Lucent Technologies
Bell Labs Innovations

LCS60 Network Interface for Ethernet R3.0 Installation and Administration Guide

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1 Feature Description

Document Organization

This installation and administration guide is arranged as follows:

Feature Description	Chapter 1 describes the LCS60 and its supported services.
Hardware Installation	Chapter 2 gives all the information needed to install the LCS60.
General Software Configuration	Chapter 3 details the basic configuration procedures for the LCS60 and gives examples of configuring the supported services (PPP, SLIP, ARAP, Gateway).
PPP Configuration and Administration	Chapter 4 gives the specific instructions for configuring and administering the PPP service.
SLIP Configuration and Administration	Chapter 5 gives the specific instructions for configuring and administering the SLIP service.
ARAP Configuration and Administration	Chapter 6 gives the specific instructions for configuring and administering the ARAP service.
Gateway Services Configuration and Administration	Chapter 7 gives the specific instructions for configuring and administering the Async-to-TCP service, including details of the UUCP feature and the Telnet service.
Administration	Chapter 8 provides detailed instructions on administering the LCS60 system.
Maintenance	Chapter 9 provides maintenance procedures for reloading and removing the software, performing board diagnostics, and verifying connections.
Originating Group Security	Appendix A briefly defines the originating group security built into the LCS60 using the *srvtab* files.
StarKeeper II NMS	Appendix B provides configuration instructions for the StarKeeper II NMS and lists the LCS60 alarms reported by the StarKeeper II NMS.
User Error Messages	Error messages that the user may encounter are listed in Appendix C.

Software Installation	This appendix gives instructions for installing UNIX System software on LCS60 machines with Fujitsu Drives and with Seagate 5660N Drives.
Man Pages	Appendix E includes copies (listed alphabetically) of selected man pages provided on-line with the LCS60.
User Information	Appendix F provides *examples* of software packages that may be used with the LCS60. This appendix is provided for the convenience of the user and is not an endorsement of any particular software package.
Glossary	A glossary of terms is provided.

Reference Documentation

Note: LCS60 users can obtain assistance to problems encountered while working on the system by calling the Customer Assistance Center (CAC) HOTLINE: 1-800-WE2CARE.

Because it may be necessary to integrate the LCS60 with data switch and StarKeeper II NMS products, the following manuals are useful references:

- *StarKeeper II NMS User Guide*, select code 255-114-707
- *Network Access Control (NAC) System Installation, Operations, and Maintenance Guide*, select code 255-102-101
- *Datakit II VCS Node Reference*, select code 255-115-220
- *BNS-1000 Node Reference*, select code 255-190-220
- *BNS-2000 Node Reference*, select code 255-191-220
- *CommKit Host Interface 386/486 Computers Installation and Administration Guide*, select code 255-110-115

- *Data Networking Products and Services Ordering Guide*, select code 255-100-021.
- *CommKit Internal Interface Specification*, select code 700-283.

Order these manuals from the Customer Information Center, P.O. Box 19901 Indianapolis, IN 46219, 1-800-432-6600 (USA), 1-800-255-1242 (Canada), 1-317-352-8557 (other areas), or contact your Lucent Technologies account executive (AE).

Apple References

When using the LCS60 with AppleTalk or ARAP, the following references may be useful:

- *Inside AppleTalk*, Second Edition, G.S. Sidhu, *et.al*, Addison-Wesley Publishing (ISBN 0-201-55021-0).
- *AppleTalk Remote Access Modem Script Workshop* – Software (contact Apple Computer).

Gateway References

RFC 854, Telnet Protocol Specification
RFC 856, Telnet Binary Transmission
RFC 857, Telnet Echo Option
RFC 858, Telnet Suppress 60 Ahead Option
RFC 859, Telnet Status Option
RFC 860, Telnet Timing Mark Option
RFC 861, Telnet Extended Options - List Options
RFC 884, Telnet Terminal Type Option

PPP References

RFC 1549, PPP in HDLC Framing
RFC 1548, The Point-to-Point Protocol (PPP)
RFC 1378, The PPP AppleTalk Control Protocol (ATCP)
RFC 1332, The PPP Internet Protocol Control Protocol (IPCP).
RFC 1552, The PPP Internetwork Packet Control Protocol (IPXCP).
RFC 1553, Compressing IPX Headers over WAN Media (CIPX).

SLIP Reference

RFC 1055, Nonstandard for Transmission of IP Datagrams over Serial Lines (SLIP).

Other References

RFC 1213 Management Information Base for Network Management of TCP / IP-based internets: MIB-II

Overview

The LCS60 supports the following protocols:

- TCP / IP
- Serial Line IP (SLIP)
- Point to Point (PPP)
- AppleTalk
- AppleTalk Remote Access Protocol (ARAP)
- IPX

LAN to data switch connectivity between the resources of Ethernet LANs and the data switch network is accomplished using the LCS60 (refer to Figure 3-1 for an example of a data switch network).

The LCS60 provides the required hardware and software for the interface between LAN and data switch network resources.

The LCS60 provides high-speed connectivity between Ethernet networks and the Lucent Technologies family of data switches (Datakit II VCS 2.1 or greater, BNS-1000, and BNS-2000).

Each LCS60 has the following components:

- A CPU board to run the LCS60 software and to provide one Ethernet LAN interface
- A VMEDKHS board to provide a fiber interface to the data switch CPM-HS trunk board

Communication between boards within the LCS60 is handled over a VME bus.

Benefits

The LCS60 expands the connectivity and enhances the functionality of the Lucent Technologies data switch product line by allowing LAN and data switch network environments to communicate. Some of the benefits include:

- Device-to-device connectivity over multiple LANs
- Improved capability to develop and use distributed processing environments
- Access through the most commonly used network protocols
- Data switch network access to LAN data
- Modular design which permits easy expansion as needs increase.

LAN Protocols

TCP/IP

IP traffic is commonly associated with the Department of Defense (DOD) TCP / IP suite and is often run over Ethernet LANs. The LCS60 allows asynchronous endpoints, such as a terminal or host connected to a data switch, to log onto any Ethernet TCP / IP LAN host by using the LCS60's *async-to-TCP* gateway service. The LCS60 provides the terminal user with an interface to the TCP / IP **telnet** command, which allows the network user to remotely log onto LAN hosts via a *virtual terminal*.

Conversely, an Ethernet TCP / IP LAN host can use the LCS60's *TCP-to-async* gateway service to access any asynchronous device (host, modem pool, etc.) connected to the data switch network. The LCS60 terminates the TCP / IP **telnet** command initiated by the LAN host and provides the LAN user with asynchronous connectivity to the data switch network.

Domain Name Server (DNS) Resolver

The LCS60 can be configured as a Resolver in the DNS; this allows the LCS60 to access a DNS Server for the translation of symbolic names into IP addresses. This reduces the administration required for the LCS60. This feature provides a less cumbersome and more efficient mechanism for performing translations between symbolic host names and Internet addresses than checking the LCS60 database files.

The DNS function is a more manageable translation mechanism for large and interconnected networks. It can connect to a name server (which maintains the information database) on another host on the local or remote network.

The LCS60 default operating environment is still the use of the local host file. If *dns* service is selected, the system will act as a **resolver** only.

Simple Network Management Protocol (SNMP)

SNMP software allows the LCS60 to report its TCP / IP status to an SNMP Manager. SNMP service can be started and stopped using the **lcsadm** interface of the LCS60. Implicit in the SNMP architectural model is a collection of network management stations and network elements. Network management stations execute management applications which monitor and control network elements. Network elements are devices such as hosts, gateways, terminal servers, and the

like which have management agents responsible for performing the functions requested by the network management stations. SNMP is used to communicate management information between the network management stations and the agents in the network elements.

The LCS60 supports the standard SNMP management information base (MIB-II). Refer to RFC 1213.

Supported Traps and MIBs

The generic traps that are supported are:

0 = cold start	3 = link up
2 = link down	4 = authentication failure

Routing Information Protocol (RIP)

The LCS60 supports RIP processing, i.e., handling IP routing information through the use of **routed**. **routed** maintains the route table used by IP to determine the interface through which to send packets.

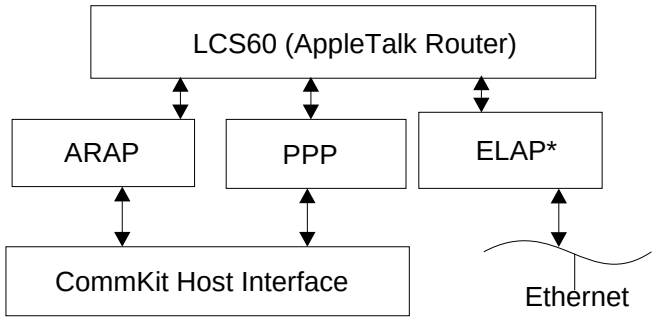
The LCS60 enables the administrator to start and stop **routed** service separately using the **lcsadm** interface. In addition, the administrator can configure this service to be started at boot time.

AppleTalk Protocol

The AppleTalk network system was developed to provide a link-independent architecture to connect Apple and non-Apple network devices. AppleTalk provides a simple peer-to-peer protocol which allows any network device to communicate with any other network device running AppleTalk software.

The LCS60 can be used as an AppleTalk router connecting the Ethernet LAN to a virtual AppleTalk network. The virtual AppleTalk network created by the LCS60 permits as many as 120 remote AppleTalk devices to dial in over the data switch and connect to the AppleTalk internet. The virtual network on the LCS60 supports a single network number and zone name.

Figure 1-1: LCS60 as an AppleTalk Router

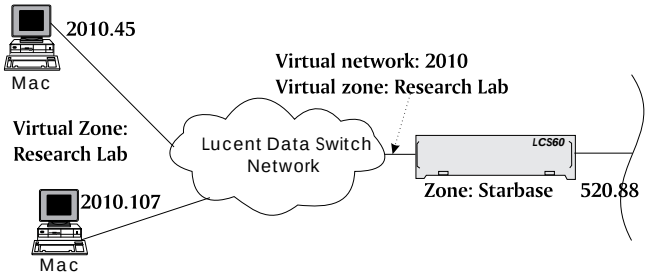


* EtherTalk Link Access Protocol. EtherTalk is Apple's data link protocol that allows Ethernet cables to be used to connect an AppleTalk network.

AppleTalk Network Number and Zone Assignment

The LCS60 supports dynamic AppleTalk address assignment within a *virtual zone* of PPP and ARAP clients. (Refer to Figure 1-2.) Upon dialing into the LCS60, the PPP client is assigned an available network and node number automatically. The client then becomes part of the virtual zone configured on the LCS60; no special dialstring options are used.

Figure 1-2: AppleTalk Virtual Zone



Note: It is *not* necessary to configure the LCS60's Ethernet interface for AppleTalk. The LCS60 is *not* a seed router on the Ethernet. It will discover the network range and the zones assigned to the Ethernet by another router and will dynamically acquire a unique AppleTalk node address within the assigned network number range.

IPX Protocol

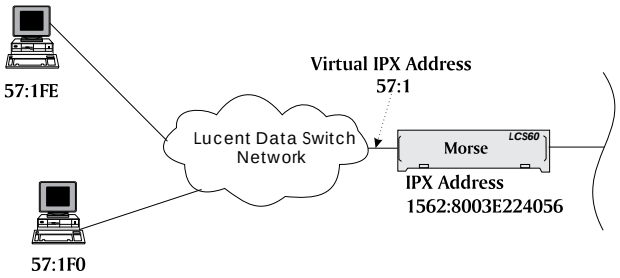
The IPX protocol is used to connect hosts in a Novell network.

The LCS60 can be used as an IPX router connecting the Ethernet LAN to a virtual IPX network via PPP. The virtual IPX network created by the LCS60 permits as many as 120 remote end hosts to dial in over the data switch and connect to the Novell network. The virtual network on the LCS60 supports a single network number.

IPX Virtual Network Assignment

The LCS60 supports dynamic address assignment within a *virtual network* of IPX over PPP clients. (Refer to Figure 1-3.) Upon dialing into the LCS60, the PPP client is assigned an available IPX address automatically. The client then becomes part of the virtual IPX network configured on the LCS60; no special dialstring options are used.

Figure 1-3: IPX Virtual Network



Remote Access Protocols

TCP/Async Gateway Service

The LCS60 provides a gateway service such that a terminal user connected to the data switch network either directly or through a modem can reach LAN-connected hosts / workstations – this is the *async-to-TCP* gateway service. The LCS60 provides communication in the other direction – from the LAN-host to the data switch – with the *TCP-to-async* gateway service.

This connectivity is accomplished through the **telnet** and **tcpsock** commands which allow communication between the data switch and LAN-host by means of the TELNET protocol. Some features of this service are:

- **File Transfer**. The LCS60 provides a mechanism for data switch to LAN and LAN to data switch file transfer. A host connected to the data switch network or to the LAN can initiate a file transfer (such as a **uucp** file transfer) by including the dialstring for the LCS60 in its system files and requesting TCP *socket service*. Both services provide an 8-bit TCP pipe as a path for large file transfers; this pipe bypasses **telnet** which is slower.
- **Break character**. The LCS60 recognizes the data-switch connected user's break character and converts it into a **telnet** IAC break character. From the LAN, the LCS60 converts the **telnet** IAC BREAK sequence into an URP* Level-D break toward the data switch connection.
- **Security**. The LCS60 can be configured to drop the telnet connection if the host to which the user is trying to telnet is unavailable. Without this feature, trying to reach an unavailable host would result in putting the user at the `telnet>` prompt and could possibly allow unauthorized connection to other LAN hosts. With this security feature, the connection is taken down completely if the host is unavailable.

The LCS60 provides as many as 500 simultaneous **telnet** sessions (when no PPP / SLIP / ARAP sessions are configured), which may be distributed in any way between TCP-to-async and async-to-TCP sessions.

Note: Simultaneous sessions are not necessarily all active.

Details of the **telnet** service are given in Chapter 7.

* Refer to the *CommKit Internal Interface Specification* for details of the Universal Receiver Protocol (URP).

The TCP gateway sessions take advantage of the highly efficient fiber interface between the LCS60 and the data switch. With this service, any TCP/IP host that can be reached on the LAN is accessible from the data switch network. For LAN users, connection is generally provided through a `DESTINATION:` prompt, however, a TCP service port can be customized to bypass this prompt and automatically connect the LAN user directly to a particular data switch end point.

Refer to Chapter 7 for configuration of gateway services.

TCP Service Ports

A TCP service port is identified by a port number and can be customized to streamline the transition from the TCP/IP network to the data switch network. These ports can be configured with predefined destinations (PDDs), disconnect options, window size changes, time limit options for the `DESTINATION:` prompt and for data transmission, and customized destination prompts.

The number of TCP service ports is 500; each port can be defined with a unique PDD offering the administrator enhanced flexibility in terms of the number of data switch network connected hosts than can be contacted by each LCS60.

Serial Line IP (SLIP)

The LCS60 provides SLIP protocol capability to enhance dial-in access through the data switch network. SLIP enables remote users to gain access to their internet and use familiar TCP/IP commands for most applications, e.g., file transfer, electronic mail, and remote login.

SLIP allows a remote PC or Macintosh to logically reside on the TCP/IP LAN. In a SLIP session, a remote user can dial into an LCS60, request SLIP service, and receive an IP address automatically. This remote user is then logically connected to the LAN and can execute such TCP/IP commands as **ftp, telnet,** and **ping**.

With the capability for automatic assignment of IP addresses, the LCS60 maintains a database of used addresses and the LCS60 administrator does not have to pre-assign IP addresses to users. Static assignment of these addresses is still possible, however, for any situation where it may be necessary.

The total combined number of remote access sessions – when SLIP, PPP, and / or ARAP are configured – available through the LCS60 is 120.

Refer to Chapter 5 for configuration of the LCS60 for SLIP service.

Point-to-Point Protocol (PPP)

PPP provides point-to-point connectivity between a remote PC or Macintosh and a LAN host, and is the industry standard. It is designed to carry multiple protocols such as TCP / IP, XNS, IPX, AppleTalk, and DECnet.

The remote PC or Macintosh negotiates the PPP protocol options with the LCS60 through the client software package residing on the PC or Mac. A remote user can dial into the LCS60 through the data switch, request PPP service, and receive an IP address, IPX address, and / or AppleTalk network and node number automatically.

For TCP / IP, the IP address can be statically assigned, if needed (as it can be with SLIP), and gives the remote user access to the TCP / IP network via commands such as **ftp, telnet**, and **ping**.

For AppleTalk, a virtual AppleTalk address is assigned enabling the remote user to access AppleShare and remote printer spooling services in various zones in the network.

For IPX, a virtual IPX address is assigned. The remote user is viewed as a Novell NetWare client and can therefore access file servers, printer servers, etc., in a Novell network.

Refer to Chapter 4 for configuration of the LCS60 for PPP service.

Van Jacobson TCP/IP Header Compression

Negotiation of the TCP / IP header compression option is defined in RFC1332. If your client package supports Van Jacobson Header Compression, then configure this feature on your Mac or PC. The size of each packet can shrink up to 35 bytes, thereby giving your PPP session a significant performance boost.

Compressed IPX Header (CIPX)

Negotiation of the IPX header compression option is defined in RFC1553. If your client package supports Compressed IPX Headers (CIPX), then configure this feature on your PC. The size of each packet can shrink up to 34 bytes, thereby giving your PPP session a significant performance boost.

AppleTalk Remote Access Protocol (ARAP)

ARAP is used to obtain direct access to AppleTalk resources at remote locations. The LCS60 uses ARAP to provide connection between the CommKit Host Interface and Ethernet-connected AppleTalk devices.

A remote user can dial into the LCS60 through the data switch, request ARAP service, and receive the AppleTalk network and node number automatically. The remote user can access AppleShare and remote printer spooling services in various zones in the network.

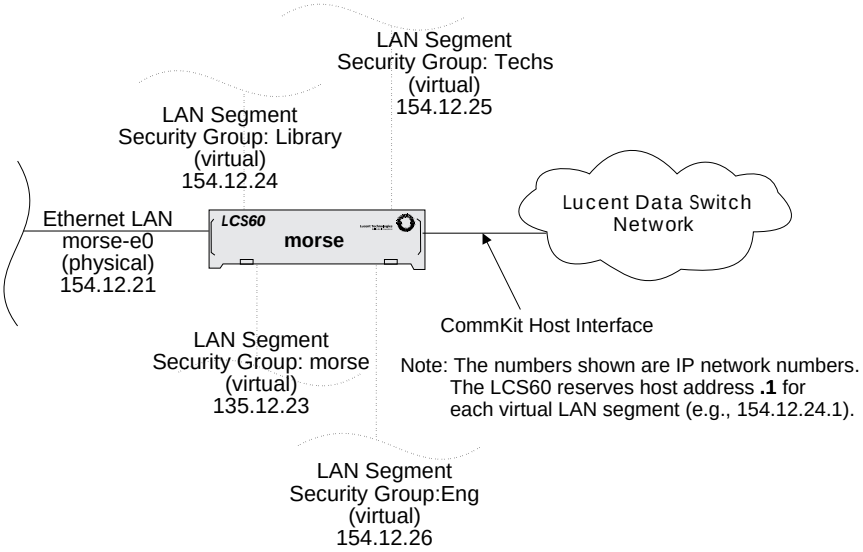
Refer to Chapter 6 for configuration of the LCS60 for ARAP service.

Multiple IP Subnetworks

IP Routing

The LCS60 acts as an IP router with multiple IP network interfaces. Figure 1-4 shows an example of how an LCS60 might be configured, defining four virtual IP subnetworks. Each interface has a unique IP subnetwork number that represents a LAN segment. These numbers are allocated by the Network Administrator during configuration of the LCS60.

Figure 1-4: IP Routing with the LCS60



The LCS60 has a physical IP network number for its Ethernet interface (e.g., **154.12.21**) and can have a virtual IP network number for each defined security group (e.g., **Library, morse, Techs, Eng**), up to a maximum of four such groups as shown in Figure 1-4.

Note: The Ethernet IP network number and the four virtual IP network numbers *must* be unique.

The LCS60 examines the destination address of every IP packet it receives over the Ethernet and CommKit Host interfaces, and sends the packet on to the LAN segment it matches. For this reason, all network numbers must be unique. For example, for an IP packet with a destination address 154.12.24.50, the LCS60 **morse** would route the packet through LAN segment **Library** as shown in Figure 1-4.

Security Groups

The LCS60 provides a mechanism for allocating IP addresses from one or more pools of addresses. Each address pool is associated with a unique IP network security group and is used to limit user access to the LAN.

This feature allows the LCS60 administrator to define up to four IP networks that an LCS60 user can select when dialing in for either SLIP service or IP over PPP service. Each IP network is associated one for one with a **dkserver** service name. This name must be entered in the following databases:

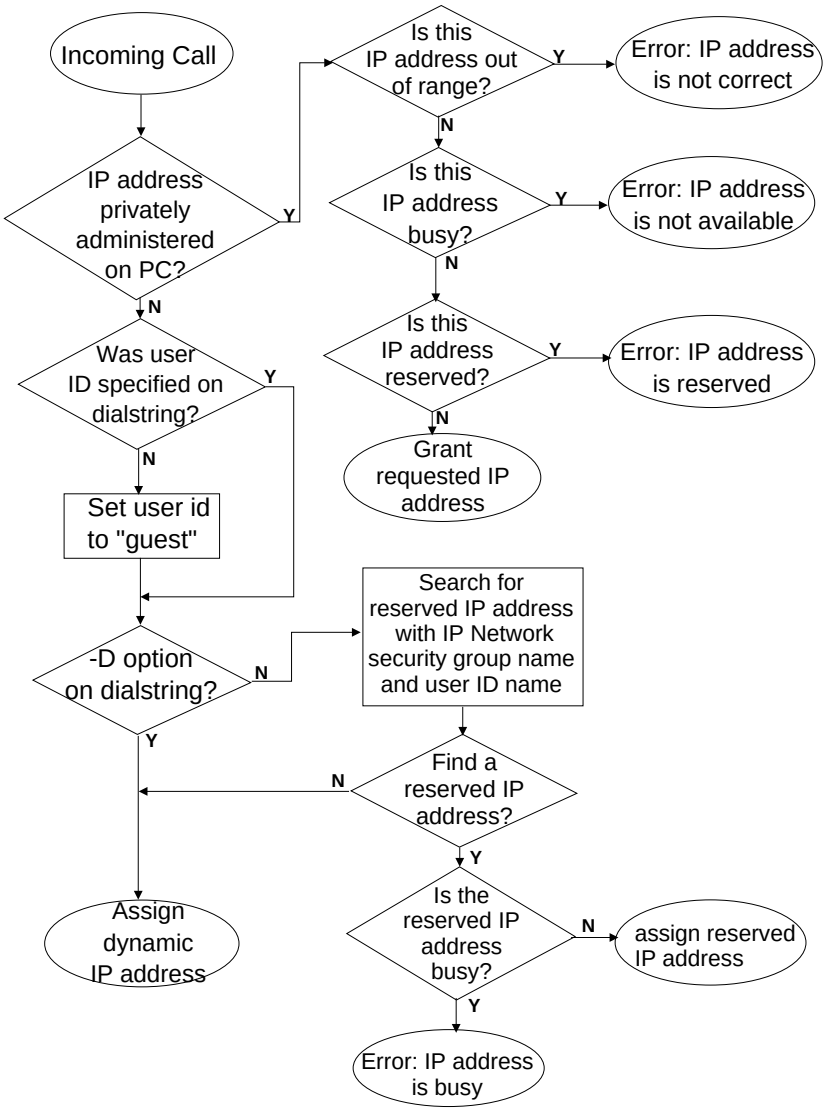
- LCS60 in which the **dkserver** name is referred to as an *IP network security group*. One of these IP network security groups is required to match the UNIX node **uname** value.
- Data switch controller database as a local CPM host address, all associated with the same CPM group.
- Network Access Controller (NAC) as a host name (if security is required).

The NAC database is used to authorize members of a particular user group to create calls to the LCS60 host name represented by the IP network security group name. Generally, all those users who share common IP network access privileges are assigned to a NAC user group; the NAC is set up to present the group members a menu of LCS60 hosts they are permitted to call.

The IP routers connected to the same Ethernet LAN as an LCS60 are configured to filter / secure IP traffic flow on the basis of an arriving packet's source IP network address. A user's source IP address is assigned by the LCS60 (or subject to verification, it can be nominated by the user) when the SLIP or PPP session is started.

An LCS60 is required to have an IP network security group whose name matches the LCS60's UNIX node name; this is referred to as the **uname** IP network security group. As a consequence, the **ipas** script requests that you configure the **uname** security group's IP network address before you are allowed to add any other IP network security group. When editing the **uname** IP network security group, the **ipas** script prevents you from altering its name; if you want to edit this attribute, use the **nodename** script. Any change in the UNIX node name is automatically applied to the **uname** IP network security group name and any of its associated reserved IP addresses. You are not allowed to delete the **uname** IP network security group because other LCS60 services depend on its **dkserver** process being present.

Figure 1-5: IP Address Assignment



IP Address Assignment by the LCS60

PPP and SLIP users need to be assigned an IP address when they connect to the LCS60, thereby allowing them to run TCP/IP applications over their serial connection. Figure 1-5 describes IP address assignment; refer to Chapter 4 (PPP) or Chapter 5 (SLIP) for more information.

Note: IP address assignment is defined in RFC1332.

The LCS60 has three mechanisms for assigning a SLIP or PPP user an IP address:

1. *Privately Administered Static IP Address.* The user's IP address is locally administered by the user on his/her PC software package. The LCS60 will use the IP address requested by the PC package if it is valid and unused.
2. *Reserved IP Address.* This IP address, administered by the LCS60 administrator, is requested by specifying a zero IP address on the client software package. A reserved IP address must exist in the LCS60 configuration database before the session start up attempt.
3. *Dynamically Assigned IP Address.* This IP address is randomly assigned by the LCS60 from the IP network range associated with the particular IP Network Security Group. A dynamic address may be requested on the dialstring if no reserved IP address exists for a user ID.

Hardware Features

Enhanced Processor

The LCS60 offers the enhanced Motorola MVME197 processor, rated at 100+ MIPS. With this processor, the LCS60 can sustain a higher number of sessions at a greater aggregate throughput than its LCS50E predecessor.

Fiber Interface

The LCS60 supports a single multiplexed fiber interface to the data switch CPM-HS module. This is a distinct advantage in terms of cable management and efficiency over traditional terminal servers which require separate asynchronous connections.

Network Security

Complete network security is achieved through the Lucent Technologies Network Access Control (NAC) System. When a data-switch connected modem accepts a call from a remote user, a PDD can force that user to authenticate through a NAC. Once authenticated, the user can request a TCP gateway session or a remote access session (such as ARAP, PPP, or SLIP) with an LCS60 by means of a simple dialstring. From the LAN, all sessions bound for the data switch network can be forced to be authenticated by means of the TCP service port feature.

Additionally, the LCS60 supports a first-time authentication option with the NAC. This option requires the LAN users to authenticate only once with the NAC as long as the TCP / Async session remains open with the LCS60. The actual duration time of an authenticated session is a NAC-dependent variable. Therefore, consult the NAC documentation (refer to the section *Reference Documentation* in this chapter) for complete details on this feature.

Copy Protection

This release of the LCS60 is copy-protected and requires a personalized software key before it can be used. This number is assigned during the initial setup of the LCS60 using the **lcsadm** interface (refer to Chapter 3 for complete details). The copy-protection feature uses a release-specific software key; that is, Release 3 services can only be activated using the Release 3 key.

Administration

The LCS60 has its own local management software package called **lcsadm**. This package allows a network administrator to configure services, administer service sessions, and collect performance measurement data. This administration tool can be accessed either through the LCS60 console port or through the multiplexed fiber interface.

Note: The remote administration feature is delivered in the disabled state. Instructions for enabling this feature are given in Chapter 8.

Backup/Restore

The LCS60 provides a backup / restore feature that allows an LCS60 to be configured as a backup / restore *server*. A backup / restore server can copy to its hard disk (i.e., back up) a predefined set of files / directories from multiple remote LCS60s (and LCS50Es) which are configured as backup / restore *clients*. The backup / restore server can also be configured as its own client.

Note: LCS60 R1.0 backups cannot be used to restore R3.0 systems.

The remote backup of clients is done disk-to-disk over the data switch network. Backups and restores may be initiated either from a server or from a client.

This feature allows multiple backups of configuration files to be stored, and any of several stored backups may be selected to be restored. Restores may be comprehensive or selective, as required.

R3.0 Upgrade

Previous releases of the LCS60 can be upgraded to Release 3.0. This requires removing the software and any patches for the earlier release and installing the R3.0 software from tape. Upgrade procedures are given in Chapter 9.

The configuration is automatically restored after installing R3.0; the user need only configure new or changed services.

Note: When upgrading from R1.0 or R2.0 to R3.0, you must have an R3.0 software key to activate R3.0 features. Refer to the section on *Copy Protection*.

Remote Upgrade

Upgrading multiple LCS60s to release 3.0 or greater can be done using the remote upgrade feature. To upgrade several LCS60s to release 3.0 or greater, the local tape drive need only be used to install the upgrade release on a single LCS60 (the remote upgrade server). All other R2.0 or greater LCS60s in your data switch network (remote upgrade clients) may then be upgraded remotely across the data switch network.

Centralized Network Management

StarKeeper II NMS provides complete network management from one centralized location for both the data switch and the LCS60. The StarKeeper II NMS can be located anywhere on the data switch network and can contact many LCS60 gateways.

Manual Pages

The LCS60 is provided with a set of online manual pages. Some commands that may be of particular help to the system administrator are listed in Table 1-1 and are included in Appendix E.

Table 1-1: Online Manual Pages

Protocol	Commands	Path
General	dkcu	/opt/dk/bin/dkcu
	dkmaint	/opt/dk/sbin/dkmaint
	ifstat	/usr/bin/ifstat
	iftrace	/usr/etc/iftrace
	push	/usr/bin/push
	pull	/usr/bin/pull
	statlcs	/usr/etc/statlcs
TCP/IP	ftp	/usr/etc/ftp
	ifconfig	/usr/etc/ifconfig
	netstat	/usr/etc/netstat
	nslookup	/usr/etc/nslookup
	ping	/usr/etc/ping
	route	/usr/etc/route
	telnet	/usr/etc/telnet
AppleTalk	atlog	/usr/etc/atlog
	atping	/usr/etc/atping
	atnetstat	/usr/etc/atnetstat
IPX	ipxping	/usr/etc/ipxping
	ipxnetstat	/usr/etc/ipxnetstat

The commands **dkmaint** and **ifconfig** are not used in normal LCS60 operations, and should only be used by expert users and system administrators. These commands are not recommended except for troubleshooting purposes.

Access online man pages by executing the command:

```
# man command
```

where *command* is the name of the command.

Customer Assistance

Technical support is available for the LCS60 from the Lucent Technologies Customer Technical Support Center at 1-800-WE2CARE.

For more information on these service offerings, or to establish a service account, contact your Lucent Technologies account representative, or call 1-800-WE2-CARE during our standard business hours (8AM – 5PM Eastern Time, Monday through Friday, excluding holidays) and ask for the Data Networking Services Operations department.

When you need assistance, call 1-800-WE2-CARE during the coverage period selected when you established your service account. You will need to provide your Service Account Number and identify the specific Lucent Technologies Data Networking product for which you need assistance.

Outside the United States, Lucent Technologies Data Networking products and support services are provided by Lucent Technologies subsidiaries and authorized value-added resellers. For more information, contact your sales representative.

2 Hardware Installation

Introduction

The LCS60 is supplied with the operating software already installed; therefore, installation consists mainly of installing hardware and configuring the system.

The list below identifies the tasks, in the order that they should be performed, to install and configure the product. These tasks are discussed in detail in the following sections.

1. Mount the LCS60
2. Attach the console to the LCS60
3. Connect the fiber between the LCS60 and the CPM-HS
4. Configure the LCS60 in the data switch
5. Power-up the LCS60
6. Verify the LCS60 console connection
7. Verify the LCS60 fiber connection
8. Configure the LCS60 using the **lcsadm** interface (Chapters 3–7)
9. Verify connections between the LCS60 and LAN hosts and between the LCS60 and data switch connected endpoints (Chapter 9).

Controls and Indicators

Table 2-1 lists the LCS60 controls and indicators.

Table 2-1: Controls and Indicators

Controls		
Location	**Switch**	**Function**
Rear Panel	Power	Power ON / OFF
	SYSTEM RESET	Processor and VME bus reset
MVME197	ABORT	Aborts program, returns to debugger
	RESET	Processor and VME bus reset
Indicators		
Board	**Indicator**	**Function**
MVME197	FAIL	Hardware failure
	SCON	Indicates 197 board is VME bus controller
	RUN	Processor run state
	LAN	LAN status
	VME	VME status
	SCSI	SCSI status
MVME712M	ETHERNET XCVR PWR STATUS*	Ethernet Transceiver power status (amber)
	SCSI TERM PWR STATUS*	SCSI terminator power status (green)

*Can be seen by means of the rear panel cutout labeled SCSI INTERFACE.

Site Preparation

LCS60 specifications for the power, interface, and operating requirements, as well as the other pertinent interface specifications, are listed in Table 2-2.

Table 2-2: Specifications

LCS60 Network Interface for Ethernet	
Power Requirements	90 to 132 VAC (47 to 63 Hz), 5 Amps 180 to 250 VAC (47 to 63 Hz), 2.5 Amps 41 to 60 VDC, 8 Amps
Operating Temperature	10 to 45°C
Storage Temperature	–40 to 54°C
Operating Humidity	Long-Term 20 to 55% Short-Term 20 to 80%
Storage Humidity	10 to 95%
Fiber Interface	
Fiber Core Size	62.5 microns
Mode	Multi-mode
Fiber Optic Cable	FL2P-P Type
Connector	ST Type
Ethernet Interface	
Interface	IEEE 802.3
Connector	Female 15-pin DB15
Console/Terminal Interfaces	
Port 1 (console)	RS-232C (limited) Asynchronous
Ports 2,3,4 (terminal)	RS-232C Asynchronous
Connectors	25-pin DB25 (receptacle)
Serial Port Defaults	
Port 1	9600 bps
Port 2	9600 bps
Port 3	9600 bps
Port 4	1200 bps

Space Requirements

The LCS60 can be rack mounted, wall mounted, or installed on a secure surface. The unit is $7 \times 17 \times 19$ inches and weighs 40 lbs. A minimum of 12 inches of clearance is required at the front and rear of the unit for access, and a minimum of two inches of clearance at the sides of the unit to permit proper airflow through the unit.

Cabling

WARNING: Connect and disconnect cables ONLY when the power is off.

There are four types of connections commonly required for the LCS60:

1. A dual optical fiber connection to a CPM-HS module installed in a Lucent Technologies data switch or concentrator. The fiber cable between the LCS60 and the data switch is limited to a maximum length of 2.9 km.
2. Ethernet LAN connection.
3. A console connection through an RS-232C interface to either a terminal or data switch port. RS-232 distance limits apply to the LCS60 console connection (nominally 50 feet).
4. An AC power connection is required for an AC powered unit. An AC outlet must be within 6 feet of the LCS60; the use of extension cords should be avoided.
5. A DC power connection is required for DC powered units. The customer must make this connection with wire no larger than 6 AWG and no smaller than 18 AWG.

Cautions: Do not run signal cables next to, or parallel with, AC power cables.

Do not run signal cables near radio transmitters or any equipment that generates radio frequencies.

Do not run signal cables near electric motors, power supplies, power line regulators, or relays.

Do not run signal cables near equipment that generates power line noise; such as air conditioners, copy machines, and water coolers.

Use power outlets with adequate protective grounding.

EMI Considerations

The LCS60 can radiate radio frequency energy, and if not installed in accordance with instructions, may cause interference to radio communications. This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15, Subpart J of FCC Regulations, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation in a residential area is likely to cause interference, in which case the user must take whatever measures may be required to correct the interference.

Required Equipment

The LCS60 is shipped in the hardware configuration ordered, the operating software loaded, and user documentation included. Additional equipment required for the initial installation of an LCS60 is listed in Table 2-3.

Table 2-3: Required Additional Equipment

Quantity	Item	Description
1	Fiber Pair	Lucent FL2P-P-[*length*]* (specified in feet)
1	RS-232 (DB25) Cable	Length required to connect console to LCS60
1	Ethernet Transceiver (IEEE Cable)	Length required for connection from LCS60 to Ethernet transceiver
(as reqd.)	Horizontal Shelf, Slide Rails, or support brackets	Rack mounting hardware for additional support; provided by rack/cabinet vendor.
1 (as reqd.)	ED5P183-33, G-40	Wall Mounting Kit for LCS60
1	CPM-HS module	Node connection
1	AWJ2	Paddleboard for the CPM-HS module
(as reqd.)	wire	18 AWG — 6 AWG wire for DC powered unit only

* Formerly AT&T FL2P-P.

Assembly

Unpacking

The LCS60 hardware comes fully assembled, with the exception of two handles that mount on the front frame of the enclosure. After opening the shipping container, remove the documentation package, system software tapes and diskettes and package of loose parts. Carefully remove the LCS60 unit. Open the front cover of the LCS60 and check that the system is equipped as ordered and that all circuit packs are fully seated in the LCS60 card cage.

Installing the LCS60

Follow the appropriate instructions (refer to Figure 2-1) to install the LCS60.

Rack Mounting

Mount the LCS60 in a 19-inch rack or cabinet using compatible mounting hardware as shown in Figure 2-1. Mounting in a 23- or 25-inch rack or cabinet requires a Bracket Extension Kit.

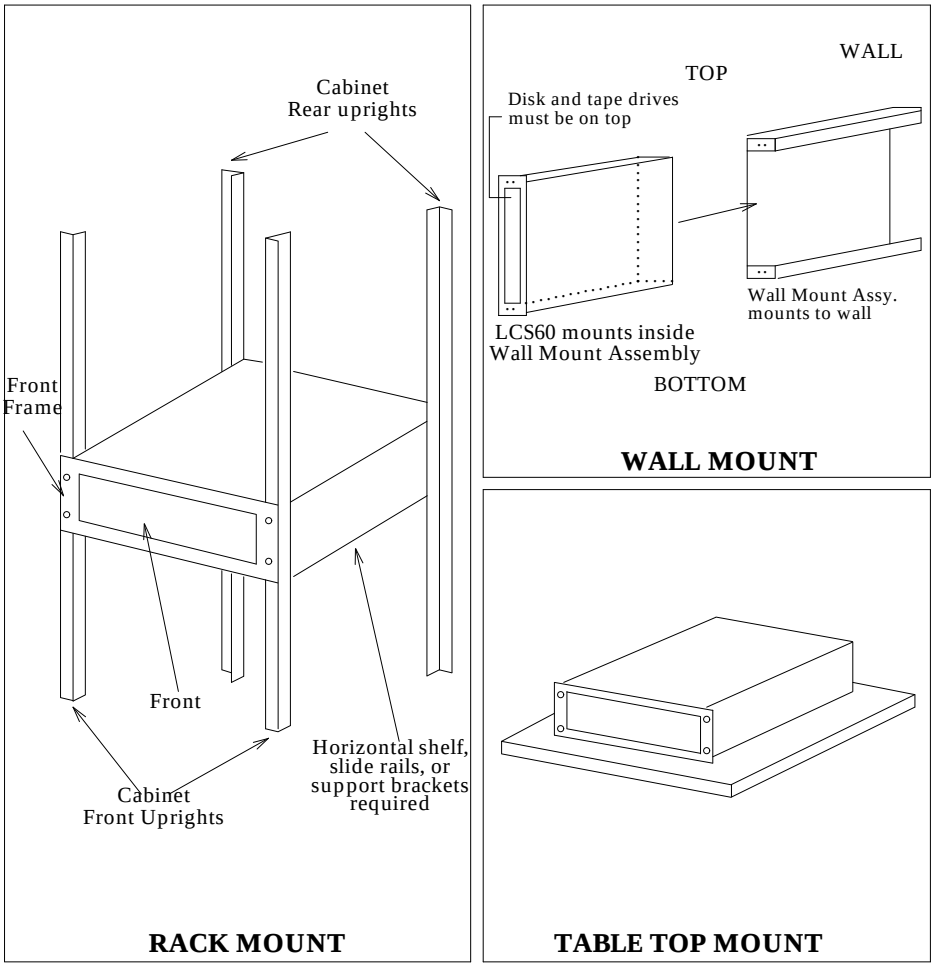
The front frame of the LCS60 has four mounting holes for securing the unit in a standard 19-inch equipment rack. The weight of the LCS60 requires a shelf, slide rails, or a support bracket. Contact the cabinet vendor for compatible hardware. The handles for the LCS60 are shipped in a separate package within the main shipping box. The handles can be attached to the front frame, with the handles pointing away from the LCS60, using the four flat-head machine screws.

To rack mount the unit:

1. Attach either a horizontal shelf, slide rails, or support brackets to the vertical uprights of the cabinet. For design compatibility, this hardware should be purchased from the cabinet vendor.

2. With the horizontal support in place, slide the LCS60 into place. Fasten the front frame of the LCS60 to the front uprights with four screws (23- or 25-inch cabinets require extension brackets).

Figure 2-1: Mounting the LCS60 Cabinet



Wall Mounting

Wall mounting the LCS60 requires a Wall Mount Assembly to position the unit vertically as shown in Figure 2-1.

Wall mounting requires a surface 45 inches wide by 21 inches high covered by a securely-fastened ¾-inch plywood sheet (or a comparably stable mounting surface).

The handles for the LCS60 are shipped in a separate package within the main shipping box. If desired, attach the handles to the front frame, with the handles pointing away from the LCS60, using the four flat-head machine screws.

To wall mount the unit:

1. Using the Wall Mounting Assembly as a template, mark the location of the four mounting holes on the plywood sheet. Drill the pilot holes or install appropriate anchors, as required.

Note: To function properly, the LCS60 must be positioned in the Wall Mount Assembly with the disk and tape drive on top, the bottom surface toward the wall, and the front cover of the LCS60 to the left.

2. Attach the Wall Mounting Assembly to the plywood surface, using four ¼ x ¾-inch lag screws.
3. Locate the LCS60 in the mounting assembly by aligning the front flange of the LCS60 with the four threaded holes on the flange at the left end (facing the assembly). Secure the LCS60 to the assembly, using the four M6 x 12mm screws included with the Wall Mount Assembly.

Table-Top Mounting

The handles for the LCS60 are shipped in a separate package within the main shipping box. Attach the handles to the front frame, with the handles pointing away from the LCS60, using the four flat-head machine screws.

Install the LCS60 on a stable surface with the required clearance as described previously under *Space Requirements.*

Connecting the System Console

WARNING: Connect and disconnect cables ONLY when the power is off.

The LCS60 uses a system console to run diagnostics, receive error messages, and for administration. Configure the console as shown in Table 2-4.

Table 2-4: System Console (and Port) Configuration

Baud Rate	9600 bps
Flow Control	XON / XOFF
Data Bits	8, no parity
Stop Bits	1
Local Echo	None (full duplex)

The LCS60 has four serial RS-232 ports which can emulate asynchronous DTE or DCE. Serial Port 1 is used for the LCS60 system console and operates at 9600 bps. Ports 2, 3, and 4 can be used to interface asynchronous terminals to the LCS60 UNIX System with Ports 2 and 3 providing 9600 bps operation and Port 4 providing 1200 bps operation. The system console must be an asynchronous ASCII terminal or PC (with terminal emulator). We recommend using a system console with scrolling capability. The system console can be connected directly, through a Lucent Technologies data switch, through modems (9600 bps), or through StarKeeper II NMS.

Connect the system console to the LCS60 using one of the four connection methods described in the following sections.

Serial Port Optioning (DTE/DCE)

Direct- and network-connected system consoles require Serial Port 1 to be optioned to emulate DCE for connection to an external DTE device (this is the default). If connection is through modems (DCE), Serial Port 1 must be optioned to emulate DTE. Refer to Figure 2-2 and Table 2-5 for optioning information; see Table 2-6 for DTE and DCE emulation and pin assignments for RS-232C interfaces.

Table 2-5: MVME712M Module Optioning

Default Optioning				
Ext.Interface	**Port Emulation**	**Port**	**Jumper**	**Bridged Pins**
DTE	DCE	1	J1	all
DTE	DCE	2	J16	all
DTE	DCE	3	J13	all
DCE	DTE	4	J19	all
			J15	no jumpers
Non-Default Optioning				
DCE	DTE	1	J11	all
DCE	DTE	2	J17	all
DCE	DTE	3	J14	all
DTE	DCE	4	J18	all
			J15	no jumpers

Figure 2-2: MVME712M Header Locations and Factory Jumper Placements

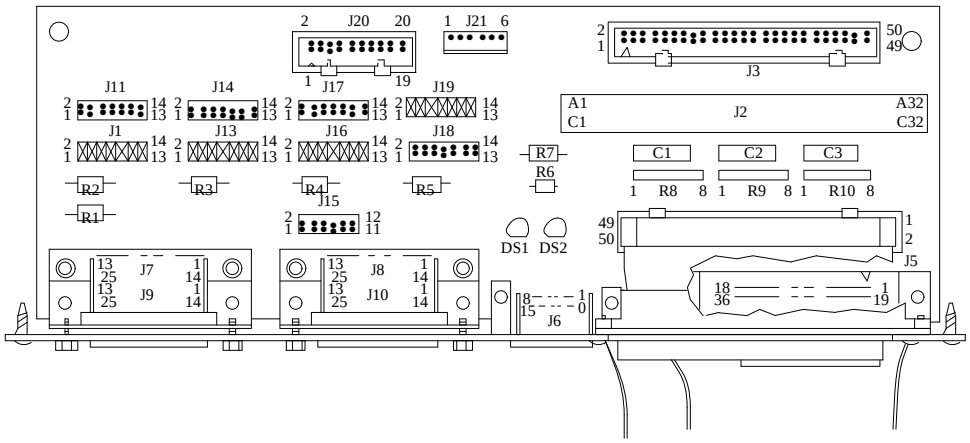


Table 2-6: RS-232 Interface

	Pin	Designation	Function	Direction
Port 1	2	BA	TD-Transmit Data	To DCE
	3	BB	RD-Receive Data	From DCE
Async DTE	4	CA	RTS-Request To Send	To DCE
	5	CB	CTS-Clear To Send	From DCE
Emulation	7	AB	Signal Ground	
	20	CD	DTR-Data Terminal Ready	To DCE
	Pin	**Designation**	**Function**	**Direction**
Port1	2	BA	TD-Transmit Data	From DTE
	3	BB	RD-Receive Data	To DTE
Async DCE	4	CA	RTS-Request To Send	From DTE
	5	CB	CTS-Clear To Send	To DTE
Emulation	6	CC	DSR-Data Set Ready	To DTE
	7	AB	Signal Ground	
	8	CF	DCD-Data Carrier Detect	To DTE
	Pin	**Designation**	**Function**	**Direction**
Ports 2, 3,	2	BA	TD-Transmit Data	To DCE
	3	BB	RD-Receive Data	From DCE
and 4	4	CA	RTS-Request To Send	To DCE
	5	CB	CTS-Clear To Send	From DCE
Async DTE	7	AB	Signal Ground	
	8	CF	DCD-Data Carrier Detect	From DCE
Emulation	20	CD	DTR-Data Terminal Ready	To DCE
	Pin	**Designation**	**Function**	**Direction**
Ports 2, 3,	2	BA	TD-Transmit Data	From DTE
	3	BB	RD-Receive Data	To DTE
and 4	4	CA	RTS-Request To Send	From DTE
	5	CB	CTS-Clear To Send	To DTE
Async DCE	6	CC	DSR-Data Set Ready	To DTE
	7	AB	Signal Ground	
Emulation	8	CF	DCD-Data Carrier Detect	To DTE
	20	CD	DTR-Data Terminal Ready	From DTE

Direct Connection to the LCS60

To connect an asynchronous terminal or PC directly to the LCS60 for use as an LCS60 console, refer to Figure 2-3 and follow the steps below:

1. Serial Port 1 should be optioned to emulate DCE operation. This is the default; therefore, if you haven't changed anything there will be no need to change the option.
2. Connect a 25-pin RS-232 cable between the LCS60 rear panel connector labeled "Serial Port 1" and an asynchronous terminal or PC (Figure 2-7).
3. Power-up the system console and set the options as directed in Table 2-4.
4. Continue with the *Connecting Fiber Interface* section.

Figure 2-3: System Console Connections – Direct

Connection through a Data Switch

To connect an asynchronous terminal or PC to the LCS60 for use as a system console through a data switch network, refer to Figure 2-4 and follow the steps below:

Note: Connections to the data switch network must be to an asynchronous port (e.g., a TY-12 port).

1. Serial Port 1 should be optioned to emulate DCE operation. This is the default; therefore, if you haven't changed anything there will be no need to change the option.
2. Connect the LCS60 rear panel connector labeled "Serial Port 1" to an asynchronous port using a straight-through connection (D8AH connector); connect the 25-pin end to the LCS60.
3. Configure the asynchronous port on the data switch according to Table 2-4 as a receiving group. Conduct the dialogues shown in Screen 2-1 or 2-2 on the data switch console to:

a. Configure a group on the data switch network for the asynchronous port connected to the LCS60

b. Configure a name pointing to this group which can be used to access the LCS60 console port. (Refer to the appropriate Lucent Technologies data switch *Node Reference Guide* for complete instructions.)

Note: If you already have a terminal attached to the data switch that has a DESTINATION prompt, skip to step 7.

Screen 2-1: TY Configuration Dialogue

```
CC0> enter group
GROUP [up to 8 chars]: gmorscon
TYPE [local, trunk: +(local)]: local
DIRECTION [originate, receive, 2way]: receive
DEVICE OR HOST [up to 8 chars]: morscon
HOST AUTOBAUD [on, off: +(off)]: off
ROUND ROBIN SERVICE [per_port, per_module, none: +(none)]:   Return
Creating New Host: morscon
GROUP [up to 8 chars]:  Delete
CC0> enter ty
TY TYPE [12 or ba12]: 12
MODULE ADDRESS: 18
```

Screen 2-1: *continued*

```
PORT NUMBER [1-12: +(1-12)]: 11
COMMENT [up to 60 chars double quoted]:
"console for lcs60 morse"
SERVICE TYPE[console, dialer, host, modem, 2way, or terminal:+(terminal)]: console
GROUP [up to 8 chars]: gmorscon
BAUD RATE [300, 1200, 9600, ext, auto: +(9600)]:  Return
EXTERNAL BAUD RATE [2400, 4800, 19200: +(2400)]:  Return
PARITY [off, even, odd: +(off)]:  Return
FLOW CONTROL OF TY-12 BY DEVICE [xon_xoff, eia, none: +(none)]:  Return
FLOW CONTROL OF DEVICE BY TY-12 [xon_xoff, eia, none: +(xon_xoff)]:  Return
IS AN AT&T VDM CONNECTED TO THIS LINE [yes, no: +(no)]:  Return
TY TYPE [12 or ba12]:  Delete
CC0> enter address
LEVEL [local, area, exchange, local, speedcall: +(local)]:  local
TYPE [numeric, mnemonic, both: +(mnemonic)]:  Return
MNEMONIC ADDRESS [up to 8 chars]: morscon
PAD SUPPORT [yes, no: +(no)]:  Return
DIRECTORY ENTRY [up to 30 chars double quoted, none: +(none)]:
"console to morse"
GROUP(S) [up to 4 groups separated by commas, none: +(none)]:
gmorscon
ORIGINATING GROUP NAME SECURITY PATTERN(S)
[comma-separated pattern list, same_as, none: +(none)]:  Return
INITIAL SERVICE STATE [in, out: +(out)]: in
LEVEL [network, area, exchange, local, speedcall: +(local)]:  Delete
CC0> restore ty
MODULE ADDRESS: 18
PORT NUMBER [1-12]: 11
CC0>
```

Screen 2-2: MSM Configuration Dialogue

```
CC0> enter group
GROUP [up to 8 chars]: gmorscon
TYPE [local, trunk: +(local)]: local
```

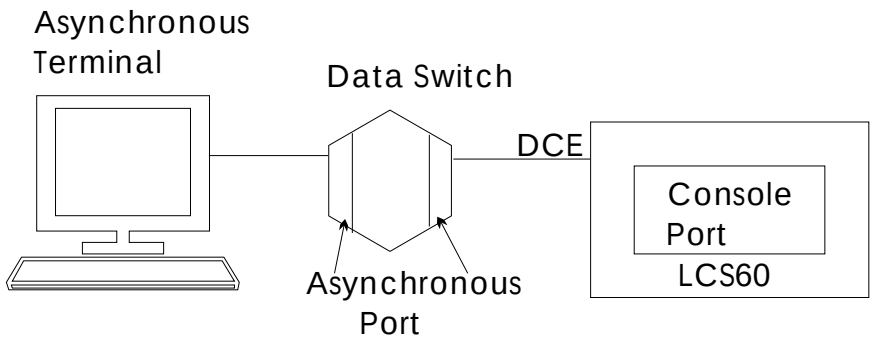
Screen 2-2: *continued*

```
DIRECTION [originate, receive, 2way]: receive
DEVICE OR HOST [up to 8 chars: +(standard)]: morscon
HOST AUTOBAUD [on, off: +(off)]: off
ROUND ROBIN SERVICE [per_port, per_module, none: +(none)]:  Return
Creating New Host: morscon
CC0> enter msm
COMPONENT [module, port]]: p
MODULE ADDRESS: 18
PORT NUMBER [1-12: +(1-12)]: 11
CC0> enter group
GROUP [up to 8 chars]: gmorscon
CONNECTED TO 2-WIRE MODEM [yes, no: +(no)]:  Return
BAUD RATE [75, 110, 150, 300, 1200, 2400, 4800, 9600, 14400
          19200, 28800, 38400, 57600, 76800, 115200: +(9600)]:  Return
PARITY [off, even, odd: +(off)]:  Return
FLOW CONTROL OF MSM BY DEVICE [xon_xoff, eia, none: +(eia)]: none
FLOW CONTROL OF DEVICE BY MSM [xon_xoff, eia, none: +(eia)]: xon
VDM ON THIS PORT [yes, no: +(no)]:  Return
PERMANENTLY ACTIVATED PORT [yes, no: +(no)]: y
BITS PER CHARACTER [5, 6, 7, 8: +(8)]:  Return
NUMBER OF STOP BITS [1, 1.5, 2: +(1)]:  Return
ENDPOINT NUMBER OR RANGE [0000-9999, none: +(none)]:  Return
PORT NUMBER [1-12: +(1-12)]:  Delete

CC0> enter address
LEVEL [local, area, exchange, local, speedcall: +(local)]:  local
TYPE [numeric, mnemonic, both: +(mnemonic)]:  Return
MNEMONIC ADDRESS [up to 8 chars]: morscon
PAD SUPPORT [yes, no: +(no)]:  Return
DIRECTORY ENTRY [up to 30 chars double quoted, none: +(none)]:
"console to morse"
GROUP(S) [up to 4 groups separated by commas, none: +(none)]:
gmorscon
ORIGINATING GROUP NAME SECURITY PATTERN(S)
[comma-separated pattern list, same_as, none: +(none)]:  Return

INITIAL SERVICE STATE [in, out: +(out)]: in

LEVEL [network, area, exchange, local, speedcall: +(local)]:  Delete

CC0> restore msm
COMPONENT [module, port]]: p
MODULE ADDRESS: 18
PORT NUMBER [1-12: +(1-12)]: 11
CC0>
```

Note: There are small variations in system prompts and responses depending on the release of the Lucent Technologies data switch (Datakit II VCS or BNS).

4. Power-up the system console terminal or PC and set the options as directed in Table 2-4.
5. Connect an asynchronous terminal or PC to an asynchronous port on the data switch, using a null-modem connection (D8AG connector). A gender changer may be required depending on the type of RS-232 connector available on the terminal device. Configure the asynchronous port according to Table 2-4 as an originating group. Refer to the appropriate Lucent Technologies data switch *Node Reference Guide* for complete instructions.
6. Restore both asynchronous ports and name to service.
7. In response to the `DESTINATION` prompt on the terminal device, enter the name created for the LCS60 console. This step can be done from any terminal displaying a `DESTINATION` prompt. Maintain proper security precautions to guard against unauthorized or accidental usage.
8. Continue with the *Connecting Fiber Interface* section.

Figure 2-4: System Console Connections – through a Data Switch

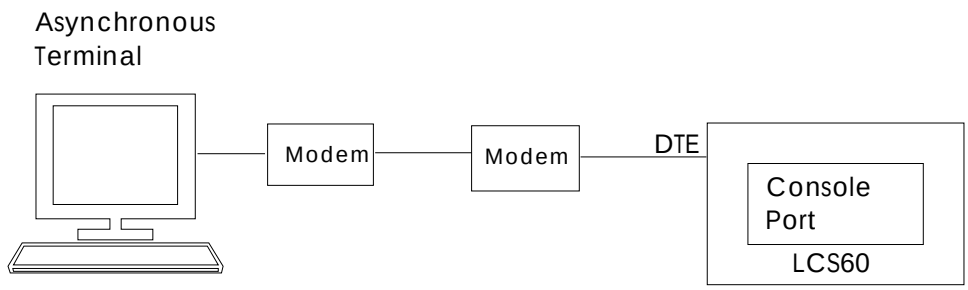


Connection through Modems

To connect an asynchronous terminal or PC to the LCS60 for use as a system console by means of modems, refer to Figure 2-5 and follow the steps below:

1. Option Serial Port 1 to emulate DTE operation. (Refer to the section *Serial Port Optioning* earlier in this chapter.)
2. Connect the LCS60 rear panel connector labeled "Serial Port 1" to an asynchronous terminal by means of modems using straight-through RS-232 cabling. Modems must operate asynchronously at 9600 bps.
3. Power up the system console and set options as directed in Table 2-4.
4. Continue with the *Connecting Fiber Interface* section.

Figure 2-5: System Console Connections – through Modems



Connection through StarKeeper II NMS

For the StarKeeper II NMS connection (Figure 2-6), follow the steps below:

1. Serial Port 1 should be optioned to emulate DCE operation. This is the default; therefore, if you haven't changed anything there will be no need to change the option.

2. Connect the LCS60 rear panel connector labeled "Serial Port 1" to an asynchronous port on the data switch using a straight-through connection (D8AH connector); connect the 25-pin end to the LCS60.
3. Configure the asynchronous port on the data switch according to Table 2-4 as a receiving group. Conduct the dialogue shown in Screen 2-1 (TY-12) or Screen 2-2 (MSM) on the data switch console to:

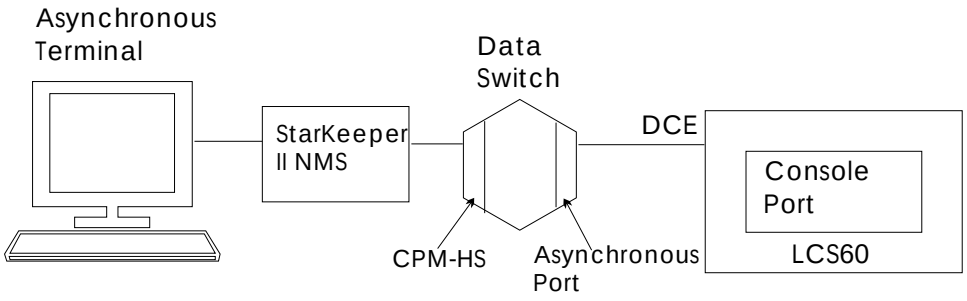
a. Configure a group on the data switch network for the asynchronous port connected to the LCS60

b. Configure a name pointing to this group which can be used to access the LCS60 console port.

   Refer to the appropriate Lucent Technologies data switch *Node Reference Guide* for complete instructions.

4. Restore the asynchronous port and name to service.
5. Log on to StarKeeper II NMS; execute **dkcu** to the call address created for the LCS60 console. Maintain proper security precautions to guard against unauthorized or accidental usage.
6. Continue with the *Connecting Fiber Interface* section.

Figure 2-6: System Console Connections – through StarKeeper II NMS



Connecting the Fiber Interface

Connection to the data switch network for data communications is by means of a dual optical fiber cable. The network LCS60 fiber connection must be to a CPM-HS module in a *Datakit* II VCS or BNS.

For network connection follow the steps below:

Routing the Optical Fiber Cable

The optical fiber cable may be run in suspended ceilings, subfloor cable runs, and riser shafts up to 500 feet. Before routing the cable, connect rubber caps to each end of the cable to protect it from dirt and dust during installation.

Note: Tools and hardware used to install copper wire and cable in building duct and conduit systems are satisfactory for use in installing optical fiber cable (such as, fish wire, woven cable grips, or rope). If woven cable grips are used with fiber optic cables, tape them to the cable jacket before pulling the cable.

When routing the cable, keep it away from copper riser cables. If this is not possible, install an inner liner (conduit or innerduct) to keep the cables separated. EFT corrugated tubing (or equivalent) can be used; this tubing comes in short lengths and can be bent.

Caution: Optical fiber cables are not intended for use in air-handling ceiling areas unless installed in approved conduit.

When installing the cable, avoid tight pulls or tugs against sharp corners of framework. If cables are to be installed around sharp edges of cabinetry or framework, cover the edges with split tubing or similar material. Observe the *minimum bending radius* and *maximum pulling tension* specifications when routing the dual optical fiber cables. When lacing or securing the cable, use flat lacing twine or cable ties and do not tie the cable too tightly or microbending losses may occur. Bundles of cables should not hang or protrude into the work space. Wrap the cables in loops not less than 6 inches in diameter.

The optical fiber cable is not designed for conduit installation, but can be installed in conduit if:

- Cables are placed in a single conduit having not less than ¾-inch inner diameter
- The pull force on an optical fiber cable does not exceed 50 pounds per cable.

Optical fiber cables should not be pulled through more than four 90-degree bends, if more than four such bends are required, provide intermediate *help* points. The minimum recommended conduit bend radius is 4-½ inches. Under no circumstances should the cable be pulled around a sharp corner such as a junction box connection.

Pulling tension during conduit installation can be minimized by:

- Having the cable enter the end of the conduit nearest the curved sections.
- Freeing ducts or conduits of foreign obstructions before cable installation.
- Using approved polyvinylchloride (PVC) lubricants. Approved lubricants are:

  - Polywater A&C Lubricant
  - Hydralube Blue Lubricant
  - Neutral soft soap
  - Talcum powder

Installing the CPM-HS Module and Optical Fiber Cable

1. Slide the I/O distribution board (paddleboard) into one of the available backplane slots from the rear of the data switch cabinet.
2. Connect the paddleboard to the chassis.
3. Slide the CPM-HS module into the same number slot as the paddleboard from the front of the data switch cabinet.
4. Connect the optical fiber cable as follows:

Note: The length of the optical fiber cable between the data switch and the LCS60 should not exceed 2.9 km.

- Remove the rubber caps from the optical fiber cable that runs from the transmitter side of the LCS60 and connect the optical fiber cable to the receiver side (top connector) of the CPM-HS module in the data switch.

- Remove the rubber caps from the optical fiber cable that runs from the receiver side of the LCS60, and connect the optical fiber cable to the transmitter side (bottom connector) of the CPM-HS module in the data switch.

5. Set the MODE toggle switch on the CPM-HS faceplate to ENABLE.
6. Set the Loopback switch on the CPM-HS paddleboard to NORM.

Note: If the cable is installed backwards, no harm will be done when powering up.

Configuration of the Lucent Technologies Data Switch – LCS60

Configuration of the CPM-HS module in the data switch is done in the same way as a CPM-HS module connected to a UNIX System host. The number of channels should be the same as the number of channels with which the LCS60 is configured, 512.

The first local address entered must match the first IP Network Security Group's name. Subsequent local addresses should match the other IP Security Group names entered into the LCS60 configuration database. The LCS60 supports up to four IP Network Security Groups. The first local address should be the same as the node name of the LCS60. Additional information on creating the local address group, and CPM-HS entries can be found in the Lucent Technologies data switch documentation.

After the CPM-HS module is plugged into the data switch, the CPM-HS module must be configured from the data switch console. The Network Administrator enters the group name and local address for the LCS60, and configures the CPM-HS module. The following tasks are performed at the data switch console:

- Enter group name
- Define the local address for the LCS60
- Configure the CPM-HS module.

Sample dialogues (see also Figure 3-1) for these tasks are described below.

Dialogues

Note: Dialogues differ depending on the data switch and release.

Enter Group Name

```
CC0> enter group
GROUP [up to 8 chars]: morse
TYPE [local, trunk: +(local)]: local
DIRECTION [originate, receive, 2way]: 2way
DEVICE OR HOST [up to 8 chars]: morse
PASSWORD [up to 8 chars, none: +(none)]:none
ROUND ROBIN SERVICE [per_port, per_module, none: +(none)]: none
GROUP [up to 8 chars]:  Delete
CC0>
```

Conduct the appropriate dialogue as shown in screen above. (Enter **Delete** to end the session.) The entries are described below:

group Defines the group name by which the data switch knows the LCS60. This is **morse** in the example. **This must be the same as the LCS60 node name.**

type The LCS60 is a local connection to the data switch (the CPM-HS module resides in this data switch).

direction The fiber interface may be used to originate and receive calls through the CPM-HS module, therefore, it is *2way*.

device/host We recommend the name be the same as the name of the LCS60.

password Passwords are not used with the CPM-HS module.

round robin Choose the default of **none**.

Define the Local Address for the LCS60

Note: You must enter an address for each IP Network Security group on the node with a group name of the default node.

Conduct the appropriate dialogue as shown in the screen below.

```
CC0> enter address
LEVEL [local, area, exchange, local, speedcall: +(local)]:  local
TYPE [x121, mnemonic, both: +(mnemonic)]: mnemonic
MNEMONIC ADDRESS [up to 8 chars]: morse
PAD SUPPORT [yes, no: +(no)]:   Return
DIRECTORY ENTRY [up to 30 chars double quoted, none: +(none)]:
"name of the LCS60"
GROUP(S) [up to 4 groups separated by commas, none: +(none)]:
morse
ORIGINATING GROUP NAME SECURITY PATTERN(S)
[comma-separated pattern list, same_as, none: +(none)]: Return

INITIAL SERVICE STATE [in, out: +(out)]: in

LEVEL [local, area, exchange, local, speedcall: +(local)]:  local
TYPE [x121, mnemonic, both: +(mnemonic)]: mnemonic
MNEMONIC ADDRESS [up to 8 chars]: Library
PAD SUPPORT [yes, no: +(no)]:  Return
DIRECTORY ENTRY [up to 30 chars double quoted, none: +(none)]:
"name of the LCS60"
GROUP(S) [up to 4 groups separated by commas, none: +(none)]:
morse
ORIGINATING GROUP NAME SECURITY PATTERN(S)
[comma-separated pattern list, same_as, none: +(none)]: Return

LEVEL [local, area, exchange, local, speedcall: +(local)]:  local

INITIAL SERVICE STATE [in, out: +(out)]: in

TYPE [x121, mnemonic, both: +(mnemonic)]: mnemonic
MNEMONIC ADDRESS [up to 8 chars]: Techs
PAD SUPPORT [yes, no: +(no)]:  Return
DIRECTORY ENTRY [up to 30 chars double quoted, none: +(none)]:
"name of the LCS60"
GROUP(S) [up to 4 groups separated by commas, none: +(none)]:
morse
ORIGINATING GROUP NAME SECURITY PATTERN(S)
[comma-separated pattern list, same_as, none: +(none)]: Return

INITIAL SERVICE STATE [in, out: +(out)]: in

LEVEL [network, area, exchange, local, speedcall: +(local)]:  Delete
CC0>
```

level Enter **local**.

type Enter **mnemonic**.

address This is the IP network security group name. The first address entered must be the the same as the node name that is assigned to the LCS60 when the LCS60, itself, is subsequently configured from the LCS60's system console. Up to four security groups may be configured for the LCS60, therefore, four corresponding local addresses may be defined.

PAD This is not used.

directory entry A 30-character description of the LCS60 in double quotes.

group Enter the group from the previous operation.

security pattern The originating group name security feature allows the *Datakit* II VCS to restrict calls for this host to a select group of *Datakit* II VCS originating groups. Since the *srvtab* files (see Appendix A) may also be used to restrict incoming calls, **Return** is used to disable this feature.

service state The local address must be *in service* for the LCS60 to originate and receive calls.

Configure the CPM-HS Module

```
CC0> enter cpm
MODULE ADDRESS: 6
COMMENT [up to 60 chars double quoted]:
"fiber interface to LCS60"
HARDWARE TYPE [422, hs: +(hs)]: hs
NUMBER OF CHANNELS [2-512: +(32)]:512
CONNECT-TIME BILLING [on, off: +(off)]: off
SINGLE OR MULTIPLE GROUP(S) [single, multiple: +(single)]: single
GROUP [up to 8 chars]: morse
ENDPOINT NUMBER OR RANGE [0000-9999, none: +(none)]: none
CC0> restore cpm 6
CC0>
```

Conduct the dialogue as shown in the screen above.

address Check the data switch cabinet for the slot number of the CPM-HS module to which the LCS60 is connected. Enter the slot number of the CPM-HS module. In this example the CPM-HS module is in slot 6.

comment	A description of the entry.
hardware type	The fiber interface hardware for the LCS60 always connects to the CPM-HS.
connect-time	Specifies if billing information is to be logged.
number of channels	Enter **512**.
connect time billing	This is not used for the LCS60.
Single or multiple	Enter **single**.
group	Enter the group from the previous operation.
Endpoint	This is not used for the LCS60.
restore	The CPM-HS module must be restored to service before it can be used.

Power and Grounding

Connect the AC power cord provided to a three-wire grounded 110 VAC receptacle and the LCS60 rear panel power receptacle as shown in Figure 2-7.

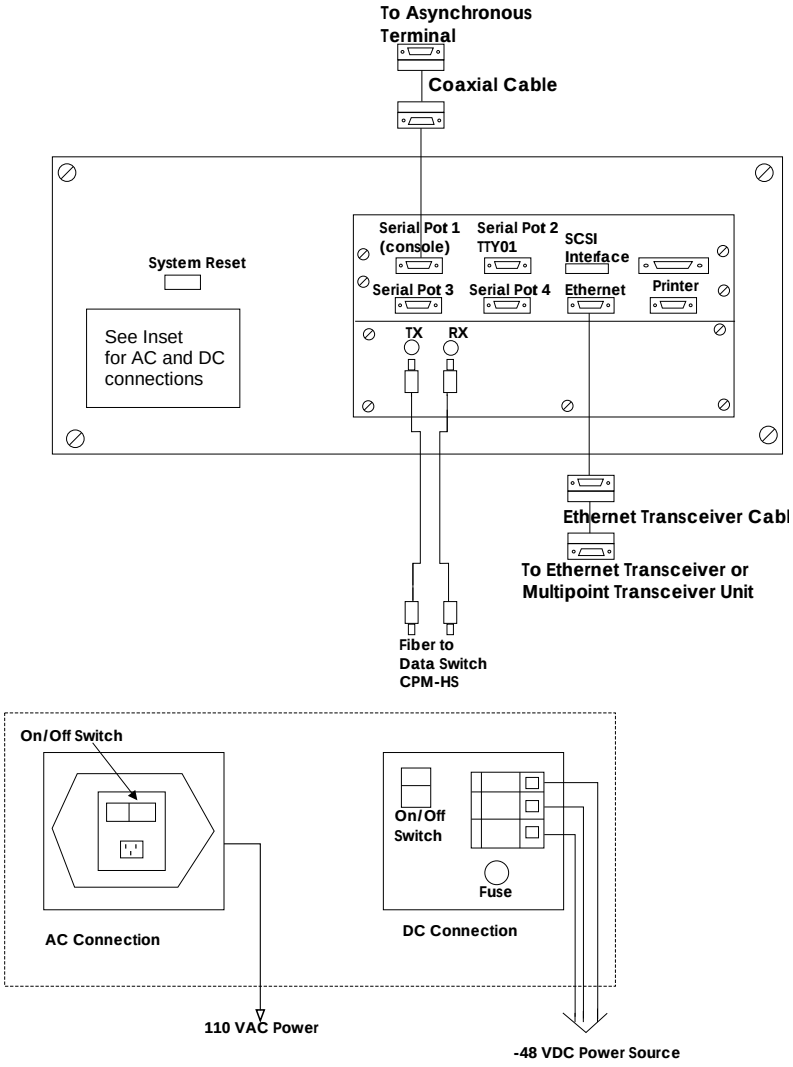
Connect DC power as shown in Figure 2-7.

Power-Up Procedures

Follow the steps below for LCS60 power up only *after* reading this section.

1. Connect the LCS60 to the power source. For the AC power unit, the outlet should be on a dedicated circuit for the LCS60.
2. Power up the system console. (Refer to the section *Connecting the System Console*.) If the system console is connected to the LCS60 by means of a data switch network, enter the appropriate console name (entered in Screens 2-1 or 2-2) in response to the `DESTINATION` prompt.
3. Power up the LCS60 by turning the on / off switch to on.

Figure 2-7: LCS60 Rear Panel AC Connections



Power-Down Procedures

Only a user logged on as **root** may shut the system down at the system console. When logged on as a user, log off and log back on as **root** (refer to Chapter 8). (As shipped, the root password is the Return key.) At the root prompt (#), enter:

/etc/shutdown -g0 -y -i0

The on / off switch can be used to halt the system only when you receive the message stating the system is secured for powering down.

Caution: Use the correct procedure to power down the system. Do not use the Reset button, the on/off system power switch, or pull the electrical plug to stop the system or UNIX System file corruption may result.

Reboot

To reboot the system (rather than shut it down), use the command:

/etc/shutdown -g0 -y -i6

This will shutdown the system and then reboot it. The reboot sequence ends with the `Console Login:` prompt.

Verify LCS60 Console Connection

To verify the console connection, perform the following:

1. Power-up the LCS60 and verify that communication with the console has been established. The console should display diagnostic text followed by the *Console Login*: prompt.
2. If the above information is not displayed on the console after powering-up the LCS60, check the following for your connection:
   - *Direct* – console optioning and cabling
   - *Through the Data Switch* – console and LCS60 connections to the data switch network and the related data switch configuration

- *Through Modems* – console and modem optioning and cabling
- *Through StarKeeper II NMS* – check the console and LCS60 connections to the data switch network and the related data switch configuration.

3. If the STATUS and RUN LEDs on the MVME197 are on solid, contact your service representative.

Caution: Use the *exit* command or *ctrl-d* to log off the system console, and use a break-break sequence to disconnect. The break-break sequence will not log you off the console, so you must first type *exit* or *ctrl-d* to log off.

Verify Fiber Connection

The newer CPM-HS modules have a red LED on the CPM-HS paddleboard that indicates if the cable has not been installed correctly. If this LED is lit or if, after configuring the CPM-HS module, the following message appears:

```
NOTICE: DKHS0:Interface is down: TX-HANG
. . .
**********
** The CommKit Server for morse is having problems
** Please get someone to attend to it.
** The last error was:May 16 07:49:20(273)[0]dkmgr:Can't open /dev/dk/dial0
**********
```

reverse the fiber cable connection on either the LCS60 or CPM-HS (whichever is more convenient); if the machine doesn't recover after a few minutes **stop** and **start dkhost** from the **lcsadm** interface. If the error message appears again, perform a diagnostic check as described in Chapter 9.

Configure the LCS60

Configure the LCS60 as directed in Chapters 3 through 7.

LAN Connections

Ethernet

Connections to an Ethernet LAN are made by a standard DB15 Ethernet transceiver cable. The MVME197 processor board supports a single LAN connection. Refer to Figure 2-7 and follow the steps in the procedure below to connect the LAN to an LCS60. Label all connections. This data is required for correct configuration.

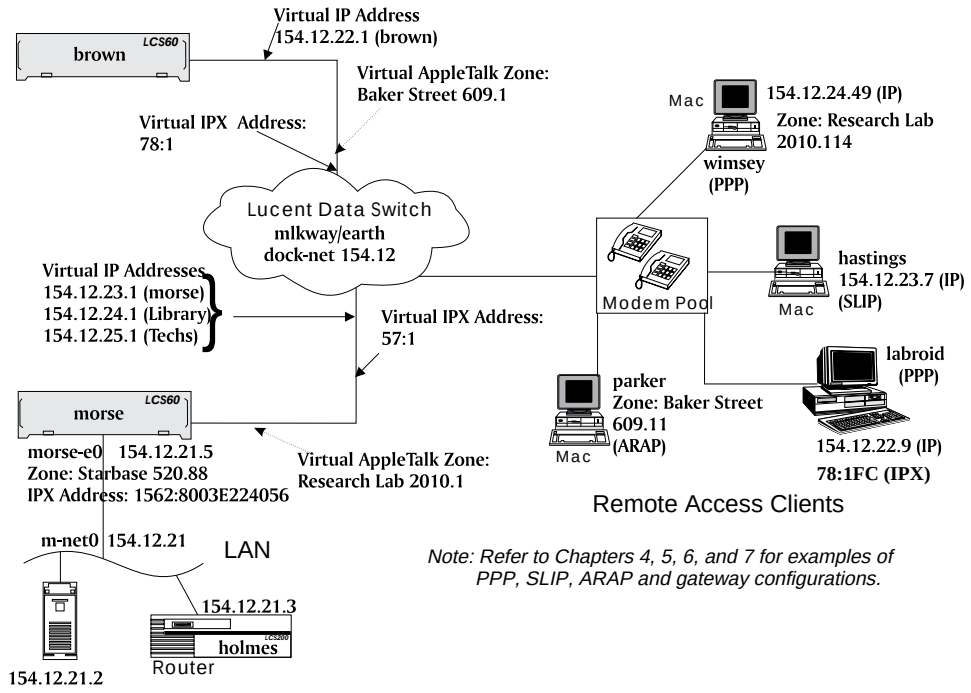
1. When using the MVME197 interface, connect one end of the DB15 cable to the "Ethernet 0" connector on the MVME712M module at the back of the LCS60.
2. Connect the other end of the cable to the Ethernet transceiver at the LAN.
3. After configuring the system (as described in Chapters 3 through 7), verify the connections as specified in Chapter 9.

3 General LCS60 Software Configuration

Introduction

This chapter describes the steps required for configuring the LCS60 software. An example of a network topology is shown in Figure 3-1.

Figure 3-1: Example Network



Note: All addresses and names in this figure are examples only.

Preliminary Hardware Requirements

Before configuring your LCS60, make sure you have followed the instructions in Chapter 2 for hardware installation.

Verify that the following procedures have been followed:

1. The LCS60 is securely mounted as described in Chapter 2.
2. There is a fiber pair connection between the LCS60 and the CPM-HS module in the data switch node.
3. A grounded power cord is attached to the power input jack on the rear panel of the LCS60.
4. An RS-232 connection exists between the rear console port of the LCS60 and one of the following:
   - Modem
   - TY-12 port on the data switch node
   - Directly connected terminal.

Preliminary Configuration Requirements

Before configuring the LCS60, you must have the following information on hand:

- nodename of the LCS60
- IP and IPX addresses for the ethernet
- IPX frame type for ethernet
- protocols and services the LCS60 will be using
- the number of sessions required for each protocol
- the default route
- the Domain Name Service (if DNS is to be used)
- the SNMP manager (if SNMP is to be used)
- IP and IPX addresses for virtual networks (if remote access is to be used)
- AppleTalk address and zone name for the AppleTalk virtual network (if AppleTalk is to be used)

Specific Services

The instructions in this chapter describe the configuration of some of the available services on the LCS60. For details of configuring a specific service, refer to the appropriate chapter: PPP (Chapter 4), SLIP (Chapter 5), ARAP (Chapter 6), gateway services (Chapter 7).

Initial Setup

The **initsetup** command allows you to configure the *basic* LCS60 as shown in Figure 3-2. After completing the steps in **initsetup** you must continue with the configuration required for your LCS60 (refer to the sections *Configure Protocols and Gateway Services* and *Configure Default Route, DNS, and SNMP* in this chapter and to Chapters 4 through 7).

Note: Fill-in the "Installer, Administrator, and Hardware Site" information on your *LCS60 Network Interface for Ethernet Software Certificate* (included in your LCS60 package). Keep this certificate handy; you will need it once you enter **initsetup**. You will *not* be able to complete all the steps in **initsetup** without this certificate.

Perform the following steps to power up the LCS60 and configure the basic features (**nodename, datetime, softwarekey**).

Step 1 Flip the LCS60 rear power switch to the **on** position.

Step 2 Notice the power-on messages on the screen, and wait for the `Console Login:` prompt. This may take 1–2 minutes.

Step 3 Enter **root** as the login name.

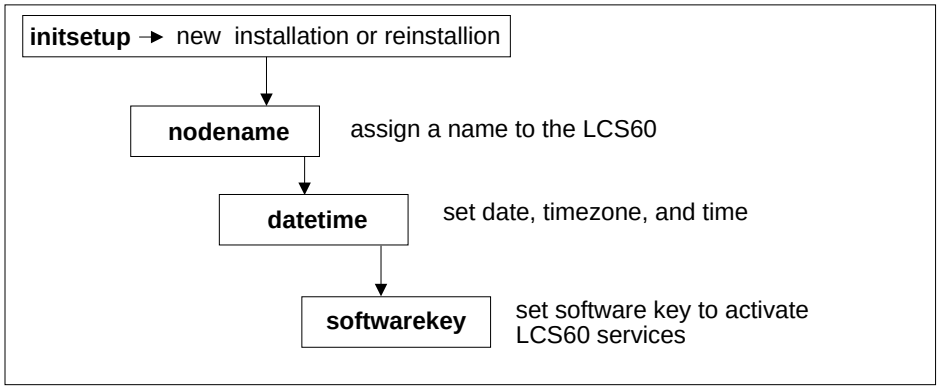
Step 4 As shipped the **root** login uses a carriage return for the password. Enter **Return** at the password prompt; you are now logged in to the LCS60 as **root**.

Caution: **You have super-user permission and could inadvertently change/delete any and all files, therefore, it is important that you follow these steps verbatim.**

Step 5 Assign a password to **root** by using the **passwd root** command. The password must contain at least six characters. Only the first eight characters are significant; longer passwords can be used but the additional characters are ignored.

Step 6 Enter the LCSADM system administration interface by entering **lcsadm** at the root prompt.

Figure 3-2: initsetup



Caution: **Only one system administrator at a time should be using *lcsadm* to configure the LCS60. Use the *lcsadm* interface for all system administration; do not attempt to adjust individual configuration database files in any other way. If you attempt to execute any of the configuration commands while another administrator is executing Config commands, the following message will be displayed:**

```
WARNING: "lcsadm" configuration is already in progress.  Continuing can
cause catastrophic results!

Do you want to continue? [y/n]
```

Step 7 The **lcsadm** interface takes you into a hierarchical system of directories and commands. (For example, Screen 3-1.)

Screen 3-1: LCS60 Top Directory

```
sysV68:Top>   Return
Commands may be abbreviated.  Commands are:

config/          help             manager/         ports/           quit
service/         session/         start            stop             ^
!
```


Note: The machine name (shown in Screen 3-1 as **sysV68**) appears at the beginning of the *Top>* prompt. The **sysV68** will be replaced by the node name you configure for your LCS60 after you exit and then re-enter the **lcsadm** interface (in the example that follows the prompt would become *morse:Top>*). The screen displays in this document, however, omit the machine name to avoid confusion.

Note: The directories are followed by a slash "/" in the screen display.

Step 8 To navigate through the directories, enter the name of the directory you wish to access (*top, session, ports, service, manager, config*). To see the contents of a directory, use the **ls** command or the **Return** key.

Step 9 Enter the Config directory by typing **config** at the *Top>* prompt.

Note: Command and directory names can be abbreviated by typing a unique string of the beginning characters of the command (e.g., the command **backup** can be accessed by typing **b** at the *Top>Config>#* prompt).

```
Top>#  config
Top>Config>#    Return
Commands may be abbreviated.  Commands are:

addhost          addnet           atalkas          backup           console
datetime         delhost          delnet           dftroute         dns
etherif          help             initsetup        ipas             ipx
manager/         maxsessions      nodename         ports/           protocol
quit             service/         session/         snmp             softwarekey
srvports         srvsetup         subnet           top/             upgrade
viewhosts        viewnets         ^                !

Top>Config># init
```

Step 10 Enter **init** (at *Top>Config>*) to start the initsetup routine.

Step 11 Follow the menus in the initsetup; they will guide you through the essential items that must be configured for basic LCS60 operation (as shown in Figure 3-2). A sample **initsetup** session is presented on the following screen.


```
Top>Config># init

                LCS60 Initial Setup and Configuration Procedure

The "initsetup" procedure leads you through the steps to initially set up this
LCS60 by entering the node name, time and date, and the software key.

*** This step allows the LCS60 Administrator to set the node name.
*** This is the name by which other hosts know this LCS60.

The LCS60 is currently called "sysV68".
         ==> Do you want to change it? [y, n, ?, q] y

    Enter the new node name for this LCS60
    [? for help, q to quit]
    ==>  morse

*** This step allows the LCS60 Administrator to set the timezone, date, and
*** time of the LCS60 system clock.

Current time and time zone is: 13:33 EST
        ==> Change the time zone? [y, n, ?, q] n

Current date and time: Mon. 08/17/95 13:33
        ==> Change the date and time? [y, n, ?, q] n
```

```
*** This step allows the LCS60 Administrator to enter the software key for this
*** LCS60 in order to activate the appropriate software features.

                    SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 Machine ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> 1

                   +-------------------------+
                   |                         |
                   |   LCS60 ID:  XXXXXXXX   |
                   |                         |
                   +-------------------------+

                    SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 Machine ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> 2
```


In order to complete the software key configuration, you must:

- Display the LCS60 machine ID as shown above and enter this number on your *LCS60 Network Interface for Ethernet Software Certificate*
- Call 1-800-WE2CARE for the software key; you will need to supply the information requested on your *LCS60 Network Interface for Ethernet Software Certificate.*

Note: If you do not receive the software key immediately (for example, if you call the 800 number after hours), you may enter a **q** on the screen above to continue with configuration. You can enter the software key using the **lcsadm config softwarekey** command at any time, however, you *must* enter the software key before you can successfully activate the services you configure. (Refer to Chapter 8 for the **softwarekey** command.)

- Enter **2** on the screen above and continue with **initsetup** as shown below.

Note: If a software key already exists on the LCS60, you will receive a message asking if you want to retain it or delete it and enter a new one. If a software key exists, entry of a new one is not necessary unless you are upgrading to a new release that requires a different key. Answer **y** to keep the current key or **n** to discard it and enter a new one.

```
You will now be prompted to enter your Software Certificate Number and Software
Key. These values must be properly entered to unlock the copy protected LCS60
Software. Please refer to the Software Certificate for details on obtaining a
Software Key from the WECARE Support Center (1-800-WE2-CARE).

You can bypass entry of the software key values by typing "q" at the
appropriate prompt. If you choose to bypass entry of the Software Certificate
Number and Software Key at this time, you must manually run the "lcsadm -c
config softwarekey" command before the LCS60 can be used to provide network
services.

Please enter your Software Certificate Number.

Certificate number (or "q" to quit) > l60r3-xxxxxx-xxxx

You entered "L60R3-XXXXXX-XXXX".  Is this correct (y/n/q)? y

Please enter your Software Key.

Software Key (or "q" to quit) > xxxxx-xxxx-xxxx-xxxx

You entered "XXXXX-XXXX-XXXX-XXXX".  Is this correct (y/n/q)? y

Registration Completed Successfully

                    SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> q

*** To configure LCS60 protocols and services, enter the command "lcsadm" and
*** then type "config srvsetup" and follow the instructions in the LCS60
*** Network Interface Installation and Administration Guide.

Top>Config>#
```

Note: You must have the appropriate key to activate the features on your LCS60. The R1 key will activate gateway services and the IP protocol feature, R2 activates the R1 features and the AppleTalk protocol feature, and the R3 key will activate all R2 features and the IPX protocol.

After completing the steps in **initsetup**, you must complete the configuration of your LCS60 by adding the protocols and services you will be using. Refer to the sections (*Configure Protocols and Gateway Services–srvsetup* and *Configure Default Route, DNS, and SNMP*) below to complete the configuration of your LCS60.

The individual configuration commands are listed in Table 3-1. These commands may be run individually from the *Top>Config>* prompt, or as part of the **srvsetup** command as noted in Table 3-1.

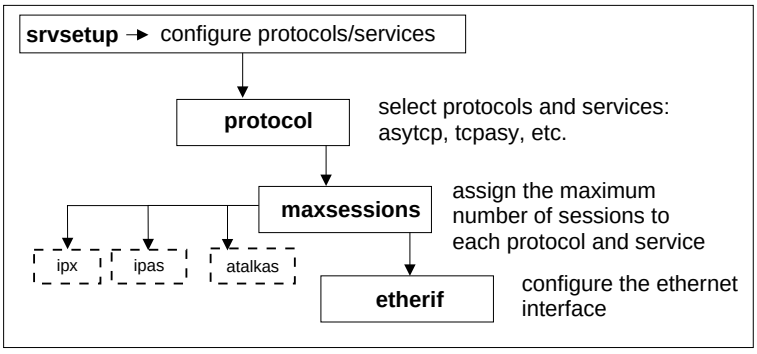
Table 3-1: Protocol and Services Commands

Service	Command	Notes
Define protocols / services	protocol	srvsetup
Configure the Ethernet Interface	etherif	srvsetup
Set the default route	dftroute	dftroute
Configure the Domain Name Resolver	dns	dns
Configure the SNMP Agent	snmp	snmp
Define the maximum LCS60 and gateway service sessions	maxsessions	srvsetup
Configure IPX virtual and ethernet addresses for PPP sessions	ipx	srvsetup, Chap. 4
Configure virtual network for SLIP and PPP services	ipas	srvsetup, Chap. 4 and 5
Configure virtual AppleTalk network / zone for PPP and ARAP services	atalkas	srvsetup, Chap. 4 and 6
Configure TCP-to-Async gateway service (ports)	srvports	Chap. 7

Configure Protocols and Gateway Services — srvsetup

After executing the initial setup procedures above, configure the protocols and gateway services using the **srvsetup** command (Figure 3-3).

Figure 3-3: srvsetup



Note: The configuration activities in the **srvsetup** command (**protocol, maxsessions, ipas, ipx, atalkas, etherif**) can also be accessed individually. Refer to Chapters 4, 5, 6, and 7 for examples of individual commands.

Perform the following steps to configure the protocols and gateway services for your LCS60. (You should have already done an **initsetup** as described previously.)

Step 1 Enter **srvsetup** at the *Top>Config>#* prompt to start the protocol / service setup routine.

Step 2 Follow the menus in the srvsetup; they will guide you through the items essential for your configuration (refer to Figure 3-3). A sample **srvsetup** session is presented in the screens that follow.

Note: Refer to the Glossary at the end of this document for definitions of parameter values.

```
Top>Config># srvset

            LCS60 Protocols and Services Configuration Procedure

The "srvsetup" procedure leads you through the steps to configure the LCS60
protocols and services. Before you run "srvsetup", you should read about LCS60
configuration in the "LCS60 Network Interface Installation and Administration
Guide" and assemble the information required for configuration.

    [ q to quit, RETURN to continue ]
    ==>   Return

*** This step allows the LCS60 Administrator to define which services will
*** be activated on this LCS60 whenever the system is rebooted.

        PROTOCOL/SERVICES TO BE STARTED WHEN BOOTING

        1  Add Protocol/Service to Configuration
        2  Delete Protocol/Service from Configuration
        3  Display Current Protocol/Service Configuration

    Enter Menu Selection
    [? for help, q to quit, RETURN for menu]
    ==>  1

        Please choose from the following protocols/services
        that you want to add:

         **> arap  asytcp  atalk  ipx  ppp  routed  slip  snmp  tcpasy  tcpip <**

    Enter the protocol/service name(s) to be added
    [? for help, q for MENU]
    ==>  atalk ipx tcpip slip ppp arap asytcp tcpasy routed

        "atalk" is added!

        "ipx" is added!

        "tcpip" is added!

        "slip" is added!

        "ppp" is added!

        "arap" is added!

        "asytcp" is added!

        "tcpasy" is added!

        "routed" is added!

        PROTOCOL/SERVICES TO BE STARTED WHEN BOOTING

        1  Add Protocol/Service to Configuration
        2  Delete Protocol/Service from Configuration
        3  Display Current Protocol/Service Configuration
```

```
    Enter Menu Selection
    [? for help, q to quit, RETURN for menu]
    ==>  q

*** This step allows the LCS60 Administrator to define the maximum number of
*** sessions for each configured service.

    CAUTION: Please refer to the I&A Guide for instructions
    about configuring this feature.

            LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

    1. Add/Change a Session Parameter
    2. Delete a Session Parameter
    3. Display all Session Parameters

    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> 1

    Enter session parameter:
    "maxsessions", "ppp", "slip", "arap", "asytcp", "tcpasy"
    [ Type q to QUIT or ? for HELP ]
    ==> tcpasy
```


Note: If you enter a value greater than 180 for **maxsessions**, the CPM-HS module must be configured for **512** channels (refer to page 2-25).

```
    Enter session parameter value
    [ Type q to QUIT or ? for HELP ]
    ==> 120

        NOTICE: Entering < tcpasy > service with value of < 120 >

    Is this correct?
    Enter y,n ==> y

    CAUTION: Please refer to the I&A Guide for instructions
    about configuring this feature.

            LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

    1. Add/Change a Session Parameter
    2. Delete a Session Parameter
    3. Display all Session Parameters
```

```
Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 1

Enter session parameter:
"maxsessions", "ppp", "slip", "arap", "asytcp", "tcpasy"
[ Type q to QUIT or ? for HELP ]
==> ppp

Enter session parameter value
[ Type q to QUIT or ? for HELP ]
==> 90

     NOTICE: Entering < ppp > service with value of < 90 >

Is this correct?
Enter y,n ==> y

CAUTION: Please refer to the I&A Guide for instructions
about configuring this feature.

        LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

1. Add/Change a Session Parameter
2. Delete a Session Parameter
3. Display all Session Parameters

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 1

Enter session parameter:
"maxsessions", "ppp", "slip", "arap", "asytcp", "tcpasy"
[ Type q to QUIT or ? for HELP ]
==> asytcp

Enter session parameter value
[ Type q to QUIT or ? for HELP ]
==> 120

     NOTICE: Entering < asytcp > service with value of < 120 >

Is this correct?
Enter y,n ==> y

CAUTION: Please refer to the I&A Guide for instructions
about configuring this feature.

        LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

1. Add/Change a Session Parameter
2. Delete a Session Parameter
3. Display all Session Parameters

Enter Menu Selection
```

```
[ Type q to QUIT or ? for HELP ]
==> 1

Enter session parameter:
"maxsessions", "ppp", "slip", "arap", "asytcp", "tcpasy"
[ Type q to QUIT or ? for HELP ]
==> slip

Enter session parameter value
[ Type q to QUIT or ? for HELP ]
==> 80

     NOTICE: Entering < slip > service with value of < 80 >

Is this correct?
Enter y,n ==> y

CAUTION: Please refer to the I&A Guide for instructions
about configuring this feature.

        LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

1. Add/Change a Session Parameter
2. Delete a Session Parameter
3. Display all Session Parameters

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 1

Enter session parameter:
"maxsessions", "ppp", "slip", "arap", "asytcp", "tcpasy"
[ Type q to QUIT or ? for HELP ]
==> arap

Enter session parameter value
[ Type q to QUIT or ? for HELP ]
==> 60

     NOTICE: Entering < arap > service with value of < 60 >

Is this correct?
Enter y,n ==> y

CAUTION: Please refer to the I&A Guide for instructions
about configuring this feature.

        LCS60 AND SERVICE SESSION PARAMETER CONFIGURATION MENU

1. Add/Change a Session Parameter
2. Delete a Session Parameter
3. Display all Session Parameters

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> q

     NOTICE: Session parameter changes have been made effective!
```

Note: The following prompts (**ipas**) will be displayed only if SLIP or PPP is configured.

```
*** This step allows the LCS60 Administrator to configure the IP address
*** server, which is used by < ppp slip > for both the static and dynamic
*** allocation of IP Addresses. Since one or more of these services is
*** currently configured, IPAS must be configured.

  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

NOTICE: The first IP Network Security Group is required to be named [morse]

    Enter an IP Network Security Group name [q to quit, ? for help]
    ==> morse

    Enter an Internet network address
    [q to quit]
    ==> 154.12.23
    ==> Is [154.12.23.0] divided into subnets ?  [y, n, ?] y

    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8

        *** New IP Network Security Group "morse" Configuration is:
        ***
        *** Class B IP Address: 154.12.23
        *** Network Mask:       255.255.255.0

    Is this correct?
    Enter y,n ==> y
```

```
IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

1  Add an IP Network Security Group
2  Delete an IP Network Security Group
3  Edit an IP Network Security Group
4  Display all IP Network Security Groups

Enter Menu Selection
[ ? for help, q to quit, RETURN for menu ]
==>  1
Enter an IP Network Security Group name [q to quit, ? for help]
==> Library

Enter an Internet network address
[q to quit]
==> 154.12.24
==> Is [154.12.24.0] divided into subnets ?  [y, n, ?] y

Enter number of mask bits for this subnet
[? for help, q for quit]
==>  8

    *** New IP Network Security Group "Library" Configuration is:
    ***
    *** Class B IP Address: 154.12.24
    *** Network Mask:       255.255.255.0

Is this correct?
Enter y,n ==> y

IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

1  Add an IP Network Security Group
2  Delete an IP Network Security Group
3  Edit an IP Network Security Group
4  Display all IP Network Security Groups

Enter Menu Selection
[ ? for help, q to quit, RETURN for menu ]
==>  1
Enter an IP Network Security Group name [q to quit, ? for help]
==> Techs

Enter an Internet network address
[q to quit]
==> 154.12.25
==> Is [154.12.25.0] divided into subnets ?  [y, n, ?] y

Enter number of mask bits for this subnet
[? for help, q for quit]
==>  8

    *** New IP Network Security Group "Techs" Configuration is:
```

```
        ***
        *** Class B IP Address: 154.12.25
        *** Network Mask:       255.255.255.0

    Is this correct?
    Enter y,n ==> y

    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  2

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

    Enter User login Id
    [? for help, RETURN for user ids, q to quit]
    ==>  tbaker

Select an IP Network Security Group to add an IP Reserved Address
        morse
        Library
        Techs
[q to quit]
==> morse
Selected IP Network Security Group [ morse ]

    Enter an Internet host address allocated from
    IP network 154.12.23  [q to quit]
    ==> 154.12.23.7
```

```
Added reserved IP address [ 154.12.23.7 ] for [ tbaker ]
within IP Network Security Group [ morse ]

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
```


Note: The following prompts (**atalkas**) will be displayed only if ARAP or PPP is configured.

Note: It is not necessary to configure the LCS60's Ethernet interface for AppleTalk. The LCS60 is not a seed router on the Ethernet. It will discover the network range and the zones assigned to the Ethernet by another router and will dynamically acquire a unique AppleTalk node address within the assigned network number range.

```
*** This step allows the LCS60 Administrator to configure the virtual AppleTalk
*** network and zone, which are used by < ppp arap > for dynamic allocation of
*** AppleTalk Addresses. Since one or more of these services is currently
*** configured, ATALKAS must be configured.
    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK
    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name
```

```
    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> 1

    *** The AppleTalk virtual network has not yet been configured.

    Enter the network number for the LCS60 interface to the AppleTalk network.

    This must be a number between 1 and 65279, and must NOT be equal to any
    other network number in use in the AppleTalk network, and must not be
    contained within any other network number range in use in the AppleTalk
    network.
    [ Type q to quit ]
    ==> 2010

    Enter the zone name to be used by AppleTalk nodes that use the virtual
    network.  The name may contain no more than 32 characters.
    [ Type q to quit or ? for help ]
 ==> Research Lab

    You have entered:
    VIRTUAL NETWORK NUMBER ..... 2010
    VIRTUAL NODE NUMBER ........ 1
    VIRTUAL NETWORK ZONE NAME .. Research Lab

    Confirm?
    Enter y,n ==> y

    The LCS60 virtual AppleTalk network is configured as follows:
    VIRTUAL NETWORK NUMBER ..... <2010>
    VIRTUAL NODE NUMBER ........ <1>
    VIRTUAL NETWORK ZONE NAME .. <Research Lab>

    NOTE: Changes to the configuration of the LCS60 virtual AppleTalk network
    will not take effect until you:
    - Enter the lcsadm command and then type 'start atalk' from the top command
    directory to start AppleTalk protocol.

    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK

    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name

    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> q

*** This step allows the LCS60 Administrator to configure the Ethernet
*** interface for TCP/IP on this LCS60. This must be configured for TCP
*** Gateway, PPP and SLIP services.

        TCP/IP ETHERNET INTERFACE CONFIGURATION MENU
```

```
        1  Configure an Ethernet Interface
        2  Delete an Ethernet Interface
        3  Display all Interfaces that are configured

    Enter Menu Selection
    [? for help, q to quit, RETURN for menu]
    ==> 1

WARNING !!
        This option will automatically delete each interface that was
        previously configured. It reconstructs the Ethernet interface
        database from scratch and requires the user to reconfigure
        each interface again.

Do you want to continue? [y, n, ?] y

    Enter a name for Ethernet Interface 0
    [? for help, q for menu]
    ==>  morse-e0

    Enter aliases for morse-e0
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>  mor

    Enter morse-e0 internet address (e.g. 154.11.21.1) [q to quit]
    ==> 154.12.21.5

    Enter official name of network [154.12] or q to quit
    ==>  dock-net

    Enter aliases for dock-net
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>    Return

    ==> Is dock-net [154.12] divided into subnets ?  [y, n, ?] y

    Enter name of subnet to be added
    [? for help, q for quit]
    ==>  m-net0

    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8
    Entering Ethernet interface 0 morse-e0 [154.12.21.5]
    ==> Is this correct?  [y, n] y

    Ethernet interface 0 morse-e0 [154.12.21.5] configured !

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
```

Note: The following prompts (**ipx**) will be displayed only if IPX is configured.

```
*** This step allows the LCS60 Administrator to configure the IPX protocol for
*** the Ethernet interface and define the virtual IPX network for PPP. Since
*** the IPX protocol is selected, it must be configured.

  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

        IPX CONFIGURATION MANAGEMENT

    1  Ethernet interface configuration parameters

    2  Virtual (PPP) interface configuration parameters

    3  Display all Parameters

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==> 1

    ETHERNET CONFIGURATION PARAMETERS

    1 Configure/Display Network Address

    2 Configure/Display Framing Type

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

         Current Ethernet Network Number ..... < Undefined >

    Enter an IPX Network Number
    [ Type q to quit or ? for help ]
    ==> 1562

    ETHERNET CONFIGURATION PARAMETERS

    1 Configure/Display Network Address

    2 Configure/Display Framing Type

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  2

         Current Ethernet Frame Type ..... < Undefined >

    Enter frame type "ethernet", "802.2", "802.3", or "snap"
    [ Type q to quit or ? for help ]
    ==> ethernet

    ETHERNET CONFIGURATION PARAMETERS

    1 Configure/Display Network Address
```

```
  2 Configure/Display Framing Type

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  q
CAUTION:  Please refer to the I&A Guide for instructions
about configuring this feature.

       IPX CONFIGURATION MANAGEMENT

  1  Ethernet interface configuration parameters

  2  Virtual (PPP) interface configuration parameters

  3  Display all Parameters

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  2

  VIRTUAL (PPP) CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  1

      Current Virtual Network Number ..... < Undefined >

  Enter an IPX Network Number
  [ Type q to quit or ? for help ]
  ==> 57

     Network < 57 > is already configured for your Ethernet Interface.

  VIRTUAL (PPP) CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  q
CAUTION:  Please refer to the I&A Guide for instructions
about configuring this feature.

       IPX CONFIGURATION MANAGEMENT

  1  Ethernet interface configuration parameters

  2  Virtual (PPP) interface configuration parameters

  3  Display all Parameters

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
```

```
    ==>  3

    The LCS60 IPX Parameters are configured as follows:

         Ethernet Network Number ..... < 1562 >
         Virtual Network Number ...... < 57 >
         Ethernet Frame Type ......... < Ethernet II >

  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

         IPX CONFIGURATION MANAGEMENT

    1  Ethernet interface configuration parameters

    2  Virtual (PPP) interface configuration parameters

    3  Display all Parameters

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

This completes your configuration of protocols and services on this LCS60.

To start ALL configured protocols and services, enter the command "lcsadm" and
then from the top command directory type "start all".

Top>Config>#
```


Configure Default Route, DNS, and SNMP

The following optional commands allow you to:

- Define a default route
- Define the Domain Name Server
- Define an SNMP manager.

Default Route – dftroute*

Use the **dftroute** command to define the default route as shown in the example below.

The default route may be entered either as a host name or as a TCP/IP dotted numerical address (e.g., **holmes** or **154.12.21.3**). The host name entered as the default router *must* exist in the LCS60 configuration database; use the **addhost** command to add the host as necessary.

```
Top>Config># dftroute
CURRENT default route is . . . . . .  None
                DEFAULT ROUTE FUNCTIONS
    ==================================================
    1 ... Define the default route
    2 ... Delete the default route
    To select a function, enter the corresponding number
    [ Type q to quit or ? for help]
    ==>  1
CAUTION:  The default route defined here will be overridden if a
router is advertising a default route in the network.
    Enter default router (name, alias, or internet address)
    [ Type q to quit or ? for help ]
    ==>  154.12.21.3
Trying to reach host "154.12.21.3" ... OK.
    CURRENT default route is ....... None
    NEW     default route will be .. 154.12.21.3
    Enter y to confirm NEW default route "154.12.21.3"
    Enter n to reject  NEW default route "154.12.21.3"
    ==>  y
Top>Config> #
```

Be sure to specify **routed** with the **protocol** command to start default route service at boot time.

* The **dftroute** command cannot be run unless the TCP/IP protocol is running.

Domain Name Server – dns

Use **dns** to define the Domain Name Server as shown in the example below.

```
Top>Config># dns
        DOMAIN NAME SYSTEM (DNS) CONFIGURATION
        1  Display Current Configuration
        2  Modify/Create DNS Resolver Configuration
        3  Enable/Disable DNS
    Enter Menu Selection
    [? for help, q to quit]
    ==>  2
Enter Domain Information [?, q]
==>  ny.att.com
Enter Name Server [?, q]
==>  154.12.21.110
Enter Name Server [?, q]
==>  154.12.48.5
Enter Name Server [?, q]
==>  q
        DOMAIN NAME SYSTEM (DNS) CONFIGURATION
        1  Display Current Configuration
        2  Modify/Create DNS Resolver Configuration
        3  Enable/Disable DNS
    Enter Menu Selection
    [? for help, q to quit, RETURN for menu]
    ==>  3
    This system is configured with DNS DISABLED.
    Enable DNS? [y, n] y
    Your change "will only" become effective when you exit (i.e., quit)
    from this menu.
        Warning to administrator:
        -------------------------
        To ensure your subsequent TCP/IP commands will use DNS,
        YOU SHOULD LOGOFF THEN RE-LOGIN AFTER EXITING lcsadm
    Type RETURN to continue:   Return
        DOMAIN NAME SYSTEM (DNS) CONFIGURATION
        1  Display Current Configuration
        2  Modify/Create DNS Resolver Configuration
        3  Enable/Disable DNS
    Enter Menu Selection
```

```
    [? for help, q to quit]
    ==>  q
Top>Config>#
```

Be sure to specify **routed** with the **protocol** command to start DNS service at boot time.

SNMP Manager – snmp

Use the **snmp** command to define the SNMP manager as shown in the example below.


```
Top>Config># snmp
        SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP) CONFIGURATION
        1  Display Current Configuration File
        2  Modify/Create Configuration File
    Enter Menu Selection
    [? for help, q to quit, RETURN for menu]
    ==>  2
Enter Network Administrator's Information [?, q]
==> my name
Enter Machine Location [?, q]
==>  my location
Enter Community Name [?, d, q]
==> public
IP address of SNMP manager for community "public" [?, q]
==> 0.0.0.0
Access right for SNMP manager "0.0.0.0" [r, w, ?, q]
==>  r
        Adding the following information to the configuration file:
                community public 0.0.0.0 read-only
        Confirm? [y, n] y
Enter Community Name [?, d, q]
==>  traps
```

```
IP address of SNMP manager for community "traps" [?, q]
==>  154.12.21.2
Access right for SNMP manager "154.12.21.2" [r, w, t, ?, q]
==>  t
        Adding the following information to the configuration file:
                community traps 154.12.21.2 traps
        Confirm? [y, n] y
Enter Community Name [?, q]
==>  q
Top>Config> #
```

Note: Supported traps are listed in Chapter 1. Refer to RFC1213 for supported MIBs.

Be sure to specify **routed** and **snmp** with the **protocol** command to start SNMP service at boot time.

Starting the LCS60

After configuring the LCS60, you must start the protocols and services you have configured using the **start all** command from the Top directory of **lcsadm**.

Base Level Backup

Once the LCS60 is installed and configured, the administrator should make a complete set of backup tapes of the LCS60 variable files to preserve the configuration information. These tapes can be labeled "day 0 backups" and can be used to restore the LCS60 quickly to a working state if necessary. Use the command **lcsadm -c config backup** as described in Chapter 8.

Configuration Changes

A variety of commands are available to review the configuration. Commands such as **viewnets** and **viewhosts** are available from the Config directory. Commands **show, types,** and **summary** are also available to check the current configuration before making configuration changes. Refer to Chapter 8 for details of these commands.

The configuration database may be changed at any time by using commands available from the Config directory. Table 3-2 lists the configuration commands.

Table 3-2: Configuration Commands – Config Directory

Configuration	Command
Set the date and time	**datetime**
Change the node name	**nodename**
Choose the protocols to start when the LCS60 is rebooted	**protocol**
Change the default route	**dftroute**
Set the software key	**softwarekey**
Set the DNS resolver	**dns**
Change the SNMP configuration	**snmp**
Change the number of service sessions	**maxsessions**
Define service ports	**srvports**
Configure virtual IP network for PPP and SLIP	**ipas**
Configure IPX addresses for PPP	**ipx**
Configure virtual AppleTalk network for ARAP and PPP	**atalkas**
Add a new host to the network	**addhost**
Add a new network to the LCS60 configuration	**addnet**
Remove a host from the network	**delhost**
Remove a network from the LCS60 configuration	**delnet**
Configure the Ethernet interface	**etherif**
Configure subnetworks and masks	**subnet**
Display all hosts on a network	**viewhosts**
Display all configured networks	**viewnets**

All of these commands are entered at the *Top>Config>#* prompt.

Note 1: For information on configuring multiple IP subnetworks for SLIP or for IP over PPP, refer to Chapter 1 and to the **ipas** command in Chapter 4 (PPP) or Chapter 5 (SLIP).

Note 2: The **addhost** and **viewhosts** commands display only the hosts configured in the local system database. If DNS is used on your system the **nslookup** command can be used to display host information.

Administrative and Maintenance Commands

In addition to the commands described in the previous sections, the following administrative / maintenance commands are also available from the Config directory. Refer to the chapter listed in Table 3-3 for details of these commands.

Table 3-3: Administrative/Maintenance Commands – Config Directory

Operation	Command	Description
Enable / disable autobaud	**console**	see Chapter 8
Backup / restore functions	**backup**	see Chapter 8
Remote upgrade	**upgrade**	see Chapter 9

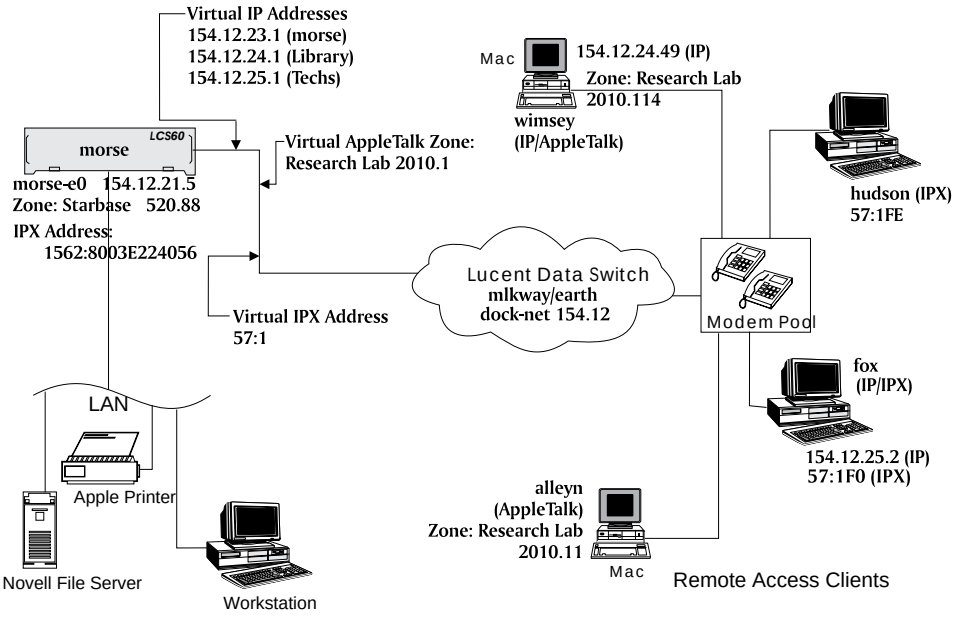
4 PPP – Configuration and Administration

LCS60 Configuration and Connection for PPP Service

Figure 4-1 shows an example network using PPP service.

Note: PPP service using AppleTalk requires an R2.0 or R3.0 software key. IPX service requires an R3.0 software key. Refer to Chapter 3 for information about the software key.

Figure 4-1: Example Network – PPP Service



You can configure the LCS60 for PPP service using either the **srvsetup** command or the individual commands (**protocol, maxsessions, ipas, ipx, atalkas, etherif**). The examples in this chapter use the individual commands.

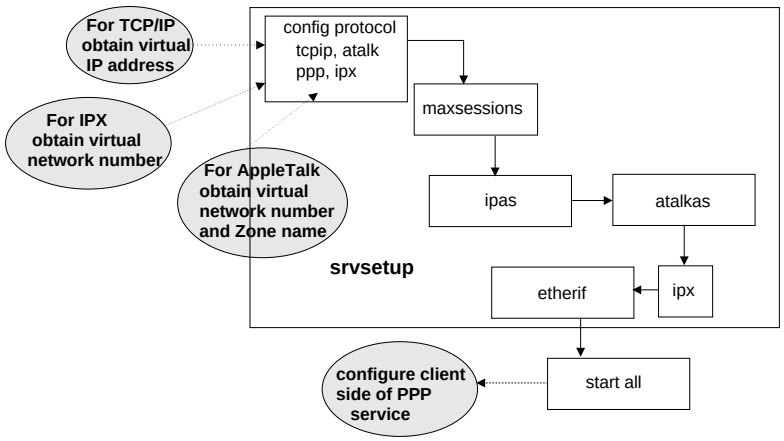
If previous configuration (for example, for SLIP service) was performed, some of the steps required for configuring the LCS60 for PPP service may have already been completed (e.g., **etherif, ipas**). Skip the steps that have been completed previously.

PPP

Note: The user should familiarize him / herself with all aspects of the LCS60 PPP service. For details, including a description of Multiple IP Subnetworks, refer to Chapter 1.

After configuring the LCS60 as described under *Initial Setup* in Chapter 3, perform the steps shown in Figure 4-2 to configure the LCS60 PPP Service.

Figure 4-2: Configuring PPP Service for IP, IPX, and AppleTalk



1. Obtain the Ethernet IP address for the LCS60 and an IP network address for each IP network security group. At least one IP address, in addition to the Ethernet address, is required for SLIP and PPP service in order to configure the physical connection used for SLIP / PPP. **These IP network addresses must be different from the LCS60's Ethernet internet address.**
2. If you will be using AppleTalk, obtain the AppleTalk virtual network number and zone name. The network number and zone must be different from the LCS60 AppleTalk Network and zone via the Ethernet.
3. If you will be using IPX, obtain the IPX virtual network number, Ethernet frame type, and Ethernet network number. The virtual network number must be different from the LCS60 IPX network via the Ethernet.

4. Enter the **lcsadm** interface.
5. Add the PPP service:
   - Enter **protocol** from *Config>* or **config protocol** from *Top>*.
   - Add **tcpip**. Add **atalk** and **ipx** as required.
   - Add **ppp**.
6. Define the PPP service sessions (maxsessions):
   - From the Config directory, enter **max**, or enter **config maxsessions** at the Top directory.
   - Assign the number of sessions. The total number of sessions through the LCS60 is 120 when PPP is configured.
7. Set up IP network security groups (ipas). Enter **ipas** at the *Top>Config>#* prompt or **config ipas** at *Top>* and follow the on-screen instructions for configuring IP network security groups for the various workgroups required. Refer to Screen 4-1 for an example. (Refer also to the *Multiple IP Subnetworks* section of Chapter 1.)

Screen 4-1: Configure IP Network Security Group – Example

```
Top>Config># ipas
  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.
        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES
    1  Configure/Display IP Network Security Groups
    2  Configure/Display Reserved IP Addresses
    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1
    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES
    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
```

Screen 4-1: continued on next page

Screen 4-1: *Continued*

```
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1
    Enter an IP Network Security Group name [q to quit, ? for help]
    ==> Library

    Enter an Internet network address
    [q to quit]
    ==> 154.12.24
    ==> Is [154.12.24.0] divided into subnets ?  [y, n, ?] y

    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8

        *** New IP Network Security Group "Library" Configuration is:
        ***
        *** Class B IP Address: 154.12.24
        *** Network Mask:       255.255.255.0

    Is this correct?
    Enter y,n ==> y

    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
Top>Config>#
```

PPP

Note: Do not use the IP addresses shown in the examples as they should follow your corporate IP address convention.

8. Configure reserved IP addresses (ipas) for those users who require them:

- Enter **ipas** at the *Top>Config>#* prompt or **config ipas** at *Top>*.
- Follow the on-screen instructions for adding a reserved IP address. Reserved IP addresses are useful in cases in which a user's security privileges are dependent on his/her source IP address. In other computing environments, a reserved IP address could be used to assure that a well known permanent IP address is set aside for server applications residing on a user's client machine.
- When a Network Access Controller (NAC) is used, the remote user's NAC ID is used in the **ipas** script to reserve an IP address for that user. Therefore, when the script prompts for `User login Id`, it is referring to the user's NAC ID. NAC user IDs are alphanumeric symbols up to nine character long. A user NAC ID can be allocated a unique reserved IP address for each of the IP network security groups.

A sample session is shown in Screen 4-2. (Refer also to the *IP Address Assignment by the LCS60* section in Chapter 1.)

Screen 4-2: Configure Reserved IP Address – Example

```
Top>Config># ipas
  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  2

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address
```

Screen 4-2: continued on next page

PPP

Screen 4-2: *Continued*

```
    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

    Enter User login Id
    [? for help, RETURN for user ids, q to quit]
    ==>  tbaker

Select an IP Network Security Group to add an IP Reserved Address
         morse
         Library
         Techs
[q to quit]
==> morse
Selected IP Network Security Group [ morse ]

    Enter an Internet host address allocated from
    IP network 154.12.23 [q to quit]
    ==> 154.12.23.7

Added reserved IP address [ 154.12.23.7 ] for [ tbaker ]
within IP Network Security Group [ morse ]

         RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  4

    Enter User Login Id
    [? for help, RETURN for user ids, q to quit]
    ==>  tbaker

        Reserved IP Address for User Login Id [ tbaker ] is:

                 morse     154.12.23.7

    Enter User Login Id
    [? for help, RETURN for user ids, q for quit]
    ==>  q

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES
```

Screen 4-2: continued on next page

Screen 4-2: *Continued*

```
    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address
    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
Top>Config>#
```

9. Configure the IPX network number and node address (ipx):
   - Enter **ipx** at *Top>Config>#* or **config ipx** from the Top directory.
   - Follow the on-screen instructions for assigning the IPX configuration parameters. (Refer to the example in Screen 4-3.)

Screen 4-3: Configure IPX Parameters – Example

```
Top>Config># ipx
  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.
        IPX CONFIGURATION MANAGEMENT
    1  Ethernet interface configuration parameters
    2  Virtual (PPP) interface configuration parameters
    3  Display all Parameters
    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==> 1
```

PPP

Screen 4-3: *Continued.*

```
  ETHERNET CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  2 Configure/Display Framing Type

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  1

       Current Ethernet Network Number ..... < Undefined >

  Enter an IPX Network Number
  [ Type q to quit or ? for help ]
  ==> 1562

  ETHERNET CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  2 Configure/Display Framing Type

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  2

       Current Ethernet Frame Type ..... < Undefined >

  Enter frame type "ethernet", "802.2", "802.3", or "snap"
  [ Type q to quit or ? for help ]
  ==> ethernet

  ETHERNET CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  2 Configure/Display Framing Type

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  q

CAUTION:  Please refer to the I&A Guide for instructions
about configuring this feature.

       IPX CONFIGURATION MANAGEMENT

  1  Ethernet interface configuration parameters

  2  Virtual (PPP) interface configuration parameters

  3  Display all Parameters

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
```

```
  ==>  2

  VIRTUAL (PPP) CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  1

       Current Virtual Network Number ..... < Undefined >

  Enter an IPX Network Number
  [ Type q to quit or ? for help ]
  ==> 57

     Network < 57 > is already configured for your Ethernet Interface.

  VIRTUAL (PPP) CONFIGURATION PARAMETERS

  1 Configure/Display Network Address

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  q

CAUTION:  Please refer to the I&A Guide for instructions
about configuring this feature.

       IPX CONFIGURATION MANAGEMENT

  1  Ethernet interface configuration parameters

  2  Virtual (PPP) interface configuration parameters

  3  Display all Parameters

  Enter Menu Selection
  [ ? for help, q to quit, RETURN for menu ]
  ==>  3

  The LCS60 IPX Parameters are configured as follows:

       Ethernet Network Number ..... < 1562 >
       Virtual Network Number ...... < 57 >
       Ethernet Frame Type ......... < Ethernet II >

CAUTION:  Please refer to the I&A Guide for instructions
about configuring this feature.

       IPX CONFIGURATION MANAGEMENT

  1  Ethernet interface configuration parameters

  2  Virtual (PPP) interface configuration parameters

  3  Display all Parameters

  Enter Menu Selection
```

```
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
NOTICE: To allow IPX configuration changes to take effect you must first stop
and restart the IPX software as follows:
        lcsadm -c stop ipx
        lcsadm -c start ipx
```

10. Configure the AppleTalk network / zone (atalkas):

    - Enter **atalkas** at the *Top>Config>#* prompt or enter **config atalkas** from the Top directory.
    - Follow the on-screen instructions for setting up the AppleTalk network number and zone name. (Refer to Screen 4-4.) The virtual AppleTalk address must be defined; it is used for dynamic allocation of AppleTalk addresses for PPP and ARAP clients.

Screen 4-4: Configure AppleTalk Virtual Network – Example

```
Top>Config># atalkas
    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK
    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name
    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> 1
    *** The AppleTalk virtual network has not yet been configured.
    Enter the network number for the LCS60 interface to the AppleTalk network.
    This must be a number between 1 and 65279, and must NOT be equal to any
    other network number in use in the AppleTalk network, and must not be
    contained within any other network number range in use in the AppleTalk
    network.
    [ Type q to quit ]
    ==> 2010
```

Screen 4-4: continued on next page

Screen 4-4: *Continued*

```
    Enter the zone name to be used by AppleTalk nodes that use the virtual
    network.  The name may contain no more than 32 characters.
    [ Type q to quit or ? for help ]
 ==> Research Lab
    You have entered:
    VIRTUAL NETWORK NUMBER ..... 2010
    VIRTUAL NODE NUMBER ........ 1
    VIRTUAL NETWORK ZONE NAME .. Research Lab
    Confirm?
    Enter y,n ==> y
    The LCS60 virtual AppleTalk network is configured as follows:
    VIRTUAL NETWORK NUMBER ..... <2010>
    VIRTUAL NODE NUMBER ........ <1>
    VIRTUAL NETWORK ZONE NAME .. <Research Lab>
    NOTE: Changes to the configuration of the LCS60 virtual AppleTalk network
    will not take effect until you:
    - Enter the lcsadm command and then type 'start atalk' from the top command
    directory to start AppleTalk protocol.
    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK
    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name
    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> q
Top>Config>#
```

Note: Do not use the AppleTalk address shown in the example; follow your corporate AppleTalk address convention.

11. Configure the Ethernet interface (etherif):
    - Enter **etherif** at the *Top>Config>#* prompt or enter **config etherif** from the Top directory.
    - Follow the on-screen instructions for configuring the ethernet interface. (Refer to the example in Screen 4-5.)

PPP

Screen 4-5: Configure the Ethernet Interface – Example

```
Top>Config># etherif
        TCP/IP ETHERNET INTERFACE CONFIGURATION MENU
        1  Configure an Ethernet Interface
        2  Delete an Ethernet Interface
        3  Display all Interfaces that are configured
    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1
WARNING !!
        This option will automatically delete each interface that was
        previously configured. It reconstructs the Ethernet interface
        database from scratch and requires the user to reconfigure
        each interface again.
    Enter a name for Ethernet Interface 0
    [? for help, q for menu]
    ==> morse-e0
    Enter aliases for morse-e0
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>  mor
    Enter morse-e0 internet address (e.g. 154.11.21.1) [q to quit]
    ==> 154.12.21.5
    Enter official name of network [154.12] or q to quit
    ==>  dock-net
    Enter aliases for morse
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>
    ==> Is morse [154.12] divided into subnets ?  [y, n, ?] y
    Enter name of subnet to be added
    [? for help, q for quit]
    ==>  m-net0
    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8
    Entering Ethernet interface 0 morse-e0 [154.12.21.5]
    ==> Is this correct?  [y, n] y
    Ethernet interface 0 morse-e0 [154.12.21.5] configured !
    Enter Menu Selection
```

Screen 4-5: continued on next page

Screen 4-5: *Continued*

```
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q
NOTE:   Changes to the configuration will not take effect until you:
         - enter the lcsadm command and then type "stop tcpip" from the
         top command directory to stop TCP/IP protocol.
         - enter the lcsadm command and then type "start tcpip" from the
         top command directory to start TCP/IP protocol.
Top>Config>#
```

12. From the Top directory, enter **start all**.

    Note: In order for changes made to the IP network number or subnet mask to take effect, you must first **stop** and then restart **tcpip** and **routed**.

13. To complete PPP configuration, you must configure the client side of the service. Refer to the documentation included with your client software; examples of some software packages are given in Appendix F.

To unconfigure PPP service, stop the service using the **stop ppp** command, enter **maxsessions** at the *Top>Config>#* prompt, and choose option **2** to delete the service.

PPP Service Connection Dialstrings

One of the following types of dialstrings (shown with the *area/exch/name* from the example in Figure 4-1) may be used to connect to the LCS60 for PPP service.

```
DESTINATION: mlkway/earth/morse.ppp

DESTINATION: mlkway/earth/morse.ppp..-q0:-e6

DESTINATION: mlkway/earth/morse.ppp..-D

DESTINATION: mlkway/earth/morse.ppp..-Con
```

The options for the dialstrings are described below.

-qN: Specifies whether or not priority queueing is enabled (**1**) or disabled (**0**). By default, priority queueing is enabled. In priority queueing, IP datagrams are marked as either interactive (e.g., telnet packets) or non-interactive (e.g., FTP packets); interactive datagrams are always queued in front of non-interactive datagrams. This reduces latency in interactive applications such as **telnet, rlogin**, etc., and yields better response time. The queue is located between the IP protocol and the data switch, therefore, priority queueing only affects datagrams flowing from the LCS60 to the data switch.

-eN Specifies whether echo requests are disabled (0) and the time to disconnect (N, where N is a number greater than 3). By default, the LCS60 will send out an echo request every 60 seconds over each PPP connection to check that each link is up. After three minutes, if there is no echo reply received from the client, the LCS60 will hang up the connection. The three-minute wait is configurable by specifying the number of minutes desired. In the screen above, the **-e** option has been used to specify a six-minute wait before hang up.

Note: Three minutes is the minimum allowed time to disconnect. If you specify a time less than three minutes, the system will maintain the three-minute time to disconnect.

-D Specifies that the user be assigned an IP address dynamically (rather than use a reserved IP address) provided a negotiable IP address has been administered in the client software package. Without the **-D** option, the reserved IP address for the user (if any exist) is assigned.

-u Identifies the user (either user name or numeric ID) for whom the IP address is requested. This is not required when a NAC is used.

-C When connecting using IPX, the **-C** option is used to specify whether CIPX header compression* is to be used. **-Con** (default) specifies that header compression will be used; **-Coff** specifies it will not.

Privately Administered Static IP Address

In this case, the user's IP address is locally administered by the user on his/her client software package. For PPP users, this IP address is embedded in their IPCP configuration request packet. The LCS60 grants the user's request for the proposed IP address if the IP address is:

- A valid IP address allocated from within the IP network range associated with the IP network security group name that he/she has called. The IP network security group name matches the local address component of the LCS60's data switch dialstring mnemonic address.
- Not already in use by another user. The LCS60 may have already assigned the requested IP address to another IP session.
- Not a match to any reserved IP address that has been allocated by the LCS60 administrator (except for a reserved IP address set aside for that user's user id).

To obtain a specific (static) address that has not been reserved for the client, set your IP address on the PPP client package. This IP address will be negotiated with the LCS60. If that address is available, your session will acquire that IP address. If the requested IP address is reserved or busy, then the connection will not be successful.

* Refer to RFC 1553.

Reserved IP Address

The user requests a reserved IP address by omitting the **-D** option on his/her data switch dialstring and by having a negotiable IP address administered in his/her client software package. The reserved IP address must be centrally administered by the LCS60 administrator prior to the user's call. To find that user's reserved IP address, the LCS60 searches its configuration database with both the IP network security group name and the user ID field. The latter value is extracted from the **-u** option appended to the data switch dialstring by the NAC. In the absence of a NAC or an explicit **-u** option, the user ID defaults to the value *guest*. If the LCS60 does not find a reserved IP address for the given combination of the IP network and user ID, then the session start up request is assigned a dynamic IP address.

If the reserved IP address is allocated when a second session setup attempt is made for the same user ID, the call is refused and an entry is placed in the *ppp.log* file. A given user ID can have multiple reserved IP addresses, one for each of the IP network security groups that has been configured on the LCS60.

Note: Reserved IP addresses can only be allocated by the system administrator or someone with **root** permissions.

To reserve specific addresses for users:

- Use the **ipas** command (Screen 4-2)
- Select option **2** to display the `RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES` menu
- Select option **1** from this menu.

This will prompt for the login ID, group, and address as shown in Screen 4-2. If you are using a NAC, the User Login Id is the NAC ID, otherwise, enter your own unique login ID. In the example in Screen 4-2, user **tbaker** is assigned the address **154.12.23.7** in the group **morse**.

To request the reserved IP address allocated for your PC or Mac by the LCS60 administrator, enter zero for the client package's IP address and omit the **-D** option from the data switch dialstring. The PPP software will then receive this address during IP negotiation with the LCS60 PPP server.

Note: If your client package does not support entry of a zero IP address (i.e., it is not fully IPCP / PPP conformant) enter the reserved IP address instead of zero.

If you are using a reserved address but not authenticating by means of a NAC, then you must also specify your userid on the data switch dial-string as shown below:

```
DESTINATION: area/exch/60name.ppp..-uuserid
```

This specifies the full address of your LCS60 including the *userid* entered when the address was reserved. For example, for a *userid* **hartnell** on the LCS60 **morse**:

```
DESTINATION: mlkway/earth/morse.ppp..-uhartnell
```

Note: When reserving IP addresses, it may take as much as a minute for the IP Network Address Server to detect changes in the database. Users who attempt to log on before that delay will not receive their reserved IP address.

Dynamically Assigned IP Address

The LCS60 will assign an IP address dynamically from the IP network range associated with the called IP Network Security Group. To do so, the session start up request must meet one of the following conditions:

- The user has included the **-D** option on his / her data switch dialstring and has a negotiable IP address administered in his / her client software package.
- The **-D** option has been omitted from the dialstring and the user does not have a reserved IP address administered in the LCS60 configuration database.

To obtain a dynamic address from the LCS60 for your Mac or PC you must:

1. Have administered a negotiable IP address in your client software package
2. Enter this address (e.g., 0.0.0.0 in some packages) on the appropriate screen as documented for your client package
3. Append the **-D** option to the data switch dialstring:

```
DESTINATION: area/exch/60name.ppp..-D
```

For example:

```
DESTINATION: mlkway/earth/morse.ppp..-D
```


Administration

Routine administration of the LCS60 includes PPP tasks such as starting or stopping PPP and generating PPP-specific reports. Refer to Chapter 8 for complete LCS60 administration and the Glossary for a description of the report fields generated by the administrative commands.

Show Session Examples

The following screen shows how to check:

- Link information for all PPP sessions
- Link, IP, IPX, and AppleTalk status for a single PPP session
- IP information for a single PPP session and display the local address as a numeric value

```
Top>Session># show ppp link
LCS60 Point-to-Point Session LINK Configuration:   Feb 05 07:56:00
               Max    Max Timeout                                Proto Addr
Sesid  State   Config Term   Secs  S MRU     ACCM      Magic     Comp  Comp
===== ======== ====== ==== ======= = ==== ========== ========== ===== ====
1.1     opened     10    2       3 L 1500 0xffffffff 0x2e01c315     1    0
                                   P 1500 0xffffffff 0xfc09fe02     1    0
1.10    opened     10    2       3 L 1500 0x00000000 0x2e0191ef     1    1
                                   P 1500 0x00000000 0x0000002a     1    1
Top>Session># show ppp 1.1 all
LCS60 Point-to-Point Session LINK Configuration:   Feb 05 07:56:07

               Max    Max Timeout                                Proto Addr
Sesid  State   Config Term   Secs  S MRU     ACCM      Magic     Comp  Comp
===== ======== ====== ==== ======= = ==== ========== ========== ===== ====
1.1     opened     10    2       3 L 1500 0xffffffff 0x2e01c315     1    0
                                   P 1500 0xffffffff 0xfc09fe02     1    0
LCS60 Point-to-Point Session IP Configuration:     Feb 05 07:56:10
                            Peer Peer                 Local Local
                     Peer    Max Comp      Local       Max   Comp
Sesid  State        Addr    Slot Slot      Addr        Slot  Slot
===== ======== ============== ==== ==== ============== ===== =====
1.1     opened  154.12.24.49     15    1   154.12.24.1     15     1
LCS60 Point-to-Point Session IPX Configuration:    Jan  5 07:56:14
                                    ROUTE  ROUTER    CIPX
Sesid  State   S        ADDRESS     PROTO   NAME   MAX SLOT
===== ======== = ==================== ===== ======== ========
1.1     opened L 00000057:01           none   morse    0
               P 00000057:01           none   morse    0
LCS60 Point-to-Point Session ATALK Configuration:  Feb 05 07:56:18
Sesid  State                          Server Info
===== ========                       ================
1.1     opened
  LOCAL   Addr: 2010.1               Class: 1                 AT Comp: none
            Zone: Research Lab       Imp ID: V1.1           Route Proto: none
          Router: 2010.1               Name: morse       Broadcast Supp: none
```

```
  PEER    Addr: 2010.114                Class: 0                 AT Comp: none
          Zone: Research Lab           Imp ID:                Route Proto: none
        Router: 2010.1                   Name:              Broadcast Supp: none
Top>Session>#  show ppp 1.1 ip
LCS60 Point-to-Point Session IP Configuration:     Feb 05 07:56:24
                                Peer Peer                 Local Local
                     Peer        Max Comp      Local       Max   Comp
Sesid  State        Addr       Slot Slot      Addr        Slot  Slot
===== ======== =============== ==== ==== =============== ===== =====
1.1     opened    154.12.23.9   15    1     154.12.23.1    15     1
Top>Session>#
```

Call Trace Example

The following screen shows how to obtain call trace information for PPP.

```
Top>Session> # trace ppp
LCS60 Point-to-Point Tracking Information: Feb  1 07:45:13
Sesid Name Remote User  Chan Switch Address
===== ==== ============ ==== ======================
1.3   p499       smccoy  499 yard/gazebo.39.4
1.6   p496     hartnell  496 yard/gazebo.39.7
1.8   p493     troughtn  493 yard/gazebo.39.9
1.9   p492     jpertwee  492 yard/gazebo.39.10
1.10  p491       tbaker  491 yard/gazebo.39.11
1.11  p490     pdavison  490 yard/gazebo.39.12
1.12  p489       cbaker  489 yard/gazebo.39.13
Top>Session>#
```

Log File

The log file, *ppp.log*, is written to by the LCS60 PPP server and contains information about incoming PPP call requests. To display the contents of the log file, use the page command as shown in the example below:

```
# pg /usr/adm/lcs/ppp.log
Fri Feb 16 11:32:55 13714  [3] ppp1 NEW 1.1 dkserver=morse dk=mlkway/earth/ \
     inbound.54.6 ch=508 uid=tbaker rqst_reserved=1
Fri Feb 16 11:34:22 13714  [3] ppp1 DEL 1.1
Tue Feb 20 13:34:25 13714  [3] ppp1 NEW 1.1 dkserver=morse dk=mlkway/earth/ \
     yardnac.65.3 ch=510 uid=pdavison rqst_reserved=1
Tue Feb 20 13:40:01 13714  [3] ppp1 DEL 1.1
Tue Feb 20 13:54:49 13714  [3] ppp1 NEW 1.1 dkserver=morse dk=mlkway/earth/ \
     yardnac.65.3 ch=510 uid=pdavison rqst_reserved=1
Tue Feb 20 15:42:47 13714  [3] ppp1 NEW 1.3 dkserver=morse dk=mlkway/earth/ \
     yardnac.65.3 ch=508 uid=troughtn rqst_reserved=1
Tue Feb 20 15:51:52 13714  [3] ppp1 DEL 1.3
Tue Feb 20 15:52:45 13714  [3] ppp1 NEW 1.4 dkserver=morse dk=mlkway/earth/ \
     yardnac.65.3 ch=508 uid=troughtn rqst_reserved=1
Tue Feb 20 15:54:12 13714  [3] ppp1 DEL 1.4
Wed Feb 21 08:33:52 13714  [3] ppp1 DEL 1.1
Wed Feb 21 08:33:53 13714  [3] ppp1 exited
Wed Feb 21 10:32:25 489    [3] ppp1 started loglevel = 3
Wed Feb 21 10:32:25 489    [3] ppp1 nfiles=256
Wed Feb 21 11:04:15 388    [3] ppp1 p3m received HANGUP for protocol: 802b
                                    •
                                    •
```


Related Commands

The following commands may be of particular interest when administering the LCS60's PPP service:

- **ping**
- **ipxping**
- **atping**
- **netstat**
- **ipxnetstat**
- **atnetstat**

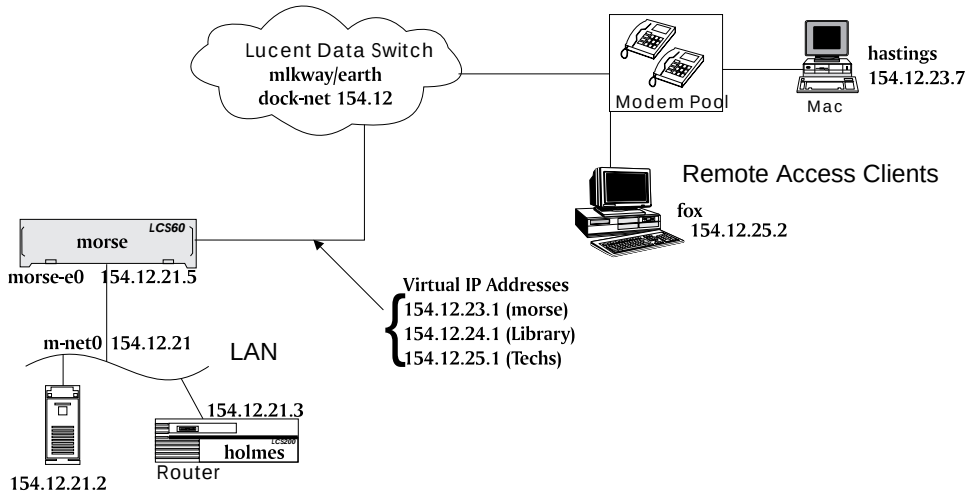
The manual pages for these commands are contained in Appendix E of this document; they are also available online.

5 SLIP – Configuration and Administration

LCS60 Configuration and Connection for SLIP Service

Figure 5-1 shows an example network using SLIP service.

Figure 5-1: Example Network – SLIP Service



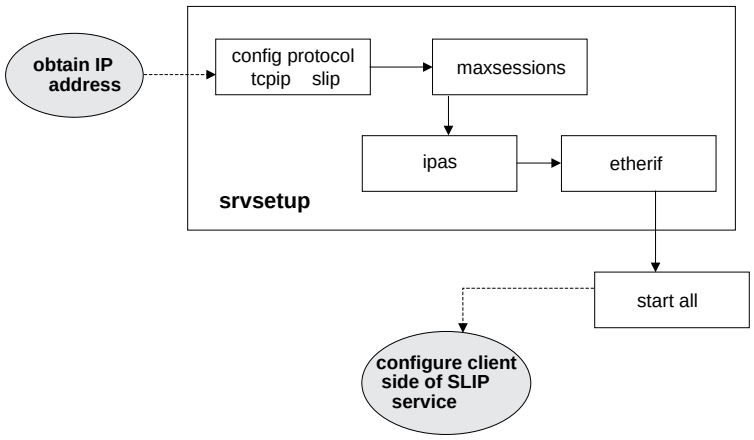
You can configure the LCS60 for SLIP service using either the **srvsetup** command or the individual commands (**protocol, maxsessions, ipas, etherif**). The examples in this chapter use the individual commands.

If previous configuration (for example, for PPP service) has been performed, some of the steps required for configuring LCS60 for SLIP service may have already been completed (e.g., **etherif, ipas**). Skip the steps that have been completed previously.

Note: The user should familiarize him / herself with all aspects of the LCS60 SLIP service. For details, including a description of Multiple IP Subnetworks, refer to Chapter 1.

After configuring the LCS60 as described under *Initial Setup* in Chapter 3, perform the steps shown in Figure 5-2 to configure the LCS60 SLIP Service.

Figure 5-2: Configuring SLIP Service



1. Obtain the Ethernet IP address for the LCS60 and obtain an IP network address for each IP network security group. At least one IP address, in addition to the Ethernet address, is required for SLIP and PPP service in order to configure the physical connection used for SLIP / PPP. **These IP network addresses must be different from the LCS60's Ethernet internet address.**
2. Enter the **lcsadm** interface.
3. Add the SLIP service:
   - From *Config>*, enter **protocol**, or **config protocol** from *Top>*.
   - Add **tcpip** (as required).
   - Add **slip**.
4. Define the SLIP service sessions (maxsessions):
   - From the Config directory, enter **max**, or enter **config maxsessions** at the Top directory.

- Assign the number of sessions. The total number of sessions through the LCS60 is 120 when SLIP is configured.

5. Set up IP network security groups (ipas):
   - Enter **ipas** at the *Top>Config>#* prompt or enter **config ipas** from the Top directory.
   - Follow the on-screen instructions for configuring IP network security groups for the various workgroups required. Refer to Screen 5-1 for an example. (Refer to the *Multiple IP Subnetworks* section of Chapter 1 for further information.)

Note: Do not use the IP addresses shown in the examples as they should follow your corporate IP address convention.

Screen 5-1: Configure IP Network Security Group – Example

```
Top>Config># ipas
  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1
    Enter an IP Network Security Group name [q to quit, ? for help]
```

Screen 5-1: continued on next page

Screen 5-1: *Continued*

```
    ==> Library

    Enter an Internet network address
    [q to quit]
    ==> 154.12.24
    ==> Is [154.12.24.0] divided into subnets ?  [y, n, ?] y

    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8

        *** New IP Network Security Group "Library" Configuration is:
        ***
        *** Class B IP Address: 154.12.24
        *** Network Mask:       255.255.255.0

    Is this correct?
    Enter y,n ==> y

    IP NETWORK SECURITY GROUP MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Add an IP Network Security Group
    2  Delete an IP Network Security Group
    3  Edit an IP Network Security Group
    4  Display all IP Network Security Groups

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

Top>Config>#
```

6. Configure IP addresses (ipas) for those users that require them:
   - Enter **ipas** at the *Top>Config>#* prompt or enter **config ipas** from the Top directory.
   - Follow the on-screen instructions for adding a reserved IP address. Reserved IP addresses are useful in cases in which a user's security privileges are dependent on his/her source IP address. In other computing environments, a reserved IP address could be used to assure that a well known permanent IP address is set aside for server applications residing on a user's client machine.

- When a NAC is used, the remote user's NAC ID is used in the **ipas** script to reserve an IP address for that user. Therefore, when the script prompts for `User login Id`, it is referring to the user's NAC ID. NAC user IDs are alphanumeric symbols up to nine character long.

  A user NAC ID can be allocated a unique reserved IP address for each of the IP network security groups.

A sample session is shown in Screen 5-2. (Refer to the *IP Address Assignment by the LCS60* section in Chapter 1 for more information.)

Screen 5-2: Configure Reserved IP Address – Example

```
Top>Config># ipas
  CAUTION:  Please refer to the I&A Guide for instructions
  about configuring this feature.

        IP ADDRESS CONFIGURATION MANAGEMENT FOR SLIP AND PPP SERVICES

    1  Configure/Display IP Network Security Groups

    2  Configure/Display Reserved IP Addresses

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  2

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

    Enter User login Id
    [? for help, RETURN for user ids, q to quit]
    ==>  tbaker

Select an IP Network Security Group to add an IP Reserved Address
        morse
        Library
```

Screen 5-2: continued on next page

Screen 5-2: *Continued*

```
        Techs
        quit
==> morse
Selected IP Network Security Group [ morse ]

    Enter an Internet host address allocated from
    IP network 154.12.23 [q to quit]
    ==> 154.12.23.7

Added reserved IP address [ 154.12.23.7 ] for [ tbaker ]
within IP Network Security Group [ morse ]

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  4

    Enter User Login Id
    [? for help, RETURN for user ids, q for quit]
    ==>  tbaker

        Reserved IP Address for User Login Id [ tbaker ] is:

                morse     154.12.23.7

    Enter User Login Id
    [? for help, RETURN for user ids, q for quit]
    ==>  q

        RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES

    1  Add Reserved IP Address
    2  Delete Reserved IP Address
    3  Edit Reserved IP Address
    4  Display Reserved IP Address

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

Top>Config>#
```

Note: Do not use the IP addresses shown in the example as they should follow your corporate IP address convention.

7. Configure the Ethernet interface (etherif):
   - Enter **etherif** at the *Top>Config>#* prompt or enter **config etherif** from the Top directory.
   - Follow the on-screen instructions for configuring the ethernet interface. (Refer to the example in Screen 5-3.)

Screen 5-3: Configure the Ethernet Interface – Example

```
Top>Config># etherif

        TCP/IP ETHERNET INTERFACE CONFIGURATION MENU

        1  Configure an Ethernet Interface
        2  Delete an Ethernet Interface
        3  Display all Interfaces that are configured

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  1

WARNING !!
        This option will automatically delete each interface that was
        previously configured. It reconstructs the Ethernet interface
        database from scratch and requires the user to reconfigure
        each interface again.

    Enter a name for Ethernet Interface 0
    [? for help, q for menu]
    ==> morse-e0

    Enter aliases for morse-e0
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>  mor

    Enter morse-e0 internet address (e.g. 154.11.21.1) [q to quit]
    ==> 154.12.21.5

    Enter official name of network [154.12] or q to quit
    ==>  dock-net
```

Screen 5-3: continued on next page

Screen 5-3: *Continued*

```
    Enter aliases for morse
    Separate each alias with blanks
    Hit return if there are no aliases [q to quit]
    ==>
    ==> Is morse [154.12] divided into subnets ?  [y, n, ?] y

    Enter name of subnet to be added
    [? for help, q for quit]
    ==>  m-net0

    Enter number of mask bits for this subnet
    [? for help, q for quit]
    ==>  8
    Entering Ethernet interface 0 morse-e0 [154.12.21.5]
    ==> Is this correct?  [y, n] y

    Ethernet interface 0 morse-e0 [154.12.21.5] configured !

    Enter Menu Selection
    [ ? for help, q to quit, RETURN for menu ]
    ==>  q

NOTE:   Changes to the configuration will not take effect until you:

        - enter the lcsadm command and then type "stop tcpip" from the
        top command directory to stop TCP/IP protocol.

        - enter the lcsadm command and then type "start tcpip" from the
        top command directory to start TCP/IP protocol.

Top>Config>#
```

8. From the Top directory, enter **start all**.

   Note: In order for changes made to IP network number or subnet mask to take effect, you must first **stop** and then restart **tcpip** and **routed**.

9. To complete SLIP configuration, you must configure the client side of the service. Refer to the documentation included with your client software; examples of some software packages are given in Appendix F.

To unconfigure SLIP service, stop the service using **stop slip**, enter **maxsessions** at the *Top>Config>#* prompt, and choose option **2** to delete the service.

SLIP Service Connection Dialstrings

One of the following types of dialstrings (shown with the *area/exch/name* from the example in Figure 5-1) may be used:

```
DESTINATION: mlkway/earth/morse.slip

DESTINATION: mlkway/earth/morse.slip..-m512:-q1:-v16

DESTINATION: mlkway/earth/morse.slip..-D

DESTINATION: mlkway/earth/morse.slip..154.12.23.10
```

The options for these dialstrings are described below:

-mN Specifies the maximum transmission unit (MTU) that the SLIP connection can transport. The default SLIP MTU is 1006; the MTU value must satisfy: $296 \leq N \leq 1006$.

-qN Specifies whether priority queueing is enabled (**1**) or disabled (**0**). By default, priority queueing is enabled. In priority queueing, IP datagrams are marked as either interactive or non-interactive; interactive datagrams are always queued in front of non-interactive datagrams. The queue is located between the IP protocol and the data switch, therefore, priority queueing only affects datagrams flowing from the LCS60 to the data switch.

-vN Specifies the number of Van Jacobson TCP/IP header compression slots to use. The default is 16; the number of slots must satisfy: $3 \leq N \leq 64$. (Refer to the section *Van Jacobson TCP/IP Header Compression* in Chapter 1.)

-D Specifies that the user be assigned an IP address dynamically (rather than use his/her reserved IP address) provided a negotiable IP address has been administered in his/her client software package. Without the **-D** option, the reserved IP address for the user is assigned provided it exists and is not already in use.

-u Identifies the user (either user name or numeric ID) for whom the IP address is requested. This is not required when a NAC is used.

154.12.23.10 Specifies a privately administered IP address in dotted IP address format. If this option is included on the dialstring, the SLIP server will assign this address only if the address is:

- Within the IP address range assigned to the LCS60, and
- Not reserved for any user, and
- Not currently in use.

If this option is not included on the dialstring, then the server assigns either a dynamic or a reserved IP address to the connection.

Note: When a SLIP host is dialed (e.g., **mlkway/earth/morse.slip**), the LCS60 attaches the incoming call to the SLIP server. When the SLIP server is ready to exchange IP datagrams, the server writes "SLIP ipaddr=A.B.C.D" to the peer.

Privately Administered IP Address

In this case, the user's IP address is locally administered by the user on his/her PC software package. **When calling into the LCS60 SLIP service, this requested IP address is presented as part of the data switch dialstring.** The LCS60 grants the user's request for the proposed IP address if the IP address is:

- A valid IP address allocated from within the IP network range associated with the IP network security group name that he/she has called. The IP network security group name matches the local address component of the LCS60's data switch dialstring mnemonic address.
- Not already in use by another user. The LCS60 may have already dynamically assigned the requested IP address to another IP session.
- Not a match to any reserved IP address that has been allocated by the LCS60 administrator (except for a reserved IP address set aside for that user's user ID).

Reserved IP Address

The user requests a reserved IP address by omitting the **-D** option on his/her data switch dialstring and by having a negotiable IP address administered in his/her client software package. The reserved IP address must be centrally administered by the LCS60 administrator prior to the user's call. To find that user's reserved IP address, the LCS60 searches its configuration database with both the IP network security group name and the user ID field. The latter value is extracted from the **-u** option appended to the data switch dialstring by the NAC. In the absence of a NAC or an explicit **-u** option, the user ID defaults to the value *guest*. If the LCS60 does not find a reserved IP address for the given combination of the IP network and user ID, then the session start up request is assigned a dynamic IP address.

If the reserved IP address is allocated when a second session setup attempt is made for the same user ID, the call is refused with a "slip is busy" error (refer also to Appendix C). A given user ID can have multiple reserved IP addresses, one for each of the IP network security groups that has been configured on a LCS60.

To reserve specific addresses for users:

- Use the **ipas** command (refer to Screen 5-2)
- Select option **2** to display the `RESERVED IP ADDRESSES FOR SLIP AND PPP SERVICES` menu
- Select option **1** from this menu.

This will prompt for the login ID, group, and address as shown in Screen 5-2. If you are using a NAC, the User Login Id is the NAC ID, otherwise, enter your own unique login ID. In the example in Screen 5-2, user **tbaker** is assigned the address **154.12.23.7** in the group **morse**.

Note: Reserved IP addresses can only be allocated by the system administrator or someone with **root** permissions.

To obtain a reserved address from the LCS60, the dialstring is:

```
DESTINATION: area/exch/60name.slip..-uuserid
```

This specifies the full address of your LCS60 including the *userid* entered when the address was reserved. For example, for a *userid* **hartnell** on the LCS60 **morse**:

```
DESTINATION: mlkway/earth/morse.slip..-uhartnell
```

To obtain a privately administered (static) address that has *not* been reserved by the LCS60, use a dialstring similiar to the following:

```
DESTINATION: mlkway/earth/morse.slip..154.12.23.11
```

This specifies the full address of the LCS60 and a specific IP address. The IP address specified in the above dialstring cannot be one of the IP addresses that has been reserved for other users or is in use.

Dynamically Assigned IP Address

The LCS60 will assign a random IP address dynamically from the IP network range associated with the called IP Network Security Group. To do so, the session start up request must meet one of the following conditions:

- The user has included the **-D** option on his/her data switch dialstring and has a negotiable IP address administered in his/her client software package.
- The **-D** option has been omitted from the dialstring and the user does not have a reserved IP address administered in the LCS60 configuration database.

For the user to always obtain a dynamic address from the PC, the dialstring is:

```
DESTINATION: area/exch/60name.slip..-D
```

If the **-D** option is omitted, then the user's reserved IP address is assigned if it is available (i.e., it exists and is not busy).

In the following example, the user ID defaults to a guest user ID. If a reserved IP address has been allocated for the guest user ID, that is the address assigned; if no reserved IP address is set aside for the guest user ID, then a dynamic address is assigned.

```
DESTINATION: mlkway/earth/morse.slip
```

Administration

Routine administration of the LCS60 includes SLIP tasks such as starting or stopping SLIP and generating SLIP-specific reports. This section gives some examples of SLIP-specific tasks.

Refer to Chapter 8 for complete LCS60 administration and to the Glossary for the report fields generated by the administrative commands.

Stop Example

The following screen shows an example of the **stop slip** command:

```
Top># stop slip
*** Stopping "slip" ...
Top>#
```

Call Trace Example

The following screen shows how to obtain call trace information for SLIP.

```
Top>Session> # trace slip

LCS60 Serial Line IP Gateway Tracking Information:  Jun 16 10:57:50

Sesid Name   Dest. Address Remote User  Chan Switch Address
===== ====   ============= ============ ==== ====================
1.78  s510   154.12.23.7   cbaker       510  yard/samterm.141.10
1.106 s508   154.12.23.18  smccoy       508  yard/samterm.140.6
```

Errors

For SLIP connection errors, refer to Appendix C.

Log File

The log file, *slip.log* is written to by the LCS60 interface software and contains information about incoming SLIP call requests. To display the contents of the log file, use the page command as shown in the example below:

```
# pg /usr/adm/lcs/slip.log
Fri Jun  2 10:59:34 22885  [3] slip1 started loglevel = 3
Fri Jun  2 11:00:32 22885  [3] slip1 NEW 1.1 dkserver=morse ip=154.12.23.89 dk=\
    marina/pier/cove.140.9 ch=510 uid=tbaker
Fri Jun  2 11:11:12 22885  [3] slip1 DEL 1.1 ip=153.22.92.14
Fri Jun  2 14:42:04 22885  [3] slip1 exited
Fri Jun  2 14:42:35 23342  [3] slip1 started loglevel = 3
                                          •
                                          •
```

Related Commands

The following commands may be of particular interest when administering the LCS60's SLIP service:

• ping • netstat

The manual pages for these commands are contained in Appendix E of this document; they are also available online.

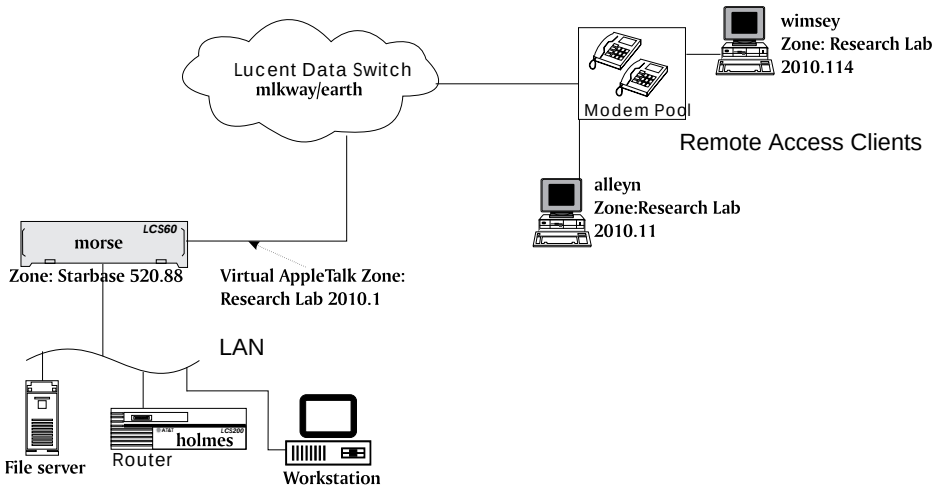
6 ARAP – Configuration and Administration

LCS60 Configuration and Connection for ARAP Service

Figure 6-1 shows an example network using ARAP service.

Note: ARAP service requires an R2.0 or R3.0 software key. Refer to Chapter 3 for information about the software key.

Figure 6-1: Example Network – ARAP Service



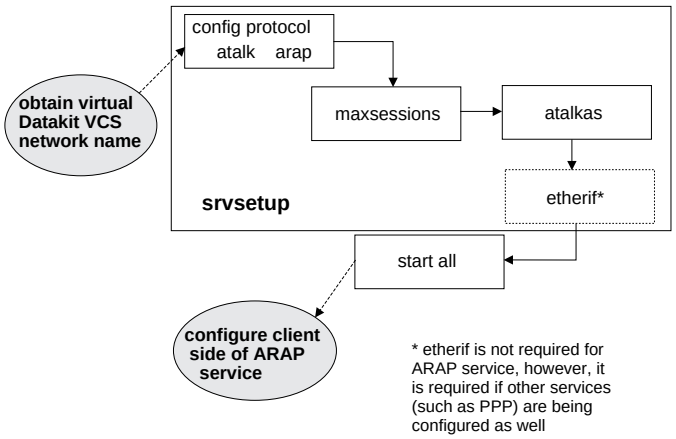
You can configure the LCS60 for ARAP service using either the **srvsetup** command or the individual commands (**protocol, maxsessions, atalkas**). The examples in this chapter use the individual commands.

If previous configuration (for example, for PPP service) has been performed, some of the steps required for configuring the LCS60 for ARAP service may have already been completed (e.g., **atalkas**). Skip the steps that have been completed previously.

Note: The user should familiarize him / herself with all aspects of the LCS60 ARAP and AppleTalk service. Refer to Chapter 1.

After configuring the LCS60 as described under *Initial Setup* in Chapter 3, perform the steps shown in Figure 6-2 to configure the LCS60 ARAP Service.

Figure 6-2: Configuring ARAP Service



1. Obtain the AppleTalk network number and zone name for the virtual network. The network number must be unique in the AppleTalk internet.
2. Enter the **lcsadm** interface.
3. Add the ARAP service:
   - Enter **protocol** from Config, or **config protocol** from the Top directory.
   - Add **atalk** (as required).
   - Add **arap**.
4. Define the ARAP service sessions (maxsessions):
   - Enter **max** from Config, or **config maxsessions** from the Top directory.
   - Assign the number of ARAP sessions. (The total number of sessions is 120 when ARAP is configured.)

5. Configure the AppleTalk network / zone (atalkas):

   - Enter **atalkas** at the *Top>Config>#* prompt or enter **config atalkas** from the Top directory.
   - Follow the on-screen instructions for setting up the AppleTalk network number and zone name. (Refer to Screen 6-1.)

Screen 6-1: Configure AppleTalk Virtual Network – Example

```
Top>Config># atalkas
    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK
    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name
    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> 1
    *** The AppleTalk virtual network has not yet been configured.
    Enter the network number for the LCS60 interface to the AppleTalk network.
    This must be a number between 1 and 65279, and must NOT be equal to any
    other network number in use in the AppleTalk network, and must not be
    contained within any other network number range in use in the AppleTalk
    network.
    [ Type q to quit ]
    ==> 2010
    Enter the zone name to be used by AppleTalk nodes that use the virtual
    network.  The name may contain no more than 32 characters.
    [ Type q to quit or ? for help ]
 ==> Research Lab
    You have entered:
    VIRTUAL NETWORK NUMBER ..... 2010
    VIRTUAL NODE NUMBER ........ 1
    VIRTUAL NETWORK ZONE NAME .. Research Lab
    Confirm?
    Enter y,n ==> y
    The LCS60 virtual AppleTalk network is configured as follows:
    VIRTUAL NETWORK NUMBER ..... <2010>
    VIRTUAL NODE NUMBER ........ <1>
```

Screen 6-1: continued on next page

Screen 6-1: *Continued*

```
    VIRTUAL NETWORK ZONE NAME .. <Research Lab>
    NOTE: Changes to the configuration of the LCS60 virtual AppleTalk network
    will not take effect until you:
    - Enter the lcsadm command and then type 'start atalk' from the top command
    directory to start AppleTalk protocol.
    CONFIGURE ADDRESS AND ZONE FOR APPLETALK VIRTUAL NETWORK
    1 Configure Address and Zone Name
    2 Display Address and Zone Name
    3 Delete Address and Zone Name
    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> q
Top>Config>#
```

The virtual AppleTalk network address and the zone name must be defined; they are used for the dynamic allocation of AppleTalk addresses for PPP and ARAP sessions.

Note: Do not use the AppleTalk address shown in the example; follow your corporate AppleTalk address convention.

6. From the Top directory, enter **start all**.
7. To complete ARAP configuration, you must configure the client side of the service. Refer to the documentation included with your client software; examples of some software packages are given in Appendix F.

To unconfigure ARAP service: stop the service using **stop arap**, enter **maxsessions** at the *Top>Config>#* prompt, and choose option **2** to delete the service.

ARAP Service Connection Dialstring

The following type of dialstring (shown with the *area/exch/name* from the example in Figure 6-1) is used to make the ARAP connection.

```
DESTINATION: mlkway/earth/brown.arap
```

Administration

Routine administration of the LCS60 includes ARAP tasks such as starting and stopping ARAP and generating ARAP-specific reports. This section gives some examples of ARAP-specific tasks. Refer to Chapter 8 for complete LCS60 administration and to the Glossary for a description of the report fields generated by the administrative commands.

Show Service Example

The following screen illustrates a check of the current status of *arap* service.

```
Top>Service># show arap
LCS60 AppleTalk Remote Access Service Statistics:   Jan 31 10:45:32
Cfg.  Use  Cap.  Max.  Total   Busy  Fail  State
====  ===  ====  ====  ======  ====  ====  =====
  50    4    8%    4      32     0     0  Enabled
```

Show Session Example

The screen below shows how to obtain session information for ARAP.

```
Top> session
Top>Session> show arap
LCS60 AppleTalk Remote Access Protocol Statistics:      Apr 20 09:22:01
                                                      - - Recv Errs - -
Sesid Xmit(Bytes) Xmit(Pkts) Recv(Bytes) Recv(Pkts)  CRC   BadF  Rej
===== =========== ========== =========== ========== ===== ===== =====
1.1          2469        145        2366        137     0     0     2
1.2           810         22         584         20     0     0     0
Top>Session>
```

Call Trace Example

The following screen shows how to obtain call trace information for ARAP.

```
Top>Session> trace arap
LCS60 AppleTalk Remote Access Protocol Tracking Information:    Apr 20 09:22:30
           - - - - - Remote Addr - - - - -   Remote
Sesid Name         Zone          Address      User   Chan     Switch Address
===== ==== ================== ========== ========= ==== ======================
1.1   a400 Research Lab          2010.114     cbaker  400    yard/gazebo.39.4
1.2   a411 Research Lab          2010.103     smccoy  411    yard/gazebo.39.7
1.6   a495 Research Lab          2010.19    troughtn  495    yard/gazebo.39.9
Top>Session>
```

Log File

The log file, *arap.log* is written to by the LCS60 interface software and contains information about incoming ARAP call requests. To display the contents of the *arap.log* file, use the page command as shown in the example below:

```
# pg /usr/adm/lcs/arap.log
Fri Jun  2 15:41:04 23961  [3] arap1 started loglevel = 3
Fri Jun  2 15:41:04 23961  [3] arap1 nfiles=256
Tue Jun 20 13:15:55 2159   [3] ARAPTOSS dk=mlkway/earth/topper.36.20 uid=5126 \
    arap is temporarily disabled
Tue Jun 20 13:16:19 2188   [3] arap1 started loglevel = 3
Tue Jun 20 13:16:20 2188   [3] arap1 nfiles=256
Tue Jun 20 13:16:29 2188   [3] arap1 NEW 1.1 dk=mlkway/earth/topper.36.20 ch=510 \
    uid=5126
Tue Jun 20 13:17:30 2188   [3] arap1 1.1 Connect Failed, r=4
Tue Jun 20 13:17:30 2188   [3] arap1 DEL 1.1
Wed Jun 21 08:15:01 2188   [3] arap1 exited
                                        •
                                        •
```

Related Commands

The following commands may be of particular interest when administering the LCS60's ARAP service:

• atping • atnetstat • atlog

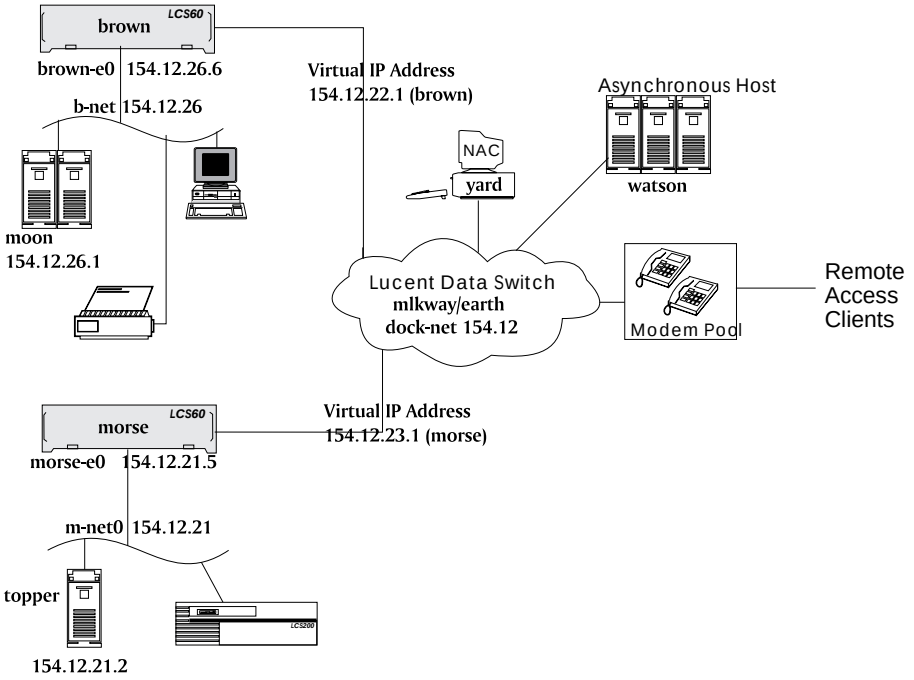
The manual pages for these commands are contained in Appendix E of this document; they are also available online.

7 Gateway Services – Configuration and Administration

LCS60 Configuration and Connection for Gateway Service

Figure 7-1 shows an example network using gateway services.

Figure 7-1: Example Network – Gateway Services



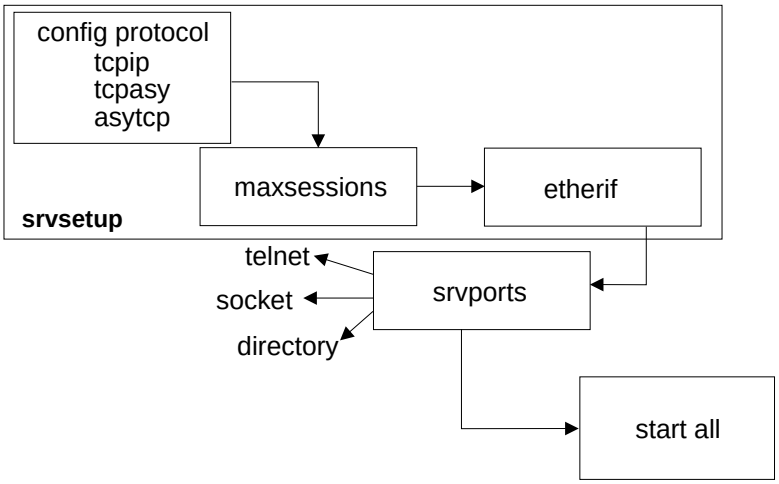
You can configure the LCS60 for gateway services using either the **srvsetup** command or the individual commands (**protocol, maxsessions, etherif**). The examples in this chapter use the individual commands.

If previous configuration (for example, for TCP/IP service) has been done, some of the steps required for configuring LCS60 for gateway services may have already been completed (e.g., **protocol, etherif**). Skip the steps that have been completed previously.

Note: The user should familiarize him / herself with all aspects of the LCS60 gateway service. For details, including a description of service ports, refer to Chapter 1.

After configuring the LCS60 as described under *Initial Setup* in Chapter 3, perform the steps shown in Figure 7-2 to configure the LCS60 Gateway Services.

Figure 7-2: Gateway Services Configuration



1. Enter the **lcsadm** interface.
2. Add the gateway service:
   - From the Config directory, enter **protocol**, or enter **config protocol** at the Top directory.
   - Add **tcpip** (as required).
   - Add **tcpasy** and / or **asytcp** as required.
3. Define the Gateway service sessions (maxsessions):

- From the Config directory, enter **max**, or enter **config maxsessions** at the Top directory.
- Assign the number of sessions of each type for the gateway service: **tcpasy** and **asytcp**. The total number of sessions for all services is 120 if PPP, SLIP, or ARAP is configured. If these services are not configured, the total number of sessions is 500.

4. Configure TCP-to-asynchronous gateway service ports (srvports):

   Note: Up to 500 TCP service ports can be configured if the LCS60 is used for gateway service *only*. The ports are identified by a number and can be customized with pre-defined destinations (PDDs), disconnect options, inactivity timers, and other options. For a complete description of all of the parameters, refer to the Glossary.

   - Enter **srvports** at the *Top>Config>#* prompt or enter **config srvports** at the Top directory.
   - Select **2** (`Add a service port`).
   - Enter a number in the range 1024 – 65535.
   - Assign a type of service to the port: **telnet** for remote terminal access, **socket** for 8-bit (raw) TCP data stream (e.g., **uucp** file transfer), or **directory** for LAN queries of the TCP service port database.
   - Follow the on-screen instructions for customizing each service port you are configuring. Help is available by typing **?**. A sample session (illustrating each of the three service port types) is shown in Screen 7-1.

5. If TCP/IP has not been started enter **start tcpip** from the Top directory now.

Screen 7-1: Gateway Service Configuration – Example

```
        TCP-TO-ASYNCHRONOUS GATEWAY SERVICE CONFIGURATION MENU

1. Display/Change the LCS60 call address prompt
2. Add a service port
3. Delete a service port
4. Change/modify a service port
5. Display service ports

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 2

Enter service port number
[ Type q to QUIT or ? for HELP ]
==> 4419

Enter service type "telnet", "socket", or "directory" for port 4419
[ Type q to QUIT or ? for HELP ]
==> telnet

Enter Pre-Defined call address or dash (-) for no call address
[ Type q to QUIT, ? for HELP, or press RETURN for default of "-" ]
==> mlkway/earth/yard

Enter TCP window size
[ Type q to QUIT, ? for HELP, or press RETURN for default of "1024" ]
==>    Return

Enable 8-bit character mode for this port?
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> y

Enable the LCS60 NOHUP (no hangup) feature for this port?
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> y

Enable the LCS60 2WAY feature for this port?
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> y

Enable the LCS60 SID (Security Server Identification) feature for this
port?
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> y

Enter Security Server type "nac" or "other" for port 4419
[ Type q to QUIT, ? for HELP, or press RETURN for default of "nac" ]
```

Screen 7-1: continued on next page

Screen 7-1: *Continued*

```
==> nac

Enter Inactivity timeout minutes
[ Type q to QUIT, ? for HELP, or press RETURN for default of "n" ]
==> 2

*** NOTICE ***

Entering port < 4419 > to provide < telnet > service as follows:

> Pre-Defined call address:
>
> mlkway/earth/yard

- TCP window size .................. 1024 (default)
- 8-bit character mode ............. Enabled
- Inactivity timeout(minutes) ...... 2
- Wait-for-Input timeout(minutes) .. 2
- NOHUP ............................ Enabled
- 2WAY ............................. Enabled
- SID .............................. Enabled as "nac"

Enter this service port?
Enter y,n ==> y

*** Port < 4419 > has been added.

Press RETURN to continue ==>  Return

        TCP-TO-ASYNCHRONOUS GATEWAY SERVICE CONFIGURATION MENU

1. Display/Change the LCS60 call address prompt
2. Add a service port
3. Delete a service port
4. Change/modify a service port
5. Display service ports

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 2

Enter service port number
[ Type q to QUIT or ? for HELP ]
==> 2511

Enter service type "telnet", "socket", or "directory" for port 2511
[ Type q to QUIT or ? for HELP ]
==> directory
```

Screen 7-1: continued on next page

Screen 7-1: *Continued*

```
*** NOTICE ***

Entering port < 2511 > to provide < directory > service.

Enter this service port?
Enter y,n ==> y

*** Port < 2511 > has been added.

Press RETURN to continue ==>  Return

        TCP-TO-ASYNCHRONOUS GATEWAY SERVICE CONFIGURATION MENU

1. Display/Change the LCS60 call address prompt
2. Add a service port
3. Delete a service port
4. Change/modify a service port
5. Display service ports

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> 2

Enter service port number
[ Type q to QUIT or ? for HELP ]
==> 1111

Enter service type "telnet", "socket", or "directory" for port 1111
[ Type q to QUIT or ? for HELP ]
==> socket

Enter Pre-Defined call address or dash (-) for no call address
[ Type q to QUIT, ? for HELP, or press RETURN for default of "-" ]
==> wimsey

Enter TCP window size
[ Type q to QUIT, ? for HELP, or press RETURN for default of "1024" ]
==> 8192

Enable the LCS60 NOHUP (no hangup) feature for this port?
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> n

Enter Inactivity timeout minutes
[ Type q to QUIT, ? for HELP, or press RETURN for default of "-1" ]
==> 1

*** NOTICE ***
```

Screen 7-1: continued on next page

Screen 7-1: *Continued*

```
Entering port < 1111 > to provide < socket > service as follows:

> Pre-Defined call address:
>
> wimsey

- TCP window size .................. 8192
- 8-bit character mode ............. Enabled
- Inactivity timeout(minutes) ...... 1
- Wait-for-Input timeout(minutes) .. 2
- NOHUP ............................ Disabled
- 2WAY ............................. Disabled
- SID .............................. Disabled

Enter this service port?
Enter y,n ==> y

*** Port < 1111 > has been added.

Press RETURN to continue ==>  Return

        TCP-TO-ASYNCHRONOUS GATEWAY SERVICE CONFIGURATION MENU

1. Display/Change the LCS60 call address prompt
2. Add a service port
3. Delete a service port
4. Change/modify a service port
5. Display service ports

Enter Menu Selection
[ Type q to QUIT or ? for HELP ]
==> q

Changes to TCP-to-Async gateway service to take effect immediately?
[ Type ? for HELP ]
Enter y,n ==> y

Note:
    Changes have been made effective !!
```

Access to Gateway Services – Dialstrings

Telnet Service

The following dialstring options are available for the *telnet* service. The usage is:

telnet [-e<off|char>] [-8] [-B] [-D<off|char>] [-M:raw|uucp] [-tterminal] [-w<1-16k>] *host-name* **[***port***]**

When using more than one option, the options must be separated by a colon (**:**).

-e<off|char> Allows the user to turn the *telnet local escape* key off or set it to something other than the default of Ctrl-] .

-8 Allows 8-bit character mode.

-B Negotiates with the remote host *binary* telnet character mode processing. Otherwise, the user must escape into the local telnet and manually negotiate *binary mode* with the remote host.

-D<off|char> Allows the user to disable the *local delete key* option or set it to something other than the default (ASCII DELETE, i.e., 0x7f). For example, the user may choose to set it to Ctrl-C which is the default delete key for Sun Workstations. This option, if enabled, will recognize the Delete key and map it to the TELNET IAC AO and IAC IP sequence which is sent to the remote host.

-M:raw|uucp Allows the user to transfer binary files across the telnet session between two cooperating hosts. This option is usually used when either *uucp* or *kermit*-like file transfer facilities are used. When selected, this option automatically disables the *local escape key* and negotiates *binary mode* with the remote host.

host-name Is the remote IP dotted host address or a DNS hostname.

-tterminal Allows the user to specify a terminal type (e.g., vt100) that will be negotiated if requested by the LAN host during initial handshake with the LAN host. A default terminal type of **unknown** is used if a terminal type is not specified.

-w<1-16K> Allows the user to specify a TCP window size that will override the default (2K) for each session. This option allows more data throughput, therefore a session will be blocked during data transfer operations. The recommended values are: 1K (1024), 2K (2048), 4K (4096), 8K (8192), 16K (16384).

port Is an optional TCP port number to which the user wants to connect on the remote host. For example, to connect to a remote host's daytime TCP service, the user would specify port 23.

An example is shown in the following screen:

```
DESTINATION: mlkway/earth/brown.telnet..-eoff:-8:-D Ctrl-C :moon
Circuit Open
Trying to connect to 154.12.26.1 ...
Connected to 154.12.26.1.
8-bit character mode is enabled.
Local Escape character 'CTRL ]' is disabled.
Local Interrupt Key is 'CTRL C'.
Local BREAK Key is enabled.

 UNIX System V Release 4.0 Version 2.1 (moon)

login:
```


Inactivity Timeout Option

An inactivity timeout option can be enabled for Async-to-TCP *telnet* and *tcpsock* services. This option allows the administrator to place constraints on user sessions that remain inactive for long periods of time. When enabled, this option will terminate all sessions that meet or exceed the inactivity timeout value. The value is the number of consecutive minutes [i.e., 1 – 1440 (= 1 day)] that elapse without any activity. This option applies to *all* users requesting this service. To enable this option, edit the */etc/opt/dk/srvtab/telnet* file for telnet and / or the */etc/opt/dk/srvtab/tcpsock* file for tcpsock by adding the **-I***minutes* option. An example of editing the *telnet* file to set a 60 minute timeout (**-I60**) is shown below:

```
# System Service  Flag    User    Program          Initial Parms
#
*               telnet   R       root    /usr/etc/lcs/ftslisten    \
    ftslisten:-v6:-Stelnet:-I60:-g%f.%m.%c:-u:%u:%p
```

Return to DESTINATION Option

The LCS60 can be configured to drop the telnet connection if the host to which the user is trying to telnet is unavailable. Without this feature, trying to reach an unavailable host would result in putting the user at the `telnet>` prompt and could possibly allow unauthorized connection to other LAN hosts. With this feature enabled, the connection is taken down completely if the host is unavailable.

To enable this option, edit the */etc/opt/dk/srvtab/telnet* file for telnet and / or the */etc/opt/dk/srvtab/tcpsock* file for tcpsock by adding the **-eoff** option. An example of editing the *telnet* file is shown below:

```
# System Service  Flag     User     Program          Initial Parms
#
*                 telnet   R        root     /usr/etc/lcs/ftslisten    \
    ftslisten:-v6:-Stelnet:-I1:-g%f.%m.%c:-u:%u:%p:-eoff
```

User Information

The gateway services include:

- Asynchronous-to-TCP
- TCP-to-Asynchronous
- UUCP

and are accessed by the **telnet** and / or **socket** service.

Async-to-TCP Gateway Service

A user on a terminal connected to the data switch network directly or through a modem can use the LCS60 connectivity to reach LAN-connected hosts or workstations.

The preferred method is to enter *<lcs60_call_address>***.telnet** at the DESTINATION: prompt. This gives the *telnet* prompt to which the user supplies the host or workstation with the **open** command for **telnet**. The next login prompt is from the host workstation on the LAN. An example is shown in the screen below.


```
DESTINATION:  earth/brown.telnet
telnet>  open  154.12.26.1
Login:
```

For each destination that an async-to-TCP gateway service user may wish to reach:

1. The LCS60 must be configured to use a DNS server, or
2. The name of that destination must be properly entered into the LCS60's configuration database (e.g., through the **addhost** command), or
3. The user must request the destination from the *telnet* prompt by opening a dotted IP numerical address (e.g., **open 123.45.6.78**).

Additionally, a host IP address can be specified in one of the following ways:

- Host name (e.g., **telnet..moon**)
- Dotted IP address (**telnet..154.12.26.1**)
- Fully qualified DNS name (**telnet..moon.lab.att.com**).

Once the user is finished and exits the telnet session, the DESTINATION prompt is returned.

A refinement of this service is shown on the screen below. The LAN can be reached directly from the DESTINATION prompt.

```
DESTINATION:   earth/brown.telnet..moon
Login:
```


The Lucent Technologies data switch speedcall feature can also be used. In the following screen, the first speedcall is entered such that **telnet** = **brown.telnet**; the second speedcall is entered such that the host **moon** = **brown.telnet..moon** (refer to the Lucent Technologies data switch documentation for details on setting up speedcall names).

```
DESTINATION:  earth/telnet
telnet>  open  154.12.26.1
Login:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
DESTINATION:   earth/moon
Login:
```

TCP-to-Async Gateway Service

A user on a host or workstation connected by means of an Ethernet LAN to an LCS60 can use the LCS60 to connect to data switch connected hosts. Examples of TCP-to-async gateway connections are shown in Figure 7-1.

To use the TCP-to-async gateway service, the user can issue a **telnet** command to the LCS60's IP address with or without the use of a service port. If no service port is configured, enter the call address of the data-switch connected host. Log on in the usual manner. An example is given below.

A service port may also be configured with a PDD, connecting the user to the destination host with a **telnet** command as shown in the second example in the following screen. In this example, service port **2222** has been configured as a telnet port with a PDD of **mlkway/earth/watson.**

```
$ telnet brown
Trying 154.12.26.6 ...
Connected to 154.12.26.6
Character mode is enabled.
Escape character is '^]'.

Notice from LCS60(brown)...

The following editing characters are valid during input at prompts:
        -- An ASCII "backspace" erases the last character typed,
        -- An ASCII "@" deletes the entire input line.

brown LCS60 DESTINATION:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
$ telnet brown 2222
Trying 154.12.26.6 (Port 2222)...
Connected to brown.lab.att.com
Character mode is enabled.
Escape character is '^]'.

Notice from LCS60(brown)...

 -- Connected to Data Switch Address: mlkway/earth/watson

login:
```


UUCP Feature

Data Switch to LCS60 to LAN

To transfer files using **uucp** between a host attached to a CommKit Host Interface and an Ethernet host on the LCS60, the */usr/lib/uucp/Systems* file must be modified on the host that is connected to the CommKit Host Interface.

The host originating the **uucp** connection must be attached to the CommKit Host Interface. For Ethernet-connected hosts that *cannot* initiate **uucp** connections to CommKit Host Interface connected hosts by means of the LCS60, configure CommKit Host Interface connected hosts to regularly poll Ethernet-connected hosts for **uucp** traffic.

There are two ways to set up the **uucp** feature for data switch to LCS60 to LAN file transfer:

1. For **telnet**, add the following entry to the */usr/lib/uucp/Systems* file on the originating CommKit Host Interface connected host.

```
e_host Any DK,g 0 area/exch/60name.telnet..-M:uucp:e_host in:--in: nuucp\012 word: password\012
```

Note: `-M:raw` may be entered instead of `-M:uucp` in the line above.

2. Async-to-TCP also offers the TCP *socket service* (**tcpsock**) which provides a higher speed transfer pipe for **uucp** service. For **tcpsock**, the administrator should add the following line to the */usr/lib/uucp/Systems* file:

```
e_host Any DK,g 0 area/exch/60name.tcpsock..e_host:540 in:--in: nuucp word: password
```

However, **tcpsock** can only be used if the LAN host supports the UUCP service over the TCP/IP protocol (specified as **540** in the */etc/Services* file on the host). Otherwise, the **telnet** method should be used.

e_host is the host name of the Ethernet-connected host, which must be entered into the LCS60 configuration database using the **addhost** command if the LCS60 has not been configured to use a DNS server. **area** and **exch** represent the area and exchange of the data switch to which the LCS60 is connected, and **60name** is the name of the LCS60 performing the **telnet**. For **tcpsock**, **540** is the service type. **nuucp** is the login ID corresponding to the UUCP service on the Ethernet-connected host, and **password** is the login password for the **nuucp** login on the Ethernet-connected host.

For example, for the network shown in Figure 7-1, the string for **telnet** would be:

```
moon Any DK,g 0 mlkway/earth/brown.telnet..-M:uucp:moon in:--in: nuucp\012 word: \
   password\012
```

Note: The above entry must be entered on one line. Enter spaces as shown.

and for **tcpsock** would be:

```
moon Any DK,g 0 mlkway/earth/brown.tcpsock..moon:540 in:--in: nuucp word: password
```

Both ends of the **uucp** connection must use the **uucp** "**g**" protocol.

LAN to LCS60 to Data Switch

To transfer files, using **uucp**, from an Ethernet host to the LCS60 to a host attached to a data switch, the system administrator must configure a service port for socket service.

Note: Configuration of the service port for socket service requires super user permission.

To configure the service, the administrator can assign a PDD (of the destination to which you will be transferring files) to the service port. (If a PDD is not assigned, once connected, the system will return the LCS60 call address prompt for the user to enter the destination desired.) The screen below shows an example based on Figure 7-1 for the Ethernet host **topper** connected to the LCS60 **morse** to send files over port **2981** to host **watson**.


```
# lcsadm
Top> # config srvports

            TCP-TO-ASYNCHRONOUS GATEWAY SERVICE CONFIGURATION MENU

    1. Display/Change the LCS60 call address prompt
    2. Add a service port
    3. Delete a service port
    4. Change/modify a service port
    5. Display service ports

    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> 2

    Enter service port number
    [ Type q to QUIT or ? for HELP ]
    ==> 2981

    Enter service type "telnet", "socket", or "directory" for port 2981
    [ Type q to QUIT or ? for HELP ]
    ==> socket

    Enter Pre-Defined call address or dash (-) for no call address
    [ Type q to QUIT, ? for HELP, or press RETURN for default of "-" ]
    ==> mlkway/earth/watson

    Enter TCP window size
    [ Type q to QUIT, ? for HELP, or press RETURN for default of "1024" ]
    ==> 8192

    Enable the LCS60 NOHUP (no hangup) feature for this port?
```

```
[ Type q to quit, ? for help, or press RETURN for default of "n" ]
Enter y,n ==> n

Enter Inactivity timeout minutes
[ Type q to QUIT, ? for HELP, or press RETURN for default of "n" ]
==>   Return

*** NOTICE ***

Entering port < 2981 > to provide < socket > service as follows:

> Pre-Defined call address:
>
> watson

- TCP window size ................. 8192
- 8-bit character mode ............. Enabled
- Inactivity timeout(minutes) ...... Disabled
- Wait-for-Input timeout(minutes) .. 2
- NOHUP ........................... Disabled
- 2WAY ............................ Disabled
- SID ............................. Disabled

Enter this service port?
Enter y,n ==> y

*** Port < 2981 > has been added.

Press RETURN to continue ==>
```

Example UUCP Service Using SunOS 4.0

To use socket service to initiate a **uucp** connection to a data switch connected host from a SunOS on the LAN, add the following line to the */etc/uucp/Systems* file on the Sun:

host_name Any TCP,g **port 60name** in: nuucp word: **password**

host_name is the host name of the data switch connected host. **port** is the port number of the port configured in the LCS60 database to provide socket service and **60name** is the name of the LCS60 that is used as the TCP-to-Async gateway.

Note: The LAN host must be able to translate the symbolic name (**60name**) to a TCP/IP address either through an entry in the */etc/hosts* file or by accessing a DNS server.

nuucp is the login ID corresponding to the UUCP service on the data switch connected host, and **password** is the login password for the **nuucp** login on the data switch connected host.

Note: If the socket port has not been configured with a PDD, additional fields for the LCS60 call address prompt and data switch call address of the host must be added to the line above.

Using port 2981 as configured above (and referring to Figure 7-1), the string would be:

```
watson Any TCP,g 2981 morse in: nuucp word: nuucp123
```


Example UUCP Service Using NCR 4.0

To use socket service to initiate a **uucp** connection to a data-switch connected host from an NCR on the LAN, perform the following steps on the LAN-connected NCR computer:

1. Add the following entry to the */etc/uucp/Systems* file on the originating LAN-connected NCR host:

   host_name Any LCST,g - **area/exch/host_name** in: nuucp word: **password**

   host_name is the host name of the data switch connected host. **area** and **exch** represent the area and exchange of the data switch to which **host_name** is connected.

2. Add the following entry to the */etc/uucp/Devices* file on the originating LAN-connected NCR host:

   ```
   LCST tcp - - TLI \x0002YYYYZZZZZZZZ lcst \D
   ```

   YYYY is the port defined for socket service on the LCS60 (in hex)

   ZZZZZZZZ is the IP address of the LCS60 (in hex) and can be obtained by executing:

   /usr/etc/rfsaddr -h "*60name***"**

   on the LCS60. At the prompt, enter **-**; the IP address will be the eight rightmost hex digits.

3. Add the following entry to the */etc/uucp/Dialers* file on the originating LAN-connected NCR host:

   ```
   lcst "" ""  \d TION:--TION: \D
   ```

Administration

Routine administration of the LCS60 includes a variety of tasks related to the gateway services. This section gives some examples of these tasks.

Refer to Chapter 8 for complete LCS60 administration.

Service Ports

The following screens show a variety of port commands:

```
Top> ports
Top>Ports> show

LCS60 TCP/Async Service Port Statistics:   Feb   2 07:44:34

  Port #  Service     State  Total  Busy  Fail  Reset
  ======  ==========  =====  =====  ====  ====  =====
      23  TELNET       UP      6     0     0      0
    1111  SOCKET       UP      0     0     0      0
    2222  SOCKET       UP      0     0     0      0
    2511  DIRECTORY    UP      0     0     0      0
    2999  TELNET     DOWN      0     0     0      0
    4000  TELNET       UP      0     0     0      0
    4419  TELNET       UP      0     0     0      0
   10283  TELNET       UP      0     0     0      0
   50000  SOCKET       UP      0     0     0      0

Top>Ports> disable 4419
Top>Ports> show 4419

LCS60 TCP/Async Service Port Statistics:   Feb   2 07:44:52

  Port #  Service  State  Total  Busy  Fail  Reset
  ======  =======  =====  =====  ====  ====  =====
    4419   TELNET   DOWN      0     0     0      2

Top>Ports> show -c

LCS60 TCP/Async Service Port Configuration Information: Apr  5 10:32:15

Port # Service   Tcpws 8bit Nohup 2way SID-Type Idle Wait Pre-Defined Address
====== ========= ===== ==== ===== ==== ======== ==== ==== ==================
    23 TELNET     1024 On   -     -    -           -    2
  1111 SOCKET     8192 On   -     -    -           -    - wimsey
```

```
  2222 SOCKET     2048 On   On    On   other       -    - marina/pier/cove
  2511 DIRECTORY  1024 -    -     -    -           -    2
  2999 TELNET     1024 On   -     -    -           -    - brown
  4000 TELNET     1024 -    On    -    -           2    - triangle/center
  4419 TELNET     1024 On   On    On   nac         2    - mlkway/earth/yard
 10283 TELNET      512 On   -     -    -           3    1
 50000 SOCKET     8192 On   On    -    nac         -    - mlkway/earth/rocket
Top>Ports> summary

LCS60 TCP/Async Service Port Summary Information:  Feb 07 12:00:55

Limit    Cfg.     Cap.  Use  Directory
=====    ====     ====  ===  =========
  500       6       3%    6       2511
Top>Ports>
```


Trace TCP/Async

The following screen shows a typical trace:

```
Top> session
Top>Session> trace tcp

LCS60 TCP to Async Gateway Tracking Information      Apr 24 15:12:48

Sesid  State   Port     Foreign Address    Chan  Switch Address
=====  =====  =====  ====================  ====  ================
1.3    CONN      23     154.12.24.44.1188     5  marina/pier/cove
1.2    CONN      23     154.12.24.47.2331     4  marina/pier/cove
1.1    CONN      23     154.12.24.39.1448     3  marina/pier/cove
```

Error Messages

For error messages that may appear when placing an outgoing call through the CommKit Host Interface, refer to Appendix C.

Log Files

The log files shown in Table 7-1 are written to by the LCS60 interface software and contain information as shown in the table.

Table 7-1: Gateway Services – Log Files

Log File	Information	Directory
tcpasy#.log	TCP-to-Async sessions	*/usr/adm/lcs/tcpasy*
asytcp#.log	Async-to-TCP sessions	*/usr/adm/lcs/asytcp*
tcplisten.log	TCP-to-Async service	*/usr/adm/lcs*

To display the contents of the files use the page command as shown in the following example:

```
# pg /usr/adm/lcs/tcplisten.log
Jun  5 12:27:06 (381) [6] main:STARTUP Complete
Jun 13 14:53:02 (381) [3] terminate:Shutdown:SIGTERM Received
Jun 13 14:58:54 (354) [6] main:STARTUP Complete
Jun 13 14:59:32 (354) [3] terminate:Shutdown:SIGTERM Received
Jun 16 11:00:40 (640) [6] main:STARTUP Complete
                                        •
                                        •
```

8 Administration

Basics

The administrator is responsible for operation of the LCS60; this includes verifying connections, maintaining the network, monitoring the operation, collecting data, backing up and restoring files, starting and stopping protocols, and generating reports. All administration is done after the LCS60 is configured (see Chapters 3 – 7). Administration can be performed at the system console or from a remote terminal.

Logging On

The most powerful user is **root**, often referred to as the superuser. The superuser may access, alter, or remove any file on the system. Only the superuser has the freedom to do all of the tasks needed to administer an LCS60. To restrict the users with superuser privileges give the **root** password only to approved users.

Caution: To protect the system from unauthorized changes, it is *strongly urged* that only the system administrator, and a minimum number of other knowledgeable users approved by the system administrator (ideally this number is zero), be allowed access to the system as the superuser.

The administrator must log on as **root** to configure the system. (As shipped, the password is the Return key.) Change the **root** password whenever the security provided by the current password is suspected of having been compromised. Only the superuser can change the password for **root**. To change the password, use the **passwd root** command.

Note: The commands in the Config and Manager directories require root permission and will initially prompt the administrator for the root password. The symbol **#** will appear at the end of the prompt (e.g., *Top>Config>#*) once the administrator has root permission.

Note: **root** can *only* log on at the system console. The system can be administered remotely, however, as long as the administrator has the **root** password and the **lcsadm** remote administration feature has been enabled.

System Console

Log on at the system console and enter **lcsadm** at the *root* prompt to obtain access to all LCS60 administrative operations.

Remote Administration

The LCS60 is provided with a remote access feature which is delivered in the disabled state. The system administrator can enable this feature:

1. Go to the *srvtab* directory:

```
# cd /etc/opt/dk/srvtab
```

2. Edit the file *lcsadm*
3. Delete the # sign from the line:

```
#*              lcsadm  t       bin     /bin/lcsadm     lcsadm:-r:%p
```

Once enabled, system administration can be performed by accessing the **lcsadm** Interface from a remote terminal. To log on remotely, use one of the strings shown below for the LCS60 **morse**.

```
DESTINATION: mlkway/earth/morse.lcsadm
Circuit Open
LCS60 Administrative Command Interface.  Enter 'RETURN' key for command list!
morse:Top>
```

```
# dkcu mlkway/earth/morse.lcsadm
Circuit Open
LCS60 Administrative Command Interface.  Enter 'RETURN' key for command list!
morse:Top>
```

Note: Remote access is impossible before the system is configured and the **dkhost** protocol has been started.

lcsadm Interface

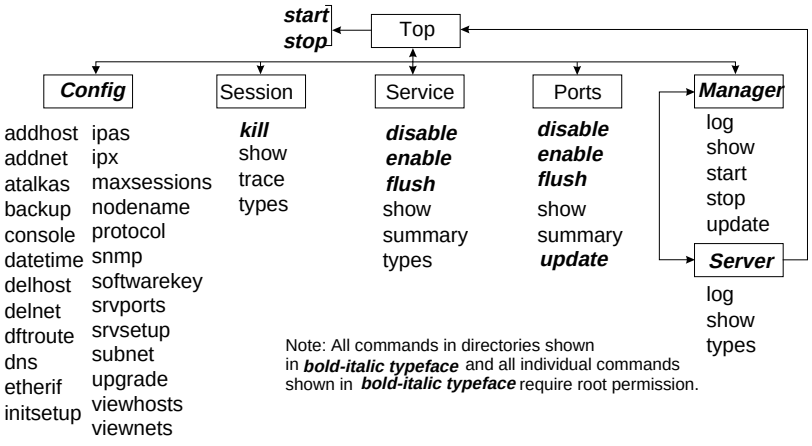
The **lcsadm** interface uses a hierarchical system of directories and commands as shown in Figure 8-1. The available directories – *Top, Config, Session, Service, Ports, Manager,* and *Manager Server* – and commands are described in the following sections.

You can obtain access to the **lcsadm** interface commands with one of the following:

```
# lcsadm
Top>
-----------------------------------------------------
# lcsadm directory command
Top>directory>
-----------------------------------------------------
# lcsadm -c directory command
#
```

The first method above takes you to the **lcsadm** interface's Top directory; the second executes the command specified and takes you to the specified **lcsadm** interface directory; the third method executes the command specified and returns you to the system prompt.

Figure 8-1: lcsadm Interface Directory Structure



Note: Descriptions of the report fields generated by the **lcsadm** interface administrative commands are given in the Glossary.

Common Commands

The following commands are available from all directories:

ls Use **ls** or the Return key to list the available commands and directories.

help **help** or **?** provides additional information for any command. Use the command **help** in conjunction with the command name for which you need information (e.g., **help start**).

quit This command exits the **lcsadm** interface.

! The **!** allows the administrator to perform shell commands without exiting the **lcsadm** interface. (**!** requires **root** permission when remotely administering.)

^ The ^ is used to move back to the previous directory. Refer to Figure 8-1.

Screen 8-1: Top Directory

```
Top># [Return]
Commands may be abbreviated.  Commands are:

config/          help             manager/         ports/           quit
service/         session/         start            stop             ^
!
Top># manager
Top>Manager># ^
Top>#
```

Note in Screen 8-1 that the Top directory is available from the Manager directory either by entering ^ or **top**.

Initial System Setup (initsetup)

The system must be initialized before it can be used. To initialize and configure the system before it is used the first time, the system administrator must log on as **root** and run the initial setup procedures described in Chapter 3.

Top Directory Commands

Once you log onto the LCS60, the *Top*> prompt is displayed. This indicates you are in the LCS60 Top Directory. To display the options available from this directory, use the **Return** key as shown in Screen 8-1.

Note: The directories appear on the screens followed by a slash "/".

Top is the initial directory entered when the **lcsadm** program is invoked. All other directories are accessible from the Top directory by entering the directory name. In addition to the common commands described previously, the following commands are available from the Top directory.

Name **start**

Synopsis **start [? | dkhost | ipx | tcpip | atalk | slip | ppp | snmp | routed | asytcp | tcpasy | arap | all]**

Description The **start** *service/protocol* command starts the named service or protocol. When invoked without options, **start** will list the services / protocols that are running. Services and protocols can be started individually or all at once using the **all** option. **all** will start all protocols and services configured to be started at boot time (through the **lcsadm config protocol** command). **start** requires **root** permission. **dkhost** indicates the CommKit Host Interface Software. The **start** command may start more services / protocols than specified on the command line due to the dependencies of the protocols and services. Table 8-1 shows the dependencies for the **start** and **stop** commands.

Name **stop**

Synopsis **stop [? | dkhost | ipx | tcpip | atalk | slip | ppp | snmp | routed | asytcp | tcpasy | arap | all]**

Description The **stop** command (requires **root** permission) stops the named service or protocol. Services / protocols can be stopped individually or all at once (**all**). The **all** option will stop all protocols and services that are running when **stop** is executed. This command may stop more services / protocols than specified on the command line due to the dependencies of the protocols and services. **stop** requires root permission. Table 8-1 shows the dependencies for the **start** and **stop** commands.

Table 8-1: Start/stop Command Dependencies

Command Entered	Protocols/Services Started
start arap	arap
start asytcp	tcpip, asytcp
start atalk	atalk
start dkhost	dkhost
start ipx	ipx
start ppp	tcpip, ppp
start routed	tcpip, routed
start slip	tcpip, slip
start snmp	tcpip, snmp
start tcpasy	tcpip, tcpasy
start tcpip	tcpip
Command Entered	**Protocols/Services Stopped**
stop arap	arap
stop asytcp	asytcp
stop atalk	atalk
stop dkhost	dkhost
stop ipx	ipx
stop ppp	ppp
stop routed	routed
stop slip	slip
stop snmp	snmp
stop tcpasy	tcpasy
stop tcpip	asytcp, ppp, routed, snmp, slip, tcpasy, tcpip

Session Directory Commands

The Session directory (Screen 8-2) is used to report information on the status of current gateway sessions.

Screen 8-2: Session Directory

```
Top>Manager># session
Top>Session>#  Return
Commands may be abbreviated.  Commands are:

config/          help             kill             manager/         ports/
quit             service/         show             top/             trace
types            ^                !
```

The following commands are available from the Session directory:

Name **kill**

Synopsis **kill** *service-type sesid [sesid ...]*

Description The **kill** command terminates a session with the specific service type and session ID (*sesid*) entered. This command requires **root** permission.

Name **show**

Synopsis **show [[-i** *interval***][-v][-w** *filename***] [***service-type***] [***sesid ...***]]**
show [-i *interval***][-w** *filename***] ppp [link/ip/atalk/ipx]**
show [-i *interval***][-w** *filename***] ppp** <*sesid*> **[link/ip/atalk/ipx/all]**

Description The **show** command gives session statistics such as connect time, idle time, and receive / transmit byte counts. The **-i** flag gives a continuous output at the specified interval; **-v** gives a verbose output. The **-w** flag puts the command output in the named file (*filename*). The statistics can be generated for all occurrences of the named service-type or individually by session ID (*sesid*). Service types are **tcpasy** (TCP-to-async), **asytcp** (async-to-TCP), **slip, ppp**, and **arap**. Arguments other than service-type are optional. Entering **show** without arguments will display statistics for all sessions.

When specifying **ppp** as the service type, the **ip, link, atalk, ipx**, and **all** options are available to show IP, link,

AppleTalk, or IPX configuration information (or **all**) for the specified session ID. When **ppp** is specified without a session ID, the **ip, atalk, link**, and **ipx** options are available to show IP, AppleTalk, link, or IPX configuration information for all sessions.

Example The following shows AppleTalk data for a PPP session.

```
Top>Session># show ppp 1.1 atalk
LCS60 Point-to-Point Session ATALK Configuration:  Feb  6 14:04:45
Sesid  State                              Server Info
===== ========                           =================
1.1     opened
  LOCAL   Addr: 2010.1                    Class: 1                 AT Comp: none
          Zone: Research Lab             Imp ID: V1.1           Route Proto: none
        Router: 2010.1                     Name: morse       Broadcast Supp: none
  PEER    Addr: 2010.118                  Class: 0                 AT Comp: none
          Zone: Research Lab             Imp ID:                Route Proto: none
        Router: 2010.1                     Name:             Broadcast Supp: none
Top>Session>#
```


Name **trace**

Synopsis **trace [-nv][-w** *filename***]** *service-type* **[***sesid ...***]**

Description The **trace** command gives tracing information on a per-session basis. The output includes connection state, local address, foreign address, fiber channel number, and data switch address. The **-v** flag gives a verbose output; **-n** displays the remote user IP address rather than the symbolic name; and **-w** puts the command output in the named file (*filename*). The **trace** command requires the user to specify a service-type.

Name **types**

Synopsis **types**

Description This command lists the available LCS60 service types as shown below.

```
Top>Session># types
Help for different types of services. Service types may be abbreviated.
They are:
  Types      Description
  =====      ===========
  tcpasy     TCP/Async Service
  asytcp     Async/TCP Service
  slip       Serial Line IP Service
  ppp        Point-to-Point Service
  arap       AppleTalk Remote Access Service
Top>Session>#
```


Ports Directory Commands

Screen 8-3: Ports Directory

```
Top>Config># ports
Top>Ports>#  Return
Commands may be abbreviated.  Commands are:
config/          disable          enable           flush            help
manager/         quit             service/         session/         show
summary          top/             update           ^                !
```

The Ports directory (Screen 8-3) contains utilities for the TCP-to-async service. The following commands are available from the Ports directory:

Name **disable** or **enable**

Synopsis **disable** *port#* **[***port#2* ...**]**

Description These commands are used with a port number to temporarily disable a particular port from service or temporarily enable a particular port. These commands require root permission. More than one port number can be specified on the command line.

Name **flush**

Synopsis **flush [***port#* ...**]**

Description This command resets TCP service port statistics for the individual ports. This command requires root permission.

Name **show**

Synopsis **show [-c[v]][-w** *filename***] [***port#, ...***]**

Description The **show** command gives TCP service port statistics about port state, service type, port resets. Output can be written to a file (*filename*) using the **-w** option. Port statistics can be shown individually by specifying a port number (*port#*). The **-c** option displays configuration statistics including service type, nohup, 2way, SID status, and PDDs. The **-v** flag gives a verbose output.

Entering **show** without arguments will display statistics for all ports.

Name **summary**

Synopsis **summary**

Description This command summarizes the service port information including number of ports configured and in use.

Name **update**

Synopsis **update**

Description This command updates the TCP service port configuration table. This command requires root permission.

Service Directory Commands

The Service directory (Screen 8-4) provides a method for obtaining current status of configured services as well as enable / disable commands.

Screen 8-4: Service Directory

```
Top> service
Top>Service>    Return
Commands may be abbreviated.  Commands are:
config/          disable          enable           flush            help
manager/         ports/           quit             session/         show
summary          types            top/             ^                !
```

The following commands are available from the Service directory:

Name **disable** or **enable**

Synopsis **disable** or **enable** *service-type* **[***service-type* **...]**

Description The **disable** (**enable**) command allows the administrator to turn a particular service off (on). These commands require root permission.

Note: When you disable a service the current sessions will not be taken down.

Name	**flush**
Synopsis	**flush** *service-type* **[***service-type* **...]**
Description	The **flush** command resets statistics for a service type. This command requires root permission.

Name	**show**
Synopsis	**show [***service-type* **...]**
Description	The **show** command lists statistics on configured services, capacities, and current states. Entering **show** without arguments will display statistics for all services.

Name	**summary**
Synopsis	**summary**
Description	This command summarizes the service information including the number of sessions configured for each service and the state of the service. For PPP, this command lists the number of IP, AppleTalk, and IPX over PPP sessions.

Name	**types**
Synopsis	**types**
Description	The **types** command lists the available service types.

Manager Directory Commands

The Manager directory (Screen 8-5) provides utilities to obtain information about the LCS60 management (LCM) subsystem components. This directory is not used for standard administration but should only be used for diagnostic administrative purposes.

Screen 8-5: Manager Directory

```
Top> manager
NOTICE: 'manager' requires super-user permission
Password: xxxx
Top>Manager>#    Return
Commands may be abbreviated.  Commands are:
config/          help             log              ports/           quit
server/          service/         session/         show             start
stop             top/             update           ^                !
```


Note: The Manager directory requires the **root** password. If you have previously supplied the **root** password, the system will not ask for it.

The following commands are available from the Manager directory:

Name **log**

Synopsis **log [***level***]**

Description The **log** command is used to obtain and change the verbosity of the log level of the LCS60 manager (*lcm.log*). The higher the number given for the log level, the more detailed the log file; valid values are **3, 6** (default), and **20**.

Name **start** or **stop**

Synopsis **start** or **stop**

Description The **start** and **stop** commands can be used to start and stop the LAN Communications manager (LCM). **start** starts the LCS60 software. **stop** terminates all active services and their corresponding sessions.

Note: Because **stop** terminates all active sessions, this command can only be executed from the system console.

Name **show**

Synopsis **show**

Description The **show** command gives information about the LCS60, including details such as process ID, start time, location of log files, log levels, and number of software servers.

Name **update**

Synopsis **update**

Description The **update** command resets the LCS60 manager configuration.

In addition to the main directories (Top, Service, Ports, Session, and Config), a Server directory (Screen 8-6) is available from the Manager directory.

Note: The Server directory is a diagnostic tool for checking protocol service information and is not intended for normal administrative purposes.

Screen 8-6: Server Directory

```
Top>Manager># server
Top>Manager>Server>#    Return
Commands may be abbreviated.  Commands are:
config/          help             log              manager/         ports/
quit             service/         session/         show             top/
types            ^                !
```

The following commands are available from the Server directory:

Name **log**

Synopsis **log** *service-type level*

Description This command is used to change the log level of each protocol server for a service. The higher the number given for the log level, the more detailed the log file. Valid log levels are:

arap	***3***, 6, 9	ppp	***3***, 6, 9, 10
slip	***3***, 6	asytcp	3, ***6***, 20
atmgr	***3***, 9	tcpasy	3, ***6***, 20
lcm	3, ***6***, 20		

Default is shown in ***bold italic*** typeface.
Use the **atlog** command to set / display the atmgr log level.
Use the Manager directory **log** command to set / display the lcm log level.

Name **show**

Synopsis **show [***service-type***]**

Description This command gives information about the specified *service type*. Entering **show** without arguments will display statistics for all services.

Example An example of the *show* command is given in the section *Typical Administrative Tasks* later in this chapter.

Name **types**

Synopsis **types**

Description The **types** command lists the available service types.

Config Directory Commands

The Config directory (Screen 8-7) provides access to the configuration commands (see Chapter 3) as well as a variety of administrative and maintenance commands.

Screen 8-7: Config Directory

```
Top> config
NOTICE: 'config' requires super-user permission
Password: xxxx
Top>Config># Return
Commands may be abbreviated.  Commands are:

addhost          addnet           atalkas          backup           console
datetime         delhost          delnet           dftroute         dns
etherif          help             initsetup        ipas             ipx
manager/         maxsessions      nodename         ports/           protocol
quit             service/         session/         snmp             softwarekey
srvports         srvsetup         subnet           top/             upgrade
viewhosts        viewnets         ^                !
```


Note: The Config directory requires the **root** password. If you have previously supplied the **root** password, the system will not ask for it.

In addition to the commands described in detail in Chapters 3–7, the following configuration commands are available from the Config directory:

Name **addhost/delhost** or **addnet/delnet**

Synopsis **addhost** or **addnet**

Description The *addhost/delhost* commands allow the system administrator to add or delete hosts (names and addresses) in the network by adjusting the LCS60 database file. The *addnet/delnet* commands allow the system administrator to add or delete the network by adjusting the LCS60 database file.

Name **datetime**

Synopsis **datetime**

Description This command allows the system administrator to set the date and time. Refer to **initsetup** in Chapter 3.

Name **nodename**

Synopsis **nodename**

Description This command allows the system administrator to set/change the LCS60 node name. Refer to **initsetup** in Chapter 3.

Name **subnet**

Synopsis **subnet**

Description This command allows the system administrator to enter subnetwork information for the LCS60.

The following administrative/maintenance commands are available from the Config directory:

Name **backup**

Synopsis **backup**

Description This command generates a menu which allows you to perform the full range of LCS60 backup and restore operations. Refer to the section *Backup and Restore Operations* later in this chapter.

Name **console**

Synopsis **console**

Description This command is used to set system console parameters. Currently, it can be used to enable or disable the autobaud feature. Refer to the section *System Console Parameters–Autobaud* later in this chapter.

Name **softwarekey**

Synopsis **softwarekey**

Description This command generates a menu which allows you to display and configure the software key parameters for your LCS60. **softwarekey** is invoked by the **initsetup** program since a key is required to activate any services you configure for the LCS60. You must obtain a software key from 1-800-WE2CARE for your particular LCS60 before you can complete the **softwarekey** command. An example of the **softwarekey** command is shown below.

The software key is specific to the release of the LCS60 and will not grant access to features introduced in later releases.

```
Top>Config># softwarekey
                    SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 Machine ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> 1

                  +-------------------------+
                  |                         |
                  |   LCS60 ID:  XXXXXXXX   |
                  |                         |
                  +-------------------------+

                   SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 Machine ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> 2


    A valid LCS60 registration record has been found on your system.

    Do you wish to retain the existing Software Certificate Number and Software
    Key values?
```

```
    [ Type ? for help ]
    Enter y,n ==> n

    Are you sure you want to delete the existing software key records?
    [ Type ? for help ]
    Enter y,n ==> y

A copy of your current keys have been saved in the file
/usr/adm/lcs/SoftwareKey.old for future reference.

You will now be prompted to enter your Software Certificate Number and Software
Key. These values must be properly entered to unlock the copy protected LCS60
Software. Please refer to the Software Certificate for details on obtaining a
Software Key from the WECARE Support Center (1-800-WE2-CARE).

You can bypass entry of the software key values by typing "q" at the
appropriate prompt. If you choose to bypass entry of the Software Certificate
Number and Software Key at this time, you must manually run the "lcsadm -c
config softwarekey" command before the LCS60 can be used to provide network
services.

Please enter your Software Certificate Number.

Certificate number (or "q" to quit) > l60r3-xxxxxx-xxxx

You entered "L60R3-XXXXXX-XXXX".  Is this correct (y/n/q)? y

Please enter your Software Key.

Software Key (or "q" to quit) > xxxxx-xxxx-xxxx-xxxx

You entered "XXXXX-XXXX-XXXX-XXXX".  Is this correct (y/n/q)? y

Registration Completed Successfully

                     SOFTWARE KEY CONFIGURATION PARAMETERS

    1. Display LCS60 ID
    2. Enter Software Certificate and Software Key
    3. Display Software Certificate and Software Key

    Enter Menu Selection
    [ Type q to quit or ? for help ]
    ==> q

Top>Config>#
```

Name	**upgrade**
Synopsis	**upgrade**
Description	This command generates a menu which allows you to perform a remote upgrade of the LCS60. Refer to the Chapter 9 for complete details of the remote upgrade feature.

Name	**viewhosts** or **viewnets**
Synopsis	**viewhosts** or **viewnets**
Description	The **viewhosts** command displays the internet addresses and host names of all hosts on a specific network or on all networks that are currently in the network database as well as IP reserved addresses for SLIP and PPP. **viewnets** displays all networks (names, numbers, and aliases) in the database configuration (as found in the */etc/networks* file).

Typical Administrative Tasks

This section gives a few examples of tasks the LCS60 Administrator may perform. For LCS60 service-specific tasks refer to the appropriate chapter: PPP (Chapter 4), SLIP (Chapter 5), ARAP (Chapter 6), gateway (Chapter 7).

Show Session Example

The following screen shows how to check the status of all sessions.

```
Top>Session># show
LCS60 TCP to Async Gateway Session Statistics:     Apr 26 09:30:25
                  Char      Total       Total                 Idle Time
Sesid  Service    Mode   Xmit(Bytes) Recv(Bytes) Connect Time  Hrs:Mins
===== ==========  ====   =========== =========== ============ =========
2.93      TELNET  8-bit    5634703     5634466   Apr 24 15:50    0:00
2.92      TELNET  7-bit    5652973     5652736   Apr 24 15:50    0:00
2.91      TELNET  binary   5574273     5574036   Apr 24 15:50    0:00
LCS60 Async to TCP Gateway Session Statistics:     Apr 26 09:30:25
                  Char      Total       Total                 Idle Time
Sesid  Service    Mode   Xmit(Bytes) Recv(Bytes) Connect Time  Hrs:Mins
===== ==========  ====   =========== =========== ============ =========
1.9       TELNET  8-bit    2700993     2700781   Apr 24 16:02    0:00
1.8       TELNET  7-bit    2701930     2701718   Apr 24 16:02    0:00
1.7       TELNET  binary   2701930     2701718   Apr 24 16:02    0:00
LCS60 AppleTalk Remote Access Protocol Statistics:      Apr 26 10:24:07
                                                    - - Recv Errs - -
Sesid Xmit(Bytes) Xmit(Pkts) Recv(Bytes) Recv(Pkts)  CRC   BadF  Rej
===== =========== ========== =========== ========== ===== ===== =====
1.1         21109        655       15714        504     0     0     8
LCS60 Serial Line IP Gateway Session Statistics:   Apr 26 08:18:20
Sesid Name Mtu  PriQ Vjslots Xmit(Bytes) Xmit(Pkts) Recv(Bytes) Recv(Pkts)
===== ==== ==== ==== ======= =========== ========== =========== ==========
1.1   s510 1006  YES      16           0          0           0          0
LCS60 Point-to-Point Session Statistics:   Apr 26 09:30:25
                                                    ---- Receive Errors ---
Sesid Xmit(Bytes) Xmit(Pkts) Recv(Bytes) Recv(Pkts)  Len   CRC  State Alloc
===== =========== ========== =========== ========== ===== ===== ===== =====
1.1          8731         90        1527        108     0     0     0     0
1.3       3558396      21156     2584518      15559     0     0     0     0
1.6       3553134      21134     2579398      15534     0     0     0     0
1.10          519         21         525         21     0     0     0     0
LCS60 Point-to-Point Session IPX Configuration:    Apr 26 09:30:40
                                      ROUTE  ROUTER    CIPX
Sesid  State   S        ADDRESS       PROTO   NAME   MAX SLOT
===== ======== = ==================== ===== ======== ========
1.1     opened L 00000057:08003E224056  none   morse    0
               P 00000057:0000000001FC  none   morse    0
Top>Session>#
```

Log Level Example

The following screen shows the user setting the log level for PPP.

```
Top>Manager>Server># log ppp 3
Top>Manager>Server>#
```

Change the Default Route Example

```
Top>Config># dftroute
CURRENT default route is ....... 154.12.21.3
                DEFAULT ROUTE FUNCTIONS
    ================================================
    1 ... Define the default route
    2 ... Delete the default route

    To select a function, enter the corresponding number
    [ Type q to quit or ? for help]
    ==>  1
CAUTION:  The default route defined here will be overridden if a
router is advertising a default route in the network.
    Enter default router (name, alias, or internet address)
    [ Type q to quit or ? for help ]
    ==>  154.12.21.86
Trying to reach host "154.12.21.86" ... OK.
    CURRENT default route is ....... holmes
    NEW     default route will be .. 154.12.21.86
    Enter y to confirm NEW default route "154.12.21.86"
    Enter n to reject  NEW default route "154.12.21.86"
    ==>  y
```

An example of changing the default route from **holmes** (**154.12.21.3**) to **154.12.21.86** is shown above.

Summary Output Examples

The following screen illustrates the summary commands.

```
Top>Service># summary
LCS60 Gateway Service Summary:          Mar  1 08:05:38
        Service Name    Cfg.    Use     Max.    State
        ============    ====    ===     ====    =====
         tcpasy            120       0         0     Disabled - Not Enabled
         slip              120      31        90     Enabled
         ppp               120       1       120     Enabled
              -ip                    1
              -ipx                   1
              -atalk                 0
         arap              120       0         0     Disabled - Not Enabled
               Totals               32
Top>Service># port
Top>Ports># summary
LCS60 TCP/Async Service Port Summary Information:       Mar  1 08:05:42
Limit   Cfg.    Cap.  Use  Directory
=====   ====    ====  ===  =========
  500      8      4%    8       2001
```


System Console Parameters– Autobaud

The following screen shows an example of the autobaud feature being disabled.

```
Top>Config># console
                    SYSTEM CONSOLE CONFIGURATION PARAMETERS
    1. Disable/Enable Autobaud Feature
    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> 1
```

```
        *** NOTICE:
        ***
        *** The system console "autobaud feature" is currently enabled!
        ***
==> Do you want to "disable" it? [y, n, ?] y
        The system console "autobaud feature" is now disabled!
        You must first log off the system console in order for this change
        to take effect.
                    SYSTEM CONSOLE CONFIGURATION PARAMETERS
    1. Disable/Enable Autobaud Feature
    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==> q
Top>Config>#
```


Backup and Restore Operations

The LCS60 backup and restore capabilities have been provided to help protect the substantial investment in time and effort that may have been required to work out the necessary networking definitions, administer them using LCS60 commands and functions, and then verify that they are correct. The backup / restore facilities even permit a brand new LCS60 to be substituted with no loss of functionality for one that has been catastrophically damaged (see the section *Reload System Software* in Chapter 9).

Note: Release 1 or 2 backups cannot be used on Release 3 systems.

The backup and restore operations can be accessed as shown in Figure 8-8, or by entering **backup** from the Config directory.

Screen 8-8: LCS60 Backup and Restore Configuration Menu

```
# lcsadm config backup

                  LCS60 BACKUP AND RESTORE CONFIGURATION MENU

    1. Backup(restore) variable files locally or to a remote server
    2. Backup-restore server operations and administration

    Enter Menu Selection
    [ Type q to quit or ? for HELP ]
    ==>
```


Generic vs. Variable Files

To use the backup and restore capabilities of the LCS60 most effectively to protect your system against accidental damage or corruption depends on understanding the difference between *generic* and *variable* files. The hard disk of each LCS60 stores both kinds of files. Generic files are the same on every LCS60, and never change. For example, executable programs such as **lcsadm** are generic files, whereas the TCP/IP configuration file */etc/hosts* is a variable file.

In case of system damage or corruption, generic files can be recovered by reinstalling the three generic tapes that are delivered with each LCS60 (see the section *Reload System Software* in Chapter 9). These tapes *cannot* be used to recover variable files, however, because variable files are changed during system administration and configuration.

To define the networking parameters (networks, interfaces, etc.) that are unique to each LCS60, the superuser invokes the LCS60's administrative commands and functions to tailor the LCS60 to its networking environment. The definitions, which can be extremely complex, are recorded in the LCS60's *variable* files, and so are *not* the same on every LCS60.

Local and Remote Modes

The LCS60 allows the backup and restore of variable files in either local or remote mode. The local mode uses the LCS60's tape drive to copy variable configuration files from the hard disk to a removable tape, and to restore configuration files to the hard disk from a tape.

The LCS60 also provides a *centralized backup/restore* capability. Using this facility, a single LCS60 configured as a backup / restore server can copy (back up) to its hard disk the variable configuration files of multiple remote LCS60s (and LCS50Es) that are configured as backup / restore clients. The backup is done disk-to-disk over the data switch network. The files that are copied to a server are the same as the files that would otherwise be copied to the local tape drive.

Backup/Restore (Tape) – Local Mode

To Back Up to Tape

The local backup / restore capability can be used at any time, by any LCS60, whether it is a backup / restore client, a backup / restore server, or if it operates in a network without a backup / restore server. This capability saves and restores variable files by copying / reading them to / from removable tape cartridges that have been inserted into the integral tape drive.

To access the local backup / restore functions:

1. Enter **lcsadm config backup** at the root prompt.
2. Select menu item **1** from the LCS60 Backup and Restore Configuration menu shown in Screen 8-8. Screen 8-9 will be displayed.

Screen 8-9: Backup/Restore Menu

```
                          BACKUP/RESTORE MENU

1. Define, delete, and list backup_restore servers
2. Create, delete, and restore backups from a remote server
3. Copy backups to/from tape

Enter Menu Selection
[ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
==> 3
```

To copy *all* variable configuration files to tape, select item **3** on the Backup / Restore menu (Screen 8-9) and then item **3** on the Tape Backup Management menu (Screen 8-10).

Screen 8-10: Tape Backup Management Menu

```
                      TAPE BACKUP MANAGEMENT MENU

1. Display the contents of a backup-restore tape
2. Selectively copy variable files from tape to disk
3. Copy ALL variable files to tape

Enter Menu Selection
[ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
==> 3
```

Insert a blank tape – which is not write-protected – into the tape drive when instructed to do so. If the LCS60 has been configured as a backup / restore server, the tape that is created will also contain the backups of all of the server's clients.

This *copy all* function should always be used to back up backup / restore servers. Although it is possible to use the centralized backup / restore facility to back up a server, the user is *strongly urged* not to do this, since doing so consumes a large amount of disk space on the server and provides no additional network security. For example, if an entire network were backed up remotely to a server and the

server, itself, was never backed up to tape, then the backups for the entire network would be lost if the server were to suffer a catastrophic accident.

When the backup has been completed, the system will redisplay Screen 8-10.

To Restore from Tape

Note: You cannot use Release 1 or 2 backup tapes for Release 3.

To restore variable configuration files from tape:

1. Enter **lcsadm config backup** at the root prompt.
2. Select option **1** from Screen 8-8.
3. Select option **3** from Screen 8-9.
4. Select option **2** from the Tape Backup Management Menu (Screen 8-10).
5. Insert a backup tape into the tape drive when instructed to do so.
6. After performing a COMPLETE, Server, or Config restore (as shown on the screen below), you must **stop** and then **start** all services.

To prevent inadvertently restoring files from one machine to another, the *selective copy* function will only accept backup tapes that were created for the same machine (this includes tapes created by a backup / restore server for a backup / restore client).

The *selective copy* function allows four types of restores:

```
1 ... COMPLETE : Return the machine to the state defined by the backup.
      ........ : ..................................................
2 ... Password : User ids and passwords
3 ... Server   : Centralized backup/restore control files
4 ... Config   : Protocol and services configuration files
```

One of these types must be selected before the restore can proceed.

A **COMPLETE** restore is comprehensive and returns the machine to the state defined by the variable configuration files at the time of the backup. *All* files and directories are restored. **COMPLETE** or **Config** restores will abort unless the TCP / IP protocol has been stopped.

There are three types of partial restores, each of which restores predefined sets of related files:

Password restores group id, password files, and shadow files, and the time zone setting.

Server restores lists of authorized backup / restore servers and clients and, for servers only, restores the archives containing all backups for all clients. The directory */etc/opt/dk* is restored as part of a **Server** restore.

Config restores configuration files for the LCS60. The **Config** restore will fail unless TCP / IP has been stopped.

Caution: When performing a Server or COMPLETE restore, the restored database will be the database of the last backup. This means that any new clients or any client backups since the last database backup will be lost. Similarly, any clients or client backups deleted since the last backup will reappear.

After selecting a type of restore but before prompting the user for final authorization to proceed with the restore, the files and directories to be restored are displayed. This gives the user an opportunity to verify that the correct type of restore has been selected.

To List the Contents of a Tape

To display the contents of a backup tape, select option **1** from Screen 8-10 and insert a backup tape into the tape drive when instructed to do so. Because this function does not copy any files from the tape to the disk, it will work with backup tapes that have not been created for the same machine.

Centralized Backup/Restore – Remote Mode

Access the centralized backup and restore operations by selecting option **2** from the LCS60 Backup and Restore Configuration menu (Screen 8-8).

The centralized backup / restore feature allows:

- An LCS60 configured as a server to copy to its hard disk variable configuration files from multiple remote LCS60s (and LCS50Es) configured as clients. The remote backup is done disk-to-disk over the data switch network. A backup / restore server may be configured to be its own client. However, since this capability would duplicate on the server's hard disk files that are already in place and functioning elsewhere on the server's disk, it is *strongly recommended* that servers back themselves up locally disk-to-tape (see above) and *not* remotely disk-to-disk.

Note: A server can *only* be a client of itself (although this is not recommended), not of another server.

- A server to store and individually access multiple backups for each client.
- A server to restore variable configuration files to clients. Any of the backups that a server has stored on behalf of a client may be selected for restore. The remote restore is done disk-to-disk over the data switch network.
- Users to choose complete or partial restores. This facility is identical to the facility available during restores from tape (see above).
- Remote backups and restores to be initiated either from a client or a server.
- A client to be backed up by more than one server.
- A server to create backup tapes for its clients. A server can copy a client's backup from disk to tape rather than transmit the backup over the data switch network from its disk to the client's disk. Such tapes may be used to restore damaged clients in case a remote restore cannot be done.

Security — Authorizing Clients and Servers

To ensure the integrity of a network containing backup / restore servers and clients, the centralized backup / restore facility requires that:

1. Servers identify which machines (clients) are authorized to store backups on their hard disk

2. Clients identify which machines (servers) are authorized to copy backups from them and restore backups to them.

Centralized backup/restore operations can only proceed when server and client authorizations agree.

Access to Backup/Restore Functions – Clients and Servers

By default, an LCS60 is configured as a backup / restore client. An LCS60 is automatically configured as a backup / restore server as soon as it defines its first client.

To access the centralized backup / restore functions needed by a backup / restore *client*, use the Backup / Restore menu (Screen 8-9 obtained by selecting option **1** from Screen 8-8).

To access these functions from a backup / restore *server*, select option **2** from the LCS60 Backup and Restore Configuration Menu (Screen 8-8); this will display Screen 8-11.

Screen 8-11: Centralized Backup/Restore Menu – Server

```
                CENTRALIZED BACKUP/RESTORE MENU -- SERVER

1. Define, delete, and list backup-restore clients
2. Create, delete, and restore backups
3. Create a backup tape for a client

Enter Menu Selection
[ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
==> 1
```

Once the proper authorizations have been made, remote operations may be initiated either from a server or from a client.

Defining Backup/Restore Servers on a Client

Servers are defined from the Backup / Restore Menu, Screen 8-9. To define which machines (servers) may back up a client, enter option **1** on the Backup / Restore menu (Screen 8-9). This will display the menu shown in Screen 8-12.

Screen 8-12: Centralized Backup Server Definition Menu

```
                CENTRALIZED BACKUP SERVER DEFINITION MENU

    1. Enter/change a backup-restore server
    2. Delete a backup-restore server
    3. List backup-restore servers
    4. Show machines backup-restore status: a client or a server

    Enter Menu Selection
    [ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
    ==>
```

Choose option **1** to define a server. The system will prompt for the client name and call address. It is *essential* when entering the call address of a server that the originating group name of the server be identical to the data switch's local address of the server.

Servers cannot define other LCS60s to back them up, however, a server can specify itself as its own client by means of the Centralized Backup / Restore Menu – Server (Screen 8-11), by choosing option **1**.

Changing a Client to a Server

In the case in which you are reconfiguring a client to be a server, you must first delete all servers previously defined for the LCS60. Select option **2** on Screen 8-12 to delete the servers. This is required because a backup / restore server may not define other servers. You can convert a client to a server *only* if any existing server has been deleted. You can then add the server by selecting option **1** on Screen 8-12.

Defining Backup/Restore Clients on the Server

To define which machines may be backed up by a server, select option **1** from Screen 8-11 to obtain the menu shown in Screen 8-13.

Screen 8-13: Centralized Backup Client Definition Menu

```
                CENTRALIZED BACKUP CLIENT DEFINITION MENU

    1. Enter/change a backup-restore client
    2. Delete a backup-restore client
    3. List backup-restore clients
    4. Show backup-restore status: a client or a server

    Enter Menu Selection
    [ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
    ==> 1
```


Select option **1** to begin the dialogue to add the client. See the example below:

```
Enter the names and data switch call addresses of clients that are
to be backed up by this server.
        Enter client name
        [ Type q to quit or ? for help ]
        ==>  brown
        Enter Data Switch call address of client "brown"
        [ Type q to quit or ? for help ]
        ==>  mlkway/earth/brown
Entered:
NEW: brown -- mlkway/earth/brown
        Enter client name
        [ Type q to quit or ? for help ]
        ==>  q
```

It is *essential* when entering the call address of a client that the originating group name of the client be identical to the data switch's local address of the client.

Changing a Server to a Client

To reconfigure a server as a client, delete all of its clients (option **2** on Screen 8-13). An LCS60 configured as a backup / restore server will be re-configured as a backup / restore client as soon as it deletes all of its clients.

Backup or Restore Functions

From a Client

To initiate a backup or restore from a client, log onto the client; select option **2** Screen 8-9; see Table 8-2 for the tasks shown on Screen 8-14.

Screen 8-14: Centralized Backup Operations Menu

```
                    CENTRALIZED BACKUP OPERATIONS MENU
1. Select a server to back up this machine
2. Select a server, delete backups of this machine stored there
3. Select a server, list backups of this machine stored there
4. Select a server to restore this machine
Enter Menu Selection
[ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
==>
```


Table 8-2: Backup/Restore Functions

Function	From	Option (Screen)
Backup	Client / Server	Option 1 (Screens 8-14 and 15)
Restore	Client / Server	Option 4 (Screens 8-14 and 15)
List this client's backups stored on a server	Client	Option 3 (Screen 8-14)
List the client's backups this server has stored	Server	Option 3 (Screen 8-15)
Delete this client's backup stored on a server	Client	Option 2 (Screen 8-14)
Delete a client's backup stored on this server	Server	Option 2 (Screen 8-15)

From a Server

To initiate a backup or a restore from a server, log onto the server; select option **2** from Screen 8-11 to obtain Screen 8-15.

Screen 8-15: Centralized Backup Operations Menu – Server

```
                CENTRALIZED BACKUP OPERATIONS MENU -- SERVER

    1. Select a client to back up
    2. Select a client, delete its backups
    3. Select a client, list its backups
    4. Select a client to restore

    Enter Menu Selection
    [ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
    ==>
```


For the appropriate task, see Table 8-2. An example of a backup from a server is shown below.

```
Back up a client's variable files.
Clients known by this server
=====================================
brown
        Enter client name
        [ Type q to quit or ? for help ]
        ==>  brown
        Type name of backup or press RETURN for default of "9401251342"
        [ Type q to quit ]
        ==>  backup1
Creating backup named "backup1" .
        - "morse" calling "brown": assemble backup data.
        - "morse" calling "brown": retrieve backup.
        - Storing backup on server "morse" .
        - "morse" calling "brown": clean up.
        - Backup complete !!
```

Choose a logical name for the backup. The backup is the filename on the server which stores the variable files. The default (**yymmddhhmm**) signifies the date and time of the backup.

A restore from server example follows:

```
Restore a client's variable files.
Clients known by this server
=====================================
brown
        Enter client name
        [ Type q to quit or ? for help ]
        ==>  brown
Backups for client "brown"
=====================================
wednesday      -- Dec 19 10:48
monday         -- Dec 17 09:55
        Type name of backup or press RETURN for default of "wednesday"
        [ Type q to quit ]
        ==>   Return
Restoring backup named "wednesday" .
        - Retrieving backup stored on server "morse" .
        - "morse" calling "brown": send backup.
        - "morse" calling "brown": install backup.
        Select a type of restore.
        1 ... COMPLETE : Return the machine to the state defined by the backup.
              ........ : ..................................................
        2 ... Password : User ids and passwords
        3 ... Server   : Centralized backup/restore control files
        4 ... Config   : Protocol and services configuration files
        Enter a restore number
        [ Type q to quit or ? for help ]
        ==> 2
        You have selected a "Password" restore.
        A "Password" restore will recover these files and directories
        IF they existed at the time the backup was made.
        - /etc/TIMEZONE
        - /etc/group
        - /etc/passwd
        - /etc/shadow
        Do you wish to proceed with a "Password" restore? [y, n, ?, q] y
        Proceeding with a "Password" restore.
        Reading the archive. Please wait ... Done.
        Restore complete !!
        Restored the following files and directories.
        + /etc/TIMEZONE
        + /etc/group
        + /etc/passwd
        + /etc/shadow
```

Creating a Tape

If it is necessary to restore a client but it is impossible or inadvisable to do so remotely, a server can copy a client's backup from disk to tape by selecting option **3** from Screen 8-11 rather than transmit the backup over the data switch network from its disk to the disk of its client. This option displays the menu shown in Screen 8-16. Select option **1** to copy the backup.

Screen 8-16: Tape Backup Management Menu – Server

```
                TAPE BACKUP MANAGEMENT MENU -- SERVER
1. Copy a clients remote backup to tape
Enter Menu Selection
[ Type q to QUIT, ? for HELP, or ^ to GO BACK ]
==> 1
```

Tapes created in this way are indistinguishable from tapes created locally by a client using the copy all option (**3** on Screen 8-9). Clients may, therefore, be restored by physically transporting a tape created from the Tape Backup Management Menu – Server from the site of the server to the site of the client, inserting the tape into the client's tape drive, and then restoring the client by invoking the command selective copy option (**2**) from Screen 8-10 on the client.

Network Access Password Option

The system administrator can require a password for the **telnet** command. When the option is set, the user is prompted for a Network Access Password before the DESTINATION prompt appears. The password is set by using the **useradd** command at the **root** prompt, followed by the **passwd** command as shown below:

```
# useradd -u444 nap
# passwd nap
New password: password
Re-enter new  password: password
#
```

Note: The password will not echo on the screen.

The Network Access Password user ID parameters (e.g., group, uid, etc.) can be modified with the **usermod** command.

An example of the **telnet** command (with the password option set) is shown in Screen 8-17.

Screen 8-17: TCP-to-Async Gateway with Network Access Password

```
$ telnet 154.12.21.5
Trying 154.12.21.5 ...
Connected to 154.12.21.5.
Character mode is enabled.
Escape character is '~'.

Notice from LCS60(morse)...

The following editing characters are valid during input at prompts:
        -- An ASCII "backspace" erases the last character typed,
        -- An ASCII "@" deletes the entire input line.
Network Access Password: enter password

Notice from LCS60(morse)...

The following editing characters are valid during input at prompts:
        -- An ASCII "backspace" erases the last character typed,
        -- An ASCII "@" deletes the entire input line.
morse LCS60 DESTINATION: mlkway/earth/watson
login:
```

Note: The Network Access Password prompt appears only if the password option is set. Echoing is turned off when the password is entered.

Deleting the Network Access Password

Use the **userdel** at the **root** prompt to delete the network access password. For example to delete the user id **nap**, enter:

```
# userdel nap
```

Changing the Network Access Password

To change an existing network access password, use the **passwd** command at the **root** prompt and enter the new password as directed. Refer to the screen below.

```
# passwd nap
New password: password
Re-enter new  password: password
#
```

Note: The password will not echo on the screen.

The new password will become effective immediately.

Status

The system administrator can query the LCS60 to obtain process, fiber, and Ethernet interface status at any time using the command **statlcs -t**. An example is shown below:

```
                        LCS60 STATUS REPORT
                       ====================

 Ethernet interface status:
      Interface to en0 is UP.

Data Switch status:
      Fiber Interface to data switch is UP.

 Process status:
      ipxd       is UP.
      sapd       is UP.
      routed     is UP.
      snmpd      is UP.
      tlid       is UP.
      inetinit   is UP.
      lcm        is UP.
      dkdaemon   is UP.
      morse      is UP (IP Network Security Group).
      Techs      is UP (IP Network Security Group).
      Library    is UP (IP Network Security Group).
      atmgr      is UP.
```

Note: If **dkdaemon** is DOWN, you must **stop dkhost** and then **start dkhost**.

Error Messages

Note: For alarms to StarKeeper II NMS, refer to Appendix B.

Error messages are displayed on the LCS60 system console.

Error Messages from the LCS60 Fiber Interface

The following sections identify error messages you may see when executing the commands that make outgoing calls over the Host Interface.

Console Error Messages

The error messages that may appear on the console as a result of errors detected in the CommKit Host Interface software and hardware are included below.

Messages that begin with the string:

`dkhs0:`

are printed by the **dkhs** driver and refer to the specified interface or unit device. **0** is the interface number.

Messages that begin with the string:

`dkux0:`

are printed by the **dkux** STREAMS module and refer to the specified circuit or channel.

Hardware Error Messages

If the CPM-HS module in the data switch node goes out of service after the data switch interface server is started, if the CPM-HS is removed from service during operation, or if a power failure occurs on the data switch node, the following error message will appear on the LCS60 system console indicating the loss in communication with the data switch.

```
NOTICE: dkhs0: Interface is down: REASONS
```

The error indicates the software on the interface board has stopped running for one of the following REASONS:

~ALIVE_S	The fiber datalink between the LCS60 and the CPM-HS unexpectedly went down. This could be caused by tampering or by a hardware failure. Try manually restarting the interface.
RX-SYNC	The optical receiver on the VMEDKHS board in the LCS60 lost synchronization with the data stream transmitted from the CPM-HS. The probable cause of this failure is tampering with the loop-back switch on the CPM-HS paddle board at the data

switch. Try manually restarting the interface.

RX-MUTE — The optical connection between the receiver on the VMEDKHS board in the LCS60 and the transmitter on the CPM-HS paddle board at the data switch has been broken. Verify that the CPM-HS is properly installed in the data switch slot and that there is optical connectivity between the LCS60 and the CPM-HS. The interface will recover automatically when the condition has been cleared.

TX-HANG — The transmitter on the VMEDKHS board in the LCS60 has stalled and is no longer able to send data to the data switch network through the CPM-HS. Verify that the CPM-HS is properly installed in the data switch slot and that there is optical connectivity between the LCS60 and the CPM-HS. Also verify that the CPM-HS is in service. The interface will recover automatically when the condition has been cleared.

TX-FULL — The transmitter on the VMEDKHS board in the LCS60 has apparently stalled and data is no longer draining to the data switch network through the CPM-HS. This condition should be detected as a TX-HANG error unless the administrator has disabled stall detection by modifying ***dkhs*** tunable parameters. Try manually restarting the interface.

```
dkhs0: Interface Restarted
```

This message indicates the interface has automatically restarted after a previously detected error.

```
NOTICE: dkhs0: Hardware Reset Failed
```

This message indicates that an attempt to reset the board by means of the **dkmaint** command has failed.

If an error message is received, the administrator should check the CPM-HS module, hardware, and fiber link connections, and execute the **dkmaint** command to reset the interface.

Server Error Messages

When communications between the LCS60 and the data switch are interrupted, the server detects the problem and prints the following error message on the host console:

```
* * * * * * * * * *
* * * The Server for servername is having problems
* * * Please get someone to attend to it.
* * * The last error was: date
* * * dkmgr: Unable to contact CommKit for Server servername
* * * * * * * * * *
```

- *servername* is the name of the server reporting the problem. The server-name must be defined in the data switch node database.
- *date* is the date, time, process ID, and channel number of the problem. This has the form: `Sep 25 08:45:40 (112) [0.000]`. The number in parentheses is the process ID of the **dkserver** process encountering the problem. The number in brackets [0.000] is in **x.yyy** format; **x** indicates the interface number and **yyy** indicates the channel number on which the error occurred.

If you get this error message, look in the *dksrvlog* file for additional information and check the state of the CPM-HS module on the data switch node console and all hardware connections.

Call Error Messages

The error messages that may appear when placing a call through the CommKit Host Interface are listed in Appendix C.

Lucent Technologies Data Switch Server Log File

The log file, *dksrvlog*, is written to by LCS60 interface software and contains information about incoming call requests. The default log file name is */var/opt/dk/log/dksrvlog.network_security_group_name*. There will be as many *dksrvlog* files as there are multiple subnetworks configured. For the example in Figure 3-1, the three *dksrvlog* files are: *dksrvlog.morse*, *dksrvlog.Library*, and *dksrvlog.Techs*.

The *dksrvlog* file name may be changed with the **-l** option of the **dkserver** command. The **-v** option specifies the amount of information that will be written to the file (i.e., log level). Its contents can be displayed by use of the **pg** command as shown in the following example.

Each entry in the *dksrvlog* file begins with a time stamp. The first message logged after the **dkserver** starts with a log level of *n* is always of the form shown in the example above: where **morse** is the name of the data switch interface server started, *srvtab* is the name of the data switch interface server table, *dkuidtab* is the name of the data switch interface **dkuidtab**, and *n* (**6** in the example) is the level at which the server activity is logged.

```
# pg /var/opt/dk/log/dksrvlog.morse
Jun 27 09:50:43 (274) [0.000]      SERVER morse is INITING files=(/etc/opt/dk \
    /srvtab /etc/opt/dk/dkuidtab) loglvl=6
Jun 27 09:50:53 (274) [0.000]      ERROR dkmgr: Can't open /dev/dk/dial0
Jun 27 09:50:53 (274) [0.000]     dkmgr : SERVER morse is ACTIVE and SERVING
Jun 27 09:51:11 (274) [0.139]      REQUEST s=pupu, u=45003=lcsadm, r=earth/ \
    mlkway/brown
Jun 27 09:51:11 (315) [0.139]       Send ioctl init = 3
Jun 27 09:51:11 (315) [0.139]      ORIGIN h=TOOLBOX.52.3, c=/opt/dk/bin/pupu
                                        •
                                        •
```

Note: **morse** is the *network security group name*.

More information is given depending on the following log levels:

Log Level 1 Each incoming call is logged with the service requested, the user id, and the dial string of the remote system from which the call originated. The entry will also show whether the call was accepted with the token **REQUEST** or rejected with the token **DENIED**.

Log Level 2 This will log the reasons incoming calls are rejected. The token used is either **ERROR** or **DENIED**.

Log Level 3 This will enter information when a call exits, including the device, process id, and exit code. The exit code is passed from the process which was spawned by the **dkserver** for the call. The token used is **EXIT**.

Log Level 4 Arguments that are passed with the incoming call are logged. The token is **ARGS**.

Log Level 5 Same as log level 4.

Log Level 6 Same as log level 4. (Default.)

Log Level 7 Prints information useful for debugging.

Log Level 8 Logs the number of channels per interface and for each call, the parsed dial string. This information is actually logged by **dkmgr** which receives and parses incoming calls. The value of the **DKKEY** is also logged by **dkmgr**.

Log Level 9 Logs the full dial string (including **DKKEY**) as it was received.

Additional Log Files

A number of other log files that can be examined for troubleshooting and diagnostic purposes are contained in the directory */usr/adm/lcs*. These files are written to by the LCS60 application software and contain information as shown in Table 8-3.

Each entry in a *.log* file begins with a time stamp process id and log level (similar to that shown in the example above). The contents of a *.log* file can be displayed by use of the **pg** command.

Table 8-3: Log Files

Log File	Information
adial.log	Dialer information
arap.log	ARAP sessions
asytcp#[1].log	Async-to-TCP sessions
atmgr.log	AppleTalk information
lcm.log	Manager software
lcsstatD.log	StarKeeper II NMS information
ppp.log	PPP sessions
slip.log	SLIP sessions
slipdial.log	SLIP calls
tcpasy#[1].log	TCP-to-Async sessions
tcplisten.log	TCP-to-Async service

1 The *tcpasy#.log* file is located in the directory */usr/adm/lcs/tcpasy*. The *asytcp#.log* file is located in the directory */usr/adm/lcs/asytcp*.

9 Maintenance

Reload System Software

If the system crashes, you may need to reload the system software:

1. Install the UNIX System software
2. Install the UFS Utility Fixes tape
3. Remove the **inet** package
4. Install the LCS60 application software.

UNIX System Software Installation

Caution: Once the UNIX Software has been loaded, do not reset or power off the LCS60 without first shutting down the system (*/etc/shutdown -y -g0 -i0*) as file damage may result. A new installation of the UNIX System will destroy all files currently on disks used for the installation.

To install the UNIX System software:

1. Power off the LCS60.
2. Insert the UNIX System installation tape (tape 1 of 3) in the tape drive. (Insert the tape with the label toward the left and the tape guard down.)
3. Turn the machine on; this will generate the autoboot.
4. Abort the autoboot by hitting the **Break** key; this will display the debugger prompt: `197-Bug>`.
5. Determine which type of drive you have by typing **ioi** at the `197-Bug>` prompt. The response to the **ioi** command is shown below for each of the three types of drives:

Seagate ST5660N

```
0    0  VME197    0    $00   N   SEAGATE  ST5660N          0600
```

Seagate ST11200N

```
0    0  VME197    0    $00   N   SEAGATE  ST11200N ST31230 0456
```

Fujitsu

```
0    0  VME197    0    $00   N   FUJITSU  M2624F-512       M405
```

If you a have a Fujitsu drive or a Seagate ST5660N, refer to Appendix D for UNIX System Software Installation; if you have a Seagate ST11200N drive, continue with the instructions below.

6. Enter **bo 0 40 COREunix** at the 197-Bug> prompt. This will generate installation screens ending with the Screen 9-1. This information will *not* be repeated; use Screen 9-1 as you proceed with installation for instructions on entering responses.

Screen 9-1: How to Enter System Responses

```
                  How to Type Responses during Installation
When typing responses:
       <response><RETURN>  Enters <response>
       <CTRL>-h            Erases the last character typed
       <CTRL>-u            Erases the entire line
       <CTRL>-r            Reprints the entire line
       <CTRL>-s            Pauses output to the screen
       <CTRL>-q            Resumes output to the screen
       <CTRL>-z            Suspends the installation
       <CTRL>-c            Cancels the installation and returns here
       ?<RETURN>           Gets help for the current screen
Press <RETURN> to continue.
```

Note: If you have not inserted the tape the following will be displayed.

```
Booting from: VM197, Controller 0, Drive 40
Loading: COREunix
Boot logic error
Packet status: 0000
Additional Error Status: 0002
```

7. Enter **Return** when Screen 9-1 is displayed; this will lead to the installation screen shown below. Continue with the dialogue as shown:

```
                              Set Display Options
The display options currently assume your terminal has:
        24 lines
        unknown cursor addressing
1) No change, proceed with installation or upgrade
2) Change the number of lines and return to this screen
3) Select vt100 cursor addressing
4) Select wyse50 cursor addressing
5) Select unknown cursor addressing
Enter option number of choice: [ 1-5 ] ( 1 ) 1
                UNIX SYSTEM V/88 Release 4 Upgrade/Installation
You have the following options:
1) Full installation
2) Upgrade an existing R40V2 or later system
3) Exit without doing anything (reboot)
4) Enter maintenance mode
Enter option number of choice: [ 1-4 ] 1
                              Installation Warning
*-------------------------------------------------------------*
| CAUTION: A new installation of the UNIX system will destroy |
| all files currently on disks used for the installation.     |
|                                                             |
| If you have not made a backup and want to do so, enter 'n'. |
*-------------------------------------------------------------*
Do you want to continue? [ y n ] y
                           Package Selection Confirmation
The following packages are available for installation.
Those currently selected for installation are marked by '*':
 C2sec              *ed                *mvme337           *sds
*Motif              *els               *mvme338           *siff
*NCD                *enet1x7           *mvme376           *spell
*X11                *envmon            *mvme37x           *sys
 X11contrb          *face              *mvme385           *sysadm
*acct               *fsd               *nfs               *tarlist
*bnu                 gold               nis               *tbx
*cdfs               *inet              *nsu               *terminf
*cds                *ipc                ocscomp           *ufs
*compat             *lp                *perf              *usrenv
*dfm                *man               *rfs               *xcp
*dfs                *mvme332xt         *rpc
1) Proceed to install packages as shown
2) View package descriptions and/or change selection
Enter option number of choice: [ 1-2 ] ( 1 )  Return
                          Installation Disk Configuration
```

```
1)      Automatic 1-disk installation
2)      All automatic disk configuration options
3)      Manual disk configuration
4)      Read the disk configuration from the disk(s)
Enter option number of choice: [ 1-4 ] ( 1 )  Return
Final Verification of 1-disk installation                BOOT COMMAND: "bo 0 0"
Device          Disk description                Format? Space Left
m197_c0d0       1GB SCSI (SEAGATE)              No      1073402
Partition       Slice           Size            FS      Block Size
/               m197_c0d0s0     58000           ufs     4K
swap            m197_c0d0s1     300000          -       -
/stand          m197_c0d0s2     25000           bfs     -
/usr            m197_c0d0s3     360000          ufs     4K
/var            m197_c0d0s4     120000          ufs     4K
/home           m197_c0d0s5     100000          ufs     4K
/tftpboot       m197_c0d0s6     22000           s5      2K
1) Proceed with installation using configuration shown
2) Change file system type and return to this screen
3) Change disk formatting and return to this screen
4) Change slice size and return to this screen
Enter option number of choice: [ 1-4 ] ( 1 ) 3
Final Verification of 1-disk installation                BOOT COMMAND: "bo 0 0"
Device          Disk description                Format? Space Left
m197_c0d0       1GB SCSI (SEAGATE)              Yes     1073402
Partition       Slice           Size            FS      Block Size
/               m197_c0d0s0     58000           ufs     4K
swap            m197_c0d0s1     300000          -       -
/stand          m197_c0d0s2     25000           bfs     -
/usr            m197_c0d0s3     360000          ufs     4K
/var            m197_c0d0s4     120000          ufs     4K
/home           m197_c0d0s5     100000          ufs     4K
/tftpboot       m197_c0d0s6     22000           s5      2K
1) Proceed with installation using configuration shown
2) Change file system type and return to this screen
3) Change disk formatting and return to this screen
4) Change slice size and return to this screen
Enter option number of choice: [ 1-4 ] ( 1 ) 1
```

8. The system will ask if you want to install Motif, NCD, and X11 package features. (Examples are shown below.) Choose the defaults by entering **Return**.

```
                          Motif Package Query #1
Install the Motif clients? [ y n ] ( y )   Return
                           NCD Package Query #6
Install the NCD 19 server? [ y n ] ( n )   Return
                           X11 Package Query #2
Install the X11 software development files? [ y n ] ( y )   Return
```

9. Continue with the dialogue as shown in the screen below:

```
                           bnu Package Query #1
 Please enter the 'node name' to call this machine, it must be
 8 or less alphanumeric characters: ( unix ) morse
                          inet Package Query #1
You can enter the value of the IP address now if you know it,
otherwise you can just press RETURN to continue.
If you do not enter a value now, the IP address must be initialized
later using the instructions found in the Initial System Setup booklet
in order to use the Internet functionality.
Internet Address: (  )  Return
                           lp Package Query #1
Enter the name of the OLD spooling directory;
just press <return> if this is a new installation: ( /usr/spool/lp )   Return
                           lp Package Query #2
Should the disable/enable commands be available to ALL users?[ y n ]( n )  Return
                           lp Package Query #3
Will you be attaching a PostScript printer to this system? [ y n ] ( y )   Return
                           nsu Package Query #1
Enter the number of pseudo-terminal devices
to configure on your system [ 0-1024 ] ( 256 )   Return
                       Ready to Start Installation
At this point, the installation should continue without interruption
until finished. You will only need to check occasionally for error
messages which require a response. If the installation media contains
multiple tapes, you may be asked to insert them as necessary.
1) Continue with Unattended Portion of Installation
2) Review Package Questions and Answers
Enter option number of choice: [ 1-2 ] ( 1 ) 1
```

```
                              Ready to begin Formatting
The following disks will now be formatted:
m197_c0d0
You can safely ignore error messages such as:
    Non-Motorola volume id read on unit xx
or
    Invalid VTOC read on unit xx
Press <RETURN> to continue with formatting or interrupt (CTRL-c) to abort:  Return
                           Slicing Installation Disk(s)
                           Activating Swapping To Disk
                               Making File Systems
                              Installing Boot Block
                         Mounting Installation Partitions
                       Switching to Installation Partitions
                              Installing Package(s)
Installation in progress.
```

10. Installation messages will continue to scroll as the UNIX System software is installed. This procedure will continue for approximately 49-60 minutes.
11. When the following message appears, remove the tape and press the **Return** key to continue the shutdown and allow the host to reboot. **Do not enter 'bo 0 0'**

```
At the nnn-Diag> or nnn-Bug> prompt, enter 'bo 0 0'.
Press <RETURN> to begin the system shutdown.
```

12. At the Console prompt, login as root to continue with the UFS Utility Fixes Tape installation.

UFS Utility Fixes Tape Installation

Install the UFS Utility Fixes tape (tape 2 of 3) by inserting the UFS Utility tape in the tape drive and conducting the dialogue shown in Screen 9-2.

Note: In the **pkgadd -d /dev/rmt/ctape1** command, the last character is a *one* not the letter *L*.

Screen 9-2: UFS Utility Fixes Maintenance Tape Installation

```
# pkgadd -d /dev/rmt/ctape1

Installation in progress.

The following packages are available:
  1  FH4042XX1     Post-IR ufs utility fixes
                   (m88k) IR03

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:   Return

Processing package instance <FH4042XX1> from </dev/rmt/ctape1>

Post-IR ufs utility fixes
Version IR03 (m88k)

## Processing package information.
## Processing system information.
   7 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.

Installing Post-IR ufs utility fixes as <FH4042XX1>

[ verifying class <none> ]
## Installing part 1 of 1.
Files overwritten by this package class have been saved in
         /var/sadm/pkg/FH4042XX1/save/root
[ verifying class <replace> ]

Installation of <FH4042XX1> was successful.
```

Remove the tape once you have completed the installation.

inet Package Removal

The LCS60 Application tape will initialize its own version of the **inet** package, therefore it is essential that you remove the existing **inet** package. Remove the **inet** package by conducting the dialogue shown Screen 9-3.

Screen 9-3: inet Package Removal

```
# pkgrm inet

The following package is currently installed:
   inet            Internet Utilities
                   (m88k) FH40.42 IR03.111393

Do you want to remove this package [y,n,?,q] y

## Removing installed package instance <inet>
## Verifying package dependencies.
WARNING:
    The <Motif> package depends on the package currently
    being removed.
WARNING:
    The <compat> package depends on the package currently
    being removed.
WARNING:
    The <nfs> package depends on the package currently
    being removed.
Dependency checking failed.

Do you want to continue with the removal of this package [y,n,?,q] y
## Processing package information.
## Executing preremove script.
                    •
                    •
                    •
## Updating system information.

Removal of <inet> was successful.
```

LCS60 Application Software Installation

To install the LCS60 Application:

1. Be sure the */var* file system has enough space (approximately 60,000 blocks required); then:
2. Insert the LCS60 Application tape (tape 3 of 3) in the tape drive and conduct the dialogue (as **root**; from the Console login) shown in Screen 9-4.

Note: Package installation will be aborted if the **inet** package has not been removed (use **pkginfo -l inet** to check for the package) or, if a version of the LCS60 package is already installed (use **pkginfo -l lcs60** and **pkginfo -l lcs60p** to check for the LCS60 package and patch, respectively).

```
Error: information for "inet" was not found
```

indicates that the **inet** package has already been removed.

Note: In the **pkgadd -d /dev/rmt/ctape1** command, the last character is a *one* not the letter *L*; similarly, in **pkginfo -l**, the character is a *one*.

Screen 9-4: LCS60 Application Software Installation

```
# pkgadd -d /dev/rmt/ctape1
Insert a cartridge tape into Cartridge Tape Drive.
Type [go] when ready,
or [q] to quit: go
Installation in progress.
The following packages are available:
  1  lcs60     LCS60 Network Interface
               (m88k) R3.0 Bldxx
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:   Return
```

Screen 9-4: *continued.*

```
Processing package instance <lcs60> from </dev/rmt/ctape1>
LCS60 Network Interface
Version R3.0 Bldxx (m88k)
Copyright (c) 1996 Lucent Technologies Inc.
All Rights Reserved
Copyright (c) 1994, 1995 AT&T
All Rights Reserved
Copyright Motorola Inc. 1988 - 1994
All Rights Reserved
Copyright (c) 1985, 1986, 1987, 1988, 1989, 1990
The Wollongong Group, Inc.
All Rights Reserved
Copyright (c) 1990, 1991, 1992, 1993, 1994
Novell Inc.
All Rights Reserved
## Processing package information.
## Processing system information.
   20 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
Installing LCS60 Network Interface as <lcs60>
## Installing part 1 of 1.
/usr/etc <implied directory>
/usr/local <implied directory>
[ verifying class <none> ]
## Executing postinstall script.
Installing DKHS module
Installing DKUX module
                  •
                  •
                  •
Installation of <lcs60> was successful.
Insert a cartridge tape into Cartridge Tape Drive.
Type [go] when ready,
        or [q] to quit: q
*** IMPORTANT NOTICE ***
        If installation of all desired packages is complete,
        the machine should be rebooted in order to
        ensure sane operation. Execute the shutdown
        command with the appropriate options and wait for
        the "Console Login:" prompt.
#
```

3. Remove the cartridge tape from the tape drive.
4. Reboot the LCS60 as shown below:

```
# /etc/shutdown -g0 -y -i6
Shutdown started.    Mon Apr  10 16:43:19 EDT 1996
Broadcast Message from root (console) on morse Mon Apr  10 16:43:21...
THE SYSTEM IS BEING SHUT DOWN NOW ! ! !
Log off now or risk your files being damaged.
Changing to init state 6 - please wait
#
INIT: New run level: 6
The system is coming down.  Please wait.
System services are now being stopped.
The LCS60 Software is being terminated.
Print services stopped.
Stopping process accounting
The system is down.

The system is being restarted.
NOTICE: System Reboot Requested

Copyright Motorola Inc. 1988 - 1994, All Rights Reserved
MVME197 Debugger/Diagnostics Release Version 1.1 - 06/17/94 (06_17.14)
COLD Start
Local Memory Found =02000000 (&33554432)
MPU Clock Speed =50Mhz
Idle MPU(s) : NONE
Autoboot in progress... To abort hit <BREAK>
Booting from: VME197, Controller 0, Drive 0
Loading: Operating System
Volume: $00000000
IPL loaded at: $00FC0000
SVR4 Disk Boot Loader 930913
Boot: system file more recent than unix.
Probing for devices
.........Probe for DKHS [0] @ (0xF0E90000) successful..
Boot: Using EDT built by probe programs
Boot: hardware change detected
Boot: reconfiguring kernel
```

```
Multiprocessor Kernel Debugger Release 4 Version 4
Copyright (c) 1988 UNISYS.
Copyright (c) 1991, 1992, 1993 Motorola, Inc.
All rights reserved.

Found 1 CPU(s)

NOTICE: MP Locking disabled

STREAMS threshold  = 13738550
Max STREAMS memory = 26103245

UNIX(R) MP System V Release 4.0 Motorola m88k Version R40V4.2
Total real memory  = 33554432
Available memory   = 27648000

Copyright (c) 1984, 1986, 1987, 1988, 1990 AT&T
Copyright (c) 1991 UNIX System Laboratories, Inc.
Copyright (c) 1987, 1988 Microsoft Corp.
Copyright (c) 1990, 1991, 1992, 1993 Addamax
Copyright (c) 1990, 1991, 1992, 1993 Motorola, Inc.
All Rights Reserved

Node: morse

Enter <CR> to pause in a single user shell before init.

Default boot sequence continuing...
Updating modules with master file contents
/stand/unix is being created.
found in in-core EDT: BSW id 0
found in in-core EDT: CONS1X7 id 0
                  •
                  •
                  •
Node: morse

Enter <CR> to pause in a single user shell before init.

Default boot sequence continuing...
The system is coming up.  Please wait.
configuration change detected: creating device nodes
sadc: Building symbols in /tmp/sa.adrfl for /stand/unix
Starting process accounting
Print services started.

                                  Welcome!

Your LCS60 Network Interface must be set up by you. When you see the "login"
prompt you must login as "root" and then type:

                          lcsadm config initsetup

followed by the RETURN key. This will lead you through the steps to configure
```

```
the LCS60 and the individual protocols and/or services you want to be up
whenever the system is rebooted.

Before you run "lcsadm" you should read about LCS60 configuration in the "LCS60
Network Interface Installation and Administration Guide" and assemble the
information required for configuration.

The system is ready.

morse
Console Login:
```

After the screen above is displayed, complete the installation by:

1. Logging on as **root**

   Note: As shipped, the **root** password is the Return key. Change the **root** password as soon as you log on.

2. Accessing the **lcsadm** Interface
3. Running **initsetup** and **srvsetup** (as required) as described in Chapter 3.

Removing the LCS60 Application Software

Before removing the LCS60 application software stop the configured protocols and services by entering **lcsadm -c stop all** from the root prompt. Remove the LCS60 application software by conducting the dialogue (as **root**; from the Console login) shown in Screen 9-5.

Screen 9-5: LCS60 Application Software Removal – R2.0 Example

```
# pkgrm lcs60
The following package is currently installed:
   lcs60           LCS60 Network Interface
                   (m88k) R2.0 Bldxx
Do you want to remove this package [y,n,?,q] y
## Removing installed package instance <lcs60>
## Verifying package dependencies.
## Processing package information.
## Executing preremove script.
Updating /etc/ttysrch
Saving:
        /usr/etc/default.route
        /usr/etc/inetinit.cf
        /usr/etc/snmpd.cf
        /usr/etc/pppd.conf
        /usr/etc/tlid.conf
        /etc/lcs/lcm_sess.cf
        /etc/lcs/tcpags.cf
        /etc/lcs/ipas.cf
        /etc/lcs/bootptab
        /etc/lcs/atalkas.cf
        /etc/networks
        /etc/netmasks
        /etc/lcscfg.boot
        /etc/hosts
        /etc/opt/dk directory
## Removing pathnames in <none> class
        •
        •
        •
## Updating system information.
Removal of <lcs60> was successful.
*** IMPORTANT NOTICE ***
        If removal of all desired packages is complete,
        the machine should be rebooted in order to
        ensure sane operation. Execute the shutdown
        command with the appropriate options and wait for
        the "Console Login:" prompt.
#
```

Note: Although the file */usr/etc/pppd.conf* is saved when an R1.0 or R2.0 package is removed, it is not needed for R3.0 and will not be reloaded when you load R3.0.

Upgrade

To upgrade an existing R1.0 or R2.0 LCS60 to R3.0, you will need an LCS60 R3.0 Application Tape (tape 3 of 3). To perform the upgrade:

1. As **root** from the Console login, stop all services (**lcsadm stop all**).
2. Determine if you have any patches on R1.0 or R2.0 by executing the **pkginfo** command as shown in the example below:

```
# pkginfo -l lcs60p
   PKGINST: lcs60p
      NAME: LCS60 R1.0 Official Maintenance Patch #2 (Cumulative)
  CATEGORY: system, utilities
      ARCH: m88k
   VERSION: R1.0 Bld24 P2
    VENDOR: AT&T-LC
    PSTAMP: R1.0 Bld24 P2 03/24/95 13:31:40
  INSTDATE: June 19 1995 03:55
    STATUS: completely installed
     FILES:     15 installed pathnames
                15 shared pathnames
                10 executables
                 1 setuid/setgid executables
              7943 blocks used (approx)
```

The line NAME on the screen above will indicate if there is a patch.

3. If you have a patch, remove it first by entering: **pkgrm lcs60p**. If no patch is installed, you will received the following message:

```
Error: information for "lcs60p" was not found
```

4. Remove the R1.0 or R2.0 LCS60 software as described in the section *Removing the LCS60 Application Software* earlier in this chapter (page 9-13).

   Note: The removal screen for the different releases will be similar but not identical to the screen shown in Figure 9-5.

5. Install the R3.0 LCS60 application software as described in the section *LCS60 Application Software Installation* earlier in this chapter (page 9-9).

Note: In order to activate R3.0 features, you must have an R3.0 software key. Refer to Chapter 3 for more details on the software key.

Remote Upgrade

To upgrade many R2.0 or later LCS60s to release 3.0 or later, the local tape drive need only be used to install the upgrade release on a single R2.0 or R3.0 LCS60, the remote upgrade server. All other LCS60s in a network are remote upgrade clients and can be upgraded remotely over the data switch from the server.

Installation and removal of releases of the LCS60 require access to the system console. To obtain the full benefit of the remote upgrade feature, the system console of the remote upgrade clients should be remotely accessible. Any of the system console connections described in Chapter 2, except for direct connection to the LCS60, provide remote console access.

Note: The remote upgrade feature does not apply to R1.0 systems.

Installing an Upgrade on a Remote Upgrade Client

To install an upgrade remotely on a client:

1. Log on to the ***client*** from the system console as **root**.

2. Access the Remote Upgrade Installation Menu using **lcsadm -c config upgrade** or:

```
# lcsadm
Top># config
Top>Config># upgrade

                        REMOTE UPGRADE INSTALLATION MENU

    CLIENT Procedures:

    1. Enable a client to receive a generic download
    2. Remove from client the previously installed generic
    3. Install on a client the downloaded generic
    4. Disable a client from receiving a generic download
    ..........................................................

    SERVER Procedures:

    5. Copy (from Tape) a generic onto this server
    6. Send a generic from this server to a client
    7. Remove a spooled generic from this server

    Enter Menu Selection
    [ Type q to QUIT or ? for HELP ]
    ==>
```

3. You are on the ***client***. Select item 1 and enter the ***server***'s call address in the form area / exchange / local when prompted. This authorizes the server to establish the necessary connections.

   Note: Do not **exit** or **quit** at this time. You will need to perform some additional steps later on throughout this procedure.

4. Log on to the ***server*** from the system console as **root**.
5. Access the Remote Upgrade Installation Menu using **lcsadm -c config upgrade**.
5. On the *server*; select item 5 under the `SERVER Procedures` and answer the prompts accordingly.

   Note: A server can only maintain (i.e., spool) one copy of an LCS60 software generic and an LCS60 patch. Therefore, if a copy already resides on the server, this procedure **will automatically remove it** before copying the newer generic from tape onto disk.

7. On the ***server***, select item 6 to transfer the software generic from the server to the client. Before the copy is initiated, the client is checked to ensure it has sufficient disk space to receive and store the copy. The software is downloaded in the client's save area. Do not continue with step 8 until this transfer has completed.
8. After the transfer from the ***server*** is complete, on the ***client***, select menu item 2. This will remove the previously installed software generic (and patch, if a patch is installed) and stop all services and protocols. You must perform this step before continuing on to step 9.

Note: After this step has been completed do not **quit** or **exit** from the **lcsadm** command or you will have to manually complete the process as follows:

- From the **root** login prompt on the client execute the following:

  # **pkgadd -d /var/spool/pkg**

- Continue with step 10 below.

9. On the ***client***, select menu item 3. This will install the downloaded LCS60 software generic. After this step has been completed successfully you may **exit** or **quit** from the **lcsadm** command.
10. Reboot the ***client*** LCS60 using **/etc/shutdown -g0 -y -i6**.
11. On the ***client***, login as **root** and perform the **initsetup** procedures as described in Chapter 3.
12. On the ***client***, configure all required protocols and services (using the **lcsadm** commands) and enter **start all** from the **lcsadm** interface's Top directory.
13. On the ***client***, select item 4 from the Remote Upgrade Installation Menu to disable the client from receiving a generic download. Exit **lcsadm**.
14. On the ***server***, remove the LCS60 Software Installation tape and store it in a safe place. Exit **lcsadm**.

Note: If the LCS60 software generic is no longer needed, remove it from the server by selecting item 7 under the *SERVER Procedures* from the Remote Upgrade Installation Menu.

Processor Board Firmware Update

If the MVME197E processor board has been replaced, the **set** and **env** must be executed to reset the time and date and autoboot functions.

After replacing the board, attach a console to the console port on the rear of the LCS60 as described in Chapter 2. Then turn the LCS60 rear power switch **on**. Within a few seconds, boot messages will begin to appear on the console screen. At the *197-Bug* prompt use the **set** command to enter the date (in the format *mmddyyhhmm*, that is, month, day, year, hour, minute), and use the **env** command to reset the autoboot. Refer to Screen 9-6.

Note: Responses to the prompts generated by the **env** command are listed in the table below.

Bug or System environment [B/S]=S?	B
Field Service Menu Enable [Y/N]=Y?	N
Remote Start Method Switch [G/M/B/N]=B?	B
Probe System for Supported Disk/Tape Controllers [Y/N]=Y?	Y
Negate VMEbus SYSFAIL* Always [Y/N]=N?	N
Local SCSI Bus Reset on Debugger Startup [Y/N]=N?	Y
Local SCSI Bus Negotiations Type [A/S/N]=A?	A
Ignore CFGA Block on a Hard Disk Boot [Y/N]=Y?	Y
Auto Boot Enable [Y/N]= N?	Y
Auto Boot at power-up only [Y/N]= Y?	N
Auto Boot Controller LUN = 00?	0
Auto Boot Device LUN = 00?	0
Auto Boot Abort Delay = 15?	15
Auto Boot Default String [NULL for an empty string]=?	<CR>
ROM Boot Enable [Y/N]=N?	N
ROM Boot at power-up only [Y/N]=Y?	Y
ROM Boot Enable search of VMEbus [Y/N]=N?	N
ROM Boot Abort Delay =0?	0
ROM Boot Direct Starting Address = FF800000?	FF800000
ROM Boot Direct Ending Address - FFBFFFFC?	FFBFFFFC
Network Auto Boot Enable [Y/N]= N?	N

Network Auto Boot at power-up only [Y / N]= N?	N
Network Auto Boot Controller LUN = 00?	0
Network Auto Boot Device LUN = 00?	0
Network Auto Boot Abort Delay = 15?	15
Network Auto Boot Configuration Parameters Pointer (NVRAM) = 00000000?	0
Memory Search Starting Address = 00000000?	0
Memory Search Ending Address = 02000000?	02000000
Memory Search Increment Size = 00010000?	00010000
Memory Search Delay Enable [Y / N] = N?	N
Memory Search Delay Address = FFFFD00F?	FFFFD00F
Memory Size Enable [Y / N] = Y?	N
Memory Size Starting Address = 00000000?	0
Memory Size Ending Address = 02000000?	02000000
Base Address of Local Memory = 00000000?	0
Size of Local Memory = 02000000?	02000000
Slave Enable #1 [Y / N]=Y?	Y
Slave Starting Address #1 = 00000000?	0
Slave Ending Address #1 = 01FFFFFF?	01FFFFFF
Slave Address Translation Address #1 = 00000000?	0
Slave Address Translation Select #1 = 00000000?	0
Slave Control #1 = 01FF?	01FF
Slave Enable #2 [Y / N]=Y?	Y
Slave Starting Address #2 = 00000000?	0
Slave Ending Address #2 = 00000000?	00000000
Slave Address Translation Address #2 = 00000000?	0
Slave Address Translation Select #2 = 00000000?	0
Slave Control #2 = 0000?	0
Master Enable #1 [Y / N]=Y?	Y
Master Starting Address #1 = 02000000?	02000000
Master Ending Address #1 = EFFFFFFF?	EFFFFFFF
Master Control #1 = 0D?	0D

Master Enable #2 [Y / N]=N?	N
Master Starting Address #2 = 00000000?	0
Master Ending Address #2 = 00000000?	0
Master Control #2 = 00?	0
Master Enable #3 [Y / N]=N?	N
Master Starting Address #3 = 00000000?	0
Master Ending Address #3 = 00000000?	0
Master Control #3 = 00?	00
Master Enable #4 [Y / N]=N?	N
Master Starting Address #4 = 00000000?	0
Master Ending Address #4 = 00000000?	0
Master Address Translation Address #4 = 00000000?	0
Master Address Translation Select #4 = 00000000?	0
Master Control #4 = 00?	0
Short I / O (VMEbus A16) Enable [Y / N]=Y?	Y
Short I / O (VMEbus A16) Control =01?	01
F-Page (VMEbus A24) Enable [Y / N]=Y?	Y
F-Page (VMEbus A24) Control =02?	02
ROM Speed Bank A Code = 02?	02
ROM Speed Bank B Code = 02?	02
PCC2 Vector Base = 05?	05
VMEC2 Vector Base #1 = 06?	06
VMEC2 Vector Base #2 = 07?	07
VMEC2 GCSR Group Base Address = D0?	D0
VMEC2 GCSR Board Base Address = 00?	00
VMEbus Global Time Out Code =01?	01
Local Bus Time Out Code =01?	01
VMEbus Access Time Out Code =02?	02
Update Non-Volatile RAM [Y / N]?[1]	Y
Reset Local System (CPU) [Y / N]?[1]	Y

1 These prompts update the parameter values you enter and reboot the machine.

Screen 9-6: set and env Commands

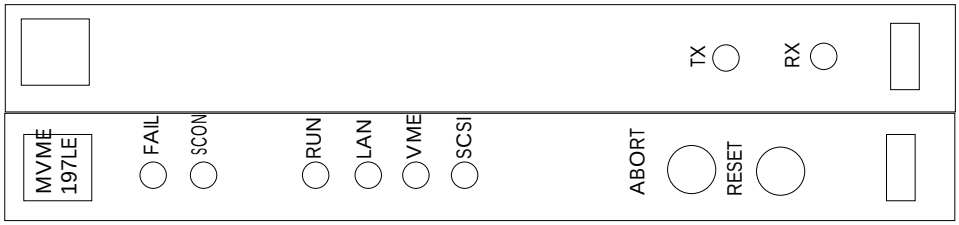
```
Copyright Motorola Inc.  1988 - 1994  All Rights Reserved
MVME197 Debugger/Diagnostics Release Version 1.1 - 06/17/94 (06_17.94)
Local Memory Found = 02000000 (&33554432)
MPU Clock Speed =50Mhz
Initializing Local Memory... 02000000 Done
Idle MPU(s) : NONE
•
•
•
197-Bug> set 0310951210
197-Bug> env
Bug or System Environment [B/S]= B? b
Field Service Menu Enabled [Y/N]= N? n
Remote Start Method Switch [G/M/B/N]= B? b
Probe System for Supported I/O Controllers [Y/N]= Y? y
Negate VMEbus SYSFAIL* Always [Y/N]= N? n
Local SCSI Bus Reset on Debugger Startup [Y/N]= Y? y
Local SCSI Bus Negotiation Type [A/S/N]= A? a
Ignore CFGA Block on a Hard Disk Boot [Y/N]=Y?Y
Auto Boot Enable [Y/N]= N? Y
Auto Boot at power-up only [Y/N]= Y? N
Auto Boot Controller LUN = 00?.
Update Non-Volatile RAM [Y/N]? y
Reset Local System CPU? y
```


3. Once you have completed the dialogue shown in Screen 9-6, the system will perform an autoboot.

Processor Diagnostics - MVME197

The MVME197 automatically runs its processor diagnostics on start up, after power is applied, and after a reset has occurred. If an error is found, it will be displayed on the console, if possible, and the FAIL LED will be turned on (refer to Figure 9-1).

Figure 9-1: Faceplates



To run additional diagnostics on the MVME197 processor board, conduct the following dialogue to obtain the diagnostics prompt and list the available diagnostics:

Note: For complete details of available diagnostics and how to run them, refer to the Motorola document, *MVME197 Single Board Computer Diagnostics Firmware User's Manual.*

```
197-Bug> sd
197-Diag> he
AEM       Append Error Messages Mode
BSW       BusSwitch Tests (DIR)
CEM       Clear Error Messages
CF        Configuration Editor
DCAM      DCAM Tests (DIR)
DE        Display Errors
DEM       Display Error Messages
```

```
DP       Display Pass Count
ECDM     ECDM Tests (DIR)
HE       Help on Tests/Commands
HEX      Help Extended
LA       Loop Always Mode
LANC     LAN Coprocessor (Intel 82596) Tests (DIR)
LC       Loop Continuous Mode
LE       Loop on Error Mode
LF       Line Feed Mode
LN       Loop Non-Verbose Mode
MASK     Self Test Mask
NCR      NCR 53C710 SCSI I/O Processor Test (DIR)
NV       Non-Verbose Mode
PCC2     PCCchip2 Tests (DIR)
RAM      Random Access Memory Tests (DIR)
RAMCD    Generic Memory Tests with Data Cache only (DIR)
RAMCDI   Generic Memory Tests with Instruction/Data Cache (DIR)
RTC      MK48T0x Timekeeping (DIR)
SE       Stop on Error Mode
ST       Self Test (DIR)
ST2401   CD2401 Serial Self-Tests (DIR)
VME2     VME2Chip2 Tests (DIR)
ZE       Zero Errors
ZP       Zero Pass Count
```

Use the **st** command at the *197-Diag>* prompt to run the self-test firmware diagnostics. This will list all tests and status (e.g., PASSED) as it runs. A partial example is shown below:


```
197-Diag> st
ECDM   REGS: Register Checks..................... Running --->     PASSED
ECDM   CHKGEN: Checkbit Generation............... Running --->     PASSED
ECDM   CHKRAM: Checkbit DRAM Test................ Running --->     PASSED
ECDM   SBEC: SBE Control Options................. Running --->     PASSED
ECDM   SBEP: SBE Permutations.................... Running --->     BYPASS
ECDM   DBEC: DBE Control Options................. Running --->     PASSED
ECDM   DBEP: DBE Permutations.................... Running --->     BYPASS
ECDM   INITCK: INIT Function Check............... Running --->     PASSED
ECDM   I2C: I2C Bus Interface Check.............. Running --->     PASSED
BSW    REGS: Register Checks..................... Running --->     PASSED
BSW    TMR1A: Timer 1 Counter.................... Running --->     PASSED
```

Use the **sd** command to return to the debugger prompt and then reboot as shown:

```
197-Diag> sd
197-Bug> bo 0 0
```

VMEDKHS Diagnostics

After configuring the CPM-HS module, if a connection problem is encountered, the screen below will be displayed.

```
NOTICE: DKHS0:Interface is down: TX-HANG
. . .
**********
** The CommKit Server for morse is having problems
** Please get someone to attend to it.
** The last error was:May 16 07:49:20(273)[0]dkmgr:Can't open /dev/dk/dial0
**********
```

If you receive these error messages:

1. Check the cabling:
   - The newer CPM-HS modules have a red LED on the paddleboard which indicates if the cable has not been installed correctly. If this LED is lit, check the cable connection. If the connection is complete, reverse the fiber cable connection on either the LCS60 or the CPM-HS (whichever is more convenient).
   - If the error message is still displayed, check the VMEDKHS board in the LCS60.

2. Check the VMEDKHS board:
   - Log into the system console and enter **stop dkhost** from the **lcsadm** interface
   - Quit the **lcsadm** interface and enter **dkdiag -a -n5 -i0** from the root prompt
   - Verify that the diagnostic is completed successfully
   - If a failure occurs, reboot the system; if the error message occurs again, check the CPM-HS board in the data switch node.
3. Check the CPM-HS board:

   On the data switch console, conduct the dialogue shown in Screen 9-7.

Screen 9-7: Example diag cpm for CPM-HS Module

```
CC0> rem cpm 11
CC0> diag cpm
MODULE ADDRESS: 11
TEST TYPE [command_logic, module_reset,
           local_loop, remote_loop]: command_logic
   90-08-18 13:46:56 NODE=NODENAME
M  diagnose cpm 11 command_logic
   Command Logic Test Successful

CC0> diag cpm 11
TEST TYPE [command_logic, module_reset,
           local_loop, remote_loop]: module_reset
   90-08-18 13:47:40 NODE=NODENAME
M  diagnose cpm 11 module_reset
   Module Reset Test Successful

CC0> diag cpm 11
TEST TYPE [command_logic, module_reset,
           local_loop, remote_loop]: local_loop
Replace the fiber optic link connection on the paddle board
with a loop-around connector.
```

```
This task must be performed within 60 seconds!
Type yes To Continue, no To Stop Command:
CONTINUE TESTING [ yes, no: +(yes) ]: yes
   90-08-18 13:47:57 NODE=NODENAME
M  diagnose cpm 11 local_loop
   DIAGNOSTIC EXITS

CC0> diag cpm 11
TEST TYPE [command_logic, module_reset,
           local_loop, remote_loop]: remote_loop
Ask the host computer administrator to replace the fiber
optic link connection on the FIB paddle board with a loop-around connector.
This task must be performed within 60 seconds!
Type yes To Continue, no To Stop Command:
CONTINUE TESTING [ yes, no: +(yes) ]: yes
   90-08-18 13:48:10 NODE=NODENAME
M  diagnose cpm 11 remote_loop
   DIAGNOSTIC EXITS

CC0> res cpm 11
CC0> display conn mod 11
```

Note: A message stating "UNIX Server Dead" may appear; ignore this message and continue.

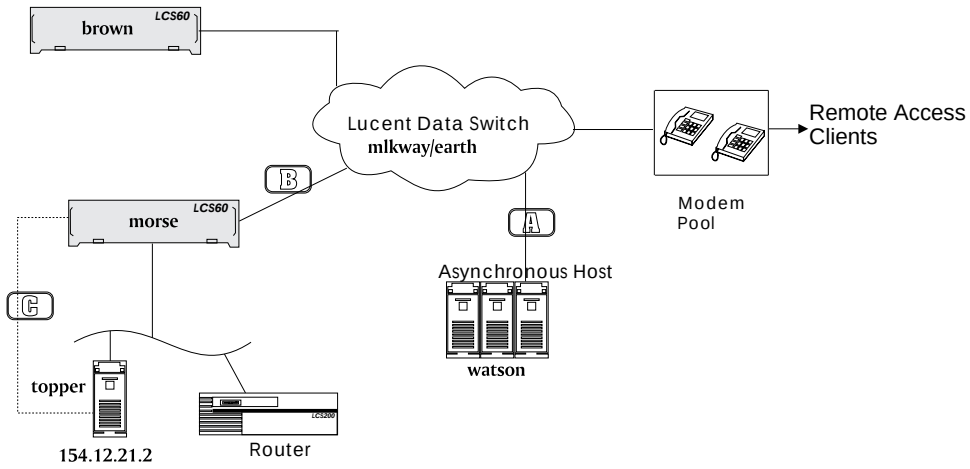
- Restore the CPM-HS to service as shown in Screen 9-7 (**res cpm #**).
- Verify that the CPM-HS is active as shown in Screen 9-7 (**display conn mod #**).

4. Restart the LCS60 software using the **start dkhost** command from the **lcsadm** interface.

Connection Verification

Verify the validity of all connections before considering the LCS60 ready to assume its role in the network.

Figure 9-2: Verifying Connections, Example Network



LCS60 to Data Switch Connected Host Verification (dkcu)

Use the **dkcu** command to verify the connectivity between the local LCS60 and a data switch connected host. From the LCS60 system console, use the following format:

dkcu <call_address>

where <call_address> is the call address of a fiber-connected host.

As an example, refer to the network in Figure 9-2. In this example, to verify the connection between the LCS60 **morse** and the data switch connected host **watson** (connection A), enter:

dkcu mlkway/earth/watson

You should get a login prompt from **watson**.

LCS60 to Data Switch Verification – Loopback Test (dkcu)

Use the **dkcu** command to verify the connectivity between the local LCS60 and a data switch. From the LCS60 system console, use the following format:

dkcu <lcs60name>

where <lcs60name> is the name of the LCS60, itself.

As an example, refer to the network in Figure 9-2. In this example, to verify the connection between the LCS60 **morse** and the data switch (connection B), enter:

dkcu mlkway/earth/morse

You should get a login prompt from **morse**.

LCS60 to Local Ethernet Host Verification (ping)

Use the **ping** command to verify the connectivity between a LCS60 and an Ethernet host on the LAN attached to the LCS60. Log onto the LCS60 system console as user **root**. Enter the following command:

/usr/etc/ping <Ethernethostname>

where the <Ethernethostname> is the internet IP address or host name of a specified host on the same LAN as the LCS60.

As an example, refer to the network in Figure 9-2. In this example, to verify the connection between **morse** and **topper** (connection C), enter:

/usr/etc/ping topper

Proper communication is verified by continuous messages displayed on the screen.

Memory Dump

If the LCS60 hangs and a memory dump is required, do the following:

1. Log the console session on a PC, if possible. Information *must* be recorded to evaluate the dump, and logging the session is, therefore, required.
2. Display the debugger prompt by pressing the 197 board **Abort** button. (Refer to Figure 9-1).

   Caution: Do not use the Reset button, this will clear the current memory status (Abort leaves the current status intact).

   Pressing the **Abort** button will dump all of the current program registers to the screen. *This information is vital.*
3. A typical register dump is shown in the screen below:

```
Format/Vector=1108
PC   =000054AC SR   =3000=TR:OFF_SM_0_.....  VBR  =00004000
USP  =01FFFEF8 MSP* =04000E64 ISP  =0018BBFC SFC  =1=UD
CACR =2111=D:W..E_I:B.E       CAAR =00000000 DFC  =1=UD
D0   =00000000 D1   =00000020 D2   =00003600 D3   =0000001C
D4   =0000001C D5   =00000000 D6   =00002000 D7   =00000000
A0   =00000000 A1   =00010202 A2   =00000000 A3   =0017F980
A4   =0017EBA0 A5   =001398E8 A6   =04000E70 A7   =04000E64
000054AC 4E75               RTS
```

4. If there is no dump of register information, enter **rd** at the *197-Diag>* prompt to dump the registers.
5. At the *197-Diag>* prompt enter **menu** for the Service Menu (Screen 9-8).

Screen 9-8: Service Menu

```
1) Continue System Start Up
2) Select Alternate Boot Device
3) Go to System Debugger
4) Initiate Service Call
5) Display System Test Errors
6) Dump Memory to Tape
Enter Menu #:
```

6. At the Service Menu, enter **6** to dump memory to tape.
7. Continue with the dialogue below; use **Return** to select defaults:

```
Do you wish to dump memory (N/Y)? y
Controller LUN = 04, Device LUN = 00.
Change DLUN and/or CLUN (Y/N)? y
Controller LUN   =04? 00
Device LUN       =00? 40
Controller LUN = 00, Device LUN = 40.
Define memory blocks to be dumped.
File Number:1
Starting Address = 00000000?  Return
Ending Address   = 02000000?  Return
Define another memory block (Y/N)? n

The following memory blocks have been defined:
File: 1  Start:  00000000  End:  02000000

Insert tape..Do you want to continue (N/Y)?
```

8. Put a write enabled tape in the tape drive. The tape may be formatted or blank; this procedure will write over any existing information on the tape. Enter **y** to dump the memory to tape.
9. The system will respond as shown:

```
Rewind command executing
Erase tape (Y/N)? n
Retension tape (Y/N)? n
Writing file #0
Writing file #1
Done with tape you may remove it.
```

followed by the Service Menu (Screen 9-8).

10. Reboot the LCS60 using the **Reset** button on the LCS60.

After the Dump is Completed

After dumping the memory and rebooting the LCS60, follow the procedures below to capture the information needed to understand the dump.

- Login as **root**
- Put in another tape (*not the tape the dump is on*) in the tape drive
- At the root prompt in the / directory, enter:

  cd /stand
  echo unix | cpio -oBc >/dev/rmt/ctape1
- At the root prompt, remove the tape from tape drive.

A Originating Group Security

srvtab

The granting and denial of access privileges by the CommKit Host Interface on a called LCS60 is controlled entirely by the *server table* on the called LCS60. An incorrect or incomplete server table can cause serious security problems by allowing unauthorized access to system files and resources.

This section describes the facilities available through the **/etc/opt/dk/srvtab** server table and provides the user with several suggestions to make the network connections more secure. A high degree of security is ensured by editing server table files.

Caution: The sample */etc/opt/dk/srvtab* files distributed with the CommKit Software are not intended to be used as provided and do not provide the customer with a high degree of security as the default. The customer must customize the example server table files to achieve the desired level of security.

Server Table

The directory */etc/opt/dk/srvtab* and associated files (referred to as the server table) are used to validate incoming call requests and map them into processes on the called host. The server table can be tailored to restrict the types of calls permitted. All incoming calls must be mapped by means of the *server table*; there are no privileged calls that can bypass this procedure.

The server table is a directory containing files whose names correspond to the names of requested services. For example, */etc/opt/dk/srvtab/pupu* is the name of the file used for the file transfer service, **pupu**.

Comments are indicated by a **#** character in the first column and are ignored during call validation and mapping. Use comments to describe the function of mapping lines. You may also use comments to disable mapping lines without removing them from the file.

Mapping lines in **srvtab** table consist of six tab-separated fields:

```
system     service     flags     user     program     initial-parameters
```

Note: Delimit fields by tabs only. Do not use blanks.

These fields are described below.

System Field

The *system field* (originating-group) contains a pattern against which originating groups are matched. The format of the pattern is **area/exchange/group[!][.user]**, where the suffixes **!** and **.user** are optional.

The **area/exchange/group** pattern may be specified in one of the following ways:

- completely specified as in **lc/sporty/hotrod**
- consisting of a single asterisk (wild card) as in *****.

The originating-group suffix **!** may be specified for originating-group patterns that end with an asterisk (*****) wild card. The exclamation point (**!**) prevents the asterisk wild card from matching the local *dkserver* name. For example, if the local server name is **camaro**, the pattern **lc/sporty/*!** will match all originating groups in *area/exchange* **lc/sporty** except **lc/sporty/camaro**. This feature prevents users from calling themselves on the same host. The local server name and the group name of the host in the data switch control computer database must be the same for the **!** feature to work.

The originating-group suffix **.user** may be used to match specific users from either specific groups or from classes of groups. The **user** must be specified as a decimal integer user ID to match the format provided in the call request information. The group pattern ***.0** would match the user **root** from any originating group, while the pattern **lc/sporty/*.0** would match the user **root** from any group in the *area/exchange* **lc/sporty**. A question mark is used to match the null user ID. Since **TY6** and **TY12** ports do not generate a user ID as part of the dialstring, the pattern ***.?** may be used to match requests from an originating terminal or modem group. Finally, the pattern **lc/sporty/*!.0** on the host **hotrod** would match the user **root** from any group except **lc/sporty/hotrod**.

Service Field

The *service field* contains the name of the service the caller may request. This field consists of a single word or abbreviation and is used to match the service string that appears after the first period in the requester's dialstring. A single asterisk may be used to match any requested service and the special entry "-" is used to match the case where no specific service was requested by the dialstring.

You may add additional unique services to the server table, but the following alphabetically listed services are distributed as part of the standard product:

File	Service*
hyphen	null (generally **login**)
arap	ARAP
asterisk	wild card (matches any requested service)
authorize	authorize (see also the section *User Field*)
cbr	LCS60 backup and restore
do	do (invoke commands on remote hosts)
lcsadm	LCS60 administrative interface
login	login
ppp	PPP
pupu	file transfer
question	directory assistance (delivered in disabled state)
rl	auto login
rx	remote execution
slip	SLIP
tcpsock	socket
telnet	telnet
uucp	uucp
whoami	invokes the **echo** command

* For complete details of the standard delivered services, refer to the *CommKit Host Interface 386/486 Computer Installation and Administration Guide* (refer to Chapter 1 for ordering information).

Flags Field

The *flags field* of a server table mapping line contains one or more flags that may be used to control or modify the actions the server takes when processing a call request that has been mapped to that line. Flags specify options that are unique to the mapped line. A brief description of each flag is provided in Table A-1.

Table A-1: Server Table Flags

Flag	Description
a	Additional arguments should be read from the incoming data channel before execution of the program. This flag should be specified only for remote execution channels (see **x** option).
e	Arranges for the exit code of the program to be passed back to the originating system. This flag should be specified only for remote execution channels.
h	Invokes the mapped program with the SIGHUP hangup signal ignored.
t	Opens the **tty mode** data service and invokes the program with the *stdin, stdout*, and *stderr* files attached to the **/dev/dkt/?.???** device for the tty channel. Note that the **t** flag should be used with caution when it is associated with non-standard service. The *t* flag uses a TTY interface that echoes its input by default. Origination endpoints other than a user terminal (from a DESTINATION prompt or a **dkcu**) will not receive the echoed data. If the data is not drained by the originating endpoint the network will flow control the echoed data which will build up on the destination host. The UNIX System STREAMS module **ldterm** that actually echoes the data, does not honor flow control and will consume all of the STREAMS resources.
u	Opens the **raw** [URP protocol] data service and invokes the program with the *stdin, stdout*, and *stderr* files attached to the **/dev/dk/?.???** device for the raw channel.
v	Environment variables should be read from the incoming data channel before execution of the program. This flag should be specified only for remote execution channels.
x	Opens the remote execution protocol data service and invokes the mapped program with the *stdin, stdout*, and *stderr* files attached to the **/dev/dkx/?.???** device for the remote execution channel.
I	Creates an INIT_PROCESS type *utmp* entry for the invoked program. This style of accounting makes an entry in the system *utmpx* file that is transparent when using the default options of the **who** command. It also makes an entry in the system *wtmpx* file that may be displayed using the command **last**.
L	Creates a LOGIN_PROCESS type *utmp* entry for the invoked program. This style of accounting makes an initial entry in the system *utmpx* file that is transparent when using the default options of the **who** command. This style of accounting assumes that

Table A-1: continued on next page

Table A-1: *Continued*

	the invoked program (e.g., **login**) will overwrite this entry in the system *utmpx* file with valid user information. This style of accounting does not make an entry in the system *wtmpx* file; it assumes that the invoked program will make the initial entry, thus avoiding multiple entries.
R	Rejects the call unless the resulting mapped user ID has an ordinary shell. An ordinary shell is defined as either a null shell field in the password file (the default **/bin/sh**), or a shell field that references a program that ends in the string "sh" and the basename of that program does not begin with the letter **r** (restricted shells like **/bin/rsh**).
T	Traps the call, rejecting it with a NAK code obtained from the first argument of the program arguments field. The remainder of the program argument field will be processed for "special code" expansion and will then be logged to the server log file.
U	Creates a USER_PROCESS type *utmp* entry for the invoked program. This style of accounting makes an entry in the system *utmpx* file that is displayed when using the default options of the **who** command. It also makes an entry in the system *wtmpx* file that may be displayed using the command **last**.
/	If a **/** flag is present, the flags that follow it act as the default flag settings and the user-supplied protocol field portion of the dialstring (if any) replaces the part after the **/**. This flag is invalid if the user-supplied protocol field contains illegal flags or if it contains an **I, L, R**, **T** or **U** flag. The flags for remote execution channels are often specified as **/vaex** to indicate that the default is to honor arguments, environment variables, and to return an exit code.

User Field

The *user field* (user ID mapping) of a server table entry determines the way in which the calling user ID is treated. The user ID in the call request may be passed to the program unchanged, translated (mapped) into a new user ID, restricted to a range, or ignored altogether by using a fixed user ID. See Table A-2.

Regardless of the user ID mapping mode specified, a valid */etc/passwd* entry must exist for the resultant user ID in order for the server table entry to match the call request. A program **cannot** be invoked with an invalid or illegal user ID.

Table A-2: User ID Mapping Options

Option	Description
***n, *o**	Use the numeric user ID supplied in the call request information. The ***o** means the user ID should be interpreted as an octal number. The ***n** indicates the user ID should be treated as a self-determining number. For example, an initial **0x** or **0X** indicates hexadecimal, and an initial **0** indicates octal. The ***n** and ***o** user ID formats will only provide a valid match if an */etc/passwd* file entry exists with the same *numerical* user ID and the password has not expired. The group-id is determined from that password file entry.
&	Translate the supplied user ID and group-id names using the *dkuidtab* file. This type of entry matches only those user IDs which have entries in the *dkuidtab* file. This facility allows a user with a user ID on one host to be preauthorized as a user with a different numerical user ID on another host. This preauthorization is performed by the **authorize** command.
<uid, >uid	The previous two forms can be further restricted to a range of user IDs by appending *<uid* or *>uid* to the field. This restricts the incoming user ID to be less than (or greater than) the specified decimal number. For example, ***n>0** prevents **root** (user ID 0) from matching the line. Only one modifier may be appended to an entry.
[login]	This type of entry provides a fixed login name that is used for all matching call requests. The [**login**] user ID format will return a valid match as long as a valid */etc/passwd* entry exists for **login**. Fixed login name specifications are useful for assigning a single **uucp** login to a group of originating sites. The facility is also useful when invoking authorization type services that require a fixed set of permissions. The [**login**] user ID format can be thought of as a form of **setuid** facility, since all call requests are mapped to the same login ID.

Program Field

The *program field* of a server table entry contains the pathname of the program to be executed. The field may contain a **%s** which will be replaced by the pathname of the user's shell as obtained from the */etc/passwd* file.

The server uses the *execv* library function when invoking programs, so only paths to binary executables may be specified in the *program field* of a server table entry. The path should be fully specified (for example, */usr/lbin/program*) for each entry in the server table.

Initial Parms Field

The *initial parms field* (*fixed program arguments field*) of a server table entry specifies the initial (fixed) arguments for the invoked program. The colon-separated arguments from the server table will be passed to the invoked program starting as the zero argument. If the flag is present in the server table entry, additional arguments obtained from the incoming remote execution channel will follow the initial arguments when the program is invoked.

Initial arguments may consist of, or be embedded with, one or more tokens (sometimes referred to as *special codes*) that may be used to substitute information from the dialstring. Each token is a two-character string consisting of a percent sign (%), followed by a single alphabetic character. Invalid tokens are silently removed and are not expanded.

Table A-3 summarizes the values and descriptions of the allowed substitution tokens. Since some older versions of the *Datakit* II VCS common controller do *not* support certain features, the substitution string may turn out to be null.

Table A-3: Program Arguments Specification

Specification	Description
%b	The baud rate of the calling terminal. This token is not expanded if the incoming call did not originate from a port providing baud rate information. (For example, hosts currently do not provide this.)
%c	Originating channel number of the call being serviced.
%d	The dialed server name (for example, **host**). This does not include the period or anything after it.
%e	The service field of the dialstring (for example, **pupu**).
%f	The originating-group name of the caller (for example, **lc/sporty/hotrod**).

Table A-3: *Continued*

Specification	Description
%h	The local server name.
%l	The originator, as known to the local node.
%m	The originating module number of the call being serviced.
%n	The originating data switch node name.
%o	The type of originating device.
%p	Parameters from the dialstring. The parameters are reparsed so that colons may be used to produce separate arguments.
%r	The protocol field of the dialstring, if any.
%s	The pathname of the user's shell as obtained from the */etc/passwd* file. A null shell field in the password file will be expanded as **/bin/sh**.
%t	The device file name that corresponds to the assigned CommKit Host Interface channel, minus the initial /**dev**/.
%u	The numeric user ID of the user placing the call.
%x	The call flag applies only to originating data switch ports (for example, **TY6**, **TY12**, etc.) which have been assigned a *predefined destination*. An **F** is returned in place of the flag if this is the first call from the originating device and a **P** if there have been previous calls.
%z	The module type flag will return the module type of the originating device if the data switch includes this information in the dialstring (field 1 of the fifth line of the dialstring).
%C	The server control file (for example, **srvtab**) or directory name used.
%H	The originating-group name truncated to the length of the host field of an */etc/utmp* entry.
%U	The user ID mapping file name (for example, **dkuidtab**) used.

Server Table Scanning Rules

Several parameters are associated with each incoming call. Some of these parameters include the requester's originating data switch group, the requested service name, and the requester's user ID, if known. The server uses these parameters to match lines in the server table during the call validation process.

Modifications to the Server Table

The server table is opened each time a call request is received from the data switch node. Opening the server table for each incoming call allows the administrator to make modifications that will take effect on the next incoming call. There is no need to restart the server after modifications to the table.

Server Table Validation and Matching

Since */etc/opt/dk/srvtab* is a directory, the file corresponding to the requested service is examined. If that file does not exist, the wild card file ***** is used. Call requests are denied with an access denied [see *dkerr(3x)*] rejection code if the end of the table is reached before a match occurs. All lines containing a **#** character in the first column and all lines without the proper number of fields are ignored. Following the format validation of a server line, three comparisons are made with the call request information:

1. The requested service is compared to the service specified in the server table entry. If the services do not match, the scan moves on to the next line of the server table.
2. The originating group for the call is then compared against the originating-group pattern in the server table entry according to the rules specified in the *System Field* section. If the originating group fails the check, the scan moves on to the next line.
3. Finally, the originating user ID contained in the call request information is processed by the method specified in the *user field* of the server table entry. If the user ID processing results in an invalid user ID on the called host, the scan moves on to the next line.

The first server table line that passes all the specified tests is considered a match. When a match occurs, the call is accepted and the program specified in the server table entry is invoked with the appropriate arguments according to the server table flags.

B StarKeeper II NMS

Configuration of the StarKeeper II NMS

The LCS60 for Ethernet is compatible with the StarKeeper II NMS Releases 3.0 through 8.0 on the HP 720/730 platform and Release 3.0 and 4.2 on the 6386 platform.

Note: To verify the version of StarKeeper II NMS that you are running, log on to the StarKeeper II NMS as **cnmsadm**. To verify the version, the output of **help version** should contain the following line:

```
StarKeeper (R) II NMS RX.Y
```

where *X.Y* is the Release number.

Before the network administrator can use StarKeeper II NMS configuration commands to configure the StarKeeper II NMS's database to allow it to monitor individual LCS60s, a software package must be installed on the StarKeeper II NMS from a tape or floppy diskette.

After installing the software package and configuring the database, all standard StarKeeper II NMS alarm features will be available for LCS60 alarms. This includes all StarKeeper II NMS commands and utilities that access the alarm database, and all dynamic and graphic displays of alarms.

The procedures for installing the software package and then configuring the database depend on the specific release of the StarKeeper II NMS. Follow the appropriate procedures that follow.

Note: If you are upgrading an LCS50 to an LCS60, you must first delete the LCS50-NIK entry on the StarKeeper II NMS and re-enter the database record for the LCS60.

Diskette or Tape Installation

To install the software package:

1. Log on to the StarKeeper II NMS console as **cnmsadm**.
2. Stop the StarKeeper II NMS; installation will abort if it is running
   a. At the *SK:* prompt, enter **SKsh**; this displays the main menu

b. Choose **SYSADM**; this displays the *Sysadm* menu

c. Choose **SHUTSK**; select **y** to continue with shutdown. Enter Return when you see the shutdown completed message.

d. Exit the **SKsh** program by pressing Return and then **y** at the `Exit the Menu Program?` prompt.

3. At the *SK:* prompt, enter the **su** command with no arguments to change your user id to **root**.

4. Confirm that the *StarKeeper II NMS Support for LCS60 for Ethernet* package has not been previously installed on this StarKeeper II NMS. At the # prompt enter the **/usr/bin/displaypkg** command (6386) or the **cat -s $INPUT/L60.name** command (HP 720/730). If the output of the command entered does *not* contain a line that begins with: `SK II NMS L60 Utility: R3.0` proceed to Step 5. If the command output **does** contain the above line then the *StarKeeper II NMS Support for LCS60 for Ethernet* package installed on this StarKeeper II NMS must be removed before the new package can be installed.

   Note: If you have a version of the *StarKeeper II NMS Support for LCS60 for Ethernet* package currently installed you **must** remove it now.

   To remove it:

   a. Have on hand the diskette or tape that was originally used to install the current package.

   b. Follow the appropriate instructions for your hardware:

For 6386 Hardware	At the # prompt, enter the **/usr/bin/removepkg** command and respond to the prompts.
For HP Hardware	Insert the tape into the tape drive and wait until the light stops blinking. Then execute the following four commands at the # prompt:

```
# cd  /tmp
# mt rew
# cpio -ivdumB  <  /dev/rmt/0mn
# ./UNINSTALL
```

c. Enter **i** **Return** when you see the following:

```
Connections for L60 must either be removed or made inactive.
If you are upgrading L60 you should make the connections inactive,
otherwise connection information will have to be re-entered.
Enter "r" to remove, or "i" to make inactive: i
```

d. Remove the diskette or tape from the drive.

5. Enter the package installation command and follow the instructions:

For 6386 Hardware Enter **/usr/bin/installpkg**; then enter **F** to install the floppy diskette. Insert the floppy diskette labeled *LCS60 Network Interface for Ethernet R3.0 StarKeeper® NMS RX.Y Support for AT&T 6386* into the disk drive when instructed to do so.

For HP Hardware Insert the tape labeled *LCS60 Network Interface for Ethernet R3.0 StarKeeper® NMS RX.Y Support for Hewlett-Packard* into the tape drive and wait until the light stops blinking. Then execute the following four commands:

```
# cd  /tmp
# mt rew
# cpio -ivdumB  <  /dev/rmt/0mn
# ./INSTALL
```

6. Remove the floppy diskette or tape from the drive when installation is complete.
7. Enter **exit** [Return] to restore the user id to **cnmsadm**.
8. Re-start the StarKeeper II NMS:
    a. At the *SK:* prompt, enter **SKsh**; this displays the main menu
    b. Choose **SYSADM**; this displays the sysadm menu
    c. Choose **STARTSK**; select **y** to continue with startup. Enter [Return] when you see the startup completed message.
    d. Exit the **SKsh** program by pressing [Return] and then **y** at the `Exit the Menu Program?` prompt.
9. You can now configure the database to monitor individual LCS60s (see below).

StarKeeper II NMS – Configuration Commands

After the software package has been installed, the network administrator can configure the StarKeeper II NMS's database to monitor individual LCS60s.

1. Log on to StarKeeper II NMS as **cnmsadm**.
2. At the *SK:* prompt, enter **SKsh** [Return]. This displays the selection menu. Select the "Configuration Commands" by entering **c** [Return]; this displays the Network Elements menu.
3. Select menu item *System/Node* by pressing [Return]. This displays the "Configure a System / Node" menu.
4. Select menu item *Add* by pressing [Return].
5. At *System/Node name* enter the name of the LCS60 (e.g., **morse** [Return], in the example in Figure 3-1).
6. At *Type* enter **L60** [Return].
7. At *Release* enter **3.0** [Return].

8. The next field is optional. At *Location* enter the location of the LCS60 entered in Step 5 (e.g., room number) followed by a **Return** or just enter **Return**.
9. At *Time zone* enter the applicable time zone for the LCS60 entered in Step 5 followed by a **Return** (refer to the StarKeeper II NMS documentation for format details).
10. The next field is optional. At *Comment* enter a comment (or nothing) and press **Ctrl-g**.
11. At *Console* press **Return**.
12. At *Alarms* enter **y** **Ctrl-t** to indicate that the LCS60 uses an Alarms-type connection.
13. At *Status* enter **a** followed by **Return** if you are ready for StarKeeper II NMS to begin monitoring this LCS60.

    If you are not ready for StarKeeper II NMS to begin monitoring this LCS60 (for example, you are populating the database in anticipation of deploying an LCS60), enter **i** **Return**.
14. At *Method* enter **h** followed by **Return** to indicate that StarKeeper II NMS should use its host fiber interface to monitor the LCS60.
15. At *Dial string* enter the *area/exchange/name* of the LCS60 entered in Step 5 followed by a carriage return (e.g., **mlkway/earth/morse** **Return**), that is, the data switch call address that StarKeeper II NMS should use to monitor the LCS60.
16. At *Password* enter **Return** to use the default password.
17. At *Host Number* select the StarKeeper II NMS host interface number that should be used to monitor the LCS60. Enter **0** **Return**.
18. At *StarKeeper II NMS name* field, if the field is not already populated, enter the name of the StarKeeper II NMS that will monitor this LCS60 and then enter **Ctrl-g**.

    The StarKeeper II NMS should confirm the entry of the LCS60 with *Alarms connection has been added*.
19. Press **Delete** (6386) or **Break** (HP) three times to exit the menu system. At the *CONFIRM EXIT* prompt, enter **Return** to return to the main selection menu.

20. To exit the selection menu, press Return and enter **yes** at the *Exit the Menu program?* prompt.
21. At the `SK:` prompt, enter **conn_sync**.

Alarms to StarKeeper II NMS

Once you have configured the StarKeeper II NMS to monitor the LCS60, the alarms listed in this section will be sent from the LCS60 to the StarKeeper II NMS. If the condition that generated an alarm corrects itself, StarKeeper II NMS will automatically clear the alarm.

Alarms transmitted to StarKeeper II NMS are not accompanied by the display of corresponding user messages on the system console of the LCS60. The data switch controller detects the loss of the LCS60's CPM-HS module and sends the alarm to StarKeeper II NMS. The StarKeeper II NMS detects loss of connectivity to an LCS60 for Ethernet. (Refer to the *StarKeeper II NMS Graphics User Guide* for details on StarKeeper II NMS alarms.)

`L600600 LCS60STATD process exiting.`

Description: The **lcs60statD** process has terminated execution.

Action: None required. StarKeeper II NMS will report a link-down condition for the LCS60 within several minutes of receiving this message, it will then attempt to reestablish connection to the LCS60. The **lcs60statD** process will automatically be restarted when the connection is reestablished.

`L600610 Interface to <interface id> is down. (reason: n)`

Description: The LCS60 is not able to transmit data over the specified interface.

Reason code 1: Loss of carrier detected for the physical Ethernet interface.

Action: The recommended action for reason code 1 is as follows. Verify the connection of the Ethernet interface to the LCS60 and verify the physical state of the Ethernet network. The LCS60 does not need to be rebooted when the physical connection is reestablished.

`L600625 Process lcm is down.`

Description: The **lcm** process is not executing.

Action: Restart the LCM by executing **lcsadm -c manager start** on the *system console*. If the problem occurs again, reboot the system from the console using: **cd / ; /etc/shutdown -y -g0 -i6**.

Call your LCS60 support personnel if the problem persists.

`L600630 Process routed is down.`

Description: The **routed** process is not executing.

Action: Restart the **routed** process by executing **lcsadm -c start routed** from the LCS60 *system console*.

Call your LCS60 support personnel if the problem persists.

`L600635 Process inetinit is down.`

Description: The **inetinit** process is not executing.

Action: Reboot the system (**cd / ; /etc/shutdown -y -g0 -i6**).

Note: Anytime the **inetinit** processs goes down, the system *must* be rebooted, even if a message is displayed that **inetinit** is back up.

Call your LCS60 support personnel if the problem persists.

`L600640 Process tlid is down.`

Description: The **tlid** process is not executing.

Action: Restart the **tlid** process by entering **lcsadm -c stop tcpip** and then **lcsadm -c start all** from the LCS60 *system console*. If the problem occurs again, reboot the system (**cd / ; /etc/shutdown -y -g0 -i6**). Refer to the **start all** command in Chapter 8.

Call your LCS60 support personnel if the problem persists.

`L600645 An IP Network Security Group <servername> process is down.`

Description: An IP Network Security group process is not executing.

Action: Log onto the LCS60 system console and restart the process (or processes) by executing **sh /etc/init.d/ipas_dkitrc restart** from the LCS60 *system console*.

Call your LCS60 support personnel if the problem persists.

`L600665 Process atmgr is down.`

Description: The **atmgr** process is not executing.

Action: Restart the **atmgr** process by entering the **lcsadm -c start atalk** command from the LCS60 *system console*. If the problem occurs again, use the **cd /; /etc/shutdown -y -g0 -i6** command to reboot the system.

Call your LCS60 support personnel if the problem persists.

`L600725 Process snmpd is down.`

Description: The **snmpd** process is not executing.

Action: Restart the **snmpd** process by executing **lcsadm -c start snmp** from the LCS60 *system console*.

Call your LCS60 support personnel if the problem persists.

`L600730 Process ipxd is down.`

Description: The **ipxd** process is not executing.

Action: Restart the **ipxd** process by executing **lcsadm -c stop ipx**, followed by **lcsadm -c start ipx** from the LCS60 *system console.*

Call your LCS60 support personnel if the problem persists.

`L600735 Process sapd is down.`

Description: The **sapd** process is not executing.

Action: Restart the **sapd** process by executing **lcsadm -c stop ipx**, followed by **lcsadm -c start ipx** from the LCS60 *system console.*

Call your LCS60 support personnel if the problem persists.

C User Error Messages

Cable Error Message

If the cable is disconnected the following error message will be displayed:

```
WARNING:e1x7=transmit packet dropped carrier sense
loss on controller 0 TDR problem at 405 3 meters.

WARNING:e1x7=transmit problem found by TDR for
on-board ethernet controller 0.
```


Outgoing Call Error Messages

The following are error messages that may appear when placing an outgoing call through the CommKit Host Interface. Error codes from the data switch node are interpreted by the CommKit Host Interface software and a descriptive message is printed at the terminal.

For example, consider the following entry and error message:

```
$ dkcu mlkway/earth/morse

dkdial: Can't connect to mlkway/earth/morse.rl.vx, dk_errno 4: Destination \
not recognized
```

This indicates the destination does not exist or the network does not allow the host access to the destination.

The error messages are described below:

- **Access denied**

  The call was denied by the remote server or network security. This error can also occur if this host attempted to set up a server, but the data switch control computer database is not prepared to accept such a setup from this

host. This can be caused by:

1. The server name is not defined in the data switch control computer database
2. The name is not assigned to a group
3. The group is not assigned to the host-connected CPM-HS module.

- **Address too long**

  The call was denied because the length of the dialstring was larger than the network maximum.

- **All channels busy**

  All assigned ports/channels are in use or are marked as not available by the remote endpoint.

- **All trunk channels busy**

  One of the network control computers has run out of some resource and is unable to process the call at this time.

- **Auto dialer failed to initiate call. Try again**

  The autodialer on the called port responded to the data switch node and failed during dialing. If this message appears more than twice in succession, contact the data switch Network Administrator.

- **Bad Parameter**

  The *dkdial* routine was called with an invalid parameter.

- **Call did not go through. Try again.**

  The autodialer on the called port responded to the data switch node and failed during dialing. If this message appears more than twice in succession, contact the data switch Network Administrator.

- **Call Failed**

  Unknown call setup or remote host error.

- **Connection broken. Try again later**

  The call cannot be completed. The connection was broken enroute to the destination. Try again.

- **Could not complete your call. Try again**

  The call could not be completed because:

  — The autodialer failed to complete the dialing sequence, or

  — The port connected to the autodialer was removed from service during the call.

- **Destination not recognized**

  Some part of the requested destination is not defined in the network. The network does not allow this host to have access to the requested destination. The requested destination is not well formed (too many slashes).

- **Dial to vlp error**

  The call could not be completed because an error occurred converting the dialstring to vlp format.

- **Dialed number is busy**

  The call was dialed successfully and a busy signal was detected.

- **Dialer error**

  The call could not be completed due to an error detected by an old autodialer.

- **Dialstring too long**

  The call was denied because the length of the dialstring was larger than the network maximum.

- **Directory Assistance**

  The user has requested directory assistance.

- **Dkserver: Can't open line. Call System Administrator**

  The call could not be completed because the remote host interface server could not open the data switch special device file needed to accept the call.

  If you are using the **dk** command and this error occurs, it may be due to improper configuration of **dkdaemon** on the machine you are calling.

  You may also see this error message on an *incoming* call from a `DESTINATION` prompt displayed as error code **130**.

Note: If you try to contact a remote host from the DESTINATION: prompt, any one of the errors 130–136 may occur. The error message will be identified by its appropriate error code in the following error message where xxx is the code number.

```
ERROR DURING CALL SETUP. CALL SYSTEM
ADMINISTRATOR. CODE: xxx
```

- **Dkserver: Can't push your streams module.**

  The call could not be completed because the configured STREAMS modules could not be pushed onto the open channel.

  You may also see this error message on an *incoming* call from a DESTINATION prompt displayed as error code **131**.

- **Dkserver: Invalid protocol requested.**

  The call could not be completed because the remote server did not understand the connection protocol.

  You may also see this error message on an *incoming* call from a DESTINATION prompt displayed as error code **132**.

- **Dkserver: Dksrvtab not readable. Call System Administrator**

  The call could not be completed because the server tables (files in */etc/opt/dk/srvtab*) on the remote host were unreadable or damaged.

  You may also see this error message on an *incoming* call from a DESTINATION prompt displayed as error code **133**.

- **Dkserver: Can't chroot. Call System Administrator**

  The call could not be completed because the remote server could not change **root** to the *home* directory of the caller on the remote host.

  You may also see this error message on an *incoming* call from a DESTINATION prompt displayed as error code **134**.

- **Dkserver: Can't set/get circuit parameters: Call System Administrator.**

  The call could not be accepted because the **dkserver** process could not communicate with the host device. Either the incoming initialization or buffer size could not be set or the the receiving buffer size could not be returned in the answer.

  You may also see this error message on an *incoming* call from a `DESTINATION` prompt displayed as error code **135**.

- **Dkserver: Call on a busy device or call collision, try again.**

  The call could not be accepted because the host device is busy or because the incoming call collided with an outgoing call. A busy device is one that is being cleaned up from a prior call or a device that is held open by some lingering process.

  You may also see this error message on an *incoming* call from a `DESTINATION` prompt displayed as error code **136**.

- **Endpoint hung up**

  The endpoint hung up the call. This is not an error.

- **Facility not subscribed**

  The facility on the SIM was not subscribed to.

- **Hop count exceeded**

  The call could not be completed because the hop count configured for this node was exceeded.

- **Host configuration mismatch. Call Network Administrator**

  The call was rejected because the host channel picked for the outgoing call is not configured on the network. Contact the data switch Network Administrator.

- **Host protocol error**

  The call could not be completed because of an error detected in the host protocol.

- **Insufficient CIR at module**

  The call could not be completed because the module receiving the call does not have sufficient resources to support the requested committed information rate (CIR).

- **Invalid or missing phone number**

  The user has neglected to type the phone number required to make a phone call as in **dkcu** *dialer_name.phone_number*. The *phone_number* is synonymous with the dialstring.

- **Mismatched GOS endpoints**

  The call can not be completed because the originating and receiving end-points of a call have the grade of service (GOS) configured differently.

- **Network congestion--Call forward error. Try again later**

  The call cannot be completed due to a lack of resources needed by a trunk in the call path. Try again.

- **Network congestion--Call initiation failure. Try again**

  The call cannot be completed because a message usually sent between processes during call setup was not sent. Wait a short time then call again.

- **Network congestion--Call timeout. Try again.**

  The call cannot be completed. No response was received and the call attempt timed out. Try again.

- **Network congestion--Channel allocation error. Try again later.**

  The call cannot be completed because there is no free channel in the data switch control computer database. Wait a short time before trying to call again.

- **Network congestion--Connection error. Try again later**

  The call cannot be completed because a connection cannot be made. Wait a short time before trying to call again.

- **Network congestion--Trunk call collision. Try again**

  The call cannot be completed because of a call collision in the trunk. Wait a short time and try the call again.

- **Network hung up**

  The network hung up the call.

- **Network routing error**

  Due to a network configuration error, the call is being sent and received over the same trunk.

- **No answer from dialed number**

  The call was dialed successfully but the autodialer did not get an answer.

- **No carrier tone was detected**

  The call was dialed successfully and answered; however, no carrier tone was detected by the autodialer.

- **No diagnostic channel**

  The call could not be completed because a diagnostic channel is not available.

- **No initial dial tone detected**

  The autodialer on the called port may have a bad telephone line. The port has been marked as bad and removed from the autodialer hunt group.

- **No response from autodialer. Try again**

  The autodialer on the called port failed to respond to the data switch node. The port has been marked as bad and removed from the autodialer hunt group.

- **No secondary dial tone detected**

  The autodialer was signaled to wait for a secondary dial tone in the dialing sequence and no such dial tone was detected.

- **Open channel error**

  The call could not be completed because an error occurred opening the channel.

- **Please supply a valid phone number**

  The user has neglected to type the phone number required to make a phone call as in **dkcu** *dialer-name.phone-number*. The *phone-number* is synonymous with the dialstring.

- **Receive window too small**

  The call could not be completed because the receive window size is too small.

- **Remote node not answering**

  A connection cannot be completed because a data switch trunk or common data switch control computer database somewhere in the network path is inoperable.

- **Server already exists**

  This host attempted to set up a CommKit Host Interface server, but the data switch control computer database already knows a server by that name.

- **Server not answering**

  The requested server name is not in service. No interface hardware is assigned to the requested name. The interface hardware assigned to the requested name is not in service or is not operational. The remote server may not answer for reasons of its own.

- **Service mismatch**

  The service on the SIM did not match the request.

- **SIM all channels busy**

  All assigned ports/channels on the SIM are in use.

- **SIM bad contact**

  The call could not be completed due to SIM resource congestion.

- **SIM no access**

  The call was denied by the remote side.

- **SIM no contact**

  The SIM rejected the call.

- **Splice completed**

  The connection endpoints were successfully spliced together.

- **Splice failed**

  The connection endpoints could not be successfully spliced together.

- **Transmit window too big**

  The call could not be completed because the transmit window size is too big.

- **Trunk busy**

  The call could not be completed because a trunk in the call path is busy.

- **Trunk configuration mismatch. Call Network Administrator**

  The call was rejected because a trunk in the call path is not properly configured. Contact the data switch Network Administrator.

- **Trunk not answering**

  The call could not be completed because a trunk in the call path is not in service.

- **Unsupported baud rate**

  The requested baud rate is not supported by the autodialer.

- **Urp error**

  The call could not be completed because of an internal protocol error.

- **Vlp to dial error**

  The call could not be completed because an error occurred converting vlp format into a dialstring.

Incoming Error Messages

The following error messages may be seen on the user's PC when he/she attempts to start up a SLIP session and the session is refused.

SLIP Sessions

The LCS60 may send the following messages to the SLIP user:

- **<IP address> is out of range**

  The IP / SLIP client requested an <IP address> on his / her data switch dialstring that was not within the range of the IP network and subnetwork mask associated with the called IP Network Security Group (i.e., the **dkserver** service name).

- **<IP address> is reserved**

  The IP / SLIP client requested an <IP address> on his / her data switch dialstring that has been reserved by the LCS60 administrator. If a user wishes to request his / her own reserved IP address, then he / she should omit the IP address from his / her data switch dialstring.

- **slip is busy**

  The SLIP service has reached its maximum allowed number of concurrent sessions or else the user's reserved IP address is in use by another session for the same user. Try again later, or else have the LCS60 administrator raise the limit.

- **<IP address> is busy**

  The IP / SLIP client requested an <IP address> on his / her data switch dialstring that has already been allocated to another user.

- **dkserver <dkserver name> does not have an IP network configured**

  The IP / SLIP client has called into the LCS60 using <**dkserver** name> as the data switch dialstring's local component. However, no IP Network Security Group (and therefore no IP network) is associated with that <**dkserver** name>. This should not happen unless the LCS60 administrator has deleted an IP Network Security Group, the **ipas** daemon terminates and is restarted, and **dkhost** is not restarted.

- **network is down**

  The SLIP service has been taken out of service by the LCS60 administrator.

- **ipaserrno=<error number>**

  An internal error occurred with the IP Address Server software logic.

- **slip is temporarily disabled**

  Either insufficient resources are available to allocate another SLIP session or one of the required system processes cannot be contacted to set up the user's session. Try again later; if the problem persists contact the LCS60 administrator.

- **may have only one -s option, got <dkserver name> and <name from user>**

  The IP / SLIP client attempted to bypass NAC security by entering a **-s** <name from user> option on his / her data switch dialstring even though he / she had been authorized to call <**dkserver** name>. The call is refused and a message logged in the */usr/adm/lcs/slip.log* file.

- **missing -s %h option in dksrvtab(4) 'slip' file**

  The **slip** file in directory */etc/opt/dk/srvtab* does not have the mandatory **-s%h** option on the **sliptoss** command line. This error message suggests that this file was not correctly installed or was edited incorrectly when adding originating group security patterns.

- **ip address <IP address> is invalid**

  The IP / SLIP client entered a syntactically invalid IP address on his / her data switch dialstring. The IP address should be in dotted notation, i.e., *WWW.XXX.YYY.ZZZ*, where *WWW*, *XXX*, *YYY*, and *ZZZ* are decimal numbers between 1 and 254 and must conform to the Internet network numbering conventions.

- **priq=<priority queue level>, must be 0 or 1**

  The IP / SLIP client gave an invalid value for the <priority queue level> on the data switch dialstring.

- **vjslots=<# of vjslots>, must satisfy 3 <= vjslots <= 64**

  The IP / SLIP client specified an out of bounds number on the data switch dialstring for the number of Van Jacobsen compression slots.

- **mtu=<MTU size>, must satisfy 296 <= mtu <= 1006**

  The IP / SLIP client specified an out of bounds number on the data switch dialstring for the SLIP Maximum Transmission Unit (MTU) size.

- **can not request both dynamic IP address and IP address <IP address>**

  The user specified both the **-D** option and a privately administered IP address in his / her dialstring. Only one of these may be entered.

D Software Installation – Fujitsu or Seagate ST5660N Drive

Reload System Software

Note: This appendix applies to the Fujitsu and Seagate ST5660N disk drives which were used in Release 1.0 and 2.0 of the LCS60. Release 3.0 is equipped with a Seagate ST11200N disk drive; procedures for the R3.0 drive are given in Chapter 9.

If the system crashes, it may be necessary to reload the system software by:

1. Installing the UNIX System software
2. Installing the UFS Utility Fixes tape (Chapter 9)
3. Removing the **inet** package (Chapter 9)
4. Installing the LCS60 application software (Chapter 9).

UNIX System Software Installation

Caution: Once the UNIX Software has been loaded, the LCS60 must not be reset or powered off without first shutting down the system (*/etc/shutdown -y -g0 -i0*). Resetting or powering off the system may result in file damage.

Caution: A new installation of the UNIX System will destroy all files currently on disks used for the installation.

To install the UNIX System software:

1. Power off the LCS60.
2. Insert the UNIX System installation tape (tape 1 of 3) in the tape drive. (Insert the tape with the label toward the left and the tape guard down.)
3. Turn the machine on; this will generate the autoboot.
4. Abort the autoboot by hitting the **Break** key; this will display the debugger prompt: `197-Bug>`.

5. Determine which type of drive you have by typing **ioi** at the 197-Bug> prompt. The response to the **ioi** command is shown below for each of the three types of drives:

Seagate ST5660N

```
0    0  VME197    0    $00   N   SEAGATE  ST5660N          0600
```

Seagate ST11200N

```
0    0  VME197    0    $00   N   SEAGATE  ST11200N ST31230 0456
```

Fujitsu

```
0    0  VME197    0    $00   N   FUJITSU  M2624F-512       M405
```

If you have a Seagate ST11200N drive, refer to Chapter 9 for UNIX System Software Installation; if you a have a Fujitsu drive or a Seagate ST5660N, continue with the instructions below.

6. Enter **bo 0 40 COREunix** at the 197-Bug> prompt. This will generate installation screens ending with the Screen D-1. This information will *not* be repeated; use Screen D-1 as you proceed with installation for instructions on entering responses.

Screen D-1: How to Enter System Responses

```
                    How to Type Responses during Installation
When typing responses:
       <response><RETURN>  Enters <response>
       <CTRL>-h            Erases the last character typed
       <CTRL>-u            Erases the entire line
       <CTRL>-r            Reprints the entire line
       <CTRL>-s            Pauses output to the screen
       <CTRL>-q            Resumes output to the screen
       <CTRL>-z            Suspends the installation
       <CTRL>-c            Cancels the installation and returns here
       ?<RETURN>           Gets help for the current screen
Press <RETURN> to continue.
```

Note: If you have not inserted the tape the following will be displayed.

```
Booting from: VM197, Controller 0, Drive 40
Loading: COREunix
Boot logic error
Packet status: 0000
Additional Error Status: 0002
```

7. If you have a Fujitsu Drive, go to step 12.
8. For the Seagate ST5660N drive *only*, continue with steps 9 through 11.

```
                              Set Display Options
The display options currently assume your terminal has:
        24 lines
        unknown cursor addressing
1) No change, proceed with installation or upgrade
2) Change the number of lines and return to this screen
3) Select vt100 cursor addressing
4) Select wyse50 cursor addressing
5) Select unknown cursor addressing
Enter option number of choice: [ 1-5 ] ( 1 ) 1
               UNIX SYSTEM V/88 Release 4 Upgrade/Installation
You have the following options:
1) Full installation
2) Upgrade an existing R40V2 or later system
3) Exit without doing anything (reboot)
4) Enter maintenance mode
Enter option number of choice: [ 1-4 ] 4
                 •
                 •
                 •
Entering maintenance shell:
#
```

9. For the Seagate ST5660N drive *only*: You are now able to edit *scsifmt.info* by entering **ed /etc/scsifmt.info** at the # prompt above.

- Add the following line to the file:

```
"SEAGATE"      "ST5660N"      mfuj2624       7       "SEAGATE ST5660N"
```

Note: Separate the fields above using tabs only; spaces are not allowed.

- Write and quit the file.

10. For the Seagate ST5660N drive *only*: Enter **Ctrl-D** at the # to return to the installation menu and continue as shown below:

```
#  Ctrl-D
Leaving maintenance shell:

                UNIX SYSTEM V/88 Release 4 Upgrade/Installation

You have the following options:

1) Full installation
2) Upgrade an existing R40V2 or later system
3) Exit without doing anything (reboot)
4) Enter maintenance mode

Enter option number of choice: [ 1-4 ]  Ctrl-C

                        Installation/Upgrade Interrupt

You have interrupted the installation or upgrade
No modifications to the system have yet taken place.

1) Restart the installation.
2) Reboot the machine.
3) Shutdown the machine.

Enter option number of choice: [ 1-3 ] ( 1 ) 1
Analyzing configuration...
```

11. For the Seagate ST5660N drive *only*: Enter **Return** once the "How to Type Responses" screen is displayed again.
12. For both the Fujitsu and Seagate ST5660N drives: Continue with the dialogue that follows:

```
                              Set Display Options
The display options currently assume your terminal has:
        24 lines
        unknown cursor addressing
1) No change, proceed with installation or upgrade
2) Change the number of lines and return to this screen
3) Select vt100 cursor addressing
4) Select wyse50 cursor addressing
5) Select unknown cursor addressing
Enter option number of choice: [ 1-5 ] ( 1 ) 1
               UNIX SYSTEM V/88 Release 4 Upgrade/Installation
You have the following options:
1) Full installation
2) Upgrade an existing R40V2 or later system
3) Exit without doing anything (reboot)
4) Enter maintenance mode
Enter option number of choice: [ 1-4 ] 1
                              Installation Warning
*-------------------------------------------------------------*
| CAUTION: A new installation of the UNIX system will destroy |
| all files currently on disks used for the installation.     |
|                                                             |
| If you have not made a backup and want to do so, enter 'n'. |
*-------------------------------------------------------------*
Do you want to continue? [ y n ] y
                         Package Selection Confirmation
The following packages are available for installation.
Those currently selected for installation are marked by '*':
 C2sec              *ed                *mvme337           *sds
*Motif              *els               *mvme338           *siff
*NCD                *enet1x7           *mvme376           *spell
*X11                *envmon            *mvme37x           *sys
 X11contrb          *face              *mvme385           *sysadm
*acct               *fsd               *nfs               *tarlist
*bnu                 gold               nis               *tbx
*cdfs               *inet              *nsu               *terminf
*cds                *ipc                ocscomp           *ufs
*compat             *lp                *perf              *usrenv
*dfm                *man               *rfs               *xcp
*dfs                *mvme332xt         *rpc
1) Proceed to install packages as shown
2) View package descriptions and/or change selection
Enter option number of choice: [ 1-2 ] ( 1 )  Return
                        Installation Disk Configuration
1)      Automatic 1-disk installation
```

Appendix D

```
2)      All automatic disk configuration options
3)      Manual disk configuration
4)      Read the disk configuration from the disk(s)
Enter option number of choice: [ 1-4 ] ( 1 )  Return
Final Verification of 1-disk installation                BOOT COMMAND: "bo 0 0"
Device          Disk description                Format? Space Left
m197_c0d0       see note below                  No      29520

Partition       Slice           Size            FS      Block Size
/               m197_c0d0s0     58000           ufs     4K
swap            m197_c0d0s1     300000          -       -
/stand          m197_c0d0s2     25000           bfs     -
/usr            m197_c0d0s3     360000          ufs     4K
/var            m197_c0d0s4     120000          ufs     4K
/home           m197_c0d0s5     100000          ufs     4K
/tftpboot       m197_c0d0s6     22000           s5      2K

1) Proceed with installation using configuration shown
2) Change file system type and return to this screen
3) Change disk formatting and return to this screen
4) Change slice size and return to this screen
Enter option number of choice: [ 1-4 ] ( 1 ) 3

Final Verification of 1-disk installation                BOOT COMMAND: "bo 0 0"
Device          Disk description                Format? Space Left
m197_c0d0       see note below                  Yes     29520

Partition       Slice           Size            FS      Block Size
/               m197_c0d0s0     58000           ufs     4K
swap            m197_c0d0s1     300000          -       -
/stand          m197_c0d0s2     25000           bfs     -
/usr            m197_c0d0s3     360000          ufs     4K
/var            m197_c0d0s4     120000          ufs     4K
/home           m197_c0d0s5     100000          ufs     4K
/tftpboot       m197_c0d0s6     22000           s5      2K

1) Proceed with installation using configuration shown
2) Change file system type and return to this screen
3) Change disk formatting and return to this screen
4) Change slice size and return to this screen
Enter option number of choice: [ 1-4 ] ( 1 ) 1
```

Note: The *Disk Description* field above varies depending on the type of drive: `525MB SCSI (FUJITSU M2624)` or `SEAGATE ST5660N`.

13. For both the Fujitsu and Seagate ST5660N drives: The system will ask if you want to install Motif, NCD, and X11 package features. Choose the defaults by entering **Return**.

14. For the both Fujitsu and Seagate ST5660N drives: Continue with the dialogue as shown in the screen below:

```
                              bnu Package Query #1
 Please enter the 'node name' to call this machine, it must be
 8 or less alphanumeric characters: ( unix ) morse
                             inet Package Query #1
You can enter the value of the IP address now if you know it,
otherwise you can just press RETURN to continue.
If you do not enter a value now, the IP address must be initialized
later using the instructions found in the Initial System Setup booklet
in order to use the Internet functionality.
Internet Address: (  ) Return
                              lp Package Query #1
Enter the name of the OLD spooling directory;
just press <return> if this is a new installation: ( /usr/spool/lp ) Return
                              lp Package Query #2
Should the disable/enable commands be available to ALL users?[ y n ]( n ) Return
                              lp Package Query #3
Will you be attaching a PostScript printer to this system? [ y n ] ( y ) Return
                              nsu Package Query #1
Enter the number of pseudo-terminal devices
to configure on your system [ 0-1024 ] ( 256 ) Return
                          Ready to Start Installation
At this point, the installation should continue without interruption
until finished. You will only need to check occasionally for error
messages which require a response. If the installation media contains
multiple tapes, you may be asked to insert them as necessary.
1) Continue with Unattended Portion of Installation
2) Review Package Questions and Answers
Enter option number of choice: [ 1-2 ] ( 1 ) 1
                             Ready to begin Formatting
The following disks will now be formatted:
m197_c0d0
You can safely ignore error messages such as:
    Non-Motorola volume id read on unit xx
or
    Invalid VTOC read on unit xx
Press <RETURN> to continue with formatting or interrupt (CTRL-c) to abort:  Return
                          Slicing Installation Disk(s)
                          Activating Swapping To Disk
```

```
                              Making File Systems
                            Installing Boot Block
                       Mounting Installation Partitions
                    Switching to Installation Partitions
                            Installing Package(s)
Installation in progress.
```

15. For both the Fujitsu and Seagate ST5660N drives: Installation messages will continue to scroll as the UNIX System software is installed. This procedure will continue for approximately 49-60 minutes.
16. For both the Fujitsu and Seagate ST5660N drives: When the following message appears, hit the **Return** key to continue the shutdown and allow the host to reboot. **Do not enter 'bo 0 0'**


```
At the nnn-Diag> or nnn-Bug> prompt, enter 'bo 0 0'.
Press <RETURN> to begin the system shutdown.
```

17. For both the Fujitsu and Seagate ST5660N drives: At the Console prompt, login as root to continue.
18. For both the Fujitsu and Seagate ST5660N drives: Continue with the procedures described in Chapter 9 to install the UFS Utility Fixes Tape, remove the **inet** package, and install the LCS60 application software.

E Manual Pages

NAME

atlog - AppleTalk manager log file

SYNOPSIS

atlog [-d *loglevel***] [-t** *enprz0***]**

DESCRIPTION

This command is used to display or set the logging level (**-d**) and the protocols for which the log information will be displayed (**-t**).

For the **-d** option, the larger numbers provide more detailed logging information.

The valid entries for the **-t** option are:

e Specify **e** to trace ECHO.

n Specify **n** to trace NBP.

p Specify **p** to trace atping sessions.

r Specify **r** to trace RTMP.

z Specify **z** to trace ZIP.

0 Specify **0** to turn off all protocol tracing.

More than one argument to the tracing, **-t**, option may be provided (e.g., **-ten** requests both ECHO and NBP to be traced). Whenever tracing (**-t**) is specified, specify a log level of **9**. Valid log levels are **3** (default) and **9**.

The **atlog** command generates output which specifies the request and the results as shown:

```
Request: loglevel=ReportOnly, tracing=e
Results: loglevel=3. TRACING: ECHO
```

The above display is generated in response to the command line:

```
atlog -te
```

Omitting both the **-d** and **-t** options reports the current specification for **atlog**.

FILES

/usr/etc/lcs/atmgr
/usr/etc/atlog
/usr/adm/lcs/atmgr.log the log file for the **atlog** requests

SEE ALSO

atping(1M).

NAME

atnetstat - show AppleTalk network status

SYNOPSIS

atnetstat -<**i**|**r**|**z**> [**-nv**]

one of **-i, -r**, or **-z** is required

DESCRIPTION

The **atnetstat** command displays the contents of AppleTalk network-related data structures to show the status of configured interfaces and routing tables known to the kernel-level Datagram Delivery Protocol (DDP) routing module, and of zone lists known to the **atmgr** process.

The interface (**-i**) option displays the status of the configured network interfaces and remote virtual connections. The configured network interfaces are of the type ETHERNET (configured automatically by the **atalkif** process) and of the type VIRTUAL (configured by the **atmgr** process) using the data provided by the **atalkas** command. Remote virtual connections are of the type PPP and ARAP and use the VIRTUAL AppleTalk network. The **-i** option displays:

address the address of the interface, expressed as the network number and node (*net.node*).

range the range of network numbers that have been assigned to the link used by the interface, expressed as (*net_low:net_high*).

interface type configured (ETHERNET, VIRTUAL) or remote (PPP, ARAP).

Ipkts the number of DDP packets received by the router from this interface. Packets are not received over a VIRTUAL interface, hence for a VIRTUAL interface, *Ipkts* is N / A.

Opkts the number of DDP packets transmitted from the router through this interface. Packets are not transmitted over a VIRTUAL interface, hence for a VIRTUAL interface, *Opkts* is N / A.

In general, *Ipkts* will not equal *Opkts*. This is true because:

1. many routing protocol *Ipkts* terminate within the router and are not rebroadcast
2. many routing protocol *Opkts* are either generated within the router or are replicated within the router for transmission over each of the router's real and virtual interfaces.

The routing table (**-r**) option displays known AppleTalk routes. The **-r** option displays:

Destination the network range to which the route points, in the form *net_low:net_high*

Gateway the address of the next router to which packets intended for this Destination will be sent or *local* if the Destination is directly connected to the router.

Distance the number of router hops from the router to the Destination network.

The **-v** (verbose) option may be requested with both the **-i** and **-r** options. If the **-v** option is requested, then the unique KEY associated with each interface and route is displayed. The VIRTUAL interface is always assigned a zero KEY. For ETHERNET connections, the KEY associates routes with the interface over which they may be reached. For PPP and ARAP connections, the KEY may be used for diagnostic purposes to ensure that a route at distance zero exists for each interface; if there is no route to a connection, then it will not be possible to transmit data to that connection.

The zone list **-z** option displays the AppleTalk zones and their corresponding network ranges known to the **atmgr** process. AppleTalk zone names may contain characters that cannot be displayed on an alphanumeric terminal. To make these characters visible, each such character that occurs in a zone name is replaced by the 5-character string:

```
${xy}
```

where *xy* is the two-digit hexadecimal value of the character. To distinguish this construct from zone names that may actually contain the **$** symbol, all **$** characters that occur within a zone name are prepended with a backslash (\) in the display.

EXAMPLES

To display the zone name ABCDÄE with the **-z** option, the display will show the following:

```
ABCD${80}E
```

Whereas the zone name ABCD$E would be displayed as:

```
ABCD\$E
```

FILES

/usr/etc/lcs/atmgr
/usr/etc/lcs/atalkif
/etc/lcs/atalkas.cf
/usr/etc/atnetstat

NAME

atping - send AppleTalk Echo Protocol (AEP) Request packets

SYNOPSIS

atping [-d *sec* **]** *net.node* **[***packetsize* **[***count***]]**

DESCRIPTION

atping is intended for use in network testing, measurement, and management, primarily for manual fault isolation. Tracking a single-point hardware or software failure in an AppleTalk network can often be difficult. **atping** uses the AppleTalk Echo Protocol (AEP) Request packet to elicit an AEP Reply from a host or gateway equipped with an Echoer process attached to the statically assigned socket number 4. Because of the load it could impose on the network, hosts, and gateways, **atping** should *not* be used during normal operations and it should *not* be used from automated scripts.

To use **atping** for fault isolation, the AppleTalk address of the target node must be specified in *net.host* format. It is also possible to contact routers on networks OTHER THAN that to which the LCS60 is attached by specifying a zero node, as in **net.0** (Refer to *Inside AppleTalk*, p. 4-7). It is not possible to contact the AppleTalk addresses that correspond to the LCS60's virtual network port or to its Ethernet port.

By default, **atping** sends an AppleTalk data packet that is 64 bytes long. The first byte is always the AEP header; this is followed by a time stamp. The remainder of the packet is padded with additional bytes to fill out the packet. The size of the packet, in bytes, may be changed by specifying an alternate *packetsize* on the command line.

By default, **atping** sends one packet per second and prints one line of output showing the round trip time for every packet sent. The delay between packets (in seconds) can be changed by specifying the argument to the **-d** option on the command line. Since a packet for which no reply has been received by the time the next packet is sent is declared "lost", it may be necessary to use **-d** to increase the inter-packet delay to communicate with hosts over slow networks, such as dial-up connections over the virtual network.

By default, **atping** continues to send packets until it is killed. If *count* is specified on the command line, **atping** will send the specified number of Echo Requests, and then exit. Summary round trip time and packet loss statistics are displayed just before **atping** exits.

DIAGNOSTICS

Exit status is zero for normal terminations; a positive number for error terminations.

FILES

/usr/etc/atping
/usr/etc/atlog
/usr/etc/atnetstat

SEE ALSO

Inside AppleTalk, Second Edition, Chapter 6.

NAME

dkcu – call another host

SYNOPSIS

dkcu [– **s**] [– **f**] [– **d**] [– **v**] [– **x**] *destination*

DESCRIPTION

dkcu dials another UNIX System, a terminal, or possibly a non-UNIX System. It manages an interactive conversation with possible transfers of ASCII files.

It places a call to the *destination* host or terminal on the data switch network. Several options are supported by **dkcu**:

– **s** Suppresses the "Circuit Open" and other non-error messages.

– **f** Forces a **dkcu** even if the user came in as a remote executor.

– **d** Used to get tracing and diagnostic output.

– **v** Local environment variables may be passed from the calling host to the *destination* host by listing them in the local environment variable DKEXPORT (such as, '**DKEXPORT=TERM,LINES,COLUMNS**'). When using this option, the *destination* should be appended by '**rl**' and '**vt**' flags (such as, '**dkcu -v** *destination***.rl.vt**') and the user should be authorized [see *authorize*(1M)] on the *destination* host.

– **x** Requests that XON/XOFF output flow control be done locally; otherwise, XON/XOFF characters are passed through to the *destination*.

After making the connection, **dkcu** runs as two processes: the *transmit* process reads data from standard input and, except for lines beginning with '**~**', passes it to the remote system. The *receive* process accepts data from the remote system and, except for lines beginning with '**~**', passes it to standard output. Lines beginning with '**~**' have special meanings.

The *transmit* process interprets the following:

~ .	Terminate the conversation. If the program on the remote host isn't reading input, typing the QUIT character twice, rapidly, will break the connection.
~ !	Escape to an interactive shell on the local system.
~ !*cmd*...	Run *cmd* on the local system (via '**sh** – **c**').
~ $*cmd*...	Run *cmd* locally and send its output as standard input to the remote system for execution.
~ %take *from* [*to*]	Copy file *from* (on the remote system) to file *to* on the local system. If *to* is omitted, the *from* argument is used in both places.

~ %put *from* [*to*]	Copy file *from* (on local system) to file *to* on remote system. If *to* is omitted, the *from* argument is used in both places. Permission to create or overwrite the *to* file must be allowed.
~ %break	Transmit a BREAK to the remote system.
~ ~...	Send the line '**~** ...' to the remote system.

The use of '**~ %put**' requires *stty*(1) and *cat*(1) on the remote side. It also requires that the current erase and kill characters on the remote system be identical to the current ones on the local system. Backslashes are inserted at appropriate places.

The use of '**~ %take**' requires the existence of *echo*(1) and *cat*(1) on the remote system. Also, '**stty tabs**' mode should be set on the remote system if tabs are to be copied without expansion.

Multiple Interfaces

If multiple interface boards are installed on the originating host, **dkcu** will use the default processing to select the interface for the outgoing call. See *dkdial*(3X) and *authorize*(1M) for more information.

FILES

/opt/dk/bin	directory in which this command resides

SEE ALSO

pull(1C), *push*(1C), *authorize*(1M), *dkdial*(3X).
cat(1), *echo*(1), *stty*(1), *cu*(1C), *uucp*(1C) in the *UNIX System V User's Reference Manual*.

DIAGNOSTICS

Exit code is zero for normal exit, non-zero otherwise.

WARNINGS

If a terminal that is directly connected to a host initiates a dial with **dkcu**, the '**-x**' option should be used.

BUGS

dkcu buffers input internally.

There is an artificial slowing of transmission by **dkcu** during the '**~ %put**' operation so that loss of data is unlikely. If the *to* file of '**~% put**' cannot be created, an error message will be displayed, but the *from* file will then be written to the standard input of the remote system and the connection dropped.

NAME

dkmaint – host interface maintenance

SYNOPSIS

dkmaint – **r** – **i** *interface* **[** – **c** *channel*] [– **v**]

DESCRIPTION

dkmaint is a program used to reset and perform other maintenance operations on host interfaces or channels. When the '– **r**' option is specified, **dkmaint** sends an *ioctl(2)* to the host interface driver which eventually causes M_HANGUP messages to be issued to each process using the specified channel. Use of the '– **i**' option without the '– **c**' option resets all channels on a given interface. **dkmaint** must be run as **root**.

The following flags are recognized by **dkmaint**:

– **r** Reset-Used to reset the host interface or channel specified. Any active connections on the interface/channel selected will be closed as a result of the reset operation.

– **i** *interface* Specifies which host interface to reset. One and only one *interface* must be specified on the command line. To reset all host interfaces installed on a system, **dkmaint** must be run multiple times.

– **c** *channel* Specifies a channel to reset. Combined with the – **i** option, a single *channel* on a single interface is reset.

– **v** Verbose Option used for debugging and trouble shooting. The **dkmaint** command works silently without the '– **v**' option.

FILES

/opt/dk/sbin directory in which this command resides
/dev/dk/ctl*X* *Common Signaling Channel* device for interface *X*

SEE ALSO

dkdaemon(1M), *dkhs*(7), *dkux*(7).
ioctl(2), *close*(2) in the *UNIX System V Programmer's Reference Manual.*

DIAGNOSTICS

The **dkmaint** command reports errors when it cannot open the driver control device for the specified interface. It also reports if the host interface driver returns an error when the *ioctl(2)* request is issued.

WARNINGS

Resetting a channel with **dkmaint** will cause the host interface driver to request that the process currently using the requested channel release [*close(2)*] the channel. This is done by sending an M_HANGUP message from the driver up STREAM to the process. This is designed to look like having the remote side of the connection disappear. The action that the process takes is application dependent.

NAME

ftp – file transfer protocol

SYNOPSIS

ftp [**-d**] [**-g**] [**-i**] [**-n**] [**-t**] [**-v**] [**-w***wsize*] [*host* [*port*]]

DESCRIPTION

Ftp is the user interface to the ARPANET standard File Transfer Protocol (FTP). This protocol allows a user to transfer files to and from a remote network site. The *ftp* client includes a command interpreter which interactively executes file transfer commands. The command interpreter prompt is **ftp**>. *Ftp* can also be run from a shell script, taking its input from a file.

Several options may be specified on the *ftp* command line. Most options correspond to an *ftp* command and are discussed in more detail in the description of the referenced command.

– **d** enable debugging (*debug*).

– **g** disable file name globbing (*glob*).

– **i** turn off interactive prompting during multiple file transfers (*prompt*).

– **n** disable autologin upon initial connection.

– **t** enable packet tracing (*trace*).

– **v** enable verbose mode (*verbose*).

– **w***wsize*
set the TCP window size.

If no *host* is specified on the command line, *ftp* will enter its command interpreter and await further instructions from the user. If a *host* is specified, *ftp* will immediately attempt to establish a connection to an FTP server on that host. *Host* can be either the host name or its Internet address. If the *host* is followed by a *port*, *ftp* will attempt to contact an FTP server at that port. *Port* can be either the port number or the name of the service associated with that port (see *services(4)*).

If autologin is enabled (default), *ftp* will check the *.netrc(4)* file in the user's home directory for an entry describing an account on the remote host. If such an entry exists, *ftp* will automatically log in to that account. If no entry is found, *ftp* will use the local user name as the login on the remote host and prompt for a password [and account] to complete the login. If autologin is disabled, *ftp* will establish the initial connection to the remote host and return to the command interpreter. The **user** command must then be used to log in to that host.

File names specified as arguments to *ftp* commands are processed according to the following rules.

1) If the file name is **-**, *stdin* (for reading) or *stdout* (for writing) will be used.

2) If the first character of the file name is |, the remainder of the argument is interpreted as a shell command. *Ftp* will fork a shell with the supplied argument, and pipe the output of the *ftp* command to the shell in the usual manner. If the shell command includes spaces, the entire argument must be enclosed in quotation marks (for example, "|ls -lt"). Note that there can be no space between the pipe symbol | and the shell command. A particularly useful example of this mechanism is: "dir <dirname> |pg".

3) If 'globbing' is enabled, local file names are expanded as per the *glob* command.

4) The transformations defined by *case*, *ntrans*, and *nmap* are applied whenever a destination file name is derived from a source file name. For a retrieval, using *mget* or *get* with an unspecified local file name, *case*, *ntrans*, and *nmap* are applied. For a storage, using *mput* or *put* with an unspecified remote file name. *ntrans* and *nmap* are applied. These transformations are of particular interest when connecting to a non-UNIX remote host with different file naming conventions or practices.

5) If *runique* or *sunique* is on, a unique local or remote destination file name will be created by appending a unique numeric extension to the file name.

Ftp commands can be aborted using the terminal interrupt key (typically the delete key or CTRL-C). Sending transfers (for example, put) will abort immediately. Receiving transfers (for example, get) are aborted by sending the FTP protocol command ABOR to the remote server and discarding the remainder of the received data. If the remote server does not support the ABOR protocol command, it will continue to send the remainder of the data and the FTP client will wait until the transfer is completed before displaying the prompt.

COMMANDS

The following commands are recognized by the *ftp* command interpreter. They may be abbreviated, so long as they remain unique. *Ftp* will prompt for required arguments omitted from a command. Command arguments that have embedded spaces should be enclosed in double quotation (") marks.

account *passwd*
Specify the supplemental password required by the remote system for access to its resources.

allbinary
Toggle the use of *binary* type for non-file transfer operations (for example, ls). Normally, these operations are done in ascii mode regardless of the file transfer type. If *allbinary* is on and the file transfer type is binary, non-file transfer operations will be done in binary mode.

append *local-file* [*remote-file*]
Append *local-file* to a file on the remote host. If *remote-file* is not specified, the remote file will be named *local-file*. File transfer uses the current settings for type, format, mode, and structure.

ascii Set the data representation type to **ascii**. This is the default type.

bell Toggle a bell that sounds after each file transfer command is completed. By default the bell is turned off.

binary
Set the data representation type to **binary**.

bye Terminate the FTP session with the remote server and exit the *ftp* program.

case Toggle case-mapping of remote file names during an mget command. When case-mapping is enabled, uppercase letters in the remote file name are changed to lowercase letters in the local file name. By default case-mapping is turned off.

cd *remote-directory*
Change the working directory on the remote host to *remote-directory*.

cdup Change the working directory on the remote host to the parent (..) of the current working directory.

chmod *mode remote-file*
Change the permission mode on the remote file or directory to *mode* per the chmod(1) command.

close Terminate the FTP session with the remote server and return to the command interpreter.

cr Toggle carriage-return stripping during ASCII file retrieval. When enabled, the carriage-return is stripped from each carriage-return/linefeed record delimiter sequence encountered in the file, leaving the linefeed record delimiter sequence recognized by UNIX. By default, carriage-return stripping is on.

debug
Toggle debug mode. When debug mode is on, each FTP protocol command sent to the remote server will be displayed, preceded by the string **-->**. By default, debug mode is off.

delete *remote-file*
Delete the file *remote-file* on the remote host.

dir [*rfile* [*lfile*] | *options* [[*rfile*] *lfile*]]
List the current working directory or the specified (*rfile*) file or directory on the remote host. Specified *options* are supplied to the remote list command (for example, the UNIX *ls* command or the VMS *dir* command). The list can be displayed on the standard output device or placed in the specified (*lfile*) local file.

disconnect
A synonym for *close*.

form *format*
Set the vertical format control for ASCII and EBCDIC file transfers to *format*. Valid formats are **carriage-control**, **non-print** (default), and **telnet**. Only the **non-print** format is currently supported.

get *remote-file* [*local-file*]
Retrieve the specified *remote-file* and store it on the local host. If *local-file* is not specified, the local file will be named *remote-file*. File transfer uses the current settings for type, format, mode, and structure.

glob Toggle local file name globbing. With globbing disabled, all local files and pathnames are treated literally. With file name globbing enabled, each local file or pathname is processed for the *sh(1)* metacharacters ***?[]~**. An additional pair of metacharacters, **{}**, may enclose several comma-separated strings, for each of which a match is sought. Globbing is always on with reference to remote files; it is on by default with reference to local files.

hash Toggle hash mark (**#**) printing for each data block transferred. The size of a data block is 4096 bytes. By default, hash mark printing is off.

help [*command*]
Display a list of the *ftp* commands (no argument) or an informative message about the specified *command*.

idle [*seconds*]
Display the current inactivity timer on the remote host or set it to *seconds*.

image A synonym for *binary*.

lcd [*directory*]
Change the working directory on the local host to the user's home directory (no arguments) or to the specified *directory*.

ls [<**-l**|*remote-directory*> [*local-file*]]
A synonym for *dir*.

macdef *mname*
Define a macro that will be invoked by using the name *mname*. Subsequent lines will be stored as the macro definition. A null line (consecutive newlines or carriage returns) will end the macro definition. Within the macro definition, a dollar sign is used to specify substitution of arguments from the macro invocation line. The sequence **$***n*, where *n* is a number, will be replaced by the *n*th argument (for example, '$1' is the first argument). The sequence **$i** will cause the macro to loop automatically, executing once with each argument. Escape the dollar sign with a backslash ('\$') to prevent this special treatment. The maximum number of macros is 16. The maximum definition length is 4096 characters. A macro definition is valid only for the duration of a connection to a remote host, all macros are automatically deleted when the connection is closed.

macdel *mname*
Delete the macro *mname*.

macls [*mname*]
List the names of defined macros or the definition of the macro named *mname*.

mdelete *remote-file ...*
Delete the specified files on the remote host. If globbing is enabled, each *remote-file* will first be expanded.

mdir *remote-file ... local-file*
Obtain an extended directory listing of multiple files on the remote host and place the result in *local-file*. Globbing must be turned off when using this command. Note that the specification of *local-file* is mandatory.

mget *remote-file ...*
Retrieve the specified files from the remote host and place them in the current local directory. If globbing is enabled, the specification of each remote file will first be expanded.

mkdir *directory-name*
Make a directory on the remote host.

mls *remote-file ... local-file*
Obtain an abbreviated listing of multiple files on the remote host and place the result in *local-file*. Globbing must be turned off when using this command. Note that the specification of *local-file* is mandatory.

mode [*mode-name*]
Set the file transmission mode to *mode-name*. Valid modes are **block**, **compressed**, and **stream** (default). Only the **stream** mode is currently supported.

modtime *remote-file*
Display the last modification time of the remote file.

mput *local-file ...*
Transfer multiple files from the current local working directory to the current working directory on the remote host.

newer *remote-file*
Get the specified remote file if a local file of that name does not exist or if the remote file has a later modification date than the local file of the same name.

nlist [*rfile* [*lfile*] | *options* [[*rfile*] *lfile*]]
List the name(s) of the files in the current working directory or the specified (*rfile*) file or directory on the remote host. Specified *options* are supplied to the remote list command (for example, the UNIX *ls* command or the VMS *dir* command). The list can be displayed on the standard output device or placed in the specified (*lfile*) local file.

nmap [*inpattern outpattern*]

Unset (no arguments) or set the file name mapping mechanism. File name mapping is used to automatically derive a destination file name from the source file name during get, mget, mput, and put commands. This is of particular interest when connecting to a non-UNIX remote host with different file naming conventions or practices.

The input pattern consists of the variables **$1** through **$9** and literals and is matched against a source file name to extract the portions of interest. The input pattern cannot contain spaces.

The output pattern specifies the manner in which the variables derived by the input pattern should be used to create the destination file name. The variables **$1** through **$9** are replaced by their values. The variable **$0** is replaced by the original source file name. The pattern **[***str1***,***str2***]** is replaced by *str1* if *str1* is not a null string or by *str2* if *str1* is a null string. All other spaces and characters are treated as literals.

For example, the mapping 'nmap $1;$2 $1.$2' can be used to create a UNIX equivalent of the VMS version number extension by replacing the semicolon with a period.

ntrans [*inchars* [*outchars*]]

Unset (no arguments) or set the file name character translation mechanism. Character translation is used to automatically derive a destination file name from the source file name during *get*, *mget*, *mput*, and *put* commands. This is of particular interest when connecting to a non-UNIX remote host with different file naming conventions or practices.

If a character in the source file name matches the *n*th character in *inchars*, it will be replaced by the corresponding character from *outchars* to create the destination file name. If the *inchars* string is longer than the *outchars* string, the characters without a corresponding output character will be ignored in the source file name.

For example, the translation 'ntrans ;$-% .' will translate semicolons to periods wherever they appear and ignore all dollar signs, hyphens, and percent signs.

open *host* [*port*]

Establish a connection to the FTP server on the specified remote *host*. *Port* is used to specify an alternate FTP server; it can be the actual port number or the service name. If autologin is enabled (default), *ftp* will also attempt to automatically log the user in.

prompt

Toggle interactive prompting. Interactive prompting occurs during multiple file transfers to allow the user to selectively retrieve or store files; it is turned on by default. If prompting is turned off, any *mget* or *mput* will transfer all specified files.

proxy *ftp-cmd*
Execute an FTP command on a secondary control connection. This command enables you to open simultaneous connections to two FTP servers and transfer files between them instead of between the local client and a server. The original FTP connection is called the primary control connection; the connection made through the proxy command is called the secondary control connection. The server on the secondary connection must support the FTP protocol command PASV.

The first proxy command should be *open*, to establish the secondary connection. The proxy command *?* will display the list of commands that can be used on the secondary connection. The following FTP commands behave differently when executed as proxy commands: the *open* command will not define new macros during auto-login; the *close* command will not erase existing macro definitions; the *get* and *mget* commands will transfer files from the primary server to the secondary server; the *put*, *mput*, and *append* commands will transfer files from the secondary server to the primary server.

put *local-file* [*remote-file*]
Store *local-file* on the remote host. If *remote-file* is not specified, the remote file will be named *local-file*. File transfer uses the current settings for type, format, mode, and structure.

pwd Print the pathname of the current working directory on the remote host.

quit A synonym for *bye*.

quote *arg ...*
The arguments specified are sent, verbatim, to the remote FTP server. A single FTP reply code is expected in return. This command is used to avoid processing of a command by the local FTP client, and facilitates the sending of an explicit FTP protocol command to the remote server when the client does not implement the related command.

recv *remote-file* [*local-file*]
A synonym for *get*.

reget *remote-file* [*local-file*]
Similar to **get**, but if *local-file* already exists and is smaller than *remote-file*, it is assumed to be a partially transferred copy of the file. The transfer is resumed from an offset into the remote file equal to the byte count of the local file.

rename *remote-file new-name*
Rename the *remote-file* to *new-name* on the remote host.

reset Clear the reply queue to resynchronize the command/reply mechanism between the client and server.

restart *marker*
When followed immediately by a **get** or **put** command, restart the file transfer at the indicated *marker*, which is usually a byte offset into the file.

rhelp [*command*]
Request a list of the FTP protocol commands implemented by the remote server (no arguments) or an explanation of the specified protocol *command*.

rmdir *directory-name*
Delete a directory on the remote host.

rstatus [*file*]
Show the status of the remote host or of the specified file on the remote host.

runique
Toggle the creation of unique local file names for retrieval using **get** and **mget**. If the destination file name already exists, a numeric extension will be added to the name, incrementing the number sequentially until a unique name is created. For example, if the target local file name is 'fortune' and that file already exists, the target name 'fortune.1' will be used. If fortune.1 already exists, the target name 'fortune.2' will be tried. This will continue with extensions 1 through 99; if all versions of the file already exist, the transfer will fail. The unique file name will be displayed if the transfer succeeds. By default, receive unique is off.

send *local-file* [*remote-file*]
A synonym for *put*.

sendport
Toggle the use of the FTP protocol command PORT when establishing a data connection. When enabled (default), *ftp* will use the PORT command to inform the server of the local port on which the client is listening for the data connection. The server will then connect to that port. When disabled, *ftp* will listen for all data connections on the default port.

site *arg ...*
Send the arguments, verbatim, to the remote server via the FTP protocol command SITE. SITE commands are non-standard or environment-specific functions implemented by a particular server; the list of supported SITE commands can be obtained with the command *site help*.

size *remote-file*
Display the size of the remote file.

status Show the current status of *ftp*.

struct [*struct-name*]
Set the structure of the file to be transferred to *struct-name*. Valid formats are **file** (default), **page**, and **record**. Only the **file** structure is currently supported.

sunique
Toggle the creation of unique remote file names for sending files using **put** and **mput**. If the destination file name already exists, a numeric extension will be added to the name, incrementing the number sequentially until a unique name is created. For example, if the target remote file name is

'fortune' and that file already exists, the target name 'fortune.1' will be used. If fortune.1 already exists, the target name 'fortune.2' will be tried. This will continue with extensions 1 through 99; if all versions of the file already exist, the transfer will fail. The unique file name will be displayed if the transfer succeeds. By default, *sunique* is off.

system
Show the type of operating system running on the remote host.

tenex Set the data representation type to **tenex**. This corresponds to the local or logical byte size type. The only byte size currently supported is 8, making this type virtually the same as **binary**.

trace Toggle packet tracing. Packet tracing is turned off by default.

type [*type-name*]
Display the data representation type of the file to be transfered (no arguments), or set it to *type-name*. Valid types are **ascii** (default), **binary**, **ebcdic**, **image**, and **tenex** (local byte size). The **binary** and **image** types are identical. The **ebcdic** type is not currently supported. The **tenex** type, in which the logical byte size is 8, is virtually the same as **binary**.

umask [*mask*]
Display (no arguments) or set the umask on the remote host per the umask(1) command.

user *login* [*password* [*account*]]
Log in to the remote FTP server as *login*. *Ftp* will prompt for the *password* and *account* if they are required and not specified.

verbose
Toggle *verbose* mode. When enabled, all responses from the FTP server are displayed to the user as well as statistics regarding the efficiency of each file transfer. By default, verbose is enabled for an interactive session and disabled for a background or batch session.

? [*command*]
A synonym for *help*.

$ *mname* [*arg* ...]
Invoke the macro *mname* with the specified arguments.

! [*command*]
Invoke a shell on the local host. To return to *ftp*, exit from the shell with CTRL-D. If an argument is specified, that *command* is executed and the shell will exit automatically.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

FILES

.netrc(4), services(4)

NOTES

Note that a command works only if the FTP server on the remote host supports it. Use *rhelp* to see which requests the remote server recognizes.

The *mget* and *mdelete* commands should be used with caution.

Specifying a directory where a plain file name is expected could produce unexpected results. For example, the *ftp* command ''ls -l *file*'' will put a long directory listing of the current working directory into *file* instead of returning a long listing of that file.

SEE ALSO

chmod(1), umask(1)

NAME

ifconfig – configure interface parameters

SYNOPSIS

ifconfig *interface* [*address_family*] [*address* [*dest_address*]] [*parameters*]

DESCRIPTION

The *ifconfig* command is used to display and modify the configuration of a network interface. Only the superuser can modify an interface configuration.

Interface is the name assigned to the interface in the network configuration file *inetinit.cf(4)*. When no other parameters are supplied, *ifconfig* displays the current configuration of the specified network interface.

The only *address-family* currently supported is the DARPA Internet family, *inet*.

The interface *address* is initially set to the Internet address of the host name assigned to the interface in the *inetinit.cf(4)* file. It can be changed by specifying either a host name (see *named(1M)* or *hosts(4)*) or an Internet address (see *inet(3)*). The destination address for a point-to-point interface can be assigned in the same manner.

The following parameters can be set with *ifconfig*:

broadcast *addr*
(Internet Address family only) Identify the address to be used for broadcasts to the network. The default broadcast address is the interface address with a host part (as identified by the subnet mask) of all 1's. This setting affects only the broadcast address for transmitted packets; addresses of all 0's and all 1's are both recognized as broadcasts on incoming packets.

down Mark an interface as being *down*. No messages will be transmitted through an interface that is down. If possible, the interface will be reset to disable reception as well. This action does not automatically disable routes using the interface.

hostgroups
Display the multicast host groups to which the interface currently belongs.

join *addr*
Join a multicast host group. Packets to the multicast address *addr* will be accepted by the interface. Joining any individual multicast host group will also automatically join the "all-hosts" multicast group with address 244.0.0.1.

leave *addr*
Leave a multicast host group. Packets to the multicast address *addr* will no longer be accepted by the interface. Leaving all other individual multicast host groups will also automatically leave the "all-hosts" multicast group with address 244.0.0.1.

metric *n*

Set the routing metric of the interface to *n*; the default metric is zero. Higher metrics have the effect of making a route less favorable; metrics are counted as additional hops to the destination network or host. The routing metric is used by the routing protocol *routed(1M)*.

mtu *mtu*

Set the **Maximum Transmission Unit** of the interface to *mtu*; the default metric is the value that was returned by the interface when the network was started.

netmask *mask*

(Internet Address family only). Identify the portions of the Internet address to be used for the network and subnetwork specification; the remainder is used as the host specification. It is strongly recommended that the subnetwork field be contiguous with the network portion. The 32-bit address mask contains 1's for the bit positions in the network and subnet parts, and 0's for the host part. The mask can be specified as a single hexadecimal number (for example, 0xffffff00), with a dot notation Internet address (for example, 255.255.255.0), or with a pseudo-network name listed in the network table *networks(4)*.

up Mark an interface as being UP. This is used to re-enable an interface after an marking it *down*. An interface is automatically marked *up* when its address is first set. If the interface was reset when previously marked *down*, the hardware will be re-initialized.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

Messages may indicate the specified interface does not exist, the requested address is unknown, or that a nonprivileged user tried to alter an interface configuration.

NOTES

Trailers are not supported.

SEE ALSO

netstat(1)
inetinit.cf(4)

NAME

ifstat - displays interface statistics

SYNOPSIS

ifstat [-adfstz] [-l *interval***] [***config file* **[***cntrlr num***]]**

DESCRIPTION

ifstat provides a common, configurable platform for the display of driver-specific interface statistics gathered by the supported drivers. **ifstat** displays statistics to **stdout** in the format dictated by the configuration file, *config file* [see *ifstat.conf*(4)]. The user may specify *config file* on the command line or let **ifstat** choose the configuration file. **ifstat** chooses a configuration file by requesting a list of supported interfaces from **ip**. **ifstat** picks the first interface for which a configuration file exists in the directory */etc/ifstat.conf*. The caller may specify *config file* as an absolute path or a relative path. If the path is relative (does not start with a "/"), **ifstat** looks for *config file* relative to */etc/ifstat.conf*. If not found, **ifstat** next looks for *config file* relative to the current working directory. **ifstat** fails if it cannot find a valid configuration file.

If *config file* is specified, the caller may also issue a controller number, *cntrlr num*, on the command line. The controller number defaults to **0** if unspecified. The controller number is either appended to the special device file name found in *config file* or ignored depending on the *action* specified in *config file* [see *ifstat.conf*(4)]. For instance, the *config file* **m376** tells **ifstat** to append the controller number to the device name. A user issuing the command **ifstat m376** would, by default, get statistics from the MVME376 driver for controller 0. The command **ifstat m376 1** would get statistics from controller 1.

The maximum length of the *config file* parameter is 128 characters. The maximum length of the *cntrlr num* parameter is 8 characters.

The caller may issue the following options on the *ifstat* command line:

-a All statistics. Display all possible statistics for the requested driver. **ifstat** simply looks for the **all** version of the *config file* specified on the command line (or the *config file ifstat* found if none are specified). The resulting display typically exceeds the screen length, so this option should not normally be used with the **-f** option.

-d Difference counts. Display the differences between the current stats and the previous stats during each display iteration. This option is used in conjunction with **-f**. Certain tagged statistics in the *config file* are unaffected by this option, i.e., they are not counters and therefore, always show the same value.

-f Forever option. Cumulative statistics displayed every five seconds until the user sends an interrupt signal to the program If the screen becomes garbled, the user may send a quit signal to the program, and **ifstat** will clear the screen on the next display iteration. See *stty*(1) for a discussion on setting the interrupt (*intr*) and quit (*quit*) control characters.

-s Show interfaces. Display the *ip* interfaces that **ifstat** supports. **ifstat** does not display interfaces not currently configured under *ip*. For example, for the two MVME376 boards in a system, if only the first board is configured under *ip*, **ifstat** displays the first board and not the second. Examine the configuration files under */etc/ifstat.conf* to learn all the possible interfaces **ifstat** can support.

-t Terminfo unsupported. Used with terminals that do not have *terminfo*(4) entries or do not support *curses*(3X) commands.

-z Zero statistics. Zeroes **ifstat**'s version of the statistics. When used with the **-f** option, causes cumulative statistics to begin at 0. Certain tagged statistics in the *config file* are unaffected by this option, i.e., they are not counters and therefore, always show the same (non-zeroed) value. NOTE: this command does not actually zero the statistics kept in the driver, only the version **ifstat** keeps.

-l *interval*
Display interval. The number of seconds to wait before gathering and displaying another set of statistics. This option is useful only in conjunction with **-f**. **ifstat** treats this value as an unsigned integer.

ifstat prints a standard header before displaying any statistics. The header consists of the name of the device the **ifstat** is requesting statistics from followed by the current time. **ifstat** then prints a blank line followed by the actual statistics. A user should examine the MACIOC GETSTATS ioctl description in a corresponding driver man page to ascertain the exact meaning of the statistics displayed from its configuration file. A driver man page that does not describe the MACIOC GETSTATS ioctl does not support **ifstat**. Not all drivers corresponding to the section 7 man pages in the SEE ALSO section support **ifstat**.

FILES

/etc/ifstat.conf/*

SEE ALSO

stty(1), *curses*(3X), *ifstat.conf*(4), *terminfo*(4), *dlce*(7), *e1x7*(7), *ip*(7), *lo*(7), *m385*(7), *ppp*(7), *slip*(7).

DIAGNOSTICS

ifstat displays the requested statistics, then exits with a 0 status. If **ifstat** does not terminate normally, it displays an error message to *stderr* and returns a non-zero exit status as follows:

1 Errors were found in the command line arguments.

2 *config file* does not exist

3 Failed to open the **ip** device to get interfaces

4 SIOCGIFCONF (get interfaces) ioctl to **ip** failed

5 No ifstat-supporting driver found via **ip**

6 Failed to open *config file*

7 Device line format bad in *config file*

8 Action in device line of *config file* bad

9 Code format bad in *config file*

10 Failed to initialize terminal for **curses**

11 Failed to open device specified in *config file*

12 MACIOC GETSTATS (get statistics) ioctl to driver failed

NAME

iftrace – trace host network packets

SYNOPSIS

iftrace [–**gdpbhrtn**] [–***f*** *diskfile*] [–***i*** *count*] [*keywords*]

DESCRIPTION

iftrace allows the super-user to trace packets at the interface level. The traced packets may be those received, sent, or both. A filtering facility is provided to discard broadcast packets (**-b**), to select received (**-r**) and/or transmitted (**-t**) packets, as well as to filter packets based upon *keywords*. Packets may be captured to a disk file or displayed as captured. The default display decodes as much of the datagram's protocol as possible. Currently, only DOD IP and AppleTalk datagram protocols are supported in this manner. All other datagram types are captured and displayed in a hexadecimal dump format.

The options have the following meaning:

–**g** Get packets. This option primes the driver for packet capture. The –**r**, –**t**, –**b** options specify the capture filter.

–**p** Print packets. This option displays the captured packets. If used with the –**g** option, the packets are displayed as they are captured. Without –**g**, the display comes from the disk file.

–**r** Set capture filter to receive. This option is only valid with –**g** (get packets). The default is to capture transmit and receive packets. Specification of either –**r** or –**t** will reset default filter.

–**t** Set capture filter to transmit. This option is only valid with –**g** (get packets). The default is to capture transmit and receive packets. Specification of either –**r** or –**t** will reset default filter.

–**b** Set capture filter to ignore broadcasts. This option is only valid with –**g** (get packets). This option does not reset the default filter.

–**h** By default, packets are interpreted and displayed in a verbose format. This option interprets Ethernet Type II, IEEE802.3, and IEEE802.2 LLC/SNAP headers, and displays the rest of the packets in a hexadecimal dump format.

–**n** Display host addresses in numerical format. The default display translates addresses into host names. This option is only valid with –**p** set. When using –**gp**, this option is recommended since packets are processed faster.

–**f** *diskfile*
Specify a diskfile for capture or display. The default filename is */var/adm/lcs/iftrace.data*.

–**i** *count*
Capture *count* packets and quit. This option is only valid with –**g** (get packets). The default action is to capture until killed.

– **d** Allows internal debug tracing to be enabled.

keywords

Allows packets to be filtered based upon specific fields within a packet. The keywords *ip*, *ipx*, and *apple* are required to filter packets for either DOD IP Internet or Novell IPX or AppleTalk datagrams, repectively. Only one datagram type can be specified at a time. Once a datagram type has been selected, the remaining keywords *src*, *dst*, *sport*, and *dport* can then be selected to further filter datagrams, based upon specific fields within a packet. The *src* and *dst* keywords will only capture packets whose *source* and *destination* address fields match the addresses specified within either an IP, IPX, or DDP datagram. The *source* and *destination* addresses for IP datagrams can be specified in either dotted IP notation or as symbolic host names. For AppleTalk addresses the format is *network.node* (e.g., 2001.147). For IPX addresses the format is *network:node:socket* (e.g. 53:0000a200443d or 53:0000a200443d:ncp). The socket portion of the IPX address is optional. However, either symbolic names or hexadecimal values can be used to specify the socket field of an IPX address. Acceptible symbolic IPX socket names are *ncp*, *sap*, *rip*, *netbios*, *diagnostic*, and *nlsp*. The *sport* and *dport* keywords are only supported for IP datagrams. Any IP (i.e., TCP or UDP) packet that contains a source port or destination port number that matches the *sport* and *dport* keywords will be captured. All other packets will be captured but discarded when displayed (**-p**).

iftrace is a tool to allow the tracing of packets at the interface level. By default, it does not capture packets from the media that are not addressed to the interface. The normal method for capture is to use the – **g** option to capture into a file and then use the – **p** option to display the captured packets. This allows for the fastest capture with a minimum of lost packets.

If fast capture is not required, the – **g** and – **p** options may be combined to display packets as they are captured.

SEE ALSO

hosts(4), *ip*(7P), *tcp*(7P), *udp*(7P)

BUGS

The packets captured are only those received / transmitted at the interface. It is not possible to use **iftrace** as a media monitor because promiscuous mode is not supported and enabled on the interface.

NAME

ipxnetstat - show IPX network status

SYNOPSIS

ipxnetstat [-ir [dv]] [-p *rip* | *ipx*] [*interval]*

DESCRIPTION

The **ipxnetstat** command symbolically displays the contents of network-related data structures to show the status of configured interfaces, routing tables, and network statistics related to IPX packet traffic.

The **-i** option shows the status of both the ethernet and virtual configured network interfaces. This display includes the network number, node address, state of the interface, the number of packets received and sent, and the number of sent and receive errors.

When used with the **-i** option or the **-r** option, the **-d** option displays the network address number in decimal.

The routing table display (**-r**) shows the status of configured routes. This display includes the network address, the number of hops or routers that must be passed through to reach the specified network, the number of ticks or length of time (i.e., expressed in units of 1/18 of a second) that a packet takes to reach the designated network as well as the node address associated with that network.

When used with the **-i** option or the **-r** option, the **-v** option enables debugging mode that displays additional information as the command executes. This information is helpful in diagnosing both software and/or network problems. The **-p** *ipx* or **-p** *rip* option will show only those statistics for the specified protocol.

The option *interval* is a number that represents the frequency with which the display is to be updated. This display shows the summary of the packets sent and received over both the ethernet and virtual interfaces.

DIAGNOSTICS

Exit status is zero for normal termination; a positive number for error termination.

The message `Can't open device in the different displays` indicates that **ipxnetstat** cannot open the specific protocol device to obtain the requested statistics because the IPX stack is not activated.

FILES

/etc/lcs/ipxas.cf
/usr/etc/ipxnetstat

SEE ALSO

ipxping(1M)

NAME

ipxping - send NetWare Link Services Protocol (NLSP) Ping Request packets

SYNOPSIS

ipxping *network:node* **[***packetsize* **] [***count***] [** *interval***]**

DESCRIPTION

ipxping is intended for use in network testing, measurement, and management, primarily for manual fault isolation. Tracking a single-point hardware or software failure in an Internetwork Packet Exchange (IPX) network can often be difficult. **ipxping** uses the NLSP Ping Request packet to elicit a Ping Reply from a Novell host or gateway equipped with NLSP. Because of the load it could impose on the network, hosts, and gateways, **ipxping** should *not* be used during normal operations and it should *not* be used from automated scripts.

To use **ipxping** for fault isolation, the hexidecimal IPX address of the target node must be specified in *network:node* format. While it is possible to contact the IPX address of the LCS60's Ethernet port, it is *not* possible to contact the addresses that correspond to the LCS60's virtual IPX network port.

By default, **ipxping** sends an IPX data packet that is 56-bytes long. The IPX header is followed by a ping header containing signature, version, type, ping id and results fields. The remainder of the packet is padded with additional bytes to fill out the packet. The size of the packet, in bytes, may be changed by specifying an alternate **packetsize** on the command line (40 >= packetsize <= 1500).

By default, **ipxping** sends one packet per second and prints one line of output showing the round trip time, in hundredths of a second, for every packet sent. The delay between packets (in seconds) can be changed by specifying an alternate **interval** on the command line. Since a packet for which no reply has been received by the time the next packet is sent is declared "lost", it may be necessary to increase the inter-packet delay to communicate with hosts over congested networks.

By default, **ipxping** continues to send packets until it is killed. If **count** is specified on the command line, **ipxping** will send the specified number of Ping Requests, and then exit. Summary round trip time, packet loss, and errored packets statistics are displayed just before **ipxping** exits.

DIAGNOSTICS

Exit status is zero for normal terminations; a positive number for error terminations.

FILES

/usr/etc/ipxping
/usr/etc/ipxnetstat

SEE ALSO

Novell NetWare® Link Services Protocol Specification, *Version 1.0, Chapter 2.*

NAME

netstat – show network status

SYNOPSIS

netstat [**-AainrsSv**] [**-p** *protocol*] [*interval*]

DESCRIPTION

The *netstat* command symbolically displays the contents of network-related data structures to show the status of active connections (default), configured interfaces, routing tables, network statistics, STREAMS buffer allocation failures, and packet traffic. The effect of pertinent options will be described in the discussion of each type of status display.

Wherever they are included in a status display, local and remote address formats are of the form *host.port*. or *network.port*. The latter format is used if a transport endpoint's address specifies a network but no specific host address. The symbolic names of *host*, *network*, and *port* will be displayed wherever available from the name server (*named(1M)*) and the network databases (*hosts(4)*, *networks(4)*, and *services(4)*). The domain names will be stripped from the host and network names. If the symbolic name for an address cannot be determined, the address will be displayed in the Internet dot notation (see *inet(3)*). Where applicable, the **-n** option to *netstat* will disable the symbolic translation of the address fields. Unspecified or wildcard addresses and ports are identified by an asterisk (*****).

The connection display (default) shows the status of active Internet connections. This display includes the protocol, the size in bytes of the send and receive queues, the local and remote addresses of the transport endpoints, and the internal state of the connection. The **-A** option adds the associated protocol control block (PCB) to the display. The **-a** option includes the inactive connections (listening servers). The **-n** option disables the symbolic translation of the local and remote addresses, causing both to be displayed in their Internet dot notation. The **-p** *protocol* option limits the display to the specified protocol.

The interface display (**-i**) shows the status of the configured network interfaces. This display includes the interface name, the maximum transmission unit (Mtu) in bytes, the network and interface addresses, the number of packets received and sent, and the number of send and receive errors. The **-n** option disables the symbolic translation of the network and interface addresses, causing both to be displayed in their Internet dot notation. An asterisk (*****) after the interface name means the interface is down.

The routing table display (**-r**) shows the status of the configured routes. This display includes the address of the destination host or network, the address of the gateway host, the status and type of the route (flags), the current number of active uses of the route (refcnt), the number of packets sent using that route (use), the maximum transmission unit (MTU) in bytes, and the interface name of the gateway. A direct route is automatically added to the table for each configured interface when the network is brought up. Routes can also be added manually by the system administrator (*route(1M)*) or dynamically by the routing daemon (*routed(1M)*) or by IP itself if MTU discovery (RFC1191) is being used. The *G* flag indicates that the route is a gateway to another network. The *H* flag indicates that

the destination of the route is a host. The *D* flag indicates that the route is dynamic. The *U* flag indicates that the route is up. The **-n** option disables the symbolic translation of the network and interface addresses, causing both to be displayed in their Internet dot notation. Note that the reference count will always be zero since the kernel routing functions do not yet track this statistic.

The network statistics display (**-s**) shows the current values of the statistics maintained by the kernel for each protocol. This display includes statistics for the *ip*, *icmp*, *tcp*, and *udp* protocols. The **-p** *protocol* option will show only those statistics for the specified protocol. The **-r** option will show routing statistics.

The STREAMS display (**-S**) shows the number of failed requests for STREAMS buffers, by the size of the requested buffer, for each TCP/IP kernel STREAMS module or driver. Note that no entry will appear for the character driver *w_*, since it is not a STREAMS driver. The display is a matrix, containing a line for every kernel module or driver. The columns represent buffer lengths, in bytes, rounded up to the nearest power of two. Each failed request increments the counter for the associated buffer size. The counters are reset only when the system is rebooted.

The packet traffic display is a running summary of packet transmission statistics. This display is selected by calling *netstat* with a single numeric argument indicating the frequency with which the display is to be updated. No options can be used with this display. This display includes the numbers of inbound and outbound packets and errors for the most active interface and the total for all interfaces. The first line of each screen of information contains a summary since the network was last brought up. Subsequent lines show values accumulated over the preceding *interval*.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

The message **can't open** *device* in the STREAMS display indicates that *netstat* cannot open the device to obtain the requested statistics, either because the module or device has not been configured into the kernel or because all of the allocated minor devices are already in use.

FILES

hosts(4), *networks(4)*, *protocols(4)*, *services(4)*

SEE ALSO

named(1M), *route(1M)*, *routed(1M)*

NAME

nslookup – query name servers

SYNOPSIS

nslookup *host* [*server*]
nslookup [**-** *server*]

DESCRIPTION

Nslookup is a program that queries DARPA Internet domain name servers. If called with a host name or address as the first argument, *nslookup* will print the name and Internet address of that host. If called with no arguments or a hyphen as the first argument, *nslookup* will enter interactive mode, enabling the user to query the name server for information about various hosts and domains. The optional second argument specifies the name or address of a specific name server to be used for the search.

COMMANDS

The following commands are available when *nslookup* is run in interactive mode. Commands may be interrupted at any time using the terminal interrupt character.

Commands must contain fewer than 80 characters.

NOTE: Unrecognized commands are interpreted as a host name.

host [*server*]
Request information about *host* using the current default server, or using server *server* if it is specified. The type of information returned is identified by the *query* command; the default type returned is the host's name and address.

exit Terminate interactive mode and return to the shell.

finger [*user*] [>|>> *file*]
Connect with the finger server on the current host (see *finger(1)*). The *finger* command must be preceded by a successful host address query (see **set query=A**). The output can be redirected to a file in the usual manner with > and >>.

help

? Print a brief summary of commands.

ls [**-a**|**-h**] *domain* [>|>> *file*]
List the name and address of each host in the specified *domain*. The **-a** option lists the name and alias of each host in the domain. The **-h** option lists the name, CPU, and operating system of each host in the domain. The output can be redirected in the usual manner with > and >>. If redirection is used, a hash mark is printed for every 50 records received from the server.

quit Terminate interactive mode and return to the shell. **Quit** is an alias for **exit**.

root Change the default server to the server for the root of the domain name space. The default root server is nic.ddn.mil. (*Root* is a synonym for the command *lserver nic.ddn.mil*.) The name of the root server can be changed with the *set root* command.

server *host*
lserver *host*
Change the default server to *host*. The *lserver* command uses the initial server to look up information about *host*, while the *server* command uses the current default server. If an authoritative answer cannot be found, the names of servers that might have the answer are returned.

set *keyword*[**=***value*]
This command is used to change state information that affects the searches. The keywords can be abbreviated, as long as they remain unique. Valid keywords are:

[no]aaonly
Allow authoritative query only.

all Print the current values of options to **set** as well as information about the current default server and host.

ALL Print the current values of all options to **set**, including the hidden options, as well as information about the current default server and host.

[no]d2
Print exhaustive debugging information.

[no]debug
Turn debugging mode on. More information is printed about the packet sent to the server and the resulting answer. The default is nodebug.

[no]defname
Append the default domain name to the host name for every search. The default is nodefname.

domain=*domain*
Change the default domain name to *domain*.

[no]ignore
Ignore truncation errors.

[no]primary
Use the primary server for the queries.

type=*qtype*
query=*qtype*
Specify the type of information requested from the name server. The **NS** and **SOA** records apply to a domain, the **PTR** records apply to a reverse Internet address, the remaining records apply to a host.

A	Internet address (the default) of the host
CNAME	canonical (official) name for an alias
HINFO	host CPU and operating system type
MB	mail destination
MG	mail group member
MINFO	mailbox or mail list information
MR	mail rename domain name
MX	mail exchanger
NS	primary name server for the domain
PTR	host having the Internet address
SOA	Start of Authority information for a domain
WKS	well known services provided by the host

[no]recurse
Tell the name server to query other servers if it does not have the information. The default is recurse.

retry=*x*
Set the number of retries to *x*; the default is 2. This regulates the number of times a request is resent if a reply is not received within a certain amount of time (changed with *set timeout*).

root=*host*
Change the name of the root server to *host*; the default is nic.ddn.mil. This affects the *root* command.

timeout=*x*
Change the time-out interval for waiting for a reply to *x* seconds; the default is 10 seconds.

[no]vc Always use a virtual circuit when sending requests to the server. The default is novc.

view *file*
Sort an *ls* output file and view it with *more.*

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination. The diagnostic messages displayed for an unsuccessful search are:

Time-out
: The server did not respond to a request after a certain amount of time (changed with **set timeout=***x*) and a certain number of retries (changed with **set retry=***x*).

No information
: Depending on the query type set with the *set query* command, no information about the host was available, though the host name is valid.

Nonexistent domain
: The host or domain name does not exist.

Connection refused
Network is unreachable
: The connection to the name or finger server could not be made at the current time. This error commonly occurs with **finger** requests.

Server failure
: The name server found an internal inconsistency in its database and could not return a valid answer.

Refused
: The name server refused to service the request.

Format error
: The name server found that the request packet was not in the proper format. NOTE: This error indicates that there is a bug in the program.

NOTES

If you are connected to a name server that handles more than one domain, all host names used in requests must be fully qualified by their domain. For example, the server seismo.css.gov handles three domains: harvard.edu, css.gov, and cornell.edu. A request for the host *aiken* in the domain *harvard.edu* must be specified as aiken.harvard.edu. The **set domain=***name* and **set defname** commands can be used to automatically append a domain name to each request.

SEE ALSO

named(1M)
resolver(3)
named.boot(4), resolv.conf(4)

NAME

ping – send ICMP ECHO_REQUEST packets

SYNOPSIS

ping [**-r**] [**-v**] *host* [*packetsize* [*count*]]

DESCRIPTION

Ping is intended for use in network testing, measurement, and management, primarily for manual fault isolation. The DARPA Internet is a large and complex aggregation of network hardware connected by gateways. Tracking a single-point hardware or software failure can often be difficult. *Ping* uses the Internet Control Message Protocol (ICMP) mandatory ECHO_REQUEST datagram to elicit an ICMP ECHO_RESPONSE from a host or gateway. Because of the load it could impose on the network, it is unwise to use *ping* during normal operations or from automated scripts.

When using *ping* for fault isolation, first ping the local host to verify that the local network interface is up and running. Then, ping hosts and gateways farther and farther away to determine where a fault occurs.

ECHO_REQUEST datagrams (pings) consist of IP and ICMP headers followed by a **struct timeval** and an arbitrary number of bytes to fill out the packet. The default packet size is 64 bytes; this may be changed by specifying an alternate *packetsize* on the command line. The maximum packet size can be calculated by subtracting 48 bytes (for the UDP and IP headers with options) from the value of the tuneable parameter SOMOD_MSGSZ. *Ping* sends one datagram per second, and prints one line of output showing the round-trip time for every ECHO_RESPONSE returned. No output is produced if there is no response.

By default, *ping* continues to send packets until it is killed. If *count* is specified on the command line, *ping* will send the specified number of ECHO_REQUESTS, and exit when all responses have been either received or assumed lost. Summary round-trip time and packet loss statistics are displayed just before *ping* exits.

The **-r** option causes *ping* to bypass the normal routing tables and send datagrams directly to a host. An error will be returned if the host is not on a directly attached network. This option can be used to ping a local host through an interface that has no route (for example, after the interface was dropped by *routed(1M)*).

The **-v** option causes *ping* to display a message any time an ICMP packet other than an ECHO_RESPONSE is received.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

SEE ALSO

netstat(1)
ifconfig(1M)

NAME

pull – transfer files from another system

SYNOPSIS

pull [**-L**] *destination filename ... directory*

DESCRIPTION

pull establishes a data switch circuit to a source (remote) host named in *destination* and transfers files from that host.

The *filename*s are files or directories on the source machine and are interpreted relative to the user's HOME directory on the source *destination* if they do not begin with a ´/´. The *filename*s are placed in the *directory* on the target (local) machine. If the *directory* does not begin with a ´/´ it is interpreted relative to the current directory. The *directory* will be created, if required, before the files are transferred. Specifying a directory as one of the *filename*s will transfer the entire directory tree beginning at the named point.

pull preserves the file modes and modification times of the files it moves. The original file owner (numeric user ID) is preserved if the effective user ID of the process on the local machine is **root**; otherwise, the files will be owned by the current user.

pull preserves the name, type and contents of the files it moves with the following exceptions.

Long Names

If the target file system does not support file names greater than 14 characters and the source machine transfers a file with a name greater then 14 characters, the name will be truncated to 14 characters. The local side will warn the user for each file name that is truncated.

Symbolic Links

Files of type symbolic link will be preserved unless the '– **L**' option is used. A transferred symbolic link will be identical to the source file. It may, however, have a different context in the target environment. If the '– **L**' option is used, the source machine will be asked to follow symbolic links with the following behaviors: the symbolic link will be treated as if it were the file type of the file pointed to. If the file does not exist or the user does not have permission to access the file, no transfer will take place and the source machine will issue a warning. If, in following a path that contains a symbolic link that points to a directory, the source machine finds a directory that has already been transferred, it will not transfer it a second time. The source however, will always transfer directories in a path that does not contain a symbolic link even if that directory has already been transferred while following a path that does contain a symbolic link. In both cases, the source machine will warn the user for every affected directory.

The *push*(1C) and **pull** commands invoke the **pupu** program (*/opt/dk/bin/pupu*) on the remote system to handle the remote end of all file transfers. If the *srvtab*(4) file on the remote system invokes the **pupu** program with the ´–**r**´ option, file transfers will be restricted to/from the home directory tree on the remote system by disallowing all paths that begin with a leading ´/´ or that contain an embedded ´**..**´ specification. In this restricted mode, only transfers containing PATHs relative to the HOME directory will be accepted.

Multiple Interfaces

If multiple interface boards are installed on the originating host, the **pull** command will use the default processing to select the interface for the out-going call. See *dkdial*(3X) and *authorize*(1M) for more information.

WARNINGS

If the source *destination* is identical to the target host and the source *directory* is identical to the target directory, then the **pull** command will overwrite *filename* and its contents may be destroyed.

The modification times are preserved on transferred files as long as they are earlier in *relative* time (i.e., seconds since the 00:00:00 GMT, January 1, 1970, epoch) than the current relative time on the local machine. If the modification time for a file would date that file in the future on the local machine, the current time on the local machine will be used as the file modification time.

FILES

/opt/dk/bin	directory in which this command resides
/etc/opt/dk/dkhosts	host control file for destination mapping

SEE ALSO

push(1C), *authorize*(1M), *dkdial*(3X), *maphost*(3X), *dkhosts*(4), *srvtab*(4).
time(2) in the *UNIX System V Programmer's Reference Manual.*

NAME

push – transfer files to another system

SYNOPSIS

push [– **L**] *destination filename ... directory*

push [– **L**] *destination – directory < file_list*

DESCRIPTION

push establishes a data switch circuit to the target (remote) host named in *destination* and transfers files to that host.

The *filename*s are files or directories on the source (local) machine. The *filename*s are placed in the *directory* on the target machine. If the *directory* does not begin with a ´/´, it is interpreted relative to the user's HOME directory on the target *destination*. The *directory* will be created, if required, before the files are transferred. Specifying a directory as one of the *filename*s will transfer the entire directory tree beginning at the named point.

The second command format takes the list of files to transfer from the standard input. It differs from the first format, however, in that the position of the files in input pathnames is preserved. For example,

```
push lxho9 a/b c a/d/e /tmp/one
```

creates files */tmp/one/b*, */tmp/one/c*, and */tmp/one/e*, while

```
push lxho9 - /tmp/two <<!
a/b
c
a/d/e
!
```

creates files */tmp/two/a/b*, */tmp/two/c*, and */tmp/two/a/d/e*. The second format is useful in combination with *find*(1) to select portions of a directory tree to transfer.

push preserves the file modes and modification times of the files it moves. The original file owner (numeric user ID) is preserved if the effective user ID of the process on the target machine is **root**. Otherwise the files will be owned by the user's login on the target host.

push preserves the name, type and contents of the files it moves with the following exceptions.

Long Names

If the target machine is a SVR4 implementation but the target file system does not support file names greater than 14 characters and the source machine transfers a file with a name greater then 14 characters, the file name will be truncated to 14 characters. The remote side will warn the user for each file name that is truncated.

Long Names

If the target machine is not a SVR4 implementation and the source machine transfers a file with a name greater then 14 characters, the name will usually be truncated to 14 characters. **Note**: A few pre-SVR4 implementations support long file names but the **push** command has no way of knowing if these systems do or do not. The local side will warn the user for each file name that may be truncated.

Symbolic Links

Files of type symbolic link will be preserved unless the '– **L**' option is used or the target machine does not support symbolic links. A transferred symbolic link will be identical to the source file; it may, however, have a different context in the target environment. If the '– **L**' option is used or the target machine does not support symbolic links, the source machine will follow symbolic links with the following behaviors: The symbolic link will be treated as if it were the file type of the file pointed to. If the file does not exist or the user does not have permission to access the file, no transfer will take place and the source machine will issue a warning. If, in following a path that contains a symbolic link that points to a directory, the source machine finds a directory that has already been transferred, it will not transfer it a second time. The source machine, however, will always transfer directories in a path that does not contain a symbolic link even if that directory has already been transferred while following a path that does contain a symbolic link. In both cases the source machine will warn the user for every affected directory.

The **push** and *pull*(1C) commands invoke the **pupu** program (*/opt/dk/bin/pupu*) on the remote system to handle the remote end of all file transfers. If the *srvtab*(4) file on the remote system invokes the **pupu** program with the ´– **r**´ option, file transfers will be restricted to/from the home directory tree on the remote system by disallowing all paths that begin with a leading ´/´ or that contain an embedded ´**..**´ specification. In this restricted mode, only transfers containing PATHs relative to the HOME directory will be accepted.

Multiple Interfaces

If multiple interface boards are installed on the originating host the **push** command will use the default processing to select the interface for the out-going call. See *dkdial*(3X) and *authorize*(1M) for more information.

WARNINGS

If the source host is identical to the target *destination* and the source directory is identical to the target *directory*, then the **push** command will overwrite *filename* and its contents may be destroyed.

The modification times are preserved on transferred files as long as they are earlier in *relative* time (i.e. seconds since the 00:00:00 GMT, January 1, 1970, epoch) than the current relative time on the local machine. If the modification time for a file would date that file in the future on the local machine, the current time on the

local machine will be used as the file modification time.

FILES

/opt/dk/bin	directory in which this command resides
/etc/opt/dk/dkhosts	host control file for destination mapping

SEE ALSO

pull(1C), *authorize*(1M), *dkdial*(3X), *maphost*(3X), *dkhosts*(4), *srvtab*(4).
time(2) in the *UNIX System V Programmer's Reference Manual.*
find(1) in the *UNIX System V User's Reference Manual.*

NAME

route – manipulate the routing tables

SYNOPSIS

route flush [<**net**|**host**>]
route add [<**net**|**host**>] *destination gateway metric* [**netmask** *value*] [**mtu** *value*]
route delete [<**net**|**host**>] *destination gateway*

DESCRIPTION

Route is used to manipulate the network routing tables used by *ip* to determine which local network interface should be used to transmit a packet.

The **flush** command will remove all gateway routes (see *netstat(1)*) from the tables. If the optional **net** or **host** keywords is used, only gateway routes of those type will be removed.

The optional keywords **net** and **host** force the *destination* of the route to be interpreted as a network or host, respectively. If neither option is specified, the Internet address of the *destination* is used to determine the type. The *destination* will be interpreted as a network if the host part of the Internet address is INADDR_ANY or the address matches an entry in the networks database (see *networks(4)*). Otherwise, the *destination* is presumed to be a host.

Destination is the name or Internet address of the host or network to which the route leads. The destination **default** will match any host or network address, the default route is used for outbound packets to any destination for which a more specific route does not exist.

Gateway is the name or Internet address of the gateway through which packets intended for the destination should be routed.

Metric is the number of hops from the local host to the *destination*. The *metric* between the local host and another host on the local network will be zero. If the route is to a destination connected through a gateway, the *metric* will be greater than zero.

Netmask can be used when installing network routes. *Value* can be represented in any of the normal forms associated with network masks. The netmask is applied to the destination address when IP is looking for network routes.

Mtu and it's *value* allow the route to have a maximum transmission unit (MTU) associated with the route to *destination*. *Value* must be less than or equal to the MTU associated with the network interface used to get to *gateway* (see *netstat(1) -i*). If the **mtu** option is not given when installing a route, IP will default the route MTU to the network interface MTU used to get to *gateway*. The route MTU is given to TCP when TCP asks IP for the Maximum Segment Size (MSS) it should use when communicating with *destination*.

Only the superuser can modify the routing tables. The command **netstat -r** will display the current routing tables.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

add host *destination*: gateway *gateway*
add network *destination*: gateway *gateway*
The specified route was successfully added to the route table.

del host *destination*: gateway *gateway*
del network *destination*: gateway *gateway*
The specified route was successfully deleted from the route table.

destination gateway **done**
This message is displayed for each route deleted by the **flush** command.

not in table
A delete operation was attempted for an entry that wasn't present in the tables.

MTU too large
The entry was not added to the table because the MTU value requested was too large.

no current route to gateway
The entry was not added to the table because there is no route to *gateway*.

routing table overflow
The entry was not added to the table because the table is full.

already exists.br The entry was not added to the table because the same route already exists.

illegal flags set
RTF_UP flag not on.

NOTES

Using the **flush** command of *route(1M)* while *routed(1M)* is running will cause inconsistencies in the route tables. If this happens, the route daemon, *routed(1M)*, must be restarted.

SEE ALSO

netstat(1)
named(1M), *routed(1M)*

NAME

statlcs - check the interfaces and core processes status of the LCS60

SYNOPSIS

statlcs [**-t**]

DESCRIPTION

statlcs with **-t** displays the status to the terminal; without the **-t** option, **statlcs** outputs the status into the file */tmp/statlcs.log*

EXAMPLES

An example of **statlcs -t** is shown:

```
                    LCS60 STATUS REPORT
                   ====================

     Ethernet interface status:
          Interface to en0 is UP.

        Data Switch status:
          Fiber Interface to data switch is UP.

     Process status:
          routed     is UP.
          snmpd      is UP.
          tlid       is UP.
          inetinit   is UP.
          lcm        is UP.
          dkdaemon   is UP.
          morse      is UP (IP Network Security Group).
          atmgr      is UP.
          ipxd       is UP.
          sapd       is UP.
```

Where:

"morse" is the official name (i.e., nodename) of your LCS60.

FILES

/usr/etc/statlcs

NAME

telnet – log in to remote host

SYNOPSIS

telnet [**-e***c*] [**-8**] [*host* [*port*]]

DESCRIPTION

Telnet is used to communicate with another host using the TELNET protocol. When invoked without the *host* and *port* arguments, *telnet* enters command mode, as indicated by its prompt (*telnet*>). In this mode, it accepts and executes the commands discussed below.

When invoked with a *host* [and *port*], *telnet* performs an **open** command with those arguments. The *host* can be either the host name or its Internet address. The *port* can be either the service number or its name (see *services(4)*). If *port* is not specified, *telnet* will attempt to contact the server at the default port. Once a connection has been opened, *telnet* enters input mode. In this mode, all text entered from the keyboard is sent to the remote host for processing.

To enter command mode from input mode, enter the *telnet* escape character. To return to input mode, enter a carriage return at the *telnet*> prompt. To execute a single command from input mode, and return automatically to input mode, enter the *telnet* command preceded by the escape character (for example, **˜linemode**). The default escape character is the tilde (˜). Use the **-e** command line option or the **escape** command to change the escape character for a *telnet* session.

The **-8** option enables the transmission of 8-bit data to facilitate communication with hosts using an 8-bit character set such as the Asian or European character set. If this option is not used, parity bits are stripped from the data.

Logging out of the shell on the remote host will terminate the *telnet* connection, returning you to the local shell if the connection was opened from the *telnet* command line or to the *telnet*> prompt if the connection was opened from command mode. This can also be accomplished with the **close** command. The **quit** command will terminate both the open connection and the *telnet* session, always returning you to the local shell.

COMMANDS

The following commands are recognized by the *telnet* command interpreter. They may be abbreviated, so long as they remain unique. The normal terminal editing conventions are available in command mode.

close Close an open *telnet* connection, returning to the *telnet*> prompt (command mode) or to the local shell (input mode).

crmod

Toggle carriage return mode. When disabled (default), no translation of carriage-return characters takes place. When enabled, a carriage-return received from the remote host will be mapped into a carriage return and a line feed. This mode does not affect characters typed by the user, only those received. This mode is required by hosts that prefer the user to do local echoing.

eight Toggle eight-bit mode. When disabled (default), the high order bit is stripped on each byte to ensure transmission of valid seven-bit characters. When enabled, *telnet* will not strip the high-order bit, facilitating communication with hosts using an 8-bit character set such as the European or Asian character set. The **-8** command line option also enables 8-bit mode.

escape *c*
Change the *telnet* escape character to the given *c*. The default escape character is the tilde (~). Control characters should be specified as ^ followed by a single letter; for example, control-X is **^X**. The **-e** command line option also changes the escape character.

help [*command*]
? [*command*]
Display a list of *telnet* commands (no arguments), or a description of the specified *command*.

linemode
Toggle line mode. When disabled (default), each character is transmitted as it is entered. When enabled, the local host will buffer all characters until a carriage-return/line-feed sequence is entered, at which time the entire line is transmitted.

localecho
Toggle the local echo mode. When disabled (default), the remote TELNET server echoes input. When enabled, the local tty driver echoes characters as they are input.

negotiate [*command option*]
Negotiate TELNET options over an open connection. The options negotiations follow the loop-preventing rules defined in the RFC 854 specifications. For a detailed description of the options, see the TELNET specifications (RFC 854-861). When *command* and *option* are specified, *telnet* will negotiate that option and return to the command or input mode prompt.

When *command* and *option* are omitted, *telnet* will enter negotiate mode, as indicated by the *negotiate*> prompt. To negotiate an option in this mode, enter *command option* at the prompt. To return to command or input mode from negotiate mode, enter a carriage return at the *negotiate*> prompt.

The negotiate commands are:

? list the commands and options that can be negotiated

DO request the remote server to *start* performing the option

DONT
request the remote server to *stop* performing the option

WILL
inform the remote server that you will *start* performing the option

WONT
inform the remote server that you will *stop* performing the option

The following options can be negotiated:

binary transmit in binary (raw) mode

echo remote echo (input is echoed by the remote server)

exopl extended options list (negotiate from the extended options list)

status display option status (display options currently in effect)

tm timing mark (send a timing mark)

Options can be abbreviated to the shortest unique sequence. No options are defined on the extended options list at this time. Note that the **sga** (suppress go ahead) option can no longer be negotiated. This option will still be recognized and processed correctly by the telnet daemon to support communications with older implementations, however.

open [**-e***c*] [**-8**] *host* [*port*]
Open a connection to the named host. The **-e** option will select an alternate escape character for the session. The **-8** option will enable eight-bit mode for the session. *Host* can be either a host name or Internet address (see *hosts(4)*). *Port* can be either a service name or number (see *services(4)*). If no port number is specified, *telnet* will attempt to contact the server at the default port.

options
Toggle viewing of TELNET options processing. When disabled (default), options negotiation is conducted silently. When enabled, options negotiation will be displayed. Options sent by the local server are labelled **SENT**; options received from the remote server are labelled **RCVD**.

quit Close the open TELNET connection, if there is one, and exit to the local shell.

status Show the current status of the **telnet** connection, modes, and options.

transnvt [*command*]
Send Network Virtual Terminal (NVT) commands to the remote server over an open connection. The NVT commands help to preserve such functions as abort output, interrupt, and break, which may be invoked by different keystrokes on the local and remote hosts. When *command* is specified, *telnet* will send that NVT command and return to the command or input mode prompt.

When *command* is omitted, *telnet* will enter transnvt mode, as indicated by the *transnvt*> prompt. To send an NVT command in this mode, enter *command* at the prompt. To return to command or input mode from transnvt mode, enter a carriage return at the *transnvt*> prompt.

The valid NVT commands are:

ao send an abort output request

ayt send a message (are you there?) to remote server

brk send a break request

ec send an erase character request

el send an erase line request

dm send a data mark to signify end of urgent data

ip send an interrupt request

nop send a null operation

? display a list of *transnvt* commands.

z Suspend the *telnet* session. True job suspension is implemented if supported by the original shell (*csh* or *ksh*). If not (*sh*), a new local shell will be created.

NOTES

The TELNET specifications specify defaults for line mode transmission with the local tty driver echoing. The Wollongong implementation, by default, provides character mode tranmission with the local tty driver echoing.

DIAGNOSTICS

Exit status is zero for normal termination, a positive number for error termination.

SEE ALSO

telnetd(4)

F User Information

Introduction

This Appendix provides examples of software packages that may be used with the LCS60. This Appendix is by no means comprehensive.

In order to configure your client software for use with the LCS60 for ARAP, PPP, and / or SLIP service, you *must* refer to the documentation provided with that software. **This Appendix offers examples only.**

Inclusion of various software packages in this Appendix is *not* an endorsement of any of these products. If you encounter difficulty with your client software configuration, contact the manufacturer of the client software. **Lucent Technologies provides support for the LCS60 side of the configuration only.**

Client Software Configuration

To use the LCS60 as a server for ARAP, PPP, or SLIP service, the remote user must have client software loaded on his or her PC or Macintosh that conforms to the ARAP, PPP, or SLIP protocol specifications. These client packages provide scripts that can be tailored by the remote user to guide him or her through dialing the modem, NAC authentication (if applicable), and dialing the LCS60 for remote access service. For information on configuring your client package, refer to the documentation for that software.

To configure your software to use the LCS60 as the server:

- Set up the connection to ARAP, PPP, or SLIP to send the following:

  All users:

  — Destination [refer to the *Service Connection Dialstrings* section of the appropriate chapter for PPP (Chapter 4), SLIP (Chapter 5), or ARAP (Chapter 6)].

Users with a NAC security server:

— Destination (as described above for **All Users**)

— NAC User ID

— NAC Password.

- Enter any options directed by your package (refer to the documentation for the package you are using).
- Specify parameters (e.g., host name, domain name, etc.) as required.

Client Packages

A variety of ARAP, PPP, and SLIP software packages are available. Some examples are shown in this section. This section is *not* comprehensive; software packages that are not listed may also be used.

Mac Connection – CCL Script

You can use a Connection Control Language (CCL) script similar to the one shown in Screen F-1 in order to establish a PPP or ARAP connection. After creating or editing the CCL Script, refer to section *PPP Service Examples* or *ARAP Service Example*.

Note: The CCL documentation will indicate the supported baud rates.

Note: Screen F-1 shows a CCL script for PPP. Screen F-1 may be used for ARAP by substituting *arap* for *ppp* in the lines which include the string *nj/exch/system.ppp*.

Screen F-1: CCL Script – Example

```
!
!
@ORIGINATE
@ANSWER
! (xxxxx)
note "Communicating at 38400 bps." 2
CommunicatingAt 38400
serreset 38400, 3, 8, 1

note "Dialing ^1" 3
write "ATDT^1/38400\13"
!

@LABEL 19
write "\13"
matchstr 1 20 "USERID"
matchread 400
jump 59
@LABEL 20
note "Got USERID"
ask 1 "Enter USERID"
write "^*\13"
matchstr 1 21 "Password:"
matchread 400
jump 59
@LABEL 21
note "Got Password"
ask 1 "Enter Password"
write "^*\13"
matchstr 1 22 "DESTINATION:"
matchread 400
jump 59
@LABEL 22
write "nj/exch/system.ppp"
note "Sent nj/exch/system.ppp"

matchstr 1 24 "PPP (or ARAP) ready"
matchread 400
jump 59
@LABEL 24
note "Got PPP (or ARAP) ready"
pause 40
exit 0
```

Screen F-1: continued on next page

Screen F-1: *Continued*

```
!
@LABEL 59
exit -6019
!
! Attempt to hang up the modem
!
@HANGUP
exit 0
```

Edit this script with the information appropriate for your modem and configuration. The entries in the above script are described below:

!	Indicates a comment.
@ORIGINATE @ANSWER	Labels to begin execution of originate and answer mode.
xxxxx	Anything specific to your modem should go here. Refer to your modem documentation.
38400	Baud rate.
note "**Dialing ^ 1**"	Writes to a log.
write "**ATDT^1**"	Writes to serial driver.
ask...	This line tells the system to prompt for the information (in this example for the User ID and password). Without this line, you would need to hard code the information into the script.
@LABEL 19	Numeric label.
matchstr 1 20...	Match incoming characters. The *20* in this line is a label.
matchread 400	Reads input from the serial driver and compares the input to the current match string.

USERID, Password, DESTINATION	Your user ID, password, and DESTINATION.
nj/exch/system.ppp	Your LCS60 dialstring for PPP; use the ARAP dialstring, *nj/exch/system.arap*, for ARAP.
exit 0	Terminates execution of the script (in this example, 0 is defined as a good return).
exit -6019	Terminates execution of the script (in this example, -6019 is defined as a bad return).
@HANGUP	Marks the point in the script where execution begins to hang up.

Note: Refer also to the software documentation.

CCL and Modem Hints

The following are suggestions designed to eliminate problems when setting up your modem and editing or creating your CCL script. For complete details on your modem, contact your modem vendor.

CCL

Use a generic CCL script or one specific to your type of modem and add:

```
@LABEL 19
write "\13"
matchstr 1 20 "USERID"
matchread 400
jump 59
@LABEL 20
note "Got USERID:"
ask 1 "Enter USERID"
write "^*\13"
matchstr 1 21 "Password:"
matchread 400
```

```
@LABEL 21
note "Got Password:"
ask 1 "Enter Password"
write "^*\13"
matchstr 1 22 "DESTINATION:"
jump 59
matchread 400
jump 59
@LABEL 22
write "nj/exch/system.ppp/arap"
note "Sent nj/exch/system.ppp/arap"
```

Be sure you don't have conflicts with existing label numbers.

Modem

The great majority of modems will work correctly right out of the box using the default settings. For the few that do require some configuration:

- Make sure the serial speed setting for MSM/TY on the data switch are set correctly. Check your modem reference for the correct AT commands.
- Make sure the MSM/TY data switch modem has *answer mode* set to pick up on a certain number of rings (if the number of rings is set to zero, it will not pick up). Check your modem reference for the correct AT commands.

PPP Service Examples

Windows 95 – IPX over PPP

Note: Windows 95 is equipped with detailed on-line help. For any problems related to Windows 95, refer to the on-line help or contact Microsoft.

PC Configuration

Before you can make a PPP connection using IPX with Windows 95, you must configure your PC as follows:

- Install the following Client, Adapter, and Protocol software (included with Windows 95):
  - — Client Software for NetWare Networks (currently R3.X only)
  - — Protocol Software for IPX (and IP if desired)
  - — Dial-up Adapter Software.

  To install the software, select Control Panel, then click on Network. Click on the Add button to display the Select Network Component Type. Select Client, Adapter, and Protocol in turn to add the software needed.
- Once this software has been installed, you must configure the properties for your particular configuration. To do so, click on Properties in the Network window. Refer to the Windows 95 on-line help screens for details.
- Establish the PPP connection as follows (refer to Figures F-1 and F-2):
  1. Click on the Dial Up Networking icon (Figure F-1, left) to display the Dial Up Networking window (Figure F-1, right).
  2. From this window, select the Make New Connection icon to enter the connection parameters. Once you have entered the connection parameters, the system will save them with a name you select and place an icon with that name in the Dial Up Networking window. The next time you want to make the same connection, you need only click on that icon.

     Note: When defining the connection parameters for your system, select Display Terminal Window *after* dialup.

  3. Once you have entered the connection parameters, a Connect to window will be displayed. Enter the appropriate information. This will open a Terminal Window in which you can authenticate and enter the data switch dialstring for the LCS60.

Figure F-1: Windows 95 IPX Over PPP – Example Screens

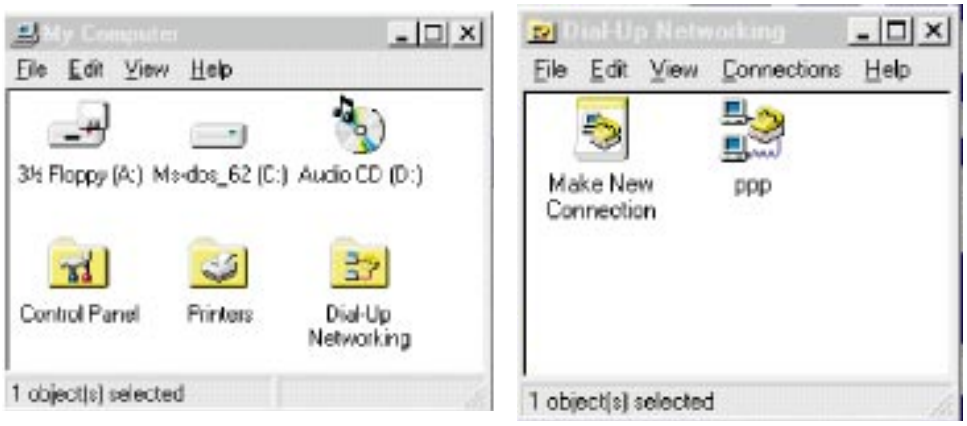
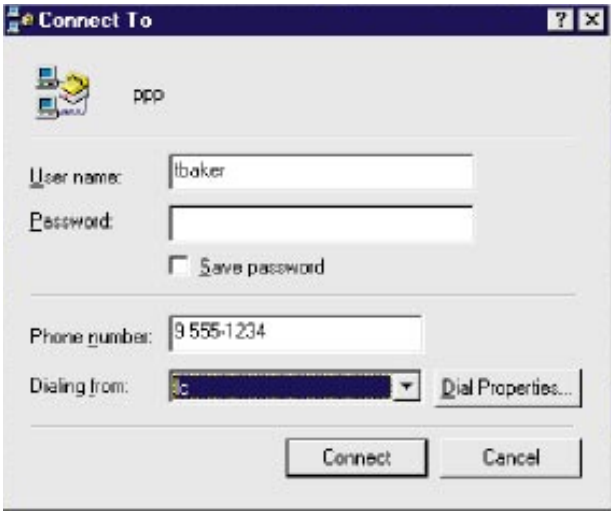


Figure F-2: Windows 95 IPX Over PPP – Connect To Example Screen



User Information

Note: In the previous screen, Password is not used.

PPP Connection

After completing the client configuration procedures described above, establish the PPP connection as follows:

- Enter the connection dialstring in the Terminal Window as shown in the example below. Be sure to enter F7 after entering the dialstring.

```
DESTINATION: mlkway/earth/morse.ppp
```

Note: Windows 95 can also use a customized dial-up script. Refer to the Windows 95 on-line help for details on scripts.

WIN PC/TCP 3.0

Note: WIN PC/TCP 3.1 is different from 3.0. Refer to the user documentation for specific details.

PC Configuration

Before you can make a PPP connection using PC/TCP, you must configure your PC as follows:

- Define a new session for the LCS60 server
- Modify the existing dialup and hangup scripts.

Procedures for these tasks are given in the *Using PC/TCP in Windows* manual provided with the PC/TCP software.

The dialup script initializes and dials the modem, handles login authentication (such as login/password prompts from the NAC) and sends the LCS60 dialstring in response to the Lucent Technologies data switch `DESTINATION` prompt. The hangup script will terminate the PPP connection and hang up the modem. Templates for these scripts are supplied with the package; a sample is shown in Screen F-2.

Screen F-2: Sample LCS60 dialup.scr

```
(comment, {})
(comment, {You must change the phone number, username, and password.})
(comment, {If you change a modem command prefix, use uppercase characters.})

(comment, {})
(comment, {To operate a modem which supports the Hayes Command Set with })

(comment, {   command extensions:})
(send, {})
(send, {AT&F&C0}(cr){})
(comment, {})
(comment, {Leave first pause time at 1 second (minimum time possible).})

(comment, {})
(pause, 1000)
(comment, {})
(send, {})
(send, {AT&Q5N1DT 5551212}(cr){})
(pause, 10000)
(comment, {})
(comment, {Pause to confirm that the physical layer is open})

(poll, physical, open)
(comment, {For most situations, an 8 sec pause should suffice for the remote})

(comment, {system to respond with a login prompt.  Change if necessary.})

(pause, 14000)

(comment, {})
(send, {janedoe}(cr){})
(comment, {})
(comment, {For most situations, a 4 second pause should suffice for the remote})

(comment, {system to respond with a password prompt.  Change if necessary.})

(pause, 1000)
(define,temp,(receive,3000,Password:))
(has,temp,Password:,{
     (send,(output,{password please?  })(input)(cr))
})
(comment, {})
(comment, {For most situations, a 2 second pause should suffice for the remote})

(comment, {system to respond to your password.  Change if necessary.})
(comment, {})
```

Screen F-2: continued on next page

Screen F-2: *Continued*

```
(pause, 2000)
(comment, {})
(comment, {Send \r to get DESTINATION prompt})
(send, {})
(pause, 1000)
(comment, {})
(comment, {Send dialstring for morse})
(send, {mlkway/earth/morse.ppp}(cr){})
(pause, 4000)
(comment, {})
(comment, {Switch the packet driver from character mode to packet mode.})
(comment, {})
(changemode, packet)
(comment, {})
(comment, {Send a request to open the LCP layer})
(comment, {Pause to confirm that the lcp and ipcp layers are open.})
(comment, {})
(poll, lcp, open)
(poll, ipcp, open)
```

Note: The above dialup script uses the script language **slang**. WIN PC/TCP can also use a script language **comscrpt**; for additional information contact Apple Computer Co.

PPP Connection

After completing the client configuration procedures described above, establish the PPP connection as described in this section.

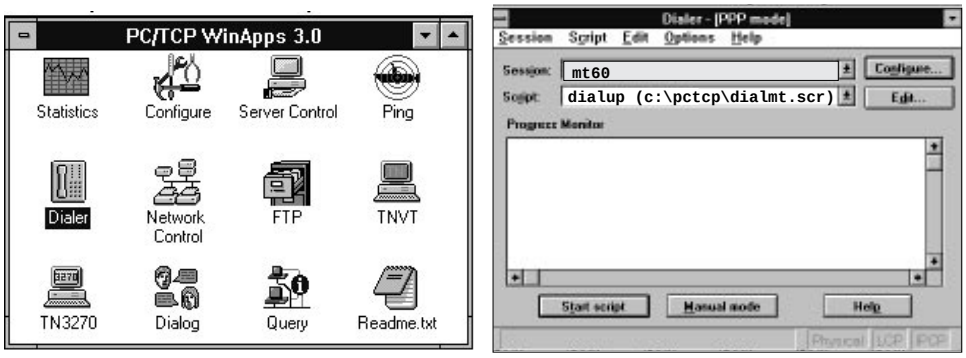
Note: Enter information in the fields shown on the screens; example entries are shown in the figures.

From the PC/TCP Main menu shown on the left in Figure F-3, select Dialer. This will display the Dialer screen shown on the right in Figure F-3.

You can configure the PPP connection options, as described in the PC/TCP Software documentation by selecting **Configure...**. You may specify the PPP LINK and IP negotiation values that will be used during negotiation with the LCS60 when you make the connection.

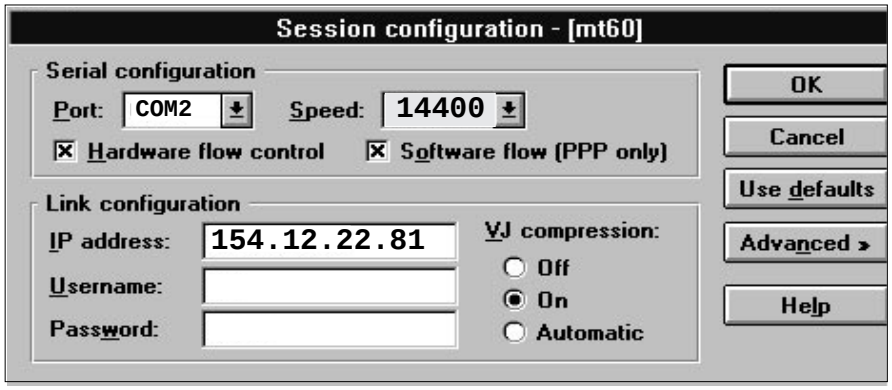
The Dialer screen allows you to specify the PPP server to which you would like to connect and the connection script to use.

Figure F-3: PC/TCP Example Screens



The choices for servers and scripts are read from the *pctcp.ini* file. Make sure you have added a session for the LCS60 server and created the dialup and hangup scripts for it. Select **Configure...** to set up your connection configuration for the LCS60. This will display the screen shown in Figure F-4.

Figure F-4: PC/TCP Session Configuration Screen Example



Set the port and baud rate to the ones you are using with your modem. Enable hardware flow control.

To have the LCS60 assign your client software an IP address dynamically, leave the IP address as zeroes and add the **-D** option to your data switch dialstring. For a privately administered address, enter the IP address your LCS60 administrator assigned to your client software. To request your reserved IP address, leave the IP address as zeroes and omit the **-D** dialstring option. Leave the login and password fields blank; the client software will not be using PPP authentication, but the NAC instead (by means of the dialup script.) Leave the VJ settings as the defaults.

Note: Negotiation of the TCP/IP header compression option is defined in RFC1332. If your client package supports Van Jacobson Header Compression, then configure this feature on your Mac or PC. The size of each packet can shrink up to 35 bytes, thereby giving your PPP session a significant performance boost.

Activate the dialup script by selecting **Start Script**. As the connection progresses, a Progress Monitor screen will show dialup script activity to the LCS60. Once the **IPCP** is highlighted, the PPP connection is established.

Note: Be aware that baud rates are dictated by the application, serial drivers installed, and the version of the PC UART.

InterPPP

Note: InterPPP II is different from InterPPP. Refer to the user documentation for specific details.

The InterPPP software requires minimal Mac configuration for AppleTalk or IP over PPP.

Note: Make sure MacTCP is installed in the Control Panels folder. MacTCP should come with the InterPPP package. TCP/IP should be selected under the MacTCP for the initial connection.

Note: Remember to reselect PPP for the next PPP session.

Connection

To establish the PPP connection, perform the following steps:

1. From the Network Control Panel of the Control Panels folder select the AppleTalk/PPP icon. (Refer to Figure F-5.) This tells the AppleTalk software to use the serial port instead of the built in LAN port.
2. Launch the InterPPP application.
3. Under **File**, choose **New** or **Open** CCL Script; create/edit and save the script.
4. Under **Configure**, select **Modem** (refer to Figure F-6):
   - — Choose **Port**; select **Modem Port**
   - — Choose **Modem**; select your CCL script
   - — Choose **After Connect**: select **StartPPP**; then close the window.
5. Under **Configure**; select **PPP**: choose the PPP settings (Figure F-6); then close the window.

6. To set the IP address, under **Configure**, select TCP/IP (Figure F-7) and enter the IP address in "Local IP Address."

   Note: If you are using a privately administered IP address, enter it in the Local IP Address field, otherwise the LCS60 will dynamically assign an IP address (if a negotiable IP address has been administered in the client software package).

7. From the Main Screen, Figure F-8:

   — Enter the phone number or the dialstring.

   — Under **File**, select **Save As** to save the setup to a file name (for example, **lcs60**). This will allow you to launch **lcs60** the next time you want to establish the PPP connection, rather than repeating this procedure.

8. Select **Connect** from the main screen (Figure F-8) to make the connection.

   Note: The status will be displayed on the right side of the main screen as shown in Figure F-8.

9. To check AppleTalk status, select **AppleTalk** under **Configure**. This will display a screen similar to that shown in Figure F-9.

Note: For additional status, under **Status** select:

— **Status** for overall status of the connection

— **Activity Log** to see log entries of the connection.

Figure F-5: Network Control Panel

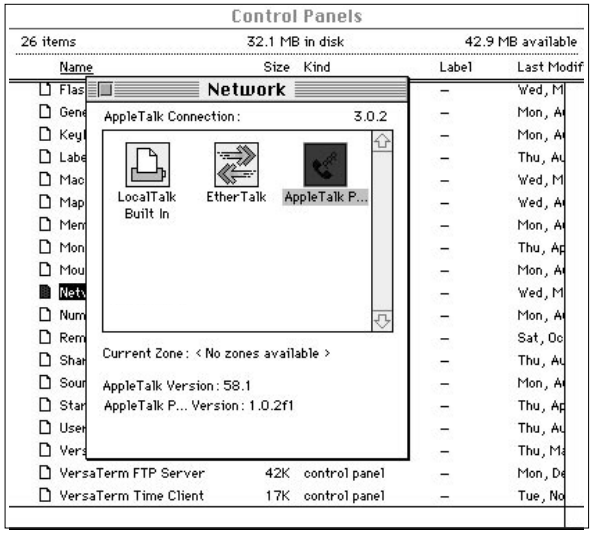
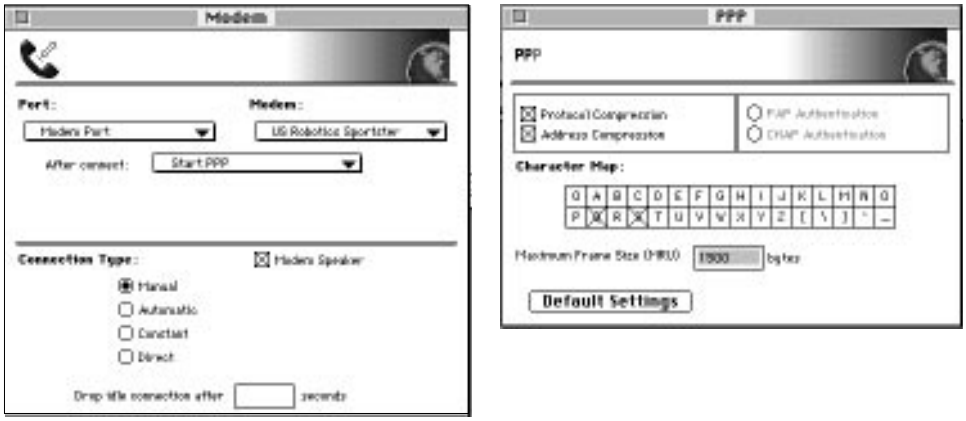


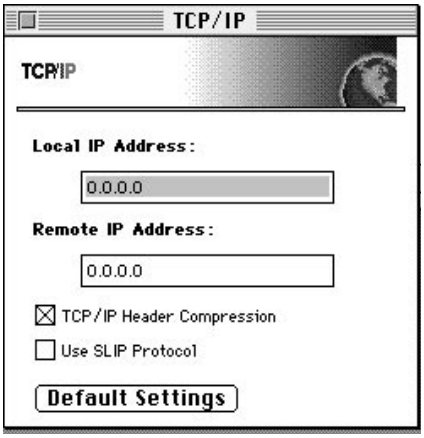
Figure F-6: Modem Port and PPP Screens



User Information

Notes: *US Robotics Sportster* in the preceding figure is the dialing script (CCL) which contains the necessary instructions to set up the modem and log on to the LCS60. *Modem Port* selects which device the modem is connected to; the modem port is usually designated. When setting your physical link parameters (LCP) you can take the defaults as shown on the right. Make sure PAP/CHAP authentication are *not* selected. Authentication is handled by the NAC.

Figure F-7: IP Address Screen



Note: If you are using a privately administered IP address, enter it in the Local IP Address field on the screen above, otherwise the LCS60 will dynamically assign an IP address (when a negotiable IP address has been administered in the client software package).

Figure F-8: PPP Connection Screen

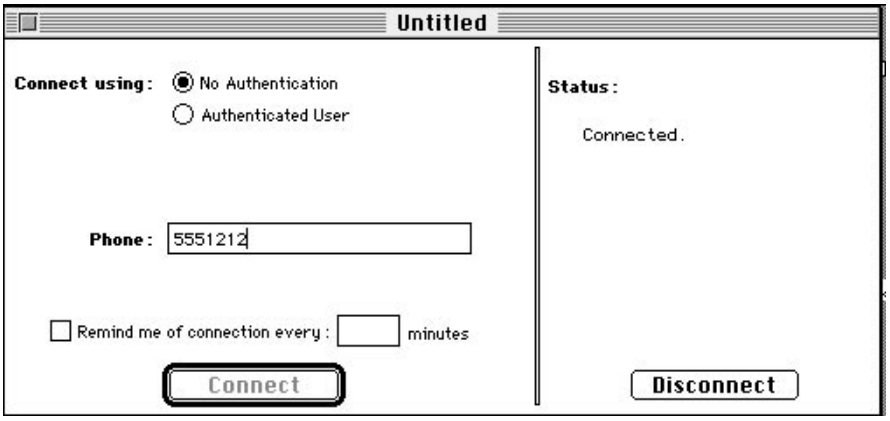
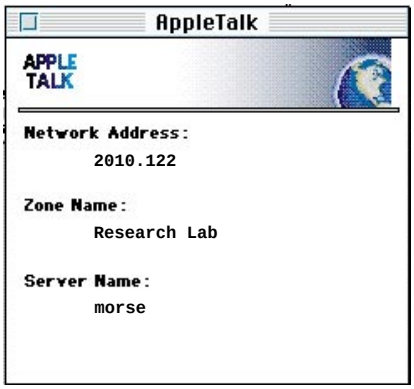


Figure F-9: AppleTalk Status Window



User Information

SLIP Service Examples

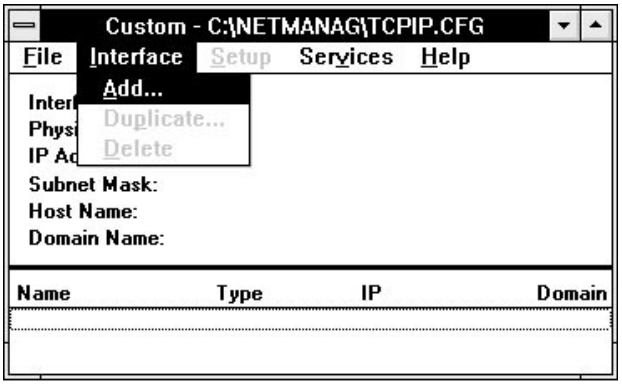
ChameleonNFS 4.0

Note: ChameleonNFS 4.5 is different from ChameleonNFS 4.0. Refer to the user documentation for specific details.

Before you can make a SLIP connection using ChameleonNFS, you must configure the SLIP interface through Windows; Figures F-10 - F12 show an example configuration for dynamic IP address acquisition.

1. Under the Custom window, select *Interface* and add a SLIP interface.

Figure F-10: Custom Interface Window



2. Under the Custom Setup window (Figure F-11), configure the following:

- IP address (**1.1.1.1** for a dynamic IP address)
- Modem
- Login (Figure F-12)
- Port
- Dial

User Name field = NAC User ID; User Password field = NAC password; Startup Command field = SLIP dialstring

Note: *NEWT* will display the dynamic IP address your PC has been assigned.

Figure F-11: Custom Setup Window

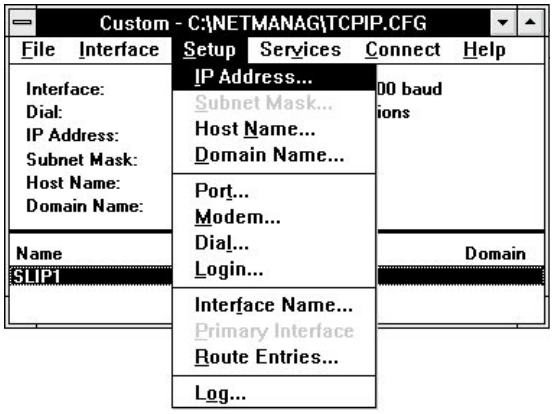
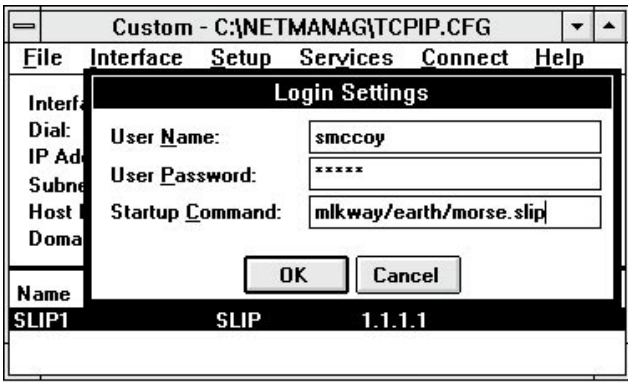


Figure F-12: Login Settings Window



The ID, password and dialstring information provided in the Setup Window (Figure F-12) is called in by the scripting language file (in this example, the

User Information

slip.ini file); refer to Screen F-3 for an example.

3. After configuring *slip.ini*, select "Connect" for the SLIP connection.

Screen F-3: slip.ini File Fragment

```
[DEFAULT]
SCRIPT=name: $u$r word: $p$r -n $6$c$r -i
TYPE=SLIP

[SLIP0]
SCRIPT=DESTINATION: $c$r -n $5
TYPE=SLIP

[SLIP1]
SCRIPT=USERID: $u$r Password: $p$r DESTINATION: $c$r -n $6 -i
TYPE=SLIP
```

Where (for the ChameleonNFS software):

$u sends the Chameleon user ID string as the NAC User ID

$p sends the Chameleon password as the NAC password

$c sends the Chameleon SLIP COMMAND as the data switch dialstring (in the example in Figure F-12, **mlkway/earth/morse.slip**)

$r sends a carriage return

-i tells the script to capture the IP address

-n tells the script not to expect an incoming string

$1-$9 indicates the number of seconds to pause.

Note: All of the variables for the scripting language file are described in detail in the software documentation for the package you are using.

ARAP Service Example

Note: In order to edit the CCL script, you should have the AppleTalk Remote Access Modem Script Workshop software (contact your modem or client software vendor). The CCL documentation will indicate the supported baud rates.

Connection (via Modem)

To establish the ARAP connection, perform the following steps:

1. From the Network Control Panel of the Control Panels folder select **Remote Only**. (Refer to Figure F-13.)
2. Launch the **Remote Access Client** program and select **Guest**. (Refer to Figure F-14.)
3. Select **Remote Access Setup** under **Setup** on the Control Bar (Figure F-15):
   - — Choose **Modem**; select your CCL Script
   - — Choose **Port**; select **modem port**
   - — Use the defaults for all other fields
4. From the Main Screen, Figure F-14:
   - — Enter the phone number.
   - — Use the defaults for all other fields.
   - — Under **File**, select **Save As** to save the setup to a file name (for example, **lcs60**). This will allow you to launch **lcs60** the next time you want to establish the ARAP connection, rather than repeating this procedure.
5. From the Main Screen (Figure F-14), select **Connect** to connect and display the Remote Access Status window (Figure F-16).

Note: Under **Windows**, select **Activity Log** to see log entries for the connection.

Figure F-13: ARAP Remote Connection – Example

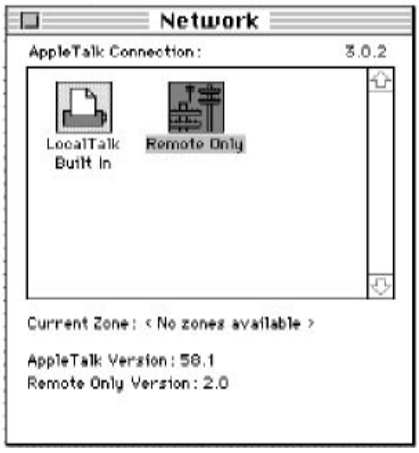
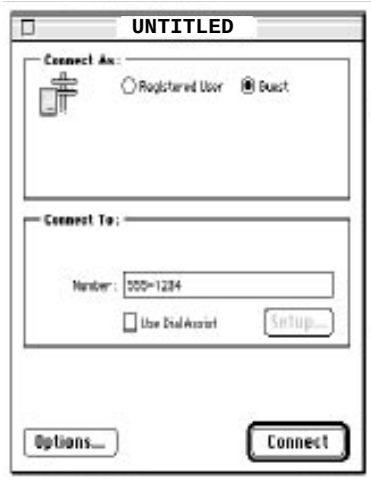


Figure F-14: ARAP Remote Access Setup – Connection Screen



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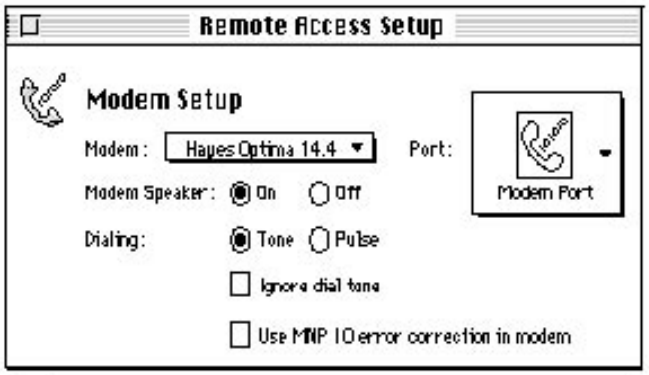
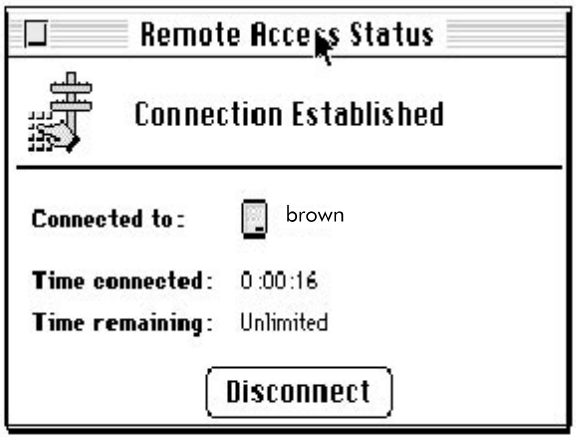
Caution: You must connect as *Guest*. You will receive the following error message if you attempt to connect as *Registered User*.

Figure F-15: ARAP Remote Access Setup – Modem Example



Note: *Hayes Optima 14.4* in the figure above is the dialing script (CCL) which contains the necessary instructions to set up the modem and log on to the LCS60. *Modem Port* is used to select which device the modem is connected to; the modem port is usually designated.

Figure F-16: ARAP Remote Access Status Screen – Example



G Glossary

Glossary

This glossary is provided as an easy reference for terms and parameters used throughout this document.

General

The following terms are used throughout this document.

AppleTalk A link independent protocol developed by Apple.

ARA Apple Remote Access. An ARAP client package from Apple Computer Co.

ARAP AppleTalk Remote Access Protocol. A set of protocols that allows a client computer to connect to an AppleTalk network via a serial connection.

call address The data switch address used to establish connectivity between destinations.

CCL Connection control language.

data switch *Datakit* II VCS, BNS-1000, or BNS-2000.

directory service This service allows LAN hosts to query the LCS60 to obtain a listing of all TCP-to-async port numbers, associated PDDs, and the service type of each port number. Only one port may act as a directory port at a time.

DNS Domain Name Server.

ELAP EtherTalk Link Access Protocol. EtherTalk is Apple's data link protocol that allows Ethernet cables to be used to connect an AppleTalk network.

frame type Indicates the Ethernet or Novell framing type.

host A workstation connected to a network or subnetwork.

host interface name In TCP/IP Protocol, the name given to the interface. A host can have more than one host interface name. (In Figure 3-1, **morse-e0** is the interface name.)

HDLC	High-level data link control. A link level protocol used by PPP.
IETF	Internal Engineering Task Force.
interface	The connection between a host and a network.
internet	A network of networks.
IP Network Security Group	A symbolic name assigned to a virtual subnet IP address. This name matches the group ID assigned on the NAC. Four such IP Network Security groups are supported in LCS60 R2.0; the first IP Network Security group name assigned is the **uname**.
IPCP	IP control protocol.
IPX	Internetwork Packet Exchange protocol.
LAN	Local area network.
LCM	LAN Communications Manager.
LCS	LAN Communications Systems.
MIB	Management information base.
NAC	The Lucent Technologies Network Access Controller. The NAC is used to provide network security.
network name	The name by which the network is identified in the configuration database. (In Figure 3-1, **dock-net** is a network name.)
node	The point where switching between computers and terminals takes place.
node name	The name given to a LCS60. This is the hostname and is independent of host interface names. This becomes the **uname** for this machine (e.g., **morse** in Figure 3-1).
originating group	A group assigned to devices which can call each other.
PDD	Predefined destination.
PPP	Point-to-Point Protocol. Similar to SLIP, but can carry multiple protocols simultaneously.

RIP	Routing information protocol. A configurable **lcsadm** process for routing IP packets.
RFC	Request for comments document of the IETF.
routed	A service which uses RIP to maintain the IP route table. A configurable **lcsadm** process for routing IP packets.
router	A device that routes information between networks.
SLIP	Serial Line IP Protocol. An internet protocol.
SNMP	Simple Network Management Protocol.
socket service	This service is used to allow LAN connected hosts to initiate **uucp** connections to data switch connected hosts. The LCS60 terminates the **uucp** TCP datastream and retransmits it using 8-bit virtual circuits over the data switch network to remote asynchronous endpoints.
subnetwork	In TCP/IP Protocol, a logical subsection of a single internet network (e.g., **dock-net** is divided into subnets **m-net0** and **b-net**).
telnet service	The **telnet** service provides telnet network virtual terminal emulation to a data-switch connected device.
zone	A collection of networks on an AppleTalk internet. AppleTalk uses zones to group resources logically across LANs, independent of device location; that is, zones do not have to be physically contiguous. Zones allow users to find devices easily.

Parameters

The following parameters are used in configuring the LCS60. The parameters are listed alphabetically according to the service being configured.

AppleTalk Network/Zone (atalkas)

network number	This is a number between 1 and 65279. It must not be equal to any other network number in use in the AppleTalk network, and must not be contained within any other network number range in use in the AppleTalk network.

zone name The name of the virtual AppleTalk network. Although an AppleTalk zone name may contain any 8-bit character listed in Table D-1 of *Inside AppleTalk*, Second Edition, the only characters that may be entered as the zone name for the LCS60 virtual AppleTalk network are the printable 7-bit ASCII characters.

The valid characters are the SPACE character, all punctuation marks, digits, and upper-case and lower-case letters. SPACE characters that precede the first non-space character are ignored. All other SPACE characters are retained.

Invalid characters include all control characters, including the horizontal TAB, the DELETE character, and all 8-bit ASCII characters.

Ethernet Interface (etherif)

interface address Specify the internet address. The interface must have a unique internet address. All hosts sharing the same network must have identical network portions in the internet addresses. For example, 154.12.21.5 is a valid host address on network 154.12.21. The internet address for the interface always has four components.

interface alias You may specify the interface alias name (a name that can be used in place of the interface name). It can be any name, but is usually an abbreviation of the name. Separate each alias with blanks or tabs.

interface name Specify a name for the interface to the LAN. For example the interface name is **morse-e0** for the LCS60 named **morse**. The interface name cannot be more than 31 characters. Interface names may contain letters, numbers, dashes, and underscores.

network aliases You may specify the network's alias names (names that can be used in place of the official network name). Separate each alias with blanks or tabs.

network name Specify the name of the network (up to 31 characters) to which this interface is connected (e.g., **dock-net**). Network names may contain letters, numbers, dashes, and underscores.

subnetted network The system will ask if the network is subnetted and if so, prompt for subnet information, actually taking the user through the subnetwork configuration option prompts.

DNS Resolver (dns)

domain	The domain this machine and its name server(s) belong to.
nameserver	The nameserver is identified by its internet address using dotted decimal notation. Multiple servers may be defined in your configuration file; they will be accessed in the order listed until a connection to a server is made.

Define Service Sessions (maxsessions)

session parameter	This parameter defines the session type: async-to-TCP (**asytcp**), TCP-to-async (**tcpasy**), PPP (**ppp**), SLIP (**slip**), and ARAP (**arap**). **maxsessions** defines the maximum number of supported LCS60 sessions for all services.
session parameter value	The number of sessions you want to configure for a specific service. Maximum values: **maxsessions** (180 for a single protocol or 500 for gateway service or, if other protocols are running, the maximum value is 120), **asytcp, tcpasy** (500 or 120 if other protocols are running), **slip, ppp, arap** (120).

SLIP/PPP Service (ipas/ipx)

IP Network Security Group name	A name (1–8 characters) for the workgroup in which the user will be assigned an IP address.
Internet network address	Enter the IP network address for the Network Security Group.
subnet	The system will ask if the the IP network address for the Network security group is divided in to subnets. If **y**, it will prompt for the number of mask bits.
mask bits	Enter the number of mask bits. Refer to the section *Subnet Configuration (subnet)* later in this Glossary.
internet host address	Enter the IP host address allocated for the user ID within the Network Security Group selected.

User login id Enter the remote user's ID. If a NAC is used, this is the NAC ID.

Network Address To configure the network address in **ipx**'s Ethernet Configuration Parameters, enter the actual IPX network number (1–8 digits in hexadecimal) of the LCS60. To configure the network address in **ipx**'s Virtual (PPP) Interface Configuration Parameters, enter the virtual IPX network number. For example, in Figure 3-1, **morse**'s actual IPX network number is **1562** and its virtual IPX network is **57**.

Frame Type Enter the type of framing; **ethernet, 802.2, 802.3** or **snap** used in the IPX network.

TCP-to-Asynchronous Gateway Services (srvports)

enable NOHUP (no hangup) The NOHUP feature keeps a **telnet** session active after the virtual circuit is disconnected. The benefit is automatic reconnection into the data switch network. Enter **y** to keep the session up when the data switch is disconnected; this will force the LCS60 to attempt to re-establish the connection when the data switch is up.

enable 2WAY 2WAY works in conjunction with NOHUP. With 2WAY enabled, the **telnet** user will be prompted to enter the Return key before automatic reconnection into the data switch network. Enter **y** if you want the LCS60 to wait for the user to press the Return key before it attempts to re-establish the connection.

enable SID The SID feature works in conjunction with NOHUP. SID allows the LAN user to automatically pass back through a security server without having to re-authenticate. The period of time that this automatic bypass stays active is dependent on the security server administrator. Enter **y** to enable this feature *only* if the service port is defined to establish telnet service to a NAC Security Server. This feature allows the LCS60 to recognize authorized users within a pre-determined time span (generally hours) and to bypass reauthorization for these users. Enter **other** if the endpoint is *not* a NAC Security Server with the SID feature configured or if you do not wish to bypass reauthorization.

Enable, 8-bit character mode This prompt will be displayed for **telnet** ports only; enter **y** to allow the administrator to configure the service port with 8-bit character mode enabled. The default (**n**) is 7-bit character mode.

inactivity timeout Enter the time in minutes in which the session will terminate if there is no input or output. The default is **n** which is a two minute wait.

PDD To associate a call address with this TCP-to-async port, enter a PDD in the form area/exchange/local address (e.g., **mlkway/earth/yard**) or local address (e.g., **yard**).

port number Enter the number of the port you wish to configure.

security server type Enter **nac** if your system uses a Lucent Technologies Network Access Control System (NAC) R4.0 to provide security service. Enter **other** if this service is provided by a non-Lucent Technologies security server.

service type Enter the type of service being configured: telnet, directory, socket.

TCP window size The allowed values for the TCP window size are: 512, 1024, 2048, 4096, 8192, and 16384; the default is 1024. Generally, choose a small window size for telnet connections, and a larger window size for file transfers.

Wait for input timeout Enter the time in minutes in which the connection attempt will be dropped if no input is received. The default is a two minute wait.

Subnetwork Configuration (subnet)

address Subnetwork addresses are specified in Interface dotted notation. For example, 154.12.26 is a subnetwork of Class B network address 154.12.

host If you know a host on the subnetwork, you can enter **h**. The host address entered in the next prompt will be used to calculate the subnet address.

host address The address of the host on this subnet. The subnet address will be calculated from this host address.

interface address	Specify the internet address for the network named in the previous prompt.
mask bits	The subnetwork mask identifies the subnetwork field of a network address. The length of the subnetwork field is chosen by specifying the number of subnetwork bits that will be used to formulate the network mask for a subnetted network. Enter only the number of bits in the host portion of the IP address. The default number is set to zero. The number of bits specified represents contiguous bits.
network name	Specify the name of the network (up to 31 characters) to which this subnetwork is connected (e.g., **dock-net**). Network names may contain letters, numbers, dashes, and underscores.
subnetwork name	Identifies the subnetwork. Subnetwork names *cannot* be more than 31 characters. They may contain letters, numbers, dashes, and underscores.

Report Fields

The following report fields are found in the LCS60 reports generated by the status commands (e.g, **show**, **trace**, etc.). The report fields are listed according to the directory in which they are generated.

Session Directory

Show ARAP

```
Top>Session> show arap
```

Sesid	Session ID number.
Xmit(Bytes)	Number of bytes transmitted.

Xmit(Pkts) Number of packets transmitted.

Recv(Bytes) Number of bytes received.

Recv(Pkts) Number of packets received.

Recv Errs

- **CRC** Indicates a checksum error for the received PPP frame.
- **BadF** Indicates the number of invalid frames received.
- **Rej** Indicates the number of duplicate or out of sequence frames rejected.

ReXmts Number of re-transmissions (this is seen with the **-v** option). When the connection is idle, this represents the continual keep-alive signals, therefore it is not ordinarily displayed.

Show SLIP

```
Top>Session> show slip
```

Sesid Session ID number.

Name The name of the session. This name will be the letter **s** followed by the data switch channel number.

Mtu The maximum transmit unit (refer to the documentation for the SLIP package you are using).

PriQ Indicates if priority queuing is on (YES) or off (NO) (refer to the documentation for the SLIP package you are using).

Vjslots The number of Van Jacobson compression slots (refer to the documentation for the SLIP package you are using).

Xmit(Bytes) Number of bytes transmitted.

Xmit(Pkts) Number of packets transmitted.

Recv(Bytes) Number of bytes received.

Recv(Pkts) Number of packets received.

Show Async/TCP

```
Top>Session> show asy
Top>Session> show tcp
```

Sesid Session ID number.

Service The service type (e.g., telnet) for TCP and ASYNC sessions.

Char Mode Indicates the mode enabled for the port (8-bit, 7-bit, or binary).

Xmit(Bytes) Number of bytes transmitted.

Recv(Bytes) Number of bytes received.

Connect Time The time the TCP or ASYNC session was connected.

Idle Time The time in hours:minutes format that the session has been idle.

Show PPP

```
Top>Session> show ppp
```

Sesid Session ID number.

Xmit(Bytes) Number of bytes transmitted.

Xmit(Pkts) Number of packets transmitted.

Recv(Bytes) Number of bytes received.

Recv(Pkts) Number of packets received.

Receive Errors

Len Indicates the length of the PPP frame received was not valid.

CRC Indicates a checksum error for the PPP frame received.

State Indicates that the state of the PPP frame received was invalid for HDLC framing.

Alloc Indicates that the system was unable to allocate a buffer for the received frame.

Show PPP – Link, IP, IPX, AppleTalk

```
Top>Session> show ppp link, ip, ipx, atalk
```

Note: Many of the report fields refer to features that are configured on the PPP host with the particular PPP package you are using. Refer to the documentation for your particular PPP package for details.

Sesid Session ID number.

State The state of the session (opened, closed, init, starting, etc.).

Max Config The number of times the LCS60 will try to configure a connection before quitting.

Max Term The number of times the LCS60 will try to terminate the link to the PPP host gracefully before dropping the connection.

Timeout Secs The number of seconds the LCS60 will wait for a response to a configure or terminate request from the peer before timing out.

S Side of the PPP link (**p** peer or **l** local).

MRU Maximum receive unit (refer to the documentation for the PPP package you are using).

ACCM	Asynchronous control character mapping (refer to the documentation for the PPP package you are using).
Magic	The option that detects if there is a loopback situation in the connection (refer to the documentation for the PPP package you are using).
Proto Comp	Protocol compression (refer to the documentation for the PPP package you are using).
Addr Comp	Address field compression (refer to the documentation for the PPP package you are using).
Peer Addr	The IP address of the remote user.
Peer Max Slot	Indicates whether Van Jacobson header compression is being used by the peer or not (**0**). If used, the number is the maximum number of slots.
Peer Comp Slot	The peer's identifier field compression setting (refer to the documentation for the PPP package you are using).
Local Addr	The IP address of the LCS60.
Local Max Slot	Indicates whether Van Jacobson header compression is being used by the LCS60 or not (**0**). If used, the number is the maximum number of slots.
Local Comp Slot	The LCS60's identifier field compression setting (refer to the documentation for the PPP package you are using).
Addr (atalk)	The virtual AppleTalk address <network>.<node>.
Zone (atalk)	Name of the virtual zone.
Router (atalk)	AppleTalk address <network>.<node> of default router (the LCS60).
Server Info (atalk)	The information listed below is given.

Note: The local side (the LCS60 side) is the server, therefore, the *Server Info* fields (*Class, Imp ID*, and *Name*) for the peer should be null. These fields will be populated if the peer is attempting to act as the server.

Class	Equals 1; dial-in server.
Imp ID	Implementation ID: V<major version>.<minor version>.
Name	Name of the server (LCS60).
AT Comp	AppleTalk compression type. (Not supported.)
Route Proto	Routing protocol. (Not supported.)
Broadcast Supp	Broadcast packet suppression. (Not supported, therefore, no packets are suppressed.)

Address (ipx)	IPX network number and node number.
Router Name (ipx)	The IPX router (the LCS60) for the virtual network.
CIPX Max Slot (ipx)	Indicates whether CIPX compression is being used or not (**0**). If used, the number is the maximum number of slots.
Route Proto (ipx)	Routing protocol to exchange. (Not supported.)

Trace ARAP

```
Top>Session> trace arap
```

Sesid	Session ID number.
Name	The name of the ARAP session. This name will be the letter **a** followed by the data switch channel number.
Remote Addr – Zone	The zone name of the virtual AppleTalk network assigned to the LCS60.
Remote Addr – Address	The network and node number assigned to this session.

Remote User The user ID (or numeric equivalent if the **-n** option is used) of the remote user's IP address.

Chan The data switch channel number used for the gateway.

Switch Address The originating group information.

Trace Async/TCP

```
Top>Session> trace asy
Top>Session> trace tcp
```

Sesid Session ID number.

State The state of the TCP-to-Async or Async-to-TCP connection (IDLE, CONN, or FLOW).

Local Address The LCS60 address. This is displayed when using the **-v** option in the form *address.port#* (e.g., **morse-e0.23**).

Port The port number of the gateway. The port number is shown as part of the *Local Address* field when using the **-v** option.

Foreign Address The symbolic name (or numeric equivalent if the **-n** option is used) of the remote host's IP address.

Chan The data switch channel number used for the gateway.

Switch Address The originating group information.

Remote User The NAC user ID if a NAC is used.

Trace PPP

```
Top>Session> trace ppp
```

Sesid	Session ID number.
Name	The name of the PPP session. This name will be the letter **p** followed by the data switch channel number.
Remote User	The symbolic name (or numeric equivalent if the **-n** option is used) of the remote user's IP address.
Chan	The data switch channel number used for the gateway.
Switch Address	The originating group information.

Trace SLIP

```
Top>Session> trace slip
```

Sesid	Session ID number.
Name	The name of the SLIP session. This name will be the letter **s** followed by the data switch channel number.
Local Address	The LCS60 IP address, displayed using the **-v** option.
Dest Address	The IP address of the user.
Remote User	The user ID of the remote user.
Chan	The data switch channel number used for the gateway.
Switch Address	The originating group information.

Ports Directory

Show Statistics

```
Top>Ports> show
```

Port # The number of the configured port.

Service The service configured on the specified port (i.e., directory, telnet, socket).

State The state of the port service (up or down).

Total The number of times the port has been accessed.

Busy The number of times the port has been busy when access has been attempted.

Fail The number of times port access has been tried and failed.

Reset The number of times the port has been reset.

Show Configurations

```
Top>Ports> show -c
```

Port # The number of the configured port.

Service The service configured on the specified port.

Tcpws The window size configured for the port.

8-bit Indicates whether the service port is configured with this option enabled (on) or disabled (-).

Nohup	Indicates whether the no hangup feature has been enabled.
2way	Indicates whether the 2way feature has been enabled.
SID-Type	The security server type (e.g., NAC).
Idle	The inactivity timeout in minutes.
Wait	Indicates whether the wait-for-input timeout feature is disabled or the number of minutes configured if it has been enabled.
Pre-Defined Address	The PDD call address associated with the specified port.

Summary

```
Top>Ports> summary
```

Limit	The maximum number of ports that can be configured (for service ports).
Cfg.	The number of ports configured.
Cap.	The number of ports configured (*Cfg*) divided by the *Limit*.
Use	The number of ports in use (enabled).
Directory	The port number of the port configured for directory service.

Service Directory

Show

```
Top>Service> show
```

Serv. Name	The type of service (tcpasy, asytcp, slip, ppp, arap).

Cfg. The total number of sessions that have been configured for the service listed (determined from **maxsessions**).

Use The number of sessions currently in use.

Cap. The percent of the maximum number of sessions currently in use.

Max. The maximum number of sessions in use at one time.

Total The number of times the session has been accessed.

Busy The number of times the session has been busy when access has been attempted.

Fail The number of times access has been tried and has failed.

State The state of the service (enabled or disabled).

Summary

```
Top>Service> summary
```

Service Name The name of the service type (e.g., asytcp, tcpasy, slip, ppp, or arap). For PPP, a breakdown of the number of sessions currently using each protocol (IP, IPX, AppleTalk) is displayed. Only the number of PPP sessions in use is included in the total at the bottom of the report.

Cfg. The total number of sessions that have been configured for the service listed (determined from **maxsessions**).

Use The number of sessions currently in use for the service listed.

Max. The maximum number of sessions in use for the service listed at one time.

State The state of the service (enabled or disabled).

Manager Directory

Show

```
Top>Manager># show
```

Name	The server name.
Pid #	Process ID number.
Total Ses. Cfg	The maximum number of sessions that can be configured.
Total Ses. Used	The maximum number of sessions in use.
Total Servers	The number of servers.
Start Time	The starting time of the session with the Pid # shown.
Verbosity	The verbosity level.
Log File Name	The session log file.

Server Directory

Show

```
Top>Manager>Server># show
```

Service Name	The type of service (tcpasy, asytcp, slip, ppp, arap).
Psid #	Process ID number of the specific service.
Maxses	The maximum number of sessions configured for the service shown.

Inuse	The number of sessions in use.
Startup Time	The starting time of the service shown.
Server Name (#)	The name and number of the server running the specified process.

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