ULTRIX-32
Guide to the
uucp Utility

Order No. AA-MF03A-TE

ULTRIX-32 Operating System, Version 3.0

Digital Equipment Corporation

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About This Guide

This guide describes how to set up and maintain the ULTRIX uucp utility (UNIX to UNIX copy program).

Audience

The audience for this guide is anyone setting up and maintaining the uucp utility. The guide assumes that:

- You, or a DIGITAL service representative, have checked the hardware to ensure that it is working properly.
- Your software contains the uucpsetup command for automatic set up of the uucp utility. Manual setup tasks may be performed on any version of the ULTRIX operating system.

Organization

This guide consists of the following chapters:

Chapter 1 Overview of the uucp Utility

This chapter introduces the uucp utility.

Chapter 2 Setting Up the uucp Utility

This chapter describes the background information and tasks required for setting up the uucp utility automatically with the uucpsetup command. It also describes how to set up the uucp utility manually for those who may be interested.

Chapter 3 Maintaining the uucp Utility

This chapter describes how to maintain the uucp utility. It describes how to modify the uucp files, add and remove modem lines, and so forth. It also addresses system security issues.

Chapter 4 Configuring the MICOM PAD for tip and uucp

This chapter describes the MICOM PAD and how to set up the uucp utility for use with it.

Chapter 5 Troubleshooting the uucp Utility

This chapter addresses how to handle communications problems and lists the error messages. It also suggests corrective action.

Conventions

The following conventions are used in this guide:

special	In text, each mention of a specific command, option, partition, pathname, directory, or file is presented in this type.
command(x)	In text, cross-references to the command documentation include the section number in the reference manual where the commands are documented. For example: See the cat(1) command. This indicates that you can find the material on the cat command in Section 1 of the reference pages.
italics	In syntax descriptions, this type indicates terms that are variable.
example	In examples, computer output text is printed in this type.
example	In examples, user input is printed in this bold type.
#	This is the default superuser prompt.
>>>	This is the console subsystem prompt.
<KEYNAME>	In examples, a word or abbreviation in angle brackets indicates that you must press the named key on the terminal keyboard.

Overview of the uucp Utility 1

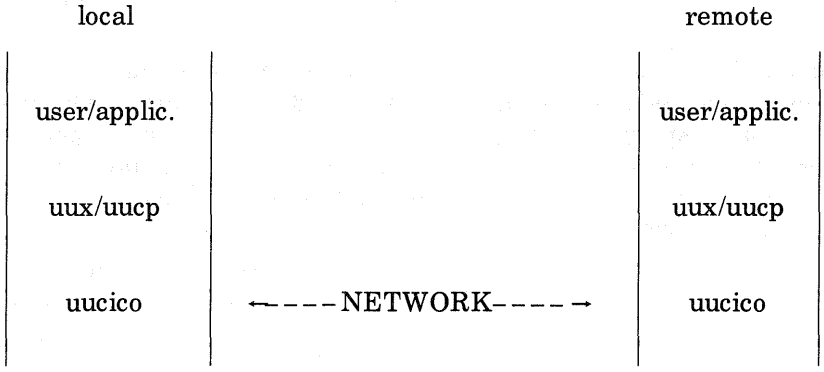
This chapter provides an overview of the uucp utility. It discusses the following topics:

- Transferring files with the uucp utility
- Required hardware
- Required software
- Manually setting up software for the uucp utility
- Maintaining the uucp utility

For instructions on how to set up the uucp utility automatically using the uucpsetup command, see Chapter 2.

1.1 Transferring Files with the uucp Utility

The uucp utility system consists of three program levels as follows:



At the highest logical level is the user or application program. This level uses the uux or uucp utility to initiate requests for both file transfers and remote job execution. The uucp utility spools user requests for file transfers. The uux program executes commands on a remote system. Each request is queued in the appropriate spool directory.

The uucico program performs the file transfer over the network. Before the transfer takes place, though, uucico must go through several stages.

First, the uucico program must call up the destination system and log in. After a successful login, the handshaking stage takes place between the destination uucico daemon process and the local daemon. At this stage, each daemon determines if the remote system has permission to use its local resources. If the handshake succeeds, then both daemons select the protocol to use to ensure that raw data is reliably transmitted over the network. Each daemon then uses the corresponding packet driver software to send and receive raw data.

The file transfer process then begins. The local daemon searches the spool directories for job requests, builds a list of files to transfer, and then starts transmitting the files. A file transfer protocol is used to ensure that each file is successfully transmitted only once. This protocol also notifies you if the uucico program cannot transmit the file and explains why the transfer failed. After the uucico program transfers all of the files, the destination site begins to transfer files back to the local system. When both systems have no more work to do, the connection through the network is broken, and the conversation is complete.

Throughout the conversation, temporary files are created and removed. For example, lock files are created in the top level spool directory /usr/spool/uucp. These lock files correspond to the remote system (LCK..sys) and the hardware device used for communication, such as LCK..cua0.

The uucp utility includes the remote execution program uux and the remote execution daemon uuxqt. The uux and uuxqt commands execute commands on a specified remote system. The uux command spools the command and associated data into the appropriate spool directories. The uucico daemon then transfers the files to the remote system. At the remote system, uuxqt starts when these execution files arrive.

The uuxqt program scans through the execution spool directories (/usr/spool/uucp/sys/DEFAULT/X. or /usr/spool/uucp/sys/*systemname*/X.) searching for commands to execute. If a command has arrived along with the data files needed by the command, uuxqt tries to execute the command. The uuxqt program also creates LCK files for the type of command it is looking for, such as LCK.XQTrmail or LCK.XQT. The uuxqt program also creates a LCK file for the command it is currently working on, such as LCK.X.chicagoX0123.

Shell scripts are automatically run periodically to remove outdated temporary files. For information about the scripts, see Chapter 3.

1.2 Required Hardware

The uucp utility can operate with any of the following hardware configurations:

- All DIGITAL modems with Auto Call Units (ACU), as listed in the Software Product Description (SPD) included in your media kit.
- Direct connect with a null modem cable such as a BC03-M
- Direct connect with a modem link

To connect the DIGITAL modems and corresponding ACUs:

1. Connect the modem to a port on the local system using a straight-through cable.
2. Connect the ACU to the phone line by following the instructions in the modem's User's Guide.
3. Set the ACU communications baud rate: see the switch options in the modem's User's Guide.

Note

The modems must be set up properly for uucp in order for the tip command to work.

To install a hardwired direct link:

- Connect a null modem cable from a port on the local system to a port on the remote system.
- When using a modem, connect the modem from a port on the local system to a port on the remote system with a straight-through cable. For more information, follow the modem installation instructions.

1.3 Required Software

The uucp program requires these files and directories to run:

/var/uucp/USERFILE	Defines uucp security
/etc/passwd	Password file
/etc/acucap	Automatic call unit capabilities file
/var/uucp/L.sys	Information needed to connect to a system
/var/uucp/L-devices	Devices used to connect to remote systems
/var/uucp/L-dialcodes	Dial code abbreviations
/var/uucp/L.cmds	Allowable remote execution commands
/var/uucp/Makefile	Creates default spool directories
/usr/spool/uucp/sys/*	Directories for depositing spooled files and temporary work files (* is a wildcard)
/etc/ttys	File used for setting up modem lines

/etc/remote Remote host description file

Files specific to the uucp utility are set up automatically when you execute the uucpsetup command. For information about setting up the uucp utility, see Chapter 2.

Setting Up the uucp Utility 2

This chapter describes how to set up a basic uucp facility on your system. The first section describes how to use the uucpsetup command. The second section of this chapter describes how to set up the uucp utility manually.

The uucp utility allows you to transfer data from one system to another, and also to perform commands on a remote system. Connections using the uucp utility can handle data communication over a wider geographic area than a local area network and usually transmit the data through telephone connections.

It is best to use the uucpsetup command to set up the uucp utility. However, the manual setup section is provided for your information.

Note

If Yellow Pages is running on your system, read the Guide to the Yellow Pages Service for information on how to modify YP maps before you invoke the uucpsetup command.

2.1 Automatically Setting Up the uucp Utility

This section describes how to set up the uucp facility using uucpsetup.

To run the uucpsetup command, type:

```
# /etc/uucpsetup -a
```

The -a option tells uucpsetup that this is a first-time installation, and the command will prompt you for information about setting up the modems and incoming and outgoing connections. In addition to setting up uucp, the -a option allows you to set up the modems for use with the tip

command.

Note

The modems must be set up properly for the uucp utility in order for the tip command to work.

Once uucpsetup is running, it sets up your uucp facility in this order:

1. Configures the modems
2. Defines the outgoing connections
3. Defines the incoming connections

The following sections describe these steps.

2.1.1 Configure the Modems

The uucpsetup command presents this prompt:

```
How many modems are you adding to this system [1] ?
```

Supply the number of modems you will be adding to the system. You will then be asked to supply the modem type, such as df224, the tty line, such as tty25, and whether each tty modem line is incoming, outgoing, or shared. A shared tty line is for both incoming and outgoing connections.

After you have supplied the modem information, uucpsetup gives you the opportunity to supply the information again, exit the command, or continue.

Note

Remember to connect the modems physically to your system either before you run uucpsetup, or directly afterwards.

The modems must be set up for the tip utility to work, regardless of whether your site will be using uucp.

2.1.2 Define Outgoing Connections

During this step, you answer questions to define the calls your system will make to remote systems (outgoing connections). For each outgoing connection, you specify:

- System name. This is the full name of the remote system, as defined in its installation.
- Time to call. Specify when your system is allowed to call the remote system. The options are:
  - **any time of any day**

- **evenings**
  Monday through Friday, 5:00 P.M. to 8:00 A.M.; Saturday and Sunday – all day.
- **nights**
  Monday through Friday, 11:00 P.M. to 8:00 A.M.; Saturday – all day; Sunday – until 5:00 P.M.
- **never**
  Use this option for systems that can call your system, although your system never calls them.

Note

Be aware that performing this step only lists the times your system is allowed to call a remote system. It does not cause periodic polling.

- Line speed of the remote system. Enter the baud rate expected by the remote system. The default rate is 1200 bits per second.
- Telephone number of the remote system. The special character equal sign (=) in a phone number tells the modem to wait for a second dial tone before dialing the rest of the numbers.
- Login name. You specify the login name to be passed to the remote system for this system's login.
- Password. You specify the password to be passed to the remote system for this system's login.

After you have supplied the outgoing uucp information for each system, uucpsetup gives you the opportunity to keep the information or supply the information again.

This series of outgoing connection questions repeats until you press the RETURN key in response to the request for the next system name.

2.1.3 Define Incoming Connections

In this step, uucpsetup displays prompts to allow you to define the remote systems that can access your system.

Before uucpsetup prompts for information about the remote systems, it creates two standard entries: one called *local* and and one called *remote*. These two entries define the default access for the local system and for all the remote systems that do not have specific entries, if an INSECURE file exists. For further information, see Chapter 3.

The local entry defines the privileges extended to all users with an account on the local system. These users are given the highest execution access

level (9) and can access any directory allowed by the file protection scheme inherent in the ULTRIX system.

The remote entry defines the privileges extended to all remote systems not otherwise defined in the uucpsetup dialogue. These remote systems are allowed to execute a limited number of commands on your system, such as rmail. Also, these systems can transfer files to and from your system, but only to and from the /usr/uucp/uucppublic directory. The *execution access level* of remote systems using the default remote entry is defined as 1.

For each incoming connection, you specify:

- System name. This is the full name of the remote system, as defined when it was installed.
- Short comment for the password file. The text you enter here is entered into the password file entry for the system. It is a good idea to enter the site's location, company name, or some other form of identification.
- Password for the remote system. This is the password expected from the remote system when it attempts to log in to the local system.
- Execution access level for the remote system. A number from 0 through 9, defining the commands that can be executed by the remote system. For further information, see Chapter 3.
- Call back option. To optimize your system's security, you can elect to call back this remote system when it attempts to call. In that way, you can ensure that you are making the connection with the remote system only. Otherwise, someone who knew the remote system's name and password could log in to your system without authorization.

Note

Be aware that if you select the call back option, you pay the telephone bill for the remote connection.

- Directory path for the remote system. This defines the directory from which the remote system can copy files to and from. The default is the directory /usr/spool/uucppublic.

2.1.4 Refreeze the sendmail Configuration File

Because the sendmail program reads the /var/uucp/L.sys file only at freeze time, you must refreeze the configuration file after you add uucp sites. If you do not refreeze the file, you will not be able to exchange mail with

new sites. After you update the files using the uucpsetup-i command, use the following command to refreeze the sendmail configuration file:

```
# /usr/lib/sendmail -bz
```

Note

The system should be in single-user mode and your system's host name should be specified prior to freezing the sendmail configuration file.

2.2 Manually Setting Up the uucp Utility

This section discusses how to set up the uucp utility manually. However, the preferred method of setting up the uucp utility is with the uucpsetup command, described in Section 2.1. This section discusses:

- Configuring modem lines
- Setting up the password file
- Setting up the remote system file
- Setting up the device file
- Setting up the command file
- Setting up spool subdirectories

2.2.1 Configuring Modem Lines

Before configuring the modem lines you need to know the following information:

- The type of modem you are using
- The baud rate of your modem
- The device special file associated with the modem line that will be connected
- Whether your modem handles dial-out service only, dial-in service only, or both, through shared lines

To configure the modem lines for use with the uucp utility, follow these steps:

1. Edit the /var/uucp/L-devices file. Add an entry for the modem device special file and modem type. Here is an example of an L-devices entry:

```
ACU     ttyd5     ttyd5     2400     df224
```

2. Change the name and mode of the special device. By convention, modem lines are named ttyd*n*, with *n* representing a unique modem number. For this reason, note that the modem line tty05 is moved to ttyd5 in the following example:

```
# cd /dev
# mv tty05 ttyd5
# chmod 666 ttyd5
```

If the modem line will be used for incoming calls only, change the mode to 622 instead of 666.

3. Edit the /etc/ttys file. Modify the entry for the appropriate line to turn on modem control. For example:

```
ttyd5   "/etc/getty  std.2400"  dialup on modem shared #oldname=tty05, df224
```

This entry allows the modem to be called and to call out. If you do not want to allow incoming calls, specify off instead of on.

4. Activate the changes to the ttys file as follows:

```
# kill -HUP 1
```

If you are setting up the modem for use with the tip command, you also need to edit the /etc/remote file. Modify the appropriate entry for the modem device name and type. Here is an example of an entry for a 2400 baud modem:

```
dial2400:dv=/dev/ttyd5:br#2400:at=df224:du:
```

For further information about the /etc/remote file, see remote(5) in the ULTRIX Reference Pages.

2.2.2 Setting Up the Password File

Any system that connects to the local system must have an entry in the /etc/passwd file. The system manager at each installation must agree on a login name and password, and this information must be entered into the password file. For information about the password file, see the Guide to System Environment Setup. Note that the last two fields of the entries for the connecting systems are as follows:

```
/usr/spool/uucppublic:/var/uucp/uucico
```

The last field is the path of the program which transfers the files, uucico. When a remote system successfully logs in, uucico is run in the slave mode, and the dialog between the peer uucico programs begins.

After installing the ULTRIX operating system, do not accidentally change the user identification number (UID) of the uucp password entry by

Before you restore your previous /etc/passwd file, compare it against the current version. If there are differences, edit the old /etc/passwd file and delete the lines which contain conflicting entries. You can then merge the two files. For example, if your previous file is called /etc/passwd.old, to merge the two files, type:

```
# cat passwd.old >> /etc/passwd
```

If Yellow Pages is running on your system, refer to the Guide to Yellow Pages for more information on setting up the /etc/passwd file.

2.2.3 Setting Up the Remote System File

The L.sys file contains entries for each remote system that the local system can call. More than one line can be present for a particular system. In this case, the additional lines represent alternative communication paths that are tried in sequential order.

The format of each entry, with each field separated by blanks or tabs, is:

system-name time device class phone login_sequence

system-name The name of the remote system.

time A string that indicates the days-of-week and times-of-day when the system can be called (for example, MoTuTh0800-1740).

The day portion may be a list containing:

```
Su Mo Tu We Th Fr Sa
```

The day portion may also be Wk for any weekday or Any for any day.

You can indicate hours in a range (for example, 0800-1230). If you do not specify a time portion, calls will be allowed at any time.

Note that a time range that spans 0000 is permitted.

For example, 0800-0600 means that times from 8 am to the following 6 am are allowed. It also means that times from 6 am to 8 am are not allowed. Multiple date specifications that are separated by | are allowed.

For example, Wk0100-0600 | Sa | Su means that the system can be called any weekday between 1 am and 6 am or any time on Saturday or Sunday.

An optional field is available to indicate the minimum time

connection. A failed connection attempt is a login failure, as opposed to a dialing (connection) failure. The field separator is a comma (,). For example, Any,9 means that your site can call any time, but that it must wait at least 9 minutes after a failure has occurred.

device Either the ACU or the hard-wired device used for the call. For the hard-wired device, use the last part of the special file name, such as tty02.

class The line speed for the call, for example 1200.

phone The phone number, made up of an optional alphabetic abbreviation and a numeric part. The abbreviation should be one that appears in the L-dialcodes file, for example, ct5900, nh6511, or an unabbreviated phone number. For the hard-wired devices, this field contains the same string as used for the *device* field.

login The login information, given as a series of fields in this format:

expect[-sendspecial-expect] send ...

The *expect* is the string expected to be read when logging in to the remote system, and *send* is the string to be sent when the *expect* string is received. If *expect* is not received, the field can be set up so that special characters (*sendspecial*) can be transmitted to the remote site. After the special characters are transmitted, the *expect* following *sendspecial* is the next expected string.

Two special characters which can be sent when *expect* is not received are EOT and BREAK. EOT sends an EOT character, and the string BREAK sends three break sequences, simulated by using line speed changes and null characters. A number from one to nine may follow the BREAK. For example, BREAK1 sends one break. Note that after every send string a \r (carriage return) is sent, except as noted below. If *sendspecial* is two consecutive dashes (--), a carriage return is sent.

In some instances, it is necessary to send characters to the remote system before expecting something to arrive. For example, some systems want a carriage return before issuing a login prompt. A sequence of two double quotes ("") is useful in this regard. If double quotes are used as the *expect* string, then nothing is expected, and the following send string is transmitted:

```
"" rc
```

This sequence expects nothing, and then sends a carriage return. Using the \c means the default \r should not be sent. If the \c was not here, two carriage returns would be transmitted.

Examples 1 through 3 illustrate alternative expect-send sequences.

Example 1:

```
ogin: xuucp ssword: foobaz
```

Explanation: ogin: is expected. When it is received, xuucp is sent. Now the word ssword is expected. The first letter of password varies from system to system, so it is safer to look for the tail end, for example, ssword. When ssword is received, foobaz is sent. If the login is successful, the conversation between the peer transfer processes (uucico) begins. If the login fails, the connection attempt fails.

Example 2:

```
ogin:--ogin: xuucp  ssword: foobaz
```

Explanation: ogin: is expected. If it is not received, then send a carriage return and expect ogin: again. If ogin: is received, send xuucp. Then, the procedure in Example 1 is followed.

Example 3:

```
ogin:-BREAK1-ogin: xuucp ssword: foobaz
```

Explanation: ogin: is expected. If it is not received, send one break sequence to change the baud rate of the remote getty process, and expect ogin: again. Then proceed as in the previous examples.

Other special characters can be used as part of the send sequence when talking to systems that are either slow or that need to be placed in a state before the true login sequence can begin. These are the special characters and their meanings:

PAUSE#	Pause # of seconds, or five seconds by default
\d	Pause one second before sending next character
\s	Send a blank character
\r	Send a carriage return

\c	Do not send a \r at the end of send string
\b	Send a break character
\###	Send the character represented by octal number ###, such as \05 is control-e
P_ZERO	Change parity from even (default) to zero
P_EVEN	Change parity to even
P_ODD	Change parity to odd
P_ONE	Change parity to one parity

Examples 4 and 5 illustrate the use of these special characters.

Example 4:

```
"" @ login: xuucp ssword: foobaz
```

Explanation: expect nothing, send an at (@) character (line kill), followed by a carriage return, and then continue the normal login sequence. The @ character is often useful for clearing out line noise before starting to log in. The default line kill character varies from system to system.

Example 5:

```
"" P_ZERO "" \d\b "" \005\c login: xuucp
ssword: foobaz
```

Explanation: expect nothing, change output parity to zero parity and expect nothing. Wait one second, and then send a break sequence, expect nothing, and send the escape character \005 without the default carriage return. Then continue with the normal login sequence.

Putting all the fields together, the following examples illustrate complete L.sys entries. Assume each entry is on one line:

```
sys1 Any ACU 1200 wy7777 "" \r\d ogin:-EOT-ogin: Ufoobaz
ssword: secret

sys1 Any ttyae 9600 tty32 "" \r\d ogin:-EOT-ogin: Ufoobaz
ssword: secret
```

(continued on next page)

```
sys2 Any ACU 300 456-1234 "" \r ogin:-EOT-ogin:-EOT-ogin:
Usystem1 ssword: testing

sys3 Any,10 ACU 1200 8=123456789 ogin:-\r\c-ogin:  \
-\r\c-ogin:-BREAK-ogin:-EOT-ogin: Usystem1 ssword: huskies

sys4 Any0000-0700 ACU 1200 8=987654321 ogin:-BREAK-ogin:  \
-BREAK-ogin:-BREAK-ogin: Usystem2 ssword: froglegs
```

If the remote system uses nonstandard hardware, the L.sys entry can become complex. To connect to some systems, you may have to alter the L.sys entries until a successful combination is found.

Note

The L.sys file must also contain an entry for the name of any system that calls you, but that you do not call. The form of such an entry is abbreviated to the system name and one word in place of the time entry, such as never or incoming.

2.2.4 Setting Up the L-dialcodes File

The L-dialcodes file contains the dial-code abbreviations used in the L.sys file, such as nh (for New Hampshire, for example), and boston. The entry format is:

abb dial-seq

abb The abbreviation as used in the L.sys file.

dial-seq The dial sequence to call that location.

For example. the entry boston 508 would force any L.sys entry that used the prefix boston in the *phone* field, to send 508 to the dial unit before the rest of the phone number is dialed.

2.2.5 Setting Up the Device File

The device file L-devices contains information about call units and direct connections. It is used to map specifiers in the L.sys file to specific devices. The format for each entry is:

type line call-unit speed brand preferred-proto

type A device type, such as ACU or DIR. DIR indicates that this is a direct connect, hard-wired line.

line The device for the modem line or hard-wired line as named in /dev, such as ttyd1. The special device files are created at

in the /dev directory.

call-unit The automatic call unit associated with *line*, such as cua0. Hardwired lines should place the device for the line in this field, for example, ttyd1. Since call units are rarely used, the value for *call-unit* is usually the same as the value for *line*.

speed The baud rate.

brand The brand name of the modem. The acceptable brands are any of the DIGITAL modems listed in Section 1.2 as well those modems you have configured for your system in the /etc/acucap file. See acucap(5) in the ULTRIX Reference Pages for more information. For direct connections, place the word direct in this field.

preferred-proto The protocol you prefer. The g protocol is the standard protocol for the uucp program. The f protocol is designed to work over the MICOM PAD. For information about the MICOM PAD see Chapter 4.

Here are some typical L-devices entries:

```
ACU ttyd1 ttyd1 300  df02      g
ACU ttyd2 ttyd2 1200 df03      g
ACU ttyd3 ttyd3 1200 df112     g
DIR tty04 tty04 9600 direct    f
```

The g in these entries is the specified default. If not specified, the system defaults to the log.

2.2.6 Setting Up the Command File

The command file L.cmds contains the list of commands that a remote system can execute via the uux command. The format of the L.cmds file is:

command X#

command A command or application program.

X# The execution level associated with *command*. The # can range from 0 through 9. If the X field is not present, then 9 is provided as the default level. If X is present but a level number is not specified, then 0 is assumed, enabling any system to execute this command. Care should be taken to limit the number and type of allowable commands.

A typical list of commands might be:

```
rmail   X1
rnews   X1
uusend   X1
```

To specify the path that uuxqt uses to search for commands, add the following line anywhere in the L.cmd file:

PATH = *path1:path2:path3:path4:...*

For example:

```
PATH=/bin:/usr/bin:/usr/ucb
```

In this example, the uuxqt daemon first searches /bin for a command; if the command is not in /bin, it then searches /usr/bin and then /usr/ucb. If no PATH entry is supplied, the default PATH = /bin:/usr/bin is used.

2.2.7 Setting Up Spool Subdirectories

These subdirectories must be created for various uucp files:

/usr/spool/uucp/TM.	Temporary files
/usr/spool/uucp/STST.	Connection status files
/usr/spool/uucp/sys	System subdirectories

The sys subdirectory is further divided into directory names that correspond to specific remote systems and a default directory (DEFAULT). The minimum configuration requires a /usr/spool/uucp/sys/DEFAULT directory. However, you must create individual system subdirectories manually. The following command creates the subdirectories for a system named system1:

```
# /var/uucp/uumkspool system1
```

Each system directory contains these subdirectories:

D.*localname*	Outgoing data files
D.*localnameX*	Outgoing remote execution files
D.	Incoming data files
C.	Work files
X.	Incoming remote execution request files

If a large amount of traffic is expected between specific systems, then you should create subdirectories for those systems. If, after a period of time, it becomes necessary to create new system directories, files have to be

moved out of the DEFAULT directory to the new system spool directory. The following command eases this process:

```
# /var/uucp/uurespool
```

2.2.7.1 Installing Subdirectories on New Systems – The /var/uucp/Makefile includes shell scripts to create the needed subdirectories. To create the minimum set of directories, enter the directory that contains the uucp Makefile and type:

```
# cd /var/uucp
# make mkdirs
```

Note

Some directories may already exist.

If that command does not succeed, try these commands, where system1 is the uucp name of the local system:

```
# cd /usr/spool/uucp
# csh
# mkdir TM. STST. sys
# chown uucp TM. STST. sys
# chmod 0755 TM. STST. sys
# cd /usr/spool/uucp/sys
# mkdir DEFAULT
# chown uucp DEFAULT
# chmod 0755 DEFAULT
# cd DEFAULT
# foreach i (C. D.system1 D.system1X D. X.)
  ? mkdir $i
  ? chown uucp $i
  ? chmod 0755 $i
  ? end
#
```

To create individual system subdirectories, use this format:

```
# /var/uucp/uumkspool sys1 sys2 ...
```

The *sys1 sys2 ...* are the names of the system subdirectories.

All of the required subdirectories should now exist.

2.2.7.2 Installing Subdirectories on Old Systems – If subdirectories are to be installed on a system that has been running with a different subdirectory scheme, follow the steps in the previous section.

Then, move the files from the old directory to the new subdirectories.

Use the command /var/uucp/uurespool to move old spool files to new spool directories. The -t# option lets you specify the type of spool that was used prior to installing the new uucp utility.

The # in the -t# option is 1, 2, 3, or 4:

- Use 1 if all spool files are located in /usr/spool/uucp. This is the format of the old uucp utilities. There are no subdirectories.
- Use 2 if the spool directory has been split out into several subdirectories: D.local, D.localX, D., X., and C.
- Use 3 if the spool directory has been split as in 2 with the addition of C./OTHERS and STST.
- Use 4 if a new system directory has been created and the spool files have to be moved from DEFAULT to the new system directory.

For example, type this command line:

```
# /var/uucp/uurespool -t2
```

2.2.7.3 Adding Individual System Subdirectories at a Later Time - If additional system subdirectories are to be added, the new directory needs to be created and spooled files moved from DEFAULT to the new directory. Type these commands:

```
# /var/uucp/uumkspool sys1 sys2 sys3
# /var/uucp/uurespool -t4
```

In this example, sys1, sys2, and sys3 are system names.

Maintaining the uucp Utility 3

This chapter lists some of the basic system management tasks for maintaining the uucp facility.

Note

If the Yellow Pages service is running on your system, read Guide to the Yellow Pages Service for information on how to modify YP maps before you invoke the uucpsetup command.

The modems must be set up properly for the uucp utility in order for the tip command to work.

Maintaining and modifying the uucp utility is a complex process. Here are the basic tasks discussed in this chapter:

- Polling remote sites
- Compacting uucp Spool Directories
- Adding or deleting remote incoming connections (users)
- Adding or deleting outgoing connections
- Adding or deleting modems
- Moving modems from one port to another
- Adding multiple telephone numbers for outgoing connections
- Cleaning up excess files and directories
- Maintaining uucp security
- Using uucp commands

This chapter describes briefly how to perform these tasks.

3.1 Polling Remote Sites

The uucpsetup command allows you to define the time of day that your system is allowed to make outgoing connections to remote sites. If a user requests a uucp transaction during the times your system is allowed to make outgoing connections, the connection will be made immediately. If, however, the user makes the request at a time when your system is not

allowed to make outgoing connections, the request is queued. It will remain queued until the remote site either calls your system, or another outgoing request is made from your system during a time when outgoing connections are allowed.

You might want to have your system periodically poll those remote sites that have calling time restrictions. By setting up polling, your system automatically calls the remote site at a regular interval. If the remote site has any queued requests for your system, then when your system polls the remote site, the queued requests are processed.

There are five intervals you can specify for polling remote sites:

hour Poll the remote site once every hour at the half hour mark.

day Poll the remote site once a day at 6:00 A.M.

noon Poll the remote site once a day at 12:00 noon.

night Poll the remote site once a day at 2:00 A.M.

longhall Poll the very distant remote site when the phone rates are least expensive.

There are five files in the /var/uucp directory, one for each polling interval. Here are the files:

uucp.day

This script is run at the start of the day. It cleans any lingering temporary files and saves the previous day's LOGFILE and SYSLOG data in LOGFILE.yesterday and SYSLOG.yesterday. It also contacts any systems listed in /var/uucp/LIST.DAY, and then starts a general poll of all systems for which there is work. Messages indicating the progress of this shell script are placed in /var/uucp/LOG.shells.

You should modify LIST.DAY whenever necessary so that the correct systems are called. If LIST.DAY is empty or nonexistent, only the general poll is performed.

uucp.hour

This script initiates a general poll every hour. Messages indicating the start and finish of the poll are sent to the console. If any systems are listed in LIST.HOUR, those systems are contacted on an hourly basis.

uucp.noon

This script contacts any system listed in LIST.NOON at noon time.

uucp.night

The uucp.night script cleans up the spool directories in the early morning hours, using the uuclean command. Any spool files older than 168 hours are removed. You can and should adjust the time limit to conform to local conditions. After the cleanup, any systems

listed in LIST.NIGHT are contacted. A general poll contacts any remaining systems for which requests are still queued. Shell script messages are sent to LOG.shells.

uucp.week
: LOG.shells is saved in LOG.shells.week and a general poll is started.

uucp.longhall
: This script calls remote systems that are listed in UUCP.LONGHALL. You can use this script to reduce your phone bill by calling those systems that are very far away, for example, across the ocean, when the phone rates are the least expensive.

To have a remote site polled, add its name to the appropriate file. For example, to have a remote site named markie polled every day at noon, edit /var/uucp/LIST.NOON and add the name markie on a new line.

You should modify the /usr/lib/crontab file such that it executes the shell scripts listed above at the appropriate intervals. The following are typical /usr/lib/crontab entries:

```
30 * * * * su uucpa < /var/uucp/uucp.hour
0 12 * * * su uucpa < /var/uucp/uucp.noon
0 6 * * * su uucpa < /var/uucp/uucp.day
0 1 * * 5 su uucpa < /var/uucp/uucp.week
45 2 * * * su uucpa < /var/uucp/uucp.longhall
```

Note

In order to poll a site at a particular interval, your system must be allowed to make outgoing connections at that time.

3.2 Compacting uucp Spool Directories

Periodically, it may be necessary to compact the spool directories. Type this command to compact the uucp spool directories:

```
# /var/uucp/uucompact
```

If the uucompact command is not available, the following command sequence will pack a directory called directory:

```
# mkdir tempdir
# chown uucp tempdir
# mv directory/* tempdir
# rm -rf directory
# mv tempdir directory
```

In this example, tempdir is a temporary directory.

3.3 Monitoring the Network

Cleanup shell scripts executed from the crontab file keep a well tuned network clean of any miscellaneous files and any files that cannot be transferred. However, there are times when the network starts to backlog. It is necessary, therefore, to monitor the network regularly. Two programs are useful in this regard: uumonitor and uustat.

3.3.1 Obtaining a Snapshot of the uucp System

The uumonitor command is in the /var/uucp directory and creates a snapshot of the uucp system. Here is the format of the output:

system-name #C #X *most_recent_status* CNT:# *time*

system-name	The remote system for which the entry applies.
#C	The number of C.files queued for the remote system.
#X	The number of requests for remote execution from the remote system.
most_recent_status	The result of the most recent attempt to connect to the remote system.
CNT:#	The number of times that a failure to log in to the remote system has occurred. This does not include the number of failed dial attempts.
time	The time the last status entry was made for this system.

The uumonitor command is helpful for detecting systems that have backlogs, have gone off the network for a while, have changed phone numbers, and so forth. The CNT: field is useful for detecting a system whose login or password has changed. If CNT: gets larger than the maximum allowable failures, 20 by default, no further attempts to connect will be made to this system.

If the number of C.files queued starts getting unusually large, try to determine the cause of the backlog. Depending on the system, large could mean anywhere from 100-1000. If a separate subdirectory does not exist for the backlogged system, create the subdirectory and move the spooled files from the DEFAULT directory to the individual system subdirectory. When the problem is resolved, make an entry in /var/uucp/LIST.HOUR to help clear out the backlog.

3.3.2 Obtaining the Status of the uucp Utility

The uustat command is also useful for monitoring the network. This command displays the status of previously specified uucp commands, cancels previously specified uucp commands, or provides general status on uucp connections to other systems.

Note

The uux command requests are not recorded in the uustat logging files. This implies that uustat does not record mail and news requests.

Some of the options are:

-m*mch* Report the status of accessibility of machine *mch*. If *mch* is specified as all, then the status of all machines known to the local uucp system are provided.

-k*jobn* Kill the uucp request whose job number is *jobn*. The killed uucp request must belong to the person issuing the uustat command, unless that person has superuser privileges.

-c*hour* Remove the status entries which are older than *hour* hours. This option can only be executed by the user uucp or the superuser.

-u*user* Report the status of all uucp requests issued by *user*.

-s*sys* Report the status of all uucp requests that are destined for remote system *sys*.

-o*hour* Report the status of all uucp requests that are older than *hour* hours.

-y*hour* Report the status of all uucp requests which are younger than *hour* hours.

-j*all* Report the status of all uucp requests or the specified job request number.

-v Report uucp status in words rather than code. If this option is not specified, a status code is printed with each uucp request.

When no options are given, the uustat command prints the status of all uucp requests issued by the current user. Note that only one of these options -j, -m, -k, -c, can be specified along with the remaining options.

```
# uustat -usteve -slimbo -y63 -v
```

This command prints the status, in words, of all uucp jobs issued by user steve that were destined for system limbo within the last 63 hours. The format of each job status entry is:

job# user destination spool_time status_time status

The status may be either an octal number or a verbal description. The octal code corresponds to this description:

OCTAL	STATUS
00001	The copy failed for unknown reasons
00002	Permission to access local file is denied
00004	Permission to access remote file is denied
00010	Bad uucp command is generated
00020	Remote system cannot create temporary file
00040	Cannot copy to remote directory
00100	Cannot copy to local directory
00200	Local system cannot create temporary file
00400	Cannot execute uucp
01000	Copy succeeded
02000	Copy finished, job deleted
04000	Job is queued

The format for the machine accessibility status entries is:

system status-time last-success-time status

system	The system in question.
status-time	The time the last status entry was made.
last-success-time	The time of the last successful connection to this system. Note that this does not imply that the entire session was completed. It does mean, however, that the transfer daemons successfully completed the handshaking phase and were able to begin transferring files.
status	A self-explanatory description of the machine status.

3.3.3 Obtaining a Log of File Transfers

The SYSLOG file records the number, size and source of each data transmission. Each entry has this format:

uid rmte_sys (date) (int_time) sent/rec'd_data #b dur, Pk: # Rxmt #

uid	The effective user ID of the running process.
rmte_sys	The name of the remote system where the data is sent or received.
date	The date of the transaction, including the time of day.
int_time	The internal representation of the date.
sent/rec'd_data	Indicates whether the data was sent or received from the remote site.
#b	The number of bytes transferred.
dur	The duration of the transfer in seconds.
Pk:	The number of packets needed to send the data.
Rxmt	The number of packets that had to be retransmitted.

3.4 Adding Incoming (Remote) Connections

If a remote site requests a uucp connection to your system, it is necessary to update the information in your uucp-related files. To do this, run the uucpsetup command with the -i option:

```
# uucpsetup -i
```

Then answer the questions pertaining to incoming connections.

3.5 Deleting Incoming (Remote) Connections

To deny a remote site access to your system, delete its entry from /var/uucp/USERFILE, and remove its login name from the /etc/passwd file. For example, to deny a system named sysY from accessing your system, delete the sysY entry from the USERFILE. Assuming this is your USERFILE, you would edit /var/uucp/USERFILE and delete the third line:

```
# cat  /var/uucp/USERFILE
remote, X1       /usr/spool/uucppublic
local,  X9       /
max,sysY  c  /usr
max,sysZ     /sys
blimpy,sysQ  /
nuucp, /usr/spool/uucppublic
#
```

Note

The presence of the INSECURE file makes your system potentially insecure. If the file /var/uucp/INSECURE exists, then all connection requests from systems not listed in USERFILE are allowed, with the remote system having the default parameters allotted by the *remote* entry in USERFILE, that is, the execution access level is 1.

Note that the remote system still has to log in to your system successfully even if the INSECURE file exists. Thus, it must have a valid uucp login name and password.

If the INSECURE file does not exist, then your system is more secure, because only those remote systems that have a specific entry in USERFILE can assess your system.

3.6 Adding Outgoing Connections

To allow your system to initiate a uucp connection with a remote site, you need to update the information in your uucp-related files. To do this, run the uucpsetup command with the -o option:

```
# /etc/uucpsetup -o
```

Then answer the questions pertaining to outgoing connections.

3.7 Deleting Outgoing Connections

To prevent your system from initiating uucp connections with remote sites, delete the remote site's entry from /var/uucp/L.sys. For example, to prevent your system from connecting with sysY, delete the sysY entry from the L.sys. Assuming this is your L.sys file, you would edit /var/uucp/L.sys and delete the second line:

```
# cat /var/uucp/L.sys
sysX Any ACU 1200 777-7777 "" \r\d ogin:-EOT-ogin: Ufoobaz ssword dog
sysY Any ACU 1200 222-2222 "" \r\d ogin: xuucp ssword frumples
sysZ Any ACU 300 465-1234 "" \r ogin:-EOT-ogin: Usys1 ssword testing
#
```

3.8 Adding Modems

To enable the tip command, you must set up the uucp modems, even if you will not be running the uucp utility.

To add a modem to your uucp facility, run the uucpsetup command with the -m option:

```
# uucpsetup -m
```

Then answer the questions pertaining to modems.

3.9 Removing Modems or Moving Them from One Port to Another

If you need to remove a modem or move one from one port to another, follow these steps:

1. Edit the L-device file. You may also need to edit the L.sys file, depending upon whether you have specific devices listed there. Delete or rename the corresponding device entries (dv) in these files, as necessary.
2. Edit the /etc/ttys file and delete or modify the corresponding special file entries. For information about the this file, see ttys(5) in the ULTRIX Reference Pages.
3. Activate the changes to the /etc/ttys file:

   ```
   # kill -HUP 1
   ```

4. Edit the /etc/remote file and delete or rename the corresponding device entries (dv) for the tip utility. For further information, see remote(5) in the ULTRIX Reference Pages.
5. Move the appropriate /dev entries. For details about the /dev directory, see the Guide to System Environment Setup.
6. Physically move the modem cable from one port to another if you are moving the modem.

3.10 Adding Direct-Connect Lines

To add a direct-connect line, you need to modify a few files on both the incoming and outgoing systems.

- To set up direct-connect lines for the uucp utility on the outgoing system:
  1. Edit the /var/uucp/L.sys file. Add an entry for the system to which you are directly connecting. For example:

     ```
     tigger Any tty03  9600  tty03 "" \r ogin: poo ssword: bear
     ```

  2. Edit the /var/uucp/L-devices file. Add an entry for the device which is the directly connected line. For example:

     ```
     DIR tty03 tty03 9600 direct
     ```

3. Change the mode of the device. For example, if the line is tty03, type this command:

```
# chmod 666 /dev/tty03
```

- To set up direct-connect lines for use with the tip command on the outgoing system:

  1. Edit the /etc/remote file and add an entry for the device. For example:

     ```
     tigger:dv=/dev/tty03:br=#9600:pa=none
     ```

  2. Change the mode of the device. For example, if the line is tty03, type this command:

     ```
     # chmod 666 /dev/tty03
     ```

- For both the uucp and tip utilities edit the /etc/ttys file on the incoming system. Be sure that the entry for the incoming direct-connect line specifies the getty daemon. For example:

  ```
  tty04 "/etc/getty std.9600" vt100 on  nomodem
  ```

Make sure both incoming and outgoing systems are using the same baud rate, for example 9600.

Note

The uucpsetup command does not set up direct-connect lines.

3.11 Cleaning Up Excess Files and Directories

The uucp facility cleans up its temporary files and directories after a uucp connection has been completed. However, there are some files and directories that you must periodically clean up, depending on the number of uucp connections your system makes.

One directory that tends to grow quickly is the /usr/spool/uucppublic directory. This directory grows because remote sites usually have access to it and, therefore, can put files there. To prevent this directory from getting too large, you can delete files from it.

Another directory that tends to grow quickly is the /usr/spool/uucp directory. This directory contains all the log files recording your system's uucp activity. If any of the log files such as ERRLOG, SYSLOG, or LOGFILE become too large, you can delete them.

3.12 Maintaining System Security

System security is maintained when remote systems with uucp connections cannot access files on your local system. There are two ways to maintain system security:

1. Assign the appropriate file access modes
2. Assign the appropriate entries to the /var/uucp/USERFILE

You should remind all users to keep their individual files and directories properly protected. They can use the chmod command to change their files' modes.

You should also be sure that all system files have the correct protection modes. In its most insecure state, the uucp facility can access files that are readable by uucp. This includes any file with mode *xx*4. The uucp facility can overwrite files that are writable by uucp, that is, if the file modes are *xx*2 or *xx*6.

The USERFILE file is the first measure of system security. It provides the following three levels of security:

- File access permission for remote and local users
- Login security
- Remote execution permissions

Each line in /var/uucp/USERFILE has the format:

login,sys X# c *path-name path-name* ...

login — The login name for a remote system or local user.

sys — The name of the remote system; optional (read following discussion).

X# — The level of execution assigned to *sys*; optional, except in the default entries.

c — The optional call-back required flag.

path-name — A pathname prefix that *sys* can access.

3.12.1 File Access Security with USERFILE

The domain of accessibility of a remote system is restricted by /var/uucp/USERFILE. An entry should exist for each system that defines which paths the system can access. If no entries exist for a particular system, the default entries are used.

The /var/uucp/USERFILE must be set up with default entries that use this format:

remote, X# */some_path_name_for_remote_systems*
local, X# */some_path_name_for_local_users*

X — A keyword used by uucp to identify the set of commands that a remote system can execute on the local system. In the following examples, the X field is included for accuracy only. For information about security from remote systems, see Section 3.12.3.

remote — The default entry for remote systems that do not have an explicit entry in /var/uucp/USERFILE. Do not be too liberal with this entry. A typical path allowed for remote users is:

```
remote,  X1  /usr/spool/uucppublic
```

The /usr/spool/uucppublic directory is a well known public repository. Users should not leave important files in this area.

local — The default entry for local users. Usually, the normal ULTRIX system file access modes are all the security that is imposed on local users. Therefore, the typical default entry for local users is:

```
local,  X9  /
```

Note

The default entries must be supplied; otherwise, the uucp utility fails.

In addition to the default entries, per-system entries may also be supplied. These entries provide the flexibility to give trustworthy systems less restrictive access to the local system. The following examples illustrate the alternatives:

Example 1:

```
remote,   X1   /usr/spool/uucppublic
local,   X9    /
max,sysX       /usr/sources
```

This example allows remote system sysX, which has logged in to the local system with the login name max, to access anything that has the prefix /usr/sources. All other systems can access only the public directories.

Example 2:

```
remote,   X1   /usr/spool/uucppublic
local,   X9    /
max,   /usr    /usr/src/share
```

This example allows any system or user who has logged in to the local system with login name max to access anything in or below the directories /usr and /usr/src/share. Note that several systems could log in with this same login name, so care should be taken to restrict access rights appropriately. All other systems can access only the public directories.
Login Security with USERFILE

The uucp utility tries to ensure that only legitimate systems log in to the local system. When a remote system logs in, it passes its name to the local system. The uucp utility crosschecks the system name and login name against the /var/uucp/USERFILE. If an entry exists for that system name and the login name does not match the one specified in the USERFILE, the connection attempt is terminated. The following example illustrates this situation:

Sample USERFILE:

```
remote,   X1   /usr/spool/uucppublic
local,   X9    /
max,sysY c     /usr
max,sysZ       /sys
blimp,sysQ     /
nuucp,         /usr/spool/uucppublic
```

Case 1:

The competition across the street has unscrupulously obtained the login name blimp and the password for your uucp utility. They successfully connect to the local uucp. The local uucp utility then checks for a USERFILE entry for blimp. It finds the entry and knows that only sysQ can connect with the login name blimp. Since the name of the remote system is syszero, the connection attempt fails.

Case 2:

In this case, the same competition stole the login entry for nuucp. Since no system name is provided in the USERFILE for the nuucp entry, the connection attempt succeeds.

Case 3:

It may happen that a system logs in and there is no entry in USERFILE that corresponds to either the login name or the remote system name. The uucp utility handles this situation as follows:

> If the file /var/uucp/INSECURE exists, the connection request is accepted. If /var/uucp/INSECURE does not exist, the connection request is rejected.

This option is provided so that you do not need to supply an entry for every system that can log in. The default (remote) entry is used for systems that do not have an entry in the USERFILE, for example, when the system manager only wants to worry about two uucp passwords: one login for trustworthy systems and another login for the other systems, for example USENET.

Here is a sample USERFILE:

```
remote,   X1   /usr/spool/uucppublic
local,    X9   /
safeuucp,      /
unsafeuucp,    /usr/spool/uucppublic
```

Since no system names are specified, connection attempts that use the login names safeuucp or unsafeuucp succeed. Attempts to connect with other login names succeed only if /var/uucp/INSECURE exists, and then they only receive the security level of the default path.

Case 4:

If you believe it is possible to forge remote system names, you should use the call-back option. In the USERFILE example, if a successful login is made from a system that claims to be sysY, the uucp utility rejects the request and then tries to call the real sysY. This is the most secure form of USERFILE entry. Note that if both the destination and local system use the call-back option, an infinite loop of call backs can occur. Make sure this does not happen.

3.12.2 Remote Execution Security

You can restrict remote execution to specified systems only. In addition, systems that are allowed to execute commands on the local system can be limited to a subset of allowable commands.

The X# field of a USERFILE entry is used to provide levels of security. The # can range from 0 to 9, where 0 is the most secure level and 9 is the least secure level. When the execution daemon (uuxqt) processes a remote execution request, it obtains the security level from the USERFILE that corresponds to the remote system making the request. The command to be executed also has a level number. If the level associated with the

remote system is greater than or equal to the number associated with the command, then the uuxqt daemon grants permission to execute that command. Otherwise, the remote execution request fails.

Note

You must specify the execute field in the default USERFILE entries. Otherwise, the uucp utility fails. No other USERFILE entries need to have the execute level specified. For entries that do not have an execution level listed, the default execution level is used for that system. The default execution level for remote systems is obtained from the remote USERFILE entry. The local USERFILE entry provides the execution level to local users.

Execution levels are provided on a system-name basis only, not to particular users. You cannot use a USERFILE entry that specifies a login name, but no system name, to determine the execution level of a system that logs in with this entry. Instead, machines that do not have their own USERFILE entry will use the default remote USERFILE entry.

The next example illustrates remote execution security, assuming the following USERFILE and L.cmds file.

Here is the sample /var/uucp/USERFILE:

```
remote,   X0   /usr/spool/uucppublic
local,    X9   /
maxuucp,sysmax  X3    /usr
xuucp,systemx   X1 /usr/spool/uucppublic
yuucp,systemy   X1 /usr/spool/uucppublic
zuucp,systemz/usr/spool/uucppublic
nuucp,    /usr/spool/uucppublic/stockroom
ruucp,    X5    /usr/spool/uucppublic/stockroom
```

Here is the sample /var/uucp/L.cmds file:

```
rmail   X1
rnews   X1
uusend  X2
```

Explanation: The default remote entry prevents any system that does not have its own USERFILE entry from executing any of the commands in L.cmds. They can, however, send or receive files from the public directories, and the systems sysmax, systemx, and systemy can execute rmail and rnews. Yet Sysmax is the only remote system that can execute uusend. Any system that logs in as nuucp is provided the default execution level, which in this case is 0, and cannot execute any commands.

The important point to notice is that these latter systems that log in as nuucp are not provided with the security level of the default path.

Therefore, the systems that log in as nuucp can only send and receive files to and from /usr/spool/uucppublic/stockroom.

Any system that logs in as ruucp has the same execute permissions as those that log in as nuucp. Because no system name is provided in the ruucp USERFILE entry, the system ignores the X field and uses the default execution level instead.

Local users can access all of the commands in L.cmds.

3.13 uucp Commands

See the following uucp commands in the ULTRIX Reference Pages: uucp(1), uulog(1), uuname(1), uustat(1), and uux(1).

Configuring the MICOM PAD for tip and uucp 4

This chapter provides information on how to configure the MICOM Micro800/X.25 Packet Assembler Disassembler (PAD) for the tip and uucp ULTRIX software utilities, and discusses the following topics:

- Connecting the PAD
- Setting up the uucp utility for the PAD
- Setting up tip for use with the PAD

The MICOM Micro800/X.25 PAD hardware is not sold or supported by Digital Equipment Corporation.

4.1 Description of the MICOM PAD

The MICOM Micro800/X.25 PAD is sold and supported by MICOM Systems Inc. The PAD implements the Consulting Committee for International Telephony and Telegraphy (CCITT) recommendations X.3, X.28, and X.29. It connects directly to an X.25 access line (also called a trunk) and performs the necessary operations to place calls and create connections to other data terminal equipment (DTE) on the X.25 network. Asynchronous devices such as terminals or multiplexer lines gain access to the PAD by being connected by a cable to one of its channels.

Depending on the model purchased, the PAD has from 4 to 16 channels for sending or receiving X.25 calls. By attaching the PAD channels to terminal multiplexer lines on a processor running ULTRIX software, you can configure the PAD to support outgoing uucp connections, outgoing tip connections, and incoming uucp and login services.

Although each channel can be configured for more than one purpose, in this discussion assume that each channel is configured for a specific purpose. For example, channel 1 is for outgoing uucp calls, channel 2 is for outgoing tip calls, channel 3 is for incoming uucp connections, and channel 4 is for incoming login service.

4.2 Connecting the PAD

Before connecting multiplexer lines to PAD channels, follow these steps:

1. Decide which channels to dedicate for which purposes, and then reserve that many multiplexer lines on your ULTRIX operating system. These lines must support modem control.
2. Turn off any getty processes that may be running on the dedicated multiplexer lines:
   a. Edit the /etc/ttys file to make sure that the status of the dedicated lines is off.
   b. Send a HUP signal to the init process by typing:

      ```
      # kill -HUP 1
      ```

      The HUP signal makes the changes in the /etc/ttys file take effect.

The multiplexer lines can now be connected to the PAD channels using DIGITAL RS-232 modem-compatible cables.

Before setting up the PAD, read the appropriate manual written for the MICOM Micro800/X.25 Concentrator PAD to become familiar with the device. The PAD documentation contains the necessary information for configuring and using the PAD. If you are setting up the PAD for the uucp or tip utilities, first acquaint yourself with the PAD by using it with a terminal until you are able to place calls successfully and create connections to remote devices. Then review the sections in the PAD documentation for information on the specific configuration parameters to make the PAD work with the uucp, tip, and remote login utilities.

The PAD makes provisions for placing calls between its channels as a form of loopback. With a loopback, calls can be made without ever going over the X.25 network.

For example, suppose you have connected terminals to channels 3 and 4. To place a call from channel 3 to channel 4, type the following at channel 3:

```
C 00/04
```

The DTE address 00 places calls between channels.

4.3 Setting up the uucp Utility for the PAD

This section describes how to set up the uucp utility for use with the PAD. This section discusses:

- Setting up incoming uucp lines

- Setting up the uucp utility to dial out over the PAD

The uucp utility has an additional protocol called f-proto, which is much faster than the standard g-proto protocol. The calling machine initiates the f-proto protocol; however, in order for it to be effective, both machines must recognize the protocol. Furthermore, the PAD parameters shown in the profile below must be set for both the PAD channel placing the call and the PAD channel receiving the call.

A device profile is a list of PAD parameter values. When a device profile is assigned to a channel, the channel's PAD parameters take on the values listed in the device profile. You can define up to eight device profiles, numbered from 1 to 8. Reserve a device profile number for uucp and set the profile as shown below. For the following example, assume profile 8 was chosen for uucp.

You should assign the same device profile to all channels dedicated for uucp, for example, profile 8. Profile 8 needs the following PAD parameters set:

```
x28acc=0          bits/char=3
echo=0            dv_parity=0
data_fwd=2        net_parity=0
idletimer=10      c.xon=17
dv_flow=1         c.xoff=19
s.signal=0        special_flow=0
break=0           count_fwd=0
cr_pad=0          escdelay=0
l.fold=0          c.break=0
speed=14          c.supp=0
p.flow=1          c.subs=0
autolf=0          echoctrl=0
lf_pad=0          special_echo_id=0
edit=0            pagelength=0
c.del=0           c.page=0
l.del=0           ff_pad=0
l.disp=0          inactivity=0
dv.type=2         x29acc=0
echomask=0
```

Note that the speed parameter selected is 9600 baud (value 14). Refer to the MICOM documentation for information on how to change the speed parameter.

4.3.1 Setting up Incoming uucp Lines

To set up incoming uucp lines, configure the channel dedicated for incoming uucp calls as follows:

```
Profile: 8
Call option: 1
Address id Mnemonic: **
Channel Option: 6
```

Then follow these steps:

1. Set the profile selection to the number assigned previously. The number 8 is used in this example because the profile was assigned 8 in the previous section. Be sure that the channel option is 6. Channel option 6 raises the carrier detect signal each time a call comes in. Be sure the carrier detect signal is passed through the cable to the multiplexer line. The situation is analogous to having a dialup modem installed. Leave the other factory-set values alone.

2. Place a getty process on the line. To do this, edit the /etc/ttys file and change the status of the line to on modem. Then, send a hangup signal to init by typing:

   ```
   # kill -HUP 1
   ```

   Assume line ttyh6 is connected to the PAD channel 3 and is reserved for uucp incoming connections. The following is an example entry for the /etc/ttys file:

   ```
   ttyh6 "/etc/getty T9600" vt100  on  modem  # PAD chan 3
   ```

   The result is a PAD channel that can be called over the X.25 network by another system running the uucp utility to request the f-proto protocol.

3. Configure the channel reserved for outgoing uucp connections as follows:

   ```
   Profile: 8
   Call option: 1
   Address id Mnemonic: **
   Channel Option: 0
   ```

   The channel option 0 means that the channel is dedicated.

4.3.2 Setting up uucp to Dial Out Over the PAD

After you have configured the PAD channels for uucp dialout, you are ready to set up the uucp utility. For information on how to set up the uucp utility, first see Chapter 2. Then follow these steps:

1. Edit the /var/uucp/L-devices file to reflect the addition of the PAD dialout lines. Here is the new format for the L-devices file:

   type line call-unit speed brand preferred_proto

   The PAD channels are treated as direct lines. The L-devices file

now contains the *preferred protocol* field from which you request f-proto for lines connected to PAD dialout channels. For example, suppose the PAD channel for uucp dialout is connected to ttyh5. The proper L-devices entry is:

```
DIR ttyh5 ttyh5 9600 direct f
```

Suppose you have two channels configured for uucp dialout: one connected to ttyh7, and the other to ttyh8. Here are the proper entries:

```
DIR ttyh7 ttyh7 9600 direct f
DIR ttyh8 ttyh8 9600 direct f
```

2. Edit the L.sys file. This file holds entries to call other systems. It contains the information necessary to call the host and perform the login sequence. To call a host over the X.25 network, assume that it is on a direct-connect line attached to the dialout channel of the modem. Include the PAD commands to call the host as part of the login sequence. For example, suppose the name of the system you are calling is mozart, the X.25 DTE address is 12345, and the PAD channel you are calling mozart, on is channel 3, the one dedicated for uucp login. Your PAD uucp dialout channel is connected to ttyh5, the login name is Umozart, and the password is donny. The following L.sys entry could be used to call system mozart:

```
mozart Any DIR 9600 ttyh5 "" \r "" C\s12345/03 ogin:-\r-ogin: \
Umozart ssword: donny
```

In this example, the entire entry is on one line, although it may wrap around. The information that places the call over the PAD is C\s12345/03 and is interpreted as follows:

C — The PAD command to place an X.25 call.

\s — Indicates how to include a space character in an L.sys entry. Make sure you have a space between the PAD command (C) and the DTE address (12345).

12345 — The DTE address.

/03 — Address channel 3 on the called PAD.

The rest of the line is the login sequence. Note that the device containing the PAD dialout line is wired into the L.sys entry for calling system mozart. Even if two PAD channels are reserved for uucp dialout, the same one is always used to call mozart. Rotary action is not possible.

4.4 Setting up tip for Use with the PAD

This section describes how to set up the tip utility for use with the MICOM PAD, and discusses the following topics:

- Setting up outgoing tip connections
- Setting up incoming login service

4.4.1 Setting up Outgoing tip Connections

The PAD tip dialout lines are treated like direct connects. For example, if you are on the X.25 network called telenet and your outgoing tip channel is connected to /dev/ttyh7, the proper entry for the /etc/remote file is:

```
telenet|pad|PAD outgoing channel:\
        dv=/dev/ttyh7:br#9600
```

By typing the following, you make a connection to the PAD:

```
# tip telenet
```

You can then place your X.25 call just as if you were connected directly to the PAD, which in effect you are.

If you have three outgoing tip channels connected to /dev/ttyh4, /dev/ttyh5, and /dev/ttyh6, then you should have the following entry in the /etc/remote file:

```
telenet|pad|PAD outgoing channel:\
        dv=/dev/ttyh4,/dev/ttyh5,/dev/ttyh6:br#9600
```

This causes a rotary effect. If the first channel is busy, tip tries connecting to the next channel, and so on.

When you have completed your call, remember to type tilde-dot (~.) to make tip hang up the connection. The tip command has no other way of knowing when your call is over.

The PAD parameters specify information such as whether the PAD echoes characters and when the host PAD forwards characters it receives to the remote PAD. The standard convention for tip is that the remote host echoes characters. This convention is necessary for screen-oriented programs such as vi. However, it produces a high X.25 traffic rate of up to two X.25 packets for each character typed and, accordingly, causes high public data network (PDN) charges. The other extreme is to have the PAD perform all the echoing and editing features, and then only forward characters when, for example, an entire line has been typed. However, many programs do not function properly if they have to wait for an entire line before they can receive any characters.

There is no solution that fits all situations. Yet, if you use the following device profile, which causes high network charges, you do not lose any

ULTRIX software functionality:

```
x28acc=0          echomask=0
echo=0            bits/char=3
data_fwd=127      dv_parity=0
idletimer=10      net_parity=0
dv_flow=1         c.xon=17
s.signal=5        c.xoff=19
break=0           special_flow=0
cr_pad=0          count_fwd=0
l.fold=0          escdelay=0
speed=14          c.break=0
p.flow=1          c.supp=0
autolf=0          c.subs=0
lf_pad=0          echoctrl=0
edit=0            special_echo_id=0
c.del=0           pagelength=0
l.del=0           c.page=0
l.disp=0          ff_pad=0
dv.type=2         inactivity=0
                  x29acc=0
```

For purposes of this example, assume that profile 5 has been assigned the values shown above. Profile 5 forwards X.25 packets for every character typed. Although the PAD displays the PAD service prompt (s.signal=5), it does not echo the characters typed as you place the call because of the echo=0 parameter.

Note

Remember, this profile (profile 5) may not be proper for your installation. The PAD parameter information in your PAD documentation gives other examples where the PAD is used to echo the characters and perform editing.

For outgoing tip connections, configure the reserved channels as follows:

```
Profile: 5
Call option: 1
Address id Mnemonic: **
Channel Option: 0
```

Note that the parameter for Profile is the only variable. The other parameters must have the values shown.

4.4.2 Setting up Incoming login Service

The same issues related to outgoing tip connections are applicable with incoming login service. Follow these steps:

1. Set up the profile. Use the same profile for incoming login services that you use for outgoing tip connections. Configure the channels

dedicated for incoming login calls as follows:

```
Profile: 5
Call option: 1
Address id Mnemonic: **
Channel Option: 6
```

The important setting is the channel option. Channel option 6 specifies that the channel will raise carrier detect when a call comes in. Thus, be sure that the carrier detect signal is passed through the cable to the multiplexer line. The situation is analogous to having a dialup modem installed.

2. Place a getty process on the line. First, edit the /etc/ttys file and change the status of the line to be on modem. Then, send a HUP signal to init by typing:

```
# kill -HUP 1
```

Assuming line ttyh6 is connected to the PAD channel 3 and is reserved for incoming login connections, the following is an example entry for the /etc/ttys file:

```
ttyh6   "/etc/getty T9600" vt100  on  modem  # PAD chan 3
```

When a call comes over the X.25 network for a channel designated for incoming login service, the channel raises the carrier detect signal, the getty waiting on the line wakes up, and a login message appears for the user placing the call.

Troubleshooting the uucp Utility 5

This chapter discusses how to troubleshoot the uucp utility.

If your system uses the supported hardware, most problems should either be hardware or administrative failures, such as files that are not set up correctly or wrong phone numbers. Problems with the software may still exist, but they should be much more rare. The discussion in the next sections should help determine the source of the problem.

The following administrative files contain uucp statistics to use for diagnosing problems:

- /usr/spool/uucp/LOGFILE
- /usr/spool/uucp/ERRLOG
- /usr/spool/uucp/SYSLOG

When a connection to a remote system does not seem to be working, you may need to do some debugging.

The first places to look are the LOGFILE and ERRLOG files, since they may give some clue as to the nature of the problem. You have to determine if the problem is in the dialing stage, the login/handshaking stage, the file transfer stage, or whether it is a hardware problem.

The most common errors occur when the remote site has set up its USERFILE incorrectly. An incorrect USERFILE results in messages being sent back to local users saying that remote access to path files is denied. However, at any time the remote system could have changed its password or phone number. You should contact the system manager of the remote system for updated information.

When error messages constantly refer to one ACU out of many, the problem is probably a bad ACU. If the SYSLOG file has recorded a lot of retransmissions, the hardware may be faulty, the communications line may be noisy, or the baud rate may be too high for the transmission media.

If the source files are available, you should try initiating a conversation with the remote system in question. To initiate a conversation, start a uucico process in the master mode in this format:

/var/uucp/uucico -r1 -x# -X# -s*system*

r1 Puts the uucico process into the master role.

x# The debugging level. # can have a value of from 0 to 9. The higher the number, the more debugging output. No packet level debugging is printed.

X# Obtains packet level debugging output. # can have a value of from 0 to 9. The higher the number, the more packet level debugging output.

system The system to be contacted.

Another option to the uucico process is -f. This forces the uucico process to start a conversation with a specified system, regardless of any previous connection status as provided by the STST. files.

Even if the source code is not available, you might observe some useful information. The output of the uucico process follows the progress of the conversation. Debugging output from the slave uucico process is placed in the file AUDIT, in the spool directory at the remote site. The output tends to be less meaningful than the LOGFILE, unless the source code is available to help interpret the messages. A detailed explanation of the messages is not given here because the messages are likely to change from version to version.

5.1 Obtaining a Log of Transmission Problems

The LOGFILE contains information logged by the transfer process uucico concerning a conversation with a remote site. If a problem occurs during the connection stage, it is noted here. The entry format is:

login_name (time of transaction-process_number) message

You might see the following error messages if a problem occurs during the connection stage:

LOGIN FAILED
The uucico process got a carrier but could not log in.

FAILED (call to some system)
The connection attempt failed as a result of a previous message.

NO CALL (RETRY TIME NOT REACHED)
You attempted to call a system too soon after previous failed attempt.

CAN NOT CALL (SYSTEM STATUS)
The call to a remote system aborted because of a previous connection status, such as too many failed attempts to log in to the remote system or attempting to log in too soon after a previous failed

connection attempt. Connection status information is kept in /usr/spool/uucp/STST. There is a separate STST. file for each remote system. If the STST. file corresponding to the remote system is removed, then a call is permitted to that remote system immediately.

NO CALL (MAX RECALLS)
The local system has failed to log in to the remote system the maximum number of times, which is 20 by default. No further attempts can be made by uucico until the STST.remote file is removed from the /usr/spool/uucp/STST. directory.

SHARED LINE IN USE
You attempted to use a shared line which is busy.

ALREADY OPEN (device name)
This also gets the log message, direct line is already in use, except this message is logged for ACUs.

FAILED (HSM no carrier)
The carrier was not detected when using a Hayes Smartmodem.

df02/df03/df112 illegal return (FAILED acu=/dev/cua2, char=0)
This message indicates that the specified ACU was in a strange state, resulting in an unknown return character. This problem usually goes away when the current uucico process exits.

WRONG TIME TO CALL (*systemname*)
An attempt was made to call a system at a time outside the range specified in the L.sys file.

NO DEVICE
An attempt to call a system was made, but no (ACU or hard-wired line devices were available.

using device (*device, fd=#*)
The uucico process is using *device* to call a remote system. The *fd* is the file descriptor that corresponds to *device*.

LOCKED (call to *systemname*)
An attempt to call a system was made for which a conversation was already in progress. Therefore a lock file, for example, exists for that system in the spool directory.

FAILED (LOGIN VS MACHINE)
A remote system tried to log in, but it failed the USERFILE security test.

TIMEOUT (DIALUP DN write)
There was no carrier detect after dialing a number.

FAILED (DIALUP ACU write)
An error occurred while writing the phone number to the ACU. If this error is constantly showing up, it could be the result of an ACU

hardware failure. There might also be something wrong with the mode of the special device file.

TIMEOUT (*systemname*)
A remote system has initiated a connection attempt and then stopped communication (reason unknown to the local site).

The following messages can occur at any time:

ret (#) from *system!user* (MAIL FAIL)
mail command failed. The exit status is indicated by ret. The originator is *user* on the remote node: *system.*

cmd: *command; ret: signal #, exit #* (CMD FAILED)
A remote execution request failed. The *command* is the command that failed. The *signal* is the signal that caused the command to fail. The *exit* is the value returned by an *exit* system call in *command.*

XQT DENIED (*command*)
A remote system tried to execute *command,* but the request was denied by the local system.

cmd xqt'ing > 55 minutes (touch lock file)
The uuxqt daemon has been executing a command for 55 minutes. The lock files associated with this command are refreshed so that they will not be removed by another uuxqt process.

command terminated - exceeded time limit (*command*)
A command that is being processed by the uuxqt daemon has been running longer than approximately eight hours. The *command* is assumed to be a runaway process and is terminated.

system_name (execute level too low)
The *system_name* was not allowed to execute a command because it did not have a high enough execute level. The specific command should be named by a subsequent LOGFILE entry.

CAUGHT (SIGNAL #)
A signal was caught by uucico that caused it to terminate.

intrEXIT (signal: #)
A signal was caught by uucico. This signal was probably the result of damaged software, an undetected bug, or some other system problem.

hayes: closing (fd = #)
The uucico daemon has finished using a Hayes Smartmodem. The *fd* is the file descriptor associated with the ACU.

closed generic acu
The uucico daemon finished using the generic dialer.

These messages occur during the file transfer stage after the connection has been made:

FAILED (CAN'T READ DATA)
: A work file (C.file) has specified a file to transfer, but that file is not readable by uucp or does not exist.

FAILED (CAN'T READ SPOOLED DATA)
: A work file (C.file) has a reference to a spooled data file (D.file), and the spooled file is either unreadable by uucp or does not exist.

NOINPUT (set no incoming files allowed (*remote name*)
: The file /var/uucp/NOINPUT exists. The existence of this file is used as a flag to the uucico daemon: if NOINPUT exists, do not allow incoming files.

ACCESS (DENIED)
: An attempt was made by a remote system to access a file for which it does not have USERFILE permission.

REQUEST
: The remote system might have run out of space. An attempt was made to write to a directory that was not writable by uucp, or some USERFILE restriction was violated.

DENIED (CAN'T OPEN)
: A remote site tried to receive a file that the local uucico daemon cannot access.

BAD READ# (expected *char* got *something_else*)
: The local uucico daemon was waiting for a reply from the remote system, but either the return message was corrupted or the remote process did not reply.

FAILED (CAN'T CREATE TM)
: An attempt to create a temporary file failed, which may indicate that the system is running out of space.

FAILED (conversation complete)
: A conversation with a remote system stopped before all of the spooled files were transferred. The reason for the failure is not known, but it could have been caused by something or someone killing the remote process or possibly by a lost line. If a conversation has lasted about 90 minutes and the remote site is running an older version of uucp, the problem may have been the premature removal of a LCK.file at the remote site.

The following informative messages can appear in the LOGFILE:

REQUEST (*char srcname dstname owner*)
A request to transfer a file to a remote site was made. If no followup message was made to indicate some kind of failure, the request was successful.

The *char* is the type of request: S for send, R for receive, X for remote execution.

The *srcname* is the name of the file on the local system.

The *dstname* is the name the file will have on the remote system.

The *owner* is the owner of the file.

REQUESTED (*char srcname dstname owner*)
A remote site has requested to transfer a file to the local site. If there is no subsequent failure message, then the transfer was successful.

OK (startup)
The local and remote sites have successfully agreed upon what low level packet protocol to use to transfer raw data.

OK (conversation complete)
All transactions with a remote system completed successfully.

uucp XQT (PATH.....;*cmd*)
A request from a remote site to execute *cmd* was successful.

XQT QUE'D (*cmd*)
A command (*cmd*) to be executed at a remote site was spooled.

:QUE'D
A user request to transfer a file was spooled.

5.2 Obtaining a Log of Administrative Errors

The ERRLOG file contains error messages that are less likely to occur during the normal operation of uucp. If a uucp support file such as the USERFILE is improperly set up, the problem is noted here in the ERRLOG file. If administrative problems such as this occur, the software will most likely stop executing. Therefore, it is important that administrative problems listed in the ERRLOG be corrected quickly. If the system has run out of space preventing the creation of files, or if referenced files do not exist, the problem is noted here. Problems that occur during the transmission of raw data packets are also noted here. Packet problems occur infrequently and do not halt the uucico daemon. They are more indicative of a poor connection or an over-loaded system and sometimes may point to a problem in the hardware.

The format of an ERRLOG message is:

ASSERT ERROR *(process name) process# time_of_entry message return_code*

ASSERT_ERROR
: Redundant information indicating that an ASSERT ERROR has occurred.

process_name
: The name of the process in which the error occurred. It could be uucico, uucp, uuxqt, uux, uustat or any other uucp-related program.

process#
: The process identification number.

time_of_entry
: The time the ASSERT error occurred.

message
: Indicates the nature of the error.

assert_return_code
: A returned value that can be helpful for finding the source of the error.

Some typical ASSERT messages are:

PKassert
: Any message that begins with PK comes from the packet transmission software. It is most likely due to a noisy line or a failure at the remote system.

NO default entry for remote machines
: The USERFILE does not have the default entry for remote systems.

NO default entry for local users
: The USERFILE does not have the default entry for local users.

xeq level undefined in USERFILE
: The remote execution security level (X#) was not specified for a default USERFILE entry.

CAN'T OPEN *filename*
: The named file probably does not exist.

WRONG ROLE
: During the file transfer stage, the uucico process reversed roles from master to slave or slave to master at the wrong time.

ARG COUNT<#
: This message indicates that a work file (C.file) has been corrupted.

STAT FAILED *filename*

stat system call failed. If it happens continuously, the named file is probably missing, but should not be.

BAD LINE

A bad entry in the L-devices file has been encountered.

TOO MANY SUBDIRECTORIES

The maximum number of individual system subdirectories has been created. No more can be made.

TOO FEW LOG FIELDS

The login/expect sequence of the L.sys entry for the remote system is incorrect.

BAD SPEED

The desired line speed is not allowed.

RETURN FROM STTY

An attempt to set the terminal I/O parameters of the outgoing line has failed. This could be either a hardware or a system problem.

BAD WRITE genbrk#

An error occurred while generating a BREAK character on the outgoing line.

BAD DIRECTORY *directory_name*

The named directory does not exist or is not set to the correct modes.

CAN NOT GET sequence file lock

A lock file cannot be created so that the sequence file /usr/spool/uucp/sys/*sysname*/SEQF can be accessed.

PERMISSION DENIED (Incoming C. file)

The uucico daemon does not permit work files (C. files) to be transmitted to the local site because of security reasons.

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