HEWLETT
PACKARD

HP 9000 Networking

Using Serial Line IP Protocols

HP 9000 Networking

Using Serial Line IP Protocols

HEWLETT PACKARD

Preface

This document describes how to use serial line IP protocols with HP 9000 computers. The protocols can be used with the Point-to-Point Link facility of HP's LAN/9000 product. This document assumes the reader is familiar with HP 9000 system administration and basics of serial communication.

Contents

Chapter 5 Maintenance

1

Introduction

Following is a brief overview of serial line IP and HP's Point-to-Point Link networking facility.

Why Serial Line IP?

Terrain, distance, and property rights often limit LAN cabling. Where coax is restricted, network connections can be made by serial lines.

Serial lines are relatively inexpensive and easy to install. However, you need special software to run TCP/IP applications over a serial link. Specifically, you need software that implements protocols such as Serial Line Internet Protocol (SLIP).

HP's Point-to-Point Link

HP 9000 computers implement SLIP and other serial line IP protocols with a feature called Point-to-Point Link (PPL). The PPL facility is supplied with HP's LAN/9000 product.

PPL includes a command program (named *ppl*), a supporting utility, and a sample file.

You can use PPL to set up:

- Dial-in to HP 9000 serial IP lines.

- Dial-out from HP 9000 serial IP lines.

- Direct connection to HP 9000 serial IP lines.

Dialing In to an HP 9000

Users at remote supported terminals or PCs can establish dial-in IP connections. This may be with or without login. For a login connection, the user establishes a modem link to an HP 9000 and logs in as usual. After login, the user invokes *ppl* at the HP-UX shell prompt. *ppl* starts the desired serial IP protocol, allowing the user full network access to the HP 9000.

For a connection without login, the user simply dials in to a preset HP 9000 *ppl* line. The specified serial protocol is already running on that line.

Dialing Out from an HP 9000

HP 9000 users can establish dial-out IP connections. This may be to any remote host that runs a supported serial IP protocol. Dial-out may be either with or without login.

For a login connection, the user simply invokes *ppl* at the HP-UX shell prompt. *ppl* establishes a modem link to the specified host and logs in. The login is transparent to the user. *ppl* runs a command on the remote machine to initiate the specified serial IP protocol. This action establishes the connection.

For a connection without login, the user's action is the same. After the user invokes *ppl*, a preset *ppl* line is assigned to that user. The user has full network access to the remote host.

Direct Connections

The system administrator may set up a direct (hardwired) IP connection between an HP 9000 and a remote host. In effect, this is simply a long distance extension of the LAN. To the user, this connection is transparent.

2

Installation

Installation consists of loading software and setting up necessary support files. Each of these steps requires super-user privileges.

Note	This document assumes the necessary hardware has been installed (cables or telephone connections, modems, etc.). The same hardware is required for UUCP connections. For details, refer to your *HP-UX System Administrator's Manual* or *HP-UX Concepts and Tutorials: UUCP*.

Loading PPL Software

PPL software is supplied on the LAN/9000 installation tape. It is part of the SLIP-RUN fileset. If you are loading the entire networking partition, this fileset is loaded automatically.

Creating System Files to Support PPL

You need to create device files in the /dev directory for serial ports and the network interface used by PPL. If you use the dial-out feature, you also need to create entries in the UUCP configuration files.

Note	Following are brief instructions for /dev and UUCP configuration files. For details, refer to the manuals cited earlier.

Creating Device Files for Serial Ports

Each serial port used for PPL may require one to four device-file entries. Depending on the hardware attached, you may need entries for dial-in, dial-out, autodial, direct connection, or any combination of the four.

You create device-file entries with SAM, the System Administration Manager. Alternately, you can use the *mknod(1M)* command.

Following is a sample *mknod* entry:

```
% mknod /dev/ttyd10 c 1 0x000002 #dial-in
```

It is important to create the device files with appropriate minor numbers. The UUCP manual describes how to derive the minor number of the device file for dial-in, dial-out, and direct connections.

Adding Entries to the UUCP Configuration Files

This step is necessary if you use the dial-out feature.

For dial-out, PPL requires entries to two UUCP configuration files: /usr/lib/uucp/Systems and /usr/lib/uucp/Devices.

Note	PPL uses the UUCP configuration files only. It does not use UUCP executables. Only the *Systems* and *Devices* files need to be installed. The format of the files must match that of HoneyDanBer (HDB) UUCP. HDB UUCP is supplied with HP-UX Series 300 Release 6.2, HP-UX Series 800 Release 2.0, and all later HP-UX releases.

The UUCP *Systems* file should contain an entry for each remote host that may be called. The UUCP *Devices* file should contain an entry for each serial port to be available for dial-out. If the appropriate entries are not already there, you need to make the necessary changes.

For example, suppose you are setting up dial-out to a remote machine, named daffy. Daffy is running a 1200-baud modem at 5551212, and the connection is always available.

To dial up daffy, you need a *Systems* file entry, for example:

```
daffy Any,2 ACHUHAYESSMART 1200 5551212 ogin:notused word:xyz
```

You also need at least one *Devices* file entry for a 1200 baud modem, for example:

```
ACHUHAYESSMART cul01 cul01 1200 hayes
```

For details about the syntax of these file entries, refer to the UUCP manuals cited earlier in this chapter.

Creating a Device File for the Network Interface

Ensure that you have a /dev/ni device file with a major number of 56 and minor number of 0. If it is not already present, create the device file using the following command:

```
% mknod /dev/ni c 56 0 #network interface
```

The *ppl* program uses this device to pass packets between the serial line and IP layer.

Configuring Your Modem

Please refer to the data communication devices support documentation for the modem that your MUX card supports. In general, MultiTech modems and Hayes Smartmodems are supported. Please refer to your owner's manual for a detailed explanation of the modem settings.

Configuration

PPL configuration involves creating three files:

- *ppl.users*

- *ppl.ipool*

- *ppl.remotes*

Each is a simple ASCII file that the super-user owns (creates). The files are located in the /usr/lib/ppl directory. The super-user must create the *ppl.users* and *ppl.ipool* files from scratch. A template is provided for *ppl.remotes*.

Note	*ppl.users* and *ppl.ipool* are optional files. They allow for special circumstances as described below. Of the three configuration files, only *ppl.remotes* is required for PPL operation.

Editing the ppl.users File

The *ppl.users* file may be used for dial-in or dial-out. It maps each user name to a single remote host. This allows a dial-in user to invoke *ppl* without identifying the remote host that is calling. It allows a dial-out user to invoke *ppl* without specifying the remote host that is being called.

Format of a *ppl.users* file entry is:

```
<username> <hostname>
```

where *username* is the login of the user, *hostname* is the identifier of the remote host. The host name may be either an Internet address in dot notation, or host alias, provided the alias is known to the local host. (The alias must be listed in */etc/hosts* or the Yellow Pages database, or it must be resolved using the domain name server.)

When *ppl* is invoked, it finds the host name associated with the user's login. It uses this name to access connection parameters stored in *ppl.remotes*.

Following are sample *ppl.users* file entries:

```
robd    columbia.nasa.gov
davey   elk
rons    reindeer
susie   123.33.42.1
```

Editing the ppl.ipool File

The *ppl.ipool* file may be used for dial-in. It specifies a pool of local Internet addresses to be used for modem connections.

This file is only necessary if you are using a modem pool. Generally, a modem pool is set up when the UUCP subsystem is configured at boot time. The pool allows the host to assign modem ports to dial-in users as needed.

When *ppl* receives a dial-in request, it identifies the remote host that is calling. *ppl* then checks if a specific port and a local Internet address are allocated for use by that host. If not, *ppl* selects a port from the modem pool. Similarly, *ppl* selects a local Internet address from *ppl.ipool*.

Format of a *ppl.ipool* file entry is:

<Internet_address>

where *Internet_address* is any valid Internet address assigned to the local host. It must be in dot notation.

Following are sample *ppl.ipool* file entries:

```
123.22.33.11
123.22.33.112
```

Editing the ppl.remotes File

The *ppl.remotes* file is a required file for all PPL connections. It is the central database used by the *ppl* program. *ppl.remotes* contains an entry for each remote host to which *ppl* can establish a connection. The entry contains parameters that allow *ppl* to set up the connection.

Each entry consists of a multi-line form. Depending on the type of connection you are permitting—direct, dial-in, dial-out, or both dial-in and dial-out—you enter different data. However, the format of the form is the same for all four types.

Following is the format of a *ppl.remotes* entry form:

```
#   your comments here
            # remote hostname or Internet address
            # local hostname or Internet address
            # Internet mask
            # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
            # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
            # UUCP system name
            # line parity [EVEN] [ODD] [NONE]
            # line speed
            # serial line
            # phone number
            # modem control available
            # log in info
            # command name
```

The first line is reserved for comments describing the entry. If necessary, use additional lines for comments. Begin each comment line with a "#".

The other lines are for entering data. They begin with a data field, followed by a comment that describes the data to enter.

Note   Depending on the type of connection, some data fields may not be used. However, all lines must be present for the form to be read by *ppl*. On lines containing data fields, do not modify any text following "#".

Following is a description of each data field:

remote hostname or Internet address. This identifies the remote host. It may specify a host name or alias, provided the name or alias can be resolved to an Internet address (by */etc/hosts*, the Yellow Pages, or domain name server). It may also be the Internet address in dot notation. This field is required for all connections.

local hostname or Internet address. This identifies the local host. It may specify a host name or alias, provided the name or alias can be resolved to an Internet address (by */etc/hosts*, the Yellow Pages, or domain name server). It may also be the Internet address in dot notation. This field is optional for all connections. If the field is left blank, *ppl* assigns a local Internet address from *ppl.ipool*.

Note   The Internet address for each SLIP interface must be unique in the system. That is, SLIP must have a different Internet address from that of the LAN interface on the same system. Also, the SLIP and LAN interfaces must be in different subnets.

For a detailed description of how to assign IP addresses and subnet addresses, refer to chapter 9, "Network Addressing," in *Installing and Administering LAN/9000 Software*. For subnetting details, refer to RFC 950.

Internet mask. This specifies a mask which may be used to set up an IP subnet. If left blank, the mask is derived from the local Internet address.

protocol. [SLIP] [ASLIPC] [ASLIPS] [PPP]. This specifies the protocol to be used for that connection: Serial Line Internet Protocol (SLIP); Abbreviated Serial Line Internet Protocol Client (ASLIPC); Abbreviated Serial Line Internet Protocol Server (ASLIPS); or Point-to-Point Protocol (PPP). This field is required for all connections.

Note   Currently, only the SLIP, ASLIPC and ASLIPS options are supported.

ASLIP is slightly faster than SLIP as it contains less overhead in its header. ASLIP clients and servers differ in the way addresses are copied and synthesized across the serial line.

```
    CLIENT SIDE                                          SERVER SIDE
   outgoing.ip_src - discarded         remote addr - incoming.ip_src
   outgoing.ip_dst ---------------------------> incoming.ip_src
   incoming.ip_src <--------------------------- outgoing.ip_src
   incoming.ip_src <--- local addr     discarded - outgoing.ip_dst
```

Note that this only works when the client **IS NOT** a gateway. The server will not send abbreviated packets if packet *dst* does not match server *remote addr*. The client will not send abbreviated packets if *src* does not match *local addr*. These gateway packets are sent abbreviated. Thus, use of ASLIP with gateways is not recommended.

type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]. This specifies the connection type. It is required for all connections. For a direct connection (hardwired), enter DIRECT; for dial-in, DIALIN; for dial-out, DIALOUT. To accommodate either dial-in or dialout, enter DIALIN & DIALOUT.

UUCP system name. This field is required if: 1) You are using dial-out or a modem pool; and 2) The name specified for the remote host in the UUCP *Systems* file is different from that specified in the remote host name or Internet address field of *ppl.remotes*. If so, enter the UUCP system name here.

line parity [EVEN] [ODD] [NONE]. This field is used for dial-out and is optional. It specifies the line parity to be used after the modem connection has been established.

line speed. This field is required if: 1) You are using dial-out, but not using a modem pool; or 2) You are using a direct connection. It specifies the line speed to be used before and after the modem connection is established.

In general, the supported baud rate is limited by the system hardware. For example, the maximum speed supported by some MUX cards is 19200 baud. The maximum speed supported on a Series 700 built-in serial port is 57600 baud. Please refer to the documentation about the specific hardware you are using.

serial line. This field is required if: 1) You are using dial-out, but not using a modem pool; or 2) You are using a direct connection. Enter the name of a specific /dev node (device file) to be used for the connection (for example, ttyOp7 or ttyOp4).

phone number. This field is required for dial-out if you are not using a modem pool. Enter the phone number of the remote host (for example, 5554423022 or 555-442-3022). The entry may consist of numeric characters and "-" or "=" symbols. A "-" specifies a 5-second pause. An "=" specifies wait for a secondary dial tone. If you are using a modem pool, *ppl* gets the number from the UUCP *Systems* file.

modem control available. This field is required for all dial-out and direct connections. It controls the use of modem signals during and after the dialing phase of *ppl*. If you specified DIRECT in the options field above, enter NO here. If you specified DIALOUT or DIALIN & DIALOUT, enter YES here. Please refer to the data communication devices support documentation for information about the modems that termio supports. In general, MultiTech and Hayes Smartmodem are supported.

log in info. This field is required for dial-out connections with login. It supplies the dialogue needed to login to the called host. The syntax is identical to the login entry in the UUCP *Systems* file. It includes a series of send/expect strings, separated by spaces.

command name. This field is required for dial-out connections with login. It supplies the dialogue needed to invoke the serial line IP protocol on the called host. (Note that, for an IP link to be established, compatible protocols must be running on each side of the line.) The field uses the same syntax as the *log in info* field above.

As mentioned previously, a template for *ppl.remotes* exists in the /usr/lib/ppl directory. It provides a blank form you may copy for each *ppl.remotes* file entry. The filled-in forms may be concatenated in any order.

The following sections describe how to edit the forms for dial-in, dial-out, or direct connections.

Editing Dial-in Forms

Following are two sample *ppl.remotes* file entries for dial-in connections. One shows configuration of dial-in with login. The other shows configuration of a preset PPL dial-in line. Keep in mind that the local host is the HP 9000 you are configuring. The remote host is the machine that is dialing in.

```
#   Sample #1:  Dial-in with login.
#
#     Sample entry in ppl.remotes file on machine biggy.
#     Enables machine smally to dial in and have a SLIP
#     connection to biggy.  The user at smally must have
#     a login on biggy.  Connection works as follows:
#     Machine smally establishes a modem connection.  User
#     logs in and runs ppl.  ppl converts the serial line
#     to SLIP.
#
smally          # remote hostname or Internet address
biggy           # local hostname or Internet address
                # Internet mask
SLIP            # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
DIALIN          # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
                # UUCP system name
NONE            # line parity [EVEN] [ODD] [NONE]
                # line speed
                # serial line
                # phone number
NO              # modem control available
                # log in info
                # command name
```

Note   The preceding sample assumes biggy is configured with the appropriate dial-in device file and that a modem is online. It also assumes biggy has a *getty* running on the serial port to which the modem is attached.

If the *ppl.users* file on biggy has an entry for the remote user, the user need not specify smally when invoking *ppl*. The user enters simply:

```
% ppl
```

If there is no such *ppl.users* file entry, the user enters:

```
% ppl smally
```

```
#  Sample #2:  Dial-in to preset ppl line.
#
#       Sample entry in ppl.remotes file on machine pizza.
#       Enables machines of type pasta to dial in and have
#       a SLIP connection to pizza (pizza views each caller
#       as the same IP address).  Connection works as fol-
#       lows:  ppl runs continuously on pizza.  When a dial-
#       in request is heard at ttyd01, ppl establishes the
#       SLIP connection immediately.
#
pasta           # remote hostname or Internet address
pizza           # local hostname or Internet address
                # Internet mask
SLIP            # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
DIRECT          # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
                # UUCP system name
NONE            # line parity [EVEN] [ODD] [NONE]
2400            # line speed
ttyd01          # serial line
                # phone number
YES             # modem control available
                # log in info
                # command name
```

Note	The preceding sample assumes pizza is configured with the appropriate dial-in device file and that a modem is online. It also assumes pizza does not have a *getty* running on the serial port to which the modem is attached.

ppl may be started on pizza at boot time or anytime thereafter. It may be executed at boot time by including the following in the */etc/netlinkrc* script:

```
ppl -o pasta &
```

Note	Because *ppl* waits until the first dial-in, *ppl* should be executed in background.

Editing Dial-out Forms

Following are two sample *ppl.remotes* file entries for dial-out connections. One is for dial-out with login. The second is for dial-out to a preset serial IP line, no login required. Again, the local host is the HP 9000 you are configuring. The remote host is the machine to which HP 9000 users are dialing out. Keep in mind that, in both cases, *ppl* does the login. Login is transparent to the user.

```
#  Sample #3:  Dial-out with login.
#
#     Sample entry in ppl.remotes file on machine misty.
#     Enables machine misty to dial out and have a SLIP
#     connection to foggy.  The IP addresses of misty and
#     foggy are known to each machine beforehand.  Con-
#     nection works as follows:  User at misty runs ppl,
#     which dials out to foggy.  ppl logs in and runs SLIP
#     on foggy using login and command sequence listed in
#     this entry.
#
foggy       # remote hostname or Internet address
misty       # local hostname or Internet address
            # Internet mask
SLIP        # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
DIALOUT     # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
            # UUCP system name
NONE        # line parity [EVEN] [ODD] [NONE]
9600        # line speed
            # serial line
8005551212  # phone number
YES         # modem control available
login: guest   ssword:guest guest_tristar   #log in info
   foggyslip\s-r\smisty running              #command name
```

Note   The preceding sample assumes misty has the necessary UUCP configuration files entries for dial-out to foggy. For an example of these entries, refer to the "Installation" section of this manual. The sample also assumes misty is configured with the appropriate dial-out device file and that a modem is online.

The login and password on foggy are both "guest." The command that executes SLIP on foggy is `foggyslip -r misty`. The command displays "running protocol" after starting up. The syntax for the login, password and command sequences in *ppl.remotes* must follow UUCP conventions.

```
#  Sample #4:  Dial-out without login.
#
#      Sample entry in ppl.remotes file on machine slinky.
#      Enables machine slinky to dial out and have a SLIP
#      connection to stuffy.  stuffy has a dedicated SLIP
#      line connected to a modem that answers to a phone
#      number known to slinky.  The IP addresses of slinky
#      and stuffy are known to each machine beforehand.
#      Connection works as follows:  User at slinky runs
#      ppl, which dials out to the preset SLIP line.  The
#      connection is established immediately.
#
stuffy        # remote hostname or Internet address
slinky        # local hostname or Internet address
              # Internet mask
SLIP          # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
DIALOUT       # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
hiho          # UUCP system name
NONE          # line parity [EVEN] [ODD] [NONE]
9600          # line speed
              # serial line
              # phone number
YES           # modem control available
              #log in info
              #command name
```

Note	The preceding sample assumes slinky has the necessary UUCP configuration files entries for dial-out to stuffy. Here, stuffy is known to the *Systems* file as "hiho." The sample also assumes slinky is configured with the appropriate dial-out device file and that a modem is online.

Editing a Direct Connection Form

Following is a sample *ppl.remotes* file entry for a direct connection. Generally, such a connection is established at boot time, using the script in the `/etc/netlinkrc` file.

```
#  Sample #5:  Direct connect
#
#      Sample entry in ppl.remotes file on machine minnie.
#      Sets up direct SLIP connection to mickey. To users
#      at both machines, minnie and mickey appear to be
#      on same LAN.
#
mickey       # remote hostname or Internet address
minnie       # local hostname or Internet address
             # Internet mask
SLIP         # protocol [SLIP] [ASLIPC] [ASLIPS] [PPP]
DIRECT       # type [DIRECT] [DIALIN] [DIALOUT] [DIALIN & DIALOUT]
             # UUCP system name
ODD          # line parity [EVEN] [ODD] [NONE]
9600         # line speed
tty04        # serial line
             # phone number
NO           # modem control available
             # log in info
             # command name
```

Note   The preceding sample assumes the necessary cable connections have been made between ports on each machine. Be sure there is no *getty* running on the serial port at either end. The sample also assumes minnie is configured with the appropriate direct connect device file.

---

ppl may be be executed at boot time by including the following in the */etc/netlinkrc* script on minnie:

```
ppl -o mickey &
```

Note   Because *ppl* waits until the first dial-in, *ppl* should be executed in background.

4

Operation

This section describes how to operate PPL dial-in, dial-out, and direct-connect features.

Using the Dial-in Feature

Any remote host or PC with appropriate dial-out capability may dial-in to an HP 9000 serial IP line. However, the following must be true:

■ The remote host has an entry in *ppl.remotes* of the HP 9000.

■ The remote host is using the serial IP protocol specified in that *ppl.remotes* entry.

■ For dial-in with login, the remote user must have a login on the HP 9000.

Establishing a Connection

The following procedure applies to dial-in with login. Keep in mind it is written for a remote user who may or may not be at another HP 9000. To establish a dial-in with login connection, the remote user must do the following:

1. Establish a modem connection to the HP 9000. (Depending upon the communications program used, this step may or may not be transparent to the user.)

2. Login on the HP 9000.

3. Invoke *ppl* at the HP-UX shell prompt. If there is an entry for the user's login in *ppl.users*, simply enter:

```
% ppl
```

If there is no entry in *ppl.users*, specify the calling host by name or Internet address. For example:

```
% ppl donald
% ppl 64.0.0.9
```

When *ppl* starts, a display appears like the following:

```
ppl: starting for joe at Fri Jan 5 14:16:14 1990
```

ppl searches *ppl.remotes* for the calling host's entry. From this entry, it gets parameters to set up the IP connection.

4. Once the IP connection starts, exit the communications program. (Again, depending on the program used, this step may be automatic.)

5. Invoke the desired networking software. For example, to *ping* to remote machine hopper over the SLIP connection, enter:

```
% ping hopper
```

For a dial-in without login connection, the procedure is somewhat different:

1. Dial-in the number of the preset HP 9000 PPL line. This number is generally provided by the HP 9000 system administrator.

2. After the modem connection is established, exit the communications program.

3. Invoke the desired networking software. (Recall that, for preset PPL dial-in, the IP connection is available immediately after the modem connection is established.)

Terminating a Connection

The IP connection is lost when the line is hung up from either end. The *ppl* program senses loss of carrier and terminates gracefully.

The HP 9000 super-user can also terminate the IP connection with one of the lock files that *ppl* creates in the /usr/spool/ppl directory. The lock files are of the form *ppl.laddr* and *ppl.raddr*, where *laddr* and *raddr* are Internet addresses (in hexidecimal notation) of the IP connection.

To kill *ppl* using the lock files, the super-user types the following at the shell prompt:

% sh lock_file_name

where *lock_file_name* is the name of either the remote or local lock file. The lock files have a shell script that causes *ppl* to exit gracefully.

Following is a sample lockfile:

```
kill -15  2213 # rhost_name=slip4 creator=joelw
# tty=/dev/tty0 Linet=slip1 Rinet=15.255.136.6 protocol=SLIP
```

Using the Dial-out Feature

The PPL dial-out feature is available to any HP 9000 user. Keep in mind that, for dial-out only, *ppl* utilizes the UUCP configuration files. The necessary entries to these files must be present for each dial-out connection.

Establishing a Connection

The following procedure applies to dial-out with or without login. Recall that, from the HP 9000 user's perspective, the two types of connections are the same. To establish a dial-out serial IP connection, the HP 9000 user must do the following:

1. Invoke *ppl* at the HP-UX shell prompt. Enter:

   `% ppl -o`

   After *ppl* starts, a display appears like the following:

   `ppl: starting for chip at Fri Jan 15 12:16:19 1990`

   ppl checks the *ppl.users* file for an entry with the user's login. If an entry is found, *ppl* uses the associated host name to search *ppl.remotes* for connection parameters.

   If there is no entry in *ppl.users*, specify the called host by name or Internet address. For example:

   `% ppl -o jumbo`

   ppl establishes a modem connection. If a login and a command sequence are provided in *ppl.remotes*, *ppl* logs in and starts the desired protocol on the remote host. For connections without login, the protocol is already running on the remote host.

   After the IP connection is established, the following is displayed:

   `initialization complete, protocol running`

2. At this point, the HP-UX shell prompt returns. Invoke the desired networking software.

Terminating a Connection

Once started, the *ppl* program runs until the carrier signal is lost or the program is stopped. The super-user may stop the program by using lock files. This is explained in "Using the Dial-in Feature."

Dialing Out to an Unknown Remote Address

Suppose an HP 9000 user wants to dial out to a remote SLIP connection, but the remote IP address is unknown. This may be the case if the remote machine has a modem pool for dial-in. Similar to the way an HP 9000 uses *ppl.ipool*, the remote machine may have a scheme to dynamically assign local addresses.

In this situation, PPL dial-out does not work initially, because a preconfigured remote address cannot exist in *ppl.remotes*.

For PPL dial-out to work, start SLIP on the remote machine by using a conventional dialing program. After the connection is established, note the local address assigned on the remote machine. Next, exit the dialing program and edit *ppl.remotes* to include the remote IP address. Finally, invoke *ppl* to complete the connection to the HP 9000.

For example:

1. Connect to the modem from which you will dial out:

    ```
    % cu -s2400 -l tty03 dir
    ```

2. Send a command string to the modem to dial out to the remote host:

    ```
    atdt5551212
    ```

3. Assuming there is a *getty* listening at that port, log in on the remote machine.

4. Use the appropriate command sequence to execute SLIP on the remote machine. When the program starts, note the local IP address used. (Keep in mind this is the remote address from the perspective of the HP 9000.)

5. At the HP 9000, open another window and edit *ppl.remotes* to include the remote IP address.

6. Back in the first window, start *ppl* by entering:

```
~&ppl -o <hostname>; sleep 9999
```

where *hostname* is the name of the remote host.

7. In the second window, invoke the desired networking application.

Using a Direct Connection

The HP 9000 system administrator may set up a direct PPL connection. This can be initialized at boot time or anytime thereafter.

To the user, the direct connection is transparent.

To set up a direct connection at boot time, the super-user inserts a line in the */etc/netlinkrc* script like the following:

```
ppl -o pluto
```

where *pluto* is the name of the remote machine.

Note   The two machines should be connected via serial ports. There should not be a *getty* running on the serial port of either machine.

Maintenance

This section describes PPL maintenance tasks, including: checking status of *ppl* connections, creating a billing file, and logging PPL events. This section also includes a note about using LAN/9000 diagnostics and troubleshooting on a serial line.

Checking Connection Status

You can configure PPL to maintain a status file of active connections. The file is binary, but can be displayed with *pplstat(1)*.

Creating a Status File

The status file can be set up at boot time or anytime thereafter. To do so, create a zero-length ASCII file named *ptmp* in the /usr/spool/ppl directory.

The *ptmp* file is maintained by invocations of *ppl*. Each time a new serial port is used, an entry is added to the file for that port. Any subsequent *ppl* use of that serial port results in an update to the file.

To create and initialize the file at boot time, add the following to the /etc/netlinkrc script:

```
PTMP = /usr/spool/ppl/ptmp
if [ -f $PTMP ]
then
        rm $PTMP
        touch $PTMP
        chmod 644 $PTMP
fi
```

To create the file anytime after boot time, enter the following:

```
%  cd /usr/spool/ppl
%  touch ptmp
%  chmod 644 ptmp
```

To disable this feature, simply remove the *ptmp* file. (If the file does not exist, *ppl* ignores this feature.)

Displaying a Status File

As mentioned, the *ptmp* file is binary. To display the file, use *pplstat(1)*. Enter the following:

```
%  pplstat
```

A display appears like the following:

```
log_name        joelw
rhost_name      slip4
system_name     slip4
Linetaddr       slip1
Rinetaddr       43.0.0.2
tty             /dev/tty0
ni              /dev/nio
status          SLIP
killfile (r)    /usr/spool/ppl/ppl.2b000002
killfile (l)    /usr/spool/ppl/ppl.2b000001
start_time      Wed Jan 10 13:24:17: 1990
```

Note   *pplstat* only displays information for connections that are not idle.

Creating a Billing File

You can set up a file to record connection information such as user, start time, and end time. Such a file is useful for billing purposes. To use this feature, create an empty ASCII file (zero length) named *bill* in the /usr/spool/ppl directory.

After termination of each invocation of *ppl*, information for that connection is entered in the file. Records within the file are ordered according to end time.

The following is a sample billing file (containing two records):

```
; 11/19/89 15:07:29 ; 11/19/89 14:37:27 ; goofy ; 70.0.0.4 ; joelw ; ttyd0 ; SLIP;
; 11/19/89 15:18:43 ; 11/19/89 09:33:10 ; goofy ; joelw_pc ; joelw ; ttyd3 ; SLIP;
```

Each field is separated by a semicolon (;). In order, the fields are:

- End time.

- Start time.

- Local host name (or Internet address).

- Remote host name (or Internet address).

- Login of user who invoked *ppl*.

- tty port used.

- Protocol used.

Note   The billing file is not pruned automatically. Be sure to check and/or prune the file at intervals appropriate to PPL usage.

To disable this feature, simply remove the billing file. (If the file does not exist, *ppl* ignores this feature.)

Logging PPL Events

PPL events are recorded to an ASCII file named */usr/spool/ppl/log*. Log messages are self-explanatory.

Note   The log file is not pruned automatically. Be sure to check and/or prune the file at intervals appropriate to PPL usage.

Using LAN/9000 Diagnostics, Logging and Tracing

LAN/9000 diagnostics *rlb*, *ping*, and *netstat* work over a PPL link the same as over the LAN. This is also true for network logging and tracing tools. No special accommodation must be made to use network diagnostics, logging and tracing over IP serial lines.

For a detailed description of LAN/9000 diagnostics, refer to chapter 6, "Network Diagnostic Commands," in *Installing and Administering LAN/9000 Software*.

Troubleshooting PPL

1. Check the Internet addresses of the PPL and LAN interfaces. They must have different Internet addresses and must be in different subnets. For a detailed description of how to assign IP addresses and subnet addresses, refer to chapter 9, "Network Addressing," in *Installing and Administering LAN/9000 Software*.

2. Run *ppl* with verbose mode (*-v* option). This requires super-user capability. Verbose debugging information is displayed on the terminal and placed in */usr/spool/ppl/log*. Secure information is included.

Note   The log file grows without limitations.

---

3. Check that major and minor numbers of the device file used for each platform (Series 300/700/800) are correct. To do so, execute the command:

    ls -l /dev/*

    The PPL device file should be */dev/ni*, the major number, 56, and the minor number, 0. For information about LAN/9000 device files, refer to chapter 4 in *Installing and Administering LAN/9000 Software*.

4. Use the correct modem cables for each platform.

5. Check the modem settings by executing the command:

    cu -l <device name>

    If you cannot call up another system, the modem settings may be incorrect.

HEWLETT
PACKARD

Customer Order No.
98194-60533

98194-90033