Lucent Technologies
Bell Labs Innovations

SLC® -2000 Access System Applications, Planning, and Ordering Guide, Appendix 1

SLC ConnectReach™ Access System

Notice

Every effort was made to ensure that the information in this customer information product (CIP) 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) Statement

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

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.

Trademarks

5ESS, SLC, SPOTS, and SPQ are registered trademarks of Lucent Technologies.
ACCUNET is a service mark of AT&T
ANSI is a registered trademark of American National Standards Institute, Inc.
BOX and LCR are trademarks of Vina Technologies, Inc.
COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of
  Bell Communications Research, Inc.
ConnectReach is a trademark of Lucent Technologies.
DMS 100 is a trademark of Northern Telecom, Ltd.
GTD-5 is a registered trademark of GTE Corporation.
UL is a registered trademark of Underwriters Laboratories Inc.

Documentation Ordering Information

The ordering number for this CIP is 363-208-000, Appendix 1. To order this CIP call 1-888-LUCENT8. Bell company personnel should process CIP orders or standing order requests. RBOC/BOC customers should process CIP orders or standing order requests through their Company Documentation Coordinator. For more ordering information, refer to "How to Order Documents" in the section "About This Document" in the base document 363-208-000, Issue 6.

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 *SLC*®-2000 Access System. Call the Lucent Technologies Regional Technical Assistance Center at 1-800-225-RTAC.

Documentation Support

Lucent Technologies provides a telephone number for you to report errors or to ask questions about the information in this CIP. The support telephone number is 1-888-LTINFO6.

Developed by Lucent Technologies Network Systems Customer Training and Information Products (CTIP) Organization.

SLC® ConnectReach™ Access System

1

Contents

Contents

Contents

Contents

Contents

SLC® ConnectReach™ Access System

<div style="text-align: right; font-size: 4em;">**1**</div>

What This Appendix Covers

This appendix supplements Document 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide (APOG)*. It covers Lucent Technologies' *SLC ConnectReach* Access System.

This appendix is being reissued to include the following information:

- *SLC*-2000 software release R4.7 that allows access to the *SLC ConnectReach* system software interface through the *SLC*-2000 host digital terminal's (HDT's) craft interface terminal (CIT) connection

- High data rate digital subscriber line (HDSL) compatibility

- The availability of a 120 V AC/48 V DC power converter with battery backup

- The availability of a hinged mounting bracket

- The availability of a Bellcore mounting bracket

- Other minor corrections from Issue 1 of this document.

Insert this appendix into the APOG after Appendix D. Appendix 1 now becomes part of the customer information product (CIP).

This appendix provides the information necessary to plan, engineer, and order equipment for a *SLC ConnectReach* Access System and is intended for the following users:

- Network planners

- Engineers

- Product evaluators

- Standardization groups

- Ordering personnel.

It is based on an understanding of basic digital transmission principles and familiarity with digital loop carrier systems. Background on digital loop carrier (DLC) systems may be found in Appendix A of 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide (APOG)*.

SLC ConnectReach Access System Overview

The *SLC ConnectReach* system reduces costs by combining the following services into a single DS1 signal:

■ Voice [metallic voice frequency (VF) lines]

■ Data including Internet and/or private corporate network access

■ Private Branch Exchange (PBX)-type services provided by the *BOX*[*] feature.

This appendix includes the following sections that provide details of the *SLC ConnectReach* Access System:

■ **Benefits and Features**: This section includes benefits that you and your customers can realize by using the *SLC ConnectReach* system. It also describes the features of the system.

■ **Product Description**: This section gives a high-level description of the *SLC ConnectReach* system and its basic parts.

■ **Applications and Configurations**: This section describes the basic *SLC ConnectReach* configurations supported by Lucent Technologies. It also covers the network configurations for connecting the *SLC ConnectReach* system to the *SLC*-2000 HDT.

■ **Services:** This section describes the basic services provided by the *SLC ConnectReach* system.

■ **Operations, Administration, Maintenance, Provisioning (OAM&P) and Preinstallation Engineering**: This section describes the *SLC ConnectReach* system's operation interfaces, security features, and the required information to provision your system. It also provides the necessary planning information to prepare the *SLC*-2000 HDT to host the *SLC ConnectReach* system.

■ **Technical Specifications**: This section provides the technical specifications of the *SLC ConnectReach* system.

■ **Ordering**: This section gives the necessary ordering information to order your system. It also gives examples of the information needed to order a system based on each basic configuration.

---

*   Trademark of Vina Technologies, Inc.

The *SLC ConnectReach* Access System "extends" the *SLC*-2000 Access System backplane closer to the customer — or to the customer premises — similar to the *SLC*-2000 multi-services distant terminal (MSDT). The *SLC*-2000 HDT must be running software release R4.06.01 or later. As shown in Figure 1-1, the typical *SLC ConnectReach* system multiplexes the bandwidth for each type of service onto a network T1/DSX-1/HDSL connection that interfaces with the *SLC*-2000 system. The *SLC*-2000 system then routes the bandwidth of each service to the proper destination. For example, after properly provisioning the *SLC*-2000 HDT, it routes the voice channels to the local digital switch (LDS) through a *TR-08 or TR-303 interface*. It routes the data bandwidth to a *frame relay network* connected to an Internet service provider and/or private corporate network using an *integrated network access (INA) interface*.

Unlike the *SLC*-2000 MSDT, the *SLC ConnectReach* system is *not* hardened for outside plant use. You must install the system in a controlled environment such as a telephone equipment vault or a customer premises. You cannot mount the system in an outside plant cabinet or other locations not protected from environmental hazards.

The *SLC ConnectReach* system can be ordered in both AC and DC versions of systems that provide either of the following network interfaces with the *SLC*-2000 HDT:

- ■ T1/DSX-1 interface
- ■ HDSL interface.

For AC configurations requiring battery backup, you can obtain an optional 120 V AC/48 V DC power converter with battery backup, if needed. The power converter outputs 48 VDC to the system so this AC configuration requires you to order a DC version of the *SLC ConnectReach* system.

See the "Applications and Configurations" section of this Appendix for configuration details. The "Ordering" section provides ordering details for each type of system along with the options and features.

As shown in Figure 1-1, the *SLC ConnectReach* system allows customer access through the following connections:

■ ***Voice or Analog Ports***: These ports allow the system to interface with POTS-type equipment or analog lines to a PBX.

■ ***10BaseT Ethernet Port***: This port allows computer and data connections to be routed through the *SLC*-2000 system to a frame relay network. This allows access to both the public Internet and/or a private corporate network.

■ ***Secondary T1/DSX-1 Port***: This port allows digital trunk ports from a PBX, key system, or an external router to interface with the switched network.

scrbasic.eps
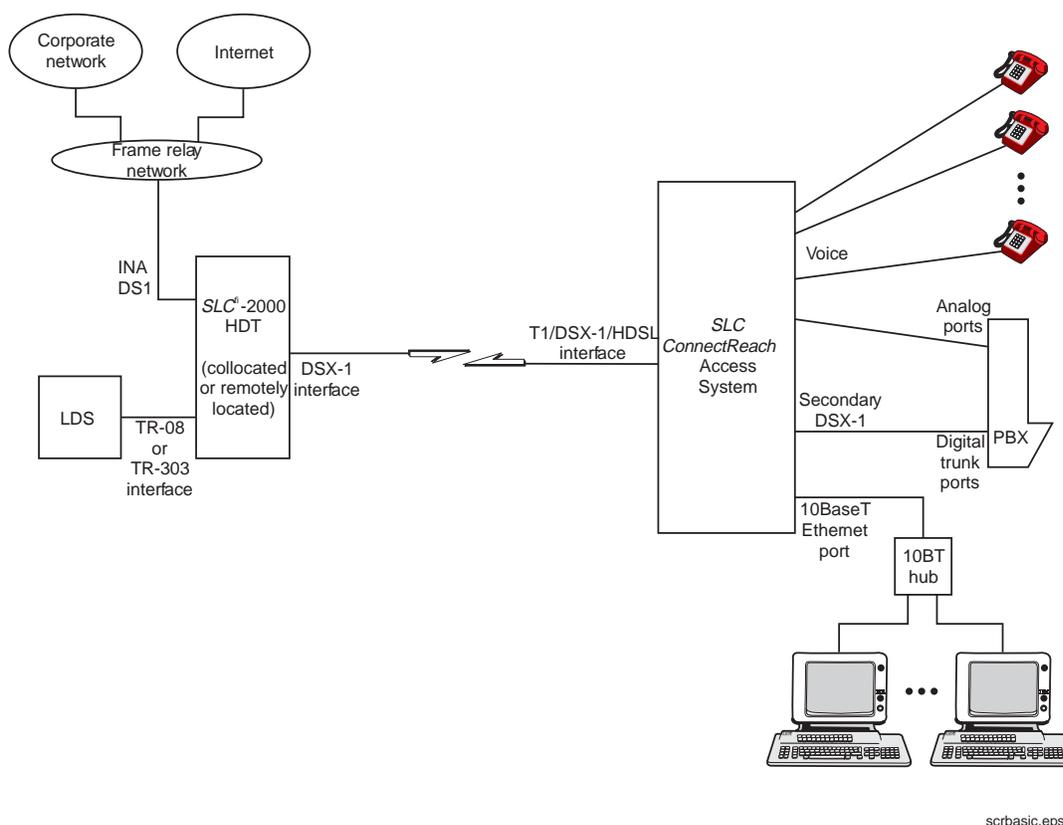
Figure 1-**1.   Basic *SLC ConnectReach* Architecture**

The *SLC ConnectReach* system also offers PBX-type services with its *BOX* feature as shown in Figure 1-2. With the system located on the customer premises, you have access to features such as call waiting and call forwarding *through the SLC ConnectReach equipment* without involving the LDS.

See the "Benefits and Features" section of this appendix for details on the *BOX* feature.

scrboxbas.eps
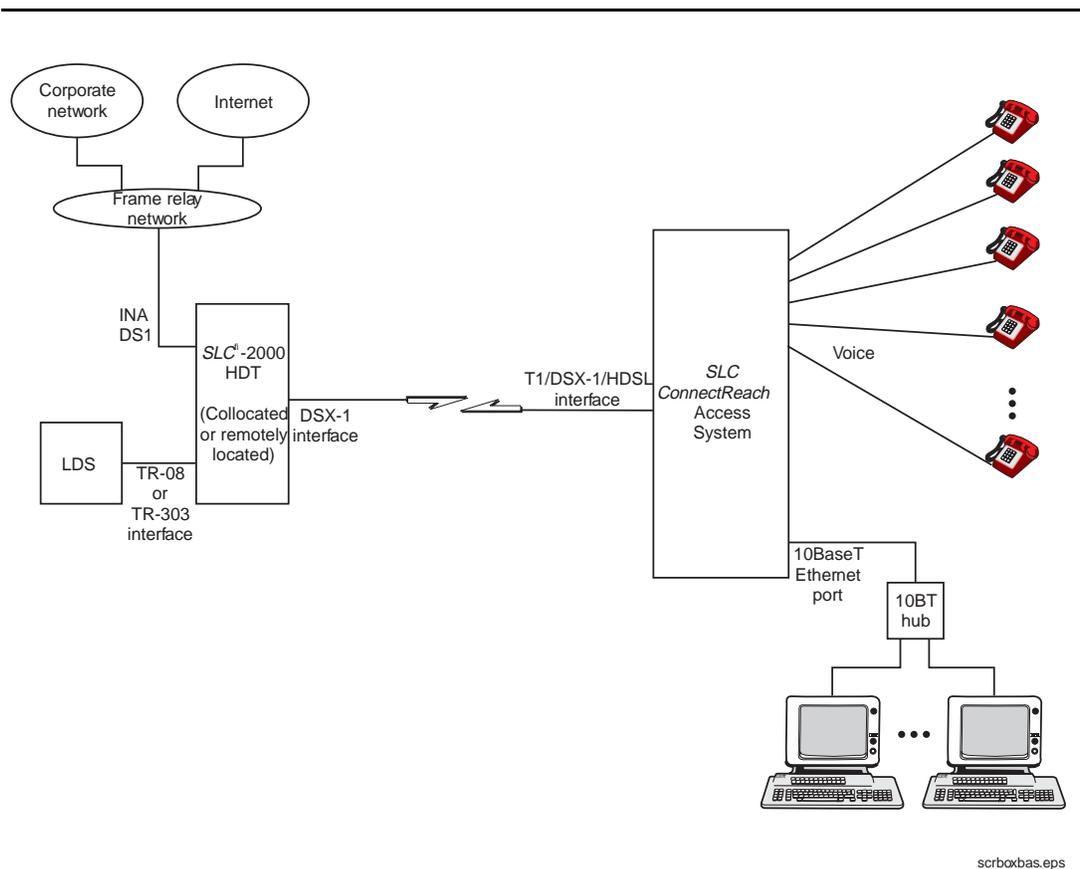
Figure 1-2.   *SLC ConnectReach* Access System Configured for the *BOX* Feature

Benefits and Features

Benefits

Cost Savings

By combining voice and data services in the DS1 signal connected to the *SLC ConnectReach* system's network T1/DSX-1/HDSL interface for all communications applications, the cost of access is significantly lower than leasing individual analog or voice lines, integrated services digital network (ISDN) lines, or switched 56- or 64-kbps lines. Costs are reduced by eliminating costly hardware components such as channel banks, digital cross-connect system (DCS)-type equipment, multiplexers, and routers.

Flexibility

The *SLC ConnectReach* system allows bandwidth to be configured to meet the particular needs of a business as it grows. For example, for faster Internet service or more phone lines, you can remotely add a DS0 channel with a simple software configuration change instead of a costly on-site visit from a phone company technician.

Speed

The *SLC ConnectReach* system can allocate greater resources (DS0 channels) to bandwidth intensive applications — up to a full DS1 speed of 1.544 Mbps. This allows for the efficient use of the DS1 bandwidth for voice while increasing the speed of data and Internet applications. The DS1 signal interfacing the *SLC ConnectReach* system allows sufficient bandwidth for multiple simultaneous applications along with enhancing access to the Internet.

SLC-2000 Access System HDT Interface

Services provided by the *SLC ConnectReach* system interface the switched voice and data networks through a *SLC*-2000 host digital terminal (HDT). Interfacing through the *SLC*-2000 HDT provides the following advantages:

- ■ ***DCS-type Capabilities***: Using the time slot interchange (TSI) of the *SLC*-2000 HDT, the HDT provides a DCS-type capability. You can map DS0s configured for data to a frame relay network over an INA DS1. You can map DS0s configured for switched telephony through a TR-303 or TR-08 LDS interface.

- ■ ***TR-303 LDS Interface***: The *SLC*-2000 HDT's TR-303 interface allows the *SLC ConnectReach* system to interface with the LDS using a high line concentration ratio, thus providing an efficient DS1 interface to the LDS. This can produce significant cost savings for your network.

- ■ ***Very High Line Density***: The *SLC*-2000 HDT can host up to 48 *SLC ConnectReach* systems, thus efficiently handling up to 1,152 DS0s. By grooming the DS0s from multiple *SLC ConnectReach* systems onto INA DS1s and TR-303 VRTs, you make the most efficient use of the transport DS1s.

- ■ ***TR-08 Interface***: The HDT can also serve as a TR-08 interface for the *SLC ConnectReach* system. This gives numerous *SLC ConnectReach* system customers TR-08 interfaces to a switch.

Comprehensive Operation, Administration, Maintenance and Provisioning (OAM&P) Capabilities

You can access the *SLC ConnectReach* OAM&P interface with any of the following methods:

- ■ Telnet session

- ■ A hyper text transfer protocol (HTTP) web browser through the Internet

- ■ A terminal directly connected to a local RS-232 console port

- ■ A remote terminal through a modem connected to the RS-232 console port

- ■ A connection to the CIT interface on the *SLC*-2000 HDT — this requires that the *SLC*-2000 HDT contain software release R4.7 or later and the *SLC ConnectReach* system contain software version R3.0.5 or later.

The system is simple network management protocol (SNMP)-capable and provides statistics reports and logs of events and T1/DSX-1/HDSL network interface status.

You can provision the *SLC*-2000 HDT locally or remotely from the HDT's craft interface terminal (CIT) port only. See Document 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide,* for details.

Features

Switched Telephone Service

The *SLC ConnectReach* system supports locally switched POTS and special service circuits through the *SLC*-2000 system. Depending on the configuration you choose, the system can provide from 0 to 24 DS0 voice or analog telephone lines. It allocates the bandwidth for POTS services — as well as all other services — in groups of four DS0s. For example, if you have only one phone line provisioned from the system (one DS0), only 20 DS0s, instead of 23 DS0s, remain for use by other services.

As shown in Figure 1-3, the *SLC ConnectReach* system multiplexes the DS0s supporting switched services into the network T1/DSX-1/HDSL interfacing with the *SLC*-2000 HDT. At the HDT, the switched DS0s are demultiplexed from the DSX-1 and routed to the LDS by the TSI. The DS0s normally interface with the LDS through the HDT's SONET or DSX-1 metallic feeder(s).

These services can interface the LDS directly through both an integrated connection or universally through a central office terminal (COT) connection.

See the "Services" section of this appendix for details on switched telephone services offered by the *SLC ConnectReach* system. The "Applications and Configurations" section provides details about basic configurations using this feature. See the "OAM&P and Preinstallation Engineering" section for provisioning information at both the *SLC ConnectReach* system and the *SLC*-2000 HDT.

scrvoice.eps
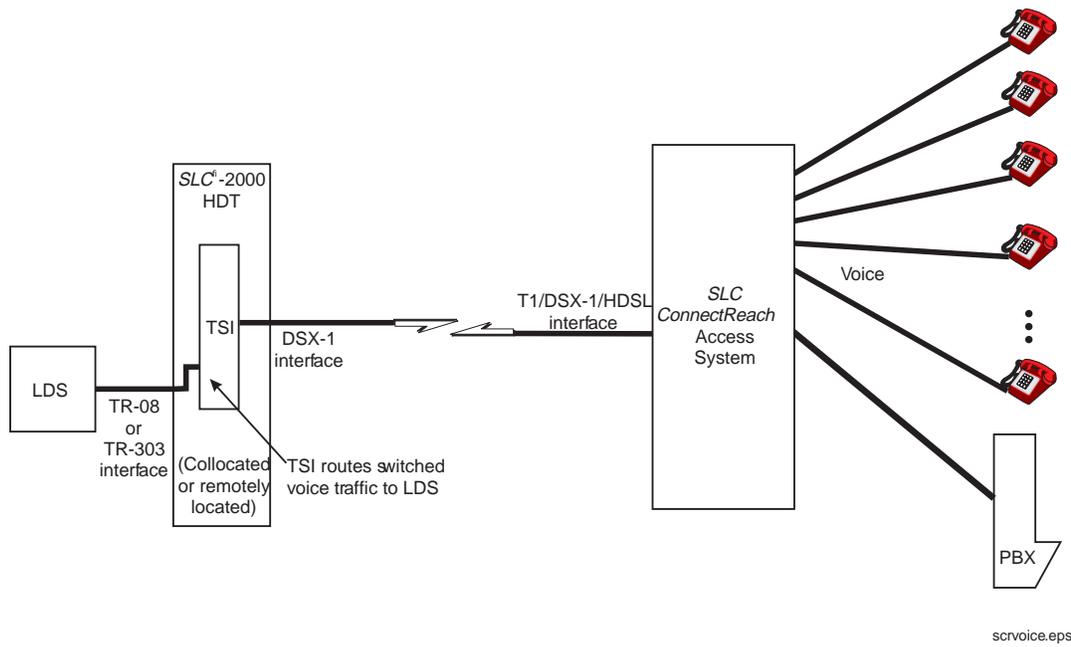
Figure 1-**3.** **Switched Telephone Service**

Built-In Wide Area Network (WAN) to Local Area Network (LAN) Service Router

The *SLC ConnectReach* system supports data traffic in 64-kb/s increments (one DS0). Depending on the configuration you choose, the system can provide a bandwidth from 0 to 24 DS0s for these services. DS0s for data bandwidth are made available in blocks of four (see Note). The customer can provision the amount of bandwidth depending on their individual needs.

⟹ **NOTE:**

If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s (DS0 blocks refer to DS0 numbers 1 through 4, 5 through 8, etc.). However, you can provision any of the remaining three DS0s as data bandwidth in the future.

As shown in Figure 1-4, computer or data traffic interfaces the 10BaseT Ethernet port on the system through a 10BaseT Ethernet hub. The *SLC ConnectReach* system then routes the traffic from this port onto the network T1/DSX-1/HDSL interfacing with the *SLC*-2000 HDT. At the HDT, the data bandwidth is demultiplexed from the DSX-1 interface and routed to an INA DS1 by the TSI. The INA DS1 normally becomes part of the HDT's SONET or metallic DSX-1 feeder(s) and interfaces both private and public networks through a frame relay network. Private networks may be a corporate data network while a public network can be the Internet.

Because you can use the *SLC ConnectReach* system as a data router and firewall to the Internet or private corporate network, you must configure the following information in the *SLC ConnectReach* software (see the "OAM&P and Preinstallation Engineering" section to obtain this information):

- **Ethernet interface:** This is the 10BaseT interface to the external LAN. To operate, you must configure the following:

  — *SLC ConnectReach* internet protocol (IP) address on the network on which it will be installed (or select IP unnumbered)

  — Netmask (if any) for the network on which the *SLC ConnectReach* system will be installed

  — 10BaseT link integrity testing.

- **Dynamic Host Configuration Protocol (DHCP):** The system uses DHCP to allocate IP addresses dynamically to devices on the network. If the site already has a DHCP server, or if each network device will be permanently assigned a unique IP address, you do not need to enable and configure DHCP on the *SLC ConnectReach* system. If using DHCP, you must configure the following:

  — IP address pool to be used at the site

  — Whether or not the site is considered a private network

— Lease time of DHCP-allocated addresses

— IP address of domain name service (DNS) server

— Local site domain name.

scrdata.eps
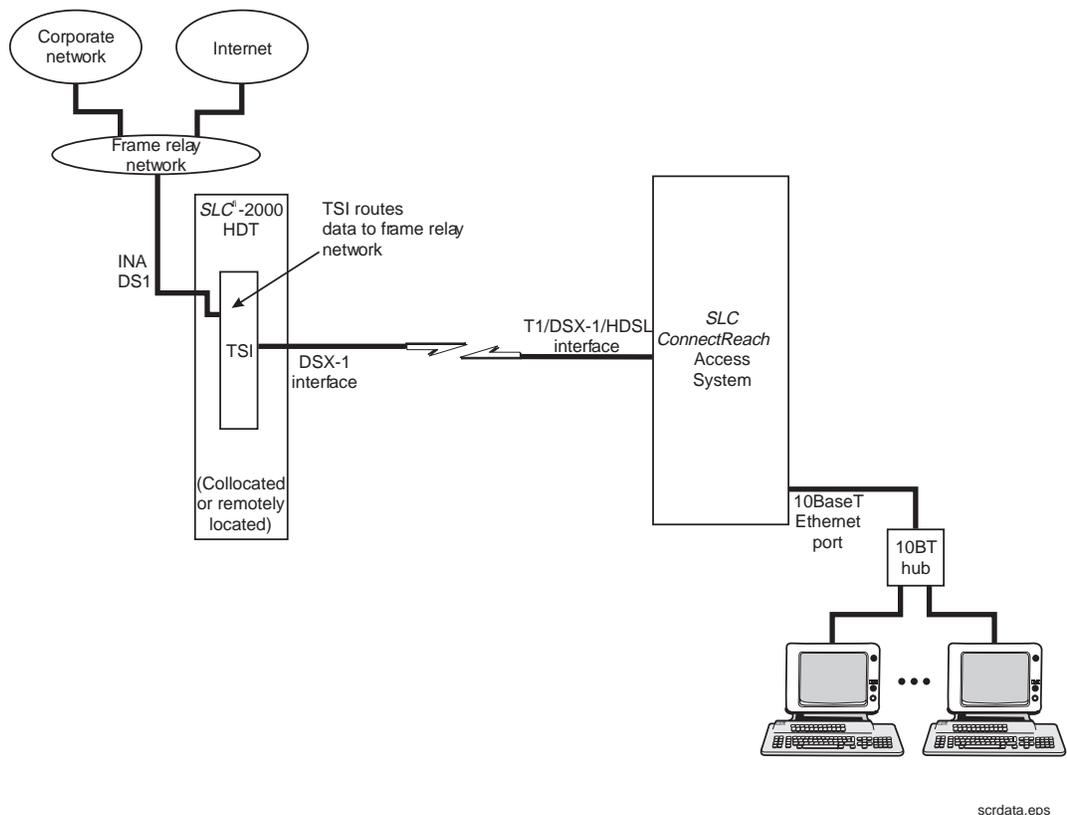
Figure 1-4.   **WAN to LAN Service Router**

■ *Simple Network Management Protocol (SNMP)***:** If SNMP traps are sent automatically to a remote host, you must specify the IP address of the host that will receive the traps. (For a definition of "traps," see the "OAM&P and Preinstallation Engineering" section of this appendix.)

■ *Route***:** The *SLC ConnectReach* system allows you to set a default route and up to ten static routes. For ease of configuration, you may specify WAN or permanent virtual circuit (PVC) number instead of an IP gateway address. For the default and each static route, you must specify:

— Network IP address

— Netmask

— PVC or IP gateway.

- ■ **Firewall:** The firewall allows the administrator control over who from the world-wide Internet can enter the LAN connected to the 10BaseT port. The *SLC ConnectReach* system allows the use of two different firewall technologies: SOCKS application proxy and IP filtering.

- ■ **Network Time Protocol (NTP):** NTP obtains the time of day for time-stamping the event log messages.

- ■ **Domain Name Service (DNS) proxy service:** If a SOCKS firewall is enabled, the DNS proxy service must be enabled. When enabling the DNS proxy service, you must specify the following:

    — IP address of the primary DNS server on the WAN/Internet

    — IP address of a secondary DNS server (if any) on the WAN/Internet.

- ■ **Internet Packet Exchange (IPX):** The IPX protocol allows routing between two offices that use Novell NetWare. The *SLC ConnectReach* system supports the IPX protocol over the main frame relay PVC only. It is not supported over WAN links using point-to-point protocol (PPP) or Cisco high-level data link control (HDLC) protocols. Since IPX protocol packets are generally not forwarded over the Internet, the *SLC ConnectReach* system implementation is intended to be used in a corporate/branch office frame relay connection topology. If Internet bound transport control protocol - internet protocol (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. To enable the IPX protocol, you must specify the following information:

    — Router name

    — 32-bit hex number representing the internal network's router

    — LAN encapsulation for IPX traffic over the Ethernet

    — 32-bit hex number representing the WAN network.

See the "Services" section of this Appendix for details on data services offered by the *SLC ConnectReach* system.

The "Applications and Configurations" section provides details about basic configurations using this feature.

See the "OAM&P and Preinstallation Engineering" section for provisioning information at both the *SLC ConnectReach* system and the *SLC*-2000 HDT.

For detailed provisioning procedures, see Document 363-208-050, *SLC ConnectReach Access System, User/Service Manual*.

Mixed Switched Voice and Data Service

As mentioned earlier, the *SLC ConnectReach* system allows you to multiplex switched voice and data on the same T1/DSX-1/HDSL interface. As shown in Figure 1-5, by provisioning the *SLC*-2000 HDT, the TSI in the HDT then normally routes the traffic to the correct location using either the HDT's SONET or metallic feeder(s). The HDT routes voice traffic to the LDS using a TR-08 or TR-303 interface. It routes data traffic to a frame relay network using an INA DS1 interface.
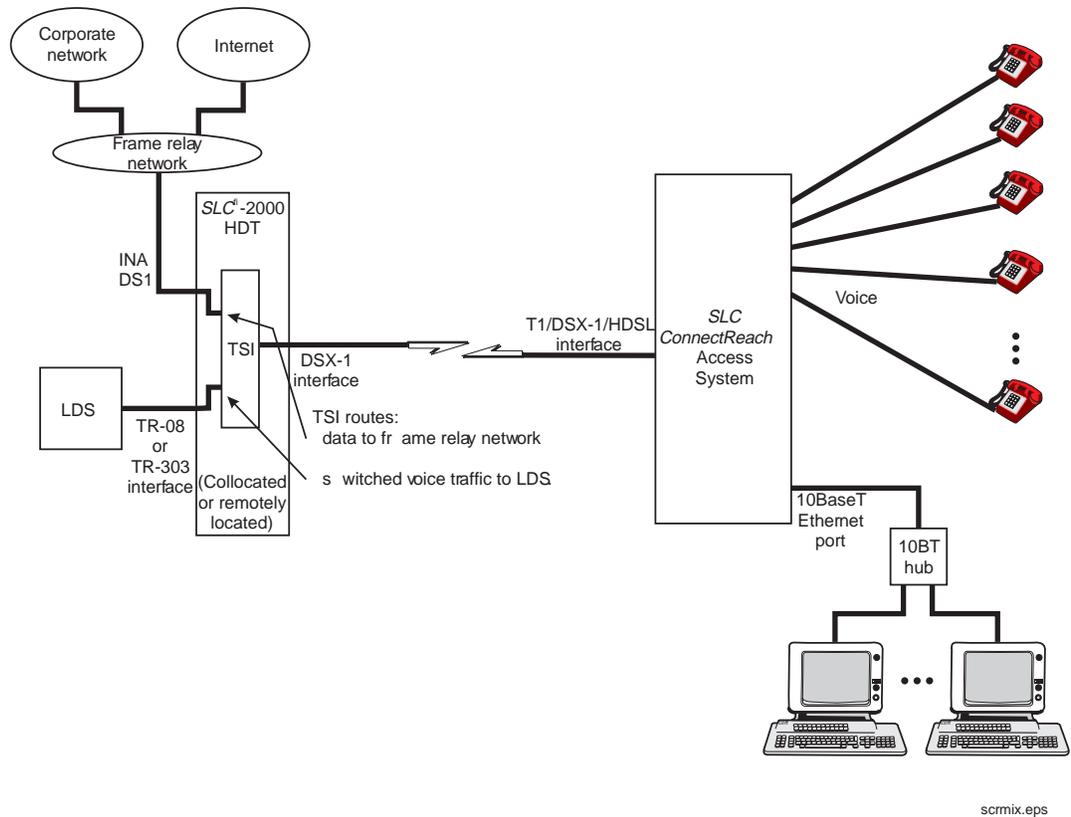
Figure 1-5.   Mixed Traffic Containing Switched Voice and Data

LCR Feature

The *LCR*[*] feature allows the *SLC ConnectReach* system to automatically route incoming or outgoing calls to customer-selectable destinations such as a central office (CO) switch. This allows for *Local Call Routing*[*] or *Least Cost Routing*[*] service. You can use this feature with or without the *BOX* feature. Outgoing calls originate only from a telecommunication device connected to a port on a current feed circuit card. Incoming calls terminate only on a telecommunication device connected to a current feed circuit card.

To use this feature, it must be configured in the software of the *SLC ConnectReach* system. It also requires the Telco DSP Processor hardware option or the Fractional T1/Telco DSP Processor Combination card option. See the "Product Description" section of this appendix for more information on these cards.

When using this feature, the system handles both preconfigured incoming and outgoing calls on preconfigured analog or digital trunk groups. Analog trunks always connect to a current sink circuit card port. Digital DS0 trunks are multiplexed onto a DS1 signal connecting to the network T1/DSX-1/HDSL interface. The *LCR* feature also supports a mixture of digital and analog trunks. However, the system will display a warning at the provisioning terminal when you choose this option. The system allows you to configure multiple trunk groups.

The "Applications and Configurations" section provides details about basic configurations using this feature. See Document 363-208-050, *SLC ConnectReach Access System, User/Service Manual,* for *LCR* configuration procedures.

Outgoing Trunk Groups

The *LCR* feature allows preconfigured outgoing calls to be automatically routed to a preconfigured outgoing trunk group. By configuring the *SLC ConnectReach* software, routing instructions to the trunk group are table driven or telephone number driven and depend on the number dialed and the availability of a trunk. See the "OAM&P and Preinstallation Engineering" section of this appendix for more information on provisioning routing tables.

---

[*]   Trademark of Vina Technologies, Inc.

You can configure two types of outgoing trunks for use with the *LCR* feature:

■ **Digital trunks** — for example, a DS0 on the T1/DSX-1/HDSL network interface facility connecting the *SLC ConnectReach* system to the central office through the HDT.

■ **Analog trunks** — for example, a voice frequency (VF) twisted pair that may connect to an analog switch port in the same central office that provides the T1/DSX-1/HDSL network interface facility or an analog switch port in another central office. At the *SLC ConnectReach* system, analog trunks must connect to a port on a current sink circuit card.

Outgoing analog and digital trunks support both loop-start and ground-start signaling.

Incoming Trunk Groups

You can also configure both analog and digital *incoming* trunks for use with the *LCR* feature. Incoming trunks can support the following types of signaling options:

■ **Digital trunks:**

— E&M (incoming)

— Loop-start

— Ground-start.

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

■ **Analog trunks:**

— Loop-start

— Ground-start.

The feature only supports DID on digital trunks provisioned for E&M signaling. *DID is not supported on analog trunks.* The telephone number of the incoming DID call controls the routing to a specific digital trunk. Instructions from a software-configured *routing table* control the final destination of all other non-DID calls. Again, see the "OAM&P and Preinstallation Engineering" section of this appendix for more information on provisioning routing tables.

Two-Way Trunk Groups

You can also configure both analog and digital two-way trunks for use with the *LCR* feature. Both analog and digital trunks can use either loop-start or ground-start signaling.

LCR Feature Examples

One application of the *LCR* feature is to allow a connection to the LDS if there is a transmission failure between the *SLC ConnectReach* system and the switch (Figure 1-6A). If a failure occurs, the customer can enter the dialing string to gain access to the LDS over the voice pair or the trunk group of voice pairs.

It can also allow a connection between the *SLC ConnectReach* system and a different CO switch than the switch normally serving the system through the *SLC-2000* HDT. An application of this feature may be local 911 service. As shown in Figure 1-6B, if the *SLC ConnectReach* system is not in the same local area as the switch, the *LCR* feature can allow a voice pair or trunk group to be connected to a local switch. The feature allows you to provision the system to recognize the dialed digits *9-1-1* and route the call to a voice pair or trunk group connected to the local LDS. During an emergency, this will allow a user on the *SLC ConnectReach* system to call the local 911 system.

SLC⁶-2000 HDT

DSX-1 interface

T1/DSX-1/HDSL interface

SLC *ConnectReach* Access System

Voice

LDS

TR-08 or TR-303 interface

Voice pair or trunk group
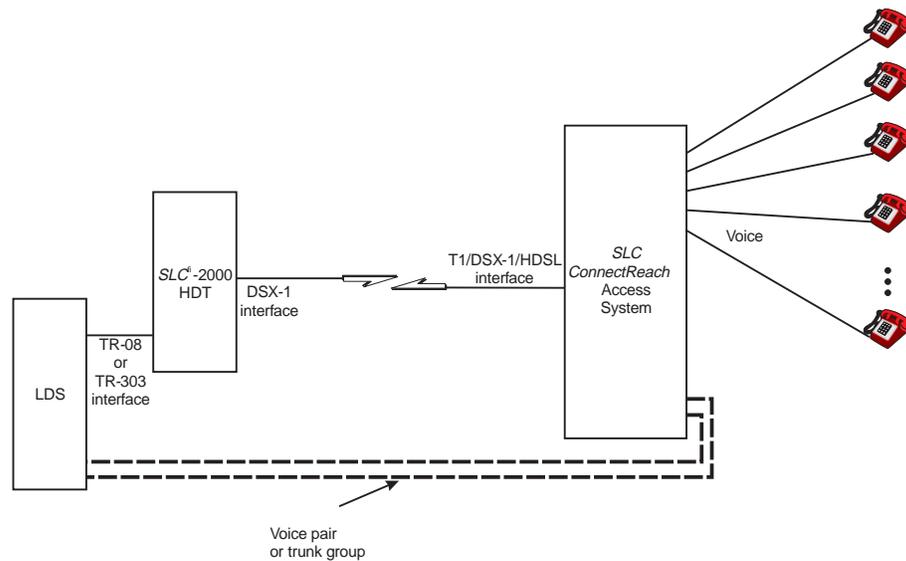
A. LCR Feature Using a Voice Pair or Trunk Group for Protection

SLC⁶-2000 HDT

DSX-1 interface

T1/DSX-1/HDSL interface

SLC *ConnectReach* Access System

Voice

LDS

TR-08 or TR-303 interface

Local LDS

Voice pair

Local 911 system
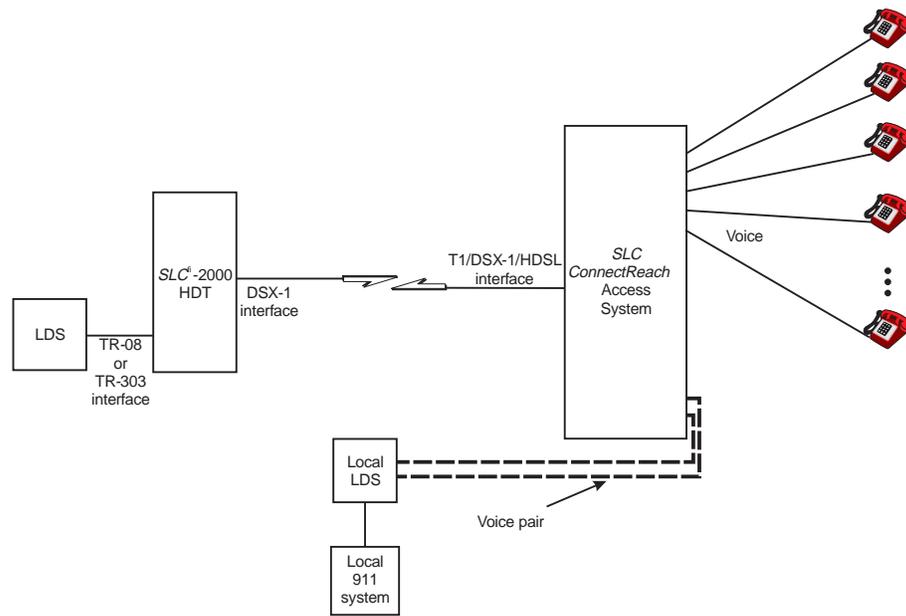
B. LCR Feature Used to Connect to a Local LDS

scrlcr.eps

Figure 1-6.   LCR Feature

BOX Feature

The *BOX* feature allows the *SLC ConnectReach* system to operate similar to a Centrex system offered by a CO switch. However, there is no need for dedicated lines to the CO for each extension.

The *BOX* feature is used in conjunction with the *LCR* feature. You must configure both features in the *SLC ConnectReach* software. This feature also requires the Telco DSP Processor hardware option. When configured for *BOX* service, the *SLC ConnectReach* system offers the following features for the telephone sets connected to the voice ports:

■ ***Transferring a call to another phone*:** By flashing the switchhook, you will receive a *secondary* dial tone that allows you to dial the number of another line and transfer the call. If there is no answer, you may flash the switchhook to return to the first party. This same procedure works from a line on the *SLC ConnectReach* system to an "outside" line. However, it is not possible to transfer an outside line to another outside line if both lines use loop-start signaling. An attempt to do this will result in the user hearing a fast busy tone. At this point, the user can flash the switchhook once to reestablish the connection with the other party.

■ ***Consultation hold*:** This feature allows you to alternate between two separate parties. If any one of the three parties hangs up, the remaining two parties retain their connection. One, but not both, of the parties may be connected from a loop-start trunk.

■ ***Three-way calling*:** This feature allows you to add a third party to your conversation. If any one of the three parties hangs up, the remaining two parties retain their connection. One, but not both, of the parties may be connected from a loop-start trunk.

■ ***Call waiting*:** When receiving a call while on the phone, you can flash the switchhook once to answer the incoming call. You may then use the *consultation hold* feature to alternate between calls. This feature is incompatible with the *call forward* feature.

■ ***Call pickup group*:** You may answer a call on 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 you dial the feature code, a fast busy tone is heard.

■ ***Call forward*:** This feature allows you to forward your phone to another extension or outside number. If the incoming call is from a loop-start trunk, it cannot be forwarded to an outside line on a loop-start trunk.

■ **Pager**: This feature allows for paging capability by dialing the pager feature code. A commercial off-the-shelf product is used for the paging amplifier.

■ **Busy redial**: This feature is used when a line is giving a busy signal when dialing another line or when seizing an outgoing trunk. When the busy line becomes free, the calling line receives a *distinctive ring*. For a trunk call, the called party's digits are remembered and redialed. If the caller does not answer within six rings, the feature is canceled.

■ **External voice mail**: The *BOX* features can communicate with an external voice mail system using dual tone multifrequency (DTMF) inband signaling. Typically, the voice mail system is located near the *SLC ConnectReach* system and interfaces through current feed circuit card port(s). You can dedicate one or more lines to the physical voice mail ports. You can choose from one of the following five preset voice mail system profiles:

— Generic

— BBS Telecom

— Panasonic TD1232

— Toshiba Dk280

— Samsung DCS.

You can also customize a configuration. The *SLC ConnectReach* system can be configured to forward incoming trunk calls to a voice mail system providing auto-attendant functions.

Refer to document 363-208-050, *SLC ConnectReach Access System, User/ Service Manual* for configuring information and procedures.

Operations Interfaces

You can provision the *SLC ConnectReach* system using the following methods:

■ **Local Provisioning Terminal**: You can connect a local computer to the *SLC ConnectReach* system through the RS-232 port to provision the *SLC ConnectReach* system.

■ **Remote Provisioning through a Modem**: By connecting a modem to the RS-232 port, you can dial in to the *SLC ConnectReach* system for provisioning from a remote site.

■ **Provisioning through a Telnet session**: You can access the *SLC ConnectReach* system for provisioning through a Telnet session.

■ **Provisioning through the Internet**: You can access the *SLC ConnectReach* system for provisioning over the Internet.

■ **_Provisioning through the Ethernet LAN_:** You can provision the _SLC ConnectReach_ system from a computer connected to the 10BaseT Ethernet hub connected to the 10BaseT port.

■ **_Remote Provisioning through the SLC-2000 HDT CIT Interface_:** You can provision the _SLC ConnectReach_ system through a connection to the CIT interface on the _SLC_-2000 HDT — this requires that the _SLC_-2000 HDT contain software release R4.7 or later and the _SLC ConnectReach_ system contain software version R3.0.5 or later.

Product Description

Figure 1-7 shows the physical dimensions of the _SLC ConnectReach_ system. The system weighs approximately 9 lb. It can operate within a temperature range of 0 to 50° C (32 to 122° F) at a maximum relative humidity of 95 percent, noncondensing.

As described in the "Applications and Configurations" section, the _SLC ConnectReach_ system accepts input power from either an AC or DC power source with the following requirements:

■ **_AC power_:** The AC input power required for the 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 system is 50 VA at 40 to 56 V DC.

The _SLC ConnectReach_ system is _not_ hardened for outside plant use. You must install the system in a controlled environment such as a telephone equipment vault or a customer premises. You cannot mount the system in an outside plant cabinet or other locations not protected from environmental hazards.

You can mount The _SLC ConnectReach_ system as follows:

■ 19- or 23-inch rack mount

■ Wall mount

■ Desk top mount.

The minimum clearance around the _SLC ConnectReach_ system after it is installed should be:

■ **_Above_:** 1.75 inches

■ **_Below_:** 0.0 inch

■ **_Front_:** 5.0 inches

■ **_Rear_:** 0.6 inch

■ **_Sides_:** 2.0 inches.

scrdemin.eps
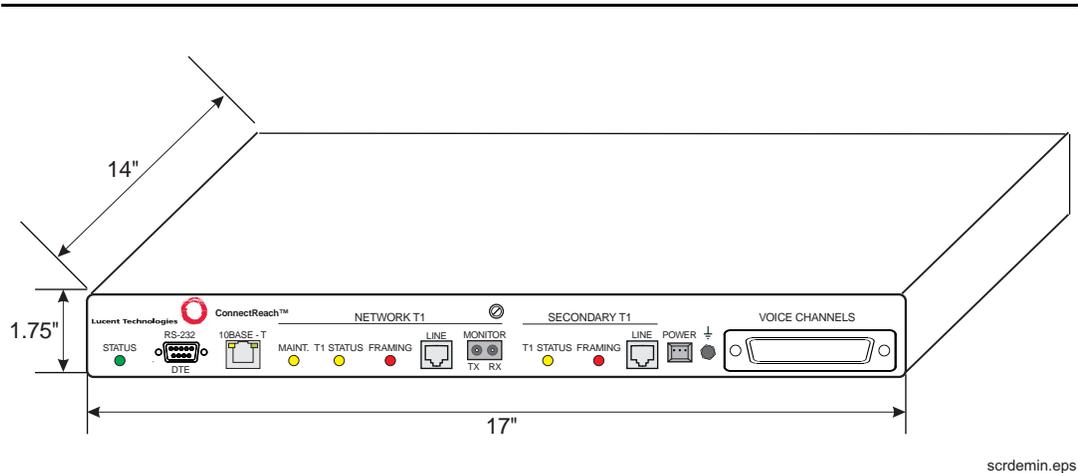
Figure 1-7.   SLC ConnectReach Physical Dimensions

Internal Equipment

The following items are software controlled and used to configure and provide
SLC ConnectReach services (Figure 1-8 on page 1-24):

- **Controller:** This is the *processor* of the unit and controls both operation
  and maintenance functions of the system.

- **Time Slot Interchange (TSI) fabric:** By provisioning the system, the TSI
  fabric controls the bandwidth assigned for each service provided by the
  system. The TSI controls up to 24 DS0s and interfaces the services with
  the network T1/DSX-1/HDSL interface port.

Circuit Cards

As Figure 1-8 on page 1-24 shows, you can equip the *SLC ConnectReach* system with any combination of three of the following two circuit cards to provide analog services:

- **Current feed circuit card**: This card comes in 4-line or 8-line versions. It provides a *current feed* function to interface with analog VF telephone equipment. Each port provides a loop range of 480 ohms including DC off-hook resistance of the phone.

- **Current sink circuit card**: This card comes in 4-line or 8-line versions. It provides a *current sink* function to interface with telephony equipment such as the analog port of a PBX. It also provides an interface for analog circuits or trunks supporting the *LCR* feature.

Optional Circuit Cards

The internal motherboard for the *SLC ConnectReach* system contains a single expansion slot for one of the following optional circuit cards to enable specific features and services:

- **Fractional T1 Circuit Card**: This card enables secondary T1/DSX-1 services. If you require secondary T1/DSX-1 services along with the *LCR* feature, install a Fractional T1/DSP Processor Combination card instead of this card.

- **Telco DSP Processor Circuit Card**: This card enables the *LCR* and/or *BOX* feature. If your system also requires secondary T1/DSX-1 services, install a Fractional T1/DSP Processor Combination card instead of this card.

- **Fractional T1/DSP Combination Circuit Card**: This card allows both secondary T1/DSX-1 services and the digital signal processor (DSP). The DSP supports the *BOX* and/or the *LCR* feature.

See the basic configurations in the "Applications and Configurations" section of this appendix to determine which card to install in your system.

Primary Ports/Connectors

Figure 1-8 shows the primary ports/connectors on the *SLC ConnectReach* system. They provide the interfaces for the services and provisioning equipment with the system. Figure 1-9 on page 1-26 shows the location and the panel-stamped name of each port/connector. The following contains a brief description:

- *RS-232 Port***:** The **RS-232** port allows you to connect a local provisioning terminal to the system or a dial-up modem for a remote provisioning terminal. It can interface with a standard 9-pin female/female null modem cable. From this terminal, you can provision the *SLC ConnectReach* software. The provisioning terminal is normally used to perform initial configuration of the *SLC ConnectReach* system. The null modem cable is required for this connector when connected to a local provisioning PC running terminal emulation software. Once the *SLC ConnectReach* system is installed and fully configured, it can be managed and reconfigured over the network from either the LAN or the WAN/Internet.

- *Voice Channel Connector***:** The **VOICE CHANNELS** port contains a 50-pin telephony type connector which connects the *SLC ConnectReach* system to voice-frequency telephone lines by means of a telephone punch-down block or break-out box at the site. This connector interfaces the voice services with the current feed and current sink circuit cards. It connects with a cable containing a standard female RJ21X 25-pair connector. It also allows a connection to an alarm relay.

- *S-T1/DSX1 Port***:** The optional **SECONDARY T1 LINE** port contains an 8-pin modular RJ-48C connector that accepts the secondary T1/DSX-1 line for the *SLC ConnectReach* system. The secondary T1/DSX-1 line connects the system to a PBX or key system that has a DSX-1 interface. For this port to be enabled, your system must contain either a Fractional T1 circuit card or a Fractional T1/DSP Processor Combination card.

- *10BaseT Ethernet Port***:** The **10BASE-T** port contains an 8-pin modular RJ-45 connector that is the Ethernet LAN port for the *SLC ConnectReach* system. It normally interfaces with an external 10BaseT Ethernet hub.

- *Network T1/DSX-1/HDSL Interface***:** The **NETWORK T1 LINE** port contains an 8-pin modular RJ-48C connector that accepts the primary T1/DSX-1/HDSL interface line for the *SLC ConnectReach* system. The network T1/DSX-1/HDSL line connects the *SLC ConnectReach* system to the *SLC*-2000 HDT. See the "Applications and Configurations" section to determine the specific equipment that provides the network interface type to meet your requirements.
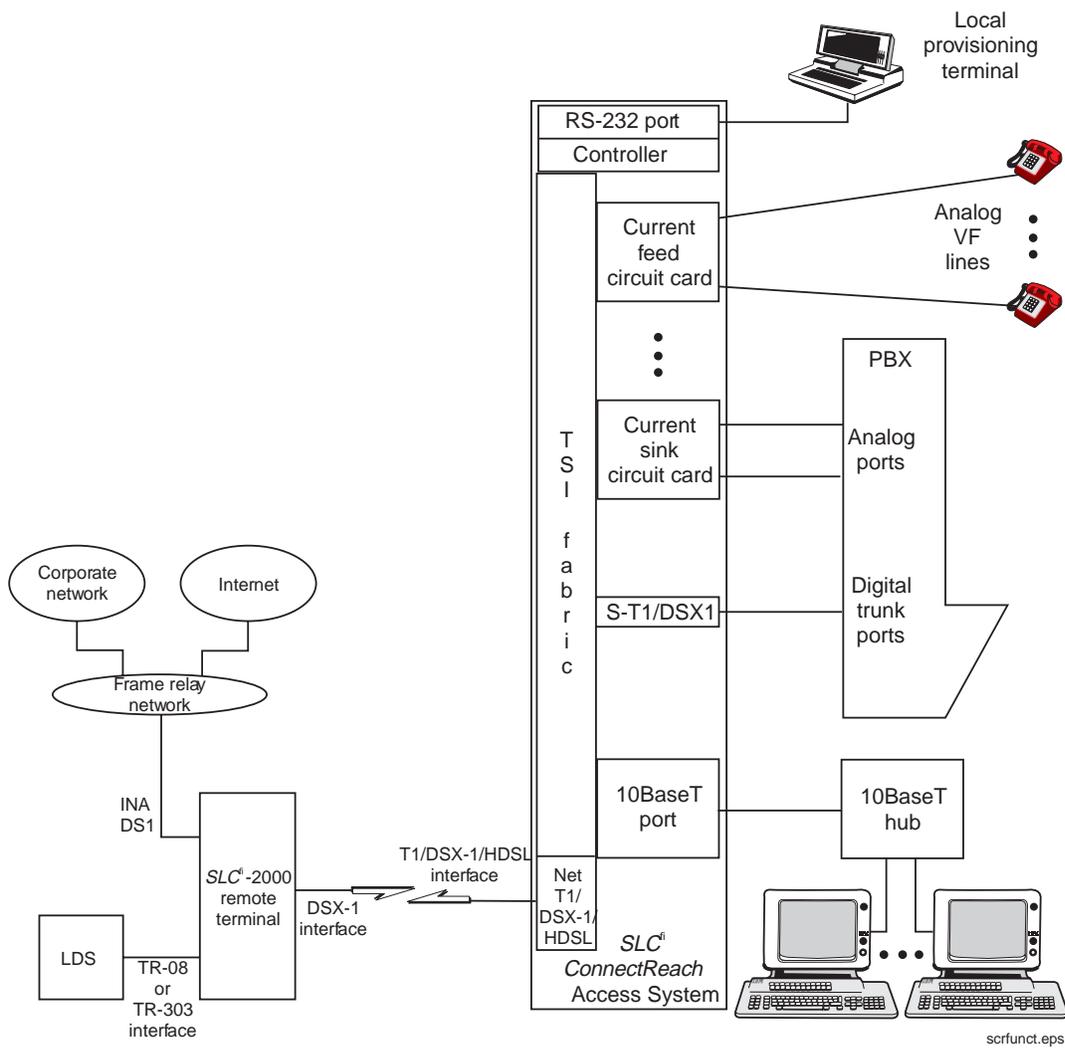
Figure 1-8.   SLC ConnectReach Block Diagram

Other Connectors and Ports

Other connectors and ports provide for monitoring and testing, along with power and ground. These connectors and ports are part of the faceplate and shown in Figure 1-9:

■ **Network T1/DSX-1 Line Monitoring Port:** The **NETWORK T1** line **MONITOR** port accepts standard bantam miniature telephone plugs from test equipment used to monitor the network T1/DSX-1 interface line.

> ⇒ **NOTE:**
> If 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/DSX-1 interface line, thereby reducing T1/DSX-1 receive signal strength to the *SLC ConnectReach* system.

■ **Power Connector:** The **POWER** port contains a 3-pin Molex connector that accepts the power cord from either a 120 V AC power supply transformer or a DC power source.

■ **Ground Stud:** This stud allows you to ground the *SLC ConnectReach* "box" to the local ground.

LED Indicators

Figure 1-9 shows the positions of the light-emitting diode (LED) indicators on the front panel of the *SLC ConnectReach* system apparatus case. 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/DSX-1/HDSL interface 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/DSX-1 line.

— **Flashing** —Self-test was successful; data packets are being sent/received on the T1/DSX-1/HDSL interface line.

— **Off** — Self-test failed.

■ **Maintenance 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/DSX-1/HDSL interface line.

— **Flashing** — A diagnose command is active.

— **Off** — The *SLC ConnectReach* system is operating normally.

■ ***Network T1/DSX-1/HDSL and Secondary/Fractional T1/DSX-1 Status LEDs (Two LEDs)*****:** These yellow LEDs provide an indication of a yellow alert or bipolar violations on the network T1/DSX-1/HDSL interface and/or secondary T1/DSX-1 line. The various states of the **T1 STATUS** or **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 *SLC ConnectReach* system is operating normally.

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

■ ***Network T1/DSX-1/HDSL and Secondary/Fractional T1/DSX-1 Framing LEDs (Two LEDs)*****:** These red LEDs provide an indication of a red alarm condition or a high bit error rate on the network T1/DSX-1/HDSL interface and/or secondary T1/DSX-1 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 *SLC 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.

T1/DSX-1 network interface

HDSL network interface

scrface.eps
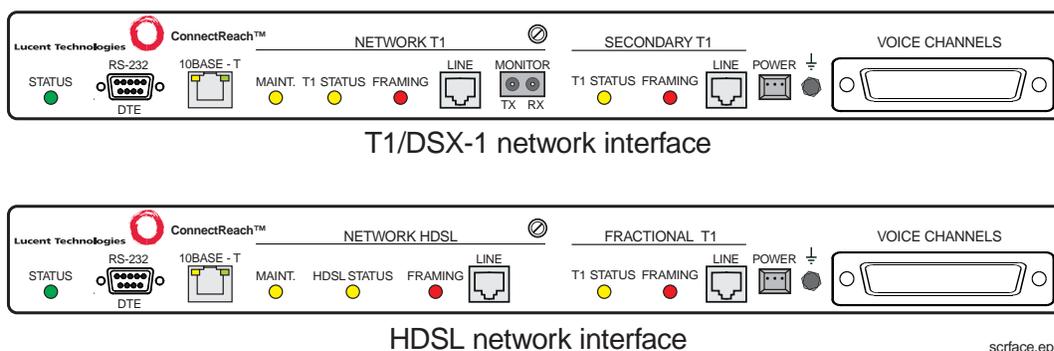
Figure 1-9.   SLC ConnectReach Faceplate

External Equipment

T1-to-V.35 Converter Module

You can order this module separately if your system requires an interface to a legacy router, channel service unit / data service units (CSU/DSUs), etc. The module converts a fractional DSX-1 signal to a standard V.35 interface. This device plugs directly into the secondary T1/DSX-1 port using an RJ48C connector. The other end of the module is a standard V.35 (M/34 male) interface that can connect to a router. To order this module, see the "Ordering" section of this appendix for the ordering information.

NEBS Installation Kit

The network equipment building standards (NEBS) installation kit allows the *SLC ConnectReach* system to meet Bellcore NEBS Level 3 standards presented in GR-63. When properly installed using this kit, the system will meet the Bellcore requirements for:

- Earthquake (zone 4 level)

- Operating thermal temperature

- Storage, transport handling

- System flammability.

Without the kit installed, the unit still complies with all requirements of NEBS Level 3, with the exception of the Shelf-Level Fire test (GR-63 criteria R4-20).

120 V AC/48 V DC Power Source with Battery Backup (Optional)

If your application requires an AC system with battery backup, Lucent Technologies offers an uninterruptible power converter that includes battery backup. For this AC powered application, you must obtain this power converter along with a **DC powered** *SLC ConnectReach* system. The power converter provides a filtered and regulated 48 V DC output voltage with a maximum current of 2 amps to the *SLC ConnectReach* system. The AC end of the converter connects to a standard 120 V AC electrical outlet. Rechargeable batteries within the unit provide backup capability if the AC input voltage fails. During an AC power failure, the power supply will provide a full 48 V DC at 2 amps for at least 2 hours.

The unit also provides "short-circuit" and "over-current" protection to the *SLC ConnectReach* system. Once the fault condition clears, the unit automatically returns to normal operation.

The power source consists of a steel enclosure that houses a circuit board, an aluminum heat-sink assembly, and four 12 V sealed lead-acid batteries. It is designed to be wall mounted using four screws provided with the unit. The dimensions and weight are as follows:

- **Height**: 6.3 inches

- **Width**: 12.4 inches

- **Depth**: 8.1 inches

- **Weight**: 29.8 pounds.

See the "Technical Specifications" section of this appendix for the technical specifications of the unit.

See the "OAM&P and Preinstallation Engineering" section of this appendix for site location information.

Hinged Wall Mount Assembly with Extension Brackets

Figure 1-10 shows a hinged wall mount assembly that you can order to conveniently mount up to four *SLC ConnectReach* systems. This assembly is securely mounted to a wall and offers the unique ability to swing away from the wall for access to the units. The extension brackets that come with the assembly allow you to "stack" up to four units while providing easy access. Using the extension brackets ensures the correct spacing for proper ventilation and NEBS compliance.

You must mount the assembly to a minimum of ¾-inch plywood or equivalent. The assembly must also be mounted to swing either to the right or left (not up or down). See the *SLC ConnectReach Access System User/Service Manual* for complete mounting instructions.

scrwallbracket.eps

Figure 1-10.   Hinged Wallmount Assembly

Bellcore Mounting Bracket Adapter

The *SLC ConnectReach* system ships from the factory to be compatible with an *ANSI*-specification rack mount. To mount the system in a Bellcore specification rack mount, you must obtain special Bellcore mounting bracket adapters. See the "Ordering" section of this appendix for ordering details.

HDT Equipment

The *SLC*-2000 HDT must contain the proper fiber-in-the-loop equipment to support the *SLC ConnectReach* system. This equipment includes:

- Metallic distribution shelf (MDS) assembly provisioned for fiber in the loop (FITL).

- Distant Terminal (DT) Servers (*SPQ*809 or later DT Servers).

For a description of this equipment, see 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide.*

⇒ **NOTE:**
When referring to Document 363-208-000, the *SLC ConnectReach* system requires the same support as a *virtual DT* (V-DT) operating in the quad mode or an MSDT fed by metallic feeders.

Applications and Configurations

This section discusses the basic *SLC ConnectReach* system configurations supported by Lucent Technologies, as well as the basic network interfaces between the *SLC ConnectReach* system and the *SLC*-2000 HDT. It also describes some of the more common configurations for connecting the HDT to the *SLC ConnectReach* system.

For provisioning rules and information to provision both the *SLC ConnectReach* system and the *SLC*-2000 HDT, see the "OAM&P and Preinstallation Engineering" section of this appendix and Document 363-208-050 *SLC ConnectReach Access System, User/Service Manual*.

Basic SLC ConnectReach Configurations

This part describes the basic *SLC ConnectReach* configurations supported by Lucent Technologies. Although you or your customer can customize many different configurations, most are based on the basic configurations described in this part.

The following terms are used in describing the basic configurations:

- ■ *Metallic Voice Frequency (VF) Lines*: This term refers to lines terminating on a current feed circuit card through the **VOICE CHANNELS** port of the *SLC ConnectReach* system (Figure 1-11). 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 *SLC*-2000 HDT, these services are usually routed to a TR-08 or TR-303 interface.

- ■ *Data*: This term refers to services interfacing the *SLC ConnectReach* system through the **10BASE-T** port (Figure 1-11). 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 *SLC*-2000 HDT, these services are usually routed to an INA DS1 interface.

- ■ *Secondary T1/DSX-1*: This term refers to connections through the **SECONDARY T1 LINE** port of the *SLC ConnectReach* system (Figure 1-11). 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.

- ■ *Metallic VF Lines with LCR Feature*: This term refers to metallic VF lines as described previously in a system containing the optional *LCR* feature (the "Benefits and Features" section of this appendix describes the *LCR* feature).

- ■ *BOX Feature*: This term refers to a *SLC ConnectReach* system provisioned for the key system or Centrex-type services known as the *BOX* feature (the "Benefits and Features" section of this appendix describes the *BOX* feature).

The basic *SLC ConnectReach* system configurations are listed below:

- ■ Metallic VF Lines Only Base System

- ■ Metallic VF Lines and Data Base System

- ■ Metallic VF Lines, Data, and Secondary T1/DSX-1 Configuration

- ■ Metallic VF Lines, Data, and *LCR* Feature Configuration

- ■ Metallic VF Lines, Data, Secondary T1/DSX-1, *LCR* Feature, and Configuration

- ■ Metallic VF Lines, Data, and *BOX* Feature Configuration.

The "Services" section describes the basic services provided by the *SLC ConnectReach* system.

10BaseT port   Voice channels port

Secondary T1/DSX-1 port   scrports.eps
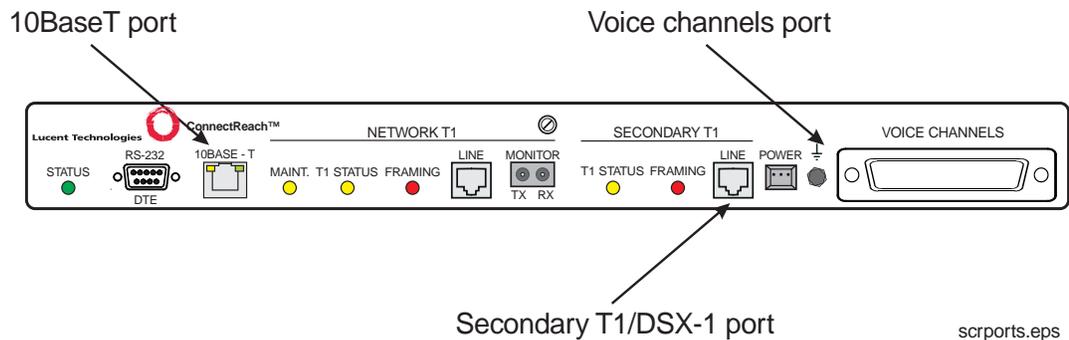
Figure 1-11.   SLC ConnectReach Port and Connector Locations

You can build the basic *SLC ConnectReach* configurations from one of the following two base systems:

- Metallic VF lines only base system
- Metallic VF line and data base system.

The following parts describe the necessary equipment for both the base systems and the basic configurations built from the base systems.

Table 1-1 on page 1-36 and Table 1-2 on page 1-40 show how to upgrade these 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" section of this appendix for more information on the access key codes.

Metallic VF 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: ED-7C830-30, G1

    — Network T1/DSX-1 Interface; DC power: ED-7C830-30, G2

    — Network HDSL Interface; AC power: LV2-70-A-0-02-00-00-L

    — Network HDSL Interface; DC power: LV2-70-D-0-02-00-00-L

- Current feed circuit cards to provide up to 24 VF lines.

> **NOTE:**
> ED-7C830-30, G1; ED-7C830-30, G2; LV2-70-A-0-02-00-00-L; and LV2-70-D-0-02-00-00-L 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 (LT-V2-4P-FXS) or 8-line cards (LT-V2-8P-FXS). The system can contain a maximum of three current feed circuit cards.

As shown in Figure 1-12, this base system provides metallic VF 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 *metallic VF 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.*

System Upgrades

Table 1-1 on page 1-36 gives the equipment required to upgrade this configuration to other basic configurations.

Local
provisioning
terminal

RS-232 port

Controller

Current
feed
circuit card

Up to
24 Analog
VF
lines

T
S
I

f
a
b
r
i
c

T1/DSX-1/HDSL
interface

Net
T1/
DSX-1/
HDSL

To
SLC-2000
HDT

*SLC*fi
ConnectReach
Access System
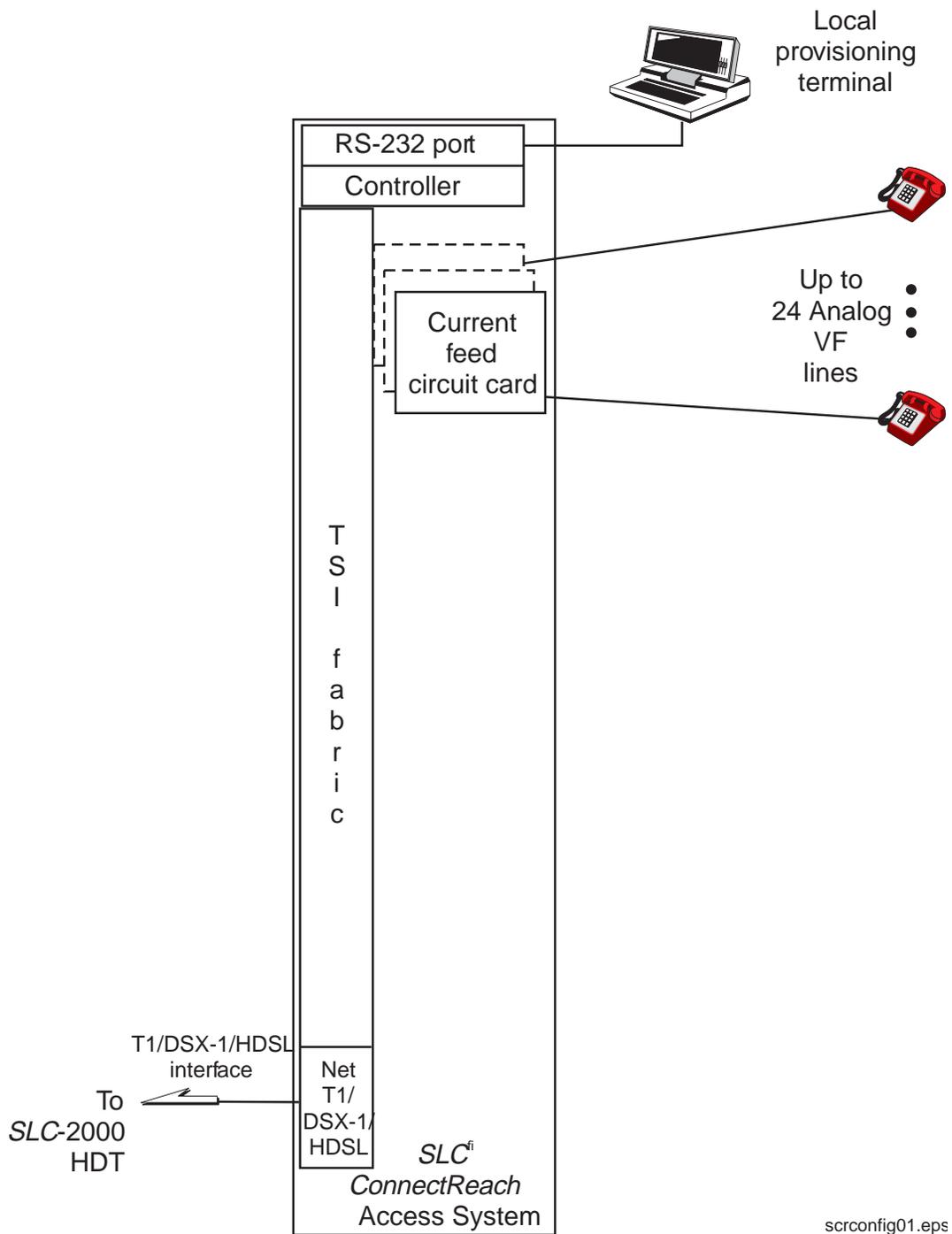
scrconfig01.eps

Figure 1-**12.** **Metallic VF Lines Only Base System**

Table 1-1.   Upgrades from the Metallic VF Lines Only Base System

To upgrade from the Metallic VF Lines Only Base System to a basic configuration containing...	Obtain the following equipment and/or software key codes...
■ Metallic VF Lines ■ Data	■ Data Module software (LT-SW-D)
■ Metallic VF Lines ■ Data ■ Secondary T1/DSX-1	■ Data Module software (LT-SW-D) ■ Fractional T1 interface card (LT-V2-FT1) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (The combination card allows for future upgrades to the *LCR*** and *BOX*** features.)
■ Metallic VF Lines ■ Data ■ *LCR* Feature[†]	■ Data Module software (LT-SW-D) ■ *LCR* software (LT-SW-LCR) ■ Telco DSP Processor card (LT-V2-DSP) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)
■ Metallic VF Lines ■ Data ■ Secondary T1/DSX-1 ■ *LCR* Feature[†]	■ Data Module software (LT-SW-D) ■ *LCR* software (LT-SW-LCR) ■ Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP).
■ Metallic VF Lines ■ Data ■ *BOX* Feature[†]	■ Data Module software (LT-SW-D) ■ *BOX* software[†] (LT-SW-BOX) ■ Telco DSP Processor card (LT-V2-DSP) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (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, LT-V2-8P-FXO; 4-line card, LT-V2-4P-FXO). *The system can only contain a maximum combination of three current feed and/or current sink cards*. See the "*LCR* Feature" in the "Benefits and Features" section of this appendix for details. 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.

Metallic VF Lines and Data Base System

Equipment Required

To provide both metallic VF 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: ED-7C830-30, G3 (includes all necessary software for data services and a network T1/DSX-1 interface, but does not include current feed circuit cards for metallic VF line services)

  — Current feed circuit cards — up to three cards (8-line card, LT-V2-8P-FXS; 4-line card, LT-V2-4P-FXS)

- ***Network T1/DSX-1 Interface; DC Powered*:**

  — Base system: ED-7C830-30, G4 (includes all necessary software for data services and a network T1/DSX-1 interface, but does not include current feed circuit cards for metallic VF line services)

  — Current feed circuit cards — up to three cards (8-line card, LT-V2-8P-FXS; 4-line card, LT-V2-4P-FXS)

- ***Network HDSL Interface; AC Powered*:**

  — Base system: LV2-60-A-0-00-00-00-L (includes all necessary software for data services and a network HDSL interface, but does not include current feed circuit cards for metallic VF line services)

  — Current feed circuit cards — up to three cards (8-line card, LT-V2-8P-FXS; 4-line card, LT-V2-4P-FXS)

- ***Network HDSL Interface; DC Powered*:**

  — Base system: LV2-60-D-0-00-00-00-L (includes all necessary software for data services and a network HDSL interface, but does not include current feed circuit cards for metallic VF line services)

  — Current feed circuit cards — up to three cards (8-line card, LT-V2-8P-FXS; 4-line card, LT-V2-4P-FXS)

As shown in Figure 1-13, each of these base systems provide metallic VF lines and data service.

> **NOTE:**
> Although each base system comes with the capability of providing 24 metallic VF lines or a data bandwidth of 24 DS0s, the *metallic VF line and data* base system assumes that you have at least one metallic VF 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 metallic VF lines required (up to 20 lines)

- The number of DS0s required to provide the data bandwidth (minimum of one DS0; maximum of 20 DS0s — see Note below).

As shown in Figure 1-13, if DS0s are allocated for each service, the maximum number of VF lines is 20. Also, the maximum DS0 bandwidth for data is 20. This is because DS0s are made available in blocks of four (see Note). Total bandwidth for both services cannot exceed 24 DS0s.

> **NOTE:**
> If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future.

When initially obtained as described above, the configuration contains the necessary hardware and software to provide *metallic VF line and data* services.

System Upgrades

Table 1-2 on page 1-40 gives the equipment required to upgrade this configuration to other basic configurations.

Local
provisioning
terminal

RS-232 port

Controller

Current
feed
circuit card

Up to
20 Analog
VF
lines

T
S
I

f
a
b
r
i
c

Data bandwidth of
up to 20 DS0s

(Actual data bandwidth
available depends on the
number of VF lines.
VF lines and data bandwidth
cannot exceed 24 DS0s)

10BaseT
port

10BaseT
hub

Up to
24 DS0s

To
SLC-2000
HDT

T1/DSX-1/HDSL
interface

Net
T1/
DSX-1/
HDSL

*SLC*ᶠⁱ
ConnectReach
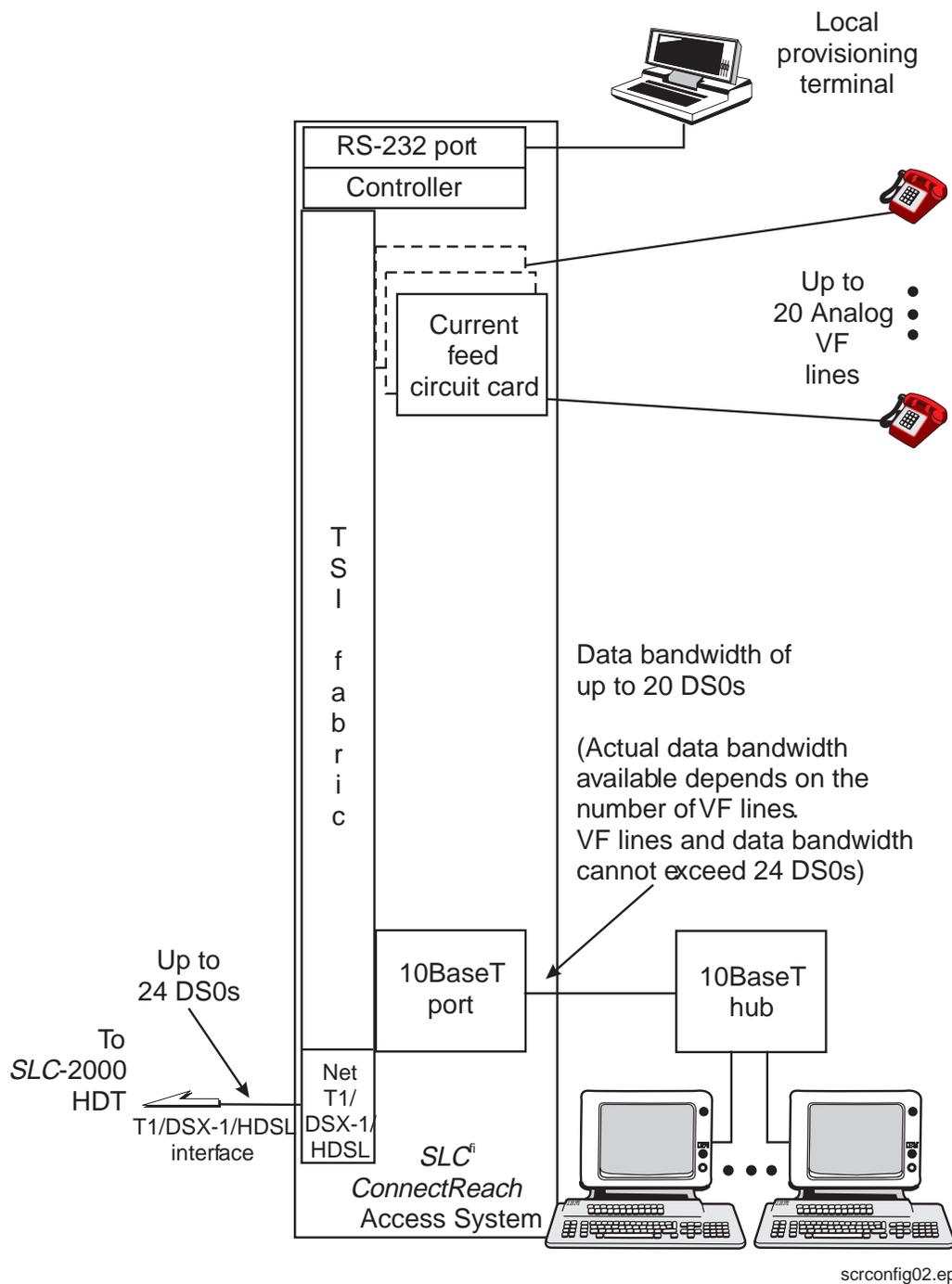Access System

scrconfig02.eps

Figure 1-13.   Metallic VF Lines and Data Configuration

Table 1-2.   Upgrades from the Metallic VF Lines and Data Base System

To upgrade from the Metallic VF Lines and Data Base System to a basic configuration containing...	Obtain the following equipment and/or software key codes...
■ Metallic VF Lines ■ Data ■ Secondary T1/DSX-1	■ Fractional T1 interface card (LT-V2-FT1) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (The combination card allows for future upgrades to the *LCR*[*] and *BOX*[*] features.)
■ Metallic VF Lines ■ Data ■ *LCR* Feature[†]	■ *LCR* software (LT-SW-LCR) ■ Telco DSP Processor card (LT-V2-DSP) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (The combination card allows for future upgrades to secondary T1/DSX-1 features.)
■ Metallic VF Lines ■ Data ■ Secondary T1/DSX-1 ■ *LCR* Feature[†]	■ *LCR* software (LT-SW-LCR) ■ Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP).
■ Metallic VF Lines ■ Data ■ *BOX* Feature[†]	■ *BOX* software[†] (LT-SW-BOX) ■ Telco DSP Processor card (LT-V2-DSP) *or* Fractional T1 interface and DSP Processor combination card (LT-V2-FT1-DSP). (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 cards must be a current sink circuit card (8-line card, LT-V2-8P-FXO; 4-line card, LT-V2-4P-FXO). *The system can only contain a maximum combination of three current feed and/or current sink cards.* See the "*LCR* Feature" in the "Benefits and Features" section of this appendix for details. 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.

Metallic VF Lines, Data, and Secondary T1/DSX-1

As shown in Figure 1-14 on page 1-43, this configuration provides metallic VF lines, data, and secondary T1/DSX-1 service. To determine the equipment needed for this configuration, begin building your system with one of the *Metallic VF Lines and Data* base systems.

➡ **NOTE:**
Although the basic configuration comes with the capability of providing 24 metallic VF lines, or a secondary T1/DSX-1 bandwidth of 24 DS0s, or a data bandwidth of 24 DS0s, the basic *metallic VF line, data, and secondary T1/DSX-1* configuration assumes that you have at least one metallic VF 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 *Metallic VF 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 metallic VF lines required (up to 16 lines)

■ The number of DS0s required to provide the data bandwidth (minimum of one DS0; maximum of 16 DS0s — see Note on next page)

■ The number of DS0s required for secondary T1/DSX-1 service (up to 16 DS0s).

As shown in Figure 1-14, if DS0s are allocated for each service, the maximum number of VF lines is 16. Also, the maximum DS0 bandwidth for data or secondary T1/DSX-1 is 16. This is because DS0s are made available in blocks of four (see Note). Total bandwidth for all services cannot exceed 24 DS0s.

➡ **NOTE:**
If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future.

By obtaining the *Metallic VF Lines and Data* base system along with the upgrade equipment and software shown in Table 1-2 on page 1-40, the configuration contains the necessary hardware and software to provide *metallic VF line, data, and secondary T1/DSX-1* services.

Table 1-2 on page 1-40 also gives the equipment required to upgrade this configuration to other basic configurations.

Local
provisioning
terminal

RS-232 port

Controller

Current
feed
circuit card

Up to
16 Analog
VF
lines

T S I   f a b r i c

Bandwidth of
up to 16 DS0s

PBX,
key
system,
or legacy
router

Fractional
T1 card
or
fractional
T1/DSP
combo
card

Secondary
T1/DSX-1
service

Digital
trunk
ports

Actual bandwidth
available depends upon
a combination of VF
lines, data bandwidth, and
secondary T1/DSX-1
bandwidth. Total
bandwidth cannot
exceed 24 DS0s

10BaseT
port

10BaseT
hub

To
SLC-2000
HDT

T1/DSX-1/HDSL
interface

Net
T1/
DSX-1/
HDSL

SLC^fi
ConnectReach
Access System

scrconfig03.eps

Figure 1-14.   Metallic VF Lines, Data, and Secondary T1/DSX-1 Configuration

Metallic VF Lines, Data, and LCR Feature

As shown in Figure 1-15, this configuration provides metallic VF lines, data, and *LCR* feature service.To determine the equipment needed for this configuration, begin building your system with one of the *Metallic VF Lines and Data* base systems.

⇒ **NOTE:**
Although the basic configuration comes with the capability of providing 24 metallic VF lines or a data bandwidth of 24 DS0s, the basic *metallic VF line, data, and LCR feature* configuration assumes that you have at least one metallic VF line and a data bandwidth of at least one DS0. However, the combined bandwidth of both services cannot exceed 24 DS0s.

To decide which *Metallic VF 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 metallic VF lines required *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, LT-V2-8P-FXO; 4-line card, LT-V2-4P-FXO). *The system can only contain a maximum combination of three current feed and/ or current sink cards.* See the "*LCR* Feature" in the "Benefits and Features" section of this appendix for details.

- The number of DS0s required to provide the data bandwidth (minimum of one DS0 — see Note below).

DS0s are made available in blocks of four (see Note). Total bandwidth for all services cannot exceed 24 DS0s.
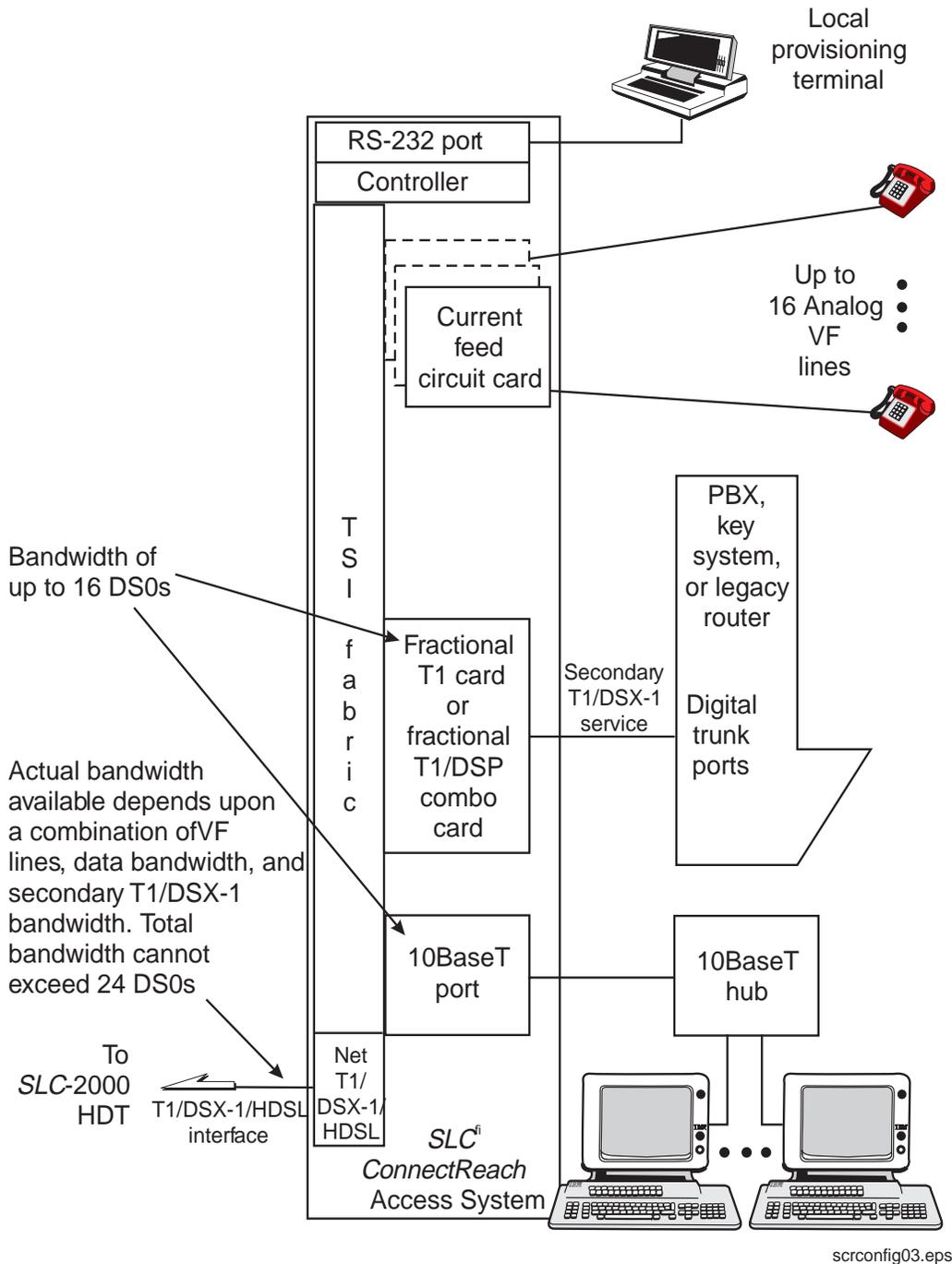
⇒ **NOTE:**
If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future.

By obtaining the *Metallic VF Lines and Data* base system along with the upgrade equipment and software shown in Table 1-2 on page 1-40, this configuration contains the necessary hardware and software to provide *metallic VF line, data, and LCR feature* services.

Table 1-2 on page 1-40 also gives the equipment required to upgrade this configuration to other basic configurations.

Figure 1-15. Metallic VF Lines, Data, and LCR Feature Configuration

**Metallic VF Lines, Data, Secondary T1/DSX-1,
and LCR Feature**

As shown in Figure 1-16, this configuration provides *metallic VF 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 *Metallic VF Lines and Data* base systems.

⇒ **NOTE:**
Although the basic system comes with the capability of providing 24 metallic VF lines, or a secondary T1/DSX-1 bandwidth of 24 DS0s, or a data bandwidth of 24 DS0s, the basic *metallic VF lines, data, secondary T1/DSX-1, and LCR feature* configuration assumes that you have at least one metallic VF 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 *Metallic VF 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 metallic VF lines required (up to 16 lines) *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, LT-V2-8P-FXO; 4-line card, LT-V2-4P-FXO). *The system can only contain a maximum combination of three current feed and/ or current sink cards.* See the "*LCR* Feature" in the "Benefits and Features" section of this appendix for details.

■ The number of DS0s on the secondary T1/DSX-1

■ The number of DS0s required to provide the data bandwidth (minimum of one DS0; maximum of 16 DS0s — see Note below).

As shown in Figure 1-16, if DS0s are allocated for each service, the maximum number of VF lines is 16. Also, the maximum DS0 bandwidth for data or secondary T1/DSX-1 is 16. This is because DS0s are made available in blocks of four (see Note). Total bandwidth for all three services cannot exceed 24 DS0s.
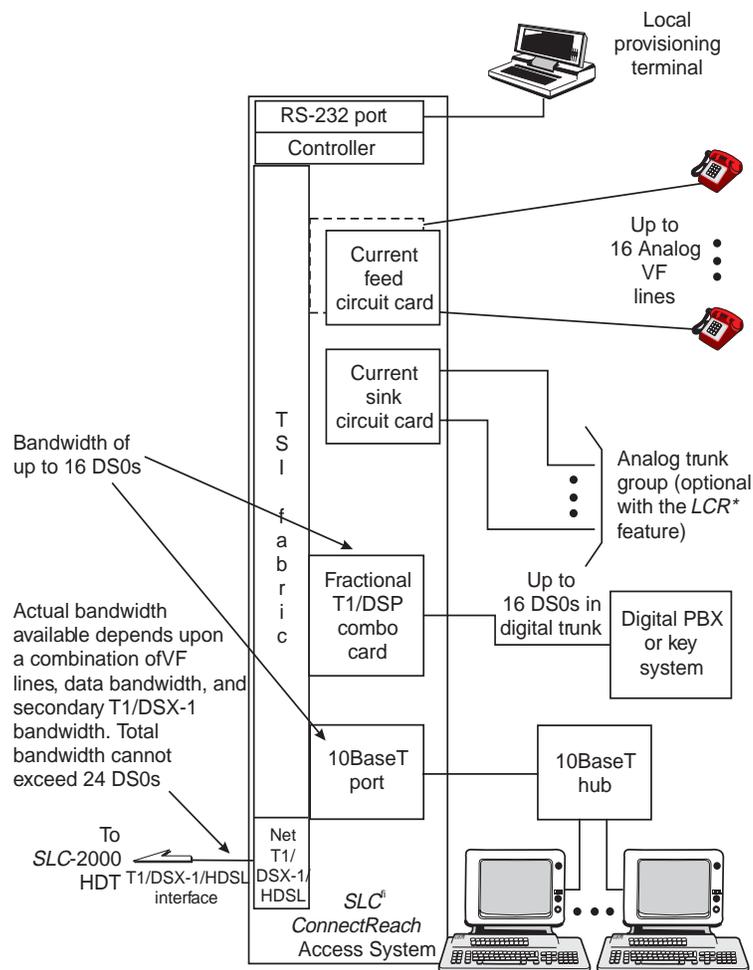
⇒ **NOTE:**
If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s.

However, you can provision any of the remaining three DS0s as data bandwidth in the future.

By obtaining the *Metallic VF Lines and Data* base system along with the upgrade equipment and software shown in Table 1-2 on page 1-40, this configuration contains the necessary hardware and software to provide *metallic VF lines, data, secondary T1/DSX-1, and LCR feature* services.

Table 1-2 on page 1-40 also gives the equipment required to upgrade this configuration to *Metallic VF Lines, Data, and BOX Feature* basic configurations.

Figure 1-16. Metallic VF Lines, Data, Secondary T1/DSX-1, and LCR Feature Configuration

Metallic VF Lines, Data, and BOX Feature

As shown in Figure 1-17, this configuration provides *metallic VF lines, data, and BOX feature* service. To determine the equipment needed for this configuration, begin building your system with one of the *Metallic VF Lines and Data* base systems.

> **NOTE:**
> Although the basic system comes with the capability of providing 24 metallic VF lines or a data bandwidth of 24 DS0s, the basic *metallic VF lines, data, and BOX feature* configuration assumes that you have at least one metallic VF 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 metallic VF lines required (up to 20 lines) *and* 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, LT-V2-8P-FXO; 4-line card, LT-V2-4P-FXO). *The system can only contain a maximum combination of three current feed and/or current sink cards*. See the "*LCR* Feature" in the "Benefits and Features" section of this appendix for details.

- The number of DS0s required to provide the data bandwidth (minimum of one DS0; maximum of 20 DS0s — see Note below).
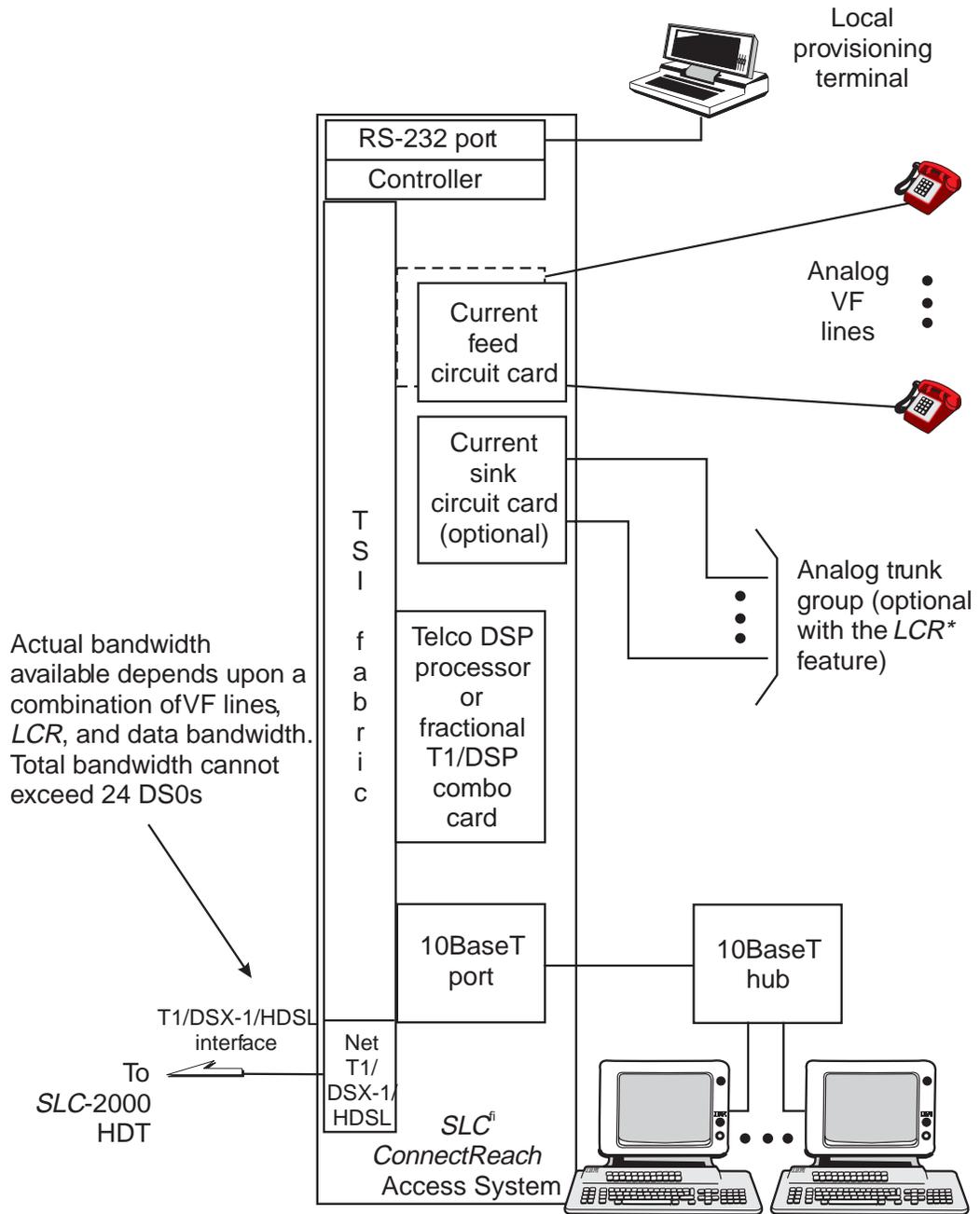
DS0s are made available in blocks of four (see Note). Total bandwidth for all services cannot exceed 24 DS0s.

> **NOTE:**
> If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future.

By obtaining the *Metallic VF Lines and Data* base system along with the upgrade equipment and software shown in Table 1-2 on page 1-40, this configuration contains the necessary hardware and software to provide *metallic VF lines, data, and BOX feature* services.

Local provisioning terminal

RS-232 port

Controller

Current feed circuit card

Analog VF lines

Current sink circuit card (optional)

Analog trunk group (optional with the *LCR** feature)

T S I f a b r i c

Telco DSP processor or fractional T1/DSP combo card

Actual bandwidth available depends upon a combination of VF lines, *LCR*, and data bandwidth. Total bandwidth cannot exceed 24 DS0s

10BaseT port

10BaseT hub

T1/DSX-1/HDSL interface

Net T1/ DSX-1/ HDSL

To *SLC*-2000 HDT

*SLC*ⁿ *ConnectReach* Access System

*Trademark of Vina Technologies, Inc

scrconfig04.eps

Figure 1-17.   Metallic VF Lines, Data, and BOX Feature Configuration
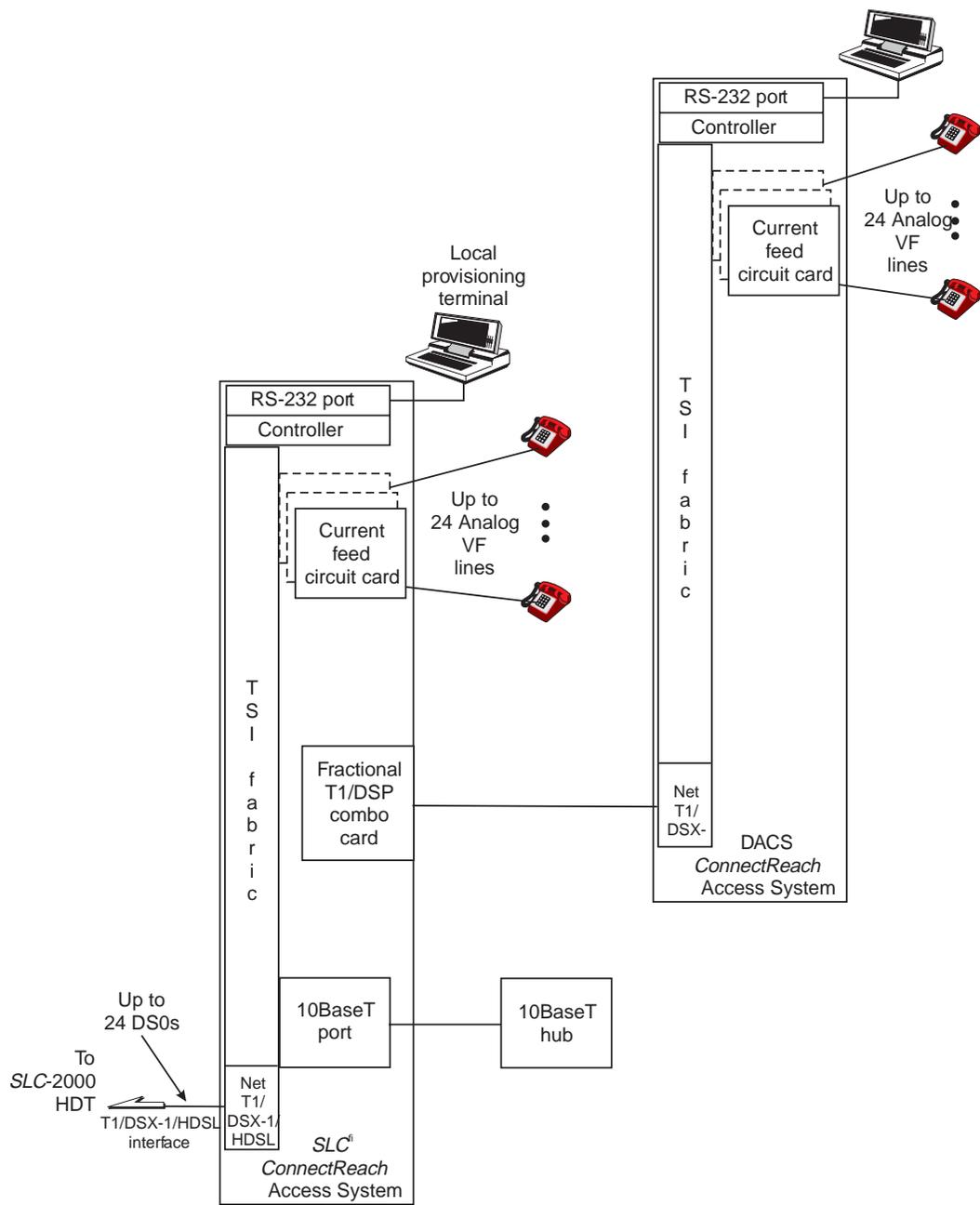
48-Line Master/Slave Configuration

You can configure the *SLC ConnectReach* system to be part of a 48-line PBX/ Centrex-type application. This configuration requires a *SLC ConnectReach* system configured with the *BOX* feature as a *master* system and a digital access and cross connect system (DACS) *ConnectReach* system configured as a *slave* system. As shown in Figure 1-18, the secondary T1/DSX-1 port of the master *SLC ConnectReach* system connects to the network interface of a DACS *ConnectReach* system to provide 48-lines of service (24 lines from the *SLC ConnectReach* system and 24 lines from the DACS *ConnectReach* system). You must provision the *SLC ConnectReach* system connected to the HDT as "master" and the DACS *ConnectReach* system interfacing through the master's secondary T1/DSX-1 port as "slave" (see the "OAM&P and Preinstallation Engineering" section of this appendix for provisioning details). The metallic VF lines connected to the "master" system are provisioned as any other *SLC ConnectReach* system configured with the *BOX* feature. See the *SLC ConnectReach User/Service* manual for details. To provision the VF metallic lines connected to the "slave" DACS *ConnectReach* system, see the *DACS ConnectReach* system documentation.

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 *SLC ConnectReach* system and the *SLC*-2000 HDT.

To provide this service, the "master" *SLC ConnectReach* system must be obtained as follows:

- **Metallic VF Lines Only (no data service):**
    - **T1/DSX-1 Interface** — ED-7C830-30, G1 (AC powered); ED-7C830-30, G2 (DC powered)
    - **HDSL Interface** — LV2-70-A-0-00-00-00-L (AC powered); LV2-70-D-0-00-00-00-L (DC powered)
- **Metallic VF Lines and Data service:**
    - **T1/DSX-1 Interface** — ED-7C830-30, G3 (AC powered); ED-7C830-30, G4 (DC powered)
    - **HDSL Interface** — LV2-60-A-0-00-00-00-L (AC powered); LV2-60-D-0-00-00-00-L (DC powered)
- **BOX feature software:** LT-SW-BOX
- **Fractional T1 Interface & DSP Combination card**: LT-V2-FT1-DSP.

scrconfig06.eps

Figure 1-18.   Basic 48-Line Master/Slave Configuration

Networking Configurations

Basic Network Interfaces

The basic network interface for the *SLC ConnectReach* system is a T1/DSX-1/ HDSL interface carrying a standard 1.544 Mbps DS1 signal with 24 64 kbps DS0s. The T1/DSX-1/HDSL interface allows for the following network connections between the *SLC ConnectReach* system and the *SLC*-2000 HDT:

- T1 carrier line (integrated interface)

- HDSL system interface

- Optical multiplexer with a DSX-1 interface

- Radio carrier system with a DSX-1 interface.

Unless the transport system is a T1 carrier system or an HDSL system interface, you must locate the *SLC ConnectReach* system within 655 feet of the electrical or optical carrier system interfacing with the HDT. If you collocate the *SLC ConnectReach* system with the HDT, they must be within 655 feet of each other or the equipment connecting the two systems.

At the *SLC*-2000 HDT, you must also provision the DT Server for **DSX**, **B8ZS**, and "24-lines" or "12-lines." If using collocated transmission equipment other than the equipment in the *SLC*-2000 ARM shelf, the HDT must also be within 655 feet of the collocated equipment.

T1 Carrier System Configuration

Figure 1-19 shows the basic configuration for connecting a *SLC ConnectReach* system with the *SLC*-2000 HDT using a T1 carrier system. Each T1 carrier line contains one DS1 signal. The interface with the T1 carrier is built in to the *SLC ConnectReach* system.

At the *SLC*-2000 HDT, the T1 carrier system usually interfaces the DT Server in the *SLC*-2000 MDS assembly through a DSX cross-connect. The HDT does not contain a built-in T1 interface.
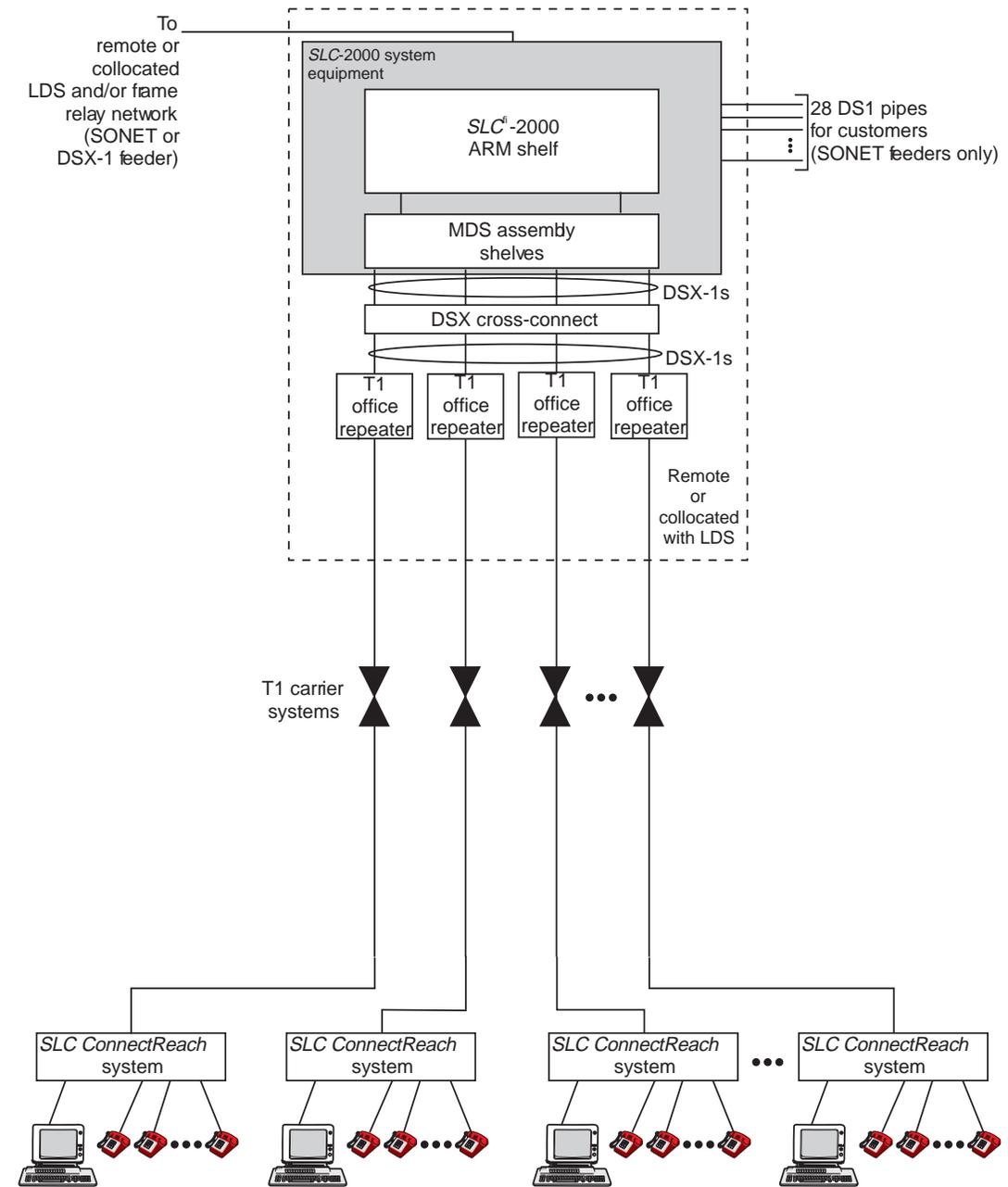
Figure 1-**19. Network Connection — T1 Carrier System**

HDSL System Interface

You can interface between the *SLC*-2000 HDT and the *SLC ConnectReach* system using an HDSL system. As shown in Figure 1-20, the DT Servers in the MDS assembly of the HDT interface with HDSL line units — usually through a DSX cross-connect panel. The HDSL transport system interfaces directly with the *SLC ConnectReach* system. When used with Pairgain Higain Line Units at the HDT, no external HDSL equipment is required at the *SLC ConnectReach* site.

HDSL feeders allow the system to operate without repeaters over two existing metallic pairs that meet carrier serving area (CSA) guidelines. This allows you to quickly provide DS1 transport over existing cable plant and eliminate the expense of engineering a T1 carrier system. Each HDSL line carries one DS1 signal. To meet CSA guidelines, the gauge of the metallic cables determines the maximum length between the HDSL units. Table 1-3 shows the maximum cable length for a specific gauge of cable.

At the *SLC*-2000 HDT end of the system, there are a variety of PairGain HDSL line units available for different applications. These include the following:

- ■ **HLU-319 HDSL line unit**. This line unit plugs into the Wescom 3192 Span Termination System (STS) shelves or equivalent. The HLU-319 can coexist with 3192-type repeater cards in the same shelf.

- ■ **HLU-388 HDSL line unit**. This line unit plugs into the DDM-Plus Shelf (or equivalent). It can coexist with AEK-type repeater cards in the same shelf.

- ■ **HLU-231 HDSL line unit**. This line unit plugs into the 222-type Office Repeater Bay shelves.

- ■ **HLU-611 HDSL line unit**. This line unit plugs into the 222-type Office Repeater Bay shelves.

If you need to interface over HDSL facilities outside of CSA guidelines, you can insert a special "repeater" — called a *doubler* — into the HDSL circuit that allows you to extend the cable length beyond CSA range limits. If required, each HDSL circuit can contain up to two doublers; thus increasing the range by a factor of two to three — 24,000 to 36,000 feet. You can obtain the following PairGain Technologies doublers for your specific applications:

- ■ **HDU-451 Doubler:** This unit plugs into a single slot of a 400-type repeater shelf and is powered by the CO line.

- ■ **HDU-439 Doubler:** This unit mounts in a standard 239-type mini-repeater mounting.

- ■ **HDU-437 Doubler:** This unit mounts into a standard DDS or ISDN repeater mounting.
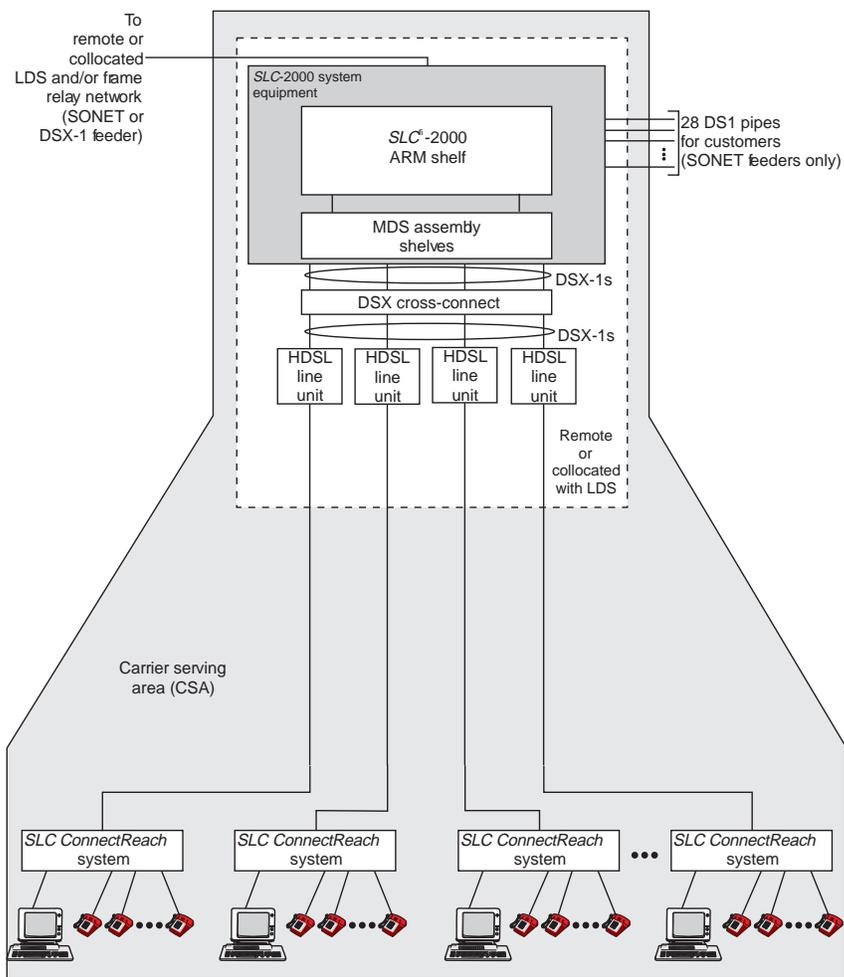
Contact Pairgain Technologies[*] for information on the full line of Hi-gain line units, doublers, and mounting options.

---

[*] Contact PairGain Technologies on 1-800-370-9670 or visit their web site at **http://www.pairgain.com/**.

Table 1-3.   **HDSL Line Unit Range Limits**

Cable Gauge	Maximum Loop Length
26	9.0 kft
24	12.3 kft
22	16.1 kft
19	22.8 kft

Figure 1-20.   **Network Connection — HDSL System Interface**

OC-1 Optical Multiplexer Configurations

The *SLC*-2000 DLC subsystem can host a *SLC ConnectReach* system through an OC-1 ring using DDM-2000 FiberReach Wideband shelves (WBSs). Each OC-1 ring can carry up to 28 DSX-1s to the *SLC ConnectReach* systems from the Servers installed in the MDS assemblies at the *SLC*-2000 HDT. However, an external DDM-2000 OC-3 Multiplexer or the synchronous optical network (SONET) subsystem of the ARM shelf must host the WBSs in the OC-1 ring. The host equipment provides single-ended operations for the elements in the OC-1 ring. If you are using more than 28 DSX-1 based DT Servers to host the *SLC ConnectReach* systems from the HDT, you may need additional collocated multiplexing equipment (DDM-2000 OC-3 shelves or DDM-2000 FiberReach WBSs) to add additional OC-1 rings to the configuration.

See Document 363-208-000 *SLC-2000 Access System Applications, Planning, and Ordering Guide* for the methods of configuring the ARM shelf to provide each application.
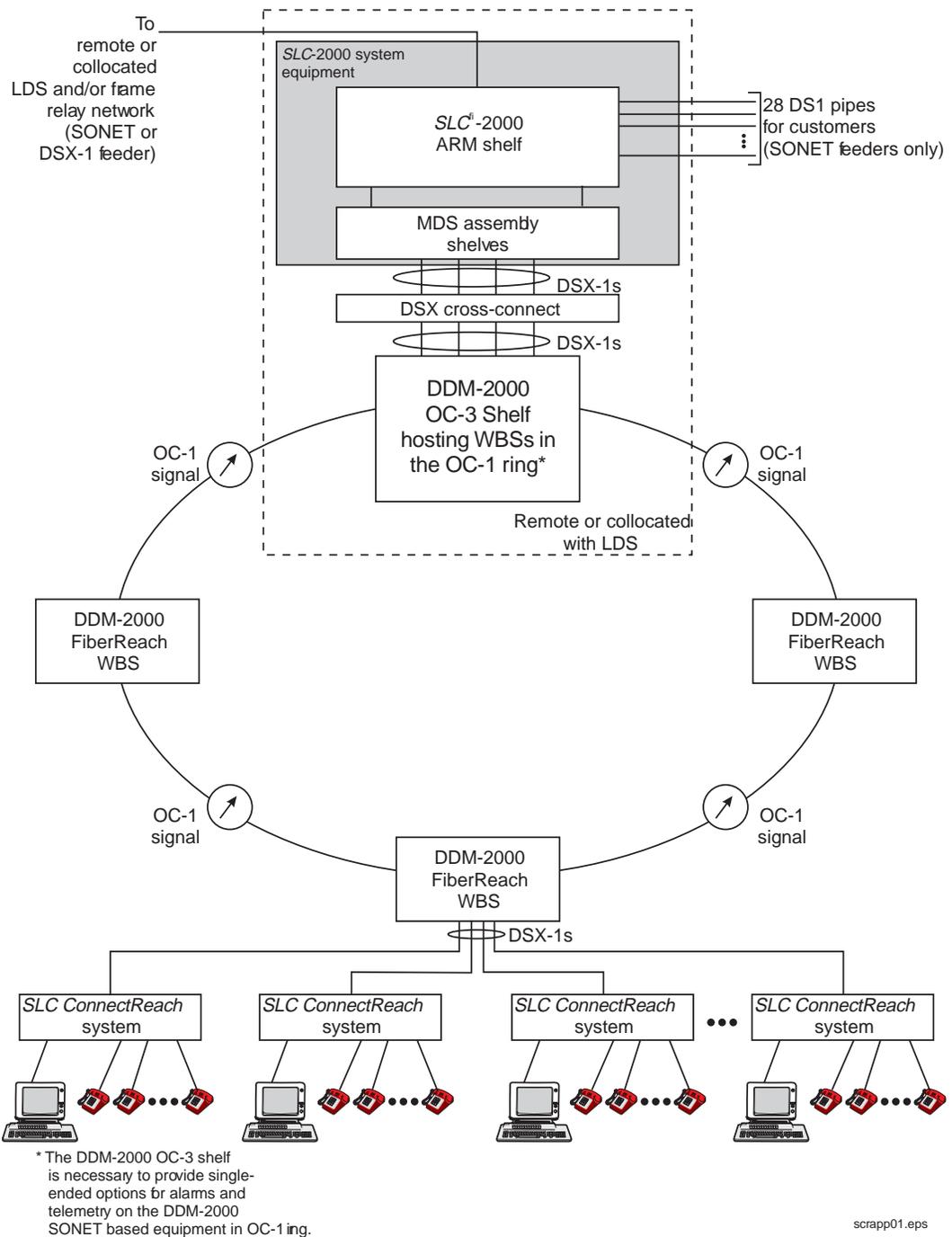
DDM-2000 OC-3 Multiplexer Collocated with the SLC-2000 HDT

Figure 1-21 shows a *SLC*-2000 HDT hosting a *SLC ConnectReach* system through a collocated DDM-2000 OC-3 shelf. In this configuration, the collocated DDM-2000 OC-3 shelf is part of an OC-1 ring and provides a CIT connection to maintain single-ended operation capability for the SONET-based elements of the OC-1 ring. This configuration allows the CO interface to feed the HDT with either SONET or DSX-1 feeders. It also allows customer access to the 28 DS1 pipes from the *SLC*-2000 HDT if fed by SONET feeders.

> **NOTE:**
> Without *SLC*-2000 software release R4.7 or later, the *SLC ConnectReach* system cannot be maintained through the craft interface terminal (CIT) interface.

To remote or collocated LDS and/or frame relay network (SONET or DSX-1 feeder)

SLC-2000 system equipment

SLC®-2000 ARM shelf

28 DS1 pipes for customers (SONET feeders only)

MDS assembly shelves

DSX-1s

DSX cross-connect

DSX-1s

DDM-2000 OC-3 Shelf hosting WBSs in the OC-1 ring*

Remote or collocated with LDS

OC-1 signal

OC-1 signal

DDM-2000 FiberReach WBS

DDM-2000 FiberReach WBS

OC-1 signal

OC-1 signal

DDM-2000 FiberReach WBS

DSX-1s

SLC ConnectReach system

SLC ConnectReach system

SLC ConnectReach system

•••

SLC ConnectReach system

* The DDM-2000 OC-3 shelf is necessary to provide single-ended options for alarms and telemetry on the DDM-2000 SONET based equipment in OC-1 ring.

scrapp01.eps

Figure 1-21. *SLC*-**2000 HDT Hosting SLC ConnectReach Systems Through a Collocated WBS — WBSs Hosted by an External DDM-2000 Multiplexer**

WBS Collocated with the SLC-2000 System — WBSs Hosted by the ARM Shelf of the SLC-2000 HDT (J1C265AA-1, L3 ARM Shelf Only)

The WBSs on the OC-1 ring must be hosted by either a DDM-2000 OC-3 shelf or the ARM shelf of a *SLC*-2000 HDT. Figure 1-22 shows the configuration of a collocated WBS hosted by a *SLC*-2000 ARM shelf. This configuration eliminates the need for a separate DDM-2000 OC-3 shelf. However, the usually available 28 DS1 pipes are not available because Function Group C of the ARM shelf is hosting the OC-1 ring. The 27G2-U OLIUs can also host up to two FiberReach rings.

⚠ **CAUTION:**
> *Use this configuration in J1C265AA-1, L3 ARM shelves only. DO NOT use 27G2-U OLIUs in Function Group C of J1C265AA-1, L4 ARM shelves.*
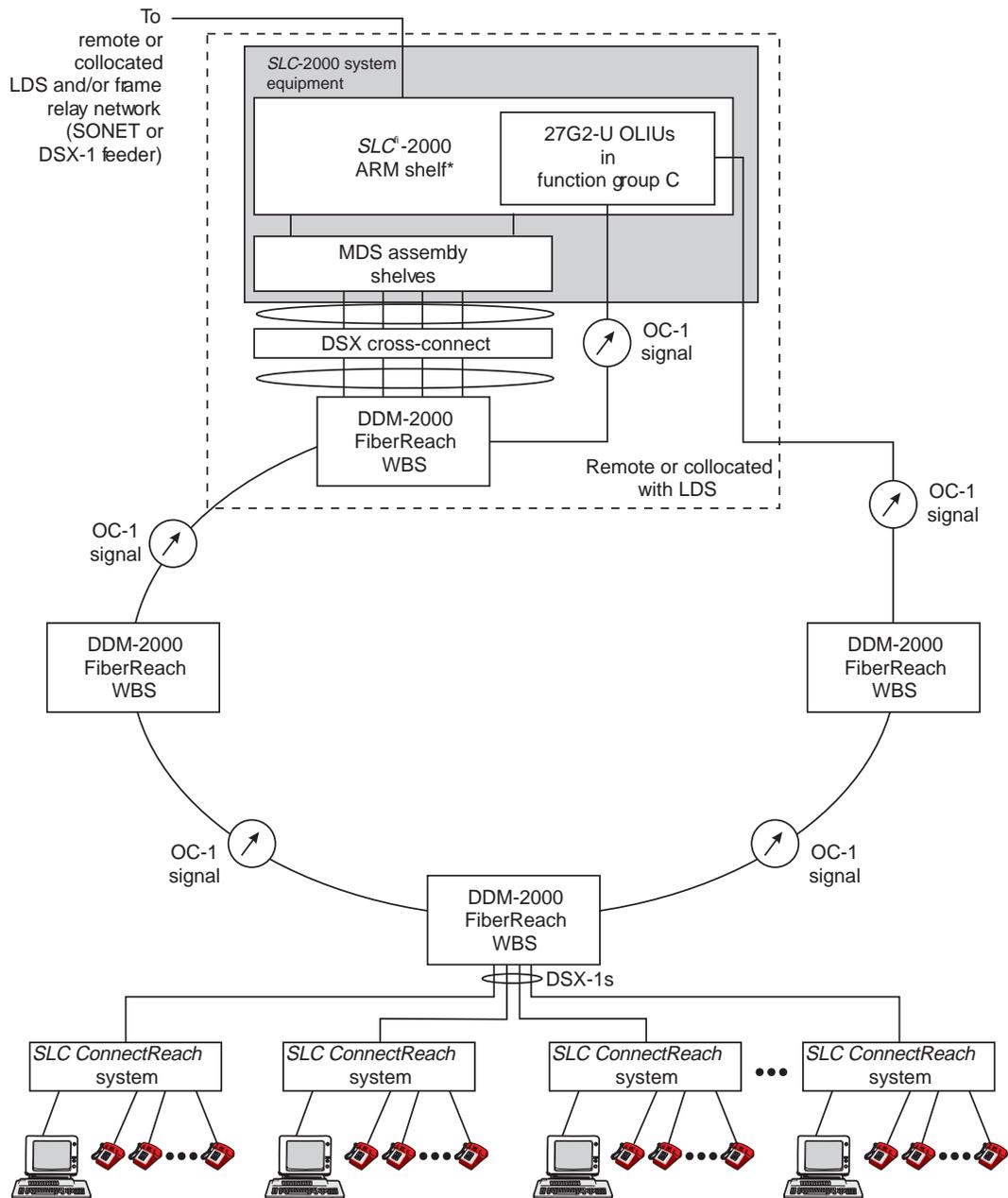
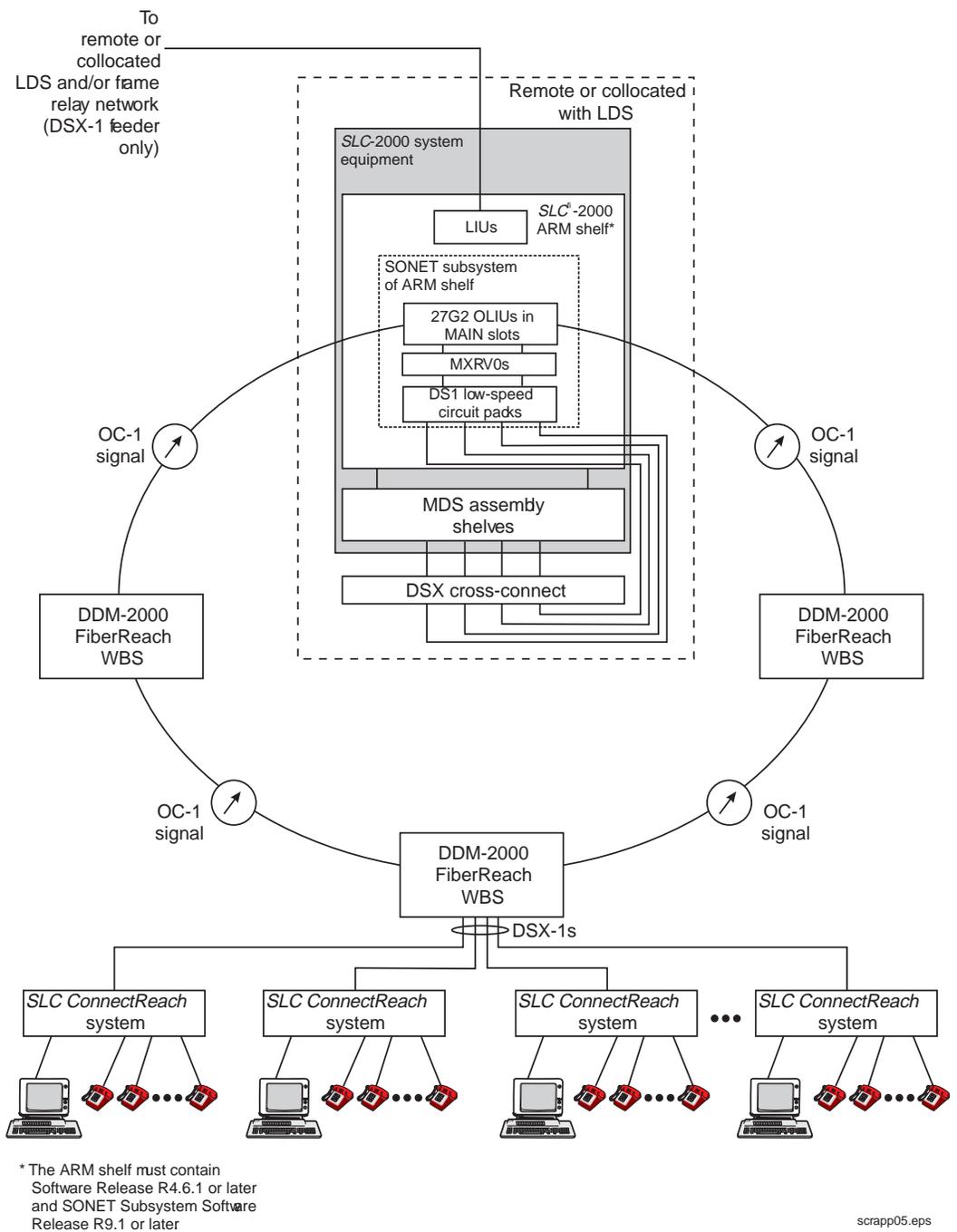**Figure 1-22.** *SLC*-2000 ARM Shelf Hosting DDM-2000 FiberReach WBSs

SLC-2000 SONET Subsystem of ARM Shelf Using 27G2-U OLIUs to Multiplex DSX-1s onto an OC-1 Ring (SLC-2000 HDT DSX-1 Metallic CO Interface Only)

If the *SLC*-2000 HDT uses a DSX-1 metallic CO interface, then the ARM shelf can use the SONET subsystem to multiplex a maximum of 28 DSX-1s from the Servers in the MDS assembly onto an OC-1 ring as shown in Figure 1-23. This configuration requires a full complement of SONET subsystem circuit packs with the exception of MXRV0s in Function Group A. The MAIN slots contain 27G2-U OLIUs and the Function Group C slots contain MXRV0s. The DS1 low-speed slots contain DS1 circuit packs as needed. The SONET subsystem must contain Software Release R9.1 or later. The 27G2-U OLIUs can interface with two OC-1 rings if needed. It also eliminates the need for a collocated WBS as well as a separate DDM-2000 OC-3 multiplexer host for providing single-ended operations. However, this configuration cannot provide DS1 pipes from the ARM shelf. A typical example of this application is when the *SLC*-2000 HDT is collocated with the LDS, making DSX-1 feeders from the LDS interface a practical alternative.

⇒ **NOTE:**
   Both the J1C265AA-1, L3 and J1C265AA-1, L4 ARM shelves support this application.

To
remote or
collocated
LDS and/or frame
relay network
(DSX-1 feeder
only)

Remote or collocated
with LDS

SLC-2000 system
equipment

LIUs

SLC®-2000
ARM shelf*

SONET subsystem
of ARM shelf

27G2 OLIUs in
MAIN slots

MXRV0s

DS1 low-speed
circuit packs

OC-1
signal

OC-1
signal

MDS assembly
shelves

DSX cross-connect

DDM-2000
FiberReach
WBS

DDM-2000
FiberReach
WBS

OC-1
signal

OC-1
signal

DDM-2000
FiberReach
WBS

DSX-1s

SLC ConnectReach
system

SLC ConnectReach
system

SLC ConnectReach
system

●●●

SLC ConnectReach
system

* The ARM shelf must contain
Software Release R4.6.1 or later
and SONET Subsystem Software
Release R9.1 or later

scrapp05.eps

**Figure 1-23.   SLC-2000 HDT Hosting SLC ConnectReach Systems Using 27G2-U OLIUs
in the MAIN Slots of the ARM Shelf**

SLC-2000 J1C265AA-1, L4 ARM Shelf with 26G2-U OLIUs in Function Group C to Multiplex DSX-1s onto an OC-1 Ring

In this configuration, the J1C265AA-1, L4 ARM shelf contains 26G2-U OLIUs in Function Group C as part of the OC-1 ring (Figure 1-24). The ARM shelf must contain SONET subsystem Software Release R13 or later and the WBSs in the ring must contain FiberReach Software Release R3.0 or later. This configuration eliminates the need for a collocated WBS and a separate DDM-2000 OC-3 shelf to host the WBSs in the OC-1 ring. It will support a maximum of 28 DS1s from the Servers. However, the 26G2-U OLIUs only support one FiberReach OC-1 ring. In this configuration, the 28 DS1 pipes are not accessible from the DS1 low-speed slots in Function Group C of the ARM shelf. However, as shown in Figure 1-25, DS1 pipes *are* accessible from any of the WBSs on the ring if the bandwidth to support them is available on the OC-1 ring.
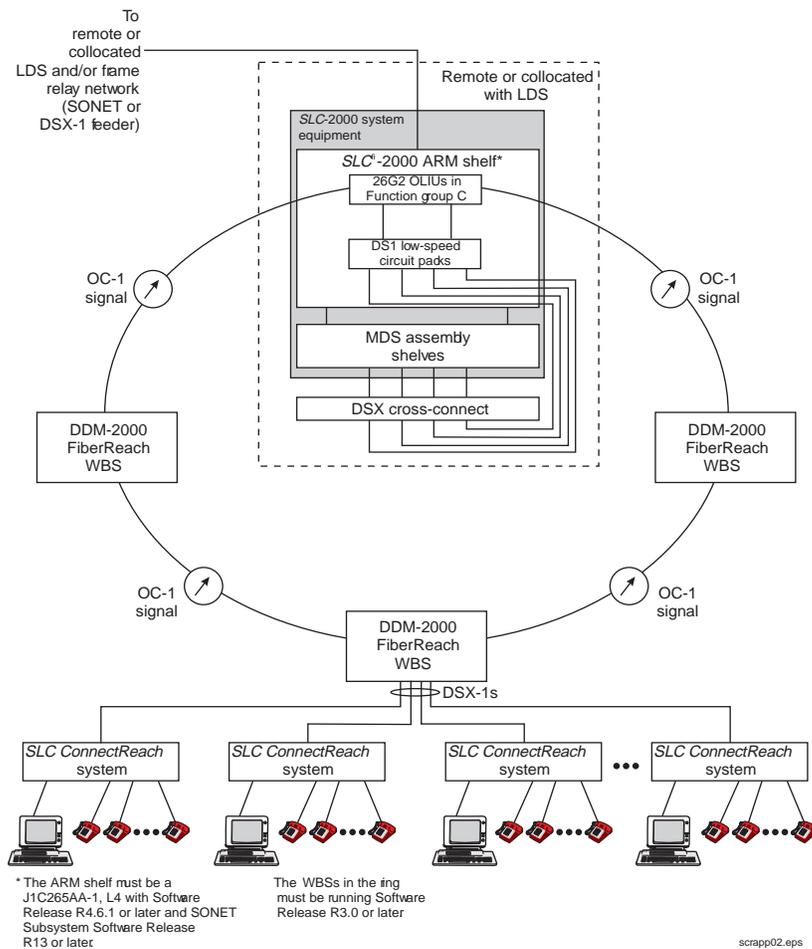
Figure 1-24. *SLC*-2000 HDT Hosting SLC ConnectReach Systems Using 26G2-U OLIUs and a J1C265AA-1, L4 ARM Shelf
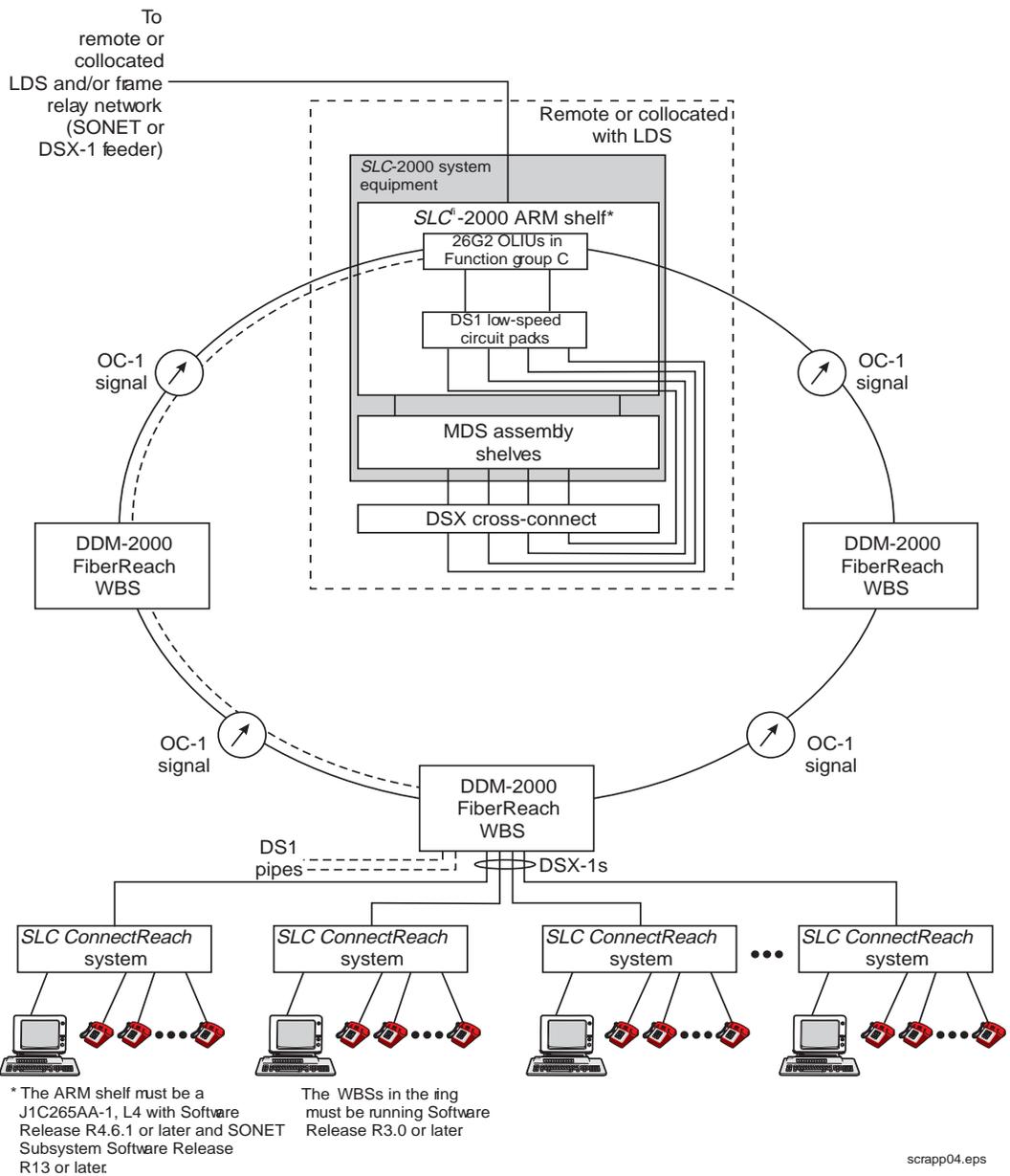
Figure 1-25. *SLC*-2000 HDT Hosting SLC ConnectReach Systems Using 26G2-U OLIUs and a J1C265AA-1, L4 ARM Shelf Providing DS1 Pipes Through a WBS

Services

The *SLC ConnectReach* system provides up to 24 DS0s for a variety of voice-grade and data services. Most voice-grade services interface with the *SLC ConnectReach* system through either a current feed or current sink circuit card. The DS0s containing the voice-grade services interface with the *SLC*-2000 HDT through the network T1/DSX-1/HDSL interface port. At the HDT, the voice-grade services are routed to a TR-08 or TR-303 interface of a switch. These services include the following:

- Analog Voice Frequency (VF) POTS Service
- Locally Switched Special Services
- Services provided with the *BOX* Feature
- Direct Inward Dial (DID) services to a PBX
- Analog trunk groups using the *LCR* feature.

> ⇒ **NOTE:**
> The *SLC ConnectReach* system does *not* support nonlocally switched or nonswitched special services.

You can order the system with current feed circuit cards installed for the service required by your specific configuration. You can also order additional current feed circuit cards to change the service type or add service to an existing system. Current sink circuit cards are not included in the base systems. You must order current sink cards separately.

> ⇒ **NOTE:**
> The system can contain any combination of up to three current feed or current sink circuit cards.

Data services interface through a 10BaseT Ethernet port connecting to an external Ethernet hub and normally provide services that interface with the Internet and/or a private corporate network. Data services are software-based with the DS0 bandwidth on the network T1/DSX-1/HDSL interface determined by configuring the software. You can provision the bandwidth for data services for up to 24 DS0s. At the *SLC*-2000 HDT, DS0s providing data services are routed to an INA DS1 that interfaces with the Internet and/or a private corporate network. Provided that your system is provisioned with the proper software loads, no user-selectable hardware equipment is needed in the system to provide data services.

Secondary T1/DSX-1 services supporting PBX, key systems, 48-line master/slave configurations, and routers, including ISDN primary rate interface (PRI) services, interface through a secondary T1/DSX-1 port. This interface supports services such as DID. To support services provided by the secondary T1/DSX-1 interface, the *SLC ConnectReach* system requires a Fractional T1 circuit card or a Fractional T1/DSP Processor Combination card. The support of an external router

requires a T1-to-V.35 convertor. The secondary T1/DSX-1 port can also connect to the network interface of a DACS *ConnectReach* system to provide 48-line PBX/Centrex-type service (24 lines from the *SLC ConnectReach* system and 24 lines from the DACS *ConnectReach* system). You must provision the *SLC ConnectReach* system connected to the HDT as "master" and the DACS *ConnectReach* system interfacing through the master's secondary T1/DSX-1 port as "slave" (see the "OAM&P and Preinstallation Engineering" section of this appendix for provisioning details).

The *SLC ConnectReach* system stores in nonvolatile memory an inventory record (including its ten-character *COMMON LANGUAGE CLEI*[*] code) readable by using the *SLC*-2000 HDT craft interface terminal (CIT) or a compatible operations support system (OSS).

The "Applications and Configurations" section provides details about basic configurations for these services.

See the "Operations, Administration, Maintenance, Provisioning (OAM&P) and Preinstallation Engineering" section and the "Ordering" section of this appendix for details needed to equip and order a system for the services you require.

Analog VF POTS Service, Locally Switched Special Services, and Services with the BOX Feature for Outbound Trunks

When equipped with 4-line or 8-line current feed circuit cards, the *SLC ConnectReach* system provides analog 2-wire VF POTS service, locally switched special services, and services with the *BOX* feature for outward bound trunks. It provides a loop range of 480 ohms including DC off-hook resistance of the phone.

In the "Applications and Configurations" section of this appendix, the configurations that provide most of these services are described as "Metallic VF Lines."

---

[*]   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

For the *SLC ConnectReach* system to provide a specific number of lines for these services, you can equip it with up to three 4-line or 8-line current feed circuit cards. By configuring your system with a combination of 4-line and 8-line cards, this will allow your system to contain the following lines of service:

■ ***Up to four lines:*** one 4-line card

■ ***Up to eight lines:***

— One 8-line card

— Two 4-line cards

■ ***Up to 12 lines:***

— One 8-line card and one 4-line card

— Three 4-line cards

■ ***Up to 16 lines:***

— Two 8-line cards

— One 8-line card and two 4-line cards

■ ***Up to 20 lines:*** Two 8-line cards and one 4-line card

■ ***Up to 24 lines:*** Three 8-line cards.

⇒ **NOTE:**
The system can only contain any combination of up to three current feed or current sink circuit cards.

The current feed circuit card provides a fast-forward disconnect feature (it reproduces the open interval when the central office open battery interval is longer than 39 ms for loop-ground circuits and 400 ms for E&M circuits). The selection of the POTS or special services loss profile is determined by the far-end channel unit or provisioning of the digital line unit. If the special services loss characteristic is desired for a loop-start circuit (for example, central office centrex), the central office termination must be a *SPOTS*® channel unit or a digital line unit provisioned for the *SPOTS* current feed channel unit interface.

For example, when providing POTS services, the *SLC ConnectReach* system interfaces the telephone network with an *SPQ*300 channel unit in a *SLC*-2000 COT or properly programmed digital switch. When providing locally-switched special services, the *SLC ConnectReach* system interfaces the telephone network with an *SPQ*340 channel unit in a *SLC*-2000 COT or properly programmed digital switch.

When providing these services, the far-end termination can be any of the following:

- *5ESS®* switch integrated digital carrier unit (IDCU) (TR-08 and TR-303)

- *DMS 100*[*] switch integrated TR-08 interface

- *DMS 100* switch integrated TR-303 interface with Software Release NA004

- *GTD-5*[†] Digital Switch EAX Software Version SVR 1722 (integrated TR-303 only)

- *SLC* 96 carrier WP10( ) POTS channel unit (CU), loop-start applications only

- *SLC* 96 carrier WP36( ) *SPOTS* CU, loop- or ground-start applications

- *SLC*-2000 COT system *SPQ*300 POTS CU, loop-start applications only

- *SLC*-2000 COT system *SPQ*340 *SPOTS* CU, loop- or ground-start applications

- *5ESS* switch digital carrier line unit (DCLU) (TR-08).

When providing these services, the *SLC ConnectReach* system provides the following features/functions:

- Automatically provides loop- or ground-start service

- On-hook transmission (OHT)

- Inventory information (*COMMON LANGUAGE CLEI* code, manufacture date, etc.).

DID Service, Services with the LCR Feature, and Services with the BOX Feature for Inward Bound Trunks

When equipped with 4-line or 8-line current sink circuit cards, the *SLC ConnectReach* system provides dial pulse terminating (DPT) current sink capability for 2-wire locally switched DID service. It also supports services provided by the *LCR* feature, and services provided by the *BOX* feature for inward bound trunks. It is compatible with reverse-battery signaling on a DID circuit and provides the DPT function between the *SLC ConnectReach* system and the DID trunk circuit of a PBX.

In the "Applications and Configurations" section of this appendix, the configurations that provide most of these services are described as "Metallic VF Lines with *LCR* feature" and "*BOX* feature."

---

[*]   Trademark of Northern Telcom, Ltd.

[†]   Registered trademark of Siemens Aktiengesellschaft.

For the *SLC ConnectReach* system to provide the maximum number of lines of these services, you can equip it with up to three 4-line or 8-line current sink circuit cards. By configuring your system with a combination of 4-line and 8-line cards, this will allow your system to contain the following lines of service:

- ***Up to four lines*:** one 4-line card

- ***Up to eight lines*:**
    — One 8-line card
    — Two 4-line cards

- ***Up to 12 lines*:**
    — One 8-line card and one 4-line card
    — Three 4-line cards

- ***Up to 16 lines*:**
    — Two 8-line cards
    — One 8-line card and two 4-line cards

- ***Up to 20 lines*:** Two 8-line cards and one 4-line card

- ***Up to 24 lines*:** Three 8-line cards.

> **NOTE:**
> The system can only contain any combination of up to three current feed or current sink circuit cards.

When providing these services, the far-end termination can be any of the following:

- *5ESS* switch integrated digital carrier unit (IDCU)

- *SLC*-2000 *SPQ*336 central office terminal (COT) quad DID channel unit

- *SLC*-2000 *SPQ*443 E*SPOTS* channel unit provisioned for dial pulse originating (DPO)

- *SLC* Series 5 AUA43( ) E*SPOTS* channel unit provisioned for DPO

- *SLC* Series 5 carrier AUA36( ) DPO channel unit

- *5ESS* switch digital carrier line unit (DCLU).

You provision the transmission loss setting from the *SLC*-2000 HDT by using the CIT. The loss may be either 0 dB or 3 dB.

Data Services

The *SLC ConnectReach* system provides data channels through the 10BaseT Ethernet port. The system provides this service through software configuration and requires no separate circuit cards or other hardware. When configuring the data bandwidth, 64 kb/s DS0s are made available in blocks of four (see Note). Total bandwidth for all services cannot exceed 24 DS0s.

> **NOTE:**
> If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future.

The 10BaseT port of the *SLC ConnectReach* system, along with the *SLC*-2000 HDT, normally provides an interface for data services between the LAN and the Internet and/or a private corporate network.

In the "Applications and Configurations" section of this appendix, the configuration that provides most of these services is described as "Data."

You can provision the *SLC ConnectReach* system to provide a maximum bandwidth of 24 DS0s. You must make available the DS0s in blocks of four. This bandwidth serves as the interface between the customer data interface and the digital line pulse code modulation (PCM) bit stream. The customer digital data rate per DS0 is 64-kb/s clear channel.

When configuring the functions at the HDT for the data services of the *SLC ConnectReach* system, you enter all functions and options through the *SLC*-2000 HDT CIT provisioning dialog or using the X.25 interface to an OSS.

Services Provided by the Secondary T1/DSX-1 Interface Supporting PBX, Key Systems, External Router, and ISDN PRI Services

When equipped with a Fractional T1 circuit card or a Fractional T1/DSP Processor Combination card, the *SLC ConnectReach* system provides an interface for secondary T1/DSX-1 services supporting PBX, key systems, and an external router through a T1-to-V.35 converter, such as nonswitched or nonlocally switched VF services.

Even though the services provided by the *SLC ConnectReach* system must be fully provisioned from the *SLC*-2000 HDT CIT, it is not necessary to provision parameters such as transmit gain, receive gain, hybrid balance, or equalization slope. The system merely cross-connects DS0s between the primary network T1/DSX-1/HDSL interface and the secondary T1/DSX-1 interface to provide this service.

ISDN PRI services provided through the secondary T1/DSX-1 interface require clear channel operation and do not require D-bank signaling. See the "OAM&P and Pre-installation Engineering" section of this appendix for provisioning details.

In the "Applications and Configurations" section of this appendix, the configurations that provide most of these services are described as "Secondary T1/DSX-1."

Operations, Administration, Maintenance, Provisioning, and Preinstallation Engineering

This section covers OAM&P and preinstallation engineering at both the *SLC ConnectReach* system and the *SLC*-2000 HDT.

SLC ConnectReach System

The "Applications and Configurations" section gives the basic *SLC ConnectReach* configurations. This section also gives the software and hardware required to support each configuration and the software and hardware to upgrade the configuration.

Document 363-208-050 contains the procedures and details necessary to perform OAM&P functions for the *SLC ConnectReach* system.

Operations Interfaces for the SLC ConnectReach System

You can provision the *SLC ConnectReach* software using the following operation interfaces:

- **Local Provisioning Terminal:** You can connect a local terminal or a PC running terminal emulation software to the system through the RS-232 port to provision the software. The initial provisioning of the system is usually performed through this port.

- **Remote Provisioning through a Modem:** By connecting a modem to the RS-232 port, you can dial in to the system for provisioning from a remote site.

- **Provisioning through a Telnet session:** You can access the *SLC ConnectReach* system for provisioning through a Telnet session.

- **Provisioning through the Internet:** You can access the *SLC ConnectReach* system for provisioning over the Internet.

- **Provisioning through the Ethernet LAN:** You can provision the *SLC ConnectReach* system from a computer connected to the 10BaseT Ethernet hub connected to the 10BaseT port.

- **Remote Provisioning through the SLC-2000 HDT CIT Interface:** You can provision the *SLC ConnectReach* system through a connection to the CIT interface on the *SLC*-2000 HDT. This requires that the *SLC*-2000 HDT contain software release R4.7 or later and the *SLC ConnectReach* system contain software version R3.0.5 or later. By using the *SLC*-2000 software's `access-dt` command, you can open a "communications channel" between the HDT and the *SLC ConnectReach* system. This command requires you to enter the *aid* of the DT Server in the HDT that interfaces with the specific *SLC ConnectReach* system. After establishing the communications channel, you can execute any *SLC ConnectReach* software command as shown in Document 363-208-050, *SLC*

ConnectReach Access System, User/Service Manual. Software downloads, slave-cold-start, slave-warm-start, and archiving are not supported through the HDT's CIT interface. To end a session with the *SLC ConnectReach* software from the HDT CIT, simply enter `dlc` to return to the *SLC*-2000 DLC subsystem software. For complete information on the `access-dt` command, see Document 363-208-003, *SLC-2000 Access System, Commands and Messages*.

Assigning Login Names and Passwords

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

When you log in to the *SLC ConnectReach* system by means of a Telnet session or the RS-232 port, there is only one level of privilege for configuring and monitoring the system. This privilege is called *Carrier*. The *carrier* privilege also applies when provisioning through the CIT connection of the *SLC*-2000 HDT. But when you log in to the *SLC ConnectReach* system by using a Web browser, there are two levels of privilege, *Carrier* and *User*. The two privilege levels offer different sets of available commands.

- **Carrier privilege:** This 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 *SLC ConnectReach* system. The use of this privilege should be carefully restricted.

- **User privilege:** This privilege allows limited access to configuration commands. It also allows you to change user passwords. User privilege also allows access to the monitoring commands. 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, you cannot log in for 5 minutes. After 20 failed attempts, you cannot log in for 1 hour.

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.

Required Information to Install and Configure Your System

Preinstallation Information

The more information you can gather about the customer site before beginning to configure and install a *SLC ConnectReach* system, the easier the process will be. Table 1-4 on page 1-75 provides a Preinstallation Worksheet. The worksheet is arranged around the following topics:

- **General Information about the Customer Site:**

  — **Placement:** After discussing options with your customer, determine if the system will be rack mounted, wall mounted, or a desktop mount. Rack mount systems require 1.75 inches above the unit for cooling. Each unit will include a rack and wall mount kit, along with rubber feet for desktop mounts. If an optional hinged wall mount assembly is used, the assembly must be mounted to ¾-inch plywood or equivalent. The assembly must also be mounted to swing to either the right or left (not up or down).

  — **Distance from the T1 carrier connector, HDSL, or DSX connection point:** Determine the distance between the unit and the network connection point. Each unit will include a 10-foot shielded (non-crossover) cable with RJ-38 connectors on both ends. If the distance is greater than 10 feet, you must obtain a custom cable. The connector type on the *SLC ConnectReach* system is an RJ48C.

  — **Distance from power source (AC powered systems):** The power requirement for the source is 120 V AC at 1 amp. Each unit includes a 6-foot. power cord with a connector that plugs into the system at one end, and a standard 120 V AC connector at the other end. Distances greater than 6 feet may require a licensed electrician to install a power source closer to the system or lengthening the power cord.

  — **Distance from power source (DC powered systems):** The power requirement for the source is a standard -48 V DC (50 VA) telephone power source. Each unit includes a DC power cable with one end containing a connector that plugs into the *SLC ConnectReach* system, and the other end containing open wires to allow for a custom engineered connection depending on your customer's requirements.

— **For AC systems requiring battery backup using optional 120 V AC/48 V DC Power Converter with Battery Pack:** If your application requires an AC system with battery backup, Lucent Technologies offers an uninterruptible power converter that includes battery backup. For this AC powered application, you must obtain this power converter along with a **DC powered** *SLC ConnectReach* system. When using this optional power converter, you must consider the air flow around the unit and the distance to the 120 V AC power outlet. The extruded aluminum heat sink, located on the front face of the unit, must remain clear to allow adequate airflow across its surface. The unit contains a 6-foot, 3-conductor power cord. Select a mounting location that allows convenient access to a grounded AC outlet. Use a separate 12- or 14-gauge wire (supplied by the customer) to ground the unit. The unit includes an installation kit that allows you to mount it to a wall. See the Technical Practice shipped with the unit for complete installation and operation instructions.

■ **Analog Voice Connections:** Determine the distance between the *SLC ConnectReach* system and the VF patch panel or telephone equipment connection. The cable required for this connection is not included with the unit. You must either purchase or make a cable of the required length that connects to a standard female RJ21X 25-pair connector.

■ **Secondary T1/DSX-1 Connections (optional):** Determine the distance between the *SLC ConnectReach* system and the PBX/Key system or telephone equipment connection. The cable required for this connection is not included with the unit. You must either purchase or make a cable of the required length. One end of the cable must connect to the *SLC ConnectReach* system's RJ48C **Secondary T1** connector, while the other end connects to the PBX/Key system or telephone equipment.

■ **10BaseT Ethernet Connection:** If your system will offer services from the 10BaseT port, determine the distance between the *SLC ConnectReach* system and the 10BaseT Ethernet hub. The cable required for this connection is not included with the unit. You must either purchase or make a cable of the required length. One end of the cable must connect to the *SLC ConnectReach* system's RJ-45 **10BaseT** port, while the other end connects to the Ethernet hub equipment.

■ **RS-232 Craft Provisioning and Maintenance Connection:** You must obtain a cable to connect the provisioning and maintenance equipment to the **RS-232** connector on the *SLC ConnectReach* system. This cable is not included with the unit. If you are connecting through a modem, you should purchase a standard 9-pin female PC modem cable.

Table 1-4. SLC ConnectReach System Preinstallation Worksheet

General

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

   (A rack and 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.

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

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

3. If AC powered, is the power receptacle within 6-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.

5. If AC powered and your application requires battery backup, obtain an optional power converter with battery backup. A separate #14 or #12 gauge ground wire is require but not included with the converter (supplied by customer).

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

Analog Voice

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

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

Secondary T1/DSX-1 RJ48C (Optional)

7. What is the distance between the *SLC 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 of KTS

	Pinouts	1 RX ring input	
		2 RX tip input	Pins 3, 6, 7, and 8 not used
		4 TX ring output	
		5 TX tip output	

Ethernet 10BaseT

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

   (Obtain or make appropriate cable length)

RS232 Craft Port

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

Remote Configuration or Diagnostics

9. 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 system requires a standard 9-pin female PC modem cable)

Preconfiguration Information

The data that should be available before beginning the configuration procedure is listed below. The numbered steps correspond to numbered areas on the Preconfiguration Worksheet (Table 1-5 on page 1-96).

Because the *SLC ConnectReach* system supports many interfaces and protocols, the configuration utility in the software 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 bold in the worksheets. All parameters listed below are described in more detail in Document 363-208-050 *SLC ConnectReach Access System, User/Service Manual*.

1. ***Network interface configuration.*** The primary information required is:

   Network HDSL Interface:

   — ***Clock source:*** For normal operation, you should always set the network HDSL clock source to *network*. Do not select *Internal* clock. (Default: Network)

   — ***Alarm operation:*** This option controls whether a failure in the network HDSL line will cause the alarm relay to close. To receive alarm information, select on. (Default: On)

   — ***Alarm delay:*** This option sets the delay between the network HDSL alarm and the closing of the alarm relay. By setting an alarm delay, you allow the system time to "clear" itself before notifying you of an alarm condition. (Default: 15 seconds)

   Network T1/DSX-1 Interface:

   — ***Framing format:*** The *SLC ConnectReach* system supports the two most common T1/DSX-1 framing formats: Extended Superframe (*ESF*) and Superframe (SF or *D4*). *TR08* option is not applicable. When connecting to a *SLC*-2000 HDT, *Lucent Technologies requires that this parameter always be set to ESF.* (Default: ESF)

   — ***Line coding format:*** Determine the type of line coding required. Line coding formats supported by the *SLC ConnectReach* system are *B8ZS* and *AMI*. Line coding determines how the DS1 requirement for ones density is handled. In every 8 bits of information, at least one pulse must be present. If the T1/DSX-1 service uses *AMI* line coding, it is important to enable the *pulse density enforcement* option. If the T1/DSX-1 service uses *B8ZS* line coding, a bipolar violation (BPV) is automatically inserted in place of a string of 8 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. *B8ZS* is the preferred configuration. *Lucent Technologies requires B8ZS line coding.* (Default: B8ZS)

   — ***Line Buildout:*** When connecting directly to T1 carrier systems, T1 line buildout is configurable to 0 dB, -7.5 dB, -15 dB, or -22.5 dB as required by FCC Part 68. Buildout sets the *SLC 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. When interfacing to a DSX-1 connection, the line buildout can be set to the following depending on the distance between the *SLC ConnectReach* system and the DSX panel or connecting equipment: 0 to 133 feet, 133 to 266 feet, 266 to 399 feet, 399 to 533 feet, 533 to 655 feet. 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). (Default: 0 to 133 feet/0 dB)

— **Clock source:** For normal operation, the network T1 clock source should always be set to *network*. Internal clock sourcing applies only to installations in which two sites are connected by two *SLC ConnectReach* systems and a private T1 line. In this case, one *SLC ConnectReach* system would be configured to use internal clock and the other to use network clock. (Default: network)

— **Pulse density enforcement:** This option is used only when *AMI* line coding is selected (see the description of line coding above. Since Lucent Technologies recommends that you normally use B8ZS instead of AMI, this option is normally off). 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. (Default: off)

— **Alarm operation:** This option controls whether the network T1/DSX-1 going down causes the alarm relay to close. To receive alarm information, select on. (Default: on)

— **Alarm delay:** This option sets the delay between the network T1/DSX-1 alarm and the closing of the alarm relay. By setting an alarm delay, you allow the system time to "clear" itself before notifying you of an alarm condition. (Default: 15 seconds)

— **ConnectReach System is a slave:** This option designates one of the two *ConnectReach* systems in a daisy-chained configuration as the slave. See the "48-Line Master/Slave Configuration" part of the "Applications and Configurations" section of this appendix for details. (Default: off).

---

[*]   Service mark of AT&T

2. ***Optional Secondary/Fractional T1/DSX-1 Interface***. For the optional secondary/fractional T1/DSX-1 interface to a PBX, key system, or other system, you need the following data:

— ***Framing format***: The *SLC ConnectReach* system supports the two most common T1/DSX-1 framing formats: Extended Superframe (*ESF*) and Superframe (SF or *D4*). When the network T1/DSX-1 is connected to a *SLC*-2000 HDT, *Lucent Technologies recommends that this parameter always be set to ESF.* (Default: ESF)

— ***Line coding format***: Determine the type of line coding required. Line coding formats supported by the *SLC ConnectReach* system are *B8ZS* and *AMI*. Line coding determines how the DS1 requirement for ones density is handled. In every 8 bits of information, at least one pulse must be present. If the T1/DSX-1 service uses *AMI* line coding, it is important to enable the *pulse density enforcement* option. If the T1/DSX-1 service uses *B8ZS* line coding, a bipolar violation (BPV) is automatically inserted in place of a string of 8 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. *B8ZS* is the preferred configuration. *Lucent Technologies recommends B8ZS line coding for most installations.* (Default: B8ZS)

— ***Line Buildout***: When connecting directly to T1 carrier systems, T1 line buildout is configurable to 0 dB, -7.5 dB, -15 dB, or -22.5 dB, as required by FCC Part 68. Buildout sets the *SLC 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. When interfacing to a DSX-1 connection, the line buildout can be set to the following depending on the distance between the *SLC ConnectReach* system and the DSX panel or connecting equipment: 0 to 133 feet, 133 to 266 feet, 266 to 399 feet, 399 to 533 feet, 533 to 655 feet. 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). (Default: 0 to 133 feet/0 dB)

— ***Pulse density enforcement***: This option is used only when *AMI* line coding is selected (see the description of line coding above. Since Lucent Technologies recommends that you normally use B8ZS instead of AMI, this option is normally off). 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. (Default: off)

— ***Alarm delay***: This option sets the delay between the secondary T1/DSX-1 alarm and the closing of the alarm relay. By setting an alarm delay, you allow the system time to "clear" itself before notifying you of an alarm condition. (Default: 15 seconds)

— **ConnectReach System has a slave:** This option allows the *SLC ConnectReach* system to serve as a *master* unit in the 48-line master/slave configuration. See the "48-Line Master/Slave Configuration" part of the "Applications and Configurations" section of this appendix for details. (Default: off)

3. **DS0 Provisioning — Voice and data channel assignments.** Voice and data channel assignments require the following data:

Voice Channels (analog DS0 services):

— Number of analog DS0 voice channels (channels set according to available hardware ports; however, analog DS0s actually provisioned can be equal or less than the number of ports that can be provided by the hardware). DS0 voice channels are provisioned in the software in blocks of four DS0s (DS0 1 - 4, DS0 5 - 8, etc.). If only one DS0 in the block of four is used, the other three DS0s in that block cannot be used for services other than voice channels.

— Number of analog DS0s for optional secondary T1/DSX-1 services (for example: to a PBX or a channel bank). (Default: none)

Data Channels (data bandwidth):

— Number of DS0 data channels assigned for data bandwidth. If you provision a data bandwidth of only one DS0 for the customer, you lose the ability to provide other types of service from the *SLC ConnectReach* system on the other three DS0s in the block of four DS0s. However, you can provision any of the remaining three DS0s as data bandwidth in the future. (Default: none)

— Number of digital DS0s for data bandwidth for optional secondary T1/DSX-1 services (for example data bandwidth for a CSU/router connected to the secondary/fractional T1/DSX-1 interface), (Default: none)

Alignment of Secondary/Fractional T1/DSX-1 Interface: If set to the default value *low*, the *SLC ConnectReach* system connects the lowest numbered DS0 on the network T1/DSX-1/HDSL interface to the first DS0 on the secondary T1/DSX-1 interface. If set to *same*, the DS0s on the network T1/DSX-1/HDSL interface are connected to the same DS0 numbers on the secondary T1/DSX-1 interface. (*Note*: Secondary/fractional T1/DSX-1 voice uses robbed bit signaling. Secondary/fractional T1/DSX-1 data does not use robbed bit signaling.)

Emulated Channel Unit Types per Channel: To provide services, the *SLC ConnectReach* system emulates *SLC*-2000 channel units. Each block of 4 DS0s can be assigned to appear to the *SLC*-2000 HDT as a specific channel unit. See the "Channel Unit Provisioning" part of this section for channel unit provisioning information from the HDT.

4. **_Synchronous interface (Network T1/DSX-1/HDSL Interface) configuration_**.

Determine whether the synchronous interface (the Network T1/DSX-1/ HDSL interface) uses frame relay, point-to-point protocol (PPP), or high-level data link control (HDLC) encapsulation.

Determine whether the synchronous interface should use HDLC inversion for pulse density enforcement (off). This parameter is normally set to "off." Pulse density enforcement applies only when the network T1/DSX-1/HDSL interface line coding format is set to AMI, regardless of the encapsulation scheme selected. _Lucent Technologies recommends that you normally set the line coding to B8ZS._

Determine the following address information (the customer's Internet service provider can provide this information):

— _SLC ConnectReach_ system IP address on the link to the carrier CO or use IP unnumbered

— Netmask (if any) for that address.

If the interface uses frame relay encapsulation, you need the following data (the customer's internet service provider can provide this information):

— Data link connection identifier (DLCI) number assigned to the _SLC ConnectReach_ system

— Local management interface (LMI) type

— N391[*] polling cycles for PVCs (6)

— N392[*] threshold (3)

— N393[*] monitored event counter (3)

— T391[*] link integrity polling timer (6)

— IP address, netmask, and DLCI of optional additional PVCs (PVC1 through PVC5).

If the interface uses PPP or HDLC, you need the following information:

— **IP Address or IP Unnumber/Disabled**: The _SLC 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**.**

— **Remote Peer IP Address**: IP address of the remote peer PPP device.

___

[*] It is recommended that the default values be used for these parameters unless the service provider specifies otherwise.

— **Netmask**

— **Routing Information Protocol (RIP) and RIP Version Number:**
For each encapsulation there are four 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*. Also, if applicable, determine the RIP version number.

5. **Ethernet interface configuration.** The data required includes the following (the customer's Internet service provider can provide this information):

    — *SLC ConnectReach* system IP address on the network on which it will be installed *or* select IP unnumbered

    — Netmask (if any) for the network on which the *SLC ConnectReach* system will be installed

    — Determine the mode of RIP to use for the primary and secondary IP addresses.; *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*. Also, if applicable, determine the RIP version number.

    — 10Base-T link integrity testing. Your customer will decide this (Default: on).

If you are using a secondary Ethernet interface, you will need to specify the IP address and netmask for this interface.

If the site already has an IP network that uses subnets, you should obtain the netmask information from the network administrator.

6. **Metallic VF Lines (Channel bank) configuration.** For an analog interface to the phone system, you will need the following data:

    ⇒ NOTE:
    In the *SLC 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 over metallic leads used with older transmission equipment.

    — **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 *SLC 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. (Default: Loop-ground)

    — **Incoming type (E&M trunks only):** This is only used for E&M trunks. It is 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 *SLC 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. (Default: wink-start)

    — **Outgoing type (E&M trunks only):** This is only used for E&M trunks. It 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*). (Default: wink-start)

    — **Analog interface (E&M trunks only):** This 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 current feed circuit card hardware, are for E&M only. The fxs-loop and fxs-ground options convert E&M signaling to current feed for connection to a loop-start or ground-start device, respectively. The fxo-did option, which requires current sink circuit card hardware, converts E&M DID signaling to current sink to allow an incoming DID connection to a PBX.

    The fxo-loop and the fxo-ground options, which requires current sink circuit card hardware, provides a connection between loop-start or ground-start at the CO and the current sink interface. Conversion from E&M signaling to FXO loop and FXO ground is not available. (Default: loop-start)

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

— ***Loop reversal from CO*:** This parameter is only used for loop-ground trunks. If enabled, and a polarity reversal signal is received on the digital trunk, then the *SLC ConnectReach* system reverses the polarity of the tip and ring leads of the current feed interface. If disabled, then polarity reversal signals from the digital trunk are ignored. (Default: enabled)

— ***Transmit gain*:** This parameter adjusts the transmit signal levels to the network from the current feed interface. The available settings are 0, −3, and −6 dB. (Default: −3 dB)

— ***Receive gain*:** This parameter adjusts the received signal levels from the network to the current feed interface. The available settings are 0, −3, and −6 dB. (Default: −3 dB)

— ***On-hook threshold*:** This parameter (in milliseconds) allows the *SLC 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 this parameter to a long enough interval (1500 milliseconds is typical) for the *SLC 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 300 milliseconds. (Default: 300 milliseconds)

— ***Alarm state*:** In the event of a network T1/DSX-1/HDSL alarm, this parameter determines if the current feed circuit card is to be put into a *busy* (tip closed) or *idle* (tip open) state. (Default: busy)

— ***State of unconfigured channels*:** This parameter determines if the current feed ports for unconfigured channels are put into a busy (tip open) or idle (tip close) state. It is not part of the configuration template, and has no impact on configured channels. (Default: idle)

7. **Digital trunk configuration.** The digital trunk menu is part of the *LCR*/DID optional feature. The DID and trunk signaling parameters for each digital trunk (DS0) are set here. You will need the following data:

— **Trunk group:** This parameter specifies the trunk group to which this DS0 belongs. (Default: 1)

— **Trunk signaling:** The *SLC ConnectReach* system supports loop-start, ground-start, or conversion from E&M trunk signaling to loop- or ground-start. The *SLC 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; (Default: unconfigured):

⇒ **NOTE:**
In the *SLC 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 parameter provides three options: incoming (calls from the CO), outgoing (calls to the CO), and 2-way (calls from and to the CO). The incoming option specifies that analog lines can only receive incoming calls, but cannot originate calls. (Default: two-way)

— **Incoming routing:** This parameter specifies the routing options for incoming calls. If you select the direct inward dial - dialed number identification service (DID-DNIS) or automatic number identification (ANI)-DNIS options, the incoming digits are collected by the *SLC ConnectReach* system, and routed to the appropriate analog line. Additional options allow an incoming call to be routed to a line or a group of lines. (Default: group)

— **Line group:** This parameter allows a trunk group to be routed to a line (station) or to a line group. It is used when the line associated with a DID or dialed number identification service (DNIS) trunk is busy. When this line is busy, the *SLC ConnectReach* system forwards the call to the analog line specified in the line-group parameter. (Default: 1)

— **Digit type:** This parameter allows the user to select the digit-addressing option. There are three options: dual-tone multiple frequency (DTMF), multiple frequency (MF), and pulse. Incoming addressing contains DID or DNIS information. (Default: DTMF)

— **Busy treatment:** This parameter 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, all trunks that route to a line group are taken off-hook whenever all lines in that line group are in use. The forward option sends the call to another line. (Default: busy signal)

— **Busy line forward:** This parameter specifies the line to which a call should be forwarded if the initial line is busy. (Default: 24)

— **Transmit gain:** This parameter adjusts transmit signal levels to the network from the current feed interface. Three settings are available: 0, −3, and −6 dB. (Default: −3 dB)

— **Receive gain:** This parameter adjusts receive signal levels from the network to the current feed interface. Three settings are available: 0, −3, and −6 dB. (Default: −3 dB)

8. **Analog trunk configuration.**The analog trunk menu is part of the *LCR/ DID* optional feature. The DID and trunk signaling parameters for each analog trunk (current sink circuit card) are set here. You will need the following data:

— **Trunk group:** This parameter specifies the trunk group to which this analog line belongs. (Default: 1)

— **Trunk signaling:** The *SLC ConnectReach* system supports *loop-start* or *ground-start* and also provides an *unconfigured* option for signaling that is absent. (Default: unconfigured)

— **Direction:** This parameter provides three options: incoming (calls from the CO), outgoing (calls to the CO), and 2-way (calls from and to the CO). The *incoming* option specifies that analog lines can only receive incoming calls, but cannot originate calls. (Default: two-way)

— **Incoming routing:** This parameter specifies the line, group of lines, or trunk to which the analog trunk is routed. (Default: group)

— **Line group:** This parameter allows a trunk group to be routed to a line group. It is used when the trunk is busy. When the line is busy, the *SLC ConnectReach* system forwards the call to the analog line specified in the line-group parameter. (Default: 1)

— **Digits type:** This parameter allows the user to select the digit-addressing option. (Default: DTMF)

— **Busy treatment:** This parameter 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 *SLC ConnectReach* system busy's out all members of the trunk when the line or line group is busy. The *forward* option sends the call to another line. (Default: busy signal)

— **Busy line forward:** This parameter specifies the line to which a call should be forwarded if the initial line is busy. (Default: 24)

— **Transmit gain:** This parameter adjusts transmit signal levels to the network from the current feed interface. Three settings are available: 0, −3, and −6 dB. (Default: −3 dB)

— **Receive gain:** This parameter adjusts receive signal levels from the network to the current feed interface. Three settings are available: 0, −3, and −6 dB. (Default: −3 dB).

9. **Line configuration.** The line menu is part of the *LCR*/DID optional feature.The line signaling parameters for the *LCR*/DID lines are set here. You will need the following data:

— **Line group:** This parameter specifies the line group to which these analog lines belongs. (Default: 1)

— **Line signaling:** The *SLC ConnectReach* system supports *loop-start* or *ground-start* and also provides an *unconfigured* option for lines that are absent. (Default: unconfigured)

— **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 *SLC ConnectReach* system also provides a *two-way* option. (Default: two-way)

— **Outgoing routing:** This parameter 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. If the trunk group is unavailable, the call is routed to the trunk group with the next highest number. (Default: LCR)

— **Trunk group:** This parameter, used only when the outgoing-routing parameter is set to *group*, allows the user to specify the trunk group number. (Default: 1)

— **On-hook threshold:** This parameter (expressed in milliseconds) allows the *SLC 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 (*1500* milliseconds is typical) for the system to differentiate between a flash and a disconnect. (Default: 1250 milliseconds)

— **Far-end disconnect:** If this parameter is enabled, and the digital central office disconnects the call, the *SLC ConnectReach* system opens the current feed tip for 1.4 seconds. This tells the analog equipment (for example, PBX) that the call has ended. (Default: enabled)

— **Polarity reversal:** This parameter is used for reversing the polarity of the DC when the central office has answered. Some PBXs use this for billing purposes. (Default: enabled)

— **Trunk ring default:** This parameter 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 parameter is system wide. (Default: double)

— **Paging line:** This parameter is used to designate a line for paging output. (Default: 0)

— **Hunting:** This parameter 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 parameter is system wide. (Default: most idle)

— **BOX features:** This parameter allows you to set the parameters for the individual *BOX* features. For a description of the *BOX* features, see the "Benefits and Features" section of this appendix.

10. **Map Extension configuration.** The map extension parameter associates phone extensions with analog lines. This parameter is primarily used for line to line calls within the premises.

It may also be used to route incoming DID calls.

The extension parameter 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 *SLC ConnectReach* system. In the *LCR*/DID mode, additional configuration menus, including the extension menu, are used to specify call routing and DID operation.

— **Extension digits:** This parameter specifies the number of extension digits to allow for each extension. (Default: 2)

— **Set Line:** This parameter 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:** The parameter allows the clearing of any line in the extension map data base. The confirm option will bypass the prompt, *Do you really want to clear the extension and alt-extension of line n?*

11. **Dialing configuration.** The dialing menu is part of the *LCR*/DID optional feature. The dialing table routes calls to digital or analog trunks and translates special numbers such as 411, 611, and 911 to 7- or 10-digit numbers. You will need the following data for dialing configurations:

— **Detect-insert:** This parameter 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. The maximum number of characters allowed for the pattern parameter is 250. If more than one pattern is specified in a row, a vertical bar surrounded by spaces — " | " — denotes the beginning of the next pattern. The syntax for a pattern is as follows:

Digit — one of the following: 0 1 2 3 4 5 6 7 8 9 matches that digit (example: 3).

Range — [digit-digit] matches any digit (example: 2-4).

X — X matches any digit (examples: XXXXXXX matches any 7-digit number, 413XXXX matches 4134361; 413436XXXX matches 4134361234.

Local — L matches any 4 digits (example: 413L matches 413 followed by any four numbers).

Timeout — T accepts additional digits waiting for inter-digit timeout (example: 413T matches both 4134361234 and 4134361).

Figure 1-26 shows an example of a Detect Table with the following rows:

Row 1 — Detects toll free and 900 number calls and refers them to output row three.

Row 2 — Detects United States long distance calls and refers them to output row one.

Row 3 — Detect international calls and refers them to output row two.

Row 4 — Detects local calls, including information, service repair and emergency calls, and refers them to output row three.

Row 5 — Detects credit card calls and refers them to output row three.

```
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
```

scrdetbl.eps

Figure 1-**26.   Detect-Insert Table Example**

— **Output-insert**: This parameter 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 maximum number of *digits* is 15. The syntax for this entry are as follows:

Digit — One of the following: 0 1 2 3 4 5 6 7 8 9 matches that digit (example: 3).

D — D deletes the current digit from the number dialed.

P — P provides a pause.

Figure 1-27 shows an example of a Output-Insert table with the following rows:

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

Row 2 — The call is routed to trunk one with trunk group two as an alternate (row 3).

Row 3 — The call is routed to trunk two.

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

scrouttbl.eps

Figure 1-27. Output-Insert Table Example

— **Access-code:** This parameter assigns from one to six digits, 0 through 9, 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 that 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 the caller dials 429-1101, the extension is 101 and the access 4291.

— **Default-output:** This parameter specifies the row in the output table entry that contains both the primary and alternate trunk groups.

— **Trunk-access:** This parameter determines how a caller will access an outside trunk. If *trunk-access* is enabled, the caller dials the *access-code* to get an outside trunk. If auto is enabled, the caller dials the *access-code* in combination with the extension to get an inside line.

— **DID-received-digits:** This parameter specifies the number of DID digits to expect from the central office.

— **DID-undefined-type:** This parameter specifies the treatment of calls with unknown DID-strings that are received from the central office. There are two options: route the call to the specified *analog line*, or refuse the call (*reorder*).

— **DID-undefined-line-num:** If the central office sends an invalid DID string, the call will be forwarded to this line.

— **Pause:** This parameter specifies the pause interval (expressed in milliseconds) inserted for a P in the *digits* option of the dial string command.

12. **Voice mail configuration.** A group of lines may be configured to interface with a voice mail system. The voice mail configuration allows for custom configuration as well as five preset voice mail profiles. If needed, you can set the following parameters:

— **Line group:** This parameter specifies the line group designated for the voice mail system. (Default: 5)

— **Integration delay:** This parameter sets the delay between the initial call to the voice mail system and the sending of the DTMF string. (Default: 500 ms)

— **Stutter tone:** If this parameter is enabled, the user will hear a stuttering dial tone when they pick up the receiver indicating there are messages waiting. (Default: off)

— **Periodic ring:** If this parameter is enabled, the phone will give two short rings every 5 minutes indicating there are messages waiting. (Default: off).

— **Dial-number:** This parameter is used to assign a unique extension number for accessing the voice mail system.

— **Profile-name:** You may assign a name to the configured voice mail settings. Any alphanumeric name up to 20 characters in length is accessible.

— **DTMF settings:** Select DTMF settings for direct prefix, ring no answer, busy no answer, forward all, unforward, and message waiting indicators.

— **Preset Profiles:** As explained in the "Features and Benefits" section of this appendix, the system includes five preset configurations for the most common voice mail system profiles.

13. **Login name and password configuration.**

For security, it is recommended that you configure login names and passwords to be used by individuals who require access to the *SLC ConnectReach* system for configuration and management. Two privilege levels are available, and you may set up one login name and password for each privilege level.

14. **DHCP configuration.** DHCP is enabled by default.

If the site uses the Dynamic Host Configuration Protocol (DHCP) on the *SLC ConnectReach* system to allocate IP addresses dynamically to devices on the network, you must specify the following:

— Start and end of the IP address pool to be used at the site. (If your system does not use a SOCKS firewall, obtain the address pool from the internet service provider. If SOCKS is used, your customer can choose the address pool.)

— Whether or not the site is considered a private network. (Your customer decides this. However, if a SOCKS firewall is used, their internal network is considered private.)

— Lease time of DHCP-allocated addresses. (It is recommended that the default value be used. However, this is up to your customer. The default value works well with Windows 95 and Windows NT operating systems.)

— IP address of DNS server (this is provided by your internet service provider)

— Local site's domain name (Your customer usually chooses their own domain name — for example: xxxxx.com. The internet service provider usually registers the name for the customer).

If the site already has a DHCP server, or if each network device will be permanently assigned a unique IP address, you do not need to enable and configure DHCP on the *SLC ConnectReach* system.

15. **Simple network management protocol (SNMP) configuration.**

If SNMP traps are sent automatically to a remote host, you must specify the IP address of the host that will receive the SNMP traps. This is usually an SNMP host on the carrier's management network, so maintenance staff is aware of changes in equipment status before getting calls from the customer site.

If you enable SNMP, you should also enable some or all of the possible SNMP trap types (see Table 1-5 on page 1-100 for the list).

> **NOTE:**
> A *trap* is a message sent when an unexpected error-type event occurs. For example, a trap is sent if the network T1/DSX-1/HDSL interface looses connectivity.

16. **Route configuration.** The *SLC ConnectReach* system allows the user to set a default route and up to ten static routes. For ease of configuration, the user may specify wide area network (WAN) or permanent virtual circuit (PVC) number instead of an IP gateway address. For each default or static route you must specify:

— Network IP address

— Netmask

— PVC or gateway (gateway needs an IP address).

> **NOTE:**
> Your customer's internet service provider assigns these items.

17. **Firewall configuration.** The *SLC ConnectReach* system incorporates two different firewall technologies: SOCKS application proxy and IP filtering. Of the two firewalls, SOCKS is the more secure because the internal network is completely invisible to the outside world (the internet). However, SOCKS also provides the following disadvantages: (1) web browsers must be specially configured to use the SOCKS server; (2) your customer cannot have an internal server that is accessible from the outside; (3) there is a slight performance degradation. IP filtering offers none of the disadvantages of SOCKS. However, it is more complicated to set up.

For most installations, configuring the firewall is extremely simple. The system allows the following four standard firewall configurations:

— SOCKS

— SOCKS plus server

— IP filter

— IP filter plus server.

18. **Network time protocol (NTP) configuration.** NTP is enabled by default.

NTP is used to obtain the time of day for time-stamping the event log messages. The following must be specified for NTP:

— IP address or host name of the server

— The difference in minutes between local time and Greenwich Mean Time (GMT).

19. **Domain Name Service (DNS) proxy service configuration.**

If SOCKS is enabled, the DNS proxy service must be enabled. You must specify the following information:

— IP address of the primary DNS server on the WAN/Internet

— IP address of secondary DNS server (if any) on the WAN/Internet.

➡ **NOTE:**
Your customer's internet service provider assigns these items.

20. **RS-232 baud rate.** By default, the RS-232 port operates at 9,600 baud.

If the system will have a modem permanently attached to the RS-232 port to allow remote configuration and management, and if the modem is capable of operating at speeds higher than 9,600 baud, you should set the RS-232 port baud rate to match the modem's data terminal equipment (DTE) speed. Available baud rates are 9,600, 19,200, and 38,400.

21. ***Internet packet exchange (IPX) configuration.*** IPX is disabled by default. The IPX protocol allows routing between two offices that use Novell NetWare. The *SLC ConnectReach* system supports the IPX protocol over the main frame relay PVC only. The IPX protocol is not supported over WAN links using PPP or Cisco HDLC protocols. Since IPX protocol packets are generally not forwarded over the Internet, the *SLC ConnectReach* system implementation is intended to be used in a corporate/branch office frame relay connection topology. 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. To enable the IPX protocol you must specify the following information:

— Router name

— 32-bit hex number representing the internal network's router

— LAN encapsulation for IPX traffic over the Ethernet

— 32-bit hex number representing the WAN network.

⇒ **NOTE:**
Your customer's system administrator assigns these items.

Table 1-5.   SLC ConnectReach System Preconfiguration Worksheet

1.	Network Interface	HDSL	Clock Source	❏ **Network**	❏ Internal (always select Network)		
			Alarm	❏ Off ❏ **On**	Delay:_____ (0...**15**...3600 sec.)		
		T1/DSX-1	Framing Format:	❏ **ESF**	❏ D4/SF		
			Line coding:	❏ **B8ZS**	❏ AMI (always select B8ZS)		
			Build-Out:	❏ **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 (always select Network)		
			Pulse Density:	❏ **Off**	❏ On		
			Alarm:	❏ Off ❏ **On**	Delay: (0...**15**...3600)		
			Is-slave:	❏ **Off** ❏ On			
2.	Secondary/Fractional T1/DSX-1		❏ **Off**	❏ On			
			Framing Format:	❏ **ESF**	❏ D4/SF		
			Line Coding:	❏ **B8ZS**	❏ AMI		
			Build-Out:	❏ **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)		
			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 _____				
			❏ Secondary T1DSX-1 voice channel range: Begin_____ End _____ (**none**)				
		Data Channels:	❏ Data Channel range: Begin_____ End _____				
			❏ Secondary T1DSX-1 data channel range: Begin_____ End _____ (**none**)				
		Alignment Sec.T1/DSX-1:	❏ **Low**	❏ Same			
		ConnectReach:	Range: 1—4	CU:_____	Range 5—8	CU:_____	
			Range: 9—12	CU:_____	Range 13—16	CU:_____	
			Range: 17—20	CU:_____	Range 21—24	CU:_____	
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...**3**...10)		

Continued on next page

Table 1-5. SLC ConnectReach System Preconfiguration Worksheet (Continued)

4.	Synchronous Interface (cont.)	Frame Relay (cont.)	PVC1 through PVC5	DLCI: _____ (16...991)
				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) Beginning and ending of configuration blocks*.	
		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:	❏ **FXS Loop Start** ❏ FXS Ground Start ❏ FXO -DID ❏ FXO Loop Start ❏ FXO 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	

Continued on next page

Table 1-5.   SLC ConnectReach System Preconfiguration Worksheet (Continued)

6.	Channel Bank (cont.)	On-hook threshold: _____ (**300**...2000 msec)			
		Alarm State:	❏ Idle	❏ **Busy**	
		Unconfigured State	❏ Idle	❏ **Busy**	
7.	Digital Trunk Note: Configuration is required only if the *LCR* feature is enabled	Range:	Begin (**1**...24) End (1...**24**) Beginning and ending of configuration blocks*.		
		Group:	(**1**...10)		
		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
		Transmit Gain:	❏ 0 dB ❏ **−3 dB** ❏ −6 dB		
		Receive Gain:	❏ 0 dB ❏ **−3 dB** ❏ −6 dB		
8.	Analog Trunk Note: Configuration is required only if the *LCR* feature is enabled	Range:	Begin (**1**...24) End (1...**24**) Beginning and ending of configuration blocks*.		
		Group:	_____ (1…**2**…5)		
		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		
9.	Line Note: Configuration is required only if the *LCR* feature is enabled	Range:	Begin (**1**...24) End (1...**24**) Beginning and ending of configuration blocks *		
		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**	

Continued on next page

Table 1-5.   SLC ConnectReach System Preconfiguration Worksheet (Continued)

9.	Line (cont.)	Polarity Reversal	❏ Disable	**❏ Enable**	
		Trunk Ring Default	**❏ Double**	❏ Single	
		Paging Line	**0 (valid line)**		
		Hunting	❏ Linear	**❏ Most Idle**	
		BOX Features		(Refer to "Benefits and Features" section 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...0,D,P)		
			Row:___(**1**...16) Group _____ Alt. out. row_____ Digits_____(0...0,D,P)		
			Row:___(**1**...16) Group _____ Alt. out. row_____ Digits_____(0...0,D,P)		
		Clear output:	Row:___(**1**...16)		
		Access code:	_____(0...9)		
		Default trunk grp.:	Output row # _____ (1 ... 16)		
		Trunk access:	**❏ Enabled**	❏ Auto	
		DID received digits:_____	(1...**2**...12)		
		DID undefined type:		❏ Analog line	**❏ Reorder**
		DID undefined line number:_____	(1 ... 48)		
		Pause: _____	(100...**2000**...20000 msec)		

Continued on next page

Table 1-5.   SLC ConnectReach System Preconfiguration Worksheet (Continued)

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: _____ DTMF settings for direct prefix, ring no answer, busy no answer, forward all, unknown forward, and message waiting indicators. Preset 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 address in address pool: _____ (192.168.0.1) Last address in address pool: _____ (192.168.255.255) Private network: ❏ **On** ❏ Off Lease time:____ (**600**…7200 seconds) DNS server IP address: _____ Domain name: _____
15.	SNMP Service	Enable: ❏ **On** ❏ Off IP address of SNMP host: _____

		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		

Table 1-5.   SLC ConnectReach System Preconfiguration Worksheet (Continued)

16.	Route (1 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.	Firewall	Standard:	❏ SOCKS	❏ SOCKS/ server	❏ IP Filter ❏ IP Filter/ server
		Custom:	(See Document 363-208-050 for custom IP firewall configuration.)		
18.	NTP	Enable:	❏ **On**	❏ Off	
		Host name or IP address:_____			
		Difference in minutes between local time and Greenwich Mean Time (GMT) _____			
19.	DNS Proxy Service	Enable: ❏ **On** ❏ Off IP address of primary DNS server: _____			
		IP address of secondary DNS server: _____			
20.	RS-232 Port:	Baud rate:	❏ **9,600**	(This is the default and recommended settings)	
21.	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.

Maintenance and Troubleshooting

LEDs

The *SLC ConnectReach* system provides the following LEDs that assist with
maintenance and troubleshooting activities:

- **Green Status LED**: This green LED provides an indication of the status of
  the self-test and activity on the network T1/DSX-1/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 network T1/DSX-1/HDSL line.

  - **Flashing** — Self-test was successful; data packets are being sent/
    received on the network T1/DSX-1/HDSL line.

  - **Off** — Self-test failed.

- **Maintenance 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/DSX-1/HDSL
    line.

  - **Flashing** — A diagnose command is active.

  - **Off** — The *SLC ConnectReach* system is operating normally.

- **Network T1/DSX-1/HDSL and Secondary T1/DSX-1 Status LEDs**:
  These yellow LEDs provide an indication of a yellow alert or bipolar
  violations on the network T1/DSX-1/HDSL and/or secondary T1/DSX-1
  line. The various states of the **T1 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 *SLC 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.

■ **Network T1/DSX-1/HDSL and Secondary T1/DSX-1 Status LEDs:**
These red LEDs provide an indication of a red alarm condition or a high bit
error rate on the network T1/DSX-1/HDSL and/or secondary T1/DSX-1
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 SLC 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.

Flash Memory Layout

The SLC ConnectReach system boots from its flash memory area. The flash
memory has the following partitions:

■ **Nonvolatile Random Access Memory (NVRAM):** This partition contains
the saved configuration information.

■ **System Image:** This partition contains the advanced operational software
such as DHCP SNMP, DNS, and SOCKS. This software is periodically
upgraded to provide new features.

■ **Protected Boot:** This partition contains software that allows recovery if the
system software is corrupted. The Ethernet address and serial number are
written to the protected boot area during the manufacturing process.

Disaster Recovery

If a catastrophic failure causes the SLC ConnectReach system to lose its system
image, the 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 SLC ConnectReach system
automatically restarts in normal mode. For information about downloading
software by means of the **RS-232** port, refer to Document 363-208-050, SLC
ConnectReach Access System, User/Service Manual.

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 Document 363-208-050, *SLC ConnectReach Access System, User/Service Manual* for detailed procedures.

Lucent Technologies recommends that you keep an up-to-date record of the *SLC 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 and Preconfiguration Worksheets that record all the configuration information gathered at the time of the initial installation and configuration. If you change the configuration later, update the worksheets 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 software's 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.

➡ **NOTE:**
The **archive** command is not available when accessing the *SLC ConnectReach* system though the *SLC*-2000 HDT CIT using the **access-dt** command.

SLC-2000 HDT

DLC Subsystem Software

To host the *SLC ConnectReach* system, the DLC subsystem must contain Software Release R4.6.1 or later.

ARM Shelf Configurations

As shown in the "Applications and Configurations" section of this appendix, you can host the *SLC ConnectReach* system through an OC-1 ring. This requires the use of DDM-2000 FiberReach Wideband Shelves (WBSs). The WBSs in the OC-1 ring must be hosted by the ARM shelf of a *SLC*-2000 system or DDM-2000 OC-3 Multiplexer. To configure the *SLC*-2000 ARM shelf to host the OC-1 ring, see Document 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide*.

Document 363-208-000 also contains ARM configurations for multiplexing DSX-1 signals from the DT Servers onto the OC-1 ring.

MDS Assembly Configurations

Document 363-208-000 contains MDS assembly configurations. The *SLC ConnectReach* system requires the MDS assembly to be configured for fiber in the loop (FITL). *Lucent Technologies recommends the use of an SPQ809 or later DT Server to interface with SLC ConnectReach systems.* All DT Servers interfacing with *SLC ConnectReach* systems are configured for the following:

- 24-lines or 12-lines
- DSX
- B8ZS.

Cross-Connections

As described in the "Benefits and Features" section of this appendix, the *SLC ConnectReach* system interfaces with the *SLC*-2000 HDT through a network T1/DSX-1/HDSL interface connection. This network interface connection can be carrying DS0s from both metallic VF lines and data equipment. The *SLC*-2000 HDT *unbundles* the VF lines and data DS0s, then routes them to their proper destination.

This unbundling occurs within the TSI of the HDT. By entering the **ENT-CRS-T0** cross-connect command from the *SLC*-2000 craft interface terminal (CIT), you can route the voice DS0s to a TR-303 or TR-08 interface or other interfaces of an LDS. You can also route the data DS0s to an INA DS1 interfacing with a data network such as the Internet or a corporate private network.

See Document 363-208-050 *SLC ConnectReach Access System, User/Service Manual,* for the specific cross-connection commands and the procedures for configuring the cross-connections.

Channel Unit Provisioning

From the *SLC*-2000 HDT prospective, the *SLC ConnectReach* system performs similar to a 24-line *SLC*-2000 MSDT. The HDT software even "sees" six virtual channel unit slots that contain emulated *SLC*-2000 channel units providing the *SLC ConnectReach* services. The *SLC ConnectReach* software emulates the following channel units. Follow the special provisioning instructions for the specific channel unit emulation:

■ *SPQ440C channel unit*: This channel unit emulation is associated with current feed VF-type service such as voice and services provided by the *BOX* feature. You must first provision the block of four DS0s at the *SLC ConnectReach* system before establishing this service at the HDT. Using the HDT CIT, the DS0s are normally cross-connected to a TR08 or TR-303 interface. If the *SLC*-2000 HDT has not been provisioned, then no HDT CIT provisioning is necessary because the system uses the default values. However, if there is any other provisioning, or if you want to verify that provisioning is correct, use the **ENT-T0** or **ED-T0** CIT commands to provision each of the four DS0s associated with the emulated channel unit using the following parameters:

— **CLEI = other**

— **Function Code = DFLT**

— **redlined = NO or YES** (customer's choice)

■ *SPQ452 OCU data port*: This channel unit emulation is normally associated with the DS0 data channel bandwidth through the Ethernet port. It usually provides data services but will also support some services associated with the secondary T1/DSX-1 port such as ISDN PRI services. You must first provision at least one DS0 in the block of four DS0s at the *SLC ConnectReach* system before establishing service at the HDT. Once the needed number of DS0s have been established at the *SLC ConnectReach* system, provision the emulated *SPQ*452 channel unit from the HDT CIT. The actual *SPQ*452 OCU normally contains two circuits for 64-kbs DS0 services: *circuit 1* and *circuit 3*. Each of these two circuits will also allow another 64-kbs channel for secondary error correction. When using the emulated *SPQ*452 OCU in the *SLC ConnectReach* system, you can use all four channels for 64-kbs DS0 bandwidth as follows:

1. *To add one 64-kbps DS0 channel*, provision *circuit 1* of the *SPQ*452 for 64 kbps with no error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = NONE** (default)

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

2. ***To add two 64-kbps DS0 channels***, provision *circuit 1* of the *SPQ*452 for 64 kbps with error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = SCEC**

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

3. ***To add three 64-kbps DS0 channels***, provision *circuit 1* of the *SPQ*452 for 64 kbps with error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = SCEC**

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

Then, provision *circuit 3* of the *SPQ*452 for 64 kbps with no error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = NONE** (default)

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

4. ***To add four 64-kbps DS0 channels***, provision *circuit 1* of the *SPQ*452 for 64 kbps with error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = SCEC**

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

Then, provision *circuit 3* of the *SPQ*452 for 64 kbps with error correction by using the **ENT-T0** or **ED-T0** CIT command along with the following parameters:

— **CLEI = 5SCTFF**

— **Function Code = OCU** (default)

— **Rate = 64**

— **EC = SCEC**

— **ZC = YES** (automatically selected when Rate = 64)

— **SC = YES** (automatically selected when Rate = 64)

— **QM = NO** (default)

— **Redlined = NO or YES** (customer's choice)

Also using the HDT CIT, these DS0s are normally cross-connected to an INA DS1 and routed to a frame relay network for data.

■ ***SPQ456 channel unit:*** This channel unit emulation is associated with current sink service for DID applications, services provided by the *LCR* feature using analog circuits or trunk groups, and services provided by the *BOX* feature on inward bound trunks. You must first provision at least one DS0 in the block of four DS0s at the *SLC ConnectReach* system before establishing this service at the HDT. Then, using the **ENT-T0** or **ED-T0** CIT command, provision each DS0 associated with the emulated channel unit using the following parameters:

— **CLEI = SACPDC**

— **Function Code = RVT** (default)

— **ls (Loss) = 2.5 dB** (recommended) or **0 dB**

— **Redlined = NO or YES** (customer's choice)

Also using the HDT CIT, these DS0s are normally cross-connected to TR-08 or TR-303 interface.

■ **SPQ443 channel unit**: This channel unit emulation is associated with the correct D-bank signaling for a digital PBX or key system connected to the *SLC ConnectReach* system through the secondary T1/DSX-1 port. Using the HDT CIT, the DS0s supported by this channel unit emulation are normally cross-connected to the trunk side of an LDS interface. You must first provision at least one DS0 in the block of four DS0s at the *SLC ConnectReach* system before establishing this service at the HDT. Then, using the `ENT-T0` or `ED-T0` CIT command, provision each DS0 associated with the emulated channel unit using the following parameters:

   — `CLEI = SAC1AE`

   — `Function Code = FXS` (default)

   — `imp = 600` (default)

   — `bal = 3` (default)

   — `sl = 0` (default)

   — `xmtgn = -1.0` (default)

   — `rcvgn = -8.0` (default)

   — `oht = NO` (default) or `YES` — `oht` can only be operational if supported by the far end customer premises equipment

   — `Redlined = NO or YES` (customer's choice).

➡ **NOTE:**
See Document 363-208-050 *SLC ConnectReach Access System, User/Service Manual* for the specific provisioning details and procedures.

Maintenance and Troubleshooting

You can perform specific maintenance and troubleshooting activities from the *SLC*-2000 HDT. You can execute commands and obtain reports from both of the following:

■ User interface panel (UIP)

■ Craft interface terminal.

For detailed information on maintenance and troubleshooting, see Document 363-208-050 *SLC ConnectReach Access System, User/Service Manual.*

Technical Specifications

This section gives the technical specifications of the *SLC ConnectReach* system.

Channel Service Unit (CSU) Functionality

- DSX-1 network interface

- Connector RJ-48C (keyed)

- Monitor jack: dual bantam

- Line rate:1.544 Mbps

- Clock source: line (carrier)/local

- Line coding: B8ZS or AMI (always select B8ZS)

- Framing: D4 (SF) or 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

Current Feed Circuit Card Analog Line Support

- 0–24 ports expandable in 4- or 8-port increments

- Loop-start/ground-start

- Robbed bit line signaling

- Support of modems

- -48-volt battery

- Ringing: 5 ringing equivalent number (REN) per port

- Tx and Rx gain adjust: 0 dB, -3 dB, or -6 dB

- Impedance: 600 ohms

- Range: 480 ohms (including DC off-hook resistance of the phone)

Current Sink Circuit Card Analog Line Support

■ 0–24 ports expandable in 4- or 8-port increments

■ Loop-start/ground-start

■ Robbed bit line signaling

■ REN = 1.2 per port

■ Tx and Rx gain adjust: 0 dB, -3 dB, or -6 dB

■ Impedance: 600 ohms

Network T1/DSX-1 and Secondary T1/DSX-1 Support

■ Fractional DSX-1 to PBX, key system, or channel bank

■ Connector: RJ-48C (keyed)

■ Line rate:1.544 Mbps

■ Clock source: network (network T1/DSX-1)

■ Line coding: B8ZS or AMI (always use B8ZS)

■ Framing: D4 (SF) or ESF or TR08 (network interface only) (when using a master/slave configuration, set the "master" *SLC ConnectReach* box to 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

■ Robbed bit line or trunk signaling supported

■ Current feed, current sink, E&M, DID, ANI, and DNIS via PBX or channel bank

⇒ **NOTE:**
In the *SLC 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.

DSX-1 Provisioning

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

DS0 Provisioning

- Data rates: 64 kbps to 1.536 Mbps in 64-kbps steps

IP Networking

- IP over frame relay
- HDLC (Cisco)
- PPP

Frame Relay

- LMI T1.617 (Annex D, *ANSI*[*] Standard)
- LMI Q.933 (Annex A)
- IP over frame relay per request for comment (RFC)1490
- Dual PVCs supported

---

[*]   Registered trademark of American National Standards Institute, Inc.

IP Address Management

- Dynamic Host Configuration Protocol (DHCP) automatically configures IP addresses for PCs on the Ethernet network
- IP address conservation

Ethernet Port

- 10Base-T
- Connector: RJ-45

Firewall Support

- 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

Local Craft Terminal Port

- 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 kbps or ISDN 64/128 kbps

- Menu-based management interface

Provisioning and Maintenance Management

- Statistics, status, and configuration of all interfaces

- Access via DSX-1 or Ethernet ports

- SNMP Version 1, MIB II

    — MIBs supported: TCP/IP, frame relay, DSX-1

- HTTP (compatible with industry-standard Web browsers)

- Telnet interface

- Local craft terminal via RS-232 port (modem or terminal)

- Telnet and console interfaces password-protected

- HTTP interface password-protected with two privilege levels

Power

- 95-125 V AC, 60 Hz, 1 amp

- 40-56 V DC, 50 VA

Physical Dimensions

- Size: 17.0" W by 14.0" D by 1.75" H
- Weight: 9.0 lb.
- Mounting configurations:
    — Desktop
    — Wall-mount
    — 19" rack mount
    — 23" rack mount
- Clearance:
    — Above: 1.75"
    — Below: 0"
    — Front: 5"
    — Rear: 0.6"
    — Sides: 2"

Compliance

- Compliance: FCC Part 68, Industry Canada CS 03
- Emissions: FCC Part 15, Class A
- Safety: *UL*[*]1950, C-UL listed I.T.E.
- AT&T TR 62411, 54016
- *ANSI* T1.403
- EIA 464-B

---

[*]   Registered trademark of Underwriters Laboratories Inc.

Optional 120 V AC/48 V DC Power Converter Unit

- Input voltage: 95 to 135 volts, 47 to 63 Hz

- Input current: 2.1 amps RMS steady state, maximum

- Power cord: 3-conductor with plug, length 6 feet, nominal, not detachable

- Output voltage: 48.5 ±1 VDC (with 50 mA minimum load)

- Output current: 2A maximum, continuous

- Output technology: on-line uninterruptible power supply (UPS)

- Battery operating time (nominal):

    — 10 hours, with 0.5 amp output current

    — 4.5 hours, with 1 amp output current

    — 2 hours, with 2 amps output current

- Battery charge time (nominal, with batteries fully discharged):

    — 4.5 hours, with 0.5 amp output current

    — 4.75 hours, with 1 amp output current

    — 6 hours, with 2 amps output current

- Batteries:

    — Quantity: 4

    — Type: 12 volt, 6.5 amp-hour, sealed lead-acid

- Output current for automatic shutdown: 2.6 amps, nominal

- Minimal load current for optimal regulation: 50 mA

- Load regulation: less than 1% load current 50 mA to 2 A, input voltage 95 to 135 VAC

- Output ripple voltage: less than 10 mV rms, maximum

- Output compliance: complies with FCC Part 68 for talk battery quality

- Input to output efficiency: 87% at full load, nominal

- Output connections: 5-position detachable screw terminal strip

- Transient protection: input and output protected against transients

- LED indicators: 3

- Auxiliary relay contact:

    — Type: normally open (not shorted)

    — Rating: 0.5 amp maximum at 60 V DC or 60 V AC (resistive

- Operating environment: -10 to 50 degrees C, humidity to 95% (no condensation)

■ Radiated noise compliance: Complies with FCC Part 15, subpart J, class A for radiated and conducted emission

■ Safety compliance: *UL* listed power supply

■ Dimensions (overall):

— 6.3 inches high

— 12.4 inches wide

— 8.1 inches deep

■ Weight: 29.8 lbs.

■ Mounting: intended for wall mounting only.

Ordering

SLC ConnectReach Access System Ordering Information

This section covers the basic information needed to order and equip a *SLC ConnectReach* system. It also includes ordering examples for each of the basic configurations described in the "Applications and Configurations" section of this appendix. To place an order, contact your Lucent Technologies Sales Representative.

Table 1-6 provides the following information for each orderable item:

- High-level description
- Comcode
- ED or apparatus code
- *COMMON LANGUAGE CLEI* code.

> **NOTE:**
> Please refer to the part of this "Ordering" section entitled "Special *SLC ConnectReach* System Ordering Considerations" before ordering any *SLC ConnectReach* system equipment or software.

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 metallic VF lines required
- If required, the number of DS0s required to provide the data bandwidth.

See the following web site for the latest ordering information (see Note):
http://www.wr.lucent.com/slc2000/

> **NOTE:**
> At the present, this site is available to Lucent Technologies employees only. External customers should contact their Sales Team Account Representative for the latest information.

Table 1-6. SLC ConnectReach Access System Orderable Items

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI* Code
Metallic VF Lines Only Systems			
Basic *SLC® 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).	601911829	ED-7C830-30, G1	SAM2DC0BRA
Basic *SLC 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).	601911837	ED-7C830-30, G2	SAM2EC0BRA

* COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

Table 1-6.   SLC ConnectReach Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI** Code
Metallic VF Lines Only Systems			
Basic *SLC® 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.	108501297	LV2-70-A-0-02-00-00-L	—
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.	108501305	LV2-70-D-0-02-00-00-L	—

*   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

Continued on next page

Table 1-6.   SLC ConnectReach Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI* Code
Integrated Metallic VF Lines and Data			
Basic *SLC® 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 metallic VF lines and full data services. However, metallic VF line circuit cards are *not* included and must be ordered separately.	601911845	ED-7C830-30, G3	SAM2FC0BRA
Basic *SLC 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 metallic VF lines and full data services. However, metallic VF line circuit cards are *not* included and must be ordered separately.	601911852	ED-7C830-30, G4	SAM2GC0BRA

*   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

Table 1-6.   SLC ConnectReach Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI* Code
Integrated Metallic VF 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 metallic VF lines and full data services. However, metallic VF line circuit cards are *not* included and must be ordered separately.	108501321	LV2-60-A-0-00-00-00-L	—
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 metallic VF lines and full data services. However, metallic VF line circuit cards are *not* included and must be ordered separately.	108501339	LV2-60-D-0-00-00-00-L	—

*   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

Table 1-6.   SLC ConnectReach Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI* Code
Options and Spares			
Hardware			
4-Channel Current Feed Circuit Card	108342478	LT-V2-4P-FXS	SACPLR0BAA
8-Channel Current Feed Circuit Card	108342486	LT-V2-8P-FXS	SACPLS0BAA
4-Channel Current Sink Circuit Card	108342494	LT-V2-4P-FX0	SACPMR0BAA
8-Channel Current Sink Circuit Card	108342502	LT-V2-8P-FX0	SACPMS0BAA
Fractional T1 Interface card for Secondary T1 Port. Needed for Secondary T1/DSX-1 service.[†]	108342510	LT-V2-FT1	SAI1CC0BAA
Telco DSP Processor. This card enables the *LCR*[‡] and *BOX*[‡] feature.[†]	108342528	LT-V2-DSP	SACPA00BAA
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	LT-V2-FT1-DSP	SAI1CE0BAA
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	LT-V2-V.35	SAI1CD0BAA
Hinged Wall Mount Assembly with Extension Brackets	108501354	LV2-HNGMNT	—
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	LV2-BBRKTS	—
120 V AC/48 V DC Power Converter with Battery Pack	108408816	LT-733	—

[*]   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

[†]   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.

Continued on next page

Table 1-6.   SLC ConnectReach Access System Orderable Items (Continued)

Description	Comcode	ED or Apparatus Code	*COMMON LANGUAGE CLEI* Code
Software			
Data Module (SW-D). When used in conjunction with SW-B, gives the Metallic VF Lines Only system full data capabilities.	108357518	LT-SW-D	—
LCR† Feature Software. Needed to enable *LCR* feature. However, this software is also provided with the *BOX*† feature but must be provisioned separately.	108357534	LT-SW-LCR	—
BOX Feature Software. Needed to enable *BOX* feature. The *LCR* feature is also included with the *BOX* feature but must be provisioned separately.	108357542	LT-SW-BOX	—

*   COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

†   Trademark of Vina Technologies, Inc.

SLC-2000 HDT Equipment and Software

To obtain the ordering codes for the *SLC*-2000 HDT FITL equipment, see Document 363-208-000, *SLC-2000 Access System, Applications, Planning, and Ordering Guide*.

Table 1-7 gives the *SLC*-2000 R4.6.2 ordering codes for both new sites and upgrades.

Table 1-8 on page 1-126 gives the *SLC*-2000 R4.7 ordering codes for both new sites and upgrades.

Table 1-7. **SLC-2000 Access System Software Ordering Guidelines for Software Release R4.6.2**

SLC®-2000 Release	Order Number for Required Software	Compatible DDM-2000 Software - Select One (Note)
4.6.2	**For new sites:** J1C265XM-1, L3, P3R, M3R	**Order one of the following depending on your application:**
	For sites upgrading from R3.2 or R3.22 only: J1C265XM-1, L3, P3X, M3X	6.2.2 or higher (OC-3 Linear)
	For sites upgrading from R4.0 only: J1C265XM-1, L3, P3Y, M3Y	7.1.2 or higher (OC-3 Ring)
	For sites upgrading from R4.1 only: J1C265XM-1, L3, P3W, M3W	9.0.3 or higher (OC-3)
	For sites upgrading from R4.2 only: J1C265XM-1, L3, P3S, M3S	2.2.1 (OC-12 Linear)
	For sites upgrading from R4.4 only: J1C265XM-1, L3, P3Z, M3Z	3.1.1 (OC-12 Ring)
	For sites upgrading from R4.5 only: J1C265XM-1, L3, P3V, M3V	
	For sites upgrading from R4.6.0 and R4.6.1 only: J1C265XM-1, L3, P3T, M3T	

Note: DDM-2000 software must be ordered separately from the *SLC*-2000 Access System software. Refer to Document 363-208-000 for DDM-2000 software ordering. DDM-2000 Release 6.2 (Linear) is recommended for DSX-1 feeder applications.

Table 1-8. **SLC-2000 Access System Software Ordering Guidelines for Software Release R4.7**

SLC®-2000 Release	Order Number for Required Software	Compatible DDM-2000 Software - Select One (Note)
4.7	**For new sites:** J1C265XN-1, L1, P1N, M1N **For sites upgrading from R3.2 or R3.22 only:** J1C265XN-1, L1, P1Q, M1Q **For sites upgrading from R4.0 only:** J1C265XN-1, L1, P1R, M1R **For sites upgrading from R4.1 only:** J1C265XN-1, L1, P1S, M1S **For sites upgrading from R4.2 only:** J1C265XN-1, L1, P1T, M1T **For sites upgrading from R4.4 only:** J1C265XN-1, L1, P1V, M1V **For sites upgrading from R4.5 only:** J1C265XN-1, L1, P1W, M1W **For sites upgrading from R4.6.0, R4.6.1, and R4.6.2 only:** J1C265XN-1, L1, P1X, M1X	**Order one of the following depending on your application:** 6.2.2 or higher (OC-3 Linear) 7.1.2 or higher (OC-3 Ring) 9.0.3 or higher (OC-3) 2.2.1 (OC-12 Linear) 3.1.1 (OC-12 Ring)

Note: DDM-2000 software must be ordered separately from the *SLC*-2000 Access System software. Refer to Document 363-208-000 for DDM-2000 software ordering. DDM-2000 Release 6.2 (Linear) is recommended for DSX-1 feeder applications.

For DDM-2000 FiberReach Multiplexer ordering information, see Document 363-206-300, *DDM-2000 FiberReach Multiplexer, Applications, Planning, and Ordering Guide*.

Cables That Are Not Provided

The following cables are not provided with the *SLC ConnectReach* system and must either be purchased separately or custom made to meet your applications:

- *Metallic VF telephone cable* — connects to a standard female RJ21X 25-pair connector such as Lucent Technologies A25B-X SGL series of cables or any similar industry standard 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)

- *Secondary T1/DSX-1 cable* — connects to the RJ48C **Secondary T1** connector

- **10BaseT Ethernet cable** — connects to the RJ-45 **10BaseT** port

- **RS-232 cable** — 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** — requires a 12- or 14-gauge ground wire to be supplied by the customer.

Special SLC ConnectReach Ordering Considerations

Before ordering any *SLC 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 1-6 with respect to hardware. For example, the ED-7C830-30, G2 base system comes with one 8-line current feed circuit cards 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):** *SLC 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 *SLC ConnectReach* provisioning terminal. Each *SLC 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.

- **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:`*`password`*`@ftp2.vina-tech.com/ConnectReach/`

  See your Lucent Technologies Account Executive to obtain a password. Follow the instructions in Document 363-208-050, *SLC ConnectReach Access System, User/Service Manual* to download the software to your PC and transfer it to the *SLC ConnectReach* box.

■ ***Software Upgrades for Specific Features on In-Service Systems:*** *(See Caution.)* When ordering software 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 *SLC 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 *SLC 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 Repairs

Ship defective parts for warranty repair to the following address:

Lucent Technologies
Attn: Dock 21
10000 Twin Lakes Pkwy
Charlotte, NC 28269

Basic Configuration Ordering Examples

This part contains ordering examples for each of the basic *SLC ConnectReach* system configurations.

Metallic VF Lines Only

This example shows the necessary equipment and software needed to order a system configured as follows (Figure 1-28):

■ Metallic VF lines only

■ 20 POTS lines

■ Network T1/DSX-1 interface

■ AC Power.

Order this system by using the following information:

- Metallic VF Lines Only, AC powered system with an 8-line Current Feed circuit card and software — Comcode 601911829

- One 8-line Current Feed circuit card — Comcode 108342486

- One 4-line Current Feed circuit card — Comcode 108342478.
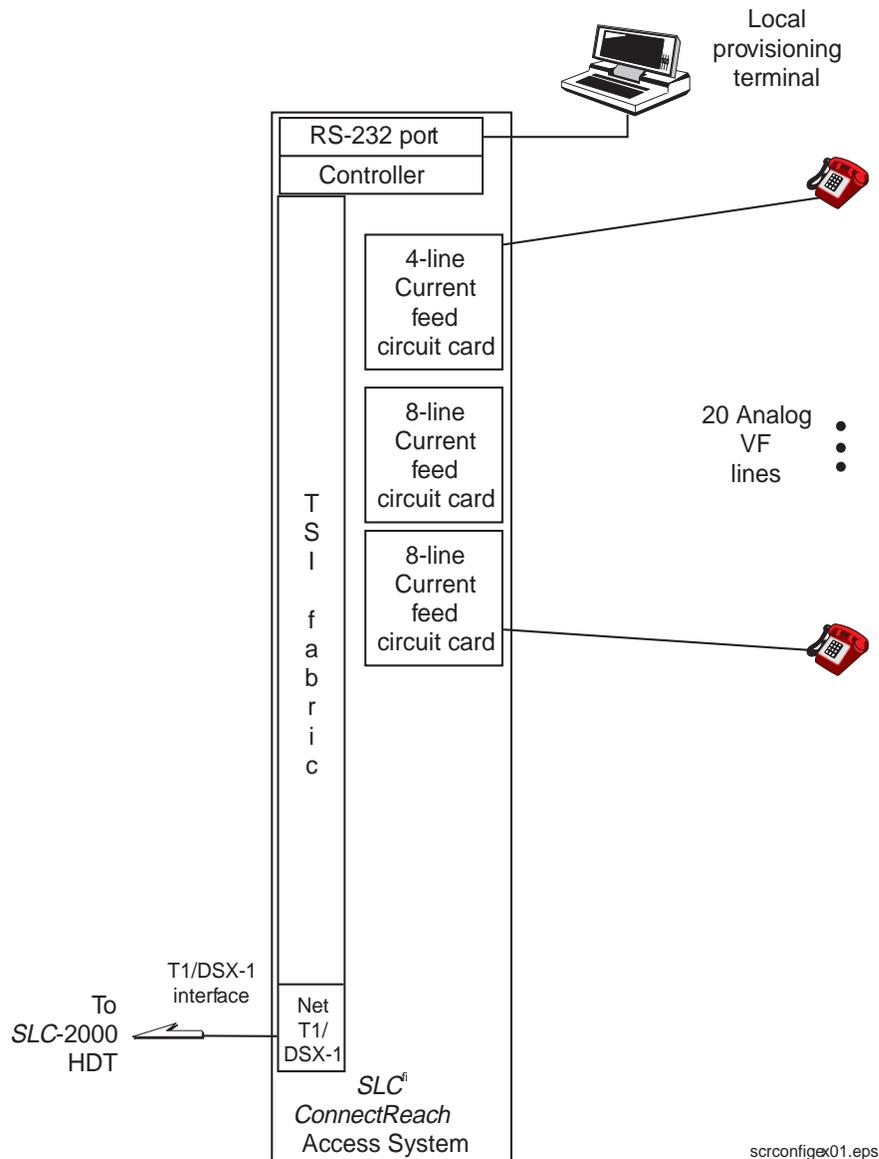
Figure 1-28.   Metallic VF Lines Only Ordering Example

Metallic VF Lines and Data

This example shows the necessary equipment and software needed to order a system configured as follows (Figure 1-29):

- Metallic VF lines and Data

- 20 POTS lines

- 256-kbps data bandwidth (four DSOs)

- Network HDSL interface

- AC Power.

Order this system by using the following information:

- Basic *SLC ConnectReach* system for metallic VF lines and data with frame relay, DHCP, SNMP, firewall, software, network HDSL interface, and AC power supply — Comcode 108501297

- Two 8-line Current Feed circuit cards — Comcode 108342486

- One 4-line Current Feed circuit card — Comcode 108342478.
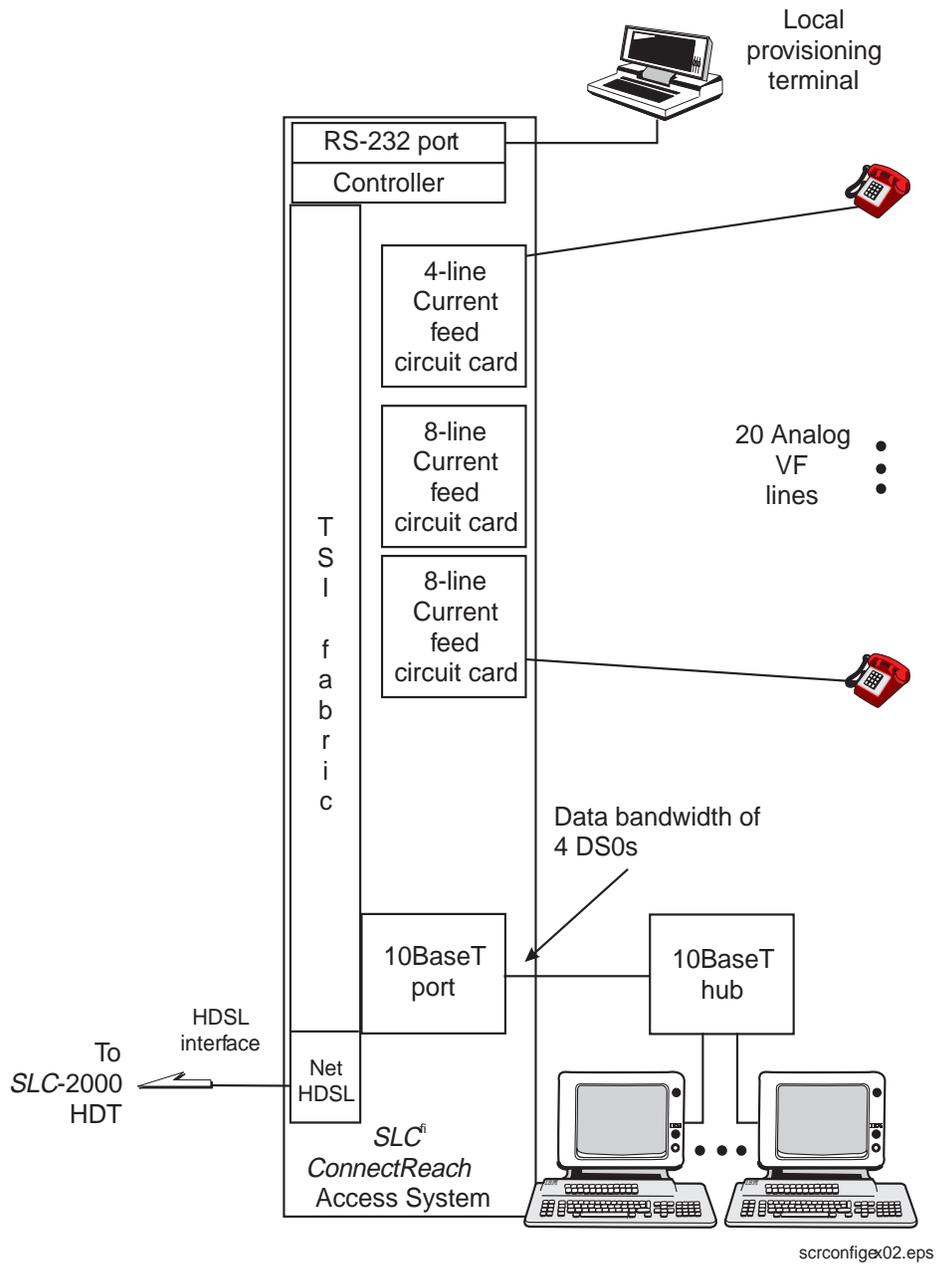
Figure 1-29. Metallic VF Lines and Data Ordering Example

Metallic VF Lines, Data, and Secondary T1/DSX-1

This example shows the necessary equipment and software needed to order a system configured as follows (Figure 1-30):

- Metallic VF lines and Data
- 16 POTS lines
- 256-kbps data bandwidth (four DSOs)
- Four DS0s interfacing with a digital PBX on a secondary T1/DSX-1
- Network T1/DSX-1 interface
- AC Power.

Order this system by using the following information:

- Basic *SLC ConnectReach* system for metallic VF lines and data with frame relay, DHCP, SNMP, firewall, software, and AC power supply — Comcode 601911845
- Two 8-line Current Feed circuit cards — Comcode 108342486
- Fractional T1 Interface card — Comcode 108342510.

scrconfigex03.eps
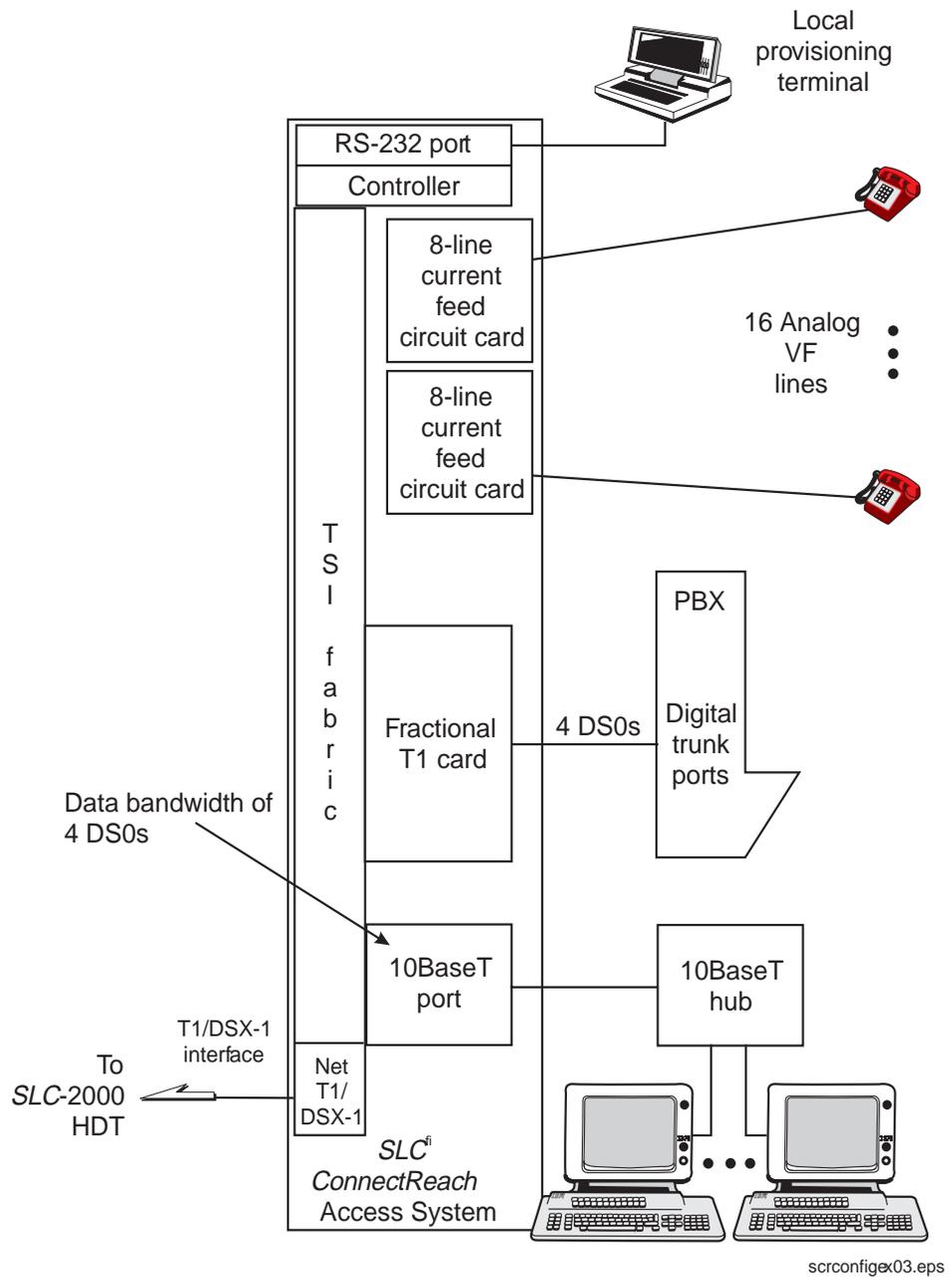
Figure 1-**30.   Metallic VF Lines, Data, and Secondary T1/DSX-1**

Metallic VF Lines, Data, and LCR Feature

This example shows the necessary equipment and software needed to order a
system configured as follows (Figure 1-31):

- Metallic VF lines and Data

- 16 POTS lines

- 256-kbps data bandwidth (four DSOs)

- An analog trunk group consisting of four VF lines

- Network T1/DSX-1 interface

- AC Power.

Order this system by using the following information:

- Basic *SLC ConnectReach* system for metallic VF lines and data with frame
  relay, DHCP, SNMP, firewall, software, and AC power supply — Comcode
  601913791

- Two 8-line Current Feed circuit cards — Comcode 108342486

- One 4-line Current Sink circuit card — Comcode 108342494

- Telco DSP Processor — Comcode 108342528

- *LCR* feature software — Comcode 108357534.

scrconfigex04.eps
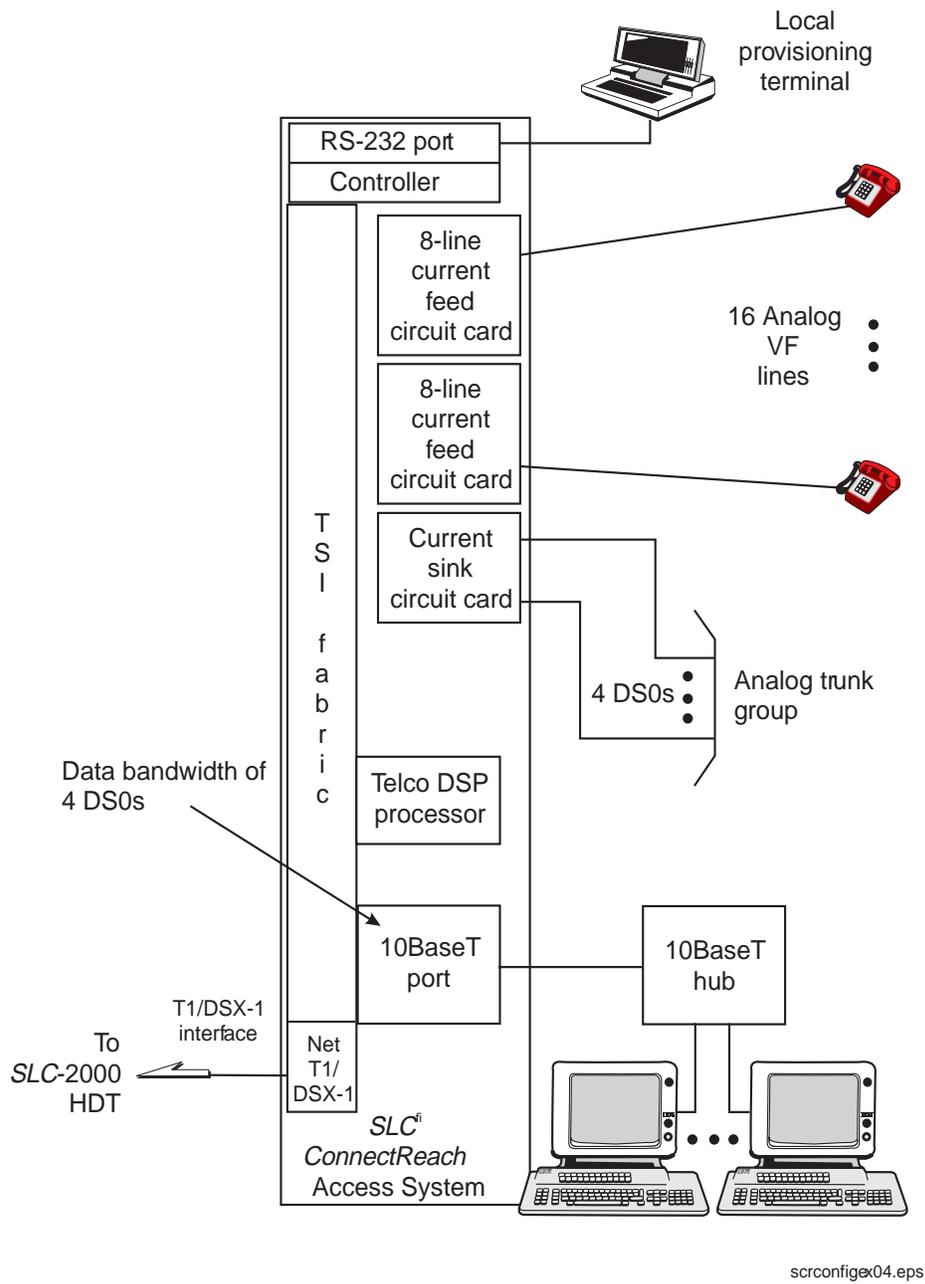
Figure 1-31. Metallic VF Lines, Data, and LCR Feature

Metallic VF Lines, Data, Secondary T1/DSX-1, and LCR Feature

This example shows the necessary equipment and software needed to order a system configured as follows (Figure 1-32):

- Metallic VF lines and Data

- 12 POTS lines

- 256-kbps data bandwidth (four DSOs)

- Four DS0s interfacing with a digital PBX on a secondary T1/DSX-1

- An analog trunk group consisting of four VF lines

- Network HDSL interface

- AC Power.

Order this system by using the following information:

- Basic *SLC ConnectReach* system for metallic VF lines and data with frame relay, DHCP, SNMP, firewall, software, network HDSL interface, and AC power supply — Comcode 108501297

- One 8-line Current Feed circuit card — Comcode 108342486

- One 4-line Current Feed circuit card — Comcode 108342478

- One 4-line Current Sink circuit card — Comcode 108342494

- Fraction T1/Telco DSP Processor Combination — Comcode 108342536

- *LCR* feature software — Comcode 108357534.

scrconfig05.eps
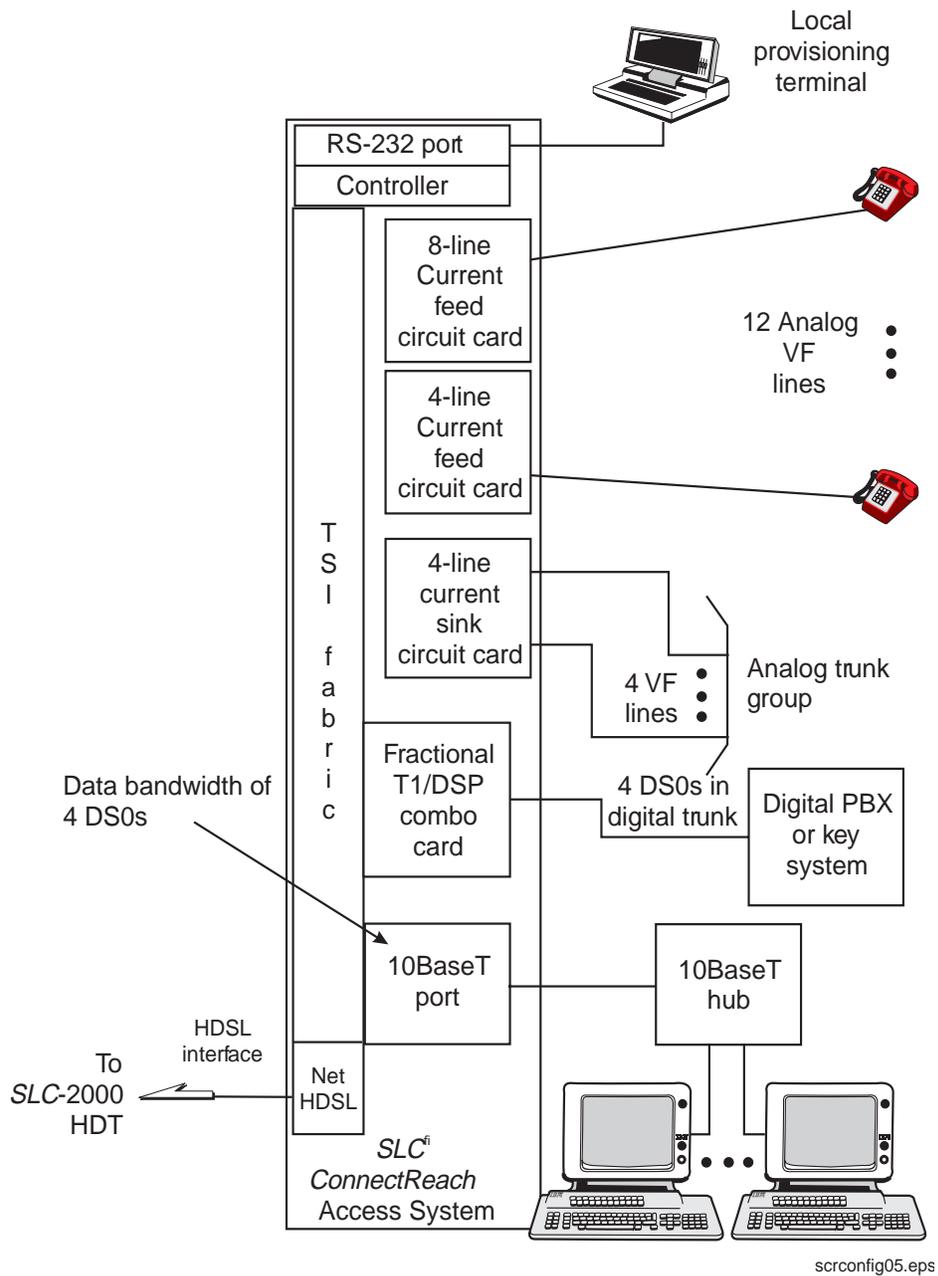
Figure 1-32.   Metallic VF Lines, Data, Secondary T1/DSX-1, and LCR Feature

Metallic VF Lines, Data, and BOX Feature

This example shows the necessary equipment and software needed to order a system configured as follows (Figure 1-33):

- Metallic VF lines and Data

- *BOX* feature

- 16 PBX-type *BOX* feature voice lines

- 256-kbps data bandwidth (four DSOs)

- An analog trunk group consisting of four VF lines

- Network T1/DSX-1 interface

- AC Power.

Order this system by using the following information:

- Basic *SLC ConnectReach* system for metallic VF lines and data with frame relay, DHCP, SNMP, firewall, software, and AC power supply — Comcode 601911845

- Two 8-line Current Feed circuit cards — Comcode 108342486

- One 4-line Current Sink circuit card — Comcode 108342494

- Telco DSP Processor — Comcode 108342528

- *BOX* feature software (includes the *LCR* feature software) — Comcode 108357542.

scrconfigex04.eps

Figure 1-33.   Metallic VF Lines, Data, and BOX Feature

Index

T

U

V

W