Lucent Technologies
Bell Labs Innovations

ConnectReach™ Access System

User/Service and Ordering Manual

363-214-001
Issue 1
February 2000

Notice

Every effort was made to ensure that the information in this information product (IP) was complete and accurate at the time of printing. However, the information, the products, and product availability are subject to change.

Mandatory Customer Information

Federal Communications Commission (FCC) Notification and Repair Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residence is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Security Statement

In rare instances, unauthorized individuals make connections to the telecommunications network through the use of remote access features. In such event, applicable tariffs require that the customer pay all network charges for traffic. Lucent Technologies cannot be responsible for such charges and will not make any allowance or give any credit for charges that result from unauthorized access.

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Documentation Ordering Information

The ordering number for this IP is 363-214-001. To order this IP call the Lucent Technologies Customer Information Center in Indianapolis, Indiana, on 1-888-LUCENT-8 (1-888-582-3688). RBOC/BOC customers should process IP orders or standing order requests through their Company Documentation Coordinator. For more ordering information, refer to “How to Order Information Products” in the chapter “About This Information Product.”

Customer Assistance and Technical Support

Follow local procedures for obtaining technical assistance. Lucent Technologies also provides in-hours or emergency out-of-hours help for the *ConnectReach*™ Access System. Call the Lucent Technologies Regional Technical Assistance Center at 1-800-225-RTAC.

Developed by Lucent Technologies Network Systems Customer Training and Information Products.

How Are We Doing?

Title: ConnectReach™ Access System, User/Service and Ordering Manual

Identification No.: 363-214-001 Issue No.: 1 Date: February 2000

Lucent Technologies welcomes your feedback on this Information Product (IP). Your comments can be of great value in helping us improve our IPs.

1. Please rate the effectiveness of this IP in the following areas:

	Excellent	Good	Fair	Poor	Not Applicable
Ease of Use					////////////////////
Clarity					////////////////////
Completeness					////////////////////
Accuracy					////////////////////
Organization					////////////////////
Appearance					////////////////////
Examples					
Illustrations					
Overall Satisfaction					////////////////////

2. Please check the ways you feel we could improve this IP.

- ❒ Improve the overview/introduction
- ❒ Improve the table of contents
- ❒ Improve the organization
- ❒ Include more figures
- ❒ Add more examples
- ❒ Add more detail
- ❒ Make it more concise/brief
- ❒ Add more step-by-step procedures/tutorials
- ❒ Add more troubleshooting information
- ❒ Make it less technical
- ❒ Add more/better quick reference aids
- ❒ Improve the index

Please provide details for the suggested improvement. _____

3. What did you like most about this IP?

4. Feel free to write any comments below or on an attached sheet.

If we may contact you concerning your comments, please complete the following:

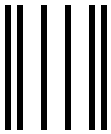
Name: _____ Telephone Number: _____

Company/Organization: _____ Date: _____

Address: _____

When you have completed this form, please fold, tape and return to address on back or Fax to: 910 727-3043.

---------- Do Not Cut — Fold Here And Tape ----------



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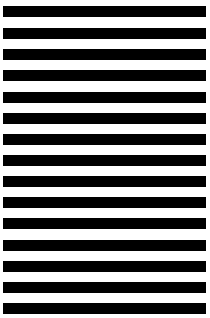

Lucent Technologies
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Title: ConnectReach™ Access System, User/Service and Ordering Manual

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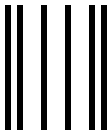

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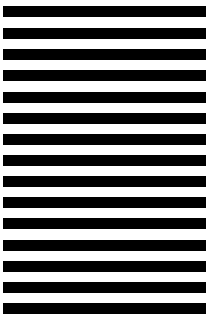

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Contents

Contents

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About This Information Product (IP)

Purpose

Overview

Introduction

The User/Service Manual provides the information needed by installation, operation, and maintenance personnel to configure, install, monitor, and maintain the *ConnectReach*™ Access System.

Scope

ConnectReach Access System

IP coverage

This IP contains the following:

- High-level description of the system
- Product description
- Procedures for preinstallation planning
- Procedures for configuring, installing, monitoring, maintaining, and clearing troubles on the *ConnectReach* system.
- Information necessary for ordering *ConnectReach* equipment.

Intended Audience

Who Uses This Manual?

Customer

The User/Service and Ordering Manual is intended for the following customers who participate in the engineering, ordering, installation, and maintenance of the system:

- Equipment engineers and outside plant engineers
- Transmission engineers
- Installation, operation, and maintenance personnel
- System administrators
- Technical support personnel
- Training personnel
- Ordering personnel.

Knowledge required to use this manual

This IP is based on an understanding of basic digital transmission principles.

Reason for Reissue

Changes Made Since Previous Issue

Introduction Whenever this IP is reissued, the reason(s) for reissue will be listed in this paragraph.

How to Use This Information Product

Organization

Introduction	This IP is organized in the given order.
"**About This Information Product (IP)**"	This section defines the purpose, scope, and intended audience for this IP; provides introductory and support information on this IP; lists training courses; and lists information on how to obtain technical support.
Chapter 1, "**System Overview**"	This chapter describes a high-level overview of the *ConnectReach* system and its architecture.
Chapter 2, "**Product Description**"	This chapter provides a physical and functional description of the *ConnectReach* system. This chapter also includes a description of the peripheral equipment that can be used with the *ConnectReach* system.
Chapter 3, "**Preinstallation Planning**"	This chapter includes instructions for completing preconfiguration and preinstallation worksheets that can be used to reduce the time it takes to configure and install a *ConnectReach* system.
Chapter 4, "**Configuring the *ConnectReach* System**"	This chapter contains procedures for configuring the *ConnectReach* system according to the settings selected on the preconfiguration worksheets. These procedures assume that the *ConnectReach* system is to be configured at a staging area prior to installation at a customer site. Procedures are also included for reconfiguring the *ConnectReach* system from a remote location after it has been installed.
Chapter 5, "**Installation**"	This chapter provides the procedures for mounting and connecting cables to the *ConnectReach* system. The procedures for installing interface cards into the *ConnectReach* system and connecting two *ConnectReach* systems together to obtain more than 24 voice channels is also included in this chapter.

(Continued on next page)

Organization (Continued)

Chapter 6, "*ConnectReach* System Monitoring"	This chapter contains the procedures for accessing and displaying various data that has been stored in or collected by the *ConnectReach* system.
Chapter 7, "Configure/Monitor the *ConnectReach* System Using a Web Browser"	This chapter contains the procedures for configuring and monitoring the *ConnectReach* system using a Web browser. This chapter also includes the procedure for executing other commands, rebooting the *ConnectReach* system, and upgrading *ConnectReach* system software.
Chapter 8, "Maintenance and Trouble Clearing"	This chapter contains the procedures for performing "as required" maintenance on the *ConnectReach* system. Also included in this chapter is information to assist in the isolation of a trouble condition using the indicators on the front of the *ConnectReach* system unit.
Appendix A, "IP Network Addresses"	This appendix describes Internet protocol (IP) addressing including the five classes of networks and the IP addresses that are valid for each one.
Appendix B, "Configuration Examples"	This appendix contains examples of configuration sessions ranging from a simple quickstart example to a more complex arrangement requiring many parameter settings.
Appendix C, "Custom Firewall Configurations"	This appendix contains procedures for configuring SOCKS and IP filter groups.

(Continued on next page)

Organization (Continued)

Appendix D, "User Interface"	This appendix includes the procedures for using the Business OfficeXchange* (BOX*) features.
Appendix E, "HDSL Manager"	This appendix describes communication with the high data-rate digital subscriber line (HDSL) module located in the *ConnectReach* system by means of the American standard code for information interchange (ASCII) Text Interface.
Appendix F, "System Configurations and Ordering Information"	This appendix contains a description of the basic *ConnectReach* system configurations and information required to upgrade and order associated hardware and software.
Glossary	This section lists and provides a definition of the various terms, abbreviations, and acronyms used throughout this manual.
Index	This section contains an alphabetical listing of selected subjects and key words contained in this IP along with the page number(s) where they can be found.

* Trademark of VINA Technologies, Inc.

Conventions Used

Special Fonts

Introduction	Special fonts are used in this IP for text that requires emphasis. The following conventions are used to highlight specific text.
Uppercase	Uppercase letters (or literal spelling) denote panel stampings located on the equipment.
Italic typeface	Italic typeface denotes the titles of IPs referenced in the text. However, italic typeface may also be used to highlight an important word or phrase.
Double quotes	Double quotes (") surround text to represent chapter titles referenced in the text.
Icons	Special symbols (icons) denote safety labels and notes.
Monospace font	**`Constant-width`** (monospace) font is used in the display of the input/output screens.

Trademarks

Introduction

The trademarks used in this IP are identified on the back of the title page. Trademarks are presented in a specific way — they stand out from the rest of the text by using a different font or capital letters, and they modify a noun. For example, the system name contains a trademark — *ConnectReach*™ Access System. The trademark is never used by itself — the trademark always modifies a noun (for example, *SPOTS*® channel units).

Trademarks of Lucent Technologies

Lucent Technologies trademarks are identified on first use in *each chapter* (in the table of contents, text, and headings) with the registered mark (®) or trademark (™) symbol. Also, they are identified on first use in each table and figure.

Trademarks of other companies

Trademarks of other companies are identified with a footnote on the first use in each chapter of the IP.

Terms

Introduction

This section explains terms used in this IP that may have a different meaning than the general or common use of the term.

Access

In the *ConnectReach* Access System, the term *access* means that the system provides the primary service interface for the customer to enter the network.

Product Safety

Safety Labels

Introduction

This IP may contain safety labels as DANGERS, WARNINGS, and CAUTIONS. These safety labels have the following definitions.

Safety alert symbol

The safety alert symbol ⚠ is used on product labels and in this IP to alert the user to important operating and maintenance instructions.

Danger

⚠ **DANGER:**
Danger indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.

Warning

⚠ **WARNING:**
Warning indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.

Caution

⚠ **CAUTION:**
Caution indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. The caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.

Electrostatic Discharge (ESD) Considerations

Considerations to avoid ESD damage

CAUTION:
Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

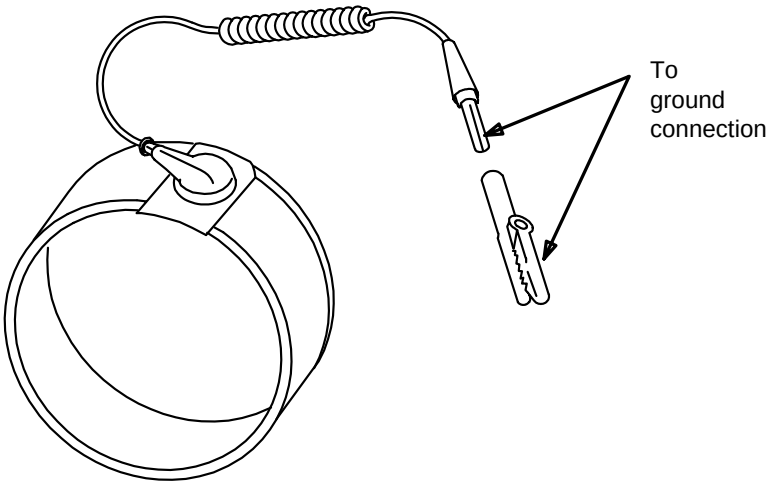
The following list of precautions should be observed when handling circuit packs to prevent damage by electrostatic discharge.

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD.
- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat. If a static-dissipating floor mat is used, be sure that it is clean to ensure a good discharge path.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats. If a static-dissipating table mat is used, be sure that it is clean to ensure a good discharge path.
- Always store and transport circuit packs in static-safe packaging. Shielding is not required unless specified.
- Keep all static-generating materials such as food wrappers, plastics, and foam packaging away from all circuit packs. On removal from the bay, immediately put circuit packs into static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.

Electrostatic Discharge (ESD) (Continued)

Grounding using wrist strap

To reduce the possibility of ESD damage, the *ConnectReach* system cabinet is equipped with a ground stud to enable personnel to ground themselves using a wrist strap (refer to the following figure) with a minimum resistance of 250 k-ohms while handling circuit packs or working on the system. The ground stud is located on the front of the cabinet between the POWER connector and the VOICE CHANNELS connector. An alligator clip adapter must be attached to the plug on the end of the wrist strap cable to enable connection to the ground stud.



Customer Assistance and Technical Support

Regional Technical Assistance Center (RTAC)

Introduction

Lucent Technologies provides customer assistance on the *ConnectReach* Access System including, but not limited to, troubleshooting assistance, technical consultation, operational problem consultation, procedural advice, and emergency recovery assistance from a qualified system support professional from the Regional Technical Assistance Center (RTAC).

1-800-225-RTAC

Service is provided from the RTAC at **1-800-225-RTAC**. This telephone number is monitored 24 hours a day, 7 days a week. During regular business hours your call will be answered by your local regional RTAC. Outside normal business hours all calls will be answered at a centralized technical assistance center where service-affecting problems will be dispatched immediately to your local RTAC. All other problems will be referred to your local RTAC on the next regular business day.

Warranty repair

If a *ConnectReach* system unit or interface card is found to be broken or defective during the warrany period, the item should be sent to the following location for repair or replacement:

Lucent Technologies
Attn: Dock 21
1000 Twin Lakes Pkwy
Charlotte, NC 28269

Training

Introduction

The National Product Training Center in Altamonte Springs, Florida, provides management courses for planning, engineering, and ordering as well as training for telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses may be available. Consult your local Lucent Technologies Account Executive for more information or reservations.

Enroll using 1-888-LUCENT-8

For information on these and other training courses available, on schedules, fees, and registration, call the training coordinator for your company. If your company does not have an assigned training coordinator, call this toll-free number (Monday through Friday, 8:00 a.m. to 6:00 p.m. EDT) to order a product training catalog, get more information on a course, find out about new courses, or register for a class:

1-888-LUCENT8 (582-3688)

When you call 1-888-LUCENT8, select Option 2 (press ABC 2 on a touch-tone phone) for Lucent Technologies product training.

Enroll using Internet access

Internet access to training course catalogs, schedules, availability, and other course related information can be found at:

http://www.lucent.product-training.com/catalog

Enrollment forms can be faxed to (407) 767-2677.

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Training (Continued)

TR4616, *ConnectReach* Access System Operations and Maintenance

Audience

This course is designed for telecommunication personnel responsible for planning, configuring, installing, and maintaining the system.

Length

2 days

Content

A comprehensive study of the *ConnectReach* Access System that includes a physical/ functional description, preinstallation planning, installation, monitoring, configuring, and maintenance.

Media

A combination of instructor lectures and class discussion. The information will be reinforced with a quiz and hands-on exercises on operational systems that are typical of those in the field.

Prerequisite

Students should have a basic understanding of the digital loop carrier (DLC), local area networks (LANs), and Internet functions and protocols.

Electronic and Alternative Media

Overview

Information products (IPs) for the *ConnectReach* Access System are available in electronic form, on compact disk-read-only memory (CD-ROM) and floppy disk. IPs are also maintained on the Internet (behind the Lucent Technologies firewall).

CD-ROM

CD-ROM has many advantages over traditional paper documentation, including cost savings, search and retrieve capability, and the assurance of the most current documentation. CD-ROM is available by annual subscription (on standing order).

Technical information for the CD-ROM

For CD-ROM technical information, call Lucent Technologies IP Support (1-800-645-6759).

Pricing information

For pricing information, contact your Lucent Technologies Network Systems Account Executive or the Lucent Technologies Customer Information Center (1-888-LUCENT8).

How to order

To order, call your Technical Information Resource Manager, your Lucent Technologies Account Executive, or the Lucent Technologies Customer Information Center (1-888-LUCENT8).

The Lucent Technologies Intranet

For *Intranet* technical information, call the Electronic Media Networked Service (EMNS) group at Lucent Technologies (1-800-228-6763). The uniform resource locator (URL) for transmission IPs is **http://www-emns.nw.lucent.com/inforware/trans/index.html**. This URL can only be accessed by Lucent Technologies personnel.

The Internet

For Internet technical information, call the EMNS group at Lucent Technologies (1-800-228-6763). The URL for transmission IPs is **http://www.lucent-info.com/**.

How to Order IPs

Additional copies

To order additional copies of this IP (**363-214-001**) and/or to request placement on the standing order list, send or call in an order as follows:

Customer	Mail Order	Telephone Order *(Monday Through Friday)*
Commercial customers*	Lucent Technologies Customer Information Center Attention: Order Entry Center 2855 N. Franklin Road P.O. Box 19901 Indianapolis, IN 46219	Within U.S.A. and Canada: **1-888-LUCENT-8 (582-3688)** *7:30 a.m. to 6:30 p.m. EST* FAX: **1-800-566-9568** From Canada: **1-800-255-1242** Worldwide: **1-317-322-6416** FAX: **1-317-322-6699**
RBOC/BOC	Process through your Company Documentation Coordinator	

* For commercial customers, a check, money order, purchase order number, or charge card number is required with all orders. Make checks payable to Lucent Technologies. Lucent Technologies entities should use Form IND 1-80.80 FA, available through the Customer Information Center.

One-time orders

One-time orders include a binder (if applicable) and the IP contents for the current issue in effect at the time of order. Also, you may request placement on the standing order list for all later reissues of any IP. The standing order list for each IP provides automatic distribution for all reissues of the IP. The Regional Bell Operating Company (RBOC)/Bell Operating Company (BOC) customers should process IP orders or standing order requests through their Company Documentation Coordinator.

How to Comment

Feedback forms

Two feedback forms are located near the front of this IP immediately after the title page.

Missing feedback forms

If the feedback forms are missing, please send your comments and suggestions to:

Lucent Technologies
Network Systems, Customer Training and Information Products
Documentation Services
2400 Reynolda Road
Winston-Salem, NC 27106-4606

Toll-free number

You may report errors or request changes to this IP by calling the toll-free number (**1-800-645-6759**) and giving the nine-digit number for the IP, **363-214-001**.

System Overview

1

Contents

About This Chapter

Introduction

Contents

This chapter provides a high-level description of the *ConnectReach*™ Access System and a description of the benefits offered by the *ConnectReach* system. A description of the customer access ports and the security provided against unauthorized access is also presented in this chapter.

ConnectReach™ System Description

Overview

Description

The *ConnectReach* Access System significantly reduces costs by combining voice, data, and Internet access into a single T1 line or high data-rate digital subscriber line (HDSL). The *ConnectReach* system performs the functions of a data service unit/channel service unit (DSU/CSU), fractional T1 multiplexer, channel bank, T1 drop/insert, router, firewall, and much more. The *ConnectReach* system is a single network device that simplifies configuration and network management by replacing more complex groups of components such as channel banks and routers.

Without the integrated access provided by the *ConnectReach* system, adding outside lines for voice and data connectivity can be expensive and complex. As a company grows, analog voice lines may need to be added to its existing key system. The company's support for data and Internet access may also increase, which requires leasing or purchasing network access devices and possibly adding costly digital lines. As shown in the following illustration, the result is an excessive quantity of access lines connected to multiple hardware devices, which makes network management complex and costly.

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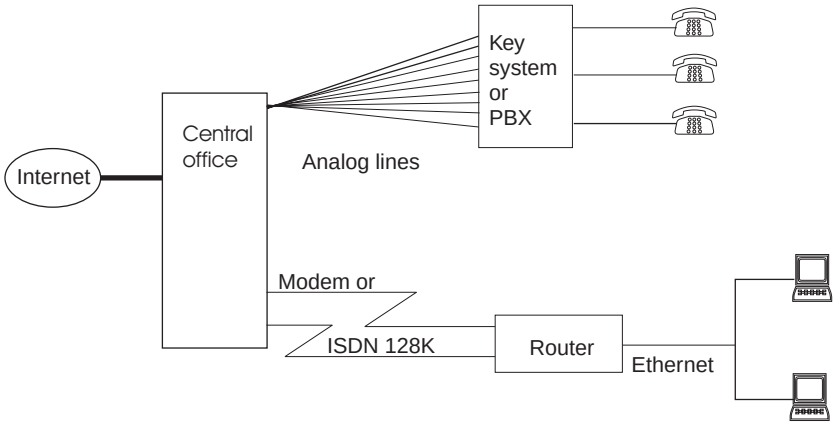
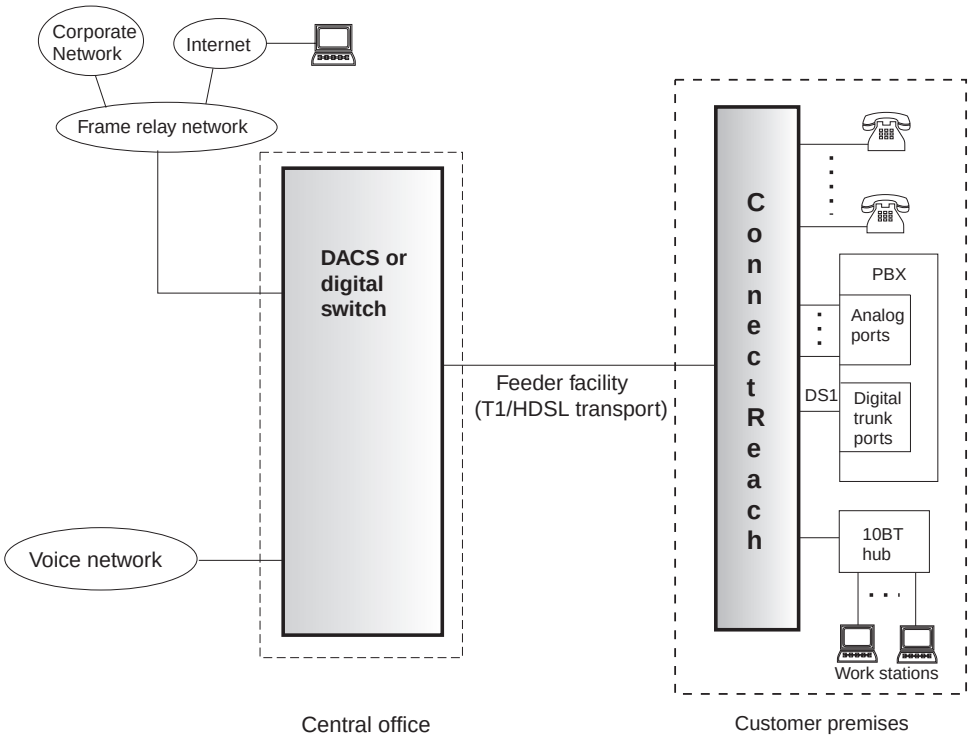
Overview (Continued)

Description (continued)



By virtue of its integrated access, the *ConnectReach* system provides a simple and comprehensive communications solution in which voice, data, and Internet access applications use a single T1 line or a high data-rate digital subscriber line (HDSL) (refer to the following figure).



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Overview (Continued)

Benefits

The *ConnectReach* system offers the following benefits:

- Cost savings — By using a single T1 or HDSL line for all communications applications, the cost of access is significantly lower than leasing individual analog (voice) lines, integrated services digital network (ISDN) lines, or switched 56-Kb/s or 64-Kb/s lines. Costs are also reduced by eliminating costly hardware components such as channel banks, multiplexers, routers, and CSUs.
- Flexibility — The *ConnectReach* system allows bandwidth to be configured to meet the particular needs of a company as it grows. For example, a DS0 channel can be added with a simple software configuration change instead of an on-site visit from a phone company technician.
- Speed — The *ConnectReach* system can allocate greater resources (DS0 channels) to bandwidth-intensive applications, which increases the speed and efficiency of voice, data, and Internet applications up to a full T1 speed of 1.544 Mb/s. The *ConnectReach* system allows sufficient bandwidth for multiple simultaneous applications, and enhances access to the World Wide Web.
- Voice redundancy — The *ConnectReach* system provides voice redundancy by means of an analog connection to the CO.
- Comprehensive management capabilities — The *ConnectReach* system management interface is accessible from Telnet, hypertext terminal protocol (HTTP) (using a Web browser), or an RS-232 (serial) console port. The *ConnectReach* system is simple network management protocol (SNMP)-capable, and provides statistics reports, and logs of events and T1/HDSL line status.
- Loop Integrity Monitor — The *ConnectReach* system span carries half of the DS0 level traffic on one loop, and half on the other loop. The loop integrity monitor (LIM) determines the current state of each loop on the *ConnectReach* system span. If one of the loops goes down, usually the whole ConnectReach system is down. With LIM, if one loop goes down, the other loop is still functional.
- Size — The ConnectReach system combines the functionality of several network devices into one space saving, compact chassis standing 1.75 inches high.

(Continued on next page)

Overview (Continued)

Security

The *ConnectReach* system supports two levels of security:

- The *ConnectReach* system offers several firewall technologies that protect local area network (LAN) users against unauthorized connections from the wide area network (WAN): network address translation (NAT), Internet protocol (IP) filtering, and SOCKS application proxy.
- Login names and passwords protect the *ConnectReach* system against unauthorized logins.

Product Description

2

Contents

About This Chapter

Introduction

Contents

This chapter provides a physical and functional description of the *ConnectReach*™ Access System. A description of the *ConnectReach* system specifications and the peripheral equipment that can be used with the *ConnectReach* system are also presented in this chapter.

Physical and Functional Description

General Physical Characteristics

Size

The *ConnectReach* system measures 1.75 inches high, 17 inches wide, and 14 inches deep.

Weight

The *ConnectReach* system weighs approximately 9 lb.

Operating temperature/ humidity

The *ConnectReach* system can operate within a temperature range of 0 to 50° C (32 to 122° F) at a maximum relative humidity of 95 percent, noncondensing.

Power requirements

The *ConnectReach* system is designed to accept input power from either an AC or DC power source with the following requirements.

AC power

The AC input power required for the *ConnectReach* system power supply transformer is 95 to 125 V AC, 60 Hz, and 1.0 amp.

DC power

The DC input power required for the *ConnectReach* system is 40 to 56 V DC at 50 VA.

Mounting positions

The *ConnectReach* system can be mounted at either of the following locations:

- 19- or 23-inch rack mount
- Wall mount
- Desk top mount.

(Continued on next page)

General Physical Characteristics (Continued)

Mounting clearance

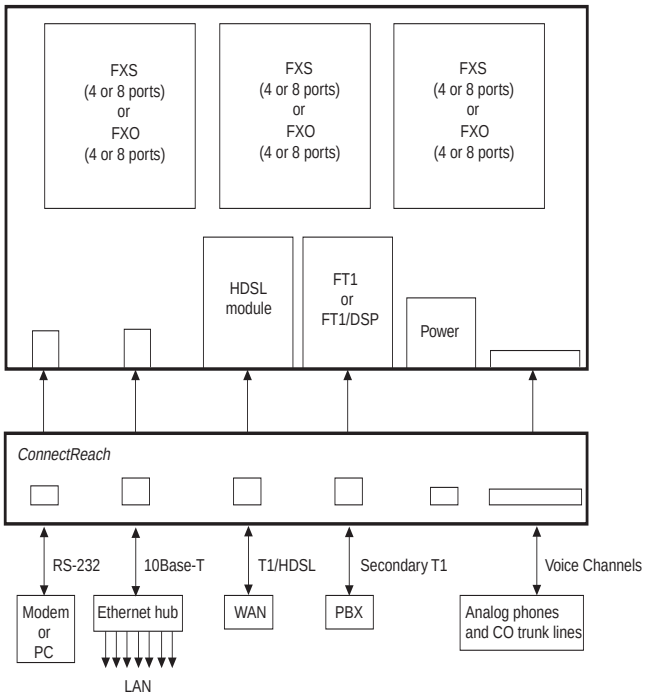
The minimum clearance around the *ConnectReach* system after it is installed should be as follows:

- Above: 1.75 inches
- Below: 0.0 inch
- Front: 5.0 inches
- Rear: 0.6 inch
- Sides: 2.0 inches.

Description of Interface Ports

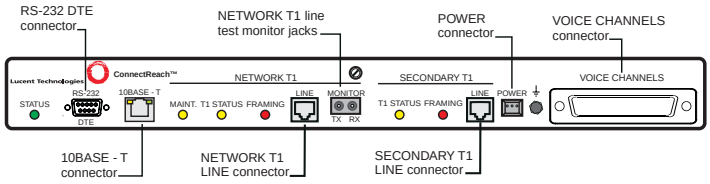
Connection information

The following figure shows a typical example of how the *ConnectReach* system ports are connected at a customer site.

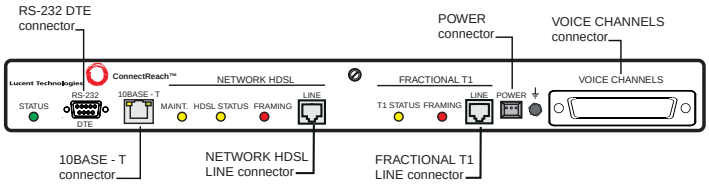


Location of ports

The following figure shows the positions of the interface ports on the front panel of the *ConnectReach* system apparatus cases. A description of each port follows.



T1/DSX-1



HDSL

(Continued on next page)

Description of Interface Ports (Continued)

RS-232 port

The **RS-232** port contains a nine-pin D-type, data terminal equipment (DTE) connector that serves as the serial port for the *ConnectReach* system. This port connects to either a local provisioning terminal serial port or to a modem accessed by a remote provisioning terminal. The provisioning terminal is used to configure the *ConnectReach* system. A null modem cable is required for this connector when connected to a local provisioning terminal running terminal emulation software. This connection can be used for initial configuration of the system.

The following table provides a list of pin assignments for the **RS-232** connector.

Description	Pin	Signal Name
Data carrier detect; input	1	DCD
Receive data; input	2	RXD
Transmit data; output	3	TXD
Data terminal ready; output	4	DTR
Interface signal ground	5	GND
Data set ready; input	6	DSR
Ready to send; output	7	RTS
Clear to send; input	8	CTS
Ring indicator; input	9	RI

(Continued on next page)

Description of Interface Ports (Continued)

10BASE-T port

The **10BASE-T** port contains an eight-pin modular, RJ-45 connector that is the Ethernet LAN port for the *ConnectReach* system. This port connects the customer's LAN by means of either an Ethernet hub or a direct connection to the network, depending on the topology of the customer's network.

The following table provides a list of pin assignments for the **10BASE-T** connector.

Description	Pin	Signal Name
Twisted-pair transmit data; positive output	1	ENTX+
Twisted-pair transmit data; negative output	2	ENTX-
Twisted-pair receive data; positive input	3	ENRX+
Not used	4	
Not used	5	
Twisted-pair receive data; negative input	6	ENRX-
Not used	7	
Not used	8	

NETWORK T1/ DSX-1/HDSL LINE port

The **NETWORK T1/HDSL LINE** port contains an eight-pin, modular, RJ-48C connector that accepts the primary T1/DSX-1/HDSL line for the *ConnectReach* system. The network T1/DSX-1/HDSL line connects the *ConnectReach* system to the digital access and cross-connect system (DACS) or digital switch. The T1/HDSL line supports both voice and data/Internet traffic. The number of channels allocated to each function is configurable based on the need of the site.

The following table provides a list of the **NETWORK T1** connector pin assignments.

T1 Description	Pin	T1 Signal Name
Twisted-pair line input	1	RXRING
Twisted-pair line input	2	RXTIP
Not used	3	
Twisted-pair line output	4	TXRING
Twisted-pair line output	5	TXTIP
Not used	6	
Not used	7	
Not used	8	

(Continued on next page)

Description of Interface Ports (Continued)

NETWORK T1/ DSX-1/HDSL LINE port (continued)

The following table provides a list of the **HDSL LINE** connector pin assignments.

Description	Pin	Signal Name
HDSL loop1 ring	1	RING1
HDSL loop1 tip	2	TIP1
Not used	3	
HDSL loop2 ring	4	RING2
HDSL loop2 tip	5	TIP2
Not used	6	
Not used	7	
Not used	8	

NETWORK T1/ DSX-1 line MONITOR port

The **NETWORK T1** line **MONITOR** port accepts standard bantam miniature telephone plugs from test equipment used to monitor the network T1/DSX-1 line.

NOTE:
In the event that it becomes necessary to connect test equipment to the **NETWORK T1** line **MONITOR** connector, be sure the test equipment is operating in the *bridge* mode. Otherwise, the test equipment can terminate the T1 line, thereby reducing T1 receive signal strength to the *ConnectReach* system.

SECONDARY/ FRACTIONAL T1/ DSX-1 LINE port

The **SECONDARY/FRACTIONAL T1 LINE** port contains an eight-pin, modular, RJ-48C connector that accepts the secondary/fractional T1/DSX-1 line for the *ConnectReach* system. The secondary/fractional T1/DSX-1 line connects the *ConnectReach* system to a private branch exchange (PBX) or key system that has a T1 interface. Open data devices, for example, video codec, can also be connected to the fractional T1 interface card by means of this port.

The connector pin assignments are the same as the pin assignments for the **NETWORK T1 LINE** connector described previously.

(Continued on next page)

Description of Interface Ports (Continued)

POWER port

The **POWER** port contains a three-pin Molex connector that provides the connection point for 48 V DC input power to the *ConnectReach* system from either a 120 V AC power supply transformer or a DC power source.

The following table provides a list of the power connector pin assignments.

The *ConnectReach* system includes polarity reversal protection for input power connections. Pins 1 and 3 can be connected to either polarity of DC voltage or to an AC power supply.

Description	Pin
48 V DC	1 (right)
Safety ground	2 (center)
48 V DC RET	3 (left)

VOICE CHANNELS port

The **VOICE CHANNELS** port contains a 50-pin telephony type connector which connects the *ConnectReach* system to voice-frequency telephone lines by means of a telephone punch-down block at the site. If the customer's PBX or key system has an analog interface, connection is made to the analog foreign exchange station (FXS) **VOICE CHANNELS** port, and optionally to the foreign exchange office (FXO) ports for direct inward dial (DID). The CO trunk lines can also be connected to the FXO **VOICE CHANNELS** port.

(Continued on next page)

Description of Interface Ports (Continued)

VOICE CHANNELS port (continued)

The following table provides a list of pin assignments for the **VOICE CHANNELS** connector.

Description	Pin	Signal	Description	Pin	Signal
Voice Channel 1	1	Ring	Voice Channel 14	14	Ring
	26	Tip		39	Tip
Voice Channel 2	2	Ring	Voice Channel 15	15	Ring
	27	Tip		40	Tip
Voice Channel 3	3	Ring	Voice Channel 16	16	Ring
	28	Tip		41	Tip
Voice Channel 4	4	Ring	Voice Channel 17	17	Ring
	29	Tip		42	Tip
Voice Channel 5	5	Ring	Voice Channel 18	18	Ring
	30	Tip		43	Tip
Voice Channel 6	6	Ring	Voice Channel 19	19	Ring
	31	Tip		44	Tip
Voice Channel 7	7	Ring	Voice Channel 20	20	Ring
	32	Tip		45	Tip
Voice Channel 8	8	Ring	Voice Channel 21	21	Ring
	33	Tip		46	Tip
Voice Channel 9	9	Ring	Voice Channel 22	22	Ring
	34	Tip		47	Tip
Voice Channel 10	10	Ring	Voice Channel 23	23	Ring
	35	Tip		48	Tip
Voice Channel 11	11	Ring	Voice Channel 24	24	Ring
	36	Tip		49	Tip
Voice Channel 12	12	Ring	T1/HDSL Alarm	25	N.O. alarm contact
	37	Tip		50	Common
Voice Channel 13	13	Ring			
	38	Tip			

(Continued on next page)

Description of Interface Ports (Continued)

VOICE CHANNELS port (continued)

Pin pairs 1 through 24 correspond to T1/HDSL channels 1 through 24. Pair 25/50 is a normally open alarm connection (150 VRMS @ 100 mA) that connects to an alarm relay. The alarm relay provides an indication to an external alarm or trunk bypass unit that the *ConnectReach* system unit is not functioning properly and one or more of the yellow or red status light emitting diodes (LEDs) are lighted.

The following four conditions will cause the alarm relay to close:

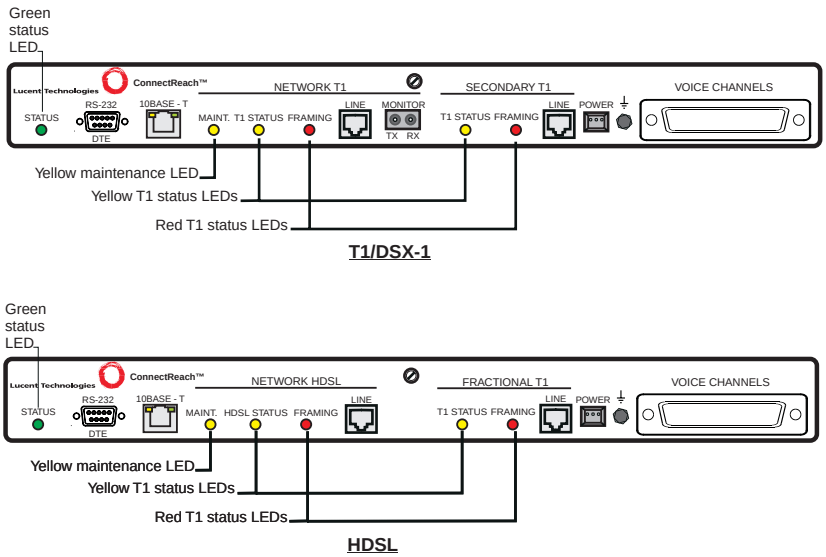
- Power fails
- *ConnectReach* system fails
- Network T1/HDSL alarm is enabled and the network T1/HDSL link fails
- Secondary/fractional T1 alarm is enabled and the secondary/fractional T1 link fails.

If the *ConnectReach* system has a foreign exchange office (FXO) card used with local call routing (LCR) and a trunk bypass unit is connected, the network T1/HDSL alarm should be disabled. If the T1/HDSL link fails, calls will automatically be rerouted out the FXO port, which is connected to the trunk bypass. If the network T1/HDSL alarm is enabled, calls will be rerouted out the foreign exchange station (FXS) port and within the bypass unit causing connection problems.

Description of Indicators

Indicator locations and designations

The following figure shows the positions of the LED indicators on the front panel of the *ConnectReach* system apparatus cases. A description of each indicator follows.



STATUS LED

This green LED provides an indication of the status of the self-test and activity on the T1/HDSL line according to the state of the LED. The various states of the **STATUS** LED and their indication are as follows:

- ***On*** — Self-test was successful; no packets are being sent/received on the T1/HDSL line.
- ***Flashing*** —Self-test was successful; data packets are being sent/received on the T1/HDSL line.
- ***Off*** — Self-test failed.

MAINT LED

This yellow LED provides an indication of a network loopback or active diagnose command. The various states of the **MAINT** LED and their indication are as follows:

- ***On*** — Network loopback is present on the network T1/HDSL line.
- ***Flashing*** — A diagnose command is active.
- ***Off*** — The *ConnectReach* system is operating normally.

(Continued on next page)

Description of Indicators (Continued)

T1/HDSL STATUS LEDs

These two yellow LEDs provide an indication of a yellow alert or bipolar violations on the network and/or secondary T1/DSX-1/HDSL line. The various states of the **T1/HDSL STATUS** LEDs and their indication are as follows:

- ***On*** — A yellow alert has occurred in the last second.
- ***Flashing*** — One or more bipolar violations has occurred in the last second.
- ***Off*** — The *ConnectReach* system is operating normally.

NOTE:
The **T1 STATUS** LED for the secondary T1/DSX-1 line will operate only if the secondary T1/DSX-1 line is installed and enabled.

FRAMING LEDs

These two red LEDs provide an indication of a red alarm condition or a high bit error rate on the network and/or secondary T1/DSX-1/HDSL line. The various states of the **FRAMING** LEDs and their indication are as follows:

- ***On*** — A red alarm condition is present.
- ***Flashing*** — The framing bit error rate has exceeded $10E^5$ in the last second.
- ***Off*** — The *ConnectReach* system is operating normally.

NOTE:
The **FRAMING** LED for the secondary T1/DSX-1 line will operate only if the secondary T1/DSX-1 line is installed and enabled.

ConnectReach System Specifications

Interface Ports and Functional Circuits

Introduction

This section provides a listing of the physical and functional specifications for the various interface ports and functional circuits located within the T1/DSX-1 and HDSL *ConnectReach* system.

CSU functionality

The following are the specifications for the channel service unit (CSU) functionality circuit:

- DSX-1/HDSL network interface
- Connector: RJ-48C (keyed)
- Monitor jack: dual bantam
- T1/DSX-1 line rate:1.544 Mb/s
- HDSL line rate: full duplex transmission at 784 kb/s over each pair (two pairs total)
- Loop Integrity Monitor: allows half payload functioning when one loop is down
- Clock source: line (carrier)/local
- Line coding (T1/DSX-1): bipolar 8 zero substitution (B8ZS) or alternate mark inversion (AMI)
- Line coding (HDSL): 2B1Q
- Framing: D4 [superframe (SF)] or extended superframe (ESF)
- Line Build out:
  - ***T1 Carrier interface*:** 0 dB, -7.5 dB, -15 dB, or -22.5 dB
  - ***DSX-1 interface*:** 0 to 133 feet, 133 to 266 feet, 266 to 399 feet, 399 to 533 feet, and 533 to 655 feet
- Automatic receive sensitivity.

(Continued on next page)

Interface Ports and Functional Circuits (Continued)

FXS/*SPOTS*® analog line support)

The following are the specifications for the foreign exchange station (FXS)/*SPOTS* analog line support circuit:

- 4–24 ports expandable in 4- or 8-port increments
- Loop start/ground-start
- Robbed bit line signaling
- Modems supported
- 48-volt battery
- –25 V DC at 25 mA talk battery
- Supports analog PBX lines
- Ringing: 5 ringer equivalency number (REN) per port or 75 REN for each *ConnectReach* system
- Transmit and receive gain adjust: 0 dB, –3 dB, –6 dB, or –12 dB
- Impedance: 600 ohms
- Range: 480 ohms (includes DC off-hook resistance of the phone plus the cable resistance)

FXO analog trunk support

The following are the specifications for the foreign exchange office (FXO) analog trunk support circuit:

- 4–24 ports expandable in 4- or 8-port increments
- Loop-start/ground-start
- Robbed bit line signaling
- REN = 1.5 per port
- Transmit and receive gain adjust: 0 dB, –3 dB, or –6 dB
- Impedance: 600 ohms.

(Continued on next page)

Interface Ports and Functional Circuits (Continued)

Network T1/ DSX-1/HDSL and secondary T1/ DSX-1 support

The following are the specifications for the channel bank — digital DSX-1 support circuit:

- Fractional DSX-1 to PBX, key system, or channel bank
- Connector: RJ-48C (keyed)
- Line rate:1.544 Mb/s
- Clock source: network/internal
- Line coding: B8ZS or AMI
- Framing (network): D4 (SF), ESF, TR08-ESF, or TR08-Framing
- Framing (secondary): D4 (SF), ESF, or TR08
- Line Build out:
  - — ***T1 Carrier interface*****:** 0 dB, -7.5 dB, -15 dB, or -22.5 dB
  - — ***DSX-1 interface*****:** 0 to 133 feet, 133 to 266 feet, 266 to 399 feet, 399 to 533 feet, and 533 to 655 feet
- Automatic receive sensitivity
- Robbed bit line or trunk signaling supported
- FXS, FXO, E&M, direct inward dial (DID), automatic number identification (ANI), and dialed number identification service (DNIS) by means of a PBX or channel bank.

NOTE:
In the *ConnectReach* system, references to E&M signaling refer to a signaling type supported on DID trunks. It does not refer to the E&M signaling used over metallic leads with older transmission equipment.

T1/DSX-1/HDSL provisioning

- Programmable between voice and data
- Fractionally multiplexed voice and data
- Both are programmable on a DS0 basis.

DS0 provisioning

The following is the specification for the DS0 provisioning circuit:

- Data rates: 64 kb/s to 1.536 Mb/s in 64-kb/s steps.

(Continued on next page)

Interface Ports and Functional Circuits (Continued)

IP networking

The following are the specifications for the Internet protocol (IP) networking circuit:

- IP over frame relay
- High-level data link control (HDLC) (Cisco)
- Point-to-point protocol (PPP).

Frame relay

The following are the specifications for the frame relay circuit:

- Local management interface (LMI) T1.617 (Annex D, ANSI*)
- LMI Q.933 (Annex A)
- IP over frame relay per RFC1490
- Up to five permanent virtual circuits (PVCs) supported.

TR-08 Support

- *SLC*96 T1 framing types with and without alarm reporting/monitoring on the A, B, C, and D links supported
- Direct local digital switch monitoring of T1 conforms to ORB-13 or ORB-16 specifications for alarm reporting and remote terminal alarms
- Universal voice grade and single party line types supported.

IP address management

The following are the specifications for the IP address management circuit:

- Dynamic host configuration protocol (DHCP) automatically configures IP addresses for personal computers (PCs) on the Ethernet network
- IP address conservation.

(Continued on next page)

* Registered trademark of American National Standards Institute, Inc.

Interface Ports and Functional Circuits (Continued)

Ethernet port

The following are the specifications for the Ethernet port:

- 10Base-T
- Connector: RJ-45
- Cable lengths: maximum length of 100 meters or 330 feet using Category 5.

Firewall support

The following are the specifications for the firewall support circuit:

- IP filtering and/or SOCKS Version 4 application proxy built in
- Compatible with Internet browsers such as those provided by Netscape and Microsoft
- Only LAN-initiated traffic is allowed through the firewall
- External firewalls supported.

Console port

The following are the specifications for the console port:

- Data terminal equipment (DTE) interface
- Baud rates: 9,600; 19,200; 38,400
- No parity, 8 bits, 1 start, 1 stop
- Hardware flow control
- Ready to connect to terminal, 28.8 modem, or switched 56 kb/s or integrated services digital network (ISDN) 64/128-kb/s modem
- Menu-based management interface.

NAT support

The following are the specifications for network address translation (NAT):

- IP address conservation through conversion and TCP/user datagram protocol (UDP) port loading
- Dynamic IP addressing using one-to-one, many-to-one, and many-to-many
- Static IP addressing
- IP addressing pass through.

(Continued on next page)

Interface Ports and Functional Circuits (Continued)

Management

The following are the specifications for the management circuit:

- Statistics, status, and configuration of all interfaces
- Access by means of T1/HDSL line or Ethernet ports
- Simple network management protocol (SNMP) Version 1, MIB II

  MIBs supported: transport control protocol/Internet protocol (TCP/IP), frame relay, T1
- Hypertext transfer protocol (HTTP) (compatible with industry-standard Web browsers)
- Telnet interface
- Local craft terminal by means of the RS-232 port (modem or terminal)
- Telnet and console interfaces password-protected
- HTTP interface password-protected with two privilege levels.

Compliance

The *ConnectReach* system has been approved to the following compliance specification:

- Telecom: FCC Part 68, Industry Canada CS 03
- Emissions: FCC Part 15, Class A; Canada C108.8-M1983
- Safety: UL1950, CSA 950 - Listed I.T.E.
- AT&T TR 62411, 54016
- ANSI T1.403
- EIA 464-B
- New equipment building standards (NEBS)
- Network compliance for FXO only: Federal Communications Commission (FCC) Part 68, Industry Canada CS-03, TA-TSY-001210, TR-TSY-000063, EIA/TIA-464-b (no rules published for the HDSL interface as of this printing).

Peripheral Hardware Equipment

Introduction

Overview

The *ConnectReach* system supports several peripheral hardware devices that are listed below and described later in this section:

- Voice mail system
- Paging unit
- Battery backup
- Trunk bypass unit.

This section contains a brief description of these peripheral devices that can be connected to the *ConnectReach* system to provide additional features. The equipment described in this section is not provided as part of the *ConnectReach* system standard equipment and must be ordered separately.

Peripheral Equipment Description

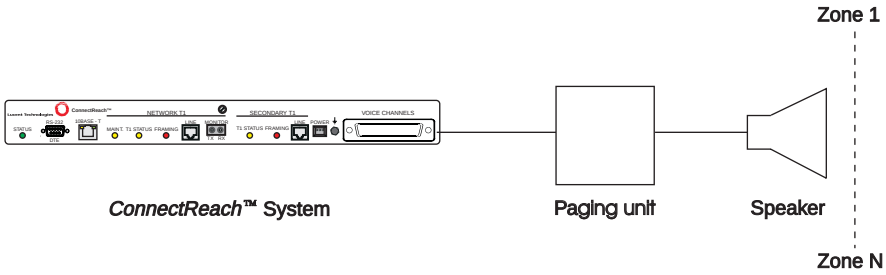
Voice mail system

The *ConnectReach* system can accommodate most popular voice mail systems. For instructions on configuring the *ConnectReach* system or loading a preconfigured profile, refer to Chapter 4, “Configuring the *ConnectReach* System”. The voice mail system is connected to the FXS lines through the **VOICE CHANNELS** port.

Paging/amplifier unit

As shown in the following figure, any compatible paging unit may be connected to one of the *ConnectReach* system’s FXS lines through the **VOICE CHANNELS** port. Currently, the Valcom V-2001A paging unit is the only paging unit that has been tested and proven to be compatible with the *ConnectReach* system.

NOTE:
The battery feed switch is configured “off” for connection to FXS lines.



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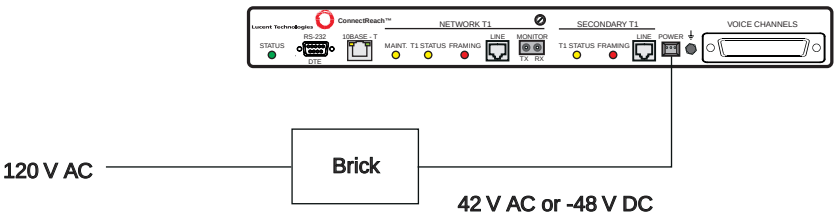
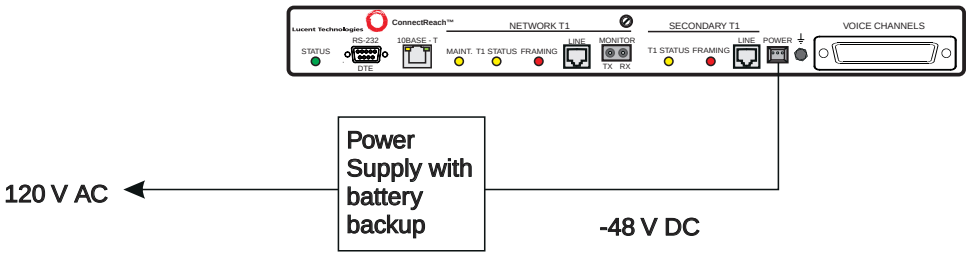
Peripheral Equipment Description (Continued)

Battery backup

The AC power supply provided with each AC powered *ConnectReach* system converts the 120 V AC input voltage to a lower voltage required by the system, but it does not provide backup power when the input power is interrupted (refer to the following figure).



As an alternative, a 120 V AC to 48 V DC power converter with battery backup can be used to provide uninterrupted power in case of a power outage on the 120 V AC input power line. It is recommended that the Gordon Kapes model LT733 AC power supply unit with battery backup (Comcode 108408816) be used with the *ConnectReach* system. This unit has a 2-hour battery backup capacity assuming that the battery is fully charged and the system is fully configured with 50 percent of the channels active and/or ringing (refer to the following figure).



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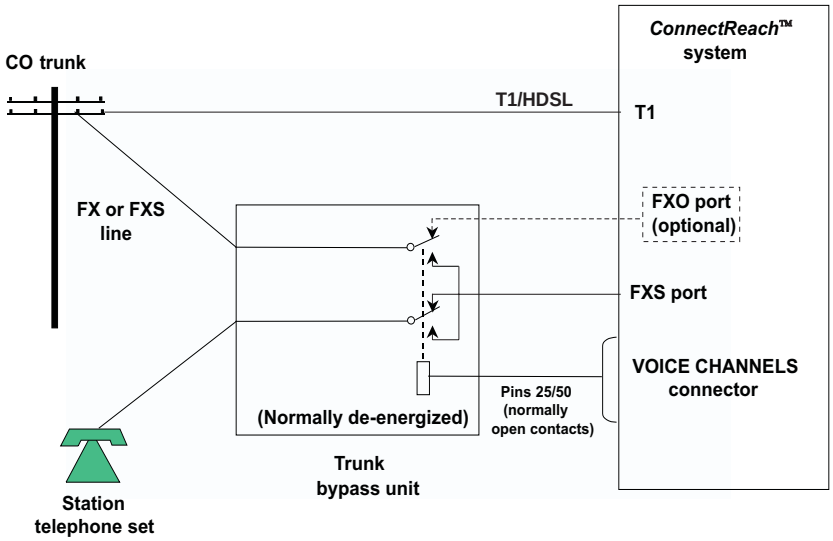
Peripheral Equipment Description (Continued)

Trunk bypass unit

In the event that the *ConnectReach* system fails, the T1 link fails, or there is an electrical power failure, a trunk bypass unit allows certain phones access to outside lines for emergency 911 calls.

If a trunk bypass unit is installed, calls will be transmitted through the bypass unit to the CO. The control relay on the bypass unit is connected to pins 25/50 on the **VOICE CHANNELS** port. A description of the normally open alarm connection provided by pins 25/50 is provided earlier in this chapter. In order for the bypass unit to function properly, an FX or FXS trunk is necessary. The FXS voice card on the *ConnectReach* system is optional. Currently, the DEES Communications 8 Trunk Powerfail Bypass unit, model 154A 24V is the only trunk bypass unit that has been tested and proven to be compatible with the *ConnectReach* system. The following figure diagrams the routing between the *ConnectReach* system and the bypass unit.



Preinstallation Planning

3

Contents

About This Chapter

Introduction

Contents

This chapter provides information about the following topics as they relate to the *ConnectReach*™ Access System:

- Summary of the configuration and installation process
- Discussion on the private and public switched networks
- Quickstart and customized configurations
- Preinstallation and preconfiguration worksheets.

Configuration and Installation Process

Summary

Introduction

This section presents the steps required to configure and install the *ConnectReach* system. The more information you can gather about the customer site before beginning to configure and install the *ConnectReach* system, the easier the process will be.

Customer site data

The complexity of a given *ConnectReach* system installation depends mainly on one factor; namely, whether or not the site is considered a "private" data network.

In a private network, addresses are obtained from a common pool of addresses and are not guaranteed to be unique on the Internet. Therefore, to prevent confusion over packet destinations, the addresses cannot be visible to the Internet. Instead, an application proxy such as SOCKS intercepts all incoming traffic and manages the mapping of packets to the appropriate destination on the private network.

Appendix A describes private network addresses in more detail.

Configuration and installation process summary

The following steps provide a summary of the action required to configure and install the *ConnectReach* system:

1. Verify that the site meets the installation and site requirements (listed in Chapter 5, "Installation").
2. Use the Preinstallation Worksheet to record the site's installation requirements.
3. Using the Preconfiguration Worksheet, record the site's configuration requirements.

NOTE:
The procedures in this manual are written with the assumption that the *ConnectReach* system will be configured in a staging area before it is installed at the customer site. If the *ConnectReach* system is to be configured after installation, then the *ConnectReach* system should be installed next using the procedures in Chapter 5, "Installation", and then configured using the procedures in Chapter 4, "Configuring the *ConnectReach* System."

(Continued on next page)

Summary (Continued)

Configuration and installation process summary (continued)

4. Apply power to the *ConnectReach* system and observe the self-test light-emitting diodes (LEDs) to verify that the unit is starting up successfully. For the self-test status information, refer to Chapter 8, “Maintenance and Trouble Clearing”.
5. In a staging area, configure the *ConnectReach* system according to the Preconfiguration Worksheet. (Chapter 4, “Configuring the *ConnectReach* System”, describes the utility program used to configure the *ConnectReach* system.)
6. Save the new configuration in the *ConnectReach* system’s nonvolatile random access memory (NVRAM). (Refer to Chapter 4, “Configuring the *ConnectReach* System”.)
7. At the customer site, install the *ConnectReach* system and connect all the required cables according to the Preinstallation Worksheet. (Chapter 5, “Installation”, describes the *ConnectReach* system installation procedure.)
8. Apply power to the *ConnectReach* system and observe the self-test light emitting diodes (LEDs) to verify that the unit is starting up successfully. For the self-test status information, refer to Chapter 8, “Maintenance and Trouble Clearing”.
9. If necessary, make any final configuration changes after physical installation is complete (refer to Chapter 4, “Configuring the *ConnectReach* System”). Remember to save the revised configuration and reboot the *ConnectReach* system using the procedure in Chapter 8, “Maintenance and Trouble Clearing”, so that the changes take effect.

Changing the configuration settings

After the *ConnectReach* system is configured and installed at the site, you can change its configuration by means of a Telnet session or hypertext transfer protocol (HTTP) connection either from the local Ethernet or over the T1 link from the carrier central office (CO). If a modem is permanently connected to the RS-232 port, you can also change the configuration by means of a dial-up connection. If the T1 connection to the *ConnectReach* system is down, you can use the Ethernet connection or the dial-up connection.

For more information about using a Telnet session, refer to Chapter 4, “Configuring the *ConnectReach* System”. For more information about HTTP connections, refer to Chapter 7, “Configure/Monitor the *ConnectReach* System Using a Web Browser”.

Quickstart Configuration

Description

The quickstart configuration is for channel bank configurations only where default settings are used for all or most of the configuration parameters. Refer to Appendix B, “Configuration Examples”, for a quickstart example of the channel bank configuration. In this type of installation, there are only a few configuration parameters that you need to set.

Quickstart configuration planning process

Unless stated otherwise, the numbered steps below are in the same order as the numbered areas on the Preconfiguration Worksheet presented later in this chapter. Default values, where applicable, are shown in parentheses below and in bold on the worksheet. For detailed information about parameters and the possible values, refer to Chapter 4, “Configuring the *ConnectReach* System”.

1. Determine whether the Network T1/DSX-1/high data rate digital subscriber line (HDSL) default values match the carrier configuration of the T1/HDSL line.
2. If the *ConnectReach* system will have a T1 connection to the site phone system, determine whether the Secondary T1/DSX-1 default values match the configuration of the T1 connection to the phone system.
3. DS0 provisioning (voice and data channel assignments). The default channel assignments correspond to the actual hardware configuration. If these are appropriate, you do not need to set or change the channel assignments.
   - — Number of analog voice channels (channels set according to actual hardware).
   - — Number of secondary T1/DSX-1 voice channels (none).
   - — Number of data channels (none).

(Continued on next page)

Quickstart Configuration (Continued)

Quickstart configuration planning process (continued)

4. Synchronous interface information:
   - — Encapsulation scheme used on the link to the CO (frame relay).
   - — *ConnectReach* system IP address on the link to the CO.
   - — Netmask (if any) for that address.
   - — If frame relay, the data link connection identifier (DLCI) assigned to the *ConnectReach* system
   - — If frame relay, the local management interface (LMI) type used in signaling.
5. To configure the channel bank, you will need to know the CO digital trunk configuration and the configuration of the equipment [analog phones, private branch exchange (PBX), or key system] at the site [number 6 (Channel bank) on the worksheet]. The following is a list of data:
   - — Trunk type (loop-ground)
   - — Analog interface (FXS-loop)
   - — Loop reversal from CO (enabled)
   - — Transmit gain (–3 db)
   - — Receive gain (–3 db)
   - — On-hook threshold (1250 milliseconds)
   - — Alarm state (busy)
   - — State of unconfigured channels (idle).

Customized Configuration

Description

This customized configuration procedure applies if the site is not a private network, or if other default parameter values are not appropriate.

Customized configuration planning process

Because the *ConnectReach* system supports many interfaces and protocols, the *ConnectReach* system configuration utility offers a large number of configuration parameters. However, almost all parameters have default values; if a parameter's default is appropriate for the customer site, you do not need to set the parameter. Default values, where applicable, are shown in parentheses below and in bold in the worksheet. All parameters listed below are described in more detail in Chapter 4, "Configuring the *ConnectReach* System".

NOTE:
Before starting any configuration, check and record the installed feature keys. For information about displaying the enabled features, refer to Chapter 4, "Configuring the *ConnectReach* System".

ConnectReach System Preinstallation Worksheet

General

1. Where will the *ConnectReach* system be placed? (circle one) RACK (19" 23") WALL DESKTOP

   (A rack mount kit for ANSI-type frames and a wall mount kit is included with all units, rubber feet are included for desktop placement.) If rack mounted, allow 1.75" above unit for cooling. Wood screws for wall mounting are not included.

2. What is the distance from the Network T1/DSX-1/HDSL Demarc? (Connector type RJ48C) _____

   (A 10 foot cable is included with each *ConnectReach* system, a custom cable is required if the distance is greater than 10 feet.)

3. If AC powered, is the power receptacle within six feet of where the unit will be located? Y N

   Power requirement: 120 V AC at 1 Amp

4. If DC powered, a DC power cable is included.

Network T1/HDSL RJ48C

5. Framing ordered (circle one) ESF D4 (SF) TR08-Framing TR08-ESF

   Coordinate with the PBX vendor to be on-site for the installation of the *ConnectReach* system in case any changes need to be made to the routing parameters, etc.

Analog Voice

6. What is the distance between the *ConnectReach* system and the PBX/KTS or patch panel? _____

   Analog channels are available on a standard female RJ21X 25 pair connector (order the appropriate cable length).

Secondary/Fractional T1/DSX-1 RJ48C (Optional)

7. What is the distance between the *ConnectReach* system and the PBX/KTS or patch panel? _____

   Pinouts are the same as the Network T1/DSX-1, a rollover/crossover cable is required to connect to the PBX or KTS. The cable pin outs are shown in Chapter 5, "Installation".

   Line coding ordered (circle one) B8ZS AMI

   Framing ordered (circle one) ESF D4 (SF) TR08-Framing TR08-ESF

   Line Buildout (circle one)

DSX-1	0-133 ft.	133-266 ft.	266-399 ft.	399-533 ft.	533-655 ft.
DS1	0 db	–7.5 dB	–15 dB	–22 dB	

Ethernet 10BaseT

8. What is the distance between the *ConnectReach* system and the 10BaseT hub? _____

   (Order or make appropriate cable length)

RS232 Craft Port

9. Uses standard 9 pin female/female null modem cable to connect to PC (not included)

Remote Configuration or Diagnostics

10. Will a modem be used for remote configuration or diagnostics? Y N

    If yes was circled, order a 1 MB (Measured Business) line

    Is a modem cable required? (Connector on the *ConnectReach* system requires a standard 9 pin female PC modem cable) Y N

NOTE:
In the following worksheet, the default values (if any) appear in **bold** type.

ConnectReach System Preconfiguration Worksheet

1.	**Network**	HDSL	Framing Format:	❑ **ESF** ❑ D4/SF ❑ TR08-Framing ❑ TR08-ESF
			HDSL Master:	❑ Off ❑ **On**
			HDSL Alternate:	❑ Off ❑ **On**
			Clock Source:	❑ **Network** ❑ Internal
			Alarm:	❑ Off ❑ **On** Delay: _____ (0...**15**...3600 sec.)
		T1/DSX-1	Framing Format:	❑ **ESF** ❑ D4/SF ❑ TR08
			Line Coding:	❑ **B8ZS** ❑ AMI
			Buildout:	❑ **0-133 ft / 0 dB** ❑ 133-266 ft ❑ 266-399 ft
				❑ 399-533 ft ❑ 533-655 ft ❑ –7.5 dB
				❑ –15 dB ❑ –22.5 dB
			Clock Source:	❑ **Network** ❑ Internal
			Pulse Density:	❑ **Off** ❑ On
			Alarm:	❑ Off ❑ **On** Delay: _____ (0...**15**...3600 sec.)
			Is-slave:	❑ **Off** ❑ On
2.	**Secondary/Fractional T1/DSX-1**			❑ **Off** ❑ On
			Framing Format:	❑ **ESF** ❑ D4/SF
			Line Coding:	❑ **B8ZS** ❑ AMI
			Buildout:	❑ **0-133 ft / 0 dB** ❑ 133-266 ft ❑ 266-399 ft
				❑ 399-533 ft ❑ 533-655 ft ❑ –7.5 dB
				❑ –15 dB ❑ –22.5 dB
			Pulse Density:	❑ **Off** ❑ On
			Alarm:	❑ **Off** ❑ On Delay: _____ (0...**15**...3600 sec.)
			Has-slave:	❑ **Off** ❑ On
3.	**DS0 Provisioning** Note: A total of 24 channels are available. Ranges must not overlap. Channels assigned in blocks of four DS0s.	Voice Channels:	❑ Analog channel range: Begin ____ End ____	
			❑ Sec./Frac. T1/DSX-1 voice channel range: Begin ____ End ____ (**none**)	
		Data Channels:	❑ Data channel range: Begin ____ End ____	
			❑ Sec./Frac. T1/DSX-1 data channel range: Begin ____ End ____ (**none**)	
		Alignment Sec./ Frac. T1/DSX-1:	❑ **Low** ❑ Same	
4.	**Synchronous Interface**	HDLC Inversion:	❑ **Off** ❑ On	
		❑ Frame Relay	DLCI: _____ (16…991)	
			LMI type: ❑ None ❑ **T1.617 (Annex D/ANSI)** ❑ Q.933 (Annex A/ITU)	
			N391 polling cycles: _____ (1...**6**...255)	
			N392 event threshold: _____ (1...**3**...255)	
			N393 event counter: _____ (1...**3**...10)	
			T391 link integrity polling timer: _____ (1...**6**...10)	

ConnectReach System Preconfiguration Worksheet

4.	**Synchronous Interface (cont.)**	PVC 1-30	DLCI: _____	(**16**...991)
		(Duplicate and fill in for each PVC that is to be defined.)	IP Address:	❑ _____IP address ❑ Enet (IP unnumbered) ❑ **Disable**
			Netmask:	_____
			RIP:	❑ Enable ❑ RxOnly ❑ TxOnly ❑ **Disable**
			RIP version:	❑ **1** ❑ 2
		❑ PPP	IP address:	❑ _____IP address ❑ Enet (IP unnumbered) ❑ **Disable**
			IP address of peer PPP device: _____	
			Netmask: _____	
			RIP:	❑ Enable ❑ RxOnly ❑ TxOnly ❑ **Disable**
			RIP version:	❑ **1** ❑ 2
		❑ HDLC	IP address:	❑ _____IP address ❑ Enet (IP unnumbered) ❑ **Disable**
			Netmask: _____	
			RIP:	❑ Enable ❑ RxOnly ❑ TxOnly ❑ **Disable**
			RIP version:	❑ **1** ❑ 2
5.	**Ethernet interface**	IP address: _____ (**192.168.0.1**)		
		Netmask: _____ (**255.255.255.0**)		
		Secondary IP address: _____ (**0.0.0.0**)		
		Secondary netmask: _____ (**255.255.255.0**)		
		RIP: ❑ Enable ❑ Rx Only ❑ Tx Only ❑ **Disable**		
		RIP version: ❑ **1** ❑ 2		
		Link integrity testing: ❑ Off ❑ **On**		
6.	**Channel bank**	Range:	Begin _____ (1...24) End _____ (1...24)*	
		Signaling:	❑ **Loop-ground** ❑ E&M ❑ Unconfigured	
		Incoming type: (E&M only)	❑ **Wink start** ❑ Immediate start ❑ Delay dial ❑ Wink delay	
		Outgoing type: (E&M only)	❑ **Wink start** ❑ Immediate start ❑ Delay dial	
		Analog interface:	❑ **Current feed loop start** ❑ Current feed ground start ❑ Current sink-DID ❑ Current sink loop start ❑ Current sink ground start	
		Far end disconnect: (E&M only)	❑ **Enabled** ❑ Disabled	
		Loop reversal:	❑ Enabled ❑ **Disabled**	
		Transmit gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB	
		Receive gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB	
		On-hook threshold:	_____ (300**...1250**...2000 msec)	
		Alarm state:	❑ Idle ❑ **Busy**	
		Unconfigured state:	❑ **Idle** ❑ Busy	

ConnectReach System Preconfiguration Worksheet

6.	**Channel Bank (cont.)**	Cross Connect:	DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___	DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___	DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___ DS0 ___ to line ___	
7.	**Digital Trunk**	Range:	Begin _____ (**1**...24)	End _____ (1...**24**)*		
		Group:	______ (**1**...10)			
	<u>Note</u>: Configuration is required only if the LCR feature is enabled.	Signaling:	❑ E&M	❑ Loop start	❑ Ground start	❑ **Unconfigured**
		E&M incoming:	❑ **Wink start**	❑ Immediate start	❑ Delay dial	❑ Wink delay
		E&M outgoing:	❑ **Wink start**	❑ Immediate start	❑ Delay dial	
		Direction:	❑ In	❑ Out	❑ **2-way**	
		Incoming routing:	❑ **DID-DNIS**	❑ ANI-DNIS	❑ Group	❑ Line
		Line group:	❑ **1** ❑ Line or line group# _______			
		Digit type:	❑ **DTMF** ❑ MF ❑ Pulse			
		Busy treatment:	❑ **Busy signal**	❑ Busy out	❑ Forward	
		Busy forward line:	Line # ______ (1...**24**)			
		Transmit gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB			
		Receive gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB ❑ –12 dB			
8.	**Analog Trunk**	Range:	Begin _____ (**1**...24)	End _____ (1...**24**)*		
		Group:	______ (1…**2**…10)			
	<u>Note</u>: Configuration is required only if the LCR feature is enabled.	Signaling:	❑ Loop start	❑ Ground start	❑ **Unconfigured**	
		Direction:	❑ In	❑ Out	❑ **2-way**	
		Incoming routing:	❑ **Group**	❑ Line		
		Line group:	❑ **1** ❑ Line or line group# _______			
		Digit type:	❑ **DTMF** ❑ Pulse			
		Busy treatment:	❑ **Busy signal**	❑ Busy out	❑ Forward	
		Busy forward line:	Line # ______ (1...**24**)			
		Transmit gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB			
		Receive gain:	❑ 0 dB ❑ **–3 dB** ❑ –6 dB ❑ –12 dB			

ConnectReach System Preconfiguration Worksheet

9.	**Line** Note: Configuration is required only if the LCR feature is enabled.	Range:	Begin _____ (**1**...48) End _____ (1...**48**)*
		Group:	_____ (**1**...10)
		Signaling:	❑ Loop start ❑ Ground start ❑ **Unconfigured**
		Direction:	❑ In ❑ **2-way**
		Outgoing routing:	❑ **LCR** ❑ Group
		Trunk group:	❑ **1** ❑ Trunk group # _____
		On-hook threshold:	_____ (300...**1250**...2000 msec)
		Far end disconnect:	❑ Disable ❑ **Enable**
		Polarity reversal:	❑ **Disable** ❑ Enable
		Trunk ring default:	❑ Double ❑ **Single**
		Paging line:	**0 (valid line)**
		Hunting:	❑ Linear ❑ **Most idle**
		Business OfficeXchange features	(Refer to Chapter 4, "Configuring the *ConnectReach* Access System", for more information)
10.	**MAP Extensions** Note: Configuration is required only if the LCR feature is enabled.	Extension Digits: (1...**2**...10)	
		Set line:	Line # _____ Ext. # _____ Alt. ext. # _____
			Line # _____ Ext. # _____ Alt. ext. # _____
			Line # _____ Ext. # _____ Alt. ext. # _____
			Line # _____ Ext. # _____ Alt. ext. # _____
			Line # _____ Ext. # _____ Alt. ext. # _____
			Line # _____ Ext. # _____ Alt. ext. # _____
		Clear line extension:	Line # _____ ❑ Confirm
11.	**Dialing** Note: Configuration is required only if the LCR feature is enabled.	Detect insert:	Row ____ (1...16) Output row ____ (1...16) Pattern _____ _____
			Row ____ (1...16) Output row ____ (1...16) Pattern _____ _____
			Row ____ (1...16) Output row ____ (1...16) Pattern _____ _____
			Clear detect: Row ____ (1...16)
		Output insert:	Row ____ (1...16) Group ____ Alt. out. row ____ Digits _____ (0...9,D,P)
			Row ____ (1...16) Group ____ Alt. out. row ____ Digits _____ (0...9,D,P)
			Row ____ (1...16) Group ____ Alt. out. row ____ Digits _____ (0...9,D,P)

ConnectReach System Preconfiguration Worksheet

11.	**Dialing (cont.)**	Clear output: Row ____ (1...16) Access code: _____ (0...9) Default trunk grp.: Output row # _____ (1...16) Trunk access: ❑ **Enabled** ❑ Auto DID receive digits: _____ (1...**2**...12) DID undefined type: ❑ Analog line ❑ **Reorder** DID undefined line number: _____ (1...48) Pause: _____ (100...**2000**...20000 msec)
12.	**Voice Mail** Note: Configuration is required only if the LCR feature is enabled.	Enable: ❑ **Off** ❑ On Line group: (1...**5**) Integration delay: (0...**500**...5000) ms Stutter tone: ❑ **Off** ❑ On Periodic ring: ❑ **Off** ❑ On Dial number: _____ Profile name: _____ Direct prefix: _____ (*****) Ring no answer: _____ Busy no answer: _____ Forward all: _____ Message wait: _____ No mesg. wait: _____ Present profile: ❑ Generic ❑ BBS Telecom ❑ Panasonic TD1232 ❑ Toshiba DK280 ❑ Samsung DCS
13.	**Names and Passwords**	User privilege: Name: _____ Password: _____ Carrier privilege: Name: _____ Password: _____
14.	**DHCP Service**	Enable: ❑ **On** ❑ Off First IP address in range: _____ (**192.168.0.2**) Last IP address in range: _____ (**192.168.0.254**) Private network: ❑ **On** ❑ Off Lease time: _____ (**600**…7200 seconds) DNS server IP address: _____ (**192.168.0.1**) Domain name: _____
15.	**SNMP Service**	Enable: ❑ On ❑ **Off** SNMP host IP address: _____ Enable messages: Cold start ❑ On ❑ **Off** Warm start ❑ On ❑ **Off** Link down ❑ On ❑ **Off** Link up ❑ On ❑ **Off** Login failures ❑ On ❑ **Off** T1 traps ❑ ESs ❑ SESs ❑ SEFs ❑ UASs ❑ CSSs ❑ PCVs ❑ LESs ❑ BESs ❑ DMs ❑ LCVs

ConnectReach System Preconfiguration Worksheet

16.	**Route** Note: One default and up to 10 static.	Static:	Network IP Address: _____ Netmask: _____ WAN, PVCn or Gateway IP Address: _____
		Default:	WAN, PVCn or Gateway IP Address: _____
17.	**NAT**	Enable:	❑ Off ❑ **On**
	Dynamic	Enable:	❑ **Off** ❑ On
		Group 1	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 2	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 3	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 4	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
	Static	Enable:	❑ **Off** ❑ On
		Group 1	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 2	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 3	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
		Group 4	LAN Start IP Address _____ Last IP address: _____
			WAN Start IP Address: _____ Last IP address: _____
	Pass Thru	Enable:	❑ **Off** ❑ On
		LAN Range: _____ to _____	
18.	**Firewall**	Standard:	❑ SOCKS ❑ SOCKS/server ❑ IP Filter ❑ IP Filter/server
		Custom:	(See Appendix C for custom IP firewall configuration.)
19.	**NTP**	Enable: ❑ On ❑ **Off**	
		Host name or IP address: _____	
		Difference in minutes between local time and Greenwich Mean Time (GMT): _____	
20.	**DNS Proxy Service**	Enable: ❑ **On** ❑ Off	
		IP address of primary DNS server: _____	
		IP address of secondary DNS server: _____	
21.	**QOS**	❑ **On** ❑ Off	
		First QOS	Source IP Address _____ Source Netmask _____
			and/or Destination IP Address _____ Destination Netmask _____
		Second QOS	Source IP Address _____ Source Netmask _____
			and/or Destination IP Address _____ Destination Netmask _____
		Third QOS	Source IP Address _____ Source Netmask _____
			and/or Destination IP Address _____ Destination Netmask _____
		Fourth QOS	Source IP Address _____ Source Netmask _____
			and/or Destination IP Address _____ Destination Netmask _____
		Fifth QOS	Source IP Address _____ Source Netmask _____
			and/or Destination IP Address _____ Destination Netmask _____

ConnectReach System Preconfiguration Worksheet

22. **RS-232 Port**	Baud rate: ❑ **9,600** (This is the default and recommended setting.) ❑ 19200 ❑ 38400	
23. **IPX**	Enable: ❑ On ❑ **Off**	
	Router name: _____	
	Internal network: _____ (**0x000000000**)	
	LAN encapsulation: _____	
	WAN network: _____ (**0x000000000**)	
***** Duplicate and fill in this numbered item of the worksheet for each set of channels requiring different configuration.		

Configuring the *ConnectReach*™ System

4

Contents

About This Chapter

Introduction

Contents

This chapter provides the procedures for setting up and configuring the *ConnectReach™* system in a staging area prior to installation. This chapter also includes information that can be used to reconfigure the *ConnectReach* system remotely after it has been installed.

Preparing the *ConnectReach*™ System for Initial Configuration

Equipment Required to Set Up the *ConnectReach* System

List of required equipment

In order to initially configure the *ConnectReach* system, you will need the following components and equipment:

- A *ConnectReach* system unit with a 120 V AC power supply transformer and power cord or a DC power cord.
- A computer equipped with a terminal emulation application for null modem or dial up modem connections. This can be an IBM*-compatible personal computer (PC) running an application such as *HyperTerminal*, or a UNIX† workstation running *tip*, or any computer running a similar application. The Telnet application is used for Ethernet connections.
- A connection between the *ConnectReach* system and a computer terminal that can be accomplished in one of the three following ways:
  - — A modem and cable for remote connection.
  - — A null modem cable to connect to the serial port of a local computer terminal. For information about the pin assignments on the **RS-232** connector, refer to Chapter 5, “Installation”.
  - — An Ethernet cross-over cable to connect to the Ethernet port on a computer equipped with an Ethernet card (required only when a PC is being connected to *ConnectReach* system **10BASE-T** port). A PC can also be connected to the *ConnectReach* system **10BASE-T** port by means of an Ethernet hub using a standard cable.

* IBM is a registered trademark of the International Business Machines Corporation.

† UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

Making Connections to the *ConnectReach* System

Introduction

There are three ways to obtain initial access to the *ConnectReach* system in order to perform configuration procedures:

- Connect a computer directly to the **RS-232** port on the *ConnectReach* system using a null modem cable.
- Connect a modem to the **RS-232** port on the *ConnectReach* system using a standard serial cable and then dial up that modem from a remote computer.

  The default settings to use for the connection at the **RS-232** port are as follows:

  — 9,600 baud

  — Eight data bits

  — One stop bit

  — No parity

  — Hardware flow control.

- Connect a computer directly to the **10Base-T** (Ethernet) port on the *ConnectReach* system using an Ethernet cross-over cable or connect a computer to the *ConnectReach* system **10BASE-T** port by means of an Ethernet hub using a standard cable. For this connection, the computer must have a network interface card installed. The default IP address setting for the *ConnectReach* system Ethernet connection is 192.168.0.1 with a subnet mask of 255.255.255.0. The IP address and netmask for the TCP/IP protocol of the network interface card should be set at 192.168.0.2 and 255.255.255.0, respectively.

  Once the computer has been configured with the correct IP address to enable it to communicate with the *ConnectReach* Ethernet interface, the *ConnectReach* system supports the following sessions:

  — A Telnet session over the Ethernet using a Telnet application. Once the Telnet session is initiated, the user interface is identical to the console session.

  — A hypertext transfer protocol (HTTP) session using the Ethernet interface and a Web browser.

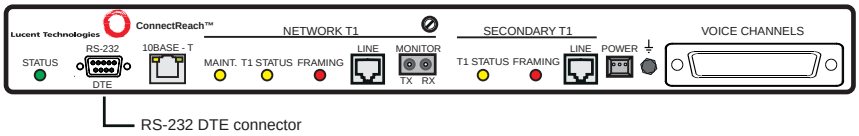
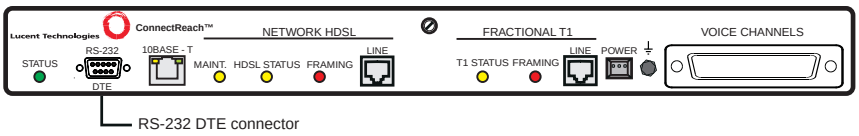
(Continued on next page)

Making Connections to the *ConnectReach* System (Continued)

Connection at the RS-232 port

Connecting a Computer Directly to the RS-232 Port

Make the following connections when using a local computer to configure the *ConnectReach* system:

Step	Procedure
1	Connect one end of a null modem cable to the serial port on the computer.
2	Connect the other end of the null modem cable to the **RS-232** connector on the *ConnectReach* system, shown in the following figure. **NOTE:** The **RS-232** connector is a data terminal equipment (DTE) device and requires a null modem cable when connected to a computer.  RS-232 DTE connector **T1/DSX-1**  RS-232 DTE connector **HDSL** **Stop! End of Procedure.**

(Continued on next page)

Making Connections to the *ConnectReach* System (Continued)

Connection at the RS-232 port (continued)

Connecting a Remote Computer to the RS-232 Port

Make the following connections when using a remote computer to configure the *ConnectReach* system:

Step	Procedure
1	Connect a modem cable from the modem to the **RS-232** connector on the *ConnectReach* system.
2	Connect the modem line cord to a telephone line jack. **Stop! End of Procedure.**

Connection at the 10Base-T (Ethernet) port

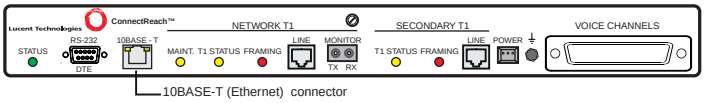
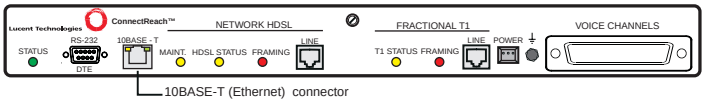
Make the following connections when using a local computer to configure the *ConnectReach* system:

Step	Procedure
1	If connecting the computer to the **10BASE-T** (Ethernet) connector on the *ConnectReach* system by means of an Ethernet hub, continue with Step **2**. Otherwise, proceed to Step **4**.
2	Connect one end of a 10BASE-T Ethernet cable to the network interface card on the computer and the other end to the appropriate port on the Ethernet hub.
3	Connect a second 10BASE-T Ethernet cable between the Ethernet hub and the **10BASE-T** connector on the *ConnectReach* system. **Proceed to Step 6**.

(Continued on next page)

Making Connections to the *ConnectReach* System (Continued)

Connection at the 10Base-T (Ethernet) port (continued)

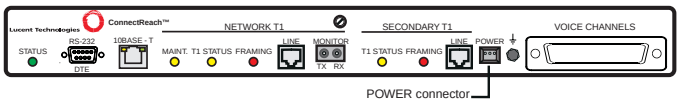
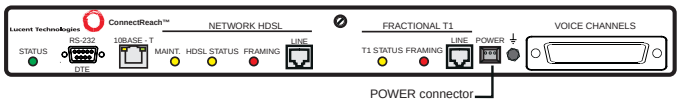
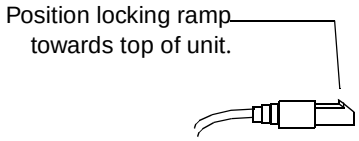
Step	Procedure
4	Connect one end of a crossover cable to the **10Base-T** (Ethernet) connector on the *ConnectReach* system, shown in the following figure.  **T1/DSX-1**  **HDSL**
5	Connect the other end of the crossover cable to a network interface card on the computer.
6	Set the Internet protocol (IP) address and netmask for transport control protocol/Internet protocol (TCP/IP) of the network interface card using the following example: IP address: 192.168.0.2 netmask: 255.255.255.0 **Stop! End of Procedure.**

(Continued on next page)

Making Connections to the *ConnectReach* System (Continued)

Power connection

The *ConnectReach* system can be powered by either a 120 V AC power supply transformer or from a 48-volt power source such as central office (CO) battery or an approved DC battery backup unit. For more information about the power requirements for the *ConnectReach* system, refer to Chapter 5, “Installation”. Make power connections to the *ConnectReach* system as follows:

Step	Procedure
1	Plug in the power cable from the power supply source into the **POWER** connector on the *ConnectReach* system. The location of the **POWER** connector is shown in the following figure.  **T1/DSX-1**  **HDSL**
2	Position the power cable connector so that the locking ramp is toward the top of the *ConnectReach* system, as shown in the following figure. 
3	Plug in the AC power supply transformer into a 120 V AC receptacle or turn on the circuit breaker switch as appropriate.
4	Observe the light emitting diodes (LEDs) on the *ConnectReach* system to verify that the unit is starting up successfully. **Requirement:** The **STATUS**, **NETWORK T1/HDSL** - **T1/HDSL STATUS**, and **NETWORK T1/HDSL** - **FRAMING** LEDS are lighted. **Stop! End of Procedure.**

Initiating a Session with the *ConnectReach* System

From a computer connected to RS-232 port

After you have connected a computer or modem to the *ConnectReach* system, start a serial terminal emulation application to initiate a communications session. For example, you can start an application such as *tip* on a UNIX workstation, or *HyperTerminal* on Microsoft Windows.

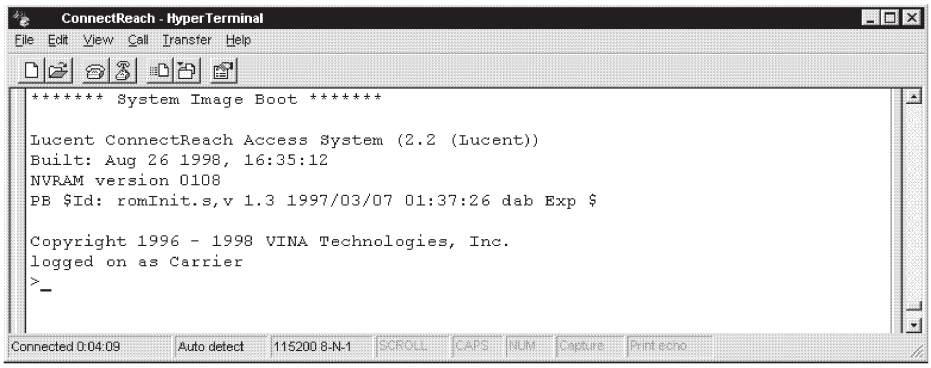
Using the *ConnectReach* System Utility

Description

After the computer terminal is connected to the *ConnectReach* system using a terminal emulation application, the *ConnectReach* system activates the utility program which allows the computer to communicate with the *ConnectReach* system to issue commands and receive messages from the *ConnectReach* system. During start-up, the utility causes a series of session start-up messages and a command prompt to appear in the console window. This prompt, a greater-than symbol (**>**), is the *ConnectReach* system Utility Main Menu prompt, as shown in the following figure.

NOTE:
These messages are not displayed if the power was applied before the terminal program was started. The Main Menu prompt (**>**) will be the only thing appearing on the screen. To display these messages, enter the `version` command.

NOTE:
The following screen display is only an example of what may appear on your console window. The actual display will depend on the version of software in the *ConnectReach* system. Refer to the appropriate software release description for additional information.



(Continued on next page)

Using the *ConnectReach* System Utility (Continued)

Entering commands

At the Main Menu prompt, you can enter a set of commands called the Main Menu commands.

These commands are not case sensitive. You can abbreviate a command to the minimum number of characters that uniquely identify the command. For example, you can enter the `configure` command by typing the first three characters:

```
> con
```

After you enter a command, the *ConnectReach* system Utility either executes the command or displays a submenu command prompt. For example, if you enter the **configure** command, the Config submenu prompt appears:

```
(config)>
```

At the Config prompt, you can enter the commands to configure specific sets of commands. Each set has its own submenu, where a new prompt is displayed. For example, when you enter the command to configure the Ethernet interface, the prompt changes to:

```
(config:Ethernet)>
```

After completing the configuration for each component, you return to the Config menu by entering the `exit` command or by typing an exclamation point (**!**). To leave the config submenu, enter the `exit` command.

Getting online help

At any time, you can display a list of the commands in the current menu by typing a question mark (**?**). If you enter a question mark after partially typing a command, the options for that specific command are displayed. Otherwise, a list of the currently available commands is displayed. The default settings are enclosed in brackets.

In addition to the question mark, each menu has a `help` command. The `help` command displays a brief explanation of each command on the current menu.

(Continued on next page)

Using the *ConnectReach* System Utility (Continued)

Exiting the Utility

When you are finished configuring the *ConnectReach* system, you should exit the Utility by using the `exit` command at the Main Menu prompt.

The *ConnectReach* system Utility allows only one management session at a time. Exiting the Utility allows another administrator to connect to the *ConnectReach* system and configure or monitor it.

A *ConnectReach* system management session can override another session in the following ways:

- If another session is already in progress, and you start a new session, you will be notified that another user is logged in and asked whether you wish to override that user.
- If you have a management session in progress, and another administrator overrides your session, you will be notified that your session has been overridden.

(Continued on next page)

Using the *ConnectReach* System Utility (Continued)

Using the Main Menu commands

The following table lists the commands available at the Main Menu prompt.

To...	Enter this command...
Display Online Help for the commands currently available	? (question mark)
Configure the *ConnectReach* system	`config`
Display statistics about the *ConnectReach* system	`statistics`
Upgrade the *ConnectReach* system with new software using the network	`network-upgrade`
Upgrade the *ConnectReach* system with new software using a modem	`xmodem-download`
Save the current configuration or retrieve a configuration from a remote computer	`archive`
Display version and uptime information	`version`
Show the hardware configuration	`show-hardware-config`
View a log of events	`log`
Set an analog voice channel to a known state for testing	`diagnose`
Check that a device is communicating on the network	`ping`
Trace the route between two points on the network	`traceroute`
Reboot the *ConnectReach* system with minimal interruption of existing voice connections if T1 feeder is TR-08. Existing voice calls are dropped if T1 feeder is TR-303.	`warm-start`
Reboot the *ConnectReach* system with interruptions of both voice and data connections	`cold-start`
Reboot the *ConnectReach* system Slave with minimal interruption of existing voice connections	`slave-warm-start`
Reboot the *ConnectReach* system Slave with interruptions of both voice and data connections	`slave-cold-start`
Get online assistance	`Help`
Exit the *ConnectReach* system Utility and disconnect from the *ConnectReach* system	`exit`

Using the Configuration Commands

Basic Procedure For Using the Configuration Commands

Introduction

A list of all configuration menu commands is given in the following table.The command(s) associated with a particular feature will appear only if that feature is available (activated).

To…	Enter this command…
Configure the Network T1/DSX-1 or Network HDSL interface to the carrier CO	`Network-t1 or Network-HDSL`
Configure the Secondary T1/DSX-1 or Fractional T1/DSX-1 interface	`Secondary-t1 or Fractional-t1`
Specify the split between voice and data T1 DS0s	`DS0-Provisioning`
Configure the synchronous interface	`Synchronous-interface`
Configure the Ethernet interface to the local area network (LAN)	`Ethernet`
Configure telephony functionality for channel-bank mode	`Channel-bank`
Configure digital trunks	`Digital-trunk`
Configure analog trunks	`Analog-trunk`
Configure lines	`Line`
Configure (Map) Line Extensions	`Map-Extensions`
Configure dialing	`Dialing`
Configure Attached Voice Mail System	`Voice-Mail`
Configure user names and passwords	`Passwords`
Configure the Internet protocol (IP) address allocation service	`DCHP`
Configure the simple network management protocol (SNMP) service	`SNMP`
Configure the default route(s)	`Route`
Configure network address translation (NAT)	`NAT`
Configure Firewall support	`FIREWALL`
Configure network time protocol (NTP)	`NTP`
Configure domain name service (DNS)	`DNS`
Configure quality of service (QOS)	`QOS`

(Continued on next page)

Basic Procedure For Using the Configuration Commands (Continued)

Introduction (continued)

To…	Enter this command…
Configure the RS-232 port	`RS232`
Configure Internet packet exchange (IPX)	`IPX`
Configure log on for file transfer protocol (FTP) download	`Ftp-log-dump`
Display features	`features-show`
Set features	`set-features`
Allows creation of configuration settings for remote *ConnectReach* system	`template-archive`
Automatic set-up of *ConnectReach* system through WAN link	`auto-config`
Show all configuration settings	`show`
Save the configuration settings in the *ConnectReach* system	`save`
Set all configuration commands to their default values	`default`
Set all configuration commands to their default values, retaining the Ethernet, password, and RS232 commands	`preserve-default`
Access online assistance	`Help`
Exit the Config prompt and return to the Main Menu prompt	`exit`

Every configuration command has default settings, including IP addresses. The default settings for each configuration command are displayed on screen in brackets after you enter a question mark (**?**) at the `Config` prompt.

(Continued on next page)

Basic Procedure For Using the Configuration Commands (Continued)

Basic steps in configuring and saving new settings

The following steps provide the basic procedure for entering configure commands and saving the configuration settings:

Step	Procedure

1	At the Main Menu prompt, enter the `configure` command.
	
	`> config`
	
	Press the **ENTER** key and the prompt changes to the Config prompt where you can enter the Configuration commands.
	
	`(config)>`

2	At the Config prompt, enter the appropriate Configuration commands or type a question mark (**?**) for a list of all available commands.
3	After you use the configuration commands, you must save your configuration settings in nonvolatile random access memory (NVRAM). To save the configuration settings, enter the `save` command at the Config prompt. `(config)> save` **NOTE:** If you do not wish to save the configuration settings that you have entered, you can discard them by using the exit command, explained in the next step, instead of the save command.
4	Enter the `exit` command: `(config)> exit` After you type exit, you receive a prompt: `Do you really want to abandon your changes? [n]y:` Type **y** to display the original configuration. **Stop! End of Procedure.**

(Continued on next page)

Basic Procedure For Using the Configuration Commands (Continued)

Activating new configuration settings

Some commands are activated and take effect as soon as you enter the `save` command, but others require that you reboot the *ConnectReach* system, using either the `warm-start` or `cold-start` command, before the new settings take effect. The following table indicates which commands require a reboot to take effect and which type of reboot is required.

Commands Requiring the Save Command to Take Effect:			
Ethernet (all commands except secondary-IP)	Channel Bank	Digital Trunk	Analog Trunk
Lines	Map-Extensions	Dialing	Voice-Mail
Password	NAT	Route	Firewall
NTP	RS-232	IPX	DS0-Provisioning* (All commands except Analog-begin)
DNS (all commands except enable on/off)	Synchronous-Interface: changing IP addressing	SNMP (all commands except enable on/off and changing SNMP-host)	QOS
Commands Requiring the Save and Warm-Start Commands to Take Effect:			
Network-T1 or Network-HDSL	Secondary-T1 or Fractional-T1	Synchronous-Interface (All commands except IP addressing)	SNMP: enable on/off and changing SNMP-host
DHCP	Preserve-Default	Set-Features	Default
DNS: enable on/off	Ethernet: secondary-IP		
Commands Requiring the Save and Cold-Start Commands to Take Effect:			
DS0-Provisioning*	Cross-connect (channel-bank submenu)		

* DS0-Provisioning command requires the Save and Cold-Start commands if the begin channel value in any of the ranges is changed. Otherwise, use only the Save command.

To reboot the *ConnectReach* system, enter the appropriate command at the Main Menu prompt:

```
> warm-start
```

or

```
> cold-start
```

(Continued on next page)

Basic Procedure For Using the Configuration Commands (Continued)

Activating new configuration settings (continued)

NOTE:
Rebooting a *ConnectReach* system fed by a TR-08 T1 line using the warm-start command interrupts all existing data connections for up to 60 seconds. Existing voice connections may have their speech path interrupted for up to one tenth of a second during the restart process. The calls will **not** be disconnected, but new connections cannot be made for up to 60 seconds. Rebooting a *ConnectReach* system fed by a TR-303 T1 line using the warm-start command drops all existing calls.

Rebooting the *ConnectReach* system with the cold-start command interrupts both voice and data connections. All connections are lost. New connections cannot be made for up to 60 seconds.

If you set up login names during the initial configuration, when the *ConnectReach* system reboots, the Utility prompts you to enter a login name and password. Information about login names is presented later in this chapter.

CAUTION:
Do not press any keys on the keyboard during the reboot process. If a key has been pressed during a one second checking interval while the ConnectReach *system is rebooting, the* ConnectReach *system will boot into the Monitor mode. The Monitor mode allows the RS-232 and 10Base-T ports to be operational. To exit the Monitor mode, restart the* ConnectReach *system and do not press any keys during the reboot process.*

Archiving configuration settings

In the event that the *ConnectReach* system loses the configuration settings stored in nonvolatile random access memory (NVRAM), it is suggested that the configuration information be stored (archived) in a remote computer so that the information can be restored without having to enter all of it again.

The `archive` command, located in the Main Menu, is used to upload the configuration settings to a remote computer and download the saved configuration settings from the remote computer. The `archive` command also allows you to download identical or nearly identical settings to multiple *ConnectReach* system units from a remote computer.

For more information concerning the use of the `archive` command to upload and download configuration settings from a remote computer, refer to Chapter 8, “Maintenance and Trouble Clearing”.

Configuring the Network T1/DSX-1 Interface

Introduction

Before configuring the Network T1/DSX-1 interface of the *ConnectReach* system, you must determine how the DS1 signal on the network carrier facility has been configured by the carrier.

Key commands

The key commands that must match the carrier's configuration are as follows:

Framing Format The *ConnectReach* system supports the three most common T1 framing formats: Extended Superframe (ESF), Superframe (SF or D4), and the Bellcore defacto standard for frame adapted to a single T1 link (TR-TSY-000008-ESF or TR08*)*. There are two framing options with TR08, TR08-Framing and TR08-ESF. *TR08-Framing* is used for voice only and implements TR08 framing and signaling. *TR08-ESF* may be used for voice or data.TR08-ESF implements ESF framing and TR08 signaling. For either TR08, two channel unit types are supported: single party (loop start) and Universal Voice Grade (loop-ground). Multiparty, Coin, and DID/DPT are supported. Refer to AT&T TR-TSY-000008, Issue 2, for more information.

Line Coding The T1 line coding formats offered by the *ConnectReach* system are bipolar 8 zero substitution (B8ZS) and alternate mark inversion (AMI). T1 line coding determines how the T1 requirement for ones density is handled. In every eight bits of information, at least one pulse must be present. If the T1 service uses *AMI* line coding, it is important to enable the *pulse density enforcement* option (see below). If the T1 service uses *B8ZS* line coding, a bipolar violation (BPV) is automatically inserted in place of a string of eight zeros during transmission. At the receiver, the original data stream is regenerated as a result of the BPV. In this configuration, the pulse density enforcement option is ignored.

(Continued on next page)

Configuring the Network T1/DSX-1 Interface (Continued)

Key commands (continued)

Line Buildout	T1 line buildout is configurable to 0 dB, –7.5 dB, or –15 dB, as required by Federal Communications Commission (FCC) Part 68. Buildout sets the *ConnectReach* system's output T1 transmission signal level (0 dB is the highest level and –22.5 dB is the lowest level). The default, *0 dB*, is the most common signal level for connection to the carrier. If line buildout is set incorrectly, the carrier may detect errors ranging from bipolar violations (line buildout too high) to loss of signal (line buildout too low).
Clock Source	Always select network.
Pulse Density Enforcement	This option is used when *AMI* line coding is selected (see the description of line coding presented earlier). Per the AT&T TR-62411 ACCUNET* specification, bit stuffing must be enabled when AMI line coding is selected. This ensures that ones density requirements are met (see ANSI† standard T1.403, paragraph 5.6).
Alarm Operation	This option controls whether the network T1/DSX-1 going down causes the alarm relay to close. Refer to Chapter 8, "Maintenance and Trouble Clearing", for more information.
Alarm Delay	This option sets the delay between when the T1 alarm is cleared and the relay returns to an unalarmed state. For example, if the delay is set for 15 seconds, the alarm relay will go from alarm to no alarm 15 seconds after the T1 alarm clears.
Is Slave	This option designates one of the two *ConnectReach* systems in a 48-line master/slave configuration as the slave unit. Refer to Chapter 5 "Installation" for details on the 48-line master/slave configuration.

(Continued on next page)

* Service mark of AT&T.

† Registered trademark of American National Standards Institute, Inc.

Configuring the Network T1/DSX-1 Interface (Continued)

Procedure

After you have determined the carrier's configuration, follow these steps to configure the network T1/DSX-1 interface:

Step	Procedure

1	At the Config prompt, enter the `network-t1` command:
	
	`(config)> network-t1`
	
	The prompt changes to the Config:Network T1 prompt.
	
	`(config:Network-t1)>`

2	At the Config:Network T1 prompt, enter the appropriate commands from the following table. The default setting for each command appears in brackets.

(Continued on next page)

Configuring the Network T1/DSX-1 Interface (Continued)

Procedure (continued

Step	Procedure
2 cont.	

To	Enter this command...	...and one of these options
Enable Network T1/DSX-1	`enable`	`off, [on]`
Set the framing format	`framing`	`[ESF], D4, TR08-Framing, TR08-ESF`
Set the line coding format	`linecode`	`[B8ZS], AMI`
Set the build out in feet or decibels *	`buildout`	`[0-133ft(DSX)/ 0dB(CSU)], 133-266ft(DSX), 266-399ft(DSX), 399-533ft(DSX), 533-655ft(DSX), –7.5dB(CSU), –15dB(CSU), -22.5dB(CSU)`
Set the clock source (this option only available if internal clock exists)	`clock`	`[network], internal`
Comply with ones density specification (applies only to AMI line coding)	`pulse-density-enforce`	`[off], on`
If set to on, an alarm on Network T1/DSX-1 will cause the alarm relay to close	`alarm-operation`	`off, [on]`
Sets the delay between a Network T1/DSX-1 alarm and closing of the alarm relay	`alarm-delay`	`0..[15]..3600 sec`
Set the *ConnectReach*™ system as a slave to another *ConnectReach* system (allows for 25-48 ports for voice only)†	`is-slave`	`[off], on`
Sets the number of bipolar violations allowed and shelf emulation	`Modify-tr08-data`‡	
Access online assistance	`Help`	

* The line buildout command may be specified for connection to a channel service unit (CSU) or to a digital signal cross-connect (DSX). For a CSU, the value is specified in decibels (dB); for a DSX, the value is specified in feet.

† All of the channel units for the DS0-Provisioning:ConnectReach command must also be set to none to allow for a slave.

‡ This command is not used in the *ConnectReach* system.

(Continued on next page)

Configuring the Network T1/DSX-1 Interface (Continued)

Procedure (continued

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

Configuring the Network HDSL Interface

Introduction

Before configuring the Network high data-rate digital subscriber line (HDSL) interface of the *ConnectReach* system, you must determine how the HDSL-T1 service has been configured by the carrier.

Key commands

The key commands that must match the carrier's configuration are as follows:

Framing Format The *ConnectReach* system supports the three most common T1 framing formats: Extended Superframe (ESF), Superframe (SF or D4), and the Bellcore defacto standard for frame adapted to a single T1 link (TR-TSY-000008-ESF or TR08*)*. There are two framing options with TR08, TR08-Framing and TR08-ESF. *TR08-Framing* is used for voice only and implements TR08 framing and signaling. *TR08-ESF* may be used for voice or data.TR08-ESF implements ESF framing and TR08 signaling. For either TR08, two channel unit types are supported: single party (loop start) and Universal Voice Grade (loop-ground). Multiparty, Coin, and DID/DPT are supported. Refer to AT&T TR-TSY-000008, Issue 2, for more information.

HDSL Master The HDSL module designated as a master manages the start-up sequence during synchronization and controls the configuration of the units in the circuit.

HDSL Alternate This option sets the DS0 assignment for each HDSL loop. Usually DS0s 1—12 are assigned to loop one and DS0s 13—24 are assigned to loop two. If HDSL Alternate is enabled, the odd DS0s are assigned to loop one and the even DS0s are assigned to loop two.

Clock Source For normal operation, the network HDSL clock source should always be set to *network* (the default value).

Alarm Operation This option controls whether the network HDSL going down causes the alarm relay to close. Refer to Chapter 8, "Maintenance and Trouble Clearing", for more information.

Alarm Delay This option sets the delay between when the T1 alarm is cleared and the relay returns to an unalarmed state. For example, if the delay is set for 15 seconds, the alarm relay will go from alarm to no alarm 15 seconds after the T1 alarm clears.

(Continued on next page)

Configuring the Network HDSL Interface (Continued)

Procedure

After you have determined the carrier's configuration, follow these steps to configure the network HDSL interface:

Step	Procedure

1	At the Config prompt, enter the `network-HDSL` command:
	
	`(config)> network-HDSL`
	
	The prompt changes to the Config:Network HDSL prompt.
	
	`(config:Network-HDSL)>`

2	At the Config:Network HDSL prompt, enter the appropriate commands from the following table. The default setting for each command appears in brackets.

To	Enter this command...	...and one of these options
Enable Network HDSL	`enable`	`off, [on]`
Set the framing format	`framing`	`[ESF], D4, TR08-Framing, TR08-ESF`
Enable the *ConnectReach* system as a master unit	`HDSL-Master`	`[off], on`
Enable the alternate DS0 assignment	`HDSL-Alternate`	`[off], on`
Start the HDSL Manager (refer to Appendix E "HDSL Manager" for additional information)	`HDSL-Manager`	
Set the clock source. This option sets the HDSL card to master or slave (network = slave, internal = master).	`clock`	`[network], internal`
Enable alarm operation	`alarm-operation`	`off, [on]`
Sets the delay between a Network HDSL alarm and closing of the alarm relay	`alarm-delay`	`0..[15]..3600 sec`
Configure the TR08 feature	`Modify-tr08-data`	
Configure IP-over-FDL	`IP-over-FDL`	
Access online assistance	`Help`	

(Continued on next page)

Configuring the Network HDSL Interface (Continued)

Procedure (continued)

<table>
<tr><th>Step</th><th>Procedure</th></tr>
<tr><td>3</td><td>The TR08 feature is enabled as explained in the section “Setting Features”, located later in this chapter. The TR08 framing format requires specification of the shelf emulation and BPV-threshold. At the config:Network HDSL prompt, enter the <code>Modify-tr08-data</code> command.

<code>(config:Network HDSL) > Modify-tr08-data</code>

The prompt changes to the config:TR08 prompt.

<code>(config:TR08) ></code></td></tr>
<tr><td>4</td><td>At the config:TR08 prompt, enter the appropriate commands from the following table. The default settings for each command appears in brackets.

<table>
<tr><th>To</th><th>Enter this command...</th><th>...and one of these options</th></tr>
<tr><td>Set the shelf emulation</td><td><code>shelf</code></td><td><code>[ASHELF], BSHELF, CSHELF, DSHELF</code></td></tr>
<tr><td>Set the number of bipolar violations*</td><td><code>bpv-threshold</code></td><td><code>2, 15, [155]</code></td></tr>
</table>
* The number of bipolar violations which must occur within 1 minute in order for the bipolar alarm bit to be transmitted in the TR08 data field.</td></tr>
<tr><td>5</td><td>When all 24 DS0s are assigned to voice, the ConnectReach system cannot be managed over the WAN. WAN management usually requires at least one DS0 for data. Configuring IP over facility data link (FDL) allows management of the ConnectReach system through Telnet, FTP, and the HTTP management feature, even when all 24 DS0s are assigned to voice. Typically, a static route needs to be defined for IP over FDL, refer to the section “Configuring Routes”, located lated in this chapter. At the config:Network HDSL prompt, enter the <code>IP-over-FDL</code> command.

<code>(config:Network HDSL) > IP-over-FDL</code>

The prompt changes to the config:IP_FDL prompt.

<code>(config:IP_FDL) ></code></td></tr>
</table>

(Continued on next page)

Configuring the Network HDSL Interface (Continued)

Procedure (continued)

Step	Procedure
6	At the config:IP_FDL prompt, enter the appropriate commands from the following table. The default settings for each command appears in brackets.

To	Enter this command...	...and one of these options
Enter the IP address of the FDL interface	`IP-address`	IP-address, `Enet`, `[Disable]`
Enter the netmask of the FDL interface	`netmask`	netmask
Access online assistance	`Help`	

Step	Procedure
7	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

(Continued on next page)

Configuring the Secondary/Fractional T1/DSX-1 Interface

Introduction

A secondary/fractional T1/DSX-1 interface can be used to connect the *ConnectReach* system to a voice or data system by means of a fractional daughter card. The fractional T1/DSX-1 interface of an HDSL *ConnectReach* system can also be used to connect a T1/DSX-1 *ConnectReach* system as a slave to support up to 24 additional foreign exchange station (FXS) lines. Examples of voice systems are key system, PBX, or channel bank. A data system is connected by means of a CSU/DSU and a router.

If the secondary/fractional T1/DSX-1 interface will be used to connect the *ConnectReach* system to the telephone system, you must determine how the T1 service has been configured in the PBX or key system.

Key commands

The key commands that must match the PBX or key system's configuration are as follows:

Framing Format The *ConnectReach* system offers the two most common T1 framing formats: Extended Superframe (*ESF*) and Superframe (SF or *D4*). However, the ESF framing format should always be selected to assure compatibility with the equipment connected to the secondary/fractional T1 port.

Line Coding The T1 line coding formats offered by the *ConnectReach* system are bipolar 8 zero substitution (B8ZS) and alternate mark inversion (AMI). However, the B8ZS line coding format should always be selected to assure compatibility with the equipment connected to the secondary/fractional T1 port. T1 line coding determines how the T1 requirement for ones density is handled. In every eight bits of information, at least one pulse must be present. If the T1 service uses *AMI* line coding, it is important to enable the *pulse density enforcement* option (described on next page). If the T1 service uses *B8ZS* line coding, a bipolar violation (BPV) is automatically inserted in place of a string of eight zeros during transmission. At the receiver, the original data stream is regenerated as a result of the BPV. In this configuration, the pulse density enforcement option is ignored.

(Continued on next page)

Configuring the Secondary/Fractional T1/DSX-1 Interface (Continued)

Key commands (continued)

Line Buildout T1 line buildout is configurable to 0 dB, –7.5 dB, or –15 dB, as required by FCC Part 68. Buildout sets the *ConnectReach* system's output T1 transmission signal level (0 dB is the highest level and -15 dB is the lowest level). The default, *0 dB*, is the most common signal level for connection to the carrier. Footage increments are provided for a digital cross-connect (DSX). If line buildout is set incorrectly, the carrier may detect errors ranging from bipolar violations (line buildout too high) to loss of signal (line buildout too low).

Pulse Density Enforcement This option is used when *AMI* line coding is selected (see the description of line coding presented earlier). Per the AT&T TR-62411 ACCUNET specification, bit stuffing must be enabled when AMI line coding is selected. This ensures that ones density requirements are met (see ANSI standard T1.403, paragraph 5.6).

Alarm Operation This option controls whether the secondary/fractional T1/DSX-1 going down causes the alarm relay to close. Refer to Chapter 8, "Maintenance and Trouble Clearing", for more information.

Alarm Delay This option sets the delay between the secondary/fractional T1/DSX-1 alarm and the closing of the alarm relay.

Has Slave This option allows the *ConnectReach* system to serve as the master unit in a 48-line master/slave configuration. Refer to Chapter 5 "Installation" for details on the 48-line master/slave configuration.

NOTE:
The clock source for the secondary/fractional T1/DSX-1 is always internal, synchronous to the network T1/DSX-1.

(Continued on next page)

Configuring the Secondary/Fractional T1/DSX-1 Interface (Continued)

Procedure

After you have verified the required configuration, follow these steps to configure the secondary/fractional T1/DSX-1 interface for the *ConnectReach* system:

Step	Procedure
1	At the Config prompt, enter the **`secondary-t1`** (T1/DSX-1 interface) or **`fractional-T1`** (HDSL interface) command: `(config)>` **`secondary-t1`** or `(config)>` **`fractional-t1`** The prompt changes to the Config:Secondary T1 or Config:Fractional T1 prompt. `(config:Secondary-t1)>` or `(config:Fractional-t1)>`

(Continued on next page)

Configuring the Secondary/Fractional T1/DSX-1 Interface (Continued)

Procedure

Step	Procedure
2	At the Config:Secondary/Fractional T1 prompt, enter the appropriate commands from the following table. The default setting for each command appears in brackets.

To	Enter this command...	...and one of these options
Enable secondary/fractional T1/DSX-1	enable	On, [Off]
Set the framing format	framing	[ESF], D4
Set the line coding format	linecode	[B8ZS], AMI
Set the build out in feet or decibels*	buildout	[0-133ft(DSX)/0dB(CSU)], 133-266ft(DSX), 266-399ft(DSX), 399-533ft(DSX), 533-655ft(DSX), –7.5dB(CSU), –15dB(CSU), –22.5dB(CSU)
Comply with ones density specification (applies only to AMI line coding format)	pulse-density-enforce	On, [Off]
Enables the alarm operation	alarm-operation	[off], on
Set the delay between a secondary/fractional T1/DSX-1 alarm and closing of the alarm relay.	alarm-delay	0..[15]..3600 sec
Set the secondary/fractional T1/DSX-1 to accept a slave from another *ConnectReach* system (allows for 25-48 ports for voice only).	has-slave	[off], on
Access online assistance	Help	

* The line buildout command may be specified for connection to a CSU or to a DSX. For a CSU, the value is specified in decibels (dB); for a DSX, the value is specified in feet.

(Continued on next page)

Configuring the Secondary/Fractional T1/DSX-1 Interface (Continued)

Procedure (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

Configuring DS0 Provisioning

Introduction

A T1 signal consists of 24 time-division multiplexed channels, which are called DS0s. The DS0 provisioning menu maps ranges of DS0s to any of these destinations:

Analog	Voice (DS0s) to analog (FXS and FXO) ports
Data	Data (DS0s) for Ethernet hosts or for the *ConnectReach* system's internal router
Secondary/Fractional T1/DSX-1 voice	Voice (DS0s) for a PBX or channel bank connected to the Secondary/Fractional T1/DSX-1 interface
Secondary/Fractional T1/DSX-1 data	Transparent data (DS0s) for a CSU/router connected to the Secondary/Fractional T1/DSX-1 interface
Alignment of Secondary/ Fractional T1/DSX-1	The DS0s on the Network T1/DSX-1/HDSL can be connected to the same DS0 numbers on the Secondary/Fractional T1/DSX-1 or the lowest numbered DS0 on the Network T1/DSX-1/HDSL can be connected to the first DS0 on the Secondary/Fractional T1/DSX-1. If the low option is used with the Secondary/Fractional T1/DSX-1 port and analog ports are enabled, a fractional T1/digital signal processor (DSP) combination circuit card is required.

NOTE:
Secondary/Fractional T1/DSX-1 voice uses robbed bit signaling (RBS), which is the common method of transporting voice over T1. Secondary/ Fractional T1/DSX-1 data does not use RBS.

Procedure

By default, the *ConnectReach* system software sets the number of analog voice channels to the number of actual analog ports that are installed. It sets no channels for data. The range of the four destinations may not overlap each other.

(Continued on next page)

Configuring DS0 Provisioning (Continued)

Procedure (continued)

Step	Procedure
1	At the Config prompt, enter the `DS0-provisioning` command: `(config)>` **`DS0-provisioning`** The prompt changes to the Config:DS0-provisioning prompt. `(config:DS0-provisioning)>`
2	At the Config:DS0-provisioning prompt, enter the `DS0` command from the following table and specify the ranges of analog and data channels.

Enter this command...	...and specify the value	Comments
`analog-begin`	`[n] 0...24`	Software automatically detects the number of voice channels. If no voice channels are found, a value of 0 is entered.
`analog-end`	`[n] 0...24`	Sets value to the last voice channel detected.
`sec-voice-begin`	`[0] 0...24`	For network T1/DSX-1 interface use only.
`frac-voice-begin`	`[0] 0...24`	For network HDSL interface use only.
`sec-voice-end`	`[0] 0...24`	For network T1/DSX-1 interface use only.
`frac-voice-end`	`[0] 0...24`	For network HDSL interface use only.
`sec-data-begin`	`[0] 0...24`	For network T1/DSX-1 interface use only.
`frac-data-begin`	`[0] 0...24`	For network HDSL interface use only.
`sec-data-end`	`[0] 0...24`	For network T1/DSX-1 interface use only.
`frac-data-end`	`[0] 0...24`	For network HDSL interface use only.
`data-begin`	`[0] 0...24`	
`data-end`	`[0] 0...24`	
`alignment-sec-t1`	`[same] low`	If set to the default value, *same,* the DS0s on the Network T1/DSX-1/HDSL are connected to the same DS0 numbers on the Secondary/Fractional T1/DSX-1. If set to *low*, the *ConnectReach* system connects the lowest numbered DS0 on the Network T1/DSX-1/HDSL to the first DS0 on the Secondary/Fractional T1/DSX-1.
`Help`		Access online assistance.

(Continued on next page)

Configuring DS0 Provisioning (Continued)

Procedure (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change the begin channel in any of the ranges while using any of the `DS0` commands, the new command values do not take effect until you save the configuration and reboot the *ConnectReach* system using the `cold-start` command. If you do not change the begin channel in any of the ranges, the new command values take effect as soon as you save the configuration. In this case you do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

(Continued on next page)

Configuring DS0 Provisioning (Continued)

Examples of channel assignment schemes

Examples of channel assignment schemes are listed below:

- ***Configure full T1 bandwidth for data as follows:*** set data-begin to 1, data-end to *24*, and all other values to *0* (zero).
- ***Configure full T1 bandwidth for voice lines connected to the Secondary/Fractional T1/DSX-1 connector as follows:*** set sec/frac-t1-voice-begin to 1, sec/frac-t1-voice-end to 24, and all other values to *0* (zero).
- ***Configure half the T1 bandwidth for analog voice connections and half for data as follows:*** set analog-begin to 1, analog-end to 12, data-begin to 13, and data-end to 24.

NOTE:
There is a restriction in the same mode, that any DS0s used for analog voice must have lower channel numbers than any DS0s used for the Secondary/Fractional T1/DSX-1.

It is recommended that you always configure the voice channel range to start with channel 1 and increment from there. Configure the data channel range to start with channel 24 and decrement from there. If some channels are unconfigured, it will be easier to make changes later if the unconfigured channels are between the voice range and the data range.

Configuring the Synchronous Interface

Introduction

You must specify Synchronous Interface Encapsulation for installations that use data channels. After you specify an encapsulation method, you must also configure the associated interface settings through the `Modify-encap-data` command. For example, if you set the encapsulation to point-to-point protocol (PPP), then you must also configure the PPP interface with the `Modify-encap-data` command.

Key commands

The following key commands are available using the synchronous interface command:

Encapsulation Allows the selection of the encapsulation protocol to be frame relay, PPP, or high-level data link control (HDLC).

HDLC Inversion Enabling HDLC inversion helps the line comply with the ones density specification. Ones density applies only if the network T1/DSX-1/HDSL interface is configured to use AMI line coding, regardless of the encapsulation scheme being used on the synchronous interface.

Modify encap data Allows the selection of specific values appropriate to the chosen encapsulation scheme.

IP Unnumbered The *ConnectReach* system allows the use of “Internet protocol (IP) unnumbered” WAN interfaces. An unnumbered interface is an interface that does not consume a unique IP address. This option is enabled by setting the **IP-address** command to ***Enet,*** indicating that this interface is to share the same IP address as the Ethernet interface***.***

RIP For each encapsulation there are four routing information protocol (RIP) options; *Enable*, *RxOnly*, *TxOnly* and *Disable*. If *RxOnly* RIP is selected, advertisements are accepted (that is, received). If *TxOnly* RIP is selected, advertisements are sent (that is, transmitted). Setting RIP to *enable* activates both transmit and receive. To turn off RIP, select *disable*.

(Continued on next page)

Configuring the Synchronous Interface (Continued)

Procedure

Step	Procedure
1	At the Config prompt, enter the `synchronous-interface` command: `(config)>` **`synchronous-interface`** The prompt changes to the Config:Synchronous-interface prompt. `(config:Synchronous-interface)>`

2	To set the synchronous interface encapsulation, enter the `encapsulation` command at the Config:Synchronous-interface prompt and the appropriate setting from the following table.
	
	Enter this command... ...and specify this setting
	`encapsulation` [`Frame-relay`], `PPP`, `HDLC`
	`HDLC-inversion` [`off`], `on`
	`modify-encap-data`
	`Help`

3	Enter the `Modify-encap-data` command to specify values appropriate to the chosen encapsulation scheme. The `Modify-encap-data` command changes the prompt to the selected encapsulation scheme.
	
	`(config:Frame-relay)>`
	
	`(config:PPP)>`
	
	`(config:HDLC)>`
	
	Refer to one of the following procedures that pertains to the selected encapsulation scheme to complete the configuration.

4	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, except `IP addressing`, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. `IP Addressing` takes effect when the `save` command is executed. **Stop! End of Procedure.**

(Continued on next page)

Configuring the Synchronous Interface (Continued)

Using the frame relay modification menu

The *ConnectReach* system uses the standard request for comment (RFC) 1490 to send IP packets over a frame relay connection. The local management interface (LMI)-type provides for two different signaling specifications, T1.617 (ANSI) and Q.933-annex-A [international telecommunication union/consultative committee for international telegraph and telephone (ITU/CCITT)]. The frame relay modification menu allows configuration for as many as five permanent virtual circuits (PVCs). At the Config:Synchronous-interface prompt, enter the Modify-encap-data command to access the frame relay commands listed in the following table:

Enter this command...	...and specify this value	Comments
PVC	(1...30)	Defines the specified PVC.
LMI-type	none,[T1.617-annex-D*], Q.933-annex-A†	Specify annex type of Local Management Interface (LMI).
N391‡	[6] 1...255	Specify the polling cycles for status of all permanent virtual circuits (PVCs).
N392‡	[3] 1...255	Specify the threshold for the monitored event counter.
N393‡	[3] 1...10	Specify the monitored event counter interval.
T391	[6] 1...10	Specify the time in seconds for LMI requests to be sent.
show-all-PVCs		Displays the configuration for all PVCs.
Help		Access online assistance.

* This setting is sometimes referred to as Annex D or ANSI.

† This setting is sometimes referred to as CCITT or ITU.

‡ It is recommended that you use the default values for these commands unless the carrier specifies otherwise.

Configuring using the PVC submenu commands

Each PVC submenu allows the user to configure Data Link Connection Identifier (DLCI) and IP commands.

The *ConnectReach* system's implementation of Inverse Address Resolution Protocol (InARP) is based on RFC 1293. It allows a router at the other end of the Frame Relay network to discover the IP address of the *ConnectReach* system associated with a PVC. The *ConnectReach* system passively responds to InARP requests by supplying its IP address.

(Continued on next page)

Configuring the Synchronous Interface (Continued)

Configuring using the PVC submenu commands (continued)

Step	Procedure
1	At the Config:Frame-relay prompt, enter PVC*n* where *n* is any number from one to five. `(config:Frame-relay)>` **`PVC1`** The prompt changes to the `Config:FrameRelay:PVC1` prompt. `(config:FrameRelay:PVC1)>`
2	At the Config:FrameRelay:PVC1 prompt, enter the appropriate commands from the following table. The default setting for each command appears in brackets.

Enter this command...	...and specify this value	Comments
`DLCI`	`[16]...991`	Enter the assigned DLCI for the *ConnectReach* system.
`IP-address`	*`IP-address`*`, Enet*, [Disable]`	Enter the IP address for the frame relay's interface, Enet or disable this command.
`netmask`	*`netmask`*	Enter a netmask value, such as 255.255.255.0.
`RIP`	`Enable, RxOnly, TxOnly, [Disable]`	Select the mode of RIP to use.
`version-RIP`	`[1], 2`	Select the version of RIP to use.
`Help`		Access online assistance.

* The Enet value assigns the primary Ethernet IP address (IP unnumbered).

Stop! End of Procedure.

(Continued on next page)

Configuring the Synchronous Interface (Continued)

Using the PPP commands

At the Config:Synchronous-interface prompt, enter the Modify-encap-data command to access the PPP commands listed in the following table:

Enter this command...	...and specify this value	Comments
IP-address	*IP-address*, Enet*, [Disable]	Enter the IP address for the PPP interface, Enet or disable.
netmask	*netmask*	Enter a netmask value, such as 255.255.255.0.
RIP	Enable, RxOnly, TxOnly, [Disable]	Select the mode of RIP to use.
version-RIP	[1], 2	Select the version of RIP to use.
Help		Access online assistance.

* The Enet value assigns the primary Ethernet IP address (IP unnumbered).

Using the HDLC commands

At the Config:Synchronous-interface prompt, enter the Modify-encap-data command to access the HDLC commands listed in the following table:

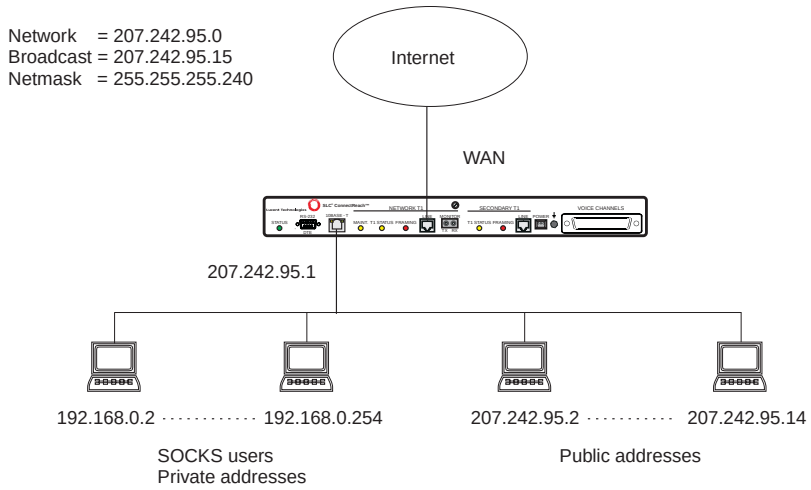
Enter this command...	...and specify this value	Comments
IP-address	*IP-address*, Enet*, [Disable]	Enter the IP address for the HDLC interface, Enet or disable.
netmask	*netmask*	Enter a netmask, such as 255.255.255.0.
RIP	Enable, RxOnly, TxOnly, [Disable]	Select the mode of RIP to use.
version-RIP	[1], 2	Select the version of RIP to use.
Help		Access online assistance.

* The Enet value assigns the primary Ethernet IP address (IP unnumbered).

Configuring the Ethernet Interface

Introduction

If SOCKS is not enabled, the IP address must be that assigned to the site by the carrier. Otherwise, the IP addresses may be private. Refer to the following figure for an example of using the secondary IP address.



In the figure example, the network interface controller/Internet service provider (NIC/ISP) supplied 16 public IP addresses. One public IP address is used for the *ConnectReach* system's Ethernet interface, one for the network, and one for the broadcast leaving 13 to assign to workstations. If there are more than 13 workstations as in this example, they would use private IP addressing with SOCKS to allow Internet access through the *ConnectReach* system. Using the Ethernet menu, two logical Ethernet interfaces would be configured, one for public and one for private IP addressing.

The default IP address is 192.168.0.1, which is one of the suggested Class C private network addresses from RFC 1918 (see Appendix A).

Procedure

Use the following procedure to configure the Ethernet interface:

Step	Procedure
1	At the Config prompt, enter the `Ethernet` command: `(config)>` **`Ethernet`** The prompt changes to the `Config:Ethernet` prompt. `(config:Ethernet)>`

(Continued on next page)

Configuring the Ethernet Interface (Continued)

Procedure (continued)

Step	Procedure
2	At the `Config:Ethernet` prompt, enter the appropriate commands from the following table.

Enter this command...	...and specify this value	Comments
`IP-address`	*`IP-address`*	Enter the IP address of the Ethernet interface (the default is 192.168.0.1).
`netmask`	*`netmask`*	Enter a netmask, such as 255.255.255.0.
`secondary-ip`	*`IP-address`*	Enter a second IP address for a separate logical network on the same physical network.
`sec-netmask`	*`netmask`*	Enter a netmask for the second IP address.
`RIP`	`Enable, RxOnly, TxOnly,[Disable]`	Enter the mode of RIP to use for the primary and secondary IP addresses.
`version-RIP`	`[1], 2`	Enter the version of RIP in use.
`link-integrity-test`	`off, [on*]`	Enable or disable automatic testing of Ethernet connectivity.
`Help`		Access online assistance.

* This setting turns on detection of conditions such as whether the *ConnectReach™* System is disconnected from the 10Base-T hub or the hub's power is off. If SNMP is enabled, and if SNMP messages of this type are also enabled, the *ConnectReach* System reports these conditions to the SNMP host.

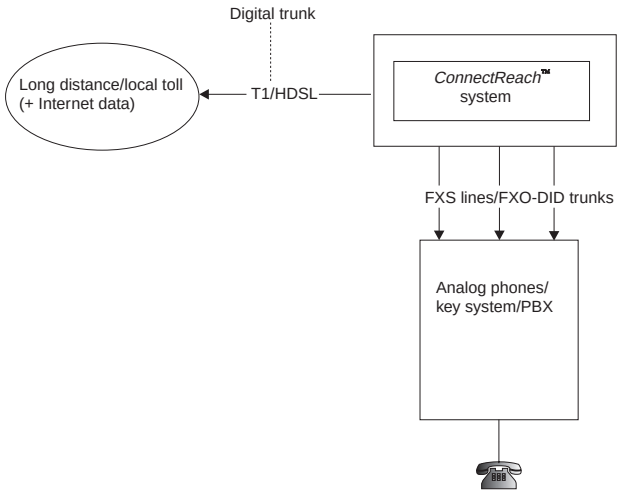
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring the Channel Bank Mode

Introduction

The *ConnectReach* system acts as a channel bank in which there is a one-to-one association between T1 voice DS0s (digital trunks) and analog (FXS) ports.

The following figure shows channel-bank functionality. The telephone symbol represents users of the system. The *ConnectReach* system maps digital trunks to FXS or DID lines.



Before configuring the channel bank menu, you must know how the digital trunks are configured in the central office, and how the equipment connected to the analog ports (analog phones, PBX or key system) is configured.

The user interface allows you to set up a configuration template which contains commands that are applied to a range of channels. The channel bank template contains the following commands:

- Signaling
- Incoming-type
- Outgoing-type
- Analog-interface
- Far-end-disconnect
- Loop-reversal
- Tx-gain-db

(Continued on next page)

Configuring the Channel Bank Mode (Continued)

Introduction (continued)

- Rx-gain-db
- On-hook-threshold
- Alarm-state.

There is one channel bank configuration command, `unconfigured-state`, that is not part of the template. The value set for `unconfigured-state` applies to all unconfigured analog voice channels.

Key commands

The channel bank configuration key commands are used as follows:

Begin and end

The *ConnectReach* system uses a template mechanism to set groups of commands and associated options within a given menu. For any given menu, the template is applied to a range of commands contained within the `begin` and `end` commands.

The `begin` and `end` commands determine the range of channels to be configured. Channels may be set individually or in groups of similar configuration. The `copy-to-channel-data` command copies the configuration template commands to the channels in the range between begin and end. If you are accessing the *ConnectReach* system by means of the console or Telnet, you must use the `copy-to-channel-data` command after modifying the data in the configuration template. If you do not, the configuration data for the individual channels will not be modified. If you are accessing the *ConnectReach* system from a Web browser, there is no `copy-to-channel-data` command. Instead, the `Update` button performs the same function. The `Show-all` command displays the data in the individual channels.

(Continued on next page)

Configuring the Channel Bank Mode (Continued)

Key commands (continued)

Signaling

Use *loop-gnd* for loop- or ground-start trunks. If *loop-gnd* is selected, the digital trunk and analog interface must both be loop-start or both be ground- start. The *ConnectReach* system does not perform loop- to ground-start conversion. Use E&M to convert digital E&M to analog loop- or ground-start signaling. *Unconfigured* is used for all unassigned channels.

NOTE: In the *ConnectReach* system, references to E&M signaling refer to a signaling type supported on DID trunks. It does not refer to the E&M signaling used over metallic leads with older transmission equipment.

Incoming-type

This command is only used for E&M trunks. This command must be set to comply with the signaling mode of the digital trunk for incoming calls. The four options are wink start (*wnk-s*), immediate start (*imm-s*), delay dial (*dly-d*), and wink delay (*wnk-d*). If wink start is selected, the *ConnectReach* system sends a wink as soon as the central office seizes the trunk to make an incoming call. If wink delay is selected, the wink is delayed until the device on the analog port has answered the call and is listening. Wink delay is normally used with PBXs, Voice Mail systems, etc.

Outgoing-type

This command is only used for E&M trunks. This command must be set to comply with the signaling mode of the digital trunk for outgoing calls. The three options are wink start (*wnk-s*), immediate start (*imm-s*), and delay dial (*dly-d*).

(Continued on next page)

Configuring the Channel Bank Mode (Continued)

Key commands (continued)

Analog-interface This command must be set to comply with the signaling requirements of the device attached to the analog port. The five options are fxs-loop, fxs-ground, fxo-did, fxo-loop, and fxo-ground. The fxs-loop and fxs-ground options, which require FXS hardware, are for E&M only. The fxs-loop and fxs-ground options convert E&M signaling to FXS for connection to a loop-start or ground-start device, respectively. The fxo-did option, which requires FXO hardware, converts E&M DID signaling to FXO to allow an incoming DID connection to a PBX.

The fxo-loop and the fxo-ground options, which require FXO hardware, provides a connection between loop-start or ground-start at the CO and the FXO interface. Conversion from E&M signaling to FXO loop and FXO ground is not available.

Far-end-disconnect This command is only used for E&M trunks. If this command is enabled, and the digital central office disconnects the call, the *ConnectReach* system opens the FXS tip for 1.4 seconds. This tells the analog equipment (for example, a PBX) that the call has terminated.

Loop-reversal This command is only used for loop-ground trunks. If enabled, and a polarity reversal signal is received on the digital trunk, then the *ConnectReach* system reverses the polarity of the tip and ring leads of the FXS interface. If disabled, then polarity reversal signals from the digital trunk are ignored.

Analog transmit gain This command adjusts the transmit signal levels to the network from the FXS interface. The available settings are 0, –3, and –6 dB.

Analog receive gain This command adjusts the received signal levels from the network to the FXS interface. The available settings are 0, –3, –6, and –12 dB.

(Continued on next page)

Configuring the Channel Bank Mode (Continued)

Key commands (continued)

On-hook-threshold This command (expressed in milliseconds) allows the *ConnectReach* system to differentiate between a flash request and an on-hook (disconnect) condition. If the telephone equipment on the far end of the digital trunk supports hook switch flash, set `on-hook-threshold` to a long enough interval (1500 milliseconds is typical) for the *ConnectReach* system to differentiate between a flash and a disconnect. Note that during the `on-hook-threshold` interval, the on-hook is sent to the far end equipment. If the telephone equipment does not support flash, use the default value of 1,250 milliseconds.

Alarm-state In the event of a network E1 alarm, this command determines if the FXS is to be put into a tip closed (battery supplied) or tip open (no battery supplied) state. If this command is set to *busy*, then battery will be supplied. If set to *idle*, then no battery will be supplied.

Unconfigured-state This command determines if the FXS ports for unconfigured channels are put into a tip closed (battery supplied) or tip open (no battery supplied) state. If this command is set to *busy*, then battery will be supplied. If set to *idle*, then no battery will be supplied. It is not part of the configuration template and has no impact on configured channels.

Load template This command loads all of the configuration command values that are stored in a template to the channel being configured. This command allows multiple channels to be set up identically without having to enter each individual command for all channels.

Cross-connect This command allows assignment of DS0s to specific lines. This becomes relevant when using four port boards or a combination of FXS and FXO boards with less than eight lines used on each board. If this command is enabled, then all DS0s must be assigned through the associated submenu.

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Configuring the Channel Bank Mode (Continued)

Procedure

After you have verified the required configuration, follow these steps to configure the voice channels:

Step	Procedure
1	At the Config prompt, enter the `channel-bank` command: `(config)>` **`channel-bank`** The prompt changes to the Config:Channel-bank prompt. `(config:channel-bank)>`
2	Use the `begin` and `end` commands to specify the range of analog ports to which subsequent changes will apply. **NOTE:** The channel numbers specified in the begin and end commands refer to the analog ports, not the T1 DS0s. For example, in the DS0 provisioning menu, if begin is set to eight, then channel one in the Secondary/Fractional T1/DSX-1 voice commands refers to the first pair on the analog connector, which is connected to DS0 number eight. In order to avoid confusion, we recommend you provision your T1 lines with the voice channels starting at the first DS0. In that case, the analog ports and DS0 channels always have the same numbers. The *ConnectReach* system software will automatically detect the number of voice channels.

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Configuring the Channel Bank Mode (Continued)

Procedure (continued

Step	Procedure
3	Make the necessary configuration changes (see the following table) or use the `load-template` command to load an existing configuration of a channel.

To	Enter this command...	...and one of these options
Set the first channel	`begin`	Software automatically detects the number of voice channels. If no voice channels found, a value of 0 is entered.
Set the last channel	`end`	Sets value to the last voice channel detected.
Enter the type of trunk signaling (input)	`signaling`	`[loop-gnd], E&M, unconfigured`
Specify the signaling for incoming E&M trunks	`incoming-type`	`[wnk-s], imm-s, dly-d, wnk-d`
Specify the signaling for outgoing E&M trunks	`outgoing-type`	`[wnk-s], imm-s, dly-d`
Specify the equipment that is attached to the channel bank/lines	`analog-interface`	`[fxs-loop], fxs-ground, fxo-did, fxo-loop, fxo-ground`
Disable if not supported by analog equipment	`far-end-disconnect`	`disable, [enable]`
Disable if not supported by analog equipment	`loop-reversal`	`disable, [enable]`
Adjust transmit gain	`tx-gain-db`	`0, [-3], -6`
Adjust receive gain	`rx-gain-db`	`0, [-3], -6, -12`
Adjust on-hook threshold	`on-hook-threshold`	`[1250] 300...2000 msec`
Set the tip status for alarm conditions	`alarm-state`	`idle, [busy]`
Set the tip status for all unconfigured channels	`unconfigured-state`	`[idle], busy`
Load a configuration of a channel	`load-template`	`1...24`
Write your changes to the specified channels	`copy-to-channel-data`	
Display channel-bank mode	`Show-all`	
Configure cross-connect	`cross-connect`	
Access online assistance	`Help`	

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Configuring the Channel Bank Mode (Continued)

Procedure (continued)

Step	Procedure
4	If you are connected to the *ConnectReach* system by means of a console session or a Telnet session, enter the `copy-to-channel-data` command to write your changes to the specified channel(s).
5	If you are accessing the *ConnectReach* system Utility from a Web browser, select the `Update` button to write your changes to the specified channel(s).
6	Repeat Steps 3, 4, and 5 to change the configuration for other channels or ranges of voice channels, if appropriate.
7	Use the `Show-all` command to see the actual channel configuration.
8	At the `Config:Channel-bank` prompt, set the tip status for all unconfigured channels using the `unconfigured-state` command. The `unconfigured-state` command applies to all unconfigured channels.

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Configuring the Channel Bank Mode (Continued)

Procedure (continued)

Step	Procedure
9	To assign DS0s manually, enter the `Cross-connect` command from the channel-bank prompt and then enter one of the following submenu commands.

To	Enter this command...	...and one of these options
Enable cross-connect	`enable`	[off], on
Assign a DS0 to a line	`set-DS0-to-line`	DS0 (1...24) Line (0....24)
Show settings	`Show-all`	
Access online assistance	`Help`	

Example:
If the *ConnectReach* system is equipped with one FXS eight port board and one FXO eight port board and the customer's site uses two FXS lines and one FXO line, the configuration steps would be as follows:

1. Enter the following commands at the config:Channel-bank:Cross-connect prompt:

   (config:Channel-bank:Cross-connect) **`enable on`**

   (config:Channel-bank:Cross-connect) **`set-DS0-to-line 1 1`**

   (config:Channel-bank:Cross-connect) **`set-DS0-to-line 2 2`**

   (config:Channel-bank:Cross-connect) **`set-DS0-to-line 3 9`**

2. To view the settings, enter the `show-all` command.
   (config:Channel-bank:Cross-connect) **`show-all`**

   DS0 Line
   1 1
   2 2
   3 9

3. To clear a DS0 setting, enter zero for the line.
   (config:Channel-bank:Cross-connect) **`set-DS0-to-line 3 0`**

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Configuring the Channel Bank Mode (Continued)

Procedure (continued)

10	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** Except for the `Cross-connect` command, the new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. If you change any parameters using the `Cross-connect` command, you must save the configuration and reboot the *ConnectReach* system using the cold-start command for the new settings to take effect. **Stop! End of Procedure.**

Configuring Digital Trunks

Introduction

The Digital Trunk table defines DID and trunk signaling commands for each digital trunk (DS0).

The digital-trunk command is included in the LCR/DID telephone functionality mode and the digital-trunk menu will appear only when the LCR/DID optional feature is installed in the *ConnectReach* system. In the LCR/DID mode additional configuration menus, including the digital-trunk menu, are used to specify call routing and DID operation.

NOTE:
The channel-bank menu must be used in conjunction with the digital-trunk menu.

Key commands

The key commands for the *ConnectReach* system's Digital Trunk menu are as follows:

Begin and end The *ConnectReach* system uses a template mechanism to set groups of commands and associated options within a given menu. For any given menu, the template is applied to a range of commands contained within the `begin` and `end` commands.

The `begin` and `end` commands determine the range of channels to be configured. Channels may be set individually or in groups of similar configuration. The `copy-to-channel-data` command copies the configuration template commands to the channels in the range between begin and end. If you are accessing the *ConnectReach* system by means of the console or Telnet, you must use the `copy-to-channel-data` command after modifying the data in the configuration template. If you do not, the configuration data for the individual channels will not be modified. If you are accessing the *ConnectReach* system from a Web browser, there is no `copy-to-channel-data` command. Instead, the `Update` button performs the same function. The `Show-all` command displays the data in the individual channels.

Group This command specifies the trunk group to which this DS0 belongs.

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Configuring Digital Trunks (Continued)

Key commands (continued)

Signaling

The *ConnectReach* system supports loop-start, ground-start, or conversion from E&M trunk signaling to loop- or ground-start. The *ConnectReach* system also provides an unconfigured option for signaling that is absent. If the E&M option is selected, then the following E&M signaling commands must be defined:

NOTE: In the *ConnectReach* system, references to E&M signaling refer to a signaling type supported on DID trunks. It does not refer to the E&M signaling used over metallic leads with older transmission equipment.

E&M-type-incoming

Signaling for incoming E&M trunks is configured to comply with the signaling mode of the provider. There are four options: wink start (wnk-s), immediate start (imm-s), delay dial (dly-d), and wink delay (wnk-d). With the wink delay option, the off-hook signal for incoming calls is delayed until the PBX is connected and "listening."

E&M-type-outgoing

Signaling for outgoing E&M trunks is configured to comply with the signaling mode of the provider. There are three options: wink start (wnk-s), immediate start (imm-s), and delay dial (dly-d).

Direction

This command provides three options: incoming (calls from the CO), outgoing (calls to the CO), and two-way (calls from and to the CO). The incoming option specifies that analog lines can only receive incoming calls, but cannot originate calls.

Incoming-routing

This command specifies the routing options for incoming calls. If you select the DID-dialed number identification service (DNIS) or automatic number identification (ANI)-DNIS option, the incoming digits are collected by the *ConnectReach* system and routed to the appropriate analog line. Selecting the `line` or `group` option allows an incoming call to be routed to a line or a group of lines, respectively.

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Configuring Digital Trunks (Continued)

Key commands (continued)

Line-group This command is used when the `line` or `group` option is selected in the `incoming-routing` command. Use this command to specify the line or group number designated to receive incoming calls. When `line` is specified, and the line specified is busy, the call will be forwarded to the line designated in the busy-forward-line command. When `group` is specified, and the first line in the group is busy, the *ConnectReach* system will forward the call to the next line in the group until an available line is found. If all lines in the group are busy, the caller will hear a busy signal. To assign lines to a group, refer to the `group` command located in the section entitled “Configuring Lines”, located later in this chapter.

Digits-type This command allows the user to select the digit-addressing option. There are three options: dial-tone multiple frequency (DTMF), multiple frequency (MF), and pulse. Incoming addressing contains DID or DNIS information.

Busy-treatment This command specifies how a call will be handled if the line (station) is busy. If the busy-signal option is selected, the caller will hear the standard busy signal. If the busy-out option is specified, whenever all lines in a line group are in use, all trunks that route to that line group are placed in busy-out mode by taking them off-hook. The forward option sends the call to another line.

Busy-forward-line This command is used in conjunction with the `line` option for `incoming-routing`. If the line specified for receiving incoming calls is busy, the call will be forwarded to the line specified in the `busy-forward-line` command.

Analog transmit gain This command adjusts transmit signal levels to the network from the FXS interface. Three settings are available (0, –3, and –6 dB).

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Configuring Digital Trunks (Continued)

Key commands (continued)

Analog receive gain This command adjusts receive signal levels from the network to the FXS interface. Four settings are available (0, –3, –6, and –12 dB).

Load template This command loads all of the configuration command values that are stored in a template to the channel being configured. This command allows multiple channels to be set up identically without having to enter each individual command for all channels.

The `copy-to-channel-data` command only modifies LCR/DID channels. If the *begin* and *end* commands include channels that are not LCR/DID, the `copy-to-channel-data` warns the user that data for those channels was not modified.

The `Show-all` command only displays all digital trunk configuration.

Procedure

After you have verified the required configuration, follow these steps to configure digital trunks:

Step	Procedure
1	Before you can set the desired channels in the digital trunk menu, you will need to unconfigure them in the channel bank menu. Refer to the previous table containing channel bank configuration commands.
2	At the Config prompt, enter the `Digital Trunk` command: `(config)>` **`Digital-trunk`** The prompt changes to the `Config:Digital Trunk` prompt. `(config:DigitalTrunk)>`
3	Use the `begin` and `end` commands to specify the digital trunk or range of digital trunks to which subsequent changes will apply. **NOTE:** The channel numbers specified in the `begin` and `end` commands refer to the analog ports, not the T1 DS0s. For example, if begin is set to eight, then channel one in the voice menu refers to the first pair on the analog connector, which is connected to DS0 number eight. In order to avoid confusion, it is recommended that you provision your T1 lines with the voice channels starting at the first DS0. In that case, the analog ports and DS0 channels always have the same numbers. The *ConnectReach* system software will automatically detect the number of voice channels.

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Configuring Digital Trunks (Continued)

Procedure (continued)

Step	Procedure
4	Make the necessary configuration changes. The following table describes these commands.

To	Enter this command...	...and one of these options
Set the first channel	`begin`	`[1]...24`
Set the last channel	`end`	`1...[24]`
Specify the trunk group	`group`	`[1]...10`
Enter the trunk signaling type	`signaling`	`E&M, loop-start, ground-start, [Unconfigure]`
Enter the signaling type for incoming E&M trunks	`E&M-type-incoming`	`[wnk-start], imm-s, dly-d, wnk-d`
Enter the signaling type for outgoing E&M trunks	`E&M-type-outgoing`	`[wnk-start], imm-s, dly-d`
Specify the direction	`direction`	`in, out, [two-way]`
Select the routing option for incoming calls	`incoming-routing`	`[DID-DNIS], ANI-DNIS, Group, Line`
Select the line routing option	`line-group`	`[1], line or line group #`
Select the digit-addressing option	`digits-type`	`[DTMF], MF, Pulse`
Specify how call is handled if line is busy	`busy-treatment`	`[busy-sig], busy-out, forward`
Select the line to forward the call if line is busy	`busy-fwd-line`	`1...[24]`
Adjust transmit gain	`tx-gain-db`	`0, [-3], –6`
Adjust receive gain	`rx-gain-db`	`0, [-3], -6, -12`
Load a configuration of a channel	`load-template`	`1...24`
Write your changes to the specified channels	`copy-to-channel-data`	
Display all DS0s	`Show-all`	
Access online assistance	`Help`	

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Configuring Digital Trunks (Continued)

Procedure (continued)

Step	Procedure
5	Use the `copy-to-channel-data` command to write your changes to the specified trunks.
6	Use the `Show-all` command to see the actual channel configuration.
7	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring Analog Trunks

Introduction

The Analog Trunk menu defines DID and trunk signaling commands for each analog trunk (FXO).

The analog-trunk command is included in the LCR/DID telephone functionality mode and the analog-trunk menu will appear only when the LCR/DID optional feature is installed in the *ConnectReach* system. In the LCR/DID mode additional configuration menus, including the analog-trunk menu, are used to specify call routing and DID operation.

NOTE:
The channel-bank menu must be used in conjunction with the analog-trunk menu.

Key commands

The key commands for the *ConnectReach* system's Analog-Trunk menu are as follows:

Begin and end

The *ConnectReach* system uses a template mechanism to set groups of commands and associated options within a given menu. For any given menu, the template is applied to a range of commands contained within the `begin` and `end` commands.

The `begin` and `end` commands determine the range of channels to be configured. Channels may be set individually or in groups of similar configuration. The `copy-to-channel-data` command copies the configuration template commands to the channels in the range between begin and end. If you are accessing the *ConnectReach* system by means of the console or Telnet, you must use the `copy-to-channel-data` command after modifying the data in the configuration template. If you do not, the configuration data for the individual channels will not be modified. If you are accessing the *ConnectReach* system from a Web browser, there is no `copy-to-channel-data` command. Instead, the `Update` button performs the same function. The `Show-all` command displays the data in the individual channels.

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Configuring Analog Trunks (Continued)

Key commands (continued)

Group This command specifies the trunk group to which this analog line belongs.

Signaling The *ConnectReach* system supports *loop-start* or *ground-start* and also provides an *unconfigured* option for signaling that is absent.

Direction This command provides three options: incoming (calls from the CO), outgoing (calls to the CO), and two-way (calls from and to the CO). The *incoming* option specifies that analog lines can only receive incoming calls, but cannot originate calls.

Incoming-routing This command specifies the line, group of lines, or trunk to which the analog trunk is routed.

Line-group This command is used when the *line* or *group of lines* option is selected in `incoming-routing`. Use this command to specify the line or group number designated to receive incoming calls. When *line* is specified and the line specified is busy, the call will be forwarded to the line designated in the `busy-forward-line` command. When `group of` *lines* is specified and the first line in the group is busy, the *ConnectReach* system will forward the call to the next line in the group until an available line is found. If all lines in the group are busy, the caller will hear a busy signal. To assign lines to a group, refer to the `group` command under the section entitled “Configuring Lines” located later in this chapter.

Digits-type This command allows the user to select the digit-addressing option.

Busy-treatment This command specifies how a call will be handled if the line (station) is busy. If the *busy-signal* option is selected, the caller will hear the standard busy signal. If the *busy-out* option is specified, the *ConnectReach* system busies out all members of the trunk when the line or line group is busy. The *forward* option sends the call to another line.

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Configuring Analog Trunks (Continued)

Key commands (continued)

Busy-forward-line This command is used in conjunction with the *line* option for `incoming-routing`. If the line specified for receiving incoming calls is busy, the call will be forwarded to the line specified in the `busy-forward-line` command.

Analog transmit gain This command adjusts transmit signal levels to the network from the FXS interface. Three settings are available (0, –3, and –6 dB).

Analog receive gain This command adjusts receive signal levels from the network to the FXS interface. Four settings are available (0, –3, –6, and –12 dB).

Load template This command loads all of the configuration command values that are stored in a template to the channel being configured. This command allows multiple channels to be set up identically without having to enter each individual command for all channels.

The `copy-to-channel-data` command only modifies LCR/DID channels. If the begin and end commands include channels that are not switched, the `copy-to-channel-data` command warns the user that data for those channels was not modified.

Procedure

After you have verified the required configuration, follow these steps to configure analog trunks:

Step	Procedure
1	At the Config prompt, enter the `Analog trunk` command: `(config)>` **`Analog trunk`** The prompt changes to the Config:Analog trunk prompt. `(config:AnalogTrunk)>`

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Configuring Analog Trunks (Continued)

Procedure (continued)

Step	Procedure
2	Use the begin and end commands to specify the analog trunk or range of analog trunks to which subsequent changes will apply. **NOTE:** The channel numbers specified in the begin and end commands refer to the analog ports, not the T1 DS0s. For example, if begin is set to eight, then channel one in the voice menu refers to the first pair on the analog connector, which is connected to DS0 number eight. In order to avoid confusion, it is recommended that you provision your T1 lines with the voice channels starting at the first DS0. In that case, the analog ports and DS0 channels always have the same numbers. The *ConnectReach* system software will automatically detect the number of voice channels.

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Configuring Analog Trunks (Continued)

Procedure (continued)

Step	Procedure
3	Make the necessary configuration changes (see the following table) or use the `load-template` command to load an existing configuration of a channel.

To	Enter this command...	...and one of these options
Set the first channel	`begin`	`[1]...24`
Set the last channel	`end`	`1...[24]`
Specify the trunk group	`group`	`1[2]...10`
Enter the trunk signaling type	`signaling`	`loop-start, grnd-start, [Unconfigure]`
Specify the direction	`direction`	`in, out, [two-way]`
Select the routing option for incoming calls	`incoming-routing`	`[Group], Line`
Select the line routing option	`line-group`	`[1], line or line group #`
Select the digit-addressing option	`digits-type`	`[DTMF], PULSE`
Specify how call is handled if line is busy	`busy-treatment`	`[busy-sig], busy-out, forward`
Select the line to forward the call if line is busy	`busy-fwd-line`	`1...[24]`
Adjust transmit gain	`tx-gain-db`	`0, [-3], -6`
Adjust receive gain	`rx-gain-db`	`0, [-3], -6, –12`
Load a configuration of a channel	`load-template`	`1...24`
Write your changes to the specified channels	`copy-to-channel-data`	
Display switched channels	`Show-all`	
Access online assistance	`Help`	

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Configuring Analog Trunks (Continued)

Procedure (continued)

Step	Procedure
4	Use the `copy-to-channel-data` command to write the changes to the specified trunks.
5	Use the `Show-all` command to see the actual channel configuration.
6	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring Lines

Introduction

The Line menu defines line signaling commands for each LCR/DID line (FXS).

The Line command is included in the LCR/DID telephone functionality mode and the Line menu will appear only when the LCR/DID optional feature is installed in the *ConnectReach* system. In the LCR/DID mode additional configuration menus, including the Line menu, are used to specify call routing and DID operation.

NOTE:
The channel-bank menu must be used in conjunction with the Line menu.

Key commands

The key commands for the *ConnectReach* system's Line menu are as follows:

Begin and end — The *ConnectReach* system uses a template mechanism to set groups of commands and associated options within a given menu. For any given menu, the template is applied to a range of commands contained within the `begin` and `end` commands.

The `begin` and `end` commands determine the range of channels to be configured. Channels may be set individually or in groups of similar configuration. The `copy-to-channel-data` command copies the configuration template commands to the channels in the range between begin and end. If you are accessing the *ConnectReach* system by means of the console or Telnet, you must use the `copy-to-channel-data` command after modifying the data in the configuration template. If you do not, the configuration data for the individual channels will not be modified. If you are accessing the *ConnectReach* system from a Web browser, there is no `copy-to-channel-data` command. Instead, the `Update` button performs the same function. The `Show-all` command displays the data in the individual channels.

Group — This command specifies the line group to which these analog lines belong.

Signaling — The *ConnectReach* system supports *loop-start* or *ground-start* and also provides an *unconfigured* option for lines that are absent.

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Configuring Lines (Continued)

Key commands (continued)

Direction	The incoming option specifies that the analog lines can only receive incoming calls from the CO, but cannot originate calls to the CO. The *ConnectReach* system also provides a *two-way* option.
Outgoing routing type	This command specifies the routing options for outgoing calls. If you select the *LCR* option, outgoing calls are routed by call processing software. If you specify the *Group* option, outgoing calls are routed to either an analog or digital trunk group.
Trunk group	This command, used only when the outgoing-routing command is set to *group*, allows the user to specify the trunk group number.
On-hook threshold	This command (expressed in milliseconds) allows the *ConnectReach* system to differentiate between a flash request and an on-hook condition. If the telephone system does not support flash, set on-hook-threshold to *300* milliseconds. If the telephone system supports flash, set on-hook-threshold to an interval long enough (*1,500* milliseconds is typical) for the system to differentiate between a flash and a disconnect.
Far-end-disconnect	If this command is enabled, and the digital central office disconnects the call, the *ConnectReach* system opens the FXS tip for 1.4 seconds. This tells the analog equipment (for example, PBX) that the call has ended.
Polarity-reversal	This command is used for reversing the polarity of the DC when the central office has answered. Some PBXs use this for billing purposes.
Trunk-ring-default	Trunk-ring-default applies to E&M and line-to-line calls. Ring cadence, for loop or ground start trunks, is controlled by the CO. This command sets the number of rings for outside trunk calls. If set to single, outside trunk calls get a single ring and inside calls get a double ring. If set to double, the opposite is true. This command is system wide and requires the optional BOX feature. The distinctive-ring command in the BOX submenu must be turned on for this command to function properly.

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Configuring Lines (Continued)

Key commands (continued)

Paging-line This command is used to designate a line for paging output.

Hunting This command sets the type of line group hunting used for incoming calls. If set to most idle, the next line chosen to receive the call will be the one that was least used. If set to linear, the lowest line number that is not busy will receive the call. This command is system wide.

The `copy-to-channel-data` command only modifies LCR/DID channels. If the begin and end commands include channels that are not switched, the copy-to-channel-data warns the user that data for those channels was not modified.

NOTE:
There is no option for tone versus pulse dialing. The software can always detect both dial pulses and DTMF address digits.

Procedure

After you have verified the required configuration, follow these steps to configure lines:

Step	Procedure
1	At the Config prompt, enter the `Line` command: (config)> **`Line`** The prompt changes to the Config:Line prompt. `(config:Line)>`
2	Use the `begin` and `end` commands to specify the line or range of lines to which subsequent changes will apply. **NOTE:** The channel numbers specified in the `begin` and `end` commands refer to the analog ports, not the T1 DS0s. For example, if begin is set to eight, then channel one in the voice menu refers to the first pair on the analog connector, which is connected to DS0 number eight. In order to avoid confusion, we recommend you provision your T1 lines with the voice channels starting at the first DS0. In that case, the analog ports and DS0 channels always have the same numbers. The *ConnectReach* system software will automatically detect the number of voice channels.

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Configuring Lines (Continued)

Procedure (continued)

Step	Procedure
3	Make the necessary configuration changes. The following table describes these commands.

To	Enter this command...	...and one of these options
Set the first channel	`begin`	`[1]...48`
Set the last channel	`end`	`1...[48]`
Select the line group	`group`	`[1]...10`
Enter the trunk signaling type	`signaling`	`loop-start, ground-start, [Unconfigure]`
Specify the direction	`direction`	`in, [two-way]`
Select the routing option for outgoing calls	`outgoing-routing-type`	`[LCR], Group`
Select the trunk group	`trunk-group`	`[1], trunk group #`
Adjust on-hook threshold	`on-hook-threshold`	`[1250] 300...2000 msec`
Set the far end disconnect	`far-end-disconnect`	`disable, [enable]`
Set the polarity reversal	`polarity-reversal`	`[disable], enable`
Display BOX* features menu	`BOX-features`	
Display menu for feature codes	`feature-codes`	
Set the number of rings for outside calls	`trunk-ring-default`	`double, [single]`
Set a line for paging	`paging-line`	`0 <valid line>`
Set the type of line group hunting	`hunting`	`linear, [most-idle]`
Write your changes to the specified channels	`copy-to-channel-data`	
Display channel-bank lines	`Show-all`	
Access online assistance	`Help`	

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(Continued on next page)

Configuring Lines (Continued)

Procedure (continued)

Step	Procedure
4	For setting BOX features enter the `BOX-features` command: `(config:Line)>` **`BOX-features`** A description of the `BOX-features` command is presented in the following section.
5	Make the necessary configuration changes. Refer to the table in the following section entitled “BOX-features, for a description of these commands.
6	For setting feature codes, enter the `feature-codes` command: `(config:Line)>` **`feature-codes`** A description of the `feature-codes` command is presented in the following section.
7	Make the necessary configuration changes. Refer to the table in the section entitled “Feature-codes”, located in the following section, for a description of these commands.
8	Use the `copy-to-channel-data` command to Update line commands from *begin* to *end*.
9	Use the `Show-all` command to see the actual channel configuration.
10	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

(Continued on next page)

Configuring Lines (Continued)

BOX features description

This submenu is used to set the Business OfficeXchange (BOX) features and only appears when the BOX features and the LCR/DID features are installed. The BOX features provided are similar to a Centrex service offered by a CO switch, but without the need for dedicated lines to the CO for each extension. The BOX features also provides configurations for connections to voice mail and paging systems. The following table lists the BOX feature commands.

To	Enter this command...	...and one of these options
Set the distinctive ring option	`distinctive-ring`	`off, [on]`
Set the transfer option	`transfer`	`off, [on]`
Set the consultation hold option	`consultation-hold`	`off, [on]`
Set the three-way calling option	`three-way-calling`	`off, [on]`
Set the call waiting option	`call-waiting`	`[off], on`
Set the forward variable option	`fwd-variable`	`off, [on]`
Set the forward no answer option	`fwd-no-answer`	`off, [on]`
Set the forward busy option	`fwd-busy`	`off, [on]`
Set the number of rings before forwarding a call	`fwd-rings`	`[4] 0...10`
Set the number for call forward variable	`fwd-num-variable`	*`(variable forward number)`*
Set the number for call forward no answer	`fwd-num-no-answer`	*`(no-answer forward number)`*
Set the number for call forward busy	`fwd-num-busy`	*`(busy forward number)`*
Set the busy redial option	`busy-redial`	`off, [on]`
Enable direct trunk access	`direct-trunk-sel`	`[off], on`
Assign a call pickup group	`call-pickup-group`	`[0] 0...5`
Set the line group to the default settings	`line-group-default`	
Access online assistance	`Help`	

(Continued on next page)

Configuring Lines (Continued)

BOX features description (continued)

For information on the user interface of the BOX features, refer to Appendix D, “User Interface”. The BOX features are described as follows:

NOTE:
Attendant consoles, busy lamp fields, digital phones, LCD displays are not supported.

Distinctive-Ring	This command allows incoming calls from an outside trunk to be distinguished from local intercom calls. The distinctive ring is a double ring (half second on, one second off, half second on, four seconds off). A call from an outside trunk transferred by an inside line is rung as an outside call. Each line may be individually configured to have distinctive ringing on or off.
Transfer	This command enables the call transfer feature. Lines may be configured independently of each other. It is not possible to transfer a trunk to another trunk if both trunks are loop-start. If there is a warm-start during the transfer process, all connections are lost.
Consultation-hold	This command enables the consultation hold feature and may be set individually for each line. One, but not both, of the parties may be connected from a loop-start trunk. If there is a warm-start during a consultation hold, all connections are lost.
Three-way calling	This command enables the three-way calling feature. This feature may be turned on or off for each individual line. Consultation hold and transfer must be enabled to activate three-way calling. One, but not both, of the parties may be connected from a loop-start trunk. If there is a warm-start during three-way calling, all connections are lost.

(Continued on next page)

Configuring Lines (Continued)

BOX features description (continued)

Call waiting This command enables the call waiting feature. Each line may be individually configured. An incoming call on a line in use is signaled by a call waiting tone (440 Hz for a half second). This feature is incompatible with call forward busy. If there is a warm-start during the transfer process of a call waiting, all connections are lost.

Call forward There are three types of call forwarding: variable, no answer, and busy. An incoming call may be forwarded as many as ten times. It is possible to set up a hunt group by configuring multiple phones for call forward busy and/or no answer, each forwarding to the next. Each line may be individually configured to have call forward on or off. The call forward request is preserved over a warm or cold restart. The three types of call forwarding are described as follows:

- **Variable** This feature allows the carrier to forward a line to another line or outside number. An incoming call from a loop-start trunk cannot be forwarded to a loop start trunk. The `fwd-num-variable` is preserved over a `warm-start`.
- **No answer** This feature can be used to enable voice mail coverage by forwarding the call to the voice mail extension. Each line may be individually configured with a unique forwarding number. The number of rings before forwarding is also individually configurable.
- **Busy** This feature can also be used to enable voice mail coverage by forwarding the call to the voice mail extension. Each line may be individually configured with a unique forwarding number.

Direct trunk select This feature enables a diagnostic function. If there is a connecting problem, the CO may have the user dial a feature code and a two-digit number for the trunk group to test the trunk.

(Continued on next page)

Configuring Lines (Continued)

BOX features description (continued)

Call pickup group This feature allows for a call pickup group number to be assigned to each line. A call may be answered by a different line in the same call pickup group by dialing a feature code. If multiple lines in a call pickup group are ringing, only one of them is answered on each pickup attempt. If no line is ringing when the user dials the feature code, a fast busy tone is heard.

Caller ID There are three forms of caller identification (ID): line-to-line or intercom, analog trunk call, and incoming digital trunk call. Caller ID for line-to-line displays the extension number. There is no configuration necessary to display the extension number of a line-to-line call. Caller ID with an incoming analog trunk call is passed through to the called line. For an incoming digital trunk call, the *ConnectReach* system is configured to accept automatic number identification (ANI). The ANI is converted to analog caller ID information for display on a display telephone. For Caller ID to be displayed in both digital and analog trunk calls, the CO must generate caller ID information. For information concerning configuring the digital trunk to receive automatic number identification-dialed number identification service (ANI-DNIS), refer to the section entitled “Configuring Digital Trunks”, located earlier in this chapter.

To return the BOX-features back to their defaults, type **line-group-default**. To turn fwd-num-variable, fwd-num-no-answer, and fwd-num-busy off, enter the command without any numbers. To access online assistance, type **help**.

(Continued on next page)

Configuring Lines (Continued)

Feature codes description

This submenu is available when the BOX-features are installed and is used to set feature codes. Feature codes must either begin with a "*****" or must be within the local dialing plan. Codes that do not start with a "*****" are required for rotary dial pulse phones. This setting is system wide. The following table provides a listing of the feature codes configuration commands that can be entered at the config:Line:feature-codes prompt.

To Modify the Feature Code for	Enter this command followed by the new code	Default Setting
Canceling call waiting	`cancel-call-waiting`	`*70`
Call pickup	`call-pickup`	`*1`
Directed call pickup	`direct-call-pickup`	`*5`
Call forwarding	`call-forward-var`	`*72`
Canceling call forwarding	`cancel-forward-var`	`*73`
Initiating a page	`pager`	`*3`
Direct trunk access	`digital-direct-access`	`*40`
Analog trunk or line access	`analog-direct-access`	`*41`
Canceling the redial on busy	`cancel-busy-redial`	`*42`

The feature codes are described as follows:

Cancel call waiting This feature code disables call waiting for the next call.

Call pickup Dialing the call pickup feature code causes a ringing line in the user's pickup group to be answered.

Direct call pickup This feature allows call pickup outside the answerer's pickup group.

Call forward variable This feature forwards calls from one extension to another extension or trunk. Calls coming from a loop-start trunk cannot be forwarded to a loop-start trunk. An incoming call may be forwarded as many as forty-seven times. If there is a warm-start, call forward variable will default to the systems settings; the user's settings will be lost.

(Continued on next page)

Configuring Lines (Continued)

Feature codes description (continued)

Cancel call forward	This feature code disables call forwarding.
Pager	The pager feature allows for paging capability by dialing the pager feature code. A commercial off-the-shelf product is used for the paging amplifier (for example, Valcom V-2001A Paging Unit).
Digital direct access	This feature is used for diagnostics. The direct trunk select feature, in the BOX submenu, must be enabled for the digital direct access to function. The user may enter the digital direct access feature code followed by the trunk number to test a specific trunk.
Analog direct access	This feature is similar to digital direct access only for analog trunks and lines.
Cancel busy redial	This feature is used when a line is given a busy signal when dialing another line or when seizing an outgoing trunk.

To return the feature codes back to their default settings type **default**. To access online assistance, type **Help**.

Configuring Extensions

Introduction

The extension menu associates phone extensions with analog lines. This menu is primarily used for line to line calls within the premises.

The map extensions menu may also be used to route incoming DID calls. Refer to the section entitled “Configuring Digital Trunks”, discussed previously in this chapter.

The extension command is included in the LCR/DID telephone functionality mode and the extension menu will appear only when the LCR/DID optional feature is installed in the *ConnectReach* system. In the LCR/DID mode additional configuration menus, including the extension menu, are used to specify call routing and DID operation.

NOTE:
The channel-bank menu must be used in conjunction with the extension menu.

Key commands

The key commands for the *ConnectReach* system map extension menu are as follows:

Extension-digits This command specifies the number of extension digits to allow for each extension and must be the same as the number specified in the `DID-received-digits` command in the Dialing menu.

Set-line This command assigns an extension number to a line with the option of an alternate extension. All extension and alternate extension numbers must be unique.

Clear-line-extension This command allows the clearing of any line in the extension map database. The confirm option will bypass the prompt, “Do you really want to clear the extension and alt-extension of line *n*?”

The `show-extension-map` command displays the map extension database entries.

(Continued on next page)

Configuring Extensions (Continued)

Procedure

After you have verified the required configuration, follow these steps to configure the map extension:

Step	Procedure
1	At the Config prompt, enter the `map-extensions` command: `(config)>` **`map-extensions`** The prompt changes to the Config:Map-Extensions prompt. `(config:Map-Extensions)>`
2	Make the necessary configuration changes. The following table describes these commands.
3	Use the `show-map-extension` command to see the actual configuration.
4	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

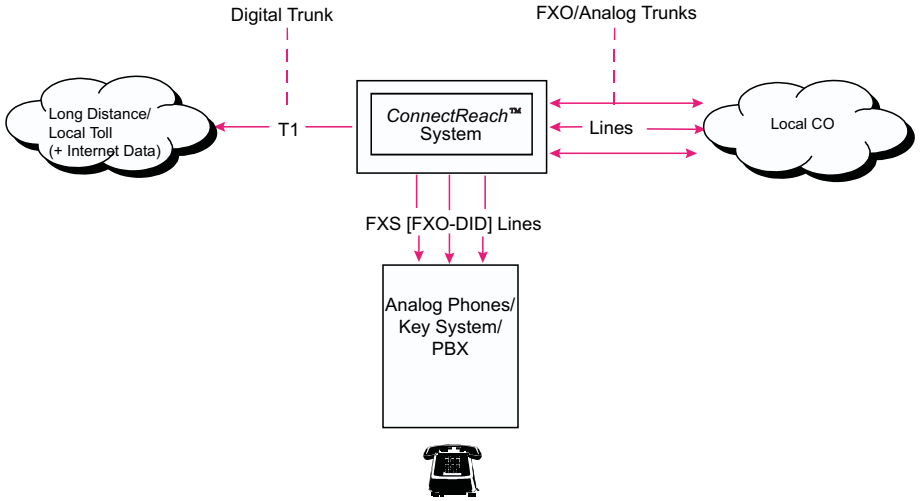
To	Enter this command...	...and specify the value
Specify the number of extension digits allowed	`extension-digits`	`1…[2]…10`
Assign an extension and optionally an alternate extension to a line	`set-line`	`line # extension # alt-extension #`
Remove a line entry. Optional automatic confirm	`clear-line-extension`	`line # (1…48) confirm`
Display the map extension database	`show-extension-map`	
Access online assistance	`Help`	

Configuring Dialing

Introduction

The *ConnectReach* system's dialing table provides the following LCR options: translating seven- to ten-digit numbers, routing calls to either digital or analog trunks, and translating special numbers such as 411, 611, and 911 to seven- or ten-digit numbers.

The following figure shows that the *ConnectReach* system intelligently routes calls to the local CO or to long distance. By configuring the dialing table, long distance calls go out by means of T1 (digital trunks) and local calls go out by means of lines (analog trunks). Incoming calls from either digital or analog trunks are routed to groups or stations.



(Continued on next page)

Configuring Dialing (Continued)

Introduction (continued)

There are two configuration tables that are used to describe this process: the detect table and the output table. The following figure shows the operation of these tables.

Detect Table

row	output-row	pattern
1	3	411
2	2	xxxxxxx
3 . . . 16	. . .	. . .

Output Table

row	group	digits
1		
2	3	1415
3 . . . 16	7 . . .	DDD14155551212 . . .

In this figure, the telephone number 411 is detected by detect-table, row 1, which refers to the output-table, row 3. This entry in the output-table directs the software to seize a trunk from trunk group 7, then delete 411, and dial 1-415-555-1212. Also in this figure, any seven-digit number is detected by detect-table, row 2, which specifies that trunk group 3 be used for the call, which is to have the digits 1415 inserted.

The Dialing command is included in the LCR/DID telephone functionality mode and the Dialing menu will appear only when the LCR/DID optional feature is installed in the *ConnectReach* system. In the LCR/DID mode additional configuration menus, including the Dialing menu, are used to specify call routing and DID operation.

NOTE:
The channel-bank menu must be used in conjunction with the Dialing menu.

(Continued on next page)

Configuring Dialing (Continued)

Key commands

The key commands for the *ConnectReach* system's dialing menu are as follows:

Detect-insert This command requires three values. The first value is the *row* number of the detect table. The second value refers to the *output-row* in the output table. The third value is where you assign a search *pattern*. When digits are dialed, the software looks at all patterns and tries to find a match. When the first match is found, the associated output table row is used to complete the call.

The *pattern* defines a range of numbers that match sequences of up to 14 digits. The syntax for the *pattern* is as follows:

Digit	One of the following: 0 1 2 3 4 5 6 7 8 9 matches that digit (for example, 3).
Range	[digit-digit] matches any digit (for example, 2-4).
X	X matches any digit (examples: XXXXXXX matches any seven-digit number, 413XXXX matches 4134361, 413436XXXX matches 4134361234).
Local	L matches any four digits (for example, 413L matches 413 followed by any four numbers).
Timeout	T accepts additional digits waiting for interdigit timeout (for example, 413T matches both 4134361234 and 4134361).

(Continued on next page)

Configuring Dialing (Continued)

Key commands (continued)

The following figure provides an example of a detect-insert table.

```
Detect table
Row out-tbl-row pattern
  1           3 1800XXXL|1888XXXL|1877XXXL|1866XXXL|1855XXXL|1900XXXL
  2           1 1[2-9]XXXXXL
  3           2 011T
  4           3 [2-9]XXL|411|611|911
  5           3 0[2-9]XXXXXL|01[2-9]T|101XXXX[0|1]XXXXXXL|10XXX[0|1]XXXXXXL
```

The following is an explanation of the detect-insert table example:

Row 1	Detects toll free and 900 number calls and refers them to output row 3.
Row 2	Detects United States long distance calls and refers them to output row 1.
Row 3	Detects international calls and refers them to ouput row 2.
Row 4	Detects local calls, including information, service repair and emergency calls, and refers them to output row 3.
Row 5	Detects credit card calls and refers them to output row 3.

Output-insert

This command requires four values. The first value is the *row* number of the output table. The second value specifies which trunk *group* to seize. The third value refers to an *alternate-output-row*. The fourth value specifies *digits* to insert or delete and includes a pausing capability. The third and fourth values are optional. For entries with digits and no alternate-output-row use a "—" (dash).

The digits define the manipulation necessary to complete the call. The syntax for this entry are as follows:

Digit	One of the following: 0 1 2 3 4 5 6 7 8 9 may be inserted at the beginning of the dialing string (for example, 3).
D	D deletes the current digit from the number dialed.
P	P provides a pause.

(Continued on next page)

Configuring Dialing (Continued)

Key commands (continued)

The following figure provides an example of an output-insert table.

```
Output table
Row      group   alt-out      digit-string
  1          1         3                 D
  2          1         3
  3          2
LocalDigits
```

The following is an explanation of the detect-insert table example:

Row 1	The one is deleted, which is required by some long distance carriers, and the call is routed to trunk group 1. Trunk group 2 is an alternate (row 3).
Row 2	The call is routed to trunk 1 with trunk group 2 as an alternate (row 3).
Row 3	The call is routed to trunk 2.

Access-code

This command assigns from one to six digits, zero through nine, as the access-code for connecting to an outside trunk or an inside line.

If the access-code is to be used for connecting to an outside line, the trunk-access command needs to be enabled. The caller dials the access-code to get an outside trunk.

If the access-code is to be used for connecting to an inside line, the trunk-access is set to auto. The caller dials a seven-digit number which is made up of the access code plus the line extension being called. The number of digits necessary for the access-code is seven minus the number of extension digits. For example, if the extension digits are set to three, the access-code needs to be comprised of four digits to bring the total number of digits dialed to seven. In this example if caller dials 429-1101, the extension is 101 and the access-code is 4291.

(Continued on next page)

Configuring Dialing (Continued)

Key commands (continued)

Default-output	This command specifies the row in the output table entry that contains both the primary and alternate trunk groups.
Trunk-access	This command determines how a caller will access an outside trunk. If trunk-access is set to *access code*, the caller dials the access-code to get an outside trunk. If trunk-access is set to *auto*, the caller dials the access-code in combination with the extension to get an inside line.
DID-received-digits	This command specifies the number of direct inward dial (DID) digits to expect from the CO. The number of DID digits must be the same as the number specified in the `extension-digits` command in the configuring extensions section described earlier in this chapter.
DID-undefined-type	This parameter specifies the treatment of calls with unknown DID-strings that are received from the CO. There are two options: route the call to the specified analog line or refuse the call (reorder).
DID-undefined-line-num	If the CO sends an invalid DID string, the call will be forwarded to this line.
Pause	This command specifies the pause interval (expressed in milliseconds) inserted for a P in the digits option of the dial-string command.
Test	This command prompts the operator to enter a digit string and view the selected trunk group as well as the output digits. This command verifies that the dial-table is functioning correctly.

The `show-all` command displays the contents of both the detect-table and the output-table.

(Continued on next page)

Configuring Dialing (Continued)

Procedure

After you have verified the required configuration, follow these steps to configure Dialing:

Step	Procedure
1	At the Config prompt, enter the `dialing` command: `(config)>` **`dialing`** The prompt changes to the Config:Dialing prompt. `(config:Dialing)>`
2	Make the necessary configuration changes. The following table describes these commands.

To	Enter this command...	...and specify the value
Assign a search pattern to detect-insert element	`detect-insert`	`row (1...16) output-row (1...16) pattern`
Remove entry from corresponding detect-row	`clear-detect`	`detect-row (1...16)`
Assign a search pattern to output-insert element	`output-insert`	`row (1...16); group; alt-out-row; digits (0...9,D,P)`
Remove entry from corresponding output-row	`clear-output`	`output-row (1...16)`
Enter digits for connecting to an outside trunk	`access-code`	`access-code (0...9)`
Specify default trunk group	`default-output`	`output-row (1...16)`
Enable the access code or set to automatic detection	`trunk-access`	`[access-code], auto`
Specify the DID digits received from the CO	`DID-received-digits`	`1...[2]...12`
Specify the treatment for unknown DID strings	`DID-undefined-type`	`analog-line, [reorder]`
Specify undefined line number	`DID-undefined-line-num`	`[1]...48`
Specify the pause interval	`pause`	`[2000] 100...20000 msecs`
Display the detect-table and the output-table	`show-all`	
Enter a digit string to view the selected trunk group	`test`	digits
Access online assistance	`Help`	

(Continued on next page)

Configuring Dialing (Continued)

Procedure (continued)

Step	Procedure
3	Use the `show-all` command to see the actual channel configuration.
4	Type **exit** or enter an exclamation point (**!**) to return to the Config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring Voice Mail

Introduction

The optional BOX features, when installed, communicate with a voice mail system using dial tone multifrequency (DTMF) inband signaling. The voice mail system, typically, is located near the *ConnectReach* system and is attached by means of the FXS line(s). One or more lines are dedicated to the physical voice mail ports. There are five preset voice mail profiles to choose from. Custom configuration is also possible. The *ConnectReach* system can be configured to forward incoming trunk calls to a voice mail system providing auto-attendant functions.

Key commands

The key commands for the voice mail menu are as follows:

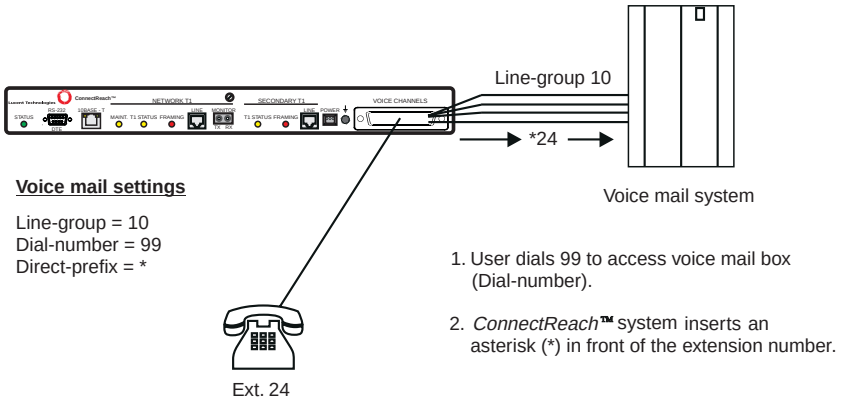
Line-group	This command specifies the line group designated for the voice mail system.
Integration-delay	This command sets the delay between the initial call to the voice mail system and the sending of the DTMF string.
Stutter-tone	If this command is enabled, the user will hear a stuttering dial tone when they pick up the receiver indicating there are messages waiting.
Periodic-ring	If this command is enabled, the phone will give two short rings every 5 minutes indicating there are messages waiting.
Dial-number	This command is used to assign a unique extension number for accessing the voice mail system.
Profile-name	A name may be assigned to the configured voice mail settings. Any alphanumeric name up to 20 characters in length is acceptable.

(Continued on next page)

Configuring Voice Mail (Continued)

Key commands (continued)

Direct-prefix This command specifies the DTMF digit required, if any, that needs to be inserted before the extension number. In most cases, this is an asterisk (refer to the following figure.



Ring-no-answer This command specifies the DTMF string that signals to the voice mail system that the line was ringing and there was no answer. The string can include the originator's and destination extension numbers.

Busy-no-answer This command specifies the DTMF string that signals to the voice mail system that the line was busy. The string can include the originator's and destination extension numbers.

Forward-all This command specifies the DTMF string that signals to the voice mail system that the destination is an unknown location. The action by the voice mail system in this case is often to give a message (for example, "the extension you have dialed is not a valid extension, please try again or dial zero for assistance").

MWI-on-prefix This command specifies the DTMF string to attach to the user's extension indicating a message is waiting. The information is coming from the voice mail system to the *ConnectReach* system.

(Continued on next page)

Configuring Voice Mail (Continued)

Key commands (continued)

MWI-off-prefix This command specifies the DTMF string to attach to the user's extension indicating no messages are waiting. The information is coming from the voice mail system to the *ConnectReach* system.

Load-profile This submenu allows the option of selecting one of five preset configurations for the most common voice mail system profiles.

The profiles included are:

- Generic
- BBS Telecom
- Panasonic TD1232
- Toshiba Dk280
- Samsung DCS.

Procedure

After you have verified the required configuration, follow these steps to configure Voice Mail:

Step	Procedure
1	At the Config prompt, enter the `voice-mail` command: `(config)>` **`voice-mail`** The prompt changes to the Config:Voice-mail prompt. `(config:Voice-Mail)>`

(Continued on next page)

Configuring Voice Mail (Continued)

Procedure (continued)

Step	Procedure
2	Make the necessary configuration changes. The following table describes these commands.

To	Enter this command...	...and specify the value
Enable the voice mail system	`enable`	`[off], on`
Specify the line group for the voice mail system	`line-group`	`(1...[10])`
Specify the delay between signaling the voice mail system and sending a string	`integration-delay`	`[500] (0...5000) (ms)`
Enable the stutter dial tone as message waiting indicator	`stutter-tone`	`[off], on`
Enable the two short rings as message waiting indicator	`periodic-ring`	`[off], on`
Specify the extension for the voice mail system	`dial-number`	(*DTMF digits*)
Specify a name for the voice mail settings	`profile-name`	(*name*)
Specify the DTMF digit prefix for the extension	`direct-prefix`	`[*]`(*DTMF digits*)
Specify the DTMF string for ringing and no answer	`ring-no-answer`	`[#d]` (*DTMF digits*,'s','d')
Specify the DTMF string for busy	`busy-no-answer`	`[#d]` (*DTMF digits*,'s','d')
Specify the DTMF string for unknown destination	`forward-all`	`[#d]` (*DTMF digits*,'s','d')
Specify the DTMF string for message waiting	`mwi-on-prefix`	(*DTMF digits*)
Specify the DTMF string for no message waiting	`mwi-off-prefix`	(*DTMF digits*)
Access online assistance	`Help`	

(Continued on next page)

Configuring Voice Mail (Continued)

Procedure (continued)

<table>
<tr><th>Step</th><th>Procedure</th></tr>
<tr><td>3</td><td>To select one of the preconfigured voice mail settings, enter the <code>load-profile</code> command.

<code>(config:Voice-Mail)> Load-Profile</code>

The prompt changes to the Config:Voice-mail:Load-Profile prompt.

<code>(config:Voice-Mail:Load-Profile)></code>

The following table describes the load-profile commands.

<table>
<tr><th>To</th><th>Enter this command...</th><th>...and one of these options</th></tr>
<tr><td>Select a profile number</td><td><code>profile-number</code></td><td><code>[1]...5</code></td></tr>
<tr><td>List the profiles available</td><td><code>list-profiles</code></td><td></td></tr>
<tr><td>Show the settings of the profile number selected</td><td><code>show-selected-profile</code></td><td></td></tr>
<tr><td>Copy the selected profile to the voice mail menu</td><td><code>copy-selected-profile</code></td><td></td></tr>
<tr><td>Access online assistance</td><td><code>Help</code></td><td></td></tr>
</table>
</td></tr>
<tr><td>4</td><td>When you have made the necessary configuration changes, you can return to the Config menu by typing exit or you can enter an exclamation point (!).

NOTE: The new command values take effect as soon as you save the configuration. You do not need to reboot the ConnectReach system to use the new values.

Stop! End of Procedure.</td></tr>
</table>

Configuring Passwords

Introduction

When you initially access the *ConnectReach* system, no login name and password are required. The *ConnectReach* system immediately displays the Main Menu prompt for the *ConnectReach* system Utility. For security reasons, you should configure the *ConnectReach* system with login names and passwords.

When you log in to the *ConnectReach* system by means of a Telnet session or the RS-232 port, there is one level of privilege for configuring and monitoring the *ConnectReach* system. This privilege is called Carrier. Two privilege levels, carrier and user, are available when logging in to the *ConnectReach* system using a Web browser. The two privilege levels offer different sets of available commands.

- Carrier privilege allows unlimited access to all configuration and monitoring commands. You may set one login name with Carrier privilege. Carrier privilege is designed for use by a limited number of individuals permitted to configure the *ConnectReach* system. The use of this privilege should be carefully restricted.
- User privilege allows limited access to the *ConnectReach* system. You may change user passwords. User privilege also allows access to the monitoring commands (see Chapter 6, "*ConnectReach* system Monitoring"). You may set one login name with User privilege.

The login name and password verification utility is case sensitive. When logging in, you must enter the name and password strings exactly as configured, including uppercase or lowercase characters.

After three failed attempts to log in to the *ConnectReach* system, you cannot log in for 5 minutes. After 20 failed attempts, you cannot log in for 1 hour. You can bypass this problem by rebooting the *ConnectReach* system.

After 5 minutes of inactivity, you are automatically logged off.

Passwords are stored using one-way encryption. If a customer loses or forgets the User password, you must log in with Carrier privilege and set the User password. However, if you lose or forget the Carrier password, you must contact Lucent Technologies, Inc. at 1-800-225-RTAC for assistance.

(Continued on next page)

Configuring Passwords (Continued)

Add a login and password

Add a login name and password using the following procedure:

Step	Procedure
1	At the Config prompt, enter the `password` command: `(config)>` **`password`** The prompt changes to the Config:Password prompt. `(config:Password)>`
2	At the Config:Password prompt, enter the privilege and the corresponding login name, as shown in the following table. Login names can range from 4 to 16 characters in length. **To** / **Enter this command:** / **...and specify the value** Add a login name with USER access privilege — `user` — *name* Add a login name with CARRIER access privilege — `carrier` — *name* Access online assistance — `Help`
3	The utility then prompts you to enter a password for the login name. Passwords can range from 4 to 16 characters in length. After you enter the password, the utility prompts you to confirm the password by entering it again.
4	When you have made the necessary configuration changes, enter an exclamation point (**!**) or the `exit` command to return to the config menu. **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

(Continued on next page)

Configuring Passwords (Continued)

Change an existing password

To change the password for an existing login name, follow the same procedure as for adding a new login name. However, in Step **3**, enter the new password.

Deleting a password

To delete a password for an existing login name, enter the `password` command without a login name. For example:

```
(config:password) > carrier
```

Logging in with carrier level privilege

After you configure login names and passwords, the next time you access the *ConnectReach* system you must enter a name and password associated with Carrier privilege. After you enter the user name and password, the Main prompt appears. For example:

Please enter name: `fred`

Enter password: `******`

>

When you are logged in with Carrier privilege, you have access to all the *ConnectReach* system's configuration and management commands.

Logging in with user level privilege

User level privilege is only available when you use a Web browser to access the *ConnectReach* system. The following subset of commands is available if you log in with User privilege:

Configure	You may change the user-level password and save the change, and you may list the current configuration. No other configuration commands are available.
Statistics	All statistics commands are available. You may display (but not clear) the statistics reports. For more information about the Statistics commands, see Chapter 6, "*ConnectReach* System Monitoring".
Log	You may display (but not clear) the *ConnectReach* system logs. For more information, see Chapter 6, "*ConnectReach* System Monitoring".
Version	You may display the *ConnectReach* system's current version information. For more information, see Chapter 6, "*ConnectReach* System Monitoring".

(Continued on next page)

Configuring Passwords (Continued)

Logging in with user level privilege (continued)

Show-Hardware-Config	You may display the *ConnectReach* system's hardware configuration information. For more information about the Show-Hardware-Config command, see Chapter 6, "*ConnectReach* System Monitoring".
Ping	You may ping a device on the LAN or WAN. For more information about the Ping command, see Chapter 6, "*ConnectReach* System Monitoring".
Exit	For more information about the Exit command, refer to the section entitled "Exiting the *ConnectReach* System Utility", presented previously in this chapter.

Configuring the DHCP Service

Procedure

Step	Procedure
1	At the Config prompt, enter the DHCP command: `(config)>` **`dhcp`** The prompt changes to the Config:DHCP prompt. `(config:DHCP)>`
2	At the Config:DHCP prompt, enter the appropriate commands from the following table.

Enter this command...	...and specify this value	Comments
`enable`	`off, [on]`	Enable or disable DHCP.
`start-ip`*	*`IP-address`*	Specify the start of the range of IP addresses to be used (the default is 192.168.0.2).
`end-ip`	*`IP-address`*	Specify the end of the range of IP addresses (the default is 192.168.0.254).
`private-network`	`off, [on]`	Enable this option if you do not want any IP addresses to be visible to the Internet. If the Private Network option is enabled, you must also enable SOCKS (refer to the section entitled “SOCKS”, located later in this chapter) or network address translation (NAT) (refer to the section entitled “Configuring NAT”, located later in this chapter).
`lease-time`†	`[600]…7200 seconds`	Specify the length of lease time. DHCP attempts to link the same address to a device each time the device requests an address.
`dns-server`	*`IP-address`*	Specify the DNS server. If SOCKS is enabled, the DNS server address must be the IP address of the Ethernet interfaces to the ConnectReach System. If SOCKS is not enabled, this address should be provided by the carrier.
`domain`‡	*`domain name`*	Specify the domain name for the site.
`Help`		Access online assistance

* The IP address pool must be that assigned to the site by the carrier if SOCKS is not enabled. Otherwise, the IP address pool can be private. See the note regarding RFC 1918 in the section entitled “Configuring the Ethernet Interface”, located earlier in this chapter.

† The lease time command is set by default to industry-standard values. Only users who are familiar with the DHCP protocol should alter these values.

‡ Obtain the domain name from the carrier.

(Continued on next page)

Configuring the DHCP Service (Continued)

Procedure (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

When DHCP allocates an address to a requesting device, DHCP also notifies the device about the address of the default gateway. Because the *ConnectReach* system is the default gateway, you do not need to configure this. There should be only one DHCP server on a given subnet.

Configuring the SNMP Service

Procedure

Step	Procedure
1	At the Config prompt, enter the `SNMP` command: `(config)>` **`snmp`** The prompt changes to the Config:SNMP prompt. `(config:SNMP)>`
2	At the Config:SNMP prompt, enter the appropriate commands and options to configure SNMP from the following table.

Enter this command...	...and specify this value	Comments
`enable`	`[off], on`	Enables SNMP.
`snmp-host`	*IP-address*	IP address of the SNMP host that will receive SNMP traps.
`cold-start`	`[off], on`	This trap is sent when the unit has been powered on, has had a power failure, or has been rebooted with the Cold-start command.
`warm-start`	`[off], on`	This trap is sent when the unit has detected a failure and has rebooted (preserving voice traffic), or has been rebooted with the Warm-start command.
`link-down`	`[off], on`	This trap is sent when the Ethernet or `T1` interface has been disconnected.
`link-up`	`[off], on`	This trap is sent when the Ethernet or `T1` interface has been connected.
`login-failures`	`[off], on`	This trap is sent after each login failure has occurred.
`t1-traps`		This submenu is for changing the `T1` trap settings.
`Help`		Access online assistance

(Continued on next page)

Configuring the SNMP Service (Continued)

Procedure (continued)

<table>
<tr><th>Step</th><th>Procedure</th></tr>
<tr><td>3</td><td>At the Config:SNMP prompt, enter either the <code>t1-traps</code> command (T1/DSX-1 interface) or the <code>HDSL-traps</code> command (HDSL interface).

<code>(config:SNMP)> t1-traps</code> or <code>HDSL-traps</code>

The prompt changes to the Config:SNMP:T1/HDSL prompt.

<code>(config:SNMP:T1)></code> or <code>(config:SNMP:HDSL)></code>

The following table lists the T1/HDSL Traps. These traps set the T1/HDSL thresholds encountered by a DS1 interface. If the threshold is reached within the current 15-minute period, the associated trap will be sent. To disable a T1/HDSL trap, set it to 0.

<table>
<tr><th>T1/HDSL Traps</th><th>Description</th></tr>
<tr><td><code>ESs-threshold</code></td><td>The number of Errored Seconds (ESs)</td></tr>
<tr><td><code>SESs-threshold</code></td><td>The number of Severely Errored Seconds (SESs)</td></tr>
<tr><td><code>SEFs-threshold</code></td><td>The number of Severely Errored Framing Seconds (SEFs)</td></tr>
<tr><td><code>UASs-threshold</code></td><td>The number of Unavailable Seconds (UASs)</td></tr>
<tr><td><code>CSSs-threshold</code></td><td>The number of Controlled Slip Seconds (CSSs)</td></tr>
<tr><td><code>PCVs-threshold</code></td><td>The number of Path Coding Violations (PCVs)</td></tr>
<tr><td><code>LESs-threshold</code></td><td>The number of Line Errored Seconds (LESs)</td></tr>
<tr><td><code>BESs-threshold</code></td><td>The number of Bursty Errored Seconds (BESs)</td></tr>
<tr><td><code>DMs-threshold</code></td><td>The number of Degraded Minutes (DMs)</td></tr>
<tr><td><code>LCVs-threshold</code></td><td>The number of Line Code Violations (LCVs)</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>When you have made the necessary configuration changes, you can return to the Config menu by typing exit or you can enter an exclamation point (!).

NOTE: If you change any of these commands, you must save the configuration and reboot the ConnectReach system using the warm-start command for the new settings to take effect.

NOTE: If the Network T1/DSX-1/HDSL connection is a frame relay network and you have established a secondary PVC to the carrier's management network, the SNMP-host command should be set to an address on that network.

Stop! End of Procedure.</td></tr>
</table>

Configuring Routes

Introduction

The Route menu of the *ConnectReach* system allows the user to set a default route and up to ten static routes. IP routes can also be obtained dynamically through routing information protocol (RIP) which is enabled in the Ethernet, Frame Relay, PPP and HDLC menus.

Key commands

The following table provides a list of the Route configuration key commands.

Enter this command...	...and specify this value	Comments
route	add, delete *net mask* WAN, PVCn, FDL, GW [*IPaddrOfGw*]	Add and delete static routes (including net mask and PVC or IP gateway).
default	[WAN], PVCn, *IPaddrOfGw,* none	Enter IP address of the primary WAN interface.
show-static-routes		Displays the static route table.
clear-static-routes		Clears the static route table.
Help		Access online assistance.

The following is a description of the Route configuration key commands:

Default

The most common use of this command instructs the *ConnectReach* system to send all nonlocal traffic to a WAN interface. For ease of use, the user can simply enter default WAN from the Route menu. This command would instruct the *ConnectReach* system to send all the default IP traffic to either PVC1 (for Frame Relay encapsulation), PPP, or HDLC. The default WAN command adjusts itself to whatever synchronous encapsulation is chosen by the user. For Frame Relay encapsulation, the user can also select any of the five PVCs. Selecting PVC1 with Frame Relay encapsulation is the same as selecting WAN.

To direct the default IP traffic to an alternate router the user can enter:

default GW *IPaddrOfGw*

Where *IPaddrOfGw* is the IP address of the router.

To disable default routing on the ConnectReach System, enter the default none command.

(Continued on next page)

Configuring Routes (Continued)

Configuring routes (continued)

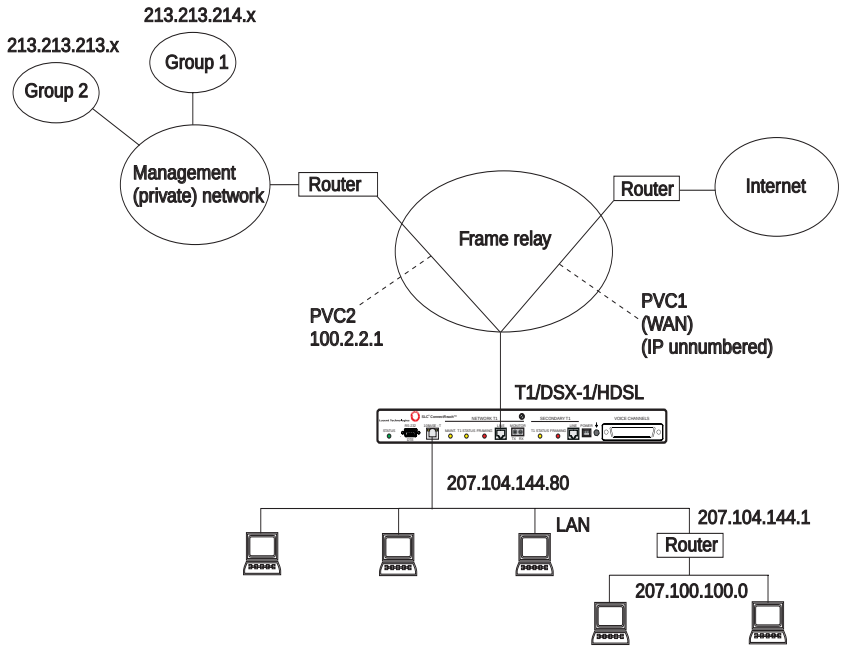
Route

This command allows the user to add or delete static routes through any IP gateway. For convenience, the user may specify WAN or PVC*n* instead of an IP gateway address. The WAN and PVC*n* options have the same definitions as they did in the `default` command. If `IP-over-FDL` is enabled in the network-HDSL menu, you may specify a static route using the route add command. To specify a router on the Ethernet as the next hop, use the GW option followed by the IP address of the router.

NOTE:
The default route must be set to the Internet access location for a successful Internet connection.

Example of default and static routes

The following figure provides an example of default and static routes.



(Continued on next page)

Configuring Routes (Continued)

Procedure

To configure the sample route shown in the figure, proceed as follows:

Step	Procedure
1	At the Config prompt, enter the `route` command: `(config)>` **`route`** The prompt changes to the Config:IPRoutes prompt. `(config:IPRoutes)>`
2	At the Config:IPRoutes prompt, enter the `default` command: `(config:IPRoutes)>` **`default WAN`**
3	At the Config:IPRoutes prompt, enter the `Route Add` command: `(config:IPRoutes)>` **`route add 213.213.213.0 255.255.255.0 PVC2`** `(config:IPRoutes)>` **`route add 213.213.214.0 255.255.255.0 PVC2`** `(config:IPRoutes)>` **`route add 201.100.100.0 255.255.255.0 GW 207.104.144.1`**
4	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **Stop! End of Procedure.**

Congifuring NAT

Introduction

Network address translation (NAT), as laid out in RFC 1631, allows internal IP addressed workstations access to the Internet through the use of an external IP address pool. The ConnectReach's NAT feature enables a company to increase the number of internal IP addresses pursuant to RFC 1597.

NAT allows the mapping of a range of LAN IP addresses to a range of WAN IP addresses. The relation of the mapping may be one-to-one, many-to-one, or many-to-many. All traffic between the LAN and the WAN must be defined if NAT is enabled. The three definitions are static allocation, dynamic allocation, and pass-thru. In dynamic allocation, the LAN IP addresses are mapped to the available WAN IP addresses on an as needed basis. Dynamic mapping may be defined with a many-to-one or many-to-many connections. With static allocation, the mapping between the LAN IP addresses and WAN IP addresses is a static one-to-one or many-to-many relation. Static mapping may or may not allow inbound connections from the WAN to the LAN. Pass-thru groups define LAN IP addresses that are allowed to pass through the NAT firewall. The WAN range must be a valid range. NAT provides a firewall different from the SOCKS firewall and eliminates the inconvenience of configuring each workstation to communicate with the SOCKS server.

If the firewall configuration, "IP filtering plus server" is to be used in conjunction with NAT, a static group with "allow-inbound enabled" for the server must be set up in NAT. SOCKS and NAT are not supported at the same time.

Examples on NAT configuration can be found in Appendix B, "Configuration Examples".

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Congifuring NAT (Continued)

Procedure

<table>
<tr><th>Step</th><th>Procedure</th></tr>
<tr><td>1</td><td>At the Config prompt, enter the NAT command:

(config)> NAT

The prompt changes to the Config:NAT prompt.

(config:NAT)></td></tr>
<tr><td>2</td><td>At the Config:NAT prompt, enter the appropriate commands and options to configure NAT from the following table.

<table>
<tr><th>Enter this command...</th><th>...and specify this value</th><th>Comments</th></tr>
<tr><td>Enable</td><td>[off], on</td><td>Enables NAT.</td></tr>
<tr><td>Dynamic</td><td></td><td>The submenu for dynamic allocation of IP addressing between LAN and WAN.</td></tr>
<tr><td>Static</td><td></td><td>The submenu for static allocation of IP addressing between LAN and WAN.</td></tr>
<tr><td>PassThru</td><td></td><td>To configure pass thru LAN addresses that are valid Internet IP addresses.</td></tr>
<tr><td>Show-sessions</td><td>[all], udp, tcp, icmp, config</td><td>Shows sessions associated with specified parameter.</td></tr>
<tr><td>Clear-sessions</td><td>[all], udp, tcp, icmp</td><td>Clears sessions associated with specified parameter.</td></tr>
<tr><td>Help</td><td></td><td>Access online assistance</td></tr>
</table>
</td></tr>
</table>

(Continued on next page)

Congifuring NAT (Continued)

Procedure (continued)

Step	Procedure
3	Each submenu command, dynamic, static, and pass-thru, has four groups available for setting allocations. The following procedures explain the use of these three commands:

Dynamic

1. At the specific submenu, enter the group to be configured. For example:

   ```
   (config:NAT:Dynamic) > 1
   ```

   The prompt changes to the submenu-group that is to be configured. For example:

   ```
   (config:NAT:Dynamic:Group1) >
   ```

2. At the submenu-group prompt, enter the appropriate command from the following table.

Enter this command...	...and specify this value	Comments
Enable	[off], on	Enables dynamic allocation.
LAN-Start	0.0.0.0	Enter the starting IP addresses for the range
LAN-End	0.0.0.0	Enter the ending IP addresses for the range
WAN-Start	0.0.0.0	Enter the starting IP addresses for the range
WAN-End	0.0.0.0	Enter the ending IP addresses for the range
Show	[all], udp, tcp, icmp	Shows connections associated with specified parameter.
Clear	[all], udp, tcp, icmp	Clears connections associated with specified parameter.
Help		Access online assistance

(Continued on next page)

Congifuring NAT (Continued)

Procedure (continued)

Step	Procedure

3 cont.	**Static**
	1. At the specific submenu, enter the group to be configured. For example:
	`(config:NAT:Static) > 1`
	The prompt changes to the submenu-group that is to be configured. For example:
	`(config:NAT:Static:Group1) >`
	2. At the submenu-group prompt, enter the appropriate command from the following table.

Enter this command...	...and specify this value	Comments
`Enable`	`[off], on`	Enables static allocation.
`LAN-Start`	`0.0.0.0`	Enter the starting IP addresses for the range.
`LAN-End`	`0.0.0.0`	Enter the ending IP addresses for the range.
`WAN-Start`	`0.0.0.0`	Enter the starting IP addresses for the range.
`WAN-End`	`0.0.0.0`	Enter the ending IP addresses for the range.
`ALLOW-INBOUND`	`off, [on]`	Allows inbound initiation from WAN.
`Show`	`[all], udp, tcp, icmp`	Shows connections associated with specified parameter.
`Clear`	`[all], udp, tcp, icmp`	Clears connections associated with specified parameter.
`Help`		Access online assistance

(Continued on next page)

Congifuring NAT (Continued)

Procedure (continued)

Step	Procedure

3 cont.	**Pass-Thru**
	1. At the specific submenu, enter the group to be configured. For example:
	`(config:NAT:PassThru) > 1`
	The prompt changes to the submenu-group that is to be configured. For example:
	`(config:NAT:PassThru:Group1) >`
	2. At the submenu-group prompt, enter the appropriate command from the following table.

Enter this command...	...and specify this value	Comments
`Enable`	`[off], on`	Enables pass-thru definition.
`LAN-Start`	`0.0.0.0`	Enter the starting IP addresses for the range.
`LAN-End`	`0.0.0.0`	Enter the ending IP addresses for the range.
`Help`		Access online assistance

4	When you have made the necessary configuration changes, you can return to the NAT menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring the Default Firewall

Introduction

The *ConnectReach* system incorporates two different firewall technologies: SOCKS application proxy and IP filtering. For most installations, configuring the firewall is extremely simple. The *ConnectReach* system allows four standard firewall configurations. However, if an installation has special requirements, the firewall configuration can be customized (see Appendix C, “Custom Firewall Configurations”).

SOCKS

The *ConnectReach* system uses Version 4 of SOCKS, the version supported by industry-leading Web browsers that are provided by companies such as Netscape and Microsoft.

NOTE:
Not all networked applications are compatible with SOCKS. For information about networked applications that are/are not compatible with SOCKS, contact Lucent Technologies, Inc.

SOCKS Version 4 is a transport control protocol (TCP) proxy; it does not directly support other IP protocols such as user datagram protocol (UDP) and Internet control message protocol (ICMP). Thus, when SOCKS is enabled, ping messages originating from the WAN are blocked.

When running SOCKS, the LAN IP addresses may be “private,” that is, not visible to the Internet. See Appendix A, “IP Network Addresses”, for more information about private networks. Ping messages originating from the LAN with large packet sizes greater than 1,466 bytes are not supported.

SOCKS Version 4 requires that the *ConnectReach* system be a DNS proxy server. For more information about the DNS proxy service, refer to the section entitled “Configuring the DNS Server” located later in the chapter.

IP Filtering

IP filtering provides an alternative method of security that can be used alone or in conjunction with SOCKS. When IP filters are configured, the *ConnectReach* system examines every LAN or WAN packet and either permits or denies the packet based on filter settings.

(Continued on next page)

Configuring the Default Firewall (Continued)

Introduction (continued)

The *ConnectReach* system's IP packet filtering consists of two groups of IP filters (sometimes called access lists): inbound filter group and outbound filter group. An IP filter group combines up to eight IP filters (access lists) and a default (generic) action. An IP filter defines a set of conditions and the action to be taken (*permit* or *deny*) if all the filter conditions are met. The default action (*permitAll* or *denyAll*) handles the case of an IP packet that does not meet the conditions in this IP filter group. If an IP packet is for the *ConnectReach* system (for example, HTTP or Telnet sessions), then the default action for this packet is always "pass." (In other words, if none of the filters inside the inbound filter group match, then the *ConnectReach* system will process this IP packet.)

When no filters are defined for any inbound or outbound IP filter groups and the default action is *permitAll*, then the *ConnectReach* system does not examine packets.

The order by which filters are applied is important. In any given filter group, all filters are examined in consecutive order, with Filter 1 having the highest priority and Filter 8 having the lowest priority.

Default configurations

The `default-configure` command allows the user to define one of the following four standard IP firewall configurations:

- SOCKS
- SOCKS plus server
- IP Filter
- IP Filter plus server.

In the above default commands, both the default SOCKS and default IP Filter methods only allow outgoing connections to be initiated from the PCs on the LAN. (No connections from the Internet to the PCs on the LAN can be made.) The difference between the two methods is that SOCKS technology is more secure. However, with SOCKS, each PC on the LAN must have all its Internet applications configured for SOCKS or must be installed with a "SOCKSifier" such as the Hummingbird SOCKS client, available from Hummingbird Communications Ltd. (www.hcl.com). The two remaining default configurations, SOCKS plus server and IP filter plus server, provide the same level of protection for the PCs while allowing a single server open access to the Internet.

(Continued on next page)

Configuring the Default Firewall (Continued)

Default configurations (continued)

If the network address translation (NAT) application is to be used with “IP filtering plus server”, a static group with “allow-inbound enabled” for the server must be set up in NAT.

SOCKS and NAT are not supported at the same time.

NOTE:
The default server supports the following services: SMTP, POP2, POP3, HTTP, FTP, DNS, Telnet, and PING.

Firewall configuration commands

The following table lists the standard firewall configuration commands.

Enter this command...	...and specify the commands
SOCKS	
InIPFilterGroup	
OutIPFilterGroup	
Default-configure	Socks, IPFilter, No [server] [x.x.x.x]
Show-config	
Help	

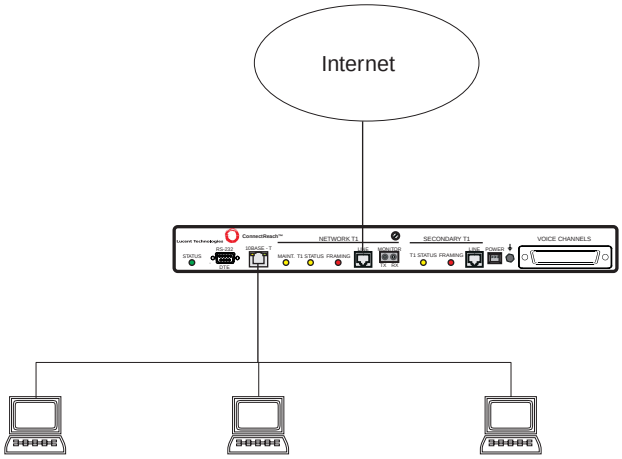
NOTE:
To totally disable the firewall (including SOCKS), give the following command: `(config:IPFirewall)>` **`default no`**

(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default SOCKS

The following figure illustrates a sample topology for the default SOCKS configuration. The PCs are SOCKS configured (client) PCs that can initiate TCP connections to the Internet.



PCs configured with SOCKS

To configure the default SOCKS firewall, proceed as follows:

Step	Procedure
1	At the Config prompt, enter the `firewall` command: `(config)>` **`firewall`** The prompt changes to the Config:IPFirewall prompt. `(config:IPFirewall)>`
2	At the Config:IPFirewall prompt, enter the `SOCKS` command: `(config:IPFirewall)>` **`socks`** The prompt changes to the config:IPFirewall:SOCKS prompt. Enter the `enable on` command: `(config:IPFirewall:SOCKS)>` **`enable on`**

(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default SOCKS (continued)

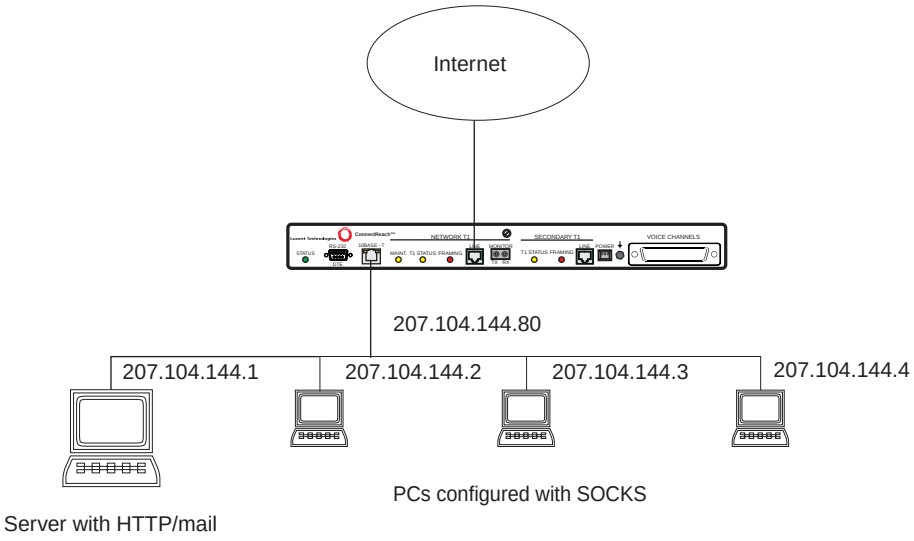
Step	Procedure
3	Enter the `exit` command or "**!**" to return to the config:IPFirewall prompt.
4	At the Config:IPFirewall prompt, enter the `default SOCKS` command: `(config:IPFirewall)>` **`default socks`** The prompt changes to the Change prompt. `Change Firewall config to the default 'socks only' settings?>[n]y:` **`y`** Enter "**y**" to set the default to SOCKS. The prompt changes to the Config:IPFirewall prompt. `(config:IPFirewall)>`
5	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default SOCKS plus server

The following figure illustrates a sample topology for the default SOCKS plus server configuration.



NOTE:
The default server also supports the following services: SMTP, POP2, POP3, HTTP, FTP, DNS, Telnet, and PING.

To configure the default SOCKS plus server firewall, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the `firewall` command:
	
	`(config)> firewall`
	
	The prompt changes to the Config:IPFirewall prompt.
	
	`(config:IPFirewall)>`

(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default SOCKS plus server (continued)

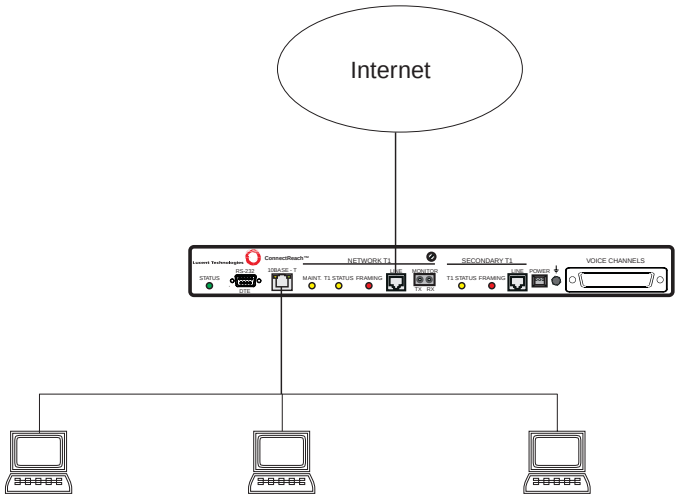
Step	Procedure
2	At the Config:IPFirewall prompt, enter the SOCKS command: (config:IPFirewall)> **socks** The prompt changes to the config:IPFirewall:SOCKS prompt. Enter the enable on command: (config:IPFirewall:SOCKS) > enable on
3	Enter the `exit` command or "**!**" to return to the config:IPFirewall prompt.
4	At the Config:IPFirewall prompt, enter the `default SOCKS` plus `server` command: (config:IPFirewall)> **default socks server 207.104.144.1** The prompt changes to the Change prompt. `Change Firewall config to the default 'Socks and server' settings?>[n]y:`**yes**
5	At the Change prompt, enter "**y**" to set the default to SOCKS plus server. `Change Firewall...>` **y** The prompt changes to the Config:IPFirewall prompt. `(config:IPFirewall)>`
6	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default IP filter

The following figure illustrates a sample topology for the default IP filter configuration.



Outgoing connections only

To configure the default IP filter firewall, proceed as follows:

Step	Procedure
1	At the Config prompt, enter the `firewall` command: (config)> **`firewall`** The prompt changes to the Config:IPFirewall prompt. `(config:IPFirewall)>`
2	At the Config:IPFirewall prompt, enter the default IP filter command: (config:IPFirewall)> **`default ipfilter`** The prompt changes to the Change prompt. `Change Firewall config to the default 'Outgoing IPFilter only' settings?>[n]y:` **`y`** Enter "**`y`**" to set the default to IP filter. `(config:IPFirewall)>`

(Continued on next page)

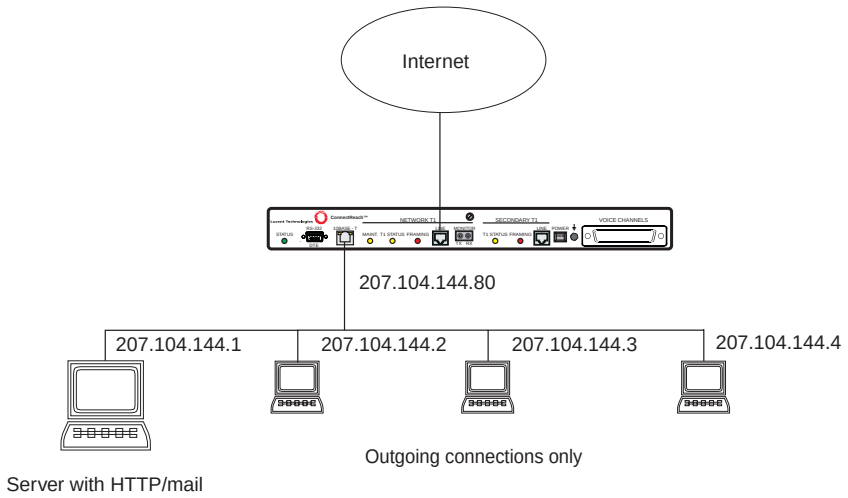
Configuring the Default Firewall (Continued)

Configuring default IP filter (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring default IP filter plus server

The following figure illustrates a sample topology for the default IP filter plus server configuration.



(Continued on next page)

Configuring the Default Firewall (Continued)

Configuring default IP filter plus server (continued)

To configure the default IP filter plus server firewall, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the `firewall` command:
	
	`(config)> firewall`
	
	The prompt changes to the Config:IPFirewall prompt.
	
	`(config:IPFirewall)>`

2	At the Config:IPFirewall prompt, enter the default ipfilter plus server command:
	
	`(config:IPFirewall)> default ipfilter server 207.104.144.1`
	
	The prompt changes to the Change prompt.
	
	`Change Firewall config to the default 'only Outgoing IPFilter and a server' settings?>[n]y: y`
	
	Enter "**y**" to set the default to IP filter plus server.
	
	`(config:IPFirewall)>`

3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

This completes the default firewall configurations. For the configuration settings for each of these default commands, refer to the following section entitled "Viewing the Default Firewall Configuration Settings."

(Continued on next page)

Configuring the Default Firewall (Continued)

Viewing default firewall configuration settings

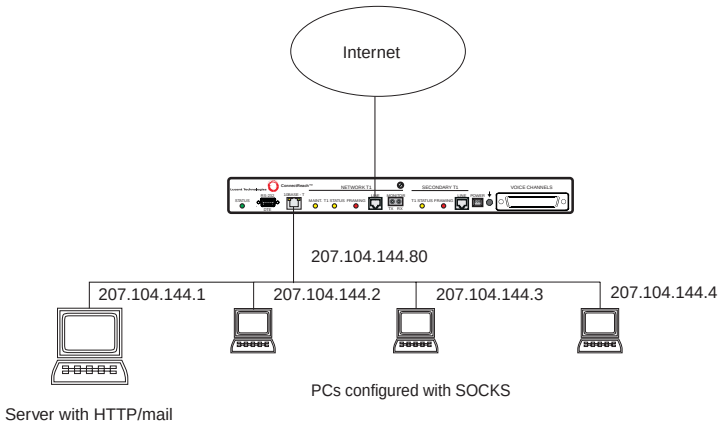
To view the IP inbound filter group settings, enter:

config:IPFirewall)> **`inipfiltergroup`**

and type a '**?**'

The IP inbound filter group settings for the default SOCKS plus server sample configuration shown in the following figure are as follows:.

1Filter:	**permit**	**dst 207.104.144.1 255.255.255.255 default**
2Filter:	**permit**	**dst 207.104.144.1 255.255.255.255 tcpport > 1023**
3Filter:	**permit**	**dst 207.104.144.1 255.255.255.255 udpport > 1023**
4Filter:		
5Filter:		
6Filter:		
7Filter:		
8Filter:		
defaultAction	**denyAll**	



NOTE:
TCP/UDP ports: 0-1023 are reserved; 1024 and above are unreserved.

NOTE:
"255.255.255.255" is a netmask.

(Continued on next page)

Configuring the Default Firewall (Continued)

Viewing default firewall configuration settings (continued)

To view the IP outbound filter group settings, type **exit** or enter an exclamation point (**!**) to return to the Config:IPFirewall menu and enter:

(config:IPFirewall)> **`outipfiltergroup`**

and type a '**?**'

The IP outbound filter group settings for the default SOCKS plus server sample configuration shown in the preceding figure are as follows:

1Filter:	**permit**	**src 207.104.144.1 255.255.255.255 All**
2Filter:	**permit**	**ping**
3Filter:		
4Filter:		
5Filter:		
6Filter:		
7Filter:		
8Filter:		
defaultAction	**denyAll**	

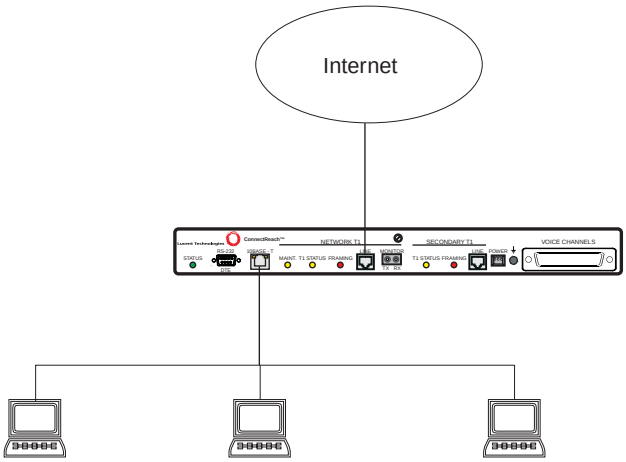
The IP inbound filter group settings for the default IP Filter sample configuration shown in the following figure are as follows:

1Filter:	**permit**	**tcpport > 1023**
2Filter:	**permit**	**udpport > 1023**
3Filter:	**permit**	**ping**
4Filter:		
5Filter:		
6Filter:		
7Filter:		
8Filter:		
defaultAction	**denyAll**	

(Continued on next page)

Configuring the Default Firewall (Continued)

Viewing default firewall configuration settings (continued)



Outgoing connections only

NOTE:
TCP/UDP ports: 0-1023 are reserved; 1024 and above are unreserved.

The IP outbound filter group settings for the default IP Filter sample configuration shown in the previous figure are as follows:

1Filter:
2Filter:
3Filter:
4Filter:
5Filter:
6Filter:
7Filter:
8Filter:
defaultAction permitAll

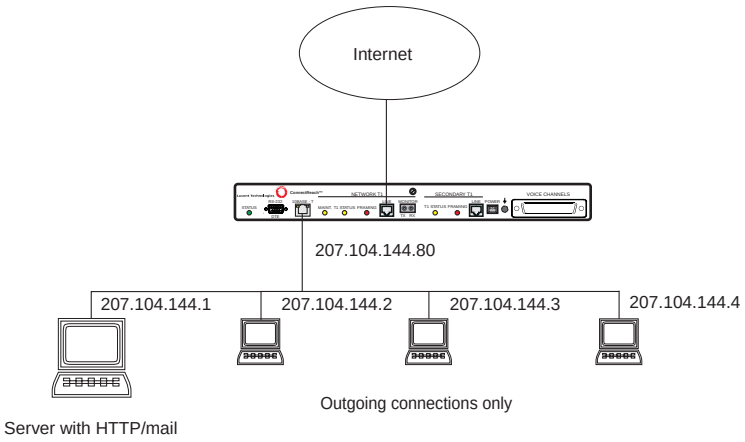
(Continued on next page)

Configuring the Default Firewall (Continued)

Viewing default firewall configuration settings (continued)

The IP inbound filter group settings for the default IP Filter plus server sample configuration shown in the following figure are as follows:

1Filter:	**permit**	**dst 207.104.144.1 255.255.255.255 default**
2Filter:	**permit**	**tcpport > 1023**
3Filter:	**permit**	**udpport > 1023**
4Filter:	**permit**	**ping**
5Filter:		
6Filter:		
7Filter:		
8Filter:		
defaultAction	**denyAll**	



NOTE:
TCP/UDP ports: 0-1023 are reserved; 1024 and above are unreserved.

NOTE:
"255.255.255.255" is a netmask.

(Continued on next page)

Configuring the Default Firewall (Continued)

Viewing default firewall configuration settings (continued)

The IP outbound filter group settings for the default IP Filter plus server sample configuration shown in the preceding figure are as follows:

1Filter:
2Filter:
3Filter:
4Filter:
5Filter:
6Filter:
7Filter:
8Filter:
defaultAction permitAll

Configuring custom firewall

For almost all *ConnectReach* system users, the default configurations will be sufficient. For custom IP firewall configurations, see Appendix C, “Custom Firewall Configurations”.

Configuring NTP

Introduction

The *ConnectReach* system uses Network Time Protocol (NTP) to obtain the time of day for time-stamping messages in the event log.

Procedure

To configure NTP, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the NTP command:
	
	`(config)> NTP`
	
	The prompt changes to the Config:NTP prompt.
	
	`(config:NTP)>`

2	At the Config:NTP prompt, enter the appropriate commands from the following table.

Enter this command...	...and specify this value	Comments
`enable`	`[off], on`	Enable or disable NTP. When NTP is enabled, the user can receive time- and date-stamped event log messages.
`server`	*name, ip-addr*	Specify the host name or the IP address. An example is host name “clock.psu.edu,” which is at IP address “128.118.25.3.”
`minutes-from-GMT`	*number*	Enter the difference in minutes between the local time and Greenwich Mean Time (GMT).*
`Help`		Access online assistance.

* The four U.S. time zones are: PST: -480, Mountain: -420, Central: -360, EST: -300. All time zones do not take into account daylight savings time.

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command values take effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new values. **Stop! End of Procedure.**

Configuring the DNS Server

Introduction

The *ConnectReach* system uses DNS servers to resolve host names for internal commands such as ping and network upgrade.

NOTE:
SOCKS Version 4 requires that the *ConnectReach* system DNS server be configured. When used with SOCKS, it acts as a DNS proxy server. The DNS proxy server forwards IP domain name resolution requests from devices on the LAN to the primary DNS server on the WAN, or to the secondary DNS server on the WAN, if necessary. For more information about SOCKS, refer to the section entitled “SOCKS” located earlier in this chapter.

Procedure

To configure the DNS server, proceed as follows:

Step	Procedure
1	Obtain the DNS server address(es) from the carrier.
2	At the Config prompt, enter the `DNS` command: `(config)>` **`dns`** The prompt changes to the Config:DNS prompt. `(config:DNS)>`
3	At the Config:DNS prompt, enter the appropriate commands from the following table. The DNS server addresses usually are the addresses of DNS servers on the WAN/Internet, not the local Ethernet, that are provided by the Internet service provider.

Enter this command...	...and specify this value	Comments
`enable`	`off, [on]`	When you enable SOCKS, DNS is also enabled.
`primary-dns-server`	*IP-address*	Enter the address of the primary Domain Name Server.
`secondary-dns-server`	*IP-address*	Enter the address of the secondary Domain Name Server.
`Help`		Access online assistance.

(Continued on next page)

Configuring the DNS Server (Continued)

Procedure (continued)

Step	Procedure
4	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

Configuring QOS

Introduction

QOS (Quality of Service) allows prioritization of IP packets going out the WAN link. The priority routes are defined by the source IP address, destination IP address or source and destination IP addresses. The IP address may either be a host or subnet. The QOS submenu allows up to five priority routes to be configured. Once the priority routes are defined, the *ConnectReach* system identifies all IP packets as low or high priority.

The QOS may be set for guaranteed service or strict priority. Guaranteed service permanently reserves a portion of the system resources for high priority traffic. Strict priority allows system resources to be shared by low priority and high priority traffic, but at any given time high priority packets are always sent ahead of low priority packets.

Procedure

After you have verified the required configuration, follow these steps to configure QOS:

Step	Procedure
1	At the Config prompt, enter the QOS command: `(config)>` **`QOS`** The prompt changes to the Config:QOS prompt. `(config:QOS)>`
2	At the Config:RS232 prompt, enter the commands from the following table

Enter this command...	...and specify the baud rate	Comments
`enable`	`[off], on`	Enables QOS
`qos`	`add, delete src [net mask] dst [net mask]`	Add and delete priority routes. Include IP address and netmask.
`Reserved-Bandwidth`	`[0] (kbits/sec)`	Set reserved minimum bandwidth. If set to zero, QOS is set for strict priority.
`show-qos-table`		Displays all priority routes.
`clear-qos-table`		Clears all priority routes.
`Help`		Access online assistance

(Continued on next page)

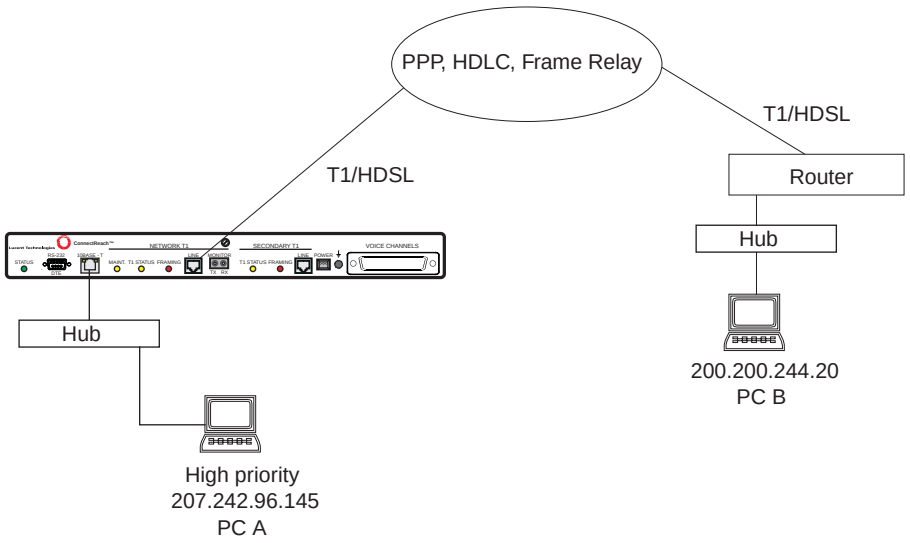
Configuring QOS (Continued)

Procedure (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command value takes effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new value. **Stop! End of Procedure.**

Example 1

The QOS example in the following figure describes a scenario where any packet originating from PC A will be treated as high priority with guaranteed service.



(Continued on next page)

Configuring QOS (Continued)

Example 1 (continued)

To configure the example shown in the figure, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the QOS command:
	
	`(config)> QOS`
	
	The prompt changes to the Config:QOS prompt.
	
	`(config:QOS)>`

2	At the config:QOS prompt, enter the following commands:
	`(config:QOS)> enable on`
	`(config:QOS)> qos add src 207.242.96.145 255.255.255.255`
	`(config:QOS)> reserved-bandwidth 128`

3	To view the QOS settings, enter the show-qos-table command.
	(config:QOS)> **show-qos-table**
	
	`IP QOS Table`
	`-------------------------------------`
	`Src Addr Src Mask Dst Addr Dst Mask`
	`207.242.96.145 255.255.255.0`

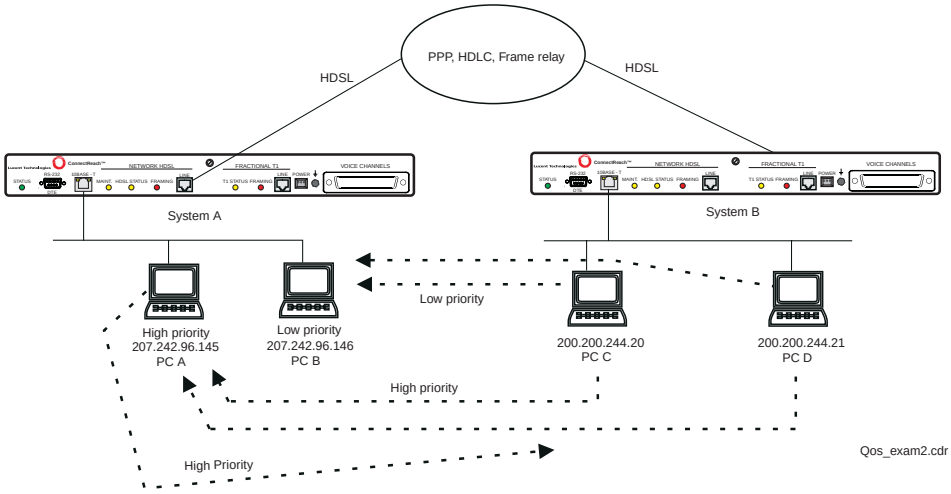
4	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command value takes effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new value. **Stop! End of Procedure.**

(Continued on next page)

Configuring QOS (Continued)

Example 2

In this example, there are two *ConnectReach* systems at two different locations as shown in the following figure. Any packets originating from PC A will be sent high priority and any packets destined for PC A will be high priority.



To configure the example shown in the figure, proceed as follows:

Step	Procedure
1	For *ConnectReach* system **A**: At the Config:QOS prompt, enter the following commands: `(config:QOS)>` **`enable on`** `(config:QOS)>` **`qos add src 207.242.96.145 255.255.255.255`**
2	For *ConnectReach* system **B**: At the Config:QOS prompt, enter the following commands: `(config:QOS)>` **`enable on`** `(config:QOS)>` **`qos add dst 207.242.96.145 255.255.255.255`**

(Continued on next page)

Configuring QOS (Continued)

Example 2 (continued)

Step	Procedure
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command value takes effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new value. **Stop! End of Procedure.**

Configuring the RS-232 Interface

Procedure

To configure the RS-232 interface, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the RS232 command:
	
	`(config)> rs232`
	
	The prompt changes to the Config:RS232 prompt.
	
	`(config:RS232)>`

2	At the Config:RS232 prompt, enter the `baud-rate` command and specify the baud rate of the RS-232 port using the following table
	
	Enter this command... ...and specify the baud rate
	`baud-rate` `[9600], 19200, 38400`
	`Help`

3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** The new command value takes effect as soon as you save the configuration. You do not need to reboot the *ConnectReach* system to use the new value. **Stop! End of Procedure.**

WARNING:
*If you are using the RS-232 interface, and the settings are changed in the **RS232** menu and saved, the connection to the* ConnectReach *system will be disrupted. The interfacing software's baud rate must be changed to match the baud rate set in the RS-232 configuration menu. The connection will be restored when the software is restarted with the matching baud rate setting.*

(Continued on next page)

Configuring the RS-232 Interface (Continued)

Procedure (continued)

If you set the baud rate to a speed the modem or attached computer cannot match, use one of these methods to correct the problem:

- If an Ethernet or Network T1/DSX-1 address is configured and the *ConnectReach* system is connected to the LAN or WAN, you can connect using Telnet or a Web browser and reset the baud rate to the correct speed for the modem or computer.
- If no Ethernet or Network T1/DSX-1 address is configured, you cannot connect to the *ConnectReach* system over the network.

Configuring IPX

Introduction

The Internet Packet eXchange (IPX) protocol supports clients that utilize Novell NetWare. This feature allows the user to configure the *ConnectReach* system in order to provide IPX routing from the branch office to the corporate office over a frame relay connection. The IPX protocol is supported only on PVC1. The IPX protocol is not supported over WAN links using PPP or Cisco HDLC protocols. If Internet bound TCP/IP data is not carried on the same PVC through the corporate office, a second PVC may be configured to carry the packets to the Internet router.

Key commands

The key commands for the IPX menu include the following:

Enable	This command allows the user to enable or disable the IPX routing function.
Router-name	A router name is required for IPX to function. The name specified is arbitrary, it is only required that there be one.
Internal-network	The internal-network command is a 32-bit hex number that represents the router's internal network.
Add LAN encapsulations	There are four different encapsulations which may be used to carry IPX traffic over the Ethernet. Each encapsulation must have a unique IPX network number. This command is used to add networks to the Ethernet side of the router and specify their encapsulation. Only one encapsulation is allowed for each network.
Delete LAN encapsulations	This command allows the user to remove networks from the Ethernet side of the router.
WAN network	Like all IPX transports the WAN network must also have a number. This is a 32-bit hex number.

(Continued on next page)

Configuring IPX (Continued)

Procedure

After you have verified the required configuration, follow these steps to configure IPX:

Step	Procedure

1	At the Config prompt, enter the IPX command:
	
	`(config)> ipx`
	
	The prompt changes to the Config:IPX prompt.
	
	`(config:IPX)>`

2	At the Config:IPX prompt, enter the commands shown in the following table.
3	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **NOTE:** If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

Enter this command...	...and specify these commands
enable	[off], on
router-name	*name*
internal-network	[0x000000000] hex-network
add-encap-lan	hex-network [encap: [ETHERNET_II] 802.3 802.2 SNAP]
del-encap-lan	hex-network
wan-network	[0x000000000] hex-network
show-all	
Help	

Configuring FTP Log Dump

Introduction

The FTP Log Dump menu sets the ftp commands necessary to enable the ftp-log-dump feature. If the *ConnectReach* system has an abnormal termination of the software, the FTP Log Dump downloads all pertinent information as American standard code for information interchange (ASCII) text to the designated location. The location is determined by the commands host, filename, and directory. The remaining commands are for customer relevant information. This information is tied in with the ftp log dump information and is purely for identification purposes only.

The information that is gathered is useful in helping to debug the cause of the abnormal software termination. The information provided includes all the relevant identification type commands, as well as the configuration. The dump also shows how the software terminated.

The password is never shown for security purposes.

Procedure

Follow these steps to configure the Ftp-log-dump menu:

Step	Procedure
1	At the Config prompt, enter the `Ftp-log-dump` command: (config)> **Ftp-log-dump** The prompt changes to the Config:Ftp-log-dump prompt.

(Continued on next page)

Configuring FTP Log Dump (Continued)

Procedure (continued)

Step	Procedure
2	Make the necessary configuration changes. The following table describes these commands.

Enter this command...	...and specify this value	Comments
`enable`	`[off], on`	Enables or disables the FTP log dump.
`host`	*IP address*	
`filename`	*target file name*	
`directory`	*target directory*	
`ftp-user-password`	*user name* *password*	Specify the ftp user name and press enter. You will be prompted to enter a password. The password is not displayed on the screen.
`business-name`	*business-name*	Enter the company's name of the *ConnectReach* System's location.
`zip-code`	*zip-code*	Enter the zip code of the *ConnectReach* System's location.
`phone-number`	*phone-number*	Enter the phone number of the *ConnectReach* System's location.
`Help`		Access online assistance.

Stop! End of Procedure.

Setting Features

Introduction

Certain features of the *ConnectReach* system are enabled by entering a feature key. This allows the *ConnectReach* system to support different feature sets with a single load image. The following table lists the features and describes their functionality.

Feature	Functionality
TR08	Enables the Modify-TR08-Data menu under Net-T1 for TR-TSY-000008 framing format.
Data	Enables the DHCP, DNS, Firewall, IPX, QOS, and NAT menus. Allows forwarding of packets.
LCR*/DID	Enables the Digital-Trunk, Analog-Trunk, Line, Map-Extensions and Dialing menus.
BOX*	Enables the Voice-Mail menu and the BOX-Features and Feature-Codes commands under the Lines menu.

* Trademark of VINA Technologies, Inc.

The following table lists the Features commands.

Enter this command...	Comments
`features-show`	Displays the features that are enabled.
`set-features`	Sets feature key, which is enabled by entering a feature number that is provided by Lucent Technologies.

(Continued on next page)

Setting Features (Continued)

Display features

To display features that are enabled, proceed as follows:

Step	Procedure

1	At the Config prompt, enter the `show features` command and press enter:
	`(config)>` **`features-show`**
	
	The following default features are displayed:
	`Feature bits: 0x000000000000000d`
	`Features enabled: Data, DIDLCR`

2	When you have made the necessary configuration changes, you can return to the Config menu by typing **exit** or you can enter an exclamation point (**!**). **Stop! End of Procedure.**

Procedure

Feature keys are normally set at the factory. To add new features to the system after it has been installed, you use the `set-features` command in conjunction with the feature key which can be obtained from Lucent Technologies.

To set a feature key, proceed as follows:

Step	Procedure
1	At the Config prompt, enter the `set-features` command followed by the feature key: `(config)>` **`set-features xxxx-yyyy-zzzz-wwww-cccc`** Example: **set-features rQ5@-pQ8n-3USr-thLq-he..** **NOTE:** If you change any of these settings, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect. **Stop! End of Procedure.**

Using Template Archive

Introduction

The template-archive mode allows a network operator to create a configuration file with complex functionality using a *ConnectReach* system chassis with minimal functionality. This is accomplished by suppressing the warning messages that normally appear if the necessary hardware is not present. The configuration is then uploaded as an ASCII text file to an FTP server (configuration server) using the archive:upload command. The FTP server may have several different configuration files used as standards for the network operations center (NOC). These files may be downloaded to the *ConnectReach* system using the `archive` command or uploaded from the *ConnectReach* system through auto-config. The auto-config optional feature is used in conjunction with the template-archive optional feature.

The template-archive menu is similar to the archive menu in that it will take a snapshot of the configuration displayed and represent it as an ASCII text file. The file has two parts:

- A listing similar to the config:show command, including the values of all configuration parameters
- A hexadecimal representation of the configuration

Procedure

To configure and use the template-archive menu, perform the following steps

Step	Procedure
1	At the Config prompt, enter the `template-archive` command: `(config)>` **`template-archive`**

(Continued on next page)

Using Template Archive (Continued)

Procedure (continued)

<table>
<tr><th>Step</th><th>Procedure</th></tr>
<tr><td>2</td><td>At the Config:template prompt, enter the commands shown in the following table.
<table>
<tr><th>Enter this command...</th><th>...and specify this value</th><th>Comments</th></tr>
<tr><td>enable-template-mode</td><td>[off], on</td><td>Enables the template archive function.</td></tr>
<tr><td>server-ipaddr</td><td>IP address</td><td>IP address of the FTP server.</td></tr>
<tr><td>filename</td><td>filename*</td><td>The file should have a .txt suffix, unless auto-config will be used on the remote ConnectReach system.</td></tr>
<tr><td>user</td><td>name</td><td>A valid username and password for the FTP server. The prompt for the password will appear after entering the username.</td></tr>
<tr><td>upload</td><td></td><td>To upload the configuration settings.</td></tr>
<tr><td>download</td><td></td><td>To download the specified configuration file from the FTP server to the ConnectReach system.</td></tr>
<tr><td colspan="3">* If template-archive is to be used with auto-config, the configuration file name must follow the convention of vinaconfig.serialnum, where serialnum is the serial number of the remote ConnectReach system.</td></tr>
</table></td></tr>
<tr><td>3</td><td>When you have made the necessary configuration changes, enter an exclamation point (!) or the exit command to return to the config menu.

The prompt changes to the Enable prompt.

<pre>Enabling the Template-Archive will place this unit in
to the Template-Archive mode. Are you sure you want to
enable this mode?

Spell out “enable” to continue (enter to cancel)>
enable</pre></td></tr>
</table>

(Continued on next page)

Using Template Archive (Continued)

Procedure (continued)

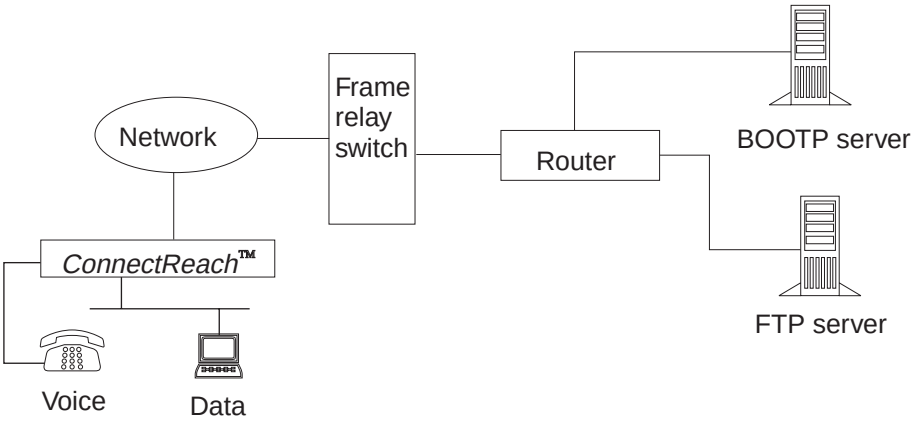
Step	Procedure
4	Save the template archive settings by entering the **save** command. This will put the *ConnectReach* system in to the template-archive mode. **NOTE:** Once the *ConnectReach* system is in template-archive mode, the only menu available is the config menu. To return to the normal mode, disable the template-archive.
5	Enter all the configuration parameters required for the remote *ConnectReach* system. For more information on setting parameters of specific submenus, see the pertinent sections in this chapter. **CAUTION:** *Do not enter the save command at this point as you may not be able to connect to the FTP server due to possible changes in the network configuration.*
6	When all the configuration parameters have been set, upload the file to the FTP server by entering the upload command from the config:template prompt. `(config:template)> upload`
7	To return to the normal operational mode, disable the template-archive by entering: `(config:template)> enable off` from the config:template prompt.
8	Save the template archive settings by entering the **save** command. This will put the *ConnectReach* system in the normal functioning mode. **Stop! End of Procedure.**

Using Auto-config

Introduction

The auto-config optional feature allows automatic and remote configuration of the *ConnectReach* system. An archived configuration is downloaded automatically by means of an FTP server when Autoconfig is enabled. With this feature a *ConnectReach* system can be taken from the shipping box, installed, and be automatically configured. This eliminates the need for pre-configuring the *ConnectReach* system at a staging area or to have a technician versed in data and voice present at the installation site. All configuration is performed automatically once the *ConnectReach* system is powered up for the first time. Once through the process, the Autoconfig is disabled. Auto-config has been tested with a CISCO router.

The technician installs the *ConnectReach* system, connects the required cables, and observes the LED patterns for verification of a successful configuration. Auto-config communicates with a router at the NOC and negotiates a connection first with the NOC's BOOTP server and then sends a request to the FTP server (configuration server). The FTP server responds by sending the *ConnectReach* system archived configuration file. When the file transfer is complete, the *ConnectReach* system reboots itself. The following figure shows the network topology for the auto-config feature.



(Continued on next page)

Using Auto-config (Continued)

Router and network requirements

There are certain router and network requirements that must be met for the auto-config feature to function properly. They are listed below.

1. The T1 line must use D4 or ESF framing with B8ZS line coding in TDM mode.
2. The network must be running Frame Relay with IP protocol.
3. The data DS0s on the network must be contiguous and configured at either the low or high end of the T1.
4. The IP router must have inverse address resolution protocol (InARP).
5. The IP router must be able to forward a BOOTP request from the *ConnectReach* system to a BOOTP server. The CISCO router has a BOOTP server included in the router, other routers may or may not have this feature.
6. The BOOTP server needs to know the IP address of the FTP server (configuration server).
7. The FTP server must have permissions for the default username and password of auto-config. These are:

```
username: vinacfg
password: archive
```

(Continued on next page)

Using Auto-config (Continued)

Introduction (continued)

8. A *ConnectReach* system archived configuration file placed in the root directory of the FTP server with the following naming convention:

   vinaconfig.serialnum (serialnum is the serial number of the remote ConnectReach system)

   The archive file can be created either with the Archive command or with the template-archive feature. See the pertinent sections in this chapter for more information on these commands.

Configuring the *ConnectReach* system

Following are the steps that auto-config goes through to configure the *ConnectReach* system.

1. Data DS0s are detected.
2. Frame Relay and LMI encapsulation are detected.
3. The *ConnectReach* system receives an local management interface (LMI) packet and determines the data link connection identifier (DLCI) number.
4. Using the DLCI, a permanent virtual circuit (PVC) is established.
5. The *ConnectReach* system finds out the IP address of the router by using InARP.
6. The *ConnectReach* system sends a BOOTP request to the router.

(Continued on next page)

Using Auto-config (Continued)

Configuring the *ConnectReach* system (continued)

7. The router responds with an IP address and subnet mask for the *ConnectReach* system and the IP address of the FTP server. If auto-config is set in the IP-only mode, the auto-config process ends here and the network operator uses Telnet or HTTP to configure the *ConnectReach* system.
8. If auto-config is set in the full mode, the *ConnectReach* system sends an FTP request to the FTP server and the server responds by sending the configuration file for that *ConnectReach* system. The configuration file on the FTP server should be in the root directory and have the name of vinaconfig.serialnum, where serialnum is the serial number of the remote *ConnectReach* system.
9. If the FTP download fails, the *ConnectReach* system will be placed in IP-only mode. The NOC operator waits approximately 40-60 seconds before using a Telnet connection.
10. The *ConnectReach* system saves the configuration and performs a cold-start.

The Status LED continuously blinks when the *ConnectReach* system is in the auto-config mode. The following table lists the LED indicators for each step of the auto-config process.

Maintenance LED	T1 Status LED	T1 Framing LED	Comments
OFF	OFF	ON	Detecting data DSOs.
OFF	ON	OFF	Determines DLCI.
OFF	ON	ON	Router assigns IP address and subnet mask for *ConnectReach* system and sends IP address for FTP server.
ON	OFF	OFF	Downloading configuration file.
ON	OFF	ON	Verifying and saving configuration file.

The following table lists the command and parameters for auto-config.

Enter this command...	...and specify this value	Comments
mode	off, ip-only, [full]	To set the mode of operation for auto-config

Displaying Current Configuration Settings

Procedure

To show the current configuration settings, enter the `show` command at the Config prompt.

```
(config)> show
```

The *ConnectReach* system Utility lists all current configuration settings. The following figure shows an example of part of the configuration settings list.

```
…
SNMP
    enable on
    SNMP-host 199.199.199.3
    cold-start on
    warm-start on
    link-down on
    link-up on
    login-failures on
    !
SOCKS
    enable on
    !
DNS
    enable on
    primary-dns-server 199.199.199.4
    secondary-dns-server 199.199.199.5
    !
RS232
    baud-rate 9600
    !
…
```

Setting All Configuration Settings to Default

Introduction

Every configuration command has a default setting. The default setting for each command is displayed on screen in brackets after you type the question mark key (**?**) at the Config prompt or one of the Config submenu prompts.

Procedure

NOTE:
The `default` command erases all configuration data.

To set all configuration settings to their default value, enter the `default` command at the Config prompt.

(config)> **`default`**

Preserving default settings

The `preserve-default` command erases all configuration data except Ethernet, password, and RS-232. To set the selected configuration settings to their preserve default value, enter the `preserve-default` command at the Config prompt.

`(config)>` **`preserve-default`**

NOTE:
If you change any of these commands, you must save the configuration and reboot the *ConnectReach* system using the warm-start command for the new settings to take effect.

Reconfiguring the *ConnectReach* System

Session Choices for Accomplishing Reconfiguration

Introduction

After you are finished with the initial configuration of the *ConnectReach* system, and it is installed at the site and connected to the networks, you can reconfigure the unit in any one of the following three types of sessions:

- A local/remote console session: This session involves the connection of a computer either directly or by means of a modem to the RS-232 port on the *ConnectReach* system. This session is one of the methods that can also be used for initial configuration. The commands and examples given in this chapter show a *ConnectReach* system console session. If the *ConnectReach* system loses its configuration in NVRAM, you must use the RS-232 port to reconfigure the unit.
- A remote Telnet session: This session involves the use of a Telnet application in making configuration changes from a remote computer through an Ethernet connection. Once the Telnet session is connected, the user interface is identical to the console session. If the T1/HDSL connection is inoperable, you can reconfigure the *ConnectReach* system and download new software by means of the Ethernet connection. For more information about downloading software, refer to Chapter 8, “Maintenance and Trouble Clearing”.
- A remote HTTP session: This session involves a connection using a Web browser through an Ethernet or Internet/T1/HDSL connection (an IP connection over T1 using frame relay, PPP, or HDLC). Chapter 7, “Configure/Monitor the *ConnectReach* system Using a Web Browser”, describes the user interface available through the Web browser.

(Continued on next page)

Session Choices for Accomplishing Reconfiguration (Continued)

Using a Telnet session to reconfigure and monitor the *ConnectReach* system

Before you can use a *Te*lnet session to configure the *ConnectReach* system, the unit must be as follows:

- Connected to AC or DC power.
- Initially configured for an Ethernet or Internet/T1/HDSL connection, including an IP address, netmask, and broadcast address. For more information about initial configuration, refer to the section entitled “Connection at the RS-232 port”, located at the front of this chapter.
- Connected to the network through an Ethernet or T1/HDSL connection. For information about connecting cables, refer to Chapter 5, “Installation”.

You must also have a computer that is connected to the same network as the *ConnectReach* system, or to a network from which access to the *ConnectReach* system is permitted.

On the computer, start a Telnet session and enter the IP address assigned to the *ConnectReach* system. Once the Telnet session is connected, the user interface is identical to the console session shown in this chapter.

If a Carrier privilege login name has been configured, the *ConnectReach* system Utility displays a login prompt. After you enter a login name and password, the Main Menu prompt appears, and the commands described in this chapter and in Chapter 6, “*ConnectReach* System Monitoring”, become available.

Installation

5

Contents

About This Chapter

Introduction

Procedures to install the unit at the site

This chapter contains the required procedures to install the *ConnectReach*™ Access System at the site. This chapter describes site requirements and instructions for installing the *ConnectReach* system. The following topics are included in this chapter.

- Installation and site requirements
- Safety precautions
- Electrostatic discharge
- Items included with the *ConnectReach* system
- Required cables
- Installing the voice interface/optional circuit cards
- Installing the new equipment building standards (NEBS) cover (optional)
- Mounting the *ConnectReach* system in a rack, on a wall, or on a desktop
- Connecting cables to the *ConnectReach* system and applying power
- Connecting a *ConnectReach* system to another *ConnectReach* system in a master/slave configuration allowing more than 24 voice channels
- Analog voice interface considerations
- Using the alarm relay of the *ConnectReach* system.

Introduction (Continued)

Safety Precautions

Before installing the *ConnectReach* system, read the following basic safety precautions.

- Read and understand all instructions.
- Exercise caution when connecting the *ConnectReach* system to telephone wires. Hazardous voltage may be present.
- Do not install telephone wiring during a lightning storm.
- Before installing or servicing the *ConnectReach* system, disconnect all power connections from wall outlets, and disconnect all telephone lines at the network interface.
- When installing or connecting electrical wiring that is external to the *ConnectReach* system, follow the provisions of the current edition of the National Electrical Code or other wiring rules that may apply.
- Do not install or use the *ConnectReach* system near water.

Electrostatic discharge considerations

The following precautions should be observed when handling *ConnectReach* system circuit cards:

- Assume all card assemblies contain solid state electronic components that can be damaged by electrostatic discharge (ESD).
- Observe warning labels on the bags and cartons. Whenever possible, do not remove the card assembly from antistatic packaging until the *ConnectReach* system is ready for card installation.
- Open all card assembly packages at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats. If a static-dissipating table mat is used, be sure that it is clean to ensure a good discharge path.
- Always store and transport card assemblies in static-safe packaging. Shielding is not required unless specified.

Standard system

The following items are included in the *ConnectReach* system.

- *ConnectReach* system unit
- Two mounting brackets [used for mounting the unit on the wall or in an American national standards institute (ANSI) 19- or 23-inch relay rack]
- Eight screws for attaching the mounting brackets to the unit

(Continued on next page)

Introduction (Continued)

Standard system (continued)

- Four screws for mounting the unit to a rack
- 120 V AC power supply or DC cable
- Rubber feet for desktop mounting
- 10-foot T1 modular shielded cable (RJ-48C) for network T1/DSX-1/high data rate digital subscriber line (HDSL) connection.

Optional mounting hardware

The following orderable mounting hardware can be used as an alternative to the standard mounting brackets provided with the *ConnectReach* system unit:

- Two mounting brackets, similar to the standard mounting brackets, for mounting the unit in a Bellcore relay rack. The eight screws for attaching the mounting brackets to the unit and the four screws for mounting the unit to the rack are also provided.
- A hinged mounting assembly that mounts to the wall and offers the ability to swing away from the wall to provide access to a maximum of four units. After the first unit is mounted on the assembly, extension brackets are used to mount the additional units.

Refer to Appendix F, “System Configurations and Ordering Information”, for information on ordering the optional mounting hardware.

What Are the Requirements?

FCC Rules

Parts 68 and 15

When installing the *ConnectReach* system, the site must meet the following Federal Communications Commission (FCC) requirements. The *ConnectReach* system complies with Part 68 of FCC rules, and with the specifications for a Class A digital device pursuant to Part 15 of FCC rules. The *ConnectReach* system also complies with UL* safety standard UL1950.

* UL is a registered trademark of Underwriters Laboratories Inc.

Power

AC installations with power supply transformer

Grounded receptacle

120 V AC grounded receptacle that is easily accessible.

Input voltage supply

Input voltage supplied to an AC power supply transformer: 120 V AC, 60 Hz @1 A.

DC installations

Wire gauge

Three-conductor, 18-AWG, stranded wire with Molex connector and contacts. A 6-foot cable with pigtails may be ordered from Lucent Technologies. Refer to Chapter 2, “Product Description”, for power connector pin assignments.

Input voltage supply

Input voltage to unit, 48 V DC @ 50 VA

Optional DC uninterruptable power supply (UPS)

Model

LT-733 DC UPS power supply (available from Gordon Kapes, Inc.)

Input voltage supply

95—135 V AC, 47—63 Hz, @ 2.1 A RMS steady state (maximum)

Physical

Environmental

Operating temperature

0 to 50° C (32 to 122° F)

Power dissipation

106 BTU

Relative humidity

0 to 95 percent, noncondensing

Dimensions

Size

17 in. W by 14 in. D by 1.75 in. H

Weight

9 lb.

Shipping specifications

Shipping container size

18.25 in. W by 21 in. D by 9 in. H

Weight

20 lb.

Cables

List of cabling

You will need to provide the following cables.

- Standard 10Base-T Ethernet cable (RJ-45) for connection to the local Ethernet network.
- T1 modular shielded cable (RJ-48C) for connection to the secondary/ fractional T1/DSX-1 port (Comcode 108585654) (this cable is normally a crossover cable) and/or Telco cable (standard Telco 50-pin) for connection to the punch-down block for analog voice channels (Comcode 108585647).
- 10 AWG copper ground wire with ring lug for frame ground (recommended).
- DC power cable (optional).
- A T1 shielded crossover cable (RJ48C) is needed for the network T1/ DSX-1/HDSL port to operate in DSX mode.
- One or both of the following cables.

  a. Modem cable for connection to a modem, allowing configuration from a remote computer. This cable should have a 9-pin female connector at the *ConnectReach* system end and a connector appropriate for the modem at the other end (usually a 25-pin male connector).

  b. Null-modem cable for connection to the serial port of a local computer. This cable should have a 9-pin female connector at the *ConnectReach* system end and a connector appropriate for the computer at the other end (for an IBM*-compatible PC, usually a 9-pin female connector). A crossover cable is needed for network T1/DSX-1/HDSL to operate in DSX mode.

* IBM is a registered trademark of International Business Machines Corporation.

Interface Card Installation

Voice Interface Card Installation

Introduction

The *ConnectReach* system unit has space for housing up to three voice interface cards. These cards can be either foreign exchange station (FXS) or foreign exchange office (FXO) voice interface cards. The *ConnectReach* system may come from the factory with the desired number of voice interface cards already installed. However, in instances where the cards have not been installed at the factory or cards are being added to an existing system, the following procedure should be used to install the interface cards.

(Continued on next page)

Voice Interface Card Installation (Continued)

Procedure

The following procedure should be used when installing FXS and/or FXO voice interface cards in the *ConnectReach* system.

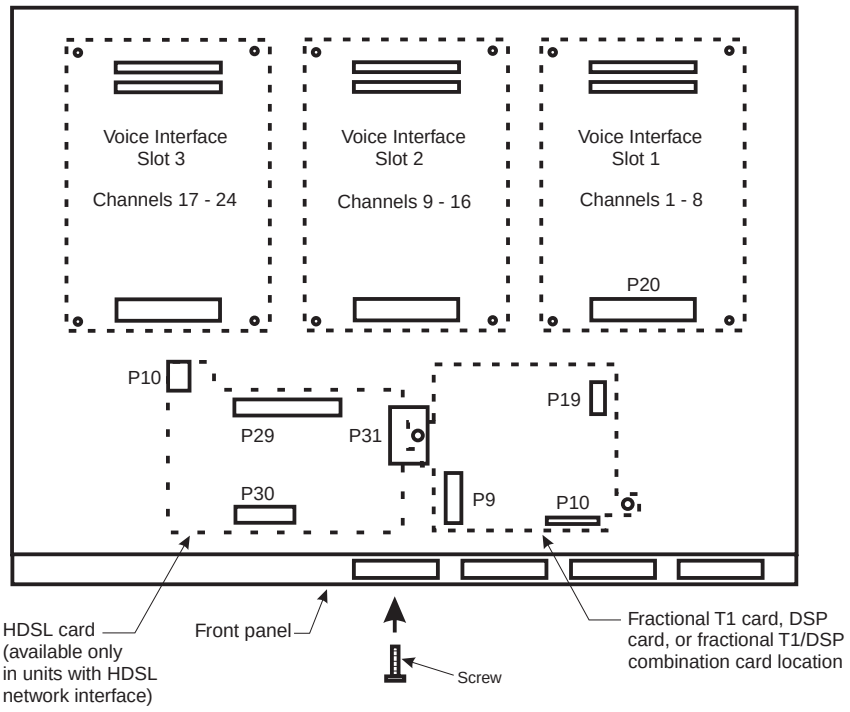
NOTE:
If Voice Interface Slots 2 and/or 3 are to be equipped with a voice interface card, then Voice Interface Slot 1 must also be equipped. If Slot 1 is not equipped, then the cards in Slot 2 and/or 3 will not be recognized.

Step	Procedure
1	Verify that power has been removed from the *ConnectReach* system unit.
2	**CAUTION:** *An electrostatic discharge (ESD) wrist strap with a resistance between 250 K and 1.5 M ohms should be worn when handling the* ConnectReach *system interface cards or motherboard to prevent damage. Before using the wrist strap, check it for shorts, opens, and proper resistance value. If the strap does not pass these checks, it should not be used. To avoid possible personal injury while using the wrist strap, do not connect it to any power source or shelf housing a power source.* Use a Phillips screwdriver to remove the screw from the center of the *ConnectReach* system front panel.
3	Obtain access to the inside of the *ConnectReach* system by sliding the bottom tray/front panel assembly forward, separating it from the top and side cover.

(Continued on next page)

Voice Interface Card Installation (Continued)

Procedure (continued)

Step	Procedure
4	Identify the location of the interface card to be installed using the following figure showing the top view of the motherboard. 
5	Remove the interface card and the package of four plastic standoff pins from the packing carton.
6	If the motherboard is not equipped with the four plastic standoff pins needed to lock each corner of the interface board, insert the pins from the packing carton.
7	Align the connectors on the bottom of the interface card with the connector pins on the motherboard and gently press on the top of the interface card until the card locks in place.
8	After all interface cards have been installed, slide the bottom tray/front panel assembly back into the cover.
9	Install the screw in the front panel.
10	**STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Optional Circuit Card Installation

Introduction

The *ConnectReach* system can contain one of the three following optional circuit cards to enable specific features and services:

- Fractional T1 circuit card
- Telco digital signal processor (DSP) processor circuit card
- Fractional T1/DSP combination circuit card.

The installation for these cards is divided into two procedures. One procedure covers the installation of the fractional T1 circuit card and the second procedure covers the installation of the DSP processor circuit card or the fractional T1/DSP combination circuit card.

(Continued on next page)

Optional Circuit Card Installation (Continued)

Fractional T1 circuit card installation procedure

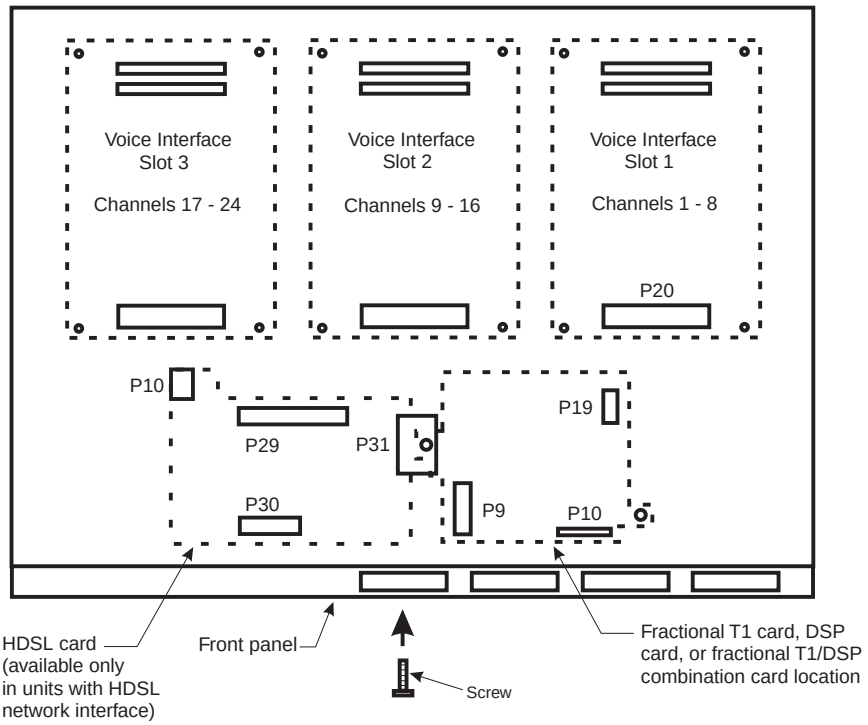
The following procedure should be used when installing a fractional T1 circuit card in the *ConnectReach* system.

Step	Procedure
1	Verify that power has been removed from the *ConnectReach* system unit.
2	**CAUTION:** *An electrostatic discharge (ESD) wrist strap with a resistance between 250 K and 1.5 M ohms should be worn when handling the* ConnectReach *system interface cards or motherboard to prevent damage. Before using the wrist strap, check it for shorts, opens, and proper resistance value. If the strap does not pass these checks, it should not be used. To avoid possible personal injury while using the wrist strap, do not connect it to any power source or shelf housing a power source.* Use a Phillips screwdriver to remove the screw from the center of the *ConnectReach* system front panel.
3	Obtain access to the inside of the *ConnectReach* system by sliding the bottom tray/front panel assembly forward, separating it from the top and side cover.
4	Remove the fractional T1 circuit card from the packing carton.

(Continued on next page)

Optional Circuit Card Installation (Continued)

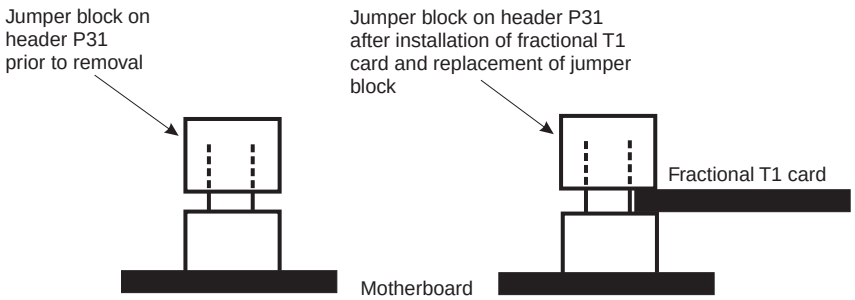
Fractional T1 circuit card installation procedure (continued)

Step	Procedure
5	Refer to the following figure showing the top view of the motherboard to locate where the card is to be installed and identify the connectors that will be involved. 
6	If the unit has an HDSL network interface, remove the HDSL card. Otherwise, go to Step **7**.
7	Remove the jumper block from header P31 located on the motherboard.
8	Align the connectors on the bottom of the fractional T1 card with the connector pins on the motherboard and gently press on the top of the card until the card locks in place over the plastic standoff pins.

(Continued on next page)

Optional Circuit Card Installation (Continued)

Fractional T1 circuit card installation procedure (continued)

Step	Procedure
9	Refer to the following figure and replace the jumper block on header P31. Note that the edge of the fractional T1 card will be located between the jumper block and header P31 when the card is properly installed. 
10	Replace the HDSL card (if equipped).
11	After the fractional T1 circuit card has been installed, slide the bottom tray/front panel assembly back into the cover.
12	Install the screw in the front panel.
13	**STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

(Continued on next page)

Optional Circuit Card Installation (Continued)

DSP or Fractional T1/DSP combination circuit card installation procedure

The following procedure should be used when installing a DSP circuit card or a fractional T1/DSP circuit card in a *ConnectReach* system unit with T1/DSX-1 or HDSL network interface

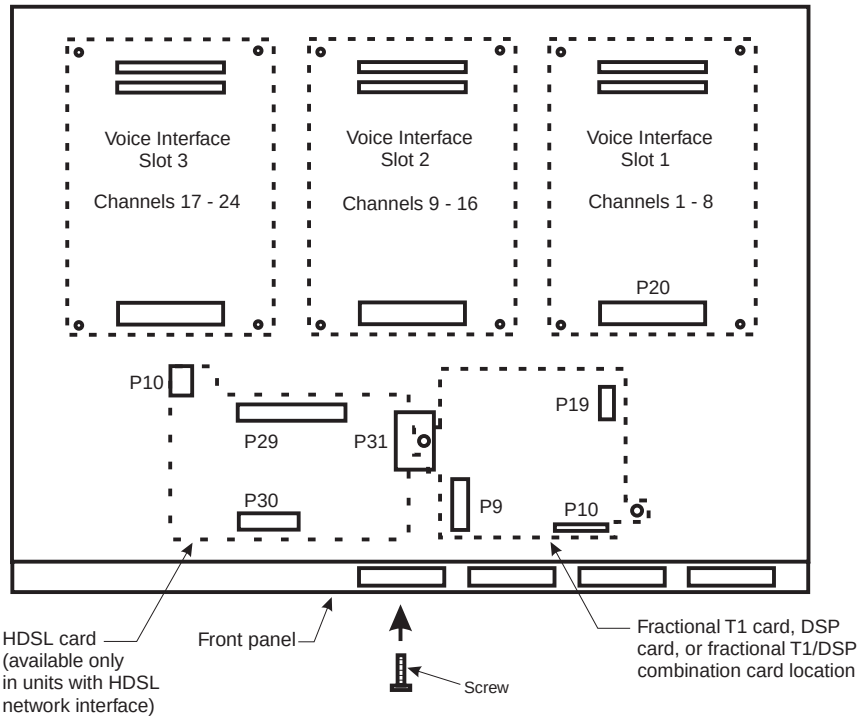
Step	Procedure
1	Verify that power has been removed from the *ConnectReach* system unit.
2	**CAUTION:** *An electrostatic discharge (ESD) wrist strap with a resistance between 250 K and 1.5 M ohms should be worn when handling the ConnectReach system interface cards or motherboard to prevent damage. Before using the wrist strap, check it for shorts, opens, and proper resistance value. If the strap does not pass these checks, it should not be used. To avoid possible personal injury while using the wrist strap, do not connect it to any power source or shelf housing a power source.* Use a Phillips screwdriver to remove the screw from the center of the *ConnectReach* system front panel.
3	Obtain access to the inside of the *ConnectReach* system by sliding the bottom tray/front panel assembly forward, separating it from the top and side cover.
4	Remove the DSP or fractional T1/DSP combination circuit card and package of hardware from the packing carton. The hardware package should contain a metal standoff and a hex nut.

(Continued on next page)

Optional Circuit Card Installation (Continued)

DSP or Fractional T1/DSP combination circuit card installation procedure (continued)

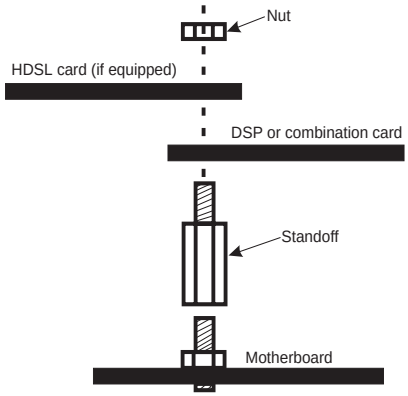
Step	Procedure
5	Refer to the following figure showing the top view of the motherboard to locate where the card is to be installed and identify the connectors that will be involved.
6	If the unit has an HDSL network interface, remove the HDSL card. Otherwise, go to Step **7**.
7	Remove the jumper block from header P31 located on the motherboard.



(Continued on next page)

Optional Circuit Card Installation (Continued)

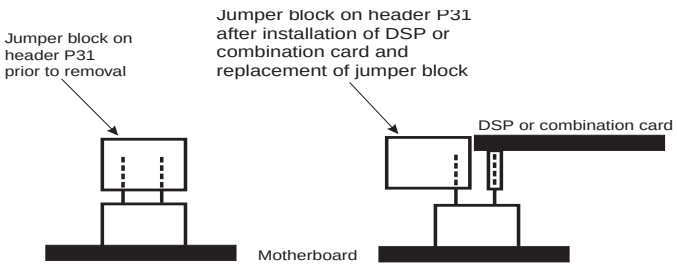
DSP or Fractional T1/DSP combination circuit card installation procedure (continued)

Step	Procedure
8	Refer to the following figure and install the metal standoff over the threaded stud on the motherboard (located near header P31). 
9	Align the connectors on the bottom of the DSP or fractional T1/DSP combination card with the connector pins on the motherboard and make sure that the hole on the edge of the circuit card is located over the standoff. Press gently on the top of the circuit card until the connector pins on the motherboard are fully seated in the circuit card connectors.
10	If the unit is equipped with an HDSL card, align the connectors on the bottom of the HDSL card with the connector pins on the motherboard and make sure that the hole on the edge of the card is located over the standoff. Press gently on the top of the HDSL card until the connector pins on the motherboard are fully seated in the circuit card connectors. Otherwise, go to Step **11**.
11	Secure the HDSL (if equipped) and DSP or fractional T1/DSP combination cards to the standoff using the hex nut provided.

(Continued on next page)

Optional Circuit Card Installation (Continued)

DSP or Fractional T1/DSP combination circuit card installation procedure (continued)

Step	Procedure
12	Reposition the jumper block over the left side of block P31 (refer to the following figure). 
13	After the DSP or fractional T1/DSP combination circuit card has been installed, slide the bottom tray/front panel assembly back into the cover.
14	Install the screw in the front panel.
15	**STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Mount the *Connect Reach*™ System

Introduction

Three configurations to mount the unit

The *ConnectReach* system can be mounted in one of three configurations.

- Rack mount (19- or 23-inch ANSI or Bellcore rack)
- Wall mount (stationary or hinged bracket)
- Desktop mount.

Mounting brackets that fit the 23-inch Bellcore racks with 25 mm hole spacing (Comcode 108501362) may be ordered separately. A hinge mount kit (Comcode 108501354) is also available for ordering. The hinge mount, installed on a wall, can hold up to four units mounted side-by-side on end. Thus providing space saving capabilities. The hinged side allows the units to swing out for easier access in servicing.

Clearances

The following table lists the required clearances to install the *ConnectReach* system.

Area	Clearance (Inches)
Above unit	1.75
Below unit	0
Front of unit (near connectors)	5
Rear of unit	0.6
Sides of unit	2

Rack Mount

Mount the *ConnectReach* System in a 19-inch rack

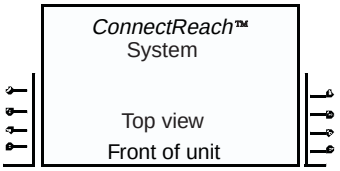
NOTE:
The mounting brackets supplied with the *ConnectReach* system are for mounting the unit in an American national standards institute (ANSI) type relay rack. The mounting brackets required to mount the unit in a Bellcore relay rack must be ordered separately. Refer to Appendix F, “System Configurations and Ordering Information”, for ordering information.

To mount the *ConnectReach* system in a 19-inch rack, attach the long side of the brackets to the *ConnectReach* system as shown in the following illustrations. You can arrange the brackets for a front, midway, or rear mount.

NOTE:
Attach the long side of the brackets to the *ConnectReach* system.

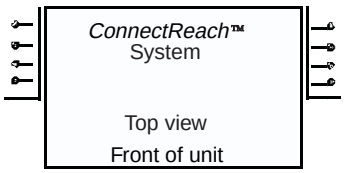
Front mount

Install the brackets as shown to front mount the ConnectReach System in a 19-inch rack.



Midway mount (*preferred*)

Install the brackets as shown to midway mount the ConnectReach System in a 19-inch rack.



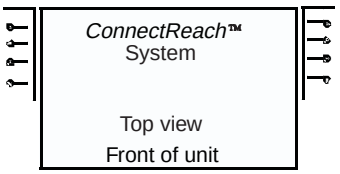
(Continued on next page)

Rack Mount (Continued)

Mount the *ConnectReach* System in a 19-inch rack (continued)

Rear mount

Install the brackets as shown to rear mount the *ConnectReach* System in a 19-inch rack.



Mount the *ConnectReach* System in a 23-inch rack

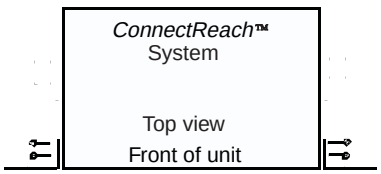
NOTE:
The mounting brackets supplied with the *ConnectReach* system are for mounting the unit in an American national standards institute (ANSI) type relay rack. The mounting brackets required to mount the unit in a Bellcore relay rack must be ordered separately. Refer to Appendix F, “System Configurations and Ordering Information”, for ordering information.

To mount the *ConnectReach* system in a 23-inch rack, attach the short side of the brackets to the *ConnectReach* system. You can arrange the brackets for a front, midway, or rear mount (the connectors are located on the front of the unit).

NOTE:
Attach the short side of the brackets to the *ConnectReach* system.

Front mount

Install the brackets as shown to front mount the ConnectReach System in a 23-inch rack.



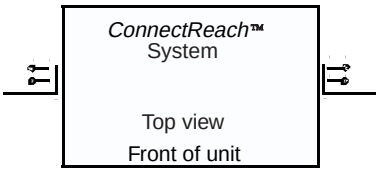
(Continued on next page)

Rack Mount (Continued)

Mount the *ConnectReach* System in a 23-inch rack (continued)

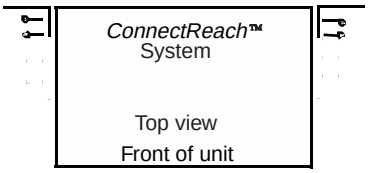
Midway mount (*preferred*)

Install the brackets as shown to midway mount the *ConnectReach* System in a 23-inch rack.



Rear mount

Install the brackets as shown to rear mount the *ConnectReach* System in a 23-inch rack.



Wall Mount

Introduction

The *ConnectReach* system can be mounted on a wall using either of the following two methods described in this section:

- Stationary mounting using the mounting brackets supplied with the unit
- Attaching the unit(s) to a hinged wall mount assembly that is fastened to the wall. Up to four units can be attached to the hinged wall mount assembly. After the first unit is mounted on the assembly, extension brackets are used to mount the additional units. The hinged wall mount assembly is not supplied with the *ConnectReach* system and must be ordered separately.

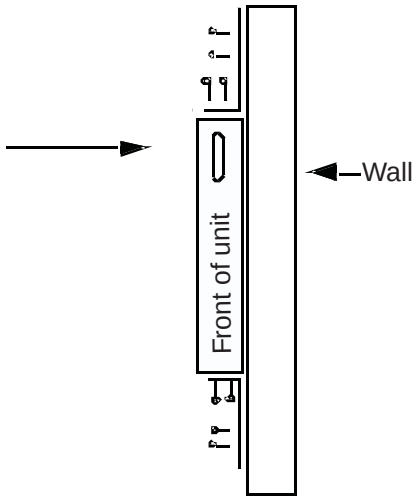
Wall mount using stationary mounting brackets

Use the following procedure to mount the *ConnectReach* system on a wall using the stationary mounting brackets.

(Continued on next page)

Wall Mount (Continued)

Wall mount using stationary mounting brackets (continued)

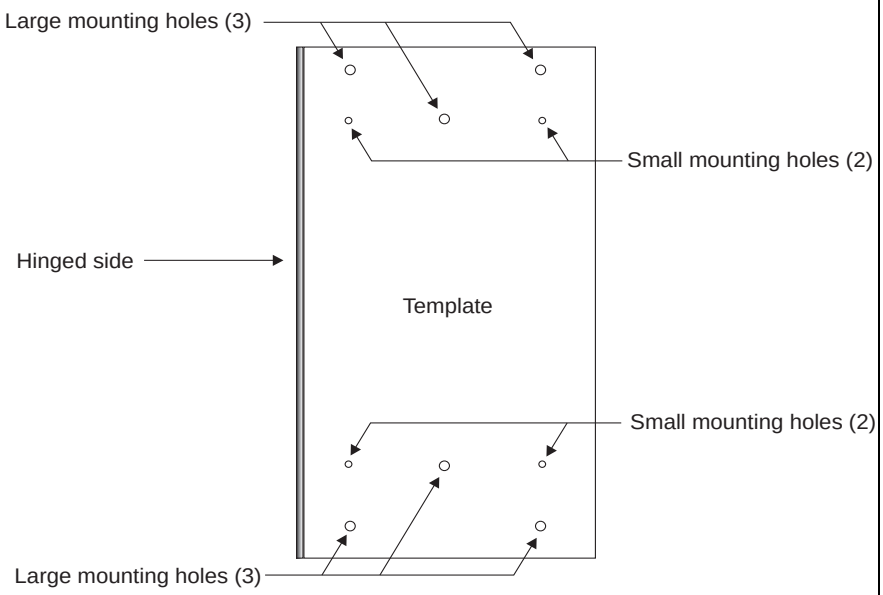
Step	Procedure
1	Attach the short side of the brackets to the *ConnectReach* system.
2	Determine the location and position the unit on the wall. Position the VOICE CHANNELS connector (UP) toward the top of the front panel. Ensure vent holes are not obstructed. 
3	**NOTE:** Wall mount screws are not provided as part of the installation kit. **CAUTION:** *Suitable anchor bolts are required when installing the* ConnectReach *system on drywall or concrete surfaces.* Secure the unit to the wall using the required fasteners.

(Continued on next page)

Wall Mounting (Continued)

Wall mount using hinged wall mount assembly

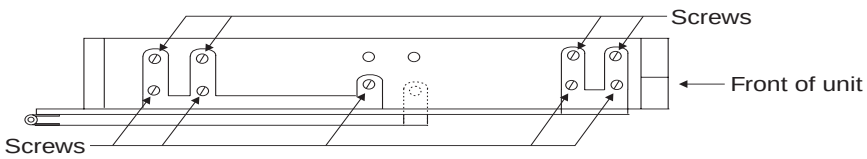
Use the following procedure to mount one or multiple (up to four) *ConnectReach* systems on a wall using the hinged wall mount assembly.

Step	Procedure
1	Using the template provided with the mounting assembly, mark the location of the mounting holes on the wall. The template contains two different sets of mounting holes (refer to the following figure). The four smaller holes (0.30 inches in diameter) in the assembly are used to temporarily hang the assembly while installing the screws in the six larger holes (0.40 inches in diameter). **NOTE:** The hinged wall mount assembly must be mounted so that the hinge is on the left or right side. Failure to comply will void UL certification of the assembly. **CAUTION:** *The hinged wall mount assembly must be mounted to a minimum ¾-inch thick plywood that is securely fastened to the mounting wall.* 

(Continued on next page)

Wall Mounting (Continued)

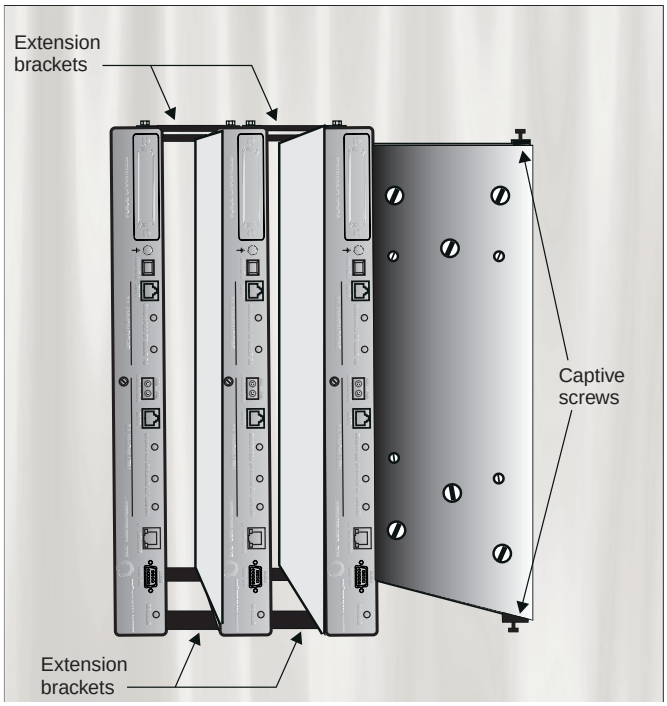
Wall mount using hinged wall mount assembly (continued)

Step	Procedure
2	Secure the hinge assembly plate to the plywood surface using #14, ¾-inch pan-head Phillips screws in each of the six large mounting holes.
3	Position a *ConnectReach* system unit on its side with the **VOICE CHANNELS** connector at the top. Insert the unit between the upper and lower mounting flanges with the rear of the unit facing the hinge on the wall mount assembly. Attach the unit to the upper and lower flanges using the 18 #6-32 mounting screws and washers provided. There are nine screw locations on the top and nine on the bottom of the assembly (refer to the following figure showing a top view of the mounting assembly). 
4	If only a single *ConnectReach* system unit is to be installed at this time, then secure the mounted unit against the wall using the two captive screws that screw into the existing holes on the top and bottom edges of the hinged assembly plate. Otherwise, continue with Step **5**.

(Continued on next page)

Wall Mounting (Continued)

Wall mount using hinged wall mount assembly (continued)

Step	Procedure
5	**NOTE:** In a multiple mount arrangement, extension brackets are used to attach a unit being installed in a hinged wall mount assembly to the unit that was installed last (for example, the second unit is attached to the first unit, the third unit is attached to the second unit, etc.). Using the screws and washers provided in the extension bracket kit, loosely attach two of the extension brackets to the top and two to the bottom of the last *ConnectReach* system unit that was mounted in the hinged wall mount assembly (refer to the following figure). 

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Wall Mounting (Continued)

Wall mount using hinged wall mount assembly (continued)

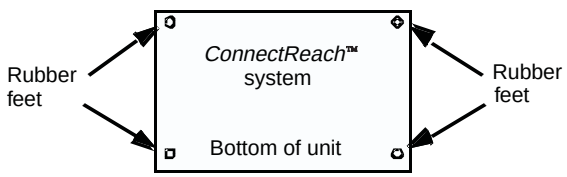
Step	Procedure
6	With the *ConnectReach* system unit oriented in the same manner as the previous unit(s), insert the unit between the extension brackets and secure the unit to the brackets using the screws provided. Tighten all extension bracket screws.
7	If additional *ConnectReach* system units are to be installed in the hinged wall mount assembly, repeat the procedure from Step **5** for the next unit to be installed. Otherwise, secure the mounted units against the wall using the two captive screws that screw into the existing holes on the top and bottom edges of the hinged assembly plate.

Desktop Mount

Install four rubber feet

Attach the four included rubber feet to the bottom of the unit to use the *ConnectReach* system on a desktop.

NOTE:
Mounting brackets are not used for a desktop installation.

Step	Procedure
1	Remove the protective covering from the self-adhesive surface on the rubber feet.
2	Place the rubber feet in the recessed areas located on the bottom of the case. 
3	Press firmly to ensure good adhesion of the rubber feet.

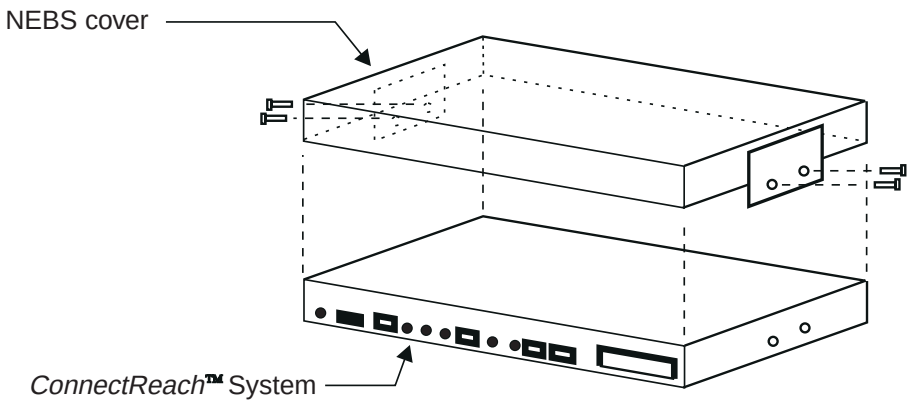
NEBS Cover Installation (Optional)

Introduction

The new equipment building standards (NEBS) installation kit (ED-7C830-30, G5) consists of a perforated metal cover for the *ConnectReach* system and four #6-32 mounting screws with lock washers. The NEBS cover allows the *ConnectReach* system to meet Bellcore NEBS Level 3 standards (GR-63).

Procedure

The NEBS cover is placed on top of the *ConnectReach* system unit and secured on each side with two screws and lock washers as shown in the following figure.

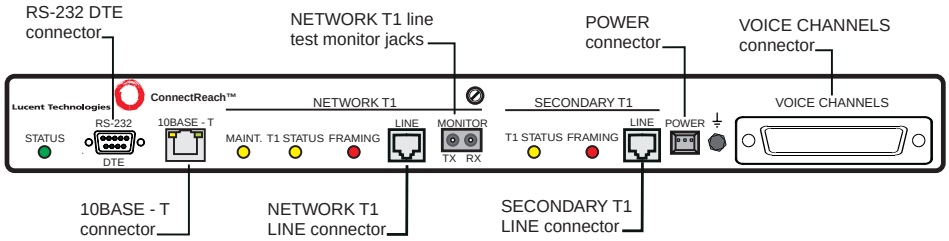


Connect Cables to the *Connect Reach* System

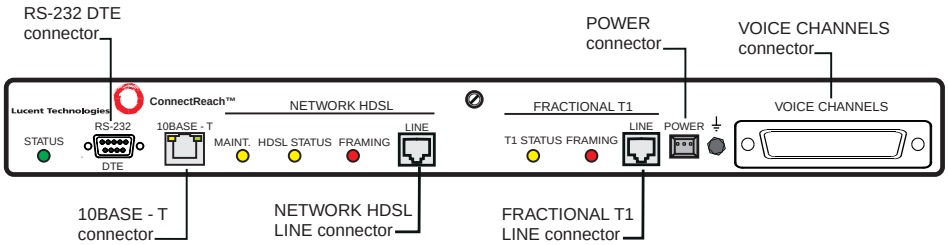
Overview

Introduction

The following figure summarizes the cable connections to the *ConnectReach* system. Refer to this figure while connecting the cables to the unit.



T1/DSX-1



HDSL

Construct Cable Assemblies

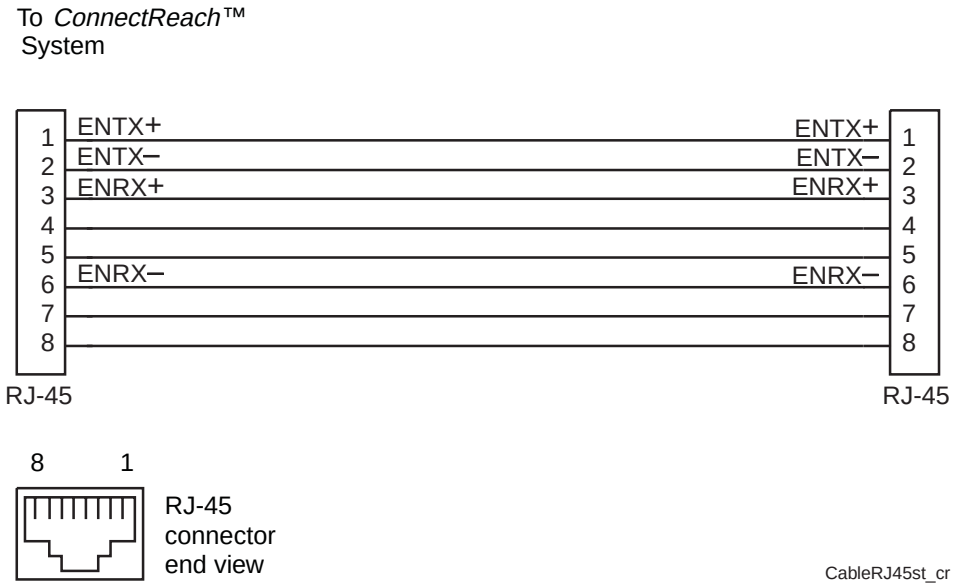
Introduction

You must provide the cable assemblies for the *ConnectReach* system.

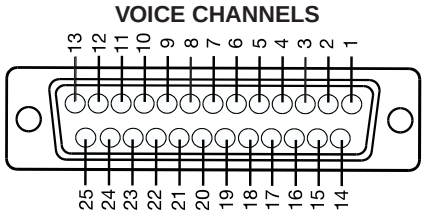
Standard cables

The following cables are standard and readily available.

- Standard 10Base-T Ethernet cable (RJ-45) for connection to the local Ethernet network (refer to the following figure for pin designations)



- Telco cable (standard Telco 50-pin) for connection to the punch-down block for analog voice channels (refer to the following figure for pin designations).



- 10 AWG copper ground wire with ring lug for frame ground (recommended)
- DC power cable (optional).

(Continued on next page)

Construct Cable Assemblies (Continued)

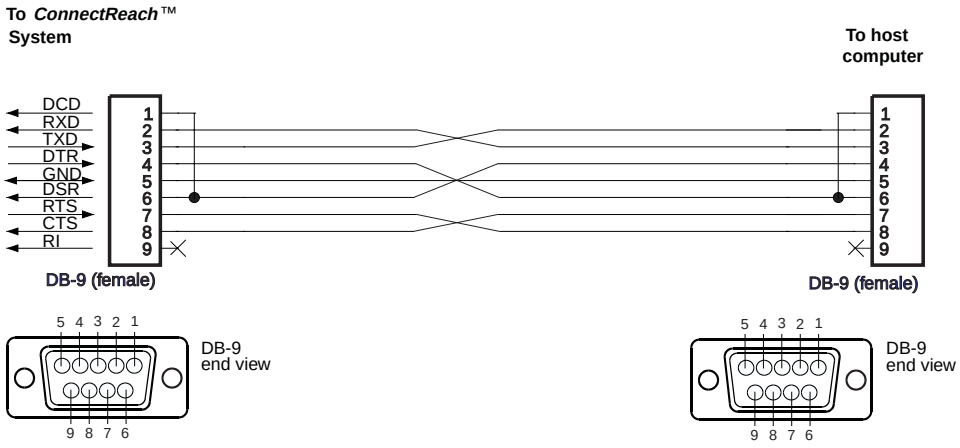
Nonstandard cables

The following cables are not standard and must be assembled for use with the *ConnectReach* system.

- One or both of the following cables.
  a. Modem cable for connection to a modem, allowing configuration from a remote computer. This cable should have a 9-pin female connector at the *ConnectReach* system end and a connector appropriate for the modem at the other end (usually a 25-pin male connector).
  b. Null-modem cable for connection to the serial port of a local computer.
- T1 modular shielded crossover cable (RJ-48C) for connection to the secondary/fractional T1/DSX-1 port.
- Ethernet crossover cable. Required when connecting a local provisioning terminal to the **10BASE-T** port which allows the use of a Web browser to configure and/or monitor the *ConnectReach* system.

RS-232 null modem

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the RS-232 null modem connection.



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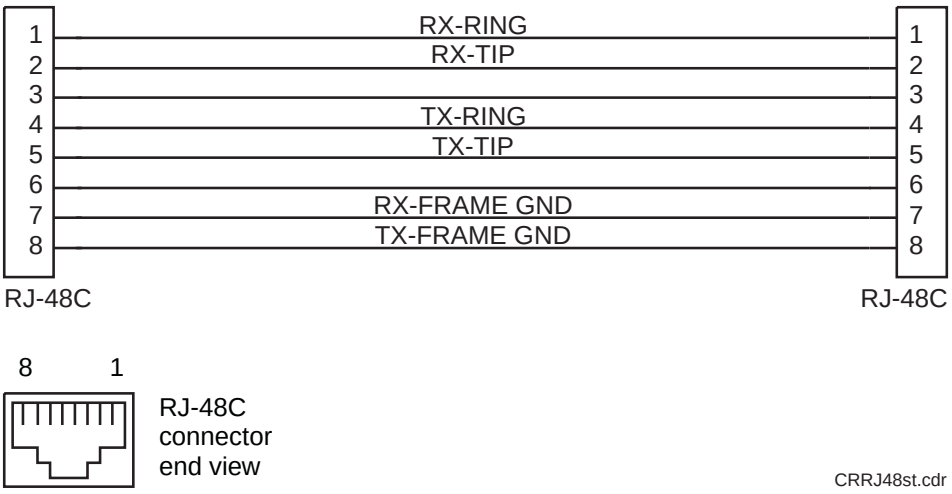
Construct Cable Assemblies (Continued)

T1, straight RJ-48 to RJ-48

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the T1 RJ-48 to RJ-48 *straight* connection. The transmit (TX) and receive (RX) designations are relative to the *ConnectReach* system.

NOTE:
Note the following assembly requirements.

- TX-TIP and TX-RING must be the same twisted pair.
- RX-TIP and RX-RING must be the same twisted pair.
- Vendor PN, Siemans Co. MC5-S-8T-10-B02.
- 10-foot shielded.



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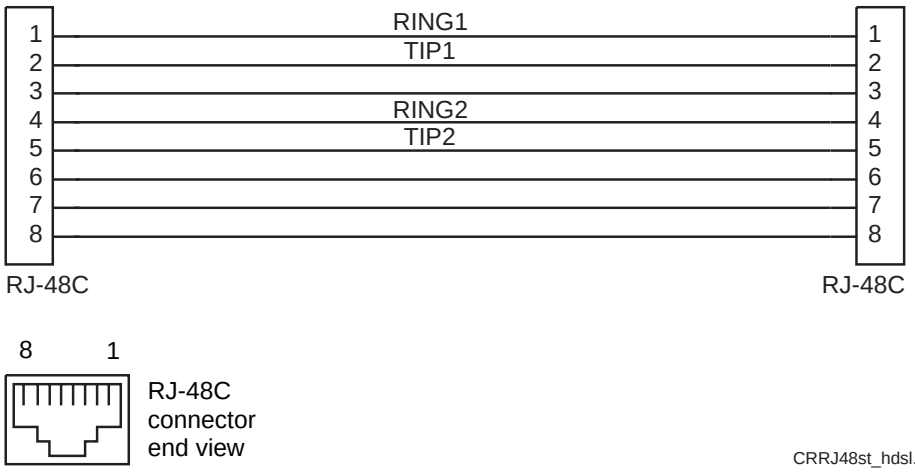
Construct Cable Assemblies (Continued)

HDSL, straight RJ-48 to RJ-48

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the high data-rate digital subscriber line (HDSL) RJ-48 to RJ-48 *straight* connection.

NOTE:
Note the following assembly requirements.

- TIP1 and RING1 must be the same twisted pair.
- TIP2 and RING2 must be the same twisted pair.
- Vendor PN, Siemans Co. MC5-S-8T-10-B02.
- 10-foot shielded.



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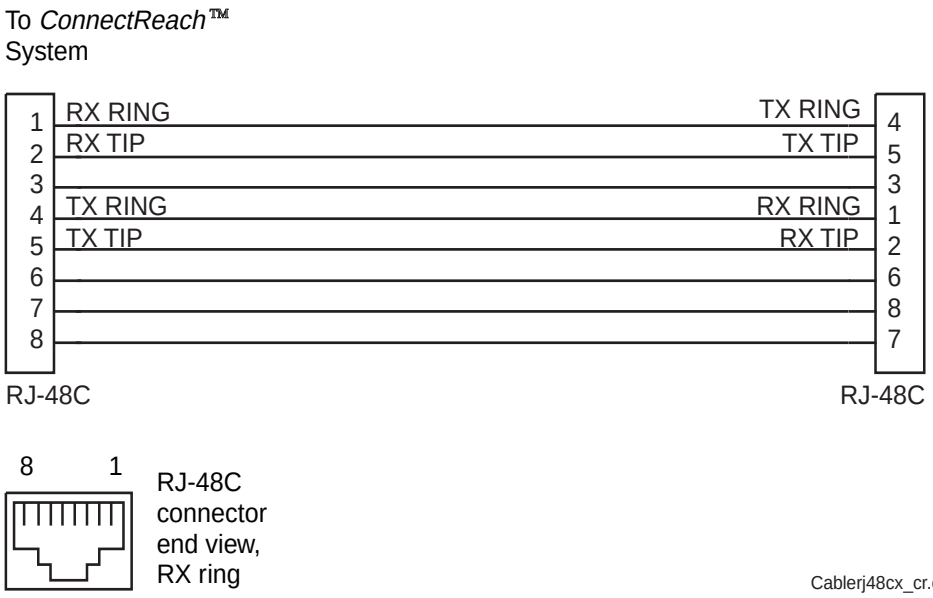
Construct Cable Assemblies (Continued)

T1, crossover RJ-48 to RJ-48

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the T1 RJ-48 to RJ-48 *crossover* connection.

NOTE:
Note the following assembly requirements.

- Use the same twisted pair for the TX-TIP and TX-RING.
- Use the same twisted pair for the RX-TIP and RX-RING.



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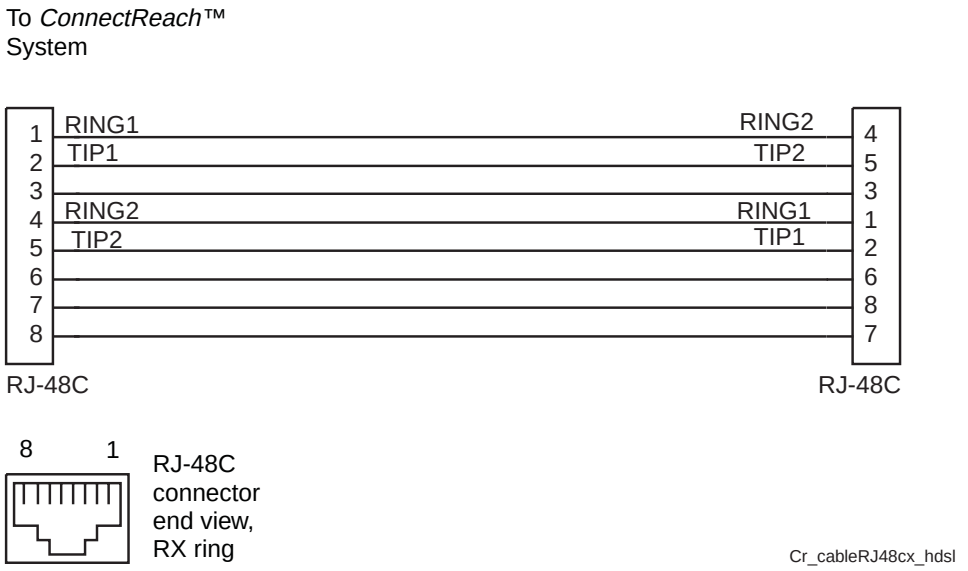
Construct Cable Assemblies (Continued)

HDSL, crossover RJ-48 to RJ-48

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the HDSL RJ-48 to RJ-48 *crossover* connection.

NOTE:
Note the following assembly requirements.

- Use the same twisted pair for the TIP1 and RING1.
- Use the same twisted pair for the TIP2 and RING2.



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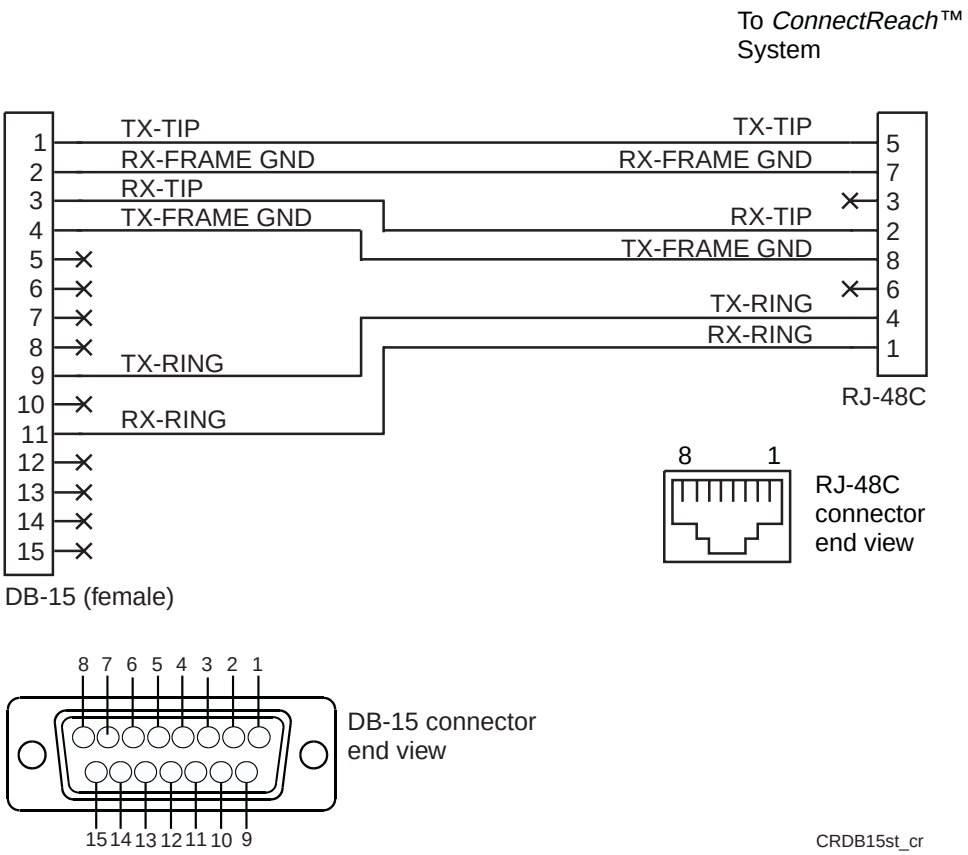
Construct Cable Assemblies (Continued)

T1, straight RJ-48 to DB-15

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the T1 RJ-48 to DB-15 *straight* connection.

NOTE:
Note the following assembly requirements.

- Use the same twisted pair for the TX-TIP and TX-RING.
- Use the same twisted pair for the RX-TIP and RX-RING.



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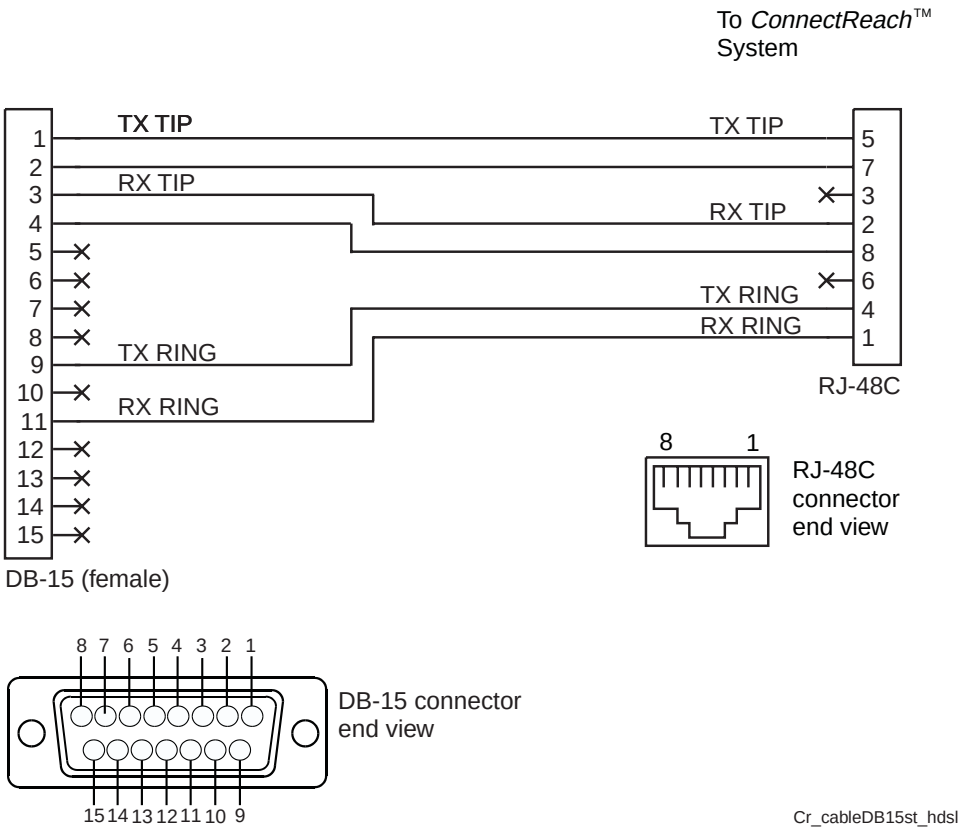
Construct Cable Assemblies (Continued)

HDSL, straight RJ-48 to DB-15

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the HDSL RJ-48 to DB-15 *straight* connection.

NOTE:
Note the following assembly requirements.

- Use the same twisted pair for the TIP1 and RING1.
- Use the same twisted pair for the TIP2 and RING2.



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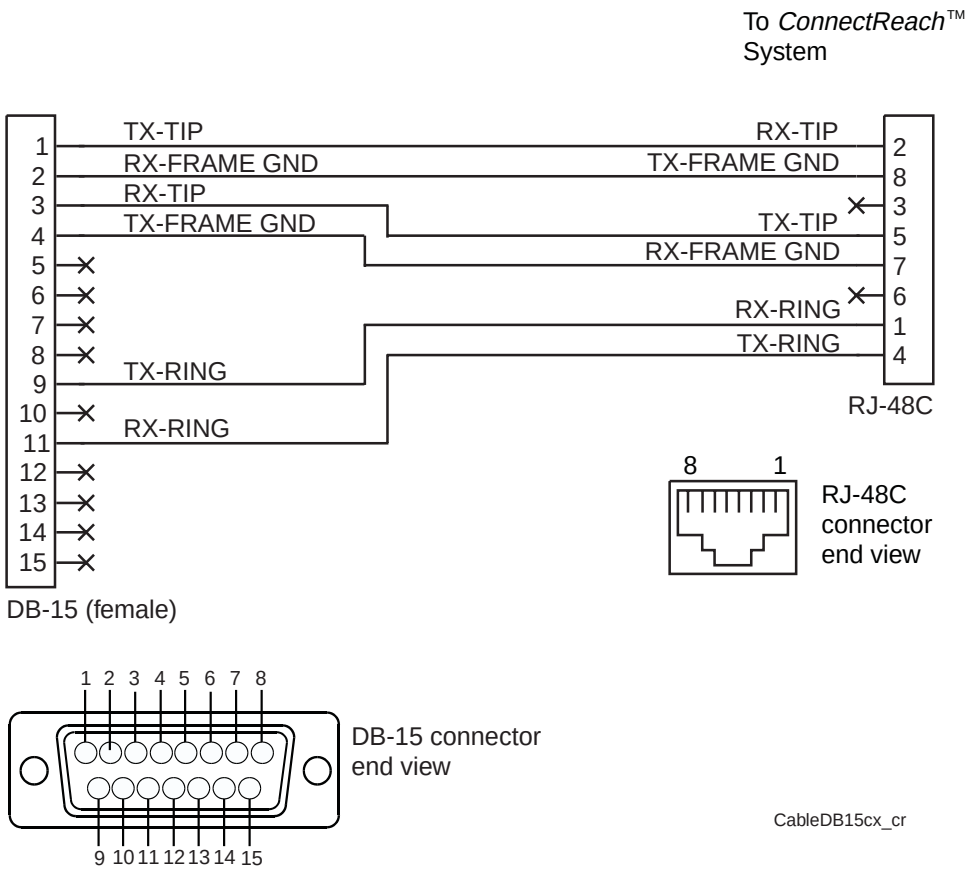
Construct Cable Assemblies (Continued)

T1, crossover RJ-48 to DB-15

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the T1 RJ-48 to DB-15 *crossover* connection.

NOTE:
Note the following assembly requirements.

- Use the same twisted pair for the TX-TIP and TX-RING.
- Use the same twisted pair for the RX-TIP and RX-RING.



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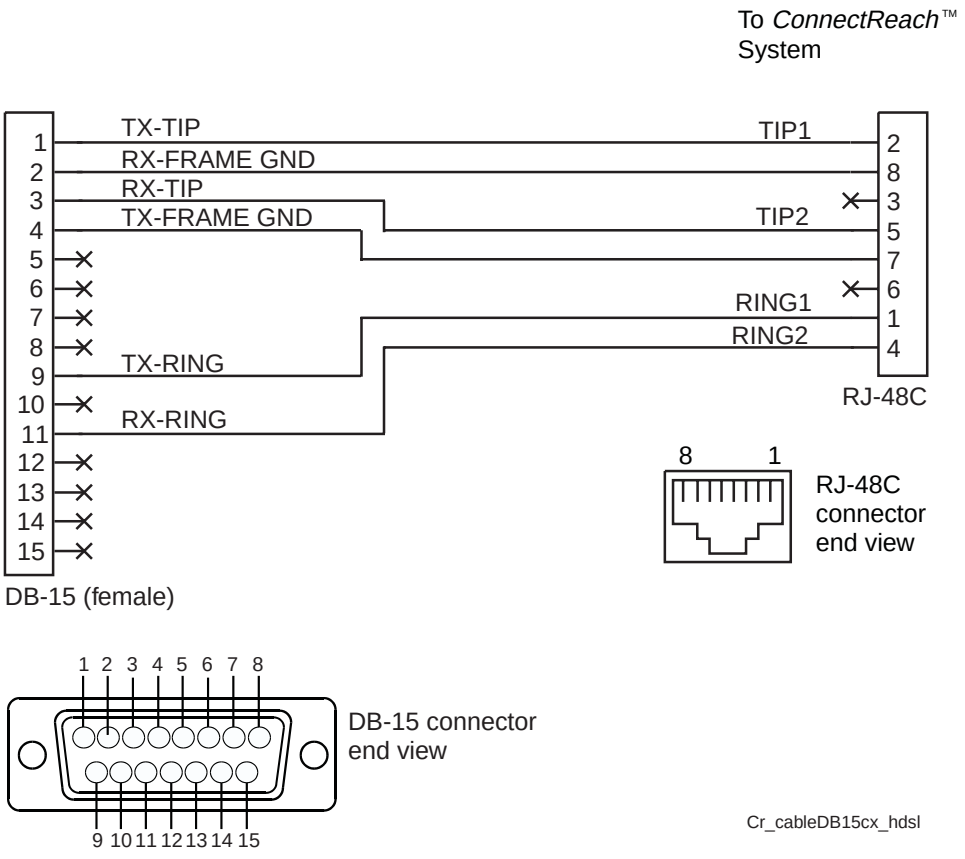
Construct Cable Assemblies (Continued)

HDSL, crossover RJ-48 to DB-15

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the HDSL RJ-48 to DB-15 *crossover* connection.

NOTE:
Note the following assembly requirements.

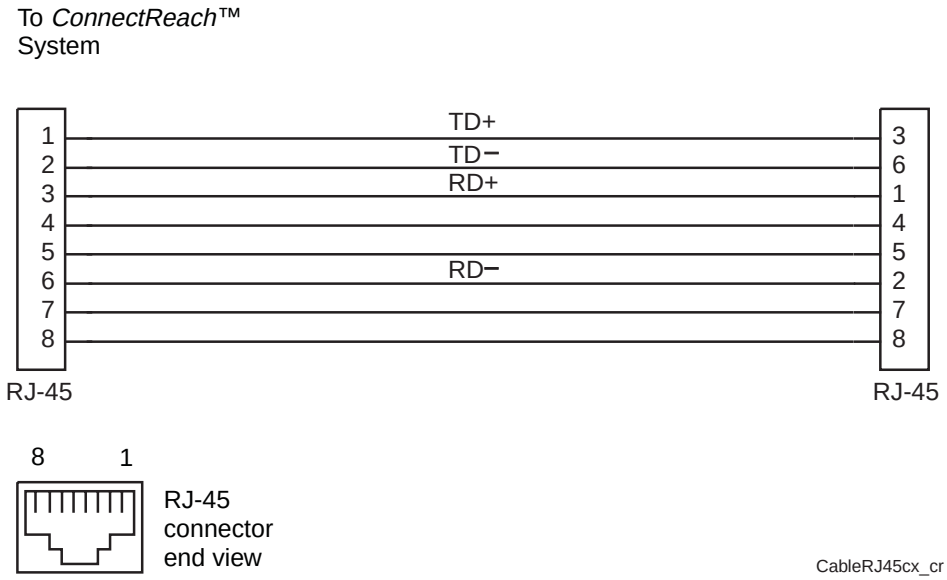
- Use the same twisted pair for the TIP1 and RING1.
- Use the same twisted pair for the TIP2 and RING2.



Construct Cable Assemblies (Continued)

Ethernet, crossover RJ-45 to RJ-45

The following figure illustrates the assembly of the required cable to connect the *ConnectReach* system using the Ethernet RJ-45 to RJ-45 *crossover* connection.



Procedures

Introduction

After mounting the *ConnectReach* system, you are ready to connect the cables to the unit.

Connect the Ethernet and T1 cables to the unit

Connect the Ethernet and network cables to the *ConnectReach* system.

Step	Procedure
1	Connect the Ethernet cable from the Ethernet network hub to the **10BASE-T** connector on the *ConnectReach* system.
2	Connect a shielded T1/HDSL cable to the **NETWORK T1/HDSL — LINE** connector on the *ConnectReach* system.

Connect the unit to the site phone system

Connect the unit to the phone system of the site and analog trunk lines.

NOTE:
The secondary/fractional T1/DSX-1 cable is normally a crossover cable.

PBX or key system (with T1 interface)

Connect a shielded T1 cable from the private branch exchange (PBX) or key system (with T1/DSX-1 interface) to the **SECONDARY/FRACTIONAL T1 — LINE** connector located on the *ConnectReach* system.

Phone system using the FXS or FXO interface

Connect a standard 50-pin Telco cable from the punch-down block or break-out box to the **VOICE CHANNELS** connector located on the *ConnectReach* system.

Hard-ground connection

A ground stud is provided on the front panel of the *ConnectReach* system for a “hard-ground” connection. The crimp-type ring lug of a main ground bus conductor is to be attached to this ground stud.

(Continued on next page)

Procedures (Continued)

Hard-ground connection (continued)

NOTE:
Frame ground is provided in the power connection, however it is recommended that the hard-ground connection be made for all installations, especially for applications employing ground-start circuits. Unpredictable results may occur if adequate ground connections are not made. A 10 AWG copper conductor should be connected from the ground stud on the *ConnectReach* system chassis to the main ground bus at the installation site using established installation practices.

Connect power cables and power the unit

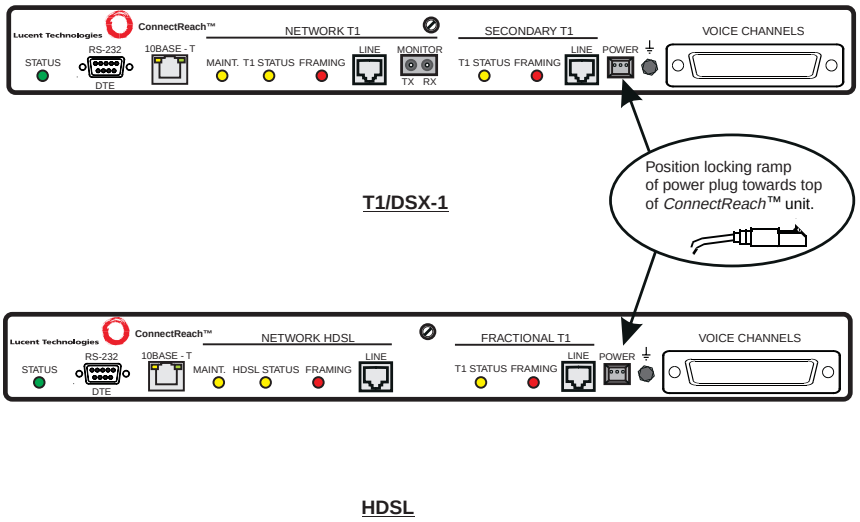
Connect AC power supply or DC power cables and power the *ConnectReach* system.

Step	Procedure
1	**NOTE:** The power connector supplies frame ground. The ground stud provides an *additional* ground point. When a secondary frame ground connection to the *ConnectReach* system is required, attach the ring lug of a frame ground cable to the ground stud on the *ConnectReach* system.
2	Route the AC power supply or DC power cable above the **VOICE CHANNELS** connector.
3	Place a tie-wrap through the tie-wrap loop located in the upper right-hand corner of the *ConnectReach* system front faceplate.
4	Secure the power cable to the *ConnectReach* system using the tie-wrap.

(Continued on next page)

Procedures (Continued)

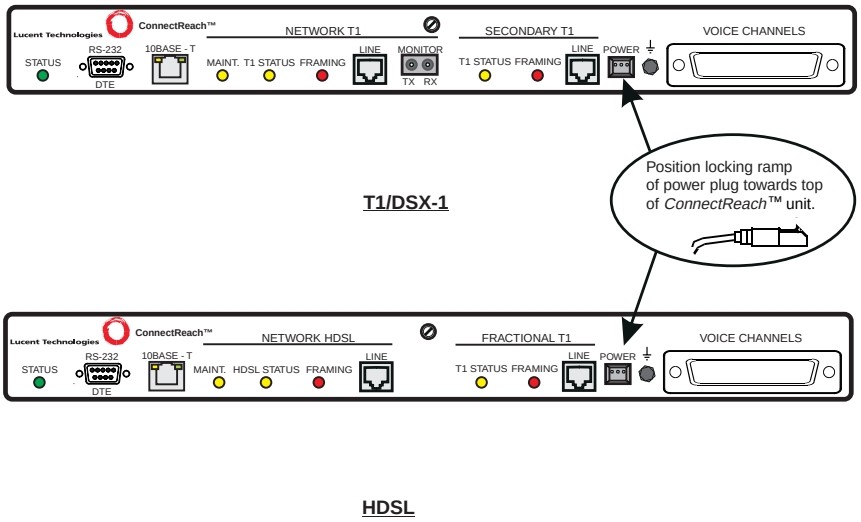
Connect the unit for power (continued)

Step	Procedure
5	Position the power cable plug so that the locking ramp is facing up (toward the top of the *ConnectReach* system). 
6	Insert the power cable plug into the **POWER** connector located on the *ConnectReach* system.
7	Remove the 6-32 nut from the stud located next to the **POWER** connector.

(Continued on next page)

Procedures (Continued)

Connect the unit for power (continued)

Step	Procedure
8	Install the retaining bracket for the power connector. 
9	Reinstall the 6-32 nut and tighten.
10	**AC** Plug the AC power supply into a grounded 120-V AC receptacle. **DC** Connect the DC power cable to the battery, the DC supply, or the battery backup unit. **NOTE:** If the Model LT733 AC-to-DC power converter with battery backup is used in powering the *ConnectReach* system, refer to the Gordon Kapes, Inc. Technical Practice for the *Model 733 DC UPS Power Supply* for information concerning the installation and connection of this unit.

(Continued on next page)

Procedures (Continued)

Self test

When power is supplied, the *ConnectReach* system performs a self-test. The results of the test are indicated through illuminating a combination of light-emitting diodes (LEDs) located on the front of the unit. The green **STATUS** LED indicator lights (only the **STATUS** LED indicator) when the unit passes all tests and the T1 lines are properly operating.

LED Indicator					
Green STATUS	**Yellow MAINT**	**Yellow T1 STATUS**	**Red T1 FRAMING**	**Condition**	**Recoverable/ Not Recoverable**
ON or *flashing*	OFF	OFF	OFF	The *ConnectReach*™ system passed all tests and is functioning normally.	Normal operating condition
OFF	OFF	OFF	OFF	No power available to the *ConnectReach* system.	Recoverable*
OFF	OFF	OFF	ON	System image check sum failed.	Recoverable†
OFF	OFF	ON	OFF	The nonvolatile random access memory (NVRAM) check sum failed.	Recoverable‡
OFF	ON	OFF	OFF	The flash *protected boot* code check sum failed.	Not recoverable§
OFF	ON	OFF	ON	An Ethernet loopback failed.	Not recoverable§
OFF	ON	ON	OFF	Codec loopbacks failed.	Not recoverable§
OFF	ON	ON	ON	Code execution from protected boot.	Not recoverable§
OFF	OFF	ON	ON	A random access memory (RAM) test failed.	Not recoverable§

* If the self-test indicates that no power is available to the *ConnectReach* system, first verify that the AC power cord is plugged into a functional AC outlet or that the DC power cord is plugged into a functional DC power source. If the power source is verified to be functional, replace the power cord.

† If the system image check sum fails, you must connect a modem to the RS-232 port and download a new system image (refer to Chapter 8, “Maintenance and Trouble Clearing”).

‡ If the NVRAM check sum fails, it is because some part of the stored configuration has become corrupted. Since it is not possible to determine which part of the data is corrupted, you should completely reconfigure the *ConnectReach* system, save the new configuration, reboot, and observe the self-test LEDs again.

§ Nonrecoverable errors indicate a *ConnectReach* system hardware failure. You must replace the failed *ConnectReach* system with a new unit. After installing the new unit, you must configure the replacement with the same configuration settings as the original unit.

(Continued on next page)

Procedures (Continued)

Reconfigure the ConnectReach System

If necessary, you can reconfigure the *ConnectReach* system. For information about using the *ConnectReach* system Utility, see Chapter 4, “Configuring the *ConnectReach* system”. You can also check the status of the *ConnectReach* system. For more information, see Chapter 6, “*ConnectReach* System Monitoring”.

48-Line Master/Slave Configuration

Overview

Introduction

A T1/DSX-1 *ConnectReach* system may be connected to an HDSL *ConnectReach* system thereby doubling the maximum number of FXS lines. This configuration requires an HDSL *ConnectReach* system configured with the *LCR** feature and equipped with the DSP circuit card as a *master* system and a second T1/DSX-1 *ConnectReach* system, configured for channel bank capability only, as a *slave* system. Voice configuration of both units is accomplished through the master system. The T1/DSX-1 *ConnectReach* system is similar to the HDSL *ConnectReach* system, with the network interface being the only difference. This feature is supported for LCR/DID lines only. FXO analog trunks are supported only on the HDSL *ConnectReach* system. The secondary/fractional T1/DSX-1 port of the master *ConnectReach* system connects to the network interface of the slave *ConnectReach* system to provide 48-lines of service (24 lines from the master *ConnectReach* system and 24 lines from the slave *ConnectReach* system). The connection between the master and slave units will always be ESF/B8ZS in loop/ground mode. You must provision the *ConnectReach* system connected to the host as "'master" and the *ConnectReach* system interfacing through the master's secondary/fractional T1/DSX-1 port as "slave". The metallic voice frequency (VF) lines connected to the "master" system are provisioned as any other *ConnectReach* system configured with the *LCR* feature. To provision the VF metallic lines connected to the "slave" *ConnectReach* system, refer to Chapter 4, "Configuring the *ConnectReach* System."

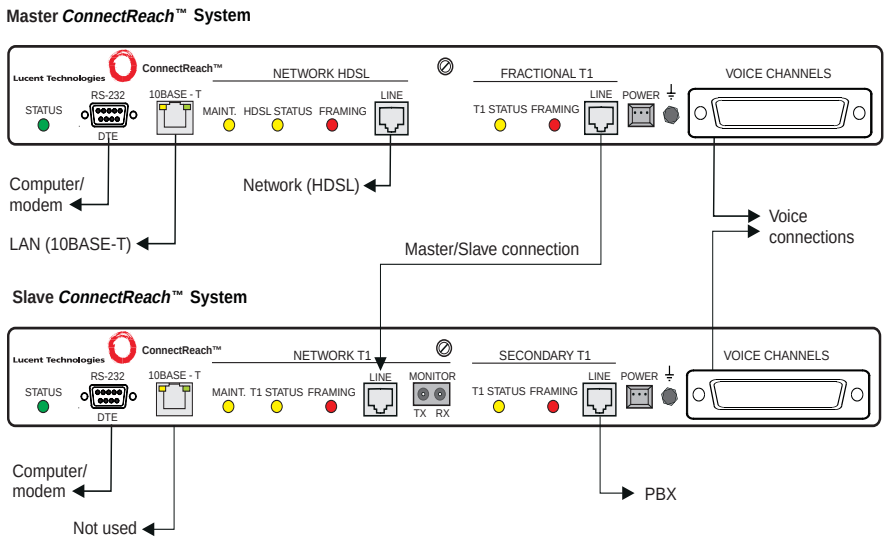
Although this configuration allows for 48 VF connections, only 24 VF lines (DS0s) can be in use at a time because of the capacity of the network T1/DSX-1/HDSL interfacing between the *ConnectReach* system and the DACS or digital switch host.

* Trademark of VINA Technologies, Inc.

Connecting Master and Slave Units

Procedure

Connect and configure master and slave *ConnectReach* systems for daisy chaining using the following procedure. Refer to the following figure when making connections.



Step	Procedure
1	Mount the master and slave *ConnectReach* systems using the mounting information located earlier in this chapter. **CAUTION:** *Do not mount one system on top of the other system.*

(Continued on next page)

Connecting Master and Slave Units (Continued)

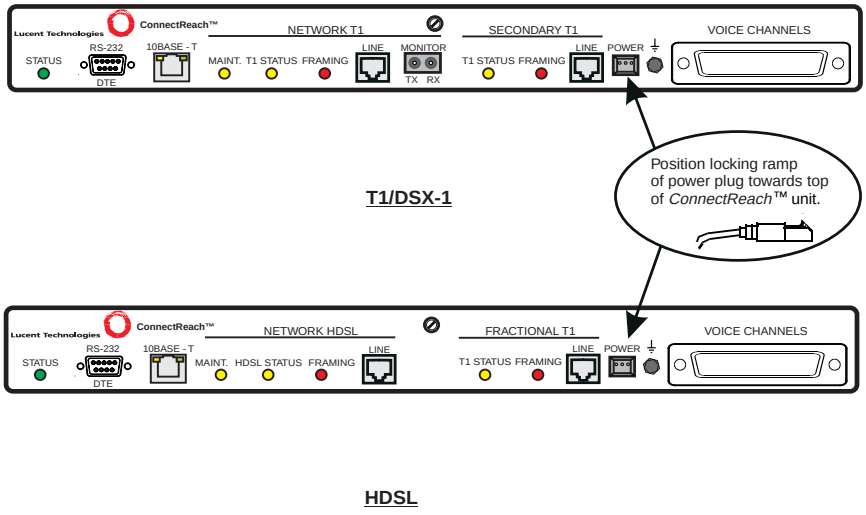
Procedure (continued)

Step	Procedure
2	Make the following cable connections according to the procedure in the section entitled “Connect Cables to the *ConnectReach* system”: ■ At both *master* and *slave* units, connect the **RS-232** connector to either a local computer using a null modem cable or to a modem using a fabricated modem cable. ■ Connect the **10BASE-T** connector on the *master* unit to the Ethernet network hub using the Ethernet cable. ■ Connect the **NETWORK T1/HDSL — LINE** connector on the *master* unit to the T1/HDSL facility using a shielded T1 cable. ■ Connect the **SECONDARY/FRACTIONAL T1 — LINE** connector on the *master* unit to the **NETWORK T1 — LINE** connector on the *slave* unit using a crossover cable (refer to Chapter 2, “Product Description”, for pin assignment). ■ At both *master* and *slave* units, connect the **VOICE CHANNELS** connector to a punch-down block using a standard 50-pin Telco cable.
3	**NOTE:** The power connector supplies frame ground. The ground stud provides an *additional* ground point. When a secondary frame ground connection to the *master* unit is required, attach the ring lug of a frame ground cable to the ground stud on the *master* unit.
4	Route the AC power supply or DC power cable above the **VOICE CHANNELS** connector on the *master* unit.
5	Place a tie-wrap through the tie-wrap loop located in the upper right-hand corner of the *master* unit front faceplate.

(Continued on next page)

Connecting Master and Slave Units (Continued)

Procedure (continued)

Step	Procedure
6	Secure the power cable to the *master* unit using the tie-wrap.
7	Position the power cable plug so that the locking ramp is facing up (toward the top of the unit). 
8	Insert the power cable plug into the **POWER** connector located on the *master* unit.
9	Remove the 6-32 nut from the stud located next to the **POWER** connector.
10	Install the retaining bracket for the power connector.
11	Reinstall the 6-32 nut and tighten.
12	**AC** Plug the AC power supply into a grounded 120-V AC receptacle. **DC** Connect the DC power cable to the battery, the DC supply, or the battery backup unit.
13	Repeat Steps **3** through **12** to make powering connections to the *slave* unit.

(Continued on next page)

Connecting Master and Slave Units (Continued)

Procedure (continued)

Step	Procedure
14	Refer to Chapter 4, “Configuring the *ConnectReach* system”, to set up a console session on the master *ConnectReach* system. The master *ConnectReach* system must be configured to accept a slave. This is done in the Config:Secondary/Fractional-t1 menu. The `has-slave` command must be set on. For more information on this menu, see Chapter 4, “Configuring the *ConnectReach* System”.
15	Refer to Chapter 4, “Configuring the *ConnectReach* system”, to set up a console session on the slave *ConnectReach* system. The slave *ConnectReach* system must be configured as a slave. This is done in the Config:Network-t1 menu. The `is-slave` command must be set on. For more information on this menu, see Chapter 4, “Configuring the *ConnectReach* System”.
16	At this point the two *ConnectReach* systems are connected as master and slave. The voice channel details will be configured on the master *ConnectReach* system. The slave DACS *ConnectReach* system will reflect any changes made on the master *ConnectReach* system. For more information, refer to Chapter 4, “Configuring the *ConnectReach* System”.

Analog Voice Interface Considerations

FXS

On-premises loop lengths of hookup wire

The talk battery of the FXS interface is –25 V DC at 25 mA. Based on a typical 330-ohm telephone plus 150 ohms of loop resistance at 25 mA, the FXS interface of the *ConnectReach* system supports the following on-premises loop lengths of hookup wire.

Loop Length (Feet)	Wire Gauge (AWG)
2,850	24
1,750	26

Ringer equivalent number (REN)

Cadence ringing

For cadence ringing, the FXS interface of the *ConnectReach* system supports a ringer equivalent number (REN) of five per channel, with a maximum of 75 REN per system.

Continuous ringing

For continuous ringing, the FXS interface of the *ConnectReach* system supports a REN of 1.5 per channel, with a maximum of 25 REN per system.

Minimum ringing voltage

The minimum ringing voltage supplied by the FXS interface of the *ConnectReach* system is 42.5 V_{rms} at 20 Hz.

AT&T Publication 43801 specifies that the AC ringing signal is to be superimposed on the ring lead only, with the tip lead grounded. The *ConnectReach* system generates a balanced AC voltage between the tip and ring leads. AT&T Publication 43801 also specifies that ringing on a ground-start line may be tripped by either grounding the ring lead or going off-hook. However, a ground-start device connected to the *ConnectReach* system can only trip ringing by going off-hook.

(Continued on next page)

FXS (Continued)

T1/HDSL state transitions

In some cases, invalid T1/HDSL state transitions are ignored.

Using ESF

When using ESF, the *ConnectReach* system ignores all transitions where the A and C bits have different values. (For example, a transition from 1010 to 1000 will be ignored.)

E&M trunks

On E&M trunks, the *ConnectReach* system ignores the B (and for ESF, the D) bits. (For example, a transition from 1111 to 1010 will be ignored on an E&M trunk.)

Can never happen

Some state transitions that *can never happen* are ignored. [For example, on loop- or ground-start trunks, a transition from 0000 (ringing) to 0100 (current feed reversal) is ignored, since ringing only occurs on incoming calls, and current feed reversal only occurs after an outgoing call is answered.]

FXO

REN

The *ConnectReach* system presents a REN equivalent of 1.5 at the FXO interface port.

Alarm Relay

Improper Function

Four conditions

The *ConnectReach* system supports an alarm relay that indicates when the unit is not functioning properly and one or more of the yellow or red status LEDs are illuminated. The alarm contacts are assigned to pins 25 and 50 of the Voice Channels connector. For information about the Voice Channels connector pin assignments, refer to Chapter 2, “Product Description”. The alarm contacts may be connected to an external alarm or a trunk bypass unit. Refer to the description of peripheral equipment located in Chapter 2, “Product Description”, for more information. One of the following four conditions will cause the alarm relay to close.

a. Power fails.

b. *ConnectReach* system fails.

c. Network T1/DSX-1/HDSL alarm is enabled and the network T1/DSX-1/HDSL link fails.

d. Secondary/fractional T1/DSX-1 alarm is enabled and the secondary/fractional T1/DSX-1 link fails.

FXO card

Disable the network T1/DSX-1/HDSL alarm when the *ConnectReach* system has an FXO card used with LCR and a trunk bypass unit is connected. If the T1/HDSL link fails, calls will automatically be rerouted out the FXO port, which is connected to the trunk bypass. If the network T1/DSX-1/HDSL alarm is enabled, calls will be rerouted out the FXS port and within the bypass unit causing connection problems.

ConnectReach System Monitoring

6

Contents

About This Chapter

Introduction

Contents

This chapter contains procedures for displaying various data stored in the *ConnectReach™* system, including system elements status and performance, by means of a local or remote provisioning terminal.

Using the Statistics Command to Display System Elements Status

Entering the Statistics Mode

General

You can use the `statistics` command with the appropriate options to display the status of the following system elements associated with the *ConnectReach* system:

- Internet protocol (IP)
- Internet packet exchange (IPX)
- Quality of service (QOS)
- Internet control message protocol (ICMP)
- Transport control protocol (TCP)
- User datagram protocol (UDP)
- Interfaces
- SOCKS
- Firewall
- Network address translation (NAT)
- Dynamic host configuration protocol (DHCP)
- Point-to-point protocol (PPP)
- T1/high data-rate digital subscriber line (HDSL) interface
- Voice channels
- Frame relay interface
- Routing.

Entering the statistics command

To display statistics for the *ConnectReach* system, you must first switch to the statistics mode by entering the `statistics` command at the Main prompt (`> statistics`).

The prompt changes to the statistics prompt [`(statistics) >`] where you can enter statistics command options.

(Continued on next page)

Entering the Statistics Mode (Continued)

Entering the statistics command options

Use the following procedure to enter the desired statistics command option(s):

1. At the statistics prompt [`(statistics) >`], enter the appropriate statistics command option from the following table.
2. When you are done, enter the `Exit` command to return to the Main Menu.

To …	Enter this command
Display statistics for IP*	`ip`
Display statistics for IPX	`novell-ipx`
Display statistics for QOS	`Qos`
Display statistics for ICMP*	`icmp`
Display statistics for TCP*	`tcp`
Display statistics for UDP*	`udp`
Display statistics for the interfaces	`interfaces`
Display statistics for SOCKS	`SOCKS`
Display statistics for Firewall	`Firewall`
Display statistics for NAT	`NAT`
Display statistics for DHCP	`DHCP`
Display statistics for PPP	`PPP`
Display statistics for the T1 Interface	`T1-E1`
Display statistics for the HDSL-T1 Interface	`HDSL-T1`
Display statistics for voice channels	`voice-states`
Display statistics for the frame relay interface	`frame`
Display statistics for routing	`routes`
Access on-line assistance	`Help`
Exit the Statistics submenu and return to the Main prompt	`exit`

* IP, ICMP, TCP, and UDP statistics reports are intended for advanced users who are familiar with Ethernet networks.

Displaying Statistics for IP

Entering the IP command

To display the statistics for IP, enter the `IP` command at the statistics prompt. For example:

```
(statistics)> ip
```

Example of IP statistics report

The following is an example of an IP statistics report that will be displayed on the PC monitor screen.

```
total         794
badsum        0
tooshort      0
toosmall      0
badhlen       0
badlen        0
fragments     0
fragdropped   0
fragtimeout   0
forward       0
cantforward   11
redirectsent  0
fastpath      0
```

Displaying Statistics for IPX

Entering the IPX command

To display the statistics for IPX, enter the `Novell IPX` command at the statistics prompt. For example:

```
(statistics)> Novell-ipx
```

Example of IPX statistics report

The following is an example of an IPX statistics report that will be displayed on the PC monitor screen.

```
IPX TRAFFIC STATISTICS

Virtual Port #0 (LAN)      Encapsulation 802.2
Node 0060490002fe          Network 16202222
RIP packets received       5
SAP packets received       1246
RIP packets sent           21
SAP packets sent           5
Total packets received     4081104
Total packets sent         4074759

Virtual Port #1 (WAN)      Encapsulation RFC 1490
Node 0060490002fe          Network 0003c591
RIP packets received       2420
SAP packets received       2421
RIP packets sent           3
SAP packets sent           6
Total packets received     6194643
Total packets sent         5079731
```

Displaying Statistics for QOS

Entering the QOS command

To display the statistics for QOS, enter the QOS command at the statistics prompt. For example:

```
(statistics)> qos
```

Example of QOS statistics report

The following is an example of a QOS statistics report that will be displayed on the PC monitor screen.

```
QOS PACKET STATISTICS
IP QOS is enabled
Highpriority packets Tx : 52
Low priority packets Tx : 395
Highpriority packets Tx Errors 0
```

Displaying Statistics for ICMP

Entering the ICMP command

To display the statistics for Internet control message protocol (ICMP), enter the ICMP command at the statistics prompt. For example:

```
(statistics)> ICMP
```

Example of ICMP statistics report

The following is an example of an ICMP statistics report that will be displayed on the PC monitor screen.

```
ICMP:
    2   call to icmp_error
    0   error not generated because old message was icmp
    Output histogram:
             echo reply: 1
    0   message with bad code fields
    0   message < minimum length
    0   bad checksum
    0   message response generated
    Input histogram:
             echo reply: 12
             destination unreachable: 6
    0   message response generated
```

Displaying Statistics for TCP

Entering the TCP command

To display the statistics for transport control protocol (TCP), enter the TCP command at the statistics prompt. For example:

```
(statistics)> TCP
```

Example of TCP statistics report

The following is an example of a TCP statistics report that will be displayed on the PC monitor screen.

```
TCP:
        713     packet sent
                290     data packet
                33      data packet (28299 byte) retransmitted
                221     ack-only packet (98 delayed)
                0       URG only packet
                0       window probe packet
                91      window update packet
                80      control packet
        750     packet received
                303     ack (for 113493 bytes)
                24      duplicate ack
                0       ack for unsent data
                394     packet (96285 byte) received in-sequence
                5       completely duplicate packet (725 byte)q
                0       packet with some dup. data (0 byte duped)
                33      out-of-order packet (15872 byte)
                2       packet (2 bytes) of data after window
                2       window probe
                2       window update packet
                5       packet received after close
                0       discarded for bad checksum
                0       discarded for bad header offset field
                0       discarded because packet too short
        30      connection request
        32      connection accept
        59      connection established (including accepts)
        60      connection closed (including 0 drop)
        3       embryonic connection dropped
        269     segment updated rtt (of 0 attempt)
        37      retransmit timeout
                0       connection dropped by rexmit timeout
        0       persist timeout
        0       keepalive timeout
                0       keepalive probe sent
                0       connection dropped by keepalive
```

Displaying Statistics for UDP

Entering the UDP command

To display the statistics for user datagram protocol (UDP), enter the UDP command at the statistics prompt. For example:

```
(statistics)> udp
```

Example of UDP statistics report

The following is an example of a UDP statistics report that will be displayed on the PC monitor screen.

```
UDP:
   81   total packets
   44   input packets
   37   output packets
   0    incomplete header
   0    bad data length field
   0    bad checksum
   16   broadcasts received with no ports
   0    full socket
```

Displaying Statistics for Interfaces

Entering the interfaces command

To display the statistics for interfaces, enter the `interfaces` command at the statistics prompt. For example:

```
(statistics)> interfaces
```

Example of interfaces statistics report

The following is an example of an interfaces statistics report that will be displayed on the PC monitor screen.

```
cpm0 (unit number 0):
    Flags: (0x63) UP BROADCAST ARP RUNNING
    Internet address: 207.104.144.180
    Broadcast address: 207.104.144.255
    Netmask 0xffffff00 Subnetmask 0xffffff00
    Ethernet address is 00:60:49:f0:00:05
    Metric is 0
    Maximum Transfer Unit size is 1500
    85999 packets received; 1480 packets sent
    0 input errors; 1480 output errors
    0 collisions
lo (unit number 0):
    Flags: (0x69) UP LOOPBACK ARP RUNNING
    Internet address: 127.0.0.1
    Netmask 0xff000000 Subnetmask 0xff000000
    Metric is 0
    Maximum Transfer Unit size is 4096
    0 packets received; 0 packets sent
    0 input errors; 0 output errors
    0 collisions
```

(Continued on next page)

Displaying Statistics for Interfaces (Continued)

Example of interfaces statistics report (continued)

The report contains a section for each available network interface on the *ConnectReach* system. Each section begins with a code identifying the interface the section describes. The possible codes are shown in the following table.

Code	Interface	Comments
`cpm0-1`	10Base-T	Normal interface to local Ethernet network.
`lo`	10Base-T	Loopback interface. Always reported, even when the link is not in loopback mode. Address shown is the standard loopback IP address.
`fr 0-29`	Network T1/DSX-1/HDSL [primary frame relay permanent virtual circuit (PVC)]	Present only if encapsulation is set to frame relay.
`sppp`	Network T1/DSX-1/HDSL [point-to-point protocol (PPP) interface]	Present only if encapsulation is set to PPP.
`hdlc`	Network T1/DSX-1/HDSL [high-level data link control (HDLC) interface]	Present only if encapsulation is set to HDLC.
`ds 0`	Secondary/fractional T1	Present only if Secondary/fractional T1 is enabled.
`fd1`	Network HDSL (FDL interface)	Present only if IP over facility data link (FDL) is enabled

If you are unable to make a data or voice connection across the *ConnectReach* system, check the Interface statistics to determine which interface is not functioning. In particular, if the flags line indicates “DOWN” for any interface you expect to see “UP,” check the physical connection for that interface.

Displaying Statistics for SOCKS

Entering the SOCKS command

To display the statistics for SOCKS, enter the SOCKS command at the statistics prompt. For example:

```
(statistics)> socks
```

Example of SOCKS statistics report

The following is an example of a SOCKS statistics report that will be displayed on the PC monitor screen. The report includes the source and destination addresses of all connections.

```
192.168.0.2 connected to 189.47.34.16
192.168.0.3 connected to 112.13.75.18
192.168.0.12 connected to 207.104.240.17
192.168.0.56 connected to 200.100.100.3
Currently, there are 4 SOCKS connections
```

This is a status report only; no errors are reported.

Displaying Statistics for Firewall

Entering the firewall command

To display the statistics for Firewall, enter the `firewall` command at the statistics prompt. For example:

```
(statistics)> firewall
```

Example of firewall statistics report

The following is an example of a firewall statistics report that will be displayed on the PC monitor screen.

```
IN (from WAN to LAN) [currently enabled]
Number of packets passed 75389
Number of packets failed 13

OUT (from LAN to WAN) [Currently enabled]
Number of packets passed 116
Number of packets failed 83

IP Forwarding is enabled
```

This is a status report only; no errors are reported.

Displaying Statistics for NAT

Entering the NAT command

To display the statistics for NAT, enter the NAT command at the statistics prompt. For example:

```
(statistics)> NAT
```

Example of NAT statistics report

The following is an example of an NAT statistics report that will be displayed on the PC monitor screen.

```
NAT IP Packets                      :    4614
NAT IP Outbound Packets             :    14
NAT IP Inbound Packets              :    4600
NAT IP Fragments                    :    0
NAT IP Packets Dropped              :    215
NAT IP Packets Translated           :    0
NAT TCP Packets Translated          :    0
NAT UDP Packets Translated          :    0
NAT ICMP Packets Translated         :    0
NAT IP Packets Passed Thru          :    0
NAT Sessions in Use                 :    0
NAT Sessions Allocated              :    0
NAT Sessions Freed                  :    0
NAT Sessions Refused                :    4614
NAT Sequence Adjusts in Use         :    0
NAT Stress Recovery                 :    0
NAT Norm Recovery                   :    19
```

Displaying Statistics for DHCP

Entering the DHCP command

To display the statistics for dynamic host configuration protocol (DHCP), enter the DHCP command at the statistics prompt. For example:

```
(statistics)> dhcp
```

Example of DHCP statistics report

The following is an example of a DHCP statistics report that will be displayed on the PC monitor screen.

```
IP-address       ethernet address
168.192.100.11   00:c0:ff:11:22:ce   hostname1
168.192.100.23   00:c0:ff:11:22:33   hostname2   expired
```

This is a status report only; no errors are reported.

The hostname field will be *hostname unknown* if the *ConnectReach* system has been running for an interval shorter than the DHCP lease time.

The *expired* tag appears if the network application running on the client computer allowed the DHCP lease to expire (usually because the computer was powered off while the application was running).

Displaying Statistics for PPP

Entering the PPP command

To display the statistics for point-to-point protocol (PPP), enter the PPP command at the statistics prompt. For example:

```
(statistics)> PPP
```

Example of PPP statistics report

The following is an example of a PPP statistics report that will be displayed on the PC monitor screen.

```
                    Point to Point Protocol

Link Control Protocol Status = OPENED
Internet Protocol Control Protocol Status = OPENED
```

This is a status report only; no errors are reported.

Displaying Statistics for a T1 or HDSL-T1 Interface

Entering the T1-E1 command

To display the statistics for the T1/DSX-1 interface, enter the `T1-E1` command at the statistics prompt. For example:

```
(statistics)> T1-E1
```

At the `statistics:T1-E1` prompt, enter the appropriate T1/DSX-1 interface command option from the following table.

Enter this command …	…and specify this parameter…	…and this parameter	…and this time period
report	network, secondary	carrier, user	hour, day
clearReport	network, secondary		
statusReport	network, secondary		
setLoopback	network, secondary	payload, line, AIS	[5]…20 min
clearLoopback	network, secondary	payload, line, AIS	
usageReport	hours [8]		

Entering the HDSL-T1 command

To display the statistics for the HDSL-T1 interface, enter the `HDSL-T1` command at the statistics prompt. For example:

```
(statistics)> HDSL-T1
```

At the `statistics:HDSL-T1` prompt, enter the appropriate HDSL interface command option from the following table.

Enter this command …	…and specify this parameter…	…and this parameter	…and this time period
report	network, fractional	carrier, user	hour, day
clearReport	network, fractional		
statusReport	network, fractional		
setLoopback	network, fractional	payload, line, AIS	[5]…20 min
clearLoopback	network, fractional	payload, line, AIS	
usageReport	hours [8]		

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Example of T1 or HDSL line statistics report

At the statistics:T1-E1 or statistics: HDSL-T1 prompt, enter the following commands:

```
(statistics:T1-E1)> report network carrier hour
```

or

```
(statistics:HDSL-T1)> report network carrier hour
```

The following is an example of a T1/HDSL line statistics report that will be displayed on the PC monitor screen.

```
Network Carrier ONE HOUR REPORT
ESF Counter: 36855
Current Interval Time: 818              Valid Intervals: 19

                 BPV   CRC   ES   UAS   BES   SES   CSS   LOFC
Current Count    0     0     0    0     0     0     0     0
24-Hour Count    4     0     0    0     0     0     0     1

Interval 1       0     0     0    0     0     0     0     0
Interval 2       0     0     0    0     0     0     0     0
Interval 3       0     0     0    0     0     0     0     0
Interval 4       0     0     0    0     0     0     0     0
```

NOTE: BPV = bipolar violation; BES = bursty seconds; CRC = CRC errors; SES = severely error seconds; ES = error seconds; CSS = counted slip seconds; UAS = unavailable seconds; LOFC = loss of frame count

If the count of bipolar violations (BPV) is high, verify that the T1/HDSL line coding format is set correctly. If the line is set to bipolar 8 zero substitution (B8ZS) line coding when it should be set to alternate mark inversion (AMI), this would cause bipolar violations.

If you suspect a problem with the T1/HDSL line, enter the same `report` command several times in succession. If the Current Count field for any condition increments rapidly, a problem with the physical connection is indicated. If the Current Count field increments gradually, verify whether the error rates fall within the carrier's guaranteed Quality of Service. If they do not, contact the carrier.

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Clearing statistics on a T1 or HDSL-T1 line

At the statistics:T1-E1 or statistics: HDSL-T1 prompt, enter either the `clearReport network` or `clearReport secondary/fractional` to select the network T1/DSX-1/HDSL line or the secondary/fractional T1/DSX-1 line, respectively. For example:

```
(statistics:T1)> clearReport network
```

or

```
(statistics:HDSL-T1)> clearReport network
```

The *ConnectReach* system maintains two sets of statistics records, one called the carrier database and the other called the user database. Initially, both sets are identical. When you clear statistics, you clear only the user database. The entire carrier database is always retained, so that statistics records are available even if the user database is cleared.

Displaying status on a T1 or HDSL-T1 line

At the statistics:T1-E1 or statistics: HDSL-T1 prompt, enter either the `statusReport network` or `statusReport secondary/fractional` command to select the network T1/DSX-1/HDSL line or the secondary/fractional T1/DSX-1 line, respectively. For example:

```
(statistics:T1-E1)> statusreport network
```

or

```
(statistics:HDSL-T1)> statusreport network
```

A report similar to the following example is displayed for the T1/HDSL line you specified:

```
Network T1/HDSL LINE STATUS
Loss of Signal        : NO
Unavailable State     : NO
Loss of Frame         : NO
Receive AIS           : NO
Receive RAI           : NO
Transmit RAI          : NO
Transmit AIS          : NO
Loopback Status       : OFF

HDSL Loop Status      : Both Loops Up
```

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Displaying status on a T1 or HDSL-T1 line (continued)

If “NO” is displayed after any of the conditions in the status report, this is an indication that no error is detected by the *ConnectReach* system. If “Yes” is displayed, this is an indication that the corresponding error condition has been detected.

T1/HDSL line error conditions and the corresponding corrective actions are listed in the following table.

Condition	Corrective Action
Loss of Signal	A problem with the wiring exists. Check the physical connection. Contact the carrier if necessary.
Unavailable State	The most recent 10 or more seconds have been flagged Errored Seconds. A problem with the T1/HDSL line exists. Contact the carrier.
Loss of Frame	The line is configured for the wrong framing format. Verify with the carrier whether the framing format should be changed.
Receive AIS	Alarm Indication Signal (AIS). Loop has been placed down at the remote end. Contact the carrier.
Receive RAI	Remote Alarm Indicator (RAI). This indicates an error at the remote end. Contact the carrier.
Transmit RAI	Errors in these categories usually indicate that the T1/HDSL line is incorrectly configured. Check that the *ConnectReach* system configuration matches the carrier’s configuration of the line.
Transmit AIS	

HDSL loop status

HDSL consists of two loops, each carrying 784 Kb/s. When both loops are up, the payload is 1.544 Mb/s. Loop status displays the current status of the loop integrity monitor (LIM).

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Setting loopback on a T1 or HDSL-T1 line

The `setloopback` command is used to place the T1/HDSL circuit into the loopback mode. The following types of loopback are possible:

- A payload loopback unframes then reframes prior to echoing bits.
- A line loopback simply echoes bits.

At the statistics:T1 or statistics: HDSL-T1 prompt, enter the `setloopback` command and the appropriate T1/HDSL line parameters from the following table.

The device which is both the source and destination of the T1 stream needs to be internally clocked. The other T1 device should be network clocked.

Enter this command at the Statistics:HDSL prompt …	..and specify this HDSL-T1 line parameter…	..and this parameter	..and this timeout value
`setloopback`	`network, fractional`	`payload, line, AIS`	`[5]...20`

For example:

```
(statistics:T1-E1)> setloopback network line 10
```

or

```
(statistics:HDSL-T1)> setloopback network line 10
```

NOTE:
The alarm indication signal (AIS) is a blue alarm, not a loopback.

The time-out limit (which is expressed in minutes) ensures that the T1/HDSL line reverts to normal operation automatically after the specified time elapses, preventing unnecessary downtime.

The *ConnectReach* system responds to remote channel service unit (CSU) and data service unit (DSU) loopback requests in accordance with AT&T Publication 43801. The *ConnectReach* system does not respond to remote fractional loopback requests in the V.54 or T1.403 (annex B) specifications.

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Clearing loopback on a T1 or HDSL-T1 line

The `clearloopback` command is used to clear a loopback that has been established on a T1/HDSL line.

At the statistics:T1-E1 or statistics: HDSL-T1 prompt, enter the `clearloopback` command and the appropriate parameters for a T1/HDSL line from the following table.

Enter this command at the Statistics:HDSL prompt …	..and specify this HDSL-T1 line parameter…	..and this parameter
`clearloopback`	`network, fractional`	`payload, line, AIS`

For example:

```
statistics:T1)> clearloopback network line
```

or

```
(statistics:HDSL-T1)> clearloopback network line
```

Displaying usage report

The `usageReport` command is used to display usage report data over a specified time period for a T1/HDSL line. The default time period is 8 hours.

At the statistics:T1-E1 or statistics: HDSL-T1 prompt, enter the `usageReport` command and specify the number of hours if different from the default of 8 hours.

For example:

```
(statistics:T1)> usageReport 4
```

or

```
(statistics:HDSL-T1)> usageReport 4
```

(Continued on next page)

Displaying Statistics for a T1 or HDSL-T1 Interface (Continued)

Displaying usage report (continued)

A report similar to the following example is displayed.

```
T1/HDSL usage samples during previous 4 hours:

                 data transmit      data receive       voice
                 min   avg   max  | min   avg   max  | min   avg   max
15  min   ago:  0%    0%    12%  | 0%    3%    74%  | 0%    1%    7%
30  min   ago:  0%    1%    30%  | 0%    6%    99%  | 0%    6%    7%
45  min   ago:  0%    1%    18%  | 0%    6%    77%  | 0%    5%    14%
60  min   ago:  0%    1%    24%  | 0%    16%   100% | 0%    2%    7%
75  min   ago:  0%    1%    12%  | 0%    16%   100% | 0%    0%    0%
90  min   ago:  0%    0%    9%   | 0%    3%    97%  | 0%    4%    7%
105 min   ago:  0%    0%    10%  | 0%    1%    47%  | 0%    1%    7%
120 min   ago:  0%    1%    25%  | 0%    2%    92%  | 0%    0%    7%
135 min   ago:  0%    1%    60%  | 0%    1%    64%  | 0%    1%    7%
150 min   ago:  0%    0%    10%  | 0%    0%    38%  | 0%    0%    0%
165 min   ago:  0%    0%    8%   | 0%    0%    11%  | 0%    0%    0%
180 min   ago:  0%    0%    5%   | 0%    0%    4%   | 0%    0%    0%
195 min   ago:  0%    0%    5%   | 0%    0%    11%  | 0%    0%    0%
210 min   ago:  0%    0%    15%  | 0%    0%    10%  | 0%    0%    0%
225 min   ago:  0%    0%    1%   | 0%    0%    11%  | 0%    0%    0%
240 min   ago:  0%    0%    1%   | 0%    0%    2%   | 0%    0%    0%
```

The Usage Report data is displayed in 15 minute increments. Voice DS0s are sampled once every minute with the minimum, maximum, and average minutes displayed. Data DS0s are monitored by counting the total number of bytes sent during a 1-minute interval.

The Usage Report is an indicator of efficient DS0 assignment. If the following example were the case for an extended period of time, reallocating the DS0s would improve the overall use of the T1/HDSL line:

— 16 voice DS0s showing a maximum minute of 10 percent

— Eight data DS0s showing an average minute of 90 percent.

Displaying Statistics for Voice Channels

Entering the voice-states command

To display voice channel statistics, enter the `voice-states` command at the statistics prompt.

For example:

```
(statistics)> voice-states
```

If the LCR/DID application is being used for voice, then a report similar to the following example is displayed:

```
Switched Digital Trunks
DS0 RxA RxB Dest      State
--- --- --- --------  -----
1   0   1   Line 5    Active
2   0   1   Line 7    Active
3   1   1             Idle
4   1   1             Idle
5   1   1             Idle
6   1   1             Idle
7   1   1             Idle
8   1   1             Idle


Switched Analog Trunks
Ch# CdA CdB Dest      State
--- --- --- --------  -----
9   0   0             Idle
10  0   0             Idle
11  0   0             Idle
12  0   0             Idle
13  0   0             Idle
14  0   0             Idle
15  0   0             Idle
16  0   0             Idle
```

(Continued on next page)

Displaying Statistics for Voice Channels (Continued)

Entering the voice-states command (continued)

```
Switched Analog Trunks
Ch# CdA CdB Dest      State
--- --- --- --------  -----
1   1   1             Idle
2   1   1             Idle
3   1   1             Idle
4   1   1             Idle
5   0   1   DigTrk 1  Active  *05*12018889902
6   1   1             Idle
7   1   1   DigTrk 2  Active
8   1   1             Idle
```

If voice connections are not operating as expected, use the `diagnose` command, discussed later in this chapter, to test the channel.

(Continued on next page)

Displaying Statistics for Voice Channels (Continued)

Entering the voice-states command (continued)

The following table lists the possible channel states that may appear in the State column of the voice channel statistics report.

State	Description
`active`	A call is currently active on the channel.
`idle`	The channel is currently idle (no call is active).
`ringing`	The channel is in ringing mode either by means of the Diagnose command, discussed later in this chapter, or because an incoming connection is being requested on the channel.
`tone1k`	The channel has been put in tone1k mode either by the Diagnose command, discussed later in this chapter, or by the carrier. In this mode, a phone attached to the channel will emit an audible 1-kHz tone.
`reversal`	The channel has been put in reversal mode either by the Diagnose command, discussed later in this chapter, or by means of carrier signaling.
`not active`	Hardware to support the channel is present in the *ConnectReach* system, but the channel has not been enabled (refer to Chapter 4, "Configuring the *ConnectReach* System").

Displaying Statistics for the Frame Relay Interface

Entering the frame command

The `frame` command is used to display a frame relay traffic statistics report.

At the statistics prompt, enter the `frame` command:

```
(statistics)> frame
```

The prompt changes to the statistics:frame prompt where you can enter the commands from the following table.

To	Enter this command...	...and one of these options
Display one or all PVCs	PVC	(1...30), all
Display LMI	LMI	
Exit this submenu	Exit	

If the PVC command is entered with the parameter *all*, a report similar to the following example is displayed:

(Continued on next page)

Displaying Statistics for the Frame Relay Interface (Continued)

Entering the frame command (continued)

FRAME RELAY PVC STATISTICS

PVC	Enabled	UP/DOWN	DLCI	RxFrames	TxFrames
PVC1	Enabled	UP	101	213	0
PVC2	Enabled	UP	102	213	420
PVC3	Disabled	DOWN	103	213	0
PVC4	Disabled	DOWN	104	213	0
PVC5	Disabled	DOWN	105	213	0
PVC6	Disabled	DOWN	106	213	0
PVC7	Disabled	DOWN	107	213	0
PVC8	Disabled	DOWN	108	213	0
PVC9	Disabled	DOWN	109	213	0
PVC10	Disabled	DOWN	110	213	0
PVC11	Disabled	DOWN	111	213	0
PVC12	Disabled	DOWN	112	213	0
PVC13	Disabled	DOWN	113	213	0
PVC14	Disabled	DOWN	114	213	0
PVC15	Disabled	DOWN	115	213	0
PVC16	Disabled	DOWN	116	213	0
PVC17	Disabled	DOWN	117	213	0
PVC18	Disabled	DOWN	118	213	0
PVC19	Disabled	DOWN	119	213	0
PVC20	Disabled	DOWN	120	213	0
PVC21	Disabled	DOWN	121	213	0
PVC22	Disabled	DOWN	122	213	0
PVC23	Disabled	DOWN	123	213	0
PVC24	Disabled	DOWN	124	213	0
PVC25	Disabled	DOWN	125	213	0
PVC26	Disabled	DOWN	126	213	0
PVC27	Disabled	DOWN	127	213	0
PVC28	Disabled	DOWN	128	213	0
PVC29	Disabled	DOWN	129	213	0
PVC30	Enabled	UP	130	213	0

(Continued on next page)

Displaying Statistics for the Frame Relay Interface (Continued)

Entering the frame command (continued)

The report should be reviewed for the following indications and the appropriate action taken:

- If the status of a PVC is “DOWN,” first verify that the *ConnectReach* system is configured correctly, then contact the carrier.
- If the number of packets sent and received is zero for a PVC, either the *ConnectReach* system is configured incorrectly, or there is no traffic between the local area network (LAN) and the wide area network (WAN). Verify the *ConnectReach* system configuration. You can use the `ping` command to generate traffic, and verify whether frame counts have incremented. Also, use the `log` command to see if any simple network management protocol (SNMP) link-down traps have been logged.
- If the cyclic redundancy check (CRC) error count increments rapidly, a problem with the physical connection is indicated. If the field increments gradually, verify whether the error rates fall within the carrier’s guaranteed Quality of Service. If they do not, contact the carrier.

(Continued on next page)

Displaying Statistics for the Frame Relay Interface (Continued)

Entering the frame command (continued)

If the local management interface (LMI) command is entered, a report similar to the following example is displayed:

```
FRAME RELAY LMI STATISTICS
--------------------------
Total Status Enquires Sent:          535
Full Status Enquires Sent:           90
Total Status Responses Received:     535
Full Status Enquires Received:       90
Invalid LMI Messages Received:       0

Last Sequence Number Received:       25
Local Sequence Number:               25
Sequence Number Sync Errors:         0


Total Receive CRC Errors:            0
Total Low Buffer Drops:              0
Total Queue Full Drops:              0
Total Circuit Errors:                0
Total Send Data Errors:              0
```

If invalid LMI messages are received, the configuration of the *LMI-type* parameter on the Config:Frame-relay menu is incorrect. Verify the correct setting with the carrier.

Displaying Statistics for Route

Entering the route command

The `route` command is used to display a status report for each route.

At the statistics prompt, enter the `route` command:

```
(statistics)> route
```

A Route Net Table report similar to the following example is displayed:

```
ConnectReach Routing Table
Network        Mask           GW              Dist  Intf  Flags  State  Ref
1.0.0.0        255.0.0.0      1.1.1.1         2     fr0   R      G      1
13.0.0.0       255.0.0.0      207.242.96.201  1     fr0   S      G      1
14.0.0.0       255.0.0.0      207.242.96.201  1     fr0   S      G      1
100.0.0.0      255.0.0.0      207.242.96.1    1     qu0   S      G      1
200.200.100.0  255.255.255.0  207.242.96.176  2     qu0   R      G      1
200.200.200.0  255.255.255.0  207.242.96.176  1     qu0   S      G      1
207.242.96.0   255.255.255.0  207.242.96.201  1     qu0   D      G      2
213.213.213.0  255.255.255.0  213.213.213.1   1     fr1   D      G      1
0.0.0.0        0.0.0.0        207.242.96.201  0     fr0   F      G

Flags: D->Direct     S->Static     F->Default     R->RIP     H->Host
State: G->Good       P->Suspect    B->Bad
Total number of routes: 9
```

This is a status report only; no errors are reported. The Ref column indicates the number of interfaces associated with each route. Only routes that are up are displayed. The routing table is updated once every 30 seconds. A description of the possible routing states follows:

Good — A direct, static, or default route is good if the associated interface is up. A routing information protocol (RIP) route has a good state if it has been heard from in the last 60 seconds.

Suspect — This state applies to RIP routes only. A RIP route is suspect if it has not been heard from in the last 60 seconds.

Bad — This state applies to RIP and static routes only. A route in a bad state is about to be deleted. It is kept on the routing table for 3 minutes during which routing neighbors are notified of its state. It takes 94 seconds for a RIP route to go from suspect to bad.

Miscellaneous Monitoring Commands

Introduction

Definition of miscellaneous monitoring commands

This section provides procedures for using the miscellaneous monitoring commands and the displays resulting from the use of these commands. The commands described include the following:

- Version
- Show-hardware-config
- Traceroute.

Display Current Version of System Software

Entering the version command

The `version` command is used to display the current version of the *ConnectReach* system software and uptime information; that is, how long the *ConnectReach* system has been running since the last power-on or reboot.

At the Main Menu prompt, enter the `version` command:

Example:

> **`version`**

The following is an example of the display obtained when the `version` command is entered.

```
******* System Image Boot *******

ConnectReach system(2.3.1)
Built: Apr 6 1998, 15:24:47
NVRAM version 0107
PB $Id: romInit.s,v 1.3 1997/03/07 23:44:27 dab Exp $

Copyright 1996-1998 VINA Technologies, Inc.

System running for   18 day 22 hour 29 mins 13 secs
```

The version information can be interpreted as follows:

ConnectReach system (2.3.1)	System image version
NVRAM version 0107	Configuration partition version
PB $Id: romInit.s,v 1.3…	Protected boot version

Displaying Hardware Configuration

Entering the show hardware command

The `show hardware` command is used to display the current hardware configuration for the *ConnectReach* system. This command displays information such as the unit's serial number, the Ethernet address, the amount of main memory, and the presence or absence of optional hardware components.

At the Main Menu prompt, enter the `show-hardware-config` command:

```
> show-hardware-config
```

Information about the current hardware configuration for the *ConnectReach* system is displayed. The following is an example of the information displayed.

```
Hardware configuration:

Hardware version 0006
Serial number 0000000000323
Ethernet address 00.60.49.00.02.8C
Analog channels 1-8 are type FXS
Analog channels 9-16 are type FXO revision A
4194304 bytes of main memory
No SIMM memory present
Secondary T1 is not present
DSP is present
```

Using the Traceroute Command

Entering the traceroute command

The *traceoute* command allows you to trace the routing history between two points on an IP network. Traceroute sends three separate packets with the time to live (TTL) field set to the lowest number possible. When the packets reach the first router, three timeout messages are returned to the *ConnectReach* system by means of the Internet control message protocol (ICMP). Three more packets are sent with the TTL field incremented by one. These packets pass the first router, know as a hop, and reach the second router. This process continues until the hop count reaches 30 or the destination address is reached.

For example:

```
>traceoute 199.188.96.83
traceroute to 199.188.96.83: 1-30 hops, 28 byte packets
192.168.0.1 (192.168.0.1) 8.33 ms 0.0 ms 10 ms
199.188.96.83 (199.188.96.83) 5.0 ms (ttl=125!) 10 ms
(ttl=125!) 5.0 ms (ttl=125!)
```

Some routers do not reply with a timeout message. In those instances, an "*****" will be placed in the time field. The `ttl` is displayed with a number and an exclamation point (for example, `ttl=125!`) when the response packet returns an unexpected value for the `ttl`. Refer to the following table for a listing of some of the possible codes.

Code	Comments
!H	host unreachable
!N	network unreachable
!P	protocol unreachable
!S	source route failed
!F	fragmentation needed

Configure/Monitor the *ConnectReach* System Using a Web Browser

7

Contents

About This Chapter

Introduction

Contents

This chapter explains the use of a Web browser in configuring and monitoring the *ConnectReach*™ system. The information covered in this chapter includes the following:

- Preparing the *ConnectReach* system for access by a Web browser
- Configuring the *ConnectReach* system
- Displaying logs and statistics
- Upgrading the *ConnectReach* system with new software
- Rebooting the *ConnectReach* system
- Exiting the *ConnectReach* system Utility.

Preparing/Accessing the *ConnectReach*™ System

Preparing the *ConnectReach* System for Access Using a Web Browser

Required items

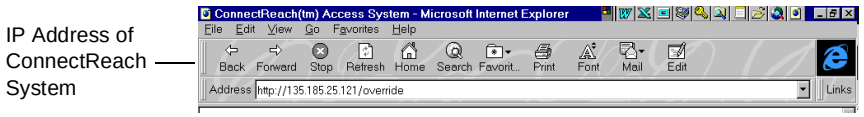
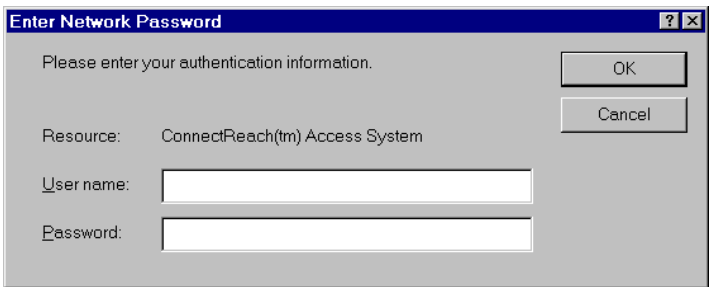
Before you can use a Web browser to configure and monitor the *ConnectReach* system, you must:

- Verify that the *ConnectReach* system has been installed and connections made to the Ethernet or T1/high data-rate digital subscriber line (HDSL) network according to the procedures contained in Chapter 5, “Installation”.
- Configure the *ConnectReach* system for an Ethernet or Network T1/DSX-1/HDSL connection, including an Internet protocol (IP) address, subnet mask, and broadcast address according to the procedure in Chapter 4, “Configuring the *ConnectReach* System”.
- Have a Web browser, such as Netscape Navigator or Microsoft Internet Explorer, running on a provisioning terminal (computer) that is connected to the same network [local area network (LAN) or wide area network (WAN)] as the *ConnectReach* system. The hypertext transfer protocol (HTTP) interface supports the following browsers:
  - — Netscape Navigator 3.x and above
  - — Microsoft Internet Explorer 4.x and above.

Accessing the *ConnectReach* System Using a Web Browser

Logging in to the *ConnectReach* system

Use the following procedure to access and log in to the *ConnectReach* system:

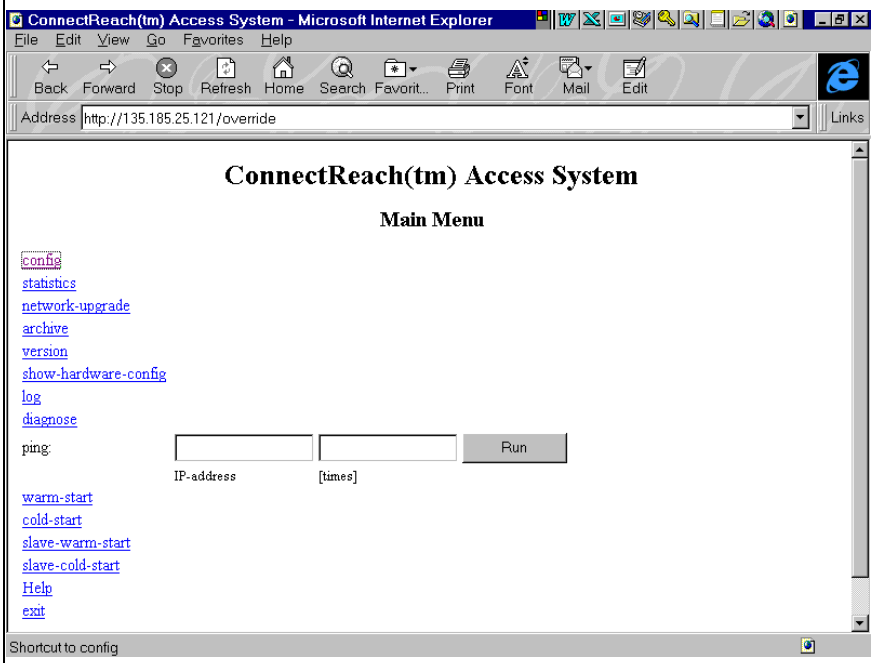
Step	Procedure
1	Start a Web browser on the computer.
2	In the Web browser, enter the IP address or host name assigned to the *ConnectReach* system in the **Location/Address** box and press the **Return/Enter** key. The following figure shows an IP address entered in the **Location** text box in the Netscape Navigator browser.  **NOTE:** If you are connecting to the *ConnectReach* system from the local area network (LAN), the IP address should be the *ConnectReach* system's address on the LAN. If you are connecting to the *ConnectReach* system from the wide area network (WAN), the IP address should be the *ConnectReach* system's address on the link to the central office (CO).
3	The *ConnectReach* system prompts you to enter a login name and password in the Password dialog box, as shown in the following figure.  **NOTE:** If no login name and password are assigned, leave the Name and Password dialog box blank, and click OK.

(Continued on next page)

Accessing the *ConnectReach* System Using a Web Browser (Continued)

Logging in to the *ConnectReach* system (continued)

Step	Procedure
4	After you log in, the *ConnectReach* system Main Menu appears. The following figure shows an example of the Main Menu.



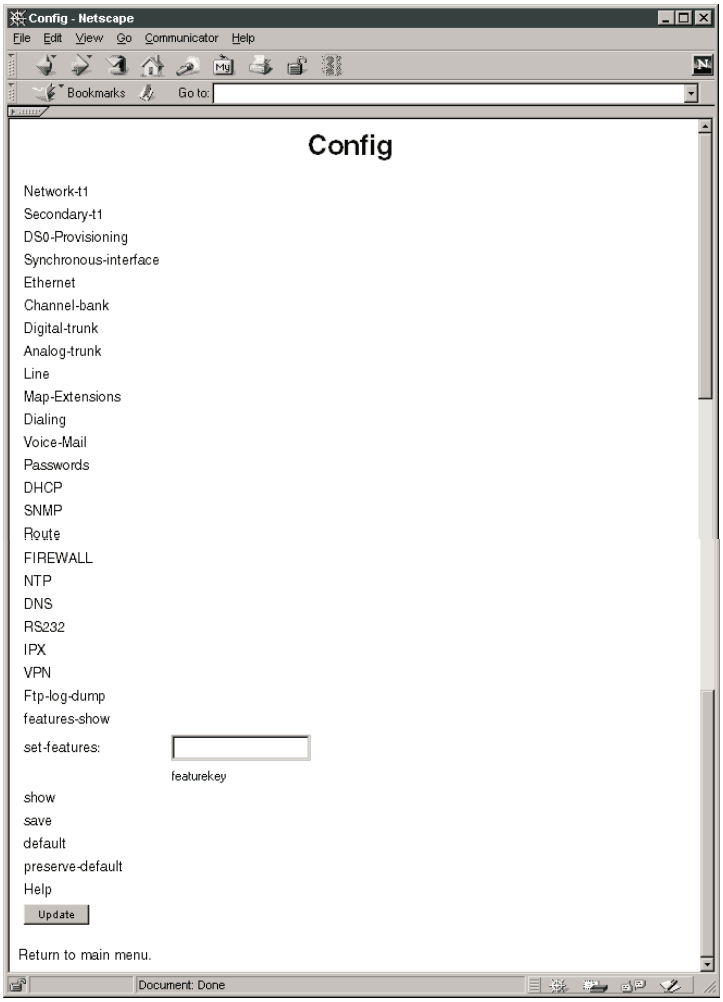
Executing Commands from the Main Menu

Displaying Selected Menu Screens

Display config submenu

The following procedure is used to display the configuration submenu and make necessary changes to the configuration settings:

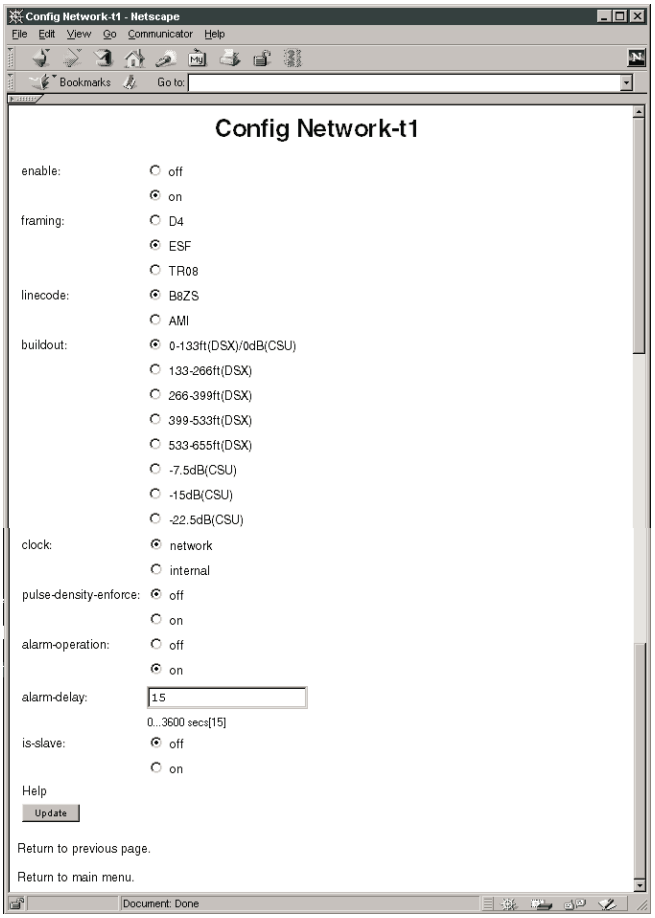
Step	Procedure
1	In the *ConnectReach* system Main Menu, click the `config` command. Refer to the following figure for a sample of the Config submenu that appears.



(Continued on next page)

Displaying Selected Menu Screens (Continued)

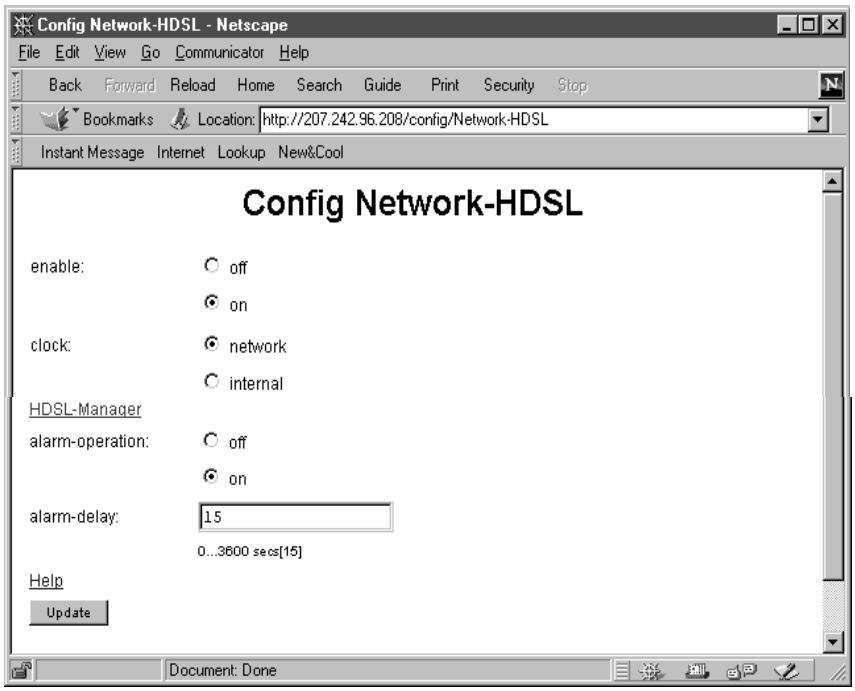
Display config submenu (continued)

Step	Procedure
2	In the Config submenu, click a command to change configuration settings for that command. For example, if you click the `Network-t1` or `Network-HDSL` command in the Config submenu, the parameters for configuring the network T1/DSX-1 or HDSL interface, respectively, appear, as shown in the following figures. For details about each configuration setting, refer to Chapter 4, "Configuring the *ConnectReach* System". 

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display config submenu (continued)

Step	Procedure
2 cont.	
3	Change the configuration settings as necessary, and then click the `Update` button in the Configuration screen to store the new settings in a temporary memory buffer in the *ConnectReach* system.
4	To return to the Config screen, click the `Previous Page` command at the bottom of the Config Network-T1 screen.
5	To save your settings in nonvolatile random access memory (NVRAM) in the *ConnectReach* system, click the `save` command in the Config screen.
6	To return to the Main Menu, click the `Main Menu` command at the bottom of the Config screen.

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display config submenu (continued)

Some parameters take effect as soon as you click the `save` command, but others require that you reboot the *ConnectReach* system. See the detailed descriptions of configuration parameters in Chapter 4, “Configuring the *ConnectReach* System”, for information on whether the parameters require a reboot to take effect.

NOTE:
In most cases, if a reboot is required, you click the `warm-start` command. However, if you change the beginning channel number of any range in the DS0 Provisioning menu and do a warm-start, the system will automatically prompt you that it will perform a cold-start. Refer to the section entitled “Using a Web Browser to Reboot the *ConnectReach* system”, located later in this chapter, for information on the warm-start and cold-start commands.

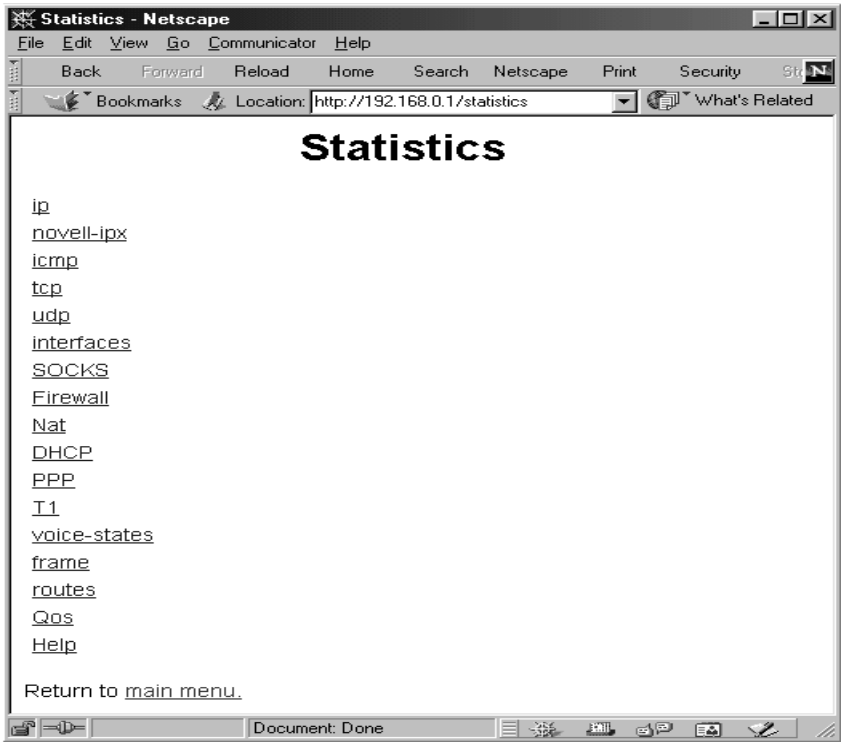
(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display statistics submenu

The following procedure is used to display the statistics submenu, select a report from the submenu to be displayed, and enter any options associated with the report:

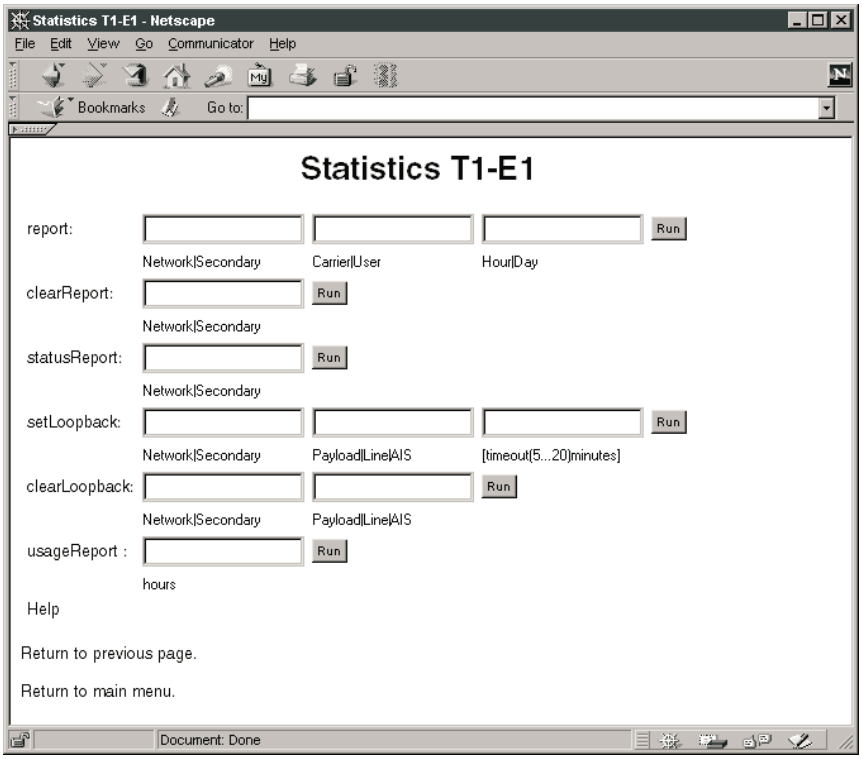
Step	Procedure
1	In the *ConnectReach* system Main Menu, click the `statistics` command. Refer to the following figure for a sample of the Statistics screen that appears. For details about each option for the Statistics command, refer to Chapter 6, "*ConnectReach* System Monitoring".



(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display statistics submenu (continued)

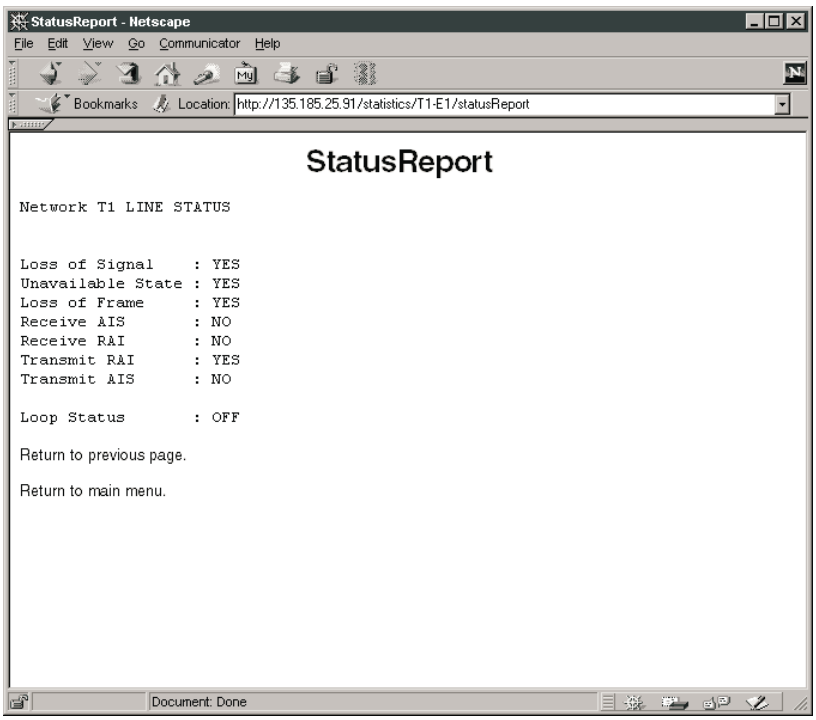
Step	Procedure
2	In the Statistics screen, click a command to display a statistics report. For example, if you click the T1 command in the Statistics screen, the Statistics T1 screen appears, as shown in the following figure. This screen lists the options for running the T1 performance reports. 
3	Enter the options for the report you want to run. For example, to run a status report on the Network T1/DSX-1 interface, enter Network in the text field next to the statusReport command.

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display statistics submenu (continued)

Step	Procedure
4	Click the Run button next to the command for the report you want to run. For example, if you click the Run button next to statusReport, a report similar to the example shown in the following figure is displayed.
5	To return to the previous screen, click the `previous page` command at the bottom of the screen.

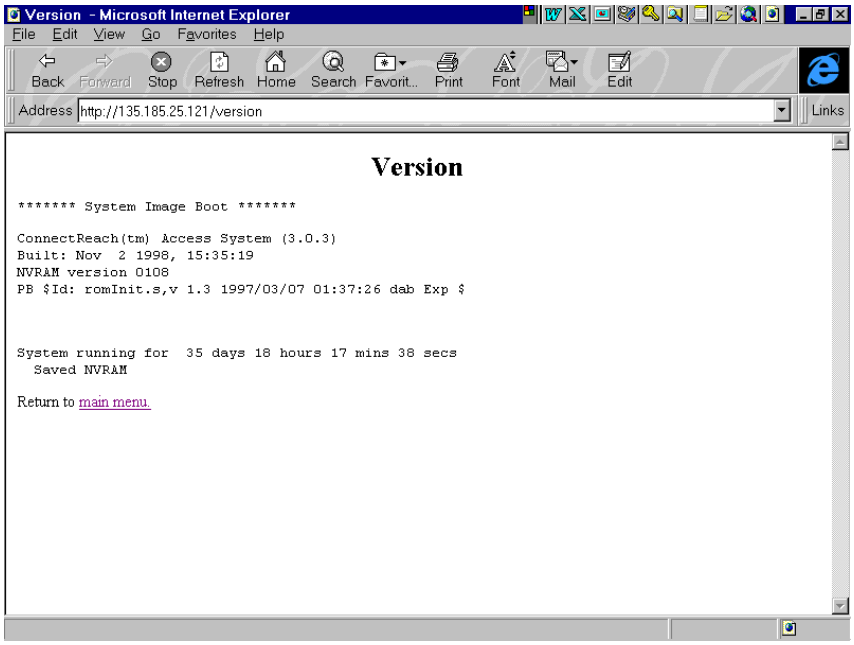


(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display version information

The following procedure is used to display the version screen:

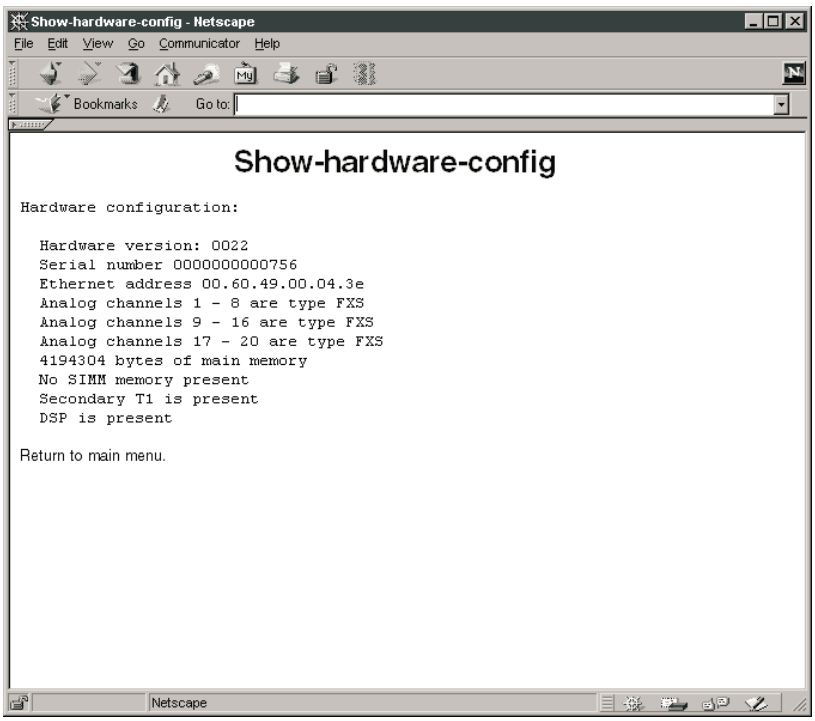
Step	Procedure
1	In the *ConnectReach* system Main Menu, click the `version` command. The Version screen appears. An example of the Version screen is shown in the following figure. 
2	To return to the Main Menu, click the `Main Menu` command at the bottom of the Version screen.

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display hardware configuration

The following procedure is used to display the hardware configuration screen:

Step	Procedure
1	In the *ConnectReach* system Main Menu, click `show-hardware-config` command. The show-hardware-config screen appears. An example of the show-hardware-config screen is shown in the following figure. 
2	To return to the Main Menu, click the Main Menu command at the bottom of the show-hardware-config screen.

Display logs of events and errors

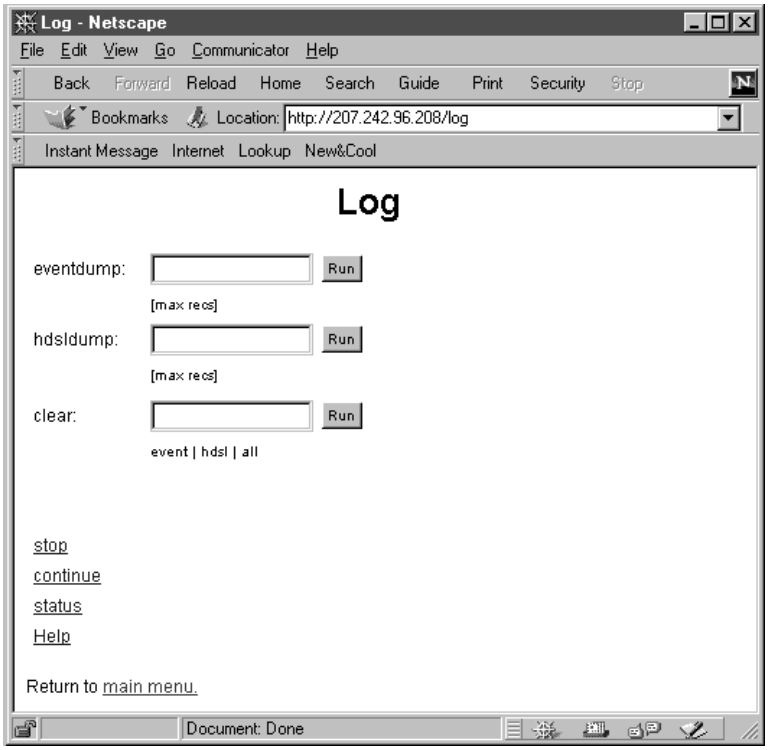
The *ConnectReach* system keeps logs of various kinds of events and errors. The following procedures describe how to access, clear, start, stop, and view the status of the logs. For more information about interpreting the logs, refer to Chapter 8, “Maintenance and Trouble Clearing”.

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display logs of events and errors (continued)

To Display a Log Screen and Set Parameters

Step	Procedure
1	In the *ConnectReach* system Main Menu screen, click the `log` command and the Log screen appears. Refer to the following figure for a sample of the Log screen that appears. 
2	In the Log screen, next to either the `Eventdump`, `T1dump` (or `HDSLdump`), or `Accessdump` option, enter the maximum number of log event records you want to display.
3	Click the Run button next to the option.

(Continued on next page)

Displaying Selected Menu Screens (Continued)

Display logs of events and errors (continued)

To Clear the Log

Step	Procedure
1	In the text box next to the `Clear` option, enter one of the parameters listed in the following table.
2	Click the Run button next to the `Clear` option.

To Clear …	..Enter this option
The event log	`event`
The T1 line log	`t1`
The HDSL line log	`HDSL`
All logs	`all`

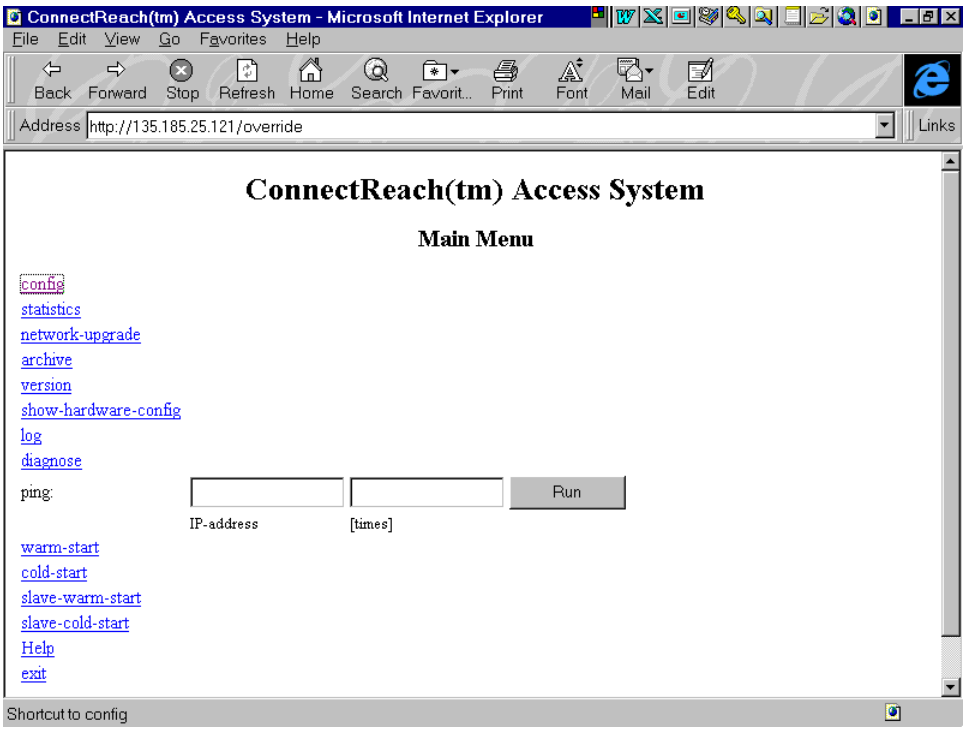
To Stop, Start, or View Status of the Log

- To stop the log from running, click the `stop` command in the Log screen.
- To start the log, click the `continue` command in the Log screen.
- To display the status of the log, click the `status` command in the Log screen.

Using a Web Browser to Execute a Ping Command

Selecting the ping command

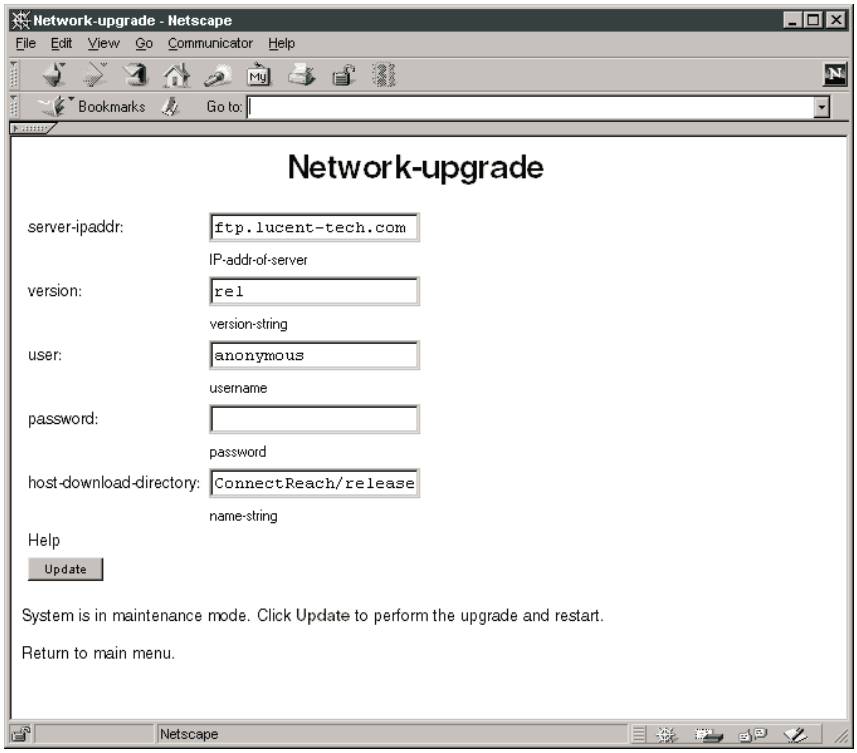
The `ping` command is available on the *ConnectReach* system Main Menu screen, as shown in the following figure.



Step	Procedure
1	In the *IP-address* text box, enter either a host name or the IP address for the system you want to ping.
2	In the *Times* text box, enter the number of times you want the ping to be repeated. If you do not specify repetitions, one ping is sent.
3	Click the Run button next to the `ping` command.

Using a Web Browser to Upgrade Software

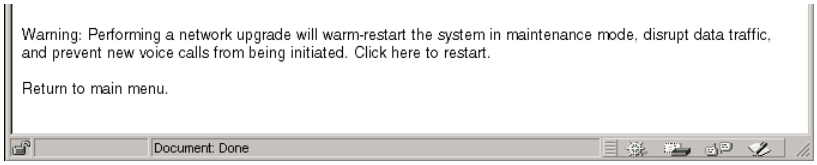
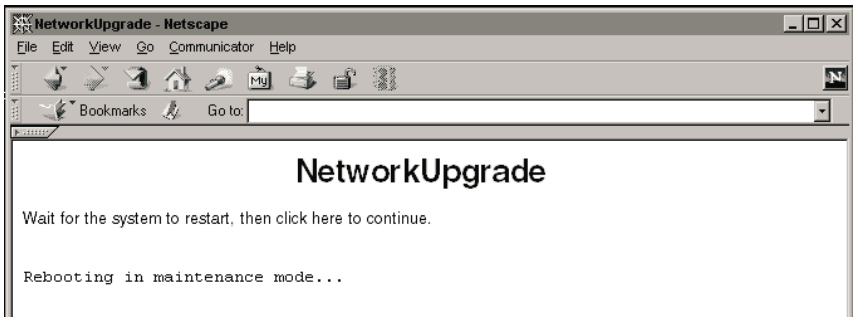
Displaying and using the network-upgrade screen

Step	Procedure
1	In the *ConnectReach* system Main Menu, click the `network-upgrade` command and the network-upgrade screen will appear (refer to the following figure). 
2	In the network upgrade screen, click the Update button to restart the *ConnectReach* system in the maintenance mode. In maintenance mode, data traffic from the LAN to the WAN and vice versa is blocked in order to allocate sufficient memory to accommodate the download.

(Continued on next page)

Using a Web Browser to Upgrade Software (Continued)

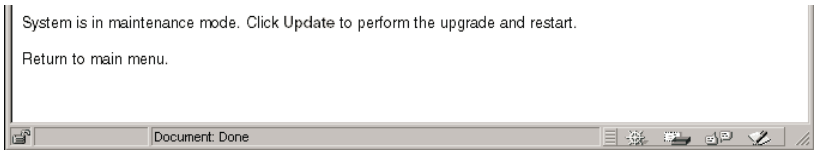
Displaying and using the network-upgrade screen (continued)

Step	Procedure
3	After you click the Update button, the network upgrade screen refreshes. Read the warning displayed at the bottom of the screen (shown in the following figure) and follow the instructions to continue.  While the *ConnectReach* system is rebooting, the screen shown below appears. 
4	Wait approximately 30 seconds and then click on the location indicated to continue with the procedure.
5	When the login screen appears, enter your login name and password.

(Continued on next page)

Using a Web Browser to Upgrade Software (Continued)

Displaying and using the network-upgrade screen (continued)

Step	Procedure
6	In the Main Menu screen, click the `network-upgrade` command. The network upgrade screen appears again. Note that at the bottom of the screen, new instructions are displayed, as shown in the following figure. 
7	The following table describes the parameters used for a network upgrade. To download from Lucent Technologies' FTP site directly to the *ConnectReach* system, set the version parameter to the version you want to download and enter the password to your e-mail address. The remainder of the parameters are preset for Lucent Technologies' FTP site.

Next to this option	Specify this information
`server-ipaddr`	IP address of the file transfer protocol (FTP) server on which the software is located.
`version`	Version string of the software you want to download.
`user`	Name for logging on to the FTP server.
`password`	Password for logging on to the FTP server, this is your email address.
`host-download-directory`	Directory on the FTP server in which the new software is located.

(Continued on next page)

Using a Web Browser to Upgrade Software (Continued)

Displaying and using the network-upgrade screen (continued)

Step	Procedure

8	To start the download, click the Update button.
	
	As the download occurs, progress messages similar to the following are displayed at the bottom of the screen:
	
	`1 meg of RAM allocated for preparing flash`
	`using version <24A1>`
	`Opening FTP connection to`
	`flash:/download/lucent.st_rom.24A1`
	`Downloading 425632 bytes`
	`Read 0 of 425632 bytes`
	…
	`Read 425632 of 425632 bytes`
	`downloaded standalone boot from`
	`/download/lucent.st_rom.24A1`
	`Checksum ffff5b80 OK.`
	`DONE`

9	After the download completes, the *ConnectReach* system saves the new software in the system image partition of Flash memory and performs a warm restart. During this process, messages similar to the following are displayed at the bottom of the screen:
	
	`Saving image`
	`using version <24A1>`
	`using 1 meg buffer allocated at 0x81de724`
	`writing standalone section (425644 bytes starting @ 0x20000`
	`Time spent: 27 seconds`
	`Wrote standalone section OK`
	`DONE`
	`Rebooting …`

10	Wait approximately 60 seconds and then select the ***Back*** button on your browser. The Network-upgrade screen appears. Select ***main menu***, enter your user name and password when prompted, and then select ***version*** to verify the software.

(Continued on next page)

Using a Web Browser to Upgrade Software (Continued)

Downloading a software upgrade to a PC

The following procedure should be used to download a software upgrade to a PC for later use.

NOTE:
The PC used to communicate with the *ConnectReach* system must be equipped with an FTP server program. The FTP server program used must be configured to allow file access to the location on the PC where the software file is to be saved. The user name and password in the Network-upgrade menu must match a user name and password in the FTP server program. All parameters in the Network-upgrade menu would then reflect the FTP server program on that PC.

(Continued on next page)

Using a Web Browser to Upgrade Software (Continued)

Downloading a software upgrade to a PC (continued)

Step	Procedure
1	**NOTE:** This step requires the entry of a password as part of the address location. This password can only be obtained from your Lucent Account Executive. Set the address location of your browser to: *ftp://lucentftp:connectreach@ftp2.vina-tech.com/ConnectReach/*. Press the **Enter**/**Return** key.
2	**NOTE:** The software is stored in a file named **vina.st_rom.*xxx*,** where the suffix ***xxx*** is the version string (for example, **305** is Software Release 3.05). Since the FTP server may be case sensitive, enter all alphabetic characters exactly as they appear in the file suffix. From the list of files appearing on the screen, click on the desired version of *ConnectReach* system software **NOTE:** It is important to specify the correct version number. If a version older than the one presently running on the *ConnectReach* system is accidentally specified, the download will still take place and the old software will overwrite the new software.
3	Save the appropriate software file to a location on your PC. Since some Web browsers may replace the first period in the software file name with an underscore, verify that the software file name matches the file name in the directory listing shown under /ConnectReach. If the two file names do not match exactly, the network upgrade will not work properly.

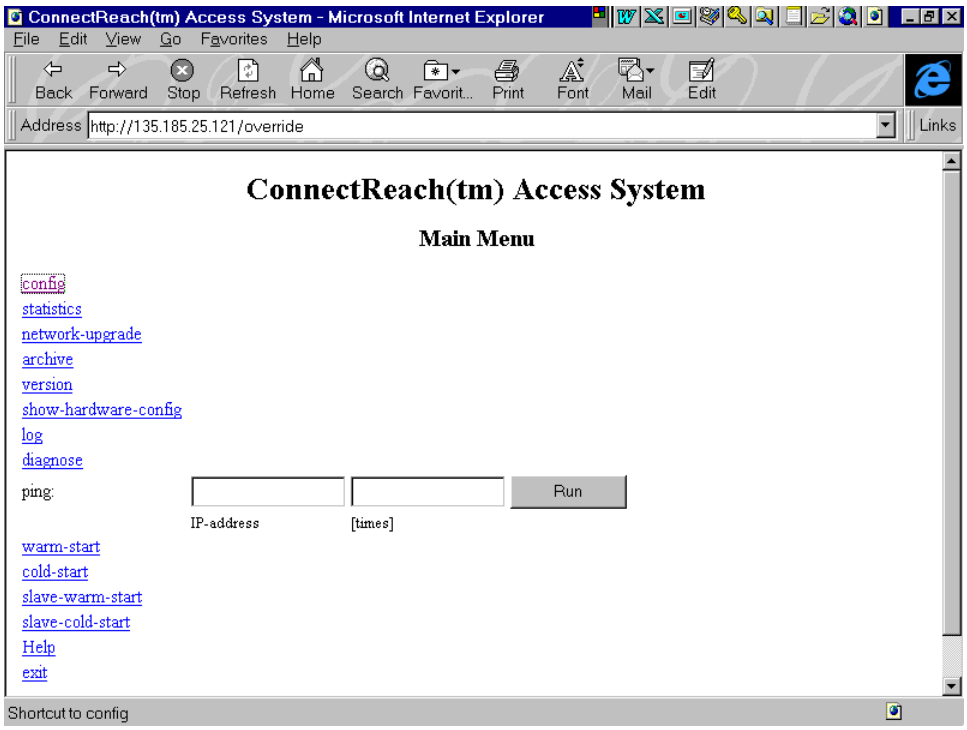
Using a Web Browser to Reboot the *ConnectReach* System

Performing a warm-start reboot

The `warm-start` command is typically used when you have changed and saved configuration values and want the *ConnectReach* system to begin using the new values. Note that if you change the starting channel of any range of voice or data channels, you must use the cold-start command to begin using the new values.

For *ConnectReach* systems fed by a TR-08 T1 line, executing a `warm-start` command only affects data and new voice connections. Existing voice connections may have their speech path interrupted for up to one tenth of a second during the restart process. During the time it takes the system software to reinitialize and read the saved configuration information (up to 35 seconds), new voice connections cannot be made and data connections will be interrupted.

To initiate a `warm-start` command, click the `warm-start` command on the *ConnectReach* system Main Menu (shown in the following figure).The *ConnectReach* system terminates your hytertext transfer protocol (HTTP) session and reboots.



(Continued on next page)

Using a Web Browser to Reboot the *ConnectReach* System (Continued)

Performing a warm-start reboot (continued)

NOTE:
If you change the beginning channel number of any range in the DS0 Provisioning menu and do a warm-start, the system will automatically prompt you that it will perform a cold-start.

Performing a cold-start reboot

Performing a `cold-start` command is the equivalent of cycling power to the *ConnectReach* system. All connections (both voice and data) are interrupted, and new connections cannot be made during the time it takes for the hardware to initialize and run the self-test routines and the system software to initialize and read saved configuration information (approximately 35 seconds).

The `cold-start` command is used when an error condition can only be resolved by completely reinitializing the *ConnectReach* system. In addition, a cold start is required if you change the starting channel of any range of voice or data channels.

To initiate a `warm-start` command, click the `cold-start` command on the *ConnectReach* system Main Menu (shown in the previous figure).The *ConnectReach* system terminates your HTTP session and reboots.

Using a Web Browser to Exit the *ConnectReach* System Utility

Entering the exit command

When you are finished using a Web browser to configure and monitor the *ConnectReach* system, you should click the `exit` command in the Main Menu.

The *ConnectReach* system Utility allows only one management session at a time. Exiting the *ConnectReach* system Utility allows another administrator to connect to the *ConnectReach* system and configure or monitor it.

A *ConnectReach* system management session can override another session.

- If another session is already in progress, and you start a new session, you will be notified that another user is logged in, and asked whether you wish to override that user.
- If you have a management session in progress, and another administrator overrides your session, you will be notified that your session has been overridden.

Maintenance and Trouble Clearing

8

Contents

About This Chapter

Introduction

Contents

This chapter provides procedures required for maintaining and correcting trouble conditions that may occur on the *ConnectReach*™ system. The maintenance procedures are performed on an “as needed” basis and include the following procedures:

- Upgrading the *ConnectReach* system with new software
- Archiving the current configuration and accessing archived configurations
- Rebooting the *ConnectReach* system.

The trouble clearing procedures help locate the source of trouble when the *ConnectReach* system or associated lines are not operating properly. The following procedures and information are included in the trouble clearing area:

- Understanding the light emitting diode (LED) status indicators and self-test results
- Disaster recovery
- Connecting T1 line test equipment to the *ConnectReach* system with T1/DSX-1 network interface.

Maintenance Procedures

Upgrading the *ConnectReach*™ System with New Software

Introduction

The *ConnectReach* system software can be upgraded with new software in either of the following three ways:

- Connecting a computer directly to the **RS-232** port by means of a null modem cable and using Xmodem commands to transfer the new software from the local computer
- Using a remote computer to dial up a modem connected to the *ConnectReach* system **RS-232** port and using Xmodem commands to transfer the new software from the remote system
- Downloading the new software from a file transfer protocol (FTP) server on the T1/HDSL line or Ethernet network.

NOTE:
Upgrading the *ConnectReach* system with new software does not normally affect the current configuration settings which are stored separately from the system software.

Software upgrade from a local computer

The steps to upgrade the *ConnectReach* system software using a local computer connected to the **RS-232** port by means of a null modem cable are contained in the following procedure:

Step	Procedure
1	Start a terminal application and enter your login name and password at the login prompt.
2	At the Main prompt, enter the `network-upgrade` command: `> network-upgrade`
3	At the network-upgrade prompt, enter the `prepare` command: `(Network-upgrade)> prepare`

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Upgrading the *ConnectReach*™ System with New Software (Continued)

Software upgrade from a local computer (continued)

Step	Procedure
4	The *ConnectReach* system will ask for confirmation that you want to perform a warm restart and enter the maintenance mode. Enter "**y**." **NOTE:** While the unit is in the maintenance mode, data traffic from the LAN to the WAN and vice versa are blocked in order to free enough memory to accommodate the download.
5	When the *ConnectReach* system boots in the maintenance mode, you are prompted for your login name and password. Enter the carrier login name and password.
6	At the Main menu prompt, enter the `xmodem-download` command. **`> xmodem-download`** The system responds with: `1 meg of ram allocated for preparing flash` followed by: `CCCCCC` While the `CCCCCC` string is progressing across the screen, start a file transfer using the terminal emulator
7	From the terminal application, send the file using the xmodem protocol. In Hyperterminal, a Windows application, select Transfer from the menu bar and select Send File. When the Send File dialog box appears, select the Xmodem protocol and enter the path and file name. If binary or American standard code for information interchange (ASCII) is an option, choose binary.

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Upgrading the *ConnectReach*™ System with New Software (Continued)

Software upgrade from a local computer (continued)

8	After the transfer completes, the following message will appear on the screen and the system will reboot: `Transfer complete.... Saving image`
9	After the system has rebooted, verify that the system is running the new software. Check the version number using the `version` command at the Main Menu prompt or by viewing the version number that appears on the screen after rebooting. `ConnectReach System (x.xx)` Where `x.xx` is the software version. **Stop! End of Procedure.**

Software upgrade from a remote computer

The steps to upgrade the *ConnectReach* system software using a remote computer and a modem connected to the **RS-232** port are contained in the following procedure:

Step	Procedure
1	From the remote computer, start a terminal application and dial the modem connected to the *ConnectReach* system.
2	At the login prompt, enter your login name and password.
3	At the Main menu prompt, enter the `network-upgrade` command: `> network-upgrade`
4	At the network-upgrade prompt, enter the `prepare` command. `(Network-upgrade)> prepare`

(Continued on next page)

Upgrading the *ConnectReach*™ System with New Software (Continued)

Software upgrade from a remote computer (continued)

Step	Procedure
5	The *ConnectReach* system asks you to confirm that you want to perform a warm restart and enter maintenance mode. Enter "**y**."
6	Dial the modem connected to the *ConnectReach* system again. When the *ConnectReach* system boots in the maintenance mode, you are prompted for your login name and password. Enter the carrier login name and password.
7	At the Main menu prompt, enter the `xmodem-download` command. > **`xmodem-download`** The system responds with: `1 meg of ram allocated for preparing flash` followed by: `CCCCCC`
8	While the `CCCCCC` string is progressing across the screen, start an Xmodem transfer of the new software. Be sure to use Xmodem as your protocol in your terminal application. In Hyperterminal, a Windows application, select Transfer from the menu bar and select Send File. When the Send File dialog box appears, select the Xmodem protocol and enter the path and file name. If binary or American standard code for information interchange (ASCII) is an option, choose binary. After the transfer completes, the following message will appear on the screen and the system will reboot: `Transfer complete.... Saving image`

(Continued on next page)

Upgrading the *ConnectReach*™ System with New Software (Continued)

Software upgrade from a remote computer (continued)

Step	Procedure
9	Dial the modem connected to the *ConnectReach* system again. After the system has rebooted, verify that the system is running the new software. Check the version number using the `version` command at the Main Menu prompt or by viewing the version number that appears on the screen after rebooting. `ConnectReach System (x.xx)` Where `x.xx` is the software version. **Stop! End of Procedure.**

Software upgrade from the network

NOTE:
The procedures to upgrade the *ConnectReach* system software from the network are for future use only since the Lucent Technologies network upgrade server site is presently unavailable.

There are two procedures for upgrading the *ConnectReach* system software from the network — normal upgrade and custom upgrade. Both procedures are identical with one exception, the normal upgrade procedure uses default (user supplied) values already in the system for the network upgrade commands whereas, the custom upgrade procedure requires that these network command values be specified.

The software to be downloaded is stored at the FTP server in a file named lucent.st_rom.*xxx*, where the suffix *xxx* is the version string you must enter with the `version` command. The FTP server may be case-sensitive, so be sure to enter any alphabetic characters exactly as they appear in the file suffix.

(Continued on next page)

Upgrading the *ConnectReach*™ System with New Software (Continued)

Software upgrade from the network (continued)

NOTE:
Be sure to specify the correct version number. If more than one version is present in the download directory, and you accidentally specify an older version than the *ConnectReach* system is already running, the download will still take place, and the old software will overwrite the new software.

After the download completes, the *ConnectReach* system Utility saves the software in the system image partition of Flash memory and performs a warm restart. Refer to the section entitled “Rebooting the *ConnectReach* system”, located later in this chapter, for a description of the difference between warm-start and cold-start.

Normal Network Upgrade

The network upgrade server is by default Lucent’s server; therefore, it is not necessary to specify the server or the software release. However, the domain name service (DNS) server must be configured and enabled for the network-upgrade to function. Refer to Chapter 4, “Configuring the *ConnectReach* System” for information on configuring the DNS server. For all normal upgrades, proceed as follows:

Step	Procedure
1	At the Main Menu prompt, enter the `network-upgrade` command: `> network-upgrade`
2	Set the version to the one you want to download (for example, Software Release 3.0.2 would be entered as **`ver 302`**) `(Network-upgrade)> ver` *XXXX*
3	Set the password to *your* email address: `(Network-upgrade)> password` *support@lucent.com*
4	To save the settings enter the `save` command `(Network-upgrade)> save`

(Continued on next page)

Upgrading the *ConnectReach* System with New Software (Continued)

Software upgrade from the network (continued)

Step	Procedure
5	At the network-upgrade prompt, enter the `prepare` command: `> prepare`
6	The *ConnectReach* system asks you to confirm that you want to perform a warm restart and enter maintenance mode. Enter "**y**." While the unit is in maintenance mode, data traffic from the local area network (LAN) to the wide area network (WAN) and vice versa is blocked in order to free enough memory to accommodate the download.
7	When the *ConnectReach* system boots in maintenance mode, you are prompted for your login name and password. Enter the carrier login name and password.
8	At the Main Menu prompt, enter the `network-upgrade` command: `> network-upgrade`
9	Execute the download: `(Network-upgrade)> download` **Stop! End of Procedure.**

Custom Network Upgrade

The DNS server must be configured and enabled for the network-upgrade to function. Refer to Chapter 4, "Configuring the *ConnectReach* System", for information on configuring the DNS server. To specify a particular Internet protocol (IP) address or software release, proceed as follows:

Step	Procedure
1	At the Main Menu prompt, enter the `network-upgrade` command: `> network-upgrade`

(Continued on next page)

Upgrading the *ConnectReach* System With New Software (Continued)

Software upgrade from the network (continued)

Step	Procedure
2	At the network-upgrade prompt, enter the commands shown in the following table.

Enter this command...	...and specify this value	Comments
`server-ipaddr`	*`name, ip-addr`*	Host name or IP address of the network upgrade server to which the software is to be downloaded.
`version`	`rel`	Version of the software.
`user`	*`username`*	Username valid on the network upgrade server. For Lucent's FTP site, username = anonymous.
`password`	*`password`*	Password for the username. For Lucent's FTP site, password = your email address.
`host-download-directory`	`/t1-int/release`	The directory where the software files will be stored.
`prepare`		
`download`		

Step	Procedure
3	Enter the `save` command to save the new settings. The `prepare` command will restore the settings to the last saved values.
4	To save the settings enter the `save` command `(Network-upgrade)>` **`save`**
5	At the network-upgrade prompt, enter the `prepare` command: `>` **`prepare`**
6	The *ConnectReach* system asks you to confirm that you want to perform a warm restart and enter maintenance mode. Enter "**y**." While the unit is in maintenance mode, data traffic from the local area network (LAN) to the wide area network (WAN) and vice versa is blocked in order to free enough memory to accommodate the download.

(Continued on next page)

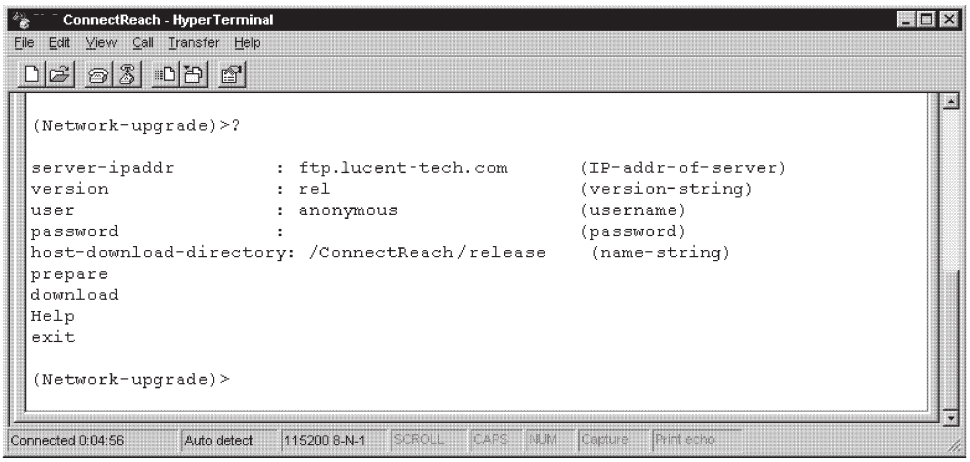
Upgrading the *ConnectReach* System With New Software (Continued)

Software upgrade from the network (continued)

Step	Procedure
7	When the *ConnectReach* system boots in maintenance mode, you are prompted for your login name and password. Enter the carrier login name and password.
8	At the Main Menu prompt, enter the `network-upgrade` command: `> network-upgrade`
9	Execute the download: `(Network-upgrade)> download` **Stop! End of Procedure.**

After the download completes, the *ConnectReach* system saves the software in the system image partition of Flash memory and performs a warm restart.

To download from Lucent Technologies' FTP site directly to the *ConnectReach* system, set the parameters as shown in the following figure. Setting the `version` command to *rel* will ensure you download the most current software..



You may also download the upgrade to a personal computer (PC) for later use. The PC used to communicate with the *ConnectReach* system must have an FTP server. All parameters in the network-upgrade menu would then reflect the FTP server on that PC.

Using the Archive Command to Upload/Download Configuration Settings

Introduction

The `Archive` command is useful in two scenarios:

- If you have set up a customized configuration that required many parameters to be changed, you can use the `archive` command to upload the configuration to a local computer. In the event that the *ConnectReach* system loses the configuration information stored in nonvolatile random access memory (NVRAM), you can use the `archive` command to download the saved configuration information rather than entering all of it again.
- If you are installing multiple *ConnectReach* system units, and all the units will have nearly identical configurations, the `archive` command allows you to set up one configuration, then download it to multiple units. On individual units, you only need to set those parameters that differ from other units.

You can upload and download configurations over either the RS-232 connection or over the Ethernet or T1/HDSL network (refer to Chapter 5, “Installation”, for connection to the RS-232 port). An archived configuration file is stored as American standard code for information interchange (ASCII) text. The file has two parts:

- A listing similar to the `Config:Show` command, including the values of all configuration parameters
- A hexadecimal representation of the configuration.

The following sections describe the procedures for uploading and downloading configurations over the network and over the RS-232 port.

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Uploading the current configuration over the network to an FTP server

Use the following procedure to upload and store the current configuration settings on an FTP server:

Step	Procedure
1	At the Main prompt, enter the `archive` command: `> archive`
2	At the Archive prompt, enter the `net-upload` command: `(archive)> net-upload`
3	At the Archive:Net-upload prompt, enter the commands shown in the following table.

Enter this command...	...and specify this value	Comments
`server-ipaddr`	*`name, ip-addr`*	Host name or IP address of the FTP server to which the configuration is to be uploaded.
`filename`	*`pathname`*	Path and file name of the file to be saved on the FTP server. The file should have a .txt suffix.
`user`	*`username`*	Username valid on the FTP server.
`password`	*`password`*	Password for the username.

4	To save the settings, enter the `save` command. `(archive)> save`
5	To start the upload, enter the `do-upload` command: `(archive)> do-upload` **Stop! End of Procedure.**

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Downloading an archived configuration over the network from an FTP server

Use the following procedure to download archived configuration settings from an FTP server to a *ConnectReach* system over the network:

Step	Procedure
1	At the Main prompt, enter the `archive` command: `> archive`
2	At the Archive prompt, enter the `net-download` command: `(archive)> net-download`
3	At the Archive:Net-download prompt, enter the commands shown in the following table.
4	To start the download, enter the `do-download` command: `(archive)> do-download`
5	After the download completes, save your changes: `(archive)> save`

Enter this command...	...and specify this value	Comments
`server-ipaddr`	*`name, ip-addr`*	Host name or IP address of the FTP server on which the configuration is stored.
`filename`	*`pathname`*	Pathname of the file on the FTP server.
`user`	*`username`*	Username valid on the FTP server.
`password`	*`password`*	Enter the password for the username.

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Downloading an archived configuration over the network from an FTP server (continued)

Step	Procedure
6	On the Main Menu, use the `warm-restart` command to reboot the *ConnectReach* system: `> warm-start` **NOTE:** If the download configuration changes the beginning channel number of any range in the DS0 Provisioning menu, you must use the `cold-start` command to reboot the *ConnectReach* system. **Stop! End of Procedure.**

Uploading the current configuration using a modem

Use the following procedure to upload and store the current configuration settings on a remote computer:

NOTE:
The archived configuration will be stored in the file and location you specify when you start a text capture.

Step	Procedure
1	From the remote computer, start a terminal application and dial the modem connected to the *ConnectReach* system.
2	At the login prompt, enter your login name and password.

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Uploading the current configuration using a modem (continued)

Step	Procedure
3	At the Main Menu prompt, enter the `archive` command. `> archive`
4	Start a text capture in HyperTerminal by selecting Transfer, Capture Text, and entering a meaningful file name with a .TXT extension (for example, Lucent34.TXT) and then select Start. **NOTE:** When using Windows HyperTerminal, make sure the file name specified is unique. If the same file name is used more than once, the information is appended to the existing file. This creates a problem when it becomes time to do a tty download.
5	At the Archive prompt, enter the `tty-upload` command `(archive)> tty-upload`
6	When the Archive prompt returns, stop the text capture by selecting Transfer, Capture Text, and Stop. This will close the text file.
7	To return to the Main Menu, enter the exit command twice. (Archive:tty-upload)> exit (Archive)> exit **Stop! End of Procedure.**

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Downloading an archived configuration using a modem

Use the following procedure to download archived configuration settings from a remote computer to a *ConnectReach* system using a modem:

NOTE:
To ensure proper transfer of archived configuration settings, set the baud rate of the *ConnectReach* system and the FTP server terminal emulator to 9,600 baud.

NOTE:
The archived configuration must be present on the computer from which you perform the procedure, or on a network drive to which the computer has access.

Step	Procedure
1	From the remote computer, start a terminal application and dial the modem connected to the *ConnectReach* system.
2	At the login prompt, enter your login name and password.
3	At the Main Menu prompt, enter the `archive` command. `> archive`
4	At the Archive prompt, enter the `tty-download` command `(archive)> tty-download`
5	The system responds with the following message: `Set your terminal program to send the text file now...`
6	Use HyperTerminal to send the configuration data by selecting Transfer, Send Text File, and specifying the same file name used for the upload procedure.

(Continued on next page)

Using the Archive Command to Store and Retrieve Configuration Settings (Continued)

Downloading an archived configuration using a modem (continued)

Step	Procedure
7	After the download completes, the system responds with: `Configuration downloaded successfully.` Use the Config:Save command to save your data. `(archive)>` **`exit`** `(archive)>` **`save`**
8	At the Main Menu, use the `warm-start` command to reboot the *ConnectReach* system: `>` **`warm-start`** **NOTE:** If the download configuration changes the beginning channel number of any range in the DS0 Provisioning menu, you must use the `cold-start` command to reboot the *ConnectReach* system. **Stop! End of Procedure.**

Rebooting the *ConnectReach* System

Introduction

There are two methods of rebooting the *ConnectReach* system; the warm-start reboot and the cold-start reboot. A description of each method is given in the following sections. The method you use to reboot the *ConnectReach* system depends on what you need to accomplish.

Performing a warm-start reboot

The `warm-start` command is typically used when you have changed and saved configuration values and want the *ConnectReach* system to begin using the new values.

NOTE:
If you change the beginning channel number of any range in the DS0 Provisioning menu and do a warm-start, the system will automatically prompt you that it will perform a cold-start.

For *ConnectReach* systems fed by a TR-08 T1 line, executing a `warm-start` command only affects data and new voice connections. Existing voice connections may have their speech path interrupted for up to one tenth of a second during the restart process. During the time it takes the system software to reinitialize and read the saved configuration information (up to 35 seconds), new voice connections cannot be made and data connections will be interrupted.

To initiate a warm-start reboot, select the `warm-start` command from the *ConnectReach* system Main Menu.

Performing a cold-start Reboot

Performing a `cold-start` command is the equivalent of cycling power to the *ConnectReach* system. All connections (both voice and data) are interrupted, and new connections cannot be made during the time it takes for the hardware to initialize and run the self-test routines and the system software to initialize and read saved configuration information (approximately 35 seconds).

The `cold-start` command is used when an error condition can only be resolved by completely reinitializing the *ConnectReach* system. In addition, a cold start is required if you change the starting channel of any range of voice or data channels.

(Continued on next page)

Rebooting the *ConnectReach* System (Continued)

Performing a cold-start Reboot (continued)

To initiate a `cold-start` command, click the `cold-start` command on the *ConnectReach* system Main Menu.The *ConnectReach* system terminates your hypertext transfer protocol (HTTP) session and reboots.

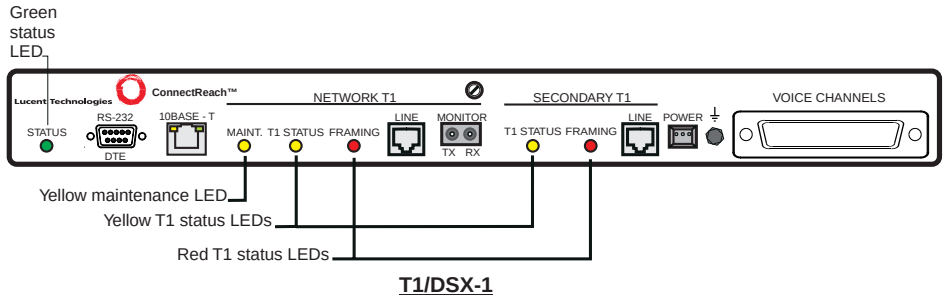
To initiate a cold-start reboot, select the `cold-start` command from the *ConnectReach* system Main Menu.

Trouble Clearing Procedures

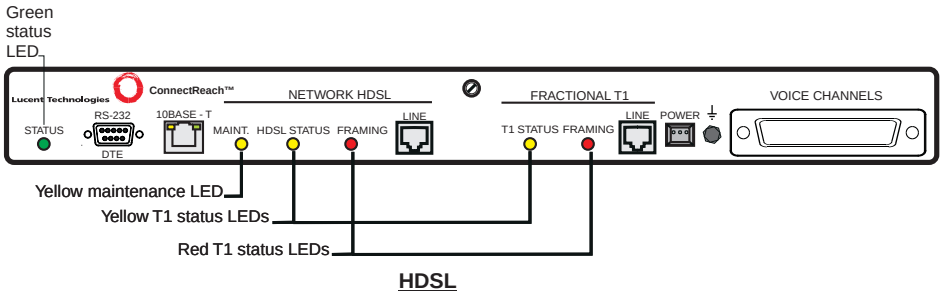
Using the LED Status Indicators to Isolate Troubles

Understanding the LED status indicators

The faceplate of the *ConnectReach* system unit is equipped with six LED status indicators as shown in the following figure.



T1/DSX-1



HDSL

(Continued on next page)

Using the LED Status Indicators to Isolate Troubles (Continued)

Understanding the LED status indicators (continued)

The following table lists the possible states of each LED and indicates the condition that corresponds to each state.

When the Green Status LED is...	Then...
On	The self-test was successful; no packets are being sent/received.
Flashing	The self-test was successful; data packets are being sent /received on the T1/HDSL line.
Off	The self-test failed. For details about status codes, refer to the following section entitled "Using the Self-Test Results to Detect Troubles".
When the Yellow Maintenance LED is...	**Then...**
On	There is a network loopback occurring on the network T1/DSX-1/HDSL line.
Flashing	A diagnose command is active or the *ConnectReach*™ system is in the maintenance mode.
Off	The unit is operating normally.
When the Yellow T1 Status LED is...	**Then...**
On	There has been a yellow alert in the last second.
Flashing in 500-ms intervals	There have been one or more bipolar violations in the last second.
Off	The unit is operating normally.
When the Red T1 Framing LED is...	**Then...**
On	There is a red alarm condition. Refer to the following section entitled "Using the Self-Test Results to Detect Troubles".
Flashing in 500-ms intervals	There is framing bit error rate greater than $10E^5$ in the last second.
Off	The unit is operating normally.

NOTE:
The Secondary/Fractional T1/DSX-1 LEDs operate only if a Secondary/ Fractional T1/DSX-1 line is installed and enabled.

Using the Self-Test Results to Detect Troubles

Self-test results

After the *ConnectReach* system boots up, the unit performs a self-test. The results of the test are indicated by the illumination of a combination of LEDs. The following table describes the combination for each test result.

LED Indicator					
Green STATUS	**Yellow MAINT**	**Yellow T1 STATUS**	**Red T1 FRAMING**	**Condition**	**Recoverable/ Not Recoverable**
ON or *flashing*	OFF	OFF	OFF	The *ConnectReach*™ system passed all tests and is functioning normally.	Normal operating condition
OFF	OFF	OFF	OFF	No power available to the *ConnectReach* system.	Recoverable*
OFF	OFF	OFF	ON	System image check sum failed.	Recoverable†
OFF	OFF	ON	OFF	The NVRAM check sum failed.	Recoverable‡
OFF	ON	OFF	OFF	The flash *protected boot* code check sum failed.	Not recoverable§
OFF	ON	OFF	ON	An Ethernet loopback failed.	Not recoverable§
OFF	ON	ON	OFF	Codec loopbacks failed.	Not recoverable§
OFF	ON	ON	ON	Code execution from protected boot.	Not recoverable§
OFF	OFF	ON	ON	A random access memory (RAM) test failed.	Not recoverable§

* If the self-test indicates that no power is available to the *ConnectReach* system, first verify that the AC power cord is plugged into a functional AC outlet or that the DC power cord is plugged into a functional DC power source. If the power source is verified to be functional, replace the power cord.

† If the system image check sum fails, you must connect a modem to the **RS-232** port and download a new system image (refer to Chapter 9, “Maintenance and Trouble Clearing”).

‡ If the nonvolatile random access memory (NVRAM) check sum fails, it is because some part of the stored configuration has become corrupted. Since it is not possible to determine which part of the data is corrupted, you should completely reconfigure the *ConnectReach* system, save the new configuration, reboot, and observe the self-test LEDs again.

§ Nonrecoverable errors indicate a *ConnectReach* system hardware failure. You must replace the failed *ConnectReach* system with a new unit. After installing the new unit, you must configure the replacement with the same configuration settings as the original unit.

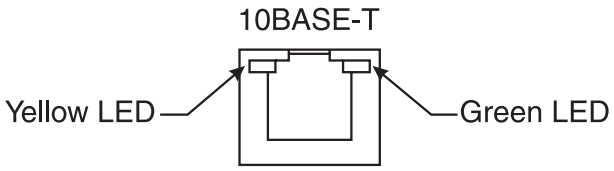
(Continued on next page)

Using the Self Test Results to Detect Troubles (Continued)

Ethernet port LEDs

The Ethernet port has two built-in LEDs that are located on the **10BASE-T** connector (refer to the following figure for location), they are as follows:

- The green “link integrity” LED. This LED lights when the link between the *ConnectReach* system and the Ethernet hub is functioning.
- The yellow “activity” LED. This LED blinks when the *ConnectReach* system transmits or receives data to and from the Ethernet port.



Displaying a Time-Stamped Log of Events

Entering the log command

The `log` command is used to display a time-stamped log of events that occur in the *ConnectReach* system, such as logins, HTTP or console commands, and errors. You can also display a log of the T1/HDSL line that records information such as alarms and line-up or line-down conditions.

At the Main Menu prompt, enter the `log` command followed by an option obtained from the following table.

For example:

> **`log eventdump`**

To…	Enter this command…
Display the log for the *ConnectReach*™ system	`log eventdump`
Display the log for the T1 line	`log t1dump`
Display the log for the HDSL-T1 line	`log hdsldump`
Clear the log for the *ConnectReach* system	`log clear event`
Clear the log for the T1 line	`log clear t1`
Clear the log for the HDSL-T1 line	`log clear hdsl`
Clear the log for both the *ConnectReach* system and the T1/HDSL-T1 line	`log clear all`
Stop all logging	`log stop`
Resume all logging	`log continue`
Determine whether the log is running or stopped	`log status`

(Continued on next page)

Displaying a Time-Stamped Log of Events (Continued)

Entering the log command (continued)

NOTE:
Log eventdump 10 shows the first ten events in the log. Log eventdump -10 shows the last ten events in the log.

The following is an example of the display obtained when the `log` command plus option is entered.

```
 > log eventdump
0/00:00:00.000000000 httpd
0/00:00:00.000000030 ?083fd66c maxMemRecs 500 maxEventRecs 500
0/00:03:04.000011056 httpd 207.104.144.199 started HTML
   session
Log: max 500 cur 3. log is running

> log status
Log status:
memMax 500,cur 327 eventMax 500,cur 6 t1Max 500,cur 2
inFilter mask 0x00000000 level 0, outFilter mask 0x00000000
   level 0
log is running
Reset counters:
RSR 002 cookie 1 endCookie 0
death 0 taskDie 0 watchDog 0
```

Preparing the *ConnectReach* System for Channel Testing

Entering the diagnose command

The `diagnose` command is used to set a given channel to a known state so that channel testing can be performed using external test equipment (which could be a telephone).

NOTE:
The `diagnose` command applies to lines [foreign exchange station (FXS)], analog trunks [foreign exchange office (FXO)], and digital trunks (T1).

Use the following procedure to configure a channel for testing:

Step	Procedure

1	At the Main Menu prompt, enter the `diagnose` command:
	
	`> **diagnose**`
	
	The prompt changes to the diagnose prompt:
	
	`(diagnose)>`

2	Identify the channel that you wish to test using the appropriate command from the following table. For example: `(diagnose)> **set-analog-channel 7**`
3	Set the channel to the appropriate state (refer to the following table). For example: `(diagnose)> **busy**`

To …	Enter this command…	..and specify this parameter
Identify a channel to be tested	`set-analog-channel`	`[0] (1…24)`
Identify a channel to be tested	`set-digital-trunk`	`[0] (1…24)`
Set the channel to normal state	`normal`	
Set the channel to idle state	`idle`	
Set the channel to busy state	`busy`	
Set the channel to ringing state	`ringing`	
Set the channel to tone1k state	`tone1k`	
Set the channel to reversal state	`reversal`	
Set the channel to voice state	`voice-states`	
Get online assistance	`Help`	
Exit the Diagnose submenu and return to the Main Menu	`exit`	

(Continued on next page)

Preparing the *ConnectReach* System for Channel Testing (Continued)

Entering the diagnose command (continued)

Step	Procedure
4	Using the external test equipment, verify that the channel is in the specified state.
5	When you have completed testing, set the channel back to normal state using the `normal` command.
6	Enter the `exit` command to return to the Main Menu.

Definition of diagnose command options

The `diagnose` command options are described as follows:

Normal — In normal mode, signaling passes through from the T1/HDSL-T1 line to the phone, and the channel is able to process calls normally. All the remaining modes interrupt the T1/HDSL-T1 signaling and force a state other than normal.

Idle — When set to idle mode, a connected phone should detect tip open on the channel (for example, a dial tone). If it does, the line should be able to receive calls when reset to normal mode.

Busy — When set to busy, a connected phone should detect tip closed on the channel (for example, a busy signal). If it does, the line should be able to receive calls when reset to normal mode.

Ringing — When set to ringing mode, a connected phone should ring for 2 seconds on and 4 seconds off. If it does, the line should be able to receive calls when reset to normal mode.

(Continued on next page)

Preparing the *ConnectReach* System for Channel Testing (Continued)

Definition of diagnose command options (continued)

Tone1k	When set to tone1k mode, the line should emit a constant 1-kHz tone audible on a connected phone. If it does, the line should be able to receive calls when reset to normal mode.
Reversal	When set to reversal mode, the polarity of tip and ring are reversed for the channel. To verify that the line is in reversal mode, use external test equipment. If the test equipment indicates that tip and ring are in fact reversed, the line should be able to receive calls when reset to normal.

Check the Operational State of a Node on the LAN/WAN

Entering the ping command

With the `ping` command, you can test whether a node on the LAN/WAN is operational. The `ping` command sends an Internet control message protocol (ICMP) echo packet to the target node; if the node is powered on and correctly connected to the network, it returns an ICMP response packet.

At the Main Menu prompt, enter the `ping` command, followed by either the host name or the IP address of the node to be pinged, and the number of times to ping. If you do not specify a number of repetitions, the default is one.

For example:

```
> ping 111.222.33.1 2
```

In this example, the node whose IP address is 111.222.33.1 is sent two ICMP echo packets.

If the node or the network connection to the node is operational, you should see the response within a few seconds. If the node or network is not operational, the `ping` attempt times out after 10 seconds. To stop a `ping` before the 10-second interval elapses, simply press any key.

The response to the above example might look like this:

```
PING 111.222.33.1: 64 data bytes
64 bytes from 111.222.33.1: icmp_seq=0. time=0. ms
64 bytes from 111.222.33.1: icmp_seq=1. time=0. ms

----111.222.33.1 PING Statistics----
2 packets transmitted, 2 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/0/0
```

Disaster Recovery

Procedure for recovery from loss of system image

If a catastrophic failure causes the *ConnectReach* system to lose its system image, the *ConnectReach* system boots from the software in the protected boot area of memory. In protected boot mode, you can download new software by means of the **RS-232** port. After the download is complete, the *ConnectReach* system automatically restarts in normal mode. For information about downloading software by means of the **RS-232** port, refer to the section entitled “Software upgrade from a remote computer”, located earlier in this chapter.

After downloading new software, you should verify that the unit’s configuration settings are intact. If the configuration stored in NVRAM has been lost, you must reconfigure the unit as if it were a new installation unless you have archived a copy of the latest configuration settings. Maintaining current archive copies of the configuration settings will facilitate the process of reconfiguration. In the event of catastrophic failure, you can download the archived configuration rather than reenter it from scratch. Refer to the section entitled “Using the Archive Command to Store and Retrieve Configuration Settings”, located earlier in this chapter, for information on the Archive command.

It is recommended that you keep an up-to-date record of the *ConnectReach* system’s configuration settings. You can keep a record in any or all of the following ways:

- Keep an updated copy of the Preinstallation Worksheet that records all the configuration information gathered at the time of the initial installation. If you change the configuration later, update the worksheet accordingly.
- Print a configuration report using the `Show` command in the Config submenu. If you change the configuration later, print a new report and save it in either electronic or hard copy form.
- Use the `Archive` command in the Main Menu to upload a copy of the current configuration to a local or remote computer. If you change the configuration later, upload a new copy of the configuration.

T1 Line Test Equipment

Connection information

In the event that it becomes necessary to connect test equipment to the **NETWORK T1 MONITOR** connector on the front panel of the *ConnectReach* system with T1 network interface, ***be sure the test equipment is operating in bridge mode***. Otherwise, the test equipment can terminate the T1 line, thereby reducing T1 receive signal strength to the *ConnectReach* system.

IP Network Addresses

A

Contents

About This Appendix

Introduction

Contents

This appendix briefly describes Internet protocol (IP) network addresses. Detailed specifications are available in Request for Comment (RFC) documents. RFC documents can be obtained by means of a hypertext transfer protocol (HTTP) or anonymous file transfer protocol (FTP) from various Internet sites.

IP Network Addresses Description

Introduction

General

Each host on the network (that is, each individual machine connected to the network) has an IP address that uniquely identifies it.

Each IP address is a 32-bit value. A portion of the address identifies the network, while another portion identifies the host on that network.

The 32-bit IP address is commonly represented as four 8-bit decimal values. Each decimal value is separated from other values by dots (.). This notation is known as “dotted decimal.” Since each decimal value represents eight binary digits, the maximum dotted decimal value is 255. The following is an example of a dotted decimal IP address: 161.62.63.64.

Address Classes

Introduction

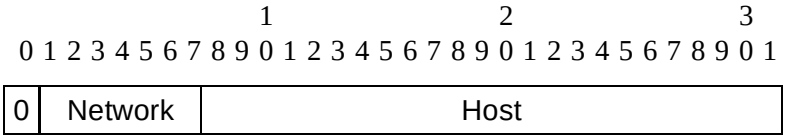
Five network classes are used to group networks according to the number of hosts on the network.These network classes are listed in the following table.

Network Class	Number of Hosts
Class A	Can contain millions of hosts.
Class B	Can contain thousands of hosts.
Class C	Can contain up to 254 hosts.
Class D	Used to address a group of computers all at one time (“multicast” addresses).
Class E	Reserved.

The following sections describe these five network classes.

Class A networks

As shown in the following figure, the uppermost bit of a class A network address is always 0. The next 7 bits define the network and the last 24 bits define the host. This allows 128 class A networks.



The following table lists the address ranges and their status.

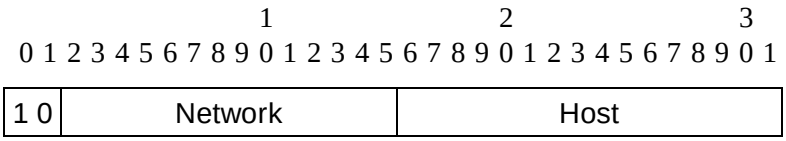
Address Range	Status
0.0.0.0	Reserved
1.0.0.0 through 126.0.0.0	Available
127.0.0.0	Reserved

(Continued on next page)

Address Classes (Continued)

Class B networks

As shown in the following figure, class B networks use the uppermost 2 bits as 1,0, the next 14 bits define the network, and the last 16 bits define the hosts. This allows up to 16,384 class B networks.

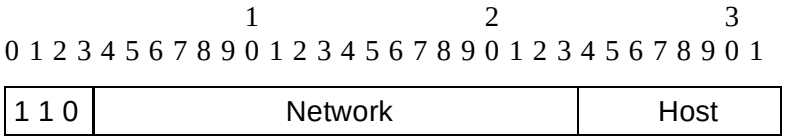


The following table lists the address ranges and their status.

Address Range	Status
128.0.0.0	Reserved
128.1.0.0 through 191.254.0.0	Available
191.255.0.0	Reserved

Class C networks

As shown in the following figure, class C networks use the uppermost 3 bits as 1,1,0, the next 21 bits define the network and the last 8 bits define the hosts. This allows up to 2,097,152 class C networks.



The following table lists the address ranges and their status.

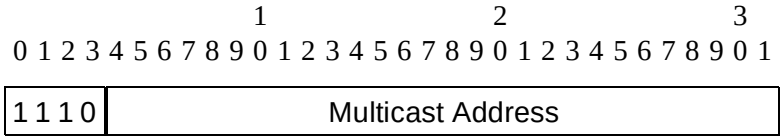
Address Range	Status
192.0.0.0	Reserved
192.0.1.0 through 223.255.254.0	Available
223.255.255.0	Reserved

(Continued on next page)

Address Classes (Continued)

Class D networks

IP multicasting uses class D network addresses. As shown in the following figure, class D networks use the uppermost 4 bits as 1,1,1,0. The remaining 28 bits are used for multicast groups of computers. RFC 1112 describes multicast groups.

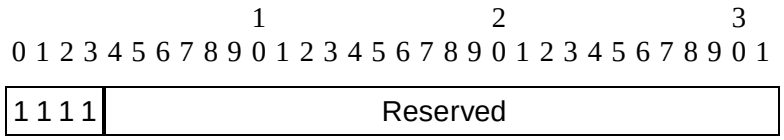


The following table lists the address range and status.

Address Range	Status
224.0.0.0 through 255.255.255.254	Reserved for use by IP multicast traffic

Class E networks

As shown in the following figure, class E networks use the uppermost 4 bits as 1,1,1,1. Class E networks are reserved for future use. The only class E address currently used is 255.255.255.255, which is a global broadcast address.



Subnets and Netmasks

Subnet description

Subnets are logical partitions of a single network. Subnets are created for administrative or technical reasons, isolating similar network traffic or similar network technology to one area of the network. RFC 950 explains the Internet Standard Subnetting Procedure.

Subnets are created by partitioning the host field of the network address. Each partition defines a subnet. For example, Class C networks use the last 8 bits to define the host. To divide this network into two subnets with an equal number of addresses in each, 1 bit of the host field is used. The broadcast address differs for each subnet, thus broadcasts only reach those hosts in the subnet.

The following table lists some subnet examples.

Network	No. Subnets	No. Subnet Bits	Broadcast Address
192.86.85.0	0	0	192.86.85.255
192.86.85.0	2	1	
		when 0: 192.86.85.1 through 192.86.85.126	192.86.85.127
		when 1: 192.86.85.129 through 192.86.85.254	192.86.85.255
192.86.85.0	8	3	
		when 000: 192.86.85.1 through 192.86.85.30	192.86.85.31
		when 001: 192.86.85.33 through 192.86.85.62	192.86.85.63
		when 010: 192.86.85.65 through 192.86.85.94	192.86.85.95
		when 011: 192.86.85.97 through 192.86.85.126	192.86.85.127
		when 100: 192.86.85.129 through 192.86.85.158	192.86.85.159
		when 101: 192.86.85.161 through 192.86.85.190	192.86.85.191
		when 110: 192.86.85.193 through 192.86.85.222	192.86.85.223
		when 111: 192.86.85.223 through 192.86.85.254	192.86.85.255

(Continued on next page)

Subnets and Netmasks (Continued)

Netmask description

Subnet partitions are identified by a netmask. The netmask is the network address with ones in each subnet bit location. The following table lists some examples.

Network	Number of Partitions	Number of Subnet Bits	Netmask
192.86.85.0	0	0	192.86.85.0 (no subnet)*
192.86.85.0	2	1	192.86.85.128 (decimal 128 equals binary 10000000)
192.86.85.0	8	3	192.86.85.224 (decimal 224 equals binary 11100000)

* A generic form of this netmask, 255.255.255.0, is sometimes used in place of the specific form.

Private IP Network Addresses

Description

A “private” network is one in which devices on a local area network (LAN) either do not require any access to other networks, or the devices need access to only a limited set of internetwork services that can be handled by an application proxy such as SOCKS. Examples of such services include e-mail, World Wide Web, FTP, and Telnet connections.

In a private network, addresses are obtained from a common pool of addresses; and although the addresses are always unique among the devices on the LAN, they are not guaranteed to be unique on the Internet. Therefore, to prevent confusion over packet destinations, these private addresses cannot be visible to the Internet. Instead, the application proxy must intercept all incoming traffic and manage the mapping of packets to the appropriate destination on the private network.

This allows an Internet service provider to allocate only one unique IP address to the site: the address of the *ConnectReach™* system on its link to the service provider. A range of IP addresses from the common pool are then used for all of the user devices on the LAN.

Suggested private networks are defined in RFC 1918, which lists the pool of IP addresses from which private network addresses may be selected. This pool is shown in the following table.

.

Address Class	Range of Addresses
Class A	10.0.0.0 through 10.255.255.255
Class B	172.16.0.0 through 172.31.255.255
Class C	192.168.0.0 through 192.168.255.255

The default IP address assigned to the *ConnectReach* system (192.168.0.1) is a class C private network address. If the *ConnectReach* system is configured to run dynamic host configuration protocol (DHCP) and use private network addresses, the addresses allocated by DHCP are derived from the same class C network.

Configuration Examples

B

Contents

About This Appendix

Introduction

Contents

This appendix contains examples of configuration sessions, ranging from an extremely simple configuration in which only the absolute minimum of parameters are specified to a more complex configuration requiring many parameters to be changed.

Examples of the Different Methods of Configuring the *ConnectReach*™ System

Quickstart Configuration Example

Configuration site conditions

This configuration applies to sites that:

- Use private Internet protocol (IP) network addresses.
- Use network address translation (NAT).
- Run the SOCKS application proxy.
- Have a telephone system and T1 link to the central office (CO) for which the *ConnectReach*™ system defaults are appropriate. Chapter 4, "Configuring the *ConnectReach* System", describes the defaults for all parameters.

Configuration list

If these conditions are met, you only need to configure the following:

- Synchronous interface encapsulation scheme and addresses [including data link connection identifier (DLCI), if encapsulation is set to frame relay]
- Primary domain name server (DNS) address [used by SOCKS to resolve domain names on the wide area network (WAN)]
- Site domain name
- Default route
- Voice and data channel assignments
- Login names and passwords.

(Continued on next page)

Quickstart Configuration Example (Continued)

Example

The following is an example of the configuration session. In this example, all commands are entered in their full form for easier reading. However, you can abbreviate any commands to the minimum number of characters that uniquely identify the command.

```
******* System Image Boot *******
ConnectReach System(2.1)
Built: Apr 21 1998, 19:25:09
NVRAM version 0107
PB $Id: romInit.s,v 1.3 1997/03/07 01:37:26 dab Exp $

Copyright 1996, 1997 VINA Technologies, Inc.

> config
(config)> ds0-provisioning
(config:DS0-provisioning)> analog-end 12
(config:DS0-provisioning)> data-begin 13
(config:DS0-provisioning)> data-end 24
(config:DS0-provisioning)> !
(config)> synchronous-interface
(config:Synchronous-interface)> encapsulation frame-relay
(config:Synchronous-interface)> modify-encap-data
(config:Frame-relay)> PVC1
(config:Frame-relay:PVC1)> DLCI 379
(config:Frame-relay:PVC1)> ip-address 199.199.199.99
(config:Frame-relay:PVC1)> netmask 255.255.255.0
(config:Frame-relay:PVC1)>                          !
(config:Frame-relay)                        !
(config)> dhcp
(config:DHCP)> enable on
(config:DHCP)> domain telco.net
(config:DHCP)> !
(config)> route
(config:IPRoute)> default 199.199.199.100
(config:IPRoute)> !
(config)> NAT
(config:NAT)> enable on
(config:NAT)> Dynamic
(config:NAT:Dynamic)> 1Group
(config:NAT:Dynamic:Group1)> enable on
(config:NAT:Dynamic:Group1)> Lan-Start 192.168.0.2
```

(Continued on next page)

Quickstart Configuration Example (Continued)

Example (continued)

```
(config:NAT:Dynamic:Group1)> Lan-End 192.168.0.254
(config:NAT:Dynamic:Group1)> Wan-Start 199.199.199.99
(config:NAT:Dynamic:Group1)> Wan-End 199.199.199.99
(config:NAT:Dynamic:Group1)> !
(config:NAT)> !
(config)> password
(config:Password)> user customer
Enter password: ****
Validate password: ****
(config:Password)> carrier telco
Enter password: *****
Validate password: ****
(config:Password)> !
(config)> save
Verifying system configuration...
Do you really want to update the system NVRAM
configuration [n]y: y
Updating Flash NVRAM... wait

DONE

(config)> exit

> warm-start
Warning: Data traffic will be interrupted...
continue? [y/n] y :resetting...
```

NOTE:
If you change the beginning channel number of the range of data channels and do a warm-start, the system will automatically prompt you that it will perform a cold-start.

The next time you connect to the *ConnectReach* system, you will be prompted for a login name and password. If you want access to the full set of *ConnectReach* system configuration and monitoring commands, log in with the carrier name and password (“telco” in the previous example).

Customized Configuration Example

Configuration site conditions

This configuration applies to sites that:

- Do not use private IP network addresses.
- Have a telephone system and T1 link to the CO for which the *ConnectReach* system defaults are not always appropriate. Chapter 4, "Configuring the *ConnectReach* System", describes the defaults for all parameters.

Configuration settings that need verification

Under these conditions, you need to verify the settings of all configuration parameters and determine which need to be adjusted.

(Continued on next page)

Customized Configuration Example (Continued)

Example

The following is an example of this type of configuration session on a system with T1/DSX-1 interface. The example for a system with HDSL interface will be similar. In this example, all commands are entered in their full form for easier reading.

The example assumes that the site has been assigned a range of unique IP addresses to be used on the Ethernet network. The simple network management protocol (SNMP) host is a device on network 123.45.67.0, and access to the *ConnectReach* system is restricted to traffic from that network only. A secondary permanent virtual circuit (PVC) is constructed, and a route to the access network by means of the secondary PVC is declared. The secondary /fractional T1/DSX-1 interface is connected to a private branch exchange (PBX) or key service unit (KSU) and is DS0 voice channels and 12 DS0 data channels. In addition, the service provider requires all WAN addresses to have a numbered interface.

```
******* System Image Boot *******

ConnectReach (2.1)
Built: Apr 21 1998, 19:25:09
NVRAM version 0107
PB $Id: romInit.s,v 1.3 1997/03/07 01:37:26 dab Exp $

Copyright 1996, 1997 VINA Technologies, Inc.

logged on as Carrier

> conf
(config)> secondary-t1
(config:Secondary-t1)> enable on
(config:Secondary-t1)> !
(config)> ds0-provisioning
(config:DS0-provisioning)> analog-begin  0
(config:DS0-provisioning)> analog-end  0
(config:DS0-provisioning)> sec-T1-voice-begin 1
(config:DS0-provisioning)> sec-T1-voice-end 12
(config:DS0-provisioning)> data-begin 13
(config:DS0-provisioning)> data-end 24
(config:DS0-provisioning)> !
(config)> synchronous-interface
(config:Synchronous-interface)> modify-encap-data
(config:Frame-relay)> PVC1
(config:Frame-relay:PVC1)> dlci 358
(config:Frame-relay:PVC1)> ip-address 199.188.177.166
```

(Continued on next page)

Customized Configuration Example (Continued)

Example (continued)

```
(config:Frame-relay:PVC1)> netmask 255.255.255.0
(config:Frame-relay:PVC1)> !
(config:Frame-relay)> PVC2
(config:Frame-relay:PVC2)> dlci 19
(config:Frame-relay:PVC2)> ip-address 299.88.77.6
(config:Frame-relay:PVC2)> netmask 255.255.255.0
(config:Frame-relay:PVC2)> !
(config:Frame-relay)> lmi-type Q.933-annex-a
(config:Frame-relay)> !
(config)> ethernet
(config:Ethernet)> ip-address 211.22.33.1
(config:Ethernet)> netmask 255.255.255.0
(config:Ethernet)> !
(config)> route
(config:IPRoutes)> default 199.188.177.1
(config:IPRoutes)> add 123.45.67.0 255.255.255.0 PVC2
(config:IPRoutes)> !
(config)> passwords
(config:Password)> user customer
Enter password: ****
Validate password: ****
(config:Password)> carrier sysadm
Enter password: ****
Validate password: ****
(config:Password)> !
(config)> dhcp
(config:DHCP)> start-ip 211.22.33.2
(config:DHCP)> end-ip 211.22.33.54
(config:DHCP)> private-network off
(config:DHCP)> dns-server 199.188.177.5
(config:DHCP)> domain isp.net
(config:DHCP)> !
(config)> snmp
(config:SNMP)> snmp-host 123.45.67.89
(config:SNMP)> cold-start on
(config:SNMP)> warm-start on
(config:SNMP)> link-down on
(config:SNMP)> link-up on
(config:SNMP)> login-failures on
(config:SNMP)> !
```

(Continued on next page)

Customized Configuration Example (Continued)

Example (continued)

```
(config)> dns
(config:DNS)> enable off
(config:DNS)> !
(config)> save
Verifying system configuration...
Do you really want to update the system NVRAM
configuration [n]\y: y
Updating Flash NVRAM... wait
DONE
(config)> exit
> cold-start
Warning: Voice and Data traffic will be interrupted...
continue? [n]\y: y
resetting...
```

NOTE:
Because this configuration has changed the beginning channels of both voice and data ranges, the `cold-start` command must be used for the new settings to take effect.

The next time you connect to the *ConnectReach* system, you will be prompted for a login name and password. If you want access to the full set of *ConnectReach* system configuration and monitoring commands, log in with the carrier name and password (“sysadm” in the previous example).

LCR/DID Configuration Example

Quickstart assumptions

The local call routing/direct inward dial (LCR*/DID) telephony quickstart makes the following assumptions:

- One or more DS0s on the Network T1/DSX-1 connect to a long distance carrier.
- At least one foreign exchange office (FXO) card is present, and it is used to connect to a local carrier.

If these assumptions do not apply to your configuration, refer to Chapter 4, "Configuring the *ConnectReach* System", for more detailed instructions.

Configuration setting example

The following is an example of the procedure for configuring the *ConnectReach* system in the LCR/DID mode:

1. Go to the config/DS0 menu. Set `analog-begin` and `analog-end` to the first and last DS0 numbers used for digital trunks.
2. Go to the config/channel-bank menu. Set `signaling` to *unconfigured*. Use the `copy-to-channel-data` command. This takes all voice DS0s out of channel bank mode.
3. Go to the config/digital-trunk menu. Set `begin` and `end` to the first and last DS0 numbers used for digital trunks. Set `signaling` to match the trunk type as configured in the central office. Inspect the other parameters for accuracy. In most cases, they will not need modification. Use the `copy-to-channel-data` command. This puts the selected range of DS0s into LCR/DID mode and configures them as digital trunks.
4. Go to the config/analog-trunk menu. Set `begin` and `end` to the first and last cable pairs on the voice channels connector used for analog trunks. Set `signaling` to match the trunk type as configured in the central office. Inspect the other parameters for accuracy. In most cases, they will not need modification. Use the `copy-to-channel-data` command. This configures the analog trunks.
5. Go to the config/line menu. Set `begin` and `end` to the first and last FXS ports used for phones. Set the signaling to match the line type of the phones. Inspect the other parameters for accuracy. In most cases, they will not need modification. Use the `copy-to-channel-data` command. This configures the lines.

(Continued on next page)

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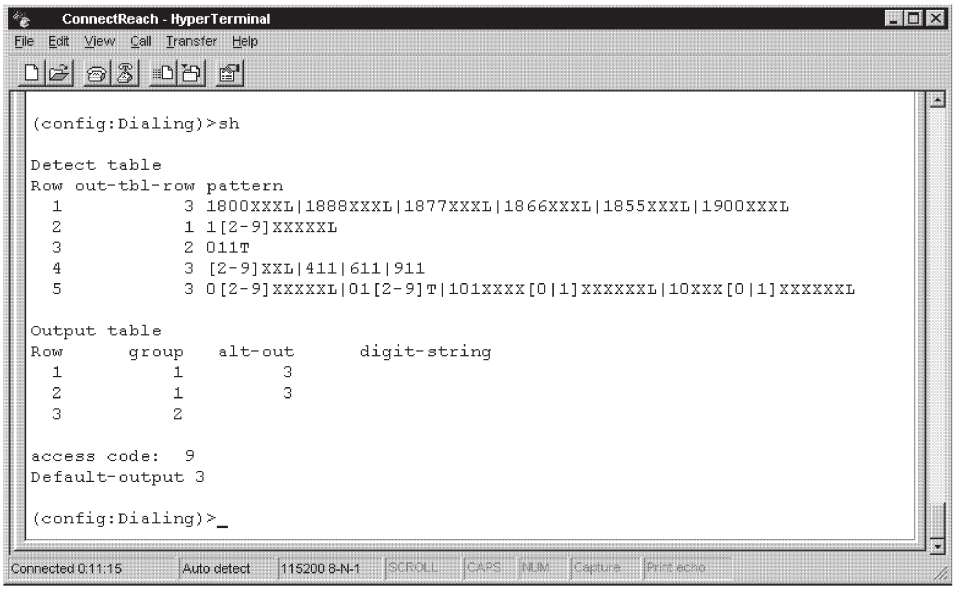
LCR/DID Configuration Example (Continued)

Configuration setting example (continued)

6. Go to the config/dialing menu. Use the `show-all` command to inspect the system defaults. The default routes all direct dialed long distance and international calls over the digital trunks; and all local, toll-free and operator-assisted calls over the analog trunks. Refer to the following figure for more detail.



7. If there are any seven-digit calls that are to be routed over the digital trunks (seven-digit long distance call), enter the following commands:

   `detect-insert 6 4 AAA|BBB|CCC| |YYY`

   `output-insert 4 1 - 1ZZZ`

   where AAA through YYY are the exchanges to be rerouted, and ZZZ is the local area code to be prefixed to the digital trunk. Eliminate the “1” before ZZZ if it is not required.

(Continued on next page)

LCR/DID Configuration Example (Continued)

Configuration setting example (continued)

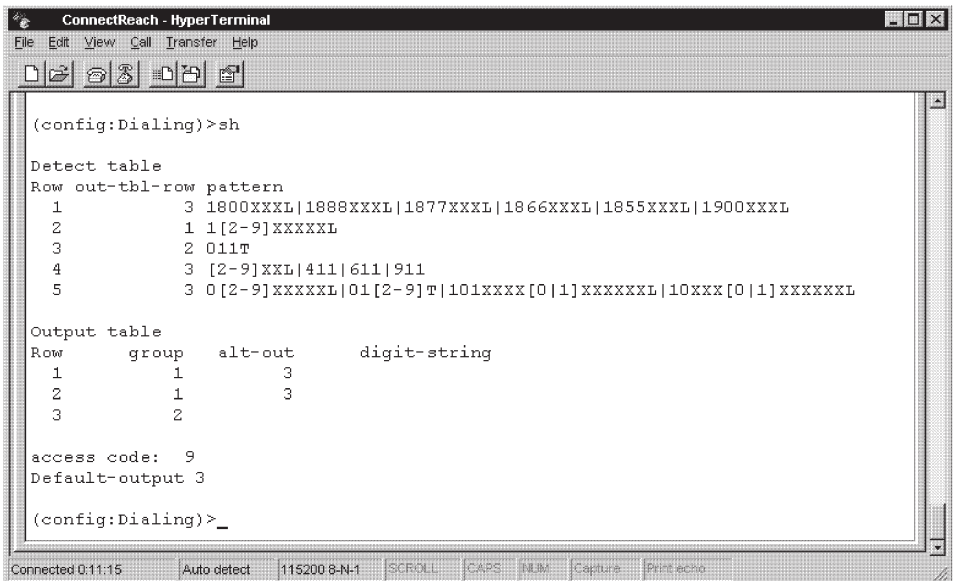
8. If there are any ten digit calls that are to be routed over the analog trunks (ten-digit local call), enter the following command:

   ```
   detect-insert 7 3 1AAAAAA|1BBBBBB| |ZZZZZZ
   ```

   where AAAAAA through ZZZZZZ are the area code and exchanges to be rerouted.

Dialing table default entries

The following is a description of the dialing table default entries shown in the following figure. The dialing table is displayed using the `configure-dialing-show-all` commands.



Detect-table *row 1* routes toll free calls (900 service is toll free to the recipient) to *output-row* 3, which, in turn, routes them to trunk group *2*.

(Continued on next page)

LCR/DID Configuration Example (Continued)

Dialing table default entries (continued)

Detect-table *row 2* routes United States long distance calls to *output-row 1*, which, in turn, routes them to trunk group *1* with an *alternate* route to trunk group *2*.

Detect-table *row 3* routes international calls to *output-row 2*, which, in turn, routes them to trunk group *1* with an *alternate* route to trunk group *2* (*output-row 3*).

Detect-table *row 4* routes local calls, including information, service repair, and emergency calls, to *output-row 3*, which, in turn, routes them to trunk group *2* (*output-row 3*).

Detect-table *row 5* routes credit card calls to *output-row 3*, which, in turn, routes them to trunk group *2*.

The default for all other calls is *output-row 3*, which, in turn, routes them to trunk group *2*.

NAT Examples

Example 1

This is an example of a many-to-one connection, including TCP, UDP, and ICMP connections. All the LAN private addresses on 192.168.1.0 network will be mapped to one Internet address, 200.200.200.1.

```
(config:NAT:Dynamic:Group1)> enable on
(config:NAT:Dynamic:Group1)> LAN-Range 192.168.1.1 192.168.1.254
(config:NAT:Dynamic:Group1)> WAN-Range 200.200.200.1 200.200.200.1
```

Example 2

In this one-to-one example, the address 192.168.1.100 will always be mapped to the address 200.200.200.2. Only Outbound (from LAN to WAN) connections will be allowed.

```
(config:NAT:Static:Group2)> enable on
(config:NAT:Static:Group2)> LAN-Range 192.168.1.100 192.168.1.100
(config:NAT:Static:Group2)> WAN-Range 200.200.200.2 200.200.200.2
(config:NAT:Static:Group2)> ALLOW-INBOUND OFF
```

Example 3

In this example, all IP packets with the source or destination on the network 207.242.96.0 will be passed through NAT (in other words, these packets will not be translated).

```
(config:NAT:PassGroup2)> enable on
(config:NAT:PassGroup2)> LAN-Range 207.242.96.1 207.242.96.254
```

Example 4

In this example, the LAN range 192.168.1.101—192.168.1.254 will be mapped dynamically (at random) to the WAN range 200.200.200.3—200.200.200.6. For example, all TCP connections from 192.168.1.107 might be mapped to some TCP connections of IP addr 200.200.200.5.

```
(config:NAT:Static:Group4)> enable on
(config:NAT:Static:Group4)> LAN-Range 192.168.1.101 192.168.1.254
(config:NAT:Static:Group4)> WAN-Range 200.200.200.3 200.200.200.6
```

Custom Firewall Configurations

C

Contents

About This Appendix

Introduction

Contents

This appendix describes the customized Firewall configurations for SOCKS and Internet Protocol (IP) filtering.

Configuring SOCKS and IP Filter Groups

Configuring SOCKS

Configuration procedure

The following procedure should be used to configure SOCKS:

1. At the Config prompt, enter the `firewall` command:

   ```
   (config)> firewall
   ```

   The prompt changes to the Config:IPFirewall prompt.

   ```
   (config:IPFirewall)>
   ```

2. At the Config:IPFirewall prompt, enter the SOCKS command:

   ```
   (config:IPFirewall)> socks
   ```

   The prompt changes to the Config:IPFirewall:SOCKS prompt.

3. At the Config:IPFirewall:SOCKS prompt, enter the appropriate commands (see the following table).

Enter this command	Specify this value	Comment
`enable`	`on, [off]`	SOCKS is enabled by default.

4. When you have made the necessary configuration changes, enter an exclamation point (**!**) to return to the Config menu.

NOTE:
If you change this parameter, you must save the configuration and reboot the *ConnectReach*™ system using the `warm-start` command before the new setting takes effect.

Configuring IP Filter Groups

Configuration procedure

There are two IP filter groups: inbound and outbound (each one containing up to eight different IP filters). An IP filter can filter IP packets based on source and/or destination IP address, and/or based on any known application (protocol). Examples of IP filters include, but are not limited to the following:

- Deny all packets from certain IP addresses/networks.
- Deny all packets from certain source IP addresses/networks to certain destination IP addresses/networks.
- Deny all Telnet session requests coming into this interface.
- Permit all pings coming from certain IP addresses/networks.
- Deny all transport control protocol (TCP) packets coming to certain destination IP addresses/networks.
- Permit all TCP sessions that are established.
- Permit all user datagram protocol (UDP) packets with UDP ports greater than (any number).
- Deny all IP packets of IP type 1 coming from certain IP addresses/networks.
- Permit all hypertext transfer protocol (HTTP) (www) packets from any source to any destination.
- Permit mail protocol only to the particular IP addresses/networks.

The filter syntax is as follows:

Filter*n*	permit/deny/clear [dst [net mask]] [src [net mask] [All | keyword | default [tcpport/uddport/iptype/ cmp #]] [est]

(Continued on next page)

Configuring IP Filter Groups (Continued)

Configuration procedure (continued)

Remarks	All [ ] parameters above are optional. The only required parameters are Action and Protocol. Once the filter matches, the action (permit/deny) is immediately performed. The source (src) and destination (dst) parameters are specified with an IP address and netmask or one of the following words: eth0, eth1, pvc1, pvc2, pvc3, pvc4, pvc5, ppp0, hdlc0 Filter 1 has the highest priority and so on. The **defaultAction** specifies what to do with the packet in the default case. **defaultAction permitAll** is the only factory default statement. "All" means all packets. "Keyword" can be one of the following words: Telnet, FTP, SMTP, HTTP, PING, RIP, ICMP, TFTP, bootp, gopher, DNS, SNMP, NTP, OSPF, NFS, FTP-data, RSVP, NHRP, POP2, POP3 "**Default**" means all of the following protocols: Telnet, FTP, SMTP, DNS, HTTP, PING, POP2, POP3 The parameters tcpport, udpport, and iptype are each followed by a setting for the cmp. **Cmp** can be one of the following: **>**, **<**, **=**, **!=** Examples of iptype settings are: 1 for ICMP 6 for TCP 46 for RSVP 83 for VINES For a complete list of assigned numbers for iptype, see RFC 1700. **Est** means to apply this access list to already established TCP connections.

IP filtering is completely independent of the SOCKS server. An IP filter group can be applied to an interface regardless of whether the SOCKS server is running or not. One distinguishable feature of the implementation is the presence of the special "default" keyword. This specifies the normal protocols that a typical server would support, that is, those protocols that should be permitted: Telnet, FTP, SMTP, DNS, HTTP, PING, POP2, POP3. The default keyword is very useful in cases where access is allowed for just one server on the local area network (LAN) [for all the traffic coming from the wide area network (WAN) side].

(Continued on next page)

Configuring IP Filter Groups (Continued)

Configuration procedure (continued)

Enter a question mark to view the settings.

>(Config:IPFirewall:InFilterGroup) **?**

A sample of the Inbound Filter Group settings is as follows:

Filter1	permit	src pvc2 ping
Remarks	Filter 1 permits all ping packets coming from PVC2.	
Filter2	permit	dst 207.104.144.153. 255.255.255.255 default
Remarks	Filter 2 permits all packets destined to the host 207.104.144.153. The keyword **default** refers to the common server protocols (FTP, SMTP, DNS, HTTP, and PING). Note that a particular host is specified as the destination by the netmask 255.255.255.255: the destination address is formed by applying the netmask (255.255.255.255) to the address (207.104.144.153), resulting in the single (host) address 207.104.144.153.	
Filter3	permit	ping
Remarks	Filter 3 permits all (ICMP) PING packets to pass.	
Filter4	permit	207.104.144.0 255.255.255.0 smtp
Remarks	Filter 4 permits all SMTP packets to pass addressed from/to any host on the network 207.104.144.0.	
Filter5	permit	1.1.1.1 255.0.0.0 tcp = 29 est
Remarks	Filter 5 permits all packets using TCP port 29 from/to any host on the network 1.0.0.0 (the network 1.0.0.0 is the result of applying the netmask 255.0.0.0 to 1.1.1.1).	
Filter6	permit	207.104.144.0 255.255.255.0 All
Remarks	Filter 6 permits all packets from/to the network 207.104.144.0 to pass.	
Filter7		
Filter8		
defaultAction	denyAll	
Remarks	DefaultAction drops all packets that do not match any of the above filter specifications.	

(Continued on next page)

Configuring IP Filter Groups (Continued)

Examples of using IP filter groups

The following examples describe how to use IP filter groups.

Example 1

Allow SOCKS clients. For non-SOCKS clients do not allow any IP access, except to the main IP LAN Server of IP address 207.104.144.153. Allow “default” access to 207.104.144.153 from WAN.

Enter a question mark to view the SOCKS settings.

```
>(Config:IPFirewall:Socks) ?
```

SOCKS settings for Example 1 are as follows:

```
enable      on
```

Enter a question mark after the Inbound Filter command to view the settings.

```
>(Config:IPFirewall:INFilterGroup) ?
```

IP Inbound Filter settings for Example 1 are as follows:

```
Filter1          permit dst 207.104.144.153 255.255.255.255 default
defaultAction    denyAll
```

Enter a question mark after the Outbound Filter command to view the settings.

```
>(Config:IPFirewall:OUTFilterGroup) ?
```

IP Outbound Filter Settings for Example 1 are as follows:

```
Filter1          permit src 207.104.144.153 255.255.255.255 default
defaultAction    denyAll
```

(Continued on next page)

Configuring IP Filter Groups (Continued)

Examples of using IP filter groups (continued)

Example 2

Allow only pings packets to get through from WAN.

Enter a question mark after the Inbound Filter command to view the settings.

```
>(Config:IPFirewall:INFilterGroup) ?
```

IP Inbound Filter settings for Example 2 are as follows:

Filter1	**permit ping**
defaultAction	**denyAll**

Example 3

Do not allow any HTTP (www) sessions requests coming from WAN side (except for already established ones). Allow HTTP and a Telnet access to the Integrator only from address 1.1.1.1.

Enter a question mark after the Inbound Filter command to view the settings.

```
>(Config:IPFirewall:INFilterGroup) ?
```

IP Inbound Filter settings for Example 3 are as follows:

Filter1	**permit http est**
Filter2	**deny http**
defaultAction	**permitAll**

Enter a question mark after the Access Restrict command to view the settings.

```
>(Config:IPFirewall:T1Int-AccessRestrict) ?
```

AccessRestrict settings for Example 3 are as follows:

IP-address	**1.1.1.1**
netmask	**255.255.255.255**

User Interface

D

Contents

About This Appendix

Introduction

Contents

This appendix includes the instructions for using the Business OfficeXchange* (BOX*) features on a single line telephone.

* Trademark of VINA Technologies, Inc.

Business OfficeXchange Features

Transferring a Call to Another Phone

Procedure

Use the following procedure to transfer a call from your phone to another phone:

NOTE:
"Flash" means press and release the receiver button quickly; or if your phone is equipped with a **FLASH** button, press the **FLASH** button.

While connected to a call:

Step	Procedure
1	Flash. You will hear a dial tone.
2	Dial the extension or phone number of the phone you are transferring the call to.
3	At this point you have the following options available to you: ■ Hang up and the call will be transferred. ■ Announce the call to the receiving party and then hang up. The call will be transferred. If there is no answer, flash the hook again to return to the first party.

Depending on the caller's connection and the receiver's connection to the phone company, this feature may not be available. This condition is only for outside to outside transfers. If the transfer cannot be completed, you will hear a fast busy tone. At this point you may flash to return to the first party.

Consultation Hold Feature

Procedure

The consultation hold feature allows you to alternate between two calls. Use the following procedure to alternate between two calls:

While connected to a call:

Step	Procedure
1	Flash. You will hear a dial tone.
2	Dial the second extension or phone number. The second party answers.
3	To alternate between the two parties, flash the hook twice within a 3-second interval.

A single flash activates three-way calling. If either of the other parties flashes their receiver, the flash is ignored. If any one of the three parties hangs up, the remaining two parties retain their connection. This feature's availability is dependent on the phone company connection of the two outside parties.

Three-Way Calling

Procedure

Use the following procedure to set up a three-way call between your phone and two other parties:

Step	Procedure
1	Follow the instructions for consultation hold discussed previously.
2	Flash. This causes all three parties to be conferenced together.

If either of the other parties flashes, the flash is ignored. If any one of the three parties hangs up, the remaining two parties retain their connection. This feature's availability is dependent on the phone company connection of the two outside parties.

Call Waiting

Procedure

When you are on the line and a second call is coming in, you will hear a call waiting tone. To retrieve an incoming call while on another call, flash.

You may use consultation hold to switch between calls. If your administrator has configured your phone system for call forward busy, then call waiting will be disabled. In call forward busy, a second call will automatically be forwarded to another extension (for example, voice mail or the operator).

Feature Codes

Introduction

Feature codes are sets of numbers that are entered at the telephone keypad in order to implement or cancel certain BOX features. To enter the feature codes, lift the telephone receiver and dial the feature code followed by the extension number, if appropriate. The following table provides dialing instructions when entering feature codes. If a feature code has been programmed with a code that is different from the one in the table, make note of it in the table.

Feature	Feature Code	Additional Dialing Required?
Cancel Call Waiting	*70	No
Call Pickup	*1	No
Direct Call Pickup	*5	Extension number
Call Forward Variable	*72	Extension number
Cancel Call Forward Variable	*73	No
Pager	*3	No
Digital Direct Access	*40	Trunk number
Analog Direct Access	*41	Trunk or line number
Cancel Busy Redial	*42	No

Cancel call waiting

This feature code disables call waiting for the next call. A second dial tone is provided after dialing the feature code. Canceling call waiting allows for modem data transfer without the interference of the call waiting tone.

Call pickup

Dialing the call pickup feature code causes a ringing line in the user's pickup group to be answered. Each line may be assigned to a call pickup group.

Direct call pickup

This feature allows call pickup outside the answerer's pickup group. To activate this feature, dial the directed call pickup feature code followed by the extension number.

(Continued on next page)

Feature Codes (Continued)

Call forward

This feature forwards calls from one extension to another extension or trunk. An incoming call may be forwarded as many as ten times. To activate call forwarding:

Step	Procedure
1	The user dials the call forward feature code followed by the number of the forwarding location.
2	The software places a call to the forwarding location. If the line is answered, forwarding is enabled. If the line is not answered, the user must place a second call to the same number within 60 seconds. The user will hear a confirmation tone (same as call waiting). Each time the forwarded line is called, there will be a short ring to remind you that you have call forwarding activated. If your phone system is equipped with a voice mail system, the call forward variable may be used to immediately forward all calls to voice mail. Obtain a voice mail extension from your administrator and enter it as the forwarding location.

Cancel call forward

To cancel call forwarding, the user dials the cancel call forward feature code and a confirmation tone is sounded.

Pager

The pager feature allows for paging capability by dialing the pager feature code.

Digital direct access

This feature is used for diagnostics and is not included in the quick reference guide. If direct trunk select is enabled, the user may enter the feature code followed by the trunk number to test a specific trunk.

Analog direct access

This feature is similar to digital direct access. It is not included in the quick reference guide. The user enters the feature code followed by the analog line number to test a line or analog trunk.

(Continued on next page)

Feature Codes (Continued)

Busy redial

This feature is used when you are given a busy signal when dialing another line or a fast busy signal when making an outgoing call.

To activate busy redial, flash, listen for a second dial tone, and hang up. You will be called back with an internal distinctive ring when the called line is available or an outgoing line becomes free. In the case of an outgoing call, the number dialed is remembered and redialed.

If you do not answer the distinctive ringing within six rings, the busy redial feature is canceled.

Cancel busy redial

To cancel the busy redial feature, lift the receiver and dial the cancel busy redial feature code.

HDSL Manager

E

Contents

About This Appendix

Introduction

Contents

This appendix describes communication with the high data-rate digital subscriber line (HDSL) module located in the *ConnectReach*™ system by means of the American standard code for information interchange (ASCII) Text Interface.

Using the ASCII Text Interface

Understanding the ASCII Text Interface

Description

The ASCII Text Interface provides network management, provisioning, and testing capabilities. It is an interactive, human-readable, menu driven interface for easy access to the HDSL module and is compatible with an ASCII terminal or personal computer (PC) operating in VT-100 mode.

The following nine screens are available by means of the ASCII Text Interface:

- Maintenance terminal Main Menu
- View span status
- Set clock
- System settings
- Loopback mode
- View performance data
- View performance history
- View alarm history
- Enter circuit identification (ID) number.

The sections that follow provide a detailed description of the nine ASCII Text Interface screens.

Accessing the ASCII Text Menus

Procedure To view the ASCII Text Interface screen, follow these steps:

Step	Procedure
1	At the config prompt, enter the `Network-HDSL` command: `(config)>` **`Network-HDSL`** The prompt changes to the config:Network-HDSL prompt. `(config:Network-HDSL)>`
2	At the config:Network-HDSL prompt, enter the `HDSL-Manager` command. `(config:Network-HDSL)>` **`HDSL-Manager`** The prompt does not change.
3	Press the space bar several times to activate the ASCII Text Interface and display the Maintenance Terminal Main menu. **Stop! End of Procedure.**

Maintenance Terminal Main Menu

Description

The Maintenance Terminal Main Menu displays a list of the ASCII Text Interface screens. To select an option, type the letter next to it.

The following figure shows the Maintenance Terminal Main Menu.

```
HI-GAIN m/OEM-T1    MAINTENANCE TERMINAL MAIN MENU   (ver V1.4 -0004)
                         CIRCUIT ID#:

                    A. VIEW SPAN STATUS
                    B. SET CLOCK
                    C. SYSTEM SETTINGS
                    D. LOOPBACK MODE:  NONE
                    E. VIEW PERFORMANCE DATA
                    F. VIEW PERFORMANCE HISTORY
                    G. VIEW ALARM HISTORY
                    H. ENTER CIRCUIT ID #
```

Navigating through the maintenance terminal main menu

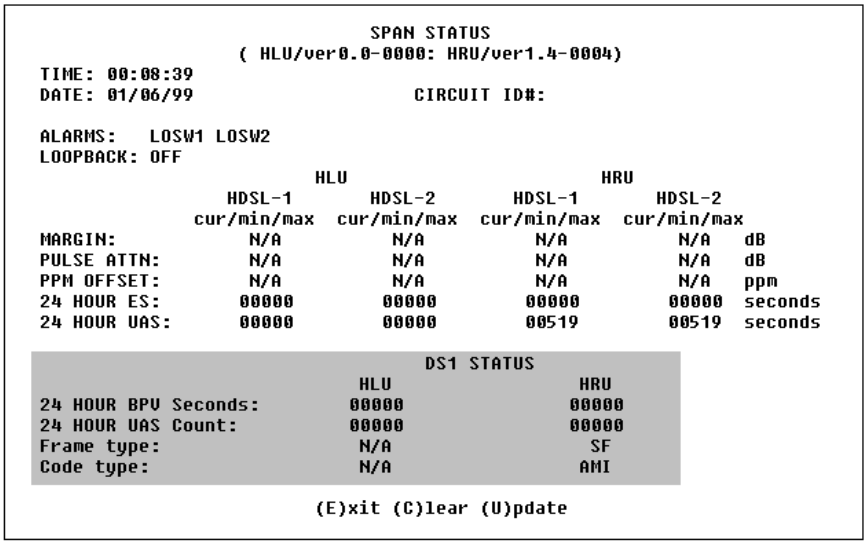
The following steps provide the information necessary to navigate through the Maintenance Terminal Main Menu:

- To change any parameter on a screen enter the letter associated with the parameter shown in parenthesis ( ).
- To scroll through the parameter values, press the letter associated with the parameter continuously.
- To exit the screen, press the letter "**E**" key.
- To confirm the changes, press the letter "**C**" key.
- To exit the HDSL-Manager, type **Ctrl-C** from the Main Menu. This is done by holding the "**Ctrl**" key down while pressing the letter "**C**" key. The ASCII terminal will return to the *ConnectReach* system Utility and the *ConnectReach* Utility prompt will appear.

Span Status

Description

The Span Status screen displays the circuit status from the HiGain line unit (HLU) and the HiGain remote unit (HRU) or the master and slave unit depending on the system configuration. The screen displays information about the two HDSL interfaces (HDSL-1 and HDSL-2) and DS1. This screen shows the status for one span at a time. If doublers are present on the circuit, press the letter "**S**" key to view the status information for the next span. The following figure shows the Span Status screen. The shaded areas in the screen indicate the parameters that are only valid when an HLU (master) or an HRU (slave) is in the circuit.



To exit, clear, or update the screen, type the first letter of the action.

Span status menu field values

This section describes the values that could appear in the Span Status menu fields.

NOTE:
Fields marked with an asterisk are only valid when the *ConnectReach* system is connected to a HiGain unit.

(Continued on next page)

Span Status (Continued)

Span status menu field values (continued)

ALARMS

The following values could appear in the **ALARMS** menu field:

LLOS*	Local Loss of Signal. No signal at the local DS1 input port.
RLOS*	Remote Loss of Signal. No signal at the remote DS1 input port.
LOSW1	Loss of Sync Word. HDSL loop 1 has lost synchronization.
LOSW2	Loss of Sync Word. HDSL loop 2 has lost synchronization.
H1ES	HDSL loop 1 Errored Second (ES). The number of HDSL ES detected on the HDSL input port of the master or slave on the current span has exceeded the user-defined threshold.
H2ES	HDSL loop 2 Errored Second. The number of HDSL ES detected on the HDSL input port of the master or slave on the current span has exceeded the user-defined threshold.
DS1 (for T1/FT1)*	DS1 BPV Error. The number of bipolar violation (BPV) ES detected on the DS1 input of the HLU or HRU has exceeded the user-defined threshold.
G703 (for E1)*	G703 BPV Error. The number of BPV ES detected on the G703 input of the master or slave has exceeded the user-defined threshold.
LAIS*	Local Alarm Indication Signal. The local unit is transmitting an AIS bit pattern (all 1 bits).
RAIS*	Remote Alarm Indication Signal (AIS). The remote unit is transmitting an AIS bit pattern (all 1 bits).
MAL1	Margin Alarm. The margin on HDSL loop 1 of the current span has dropped below the user-defined threshold.

(Continued on next page)

Span Status (Continued)

Span status menu field values (continued)

MAL2	Margin Alarm. The margin on HDSL loop 2 of the current span has dropped below the user-defined threshold.
CHREV	Channels Reversed. The HDSL loops are reversed at the HDSL input ports.
NONE	No alarm condition detected.

LOOPBACK

The following values could appear in the **LOOPBACK** menu field:

SMJK	Smart-Jack loopback. Loopback at the slave unit toward the network.
NREM	Network Remote loopback. Loopback at the slave unit toward the network.
NLOC	Network Local loopback. Loopback at the master unit toward the network.
NDU1	Network Doubler 1 loopback. Loopback at doubler 1 toward the network.
NDU2	Network Doubler 2 loopback. Loopback at doubler 2 toward the network.
CLOC	Customer Local loopback. Loopback at the slave unit toward the customer.
CREM	Customer Remote loopback. Loopback at master toward the customer.
CDU1	Customer Doubler 1 loopback. Loopback at doubler 1 toward the customer.
CDU2	Customer Doubler 2 loopback. Loopback at doubler 2 toward the customer.
ARM	Armed. The system has detected the Intelligent Repeater loopback arming code.

(Continued on next page)

Span Status (Continued)

Span status menu field values (continued)

TLOS*	Transmit Loss of Signal. The slave unit is in a logic-loopback state caused by a loss of T1 input from the customer.
NONE	No loopbacks are enabled.

MARGIN

Displays the excess signal-to-noise ratio (SNR) relative to a 10^{-7} bit error rate. The normal range is from 22 to 6 dB. The margin appears in the format xx/yy/zz where:

- xx is the current margin updated in real-time
- yy is the minimum value since last cleared
- zz is the maximum value since last cleared.

If the loop is not in sync, N/A (not available) appears in the margin field.

PULSE ATTN

Displays the attenuation of the HDSL 2B1Q pulse from the distant end. The HDSL module operates with pulse attenuation in excess of 30 dB. This value is related to the cable pair's 196 kHz loss for T1. The pulse attenuation is a more direct indication of the loop attenuation to the 2B1Q signal than the 196 kHz loss. The normal range of pulse attenuation is from 1 to 32 dB.

PPM OFFSET

Displays the relative offset of the crystal oscillator in the master unit from the crystal oscillator in the slave unit. Any value between -64 and +64 is adequate. Values outside this range indicate out-of-tolerance components or excessive temperature drift in critical components

24-HOUR ES

Displays the number of seconds that contained at least one HDSL cyclic redundancy check (CRC) error during the current 24-hour period.

(Continued on next page)

Span Status (Continued)

Span status menu field values (continued)

24-HOUR UAS

Displays the number of seconds the HDSL loop was out of sync during the current 24-hour period.

24-HOUR BPV Seconds*

Displays the number of seconds at least one BPV was detected at the HLU or HRU DS1 input port.

24-HOUR UAS Count*

Displays the number of seconds the HLU or HRU DS1 signal was absent (125 or more consecutive zeros).

Frame type*

The DS1 frame format [superframe (SF), extended super frame (ESF), or unframed) the unit is receiving.

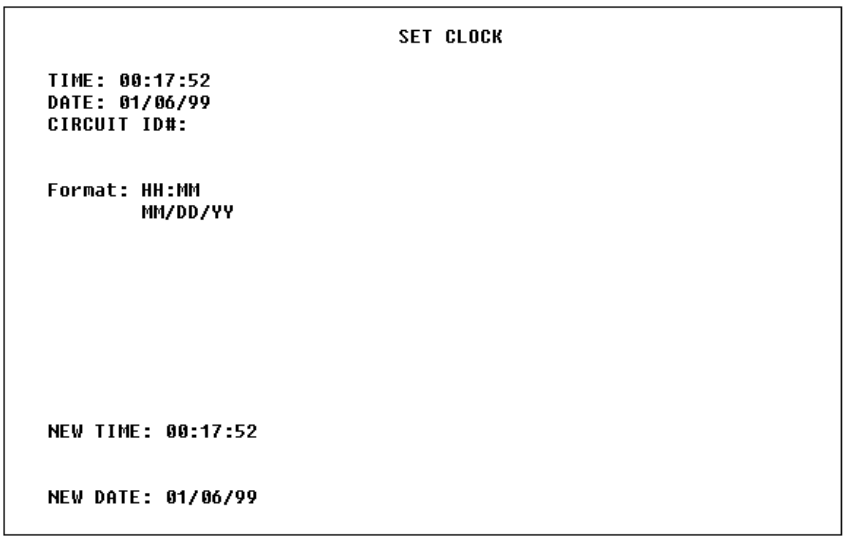
Code type*

The encoding type [alternate mark inversion (AMI), bipolar 8 zero substitution (B8ZS)] that the unit is transmitting.

Set Clock

Description

The Set Clock screen displays the date and time set on each HDSL module. (Time is displayed in the 24-hour or military format.) To change the time or date, enter the new time and date in the appropriate fields. Press the letter "**U**" key to update the time and date of the remote HDSL module. The time and date of the remote HDSL module is updated to the new time and date set on the local HDSL module. The following figure shows the Set Clock screen

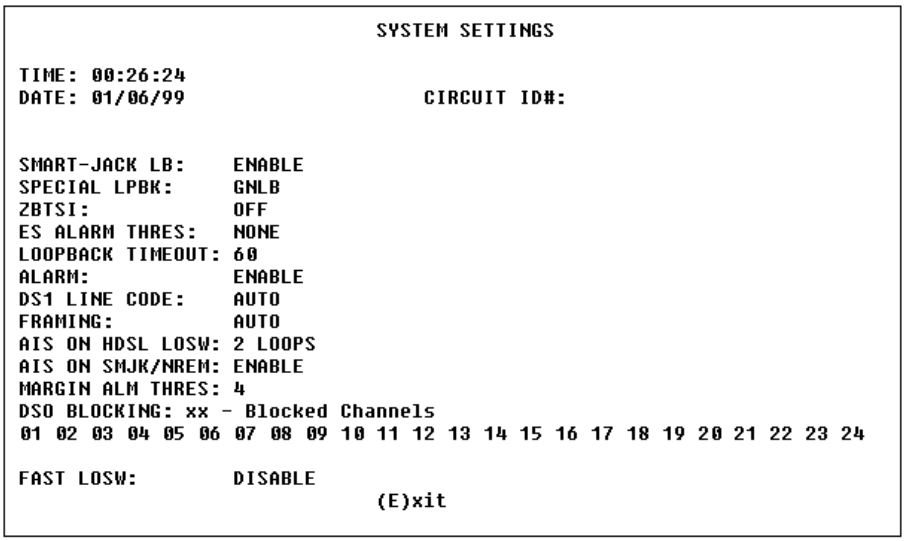


NOTE:
The clock settings are not saved in memory. If the system is powered off, the clock settings will be lost.

System Settings

Description

The System Settings screen displays system parameters. Settings can be changed from the master side of the circuit only. To select an option, enter the letter in parenthesis. After all parameters are set, press the letter "**E**" key to exit the screen and the letter "**C**" key to confirm the settings. The following figure shows the System Settings screen. The shaded areas in the screen indicates the parameters that are only valid when an HLU or an HRU is in the circuit.



System settings menu field values

This section describes the values that could appear in the System Settings menu fields.

NOTE:
Values with a dagger (†) are the default values for that parameter for the HDSL module.

SMART-JACK LB

The following values could appear in the **SMART-JACK LB** menu field:

ENA†	System recognizes all Smart-Jack loopback commands.
DIS	System ignores all Smart-Jack loopback commands.

(Continued on next page)

System Settings (Continued)

System settings menu field values (continued)

SPECIAL LPBK

The following values could appear in the **SPECIAL LB** menu field:

GNLB†	Generic in-band loopback. Enables response to the generic 3/4 in 7 in-band loopback codes.
A1LB	A1 loopback. Enables response to the T1/E1.4/92 addressable repeater in-band loopback codes.
A2LB	A2 loopback. Enables response to the Teltrend addressable repeater in-band loopback codes.
A3LB	A3 loopback. Enables response to the Wescom addressable repeater in-band loopback codes.
A4LB	A4 loopback. Enables response to the Wescom Mod 1 addressable repeater in-band loopback codes.
A5LB	A5 loopback. Enables response to the Teltrend Mod 1 addressable repeater in-band loopback codes.

NOTE:
All special loopback features may not be supported in every product configuration.

ZBTSI

The following values could appear in the **ZBTSI** menu field:

On	ESF frame operates in the zero-byte- time-slot interchange (ZBTSI) mode.
Off†	ESF frame operates in the normal (non-ZBTSI) mode.

(Continued on next page)

System Settings (Continued)

System settings menu field values (continued)

ES ALARM THRESHOLD

The following values could appear in the **ES ALARM THRESHOLD** menu field:

17	Sets an errored second threshold value of 17 seconds for generating HDSL alarms (H1ES or H2ES) or BiPolar Violation Alarms (DS1) over a 24-hour period.
170	Sets an errored second threshold value of 170 seconds for generating HDSL alarms (H1ES or H2ES) or BiPolar Violation Alarms (DS1) over a 24-hour period.
NONE†	Disable generation of errored second alarms.

LOOPBACK TIMEOUT

The following values could appear in the **LOOPBACK TIMEOUT** menu field:

NONE	Disables automatic time-out cancellation of all loopbacks.
20	Selects a 20 minute automatic time-out cancellation of all loopbacks.
60†	Selects a 60 minute automatic time-out cancellation of all loopbacks.
120	Selects a 120 minute automatic time-out cancellation of all loopbacks.

ALARM

The following values could appear in the **ALARM** menu field:

DIS	Disable. Disables external notification of alarm on alarm interface signal.
ENA†	Enable. Enables external indication of alarm condition.

(Continued on next page)

System Settings (Continued)

System settings menu field values (continued)

DS1 LINE CODE

The following values could appear in the **DS1 LINE CODE** menu field:

AUTO (T1 and FT1)†	Auto. The master and slave units independently monitor their incoming DS1 bit streams for the B8ZS pattern. If either unit detects this pattern, it enters its B8ZS mode. It reverts back to the AMI mode if no B8ZS patterns are received for five seconds. This parameter is only valid when an HLU or an HRU is in the circuit.
B8ZS/HDB3 (E1)†	Binary Eight Zero Substitution/High Density Bipolar 3. Both the master and slave units enter the B8ZS mode.
AMI	Alternate Mark Inversion. Both the master and slave units enter the AMI mode.

FRAMING

The following values could appear in the **FRAMING** menu field:

AUTO (T1 and FT1)†	Auto. The system operates in an auto-framing mode, continuously searching the input T1 bit stream for a valid SF or ESF frame pattern. A valid frame pattern is required for fractional T1 applications (DS0 blocking) to ensure proper channel time slot alignment. The module can also process unframed data in this auto mode, but it is recommended that the unframed mode be used for all unframed applications. Using the auto mode for unframed applications may cause the detection of pseudo-valid frame sequences, affecting data integrity.
UNFR (E1)†	Unframed. This mode disables the auto framing process and forces the system to function in Transparent mode.

(Continued on next page)

System Settings (Continued)

System settings menu field values (continued)

AIS ON HDSL LOSW

The following values could appear in the **AIS ON HDSL LOSW** menu field:

2LP (T1 and E1)†	Two loops. The system transmits the AIS signal at the output ports of both the master and slave units when neither of the HDSL loops are in sync (loss of sync-word).
1LP (FT1)†	One loop. The system transmits the AIS signal at the output ports of both the master and slave units when either of the HDSL loops are not in sync (loss of sync-word).

AIS ON SMJK/NREM

The following values could appear in the **AIS ON SMJK/NREM** menu field:

ENA (T1 and FT1)†	Enabled. The slave unit transmits the AIS signal toward the customer interface when in NREM or Smart-Jack loopback.
DIS (E1)†	Disabled. In a NREM or Smart-Jack loopback, The slave unit transmits the signal from the network toward the customer interface and loop the network signal back to the master unit.

MARGIN ALM THRES

The following values could appear in the **MARGIN ALM THRES** menu field:

0 to 15 dB	Specifies the HDSL margin alarm threshold value. The threshold must be in the range of 0 to 15 dB range. Below this value an alarm occurs. Setting the threshold to 0 turns the margin alarm off.
4 dB†	Default value.

(Continued on next page)

System Settings (Continued)

System settings menu field values (continued)

DS0 BLOCKING

The following values could appear in the **DS0 BLOCKING** menu field:

BLK (FT1 13-24)†	Block. Specifies the DS0 channels to be blocked. (When entering a list of channels in this field, separate each one with a space.)
NONE (T1 and E1)†	No channels are blocked.

FAST LOSW

The following values could appear in the **FAST LOSW** menu field:

ENA	Enabled. Enables fast detection of loss of sync-word. Enabling this parameter causes the sync1 or sync2 interface lead to be false each time an HDSL sync word is not detected where it should be in the HDSL data stream. Conversely, a valid HDSL sync word keeps the interface lead true for the next HDSL frame time of 6 msec. This option in noisy loop environments may cause the sync1 and sync2 leads to toggle randomly.
DIS†	Disabled. Disables fast detection of loss of sync-word.

Special Loopback Test Procedures

Introduction

GNLB is the generic loopback code. The Addressable Repeater Loopback commands (A2LB - A5LB) provide the module with sophisticated maintenance and troubleshooting tools. These loopbacks have been enhanced to handle the specific requirements of the following customers:

- A2LB (Teltrend) = Southwestern Bell
- A3LB (Wescom) = NYNEX
- A4LB (Wescom Mod 1) = NYNEX
- A5LB (Teltrend Mod 1) = Southern New England Tel (SNET).

NOTE:
All special loopback features may not be supported in every product configuration.

When T1 loopback tests are performed on the system with metallic loopback connections at either end, the DS1 code that exists at the metallic loopback interface may be different from the DS1 code being received at the opposite end when the DS1 user code is set to AUTO. This occurs because in the Auto DS1 code mode, the HLU and HRU set their own code independent of each other. Each end sets its transmit code to match its receive code. Thus if one end is receiving AMI and the other B8ZS, their codes are different. For example, if the HRU has a metallic loopback and the HLU's receive pattern code is AMI, when the all 0 pattern is sent into the HLU it will change its code to B8ZS. The result is that the HLU changes to B8ZS mode while the HRU remains in AMI mode and thus loops all 0 bits. This causes the HRU to indicate a LOS condition which then causes the HLU to output the AIS pattern.

The module may take longer than normal to respond to in-band loopback commands when its framing mode is set to UNFR and the in-band commands are sent either in SF or ESF mode. The frame bits override the command bits and cause errors in the command sequence. These errors cause the module to reject some sequences. This can extend the detection interval.

(Continued on next page)

Special LoopBack Test Procedures (Continued)

GNLB generic loopback code

The GNLB allows in-band codes to loop-up either HLU or HRU toward the network. To loop-up the HLU, send the NLOC 4 in 7 in-band loop-up code for five seconds. To loop-up the HRU, send the NREM 3 in 7 in-band loop-up code for five seconds. Loop-up condition is terminated (looped-down) with the 3 in 5 loop-down code.

In addition, it allows in-band codes to loop-up the HLU or HRU toward the customer. To loop-up the HRU, send the CLOC 5 in 7 loop-up code for five seconds. To loop-up the HLU, send the CREM 6 in 7 in-band loop-up code for five seconds. Loop-up condition is terminated (looped-down) with the 3 in 5 loop-down code.

A1LB, A2LB, and A5LB addressable repeater loopback options

The A1LB loopback option complies with the T1/E1.4/92 recommendation for HDSL systems with the following additions:

- Query loopback
- IOR power down
- Three loopback time-out choices
- Initiation from either end
- Repeating bit error signatures
- Alternate Query loopback.

These additions make A1LB identical to A2LB. It is given a separate identity to allow future T1 and E1 enhancements to be added without affecting A2LB.

A2LB and A5LB are patterned after the Teltrend addressable T1 repeater loopbacks. A5LB differs from A2LB in that A5LB does not block the arming code from exiting the HLU and entering the network. A2LB can be configured to either block this arming code after two seconds, and replace it with the AIS code, or to unblock it by executing the Far-End Activate code. Since A5LB never blocks the arming code from exiting the HLU, it does not need this Far-End Activate code.

(Continued on next page)

Special LoopBack Test Procedures (Continued)

A1LB, A2LB, and A5LB addressable repeater loopback options (continued)

The following is the test procedures for A1LB, A2LB, and A5LB. The table that follows the procedures shows the A1LB, A2LB, and A5LB repeater loopback codes.

1. Send the in-band Arming and Network Interface Unit (NIU) LPBK code into the HLU for at least five seconds, or at least four repetitions of the 16-bit ESF Data Link Arming code.
2. Monitor the output of the HLU for the return of the pattern. Return of pattern indicates that either the HRU has looped-up (if the Smart-Jack LB option is enabled) or that an external NIU has looped up (if the Smart-Jack LB option is disabled) and that the HLU and HRU units have been armed.
3. Once armed, the HLU can be looped back (NLOC) by sending the IOR (Intelligent Office Repeater) LPBK activation code for at least five seconds. The tester observes the following activation response:
   a. Two seconds of AIS (all ones).
   b. Five seconds of returning data pattern.
   c. Two hundred thirty-one logic errors (including the frame bits) occur in the returned pattern (20 errors if ILR-2 were sent).
   d. Normal looped data.
   e. This error pattern repeats every 20 seconds as long as the IOR loopback pattern is being sent. The same 20 second repetitions also occurs with ILR, Time-out Override, and Query commands.
4. The module is now in Logic Loopback (NLOC). The user-defined Loopback Time-out option determines the duration of this loopback unless it is overridden by the Time-out Override command or a loop down command is sent.
   - If the Time-out Override code is received, the “activation sequence” described in step 3 is repeated and the automatic timed expiration of the loopback is inhibited.
   - If this Time-out Override is sent, then the only way to loop the HLU down is to issue the IR LPDN code or to issue the NI LPDN and Disarm Code.

(Continued on next page)

Special LoopBack Test Procedures (Continued)

A1LB, A2LB, and A5LB addressable repeater loopback options (continued)

5. The automatic time-out timer is restored during subsequent loopback sessions.
6. Upon completion, the tester sends IOR LPDN code (1001 0011 1001 0011) to loop-down the module. However the unit remains armed.
7. Using the Repeater Loopback codes, a network tester can activate loopbacks NLOC or NREM or SMJK (if enabled). A customer tester can activate loopbacks CLOC or CREM.
8. After testing is complete, send IR LPDN code if the system is to loop-down but remains armed. The armed mode has an automatic time-out of 120 minutes. Send the Disarm code if all the equipment is to be looped down, disarmed, and returned to normal operation.

Arming Code	Action	Code*
ARMING or NI LPBK (in-band)	Arming code	11000 11000...
ARMING or NI LPBK (ESF Data Link)	Arming code	1111(F)† 1111(F)0100(4)1000(8)
IR LPDN or DISARM (in-band)	Disarming code	11100 11100...
DISARM (ESF Data Link)	Disarming code	1111(F)1111(F)0010(2)0100(4)
IOR LPBK (NLOC & CREM 231 errors)	HLU Loop up	1101(D)0011(3)1101(D)0011(3)
ILR-1 LPBK (NDU1 & CDU1 10 bit errors)	DOUBLER-1 Loop up	1100(C)0111(7)0100(4)0001(1)
ILR-20 LPBK (NDU2 & CDU2 200 bit errors)	DOUBLER-2 Loop up	1100(C)0111(7)0101(5)0100(4)
ILR-2 LPBK (NREM & CLOC 20 bit errors)	HRU Loop up	1100(C)0111(7)0100(4)0010(2)
IR LPDN	Loop down (HLU or HRU)	1001(9)0011(3)1001(9)0011(3)
IR QUERY LPBK	Query loopback	1101(D)0101(5)1101(D)0101(5)
IR ALTERNATE QUERY LPBK	Alternate Query loopback	1101(D)0101(5)1110(E)1010(A)
TIME-OUT OVERRIDE	Loopback Time-out Override	1101(D)0101(5)1101(D)0110(6)
FAR END NI ACTIVATE	Unblock AIS & pass (2 in 5)	1100(C)0101(5)0101(5)0100(4)
IOR POWER DOWN (HLU)‡	Removes HDSL line power	0110(6)0111(7)0110(6)0111(7)

* The left most bit arrives first in all sequences. The detection algorithm functions reliably with a random $10E^{-3}$ bit error rate (BER) on the facility.

† This is the HEX number for the 4 bit group.

‡ The IOR POWER DOWN code must remain present for the duration of the power down mode. When this code is removed, the module returns to its normal unlooped and unarmed state.

(Continued on next page)

Special LoopBack Test Procedures (Continued)

A3LB and A4LB addressable repeater loopback options

A3LB and A4LB are patterned after the Wescom addressable T1 repeater loopbacks. A3LB differs from A4LB in that A3LB supports the additional (1 in 6) Smart-Jack loopback command. The following is the test procedures for A3LB and A4LB. The table that follows the procedures shows the A3LB and A4LB repeater loopback codes.

1. The module can be looped back (NLOC) by sending the Addressable Office Repeater (AOR) LPBK activation code for at least five seconds. This causes the HLU to enter its NLOC state. The user-defined Loopback Time-out option determines the duration of this loopback unless it is overridden by the reception of a second identical 16 bit loop-up command before the timer expires. When this Time-out Override state exists, the only way to loop the HLU down is to issue one of the three loop-down commands listed in the table. The automatic time-out mode is restored during subsequent loopback sessions.
2. Execute loopbacks.

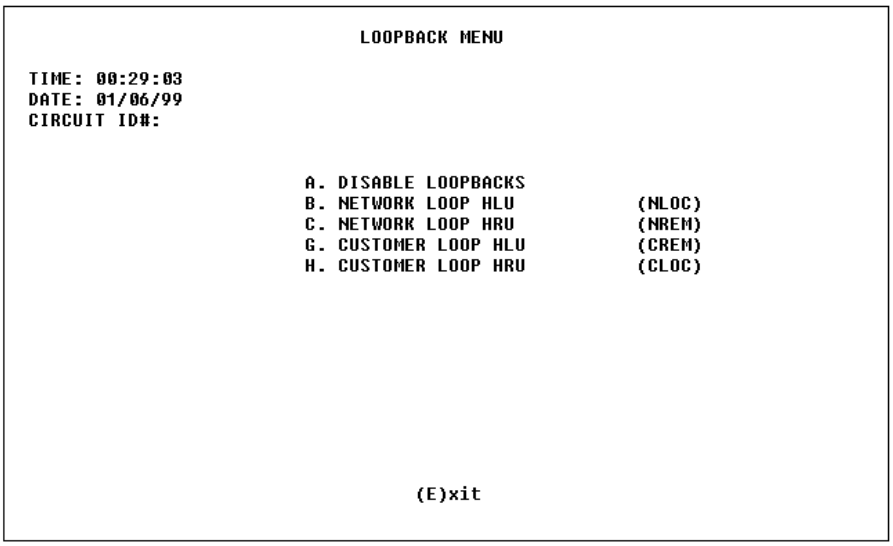
Position	Name	Code*
HLU Loop-up from Network Interface	NLOC	1111(F)† 1111(F)0001(1)1110(E)
HLU Loop-up from Customer Interface	CREM	0011(3)1111(F)0001(1)1110(E)
HDU DOUBLER 1 from Network Interface	NDU1	1111(F)† 1111(F)0000(0)0100(4)
HDU DOUBLER 1 from Customer Interface	CDU1	0011(3)† 1111(F)0000(0)0100(4)
HDU DOUBLER 2 from Network Interface	NDU2	1111(F)† 1111(F)0000(0)0101(6)
HDU DOUBLER 2 from Customer Interface	CDU2	0011(3)† 1111(F)0000(0)0101(6)
HRU Loop-up from Network Interface	NREM	1111(F)1111(F)0000(0)0010(2)
HRU Loop-up from Customer Interface	CLOC	0011(3)1111(F)0000(0)0010(2)
HRU Loop-up from Network Interface	SMJK	11000 11000 11000...
HRU Loop-up from Network Interface (A3LB only)	SMJK	100000 100000 100000...
HRU Loop-up from Network Interface (ESF-DL)	SMJK	1111(F)1111(F)0100(4)1000(8)
HLU and HRU Loop-down from Network Interface or Customer Interface		11100 11100 11100...
HLU and HRU Loop-down from Network Interface or Customer Interface		100 100 100...
HLU and HRU Loop-down from Network Interface or Customer Interface (ESF-DL)		1111(F)1111(F)0010(2)0100(4)

* The left most bit (LSB) arrives first in all sequences. The detection algorithm functions reliably with a random $10E^{-3}$ bit error rate (BER) on the facility.
† This is the HEX number for the 4 bit group.

Loopback Mode

Description

The Loopback Mode screen displays a list of loopbacks. If doublers are present on the circuit, network and customer doubler loopback options are added to the list of loopbacks. The following figure shows the Loopback Mode screen.



To enable a loopback, type the letter that proceeds the loopback.

Loopback mode menu field values

This section describes the values that could appear in the Loopback Mode menu fields.

Disable Loopbacks	Disables all loopbacks.
NLOC	Network Loop HLU. Enables a loopback at the master unit toward the network.
NREM	Network Loop HRU. Enables a loopback at the slave unit toward the network.
NDU1	Network Doubler 1. Enables a loopback at doubler 1 toward the network.

(Continued on next page)

Loopback Mode (Continued)

Loopback mode menu field values (continued)

NDU2	Network Doubler 2. Enables a loopback at doubler 2 toward the network.
CREM	Customer Loop HLU. Enables a loopback at master unit toward the customer.
CLOC	Customer Loop HRU. Enables a loopback at the slave unit toward the customer.
CDU1	Customer Doubler 1. Enables a loopback at doubler 1 toward the customer.
CDU2	Customer Doubler 2. Enables a loopback at doubler 2 toward the customer.

NOTE:
Loopbacks for a doubler only appear in the Loopback Mode menu if doublers are present in the circuit.

View Performance Data

Description

The View Performance Data screen displays performance data at fifteen minute intervals for each HDSL link and the T1 link.

All data appears in the xxx/yyy format where:

- xxx is the number of errored seconds that occurred during a fifteen minute period.
- yyy is the number of seconds during a fifteen minute period when the link or signal was deemed unavailable.

The following figure shows the Performance Data screen. The shaded areas in the screen indicates the parameters that are only valid when an HLU or an HRU is in the circuit.

Date: 01/06/99 PERFORMANCE DATA
CIRCUIT ID#:
ERRORED SECONDS/UNAVAILABLE SECONDS

	DS1		HDSL-1		HDSL-2	
	HLU	HRU	HLU	HRU	HLU	HRU
20:45	000/000	000/000	000/000	000/000	000/000	000/000
21:00	000/000	000/000	000/000	000/000	000/000	000/000
21:15	000/000	000/000	000/000	000/000	000/000	000/000
21:30	000/000	000/000	000/000	000/000	000/000	000/000
21:45	000/000	000/000	000/000	000/000	000/000	000/000
22:00	000/000	000/000	000/000	000/000	000/000	000/000
22:15	000/000	000/000	000/000	000/000	000/000	000/000
22:30	000/000	000/000	000/000	000/000	000/000	000/000
22:45	000/000	000/000	000/000	000/000	000/000	000/000
23:00	000/000	000/000	000/000	000/000	000/000	000/000
23:15	000/000	000/000	000/000	000/000	000/000	000/000
23:30	000/000	000/000	000/000	000/000	000/000	000/000
23:45	000/000	000/000	000/000	000/000	000/000	000/000
00:00	000/000	000/000	000/000	000/000	000/000	000/000
00:15	000/000	000/000	000/000	000/898	000/000	000/898
00:30	000/000	000/000	000/000	000/1022	000/000	000/1022

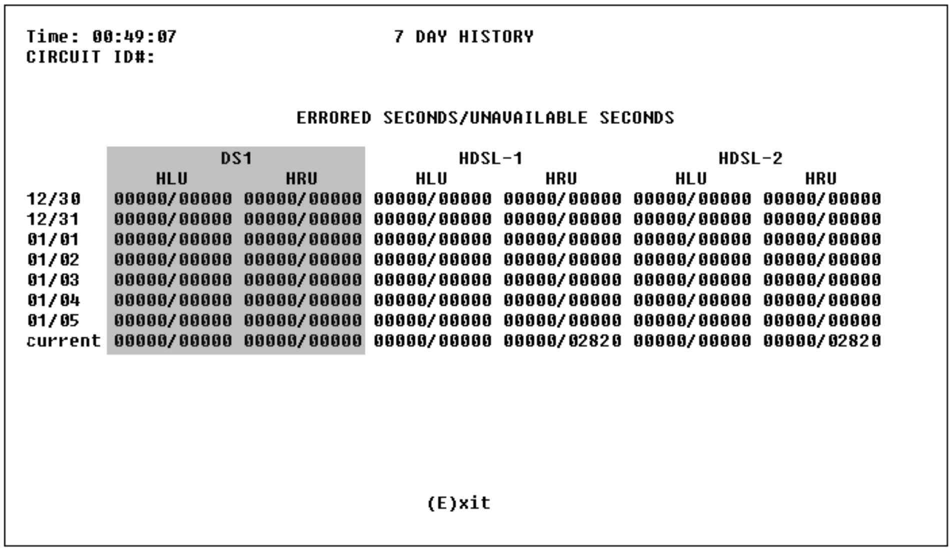
(E)xit (P)revious (N)ext

The Previous and Next options show the performance data for the previous and next four hours. To clear or update data, go to the View Span Status screen (option A on the Maintenance Terminal Main Menu).

View Performance History

Description

The View Performance History screen shows the daily performance data for the past seven days for each HDSL link and the T1 link. The following figure shows the Performance History screen. The shaded areas in the screen indicates the parameters that are only valid when an HLU or an HRU is in the circuit. Each line shows the errored and unavailable seconds for its respective 24 hour period.


Time: 00:49:07 7 DAY HISTORY
CIRCUIT ID#:

ERRORED SECONDS/UNAVAILABLE SECONDS

	DS1		HDSL-1		HDSL-2	
	HLU	HRU	HLU	HRU	HLU	HRU
12/30	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
12/31	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
01/01	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
01/02	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
01/03	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
01/04	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
01/05	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000	00000/00000
current	00000/00000	00000/00000	00000/00000	00000/02820	00000/00000	00000/02820

(E)xit

To clear or update data, go to the View Span Status screen (option A on the Maintenance Terminal Main Menu).

View Alarm History

Description

The View Alarm History screen shows a summary of alarms that are currently active. The following figure shows the Alarm History screen. The shaded areas in the screen indicates the parameters that are only valid when an HLU or an HRU is in the circuit.

```
                              ALARM HISTORY

TIME: 00:58:29
DATE: 01/06/99
CIRCUIT ID#:

Type              First               Last                Current        Count
LOS, DS1-HLU                                              OK             000
LOS, DS1-HRU                                              OK             000
LOSW, HDSL1       00/00/00-00:00      00/00/00-00:00      ALARM          001
LOSW, HDSL2       00/00/00-00:00      00/00/00-00:00      ALARM          001
ES, HDSL1                                                 OK             000
ES, HDSL2                                                 OK             000
MARGIN L1                                                 OK             000
MARGIN L2                                                 OK             000

LAST CLEARED:  NONE

                          (E)xit (C)lear (U)pdate
```

To exit, clear, or update the screen, type the letter in parenthesis ( ).

View alarm history menu field values

This section describes the View Alarm History columns and the values that could appear in those columns.

Type

LOS	Loss of DS1 or G703 input signal.
LOSW	Loss of sync word for each HDSL link.
ES	Errored seconds exceeded threshold for each HDSL link.
MARGIN	HDSL margin threshold exceeded for each HDSL link.

(Continued on next page)

View Alarm History (Continued)

View alarm history menu field values (continued)

First and Last

The First and Last columns display the time of the first and last occurrence of each alarm.

Current

The Current column shows the current alarm status.

Count

The Count column displays the number of times each alarm has occurred.

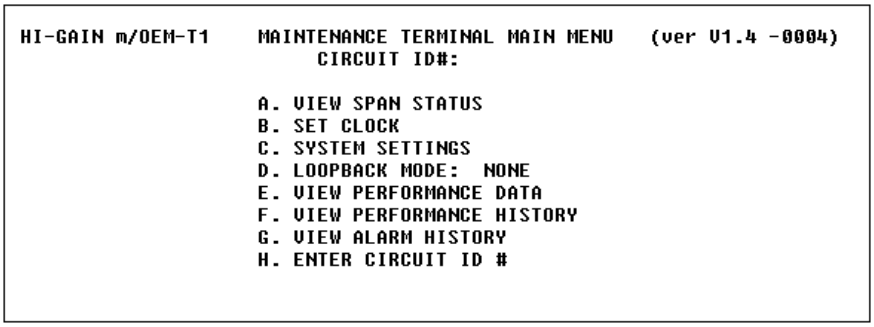
LAST CLEARED

The Last Cleared field displays the last time and date that the alarm history was cleared.

Enter Circuit ID Number

Description

The Circuit ID appears at the top of each screen to provide a text field to identify each unit. To enter a Circuit ID, at the Maintenance Terminal Main Menu press the letter "**H**" key. The Circuit ID cannot exceed 24 alphanumeric characters. The following figure shows the Maintenance Terminal Main Menu.



System Configurations and Ordering Information

F

Contents

(Continued on next page)

What this Appendix Covers

Overview

This appendix covers the following information:

Basic Configurations

This part covers the base system configurations and the basic configurations constructed from the base systems. It also includes tables containing base system upgrade information to allow you to upgrade your system to another basic configuration.

Ordering Information

This part covers ordering information — including comcodes and equipment codes — necessary to order the base system along with the hardware and software options for the configuration that your system requires. It also includes ordering information for optional equipment such as an uninterruptable power supply (UPS), Bellcore mounting bracket adapters, hinged wall mount bracket, T1-to-V.35 converter, NEBS installation kit, etc.

Warranty Return Information

This part covers information needed to return defective equipment covered under the equipment warranty.

Basic System Configurations

Overview

This section discusses the basic *ConnectReach* system configurations supported by Lucent Technologies. For rules and information to provision the *ConnectReach* system, see Chapter 4 “Configuring the ConnectReach System” of this document.

Although you or your customer can customize many different configurations, most are based on the basic configurations described in this part.

Terms and Definitions

The following terms are used in describing the basic configurations:

Plain Old Telephone Service (POTS) Lines

This term refers to lines terminating on a current feed circuit card through the **VOICE CHANNELS** port of the *ConnectReach* system (Figure F-1). These lines usually provide services such as POTS services or switched special services. It is sometimes referred to as the *Channel Bank* mode. At the host system, these services usually originate from an local digital switch (LDS).

Data

This term refers to services interfacing the *ConnectReach* system through the **10BASE-T** port (Figure F-1). It usually consists of a connection from an external 10BaseT Ethernet hub. This external hub provides the interface for data equipment such as computer terminals to data networks such as the Internet and/or a private corporate network. At the host system, these services are usually routed to a DS1 interface.

(Continued on next page)

Basic System Configurations (Continued)

Terms and Definitions (Continued)

Secondary T1/DSX-1

This term refers to connections through the **SECONDARY T1 LINE** port of the *ConnectReach* system (Figure F-1). The secondary T1/DSX-1 connection usually provides services such as digital lines to an external PBX or key system. It requires the use of the Fractional T1 circuit card or the Fractional T1/DSP Processor combination card.

POTS Lines with *LCR** Features

This term refers to POTS lines as described previously in a system containing the optional *LCR* feature. The *LCR* feature allows you to route incoming and outgoing calls to specific analog and/or digital trucks or lines. It requires the use of the DSP processor circuit card or the Fractional T1/DSP Processor combination card.

*BOX** Feature

This term refers to a *ConnectReach* system provisioned for key system or Centrex-type services known as the *BOX* feature. The feature includes the access keys for the *LCR* feature. However, you are required to enable the *LCR* software when you provision the system.

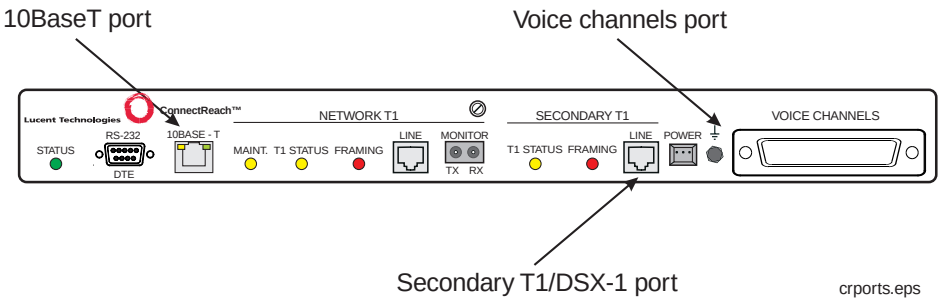


Figure F-1. ConnectReach Port and Connector Locations

* Registered trademark of Vina Technologies, Inc.

Basic System Configurations (Continued)

Base System Configurations

You can build the basic *ConnectReach* configurations from one of the following two *base* systems:

- POTS Lines Only Base System
- POTS Lines and Data Base System.

Details of each base configuration are described in later sections.

Basic Configurations

Using one of the base system configurations, you can build any of the following basic *ConnectReach* configurations:

- POTS Lines, Data, and Secondary T1/DSX-1 Configuration
- POTS Lines, Data, and *LCR* Feature Configuration
- POTS Lines, Data, Secondary T1/DSX-1, *LCR* Feature, and Configuration
- POTS Lines, Data, and *BOX* Feature Configuration.

The following parts describe the necessary equipment for both the base systems and the basic configurations built from the base systems.

Basic System Configurations (Continued)

Configuration Upgrades

Table F-1 on page F-10 and Table F-2 on page F-14 show how to upgrade the base systems to the basic configurations allowing you to meet your customers needs.

You can add different software upgrades for specific features— such as SW-D, *LCR* software, *BOX* software, etc. — by obtaining *software keys* that consist of an access code. You can, then, use these key codes to provision the specific software into the system. To obtain these key codes, contact your Lucent Technologies Sales Representative.

NOTE:
See the “Ordering Information” section of this appendix for more information on the access key codes

Basic System Configurations (Continued)

POTS Lines Only Base System

Equipment Required

The following equipment is required to obtain the services provided by this base system:

- One of the following base systems that includes software support for VF lines only:
  - — Network T1/DSX-1 Interface; AC power: ALV230A0020000L (Comcode 108562117)
  - — Network T1/DSX-1 Interface; DC power: ALV230D0020000L (Comcode 108562125)
  - — Network HDSL Interface; AC power: ALV270A0020000L (Comcode 108646803)
  - — Network HDSL Interface; DC power: ALV270D0020000L (Comcode 108646811).
- Current feed circuit cards to provide up to 24 VF lines.

NOTE:
ALV230A0020000L (Comcode 108562117); ALV230D0020000L (Comcode 108562125); ALV270A0020000L (Comcode 108646803); and ALV270D0020000L (Comcode 108646811) provide one 8-line current feed circuit card to support eight VF lines. If you need additional lines, you must obtain additional 4-line cards (LTV24PFXS—Comcode 108342478) or 8-line cards (LTV28PFXS—Comcode 108342486). The system can contain a maximum of three current feed circuit cards.

As shown in Figure F-2, this base system provides POTS lines only service. *It does not provide other services such as full data or secondary T1/DSX-1.* When initially obtained, the system contains the necessary hardware and software to provide *POTS lines only* service.

NOTE:
These systems also contain software (SW-B) to provide both the channel bank function and an HTTP web browser interface. When properly configured, this allows you to provision the system through an internet connection. *The SW-B software does not provide data features that include IP/IPX routing, frame relay data, or 10BaseT services.*

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines Only Base System (Continued)

System Upgrades

Table F-1 on page F-10 gives the equipment required to upgrade this configuration to other basic configurations.

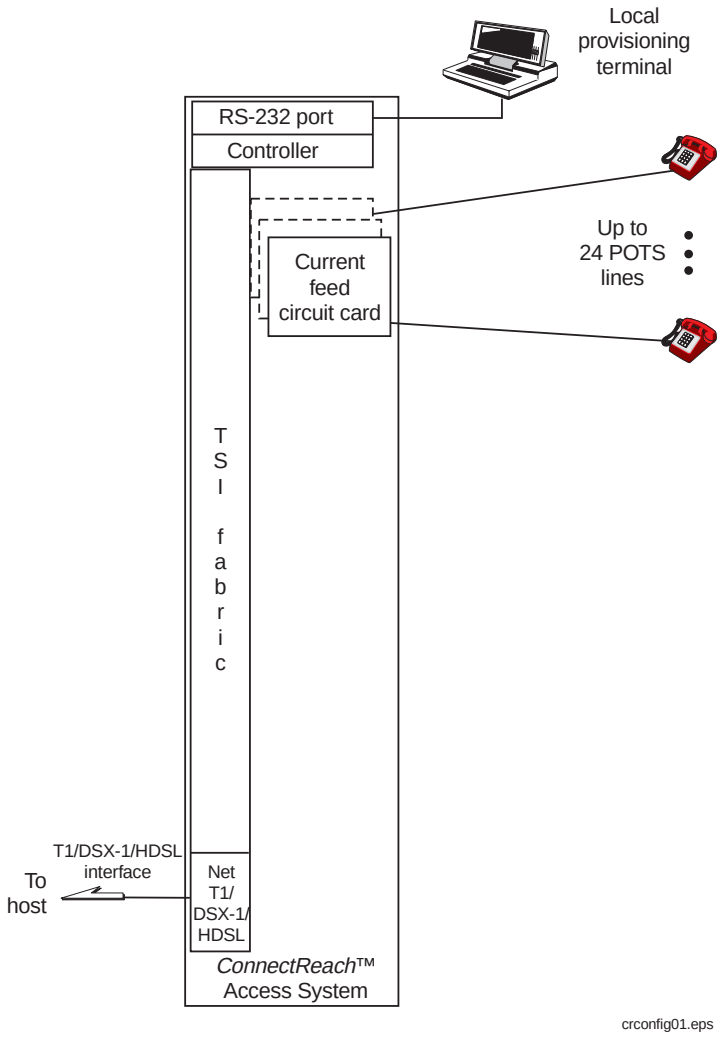


Figure F-2. POTS Lines Only Base System

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines Only Base System (Continued)

Table F-1. Upgrades from the POTS Lines Only Base System

To upgrade from the POTS Lines Only Base System to a basic configuration containing...	Obtain the following equipment and/or software key codes...
■ POTS Lines ■ Data	■ Data Module software (LTSWD—Comcode 108357518)
■ POTS Lines ■ Data ■ Secondary T1/DSX-1	■ Data Module software (LTSWD—Comcode 108357518) ■ Fractional T1 interface card (LTV2FT1—Comcode 10834251)) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to the *LCR** and *BOX** features.)
■ POTS Lines ■ Data ■ *LCR* Feature†	■ Data Module software (LTSWD—Comcode 108357518) ■ *LCR* software (LTSWLCR—Comcode 108357534) ■ Telco DSP Processor card (LTV2DSP—Comcode 108342528) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)
■ POTS Lines ■ Data ■ Secondary T1/DSX-1 ■ *LCR* Feature†	■ Data Module software (LTSWD—Comcode 108357518) ■ *LCR* software (LTSWLCR—Comcode 108357534) ■ Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536).
■ POTS Lines ■ Data ■ *BOX* Feature†	■ Data Module software (LTSWD—Comcode 108357518) ■ *BOX* software† (LTSWBOX—Comcode 108357542) ■ Telco DSP Processor card (LTV2DSP—Comcode 108342528) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)

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†If the *LCR* feature requires an outgoing analog line or trunk group, at least one of the three circuit cards must be a current sink circuit card (8-line card, LTV28PFX0—Comcode 108342502; 4-line card, LTV24PFX0—Comcode 108342494). *The system can only contain a maximum combination of three current feed and/or current sink cards.* The *BOX* feature includes the access keys for the *LCR* feature. However, you are required to enable the *LCR* software when you provision the system.

Basic System Configurations (Continued)

POTS Lines and Data Base System

Equipment Required

To provide both POTS lines and data service, you must obtain one of the following base systems depending on the network interface type and the type of power:

- ***Network T1/DSX-1 Interface; AC Powered*:**
  - — Base system: ALV210A0000000L (Comcode 108562091) (includes all necessary software for data services and a network T1/DSX-1 interface, but does not include current feed circuit cards for POTS line services)
  - — Current feed circuit cards — up to three cards (8-line card, LTV28PFXS—Comcode 108342486; 4-line card, LTV24PFXS—Comcode 108342478)
- ***Network T1/DSX-1 Interface; DC Powered*:**
  - — Base system: ALV210D0000000L (Comcode 108562109) (includes all necessary software for data services and a network T1/DSX-1 interface, but does not include current feed circuit cards for POTS line services)
  - — Current feed circuit cards — up to three cards (8-line card, LTV28PFXS—Comcode 108342486; 4-line card, LTV24PFXS—Comcode 108342478)
- ***Network HDSL Interface; AC Powered*:**
  - — Base system: ALV260A0000000L (Comcode 108646829) (includes all necessary software for data services and a network HDSL interface, but does not include current feed circuit cards for POTS line services)
  - — Current feed circuit cards — up to three cards (8-line card, LTV28PFXS—Comcode 10834248); 4-line card, LTV24PFXS—Comcode 108342478)
- ***Network HDSL Interface; DC Powered*:**
  - — Base system: ALV260D0000000L (Comcode 108646837) (includes all necessary software for data services and a network HDSL interface, but does not include current feed circuit cards for POTS line services)
  - — Current feed circuit cards — up to three cards (8-line card, LTV28PFXS—Comcode 108342486; 4-line card, LTV24PFXS—Comcode 108342478)

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines and Data Base System (Continued)

As shown in Figure F-3, each of these base systems provide POTS lines and data service.

NOTE:
Although each base system comes with the capability of providing 24 POTS lines or a data bandwidth of 24 DS0s, the *POTS line and data* base system assumes that you have at least one POTS line and a data bandwidth of at least one DS0. However, the combined bandwidth of both services cannot exceed 24 DS0s.

To decide which of the equipment to obtain, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- The number of POTS lines required (up to 23 lines)
- The number of DS0s required to provide the data bandwidth (minimum of one DS0; maximum of 23 DS0s).

When initially obtained as described above, the configuration contains the necessary hardware and software to provide *POTS line and data* services.

System Upgrades

Table F-2 on page F-14 gives the equipment required to upgrade this configuration to other basic configurations.

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines and Data Base System (Continued)

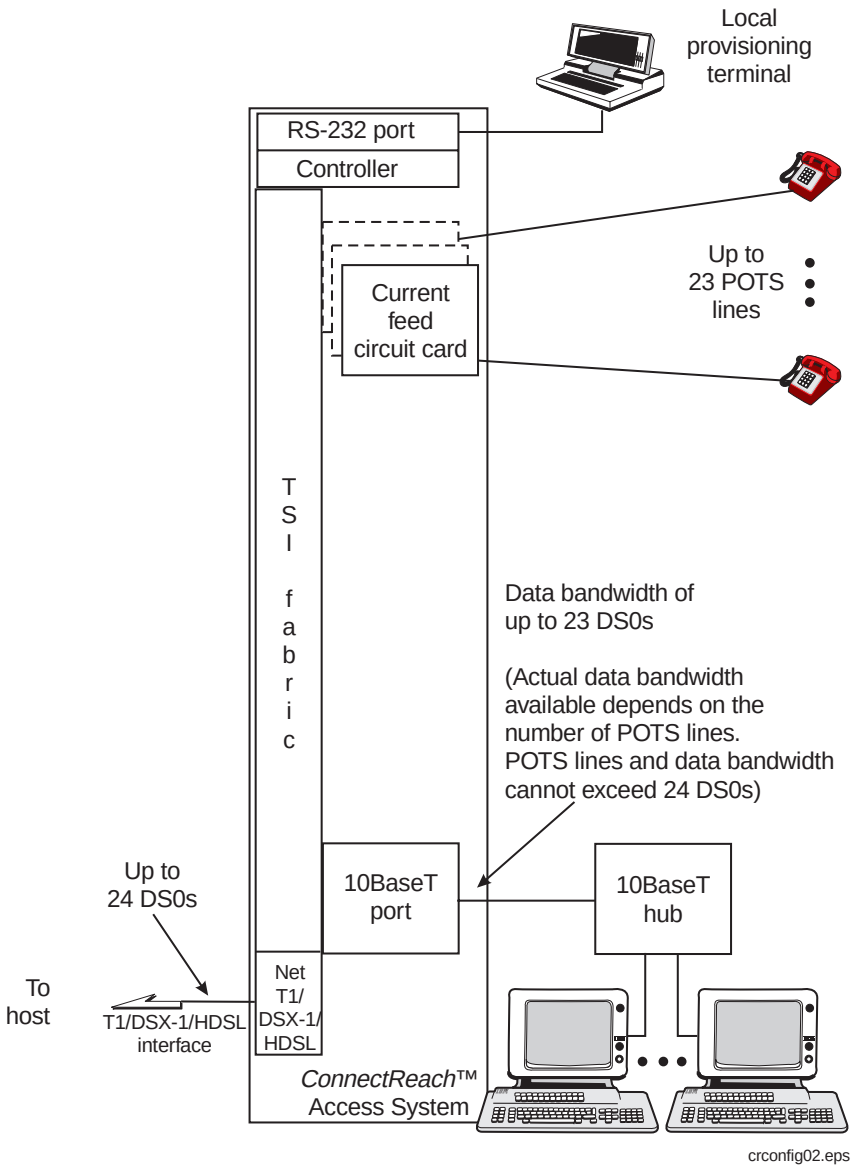

Figure F-3. POTS Lines and Data Configuration

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines and Data Base System (Continued)

Table F-2. Upgrades from the POTS Lines and Data Base System

To upgrade from the POTS Lines and Data Base System to a basic configuration containing...	Obtain the following equipment and/or software key codes...
■ POTS Lines ■ Data ■ Secondary T1/DSX-1	■ Fractional T1 interface card (LTV2FT1—Comcode 108342510) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to the *LCR** and *BOX** features.)
■ POTS Lines ■ Data ■ *LCR* Feature†	■ *LCR* software (LTSWLCR—Comcode 108357534) ■ Telco DSP Processor card (LTV2DSP—Comcode 10834252ε) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)
■ POTS Lines ■ Data ■ Secondary T1/DSX-1 ■ *LCR* Feature†	■ *LCR* software (LTSWLCR—Comcode 108357534) ■ Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536).
■ POTS Lines ■ Data ■ *BOX* Feature†	■ *BOX* software† (LTSWBOX—Comcode 108357542) ■ Telco DSP Processor card (LTV2DSP—Comcode 10834252ε) *or* Fractional T1 interface and DSP Processor combination card (LTV2FT1DSP—Comcode 108342536). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)

*Trademark of Vina Technologies, Inc.

†If the *LCR* feature requires an outgoing analog line or trunk group, at least one of the three circuit cards must be a current sink circuit card (8-line card, LTV28PFX0—Comcode 108342502; 4-line card, LTV24PFX0—Comcode 108342494). *The system can only contain a maximum combination of three current feed and/or current sink cards.* The *BOX* feature includes the access keys for the *LCR* feature. However, you are required to enable the *LCR* software when you provision the system.

Basic System Configurations (Continued)

POTS Lines, Data, and Secondary T1/ DSX-1

As shown in Figure F-4 on page F-17, this configuration provides POTS lines, data, and secondary T1/DSX-1 service. To determine the equipment needed for this configuration, begin building your system with one of the *POTS Lines and Data* base systems.

NOTE:
Although the basic configuration comes with the capability of providing 24 POTS lines, or a secondary T1/DSX-1 bandwidth of 24 DS0s, or a data bandwidth of 24 DS0s, the basic *POTS line, data, and secondary T1/DSX-1* configuration assumes that you have at least one POTS line, a secondary T1/DSX-1 bandwidth of at least one DS0, and a data bandwidth of at least one DS0. However, the combined bandwidth of the three services cannot exceed 24 DS0s.

To decide which *POTS Lines and Data* base system to obtain and the DS0 bandwidth needed for your application, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- The number of POTS lines required (up to 22 lines; assuming a data bandwidth of one DS0 and a secondary T1/DSX-1 bandwidth of one DS0)
- The number of DS0s required to provide the data bandwidth (minimum of one DS0, maximum of 22 DS0s; assuming one POTS line and a secondary T1/DSX-1 bandwidth of one DS0)
- The number of DS0s required for secondary T1/DSX-1 service (up to 22 DS0s; assuming one POTS line and a data bandwidth of one DS0).

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines, Data, and Secondary T1/ DSX-1 (Continued)

By obtaining the *POTS Lines and Data* base system along with the upgrade equipment and software shown in Table F-2 on page F-14, the configuration contains the necessary hardware and software to provide *POTS lines, data, and secondary T1/DSX-1* services.

Table F-2 on page F-14 also gives the equipment required to upgrade this configuration to other basic configurations.

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines, Data, and Secondary T1/ DSX-1 (Continued)

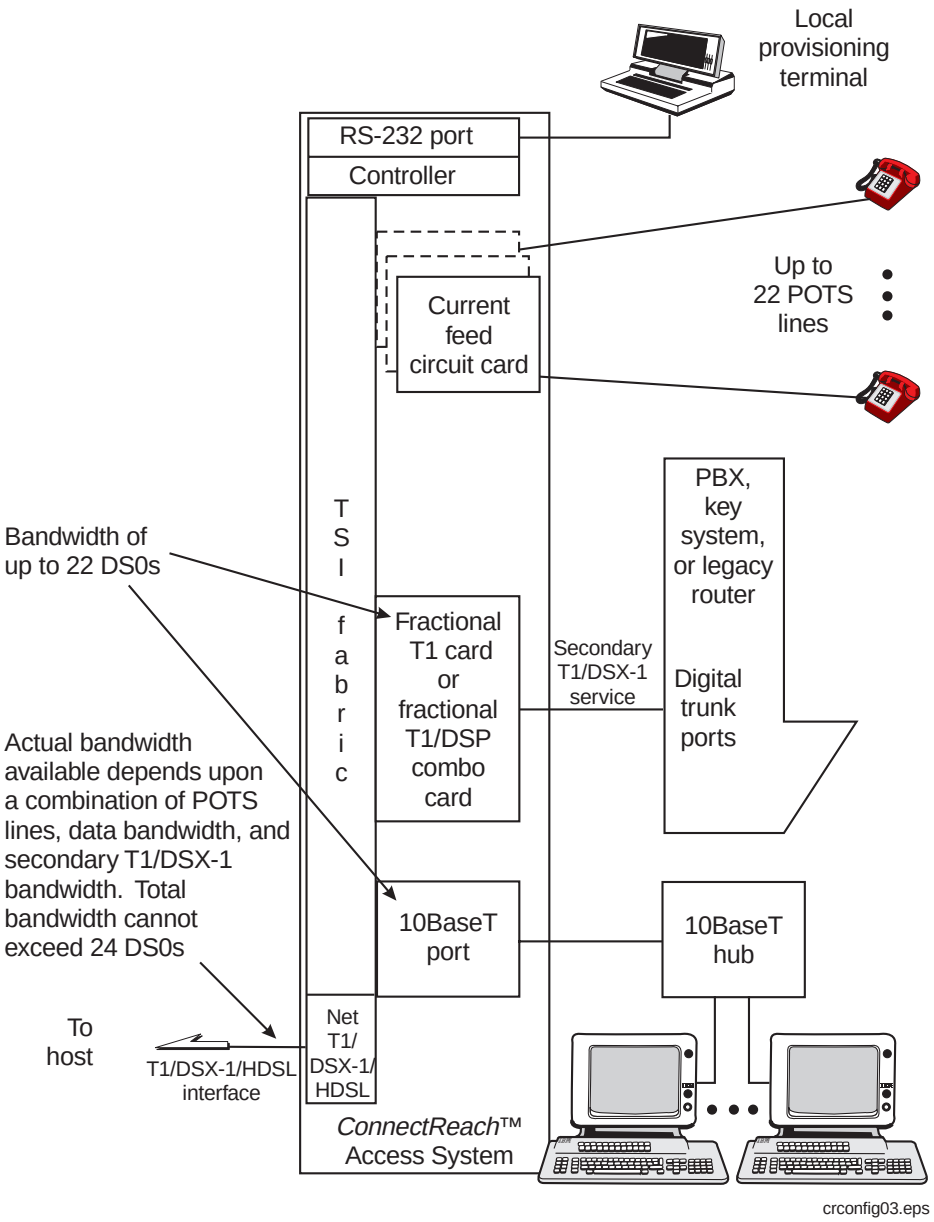

Figure F-4. POTS Lines, Data, and Secondary T1/DSX-1 Configuration

Basic System Configurations (Continued)

POTS Lines, Data, and *LCR* Feature

As shown in Figure F-5, this configuration provides POTS lines, data, and *LCR* feature service.To determine the equipment needed for this configuration, begin building your system with one of the *POTS Lines and Data* base systems.

NOTE:
Although the basic configuration comes with the capability of providing 24 POTS lines or a data bandwidth of 24 DS0s, the basic *POTS line, data, and LCR feature* configuration assumes that you have at least one POTS line and a data bandwidth of at least one DS0. However, the combined bandwidth of both services cannot exceed 24 DS0s.

To decide which *POTS Lines and Data* base system to obtain and the DS0 bandwidth needed for your application, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- The number of DS0s required to provide the data bandwidth (minimum of one DS0)
- The number of POTS lines required *and* whether the *LCR* feature will use outgoing analog circuits or trunk groups (see Note).

NOTE:
If the *LCR* feature requires an outgoing analog line or trunk group, at least one of the three circuit cards must be a current sink circuit card (8-line card, LTV28PFX0—Comcode 108342502; 4-line card, LTV24PFX0—Comcode 108342494). *The system can only contain a maximum combination of three current feed and/or current sink cards*.

By obtaining the *POTS Lines and Data* base system along with the upgrade equipment and software shown in Table F-2 on page F-14, this configuration contains the necessary hardware and software to provide *POTS line, data, and LCR feature* services.

Table F-2 on page F-14 also gives the equipment required to upgrade this configuration to other basic configurations.

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines, Data, and *LCR* Features (Continued)

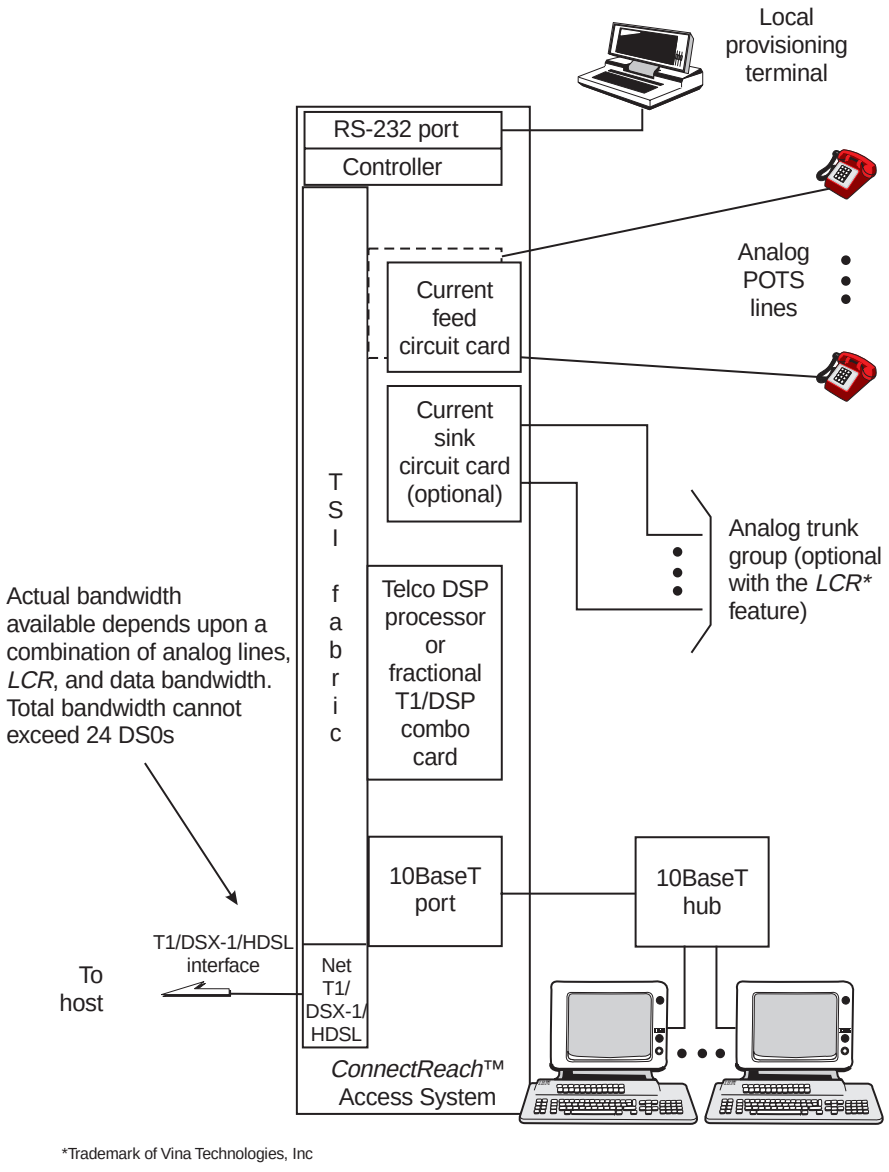

Figure F-5. POTS Lines, Data, and LCR Feature Configuration

Basic System Configurations (Continued)

POTS Lines, Data, Secondary T1/ DSX-1, and *LCR* Feature

As shown in Figure F-6, this configuration provides *POTS lines, data, secondary T1/DSX-1, and LCR feature* service. To determine the equipment needed for this configuration, begin building your system with one of the *POTS Lines and Data* base systems.

NOTE:
Although the basic system comes with the capability of providing 24 POTS lines, or a secondary T1/DSX-1 bandwidth of 24 DS0s, or a data bandwidth of 24 DS0s, the basic *POTS lines, data, secondary T1/DSX-1, and LCR feature* configuration assumes that you have at least one POTS line, a secondary T1/DSX-1 bandwidth of at least one DS0, and a data bandwidth of at least one DS0. However, the combined bandwidth of the three services cannot exceed 24 DS0s.

To decide which *POTS Lines and Data* base system to obtain and the DS0 bandwidth needed for your application, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- The number of DS0s on the secondary T1/DSX-1 (minimum bandwidth of 1 DS0, maximum bandwidth of 22 DS0s; assuming one POTS line and a data bandwidth of one DS0)
- The number of DS0s required to provide the data bandwidth (minimum of one DS0, maximum of 22 DS0s; assuming one POTS line and a secondary T1/DSX-1 bandwidth of one DS0).
- The number of POTS lines required (up to 22 lines; assuming a data bandwidth of one DS0 and a secondary T1/DSX-1 bandwidth of one DS0) *and* whether the *LCR* feature will use outgoing analog circuits or trunk groups.

NOTE:
If the *LCR* feature requires an outgoing analog line or trunk group, at least one of the three circuit cards must be a current sink circuit card (8-line card, LTV28PFX0—Comcode 108342502; 4-line card, LTV24PFX0—Comcode 108342494). *The system can only contain a maximum combination of three current feed and/or current sink cards*.

As shown in Figure F-6, if at least one DS0 is allocated for each service, the maximum number of analog lines is 22. Also, the maximum DS0 bandwidth for data or secondary T1/DSX-1 is 22.

(Continued on next page)

Basic System Configurations (Continued)

POTS Lines, Data, Secondary T1/ DSX-1, and *LCR* Feature (Continued)

By obtaining the *POTS Lines and Data* base system along with the upgrade equipment and software shown in Table F-2 on page F-14, this configuration contains the necessary hardware and software to provide *POTS lines, data, secondary T1/DSX-1, and LCR feature* services.

Table F-2 on page F-14 also gives the equipment required to upgrade this configuration to *POTS Lines, Data, and BOX Feature* basic configurations.

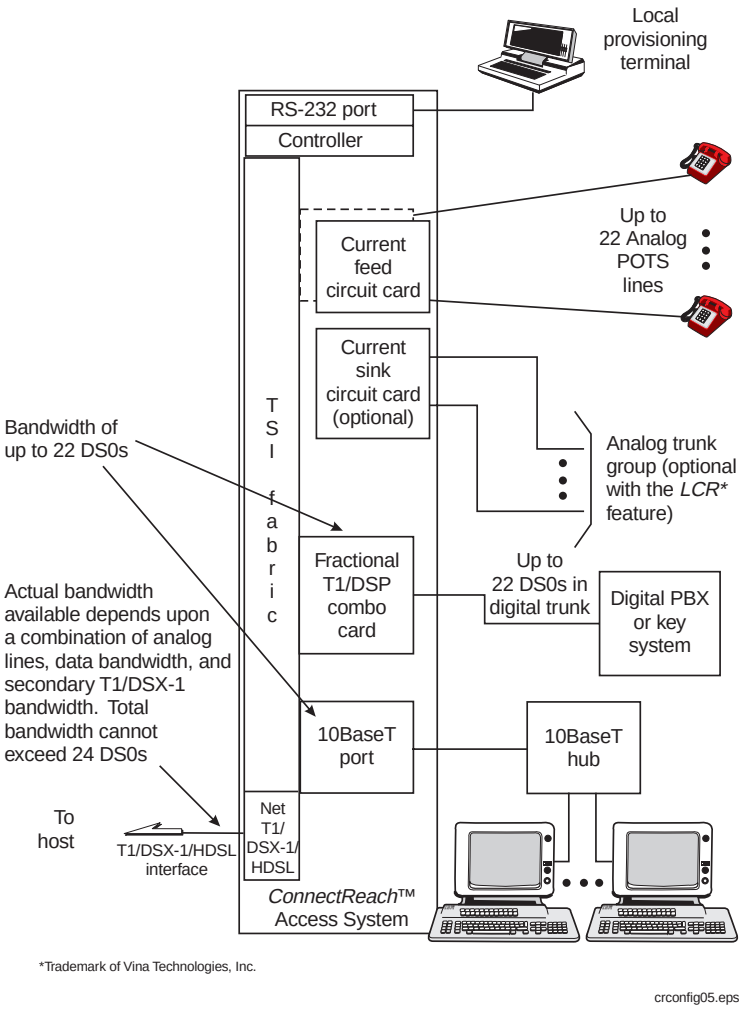

Figure F-6. POTS Lines, Data, Secondary T1/DSX-1, and LCR Feature Configuration

Basic System Configurations (Continued)

POTS Lines, Data, and *BOX* Feature

As shown in Figure F-7, this configuration provides *POTS lines, data, and BOX feature* service. To determine the equipment needed for this configuration, begin building your system with one of the *POTS Lines and Data* base systems.

NOTE:
Although the basic system comes with the capability of providing 24 POTS lines or a data bandwidth of 24 DS0s, the basic *POTS lines, data, and BOX feature* configuration assumes that you have at least one POTS line and a data bandwidth of at least one DS0. However, the combined bandwidth of both services cannot exceed 24 DS0s.

To decide which of the above equipment to obtain, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- The number of DS0s required to provide the data bandwidth (minimum of one DS0, maximum of 23 DS0s; assuming one POTS line)
- The number of POTS lines required (up to 23 lines; assuming a data bandwidth of one DS0)

The *BOX* feature includes the access keys for the *LCR* feature. However, you are required to enable the *LCR* software when you provision the system. If you provision the *LCR* feature, determine the following based on your customer's needs:

- Whether the *LCR* feature will use outgoing analog circuits or trunk groups.

NOTE:
If you are using the *LCR* feature and it requires an outgoing analog line or trunk group, at least one of the three circuit cards must be a current sink circuit card (8-line card, LTV28PFX0—Comcode 108342502; 4-line card, LTV24PFX0—Comcode 108342494). *The system can only contain a maximum combination of three current feed and/or current sink cards.*

By obtaining the *POTS Lines and Data* base system along with the upgrade equipment and software shown in Table F-2 on page F-14, this configuration contains the necessary hardware and software to provide *POTS lines, data, and BOX feature* services.

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Basic System Configurations (Continued)

POTS Lines, Data, and *BOX* Feature (Continued)

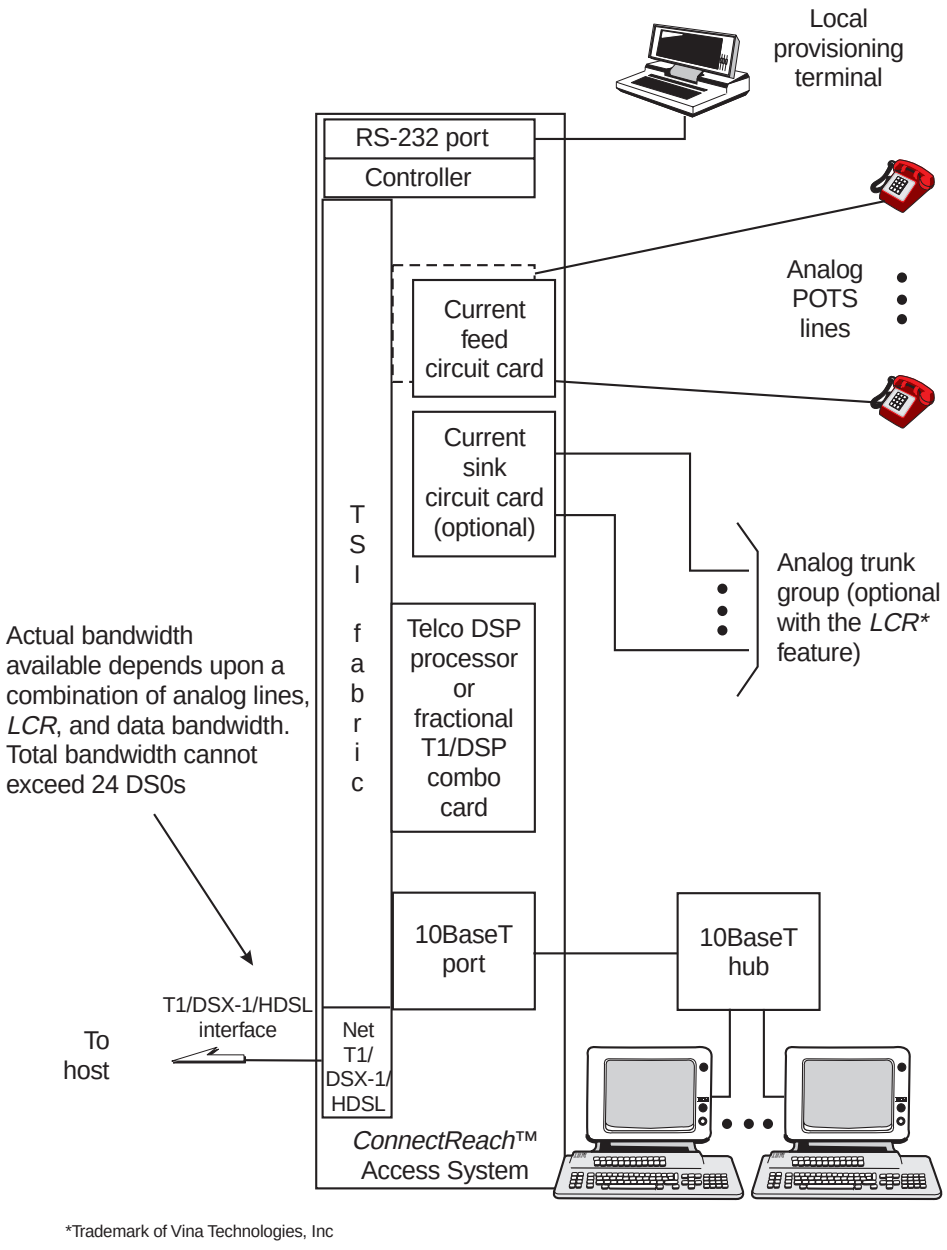

Figure F-7. POTS Lines, Data, and BOX Feature Configuration

Ordering Information

What This Section Covers

This section covers the basic information needed to order and equip a ConnectReach system. It also gives the cables that are *not* provided with the order, and special ordering considerations. To place an order, contact your Lucent Technologies Sales Representative.

Information Covered in the Ordering Table

Table F-3 provides the following information for each orderable item:

- High-level description
- Comcode
- ED or apparatus code.

NOTE:
Please refer to the part of this "Ordering Information" section entitled "Special *ConnectReach* System Ordering Considerations" before ordering any *ConnectReach* system equipment or software.

Information Needed to Determine Your Order

To assist in the ordering process, determine the following based on your customer's needs:

- Type of network interface (T1/DSX-1 or HDSL)
- Type of power (AC or DC power)
- If required, the number of POTS lines required
- If required, the number of DS0s required to provide the data bandwidth.

Ordering Information (Continued)

Orderable Items

Table F-3. *ConnectReach* Access System Orderable Items

Description	Comcode	ED or Apparatus Code
POTS Lines Only Systems		
Basic *ConnectReach*™ system equipped with the following: ■ ***Network T1/DSX-1 interface*** ■ ***AC power*** supply ■ Base system software ■ One 8-channel current feed circuit card ■ Standard channel bank software (SW-B) ■ SNMP, HTTP interface. Software will *not* allow full support for services from the 10BaseT port, but will allow services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/ DSP Combination card. Software can be remotely upgraded to support full data capabilities (SW-D).	108562117	ALV230A0020000L
Basic *ConnectReach* system equipped with the following: ■ ***Network T1/DSX-1 interface*** ■ ***DC power*** supply ■ Base system software ■ One 8-channel current feed circuit card ■ Standard channel bank software (SW-B) ■ SNMP, HTTP interface. Software will *not* allow full support for services from the 10BaseT port, but will allow services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/ DSP Combination card. Software can be remotely upgraded to support full data capabilities (SW-D).	108562125	ALV230D0020000L

(Continued on next page)

Ordering Information (Continued)

Orderable Items (Continued)

Table F-3. *ConnectReach* Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code
POTS Lines Only Systems		
Basic *ConnectReach*™ system equipped with the following: ■ ***Network HDSL interface*** ■ ***AC power*** supply ■ Base system software ■ One 8-channel current feed circuit card ■ Standard channel bank software (SW-B) ■ SNMP, HTTP interface. Software will *not* allow full support for services from the 10BaseT port, but will allow services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/DSP Combination card. Software can be upgraded to support full data capabilities by adding SW-D software.	108646803	ALV270A0020000L
Basic *SLC ConnectReach* system equipped with the following: ■ ***Network HDSL interface*** ■ ***DC power*** supply ■ Base system software ■ One 8-channel current feed circuit card ■ Standard channel bank software (SW-B) ■ SNMP, HTTP interface. Software will *not* allow full support for services from the 10BaseT port, but will allow services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/DSP Combination card. Software can be upgraded to support full data capabilities by adding SW-D software.	108646811	ALV270D0020000L

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Ordering Information (Continued)

Orderable Items (Continued)

Table F-3. *ConnectReach* Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code
Integrated POTS Lines and Data		
Basic *ConnectReach*™ system equipped with the following: ■ ***Network T1/DSX-1 interface*** ■ ***AC power*** supply ■ Base system software ■ frame relay ■ DHCP ■ SNMP ■ firewall. System includes all software to provide both POTS lines and full data services. However, POTS line circuit cards are *not* included and must be ordered separately. The base system software allows services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/DSP Combination card.	108562091	ALV210A0000000L
Basic *ConnectReach* system equipped with the following: ■ ***Network T1/DSX-1 interface*** ■ ***DC power*** supply ■ Base system software ■ frame relay ■ DHCP ■ SNMP ■ firewall. System includes all software to provide both POTS lines and full data services. However, POTS line circuit cards are *not* included and must be ordered separately. The base system software allows services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/DSP Combination card.	108562109	ALV210D0000000L

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Ordering Information (Continued)

Orderable Items (Continued)

Table F-3. *ConnectReach* Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code
Integrated POTS Lines and Data		
Basic *SLC® ConnectReach*™ system equipped with the following: ■ ***Network HDSL interface*** ■ ***AC power*** supply ■ Base system software ■ frame relay ■ DHCP ■ SNMP ■ firewall. System includes all software to provide both POTS lines and full data services. However, POTS line circuit cards are *not* included and must be ordered separately. The base system software allows services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/ DSP Combination card.	108646829	ALV260A0000000L
Basic *SLC ConnectReach* system equipped with the following: ■ ***Network HDSL interface*** ■ ***DC power*** supply ■ Base system software ■ frame relay ■ DHCP ■ SNMP ■ firewall. System includes all software to provide both POTS lines and full data services. However, POTS line circuit cards are *not* included and must be ordered separately. The base system software allows services from the Secondary T1 port if equipped with a Fractional T1 Interface card or a Factional T1/ DSP Combination card.	108646837	ALV260D0000000L

(Continued on next page)

Ordering Information (Continued)

Orderable Items (Continued)

Table F-3. *ConnectReach* Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code
Options and Spares		
Hardware		
4-Channel Current Feed Circuit Card	108342478	LTV24PFXS
8-Channel Current Feed Circuit Card	108342486	LTV28PFXS
4-Channel Current Sink Circuit Card	108342494	LTV24PFX0
8-Channel Current Sink Circuit Card	108342502	LTV28PFX0
Fractional T1 Interface card for Secondary T1 Port. Needed for Secondary T1/DSX-1 service.*	108342510	LTV2FT1
Telco DSP Processor. This card enables the *LCR*†and *BOX*† feature.*	108342528	LTV2DSP
Fractional T1 Interface & DSP Combination card. This card should be used for applications that require a Telco DSP but also require a Fractional T1 Interface.*	108342536	LTV2FT1DSP
NEBS (GR-63) Installation Kit — allows the *SLC ConnectReach* system to meet Bellcore NEBS Level 3 standards (GR-63)	601911860	ED-7C830-30, G5
Fractional T1-V.35 Convertor — provides an interface between a legacy router and the secondary T1/DSX-1 port.	108342544	LTV2V.35
Hinged Wall Mount Assembly with Extension Brackets	108501354	LV2HNGMNT
Mounting Brackets for Bellcore-spec frames (ANSI-spec brackets are normally shipped with each chassis. These brackets allow mounting in a Bellcore-spec frame.)	108501362	LV2BBRKTS
120 V AC/48 V DC Power Converter with Battery Pack	108408816	LT733

*If, either now or in the future, you plan on using both secondary T1/DSX-1 services and the LCR feature, order the Fractional T1 Interface & DSP Combination card.

†Trademark of Vina Technologies, Inc.

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Ordering Information (Continued)

Orderable Items (Continued)

Table F-3. *ConnectReach* Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code
Hardware (Continued)		
10ft RJ21 cable with 66 block package	108585647	LCBL1
30ft RJ-48 cross over cable*	108585654	LCBL2
Software		
Data Module (SW-D). When used in conjunction with SW-B, gives the POTS Lines Only system full data capabilities.	108357518	LTSWD
LCR† Feature Software. Needed to enable *LCR* feature. However, this software is also provided with the *BOX*† feature but must be provisioned separately.	108357534	LTSWLCR
BOX Feature Software. Needed to enable *BOX* feature. The *LCR* feature is also included with the *BOX* feature but must be provisioned separately.	108357542	LTSWBOX

*Lucent Technologies also provides the A25B-X SGL series of cables that can be used for a POTS telephone cable. For the A25B-X SGL series, "X" equals the number of feet. For example: A25B-5 SGL, 5-feet, Comcode 100959113; A25B-50 SGL, 50-feet, Comcode 100016765; A25B-150 SGL, 150-feet, Comcode 100959428.

†Trademark of Vina Technologies, Inc.

Cables That Are Not Provided by Lucent Technologies

The following cables are not provided with the *ConnectReach* system and must either be purchased separately or custom made to meet your applications:

10BaseT Ethernet Cable

This cable connects to the RJ-45 **10BaseT** port.

(Continued on next page)

Ordering Information (Continued)

Cables That Are Not Provided by Lucent Technologies (Continued)

RS-232 Cable

This cable requires you to purchase a standard 9-pin female PC null modem cable.

Ground Wire for Optional 120 V AC/48 V DC Power Converter with Battery Backup

This optional power converter requires a 12- or 14-gauge ground wire to be supplied by the customer.

Special *ConnectReach* Ordering Considerations

Before ordering any *ConnectReach* system equipment or software for specific features, read the following notes and recommendations:

Ordering Hardware in Addition to the Base Systems

A base system ships exactly as described in Table F-3 with respect to hardware. For example, the ALV230D0020000L—comcode 108562125 base system comes with one 8-line current feed circuit card installed in the unit. Additional hardware items ordered for a basic or custom configuration require installation by telephone company operating personnel. This includes hardware such as current feed or current sink cards, Fractional T1 interface card, Telco DSP Processor, Fractional T1 Interface & DSP Combination card, Fractional T1-V.35 Convertor, and the NEBS Installation Kit.

Software Upgrades for Specific Features (General)

ConnectReach system software upgrades (including SW-D, *LCR* feature, and *BOX* feature) consist of a string of alpha-numeric characters comprising a *key* that activates the particular feature requested when the key is entered into the *ConnectReach* provisioning terminal. Each *ConnectReach* system chassis is represented by a unique serial number and has a unique key for each software upgrade feature.

Software Upgrades for Specific Features on a New Chassis

When submitting orders for software upgrades for specific features on a new chassis, telephone company personnel will not have prior knowledge of the chassis serial number and should enter the string "9999999999999." This will alert Lucent Technologies personnel to activate the enhanced software features prior to shipping the unit to the telephone company.

(Continued on next page)

Ordering Information (Continued)

Special *ConnectReach* Ordering Considerations (Continued)

Base System Software Upgrades for Existing Chassis

Using a PC with an internet browser, you can download base system software upgrades from the following web site:

`ftp://lucentftp:connectreach@ftp2.vina-tech.com/ConnectReach/`

Follow the instructions in Chapters 7 and 8 of this document to download the software to your PC and transfer it to the *ConnectReach* box.

Feature Upgrades for In-Service Systems

(See Caution.) When ordering feature upgrades for systems in the field, the serial number of the chassis must be submitted as part of the order so that Lucent Technologies can deliver the appropriate key to the user. Information for contacting the telephone company personnel who will coordinate the administration of the key to the *ConnectReach* unit must also be submitted as part of the ordering process. Software keys can be deliver either by fax or by email to the *ConnectReach* user. Telephone company personnel contact information should include:

- name (required)
- phone number (required)
- fax number, and/or email address (whichever is appropriate).

CAUTION:
Requests for software upgrade features lacking either the chassis serial number or telephone company contact information will not be processed.

Warranty Return Information

Return Address

When returning defective parts and equipment to Lucent Technologies for warranty repair, send the parts and equipment to the following address:

Lucent Technologies
Attn: Dock 21
10000 Twin Lakes Pkwy
Charlotte, NC 28269

Glossary

2B1Q — Two Binary, One Quarternary. A line coding format used in high data-rate digital subscriber line (HDSL) and integrated services digital network (ISDN) basic rate interface (BRI). 2B1Q is a pulse amplitude modulation (PAM) system which maps two bits of data into one quarternary symbol.

10Base-T — A widely used standard for Ethernet networks and T1 services using twisted-pair wiring as the physical medium.

A

Address Digits — The digits that specify the destination (or source) of a call, such as dial tone multifrequency (DTMF), multifrequency (MF), and pulse.

AIS — Alarm Indication Signal. Sometimes called a blue alarm or blue signal. In T1, the AIS indicates to the far end of the line that the near end has detected a transmission fault at the far end. The AIS sends ones in all bits of all time slots.

AMI — Alternate Mark Inversion. Digital transmission requires that each consecutive pulse be transmitted at opposite polarity or voltage.

ANI — Automatic Number Identification. Imbedded in the phone call is a series of digits that tell you the phone number of the phone calling you. This identification could be used to search a database for customer information.

Answer Supervision — A means by which a private branch exchange (PBX) tells a central office (CO) that an incoming call has been answered.

AOR — Addressable Office Repeater.

ARP — Address Resolution Protocol. A basic level protocol within the transport control protocol/Internet protocol (TCP/IP) group that “maps” IP addresses to Ethernet addresses.

B

B8ZS — Bipolar 8 Zero Substitution. A line coding format in which a bipolar violation code is substituted for a string of eight zeros.

BER — Bit Error Rate. Errored bits over total bits.

Bipolar — An intelligence-carrying voltage that turns both negative and positive in relation to a base reference of zero.

Blue Alarm — See AIS.

BOX — Business OfficeXchange. An integrated voice switch incorporating key system functionality.

BPV — Bipolar violation. The digital data format consists of pulses at opposite polarity or voltage. Two consecutive pulses of the same polarity are considered a bipolar violation.

BRI — Basic Rate Interface. BRI has two bearer B-channels at 64 kilobits per second (kbps) and a data D-channel at 16 kb/s.

Browser — See Web Browser.

C

CAS — Channel Associated Signaling. A form of circuit state signaling in which control signals are carried in the same channel along with voice and data signals. Also known as robbed bit signaling (RBS).

Channel Bank — A device that fractions the 1.544-Mb/s HDSL-T1 line into 24 channels.

CLOC — Loopback - toward customer side at slave unit.

CO — Central office.

CRC — Cyclic Redundancy Check. Error detection technique that derives a binary number by reading an incoming block of data and compares it with a number transmitted with the data.

CREM — Loopback - toward customer side at master unit.

CSMA/CD — Carrier sense multiple access collision detect. Media-access mechanism wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all colliding devices. This collision subsequently delays retransmissions from those devices for some random length of time. CSMA/CD access is used by Ethernet and IEEE 802.3.

CSU — Channel Service Unit. A CSU terminates a T1 digital circuit at the customer site. The CSU performs certain line-conditioning functions, ensures network compliance with Federal Communications Commission (FCC) rules, and responds to loopback commands. The CSU also ensures proper ones density in transmitted bit stream and performs bipolar-violation correction.

D

D4 — A framing format that uses a 12-bit pattern repeating sequence for the location of the framing bits. Also referred to as Superframe (SF) format.

DACS — Digital Access and Cross-connect System.

dB — Decibel, a unit of measure of relative power, expressed as the ratio of two values. dB = 10 log P1/P2, where P1 and P2 are the power levels in watts.

Delay Dial — A type of trunk signaling for incoming and outgoing calls. With this signaling, the *ConnectReach*™ system sends an off-hook pulse until it is ready to receive digits.

DHCP — Dynamic Host Configuration Protocol. Acting as a DHCP server, the *ConnectReach* system dynamically assigns IP addresses and other configuration parameters needed by personal computers (PCs) or workstations to connect to the Internet and perform common network functions.

Dial Supervision — The method for originating address digit transmission such as wink start and delay start.

DID — Direct Inward Dial. A DID trunk passes the last two to four digits of a phone number to the PBX or hybrid phone system. At this point the digits are either modified by the phone system or used as is to connect to an internal extension. This allows outside calls to reach an internal extension directly by dialing a seven-digit number.

DLCI — Data Link Connection Identifier. The frame relay virtual circuit number corresponding to a particular destination. The DLCI is part of the frame relay header.

DNIS — Dialed Number Identification Service. DNIS provides the number the caller dialed. Used with 800 and 900 lines, DNIS capabilities allow one trunk group to be used for multiple service applications.

DNS — Domain Name Service. A DNS server resolves an Internet domain name, such as lucent.com, to an IP address. A DNS proxy manages Internet name resolution requests on behalf of devices on a private network.

DS0 — Digital or data signal level 0. The basis of a 64-kbps digital data stream.

DS1 — Digital signal level 1. The 1.544-Mb/s T1 line.

DSP — Digital Signal Processor. A specialized digital microprocessor that performs calculations on digitized signals that were originally analog (for example, voice) and then sends the results on.

DSU — Data Service Unit. A DSU interfaces to a HDSL-T1 digital circuit, in combination with a CSU. The DSU converts the customer data stream to bipolar format for transmission.

DSX — Digital System Cross-Connect Frame. A bay or panel to which HDSL-T1 lines and DS1 circuit packs are wired and that permits cross-connections by patch cords and plugs. A DSX panel is used in small offices where only a few digital trunks are installed.

DTE — Data Terminal Equipment. The name applied to a piece of equipment such as personal computers, systems network architecture (SNA) control units, automatic teller machines, reservation terminals, etc.

DTMF — Dual Tone Multifrequency. A type of signaling consisting of a push button or touchtone dial that sends out two discrete tones which are picked up and interpreted by telephone switches.

E

E&M Signaling — Conventional telephony arrangement that uses separate leads called, respectively, the "E" ("ear") lead and "M" ("mouth") lead, for signaling and supervisory purposes.
In the *ConnectReach* system, references to E&M signaling refer to a signaling type supported on DID trunks. It does not refer to the E&M signaling used over metallic leads with older transmission equipment.

ES — Errored Seconds.

ESF — Extended superframe format. A framing format that allows a maintenance channel and error-detection capability on a DS1.

Ethernet — A standard networking protocol widely used in local area networks for connecting often dissimilar devices. Invented by the Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet networks use carrier sense multiple access/collision detect (CSMA/CD) and run over a variety of cable types at 10 Mbps. Ethernet is similar to the IEEE 802.3 series of standards.

F

FDL — Facility Data Link. An embedded overhead channel with the ESF format traditionally used for maintenance messaging within a carrier network. FDL uses the 193rd bit and is a four kb/s bandwidth.

Firewall — A combination of hardware and software which limits the exposure of a computer or group of computers to an attack from outside. A network-level firewall, or packet filter, examines traffic at the network protocol packet level.

Frame Relay — A packet switching protocol that performs error checking and efficiently handles high-speed, bursty data over wide area networks.

Framing Bit — A bit used for frame synchronization.

Framing Error — Occurs when framing bits are set improperly, or when the two ends of a circuit are configured for different framing formats.

FTP — File Transfer Protocol. A protocol used for reliable file transfers.

FXO — Foreign Exchange Office. An analog trunk interface which may be connected to a PBX or to the local public switched telephone network (PSTN) Central Office. The FXO interface may be configured in either loop-start or ground-start mode.

FXS — Foreign Exchange Station. An analog line interface which may be connected to a PBX or directly to a telephone station set. The FXS interface may be configured in either loop-start or ground-start mode.

G

Gateway — A combination of hardware and software that links two different types of networks.

Ground-Start/Loop-Start — Two common telephone trunk signaling schemes. In ground-start signaling, the device at one end of the connection grounds one side of the line and the device at the other end detects the presence of the ground. In loop-start signaling, one device closes the loop and the resulting current flow is detected by the device at the other end. PBX systems usually are connected to ground-start trunks, and single telephone lines and key systems to loop-start trunks. The *ConnectReach* system supports both, and automatically detects for channel bank which signaling scheme is used on a line-by-line basis.

H

HDLC — High-level Data Link Control. A communications protocol for point-to-point and multipoint communications that reduces the likelihood of errors.

HDSL — High data-rate Digital Subscriber Line. Delivers T1/E1 line speeds over local loop circuits. HDSL uses the same unshielded twisted pair (UTP) as T1/E1 and can travel up to 12,000 feet without a repeater. Unlike the requirements for T1/E1, the UTP may be bridged, however loading coils are not tolerated. Special electronics are installed at the CO and the customer premises for transmitting HDSL. Each UTP uses full duplex transmission at a lower frequency which allows for the longer distances HDSL may travel without a repeater.

HLU — HiGain Line Unit (master).

HRU — HiGain Remote Unit (slave).

Host Number — The low bits of an IP address which corresponds to those bits in the associated subnet mask which have 0's.

HTTP — HyperText Transfer Protocol. The protocol used for communication between World Wide Web servers and Web browsers.

I

ICMP — Internet Control Message Protocol. A low-level protocol that supports functions such as echo requests and "host not available" messages.

Immediate Start — A type of trunk signaling for incoming and outgoing calls. This signaling indicates that the originating trunk goes off-hook, and maintains this condition for at least 150 milliseconds. Then the originating trunk sends out digits.

Incoming — A call that comes from the CO to a user on the *ConnectReach* system.

Internet — Largest global internetwork, connecting tens of thousands of networks worldwide and having a "culture" that focuses on research and standardization based on real-life use

IOR — Intelligent Office Repeater.

IP — Internet Protocol. The network-layer protocol in the TCP/IP protocol stack.

IP Address — A 32-bit address (specified as x.y.z.w) which is assigned to hosts in a TCP/IP Internet. This 32-bit address is comprised of a network portion and a host portion.

IP Unnumbered Interface — This describes an interface that does not consume a unique IP address.

IPX — Internet Packet eXchange. Novell NetWare's local area network (LAN) communications protocol. The IPX protocol is used to move data contained in encapsulated packets between server and/or workstation programs running on different network nodes. IPX supports packet sizes up to 64 bytes.

IR — Intelligent Repeater.

ISDN — Integrated Services Digital Network. A switched digital network from the local or long-distance exchange carrier to the subscriber. There are two types of service: Basic Rate Interface (BRI) and Primary Rate Interface (PRI). BRI transmits at 1.44 Mb/s; PRI transmits at 1.544 Mb/s.

ISP — Internet Service Provider. A company that provides access to the Internet. For a monthly fee, the service provider gives you a software package, username, password and access phone number. Equipped with a modem, you can then log on to the Internet and browse the World Wide Web and send and receive e-mail.

L

LAN — Local Area Network. A short distance data communications network (typically within a building or campus) used to link computers and peripheral devices [such as printers, compact disc-read only memories (CD-ROMs), modems] under some form of standard control.

LCR — Local Call Routing. (Also known as Least Cost Routing.) A telephone system feature that automatically selects the most economical route available for an outgoing call.

LIM— Loop Integrity Monitor. The T1/HDSL span carries half of the DS0 level traffic on one loop and half on the other loop. The LIM determines the current state of each loop on the T1/HDSL span. If one of the loops goes down, usually the whole T1/HDSl service is down. With LIM, if one loop goes down, the other loop is still functional.

LMI — Local Management Interface. A specification for the use of frame-relay products that defines a method of exchanging status information between devices such as routers.

Local Loop — The voice-band channel connecting the subscriber to the CO. Sometimes called subscriber loop.

Loop-down — Disarm loopback.

Loop-up — Arm loopback.

Loop-Start — See Ground-Start.

LOS — Loss of Signal (T1).

LOSW — Loss of Sync-Word (HDSL).

LSB — Least Significant Bit/Byte.

M

Margin — The difference (in dB) between existing noise and acceptable noise.

Master — A module that operates at the central control point.

MDS — Metallic Distribution Shelf. A two-shelf assembly that provides control and distribution for DS0-based metallic services using common units and channel units. It also provides control and distribution for DS0-based 12- and 24-line fiber-in-the-loop services using common units and distant terminal Servers.

MSB — Most Significant Bit/Byte.

N

NAT — Network Address Translation. An Internet standard that allows a LAN to use one set of IP addresses for an internal traffic and another set of IP addresses for external traffic.

Netmask — Also called subnet mask. When this value is viewed as a 32-bit binary number, the high bits have 1's. These 1's "mask off" the network and host number.

Network Number — The high bits of an IP address which correspond to those bits in the associated subnet mask which have 1's.

NLOC — Loopback - toward network side at master unit.

NOC — Network Operations Center.

NREM — Loopback - toward network side at slave unit.

NTP — Network Time Protocol. Developed to provide an accepted concept of time among Internet hosts around the world.

Null modem — Small box or cable used to join computing devices directly, rather than over a network.

NVRAM — Non-Volatile Random Access Memory. A type of memory that retains its contents when power is turned off.

O

Off-Hook — Off-hook condition indicates that the circuit is in the active state (that is, busy). The opposite condition is on-hook (idle).

Outgoing — A call that comes from a user on the *ConnectReach* system to the CO.

P

Packet Filtering — The recognition and selective transmission or blocking of bundles of data based on destination addresses or other packet contents.

Pattern — One or more sequences separated by "|," followed by an optional time-out. Example: 92[2-3] | 95x matches 922, or 923, or 950, or 951...959.

PBX — Private Branch Exchange. A customer telephone system that emulates a carrier branch exchange office.

Ping — A command that sends an ICMP echo packet to a node on an IP network. The target node (if operational) returns an ICMP response packet to the originator. Commonly used to indicate that both the target node and the network path to it are functioning properly.

POP — Post Office Protocol. A protocol used to retrieve e-mail from a mail server. POP2 requires simple mail transfer protocol (SMTP) to send messages whereas, POP3 can be used with or without SMTP.

PPP — Point-to-Point protocol. A protocol that allows a computer to connect to a remote network or device over either a synchronous interface or a standard dial-up telephone line and modem.

PRI — Primary Rate Interface. PRI in the United States provides 23 B-channels with a D-channel transmitting at 1.544 Mb/s. European PRI has 30 B-channels with a D-channel and transmits at 2.048 Mb/s.

Protocol — An agreed-upon format for transmitting data between two devices. The protocol determines the following:

- The type of error checking to be used
- Data compression method, if any
- How the sending device will indicate that it has finished sending a message
- How the receiving device will indicate that it has received a message.

Proxy Server — A server that sits between a client application, such as a Web browser, and a real server. It intercepts all requests to the real server to see if it can fulfill the requests itself. If not, it forwards the request to the real server.

Pulse Attenuation — The amount of signal power loss over the HDSL span. Valid range is 1 to 32 dB.

PVC — Permanent Virtual Circuit. A logical link established in a packet network assuring an available connection and bandwidth for subscribers without actually having to set aside physical facilities. A PVC emulates a dedicated physical connection across a wide area network (WAN).

Pulse Density — The ratio of ones to zeros in a digital data stream. The ones density rule requires at least three ones in a sampled byte of information.

R

RAI — Remote Alarm Indication. A signal transmitted in the outgoing direction when a terminal determines that if has lost the incoming signal. RAI is commonly called the Yellow Alarm signal.

RBS — Robbed Bit Signaling (see CAS).

Red Alarm — In T1, a red alarm is generated when a locally detected error such as loss of synchronization exists for 2.5 seconds.

REN — The Ringer Equivalency Number indicates the number of ringers that may be connected to a single telephone line. If the number of ringers exceeds the REN of the line, some or all of the ringers may not operate.

RFC — Request for Comment. A documentation mechanism for developing TCP/IP standards, procedures, and specifications.

RIP — Routing Information Protocol. A protocol defined by RFC 1058 that specifies how routers exchange routing table information. With RIP, routers periodically exchange entire tables.

Ring — One conductor of a telephone wire pair, designated by R.

Router — Network layer device that uses one or more metrics to determine the optimal path along which network traffic should be forwarded. Routers forward packets from one network to another based on network layer information.

S

Sequence — One or more digits, range of digits, x, or local, defined in the detect-string parameter of the Dialing table, that matches a given sequence. Example: 51092[3-5] matches 510923, or 510924, or 510925.

SF — Superframe format. Another name for D4 format. See D4.

Slave — A module that operates at the remote end of the circuit.

Smart-Jack — A RJ48X jack, single-line, 4-wire, T/R, T1/R1, 1.544 Mb/s, eight position. (RJ means a jack registered with the FCC.)

SMTP — Simple Mail Transfer Protocol. A protocol for sending e-mail messages between servers.

SNMP — Simple Network Management Protocol. SNMP is a network management protocol that allows a network manager to communicate with devices over an IP network and allows a device to send alarm and status messages to an SNMP network management system located either on the LAN or on a remote network.

SNR — Signal-to-Noise Ratio.

SNRHIGH — Signal-to-Noise Ratio/High.

SNRLOW — Signal-to-Noise Ratio/Low.

SOCKS — An application proxy which operates at the application “socket” level.

Subnet — Logical partitions of a single network.

T

T1 — A digital line that carries data at 1.544 Mb/s. Fractional T1 refers to data transmission between 56 kb/s and 1.544 Mb/s. The *ConnectReach* system provides twenty-four 64-kb/s “fractions,” or channels, which may be allocated for either voice or data traffic.

T1 Multiplexer — A device that can multiplex 24 channels at 64 kb/s onto a single digital signal.

TCP — Transport Control Protocol. The primary transport-layer protocol of the TCP/IP protocol stack.

Telnet — A TCP/IP protocol offering a line-oriented connection over the LAN/WAN. Telnet is typically used to remotely log on to an Internet device or host.

Tip — One conductor of a telephone wire pair, designated by T.

Tip Status — Transmission state of an unconfigured channel. In the channel-bank menu, the tip status is either busy or idle.

TR08 — A defacto Bellcore standard for adapting to a single T1 link.

Trunk — A transmission channel connecting two switching devices.

Trunk Signaling — The handshaking used to communicate on a trunk such as loop-start and ground- start.

U

UAS — Unavailable Seconds.

UDP — User Datagram Protocol. An alternate transport-layer protocol of the TCP/IP protocol stack.

W

WAN — Wide Area Network. A data network typically extending a LAN outside the building, over telephone carrier lines to link to other LANs in remote buildings in possibly remote cities.

Web Browser — A software application used to locate and display World Wide Web (WWW) pages.

Wink Delay — A type of trunk signaling for incoming call. This signaling allows ANI and DNIS numbers to be used with standard loop-start cards (that is, voice mail, fax) without the need for special signaling converters. This is done by providing a “wink back” to the carrier after the analog line is answered so that any digits delivered by the carrier may be received from the analog port.

Wink Start — The most common type of trunk signaling for incoming and outgoing calls. After the *ConnectReach* system detects the trunk going off-hook on an incoming call, it transmits a 200-millisecond off-hook pulse, then returns to the on-hook state. The originating trunk detects this “wink back,” waits at least 210 milliseconds, sends out digits, and then rings the analog line. When the call is answered, the *ConnectReach* system transmits an off-hook pulse.

WINS — Windows* Internet Naming Service. A system that determines the IP address associated with a particular network computer. This is called name resolution. WINS supports network client and server computers running Windows and can provide name resolution for other computers with special arrangements.

* Windows is a registered trademark of Microsoft Corporation.

WWW — World Wide Web. A system of Internet servers that support specially formatted documents. The documents are formatted in a language called hypertext markup language (HTML) that supports links to other documents, as well as graphics, audio, and video files. This means you can jump from one document to another simply by clicking on hot spots.

X

Xmodem — One of the most popular file-transfer protocols. Although Xmodem is a relatively simple protocol, it is fairly effective at detecting errors. It works by sending blocks of data together with a checksum and then waiting for acknowledgment of the block's receipt. The waiting slows down the rate of data transmission considerably, but it ensures accurate transmission.

Y

Yellow Alarm— A yellow alert is a T1 alarm signal sent back toward the source of a failed transmit circuit. The alert sends zeros in bit two of all time slots. Also see RAI.

Z

ZBTSI — Zero-Byte Time-Slot Exchange. Used with T-carrier extended superframe format (ESF). One area of the ESF frame carries information locating eight consecutive zeros in the data.

Index

Numerics

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y