selected subsystem files** is selected from the backup menu, the system only archives configuration files related to the PowerNet configuration. The following sample shows a list of files that the operator is prompted through in order for the system to backup.

1. Respond to each prompt with a **y** or **n** response. After all requested files have been collected, (whether **all** or **selective**), the Archive Selection menu appears on the bottom of the screen.

```

                                Backup Options

    1 ALL site specific files
    2 Selected subsystem files
    q Quit

Enter Selection: 2

    Selective Backup

    Installation and serial port setups (y/n): y
    RF network and handler setups (y/n): y
    Hot spare setups (y/n): y
    Host network setups (y/n): n
    System setups (y/n): y

Installation configuration ... 2 file(s)

```

Note: Files listed and file counts in the example may differ depending on the model and configuration.

2. Select the archive type to create the site backup file.
4. Enter the archive file name. The system reports the saved file name.
5. Press **ENTER** to continue.

```

    1 TAR format and COMPRESS
    2 CPIO format and COMPRESS
    3 ZIP

    Selection: 3

    Enter archive filename: test

Creating ZIP archive ...

Archive is "/home/crf/xfer/test.zip"

Press ENTER to continue

```

- **[RESTORE]** Restores a backup file. This facility is most commonly used to restore site backups. The utility determines the format of the file (ZIP, TAR, or CPIO), and then prompts the user to determine if the archive is a site backup. If so, the files are de-archived referencing the root directory. Otherwise, the files are de-archived into the current directory.
- **[ZIP] [TAR] [CPIO]** Creates a compressed archive file(s) in the respective number of files is too large for the compression software. In that case, select CPIO as the archive method.

Chapter 9 • Using Object Editing

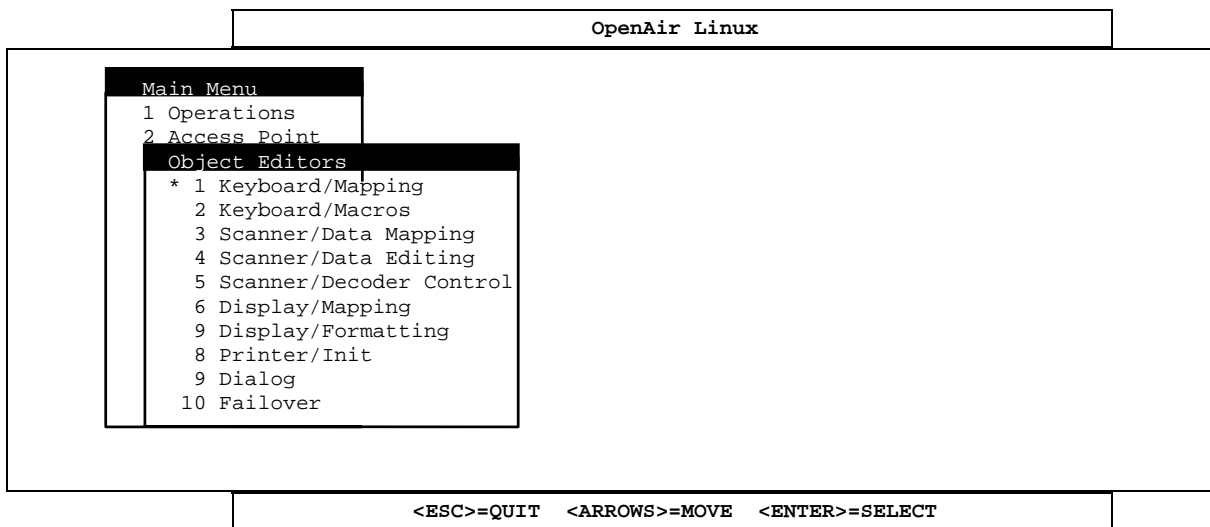
RFSupernet relies on configuration objects rather than custom code development for integration. The utilities for manipulating these objects are described in this chapter, with the following exceptions:

- Screen Formatter and Scan Editor, which are described in separate manuals
- Printer configuration, which is addressed in the Supported Equipment Reference Manual
- Failover objects, which are discussed in the Hot Spare section of the Spectrum One Reference Manual.

Using the Object Editing Utilities

All object editing utilities found in this chapter are accessed from the Object Editors menu.

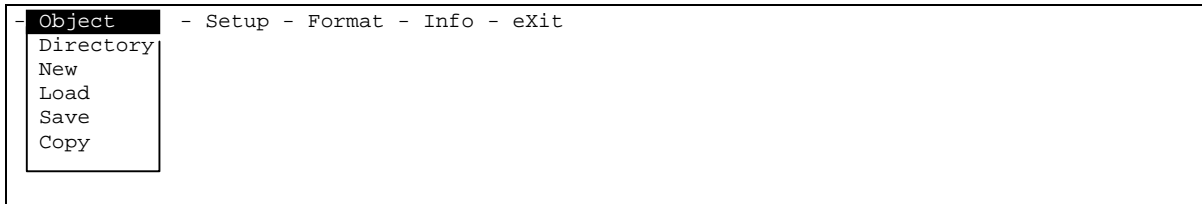
- Select Object Editors from the Main Menu. The Object Editors menu appears.



Mapping Keyboards

This utility is used to redefine the functionality of the terminal keypad. The object file you create with this editor is assigned to a specific Host List entry, which is used to initialize the terminal.

- Select Keyboard/Mapping from the Object Editors submenu to access a Mapping Object menu for keyboards.



Object Name of this menu.

Directory Lists all keyboard mapping objects currently available.

New Clears memory for creation/loading of new objects.

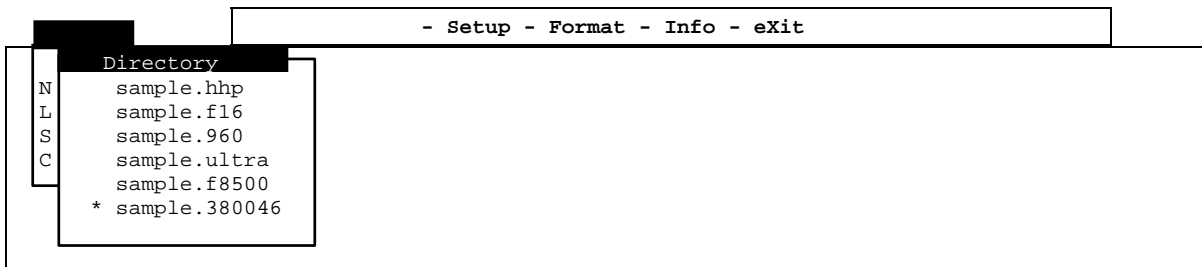
Load Load the object into memory.

Save Saves formatted sessions.

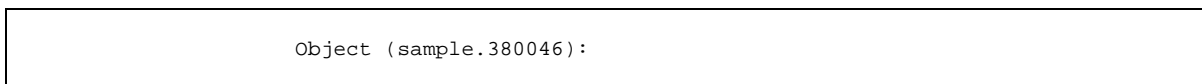
Copy Copies previously-captured host screens or formatted sessions.

Directory

1. Select **Directory** to view a list of all keyboard mapping objects currently available.



2. Use the **ARROW** keys to select a mapping object from the list and press **ENTER**. An Object Selection form appears with the object in parentheses that was selected and loaded.



3. If this is the correct mapping object to load into memory, press **ENTER**.
4. If not, type in the name of the object to load at the colon (:), then press **ENTER**. The object is then loaded.

Load

The Load option can be used without displaying the Directory, if the name of the object is known.

1. Select **Load** and the **Object Selection** form is displayed.

```
Object (sample.380046):
```

2. Type at the colon (:), the name of the object to load, which overrides the default that appears in parentheses. Press **ENTER** to load the object into memory.

Save

The **Save** option saves all mapping session work. Save frequently during a keyboard mapping session to ensure that if the mapping is exited improperly, all work is not lost.

- Select **Save** from the Object menu and the confirmation display shown below appears.

```
Saved sample1.380046
```

Copy

The Copy function creates copies of previously mapped sessions. If you want to save an unedited copy of the mapping object, make the copy before any editing takes place.

1. Select **Copy** from the Object menu. The Copy display shown below is displayed.

```
Object to copy:
```

2. Type the name of the object to copy at the colon (:), and press **ENTER**. The program prompts for a new name for the copied object.

```
New object name:
```

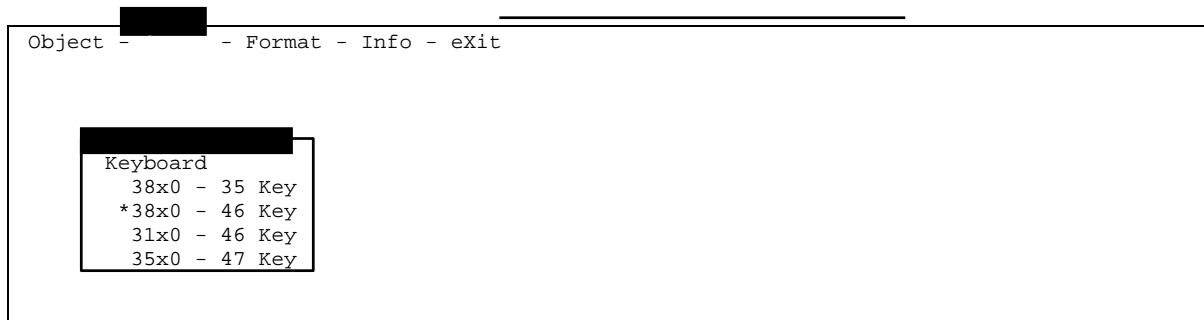
3. Type in a new name, and press **ENTER**. A confirmation message appears to confirm the operation has completed.
4. Press Enter to remove the message from the screen.

Using Mapping Setup

The Mapping Setup follows object loading. It is important to perform this step immediately after loading a new mapping object as all terminal-specific characteristics and keys are set here for the remainder of the mapping session.

The Setup option allows the user to define which terminal model keyboard layout to use for the terminal keys that are available.

1. Select **Keyboard/Mapping** from the **Object Editors** submenu to access a **Setup** menu for keyboards.



Setup Name of this menu.

Keyboard Lists all keyboard mapping objects currently available.

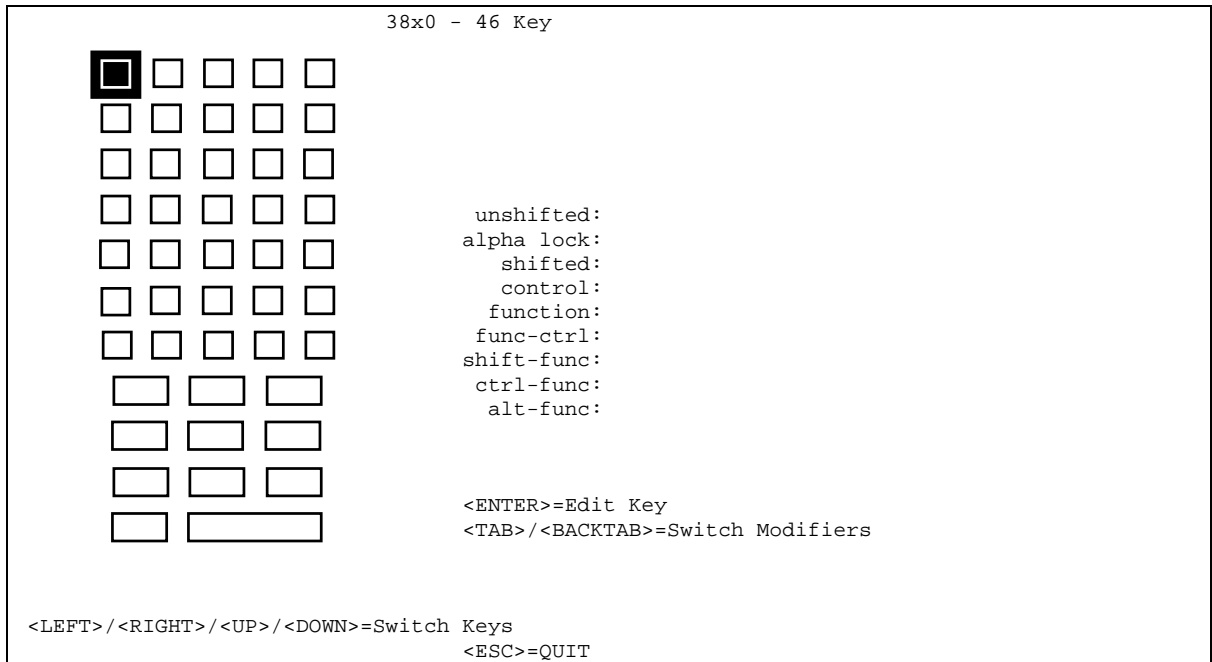
Note: The exact content varies depending upon the terminal types that are supported and authorized.

2. Use the **ARROW** keys to select the terminal model and keyboard layout the mapping editor uses.
3. Press **ENTER** when complete.

Using Format

The **Format** option redefines the keyboard functionality.

1. Select **Keyboard/Mapping** from the **Object Editors** submenu to access a **Format** menu for keyboards. A graphical map that matches the selected terminal and keyboard is displayed below.



The keyboard mapping screen is divided into two sections. The left side of the page displays the key selection area using a graphical key map. Terminal keyboard keys to modify are selected on the keyboard graphical map by using the up, down, left, and right **ARROW** keys.

The right side of the page shows the applicable key modifiers. Switching between modifiers is accomplished by using the **TAB** and **BACKTAB** keys. These modifiers, when selected, allow re-mapping of the standard key definitions to key definitions that the user specifies. Allowable keyboard session states are as follows:

- unshifted** The unshifted keyboard state applies when no other key is pressed to modify the keyboard state.
- alpha lock** The alpha lock state applies to the keyboard when **FUNC+SHIFT** is pressed on the terminal. Any subsequent key presses are in the alpha lock mode until **FUNC+SHIFT** is pressed again to return the keyboard back to unshifted mode.
- shifted** The shifted state is applied when the **SHIFT** key on the terminal's keyboard is pressed. Any key pressed immediately thereafter is handled as a shifted character. The keyboard state returns back to the unshifted state once the character key is pressed.
- control** The control state is applied when the **CTRL** key on the terminal's keyboard is pressed. Any key pressed immediately thereafter is handled as a control character. The keyboard state returns back to the unshifted state once the character key is pressed.
- function** The function state is applied when the **FUNC** key on the terminal's keyboard is pressed. Any key pressed immediately thereafter is handled as a function character. The keyboard state returns back to the unshifted state once the character key is pressed.
- func-ctrl** The function-control state is applied when the **FUNC**, then the **CTRL** keys on the terminal's keyboard are pressed in sequence. Any key pressed immediately after is handled as a function-control character. The key-

board state returns to the unshifted state once the character key is pressed.

shift-func The shifted-function state is applied when the **SHIFT**, then the **FUNC** keys on the terminal's keyboard are pressed in sequence. Any key pressed immediately thereafter is handled as a shifted-function character. The keyboard state returns back to the unshifted state once the character key is pressed.

ctrl-func The control-function state is applied when the **CTRL** then the **FUNC** keys on the terminal's keyboard are pressed in sequence. Any key pressed immediately after is handled as a control-function character. The keyboard state returns back to the unshifted state once the character key is pressed.

alt-func The alternate-function keyboard state is applied when the **FUNC+CTRL** then the **FUNC** keys on the terminal's keyboard are pressed in sequence. Any key pressed immediately thereafter is handled as an alternate-function character. The keyboard state returns back to the unshifted state once the character key is pressed.

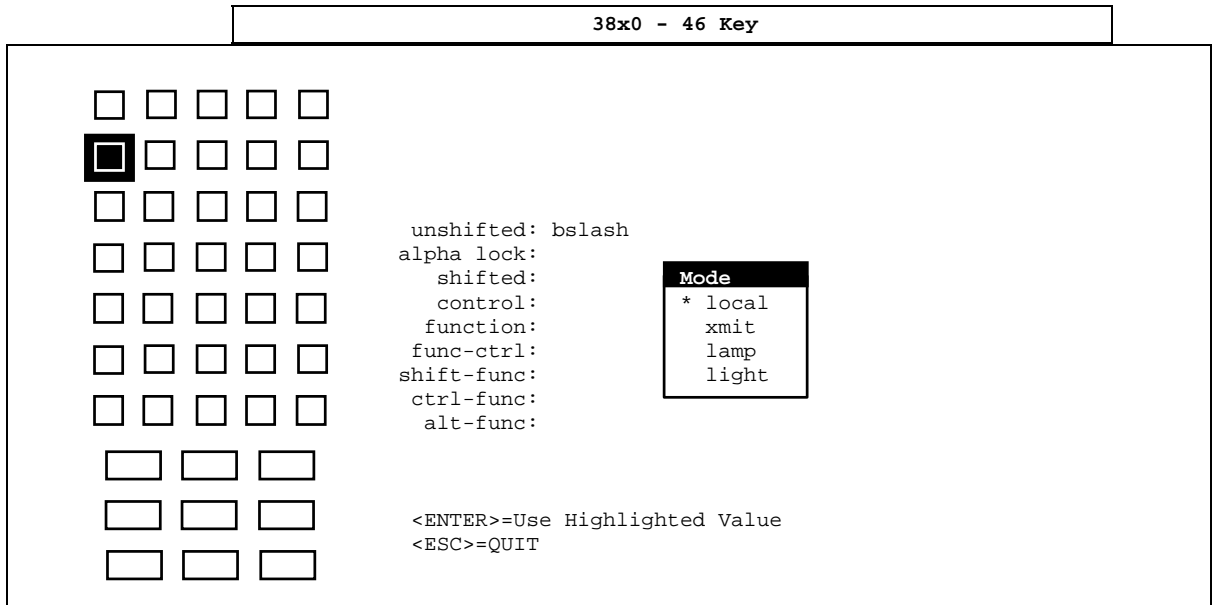
To modify a given key

1. Select the key to be modified using the up, down, left or right **ARROW** keys.
2. Use the **TAB** or **BACKTAB** keys to select the keyboard state modifier for which the key is to be modified.
3. Press the **ENTER** key to display a pop-up selection box allowing you to select the particular key code to implement.
4. Select a key code by using the up and down **ARROW** keys to scroll through the list, or by pressing the first letter of the desired code repeatedly until the code appears on the screen. An example of a 38x0, 46-key keyboard layout with pop-up key selection is shown below.

38x0 - 46 Key

<div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input checked="" type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> <div style="width: 50%;"><input type="checkbox"/></div> </div>	<pre> unshifted: alpha lock: shifted: control: function: func-ctrl: shift-func: ctrl-func: alt-func: </pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="margin: 0;">Transmit</p> <p style="margin: 0;">* Default</p> <p style="margin: 0;">null</p> <p style="margin: 0;">ctl_a</p> <p style="margin: 0;">ctl_b</p> <p style="margin: 0;">ctl_c</p> <p style="margin: 0;">ctl_d</p> <p style="margin: 0;">ctl_e</p> </div> <p style="margin-top: 20px;"><ENTER>=Use Highlighted Value <ESC>=QUIT</p>
---	--

5. Once the key code is selected, press **ENTER** and a key mode box appears.



The key modes are as follows:

- local** Handle the specified key locally on the terminal, send (if required, as in the case of alphanumeric characters and symbols) when **ENTER** on the terminal is pressed.
- xmit** Transmit the key immediately to the host.
- lamp** Turn on the terminal's backlight.
- light** Lighten the display contrast.
- dark** Darken the display contrast.
- noop** Don't do anything.
- edleft** Non-destructive backspace (move) to the left of the cursor within a field.
- edrite** Non-destructive space (move) to the right of the cursor within a field.
- edbksp** Destructive backspace (move) to the left of the cursor within a field.
- edbksp** Destructive backspace (move) to the left of the cursor within a field.
- edeeof** Destructive space (move) to the right of the cursor within a field, to the end of the field.
- edefld** Edit mode.
- lhelp** This key, when pressed, displays the terminal ID, date, time, and terminal software version number.
- scan** Set a key that, when pressed, triggers the scanner to scan.

Info

The **Main Menu** bar selection, **Info**, displays program information that includes the release version.

```
Object - Setup - Format - Info - eXit
-----
Keyboard Mapper
PowerNet™ Release 6.0.0
Copyright © 1992-2001
Connect, Inc. All Rights Reserved
```

Exit

The **Exit** option terminates the mapping session. If work has been done but not saved, the mapping program prompts with the following:

```
Save Changes [y/n]?
```

- Press **n** to exit without saving changes, or press **y** to save and exit. The system then returns to the **Object Editor** menu.

Keyboard Macros Editing

The VT/HP emulation (VTERM) allows for the definition of keyboard *macros*, or scripts. It is used to assign a character or string of characters to a specific key on the keyboard. When the key is pressed, the character string is transmitted, rather than the key. For example, the string "**ESC[4i**" can be assigned to the terminal's programmable function key 4 (**F4**) with this tool. After the object is created, it is assigned to a VTERM Host List entry via the Keyboard Macro field in the VTERM handler setup form.

1. Select the Keyboard/Macro **Object Editor** to display the **Object Editor Selection** screen. Existing keyboard macro objects are listed in the center section of the screen.

```
Object Editor Selection
Keyboard Macro Objects
-----
sample1
-----
[EDIT] [QUIT] [DELETE]      Object[sample1 ] Editor[vi]
      <ESC>=QUIT <ENTER>=SELECT <ARROWS>=MOVE
```

1. Use the **TAB** or **ARROW** keys to go to the Object field and type the name for the new object to create.
2. Press **ENTER**, which invokes the system editor specified in the **Editor** field.

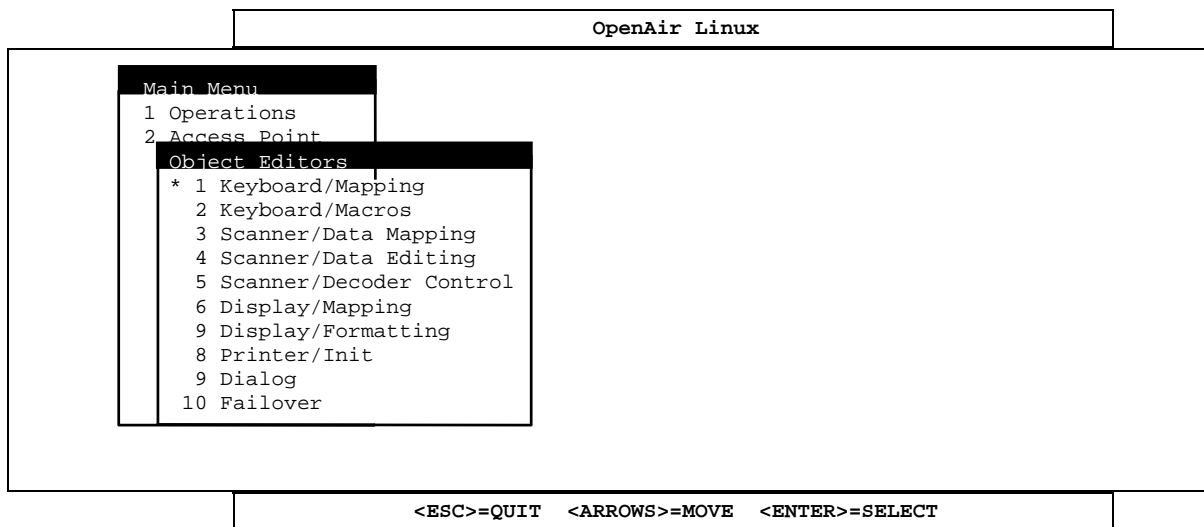
Function 14	pf14	Control X	ctl_x
Function 15	pf15	Control Y	ctl_y
Function 16	pf16		
Function 17	pf17		
Function 18	pf18		
Function 19	pf19		
Function 20	pf20		
Function 21	pf21		
Function 22	pf22		
Function 23	pf23		
Function 24	pf24		
3270 PA1	pa1		
3270 PA2	pa2		
3270 PA3	pa3		

Dialog Object Editor

Dialog Objects can be used to automate portions of a terminal emulation session, thus reducing the impact of the inherent differences between genuine, full screen terminals and the smaller mobile units. Ultimately, this is an integration aid reducing operator workload and training requirements.

The **Dialog Object Editor** is selected from the **Object Editors** menu, and the objects are created and edited as shown in the following samples. The Dialog object is associated with a specific handler via the Dialog field in each of the emulator configuration forms.

1. Select Object Editors from the Main Menu. The Object Editors menu appears.



2. Choose **Dialog** and press **ENTER** to select.

Dialog Format

Each line in the file is a single entry that may contain one of the following constructs:

```
Command
Comment
Blank line
```

The command verbs and their arguments are presented in the following sections. Comments entries must begin with the # character on the left margin. Tabs and spaces may precede all other entries.

Command Verbs and Arguments

The command verbs provide conditional branching and control over both the terminal and host sessions. Many commands require arguments. In the case of verbs with multiple arguments, the arguments are separated by commas and the command line requires a semicolon character for termination. Verbs with less than two arguments must **not** have a semicolon terminator.

Those verbs with argument lists require that all arguments be supplied. If an argument is blank, indicate this with a hyphen (-).

Substitutable Parameters

Up to 10 substitutable parameters may be used for string and numeric data storage and manipulation within the script. They are numbered from 0 to 9. The parameter value is substituted for the argument when preceded by the \$ character. In the event that the argument strings actually begin with this character, the character may be changed using the `parmchar` command verb.

Command Verb Descriptions

The following sections describe each verb and its arguments in detail. A quick reference summary is provided following the detailed information.

label target—Defines a branch target for the conditional verbs, `onfail`, `equal`, `compare`, `host state`, and `host scan`, and the unconditional branch verb, `goto`. The target name may be up to 20 characters long.

goto target—Script execution begins unconditionally and immediately at the named target.

onfail target—Provides for the handling of script syntax errors and for errors that occur within session verbs, such as `host on`. Upon detection of a line or system error, script execution continues at target.

equal 0-9,value,target;—Script execution resumes at target, if the value of the substitutable parameter indicated by the first argument, equals value. Otherwise, execution continues with the next verb in the file.

compare 0-9,operator,value,target;—Script execution resumes at target if the result of comparing the value of the substitutable parameter, indicated by the first argument, and the value argument, is true. The possible comparison operators are the following:

```
$=      String equality
$!=     String inequality
=       Numeric equality
!=      Numeric inequality
```

<< Numerically less-than
>> Numerically greater-than

Execution continues with the next verb in the file, if the comparison is not true.

host state statename,target;—Script execution resumes at target if the host session is in the state indicated by statename, which may be one of the following: inactive, unown, busy, sscp, or plu. Execution continues with the next verb in the file if the host session is not in the specified state. Note: all emulations recognize the inactive and plu states; the plu state indicates that the session is bound and active. The others are unique to 3270 mainframe sessions (See Session States and 3270 Emulation below).

host scan top,bot,searchstring,target;—Script execution resumes at target if searchstring is found within the range of PS lines specified by the first two arguments; otherwise, script execution continues with the next verb in the file. The top and bottom line values may range from 0 to 23.

exit—Unconditionally terminates script execution and the terminal process.

log message string;—Writes the message string argument to the terminal process log file.

sleep seconds—Suspends script execution for the specified number of seconds.

setparm 0-9,value;—Sets the substitutable parameter indicated by the first argument to value.

modify 0-9,operator,value;—Adds to, or subtracts from, the value of the substitutable parameter indicated by the first argument by the amount indicated in the second argument. The + operator indicates addition, and the - operator indicates subtraction.

concat 0-9,string;—Concatenates string to the substitutable parameter indicated by the first argument.

insert 0-9,string;—Inserts string to the beginning of the substitutable parameter indicated by the first argument.

host on—Request establishment of a host session.

host off—Terminates the host session.

host update hsec—Waits up to hsec half-seconds for an update of the host PS or state. This verb must be called to obtain the current PS and state prior to use of the host scan or host state verbs.

settle dsec—Operation is similar to the host update command with the following exception. It does not return until the specified number, dsec, of deciseconds has been reached, regardless of the number of host screen updates that have occurred.

host send field_number,value,key;—Places value and key into the host PS. In the case of an unformatted host PS, the field number argument is ignored and the value is placed at the current cursor position within the PS. Within a formatted host PS, value is placed at the start of the indicated field (field numbers start at 0).

A value of - indicates that no data is to be placed in the PS and only the key is generated. The key may be one of the following:

BACKTAB	CLEAR	ENTER			
	PF1	PF2	PF3	PF4	PF5
	PF6	PF7	PF8	PF9	PF10
	PF11	PF12	PF13	PF14	PF15
	PF16	PF17	PF18	PF19	PF20
	PF21	PF22	PF23	PF24	EOF
	RESET	SYSREQ	TAB		

term clear—Transmits a clear screen command to the terminal.

term logoff—Transmits a logoff command to the terminal.

term wait—Waits for terminal input. The returned string is discarded; this command is useful at startup while waiting for the terminal network logon message, and is also useful when an operator controlled pause is needed.

term display row,string;—Transmits a display command to the terminal that displays the string value at the indicated terminal row. Terminal row numbers begin at 1.

term input 0-9,row,column,length;—Transmits an input command to the terminal and waits for a response; the string value of the response is stored in the substitutable parameter indicated by the first argument. The row and column numbers start at 1.

term noecho 0-9,row,col,length;—Performs the same function as the term input verb, except that the terminal is instructed not to echo the keystrokes entered. This is used for password entry.

session—Places the terminal into session with the host. This verb does not complete until an endkey is generated by the terminal. By default, the endkey is pf10 as indicated in the corresponding Host List entry.

Command Verb Summary

The following is a quick reference summary of all of the verbs and their arguments.

Script Control Commands

```
label target
goto target
onfail target
equal 0-9,string|- ,target;
compare 0-9,$=|$!=|=|!<<|>>,value,target;
host state busy|sscp|plu|unown|inactive,target;
host scan top,bot,searchstring,target;
exit
log message string;
sleep seconds
```

Parameter Control Commands

```
setparm 0-9,value;
modify 0-9,+|- ,value;
concat 0-9,string;
insert 0-9,string;

parmchar char
```

Host Session Commands

```
host on
host off
host update hsec
host send field_number,string|-,KEY;
```

Terminal Session Commands

```
term clear
term logoff
term wait
term display row,string;
term input 0-9,row,col,length;
term noecho 0-9,row,col,length;
session
```

Session States and 3270 Emulation

The 3270 emulations through Front End Processors (FEPs) to mainframes may require additional state information. The available states are summarized as follows:

inactive	Link is down.
unown	Waiting for a session.
sscp	In session with VTAM.
plu	In session with host.
busy	In session, host is busy.

Initially, a session on an active link is in the unowned state. The state changes to `sscp` after VTAM recognizes the terminal. In this state, the PS is normally unformatted. Depending on the host configuration, entry of a region name is required at this point. Once a region has been assigned and a host transaction is attached to the terminal, the state changes to `plu`.

Note: For uniformity, these additional states may be specified in VT/HP and 5250 dialog objects; however, they are ignored.

Session Startup

The following dialog demonstrates the startup of a terminal session. The start routine waits for the startup signal from the wireless terminal (`term wait`), and then activates the session (`host on`). It then enters the `get_screen` loop. Within this loop, the state of the host session is used to control subroutine branches.

```
label start
  onfail err_fail
  ##### set loop counters
  setparm 9,0;
  setparm 8,0;
  setparm 7,0;
  log Waiting for terminal logon;
  term wait

term clear
  term display 1,CONNECTING TO HOST;
  log Connecting to host;
  host on
```



```
#### place logon collection routine here
    goto get_screen

label get_screen
    modify 7,+,1;
    compare 7,>,20,err_loop;
    host update 5
    host state busy,busy;
    host state inactive,inactive;
    host state unown,unown;
    host state sscp,sscp;
    host state plu,plu;
    goto get_screen

label busy
    log BUSY;

term clear
    term display 1,BUSY;
    sleep 2
    goto get_screen

label inactive
    log INACTIVE;
    term display 1,INACTIVE;
    goto get_screen

label unown
    log UNOWN;

term clear
    term display 1,UNOWN;
    goto get_screen

label sscp
    log SSCP;

term clear
    term display 1,SSCP;
    goto session

label plu
    log PLU;

term clear
    term display 1,PLU;
    goto session

label session
    session
    goto end_session

label err_loop
    log ERROR: loop;

term clear
    term display 1,LOOP ERROR;
    term wait
    goto end_session

label err_fail
    log ERROR: failure;

term clear
    term display 1,SESSION FAILURE;
```

```
        sleep 5
        term logoff
        exit

label end_session
        term logoff
        host off
        exit
```

Logon Data Collection

The following script fragment demonstrates the collection of logon data. The userid is stored in parameter 0, the password in parameter 1, the CICS region in parameter 2.

```
label get_info
        term display 1,LOGON INFO      ;
        term display 3,NAME;
        term input 0,3,6,14;
        equal 0,-,err_badlogon;
        term display 4,PSWD;
        term noecho 1,4,6,13;
        equal 1,-,err_badlogon;
        term display 5,REGN;
        term input 2,5,6,12;
        equal 2,-,err_badlogon;
        insert 2,/for ;
        term clear
        log Logon info collected;
        goto get_screen

label err_badlogon
        log BAD LOGON;
        term display 8,BAD LOGON      ;
        term wait
        goto end_session
```

Logon Automation

The following script fragment demonstrates how the original sscp and plu routines can be modified to make use of the collected logon information for an automated logon.

```
label sscp
        log SSCP;
        term display 8,SSCP          ;
        modify 8,+,1;
        compare 8,,10,err_loop;
        host scan 1,23,CONNECTION IN PROGRESS,get_screen;
        host scan 1,23,INVALID TERMINAL,err_terminal;
        term display 8,REGION        ;
        host send -,$2,enter;
        goto get_screen

label plu
        log PLU;
        term display 8,PLU           ;
        modify 9,+,1;
        compare 9,>,10,err_loop;
```

```

        host scan 1,23,LOGON COMPLETE,session;
        host scan 1,23,LOGON IN PROGRESS,get_screen;
        host scan 1,23,INVALID USERID,send_clear;
        host scan 1,23,PASSWORD EXPIRED,err_expired;
        host scan 1,23,USERID:,logon;
        goto send_clear

label logon
    log LOGON;
    term display 8,LOGON          ;
    host send 0,$0,tab;
    host send 1,$1,enter;
    goto get_screen

label send_clear
    log Sending CLEAR;
    term display 8,CLEAR          ;
    host send -,-,clear;
    goto get_screen

label err_expired
    log EXPIRED PASSWORD;
    term display 8,PASSWORD EXPIRED;
    term wait
    goto end_session

```

Scanner Decoder Control

The scanner decoder control object can be used to define those barcodes that are active for a particular terminal session. For example, a terminal used in a picking application can be prevented from accidentally scanning putaway bins by disabling the barcodes used on the putaway bins.

In addition, applications can control the scanner decoder in real time via VT100 escape sequences. These are extensions to the VT100 emulation protocol, and they may also be used in 3270 and 5250 emulations (see VT100 Extension in the Handler Setup for 3270 and 5250). The format of each escape sequences is included after each control description below.

Add the appropriate command lines from the lists below. The only rule on sequencing the lines is that the State command (i.e., `dc_codabar_state`) must be the first line for that code type. The following example object enables the host TEST to scan code-39 in full ASCII mode and UPC-A with optional 5-digit supplementals.

```

dc_code39_state=1;
dc_code39_minlen=1;
dc_code39_maxlen=30;
dc_code39_depend=1;
dc_upca_state=1;
dc_upca_minlen=0;
dc_upca_maxlen=1;
dc_upca_depend=2;

```

Note: All lines must be terminated with a semicolon (;).

Be aware of the following rules when enabling/disabling barcodes:

- When a handheld is brought online and a scanner decoder control object is defined for that Host List entry, the first action taken is to disable **all** barcodes. Therefore, the object must contain entries for all barcodes to be used. If the object does not exist or does not contain any commands, then **all** barcodes are enabled.
- When turning a code on, `minlen`, `maxlen` and `depend` all default to zero.
- All other commands are **not** reset when the handheld is rebooted. For example, if you turn on editing and then decide later that it should be off, you must include the disable command in your control file.

CODABAR

dc_codabar_state—disable/enable codabar scanning

- 0—disabled
- 1—enabled

dc_codabar_minlen—minimum valid barcode length

1-54

dc_codabar_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.

1-54

dc_codabar_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy).

- 0—codabar redundancy disabled
- 1—codabar redundancy enabled

dc_notis_edit—remove the stop and start characters from codabar prior to transmission to the host.

- 0—disabled
- 1—enabled

dc_clsi_edit—change 14 digit codabar into 17 digits by adding spaces after the first, fifth and tenth digits. Additionally, the start and stop characters are removed.

- 0—disabled
- 1—enabled

VT-100 Extended Command: <ESC>[?0;<state>;<minlen>;<maxlen>;0z

CODE 11

dc_code11_state—disable/enable code 25

- 0—disabled
- 1—enabled

dc_code11_minlen—minimum valid barcode length

4-54

dc_code11_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.

4-54

dc_code11_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy)

- 0—disabled (single scan sufficient)
- 1—enabled (two valid scans required)

dc_code11_depend—number of check digits

0, 1 or 27

dc_code11_rptchk—should check digits be transmitted to the host

- 0—do not transmit
- 1—transmit check digits

VT-100 Extended Command: <ESC>[?11;<state>;<minlen>;<maxlen>;<depend>z

CODE 128

dc_code128_state—disable/enable code 128 scanning

0—disabled

1—enabled

dc_code128_minlen—minimum valid barcode length

1-54

dc_code128_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.

1-54

dc_code128_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy)

0—code 128 redundancy disabled

1—code 128 redundancy enabled

VT-100 Extended Command: <ESC>[?2;<state>;<minlen>;<maxlen>;0z

CODE 39

dc_code39_state—disable/enable code 39 scanning

0—disabled

1—enabled

dc_code39_minlen—minimum valid barcode length

1-54

dc_code39_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.

1-54

dc_code39_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy)

0—disabled

1—redundancy enabled

dc_code39_chkb—code 39 check digit

0—check digit ignored if present and just transmitted to the host as data.

1—check digit required and must be valid.

dc_code39_depend—disable/enable full ascii code 39 interpretation.

0—disabled

1—full ascii enabled

VT-100 Extended Command: <ESC>[?3;<state>;<minlen>;<maxlen>;<depend>z

CODE 49

dc_code49_state—disable/enable code 49 scanning

0—disabled

1—enabled

VT-100 Extended Command: <ESC>[?4;<state>;0;0;0z

CODE 93

dc_code93_state—disable/enable code 93 scanning

0—disabled

1—enabled

dc_code93_minlen—minimum valid barcode length

1-54

dc_code93_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.

1-54

dc_code93_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy)
0—disabled
1—enabled
VT-100 Extended Command: <ESC>[?5;<state>;<minlen>;<maxlen>;0z

I 2 of 5

dc_coded25_state—disable/enable code 25
0—disabled
1—enabled
dc_coded25_minlen—minimum valid barcode length
1-54
dc_coded25_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.
1-54
dc_coded25_red—is one valid laser sweep sufficient or does the scanner have to +make two valid sweeps (redundancy)
0—d2of5 redundancy disabled (single laser scan sufficient for validation)
1—d2of5 redundancy enabled (two laser scans required for validation)
VT-100 Extended Command: <ESC>[?6;<state>;<minlen>;<maxlen>;0z

INTERLEAVED 2 OF 5

dc_codei25_state—disable/enable interleaved 2 of 5 scanning
0—disabled
1—enabled
dc_codei25_minlen—minimum valid barcode length
1-54
dc_codei25_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.
1-54
dc_codei25_red—is one valid laser sweep sufficient or does the scanner have to make two valid sweeps (redundancy)
0—Interleaved 2of5 redundancy disabled
1—d2of5 redundancy enabled
VT-100 Extended Command: <ESC>[?7;<state>;<minlen>;<maxlen>;0z

EAN-13

dc_ean13_state—disable/enable EAN-13 scanning
0—disabled
1—enabled
VT-100 Extended Command: <ESC>[?8;<state>;0;0;0z

EAN-8

dc_conv_ean8to13—should ean8 barcodes be zero padded to 13 digits
0—do not pad
1—add padding zeroes
dc_ean8_state—disable/enable EAN-8 scanning
0—disabled
1—enabled

PLESSEY/MSI

dc_msi_state—disable/enable code MSI scanning

0—disabled
 1—enabled
dc_msi_minlen—minimum valid barcode length
 4-54
dc_msi_maxlen—maximum valid barcode length. The maximum length must be greater than or equal to the minimum length.
 4-54
dc_msi_red—is one laser scan sufficient or does the scanner have to make two valid scans (redundancy)
 0—single scan sufficient
 1—two valid scans required
dc_msi_depend—number of check digits
 0, 1 or 2
dc_msi_rptchk—should check digits be transmitted to the host
 0—do not transmit
 1—transmit check digits
 VT-100 Extended Command: <ESC>[?10;<state>;<minlen>;<maxlen>;<depend>z

UPC-A

dc_upca_state—disable/enable UPC-A scanning
 0—disabled
 1—enabled
dc_upca_chkb—should the check digit be transmitted to the host
 0—do not transmit
 1—transmit check digit
dc_upca_preamble—transmit no prefix characters (0), prefix the number system for the code type (1), or prefix a zero followed by the code type number system (2)
 0—no prefix
 1—prefix the code type number system
 2—prefix 0 followed by the code type number system
 VT-100 Extended Command: <ESC>[?13;<state>;0;0;z

Note: In order to control supplementals, use the **Supplemental Barcode Handling** sequences presented later in this chapter.

UPC-E0

dc_upce0_chkb—should the check digit be transmitted to the host
 0—do not transmit
 1—transmit check digit
dc_upce0_depend—expand 6 digit UPC-E0 to a 12 digit UPC-A
 0—do not expand
 1—expand to UPC-A
 VT-100 Extended Command: <ESC>[?14;<state>;<minlen>;<maxlen>;<depend>z

UPC-E1

dc_upce1_chkb—should the check digit be transmitted to the host
 0—do not transmit
 1—transmit check digit
dc_upce1_depend—expand 6 digit UPC-E0 to a 12 digit UPC-A
 0—do not expand
 1—expand to UPC-A
dc_upce1_preamble—transmit no prefix characters (0), prefix the number system for the code type (1), or prefix a zero followed by the code type number system (2)

UPC-E0

dc_upce0_chkb—should the check digit be transmitted to the host

- 0—do not transmit
- 1—transmit check digit

dc_upce0_depend—expand 6 digit UPC-E0 to a 12 digit UPC-A

- 0—do not expand
- 1—expand to UPC-A

VT-100 Extended Command: <ESC>[?14;<state>;<minlen>;<maxlen>;<depend>z

UPC-E1

dc_upce1_chkb—should the check digit be transmitted to the host

- 0—do not transmit
- 1—transmit check digit

dc_upce1_depend—expand 6 digit UPC-E0 to a 12 digit UPC-A

- 0—do not expand
- 1—expand to UPC-A

dc_upce1_preamble—transmit no prefix characters (0), prefix the number system for the code type (1), or prefix a zero followed by the code type number system (2)

Supplemental Options for UPC/EAN

dc_supps_state—this flag should always be set to one.

dc_supps_minlen—two character supplementals enabled/disabled (only applies to transmit mode 1)

- 0—no codes with two character supplementals decoded
- 1—codes with two character supplementals decoded

dc_supps_maxlen—five character supplementals enabled/disabled (only applies to transmit mode 1).

- 0—no codes with five character supplementals decoded
- 1—codes with five character supplementals decoded

dc_supps_depend—supplementals transmit mode

- 0—no supplementals transmitted to host, supplemental enable/disable ignored
- 1—only codes with the appropriate supplemental (from minlen/maxlen) decoded
- 2—all codes sent as is, supplemental enable/disable ignored

dc_supp_max—how many passes should be made to attempt to decode UPC supplementals.

- 2-10

VT-100 Extended Command: <ESC>[?12;<state>;<minlen>;<maxlen>;<depend>z

General Barcode Options

dc_xmit_codeid—if non-zero, prefix the scanned bar code with the indicated character as shown below:

- A—UPC, UPCE, UPCE1, EAN13, EAN8
- B—Code39
- C—Codabar
- D—Code 128
- E—Code 93
- F—Interleaved 2 of 5
- G—D 2 of 5 , IATA
- H—Code 11
- J—MSI

0—disabled

1—enabled

dc_bidir_red—for any barcodes that have redundancy enabled, the two sweeps must be in opposite directions

0—same direction scans sufficient
 1—opposite direction scans required

The VT-100 extended command below has no equivalent in the configuration file. It is used to disable ALL barcodes on the handheld. Typically this would be issued before turning on an individual barcode type just to make sure of the state of the active barcodes.

VT-100 Extended Command: <ESC>[?z

Using System Editor

The system editor, which is the Linux or UNIX **vi editor**, is used by installation and support engineers to customize OpenAir files. It is a full function screen-oriented text editor, but only a minimum number of keys and operations are required to use the editor effectively for file modification. Only these functions are described in this chapter. For further information, see a Linux or *UNIX Operating System User Reference Manual*.

The vi program works with any ASCII terminal keyboard with an **ESC** key. A mouse, function keys, and **ARROW** keys are not required. The editor provides several modes of operation, which make use of the available keys.

Command Mode

The command mode provides cursor positioning, editing mode, and exit/save functions. When the editor is started, it is in command mode. During operation the editor can be put into the command mode at any time by pressing **ESC**. To start editing a specific file, type the following at the command line:

```
vi filename      ENTER
```

filename is the name of the file to be edited. When the file opens, the cursor is positioned at the beginning of the file. Note that the vi editor commands are case-sensitive.

Cursor Position

When starting, place the cursor at the location of the text that needs to be changed, or where text needs to be added. The following keys provide cursor positioning from within the command mode.

Use This Key	To Move the Cursor
SPACE BAR	Move right one character
h	Move left one character
j	Move down one line
k	Move up one line

After the cursor has been positioned at the selected line or character, enter the edit mode.

Edit Mode

The edit mode either adds or deletes text from a file. The first four commands are used to enter the edit mode for text addition. The last two are for text deletion. The editor remains in the edit mode until **ESC** is pressed, which returns the editor to the command mode.

To append text to the file, **a** is used. Text that is typed after this command appears one space to the right of the cursor. The **i**, **o**, and **O** commands are used to insert text at the cursor position. When a new line is specified, above or below, a blank line appears with the cursor at the beginning.

Use This Key To Perform This Function

a	Append (insert after current position)
I	Insert at current cursor position
o	Insert a line below current line
O	Insert a line above current line

To remove text from the file, use the following keys. Make sure that the command mode is active and the cursor is positioned on the character or line that is to be deleted, before issuing these commands. Note that the editor returns to the command mode immediately after the function is performed.

Use This Key To Perform This Function

x	Delete character at current position
dd	Delete current line

Exit

Within the command mode, the colon (:) begins a save and/or exit command sequence. The options allow the following:

- Changes made to file are saved, vi editor is active, and file is still open.
 - Changes to the file are saved and the editor exited.
 - Changes are ignored, the file closed, and the editor exited.
1. Press **ESC** to make sure that the program is in command mode.
 2. Type a colon by pressing **SHIFT+:** (colon) key. The cursor and colon are placed at the bottom of the screen.
 3. Type the rest of the key sequence as listed below and press **ENTER**.

Use This Key To Perform This Function

:+w	Save the changes.
:+w+q	Save the changes and leave the editor.
:+q+!	Leave the editor, do not save changes.

Chapter 10 • TN3270E Update

The April 1998 Update to RFC2355 defines the TN3270E negotiation, permitting the transfer of some of the TN3270E Sub-negotiation variables such as **Lunames** from the Telnet terminal to the host during session initialization.

TN3270E is implemented using two text files located in the working directory (refer to `/etc/.CRF/WORKDIR`). The **tnenvcom.cf** file allows for the definition of variables that will be shared by all devices, and the **tnenv.cf** file allows for the definition of terminal-specific variables. These files are currently created and maintained with the system editor.

Line Entry Format, **tnenvcom.cf**:

VARIABLE=VALUE;

Example `*DEVTYPE=IBM-3278-2;*CONNECT=RFZ81;`

This will assign all terminals the luname of RFZ81.

Line Entry format, **tnenv.cf**:

IDENT:VARIABLE=VALUE;[VARIABLE=VALUE]...!

Where IDENT is either the last two octets of the terminal's IP address, or the three digit Spectrum address (065-511). Multiple variables can be defined, separated by semi-colons. The entry is terminated with an exclamation.

Example file:

#IP terminal's fully qualified octets, 7 characters:

`010.031:*DEVTYPE=IBM-3278-2;*CONNECT=RF3278.001;!`

`010.032:*DEVTYPE=IBM-3278-2;*CONNECT=RF3278.002;!`

This will assign the terminal with an IP address of xxx.yyy.010.031 a device type of IBM-3278-2 to the luname of RF3278.001.

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Chapter 11 • RFC1205 Update

The April 1999 Update to RFC1205 defines the NEW-ENVIRON negotiation, permitting the transfer of environmental variables from the Telnet terminal to the host during session initialization.

NEW ENVIRON is implemented using two text files located in the working directory (refer to `/etc/.CRF/WORKDIR`). The `tnenvcom.cf` file allows for the definition of variables that will be shared by all devices, and the `tnenv.cf` file allows for the definition of terminal-specific variables. These files are currently created and maintained with the system editor.

Line Entry Format, **tnenvcom.cf**:

VARIABLE=VALUE;

Line Entry format, **tnenv.cf**:

IDENT:VARIABLE=VALUE;[VARIABLE=VALUE]...!

Where IDENT is either the last two octets of the terminal's IP address, or the three digit Spectrum address (065-511). Multiple variables can be defined, separated by semi-colons. The entry is terminated with an exclamation.

Example file:

#IP terminal's fully qualified octets, 7 characters:

010.031:DEVNAME=RF5291.001;!

#Spectrum ONE fully qualified radio ID 3 characters

065:DEVNAME=RF5291.002;!

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Chapter 12 • ISO 8859-1

Description	Char	Dec	Hex
non-breaking space		160	A0
inverted exclamation	¡	161	A1
cent sign	¢	162	A2
pound sterling	£	163	A3
general currency sign	¤	164	A4
yen sign	¥	165	A5
broken vertical bar		166	A6
section sign	§	167	A7
umlaut (dieresis)	¨	168	A8
copyright	©	169	A9
feminine ordinal	^a	170	AA
left angle quote, guillemot left	«	171	AB
not sign	¬	172	AC
soft hyphen	-	173	AD
registered trademark	®	174	AE
macron accent	¯	175	AF
degree sign	°	176	B0
plus or minus	±	177	B1
superscript two	²	178	B2
superscript three	³	179	B3
acute accent	´	180	B4
microsign	μ	181	B5
paragraph sign	¶	182	B6
middle dot	·	183	B7
cedilla	¸	184	B8
superscript one	¹	185	B9
masculine ordinal	º	186	BA

Description	Char	Dec	Hex
right angle quote, guillemot right	»	187	BB
fraction one-fourth	¼	188	BC
fraction one-half	½	189	BD
fraction three-fourths	¾	190	BE
inverted question mark	¿	191	BF
capital A, grave accent	À	192	C0
capital A, acute accent	Á	193	C1
capital A, circumflex accent	Â	194	C2
capital A, tilde	Ã	195	C3
capital A, dieresis or umlaut mark	Ä	196	C4
capital A, dieresis or umlaut mark	Ä	196	C4
capital A, ring	Å	197	C5
capital AE diphthong (ligature)	Æ	198	C6
capital C, cedilla	Ç	199	C7
capital E, grave accent	È	200	C8
capital E, acute accent	É	201	C9
capital E, circumflex accent	Ê	202	CA
capital E, dieresis or umlaut mark	Ë	203	CB
capital I, grave accent	Ì	204	CC
capital I, acute accent	Í	205	CD
capital I, circumflex accent	Î	206	CE
capital I, dieresis or umlaut mark	Ï	207	CF
capital Eth, Icelandic	Ð	208	D0
capital N, tilde	Ñ	209	D1
capital O, grave accent	Ò	210	D2
capital O, acute accent	Ó	211	D3
capital O, circumflex accent	Ô	212	D4
capital O, tilde	Õ	213	D5
capital O, dieresis or umlaut mark	Ö	214	D6
multiply sign	×	215	D7

Description	Char	Dec	Hex
capital O, slash	Ø	216	D8
capital U, grave accent	Ù	217	D9
capital U, acute accent	Ú	218	DA
capital U, circumflex accent	Û	219	DB
capital U, dieresis or umlaut mark	Ü	220	DC
capital Y, acute accent	Ý	221	DD
capital THORN, Icelandic	Þ	222	DE
small sharp s, German (sz ligature)	ß	223	DF

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Chapter 13 • MIB

```
CRF-MIB DEFINITIONS ::= BEGIN
IMPORTS
    enterprises, OBJECT-TYPE, IPAddress
        FROM RFC1155-SMI
    DisplayString
        FROM RFC1213-MIB
    OBJECT-TYPE
        FROM RFC-1212;

crf OBJECT IDENTIFIER ::= { enterprises 1334 }

specOne OBJECT IDENTIFIER ::= { crf 1 }
accessPoint OBJECT IDENTIFIER ::= { crf 2 }

slStatus OBJECT-TYPE
    SYNTAX INTEGER {
        active(1),
        inactive(2)
    }
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If active, the slbase program is actively running. If inactive,
        slbase is not currently running"
    ::= { specOne 1 }

slBaseCnt OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of bases active on this NCU."
    ::= { specOne 2 }

slTermCnt OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of sl terminals active on this NCU."
    ::= { specOne 3 }

slBaseTable OBJECT-TYPE
    SYNTAX SEQUENCE OF SlBaseEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The table of spectrum one point information."
    ::= { specOne 4 }

slBaseEntry OBJECT-TYPE
    SYNTAX SlBaseEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "An entry in the slBaseTable table. Instance-identification
        is taken from slBaseNumber and consists of `1' sub-identifiers
        in length."
    INDEX { slBaseIndex }
    ::= { slBaseTable 1 }

SlBaseEntry ::=
    SEQUENCE {
        slBaseIndex
            INTEGER,
```

```

s1BaseLan
    INTEGER,
s1BaseNumber
    INTEGER,
s1BaseLastRcv
    TimeTicks
}

s1BaseIndex OBJECT-TYPE
SYNTAX INTEGER (1..512)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A value which uniquely identifies an entry in the s1BaseTable table.
The value is a index. This number ranges between 1 and the number
of entries in the AccessPointTable table."
::= { s1BaseEntry 1 }

s1BaseLan OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The RF LAN number that the base is attached to"
::= { s1BaseEntry 2 }

s1BaseNumber OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The id number of the base. This number must be unique within the LAN"
::= { s1BaseEntry 3 }

s1BaseLastRcv OBJECT-TYPE
SYNTAX TimeTicks
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The 100ths of a second since anything was received from the base"
::= { s1BaseEntry 4 }

s1TermTable OBJECT-TYPE
SYNTAX SEQUENCE OF S1TermEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The table of spectrum one terminal information."
::= { specOne 5 }

s1TermEntry OBJECT-TYPE
SYNTAX S1TermEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"An entry in the s1TermTable table. Instance-identification
is taken from s1TermNumber and consists of `1' sub-identifiers
in length."
INDEX { s1TermIndex }
::= { s1TermTable 1 }

S1TermEntry ::=
SEQUENCE {
    s1TermIndex
        INTEGER,
    s1TermLan
        INTEGER,
    s1TermBase
        INTEGER,
    s1TermNumber
        INTEGER,
    s1TermLastRcv

```

```

        TimeTicks
    }
    s1TermIndex OBJECT-TYPE
        SYNTAX INTEGER (1..512)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "A value which uniquely identifies an entry in the s1TermTable table.
            The value is a index. This number ranges between 1 and the number
            of entries in the s1TermTable table."
        ::= { s1TermEntry 1 }

    s1TermLan OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The RF LAN number that the terminal is attached to"
        ::= { s1TermEntry 2 }

    s1TermBase OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The id number of the base the terminal is attached to."
        ::= { s1TermEntry 3 }

    s1TermNumber OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The id number of the terminal."
        ::= { s1TermEntry 4 }

    s1TermLastRcv OBJECT-TYPE
        SYNTAX TimeTicks
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The 100ths of a second since anything was received from the terminal"
        ::= { s1TermEntry 5 }

    apStatus OBJECT-TYPE
        SYNTAX INTEGER {
            active(1),
            inactive(2)
        }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "If active, the apbase program is actively running. If inactive,
            apbase is not currently running"
        ::= { accessPoint 1 }

    apBaseCnt OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The total number of access points active on this NCU."
        ::= { accessPoint 2 }

    apTermCnt OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The total number of AP terminals active on this NCU."
        ::= { accessPoint 3 }

```

```
accessPointTable OBJECT-TYPE
    SYNTAX SEQUENCE OF AccessPointEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The table of access point information."
    ::= { accessPoint 4 }

accessPointEntry OBJECT-TYPE
    SYNTAX AccessPointEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "An entry in the AccessPointTable table. Instance-identification
        is taken from AccessPointNumber and consists of `1' sub-identifiers
        in length."
    INDEX { accessPointIndex }
    ::= { accessPointTable 1 }

AccessPointEntry ::=
    SEQUENCE {
        accessPointIndex
            INTEGER,
        accessPointIP
            IpAddress,
        accessPointMAC
            DisplayString,
        accessPointLastRcv
            TimeTicks
    }

accessPointIndex OBJECT-TYPE
    SYNTAX INTEGER (1..512)
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "A value which uniquely identifies an entry accessPointIP OBJECT-TYPE
    SYNTAX IpAddress
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "This IP address is just here as an example of how
        to read and write an object with a syntax of NetworkAddress."
    ::= { accessPointEntry 2 }

accessPointMAC OBJECT-TYPE
    SYNTAX DisplayString
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The MAC address of the access point is given here."
    ::= { accessPointEntry 3 }

accessPointLastRcv OBJECT-TYPE
    SYNTAX TimeTicks
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The 100ths of a second since anything was received from the access point"
    ::= { accessPointEntry 4 }

apTermTable OBJECT-TYPE
    SYNTAX SEQUENCE OF APTermEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The table of access point information."
    ::= { accessPoint 5 }

apTermEntry OBJECT-TYPE
    SYNTAX APTermEntry
    ACCESS not-accessible
```

```

STATUS mandatory
DESCRIPTION
    "An entry in the AccessPointTable table. Instance- identification
    is taken from AccessPointNumber and consists of `1' sub-identifiers
    in length."
INDEX { apTermIndex}
 ::= { apTermTable 1 }
APTermEntry ::=
SEQUENCE {
    apTermIndex
        INTEGER,
    apTermIP
        IpAddress,
    apTermMAC
        DisplayString,
    apTermLastRcv
        TimeTicks
}

apTermIndex OBJECT-TYPE
SYNTAX INTEGER (1..512)
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "A value which uniquely identifies an entry in the apTermTable table.
    The value is a index. This number ranges between 1 and the number
    of entries in the apTermTable table."
 ::= { apTermEntry 1 }

apTermIP OBJECT-TYPE
SYNTAX IpAddress
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "This IP address is just here as an example of how
    to read and write an object with a syntax of NetworkAddress."
 ::= { apTermEntry 2 }

apTermMAC OBJECT-TYPE
SYNTAX DisplayString
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "The MAC address of the access point is given here."
 ::= { apTermEntry 3 }

apTermLastRcv OBJECT-TYPE
SYNTAX TimeTicks
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "The 100ths of a second since anything was received from the base"
 ::= { apTermEntry 4 }

END

```

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Chapter 14 • Ethereal

What is Ethereal?

Every network manager at some time or other needs a tool that can capture packets off the network and analyze them. In the past, such tools were either very expensive, proprietary, or both. However, with the advent of Ethereal, all that has changed.

Ethereal is perhaps one the best open source packet sniffers available today.

Platforms Ethereal runs on

Ethereal currently runs on most UNIX platforms and the various Windows platforms. It requires GTK+, GLIB and libpcap in order to run.

Where to get Ethereal

You can get the latest copy of the Ethereal from the Ethereal Website: <http://www.ethereal.com>. The website allows you to choose from among several mirrors for downloading.

Obtaining the source and binary distributions

You can obtain both source and binary distributions from the Ethereal web site: <http://www.ethereal.com>. Simply select the download link, and then select either the source package or binary package of your choice from the mirror site closest to you.

Installing Ethereal under Windows

In this section we explore installing Ethereal under Windows from the binary packages. You must follow two steps:

1. Install WinPcap. There are instructions at the WinPcap web site for installing it under Windows 9X, Windows NT and Windows 2000. These are located at: <http://netgroup-serv.polito.it/winpcap/install/Default.htm>.
2. Install Ethereal. You may acquire a binary installable of Ethereal at <http://www.ethereal.com/download.html#binaries>. Download the installer (after installing WinPcap) and execute it.

Starting Ethereal

You can start Ethereal from the command line under UNIX, but it can also be started from most Window managers as well.

Ethereal is comprised of three main windows, or panes.

1. The top pane is the packet list pane. It displays a summary of each packet captured. By clicking on packets in this pane you control what is displayed in the other two panes.
2. The middle pane is the tree view pane. It displays the packet selected in the top pane in more detail.
3. The bottom pane is the data view pane. It displays the data from the packet selected in the top pane, and highlights the field selected in the tree view pane.

In addition to the three main panes, there are four elements of interest on the bottom of the Ethereal main window.

- A. The lower leftmost button labeled "Filter:" can be clicked to bring up the filter construction dialog.
- B. The left middle text box provides an area to enter or edit filter strings. This is also where the current filter in effect is displayed. You can click on the pull down arrow to select past filter string from a list.
- C. The right middle button labeled "Reset" clears the current filter.
- D. The right text box displays informational messages. These messages may indicate whether or not you are capturing, what file you have read into the packet list pane if you are not capturing. If you have selected a protocol field from the tree view pane and it is possible to filter on that field then the filter label for that protocol field will be displayed.

The Ethereal menus

The Ethereal menu sits across the top of the Ethereal window.

It contains the following items:

File

This menu contains menu-items to open and reread capture files, save capture files, print capture files, print packets, and to quit from Ethereal.

Edit

This menu contains menu-items to find a frame and goto a frame, mark one or more frames, set your preferences, create filters, and enable or disable the dissection of protocols (cut, copy, and paste are not presently implemented).

Capture

This menu allows you to start and stop captures.

Display

This menu contains menu-items to modify display options, match selected frames, colorize frames, expand all frames, collapse all frames, show a packet in a separate window, and configure user specified decodes.

Tools

This menu contains menu-items to display loaded plugins, follow a TCP stream, obtain a summary of the packets that have been captured, and display protocol hierarchy statistics.

Help

This menu contains the About Ethereal... menu item and access to some basic Help.

Ethereal preferences

There are a number of preferences you can set from one place. Simply select the Preferences... menu item from the Edit menu, and Ethereal will pop up the Preferences dialog box.

The Ethereal Preferences dialog box is a tabbed dialog box that allows you to set preferences for each of the following elements:

Printing

This tab allows you to define the default printing command that Ethereal will use as well as the default output file name when you print to a file.

Columns

This tab allows you to select which columns appear in the Packet List Pane.

TCP Streams

This tab allows you to change the foreground and background colors used by the **Follow TCP Stream**.

GUI

This tab allows you to configure various characteristics of the GUI.

Other tabs

The remaining tabs allow you to configure various preferences for the dissection of various network protocols.

Files used by Ethereal

Ethereal uses a number of files while it is running. Some of these reside in `$HOME/.ethereal` and are used to maintain information between runs of Ethereal, while some of them are maintained in system areas.

The following are some of the files accessed by Ethereal:

`$HOME/.ethereal/preferences`

This file contains all your Ethereal preferences, including defaults for capturing and displaying packets. It is a simple text file containing statements of the form **variable: value**.

`$HOME/.ethereal/filters`

This file contains all the filters that you have defined and saved. It consists of one or more lines, where each line has the following format:

```
"<filter name>" <filter string>
```

`$HOME/.ethereal/colorfilters`

This file contains all the color filters that you have defined and saved. It consists of one or more lines, where each line has the following format:

```
@<filter name>@<filter string>@[<bg RGB(16-bit)>][<fg RGB(16-bit)>]
```

`/usr/share/ethereal/plugins`, `/usr/local/share/ethereals/plugins`, `$HOME/.ethereal/plugins`

Ethereal searches for plugins in the directories listed above. They are searched in the order listed.

`/etc/ethers`, `$HOME/.ethereal/ethers`

When Ethereal is trying to translate Ethernet hardware addresses to names, it consults the files listed above in the order listed. If an address is not found in `/etc/ethers`, Ethereal looks in `$HOME/.ethereal/ethers`

Each line in these files consists of one hardware address and name separated by whitespace. The digits of hardware addresses are separated by colons (:), dashes (-) or periods(.). The following are some examples:

```
ff-ff-ff-ff-ff-ff      Broadcast
c0-00-ff-ff-ff-ff      TR_broadcast
00.2b.08.93.4b.a1      Freds_machine
```

`/usr/local/etc/manuf`

Ethereal uses the file listed above to translate the first three bytes of an Ethernet address into a manufacturer's name. This file has the same format as the `ethers` file, except addresses are three bytes long.

\$HOME/.ethereal/ipxnets

Ethereal uses the above file to translate IPX network numbers into names.

An example is:

```
C0.A8.2C.00      HR
c0-a8-1c-00      CEO
00:00:BE:EF      IT_Server1
110f              FileServer3
```

The Ethereal section above is comprised of excerpts from **Ethereal User's Guide: V1.1 for Ethereal 0.9.7** to which the following license applies.

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Version 1.1, March 2000

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Chapter 15 • TightVNC

VNC (Virtual Network Computing) is a client/server software package allowing remote network access to graphical desktops. With VNC, you can access your Internet-connected machine from anywhere. VNC is free (released under the [GNU General Public License](#)) and available on most platforms.

An enhanced version of VNC, TightVNC, contains new features, improvements, optimizations and bugfixes. TightVNC is compatible with standard VNC.

TightVNC is used to perform remote control and administration tasks in Windows, Unix and mixed network environments. It is helpful in distance learning and remote customer support.

The following are instructions on installation, remote upgrade, running the server and viewer, and uninstalling.

Installation

TightVNC is available in the self-installing form, starting from its 1.2.1 release. Run the executable to install. The installation wizard will allow you to choose an installation directory and a name for the TightVNC group under the **Start->Programs** menu. By default, TightVNC installs into the Program Files\TightVNC directory, but you may choose any other location during installation.

Upgrading Remotely

TightVNC servers can be upgraded remotely, starting from its 1.2.5 version, meaning that the TightVNC installation can be performed in an active TightVNC session. You cannot replace the executable files in place while the TightVNC service is running, so the installer will copy the new files to a temporary location, and these new files will replace the older versions during the next reboot. The installer prompts for reboot if unable to replace the executables.

Reboot the computer before using this feature. If you want to access your computer after the reboot, run WinVNC as a service, not in the application mode.

Note: There is no warranty of absolute reliability of the remote upgrade procedure. Close all running applications (besides the WinVNC service) before launching the TightVNC installer to minimize risks.

Running the Server and Viewer

Like normal VNC, TightVNC is comprised of the server (WinVNC), which shares the screen of the machine on which it's running, and the viewer, which shows the remote screen received from the server. To get started, run a server on the machine to be accessed remotely and connect to it with a viewer. TightVNC Win32 distribution includes both the server and viewer parts.

Running a Server (WinVNC)

WinVNC can run in the application mode and as a Windows service. In the application mode, the server runs only during the current user session and closes on logout. To start WinVNC in the application mode, choose **Start ->Programs->TightVNC->Launch TightVNC Server**.

Right-click the tray icon to bring up a menu with the following options.

- **Properties** - displays the Properties dialog, allowing the user to change WinVNC parameters.
- **Add New Client** - allows outgoing connections from the server to any viewer started in "listening" mode.
- **Kill All Clients** - disconnects all currently connected clients from the server.
- **Disable New Clients** - disables new client connection to the server.
- **About WinVNC** - shows the "About..." box.
- **Close** - shuts down the server.

Running a Viewer

To view and control a remote desktop on which a TightVNC server is running, run the TightVNC viewer.

Choose one of the following under **Start->Programs->TightVNC**:

- **TightVNC Viewer** - for a slow network connection to the server (best compression)
- **TightVNC Viewer** - for high-speed networks (fast compression)
- **TightVNC Viewer** - starts the viewer in Listen Mode.

After starting the viewer, enter the host name and optional display number of the remote server you want to access at the prompt.

Note: The TightVNC server displays the IP address as the mouse passes over its tray icon.

Uninstalling

Uninstall TightVNC using Add/Remove Programs under Control Panel. You may also remove the directory into which you have installed it (e.g. C:\Program Files\TightVNC).

Note: The TightVNC installation program does not copy files into the system directory. Before uninstalling, check that WinVNC is not running and not installed as a service.

Reference: <http://www.tightvnc.com/winst.html>