

# Book C

Chapter 1	Using the na Commands
Chapter 2	Using the Configuration Parameters
Chapter 3	Using the CLI Commands
Chapter 4	Utilities
Chapter 5	Network Protocols
Chapter 6	Software Reference Guide





## *Revision Level History*



Revision	Description
A	Initial release.





# Contents

## Chapter 1 na Commands

Command Notation .....	C-2
Commands .....	C-5
annex .....	C-6
boot .....	C-8
broadcast .....	C-10
copy .....	C-11
dumpboot .....	C-12
echo .....	C-14
help .....	C-14
interface .....	C-16
password .....	C-17
port .....	C-17
printer .....	C-19
quit .....	C-19
read .....	C-19
reset .....	C-21
set .....	C-24
show .....	C-25
write .....	C-31

## Chapter 2 Configuration Parameters

Parameter Conventions .....	C-33
Entering Parameter Values .....	C-34
Setting Parameters to Supplied Defaults .....	C-35
Parameter Descriptions .....	C-37
a_router .....	C-43
acp_key .....	C-43
address_origin .....	C-43
alarmsyslog .....	C-44
allow_broadcast .....	C-44
allow_compression .....	C-45
allow_snmp_sets .....	C-45
arap_v42bis .....	C-45
at_guest .....	C-45
at_nodeid .....	C-46
at_security .....	C-46
attn_string .....	C-46
authoritative_agent .....	C-47
authorized_groups .....	C-47
autobaud .....	C-47
autodetect_timeout .....	C-48
backward_key .....	C-48
banner .....	C-48



broadcast_addr	C-49
broadcast_direction	C-50
bypass	C-50
chap_auth_name	C-50
char_erase	C-51
circuit_timer	C-51
cli_imask7	C-51
cli_inactivity	C-52
cli_interface	C-52
cli_prompt	C-52
cli_security	C-53
config_file	C-54
connect_security	C-54
control_lines	C-54
data_bits	C-55
daylight_savings	C-55
dedicated_address	C-55
dedicated_arguments	C-55
dedicated_port	C-56
default_zone_list	C-56
default_session_mode	C-56
dhcp_broadcast	C-57
disabled_modules	C-57
do_compression	C-58
echo	C-58
enable_security	C-58
erase_char	C-58
erase_line	C-59
erase_word	C-59
facility_num	C-59
forward_key	C-59
forwarding_count	C-60
forwarding_timer	C-60
group_value	C-61
hardware_tabs (asynchronous)	C-61
hardware_tabs (parallel)	C-61
host_table_size	C-61
image_name	C-62
imask_7bits	C-62
inactivity_timer	C-62
inet_addr	C-63
input_flow_control	C-63
input_is_activity	C-64
input_start_char	C-64
input_stop_char	C-64
ipencap_type	C-64
ip_forward_broadcast	C-65
ipso_class	C-65
ipx_do_checksum	C-65



ipx_dump_password	C-66
ipx_dump_path	C-66
ipx_dump_username	C-66
ipx_file_server	C-66
ipx_frame_type	C-66
ipx_security	C-67
ixany_flow_control	C-67
keep_alive_timer	C-67
lat_key	C-67
lat_queue_max	C-68
latb_enable	C-68
line_erase	C-68
load_broadcast	C-69
load_dump_gateway	C-69
load_dump_sequence	C-69
local_address	C-70
location	C-70
lock_enable	C-70
login_password	C-70
login_port_password	C-71
login_prompt	C-71
login_timer	C-71
login_timeout	C-71
long_break	C-72
loose_source_route	C-72
map	C-73
map_to_lower	C-73
map_to_upper (asynchronous)	C-74
map_to_upper (parallel)	C-74
max_chap_chall_int	C-74
max_session_count	C-74
max_vcli	C-75
metric	C-75
min_unique_hostnames	C-75
mode	C-75
mop_password	C-77
motd_file	C-78
multicast_timer	C-78
multisessions_enable (Annex)	C-78
multisessions_enable (asynchronous port)	C-78
name_server_1	C-79
name_server_2	C-79
nameserver_broadcast	C-79
need_dsr	C-79
net_inactivity	C-80
net_inactivity_units	C-80
network_turnaround	C-81
newline_terminal	C-81
node_id	C-82





option_key	C-82
output_flow_control	C-82
output_is_activity	C-83
output_start_char	C-84
output_stop_char	C-84
output_ttl	C-84
parity	C-84
password	C-85
passwd_limit	C-85
phone_number	C-86
port_password	C-86
port_server_security	C-86
ppp_acm	C-87
ppp_ipx_network	C-89
ppp_ipx_node	C-89
ppp_mru	C-90
ppp_ncp	C-90
ppp_password_remote	C-90
ppp_sec_auto	C-91
ppp_security_protocol	C-91
ppp_username_remote	C-91
pref_dhcp1_addr	C-92
pref_dhcp2_addr	C-92
pref_dump_addr	C-92
pref_load_addr	C-93
pref_mop_host	C-93
pref_name1_addr	C-93
pref_name2_addr	C-93
pref_secure1_host	C-94
pref_secure2_host	C-94
printer_crlf	C-94
printer_host	C-94
printer_name	C-95
printer_width	C-95
prompt	C-95
ps_history_buffer	C-96
redisplay_line	C-96
remote_address	C-96
reset_idle_time_on	C-96
retrans_limit	C-97
ring	C-97
rip_accept	C-97
rip_advertise	C-98
rip_auth	C-98
rip_default_route	C-98
rip_horizon	C-99
rip_next_hop	C-99
rip_rcv_version	C-99
rip_routers	C-100





rip_send_version	C-100
rip_sub_accept	C-100
rip_sub_advertise	C-101
routed	C-101
rwhod	C-101
security_broadcast	C-101
server_capability	C-102
server_name	C-102
service_limit	C-102
session_limit	C-103
short_break	C-103
sigproto	C-103
slip_allow_dump	C-104
slip_load_dump_host	C-104
slip_mtu_size	C-104
slip_no_icmp	C-104
slip_ppp_security	C-105
slip_tos	C-105
speed	C-105
stop_bits	C-106
subnet_mask (Annex)	C-106
subnet_mask (port)	C-106
sys_location	C-106
syslog_facility	C-107
syslog_host	C-107
syslog_mask	C-107
syslog_port	C-108
t1_info	C-109
tcp_keepalive (Annex)	C-109
tcp_keepalive (asynchronous)	C-109
tcp_keepalive (parallel)	C-110
tdi_distance	C-110
tdi_framing	C-110
tdi_line_code	C-110
telnet_crlf	C-111
telnet_escape	C-111
term_var	C-111
tftp_dump_name	C-111
tftp_load_dir	C-112
time_broadcast	C-112
time_server	C-112
timezone_minuteswest	C-113
tmux_delay	C-113
tmux_enable	C-113
tmux_max_host	C-114
tmux_max_mpx	C-114
tni_circuit_id	C-114
tni_clock	C-114
tni_esf_fdl	C-115





tni_framing .....	C-115
tni_line_buildout .....	C-115
tni_line_code .....	C-115
tni_ones_density .....	C-116
toggle_output .....	C-116
type (asynchronous) .....	C-116
type (parallel) .....	C-117
type_of_modem .....	C-118
user_name .....	C-118
vcli_groups .....	C-118
vcli_inactivity .....	C-119
vcli_password .....	C-119
vcli_security .....	C-119
zone .....	C-120

### Chapter 3 Using the CLI Commands

Command Syntax .....	C-121
Squelch .....	C-121
CLI Commands .....	C-122
admin .....	C-132
arap .....	C-135
arp .....	C-135
bg .....	C-137
boot .....	C-138
compact .....	C-140
connect .....	C-141
control .....	C-141
cp .....	C-142
dialout .....	C-143
edit .....	C-144
fg .....	C-145
filter .....	C-146
hangup .....	C-147
help .....	C-147
help -m .....	C-148
hosts .....	C-149
hosts .....	C-151
ipx .....	C-152
jobs .....	C-152
kill .....	C-153
lock .....	C-153
ls .....	C-154
modem .....	C-155
more .....	C-157
mv .....	C-157
netstat .....	C-158
Displays the network zone list for AppleTalk.....	C-160
passwd .....	C-161



ping .....	C-161
ppp .....	C-170
procs .....	C-171
queue .....	C-174
rlogin .....	C-176
rm .....	C-177
route .....	C-177
services .....	C-180
slip .....	C-183
stats .....	C-184
stats -c .....	C-187
stats -T .....	C-187
stty .....	C-194
su .....	C-204
t1_loopback .....	C-204
tap .....	C-205
telnet .....	C-208
tn3270 .....	C-214
who .....	C-231

## Chapter 4

### Utilities

aprint .....	C-235
erpcd .....	C-239
Default User Name and Password Verification .....	C-242
rtelnet .....	C-244

## Chapter 5

### Software Reference Guide







## **Figures**

Figure C-1. Overview of ping -t Actions. ....	C-166
Figure C-2. Topology for ping -t Examples. ....	C-168
Figure C-3. Portion of a Sample map3270 File. ....	C-219





## Tables

Table C-1. Arguments for the na Commands	C-3
Table C-2. The na Commands	C-5
Table C-3. Supported Arguments for the boot Command	C-9
Table C-4. Supported Keywords for the broadcast Command	C-10
Table C-5. Descriptions of the copy Command	C-11
Table C-6. Arguments for the dumpboot Command	C-13
Table C-7. Arguments for the help Command	C-14
Table C-8. Supported Keywords for the port Command	C-18
Table C-9. Keywords for the reset Command	C-22
Table C-10. Keywords for the reset t1 Command	C-23
Table C-11. Keywords for the show annex Command	C-26
Table C-12. Keywords for the show interface Command	C-27
Table C-13. Keywords for the show [port   asynchronous] Command	C-28
Table C-14. Keywords for the show t1 Command	C-29
Table C-15. Keywords for the show annex Command	C-38
Table C-16. Keywords for the show interface Command	C-39
Table C-17. Keyword for the show printer Command	C-39
Table C-18. Keywords for the show [port   asynchronous] Command	C-40
Table C-19. Keywords for the show t1 command	C-41
Table C-20. Valid Options for address_origin Parameter	C-44
Table C-21. Formatting Codes for Annex Prompts	C-53
Table C-22. Valid Options for the control_lines Parameter	C-54
Table C-23. Valid Options for the input_flow_control Parameter	C-63
Table C-24. Valid Options for the load_dump_sequence Parameter	C-69
Table C-25. Options for the map Parameter	C-73
Table C-26. Valid Options for the mode Parameter	C-76
Table C-27. Valid Options for the output_flow_control Parameter	C-83
Table C-28. Valid Options for the rip_accept Parameter	C-97
Table C-29. Valid Options for the rip_advertise Parameter	C-98
Table C-30. Valid Options for the rip_horizon Parameter	C-99
Table C-31. Valid Options for the rip_recv_version Parameter	C-99
Table C-32. Valid Options for the rip_send_version Parameter	C-100
Table C-33. Valid Options for the server_capability Parameter	C-102
Table C-34. Signaling Protocols	C-103
Table C-35. Priority Levels for the syslog_mask Parameter	C-108
Table C-36. IP Addresses for the time_server Parameter	C-112
Table C-37. CLI Commands	C-122
Table C-38. Non-privileged Remote Annex VMS Commands	C-126
Table C-39. Privileged Remote Annex VMS Commands	C-127
Table C-40. The Superuser admin Command Set	C-133
Table C-41. Arguments for the Superuser arp Command	C-136
Table C-42. Arguments for the bg Command	C-137
Table C-43. Arguments for the boot Command	C-138
Table C-44. Arguments for the Superuser control Command	C-142
Table C-45. Arguments for the fg Command	C-145
Table C-46. Arguments for the hosts Command	C-150



Table C-47. Status Field Definitions . . . . .	C-150
Table C-48. Arguments for the Superuser hosts Command . . . . .	C-151
Table C-49. Arguments for the kill Command . . . . .	C-153
Table C-50. Arguments for the modem Command . . . . .	C-155
Table C-51. Arguments for the netstat Command . . . . .	C-159
Table C-52. Arguments for the Superuser ping Command . . . . .	C-162
Table C-53. Fields Displayed by the ping -t Option . . . . .	C-167
Table C-54. The ping -t Command Display . . . . .	C-169
Table C-55. Arguments for the Superuser procs Command . . . . .	C-171
Table C-56. The Superuser procs Command Display . . . . .	C-172
Table C-57. Remote Annex Processes . . . . .	C-173
Table C-58. Arguments for the queue Command . . . . .	C-175
Table C-59. Arguments for the Superuser route Command . . . . .	C-178
Table C-60. Arguments for the services Command . . . . .	C-180
Table C-61. The services Command Display . . . . .	C-182
Table C-62. Arguments for the stats Command . . . . .	C-184
Table C-63. Arguments for the stats -T Command . . . . .	C-188
Table C-64. The stats -T Command Display . . . . .	C-190
Table C-65. Setting Parameters Using stty . . . . .	C-196
Table C-66. Displaying Parameters Using stty . . . . .	C-203
Table C-67. Arguments for the T1_Loopback Command . . . . .	C-205
Table C-68. Arguments for the Superuser tap Command . . . . .	C-207
Table C-69. Arguments for the telnet Command . . . . .	C-208
Table C-70. Issuing Commands Using telnet . . . . .	C-210
Table C-71. Arguments for the tn3270 Command . . . . .	C-215
Table C-72. Print-screen Parameters Set Using stty and na/admin . . . . .	C-218
Table C-73. Default Key Mappings for tn3270 . . . . .	C-221
Table C-74. Commands Used in tn3270 Command Mode . . . . .	C-225
Table C-75. Arguments for the who Command . . . . .	C-232
Table C-76. The who Command Display . . . . .	C-233
Table C-77. Supported Arguments for aprint . . . . .	C-236
Table C-78. Supported Arguments for erpcd . . . . .	C-240
Table C-79. Supported Arguments for rtelnet . . . . .	C-244
Table C-80. Supported Arguments for rtelnet . . . . .	C-245
Table C-81. All Parameters . . . . .	C-249
Table C-82. Annex Parameters . . . . .	C-279
Table C-83. AppleTalk-specific Annex Parameters . . . . .	C-291
Table C-84. LAT-specific Annex Parameters . . . . .	C-292
Table C-85. RIP-specific Annex Parameters . . . . .	C-294
Table C-86. T1-specific Annex Parameters . . . . .	C-295
Table C-87. TMux-specific Annex Parameters . . . . .	C-296
Table C-88. VMS-specific Annex Parameters . . . . .	C-297
Table C-89. RIP-specific Interface Parameters . . . . .	C-298
Table C-90. Asynchronous Port Parameters . . . . .	C-299
Table C-91. AppleTalk-specific Asynchronous Port Parameters . . . . .	C-309
Table C-92. LAT-specific Asynchronous Port Parameters . . . . .	C-310
Table C-93. PPP-specific Asynchronous Port Parameters . . . . .	C-311
Table C-94. SLIP-specific Asynchronous Port Parameters . . . . .	C-313
Table C-95. VMS-specific Asynchronous Port Parameters . . . . .	C-315





Table C-96. Parallel Printer Port Parameters.....	C-317
Table C-97. na Commands.....	C-318
Table C-98. CLI Commands.....	C-321
Table C-99. CLI Superuser Commands.....	C-323
Table C-100. ROM Monitor Commands.....	C-325
Table C-101. Formatting Codes for Annex Prompts.....	C-326
Table C-102. Variable Arguments.....	C-327
Table C-103. Annex Processes.....	C-328



The **na** utility provides the commands for managing the Annex. These commands allow you to:

- Set and display the operating characteristics of the Annex and its ports.
- Reboot or reset the Annex and its ports.
- Broadcast administrative messages to the Annex ports.



The **na** utility is stored on and accessed from a UNIX host.

The Annex stores the parameters set using **na** in non-volatile memory. After a reboot or a reset, the Annex updates its run-time parameters with the non-volatile parameters changed by **na**. The **na** utility can communicate with the Annex only when the Annex is running its operational code.

All **na** commands are taken from the **na** standard input: you can run **na** interactively or provide it with input through a file or pipeline. You can create a script file containing **na** commands to configure an Annex. This script file can save the configuration information for a specific Annex and, when required, restore the configuration.

This chapter illustrates command names, parameter names, and keywords in their long forms. Examples of **na** commands sometimes appear without the interactive command prompt, and with embedded comments that describe the functions being performed. This format resembles the appearance of **na** scripts; the portion of the script entered at the terminal in response to the command prompt appears in bold type.

## Command Notation

Interactive **na** sessions allow you to enter **na** commands with or without arguments or parameters. If you enter the command without arguments or parameters, **na** prompts for them. The conventions for an interactive session are:

- You can abbreviate commands and parameter names to the minimum number of characters that uniquely distinguish the name from any other name that may appear in the same context.
- Type a new-line character to end a command entry. To continue an entry onto the next line, type a backslash (\) character immediately preceding the new-line character.
- To enter a space as an argument, enclose it in double quotes (" "); otherwise the space is assumed to be a delimiter.
- The UNIX interrupt character (usually CTRL-C) returns you to the command prompt.

Additionally, **na** permits comments when the # character is present at the beginning of a comment line. All characters between the # and the next new line are ignored. Table C-1 describes the supported arguments for **na**.

Table C-1. Arguments for the na Commands

Argument	Description
<i>annex_identifier</i>	A symbolic name or an IP address assigned to an Annex: lab or 132.245.254.38 or 0xC0.0x9.0xC8.0x64
<i>annex_list</i>	A list of one or more <i>annex_identifiers</i> separated by commas: support, 132.245.254.42, lab
<i>annex_parameters</i>	A list of one or more Annex parameters and values separated by white space (space, tab, new line): pref_load_addr 132.245.254.66 pref_dump_addr 132.245.254.66
<i>interface_identifier</i>	The name of an interface, a list of interface names separated by commas, or a range of interface names separated by hyphens. An interface is an Annex port over which a network protocol can run. Ethernet, SLIP, and PPP ports are interfaces; CLI and LAT ports are not. The name of the Ethernet interface is en0. SLIP and PPP interface names are of the form asyn, where <i>n</i> is the SLIP or PPP port number. For example, specify asy2 for PPP port 2. In a list of asyn interface names, fully specify each name, e.g., asy1,asy2,asy3. In a range of asyn names, fully specify the beginning of the range and specify <i>n</i> for the end of the range, e.g., asy1-4. When followed by an @ and an <i>annex_identifier</i> , <i>interface_identifier</i> specifies an interface on a specific Annex: asy1@132.245.254.42 or asy1-5@lab

*(continued on next page)*

Table C-1. Arguments for the na Commands (continued)

Argument	Description
<i>interface_parameters</i>	A list of one or more interface parameters, with or without values, separated by white space (space, tab, newline): <code>rip_sub_advertise Y</code>
<i>interface_set</i>	A list of one or more <i>interface_identifiers</i> separated by semicolons. An <i>interface_set</i> can include interfaces on different Annexes: <code>en0@132.245.254.42;asy1,asy2@lab</code>
<i>port_identifier</i>	A serial port number, a list of port numbers separated by commas, or a range of port numbers separated by hyphens. When followed by an @ and an annex_identifier, <i>port_identifier</i> specifies a port for a specific Annex: <code>5@132.245.254.42</code> or <code>1,3,5@lab</code>
<i>port_set</i>	A list of one or more <i>port_identifiers</i> separated by semicolons. A <i>port_set</i> can include ports on different Annexes: <code>5@132.245.254.42;1-8@lab</code>
<i>port_parameters</i>	A list of one or more serial port parameters, with or without values, separated by white space: <code>input_flow_control eia</code>
<i>printer_parameters</i>	A list of one or more parallel printer port parameters, with or without values, separated by white space: <code>map_to_upper N</code>

## Commands

Table C-2 lists the **na** commands; the following subsections describe them.

Table C-2. The na Commands

Command	Description
annex	Defines a default <i>annex_list</i> used with subsequent commands.
boot	Boots the Annex.
broadcast	Sends a broadcast message to one or more ports.
copy	Copies configuration parameters.
dumpboot	Boots the Annex and produces a dump.
echo	Writes the remainder of the line to the standard output.
help or ?	Displays help for commands and parameters.
interface	Defines a default interface set used with subsequent commands.
password	Defines a default administrative password used to communicate with an Annex.
port	Defines a default <i>port_set</i> used with subsequent commands.
printer	Defines a default <i>printer_set</i> used with subsequent commands.
quit	Terminates <b>na</b> .
read	Reads and executes a script file.

(continued on next page)

Table C-2. The na Commands (continued)

Command	Description
reset	Resets a port, interface, or subsystem.
set	Defines or modifies the value of a parameter.
show	Displays the current value of a parameter.
write	Writes the current configuration to a script file.

After installing **na** on a UNIX host, type **na** at a terminal connected to this host. No arguments or command line options are available.

```
% na
Annex network administrator Rx.x
command:
```

Seven of the **na** commands use standard UNIX superuser protection – only a superuser at the host can execute these commands: **boot**, **broadcast**, **copy**, **dumpboot**, **read**, **reset**, and **set**.

## annex

The **annex** command establishes a default *annex\_list* that is used in subsequent commands. Before issuing an **na** command, specify the Annex to which the executed command refers. The Annexes you specify using the **annex** command become the default *annex\_list*. You can group several Annexes into a single list, and then issue one command for the entire group of Annexes. The syntax is:

```
annex annex_list
```



The following example creates an *annex\_list* containing one Annex with the Internet address 132.245.6.40:

```
command: annex 132.245.6.40
```

The following example creates an *annex\_list* containing two Annexes—one specified by its IP address, and the other specified by its name:

```
command: annex 132.245.6.40,frontlobby
```

The following example shows how **na** prompts for missing arguments:

```
command: annex  
enter default annex list: 132.245.6.40,frontlobby
```

The following **annex** command displays a message identifying the specified Annex, its Internet address, the number of serial lines it has, and its software version:

```
command: annex 132.245.6.1  
132.245.6.1: Remote Annex Rx.x,72 ports
```

The following **annex** command causes an Annex to prompt for an administrative password, provided that the password has been set and security has been enabled:

```
command: annex frontlobby  
Password for 132.245.6.40 <frontlobby>  
frontlobby: Remote Annex Rx.x,72 ports
```



If you use the **na** command **password** to define a default password for this **na** session, and that password matches the Annex administrative password, no password prompt appears and normal processing continues (see *password* on page A-17).

The password is not echoed when entered using the **annex** command. If you enter an incorrect password, **na** prompts for the correct one. If the password is incorrect a second time, **na** drops the Annex from the *annex\_list*. If an Annex in the list does not respond, **na** ignores that Annex and prints a status message:

```
132.245.6.1: Not responding
Warning:132.245.6.1 has been dropped from the list
```

The **na** utility drops an Annex from the *annex\_list* if its name could not be translated to an Internet address, if it does not respond because it is down, or if the wrong Internet address was entered using the **annex** command.

## boot

The **boot** command reboots all Annexes in the *annex\_list* and, optionally, produces a dump of the Annex's memory, including the operational code. You can set a time at which the boot is to take place. The **boot** command can send a warning message to users attached to the Annex. Table C-3 lists the supported arguments for the **boot** command. The syntax is:

```
boot [-adh1q] [[+] [HH:] [MM]] [annex_list] [filename] [warning]
```



When the Annex reboots, it terminates all active connections.

If you try to boot software Release 8.0 and above on a unit with less than 2 MB of system RAM, the **Net**, **Load**, and Status 8 indicators will flash until the **Reset** button is pressed.

If you try to boot with a non-existent image file name, the Annex will hang as it searches for the image. You must press the **Reset** button to recover.

Table C-3. Supported Arguments for the boot Command

Argument	Description
-a	Aborts any delayed boots that are pending.
-d	Causes a dump before rebooting.
-h	Causes a diagnostic boot using the ROM Monitor <b>boot</b> command if the Annex is in Test mode.
-l	Boots the operational image and stores it on local media; for use with the stand-alone file system. Only ROM revisions 0600 and greater with the self-boot option loaded support <b>-l</b> .  After a <b>boot -l</b> is executed, the <b>ls</b> command may not show the newly-loaded image.
-q	Causes a boot without sending a warning message.
HH:MM	The exact clock time for the boot, e.g., 15:15 indicates 3:15 p.m.
+HH:MM	The number of hours and minutes before the boot takes place, e.g., +2:15 indicates a boot will occur in two hours and fifteen minutes.
<i>annex_list</i>	Specifies the Annexes to be booted. If you do not include an <i>annex_list</i> , the command prompts for it. Pressing the <b>Return</b> key accepts the default <i>annex_list</i> .
<i>filename</i>	Identifies the name of the file in which the Annex's image is maintained. If you do not enter a <i>filename</i> , the Annex prompts for one. Pressing the <b>Return</b> key at the prompt directs the Annex to boot the default <i>filename</i> .
<i>warning</i>	Allows an additional 249-character message. Warning messages are sent out to users periodically. If you do not specify a time delay or message, the <b>boot</b> command generates an automatic warning message.

The following sample **boot** command requests a boot in one hour and fifteen minutes:

```
command: boot +1:15
annex list (return for default): thirdfloor, 132.245.6.40
filename (return for default): <cr>
warning: Shutting down for PM
```

The Annex can request its boot file from a defined preferred load host. If that host is not defined, or does not respond, the Annex broadcasts its request and boots from the first load host to respond.

## broadcast

The **broadcast** command sends a message to specified ports at the identified Annexes. The syntax is:

```
broadcast [=port_set | =keyword [@annex_identifier]] message
```

The *port\_set* argument indicates the port(s) to which the message is to be broadcast. If the *message* requires more than one line, using the \ character at the end of each line inserts a new line. Table C-4 lists the available keywords.

Table C-4. Supported Keywords for the broadcast Command

Keyword	Description
all	Broadcasts to all serial ports and all virtual connections.
serial	Broadcasts to all serial ports.
virtual	Broadcasts to all virtual CLI connections (you cannot broadcast to a single virtual CLI connection).

## copy



The **copy** command requires superuser privileges.

The **copy** command copies a given set of parameters from one Annex (or port) to another Annex (or port). Table C-5 defines each copy command. The syntax is:

**copy annex** *annex\_identifier annex\_list*

**copy interface** *interface\_name@annex\_identifier interface\_set*

**copy printer** *printer\_number@annex\_identifier printer\_set*

**copy [port | asynchronous]** *port\_number@annex\_identifier port\_set*

Table C-5. Descriptions of the copy Command

Command	Description
copy annex	Copies all Annex parameters except the IP address, the administrative password, the access control protocol key, LAT key, option key, and the virtual CLI password from the specified Annex to the <i>annex_list</i> .
copy interface	Copies all interface parameters from the specified interface to the <i>interface_set</i> .
copy printer	Copies all printer parameters to multiple parallel printer ports.
copy [port   asynchronous]	Copies all asynchronous port parameters except the port password from the specified asynchronous port to the <i>port_set</i> .

To copy port 1 parameters to the remaining ports on the same Annex:

```
command: copy port 1@132.245.6.40 2-16@132.245.6.40
```

To copy port 1 parameters from one Annex to port 5 on another Annex:

```
command: copy port 1@frontlobby 5@132.245.6.55
```

## dumpboot



The **dumpboot** command requires superuser privileges. When the Annex dumpboots, it terminates all active connections.

The **dumpboot** command performs a dump of every Annex specified in the *annex\_list* and then reboots the Annex. You can set the boot time, and the **dumpboot** command sends a warning message to users attached to the Annex. Table C-6 describes the arguments for **dumpboot**. The syntax is:

```
dumpboot [-aq] [[+] [HH:] [MM]] [annex_list] [filename] [warning]
```

The following is an example of the **dumpboot** command:

```
command: dumpboot  
annex list (return for default): backhall  
filename (return for default): <cr>  
warning: Diagnostic testing
```

The Annex sends the dump to a defined preferred dump host. If that host is not defined or does not respond, the Annex broadcasts its dump request and dumps to the first host that responds.

Table C-6. Arguments for the dumpboot Command

Argument	Description
-a	Aborts any delayed dump boots that are pending.
-q	Performs a boot without sending a warning message.
HH:MM	The exact clock time for the boot, i.e., 15:15 indicates 3:15 p.m.
+HH:MM	The number of hours and minutes before the boot takes place, e.g., +2:15 indicates a boot will occur in two hours and fifteen minutes.
<i>annex_list</i>	Specifies the Annexes for which dumps and boots are to be performed. If you do not include <i>annex_list</i> , the command prompts for it. Pressing the <b>Return</b> key accepts the default <i>annex_list</i> .
<i>filename</i>	Identifies the name of the file in which the Annex's image is maintained. If you do not enter a filename, the Annex prompts for one. Pressing the <b>Return</b> key at the prompt directs the Annex to boot the default filename. The Annex requests the boot file from a preferred load host if it is defined and available; otherwise, it broadcasts a boot request.
<i>warning</i>	Allows you to enter an additional 250-character message. Warning messages are sent out to users periodically. If you do not specify a time delay or message, the <b>dumpboot</b> command generates an automatic warning message.

## echo

The **echo** command writes its argument to the standard output. This command is intended for use in script files. The **write** command automatically puts **echo** commands in the script file it writes. The *write* command section of this chapter includes an example of **echo** commands included in the script file created by the **write** command. The syntax is:

**echo** *message*

## help

The **help** (or **?**) command displays on-line help information about **na**. Entering **help** without arguments displays a list of **na** commands.

Table C-7 defines the arguments for **help**. The syntax is:

**help** [*command\_name* | *parameter\_name* | \* | **syntax**]

Table C-7. Arguments for the help Command

<i>command_name</i>	Displays the command syntax, along with a description of the command and its arguments.
<i>parameter_name</i>	Displays the legal values for that parameter.
*	Displays available information for all commands and parameters.
<b>syntax</b>	Displays the syntax for all commands.



The **help** *command\_name* display looks like this:

```
command: help boot
command: boot Syntax: boot [-adlq][[+][HH:][MM]]\
                    [<filename>] [<warning>
```

The **help** *parameter\_name* display looks like this:

```
command: help timezone_minuteswest
timezone_minuteswest (annex parameter):
Minutes west of GMT: an integer
```

Entering **help** followed by the first letter or first few letters of the command or parameter name displays all entries beginning with the string. The following example represents an abbreviated display:

```
command: help t

telnet_escape (serial port parameter):
escape character to use with the telnet command: a character

term_var (serial port parameter):
Terminal variable: a string, maximum sixteen characters

time_broadcast (annex parameter):
broadcast for time server to use if none found:
Y or y to enable; N or n to disable

timezone_minuteswest (annex parameter):
Minutes west of GMT: an integer

toggle_output (serial port parameter):
character used to toggle output: a character

type (printer parameter):
printer interface style: (dataproducs or centronics)
```

## interface

The **interface** command establishes a default *interface\_set* used in subsequent commands until another interface or list of interfaces is specified. Grouping interfaces using an *interface\_set* allows you to issue one **na** command to examine or change the parameter values for multiple interfaces. The syntax is:

**interface** *interface\_set* | **all**

If you do not identify a specific Annex using the @ symbol and a name or Internet address when entering the *interface\_set*, all Annexes in the current *annex\_list* are used. An *interface\_set* referring to the default *annex\_list* is updated if a new **annex** command is issued. Specifying **all** sets the default *interface\_set* to all SLIP and PPP interfaces plus **en0**.

This example defines the default *interface\_set* as interface **asy1** on the Annex whose Internet address is 132.254.6.34:

```
command: interface asy1@132.254.6.34
```

The next example defines the default *interface\_set* as interfaces **asy1** through **asy3** on the same Annex as above, plus **asy2** on the Annex whose Internet address is 132.254.35.120:

```
command: interface asy1-3@132.254.6.34;asy2@132.254.35.120
```

This example defines the default *interface\_set* as all but interface **asy2** on every Annex in the default *annex\_list*:

```
command: interface en0,asy1,asy3-16
```

## password

The **password** command allows you to define a default password for the current **na** session. This command is useful when administering several Annexes with the same password. The syntax is:

```
password [password]
```

If you enter the command without giving the password, the Annex prompts for one, but does not echo it:

```
command: password  
password:
```

When accessing an Annex with security enabled using the **annex** command, **na** will try to match the Annex's default password with the administrative password. If they match, access is authorized automatically; if they do not match, **na** prompts for the Annex-specific administrative password. Enter a password for a given Annex only once during an **na** session, even if the Annex is dropped or the default *annex\_list* is changed.

## port

The **port** command establishes a default *port\_set* used in subsequent commands until another port or a list of ports is specified. Grouping ports using a *port\_set* allows you to issue one **na** command to examine or change the parameter values for multiple ports. The syntax is:

```
[port | asynchronous] [port_set | keyword]
```

If you do not identify a specific Annex using the @ symbol and a name or Internet address when entering the *port\_set*, all Annexes in the current *annex\_list* are used. A *port\_set* referring to the default *annex\_list* is updated if a new **annex** command is issued. The keyword identifies groups of ports. Table C-8 defines the supported keywords for **port**.

Table C-8. Supported Keywords for the port Command

Keyword	Definition
all	Sets default <i>port_set</i> to all serial ports and virtual CLI connections.
serial	Sets default <i>port_set</i> to all serial ports.

The following example defines port 1 on the Annex using the Internet address 132.245.6.34 as the default *port\_set*:

```
command: port 1@132.245.6.34
```

The next example defines ports 1–5 on the same Annex as the default *port\_set*:

```
command: port 1-5@132.245.6.34
```

This example defines all but port 6 on every Annex in the default *annex\_list*:

```
command: port 1-5,7-16
```

## printer

The **printer** command selects a subset of the parallel printer ports. The syntax is:

```
printer printer_set
```

If you do not specify a *printer\_set*, **na** prompts for one. The default *printer\_set* is all printers.

## quit

The **quit** command terminates the **na** program from a script file; **na** quits when it receives an end-of-file character (usually CTRL-D) or when it reaches the end of an input file. The syntax is:

```
quit
```

## read



The **read** command requires superuser privileges.

The **read** command reads a script file that contains **na** commands. The **na** program executes these commands as if they were entered at a terminal in interactive mode. Use **read** either to restore an Annex configuration that has been lost, or to copy parameter settings from one Annex to another. The syntax is:

```
read filename
```

You can create script files using a text editor or the **write** command.

If you plan to use LAT or a feature enabled through the **option\_key** parameter, set the **lat\_key** and **option\_key** parameters manually (using **na** or **admin**) and reboot the Annex *before* issuing the **read** command. The **lat\_key** and **option\_key** parameters are not enabled until you reboot, and any LAT- or **option\_key**-related parameters in the script file are not recognized until **lat\_key** or **option\_key** is enabled. Also, make sure the script file does not contain a different **option\_key** setting; if it does, delete the setting before issuing a **read**.

If a script file was written from an Annex that had **option\_key** enabled, and you are reading the file to an Annex on which **option\_key** has not been enabled, delete the **option\_key** and all related parameters from the script file before issuing a **read**.



The **read** command loads parameters even if the subsystem is disabled.

The following sample script file, called **testscript**, modifies Annex parameters:

```
# standard parameters for Annexes on our network
set annex pref_load_addr 132.245.6.63
set annex pref_dump_addr 132.245.6.63
set annex load_broadcast Y
set annex name_server_1 dns
set annex pref_name1_addr 132.245.6.9
set annex host_table_size 30
set annex cli_prompt "%n%s%p%c"
set annex timezone_minuteswest 360
set annex daylight_savings usa
set annex enable_security Y
set annex vcli_security Y
set annex syslog_mask all
set annex syslog_host 132.245.6.9
```

Use this script as follows:

```
command: annex thirdfloor,frontlobby,backhall
command: read testscript
```

## reset



The **reset** command requires superuser privileges. A **reset** issued to a serial, virtual, or *port\_set*, terminates any active connections.

The **reset** command (available from **na** or **admin**) changes some of the current attributes of all the Annexes in the default *annex\_list* without rebooting them. Unless you use the **reset** command, changes to configuration parameters for a specific port, virtual CLI connection, security, or name server become effective only after booting the Annex. Table C-9 describes the supported keywords for the **reset** command. The syntax is:

```
reset annex [=annex_list] annex_subsystem
```

```
reset interface [=interface_list | keyword]
```

```
reset printer [=printer_port_list | keyword]
```

```
reset [port | asynchronous] [=async_port_list | keyword]
```

The allowed values for *annex\_subsystem* are **security**, **motd**, **nameserver**, **macros**, **dialout**, **modem\_table**, **lat**, **syslog**, and **all**.

The **reset t1** command resets the T1 engine and T1 statistics information. This command is used to change the T1 engine's parameter configuration. The T1 *soft*, *hard*, and *esf* keywords are described in Table C-10. The syntax is:

```
reset t1 [soft | hard | esf]
```

The **reset int\_modem** command (available from **na** or **admin**) resets the specified T1 *modem\_set*. There is no physical reset button. A modem reset forces the port to be reset. In addition, if the signal protocol is set to wink start or immediate start, a special AT command is sent to the modem to select the dialtone detection mechanism. The syntax is:

```
reset int_modem <modem_set>
```

The *modem\_set* parameter specifies the individual modem numbers, separated by commas, or a range of numbers separated by a hyphen. The valid modem number range is 1 to 24, inclusive.

Table C-9. Keywords for the reset Command

Keyword	Definition
all	Resets all serial ports and virtual CLI connections.
annex all	Resets the message-of-the-day, the security, name server, LAT, and <i>syslog</i> subsystems, and customized user interface macros.
annex dialout	Resets all dial-out route information: it deletes all filters entered via dial-out routes, deletes all routes and chat scripts from the dial-out database, and resets all ports that have an active dial-out route. Then it re-loads the dial-out routes and chat scripts from the <b>dialout</b> section of the Annex configuration file.
annex lat	Resets the LAT-specific Annex parameters so that any future LAT circuits (connections) will use the new values; existing circuits will continue to use the old values. This keyword will not terminate existing LAT circuits.
annex macros	Resets the customized user interface macros.
annex modem	Resets attached modem(s).
annex motd	Resets the message-of-the-day.
annex nameserver	Resets the name server parameters and flushes the Annex's host table.
annex security	Resets the security parameters.


(continued on next page)



Table C-9. Keywords for the reset Command (continued)

Keyword	Definition
annex syslog	Resets the <i>syslog</i> subsystem. The <i>syslog</i> subsystem does not use any changes made to the <b>syslog_port</b> parameter.
interface	Resets the interface parameters. The syntax is: <b>reset interface</b> [ <i>interface_set</i>   <i>keyword</i> ].
printer	Resets the parallel printer port. The syntax is: <b>reset printer</b> [ <i>printer_set</i>   <i>keyword</i> ]
serial	Resets all serial ports.
virtual	Resets all virtual CLI connections.

Table C-10. Keywords for the reset t1 Command

Keyword	Definition
soft	This setting reconfigures the software parameters and will only disrupt the service on the DS0 channels that are changed.
hard	This setting resets the T1 engine causing the T1 Drop/Insert interface and modem sessions to terminate.  If modem sessions and/or equipment are attached to the Drop and Insert Interface, their service will be interrupted for a short period of time (usually a few
esf	This setting resets all the statistics in the T1 engine.

## set



The **set** command requires superuser privileges.

The **set** command modifies Annex configuration parameters:

<code>set annex</code>	Modifies Annex parameters.
<code>set interface</code>	Modifies interface parameters.
<code>set printer</code>	Modifies parallel printer port parameters.
<code>set [port   asynchronous]</code>	Modifies asynchronous port parameters.
<code>set t1</code>	Modifies T1 parameters.

The syntax is:

**set annex** [=annex\_list] annex\_parameters

**set interface** [=interface\_list] interface\_parameters

**set printer** [=printer\_list] printer\_parameters

**set [port | asynchronous]** [=port\_list] port\_parameters

**set t1** t1\_parameters

The *annex\_parameters*, *interface\_parameters*, *printer\_parameters*, *port\_parameters*, and *t1\_parameters* arguments require a name and a value separated by a space. A space is required between each parameter argument. You can enter more than one parameter argument with each command. If you are entering multiple parameter arguments that require a new line, precede the new line with the “\” character. Changes made to parameters take effect after booting or resetting the Annex or the port(s).

Sample command lines for setting port parameters are:

```
command: set port speed 9600
command: set port data_bits 7
command: set port stop_bits 1
command: set port parity odd
command: set port control_lines none
command: set port type hardwired
command: set port mode cli
command: set port inactivity_timer 120
```

## show

The **show** command displays current Annex, interface, printer, or port parameters:

show annex	Displays Annex parameters.
show interface	Displays interface parameters.
show printer	Displays parallel printer port parameters.
show [port   asynchronous]	Displays asynchronous port parameters.
show t1	Displays t1 parameters.

The syntax is:

```
show annex [=annex_list] [keyword | annex_parameters]
show interface [=interface_list] [keyword | interface_parameters]
show printer [=printer_list] [keyword | printer_parameters]
show [port | asynchronous] [=port_list] [keyword | port_parameters]
show t1 t1_parameter
```

Each keyword displays a subset of parameters:

- Table C-11 lists the keywords and associated parameters for the **show annex** command.
- Table C-12 lists the keywords and associated parameters for the **show interface** command.
- Table C-13 lists the keywords and associated parameters for the **show [port |asynchronous]** command.
- Table C-14 lists the keywords and associated parameters for the **show t1** command.

Table C-11. Keywords for the show annex Command

Keyword	Parameters
all	Displays all Annex parameters.
appletalk	a_router, default_zone_list, node_id, zone
generic	inet_addr, subnet_mask, pref_load_addr, pref_dump_addr, load_broadcast, broadcast_addr, load_dump_gateway, load_dump_sequence, image_name, motd_file, config_file, authoritative_agent, routed, server_capability, disabled_modules, tftp_load_dir, tftp_dump_name, ipencap_type, ip_forward_broadcast, tcp_keepalive, option_key, output_ttl, session_limit
ipx	ipx_frame_type, ipx_file_server, ipx_dump_username, ipx_dump_passwd, ipx_dump_path, ipx_do_checksum
lat	lat_key, facility_num, server_name, sys_location, lat_queue_max, service_limit, keep_alive_timer, circuit_timer, retrans_limit, group_value, vcli_groups, multicast_timer
mop	pref_mop_host, mop_password, login_prompt, login_password, login_timer

*(continued on next page)*

Table C-11. Keywords for the show annex Command (continued)

Keyword	Parameters
nameserver	nameserver_broadcast, rwhod, pref_name1_addr, pref_name2_addr, name_server_1, name_server_2, host_table_size, min_unique_hostnames
router	rip_routers, rip_auth
security	enable_security, security_broadcast, pref_secure1_host, pref_secure2_host, network_turnaround, acp_key, password, allow_snmp_sets, loose_source_route, lock_enable, passwd_limit, chap_auth_name
syslog	syslog_mask, syslog_facility, syslog_host, syslog_port
time	time_broadcast, daylight_savings, timezone_minuteswest, time_server
tmux	tmux_enable, tmux_max_host, tmux_max_mpx, tmux_delay
vcli	max_vcli, cli_prompt, vcli_security, vcli_password

Table C-12. Keywords for the show interface Command

Keyword	Description
all	Displays all interface routing parameters (rip_send_version, rip_horizon, rip_next_hop, rip_sub_accept, rip_accept, rep_rcv_version, rip_default_route, rip_sub_advertise, rip_advertise).
asyn	Displays all interface routing parameters for this asynchronous port.
asyn-n	Displays all interface routing parameters for this range of asynchronous ports.
en0	Displays all interface routing parameters for this Ethernet interface.

Table C-13. Keywords for the show [port [asynchronous] Command

Keyword	Parameters
all	Displays all asynchronous port parameters.
appletalk	at_guest, at_nodeid, at_security, arap_v42bis
editing	attn_string, echo, telnet_escape, telnet_crlf, map_to_lower, map_to_upper, char_erase, line_erase, hardware_tabs, erase_char, erase_word, erase_line, redisplay_line, toggle_output, newline_terminal
flow	control_lines, input_flow_control, input_start_char, input_stop_char, output_flow_control, output_start_char, output_stop_char, ixany_flow_control, need_dsr
generic	mode, location, type, term_var, prompt, speed, data_bits, stop_bits, parity, type_of_modem, max_session_count, allow_broadcast, broadcast_direction, imask_7bits, cli_imask7, ps_history_buffer, banner, dedicated_address, dedicated_port, tcp_keepalive, cli_interface, autobaud, default_session_mode, dedicated_arguments
lat	authorized_groups, latb_enable
ppp	local_address, remote_address, dialup_addresses, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression from the serial group and ppp_mru, ppp_acm, ppp_security_protocol, ppp_username_remote, ppp_password_remote, ppp_ncp
security	user_name, cli_security, connect_security, port_server_security, port_password, ipx_security, ipso_class
serial	local_address, remote_address, dialup_addresses, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression, net_inactivity_units

*(continued on next page)*

Table C-13. Keywords for the show [port [asynchronous] Command (cont'd)

Keyword	Parameters
slip	local_address, remote_address, dialup_addresses, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression from the serial group and subnet_mask, slip_load_dump_host, slip_allow_dump, slip_mtu_size, slip_no_icmp, slip_tos
timers	forwarding_timer, forwarding_count, cli_inactivity, inactivity_timer, input_is_activity, output_is_activity, reset_idle_time_on, long_break, short_break
tn3270	printer_host, printer_name
vci	login_port_password, login_timeout

Table C-14. Keywords for the show t1 Command

Keyword	Description
alarmsyslog	Displays parameter setting as <b>yes</b> or <b>no</b> . These values enable or disable the alarm event syslogs.
bypass	Displays parameter setting as <b>yes</b> or <b>no</b> . A setting of <b>yes</b> removes the T1 engine from the network.
map	Displays mappings for the DS0 channels.
ring	Displays parameter setting as <b>yes</b> or <b>no</b> . A setting of <b>yes</b> means that an audible ring is sent to the service provider for incoming calls.
sigproto	Displays the inbound and outbound signaling protocol settings for each DS0 channel.
t1_info	Displays a character string (128 bytes maximum) of printable ASCII characters that describe installation information from the service provider.

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Table C-14. Keywords for the show t1 Command (continued)

Keyword	Description
tdi_distance	Displays an integer from <b>0</b> to <b>655</b> that represents the length of the cable from the T1 Drop/Insert Interface to the PBX or other equipment.
tdi_framing	Displays the super frame format used on the T1 Drop/Insert Interface as <b>d4</b> (super frame) or <b>esf</b> (extended super frame). The default is <b>esf</b> .
tdi_line_code	Displays the T1 Drop/Insert Interface line code setting as either <b>ami</b> or <b>b8zs</b> . The default is <b>b8zs</b> .
tmi_circuit_id	Displays the T1 circuit identifier string (128 characters maximum) required by the service provider for customer service calls.
tmi_clock	Displays parameter setting as <b>loop</b> , <b>local</b> , or <b>external</b> . These values represent the source for the T1 clock.
tmi_esf_fdl	Displays parameter setting as <b>ansi</b> or <b>att</b> . These values represent the Facilities Data Link standard.
tmi_framing	Displays parameter setting as <b>d4</b> or <b>esf</b> . These values represent the superframe format setting on the T1 Network Interface
tmi_line_buildout	Displays parameter setting as 0, 7.5, 15, or 22.5. These values represent the cable loss measurement between the last line generator and the customer location.
tmi_line_code	Displays parameter setting as <b>ami</b> or <b>b8zs</b> . These values represent the line code used on the T1 Network Interface.
tmi_ones_density	Displays the T1 Network Interface ones density setting as <b>on</b> or <b>off</b> .



## write

The **write** command creates a script file from the configuration data for a specific Annex. You can modify this script file using any text editor. Use the **write** command either to back up the current Annex's configuration or copy it to multiple Annexes. Once you write a script file, issuing the **read** command activates the Annex parameter settings contained in the file (for more details, see *read* on page A-19). The syntax for **write** is:

**write** *annex\_identifier filename*



For security reasons, the following basic Annex and port parameters are written to the script file as comments: **acp\_key**, **lat\_key**, **option\_key**, **password**, **port\_password**, **ppp\_password\_remote**, **rip\_auth**, and **vcli\_password**.

Since the **inet\_addr** parameter uniquely identifies the Annex's location in the network, it is not written to the script file and it is not restored during a **read**. You must set this parameter manually.

You can remove the pound sign (#) from the parameters written as comments in the script file, enter valid data for their settings, and issue a **read** command to copy or restore these parameters to another Annex.

Entering passwords as plain text in the script file poses a possible security breach for your system. Take appropriate precautions against unauthorized access of this file.

The **write** command writes **set annex**, **set printer**, **set port**, and **set interface** commands into the script file for each basic Annex, printer, port, and interface parameter. The **write** command also includes **echo** commands in the script file. When the script is executed using the **read** command, the arguments to the **echo** command are written to the standard output, indicating the progress of the **read**.

The following is an example of the **write** command:

```
command: write 132.245.6.101 fronthall.script
```

The following example uses the **write** and **read** commands to install a new Annex and to create a back-up copy of an Annex. The first line writes configuration data for the Annex *thirdfloor* to a file named **thirdfloor.prm**. The data from *thirdfloor* is copied to the new Annex specified in the *annex\_list* defined using the **annex** command.

```
command: write thirdfloor.prm
command: annex 132.245.6.40
command: read thirdfloor.prm
```

Following is an excerpt from the script file **fronthall.script**:

```
# annex 132.245.6.101

echo setting annex parameters
set annex pref_load_addr 132.245.6.75
set annex pref_dump_addr 132.245.6.75
set annex load_broadcast Y
set annex image_name ""
set annex subnet_mask 255.255.255.0
set annex authoritative_agent Y
:
echo setting serial port parameters for port 1
set port=1 speed 19200
set port=1 data_bits 8
set port=1 stop_bits 1
set port=1 parity none

:
set port=64 slip_allow_dump Y
set port=64 do_compression N
set port=64 slip_allow_compression Y
set port=64 slip_no_icmp Y
set port=64 slip_tos Y
```

The configuration parameters define the operating characteristics for a given Annex. There are three ways in which you can configure and manage these parameters:

- The host-based **na** utility sends requests to the Annex to read, set, reset, show, or copy configuration parameters (for more details, see *na Commands* on page Book C-1).
- The CLI **admin** command is a counterpart of **na** that runs locally on the Annex.
- The SNMP agent included in the Annex software provides MIB objects that can be read and set by a standard SNMP management station; these MIB objects correspond to the configuration parameters (for more details, see *Simple Network Management Protocol (SNMP)* on page Book B-41).

This chapter includes the following sections:

- *Parameter Conventions.*
- *Parameter Descriptions.*

## Parameter Conventions

This section describes the conventions for entering parameter values and returning those values to the supplied defaults.

## Entering Parameter Values

The conventions for entering parameter values depend on the type of information the parameter defines.

- For parameters requiring an IP address, specify the address in dot notation as a decimal number (from **0** to **255**), a hexadecimal number, or a combination of both: 192.9.200.100, 0xC0.0x9.0xC8.0x64, or 192.9.200.0x64.
- For parameters requiring a yes/no input, use either **Y** or **N**. These parameters are not case sensitive.
- For parameters that define passwords, the **na/admin** command **show** displays only “<set>” or “<unset>”; it never displays the values entered for the parameters. If you forget a password after setting it, you can reset it only by using the ROM monitor **erase** command to erase all of the Annex’s non-volatile memory.



Saving the configuration to a file (using the **write** command) prevents having to reconfigure the Annex if non-volatile memory is erased.

- Parameters that require a string for input allow a maximum of 16 characters, unless otherwise specified.

## Setting Parameters to Supplied Defaults

Each configuration parameter, except the Annex's IP address, has a default value. Using the **na** command **set**, you can return any parameter to its default setting (for more details, see *set* on page Book C-24). Depending on the parameter type, the syntax options are:

### Setting Annex Parameters

1. **set annex annex\_parameter 0**

The **set annex annex\_parameter 0** command sets parameters that require a numeric value. For example, to set **pref\_dump\_addr** to its default, 0.0.0.0, enter:

```
command: set annex pref_dump_addr 0
```

2. **set annex annex\_parameter ""**

The **set annex annex\_parameter ""** command sets all parameters that require a string value; these parameters default to either a null string (") or "<unset>". For example, to set **image\_name** to its default, a null string ("), enter:

```
command: set annex image_name ""
```

3. **set annex annex\_parameter default**

The **set annex annex\_parameter default** command sets all other parameters. These parameters are set by choosing either an option from a known list or a yes/no response. For example, to set **enable\_security** to its default, **N**, enter:

```
command: set annex enable_security default
```

### Setting Interface Parameters

To set an interface parameter to its default value, use the **set interface** command:

1. **set interface [=interface\_set] interface\_parameter ^@**
2. **set interface [=interface\_set] interface\_parameter " "**
3. **set interface [=interface\_set] interface\_parameter default**

### Setting T1 Parameters

1. **set t1 t1\_parameters**

### Setting Parallel Printer Port Parameters

To set a parallel printer port parameter to its default value, use the **set printer** command:

1. **set printer [=printer\_set] printer\_parameter ^@**
2. **set printer [=printer\_set] printer\_parameter " "**
3. **set printer [=printer\_set] printer\_parameter default**

### Setting Asynchronous Port Parameters

To set an asynchronous port parameter to its default value, use the **set [port | asynchronous]** command:

1. **set [port | asynchronous] [=port\_set] port\_parameter ^@**
2. **set [port | asynchronous] [=port\_set] port\_parameter " "**
3. **set [port | asynchronous] [=port\_set] port\_parameter default**

The **set [port | asynchronous] [=port\_set] port\_parameter ^@** command sets parameters that have single-character default values. Enter the default value as a two-character sequence consisting of the circumflex character (^) followed by the at sign (@). For example, to set **erase\_word** to its default value, ^W, enter:

```
command: set port erase_word ^@
```

The **set [port | asynchronous] [=port\_set] port\_parameter ""** command sets parameters that require a string; these parameters default to either a null string ("") or "<unset>". For example, to set **user\_name** to its default, the null string, enter:

```
command: set port user_name ""
```

The **set [port | asynchronous] [=port\_set] port\_parameter default** command sets all other parameters. These parameters are set by choosing either an option from a known list or a yes/no response. The *keyword default* sets these parameters to their default values. For example, to set **speed** to its default, 9600, enter:

```
command: set port speed default
```

## Setting All Parameters

To set all of the Annex's parameters to the supplied defaults, use the ROM monitor **erase** command (see the appropriate Remote Annex Hardware Installation Guide). This command erases all parameters, including the Annex's IP address. After issuing **erase**, you must re-enter the Annex's IP address and re-configure the Annex.

## Parameter Descriptions

The Annex configuration parameters are grouped by type, e.g., Annex, interface, etc. Parameters within these groups are further divided by relative function. Each function has an associated keyword (e.g., nameserver, security, time, etc.). The **set** and **show** commands accept these keywords as arguments.

- Table C-15 lists the keywords and the associated parameters that display with the **show annex** command.
- Table C-16 lists the keywords and the associated parameters that display with the **show interface** command.
- Table C-17 lists the keyword and the associated parameters that display with the **show printer** command.
- Table C-18 lists the keywords and the associated parameters that display with the **show [port | asynchronous]** command.
- Table C-19 lists the keywords and the associated parameters that display with the **show t1** command.



The LAT-related parameters are visible only when the **lat\_key** parameter contains the correct key value (for more details, see *Configuring LAT Services* on page A-409).

The AppleTalk, tn3270, and dynamic-dialout parameters are visible only when the **option\_key** parameter contains the correct key value (for more details, see *AppleTalk* on page A-301, *tn3270* on page A-214, and *IP Routing* on page A-169).

Table C-15. Keywords for the show annex Command

Keyword	Parameters
all	Displays all Annex parameters
generic	inet_addr, subnet_mask, pref_load_addr, pref_dump_addr, load_broadcast, broadcast_addr, load_dump_gateway, load_dump_sequence, image_name, motd_file, config_file, authoritative_agent, routed, server_capability, disabled_modules, tftp_load_dir, tftp_dump_name, ipencap_type, ip_forward_broadcast, tcp_keepalive, option_key, session_limit, output_ttl, multisession_enable
vcli	max_vcli, cli_prompt, vcli_security, vcli_password
nameserver	nameserver_broadcast, rwhod, pref_name1_addr, pref_name2_addr, name_server_1, name_server_2, host_table_size, min_unique_hostnames
security	enable_security, security_broadcast, pref_secur1_host, pref_secure2_host, network_turnaround, loose_source_route, acp_key, password, allow_snmp_sets, lock_enable, passwd_limit, chap_auth_name
time	time_broadcast, daylight_savings, timezone_minuteswest, time_server
syslog	syslog_mask, syslog_host, syslog_facility, syslog_port
mop	pref_mop_host, mop_password, login_prompt, login_password, login_timer
lat	lat_key, facility_num, server_name, sys_location, lat_queue_max, service_limit, keep_alive_timer, circuit_timer, retrans_limit, group_value, vcli_groups, multicast_timer

(continued on next page)



Table C-15. Keywords for the show annex Command (continued)

Keyword	Parameters
appletalk	a_router, default_zone_list, node_id, zone
router	rip_routers, rip_auth
ipx	ipx_file_server, ipx_frame_type, ipx_dump_username, ipx_dump_password, ipx_dump_path, ipx_do_checksum
tmux	tmux_enable, tmux_max_host, tmux_delay, tmux_max_mpx

Table C-16. Keywords for the show interface Command

Keyword	Description
all	Displays all interface routing parameters (rip_send_version, rip_horizon, rip_next_hop, rip_sub_accept, rip_accept, rep_recv_version, rip_default_route, rip_sub_advertise, rip_advertise).
en0	Displays all interface routing parameters for this Ethernet interface.
asyn	Displays all interface routing parameters for this asynchronous port.
asyn-n	Displays all interface routing parameters for this range of asynchronous ports.

Table C-17. Keyword for the show printer Command

Keyword	Description
all	Displays all parallel printer port parameters (map_to_upper, printer_width, hardware_tabs, type, , printer_crlf, tcp_keepalive).

Table C-18. Keywords for the show [port | asynchronous] Command

Keyword	Parameters
all	Displays all asynchronous port parameters
generic	mode, location, type, term_var, prompt, cli_interface, speed, autobaud, data_bits, stop_bits, parity, max_session_count, allow_broadcast, broadcast_direction, imask_7bits, cli_imask7, ps_history_buffer, banner, tcp_keepalive, dedicated_address, dedicated_port, type_of_modem, default_session_mode, dedicated_arguments, backward_key, forward_key, multisession_enable
flow	control_lines, input_flow_control, input_start_char, input_stop_char, output_flow_control, output_start_char, output_stop_char, ixany_flow_control, need_dsr
timers	forwarding_timer, forwarding_count, cli_inactivity, inactivity_timer, input_is_activity, output_is_activity, reset_idle_time_on, long_break, short_break
security	user_name, cli_security, connect_security, port_server_security, port_password, ipso_class, ipx_security
vci	login_port_password, login_timeout
editing	attn_string, echo, telnet_escape, telnet_crlf, map_to_lower, map_to_upper, char_erase, line_erase, hardware_tabs, erase_char, erase_word, erase_line, redisplay_line, toggle_output, newline_terminal
serial	local_address, remote_address, address_origin, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression, net_inactivity_units
slip	subnet_mask, slip_load_dump_host, slip_allow_dump, slip_mtu_size, slip_no_icmp, slip_tos as well as the serial parameters local_address, remote_address, address_origin, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression

*(continued on next page)*

Table C-18. Keywords for the show [port | asynchronous] Command (cont'd)

Keyword	Parameters
ppp	ppp_acm, ppp_mru, ppp_security_protocol, ppp_ipx_network, ppp_ipx_node, ppp_username_remote, ppp_password_remote, ppp_ncp, as well as the serial parameters local_address, remote_address, address_origin, metric, slip_ppp_security, net_inactivity, phone_number, do_compression, allow_compression
appletalk	at_guest, at_nodeid, at_security, arap_v42bis
tn3270	printer_host, printer_name
lat	authorized_groups, latb_enable

Table C-19. Keywords for the show t1 command

Keyword	Description
alarmsyslog	Displays parameter setting as <b>yes</b> or <b>no</b> . These values enable or disable the alarm event syslogs.
bypass	Displays parameter setting as <b>yes</b> or <b>no</b> . A setting of <b>yes</b> removes the T1 engine from the network.
map	Displays mappings for the DS0 channels.
ring	Displays parameter setting as <b>yes</b> or <b>no</b> . A setting of <b>yes</b> means that an audible ring is sent to the service provider for incoming calls.
sigproto	Displays the inbound and outbound signaling protocol settings for each DS0 channel.
t1_info	Displays a character string (120 bytes maximum) of printable ASCII characters that describe installation information from the service provider.

*(continued on next page)*

Table C-19. Keywords for the show t1 Command (continued)

Keyword	Description
tdi_distance	Displays an integer from <b>0</b> to <b>655</b> that represents the length of the cable from the T1 Drop/Insert Interface to the PBX or other equipment.
tdi_framing	Displays the super frame format used on the T1 Drop/Insert Interface as <b>d4</b> (super frame) or <b>esf</b> (extended super frame). The default is <b>esf</b> .
tdi_line_code	Displays the T1 Drop/Insert Interface line code setting as either <b>ami</b> or <b>b8zs</b> . The default is <b>b8zs</b> .
tmi_circuit_id	Displays the T1 circuit identifier string (120 characters maximum) required by the service provider for customer service calls.
tmi_clock	Displays parameter setting as <b>loop</b> , <b>local</b> , or <b>external</b> . These values represent the source for the T1 clock.
tmi_esf_fdl	Displays parameter setting as <b>ansi</b> or <b>att</b> . These values represent the Facilities Data Link standard.
tmi_framing	Displays parameter setting as <b>d4</b> or <b>esf</b> . These values represent the superframe format setting on the T1 Network Interface
tmi_line_buildout	Displays parameter setting as 0, 7.5, 15, or 22.5. These values represent the cable loss measurement between the last line generator and the customer location.
tmi_line_code	Displays parameter setting as <b>ami</b> or <b>b8zs</b> . These values represent the line code used on the T1 Network Interface.
tmi_ones_density	Displays the T1 Network Interface ones density setting as <b>on</b> or <b>off</b> .

The parameter descriptions that follow are in alphabetical order. The *Software Reference Guide* on page C-269 provides a series of tables that list the parameters in functional groupings.

## a\_router

The Ethernet address of the network's A\_Router. The Annex uses this value as a hint at start-up. When a Routing Table Maintenance Protocol (RTMP) message arrives from this Ethernet address, the Annex gleans the AppleTalk DDP address from the packet and tries to talk to the AppleTalk router. The address is a hexadecimal Ethernet address, e.g., 00-7F-12-33-44-55. The default is **00-00-00-00-00-00**.

## acp\_key

This Annex parameter defines the encryption key used to exchange messages between the Annex and the security server. This parameter works only when the **enable\_security** parameter is set to **Y** and a security server is defined. The security server maintains the encryption key for each Annex in the **acp\_keys** file. The default for this string is “<unset>.”



The Annex and the security server can communicate only when this parameter's value matches the Annex's value in the security server's **acp\_keys** file.

## address\_origin

This asynchronous port parameter determines where the Remote Annex looks to find the local and remote IP addresses to use for the endpoints of a PPP/IPCP link. Table C-20 describes the options. The default is **local**.

Table C-20. Valid Options for address\_origin Parameter

Option	Description
acp	The Remote Annex passes its own address, and the user name and port, to the ACP host. The host then determines the local and remote addresses for the link by searching for entries in the <b>acp_dialup</b> file.
local	The Remote Annex uses values set by the <b>local_address</b> and <b>remote_address</b> parameters. It does not search <b>acp_dialup</b> .
dhcp	The Remote Annex contacts a DHCP server to obtain a remote address dynamically on behalf of the remote client. See <i>Dynamic Allocation of Network Addresses</i> on page A-479 for a complete explanation. This value is valid only when the port is effectively in PPP mode (e.g., the mode was set to <b>ppp</b> or the <b>ppp</b> command was issued when the port was in CLI mode). DHCP is not supported with SLIP.



When **address\_origin** is set to **acp**, the *local* and *remote* field settings in the **acp\_dialup** file supersede the values set in the **local\_address** and **remote\_address** port parameters (for more details, see *Determining Dial-up Addresses using the acp\_dialup File* on page A-482).

This parameter replaces the **dialup\_addresses** parameter for Release 13.2 and later. Earlier releases do not recognize **address\_origin** and require the use of **dialup\_addresses** instead.

## alarmsyslog

This T1 parameter enables or disables the T1 alarm event syslogs. A **Y** enables alarm syslogs, an **N** disables it. The default is **Y**.

## allow\_broadcast

This asynchronous port parameter allows an asynchronous port to receive administrative broadcast messages generated by the **boot** and **broadcast** commands. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## allow\_compression

This asynchronous port parameter allows the Annex to use TCP header compression on a SLIP or PPP line. Header compression occurs only if the other side of the serial link initiates compression. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## allow\_snmp\_sets

This Annex parameter enables the Annex to accept and process SNMP **set** commands. When disabled, the Annex rejects all SNMP **set** commands; the Annex SNMP agent returns the error *no such name* for the first object in the **set** command. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## arap\_v42bis

This asynchronous port parameter enables V.42bis compression during an AppleTalk session. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## at\_guest

This asynchronous port parameter allows guests to log into an AppleTalk session. When **at\_guest** is enabled, if a client requests guest access, the Annex asks ACP for username guest privileges. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## at\_nodeid

This asynchronous port parameter defines the node ID hint used for an ARA client during connection establishment. This parameter value is an AppleTalk address in the form *net.node*. The valid *net* values are **0** to **65534**. The valid *node* values are **0** to **254**. The default is **0.0**.

## at\_security

This asynchronous port parameter turns on ACP service for an AppleTalk session on this port. When both **at\_security** and **enable\_security** are enabled, the Annex uses ACP to get security information about the client, including authentication, logging, and zone access. If **at\_security** is not enabled, the Annex uses only local security. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## attn\_string

This asynchronous port parameter defines a control character sequence that returns users to the CLI prompt. Users can define a temporary control character sequence using the CLI **stty attn** command; **stty attn ""** disables the sequence. The default is no control character sequence, displayed as **""**; the default for virtual CLI connections is **CTRL-A (^A)**.



If you are running a **stats [-sm [ports] | [time]]** command with a defined time interval, the Annex ignores an attention string with multiple characters.



## authoritative\_agent

This Annex parameter enables the Annex to send an ICMP Address Mask reply to a host that broadcasts a subnet mask request. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## authorized\_groups

This asynchronous port parameter specifies the LAT protocol remote group codes that are accessible to users on a given Annex port. You can enter *all*, *none*, a series of numbers between 0 and 255 separated by commas (e.g., 1, 5, 7) or a range of numbers between 0 and 255 separated by dashes (e.g., 1–5, 200–255) followed by **enabled** or **disabled**. The default is *all* **disabled**.

## autobaud

This asynchronous port parameter determines whether or not the Annex automatically detects line speed when a connection is opened and whether or not it sets matching terminal port characteristics on the next login. This parameter works only when the Annex is configured as a VMS interface (i.e., when the **cli\_interface** parameter is set to **vci**). For more information, see the *Annex Interface for VMS Environments Administrator's Guide*. A **Y** enables this parameter, an **N** disables it. The default is **N**.



To disable the autobaud feature, enter a value in the **speed** parameter before setting **autobaud** to **N**.

## autodetect\_timeout

This Annex parameter specifies the maximum amount of time the Annex should wait for **auto\_detect** mode to identify an incoming call as PPP. If the specified number of seconds is exceeded, or if the user enters a carriage return before the call is detected as PPP, the Annex places the user in CLI mode. Valid values for the parameter are 1 - 60; the default value is **30**.

## backward\_key

This asynchronous port parameter specifies a character or string that reopens the next lower numbered session (already established at your port) from within the current session without returning to local mode. When defining this value, use a unique, unused character (such as Control B) or a string of characters. To clear an existing setting, enter a null string (""). The default is no control character sequence.

On virtual (*telnet*) ports, the **backward\_key** value is limited to one printable or Control character. If the user tries to set this value to more than one character, i.e., a string, the setting is ignored and the previous value is restored.

On non-virtual ports, a **backward\_key** string can range from 1 to 16 characters.

## banner

This asynchronous port parameter controls whether or not the Annex banner and message-of-the-day display on CLI ports. A **Y** enables this parameter, an **N** disables it. The default is **Y**.



This parameter has effect only at the CLI level.

## broadcast\_addr

This Annex parameter defines the IP address for Annex broadcasts. It is recommended that you set a subnet broadcast address, if possible. In this case, you set the subnet portion of the broadcast address to match the Annex subnet address, as determined by the Annex subnet mask, and you set the host portion of the broadcast address to all one-bits. For example, if the Annex subnet address is 132.254.9.0, and the Annex subnet mask is 255.255.255.252, you should set the broadcast address to 132.254.9.3. To calculate this, subtract the subnet mask from 255.255.255.255. Thus, in the previous example, you subtract 255.255.255.252 from 255.255.255.255 to arrive at 0.0.0.3.

If your network is not subnetted, you can specify a network broadcast address. In this case, you set the network portion of the broadcast address to match the Annex network address, as determined by the intrinsic mask for the network class. And you set the host portion of the broadcast address to all 1-bits.

Finally, you can set a limited broadcast address of 255.255.255.255 that reaches all nodes on the subnet. However, if you have more than one subnet on the same physical cable, the Annex will broadcast to all nodes on all of the subnets. This can be troublesome if some of the subnets or nodes do not recognize the broadcast.

The default for **broadcast\_addr** is **0.0.0.0**, which Annex RIP routing does not support (because most hosts do not recognize it).

## broadcast\_direction

This asynchronous port parameter defines the direction in which an administrative broadcast message is sent on a port. The options are **network** or **port**; the default is **port**. This parameter is valid only for a **slave** port (defined by the **mode** parameter).

If you specify **network**, the Annex sends administrative broadcast messages out the network side of the connection to the initiator. If you specify **port**, the Annex sends broadcast messages out the port side of the connection.

## bypass

This T1 parameter is used to remove the T1 engine from the network. When **bypass** is set to **Y**, the T1 engine is off-line and the T1 Network Interface (T1NI) and the T1 Drop and Insert Interface (T1DII) are physically isolated from the T1 engine. When **bypass** is set to **N**, the T1 engine has no effect on the T1 circuit. When **bypass** is set to **Y**, the T1 engine is attached to both the T1NI and the T1DII. The default is **Y**.

## chap\_auth\_name

This Annex parameter defines the character string that is used as the *Name* field entry when issuing a CHAP *challenge* over a PPP link. The minimum string length is one character and the maximum string length is 16 characters; the default is **chap**.



Change the default value:

- If you want the remote end of the PPP link to pick a secret token that depends on the received name.
- If you want to achieve the highest level of security.

## char\_erase

When this asynchronous port parameter is enabled, the Annex echoes both the character erase and the word erase characters for a video terminal; i.e., the previous character (or word) looks as if it has been erased. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

When **char\_erase** is disabled, the Annex echoes the erase characters for a hard-copy terminal. It echoes the first erase character as a “\” followed by the deleted character. Each additional use of the erase character deletes and displays another character. The first character typed (other than the erase character) echoes a “/” and the character, e.g., typing “**asdf<Delete><Delete>g**” echoes as “**asdf\fd/g**.”



This parameter has effect only at the CLI level.

## circuit\_timer

This Annex parameter defines the time interval in tens of milliseconds between the transmission of LAT packets (e.g., if you enter *9*, the time interval will be 90 milliseconds). Allowable values range from **1** to **25**. The default value is **8** (80 milliseconds).

## cli\_imask7

When this asynchronous port parameter is enabled, the Annex masks CLI input to seven bits. The Annex masks input only at the CLI. When **cli\_imask7** is disabled, the Annex expects eight-bit ASCII input. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## cli\_inactivity

This asynchronous port parameter specifies the amount of time in minutes that the Annex remains idle before disconnecting a CLI session from a port. Unlike the **inactivity\_timer**, this timer does not disconnect a CLI session with active jobs. Allowable values range from **0** (or **off**) to **255** minutes or **immediate**. The default is **0**.

Entering **0** disables the timer; entering **255** causes the Annex to disconnect as soon as it exits from its last job. Entering **immediate** causes the Annex to hang up the port immediately after exiting the last job.

## cli\_interface

This asynchronous port parameter allows you to control the prompt that appears for VMS or UNIX environments. Allowable values are **vci** and **uci**. The default is **uci**.

When set to **vci**, the *Local*> prompt is displayed followed by the *Username*> prompt; the **uci** setting provides a standard UNIX interface (with prompts defined by the **cli\_prompt** and **prompt** parameters).

## cli\_prompt

This Annex parameter defines the Annex prompt for all CLI users. This parameter uses formatting codes consisting of the percent character (%) and a single lowercase letter. You can combine up to 16 of these codes (e.g., *%a%c*). You can also enter text that will appear in the prompt as long as the entry as a whole does not exceed 32 characters. The default prompt is *%a%c* (the string *annex:*). Table C-21 lists the formatting codes.

Table C-21. Formatting Codes for Annex Prompts

Code	Expansion
%a	The string <i>annex</i> .
%c	A colon followed by a space.
%d	The current date and time in the following format: Mon Mar 14 13:59:42 1991.
%i	The Annex's IP address.
%j	A new line character, skip to the beginning of the next line.
%l	The location defined for the port; if none, the string <i>port nn</i> , where <i>nn</i> is the number of the serial line.
%n	The Annex's name, if known, or the IP address.
%p	The port number, or the virtual CLI connection number in <i>vn</i> form, where <i>n</i> is the virtual CLI connection number.
%r	The string <i>port</i> .
%s	A space.
%t	The current time in 24-hour format.
%u	The user name defined for the port; if none, a null string.

## cli\_security

This asynchronous port parameter enables user authentication by the host-based ACP server for all CLI connections. When disabled, you cannot use any Annex security mechanism other than the administrative password for CLI ports. A **Y** enables this parameter, an **N** disables it. The default is **N**.



When **cli\_security** is enabled, the Annex logs PPP/SLIP logins/logouts to the ACP log file.

## config\_file

This Annex parameter defines the file name for the configuration file maintained on the load host. This file contains information about gateways, rotaries, macros, and services; it must reside in the directory `/usr/spool/erpcd/bfs`. The default file name is **config.annex**.

## connect\_security

This asynchronous port parameter enables the host-based security policy for access from the CLI to the network (using **telnet** and **rlogin** only). If **connect\_security** is enabled, the user must receive authorization to connect to a host on the network. The supplied security policy scans the file `/install-directory/acp_restrict` to authorize a connection to a host from the Annex. If authorization is not granted, the connection is not made. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## control\_lines

This asynchronous port parameter defines the type of hardware control lines used on this port. Table C-22 describes the valid options; the default is **none**.

Table C-22. Valid Options for the control\_lines Parameter

Option	Description
both	Allows both flow control and modem control.
flow_control	Configures the control lines for flow control (RTS/CTS), but does not activate hardware flow control.
modem_control	Configures the control line for modem control using DTR/DCD/DSR hand-shaking.
none	Does not implement hardware control lines.



## data\_bits

This asynchronous port parameter defines the number of data bits in a character. This value does not include the start, stop, or parity bits. Allowable values are **5** through **8**. The default is **8**.

## daylight\_savings

This Annex parameter defines the daylight savings time for your geographic location. The Annex uses this parameter to adjust the time display for daylight savings time. Valid options are **us**, **australian**, **british**, **canadian**, **east\_european**, **mid\_european**, **west\_european**, and **none**; the default is **us**.

## dedicated\_address

This asynchronous port parameter, along with the **dedicated\_port** parameter, defines one host and one TCP port to which this port can connect. To use this parameter, set the **mode** parameter to **dedicated**. The **dedicated\_address** is the host's IP address. The default is **0.0.0.0**.



This parameter is obsolete; it has been replaced with **dedicated\_arguments** (see *dedicated\_arguments* on page A-55).

## dedicated\_arguments

This asynchronous port parameter defines the command line arguments used for dedicated ports. The parameter accepts a 100-character string. Use this parameter in conjunction with the **mode** (see *mode* on page A-75) and **dedicated\_port** parameters. The default is a **null string** ("").

## dedicated\_port

This asynchronous port parameter selects the application name or TCP port number to which this port can connect. The options are **telnet**, **rlogin**, **call**, or a TCP port number. The default is **telnet**.



If port 5B (**rlogin**) is selected, the Annex uses BSD **rlogin**. If a port in the 7000 to 7999 range is selected, the Annex uses TCP. Otherwise, the Annex uses **telnet**.

For more details on configuring the Annex for use with dedicated ports, see *Dedicated Ports* on page A-62.

## default\_zone\_list

This Annex parameter contains the zone list that is sent to AppleTalk clients in case of an ACP failure. The string size ranges from 1 to 100 characters. You must use spaces to separate zone names (e.g., *general engineering lab*). To escape embedded spaces within a zone name, use the backslash (\) character. If you do not set this parameter, the Annex provides the network zone list. The default is a **null string** ("").

## default\_session\_mode

This asynchronous port parameter defines the default session mode when the VMS interface is configured (i.e., when **cli\_interface** is set to **vci**). Valid options are **interactive**, **passthru**, **passall**, or **transparent**. The default is **interactive**.

## dhcp\_broadcast

This Annex parameter enables and disables the use of DHCP broadcast messages; a DHCP proxy client will use it to determine if it can generate DHCP broadcast messages as a means of “discovering” a DHCP server. The options for the parameter are **Y** or **N**, **N** being the default (i.e., the broadcast of DHCP messages is disabled). **dhcp\_broadcast** functions consistently with all other broadcast parameters defined in the system.

## disabled\_modules

This Annex parameter allows you to disable individual software modules to free memory space. If you enter more than one module, separate module names using commas. Valid options are **admin**, **atalk**, **dialout**, **edit**, **fingerd**, **ftpd**, **ipx**, **lat**, **nameserver**, **ppp**, **slip**, **snmp**, **tn3270**, **tstty**, **vci**, **all**, or **none**. The default is **vci** (disables the Annex VMS interface).



You should exercise extreme caution when disabling modules:

- Entering a null string ("") sets this parameter to its default value.
- If **disabled\_modules** is set to a value other than **none** and **server\_capability** includes the operational image, no modules are disabled; a syslog message announces this override.
- The **vci** option disables the Annex interface for VMS environments along with the following commands: **backwards**, **change**, **clear**, **crash**, **define**, **disconnect**, **forwardlis**, **forward**, **list**, **logout**, **resume**, **set**, **show**.
- If **lat\_key** is invalid and **server\_capability** is set to **none**, the LAT code is freed for use by the system.

- Disabling LAT also disables the CLI commands **services**, **connect**, and **queue**.
- Disabling **admin** and **snmp** can cause problems if host-based **na** is not available. To change parameters in this case, return to monitor mode, erase the parameters in non-volatile memory, and reconfigure the Annex.
- Disabling **dialout** also disables filtering.

## do\_compression

This asynchronous port parameter starts TCP/IP header compression on a SLIP link. When enabled, the Annex negotiates for TCP/IP compression for both sides of the connection. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## echo

This asynchronous port parameter directs an Annex to echo all characters as a user types. This echo occurs only at the CLI level. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## enable\_security

This Annex parameter activates the security system. To enable any security features, set this parameter to **Y**. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## erase\_char

This asynchronous port parameter defines a control character sequence for the CLI erase character. The default is the **Delete** key (displayed as **^?**).

## erase\_line

This asynchronous port parameter defines a control character sequence for the CLI line erase character. The default is **CTRL-U** (^U).

## erase\_word

This asynchronous port parameter defines a control character sequence for the CLI word erase character. The default is **CTRL-W** (^W).

## facility\_num

This Annex parameter identifies a LAT host by number. Allowable values range from **0** to **32767**. The default value is **0**.

## forward\_key

This asynchronous port parameter specifies a character or string that reopens the next available, higher numbered session already established at your port. When defining this value, use a unique, unused character (such as Control F) or a string of characters. To clear an existing setting, enter a null string (""). The default is no control character sequence.

On virtual (*telnet*) ports, the **forward\_key** value is limited to one printable or Control character. If the user tries to set this value to more than one character, i.e., a string, the setting is ignored and the previous value is restored.

On non-virtual ports, a **forward\_key** string can range from 1 to 16 characters.

## forwarding\_count

This asynchronous port parameter controls Annex port behavior for received characters. When set to a number other than zero, the port does not forward characters until it receives the specified number of characters. When set to zero, the port uses the value in the **forwarding\_timer** parameter. Allowable values range from **0** to **255**. The default is **0**.



If you use both **forwarding\_count** and **forwarding\_timer**, the Annex uses the value that occurs first.

Setting **forwarding\_count** to one or **forwarding\_timer** to zero may have a severe effect on the network when heavy serial input occurs.

## forwarding\_timer

This asynchronous port parameter sets the amount of time in ten millisecond (ms) intervals that can elapse before an Annex forwards received data. If new data arrives before the timer expires, the Annex resets the timer. Allowable values range from **0** to **255** or **off**. The default is **5 (50 ms)**; if you set the value to **0**, the Annex uses **5**.



If you use both **forwarding\_count** and **forwarding\_timer**, the Annex uses the value that occurs first.

Setting **forwarding\_count** to one or **forwarding\_timer** to zero may have a severe effect on the network when heavy serial input occurs.

## group\_value

This Annex parameter specifies the LAT protocol remote group codes that can access local services offered by an Annex. To access these services, the Annex must have at least one enabled group code that matches the service's group codes. Valid options are *all*, *none*, a series of numbers between 0 and 255 separated by commas, or a range of numbers between 0 and 255 separated by dashes, followed by **enabled** or **disabled**. The default is *all disabled*.

## hardware\_tabs (asynchronous)

This asynchronous port parameter allows the Annex to convert ASCII tab characters to the correct number of spaces when a terminal does not support hardware tabs. This occurs only at the CLI level. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## hardware\_tabs (parallel)

This parallel printer port parameter enables the printer to use hardware tab stops. When disabled, the Annex converts a tab character to the number of spaces necessary to reach the next tab stop. **Y** enables this parameter, an **N** disables it. The default is **N**.

## host\_table\_size

This Annex parameter defines the number of entries allowed in the host table. Allowable values range from **0** to **255**. Entering **255** allows an unlimited number of entries; entering **254** indicates that there is no host table. In this case, the Annex requires a name server to resolve every host name. The default is **64**.

## image\_name

This Annex parameter defines the file name containing the operational code that loads by default when you boot an Annex. The string size ranges from 0 to 100 characters. The default is a **null string** ("").

## imask\_7bits

This asynchronous port parameter enables an Annex to mask input to seven bits. When disabled, the Annex expects eight-bit ASCII input. This parameter has no effect on transmitted characters. A **Y** enables this parameter, an **N** disables it. The default is **N**.



SLIP and PPP will not work if this parameter is enabled.

## inactivity\_timer

This asynchronous port parameter specifies the number of minutes that a port can remain inactive. If the timer expires, the Annex terminates all sessions and resets the port.

You can use the **input\_is\_activity** and **output\_is\_activity** parameters to define activity as input to the port or output from the port. Setting these parameters to **N** causes the timer to run independent of activity. Allowable values range from **0** to **255**. The default is **0** (timer disabled).

If you want a port to reset after a given number of minutes, regardless of any activity, you must also set the following parameters:

```
inactivity_timer      x
input_is_activity    N
output_is_activity    N
type                  dial_i
```



n

These settings are required because the timer does not start until one of the following events occur:

1. **Input occurs and input\_is\_activity is set to Y.**
2. **Output occurs and output\_is\_activity is set to Y.**
3. **A port with type set to dial\_in starts (regardless of the value of the control\_lines parameter).**

## inet\_addr

This Annex parameter defines the Annex's IP address. This 32-bit address contains four 8-bit fields separated by periods. Each field contains a number ranging from 0 to 255 or a hexadecimal number. The IP address always displays in decimal notation. This parameter has no default.

## input\_flow\_control

This asynchronous port parameter specifies the method of flow control for input received from a device connected to an asynchronous port. Table C-23 describes the valid options; the default is **bell**.

Table C-23. Valid Options for the input\_flow\_control Parameter

Option	Description
bell	The Annex rings the terminal bell (sends ^G) when its input buffer is full.
eia	Flow control is delegated to a lower level (e.g., a parallel port). The <b>control_lines</b> parameter must be set to <b>flow control</b> or <b>both</b> , and the device must be wired appropriately.
start/stop	Designates flow control by recognizing xon and xoff characters. This action is independent of the <b>control_lines</b> parameter setting.
none	Disables flow control; characters are lost if the buffers overflow.

## input\_is\_activity

This asynchronous port parameter defines activity as input. When enabled, the Annex sets the inactivity timer when it receives input at the port. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## input\_start\_char

This asynchronous port parameter defines the control character sequence that restarts input if the **input\_flow\_control** parameter is set to **start/stop**. The default is **CTRL-Q** (^Q).

## input\_stop\_char

This asynchronous port parameter defines the control character sequence that stops input if the **input\_flow\_control** parameter is set to **start/stop**. The default is **CTRL-S** (^S).

## ipencap\_type

This Annex parameter specifies whether the Annex LAN interface encapsulates IP packets in the Ethernet Version 2 format or the IEEE 802.3 Data Link Layer format. The values for this parameter are **ethernet** or **ieee802**. The default is **ethernet**.

## ip\_forward\_broadcast

This Annex parameter allows an Annex to broadcast a packet to the SLIP or PPP interfaces. When the Annex receives a packet sent to a broadcast address (except 0.0.0.0 and 255.255.255.255), it scans the list of installed interfaces and matches the broadcast address against the interface's remote address using a subnet or net mask. If these addresses match, the Annex copies the packet to that interface. When disabled, the Annex does not scan the interface list and does not copy broadcast packets. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## ipso\_class

This asynchronous port parameter specifies the U.S. Department of Defense basic IP Security Option (IPSO) classification level included in TCP packets generated locally on Annex CLI, dedicated, or adaptive asynchronous ports.

The option is not added to locally generated ICMP messages, RIP updates, or other system packets. The Annex does not check incoming packets for the presence of the IPSO. Valid options for the classification level are **topsecret**, **secret**, **confidential**, **unclassified**, and **none**. If you specify **none**, no IPSO classification is added. The default is **none**.

## ipx\_do\_checksum

This Annex parameter controls whether or not the Annex enables an IPX checksum. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## ipx\_dump\_password

This Annex parameter contains a user password for logging on to the Novell file server before the Annex sends a dump file to the server. The string size ranges from 0 to 16 characters. The default is “<unset>”.

## ipx\_dump\_path

This Annex parameter specifies the full pathname that stores the uploaded Annex dump image on the Novell file server. The string size ranges from 0 to 100 characters. This parameter has no default value.

## ipx\_dump\_username

This Annex parameter provides a user name for logging on to the Novell file server before the Annex sends a dump file to the server. The string size ranges from 0 to 48 characters. This parameter has no default value.

## ipx\_file\_server

This Annex parameter contains the name of the Novell file server from which the Annex boots. The string size ranges from 0 to 48 characters. This parameter has no default value.

## ipx\_frame\_type

This Annex parameter defines the framing used for IPX packets on the Ethernet interface. Valid options are **ethernetII**, **raw802\_3**, **802\_2**, or **802\_2snap**. The default is **raw802\_3**.

## ipx\_security

This asynchronous port parameter controls whether or not IPX security is enabled on the port. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## ixany\_flow\_control

This asynchronous port parameter treats any input character as a start (XON) character, if output has been suspended by a stop (XOFF) character. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## keep\_alive\_timer

This Annex parameter defines the number of seconds between the transmission of identification packets during times of network inactivity. This parameter works only for the LAT protocol. The packets serve only as notices to remote nodes that the host's services are available. Allowable values range from **10** to **255** (seconds). The default is **20** (seconds).

## lat\_key

This Annex parameter restricts access to LAT-related Annex commands, parameters, functions, and the LAT protocol within the Annex. Each Annex requires a unique key value (contact your supplier to obtain a LAT key). After setting the key, your system administrator must reboot the Annex.

## lat\_queue\_max

This Annex parameter limits the number of HIC requests that the Annex can queue. This parameter affects only the operation of HIC requests received after changing the parameter's value and setting LAT. Allowable values range from **1** to **255** or **none** (entering **none** sets the value to **255**). The default value is **4**.

## latb\_enable

This asynchronous port parameter enables the Annex to decode a LAT hosts's data-b packet. Data-b packets change certain asynchronous port parameters (see your LAT host's documentation for more details). A **Y** enables this parameter, an **N** disables it. The default is **N**.



If **latb\_enable** is set to **Y** and the LAT host sends a data-b slot message requesting that flow control (XON/XOFF) be turned off, the Annex turns off flow control and passes XON/XOFF characters to the host. This scenario can adversely affect both XON/XOFF and the cursor keys on the terminal.

## line\_erase

This asynchronous port parameter allows an Annex to echo line erase for a video terminal. When enabled, the Annex erases all characters on the line and moves the cursor back to the beginning of the line. When disabled, the Annex echoes the line erase character for hard-copy terminals, making the deleted line visible and positioning the print head at the beginning of the next line. The line erase occurs only at the CLI level. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## load\_broadcast

This Annex parameter defines, during a boot, whether or not the Annex requests the configuration or message-of-the-day files from other hosts on the network if any or all of the files are not available on the preferred load host. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## load\_dump\_gateway

This Annex parameter specifies the gateway's IP address. A gateway is required if the preferred load or dump host is on a different network or subnet than the Annex. The default is **0.0.0.0** (no gateway).

## load\_dump\_sequence

This Annex parameter specifies available network interfaces (Ethernet, SLIP, or self) and the order in which they are used for a down-line load or an up-line dump. You can list more than one interface by using commas to separate interface names. Table C-24 describes the valid options.

Table C-24. Valid Options for the load\_dump\_sequence Parameter

Option	Description
net	For use with a local area network. This is the default value.
slnn	For use with a SLIP line, where <i>nn</i> is the number of the serial port.
self	Instructs the Annex to boot its image from the Flash ROMs. Since the Annex cannot dump back to itself, when booting via <b>self</b> , always have a secondary load/dump interface by setting <b>load_dump_sequence</b> to <b>self,net</b> or <b>self,slnn</b> .

## local\_address

This asynchronous port parameter defines the IP address for the asynchronous port on the Annex side of a link. This IP address is used whenever SLIP or PPP is in effect for the port (for example, because the **mode** parameter is set to **slip** or **ppp**, or because the mode is set to **auto\_detect** and SLIP or PPP is detected). The default is **0.0.0.0**.

## location

This asynchronous port parameter defines an asynchronous port location or description that displays with the CLI **who** command. The string size ranges from 0 to 16 characters. The default is a **null string** ("").

## lock\_enable

This Annex parameter enables any port to use the Annex Interface for VMS Environment's **lock** command. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## login\_password

This Annex parameter specifies the password for all ports using a VMS interface. The string size ranges from 0 to 16 characters. For security reasons, the Annex displays this value as “<set>” or “<unset>.” The default is “<unset>.”



This parameter works only when **cli\_interface** is set to **vci** and **login\_port\_password** is set to **Y**.



## login\_port\_password

This asynchronous port parameter enables the port password when the VMS command interface is configured (i.e., when **cli\_interface** is set to **vci**). A **Y** enables this parameter, an **N** disables it. The default is **N**.

## login\_prompt

This Annex parameter defines the prompt that appears for all ports using a VMS interface. The string size ranges from 0 to 16 characters. The default is the # symbol.



This parameter works only when **cli\_interface** is set to **vci**.

## login\_timer

This Annex parameter specifies the number of minutes a port using a VMS interface can remain inactive. Valid values are **0** through **60** (minutes). Entering **0** sets the timer to 30 minutes. The default is **30**.



This parameter works only when **cli\_interface** is set to **vci**.

## login\_timeout

This asynchronous port parameter enables a login timer when the VMS command interface is configured (i.e., when **cli\_interface** is set to **vci**). A **Y** enables this parameter, an **N** disables it. The default is **N**.

## long\_break

This asynchronous port parameter enables an Annex to return a user to the CLI prompt after receiving a break signal of more than two seconds. When disabled, the Annex passes the break to the local application. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## loose\_source\_route

This Annex parameter controls the Loose Source Routing protocol which defines a sequence of IP addresses that a datagram must follow. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

When enabled, The Annex forwards all IP packets that have the *Loose Source Routing and Record* option set. The Annex forwards all IP packets that have the *Strict Source Routing and Record* option set only if the next routing address is directly reachable by the Annex. Otherwise, the Annex drops these packets and sends an ICMP type *Destination Unreachable* message with a code of *Source Route Failed*.

When disabled, the Annex will not forward any IP packets that have the *Strict Source Routing and Record* or *Loose Source Routing and Record* options set. The Annex accepts these packets only if the Annex itself is the ultimate destination. If the packets are not addressed to the Annex, they are dropped and the Annex sends an ICMP type *Destination Unreachable* message with a code of *Source Route Failed* will to the originator.



Loose source routing can pose a security risk if you use filters on your network router. If you are concerned with security, set this parameter to **N**.

## map

This T1 parameter controls the mapping of the modems to the T1 Drop and Insert Interface (T1DII) and the T1 Network Interface (T1NI) DS0 channels. The modems can be mapped to any unoccupied slot on the T1NI or the T1DII. The T1NI and the T1DII can be mapped to each other on channels that are not occupied by modems. Table C-25 lists the options that are used with the **map** parameter.

Table C-25. Options for the map Parameter

Option	Description
<i>map_val modem_number</i>	<p>These options map an interface channel to a modem. The <i>map_val</i> option defines the interface as:</p> <p><b>ds1_modem</b> for the T1 Network Interface (the DS0 channel).</p> <p><b>di_modem</b> for the Drop/Insert Interface.</p> <p>The <i>modem_number</i> option must be specified. The <i>modem_number</i> value ranges from 1 to 24.</p>
<i>map_val</i>	<p>The <i>map_val</i> option by itself maps the T1 Network Interface to the Drop/Insert Interface. The <i>map_val</i> defines the type of channel as <b>data</b>, <b>voice</b>, or <b>unused</b>.</p>

## map\_to\_lower

This asynchronous port parameter enables an Annex to convert uppercase characters sent from a terminal into lowercase characters. This conversion occurs only at the CLI level. Enable this parameter for older terminals that do not support lower case characters. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## map\_to\_upper (asynchronous)

This asynchronous port parameter enables an Annex to convert lowercase characters sent to a terminal into uppercase characters. This conversion occurs only at the CLI level. Enable this parameter for older terminals that do not support upper case characters. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## map\_to\_upper (parallel)

This parallel port parameter enables an Annex to convert lowercase characters sent to a terminal using the CLI into uppercase characters. Enable this parameter for older terminals that do not support upper case characters. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## max\_chap\_chall\_int

This Annex security parameter enables the RA 6300 to re-issue a CHAP challenge to a remote node at random times during the course of a PPP connection. The parameter itself specifies the maximum number of seconds in the interval from which the RA 6300 randomly chooses the times to re-issue the challenge. Valid values are **0** to **65535** (approximately 18.2 hours). For example, a value of 60 specifies an interval ranging from one to 60 seconds. The default is **0**, which disables the re-issuing of challenges.

## max\_session\_count

This asynchronous port parameter specifies the number of active sessions (jobs) allowed per port. The allowable values range from **1** to **16**. The default is **3**.

## max\_vcli

This Annex parameter determines the maximum number of virtual CLI connections the Annex can create at a time. Allowable values are the string **unlimited** or a decimal number from **0** to **254**. A value of **0** prevents any virtual CLI connections. The default is **unlimited**.

## metric

This asynchronous port parameter defines the hop count to the remote end of the asynchronous line when the **mode** parameter is set to **slip** or **ppp**. Modify this parameter only if you want the Annex to use a route other than the SLIP or PPP interfaces to the remote end. Allowable values are **1** to **15**. The default is **1**.

## min\_unique\_hostnames

This Annex parameter determines whether or not you can identify a host in the host table by entering a minimal string rather than the full host name. A **Y** enables minimum uniqueness, an **N** disables it. The default is **Y**.

## mode

This asynchronous port parameter sets the mode for access to an asynchronous port. It determines whether access is initiated by a device connected to the Annex or from the network through the Annex to the device. Table C-26 describes the valid options; the default is **cli**.

Table C-26. Valid Options for the mode Parameter

Option	Description
adaptive	Allows a port to have both <b>slave</b> and <b>cli</b> capabilities. If a connection is initiated on the serial side, the port enters <b>cli</b> mode; if a connection is initiated via a port server, the port enters <b>slave</b> mode.
arap	Allows a port to perform as a network interface using ARAP.
auto_adapt	Allows a port to detect whether packets are incoming or outgoing. For incoming packets, the port behaves as if it were in <b>auto_detect</b> mode. For outgoing packets, it operates in <b>slave</b> mode.
auto_detect	Allows a port to identify an incoming packet's protocol and to convert to IPX, PPP, ARAP or CLI.
cli	Allows a port connected to a terminal or incoming modem access to the CLI. The CLI provides access to the network and connections to other hosts via the <b>telnet</b> , <b>connect</b> , <b>rlogin</b> and <b>tn3270</b> commands.  The <b>tn3270</b> command is available only if the <b>option_key</b> parameter is set to the correct value for the Annex.
connect	Allows a port to communicate with a LAT host via the <b>connect</b> command. This option works with the <b>dedicated_arguments</b> parameter.
dedicated	Allows a port to communicate only with one specific host defined using the <b>dedicated_address</b> and <b>dedicated_port</b> parameters. Communication can be via <b>telnet</b> or <b>rlogin</b> , but not via <b>tn3270</b> or <b>connect</b> .
ipx	Allows dial-in Novell access.
ndp	Allows Novell dial-in, dial-out, and routing.
ppp	Allows a port to perform as a network interface using PPP. IP packets are encapsulated by PPP.

*(continued on next page)*

Table C-26. Valid Options for the mode Parameter (continued)

Option	Description
rlogin	Allows a port to communicate via the <b>rlogin</b> command. Use this option in conjunction with the asynchronous port parameter <b>dedicated_arguments</b> .
slave	Allows port access through the port server. This mode provides Annex login lines for hosts that have no Ethernet interface and/or that require access to modems and serial line printers attached to the Annex. It does not provide access to the CLI.
slip	Allows a port to perform as a network interface using SLIP. IP packets are encapsulated by SLIP.
telnet	Allows a port to communicate via the <b>telnet</b> command. Use this option in conjunction with the asynchronous port parameter <b>dedicated_arguments</b> .
tn3270	Allows a port to communicate via the <b>tn3270</b> command. Use this option in conjunction with the asynchronous port parameter <b>dedicated_arguments</b> .
unused	The port has no connection; the Annex ignores it.



You should mark a port as unused if it is not connected to a device.

## mop\_password

This Annex parameter contains the MOP maintenance password. In this 8-byte password, each byte consists of two hexadecimal digits. The string size ranges from 0 to 16 characters. For security reasons, the Annex displays values as “<set>” or “<unset>.” The default is “<unset>.”

## **motd\_file**

This Annex parameter defines the file name for the message-of-the-day file maintained on the load host. The string size ranges from **0** to **16** characters. The default file name is **motd**; the file resides in the directory chosen during the host installation process (typically **/usr/spool/erpcd/bfs**).

## **multicast\_timer**

This Annex parameter defines the number of seconds that can elapse between service announcement transmissions for the LAT protocol. Allowable values range from **10** to **180** (seconds). The default is **30**.

## **multisessions\_enable (Annex)**

This Annex parameter allows multisessions to be managed on a terminal server basis. When enabled, terminals that support DEC's Terminal Device/Session Management Protocol (TD/SMP) can display two active windows simultaneously over one communication line. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## **multisessions\_enable (asynchronous port)**

This asynchronous port parameter allows multisessions to be managed on a per port basis. A **Y** enables this parameter, an **N** disables it. The default is **N**.



## name\_server\_1

This Annex parameter defines the type of name service used with the primary name server. When using this parameter, you must specify a host using the **pref\_name1\_addr**. The options are **dns**, **ien\_116**, or **none**. The default is **none**.

## name\_server\_2

This Annex parameter defines the type of name service used with the secondary name server. The service type specified with this parameter is queried if the type specified with **name\_server\_1** is not available. When using this parameter, you must specify a host using **pref\_name2\_addr**. The options are **dns**, **ien\_116**, or **none**. The default is **none**.

## nameserver\_broadcast

This Annex parameter defines whether or not the Annex broadcasts a name server request if the preferred name servers do not respond. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## need\_dsr

This asynchronous port parameter allows an Annex to use the DSR (Data Set Ready) signal to determine whether a device is attached to the corresponding asynchronous line. The Annex will not allow connection to a slave port and will not activate the CLI until the DSR signal is active. If DSR is deactivated, the connection to a slave line is terminated and the CLI is deactivated.

When disabled, the DSR signal is not required to connect to a slave line, and DSR is not required to activate a CLI line (see *Modem Signals* on page A-99 for details on using **need\_dsr** in conjunction with modem control). DSR is always considered active on ports that do not have a DSR signal (ports with partial modem control lines). A **Y** enables this parameter, an **N** disables it. The default is **N**.

## net\_inactivity

This asynchronous port parameter defines the amount of time that network protocols (e.g., SLIP, PPP, ARAP) running on the serial line can remain inactive before the port is reset. Valid options are **0** to **255**; a zero value indicates *off*. The default is **0** (*off*).

Use this parameter in conjunction with **net\_inactivity\_units**.



Since the accuracy of the inactivity timer is within five seconds, if **net\_inactivity\_units** is set to seconds, we recommend using a value for **net\_inactivity** that is a multiple of five.

## net\_inactivity\_units

This asynchronous port parameter defines the units of time used for the port's inactivity timer. Valid options are **minutes** or **seconds**. The default is **minutes**.

Use this parameter in conjunction with **net\_inactivity**.



If you are using an ISDN line, it is important to set **net\_inactivity** to a small value, such as **30**, and **net\_inactivity\_units** to **seconds**; otherwise, you may incur high costs from your ISDN service provider.

To set an inactivity timer of two minutes, set:

```
net_inactivity_units=minutes  
net_inactivity=2
```

To set an inactivity timer of 30 seconds, set:

```
net_inactivity_units=seconds  
net_inactivity=30
```

An inactivity timer can be set to the following combinations:

0 to 4 minutes 15 seconds (= 255 seconds) in 1 second intervals  
0 to 4 hours 15 minutes (= 255 minutes) in 1 minute intervals

## network\_turnaround

This Annex parameter defines the approximate number of seconds that an Annex waits for a response from a security server (an algorithm defines the actual time which typically is longer than the defined value). This parameter works only when the **enable\_security** parameter is set to **Y**. Allowable values range from **1** to **255**. The default is **2**.

Setting this parameter to a high number is not recommended unless a large timeout value is required for contacting (for security) slow hosts or waiting for a slow host's response to a security request.

## newline\_terminal

This asynchronous port parameter interprets carriage returns and line feeds at the CLI level. When enabled, a line feed terminates both the input and the output lines. When disabled, a carriage return or a line feed terminates the input line and a carriage return followed by a line feed terminates output lines. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## node\_id

This Annex parameter specifies the address the Annex tries to acquire at start-up. If this address is in use, the Annex must acquire a new node ID. The **node\_id** is an AppleTalk address in the form *net.node*. Valid *net* values are **0** to **65534**; valid *node* values are **0** to **254**. The default is **0.0**.

## option\_key

This Annex parameter enables the following features:

- The AppleTalk-specific functions and parameters.
- The CLI **tn3270** command.
- dial-out routing and filtering.
- IPX.

These features are available separately or in any combination. Each Annex requires a unique key value for the feature(s) you choose; contact your supplier to obtain an **option\_key** value.

## output\_flow\_control

This asynchronous port parameter defines the method that a device uses to stop output from an Annex. Table C-27 describes the valid options; the default is **start/stop**.

Table C-27. Valid Options for the `output_flow_control` Parameter

Option	Description
bell	Comparable to setting the parameter to <b>none</b> .
eia	Selects hardware flow control; <b>eia</b> works only if the <b>control_lines</b> parameter is set to <b>flow_control</b> or <b>both</b> and the device is wired properly.
start/ stop	Specifies XON/XOFF flow control (independent of the <b>control_lines</b> parameter). Upon receiving XOFF ( <b>output_stop_char</b> ), the Annex stops sending output to the device. Upon receiving XON ( <b>output_start_char</b> ), the Annex starts sending output to the device. The Annex removes these characters from the data stream.
both	Specifies both in-band (XON/XOFF) and out-of-band (CTS/RTS) flow control (if <b>control_lines</b> is set to <b>flow_control</b> or <b>both</b> ). Both flow controls are independent; data flows out of the port only if CTS is high and the last received character was XON. Receiving XOFF or dropping CTS stops output (Annex to device) flow.
none	Specifies no flow control; characters are lost if the buffers overflow.

## output\_is\_activity

This asynchronous port parameter defines activity as output. When enabled, the Annex resets the inactivity timer when it sends output from the port. If the line **type** is **hardwired**, the Annex also places an entry in the **who** table. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## output\_start\_char

This asynchronous port parameter defines the control character sequence that restarts output if **output\_flow\_control** is set to **start/stop**. The default is **CTRL-Q** (^Q).

## output\_stop\_char

This asynchronous port parameter defines the control character sequences that stops output if the **output\_flow\_control** parameter is set to **start/stop**. The default is **CTRL-S** (^S).

## output\_ttl

This Annex parameter sets the time-to-live (TTL) for packets the Annex generates for RIP updates. TTL is a field in IP packets that limits their lifetime on the network. Each time a packet crosses a router, the router decrements the packet's TTL by 1. When the value reaches 0, the packet is discarded. Allowable values range from **1** to **255**. The default is **64**.

## parity

This asynchronous port parameter defines the type of parity that the asynchronous port uses. The options are **even**, **odd**, or **none**. The default is **none**.

## password

This Annex parameter modifies the Annex's administrative password. This password is used for access to the superuser CLI commands and for administrative access to an Annex. It overrides the CLI **lock** and virtual CLI passwords. The string size ranges from 0 to 15 characters.



If the Annex is configured with an IP address, the default administrative password is the Annex's IP address in dotted-decimal notation.

If the Annex is not yet configured with an IP address and the administrative password has not been modified (either via this parameter or via the CLI **passwd** command), the default password is a null string ("").

If the Annex is not configured with an IP address and boots via MOP, IPX, or from FLASH ROM, the default password is a null string ("") and entering a carriage return at the *Password* prompt places you in superuser mode.

Even if **password** is not set, the default administrative password is required to access the superuser CLI commands.

Changes to this parameter take effect immediately.

## passwd\_limit

This Annex parameter defines the maximum number of times a user can try to enter a password before an Annex resets the port. Entering zero sets the limit to 3. Allowable values range from **0** to **10** (entering **0** sets the value to the default). The default is **3**.

## phone\_number

This asynchronous port parameter defines the default phone number used with dynamic dialing on the port. This 32-character string must be compatible with the modem connected to the port. The default is a **null string** ("").

## port\_password

This asynchronous port parameter defines a port password for local password protection. You can use this password as a back-up for host-based security if the security servers do not respond or as an additional line of security after entering a user name password.



When using SecurID, set **port\_password** to a null string (""), and do not set a port password in the **acp\_passwd** file (see *Using the SecurID Card* on page A-524 for more details).

## port\_server\_security

This asynchronous port parameter enables a host-based security policy for access to the port through the port server. When enabled, only authorized users can access the port. A **Y** enables this parameter, an **N** disables it. The default is **N**.



## ppp\_acm

This asynchronous port parameter (async control mask) specifies which of the first 32 bytes (0x0 to 0x1F) of the ASCII character can be sent as clear text and which should be protocol-escaped.

The Annex requests the **ppp\_acm** parameter as its local mask. If the peer rejects **ppp\_acm**, the Annex accepts the hint if it is a superset of the Annex's mask; otherwise, it uses the PPP default of 0xFFFFFFFF. The Annex accepts any mask from the peer. Values range from **0x00000000** to **0xffffffff**. The Annex default is **0x00000000**.

The **ppp\_acm** parameter is a bit mask that is set as follows:

- **ppp\_acm** for ASCII NUL (decimal 0) is 2 to the power of 0 = 0x00000001
- **ppp\_acm** for ASCII SOH (decimal 1) is 2 to the power of 1 = 0x00000002
- **ppp\_acm** for ASCII DC1 (decimal 17) is 2 to the power of 17 = 0x00020000
- **ppp\_acm** for ASCII DC3 (decimal 19) is 2 to the power of 19 = 0x00080000

Thus, the mask for XON/XOFF (DC1 and DC3) equals the OR function of 0x00020000 and 0x00080000, or 0x000a0000.

When the Annex sends an ACCM to the host, it follows this calculation to determine the initial value requested:

- The value set for **ppp\_acm** (a 32-bit integer) is read in as the ACCM.

- If **input\_flow\_control** is set to **start/stop**, the following two additions are made:  
 If **input\_start\_char** is 0–31 decimal, the bit indexed by this parameter is set in the ACCM.  
 If **input\_stop\_char** is 0–31 decimal, the bit indexed by this parameter is set in the ACCM.
- If **output\_flow\_control** is set to **start/stop**, the following two additions are made:  
 If **output\_start\_char** is 0–31 decimal, the bit indexed by this parameter is set in the ACCM.  
 If **output\_stop\_char** is 0–31 decimal, the bit indexed by this parameter is set in the ACCM.

For example, the initial ACCM sent to the peer is 0x000A0001 if **ppp\_acm** is set to 0x00000001 (i.e., the ASCII NUL character will not be sent) and the following parameters are set as indicated:

<b>input_flow_control</b>	<b>start/stop</b>
<b>input_start_char</b>	<b>^S</b>
<b>input_stop_char</b>	<b>^Q</b>
<b>output_flow_control</b>	<b>start/stop</b>
<b>output_start_char</b>	<b>f</b>
<b>output_stop_char</b>	<b>h</b>

Since the output flow control parameters are outside the range 0–31 decimal, they do not affect the ACCM.

The **na/admin** command **show port ppp\_acm** still displays the **ppp\_acm** setting. The CLI command **netstat -ipnn**, where *nn* is the port number, displays the true mask (ACCM) value, i.e., the value negotiated between the two PPP processes.

## ppp\_ipx\_network

This asynchronous port parameter is a 4-byte, Novell network number the Annex suggests for the remote PC client on an IPXCP (IPX over PPP) link. Valid values are **00000001** to **FFFFFFF**, or **0**. Leading zeroes, if any, should be included. The network number must be unique on the network and on the Annex itself.

When the IPXCP connection is established, the Annex and the client negotiate the network number, each suggesting a value. The peer suggesting the highest number wins the negotiation, and the network number is set to that value. If both ends of the link set the network number to 0, a unique, randomly-generated number is used as the default.

This parameter is overridden by the network number in the remote address field of the **acp\_dialup** file, if that field is configured correctly.

## ppp\_ipx\_node

This asynchronous port parameter is a string of 12 hexadecimal digits representing the 6-byte, non-zero node number the Annex suggests for the node number of the remote PC client on an IPXCP (IPX over PPP) link. Valid values are **000000000000** to **FFFFFFFFFFFFE**, except for multicast addresses. A multicast address is any address that has a 1 in the last bit of the first octet. For example, the Appletalk multicast address is 090007000000, of which the first octet (09) is 0000 1001 in binary; the rightmost 1 is the multicast indicator.

If the client suggests any valid value for the node number, that number will be used instead of the **ppp\_ipx\_node** value.

This parameter is overridden by the network number in the remote address field of the **acp\_dialup** file, if that field is configured correctly. If the node number is not set in **acp\_dialup** or through the **ppp\_ipx\_node** parameter, and no value is suggested by the client, the Annex uses its own Ethernet address plus 1.

### ppp\_mru

This asynchronous port parameter defines the maximum receive unit (MRU) that the Annex requests as its local MRU. If NAKed and the remote hint is less than this value, the Annex accepts the hint; otherwise, the Annex requests the PPP default (**1500**). Values range from **64** to **1500**. The default is **1500**.

### ppp\_ncp

This asynchronous port parameter specifies the PPP network control protocols that run on the interface. The Annex negotiates for these protocols only. Valid protocol settings are one or more of the following: **ipcp** (Internet Protocol Control Protocol), **atcp** (AppleTalk Control Protocol), **ipxcp** (Internet Packet Exchange Control Protocol), **mp** (Multilink PPP), and **ccp**. Separate multiple protocols with commas. You can also specify **all** to indicate all of the protocols, which is the default. For information on Multilink PPP, see the *Multilink PPP Addendum*.

### ppp\_password\_remote

This asynchronous port parameter defines a PPP port user's password. The string size ranges from 0 to 16 characters. For security reasons, the Annex displays this parameter's value as "<set>" or "<unset>." The default is "<unset>."

## ppp\_sec\_auto

This asynchronous/synchronous parameter, used in conjunction with the **ppp\_security\_protocol** parameter, allows the use of **auto\_detect** mode for PPP clients regardless of whether the clients support PAP/CHAP. The values for the parameter are Y or N, with **N** as the default.

## ppp\_security\_protocol

This asynchronous port parameter defines the security check for the peer that the Annex requires before starting the network control protocol. If the Annex wants to use security and the peer refuses, the Annex closes the link. Valid options are **chap** (challenge-handshake protocol), **pap** (password authentication protocol), **chap-pap**, and **none**. The default is **none**.



LCP requests for CHAP received by the Annex are always ACKed, regardless of this parameter's setting.

## ppp\_username\_remote

This asynchronous port parameter defines the user name by which the Annex identifies itself when the remote PPP peer asks for authentication. The string size ranges from 0 to 15 characters. The default is a **null string** ("").

## pref\_dhcp1\_addr

This optional Annex parameter specifies the IP address of the DHCP server that a DHCP client will attempt to discover as the primary source for DHCP services. A DHCP client will broadcast a DHCP message when the **dhcp\_broadcast** parameter has been set to Y. The value for **pref\_dhcp1\_addr** may be set to **0**.

## pref\_dhcp2\_addr

This optional Annex parameter specifies the IP address of the DHCP server that a DHCP client will attempt to discover as a backup source for DHCP services when the primary DHCP server does not respond. A DHCP client will broadcast a DHCP message when the **dhcp\_broadcast** parameter has been set to Y. The address specified by **pref\_dhcp2\_addr** will be used only if **pref\_dhcp1\_addr** is non-zero and does not respond. The value for **pref\_dhcp1\_addr** may be set to **0**.

## pref\_dump\_addr

This Annex parameter specifies the IP address for the preferred dump host. This is the host to which the Annex first tries to dump. The default is **0.0.0.0**.



A dump is not sent if the address is set to the default value.

## pref\_load\_addr

This Annex parameter specifies the IP address for the preferred load host. This is the host to which the Annex first requests a load of its operational code. The default is **0.0.0.0**.



Set this address to the boot host's IP address.

## pref\_mop\_host

This Annex parameter specifies the Ethernet address of the preferred MOP load or dump host. This address consists of six parts separated by dashes. Each part contains a hexadecimal value. The default value is **00-00-00-00-00-00**.

## pref\_name1\_addr

This Annex parameter defines the IP address of the host specified in the **name\_server\_1** parameter. The default is **0.0.0.0**.

## pref\_name2\_addr

This Annex parameter specifies the IP address of the host specified in the **name\_server\_2** parameter or a back-up host that serves if **name\_server\_2** is set to **none**. The default is **0.0.0.0**.

## pref\_secure1\_host

This Annex parameter specifies the IP address of the security server to which the Annex first sends security requests. This parameter works only if the **enable\_security** parameter is set to **Y**. The default is **0.0.0.0**.

## pref\_secure2\_host

This Annex parameter specifies the IP address of the host that is the back-up server if the host specified in **pref\_secure1\_host** is not available. This parameter works only if the **enable\_security** parameter is set to **Y**. The default is **0.0.0.0**.

## printer\_crlf

This parallel printer port parameter converts a carriage return to a carriage return followed by a line feed before it is sent to the printer. When disabled, a carriage return translates to a carriage return followed by a null string. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## printer\_host

This asynchronous port parameter specifies the IP address or fully qualified domain name of a machine running a Berkeley-style *lpd* server. The **tn3270** command uses this server for the print-screen function (for more details, see *tn3270* on page A-214). The default is **0.0.0.0**.



## printer\_name

This asynchronous port parameter specifies the printer used by the **tn3270** command's print-screen function. You must enter a name listed in the **/etc/printcap** file on the remote host by the **printer\_host** parameter (for more details, see *tn3270* on page A-214). There is no default value for this parameter.

## printer\_width

This parallel printer port parameter sets the maximum number of characters per line. The Annex follows this number of characters with a `<newline>`. If this parameter is set to **0**, the Annex does not insert a `<newline>` into the data stream. The default is **0**.

## prompt

This asynchronous port parameter defines a port-specific prompt string. The prompt string consists of displayable characters and embedded formatting codes. Each formatting code, which consists of a percent character (%) followed by a single character, is compressed and stored as a single character in non-volatile memory. The maximum number of characters stored for the prompt string is 16. Since each formatting code consists of two characters, the maximum string size is 32 characters. String sizes smaller than 32 characters are rejected as bad values if they cannot be stored into 16 characters in non-volatile memory after the formatting codes are compressed into single characters. Table C-21 on page A-53 lists and describes these codes. The Annex parameter **cli\_prompt** defines the default prompt.

## ps\_history\_buffer

This asynchronous port parameter is used with the **telnet** command to indicate how much incoming data to buffer on a slave port. Incoming data is buffered continuously before, during, and after the Telnet session; no data buffering occurs during LAT access to the port. The port must be reset after setting or changing this value. Values range from **0** to **32767**. The default is **0 (disabled)**.

## redisplay\_line

This asynchronous port parameter defines the reprint line character for CLI users. The allowable value is a control character sequence. The default is **CTRL-R (^R)**.

## remote\_address

This asynchronous port parameter defines the IP address for a host at the other end of the asynchronous line. This parameter works whenever SLIP or PPP is in effect for the port (for example, because the **mode** parameter is set to **slip** or **ppp**, or because the mode is set to **auto\_detect** and SLIP or PPP is detected). The default is **0.0.0.0**.

## reset\_idle\_time\_on

This asynchronous port parameter defines whether **input** or **output** resets the idle timer. The idle time is the time lapse between activity and inactivity at the device. This parameter is used with the **who** command. Valid options are **input** and **output**. The default is **input**.

## retrans\_limit

This Annex parameter defines the number of times an Annex retransmits a packet before notifying the LAT user about a network failure. Allowable values range from **4** to **120**. The default value is **8**.

## ring

This T1 parameter provides the audible ring to the central office for incoming calls. When enabled, the audible ring is sent to the central office. A **Y** enables this parameter, an **N** disables it. The default is **Y**. This parameter is used with the `wink_start` and `immediate_start` protocols only.

## rip\_accept

This Interface parameter defines the networks for which the Annex accepts advertised routes. Table C-28 lists the valid options; the default is **all**.

Table C-28. Valid Options for the `rip_accept` Parameter

Option	Description
<i>access_spec</i>	Uses the form [ <b>include</b>   <b>exclude</b> ] <i>network_list</i> where <b>include</b> means accept RIP updates only for the networks in <i>network_list</i> , and <b>exclude</b> means accept all RIP updates except for those in <i>network_list</i> . You can list up to eight network IP addresses in <i>network_list</i> .
none	No RIP updates are accepted over the interface.
all	RIP updates for all networks are accepted.

## rip\_advertise

This Interface parameter defines the networks for which the Annex will advertise routes. Table C-29 lists the valid options; the default is **all**.

Table C-29. Valid Options for the rip\_advertise Parameter

Option	Description
<i>access_spec</i>	Uses the form [ <b>include</b>   <b>exclude</b> ] <i>network_list</i> where <b>include</b> means advertise only the networks in <i>network_list</i> , and <b>exclude</b> means advertise all networks except those in <i>network_list</i> . The list can contain up to eight network addresses.
none	Turns off advertising for the interface.
all	Advertises all networks over the interface.

## rip\_auth

This Annex parameter contains the password that controls authentication for RIP 2 packets. The string size ranges from 0 to 16 characters. The Annex displays this parameter's value as "<set>" if a password is entered or "<unset>" if a null string is entered. When "<unset>," authentication is turned off and all RIP packets are accepted. The default is a **null string** ("").

## rip\_default\_route

This Interface parameter allows an Annex to advertise that it is the default router. Valid values are **0** through **15**, or **off**. A value of 1 through 15 indicates the hop count that will be advertised. A value of 0 or off turns off the advertisement. The default is **off**.

## rip\_horizon

This Interface parameter controls the split horizon algorithm for RIP. Table C-30 describes the valid options for this parameter. The default is **poison**.

Table C-30. Valid Options for the rip\_horizon Parameter

Option	Description
off	Disables split horizon.
split	Enables split horizon without poison reverse.
poison	Enables split horizon with poison reverse.

## rip\_next\_hop

This Interface parameter specifies whether or not the next hop value is included in RIP version 2 advertisements. Valid options are **never**, **needed**, or **always**. The default is **needed**.

## rip\_rcv\_version

This Interface parameter controls the RIP version(s) that an Annex accepts. Table C-31 describes the valid options for this parameter. The default is **both**.

Table C-31. Valid Options for the rip\_rcv\_version Parameter

Option	Description
1	Only version 1 packets are accepted.
2	Only version 2 packets are accepted.
both	Both versions are accepted.

## rip\_routers

This Annex parameter lets you force RIP to direct periodic RIP updates to a router list rather than broadcasting updates. Valid values are the IP addresses of up to eight directly reachable routers. The Annex ignores any address that is not on an attached subnet. Specifying the default, **all**, restores broadcasting.

## rip\_send\_version

This Interface parameter controls the RIP version(s) that an Annex sends over the IP interface(s). Table C-32 describes the valid options for this parameter. The default is **compatibility**.

Table C-32. Valid Options for the rip\_send\_version Parameter

Option	Description
1	Version 1 packets are sent to the broadcast address.
2	Version 2 packets are sent to the RIP multicast address.
compatibility	Version 2 packets are sent to the broadcast address.

## rip\_sub\_accept

This Interface parameter controls whether or not subnet routes are accepted over the SLIP, PPP, and Ethernet interfaces. When enabled, subnet routes are accepted; when disabled, subnet routes are rejected. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## rip\_sub\_advertise

This Interface parameter controls whether or not the Annex advertises subnet routes over the SLIP, PPP, and Ethernet interfaces. When enabled, subnet routes are advertised; when disabled, subnet routes are not advertised. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## routed

This Annex parameter determines whether or not the RIP routing daemon is enabled. When the daemon is enabled, the Annex performs both active and passive RIP routing. When the daemon is disabled, no RIP routing occurs. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## rwhod

This Annex parameter determines whether or not the Annex listens for RWHO broadcasts when it builds the host table. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## security\_broadcast

This Annex parameter determines whether or not the Annex broadcasts for security validation if the preferred security servers are not available. When enabled, the Annex broadcasts for security; when disabled, the Annex does not broadcast for security. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## server\_capability

This Annex parameter defines an Annex as a file server host. An Annex can provide operational code only for another Annex. Table C-33 describes the valid options; the default is **none**.

Table C-33. Valid Options for the server\_capability Parameter

Option	Description
all	The Annex is a file server for the configuration, operational image, and message-of-the-day files.
config	The configuration files.
image	The Annex's operational code.
motd	The message-of-the-day file.
none	The Annex is not a file server.

## server\_name

This Annex parameter names the Annex in the LAT protocol. The name should match the NMS host's node name used in the HIC configuration file. The string size ranges from 1 to 16 characters. The default value is the physical Ethernet address, represented as a hexadecimal value, appended to the string **LAT\_** (for example, *LAT\_080002BF0020*).

## service\_limit

This Annex parameter defines the maximum number of LAT services that an Annex can maintain in its local service table. When the table is full, the Annex removes the service that has been idle longest. If all services are busy and the table is full, the Annex discards a new service. Allowable values range from **16** to **2048**. The default is **256**.



## session\_limit

This Annex parameter specifies the maximum number of active sessions the Annex allows at one time. Allowable values range from **1** to **1152** or **none** (entering **none** sets the value to **1152**). The default is **1152**.

## short\_break

This asynchronous port parameter allows an Annex to return a user to the CLI prompt after receiving a break of less than two seconds. This occurs only at the CLI level. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## sigproto

This T1 parameter specifies the inbound and outbound signaling protocols supported by each T1 channel (DS0). Each channel supports an inbound protocol and an outbound protocol. Both protocols must be specified even if they are the same. If the protocol pair is invalid, it is rejected with an error message. For inbound-only channels, the outbound protocol must be set to **none**. For outbound-only channels the inbound protocol must be set to **none**. The signaling protocols are as follows:

Table C-34. Signaling Protocols

Protocol	Possible Settings
loop_start	Bidirectional (default)
ground_start	Bidirectional
wink_start	Inbound, outbound, or bidirectional
immediate_start	Inbound, outbound
none	

## slip\_allow\_dump

This asynchronous port parameter enables an Annex to dump its operational code across a SLIP link. A **Y** enables this parameter, an **N** disables it. The default is **Y**.

## slip\_load\_dump\_host

This asynchronous port parameter defines the IP address of the host from which an Annex receives a load or to which an Annex sends dumps over the SLIP interface. If the **load\_dump\_sequence** parameter is set to **slm**, you must enter a valid address here. This parameter's value overrides values in **pref\_load\_addr** and **pref\_dump\_addr**. The default is **0.0.0.0**.

## slip\_mtu\_size

This asynchronous port parameter sets the maximum transmission unit (MTU) size on a SLIP/CSLIP port. This parameter forces the SLIP interface to use **large** (1006) or **small** (256) MTUs. The default is **small**.

## slip\_no\_icmp

This asynchronous port parameter controls whether or not the Annex discards any ICMP packets directed to the SLIP link. When enabled, the Annex reduces unnecessary traffic and messages over the SLIP link. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## slip\_ppp\_security

This asynchronous port parameter controls dial-up SLIP/PPP access. When this parameter and the **enable\_security** parameter are enabled, the Annex determines whether or not the user at the CLI is authorized to execute a **slip** or **ppp** command. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## slip\_tos

This asynchronous port parameter allows an Annex to send interactive traffic (**telnet**, **rlogin**, and **ftp** control sessions) before sending any other traffic. This parameter provides a type-of-service based SLIP queuing. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## speed

This asynchronous port parameter defines the baud rate of the asynchronous line between the device and an Annex. The value entered in this parameter must match the device's baud rate. Allowable values are **autobaud**, **50**, **75**, **110**, **134.5**, **150**, **200**, **300**, **600**, **1200**, **1800**, **2000**, **2400**, **3600**, **4800**, **7200**, **9600**, **19200**, **38400**, **57600**, and **115,200**. The default is **9600**.



If you want the line speed to be determined automatically, use the **autobaud** parameter. If you set **autobaud** to **N**, you must enter a value in **speed**.

Not all Annexes support all port speeds (see your Annex hardware guide for detailed information).

## stop\_bits

This asynchronous port parameter specifies the number of stop bits for a port. Allowable values are **1**, **1.5**, or **2**. The default is **1**.

## subnet\_mask (Annex)

This Annex parameter defines the Annex's IP subnet mask. It is used to divide a network into subnets. The parameter's default is based on the network portion of the Annex's IP address.



Setting this parameter incorrectly can cause routing problems.

## subnet\_mask (port)

This port parameter defines the subnet mask for an asynchronous SLIP or PPP interface. Typically, you use this parameter to divide a network into subnets. Specifying **0.0.0.0**, which is the default, sets the subnet mask to **255.255.255.255**, which denotes a non-subnetted host address.



Setting this parameter incorrectly can cause routing problems.

## sys\_location

This Annex parameter supplies LAT host location or identification information. The string size ranges from 0 to 32 characters. The default is a **null string** ("").

## syslog\_facility

This Annex parameter defines the local facility to which the UNIX *syslogd* daemon sends Annex syslog messages. Valid options are **log\_local0** through **log\_local7**. The default is **log\_local7**.

If the host to which messages are logged does not support 4.3BSD logging, this parameter is ignored and messages are logged by priority level (defined by **syslog\_mask**).

## syslog\_host

This Annex parameter defines the IP address of the host that logs Annex messages. The default, **0.0.0.0**, causes the Annex to broadcast its log messages.

## syslog\_mask

This Annex parameter defines the priority levels that the Annex logs. The options are **all**, **none**, or a combination of levels separated by commas. The default, **none**, disables logging. Table C-35 lists the levels in priority order (see *Event Logging Using syslog* on page Book B-29 for more details on using *syslog* for event logging).

Table C-35. Priority Levels for the syslog\_mask Parameter

Priority Level	Description
emergency	Hardware failures.
alert	All Annex reboots.
critical	Configuration and initialization problems, such as format errors in the configuration file or lack of memory.
error	All line initialization errors, including CLI.
warning	Indications of minor problems.
notice	Time server queries and information about responses.
info	Start and end CLI sessions and Annex jobs created by the <b>rlogin</b> , <b>telnet</b> , <b>connect</b> , <b>ping</b> , and <b>tap</b> commands.
debug	Activate and exit all Annex processes.

## syslog\_port

This Annex parameter routes syslog messages to an asynchronous port where messages are time and date stamped. Valid options are **0** through the Annex's port count. A zero value indicates syslogging takes place over the network; a non-zero value indicates the port to which syslog messages are sent. The default is **0**.

A sample message looks like this:

```
Thu May 19 10:44:55 <190>cli[354]: Port Begin:1:CLI:::[local]
```

## t1\_info

This T1 parameter stores installation information from the service provider, such as a telephone number to call should the network go down. This parameter is limited to a 120-byte string of printable ASCII characters.

## tcp\_keepalive (Annex)

This Annex parameter specifies the length of time a TCP connection must be idle before an Annex sends keep-alive messages. A keep-alive message contains no data but solicits an acknowledgment from the other end of a connection to determine whether the connection is still active. If the recipient does not acknowledge the message after eight retries, the Annex drops the connection. Valid values are **0** through **255** (minutes). A value of **0** sets the keep-alive time to **120** minutes, which is the default; a value of **255** disables the keep-alive mechanism. The **tcp\_keepalive** parameters for serial-line ports and parallel ports override this parameter for those individual ports.

## tcp\_keepalive (asynchronous)

This asynchronous port parameter specifies the length of time a TCP connection must be idle on one or more specific asynchronous ports. This parameter overrides the Annex **tcp\_keepalive** parameter for connections to the host from adaptive, CLI, and dedicated ports, and for connections from the host to slave and adaptive ports. Valid values are **0** to **255** (minutes). The default is **0**. Entering a zero specifies that the keep-alive time is the value set in **tcp\_keepalive**; entering 255 disables the keep-alive mechanism for the port.

## tcp\_keepalive (parallel)

This parallel printer port parameter specifies the length of time a TCP connection must be idle on one or more specific printer ports. This parameter overrides the Annex **tcp\_keepalive** parameter for connections from applications such as **aprint** or **rtelnet** to one or more printer ports. Valid values are **0** to **255** minutes. When set to zero, the keep-alive timer uses the value set in the **tcp\_keepalive** parameter. When set to 255, the keep-alive mechanism for the printer port is disabled. The default is **0**.

## tdi\_distance

This T1 parameter defines the distance, in feet, of the cable that runs from the T1DII to the Private Branch Exchange (PBX) or other equipment. The parameter setting is an integer from **0** to **655**. The default setting is **0**.

## tdi\_framing

This T1 parameter controls which super frame format is used on the T1 Drop/Insert Interface. The parameter settings are **d4** (super frame) and **esf** (extended super frame). The default setting is **esf**. The value for **tdi\_framing** may or may not be the same as **tmi\_framing**.

## tdi\_line\_code

This T1 parameter selects the line code to be used on the T1 Drop/Insert Interface (T1DII). The device connected to the T1DII determines which line code to use. The parameter settings are **ami** and **b8zs**. The default setting is **b8zs**.



## telnet\_crlf

This asynchronous port parameter converts a carriage return in a Telnet session to a carriage return followed by a line feed. When disabled, a carriage return translates to a carriage return followed by a null string. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## telnet\_escape

This asynchronous port parameter defines the character that returns a CLI user to the *telnet* prompt. Setting this parameter to **U** disables the Telnet escape character. The default is **CTRL-]** (^).

## term\_var

This asynchronous port parameter identifies the type of terminal using the CLI connection. You must enter a valid terminal type for the host. The Annex passes the terminal type setting to the host. The string size ranges from 0 to 16 characters. The default is a **null string** ("").

## tftp\_dump\_name

This Annex parameter provides the file name used to dump an Annex's core image via **tftp** if the Annex operational image and **erpcd** fail. The parameter must include the entire path of the dump file, including parent directories. The file you enter must have read and write permissions.

## tftp\_load\_dir

This Annex parameter defines the string that precedes all files (e.g., image name, configuration, and **motd** files) when you boot an Annex via **tftp**. This string's value is determined by the system serving the **tftp** requests. This string does not precede the **tftp\_dump\_name**.

## time\_broadcast

This Annex parameter defines whether the Annex broadcasts for the time if the preferred load host is not available or does not provide a time server. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## time\_server

This Annex parameter determines whether or not the Annex queries for time service. Table C-36 lists the IP addresses to which the network administrator can set this parameter. The default is **0.0.0.0**.

Table C-36. IP Addresses for the time\_server Parameter

Address	Description
<i>loopback address</i>	Do not query for time service.
0.0.0.0	Query the boot host for time service.
127.0.0.1	Do not send out direct time queries.
<i>host address</i>	Send queries to given host address.
<i>broadcast address</i>	Send queries to given broadcast address — may require <i>direct broadcast</i> service on the network routers. This setting does not respect the <b>time_broadcast</b> parameter setting.

## timezone\_minuteswest

This Annex parameter defines the time zone in which the Annex resides. Enter a positive number of minutes for time zones west of GMT, or a negative number for time zones east of GMT. For example, enter *300* for U.S. Eastern Standard Time, which is five hours west of GMT, or *-60* for Paris, which is one hour east of GMT. The default is **300**.

## tmux\_delay

This Annex parameter defines the maximum number of milliseconds during which small packets can accumulate to form larger packets. When the time expires, the Annex sends the multiplexed packet. Valid values are **0** through **255** (milliseconds). Entering *0* sets this parameter to 20. The default is **20**.

## tmux\_enable

This Annex parameter controls whether or not an Annex uses TMux to multiplex small TCP packets into a single IP packet. This parameter works only if the host supports TMux. When enabled, and the host does not support TMux, the Annex will not support multiplexing. A **Y** enables this parameter, an **N** disables it. The default is **N**.

### tmux\_max\_host

This Annex parameter specifies the maximum number of host addresses allowed in the TMux address table. If the number of host addresses exceeds the value entered here, the Annex discards the oldest entry. Allowable values are **10** through **255**; the default is **64**.

### tmux\_max\_mpx

This Annex parameter specifies the largest user packet that can be placed in a TMux packet. The Annex does not multiplex larger packets, but passes them directly to the IP layer. Allowable values are **5** through **65535**; the default is **700**.

### tni\_circuit\_id

This T1 parameter stores the T1 circuit identifier string. The T1 circuit identifier string comes from the service provider and is used for customer service calls. The parameter setting is a string of up to 120 characters. The default setting is the null string.

### tni\_clock

This T1 parameter sets the clock for the T1 Network Interface. Parameter settings include **loop** (service provider), **local** (Annex), **external** (T1 Drop/Insert Interface). The default setting is **loop**.

## **tni\_esf\_fdl**

This T1 parameter sets the T1 facilities data link (FDL) format. The FDL format is used in conjunction with the ESF format and determined by the service provider. The parameter settings include **ANSI** (ANSI T1.403) and **AT&T** (AT&T TR54016) standard formats. The default value is **ATT**.

## **tni\_framing**

This T1 parameter controls which super frame format is used on the T1 Network Interface. Parameter settings include **d4** (super frame) and **esf** (extended super frame). The default setting is **esf**. The value for **tni\_framing** may or may not be the same as **tndi\_framing**.

## **tni\_line\_buildout**

This T1 parameter sets the Line Build-Out (LBO) value. The Channel Service Unit (CSU) portion of the T1 Network Interface requires the administrator to configure a LBO value. The service provider will supply a value measured in decibels (dB) based on the amount of cable loss from the service provider's location to the Annex. Parameter settings include **0**, **7.5**, **15**, and **22.5**. The default is **0**.

## **tni\_line\_code**

This T1 parameter selects the line code for the T1 Network Interface. The service provider determines the line code setting. Parameter settings include **ami** and **b8Zs**. The default setting is **b8zs**.

## t1\_ones\_density

This T1 parameter is used to defeat the Annex's ones density monitor. The Annex T1 engine has a built in ones density monitor that provides the network with the correct number of one pulses. The ones density monitor does the following:

1. **The monitor does not allow the Annex to transmit more than fifteen consecutive zeros.**
2. **The monitor ensures that the Annex has at least N ones in every time window of  $8X(N+1)$  bits, where  $N=1$  to 23.**

This parameter has an **on** and an **off** setting. This parameter should be set to **on** when using AMI coding. The default is **off**.

## toggle\_output

This asynchronous port parameter defines the character that flushes the output buffer for CLI users. The flush character must be a CTRL- $X$  (^ $X$ ), where  $X$  represents an alphanumeric value (not case sensitive). Pressing this character flushes the output buffer. The default is **CTRL-O** (^O).

## type (asynchronous)

This asynchronous port parameter affects the operation of two portions of the Annex code: the **who** database (the data set that the Annex queries when the CLI **who** command is issued or when the Annex is *fingered* from a remote host) and the action of dedicated ports. The options are **dial\_in** and **hardwired**. The default is **hardwired**.

When set to **dial\_in**, the user is registered with the **who** database as soon as a process (CLI or slave) attaches to the line, regardless of the **input\_is\_activity** and **output\_is\_activity** parameter settings. For dedicated ports, the Annex continuously retries the connection, regardless of errors, as long as DCD is high or modem controls are disabled.

When set to **hardwired**, the user is registered with the **who** database according to the **input\_is\_activity** and **output\_is\_activity** parameter settings. If neither parameter is set, any user on this port is invisible to **who**. If **input\_is\_activity** is set, when the user enters data, the line is registered with the **who** database (generally used for hardwired CLI terminals). If **output\_is\_activity** is set, the line is registered when the Annex first sends data (generally used for hardwired printers or other slave devices). In any case, this entry is removed on a hang-up or when the slave line is released.

For dedicated ports, if the connection times out without having received input from the user, the Annex prompts *Press return to restart login* and then waits for input, or a hang-up, before retrying the connection.

## type (parallel)

This parallel printer port parameter specifies the type of printer attached to the port. Valid options are **centronics** or **dataproducs**. The default is **centronics**.

## type\_of\_modem

This asynchronous port parameter defines a 16-byte string that specifies the modem type connected to the port. The modem type indexes a modem description table that is loaded into the Annex at boot time. This string must match the *type\_of\_modem* field in the **modem** section of the last read configuration file; otherwise, the Annex logs a warning message. The Annex also logs warnings when connecting to a port with an unrecognized value in **type\_of\_modem**.

For more details on using the configuration file and modem management, see *Parsing the Configuration File* on page A-345 and *Creating modem Entries in the Configuration File* on page A-374.

## user\_name

This asynchronous port parameter defines an asynchronous port's user name as a string. The CLI **who** command displays this value; the CLI **rlogin** command passes this value to a host. The default is a **null string** ("").

## vcli\_groups

This Annex parameter specifies which LAT remote group code is assigned to virtual CLI users. All virtual CLI users have the same group code. Values are specified as a series of numbers separated by commas (e.g., 1,5,7) or a range of numbers separated by a dash (e.g., 200-255). Following the range, specify the keyword **enable** or **disable**. Allowable values are **all**, **none**, or numbers between **0** and **255**. Following the range, specify the keyword **enable** or **disable**. The default is **none enable**.



## vcli\_inactivity

This Annex parameter specifies the amount of time in minutes that a virtual CLI session can remain inactive. If the specified interval of time has expired, the Annex will terminate the virtual session. The range of values for this parameter is 0 to 255; the default is **0**, indicating that the inactivity timer is deactivated.

## vcli\_password

This Annex parameter defines a password required for virtual CLI connections to the Annex. The string size ranges from 0 to 15 characters. This parameter is useful for local password protection and as a back-up to host-based security. For local password protection, set the **enable\_security** parameter to **Y**, set the **vcli\_security** parameter to **N**, and define a password for this parameter. As a back-up for host-based security, setting this parameter causes the Annex to request a password on a virtual CLI connection whenever the security server does not respond. The default is “<unset>”.



Changes to this parameter take effect immediately.

## vcli\_security

This Annex parameter enables user validation on virtual CLI connections to and from an Annex for the duration of the connection. When enabled, the Annex enables connection security for all virtual CLI connections and executes the same user validation, including user name and password, that it uses with CLI security on asynchronous ports. This parameter works with host-based security only when the **enable\_security** parameter is set to **Y**. A **Y** enables this parameter, an **N** disables it. The default is **N**.

## zone

This Annex parameter defines the AppleTalk zone name that the Annex uses at start-up. The string size ranges from 0 to 32 characters. You must separate zone names with spaces (e.g., general pubs lab). To escape embedded spaces, use the backslash (\) character. The default is a **null string** ("").

The Command Line Interpreter (CLI) is the command interface for the Remote Annex. At the CLI, you enter commands that connect to hosts, manage jobs (or sessions), display and modify port parameters, and display Remote Annex and network information.

The CLI provides two groups of commands – user and superuser; the superuser commands are used for Remote Annex administration.



Each CLI command can contain a maximum of ten arguments.

## Command Syntax

You can shorten any CLI command or host name to the minimum number of letters that make the name unique. This is called *minimum uniqueness*. If you do not want the Remote Annex to interpret a host name using minimum uniqueness, enclose the name in double quotes (""). For example, entering hosts “new” prevents ambiguities between hosts newark and new. You can enter commands and host names in lower case, upper case, or a combination of the two. The Remote Annex performs any necessary case conversion.

## Squelch

If six consecutive CLI errors occur within six seconds (e.g., invalid command, noise on the line), the Remote Annex triggers a squelch, i.e., stops all I/O for approximately four seconds after receiving the sixth error. Pressing **Return** after this period of time returns you to the CLI prompt.



If the errors occur over a time period greater than six seconds, the Remote Annex ignores them and restarts the timer.

If four consecutive squelches occur without an intervening known command or if serial errors (framing/parity) occur while the line is squelched, the Remote Annex shuts down the line for 20 seconds and syslog: *excessive errors on port n; shutting down* (where *n* is the port number.)

## CLI Commands

Table C-37 lists both the user and superuser CLI commands.

To access the superuser CLI commands, issue the **su** command at the user CLI prompt and enter the Remote Annex's administrative (**su**) password (for more details on the superuser password, see *su* on page A-204). The default superuser prompt is a # symbol instead of a colon:

```
annex: su
Password:
annex#
```

Table C-37. CLI Commands

Command	Type	Description
admin	superuser	Enters administrative mode.
arap	user	Converts a CLI line into an ARAP connection.
arp	superuser	Displays the Internet-to-hardware address translation tables.

(continued on next page)

Table C-37. CLI Commands (continued)

Command	Type	Description
bg	user	Puts a job in the background.
boot	superuser	Reboots the Remote Annex.
compact	superuser	Compresses non-volatile memory space.
connect	user	Uses LAT to connect to an advertised LAT service.
control	superuser	Changes the state of DTR and RTS or outputs a test message.
cp	superuser	Copies a file in the local file system.
dialout	superuser	Displays the current dial-out database.
edit	superuser	Edits configuration files.
fg	user	Returns to an established job.
filter	superuser	Enters the filtering subsystem of the CLI user interface.
hangup	user	Disconnects all jobs and resets user CLI connections.
help	user	Displays help information for user CLI commands.
help -m	superuser	Displays help information on macros.
hosts	user	Displays the current host table.
hosts	superuser	Flushes the host table.
ipx	user	Converts a CLI port to an IPX port.

*(continued on next page)*

Table C-37. CLI Commands (continued)

Command	Type	Description
jobs	user	Displays a list of current jobs.
kill	user	Terminates a job.
lock	user	Locks a port.
ls	superuser	Displays the self-boot ROM's directory.
modem	superuser	Displays the modem types supported by the Remote Annex.
mv	superuser	Renames a file in the local file system.
netstat	user	Displays network statistics.
passwd	superuser	Changes the administrative password.
ping	superuser	Sends ICMP Echo Request packets to a host.
ppp	user	Converts a CLI port to a PPP interface port.
procs	superuser	Displays processes at the Remote Annex.
queue	user	Displays information about queued HIC requests or removes a particular HIC request from the queue.
rlogin	user	Connects to a host using the <b>rlogin</b> protocol.
rm	superuser	Deletes a file in the local file system.
route	superuser	Adds/deletes routes to/from the active routing table.
services	user	Displays the LAT services that have been advertised by LAT nodes.
slip	user	Converts a CLI port to a SLIP interface port.

*(continued on next page)*

Table C-37. CLI Commands (continued)

Command	Type	Description
stats	user	Displays Remote Annex statistics.
stats -c	superuser	Clears all serial line statistics to zero.
stats -T	user	Displays T1 network interface statistics.
stty	user	Displays and modifies CLI port parameters.
su	superuser	Enters and exits superuser administrative mode.
t1_loopback	superuser	Places the T1 engine in loopback mode.
tap	superuser	Displays input and output for a serial port.
telnet	user	Connects to a host using the Telnet protocol.
tn3270	user	Connects to an IBM VM/CMS or MVS host using the <b>tn3270</b> variation of the Telnet protocol. This command is available only if the network administrator has set the <b>option_key</b> parameter to the correct value.
who	user	Displays Remote Annex users.

If the **option\_key** parameter is enabled for the Remote Annex interface for VMS environments, you will also have access to the non-privileged and privileged VMS commands listed in Table C-38 and Table C-39. For more details on these commands, see the *Interface for VMS Environments Administrator's Guide* and the *Interface for VMS Environments User's Guide*.



Remote Annex VMS commands have different minimum uniqueness criteria than standard Remote Annex CLI commands, e.g., if the **option\_key** is enabled for VMS, the Remote Annex recognizes a CLI entry of “r” as the **resume session** command.

Table C-38. Non-privileged Remote Annex VMS Commands

Command	Description
backwards	Selects next available, lower numbered session to which your port is connected.
close	Closes sessions.
connect	Uses LAT to connect to an advertised LAT service.
disconnect	Disconnects sessions.
forwards	Selects next available, higher numbered session to which your port is connected.
list port	Displays information about communications server ports from the permanent database.
list server	Displays information from the permanent database about the communications server.
lock	Locks a port to prevent unauthorized access.
logout port	Logs out of the terminal server and disconnects all sessions.
resume session	Returns to a session you have suspended.
set port	Specifies or modifies port characteristics immediately.

(continued on next page)



Table C-38. Non-privileged Remote Annex VMS Commands (continued)

Command	Description
set privileged	Enables your port to perform privileged operations.
set session	Specifies characteristics for your current LAT session.
show port	Displays information from the operational database about communication server ports.
show server	Displays information from the operational database about communications server.
show service	Displays information about LAT services to which you can connect.
show sessions	Displays connected active sessions for your port.
show users	Displays information about interactive port users on the server.

Table C-39. Privileged Remote Annex VMS Commands

Command	Description
clear services	Deletes entries for one or all local LAT services from the operational database.
crash	Performs a dump before rebooting.
define port access	Specifies the type of access allowed for the device using the port.
define port authorized groups	Allows you to authorize that groups of LAT service nodes be available to the port.

*(continued on next page)*

Table C-39. Privileged Remote Annex VMS Commands (continued)

Command	Description
define port autobaud	Sets automatic detection of the speed, parity, and character size of the port device on login and sets the Remote Annex port characteristics to match.
define/set/change port break	Specifies handling of the Break key during a session
define/set/change port character size	Specifies the number of bits in data characters exchanged between the port and the Remote Annex.
define port CLI interface	Indicates CLI behavior as related to logging in, passwords, inactivity timers and the port default prompt.
define/set/change port default session mode	Specifies the initial setting of the LAT session mode.
define port dsrlogout	When enabled, logs out of a port when the attached device powers down.
define/set/change port flow control	Specifies flow control.
define/set/change port inactivity logout	Determines if the communications sever automatically logs out of a port after a period of inactivity.
define/set/change port input flow control	Specifies input flow control.
define/set/change port local switch	Specifies a switch character that you can use to reenter local mode from service mode.
define/set/change port multisessions	Allows two active windows over a single communication line.

*(continued on next page)*

Table C-39. Privileged Remote Annex VMS Commands (continued)

Command	Description
define/set/change port username	Defines or changes a username assigned to a port.
define server circuit timer	Specifies the frequency with which the server communicates with service nodes when LAT sessions are active.
define server inactivity timer	Specifies the period of time after which the server will log out of an inactive port.
define server keepalive timer	Defines or changes the time interval at which the server will transmit a keepalive message over a LAT virtual circuit, when there is no other traffic originating at the server.
define server LAT key	Enables and disables the LAT protocol, and is used as a security mechanism to restrict access to LAT within the Remote Annex.
define server lock	Specifies whether or not interactive port users can use the <b>lock</b> command.
define server login password	Defines or changes the port password that interactive users must type when logging in to a server port.
define server login prompt	Defines or changes the prompt that requests the user's login password.
define server maintenance password	Defines or changes the user password required for remote applications such as NCP and TSM.
define server login prompt	Defines or changes the prompt that requests the user's login password.

(continued on next page)

Table C-39. Privileged Remote Annex VMS Commands (continued)

Command	Description
define server maintenance password	Defines or changes the user password required for remote applications such as NCP and TSM.
define server MOP host	Requires the physical Ethernet address for the preferred VMS host.
define/set/change port modem control	Specifies whether or not the Remote Annex manipulates modem signals.
define port name	Specifies the name of the port.
define/set/change port noloss	Specifies whether or not the port will store data in its type ahead buffer while waiting for a session connection to be made. If so, it will then pass the data to the connection partner.
define/set/change port output flow control	Specifies output flow control.
define/set/change port parity	Specifies whether or not the port will provide a parity bit with each character for error checking.
define/set/change port password	Specifies whether or not a user requires a password to log in to the Remote Annex.
define port session limit	Limits the number of connected sessions on the port.
define/set/change port speed	Specifies the port speed in bits per second.
define/set/change port stop bits	Tells the Remote Annex to use 1, 1.5, or 2 stop bits when outputting a character.

*(continued on next page)*

Table C-39. Privileged Remote Annex VMS Commands (continued)

Command	Description
define/set/change port type	Defines or changes the type of terminal connected to your port, the ports specified in the port-list, or all ports.
define server multicast timer	Specifies time to elapse between service announcement transmissions.
define server name	Specifies a 1-to- 16 character name for the Remote Annex.
define server number	Specifies a facility number for the Remote Annex.
define server password limit	Specifies the number of times a user can try to enter the correct password for any password-protected Remote Annex operation.
define server privileged password	Specifies the password a user must enter following a <b>set privileged</b> command in order to use privileged commands at the port.
define server queue limit	Specifies the maximum number of queued connection requests for remote access to Remote Annex ports.
define server retransmit limit	Specifies the number of times a LAT message is retransmitted to a service node when the Remote Annex receives no messages of acknowledgment.
define server security	Determines whether or not the Remote Annex performs any security checking.
define server session limit	Specifies the maximum number of active sessions that the Remote Annex allows at one time.

(continued on next page)

Table C-39. Privileged Remote Annex VMS Commands (continued)

Command	Description
define server software	Specifies the file name of the Remote Annex software image.
initialize server	Reboots the Remote Annex.
set unprivileged set privileged	Returns the port back to non-privileged status to inhibit unauthorized use. Enables your port to perform privileged operations.
set server all	Resets the Remote Annex subsystems (security, LAT, etc.) from the permanent database, re-reads the <b>macro</b> and <b>service</b> sections of the configuration file, and re-reads the <b>message-of-the-day</b> file.

## admin

The superuser **admin** command is a local substitute for the host-resident **na** command, especially in stand-alone environments. The CLI **admin** command set provides a subset of the host-resident **na** command set. The syntax is:

**admin** [*command*]

Entering the **admin** command alone at a superuser CLI connection puts you in administrative mode. The CLI prompt is replaced with the *admin* prompt. The attention key or **quit** command at the *admin* prompt terminates the **admin** session and returns you to the CLI prompt. Table C-40 describes the CLI **admin** command set.

Table C-40. The Superuser `admin` Command Set

Command	Description
<code>broadcast</code>	Sends a broadcast message to one or more ports.
<code>help</code> or <code>?</code>	Displays the <b>admin</b> help screen.
<code>port</code>	Enters the default <code>port_set</code> .
<code>printer</code>	Enters the default <code>printer_set</code> .
<code>quit</code>	Terminates the <b>admin</b> session.
<code>reset</code>	Resets a port, interface, or subsystem.
<code>set</code>	Modifies the value of a configuration parameter.
<code>show</code>	Displays the current value of a configuration parameter.

These CLI **admin** commands function like their **na** counterparts, with the following exceptions:

- The CLI **admin** commands function only on the local Remote Annex.
- When issuing **admin** with command line arguments (not as a subsystem) you must include the `port_set`.
- The **help** command provides a help summary only for the CLI **admin** command set. Entering **help** `command_name` indicates the command's syntax.
- The **reset** command does not reset the connection from which the **reset** is issued. To reset your port or connection, return to the CLI and issue **hangup**.
- If the **reset** command is issued without arguments, it asks if the user wishes to reset the default `port_set`. Only one character is expected as input (**R**eturn, **y**, or **Y** resets the default `port_set`, and any other response terminates the command).

- Any command issued without arguments, except **reset**, responds with an error or usage message; the commands do not prompt for missing arguments.
- The **show** command displays the annex, port, or printer parameter values for the local Remote Annex. If there are more than 24 lines of information to display, a *more* prompt appears after the 24th line. Pressing **q** for quit returns to the *admin* prompt; the attention character terminates the **admin** session; and any other key continues the display.

The **na** commands that **admin** does not support are:

- **annex**
- **boot, dumpboot**
- **copy**
- **echo**
- **passwd**
- **read, write**



The **na** utility is stored on and accessed from a UNIX host.



## arap

The **arap** command converts a CLI line into an AppleTalk Remote Access Protocol (ARAP) connection. Resetting the port returns the CLI to its original mode. The syntax is:

### arap

The command display looks like this:

```
annex: arap
Remote Annex switching line to ARAP.
```

## arp

The superuser **arp** command displays and, optionally, modifies the IP-to-hardware address translation table used by the Address Resolution Protocol (ARP). Since the Remote Annex builds the ARP table dynamically, you rarely need to modify it. Table C-41 defines the arguments for this command. The syntax is:

**arp** [**-ads**] [*host*] [*addr*] [**temp** | **pub**]

Using either the *host* or the **-a** argument, **arp** displays a host name, if known, or a **?** in place of the host name, the Internet and Ethernet addresses, and the *time to live* (TTL) field for each entry. For example:

```
annex# arp -a

thirdfloor (132.245.6.65) at 00-80-2d-00-2a-c0 ttl=20
oleom (132.245.6.12) at 00-80-20-06-34-39 ttl=19
? (132.245.6.20) at 00-80-20-01-fe-b1 ttl=19
caddy (132.245.6.25) at 00-80-2d-00-22-41 ttl=20
(23f4.3e) at 08-00-4e-34-22-39 ttl=16
```

Table C-41. Arguments for the Superuser arp Command

Argument	Description
<i>host</i>	Displays the current ARP table entry for that host.
<i>addr</i>	Displays the current ARP table entry for that address.
-a	Displays all entries in the table.
-d	Deletes the entry specified with <i>host</i> .
-s	Creates an entry for <i>host</i> , specified using either a name or Internet address, at the hardware address specified by <i>addr</i> . If you do not include <b>temp</b> or <b>pub</b> , the entry is permanent and not published.
<i>temp</i>	The created entry is temporary and is to be deleted after 20 minutes. Temporary entries are not published.
<i>pub</i>	The created entry is to be published. The Remote Annex responds to requests for the host's hardware address.



Although the **arp** command shows AppleTalk information, you cannot manipulate it. Since **arp** interprets all address as IP addresses, if you try to delete an AppleTalk address such as 1.123 using **arp -d**, the ARP table entry 1.0.0.123 is deleted.

## bg

The **bg** (background) command puts a job into the background and displays the job number, the CLI command that created it, and an ampersand (&) to indicate that the job is in the background.

The Remote Annex forwards output generated by the background job to the terminal, if another job is active. If another job is not active, the output is held until you activate a job by issuing the **fg** command. Table C-42 describes the arguments for **bg**. The syntax is:

**bg** [-d] [%] [%, +, -, n, hostname]

Table C-42. Arguments for the bg Command

Argument	Description
-d	Discards output from the background job to the terminal screen until the job is terminated or brought to the foreground.
%, %% , %+	Puts the most recent job (+) into the background.
%-	Puts the previous job (-) into the background.
n, %n	Puts job n into the background.
%hostname	Puts the job at hostname into the background.

You can omit **bg** from the command entry when you use one of the arguments beginning with %.

Entering **bg** with no arguments is the same as entering **bg%**; it puts the most recent job into the background. The **bg** command display looks like this:

```
annex: bg
2 telnet secondhost &
```

## boot

The superuser **boot** command reboots the Remote Annex and, optionally, produces a dump of the Remote Annex's operational code. You can set a time at which the boot is to take place. The **boot** command also sends a warning message to users attached to the Remote Annex. Table C-43 describes the arguments for **boot**. The syntax is:

**boot** [**-adhlqr**] [*time*] [*filename*] [*warning*]

Table C-43. Arguments for the boot Command

Argument	Description
-a	Aborts any delayed boots that are pending. Sends an abort message to all users.
-d	Causes an up-line dump before rebooting.
-h	Causes a diagnostics boot.
-l	Boots the operational image and stores it onto local media; for use with the stand-alone file system. Only ROM revisions 0601 and greater with the self-boot option loaded support <b>-l</b> .
-q	Performs a boot without sending a warning message.
-r	Uses the last loaded image name for rebooting.

(continued on next page)

Table C-43. Arguments for the boot Command (continued)

Argument	Description
<i>time</i>	Defines the time for a shut down as either an offset +MM or +HH:MM, or a clock time HH:MM.
<i>filename</i>	Identifies the name of the file in which the Remote Annex's image is maintained. If you do not enter a filename, the Remote Annex prompts for one. If you enter a blank line, the Remote Annex boots the image defined in the <b>image_name</b> parameter. Pressing the <b>Return</b> key at the prompt directs the Remote Annex to boot the default filename.
warning	Allows an optional message (up to 249 characters) to be sent to the users. This prompt appears only if the <b>-q</b> argument is not specified.

The following command line requests that the Remote Annex reboot an hour and fifteen minutes from the time of entry:

```
annex# boot +1:15
bootfile: <cr>
warning: Shutting down for PM
```

The Remote Annex can request its boot file from a defined preferred load host. If that host is not defined, or does not respond, the Remote Annex broadcasts its request and boots from the first load host to respond (assuming the **load\_broadcast** parameter is set to **Y**).



Booting the Remote Annex with a non-existent **image** filename causes the unit to hang as it searches for the image. Pressing the **Reset** switch recovers from this condition.

## compact

The superuser **compact** command consolidates all valid (in-use) records to the beginning of the non-volatile memory (EEPROM). The Remote Annex stores configuration parameters and file system records in this memory. When the amount of free space nears depletion, the Remote Annex logs a syslog warning message, and the **set** command may fail. The syntax is:

**compact** [-s]

The **-s** argument displays the non-volatile memory's total space and available free space (in bytes). The amount of free space is determined by the amount of unused space at the end of the non-volatile memory.

Compacting can take as long as three minutes for an 8K EEPROM, and 20 minutes for a 32K EEPROM. During this time, no process can access the non-volatile memory, including all **admin** commands and many CLI commands. You must wait for the CLI to issue its prompt before continuing.



The R6.x ROM Monitor compact command is incompatible with R7.0 and above. Once the Remote Annex boots the current operational image, use only the CLI superuser compact command to compress non-volatile memory.

## connect

The **connect** command uses the LAT protocol to connect to an advertised LAT service. This command is available only if you have enabled LAT by setting the **lat\_key** parameter correctly. The syntax is:

```
connect service [hostname [port]]
```

If you enter the command without arguments, the **connect** command returns a *missing service name* error. If the service to which you are connecting requires a password, you are prompted for one. If you enter **connect** with only the desired *service* name, the command connects to the highest-rated service with that name. If you enter both the *service* name and the *hostname*, **connect** overrides this distribution mechanism and tries to establish a connection to that service on that host. Entering **connect** with the *service*, *hostname*, and *port* causes the Remote Annex to attempt to connect to that service on that port on that host.

## control

The superuser **control** command is a diagnostic tool that allows you to reset DTR and RTS or to output a short test message for a specified port. Table C-44 describes the arguments for **control**. The syntax is:

```
control port [dtr- | dtr+ | rts- | rts+] | port testmsg [times | forever]
```

The following command example output the default message ten times on Port 14:

```
annex# control 14 testmsg 10  
Enter test message, or press Return for default: <cr>
```

If the port is not a CLI port, or has not been opened as a slave port from a host, the command displays *Device must be in use*.

Table C-44. Arguments for the Superuser control Command

Argument	Description
port	Specifies the port; it is required.
dtr-	De-asserts DTR.
dtr+	Asserts DTR.
rts-	De-asserts RTS.
rts+	Asserts RTS.
testmsg	Outputs a message to a CLI port or to a port that has been opened as a slave from a host. After the message prompt appears, pressing the <b>Return</b> key displays the default message <i>The quick brown fox jumped over the lazy dogs</i> .
times	Specifies the number of times the message is output.
forever	The message is output until a break is entered.



The Remote Annex Private Enterprise MIB contains two objects, **anxpDtrSignal** and **anxpRtsSignal**, that enable you to read and set the DTR and RTS control lines on non-idle ports via SNMP (for more details on using SNMP, see *Simple Network Management Protocol (SNMP)* on page Book B-41).

## cp

The superuser **cp** command copies a file in the local file system. The syntax is:

**cp** *source\_filename destination\_filename*



The *source\_filename* is the file to be copied; the *destination\_filename* is the new file. The Remote Annex overwrites the destination file if it exists; it reports an error if the source file does not exist.



Only ROM revisions 0600 and greater with the self-boot option installed support this command.

## dialout

The superuser **dialout** command displays each dial-out route along with all of the defined parameters for each route, as well as all defined chat scripts. The syntax is:

**dialout** [**do** *route\_number*]

The **dialout do** *route\_number* command displays only the specified route and the chat scripts that it references.

The **dialout** command display looks like this:

```
annex# dialout

Route do44:
mode: ppp                                local_address: 132.245.88.12
remote_address: 132.245.44.12net_inactivity: 10
phone_number: "92030401"                 do_compression: Y
allow_compression: Y                      net_inactivity_units: minutes
subnet_mask: 255.255.255.0               ppp_ncp: ipcp
rip_sub_advertise: Y                     rip_sub_accept: Y
rip_advertise: all                       rip_accept: all
advertise: Y
ports: 13-16
filter: in exclu proto udp src_port router netact
filter: out exclu proto udp src_port router netact
```

```

Route do131:
mode: ppp                                local_address: 132.245.88.12
remote_address: 131.110.0.13 net_inactivity: 10
phone_number: "92050111" do_compression: Y
allow_compression: Y net_inactivity_units: minutes
subnet_mask: 255.255.255.248 ppp_ncp: ipcp
rip_sub_advertise: Y rip_sub_accept: Y
rip_advertise: all rip_accept: all
advertise: Y
ports: 1-2
filter: in exclu proto udp src_port router netact
filter:out exclu proto udp src_port router netact

```

The **dialout do** *route\_number* command display looks like this:

```
annex# dialout do44
```

```

Route do44:
mode: ppp                                local_address: 132.245.88.12
remote_address: 132.245.44.12net_inactivity: 10
phone_number: "92030401"do_compression: Y
allow_compression: Y net_inactivity_units: minutes
subnet_mask: 255.255.255.0ppp_ncp: ipcp
rip_sub_advertise: Y rip_sub_accept: Y
rip_advertise: all rip_accept: all
advertise: Y
ports: 13-16
filter: in exclu proto udp src_port router netact
filter: out exclu proto udp src_port router netact

```

## edit

The superuser **edit** command allows you to edit any local Remote Annex file. It provides a full screen editor that supports a small set of terminal types: vt100, wy75, and wy85 (set the **term\_var** parameter to the appropriate terminal type). The syntax is:

```
edit filename
```

The editor supports quit, write-and-exit, page-up, page-down, and arrow keys. A menu bar at the top of the screen describes how to perform these functions.

## fg

The **fg** (foreground) command resumes a job that has been suspended or placed in the background. If the Remote Annex saved any output from the host while the job was interrupted, the output appears on the terminal immediately after reconnecting. Otherwise, nothing appears until you enter a carriage return. Table C-45 describes the arguments for **fg**. The syntax is:

```
fg [-q] [%] [%, +, -, n, hostname]
```

Entering the **fg** command with no arguments puts the most recent job into the foreground. The command display looks like this:

```
annex: fg
2 telnet secondhost
```

Entering **%** is the same as entering **fg%** and returns you to the most recent job. Optionally, you can omit **fg** from the command entry when using one of the arguments beginning with **%**; the following example uses **%-** to bring the previous job to the foreground:

```
annex: %-
1 rlogin firsthost
```

Table C-45. Arguments for the fg Command

Argument	Description
-q	Prevents a one-line message from appearing on the terminal screen when bringing a session to the foreground.
%, %%, %+	Brings most recent job (+) to foreground.
%-	Brings previous job (-) to foreground.
n, %n	Brings job n to foreground.
%hostname	Brings job at hostname to foreground.

## filter

The superuser **filter** command allows you to filter the traffic that crosses the Remote Annex. It affects both the currently running configuration and the configuration stored in non-volatile memory. The **filter** command has eight subcommands: **add**, **list**, **enable**, **disable**, **delete**, **help**, **usage**, and **quit**. The syntax can be either one of the following:

### filter

#### **filter** *subcommand*

If you use the first syntax, the Remote Annex enters the filtering subsystem and displays the *filter* prompt. At this prompt, you can issue any of the eight subcommands. You return to the CLI prompt from the subsystem by issuing the quit subcommand.

The second syntax lets you issue filtering subcommands directly at the superuser CLI prompt. When the subcommand completes, you are still at the superuser CLI level.

The **filter** command display looks like this:

```
annex# filter
filter:
```

The **filter list** command display looks like this:

```
annex# filter list

Num  Stat  Ifname  Dir  Scope  Family  Actions/Parameters
1    ena   en0     in   incl   ip      disc icmp/port_pair=*,nfs
2    ena   en0     in   incl   ip      disc/port_pair=*,tftp
annex#
```

For more details, see *Filtering* on page A-249.

## hangup

The **hangup** command terminates all of your jobs, resets the CLI for the port, and drops the modem control signal DTR; it restores the default terminal characteristics defined for the port. Also, entering the **hangup** command at the CLI prompt disconnects a virtual connection to another Remote Annex. The syntax is:

### hangup

If you have any open jobs on the CLI, the **hangup** command lists them and prompts for permission to terminate each job before completing the command. For example:

```
annex: hangup
Following background job(s) will be terminated:
-1 telnet mouse
+2 telnet 132.245.6.35
Do you still wish to hangup (y/n)[n]: y
Terminating jobs, resetting line and disconnecting.
```



If you are using a modem, configure it to respond when the DTR signal is dropped.

## help

The **help** or **?** command provides on-line help. The syntax is:

**help** [*command*]

**?** [*command*]

Entering **help** or **?** with a CLI command as the argument (e.g., **help hosts**) displays a short description of that command and its syntax. Entering **help** or **?** without an argument displays a summary of all CLI commands and macros available on the current port.

## help -m

The superuser **help -m** command displays a list of all macros and their assigned *port\_set* for that Remote Annex. The syntax is:

**help -m** [*macro\_name*]

The **help -m** display looks like this:

```
annex01# help -m

Name      Assigned Ports      Description
=====
1         1,12                 :Menu 1
2         1-16,v              :Read EMAIL
3         1-16,v              :Command disabled
4         1-16,v              :Another who command
=====
init_cli  7                   :Set stty commands
init_cli  2,4,6,8,10,12,14,v :Another who command
init_cli  1,3,5,16            :Dedicated port macro
init_psr  2,4,6,10            :Port 10 information
annex01#
```

The **help -m** [*macro\_name*] display looks like this:

```
annex01# help -m menu2
Macro Name: menu2  Description: Menu 2
Command List (command access restrictions apply):
    bg, boot, fg hangup, help, hosts, jobs, menu, pg,
    procs, rlogin, telnet, who
Assigned Ports: 1,12
Functional Text:
(No available data)
```

In the previous sample display, the *Command List* field applies only to menus: it lists the commands available from the menu. The following conditions may restrict command access:

- Superuser commands are not available from a non-superuser CLI.
- The aliases listed may not be available from a given port.
- Command masks may apply.
- Other restrictions may apply.

## hosts

The **hosts** command displays the names and addresses of hosts and other Remote Annexes listed in the Remote Annex's host table (known hosts). The command also displays any status information that a host broadcasts. Table C-46 describes the arguments for **hosts**; Table C-47 describes the *status* field in the **hosts** command display. The syntax is:

**hosts** [-qns] [*host*][*ip\_address*]

The **hosts** command display looks like this:

```
annex: hosts

Host Name  Status  Users  Load  Internet Addr
alpha      --      --      --    132.245.6.65
neon       up       12      0.40  132.245.6.30
calvin     down    16      3.55  132.245.6.128
hobbes     down ?  8       2.01  132.245.6.1
```

Table C-46. Arguments for the hosts Command

Argument	Description
-q	Displays only the names of known hosts.
-n	Displays data from the Remote Annex's list of name server hosts, rather than the list of all hosts, as well as the default domain and domain search list contents.
-s	Displays the name and Internet address of the currently connected security host.
<i>host</i>	Displays information for <i>host</i> . Specify <i>host</i> as a name or an IP address.  IEN-116 name servers cannot do reverse address queries. Specifying an IP address succeeds only if the address is in the local host table.

Table C-47. Status Field Definitions

Field	Definition
--	The host does not broadcast status information.
<i>up</i>	The host broadcasted within the last several minutes.
<i>down?</i>	Six minutes have elapsed since the host's last broadcast.
<i>down</i>	More than 12 minutes have elapsed since the host's last broadcast.



## hosts

The superuser **hosts** command provides information about hosts and name servers. Table C-48 describes the arguments for **hosts**. The syntax is:

**hosts** [-qaffn] [*host*...]

Table C-48. Arguments for the Superuser hosts Command

Argument	Description
-q	Displays only the names of known hosts.
-an <i>host</i>	Adds new name servers to the name server table; these entries are not saved in non-volatile memory and are lost when the Remote Annex is rebooted. The syntax is:  <b>hosts -an host [protocol [max_retry [time-out_retry [base [multiplier]]]]]</b>  All omitted values are set to defaults: <i>time-out_retry</i> is measured in minutes; <i>base</i> is in milliseconds; and <i>multiplier</i> is in tenths.
-f <i>host</i>	Flushes that host from the host table. Entering the command without <i>host</i> flushes all entries except the Remote Annex's own entry.
-ff <i>host</i>	Deletes permanent entries loaded from the <b>gateway</b> section of the configuration file.
-fn	Flushes all name servers.
-fn <i>ip_address</i>	Flushes all name servers of the given IP address.
-n	Lists all name servers.
host	Displays information for <i>host</i> . Specify <i>host</i> as a name or an IP address.  IEN-116 name servers cannot do reverse address queries. Specifying an IP address succeeds only if the address is in the local host table.

## ipx

The **ipx** command configures a CLI port for IPX usage, while leaving the port **mode** set to **cli**. This command allows IPX administrators to take full advantage of security features such as SecurID and Enigma. When a Fastlink II user in terminal mode logs into a Remote Annex CLI port, the Remote Annex authenticates the user according to the value of the **cli\_security** parameter and the configuration of Remote Annex security parameters.



Although **ipx** is a user level command, only the superuser **help** command displays information about it.

## jobs

The **jobs** command displays information for all current jobs (or sessions). The syntax is:

### **jobs**

The command displays the CLI command used to create the job. A plus sign (+) displayed with the job indicates the most recently active job; a minus sign (–) indicates the previously active:

```
annex: jobs
-1 telnet firsthost
+2 rlogin secondhost
 3 telnet thirdhost
```

## kill

The **kill** command terminates a connection and ends a job. The Remote Annex accepts up to four arguments to kill multiple jobs. Table C-49 describes the arguments for **kill**. The syntax is:

```
kill [%] [%, +, -, n, hostname] ...
```

Entering the **kill** command without arguments kills the most recent job and displays the job number and the CLI command that created it:

```
annex: kill  
2 [terminated] rlogin secondhost
```

Table C-49. Arguments for the kill Command

Argument	Description
%, %% , %+	Kills most recent job (+).
%-	Kills previous job (-).
n, %n	Kills job <i>n</i> .
%hostname	Kills job at <i>hostname</i> .

## lock

The **lock** command prevents unauthorized use of the port to which the terminal is attached. The **lock** command prompts for a password, and denies access to the port until that password is entered. The syntax is:

```
lock [time-out]
```

A *Key* prompt appears after the port is locked and remains until you enter the correct password. For example

```
annex: lock
Key:
Again:
Remote Annex port 3 locked
Key:
```



The password never displays with the *Key* or *Again* prompts.

The **lock** command permits you to define a *time-out*. This is the amount of time in minutes that the port is locked. After passing this limit, the Remote Annex resets and unlocks the port (like **hangup**). For example:

```
annex: lock 60
```

Entering the Remote Annex's administrative password, or resetting the port, unlocks the port.

## ls

The superuser **ls** command displays the image name along with revision information for the operational image stored in the self-boot ROM. The syntax is:

**ls**

The **ls** command displays three fields from each file:

- The size in bytes.
- The last modified date.
- The file name.

The self-boot image file name is a special case: the image's revision information is also displayed. Since the directory is part of the file system, it is displayed along with the other files (the directory's name is ".").



Only ROM revisions 0600 and greater with the self-boot option installed support this command.

## modem

The superuser **modem** command lists the modem types supported by the Remote Annex. The Remote Annex supports a modem type if it is defined in the **modem** section of the configuration file and at least one of the Remote Annex ports has the configuration parameter **type\_of\_modem** set to that modem type. Table C-50 defines the arguments for this command. The syntax is:

**modem** [-al]

Entering **modem** without arguments lists only the modem types used on this machine.

Table C-50. Arguments for the modem Command

Argument	Description
-a	Lists the modem types that are used and each of the strings specified for the modem(s)
-l	Lists the the names of all of the modems defined in the configuration file but not used on this machine.

Sample displays for the **modem**, **modem -a**, and **modem -l** commands look like this:

```
annex# modem
      type_of_modem    S1200
      type_of_modem    USR_144

annex#modem -a
      type_of_modem    S1200
      ready_status     0
      connect_status   1 10 5 11 12 13 14 15 48 49 50
      reset_cmd         ATZS0=1
      setup_cmd         ATE1V0Q0X1S0=1
      dial_cmd          ATDT
      timeout           40 seconds
      retry             2
      type_of_modem    USR_144
      ready_status     0
      connect_status   1 5 10 13 14 15 16 17 18 19 20 21 25 43
      reset_cmd         ATZS0=1
      setup_cmd         ATE1Q2V0X1&B1&C1&D2&H1&I0&K0&R2S0=1
      dial_cmd          ATDT
      timeout           90 seconds
      retry             2
annex#

annex# modem -l
      type_of_modem    Optima96
      type_of_modem    Optima144
      type_of_modem    CourierV32
      type_of_modem    UDS3229 (unused)
      type_of_modem    Codex3260 (unused)
      type_of_modem    T224 (unused)
      type_of_modem    U1496 (unused)
      type_of_modem    T2500 (unused)
      type_of_modem    TrailBlazer (unused)
      type_of_modem    PPM144 (unused)
      type_of_modem    penrilAXL (unused)
      type_of_modem    INTEL-HS (unused)
annex#
```

## more

The superuser **more** command provides a read-only mechanism for reviewing files in the local file system. The syntax is:

**more** *filename*

The file is displayed from the beginning to the end. This command pauses after every 23 newline characters and prompts the user to press a key. Pressing **q** or the attention key cancels the command; pressing any other key displays the next page of the file.



Only ROM revisions 0600 and greater with the self-boot option installed support this command.

## mv

The superuser **mv** command renames a file in the local file system. The syntax is:

**mv** *source\_filename destination\_filename*

The *source\_filename* is the existing file; the *destination\_filename* is the new file. The Remote Annex overwrites the destination file if it exists; it reports an error if the source file does not exist.



Only ROM revisions 0600 and greater with the self-boot option installed support this command.

## netstat

The **netstat** command displays statistics and information that the Remote Annex has obtained from the network. The command is similar to the UNIX **netstat** command in format and display, but offers additional options. Table C-51 describes the arguments for **netstat**. The syntax is:

```
netstat [-AaCfгимnpQRrSstx[-i | -r [network_number] | -sS  
[server_name] | ? | -m] z] port
```



Since the Remote Annex is a multitasking system, this command can produce misleading information if the underlying data structures are changing rapidly.

The display format varies according to the options selected and the network protocols implemented for the Remote Annex (see *Displaying Network Statistics* on page Book B-1 for sample display formats). Entering **netstat** without arguments displays the local and remote addresses, the send and receive queue sizes (in bytes), the protocol, and the internal state of the protocol for all active connections.

Addresses display as either *host.port* or *network.port*. The latter displays if a socket's address does not include a specific host address. Known host names are displayed; otherwise, the Internet addresses are displayed. Unspecified or wildcard addresses and ports appear as an asterisk (\*).



Table C-51. Arguments for the netstat Command

Argument	Description
-A	Displays the default information along with the address of any associated protocol control blocks.
-a	Displays the state of all sockets, including those used by server processes.
-C	Displays the contents of the route cache.
-i	Displays the state of the hardware interfaces, e.g., AppleTalk, SLIP, PPP, as well as a dial-out route's interface name.
-ia <i>port</i>	Displays statistics for a specific Remote Annex ARA interface.
-ip <i>port</i>	Displays the current state of a PPP interface.
-iQ	Displays interface queues.
-iS	Displays the state of the hardware interfaces plus additional information about the SLIP interfaces.
-f	Displays filtering statistics.
-g	Displays RIP statistics.
-m	Displays statistics for memory buffer allocation.
-n	Displays all network addresses as numbers rather than names or symbols; can be used in combination with -A, -a, -i, -r, -t. It displays the IP addresses and TCP ports in decimal notation.
-R	Displays information about rotaries.
-r	Displays the routing table, including dial-out routes.
-ra	Displays only AppleTalk routes.
-ri	Displays only IP routes.

(continued on next page)

Table C-51. Arguments for the netstat Command (continued)

Argument	Description
-s	Displays network protocol statistics. LAT statistics display only if the correct <b>lat_key</b> value is set. AppleTalk statistics display only if the correct <b>option_key</b> value is set.
-rs	Displays routing statistics.
-t	Displays the default active connection information along with the attached device name.
-x	Displays information about IPX.
-xi	Displays information about Remote Annexes currently in use for dial-in or LAN-to-LAN routing.
-x?	Displays information about using the <b>netstat -x</b> command.
-xm	Displays information about the amount of memory available in the large and small IPX buffer pools.
-xr	Displays the routes defined in the Remote Annex's IPX routing table.
-xr <i>network_ number</i>	Displays the Remote Annex route for that network.
-xs	Displays server names, types, and addresses.
-xs <i>server_ name</i>	Displays information for the specified server (the <i>server_name</i> argument is case-sensitive).
-xS	Displays the Remote Annex route for each server.
-xS <i>server_ name</i>	Displays the Remote Annex route for the specified server (the <i>server_name</i> argument is case-sensitive).
-z	Displays the network zone list for AppleTalk.

## passwd

The superuser **passwd** command changes the Remote Annex's administrative password. The Remote Annex does not echo passwords. Pressing the **Return** key after the prompts for the new password sets the password back to its default. The syntax is:

### passwd

The **passwd** command display looks like this:

```
annex# passwd
Current password:
New password:
Confirm new password:
```



If the Remote Annex is configured with an IP address, the default administrative password is the IP address.

If the Remote Annex is not yet configured with an IP address and the administrative password has not been modified (either via this command or via the Remote Annex parameter **password**), the default password is a null string ("").

If the Remote Annex is not configured with an IP address and boots via MOP, IPX, or from FLASH ROM, the default password is a null string ("") and entering a carriage return at the *Password* prompt places you in superuser mode.

## ping

Use the superuser **ping** (packet internet groper) command to determine whether a remote host, router, or Remote Annex can be reached and to view statistics about packet loss and delivery time. The **ping** command sends an Internet Control Message Protocol (ICMP) Echo Request message to elicit an ICMP Echo Response from the specified host, router, or Remote Annex. The command prints output for each response returned. Table C-52 describes the arguments for **ping**.

The syntax is:

**ping** [**-artv**] *host* [*databytes* [*count*]]

Table C-52. Arguments for the Superuser ping Command

Argument	Description
<b>-a</b>	Generates AppleTalk Echo Protocol (AEP) echo request packets to a target node. Displays the time the packet took to turn around.
<b>-r</b>	Bypasses the normal routing table and sends the message directly to a host on an attached network. An error returns if the host is not on a directly attached network. This option can <b>ping</b> a local host through an unlisted interface in the routing table.
<b>-t</b>	Traces the path of a packet from the local host to the destination host and back, displaying information about each router in the path. This option allows you to see whether a packet arrived at and/or returned from its remote destination and, if not, where it stopped. The option is based on the Traceroute facility described in RFC 1393. For more information, see <i>Using the -t (traceroute) Option</i> on page A-165. Table C-53 on page A-167 describes the fields displayed by this option. You can use <b>-t</b> with the <b>-r</b> and/or <b>-v</b> option, but not with <b>-a</b> .
<b>-v</b>	Displays the IP and ICMP packet headers for the reply from the host.
<i>host</i>	The host, router, or Remote Annex to which the <b>ping</b> is sent.
<i>databytes</i>	The number of bytes of data in the ICMP Echo Request message. The default is <b>56</b> .
<i>count</i>	The number of pings to be sent to the destination. The default is unlimited. When invoked with the <b>-t</b> option, <b>ping</b> ignores the <i>count</i> argument.

Each Echo Request includes a time stamp if the number of data bytes is greater than eight. This time stamp calculates the round-trip time and is returned unchanged in the Echo Response. The default packet size is 64 bytes, 56 of which are data and 8 are header. You can change the number of data bytes using the *databytes* argument.

Unless issued with the **-t** option or the *count* argument, **ping** continually sends one request per second, and displays a line of output for every response. Entering any character from the keyboard stops **ping**. The *count* argument allows you to send a limited number of requests. When **ping** stops, it displays a brief summary.

The following is a sample **ping** display, which the user stops by entering a keyboard character; the *PING Statistics* appear after the character is entered.

```
annex# ping caddy
PING caddy: 56 data bytes
64 bytes from 132.245.6.25: icmp_seq=0. time=37. ms
64 bytes from 132.245.6.25: icmp_seq=1. time=12. ms
64 bytes from 132.245.6.25: icmp_seq=2. time=12. ms
64 bytes from 132.245.6.25: icmp_seq=3. time=12. ms
---- caddy PING Statistics ----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms) min/avg/max = 12/20/37
```

The following is a sample **ping** display for a host that does not answer, which the user stops by entering a keyboard character; the *PING Statistics* appear after the character is entered.

```
annex# ping zinc
PING zinc: 56 bytes of data
---- zinc PING Statistics ----
15 packets transmitted,0 packets received, 100% packet loss
```

If *zinc* (in the previous example) is on another network, **ping** displays the following:

```
annex# ping zinc
PING zinc: 56 bytes of data
---- zinc PING Statistics ----
Host is unreachable... Received from 132.254.55.11
annex#
```

In the preceding example, *132.254.55.11* is the router connecting the local network to other networks.

### Sample Displays Using the **-a** and **-v** Options

The following is a sample **ping -a** display for a Macintosh:

```
annex# ping -a 03fe.88
PING xenna: 56 data bytes
---- zinc PING Statistics ----
64 bytes from 03fe.88: aep_seq=0. time=7. ms
64 bytes from 03fe.88: aep_seq=1. time=5. ms
```

The following is a sample **ping -v** display:

```
annex# ping -v 132.245.55.222 56 1
PING 132.245.55.222: 56 data bytes
64 bytes from 132.245.55.222: icmp_type=0 (echo reply)
x00: x00400045
x04: x00000f8b
x08: x000001ff
x0c: xde37f584
x10: xdf37f584
x14: x6de10000
x18: x00000171
x1c: x2d458f5d
x20: x0001d11e
x24: x0b0a0908
x28: x0f0e0d0c
x2c: x13121110
icmp_code=0
64 bytes from 132.245.55.222: icmp_seq=0. time=5. ms
---- 132.245.55.222 PING Statistics ----
1 packets transmitted, 1 packets received, 0% packet loss
round-trip (ms) min/avg/max = 5/5/5
annex#
```

In the preceding display, the 4-byte hexadecimal numbers in the line beginning *x00* through the line beginning *x10* represent the IP header, while the remaining hexadecimal numbers represent the ICMP header and data. The bytes in the header lines are displayed in reverse order, so read them from right to left.

### Using the **-t** (traceroute) Option

The **ping -t** command sends only one ICMP Echo Request. This request, called the *outbound packet*, contains an IP *traceroute* option and a traceroute hop count of zero. If an outbound packet crosses routers on the path to its destination, each router increments the hop count by 1, forwards the packet, if possible, and returns a traceroute message to the originator (Figure C-1 illustrates an outbound packet that crosses two routers). This message indicates whether or not the packet was forwarded. If so, the message contains the incremented hop count and information about the outbound interface over which the packet was forwarded. If the packet could not be forwarded, the router discards it, **ping -t** terminates, and the traceroute message contains zeros in place of interface information.

If an outbound packet reaches its destination, the destination node sends an ICMP Echo Response, called the *return packet*, to the router from which it received the outbound packet. The destination node copies the traceroute option from the outbound packet to the return packet and sets the return packet's hop count to zero. If the return packet passes through the routers in the path back to the **ping -t** source, each router increments the hop count by 1, forwards the packet, if possible, and returns a traceroute message to the **ping -t** source (see Figure C-1).

The traceroute message indicates whether or not the packet was forwarded. If so, the message includes the incremented hop count and information about the interface over which the packet was forwarded. If the packet could not be forwarded, the router discards it, **ping -t** terminates, and the traceroute message contains zeros in place of interface information.

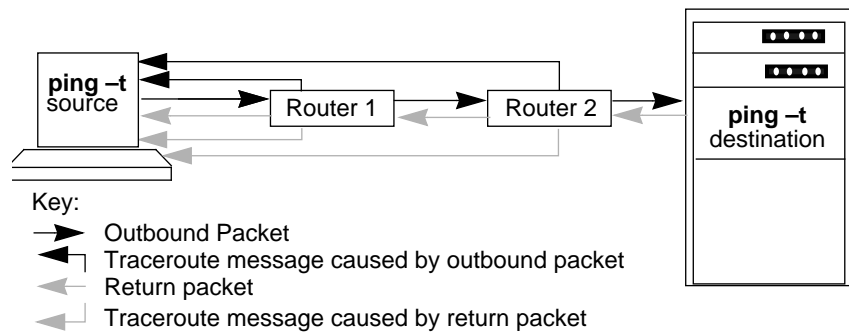


Figure C-1. Overview of ping -t Actions

Using the information carried in the outbound packet, along with the return packet and the traceroute messages, **ping -t** displays the path of the packets and the characteristics of the routing interfaces along the way and back. And, if a packet cannot be forwarded, **ping -t** locates the failure. Table C-53 on page A-167 describes the fields displayed by **ping -t**.



Table C-53. Fields Displayed by the ping -t Option

Field	Definition
Dir	The direction in which the ICMP packet is heading. The >>> symbols indicate an outbound packet heading towards the <b>ping -t</b> destination. The <<< symbols indicate a return packet heading back towards the <b>ping -t</b> source. The *** symbols indicate that a router could not forward the packet. In this case, the router discards the packet and <b>ping -t</b> terminates.
Router	The IP address of the router interface over which the outbound or return packet was forwarded.
Hops	The number of routers that the outbound or return packet has crossed. If the count skips a hop (e.g., goes from 4 to 6), a traceroute message was lost, probably due to network congestion.
Speed	The speed, in bits per second, of the interface over which the outbound or return packet was forwarded. If the packet could not be forwarded, <b>ping -t</b> displays a zero in this field.
MTU	The maximum transmission unit (in bytes) of the interface over which the outbound or return packet was forwarded. The MTU is the largest packet size the interface can forward without fragmenting the packet. If the packet cannot be forwarded because its size exceeds the MTU and its header indicates not to fragment, <b>ping -t</b> displays a zero in this field.

The sample topology shown in Figure C-2 is assumed by the **ping -t** examples that follow it.

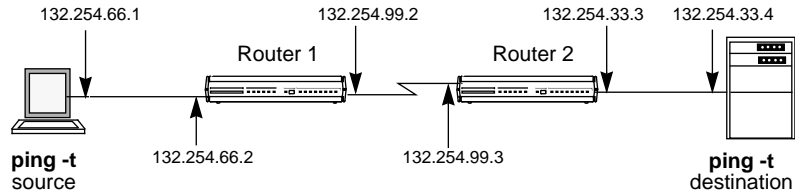


Figure C-2. Topology for ping -t Examples

Given the topology in Figure C-2, the **ping -t** command displays output such as the following when a traceroute packet passes successfully to the **ping -t** destination and back (see Table C-54).



The line numbers at the right of this example are for reference only; they are not part of the actual display.

```
annex# ping -t 132.254.33.4
PING hobbes: 56 data bytes                                line 1

Dir   Router           Hops  Speed (b/s)  MTU    line 2
>>>  132.254.99.2     1     19200        1024   line 3
>>>  132.254.33.3     2     10000000     1500   line 4
<<<<  132.254.99.3     1     19200        1024   line 5
<<<<  132.254.66.2     2     10000000     1500   line 6
64 bytes from 132.254.33.4: time=10. ms                 line 7
```

Table C-54. The ping -t Command Display

Line	Description
<i>line 1</i>	Indicates that <b>ping -t</b> has started.
<i>line 2</i>	Contains the display header.
<i>line 3</i>	Indicates that Router 1 was the packet's first hop on the path to the <b>ping -t</b> destination. The interface over which Router 1 forwarded the outbound packet has an IP address of 132.254.99.2, a speed of 19200 bits per second, and can transmit packets of up to 1024 bytes in length without fragmenting them.
<i>line 4</i>	Indicates that Router 2 was the packet's second hop on the path to the <b>ping -t</b> destination. The interface over which Router 1 forwarded the outbound packet has an IP address of 132.254.33.3, a speed of 10000000 bits per second, and can transmit packets of up to 1500 bytes in length without fragmenting them.
<i>line 5</i>	Indicates that Router 2 was the return packet's first hop on the way back to the <b>ping -t</b> source. The interface over which Router 2 forwarded the packet has an IP address of 132.254.99.3, a speed of 19200 bits per second, and can transmit packets of up to 1024 bytes in length without having to fragment them.
<i>line 6</i>	Indicates that Router 1 was the return packet's second hop on the way back to the <b>ping -t</b> source. The interface over which Router 2 forwarded the packet has an IP address of 132.254.66.2, a speed of 10000000 bits per second, and can transmit packets of up to 1500 bytes in length without having to fragment them.
<i>line 7</i>	Indicates the <b>ping -t</b> source has received the return packet and that the round-trip took 10 milliseconds.

In the following example, the second router is unable to forward the outbound packet, as indicated by the asterisks (\*\*\*) under the *Dir* heading. Note that the hop count remains at *1*, since the packet crossed only one router.

```
annex# ping -t 132.254.33.4
PING hobbes: 56 data bytes

Dir      Router           Hops   Speed (B/s)   MTU
>>>    132.254.99.2     1      19200         1024
***     132.254.33.3     1      0             0
```

## ppp

The **ppp** command allows a user at a remote host to dial into a modem attached to the Remote Annex and convert the CLI port to a PPP interface. Resetting the port returns it to CLI mode. The syntax is:

### ppp

The command display looks like this:

```
annex: ppp
Switching to PPP and starting LCP and ATCP negotiations.
```

If you issue the **ppp** command, and the port is not configured properly for PPP, the terminal displays *This port cannot be used for PPP* (see *Point-to-point Protocol (PPP)* on page A-111 for more details).



Although **ppp** is a user level command, only the superuser **help** command displays information about it.

You cannot apply the minimum uniqueness feature to **ppp**.

## procs

The superuser **procs** command displays information about Remote Annex processes in a tabular format. It is used for debugging Remote Annex software. Table C-55 describes the arguments for **procs**; Table C-56 describes the fields in the **procs** command display; and Table C-57 describes the Remote Annex processes. The syntax is:

**procs** [-ir] [-ppid] [-ddev]

Table C-55. Arguments for the Superuser procs Command

Argument	Description
-i	Displays statistics on time spent in interrupt routines.
-r	Displays only processes that are currently running on the Remote Annex.
-ppid	Displays only processes for the specified <i>pid</i> .
-ddev	Displays only processes attached to the specified <i>dev</i> . Entering a ? displays processes without an attached device.

A typical display looks like this:

annex# **procs**

```

PID  PPID  SF   SSIZ  USPTR  IP  CP  SIG  CTIME  CPU TIME  DEV  NAME
  0   0    W0  1000  c9444   0  0  0    0    0:00.306  ?   root
193   0    W0  23c   c8464   0  0  0    0    0:00.002  ?   watch
194   0    S0  c3c   c813c  12 12  0    0    0:00.034  ?   route
195   0    S0  43c   c7550  12 12  0   be123 0:00.001  ?   timed
:
233 231   Rc  63c   99044  12 12  0   be38a 0:00.085  ?   telnet
234   0    X0  c3c   97ccc  12 12  0   be38b 0:00.680  vi   cli

```

Table C-56. The Superuser procs Command Display

Command	Description
PID	Process ID in decimal.
PPID	Parent process ID in decimal.
Sx	Status: <b>S</b> (sleeping), <b>W</b> (semaphore wait), <b>R</b> (runnable), <b>X</b> (executing – always the CLI process executing <b>procs</b> ), <b>E</b> (event wait), and <b>Z</b> (zombie, waiting for parent to collect exit status).
xF	Flag bits: <b>0x01</b> (system mode), <b>0x02</b> (process pre-empted), <b>0x04</b> (SIGCLD sent to parent on exit), <b>0x08</b> (go to zombie on exit).
STACK	System stack pointer in hexadecimal.
SSIZ	Stack size in hexadecimal.
USPTR	User stack pointer in hexadecimal.
IP	Initial priority at process creation in decimal.
CP	Current priority in decimal.
SIG	Pending signals for process in hexadecimal.
CTIME	Creation time of the process. Calculated as the number of seconds since January 1, 1970 and expressed as the last six hexadecimal digits.
CPU TIME	CPU time used by the process, in minutes, seconds, and milliseconds.
DEV	Device: <b>?</b> for system processes, port number for a physical port, <b>v</b> followed by a number for a virtual CLI.
NAME	The name of the process.

Table C-57. Remote Annex Processes

Process	Purpose
adm_timer	Watches serial ports for activity (idle timer, inactivity timer).
cli	One per active CLI.
connect_rdr connect_wtr	One pair per active <b>connect</b> command.
dp_mon	Listens for dedicated port requests.
erpcd	Listens for incoming <b>erpcd</b> requests.
fingerd_lis	User information for listener.
line_adm	Port and virtual line administrator.
arap	An ARAP line client.
atalkd	AppleTalk daemon.
lpd	Listens for <b>aprint</b> commands.
netdattimer	Ages the host table.
ping	The <b>ping</b> command.
ppp	A PPP line client.
p_srvr_conv	Prompts for CLI and rotary access.
reset_mach	Listens for the <b>reset all</b> command.
rlogin_rdr rlogin_wtr	One pair for each active <b>rlogin</b> command.
root	The initial process.

(continued on next page)

Table C-57. Remote Annex Processes (continued)

Process	Purpose
routed	Listens for and transmits <b>RIP</b> messages.
rwhod	Listens for <b>rwho</b> requests.
slip	A SLIP line client.
snmpd	Listens for <b>SNMP</b> commands and requests.
syslog_port	Logs messages to the port specified in the <b>syslog_port</b> parameter.
telnet_cmd telnet_rdr	One pair per active <b>telnet</b> command.
telnetd_lis	Listens for incoming Telnet requests.
telnetd_rdr telnetd_wri	One pair per active incoming Telnet session.
timed	Maintains the Remote Annex time-of-day clock.
watcher	Maintains the watchdog timer.

## queue

The **queue** command displays information about queued HIC requests or removes a particular HIC request from the queue. It is available only after LAT is configured. Table C-58 describes the arguments for **queue**. The syntax is:

```
queue [[[-h hostname] [-s service] [-p port]], [-r entry_id] [-v]]
```



Table C-58. Arguments for the queue Command

Argument	Description
-h	Displays only the entries originating from the <i>hostname</i> .
-s	Displays only the entries requesting <i>service</i> .
-p	Displays only the entries requesting connection to <i>port</i> .
-r	Removes the entry associated with <i>entry_id</i> from the queue. Do not combine this argument with another argument.
-v	Displays the <i>service_name</i> and the <i>port_number</i> for each queued service that is available.

Entering the command without arguments displays all the requests in the queue. For each entry, **queue** displays the *service\_name* and the *port\_number* requested (if specified), the host requesting the service, the *entry\_id* assigned to each queued request, the time (in minutes) that the request has been waiting in the queue, and the request's position in the queue.

The **queue** command display looks like this:

```
annex: queue
```

```

position
in queue host (from) service (to) port (to) time (min) entry id
1          vax_marketing lab_printer 10    17    538
3          vax_sales     laser_printer 8     11    384
4          vax_marketing modem_pool   -     8     82
7          annex_lab    modem_test  2     2     611

```



Queue positions 2, 5, and 6 are not displayed because they are being used for non-LAT requests.

The following example shows a display using **queue -h host\_name**:

```
annex: queue -h vax_marketing
```

<u>position</u>	<u>in queue</u>	<u>host (from)</u>	<u>service (to)</u>	<u>port (to)</u>	<u>time (min)</u>	<u>entry id</u>
1		vax_marketing	lab_printer	10	17	538
4		vax_marketing	modem_pool	-	8	82

The following example shows a display using **queue -r entry\_id**:

```
annex: queue -r 538
Entry 538: removed
```

The following example shows a display using **queue -v**:

```
annex: queue -v
```

Service Name	Ports
TERMINAL	2, 3
WPVAX	3, 4, 12
No entries found.	

## rlogin

The **rlogin** command connects to the specified host using the **rlogin** protocol. The syntax is:

```
rlogin host [-l user_name]
```

The **-l user\_name** argument logs you into the remote host under that *user\_name*; otherwise, it sends port's *user\_name* or prompts for *user\_name*.

The **rlogin** command display looks like this:

```
annex: rlogin slowpo
login:
```

## rm

The superuser **rm** command deletes one or more files in the local file system. The syntax is:

**rm** *filename* ...

The Remote Annex reports an error if a specified file does not exist, and continues with the next file name in the list.



Only ROM revisions 0600 and greater with the self-boot option installed support this command.

## route

The superuser **route** command adds routes to and deletes routes from the RIP route cache and active routing table.



The gateway address specified in the **route** command must be the *remote\_address* of the PPP or SLIP link, not the *local\_address*.

Table C-59 describes the arguments for **route**. The syntax is:

**route** [-fF] **add** [-s] *dest mask gateway [metric]*

**route** [-fF] **add default** *gateway [metric]*

**route** [-fF] **delete** [**default** | *dest*]

Added routes are either *temporary* or *hardwired*.

- A temporary route does not age but a RIP route can replace it.
- A hardwired route does not age and a RIP route cannot replace it.



If you are using **telnet** to connect to the Remote Annex, deleting the route leading to the host to which you are connected breaks the connection.


For more details on routing, see *IP Routing* on page A-169.

Table C-59. Arguments for the Superuser route Command

Argument	Description
-f	Flushes the temporary routes from the routing table and route cache.
-F	Flushes the hardwired and interface routes from the routing table and route cache. An interface route is a route to a network directly connected to the Remote Annex. Remote Annex RIP automatically enters these routes into the routing cache and table.
-fF	Flushes all routes from the routing table and cache.
add	Adds a route to the route cache. It also adds the route to the routing table if the <i>gateway</i> argument specifies an address that is directly reachable on an active interface.
-s	Specifies a hardwired route that RIP cannot replace.

(continued on next page)

Table C-59. Arguments for the Superuser route Command (continued)

Argument	Description
default	<p>Specifies the default route.</p> <p> In general, using <b>route</b> to add or delete a default route can have unpredictable results. The only time you can safely use <b>route</b> to add a default route is when a default route is not defined in the configuration file and the Remote Annex is not receiving</p>
<i>dest</i>	Specifies the destination address of the route.
<i>mask</i>	Specifies the subnet mask to apply to the destination address.
<i>gateway</i>	Specifies the IP address of the gateway (router) that is to be the next hop for the route. This address must be on a network directly attached to the Remote Annex.
<i>metric</i>	Specifies the number of hops to the destination. Values range from <b>1</b> through <b>15</b> ; the default is <b>1</b> .
delete	Deletes a route (temporary, hardwired, or interface) from the route cache and the routing table.

## services

The **services** command displays information about available LAT services that have been advertised by LAT hosts. The format of this display depends on the arguments and information that you supply on the command line. Table C-60 describes the arguments for **services**; Table C-61 describes the command display. The syntax is:

**services** [-vh] *service\_name host\_name*

Entering the **services** command without arguments displays a summary of available LAT services on the network. Available services are restricted by group codes (see *group\_value* on page Book C-61). The summary typically includes the *service name*, *status*, and *service identification*.

Table C-60. Arguments for the services Command

Argument	Description
-v	Displays the expanded view of LAT services on the network. The expanded view includes the <i>service name</i> , <i>rating</i> , <i>service identification</i> , <i>host name</i> , <i>host identification</i> , <i>host status</i> , and <i>facility number</i> of the advertising host. If multiple services have the same name, the summary includes only the service of the highest rating.
<i>service_name</i>	Displays a summary of all services having that <i>service name</i> , regardless of the service's rating. This summary displays the <i>host name</i> field of the requested service rather than the <i>service name</i> field.
<i>service_name</i> <i>host_name</i>	Displays a summary of the service having that <i>service_name</i> on the host specified by the <i>host_name</i> .

(continued on next page)

Table C-60. Arguments for the services Command (continued)

Argument	Description
<code>-h</code>	Displays a summary of all available LAT services by host.
<code>-vh</code>	Displays the expanded view of all available LAT services by host.
<code>-h</code> <i>host_name</i>	Displays a summary of all the services available from the specified host.
<code>-vh</code> <i>host_name</i>	Displays the expanded view of all services available for the specified host.

If multiple services have the same name, the summary includes only the service of the highest rating. For example:

```
annex: services
```

```
Local Server Name : ALPHA
```

```
Service Name      Host Status      Service Id
TERMINAL          Reachable        LAT server
DA08              Unreachable     LAT server
LAT_00802D0018B6 Reachable        Modem
WPVAX             Reachable        SYS$ANNOUNCE
```

The following example displays **services -v**:

```
annex: services -v terminal
```

```
Local Server Name: ALPHA
```

```
Service Name : TERMINAL
Service Id   : LAT server      Rating      : 9
Host Name    : WPVAX           Host Id     : 3f
Host Status  : Reachable       Facility #  : 0
```

The following example displays **services -h**:

```
annex: services -h wpvax

Local Server Name : ALPHA

Host Name : WPVAX

      Service Name      Host Status      Service Id
      TERMINAL          Reachable        LAT server
```

The following example displays **services -vh**:

```
annex: services -vh wpvax

Local Server Name: ALPHA

Host Name      : WPVAX                Host Id       : 3f
Host Status    : Reachable            Facility #    : 0

      Service Name : TERMINAL
      Service Id   : LAT server        Rating       : 9
```

Table C-61. The services Command Display

Field	Definition
<i>Service Name</i>	A string indicating the name of the service being offered.
<i>Service Identification</i>	A string indicating the service's use or purpose.
<i>Rating</i>	An integer typically indicating the number of resources (ports) available for the service on the indicated host.
<i>Host Name</i>	A string indicating the name of the host offering the service.

(continued on next page)



Table C-61. The services Command Display (continued)

Field	Definition
<i>Host Identification</i>	A string typically indicating the host's location or other special characteristics of the host offering the service.
<i>Host Status</i>	A string indicating the disposition of the host offering the service.
<i>Facility Number</i>	An integer indicating the facility number or the host number of the host offering the service.

## slip

The **slip** command allows a user at a remote host to dial into a modem attached to the Remote Annex and convert the CLI port to a SLIP interface. The syntax is:

### slip

The command display looks like this:

```
annex: slip
Username: ellis
Password:
Switching to SLIP.
Remote Annex address is 132.245.254.65. Your address is
132.254.6.90.
```

If you issue the **slip** command, and the port is not configured properly for SLIP, the terminal displays *This port cannot be used for SLIP* (for more details on using a SLIP link, see *Serial Line Internet Protocol (SLIP)* on page A-137).



The remote host must be configured to use these addresses.

Resetting the port returns it to CLI mode.

You cannot use the minimum uniqueness feature with the **slip** command.

## stats

The **stats** command displays Remote Annex statistics. Table C-62 describes the arguments for **stats**. The syntax is:

**stats** [**-sm** [*ports*][*time*]] [**-op**]

Table C-62. Arguments for the stats Command

Argument	Description
<b>-s</b>	Displays statistics for all serial ports. You can enter a single port ( <b>-s5</b> ) or a range of ports ( <b>-s5-10</b> or <b>-s5,7,9-12</b> ). This argument also displays control line status in which an asserted signal appears in upper case letters and a de-asserted signal appears in lower case letters.
<b>-s time</b>	Displays serial line statistics, pausing between each display the number of seconds specified by <i>time</i> . Entering the attention character, attention string, or the <b>Break</b> key aborts the display.
<b>-m</b>	Displays statistics for active control lines much the same as <b>-s</b> , but displays the modem controls for inactive control lines (i.e., unattached slave lines) rather than displaying <i>idle</i> .

(continued on next page)

Table C-62. Arguments for the stats Command (continued)

Argument	Description
-m <i>time</i>	Displays statistics for both active and inactive control lines, pausing between each display the number of seconds specified by <i>time</i> .
-p	Displays parallel printer statistics for all connected printers, including the printer type, number of characters transmitted, and printer status. You can specify the printer by number.
-o	Displays the status of the Remote Annex keyed options and disabled modules.



If you specify a time interval, the Remote Annex ignores an attention string that contains multiple characters.

The **stats** command display looks like this:

```
annex: stats

S/W Version: Remote Access Rx.x Build #2: Thu Sep 14 20:37:27 EDT 1995
H/W: Remote Remote Annex 4000 H/W Rev: 36. ROM Rev 0811.
Comm: eth-aiui&twi/64asy/lpar Mem: 5mDRM/64kEPRM/16kSL1/16kSL2
Boot from: 132.245.88.5 Date: Thu Sep 21 13:27:50 1995 EDT
Image: oper.46.enet Uptime: 15 hours 48 mins
Inet addr: 132.245.88.170 Subnet mask: 255.255.255.0
Ethernet addr:00-80-2d-00-b4-42 Broadcast addr: 132.245.88.255
Default domain: <unknown>
CPU current/average = 1%/0% procs active/max/limit = 87/88/800
rescheds = 0/32 switches = 48/109401 activates = 49/109722
Loading:
CPU current/average = 1%/0% procs active/max/limit = 87/88/800
rescheds = 0/32 switches = 48/109401 activates = 49/109722
Mbufs:
total=5400 free=3273 minimum free=3200 denied=0
Serial Ports:
Total bytes: rcv'd=24982 xmt'd=5934
Errors: parity=0 framing=0 fifo overruns=0
Parallel Ports:
Total bytes: xmt'd=0
```

(continued on next page)

```
Memory:
    total=5242880 avail=3894424 free=2073480 min free=1782488
    fails=0
annex:
```



If the Remote Annex is operating without IP protocols (i.e., **inet\_addr** parameter set to 255.255.255.255), the **stats** command omits the *Inet addr* and *Subnet mask* fields as well as the *Broadcast addr* field from the display.

If the Remote Annex is operating without IP on the Ethernet interface, but IP protocols are enabled (i.e., the **subnet\_mask** parameter is set to 255.255.255.255), the **stats** command shows *<unused>* in place of the subnet mask value and omits the *Broadcast addr* field from the display.

The **stats -s** command displays statistics for all serial ports:

```
annex01# stats -s
P#   Control Lines Speed CharTx CharRx ParityOverrun Framing
1    none           38400   2550     0         0         0
2    CTS RTS         4800   2550     0         0         0
:
total                               1118837 11987 0         0         0
```

The **stats -m** command displays statistics for active control lines, but displays the modem controls for all active and inactive control lines rather than displaying *idle*.

```
annex01# stats -m
P#   Control      Speed CharTx CharRx ParityOverrun Framing
    Lines
1    CTS RTS DTR 9600  0      0      0      0      0
    DCD DSR
2    CTS TRS DTR 9600  0      0      0      0      0
    DCD DSR
:
64   cts RTS DTR 9600  0      0      0      0      0
    dcd dsr
```

The **stats -o** command displays the status of the keyed options and the disabled modules:

```
annex01# stats -o
KEYED OPTIONS:
LAT:                keyed on but disabled by disabled_modules
Atalk:              keyed off
tn3270:             keyed off
dialout/RIP/filtering: keyed off
IPX:                keyed on but disabled by loader
MODULES DISABLED:
    atalk, dialout, ipx, lat, tn3270, vci
```



In the above command display, IPX is disabled by both the **disabled\_modules** parameter and by the loader. In this case, the loader takes precedence since removing IPX from **disabled\_modules** will still not enable it.

The **stats -p** command displays statistics for all parallel ports:

```
annex01# stats -p
P#   Type  CharTx  Status
1    CT    576     selected, paper error, busy
2    DP    1318    selected
total      1894
```

## stats -c

The superuser **stats -c** command clears the serial line statistics to zero. You can enter a single port (**-c5**) or a range of ports (**-c5-7**).

## stats -T

The **stats -T** command displays T1 network interface statistics for the Remote Annex. Table C-63 describes the arguments for **stats -T**. The syntax is:

```
stats -T [ current | total | all | interval_set | clear_alarm ]
```

Table C-63. Arguments for the stats -T Command

Argument	Description
current	Displays current T1 statistics information for the current 15-minute interval.
total	Displays the summary of T1 statistics information for the last 24 hours.
all	Displays the T1 statistics for each one of the valid intervals. There are up to 95 intervals (15 minutes per interval) for a 24-hour period.
interval _set	Displays the T1 statistics for the selected intervals only. You can enter a single interval or a range of intervals from 1 to 96. Interval 1 is the most recent interval. For example: <b>stats -T 4-6, 10</b> displays intervals 4, 5, 6, and 10.
clear_alarm	Clears the alarm condition saved in the history buffer. Once the alarm history buffer is cleared, the next alarm event is captured and stored in the history buffer. Subsequent alarm events will not overwrite the history buffer. This option is available only to the Superuser.

All T1 statistics are captured in 15-minute periods. Information on intervals being captured is kept in “current.” Once the 15-minute interval expires, the information in “current” is transferred to interval #1, and the current statistics are cleared before restarting the statistics capture process. All intervals are aged every 15 minutes. Interval  $n$  becomes  $n+1$ , and interval 96 is discarded. The 96 intervals cover a 24-hour period. Interval #1 becomes valid only after the T1 engine has been on-line for at least 15 minutes.

The **stats -T current** command display looks like this:

```
annex# stats -T current
alarm history:[no blue no red no yellow], Fri July 28 16:48:37 1995 EDT
Alarms:          no blue          no red          no yellow

engine:offline  no sync          no D&I sync    no loss of signal

serial number:      0811
circuit ID:
T1 info:
unit ID: XYLOGICS T1-ENGINE 085234 Rev. A 07/19/95 6343
loopback mode: No loopback                uptime: 69:07:49

                                Current Statistics

number of valid seconds:      469
bursty errored seconds (ESF only):0Controlled slip seconds:0
errored seconds:              0          Severely errored seconds
unavailable seconds:          0

out of frame errors:          0          bipolar violations: 0
CRC errors (ESF only):        0          controlled slilps: 0
received net alarms:          0

annex#
```

The information displayed from a **stats -T** command is described in Table C-64.

Table C-64. The stats -T Command Display

Field	Description
Sync	When Sync is true, the T1 engine is detecting frame synchronization. When Sync is false, the T1 engine has lost frame synchronization and enters the red alarm state.
Loss of Signal	When Loss of Signal is true, the T1 engine is not detecting pulses on the T1 network interface receiver. When Loss of Signal is false, the T1 network interface is receiving pulses. The loss of signal condition causes the T1 engine to transmit AIS (all ones unframed) on the T1 network interface.
Blue Alarm	When the Blue Alarm is true, the T1 engine is receiving AIS (all ones unframed) from the network. When the Blue alarm is false, the T1 engine is not receiving AIS. The Blue Alarm event saved in the history buffer is also displayed.
Red Alarm	When the Red Alarm is true, the T1 engine has detected loss of frame synchronization. During this condition, the T1 interface is sending a Yellow Alarm to the network. When the Red Alarm is false, The T1 engine is in frame synchronization and the sync indication is true. The Red Alarm event saved in the history buffer is also displayed.
Yellow Alarm	When the Yellow Alarm is true, the T1 engine is receiving a Yellow alarm from the network. When the Yellow alarm is false, the T1 engine is not receiving a Yellow alarm from the network. The Yellow Alarm event saved in the history buffer is also displayed.

*(continued on next page)*



Table C-64. The stats -T Command Display (continued)

Field	Description
Loopback	<p>The loopback status has the following possible states:</p> <p><b>None</b> - There is no loopback in progress. The test LED on the front panel is not illuminated.</p> <p><b>Local</b> - The T1 network interface is in local loopback. the test LED on the front panel is illuminated.</p> <p><b>Line</b> - The T1 network interface is in line loopback. The test LED on the front panel is illuminated.</p> <p><b>Payload</b> - This means that the T1 network interface is in payload loopback. The test LED on the front panel is illuminated.</p>
Online	When illuminated, the T1 engine is engaged with the network. Otherwise, the T1 Network Interface and Drop/Insert Interface are isolated from the T1 engine.
Up Time	Amount of time the T1 engine has been up, in hours, minutes, and seconds. The “hours” field is a 16-bit register that can count up to 2700 days (more than 7 years).
Serial Number	The T1 engine’s serial number.
Circuit ID	The T1 engine’s Circuit ID displayed from the <b>tni_circuit_id</b> parameter.
Unit ID	<p>The T1 engine’s Unit ID displayed as:</p> <p>“XYLOGICS T1-ENGINE 085nnn Rev. n mm/dd/yy xxxx”</p> <p>Where:</p> <p><b>085nnn</b> - This is the firmware number.</p> <p><b>Rev. n</b> - This is the firmware revision number.</p> <p><b>mm/dd/yy</b> - This is the firmware release date.</p> <p><b>xxxx</b> - This is the EPROM check sum.</p>

(continued on next page)

Table C-64. The stats -T Command Display (continued)

Field	Description
DII Sync	When DII Sync is true, the Drop/Insert Interface is receiving ones pulses and is in frame sync. When DII Sync is false, the Drop/Insert Interface is out of frame sync or not receiving pulses and is sending AIS (all ones unframed).
Interval	The 15-minute interval being displayed. This is an integer from 1 to 96, "current" or "total".
Number of Valid Seconds	Part of the "current" report which indicates the number of seconds for which the statistics data has been collected.
Number of 15-minute Periods	Part of the "total" report which indicates the number of valid 15-minute periods. This could also be derived from the uptime.
Bursty Errored Seconds	A Bursty Errored Second (BES) is a second with more than one, but less than 320 CRC error events.
Controlled Slip Seconds	A Controlled Slip Second (CSS) is a second with one or more Controlled Slips.
Errored Seconds	An Errored Second is a second with one or more ESF error events; that is, one or more CRC error events or one or more Out of Frames (OOFs).
Severely Errored Seconds	A Severely Errored Second (SES) is a second with 320 or more CRC error events or one or more OOFs.
Unavailable Seconds	Unavailable Seconds (UAS) are a count of one second intervals during which service is unavailable.

*(continued on next page)*

Table C-64. The stats -T Command Display (continued)

Field	Description
Out of Frame Errors	An Out of Frame (OOF) event begins when any two of four consecutive frame synchronizing bits received from the network interface are incorrect. An OOF state ends when a reframe occurs.
BiPolar Violations	A BiPolar Violation (BPV) error event for an AMI-coded signal is the occurrence of a pulse of the same polarity as the previous pulse. A BPV error event for a B8ZS-coded signal is the occurrence of a pulse of the same polarity as the previous pulse without being a part of the zero substitution code.
CRC Errors	A CRC error occurs when the CRC field calculated by the customer installation, based on the incoming DS1 signal does not agree with the CRC field contained in the DS1 signal received from the network.
Controlled Slips	A CS is the occurrence of a replication or deletion of a DS1 frame by the receiving terminal.
Receive Network Alarm Seconds	The number of seconds with alarm events.

## stty

Using the **stty** command, which is similar to the UNIX **stty** command, you can display and change port parameters that control terminal characteristics, CLI connection options, and special characters. The syntax is:

```
stty [parameter [value]]
```

Table C-65 describes the parameters that can be set using the **stty** command; Table C-66 describes the parameters that the **stty** command displays, but does *not* set (it displays only the current settings).



Parameter changes are valid only for this CLI session.

The **stty** command displays the current parameter settings:

```
annex: stty
Remote Annex port 3

-newlin echo -ilower -olower crtcera crtlera tabs
cera      lera      wera      ldisp      flush      tesc
[^?]      [^U]      [^W]      [^R]      [^O]      [^]]
prompt: %a%c
break lbreak -ixany broadcast climask7
iflow: bell, oflow: xonoff, isize: 1, fwdtimer: 5, attn: ^A
ostopc  ostartc
[^S]    [^Q]
baud: 9600, bchar: 8, stopb: 1, parity: none, control_lines:
none
-imask7
annex:
```

You can modify these parameters using the **stty** command. Rebooting the Remote Annex, resetting the port, or issuing a **hangup** command returns the parameters to their original values. There are several ways to enter a new parameter value:

- As either on or off. A minus sign (–) before the parameter name indicates off. For example, entering **break** defines the **Break** key as an attention signal; entering **–break** indicates the key is not defined as an attention signal.
- As one value from a list of available values. For example, the **baud** parameter requires a numeric value.
- As the parameter name followed by a single character, which is often a control character – for example, the **lera** (line erase) argument followed by CTRL-U. (The **stty** command displays this value as ^U.) Specify control characters in one of two ways: 1) enter a circumflex (^) followed by the desired character – for example, enter ^c to indicate CTRL-C; or 2) enter the special character – for example, hold down the **Control** key while you type C.
- As a string, e.g., the string **martha** for the **user** parameter.

To *undefine* or turn off a parameter that requires a value, enter one of the following values along with the parameter:

- **undef** (or **u**).
- **none** (or **n**).
- The two characters ^ and @ (indicating a null string) for parameters that require control characters.
- Double quotes (") for the parameters **prompt**, **term**, and **user** (this is the only way to turn off these parameters).

Table C-65. Setting Parameters Using stty

Parameter	Description
<i>attn string</i>	Defines a control character sequence as an attention character or string. Entering this character or string returns you to the CLI prompt. Make sure the selected control character sequence is not one that is used with any host applications. If both <i>break</i> and <i>lbreak</i> are not defined, and you do not define an attention character or string, you must log off the host to return to the CLI prompt. The default for a serial connection is a null string (""); the default for a virtual CLI connection is CTRL-A.
<i>back string</i>	Defines a control character sequence as a backward switch character or string. Entering this character or string reopens the next lower numbered session, already established at your port, from within the current session without returning to local mode. Make sure the selected control character sequence is not one that is used with any host applications. To clear an existing switch, enter a null string ("").  On virtual ports, the switch is limited to one character; on non-virtual ports, the switch string can range from 1–16 characters.
<i>baud value</i>	Sets the serial line speed for input and output. Possible values are: 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 57600, 115200. The default is 9600.
<i>bchar argument</i>	Defines the data bits per character, not including the start bit, stop bits, or the parity bit (if any). Possible values are: 5, 6, 7, or 8. The default is 8.
<i>break</i> <i>–break</i>	Defines a break as an attention signal. Generally, the break is generated by a key labeled Break. Setting <i>–break</i> turns off Break as an attention signal.

*(continued on next page)*

Table C-65. Setting Parameters Using stty (continued)

Parameter	Description
broadcast -broadcast	Enables the terminal to display Remote Annex administrative messages. Setting the parameter -broadcast prevents any display of administrative messages. The default is broadcast.
cera <i>character</i>	Sets the character-erase character. The default is Delete (CTRL-?).
climask7	Masks CLI input to seven bits. When climask7 is disabled, 8-bit ASCII input is expected.
crt	Sets the following defaults for video terminals: crtcera, crtlera, tabs, echo, -newlin, -ilower, and -olower.
crtcera -crtcera	Controls how both the character erase (cera) and the word erase (wera) are echoed. Setting crtcera echoes the erase characters in an appropriate way for a video terminal; the previous character (or word) appears as if it has been erased. The default is crtcera. Setting -crtcera echoes the erase characters in a way appropriate for a hard-copy terminal. The first erase character is echoed as a \ followed by the deleted character. Each additional use of the erase character deletes and displays another character. The first character typed (other than the erase character) echoes a / and the character; typing asdf<Delete Delete>g echoes as asdf\fd/g.
crtlera -crtlera	Controls how the line erase (lera) is echoed. Setting crtlera erases all characters on the line and moves the cursor back to the beginning of the line. Setting -crtlera echoes the line erase character in a way that is suitable for hard-copy terminals. It echoes the erase character and a new line, so that the deleted line is still visible but the print head is positioned at the beginning of the next line. The default is crtlera.

*(continued on next page)*

Table C-65. Setting Parameters Using stty (continued)

Parameter	Description	
echo –echo	Controls the echoing of characters as they are typed. Setting –echo turns off echoing. The default is echo.	
flush <i>character</i>	Sets the flush character. When pressed, this character flushes your output buffer. The default is CTRL-O.	
forw <i>string</i>	Defines a control character sequence as a forward switch character or string. Entering this character or string reopens the next available higher numbered session, already established at your port. Make sure the selected control character sequence is not one that is used with any host applications. To clear an existing switch, enter a null string ("").  On virtual ports, the switch is limited to one character; on non-virtual ports, the switch string can range from 1–16 characters.	
iflow <i>argument</i>	Specifies the method the Remote Annex uses to stop input from the terminal if the Remote Annex's input buffer is about to overflow. The default is bell. Possible values are:	
	none	Specifies no flow control; characters are lost if the buffers overflow.
	eia	Selects hardware flow control and works only if the control_lines parameter is enabled for hardware flow control and the terminal is wired appropriately.
xonoff	Specifies XON/XOFF flow control. The Remote Annex sends XOFF when its buffers are nearly full and sends XON when the buffer level reaches a safe level. This is known as in-band flow control.	
	bell	The Remote Annex rings the terminal bell when its input buffer is full.

(continued on next page)



Table C-65. Setting Parameters Using stty (continued)

Parameter	Description
imask7 -imask7	Enables clearing the eighth bit of received characters. This parameter has no effect on transmitted characters. When the parameter <code>data_bits</code> is set to 5, 6, or 7, <code>imask7</code> has no effect at all. Setting <code>-imask7</code> does not clear the eighth bit. The default is <code>-imask7</code> .
ilower -ilower	Controls case conversion for characters sent from the terminal to the Remote Annex. Use <code>ilower</code> for older terminals without lower case characters. The Remote Annex converts typed upper case characters to lower case. The default, <code>-ilower</code> , does not change case.
ixany -ixany	Specifies that typing any character restarts the output to the screen that was stopped with the XOFF character. The default is <code>-ixany</code> .
lbreak -lbreak	Defines a long break as an attention signal; <code>-lbreak</code> turns off long break as an attention signal. The default is <code>lbreak</code> .
<code>ldisp character</code>	Sets the reprint line character. The default is CTRL-R.
ixany -ixany	Specifies that typing any character restarts the output to the screen that was stopped with the XOFF character. The default is <code>-ixany</code> .
lbreak -lbreak	Defines a long break as an attention signal; <code>-lbreak</code> turns off long break as an attention signal. The default is <code>lbreak</code> .
<code>ldisp character</code>	Sets the reprint line character. The default is CTRL-R.

*(continued on next page)*

Table C-65. Setting Parameters Using stty (continued)

Parameter	Description
<i>lera character</i>	Sets the line erase character. The default is CTRL-U.
<i>newlin</i> <i>-newlin</i>	Defines the terminal as a new line terminal, which sends a carriage return followed by a line feed when Return is pressed and displays a carriage return followed by a line feed when a line feed character is received. The default is <i>-newlin</i> .
<i>oflow argument</i>	Specifies the terminal's method for stopping output from the Remote Annex. The default is <i>xonoff</i> . Possible values are:
<i>none</i>	No flow control; characters are lost if the buffers overflow.
<i>eia</i>	Selects hardware flow control and works only if the <i>control_lines</i> parameter is enabled for hardware flow control and the terminal is wired appropriately.
<i>xonoff</i>	Specifies XON/XOFF flow control. When the Remote Annex receives XOFF, it stops sending output to the terminal; when it receives XON, it starts sending output again. Setting <i>ostopc</i> to CTRL-S for XOFF and <i>ostartc</i> to CTRL-Q for XON allows you to type these characters to stop and to start output before data scrolls off the screen.
<i>both</i>	Specifies both XON/XOFF and CTS/RTS flow control. Both flow controls are independent. Data flows out of the port only if CTS is high and the last received XON/XOFF character was an XON. Receiving XOFF or dropping CTS stops output flow from the Remote Annex to the device.
<i>bell</i>	Has the same effect as setting the parameter to <i>none</i> .

*(continued on next page)*

Table C-65. Setting Parameters Using stty (continued)

Parameter	Description
olower -olower	Controls case conversion for characters sent from the Remote Annex to the terminal. Setting <code>olower</code> converts lower case characters to upper case. The default, <code>-olower</code> , does not change case.
ostartc <i>character</i>	Sets the restart output character. The default is CTRL-Q.
ostopc <i>character</i>	Sets the stop output character. The default is CTRL-S.
parity <i>argument</i>	Type of parity checked on input and generated on output. Possible values are: none, even, or odd. The default is none.
prompt <i>code</i>	Changes the CLI prompt. The prompt is specified as alphanumeric characters and embedded formatting codes that are expanded when the prompt is displayed. The formatting codes consist of a percent character (%) followed by a single lower case character. The default is %a%c ( <i>annex:</i> ). The formatting codes are:
%a	The string <i>annex</i> .
%c	A colon followed by a space.
%d	The current date and time in standard UNIX format, such as Mon Mar 14 13:59:42 1988.
%i	The Remote Annex's IP address.
%j	A new line character; skip to the beginning of the next line.
%l	The location defined for the port or the string <i>port nn</i> .
%n	The Remote Annex's name or IP address.
%p	The port number.

*(continued on next page)*

Table C-65. Setting Parameters Using stty (continued)

Parameter	Description
%r	The string <i>port</i> .
%s	A space.
%t	The current time in 24-hour format, such as 13:59:42.
%u	The user name defined for the port or a null string.
stopb <i>argument</i>	Number of stop bits. Possible values are: 1, 1.5, and 2. The default is 1.
tabs -tabs	Specifies replacing output tab characters with spaces. If the terminal does not have hardware tab support, use -tabs. The default is tabs.
term <i>string</i>	Identifies the type of terminal using the CLI connection. The value should be a valid terminal type for the host.
tesc <i>character</i>	Sets the Telnet escape character. This character returns you to the <i>telnet</i> prompt when you are in a Telnet session with the remote host. The default is CTRL-].
fdwtimer <i>time</i>	Defines the time in hundredths of a second for the forwarding timer. This timer causes data read from a serial port and stored in a buffer to be forwarded to a host when it expires.
user <i>name</i>	Sets the user name for the connection.
wera <i>character</i>	Sets the word erase character. The default is CTRL-W.

Table C-66. Displaying Parameters Using stty

Parameter	Description
<code>cliidletimer</code> <i>time</i>	Displays the number of minutes for a <i>no jobs</i> timer in which the CLI hangs up when the last CLI session exits.
<code>control_lines</code> <i>argument</i>	Displays the function of the hardware control lines. The default is none. Possible values are:
none	The Remote Annex ignores the hardware control lines.
flow	Configures CTS and RTS for flow control, but does not activate hardware flow control.
modem	Configures DTR, DCD, and DSR for asynchronous modem control (see <i>need_dsr</i> on page Book C-79).
both	Configures CTS, RTS, DTR, DCD, and DSR for both flow control and modem control.
<code>idletimer</code> <i>time</i>	Displays the number of minutes in which the port can be inactive before all sessions are terminated.
<code>isize</code> <i>value</i>	Displays the input buffer size in 240-byte blocks.
<code>signal</code> <i>value</i>	Displays the current state of the control lines (specified in the <code>control_lines</code> parameter) in which a plus (+) indicates the signal is asserted and a minus (-) indicates the signal is not asserted.

## su

When entered in superuser mode, the superuser **su** command returns you to the user CLI and requires no password.



If the Remote Annex is configured with an IP address, the default administrative (**su**) password is the IP address in dotted-decimal notation.

If the Remote Annex is not yet configured with an IP address and the administrative password has not been modified (via the Remote Annex parameter **password** or via the CLI **passwd** command), the password is a null string ("").

If the Remote Annex is not configured with an IP address and boots via MOP, IPX, or from FLASH ROM, the default password is a null string ("") and entering a carriage return at the *Password* prompt places you in superuser mode.

## t1\_loopback


The superuser **t1\_loopback** command places the T1 engine into loopback mode. None of the loopback conditions persist through a power down or reboot. A major consideration to those using the T1 service must be made before using this command since it will completely disrupt the T1 service.

The syntax for the **t1\_loopback** command is:

```
t1_loopback [ none | line | payload | local ]
```

Table C-67 describes the arguments for **t1\_loopback**.

Table C-67. Arguments for the T1\_Loopback Command

Argument	Description
None	No loopback. This is the default. If the t1_loopback command is initiated with no parameters, then none is assumed. It cancels any user specified loopbacks.
Line	Line loopback provides the network a means to test the T1 circuit for single ended fault isolation. The line loopback regenerates the DS1 signal and does not correct bipolar violations.
Payload	Payload loopback is used to provide a loopback toward the network. The data portion of the DS0s is looped back.
Local	Local loopback will loopback the data from the customer side of both the T1 Network Interface and the T1 Drop/Insert Interface.   Network direction loopbacks in most cases can be initiated by the Telco. The front panel Test indicator illuminates when the T1 is in loopback.

## tap

The superuser **tap** command displays input and output on a device attached to a specific port. Any input from the port performing the tap is inserted into the tapped port's input stream. Table C-68 describes the arguments for **tap**. The syntax is:

**tap** [-aksvx] *port*

Entering the **tap** command without the *port* argument displays the message *CLI: Destination address required*; entering the **tap port** command without additional arguments displays any output to the port on the terminal. Keystrokes from the terminal are interpreted as if they are typed on the port. After establishing a tap, the terminal displays the message *Warning: This port is being tapped*, unless the **-s** argument was selected. To stop a tap, break back to the CLI prompt and issue the CLI **kill** for the **tap** job.

The **tap** command creates a Remote Annex job like the **telnet** and **rlogin** commands. You can break back to the CLI prompt and execute other CLI commands. However, when **tap** is not the active job, all activity on the tapped port is suspended.

Flow control on the tapping port affects the tapped port. Suspending output on the tapping port also stops output on the tapped port.

The **-k** and **-v** arguments allow you to use **tap** as a limited software line monitor. You can monitor traffic in both directions, including incoming special conditions (i.e., line breaks, flow control, and characters with special interpretations).

The **who** command displays a tap on a port only when it is invoked locally in superuser mode using the CLI **su** command.



Table C-68. Arguments for the Superuser tap Command

Argument	Description
-a	Use ANSI enhanced display mode escape sequences instead of angle brackets for highlighting all input displayed by <b>-k</b> . For printing characters, the escape sequence 033 133 061 155 octal (ESC [ 1 m) is output instead of <; the escape sequence 033 133 060 155 (ESC [ 0 m) is output instead of >. Both the escape sequences and the angle brackets are output for special characters. These escape sequences can begin and end a graphic rendition such as bold or reverse video.
-k	Displays input and output data, but the order of the displayed data may not match the actual time sequence of the events. Special characters and control line changes are stored in a limited buffer; if they occur too rapidly, some may be lost. Angle brackets distinguish input from output. Additional information also appears in angle brackets: Control characters: <^J> for line feed, <^I> for tab, etc. Special characters: the characters defined as special for the tapped port, such as flow control or attention characters, display as <spcl ^S>, <spcl ^Q>, etc. Line breaks: <break> and <break end>. Control line state changes: <rts-> and <rts+>, <dcd-> and <dcd+>, etc.
-s	Do not display a warning message after establishing the tap. This option is useful when the device connected to the port is not a terminal, and the message might interfere with its normal operation.
-v	Display output from the tapped port in verbose mode. Control codes (000 to 037 octal) display as ^X. DEL (177 octal) display as ^?. Codes greater than 177 octal display with <b>M</b> - preceding their 7-bit representation. For example, 012, the code for line feed, displays as ^J; 212 displays as M-^J.
-x	Display hexadecimal codes for all characters. Use this option with either <b>-k</b> or <b>-v</b> .
<i>port</i>	The number of the port to be tapped.

## telnet

The **telnet** command establishes a **telnet** connection between two ports on two machines. Table C-69 describes the arguments for this command; Table C-70 describes the commands that you can issue using **telnet**. The syntax is:

```
telnet [-lrst] [host [port]]
```

Table C-69. Arguments for the telnet Command

Argument	Description
-l	In <i>character-at-a-time</i> mode, if neither side negotiates for echo, <b>telnet -l</b> directs the Remote Annex to send a LF character to the terminal for each CR received.  Do not issue a <b>telnet -l</b> if <b>stty echo</b> is turned on.
-r	Requests <i>raw</i> mode. In raw mode, <b>telnet</b> passes data between the terminal and a TCP connection in line-by-line mode.
-s	Requests <i>silent</i> mode. Prevents the Remote Annex connection from sending progress or termination messages unless an unexpected error occurs. Use <b>-s</b> in combination with <b>-r</b> and <b>-t</b> , or alone; it is most useful in macros to hide the telnet interface from the user.
-t	Opens a <i>transparent</i> TCP connection to the specified port in which the Telnet protocol is not used. The Telnet escape character is ignored.
host	Opens a connection to that host.
port	Allows you to enter a TCP port number on the specified host to which <b>telnet</b> makes a connection.

If you enter the command without arguments, **telnet** enters command mode and displays the Telnet prompt. After connecting to the remote host, **telnet** prints a message called a connect banner, which displays the Telnet escape character. If pressed, the Telnet escape character returns you to the *telnet* prompt, where you can enter **telnet** commands. For example:

```
annex: telnet topsy
Trying...
Connected to topsy
Escape character is '^]'.
4.3 BSD UNIX (topsy)
login:
```

After establishing the connection, **telnet** is in input mode. Input mode supports either *character-at-a-time* or *line-by-line* mode. In character-at-a-time mode, the Remote Annex immediately sends each typed character to the host, where character echoing and line editing occur.

In line-by-line mode, the Remote Annex retains input until you press either **Return** or an interrupt character. In this mode, character echoing and line editing are performed locally at the Remote Annex. Using the **telnet mode** command, you can change both the mode and where echoing occurs.

You can send a **Break** to the remote host by using either the regular break or the long break key. This allows you to send a **Break** sequence using a local break, rather than using the Telnet **send brk** command. To do this, you must turn off the regular and/or long break as the CLI attention character (see *stty* on page A-194).

If a foreign port is not specified, **telnet** defaults to port 23. The local port is chosen to represent the user location as follows:

- If the user connects to the Remote Annex via a serial port through a modem or a terminal, the local port is chosen as  $10000 + port * 100 + sequential$ , where *port* is the serial line number (1 to 99), and *sequential* is a number (0 to 99) that distinguishes connections, and is chosen sequentially.
- If the user connects to the Remote Annex via the network, by using **telnet annexname**, the local port is chosen as  $10000 + sequential$ , where *sequential* is a number (0 to 99) that distinguishes connections and is chosen sequentially. If all local ports from 10000 to 10099 are in use, a random unused port in the range 20000 to 29999 is chosen.

Table C-70. Issuing Commands Using telnet

Command	Description
close	Closes a telnet session and returns to the CLI prompt.
display	Displays the state of the toggle arguments and the definitions of the special characters.
mode <i>type</i> [ <i>echo</i> ]	Specifies the input mode. The value for <i>type</i> is specified as line for line-by-line and character for character-at-a-time. The <i>echo</i> argument specifies whether echoing is performed by the Remote Annex ( <i>local_echo</i> ) or by the host ( <i>remote_echo</i> ). The defaults for echo are <i>remote_echo</i> for character mode and <i>local_echo</i> for line mode.
open [-rt] <i>host</i> [ <i>port</i> ]	Opens a connection to the specified host. You can enter either the host's name or its Internet address. If a port is not specified, telnet connects to the default Telnet port (23). The <b>-r</b> argument turns off all Telnet protocol interpretation; <b>-t</b> opens a transparent TCP connection to the specified port (you must specify the port number).

(continued on next page)

Table C-70. Issuing Commands Using telnet (continued)

Command	Description
quit	Closes any open telnet session and exits telnet.
status	Displays the current status of telnet.
send [ <i>arguments</i> ]	Sends one or more special character sequences to the remote host. Valid arguments include:
ao	Sends the Telnet <i>Abort Output</i> sequence, causing the remote host to stop sending output to your terminal.
ayt	Sends a Telnet <i>Are You There</i> sequence.
brk	Sends a Telnet <i>Break</i> sequence.
ec	Sends a Telnet <i>Erase Character</i> sequence.
el	Sends a Telnet <i>Erase Line</i> sequence.
escape	Sends the current Telnet escape character.
ga	Sends a Telnet <i>Go Ahead</i> sequence.
ip	Sends a Telnet <i>Interrupt Process</i> sequence.
nop	Sends a Telnet <i>No Operation</i> sequence.
synch	Sends a Telnet <i>Synch</i> sequence.
?	Displays help information for the <b>send</b> command.
set [ <i>special character</i> ]	Sets the Telnet special characters. (The <i>special characters</i> that <b>set</b> accepts can also be designated by their <i>stty</i> counterparts (aliases), e.g., specify <i>escape</i> as <b>set escape ^</b> ] or <b>set esc ^</b> .) Setting the value for a <i>special character</i> to <b>U</b> turns off that character's function. Use the <b>display</b> command to display the <i>special character</i> assignments. <i>Special characters</i> include:

(continued on next page)

Table C-70. Issuing Commands Using telnet (continued)

Command	Description
eof	Sets the <b>eof</b> character to be sent to the host (if Telnet is operating in line-by-line mode).
erase	Sets the erase character that, when entered, sends the <b>send ec</b> command (if the <b>telnet</b> session is in <b>localchars</b> mode and in character-at-a-time mode). The initial value is taken from the <b>stty cera</b> character.
escape	Sets the Telnet escape character used to enter command mode. The initial value is taken from the <b>stty tesc</b> character.
flushoutput	Sets the <b>flushoutput</b> character that, when entered, sends the <b>send ao</b> command (if the Telnet session is in <b>localchars</b> mode). The initial value is CTRL-O.
interrupt	Sets the interrupt character that, when entered, sends the <b>send ip</b> command (if the Telnet session is in <b>localchars</b> mode). The initial value is CTRL-C.
kill	Sets the <b>line erase</b> character that, when entered, sends the <b>send el</b> command (if the Telnet session is in <b>localchars</b> mode and in character-at-a-time mode). The initial value is taken from the <b>stty lera</b> character.
quit	Sets the <b>quit</b> character that, when entered, sends the <b>send brk</b> command (if the Telnet session is in <b>localchars</b> mode). The initial value is CTRL-A.
?	Displays help for the <b>set</b> command.
toggle <i>argument</i>	Toggles (turns on/off) arguments that control how <b>telnet</b> responds to events. The <b>display</b> command displays the current value. Arguments include:
binary	Toggles <b>telnet</b> binary mode. Using binary mode eliminates some translation errors that can occur with carriage return and line feed characters. The initial setting is not to use binary mode.

(continued on next page)

Table C-70. Issuing Commands Using telnet (continued)

Command	Description
crlf	<p>Toggles carriage return-line feed mode. When enabled, a carriage return received from the serial port is encoded as a Telnet protocol carriage return-line feed end-of-line sequence. When disabled, a carriage return received is encoded as a Telnet protocol carriage return-null carriage-return sequence.</p> <p>Additionally, when using the <code>-r</code> flag, enabling this mode causes the Telnet encoder to send a carriage return-line feed for a received carriage return and to delete a subsequent line feed from the input stream if it is the next received character. When disabled, all characters received are sent without this translation.</p>
crmod	<p>Toggles carriage return mode. When enabled, most carriage return characters received from the host are translated into a carriage return followed by a line feed. This mode is used when the host sends only a carriage return without a line feed. The initial value disables carriage return mode.</p>
localchars	<p>Toggles the local recognition of Telnet special characters. When enabled, the special characters are recognized by the Remote Annex and are mapped into appropriate Telnet control sequences. The initial setting is <i>will map</i> when the mode is line-by-line, and <i>won't map</i> when the mode is character-at-a-time. You can toggle the <b>localchars</b> between <i>will map</i> for both modes, <i>won't map</i> for both modes, and the initial setting of <i>will/won't</i> translate based on mode.</p>

(continued on next page)

Table C-70. Issuing Commands Using telnet (continued)

Command	Description
options	Toggles displaying internal Telnet protocol processing. The initial value is no display.
?	Displays help information on the <b>toggle</b> command.
? [ <i>command</i> ]	Displays help information. Without arguments, <b>telnet</b> prints a help summary. If you specify a command, <b>telnet</b> prints help information for that command.

## tn3270

The **tn3270** command is a variation of **telnet** that allows you to log on to an IBM host from an ASCII terminal attached to the Remote Annex. The IBM host to which you connect can be running either the Virtual Machine/Conversational Monitor System (VM/CMS) or the Multiple Virtual Systems (MVS). While you are connected to an IBM host, your ASCII terminal emulates an IBM 3278 (Model 2) full-screen terminal. This is the only member of the IBM 3270 family of terminals that the Remote Annex **tn3270** supports. Table C-71 describes the arguments for **tn3270**. The syntax is:

```
tn3270 [host [port]]
```



Table C-71. Arguments for the tn3270 Command

Argument	Description
host	Opens a connection to <i>host</i> . Specify <i>host</i> as either an IP address (in dotted decimal notation) or a host name. If you use a host name, it must be defined in the Remote Annex's host table or available from the Remote Annex's name server (see <i>hosts</i> on page A-149, <i>name_server_1</i> on page Book C-79, and <i>name_server_2</i> on page Book C-79).
port	Specifies the number of the protocol port on <i>host</i> to which <b>tn3270</b> connects. The default is the standard Telnet port (23).



This product supports only the United States ASCII character set.

Once it has opened a connection to a host, **tn3270** displays a connect banner. The remote host then displays its own connect banner and prompts you to log on:

```
annex: tn3270 132.345.254.3
Trying...
Connected to 132.245.254.3
Escape char is "^]"
```

```
VIRTUAL MACHINE/CMS
```

```
VM/CMS
```

```
Fill in your USERID and PASSWORD and press Enter
USERID ==>
PASSWORD ==>
```

In the previous example, note the line that displays the escape character. Use this character to enter **tn3270** command mode from within a logon session (see *tn3270* on page A-214). To change this escape character, issue the CLI **stty** command with the **tesc** argument before executing the **tn3270** command.



A second escape character is defined in the **map3270** file. You can use this escape character instead of the one that displays when a connection is opened.

Entering the **tn3270** command puts the Remote Annex in **tn3270** command mode and displays the *tn3270* prompt:

```
annex: tn3270
tn3270:
```

In **tn3270** command mode, you can issue the commands shown in Table C-74 on page A-225.



The **tn3270** command is available only if the **option\_key** parameter is set to the correct value. Each Remote Annex requires a unique value. Depending on what you requested when you purchased your Remote Annex, this value may be affixed to the bottom of your Remote Annex. If it is not, you must obtain a valid value from your supplier. You will be asked for your Remote Annex's Ethernet address, which is taped to the back of the unit.

When requesting a **tn3270 option\_key** value from your supplier, be sure to mention any of the other **option\_key** features currently enabled for your Remote Annex. To check the status of the options enabled for your Remote Annex, issue the CLI **stats -o** command.

## ASCII Terminal Requirements and Setup

An ASCII terminal connected to the Remote Annex must have the following characteristics in order to use **tn3270**:

- Cursor addressing and movement. If a terminal does not have this feature, **tn3270** denies access to the IBM host and displays the error message *Terminal must have cursor addressing capability*.
- A screen size of at least 24 lines and 80 columns. If the screen is smaller, **tn3270** denies access to the IBM host and displays the error message *Terminal must have at least 24 lines and 80 columns*.

**tn3270** uses the standard UNIX file **termcap** to determine whether or not a particular terminal type has these features. An administrator must make **termcap** accessible to **tn3270** and ensure that the terminals using **tn3270** have terminal types listed in this file (see *Configuration Checklist* on page A-226).

## Print Screen and Transparent Mode

The Remote Annex **tn3270** has two features not available with the Berkeley version of **tn3270** on which it is based. These are:

- The IBM print-screen function.
- The ability to turn transparent mode on or off.

Transparent mode is useful for running file transfer programs such as Kermit. The command you use to turn transparent mode on or off depends on the IBM host. This feature requires no special configuration.

The print-screen feature lets you dump a screen from the IBM host session to a printer. To do this, enter the Remote Annex key sequence that is mapped to the IBM **LPRT** key.

The network administrator must configure the print-screen feature. This includes mapping a Remote Annex key sequence to the IBM **LPRT** key (see *Terminal Emulation* on page A-218 and *Configuration Checklist* on page A-226). It also involves setting the **na/admin** port parameters **printer\_name** and **printer\_host**. These parameters have user-level equivalents, **printer** and **printhost**, that can be set using the CLI **stty** command. Table C-72 describes both sets of parameters.

Table C-72. Print-screen Parameters Set Using stty and na/admin

stty	na / admin	Explanation
printer <i>name</i>	printer_name <i>name</i>	Specifies the name of the printer to which screen dumps are to be sent. This name must be listed in the <b>/etc/printcap</b> file on the host specified as <b>printhead</b> or <b>printer_host</b> .
printhead <i>ip_addr</i>	printer_host <i>ipaddr</i>	Specifies the IP address of a host running a Berkeley-style line printer daemon (lpd) server and configured to accept print requests from the Remote Annex.

## Terminal Emulation

To make an ASCII terminal emulate a 3278 terminal, **tn3270** simulates the special 3278 keys. For example, a 3278 terminal has a key labeled EEOF that erases the contents of the current field from the location of the cursor to the end of the field. An ASCII terminal does not have this key.

To simulate the 3278 keys, **tn3270** maps them to keys sequences you can enter from an ASCII terminal. The key sequences **tn3270** uses depend on the Remote Annex terminal type and are defined in the standard Unix file **/etc/map3270**. So that **tn3270** can access the file, you must copy it into (or create a link to it in) the directory on the load host that contains the Remote Annex operational image (see *Configuration Checklist* on page A-226).

Each entry in a **map3270** file begins with the name(s) of the terminal type(s) to which it applies. A vertical bar (|) separates one type from another. Following the terminal type(s) are the key-sequence definitions, grouped by function.

Figure C-3 shows part of a **map3270** entry that applies to six terminal types – *avt*, *vt100*, etc. Each definition begins with a reserved name, such as *enter*, identifying the IBM key or function. Not all key names listed in a **map3270** file refer to actual keys on a 3278 keyboard (Table C-73 on page A-221 describes the key names).

```
avt | vt100 | vt100nam | pt100 | vt125 | vt102
enter = '^m';
clear = '^z' | '\EOM';

#for tn3270 print-screen function
lprt = '\Ep';

nl = '^?';
tab = '^i';
btabs = '^b';
left = '^h' | '\E[D';
right = '^l' | '\E[C';
```

Figure C-3. Portion of a Sample map3270 File

The reserved name in a **map3270** definition is followed by an equal sign (=) and one or more ASCII key sequences, each of which is enclosed in single quotation marks. Within a **map3270** ASCII sequence, a caret (^) introduces a control character (or a control-character sequence), and ESC is represented as backslash E (\E).

If more than one sequence can be used for the same IBM function, a vertical bar separates the sequences. For example, in the **map3270** file shown in the preceding example, the IBM **clear** function is defined as either of the following sequences: ^z or \EOM.

From an ASCII terminal in **tn3270** emulation mode, you enter key sequences as follows:

- To enter a non-printing character (i.e., a character preceded by ^ in **map3270**), hold down the **CTRL** key while you enter the character. For example, to enter '^z', hold down the **CTRL** key while typing **z**. If there is a second character in the key sequence, hold down the **CTRL** key, type the first character, *release* the **CTRL** key, and then type the second character. For example, to enter the sequence '^pp', hold down the **CTRL** key while typing **p**, then release **CTRL** and type another **p**. **CTRL** sequences are not case-sensitive; '^p' and '^P' generate the same ASCII code.



'^^' indicates that you press the **CTRL** key while you enter a caret (^).

- To enter an escape character (i.e., a character preceded by \E in **map3270**), press the **ESC** key, release it, and then enter each character in the sequence. For example, if you were actually to enter the three-character sequence '\EOM', you would press the **ESC** key, release it, and then type an uppercase **O** followed by an uppercase **M** (**ESC** sequences *are* case sensitive).

For more information on how to set up a VT100-type terminal to use special keys, see *Configuration Checklist* on page A-226.

In reality, it is not likely that you would be required to type a three-character escape sequence, because most of these sequences are mapped to special keys such as the those on the numeric keypad. For example, on a VT220 terminal that has *Keypad* mode set to *Application*, you can send the sequence `\EOM` by pressing the **Enter** key. describes how to set up a VT100-type terminal to use special keys.

If **map3270** does not contain an entry for the ASCII terminal you are using, or if there is no **map3270** file, **tn3270** uses the defaults shown in Table C-73. This table:

- Separates key-sequence choices with the word “or”.
- Uses CTRL- and ESC instead of ^ and \E.
- Does not enclose key sequences in single quotes.

For more information, see the *Berkeley UNIX* manual pages for **map3270**.

Table C-73. Default Key Mappings for tn3270

IBM 3270 Key Name	ASCII Key Sequence	Description
Command Keys		
ENTER	CTRL-m	Enter
CLEAR	CTRL-z	Clear screen
LPRT	CTRL-p p or CTRL-p P	Print screen
Cursor Movement Keys		
NL	CTRL-n	New line
TAB	CTRL-i	Tab
BTAB	CTRL-b	Back tab

(continued on next page)

Table C-73. Default Key Mappings for tn3270 (continued)

IBM 3270 Key Name	ASCII Key Sequence	Description
Command Keys (continued)		
LEFT	CTRL-h or ESC D or ESC [ D or ESC O D	Cursor left
RIGHT	CTRL-l or ESC C or ESC [ C or ESC O C	Cursor right
UP	CTRL-k or ESC A or ESC [ A or ESC O A	Cursor up
DOWN	CTRL-j or ESC B or ESC [ B or ESC O B	Cursor down
HOME	ESC h	Cursor home
Editing Keys		
DELETE	CTRL-d	Delete character
EEOF	CTRL-e	Erase end of field
EINP	CTRL-w	Erase input
INSRT	ESC<space>	Insert
Program Function Keys		
PFK1 – PFK9	ESC 1 – ESC 9 or ESC [ 1 – ESC [ 9 or ESC O 1 – ESC O 9	PF1 – PF9 keys
PFK10	ESC 0 or ESC [ 0 or ESC O 0	PF10 key
PFK11	ESC – or ESC [ – or ESC O –	PF11 key
PFK12	ESC = or ESC [ = or ESC O =	PF12 key
PFK13	ESC ! or ESC [ ! or ESC O !	PF13 key
PFK14	ESC @ or ESC [ @ or ESC O @	PF14 key
PFK15	ESC # or ESC [ # or ESC O #	PF15 key

*(continued on next page)*



Table C-73. Default Key Mappings for tn3270 (continued)

IBM 3270 Key Name	ASCII Key Sequence	Description
PFK16	ESC \$ or ESC [ \$ or ESC O \$	PF16 key
PFK17	ESC % or ESC [ % or ESC O %	PF17 key
PFK18	ESC ^ or ESC [ ^ or ESC O ^	PF18 key
PFK19	ESC & or ESC [ & or ESC O &	PF19 key
PFK20	ESC * or ESC [ * or ESC O *	PF20 key
PFK21	ESC ( or ESC [ ( or ESC O (	PF21 key
PFK22	ESC ) or ESC [ ) or ESC O )	PF22 key
PFK23	ESC _ or ESC [ _ or ESC O _	PF23 key
PFK24	ESC + or ESC [ + or ESC O +	PF24 key
Program Attention Keys		
PA1	CTRL-p 1	PA1 key
PA2	CTRL-p 2	PA2 key
PA3	CTRL-p 3	PA3 key
Local Control Keys		
ESCAPE	CTRL-c	Telnet escape
FLINP	CTRL-x	Flush input
MASTER_R ESET	CTRL-g	Unlock and redisplay
RESHOW	CTRL-v	Redraw screen
RESET	CTRL-t	Unlock keyboard

(continued on next page)

Table C-73. Default Key Mappings for tn3270 (continued)

IBM 3270 Key Name	ASCII Key Sequence	Description
DP	ESC d or ESC [ d or ESC O d	Duplication character
FM	ESC f or ESC [ f or ESC O f	Field mark character
FERASE	CTRL-u	Field erase
SYNCH	CTRL-r	Synch with user
TREQ	CTRL-a	Test request
XOFF	CTRL-s	Suspend output to screen
XON	CTRL-q	Resume output to screen

### tn3270 Command Mode

Table C-74 shows the commands you can issue in **tn3270** command mode. Enter this mode in one of two ways: 1) by entering the escape character while you are connected to a host, or 2) by issuing the CLI **tn3270** command with no arguments. When you enter the escape character, the current host session is suspended.



The **tn3270** commands are a subset of the **telnet** commands (see Table C-70 on page A-210).

Table C-74. Commands Used in tn3270 Command Mode

Command	Description
close	Closes the connection to the remote host and returns you to the CLI prompt. On the Remote Annex, this method of ending a connection is equivalent to using <b>quit</b> (see <i>Ending a tn3270 Session</i> on page A-226).
open [ <i>host</i> [ <i>port</i> ]]	Opens a connection to <i>host</i> . Specify <i>host</i> as either an IP address (in dotted decimal notation) or a host name. If you use a name, it must be defined in the Remote Annex's host table or available from the Remote Annex's name server. If you do not specify a host, <b>tn3270</b> prompts you for it by displaying "to:". If you do not specify a port, <b>tn3270</b> connects to the default Telnet port (23). <b>Note:</b> If your Remote Annex is already connected to a host via <b>tn3270</b> , you cannot use <b>open</b> to make a tn3270 connection to another host. To do that, enter the CLI attention string (defined via the CLI <b>stty</b> command), and then re-invoke <b>tn3270</b> from the CLI.
quit	Closes the connection to the remote host and returns you to the CLI prompt. On the Remote Annex, <b>quit</b> is equivalent to <b>close</b> (see <i>Ending a tn3270 Session</i> on page A-226).
status	Displays the status of the current <b>tn3270</b> connection.
<CR>	Entering a carriage return (and nothing else) at the <i>tn3270</i> prompt resumes the suspended session. (You suspend a session by entering the escape character.)
? [ <i>command</i> ]	Displays information about one or all of the commands described in this table. If you specify <i>command</i> , <b>?</b> displays information about that particular command. Issued without an argument, <b>?</b> displays summaries of all commands.

## Ending a tn3270 Session

The best way to end a **tn3270** session is to issue the CMS or MVS **LOGOFF** command. This closes the connection in the most orderly fashion and returns you to the CLI command level.

If you cannot issue a **LOGOFF** (perhaps because the remote host is not accepting commands), the next best way to end the connection is to enter the **tn3270** escape character and then issue a **close** or **quit** command. Either of these commands closes the connection and returns you to the CLI prompt.

## Configuration Checklist

To configure your network to use **tn3270** for the first time:

1. **Create one or more user accounts on the IBM host(s) to be accessed.**
2. **Verify that the IBM hosts allow telnet-tn3270 access.**
3. **Use na, admin, or an SNMP directive to set the Remote Annex port parameter term\_var to the appropriate terminal type for each Remote Annex port on which tn3270 is to run.**
4. **If your Remote Annex boots from a load host that has the standard UNIX files /etc/termcap and /etc/map3270, copy those files into the directory that contains the Remote Annex's operational image. If the Remote Annex uses erpcd to boot, the operational image is in the load-host directory /usr/spool/erpcd/bfs. If the Remote Annex uses tftp to boot, the image is in tftp's directory.**

When **tn3270** is invoked, it queries the load host for **map3270** and **termcap**. If the host cannot supply the files, **tn3270** searches for the files in the manner specified by the Remote Annex's **load\_dump\_sequence** parameter.



During this process, **tn3270** broadcasts for **map3270** and **termcap** – even if the Remote Annex **load\_broadcast** parameter is set to **N**.

If **tn3270** follows the configured load-dump sequence but still cannot find **map3270** and **termcap**, it uses default, compiled versions of the files that are built into the Remote Annex's operational image. The default **map3270** file is shown in Table C-73. The default **termcap** file contains definitions for the following terminal types: VT100; WYSE Models 75 and 85; and IBM 3151 (For **term\_var**, specify these as **vt100**, **wy75**, **wy85**, and **ibm3151**. See Step 3.)

Another Remote Annex cannot act as a boot-server for **map3270** and **termcap** because a boot server only returns files in its cache, and these two files are not cached.

5. **Configure each terminal you specified in Step 3 to transmit 7-bit (rather than 8-bit) control codes, to match the 7-bit codes in termcap and map3270.**

At the same time, if your terminal has a keypad, you may want to configure the terminal to take advantage of the **map3270** keypad mappings. For example, if you are using a Remote Annex **term\_var** of **vt100** but the terminal has a numeric keypad (which an actual vt100 does not), you can configure the terminal as *VT200 7 bit*, *VT300 7bit*, or *VT400 7bit*, which *do* support keypads. The model you select depends on the capabilities of the terminal. Consult the programmer's manual for the terminal being emulated. For example, if you are configuring a VT100 to emulate a VT220, use the *VT220 DEC Programmer's Reference Manual*.

Use the following procedure to perform the two functions just described:

- Use the terminal's set-up utility or edit **termcap** to set the terminal's control codes to 7 bits and (optionally) to specify a terminal model number that supports a numeric keypad.



*VT100* emulation mode always uses 7 bits, although not all set-up utilities indicate that it does.

To access the set-up utility, press the appropriate key (typically labeled *Setup*). Then choose the option that lets you select a value for the emulation mode parameter. (On VT200s, VT300s, and VT400s, the option is labeled *General*, and the parameter you select is *Mode*. For *Mode*, select the value *VT400 7bit*, *VT300 7 bit*, or *VT200 7 bit*.)

Instead of using the set-up utility, you can set the emulation mode by editing the **termcap** file.

To set the emulation mode to VT200 7 bit, enter the following string in an *is* control sequence in the portion of **termcap** that corresponds to the terminal's **term\_var** port parameter:

```
\E[62;1"p
```

To set emulation mode to VT300 7 bit, enter:

```
\E[63;1"p
```



Do not confuse control sequence length with data bits (which can also be set to 7 or 8 via the set-up utility). The latter is a hardware parameter that specifies the number of bits per character the terminal transmits.

The emulation of one ASCII terminal by another should not be confused with the emulation of an EBCDIC, IBM 3278 terminal by an ASCII terminal running **tn3270**.

- In the section of **termcap** that corresponds to the **term\_var** port parameter for the terminal, enter the string `=\E=` in an *is* control sequence to enable Keypad Application mode when a user invokes **tn3270**. This allows the user to enter escape sequences by pressing the single keypad keys listed in **map3270**.



Since **tn3270** does not support the *rs* control sequence, the keypad remains in Application mode when the user ends a host session.

**6. Using the `na command` set annex, set the `option_key` parameter to enable `tn3270`; then, reboot the Remote Annex.**

The **option\_key** parameter is a mechanism for restricting access to **tn3270** (and other features) on the Remote Annex. Each Remote Annex requires a unique **option\_key** value. On some Remote Annexes, the **option\_key** value is affixed to the underside of the box. If you do not find it there, contact your supplier. Until this key is set properly, the parameters discussed in the next step are not available.

7. **If you plan to use the IBM print-screen function:**
  - Use **na**, **admin**, or an SNMP directive to set the Remote Annex port parameters **printer\_host**, **printer\_name**, and **user\_name** for each port that is to use **tn3270**. Set the first two parameters as explained in Table C-72 and make sure that **user\_name** is set to a non-null value.
  - Configure the UNIX host specified by **printer\_host** to allow print requests from the Remote Annex. See the manual pages for the host's line-printer daemon (**lpd**).
  - If your Remote Annex obtains **map3270** from a host that is running Berkeley UNIX, modify **map3270** to include the ASCII key sequence for the IBM print-screen key (**LPRT**). Since the print-screen function is not supported by Berkeley **tn3270**, **LPRT** is not included in Berkeley **map3270** files.
8. **Make sure that the Remote Annex's name is either listed in the Remote Annex's host table or available from the Remote Annex's name server (see *hosts* on page A-149, *name\_server\_1* on page Book C-79, and *name\_server\_2* on page Book C-79).**
9. **Use the `na` command `reset` to reset the ports configured in Steps 7 and 8 (see *reset* on page Book C-21 for more details).**



## who

The **who** command displays information on the current users of the Remote Annex's ports. This command also displays current users on other Remote Annexes, and on remote hosts, if those hosts have **fingerd** running for **who @host**. The command accepts one or more arguments. The syntax is:

```
who [[h=]host | [u=]user /[p=]port | @host |user@host | -l @host]
```

If you enter the command without arguments, **who** displays a list of all the Remote Annex users:

```
annex: who
```

Port	What	User	Location	When	Idle	Address
1	CLI	bob	Ext 528	8:44am		[local]
2	CLI	---	---	9:02am		[local]
4	LPD	---	---	9:45am		oaxaca
6	ARAP	cobb	P-01-03-con	9:59am		[local]
16	PSVR	cody	lpq port	10:00am	:43	support
v1	CLI	ellis	Ext 632	10:00am	:41	192.9.200.133
v2	CLI	carey	---	10:43am		192.9.200.60

```
annex:
```

Table C-75 describes the arguments for this command; Table C-76 describes the information that the **who** command displays.

Table C-75. Arguments for the who Command

Argument	Description
[h=] <i>host</i>	A single host or multiple hosts displayed in the <i>Address</i> column, or with a job entry in the <i>User</i> column. Abbreviating a host name displays any host whose name can be expanded. For example, specifying <b>bo</b> selects <b>borneo</b> , <b>bolo</b> , and <b>bonzo</b> .  To avoid potential ambiguity with other strings (such as a username), enter the host name with the type. For example, entering <b>h=bo</b> avoids displaying information for user <b>bobby</b> .
[u=] <i>user</i>	A single user or group of users with entries appearing in the <i>User</i> column. Using an abbreviated user name displays any expandable user name. For example, specifying <b>k</b> selects both <b>kevin</b> and <b>kathryn</b> .
[p=] <i>port</i>	A specific port with an entry in the <i>Port</i> column; for example, <b>2</b> displays Port 2, and <b>v2</b> displays Virtual Port 2. If you enter <b>v</b> , all virtual CLI ports are displayed. Optionally, you can enter the type; for example, <b>p=2</b> or <b>p=v2</b> .
@ <i>host</i>	All users at the specified host. If <i>host</i> is a 4.3BSD system, the display is the <b>finger</b> command. If <i>host</i> is a Remote Annex, the display is the <b>who</b> command.
<i>user</i> @ <i>host</i>	A specific user at the specified host. If <i>host</i> is a 4.3BSD system, the display is the same as the <b>finger user</b> command. If <i>host</i> is a Remote Annex, the display is the same as the <b>who user</b> command.
-l @ <i>host</i>	All users at the specified host. If <i>host</i> is a 4.3BSD system, the display is the same as the <b>finger -l</b> command. If <i>host</i> is a Remote Annex, the display is the same as the <b>who</b> command.

Table C-76. The who Command Display

Field	Description
<i>Port</i>	The number for the serial port; <i>vnn</i> indicates a VCLI connection.
<i>What</i>	One of the following connection types:
<i>CLI</i>	The port is defined as a CLI port and was opened by a device connected to the port or by a connection from a host as a virtual CLI.
<i>LPD</i>	The port is defined as a Remote Annex line printer daemon (lpd).
<i>PSVR</i>	The port is defined as a slave port and was opened via a network connection to the port server.
<i>DP</i>	The port is defined as dedicated.
<i>PPP</i>	The port is defined as a PPP interface.
<i>SLIP</i>	The port is defined as a SLIP interface.
<i>ARAP</i>	The port is defined as an ARAP interface.
<i>User</i>	Displays each user's name and current jobs. Three dashes indicate that no name is defined.
<i>Location</i>	Displays a location defined for the port.
<i>When</i>	Displays the time that the port was opened from the Remote Annex time-of-day clock.
<i>Idle</i>	Displays the amount of time (hours and minutes) since the last activity on the port.
<i>Address</i>	Displays the source of the connection. The name or network address indicates the host or Remote Annex originating the connection; <i>[local]</i> indicates a serial port.



This chapter describes the following Annex utilities and daemons:

- **aprint**
- **erpcd**
- **rtelnet**

## aprint

The **aprint** utility sends files directly to an Annex printer connected to either the parallel or serial line port. The **aprint** utility can be used as a direct command or integrated with the standard host print-spooling mechanism. Table C-77 describes the arguments for **aprint**. The syntax is:

```
aprint [-Aannex [-Lline]] [-f] [-Fstring] [-pprinterport] [filename...]
```



The **-L** and **-p** fields are mutually exclusive. If both fields are missing, the Annex uses parallel printer port 1; using **-L0** with no **-p** field sends data to parallel printer port 1.

In general, applications written for use with the Annex should not use **aprint** to connect to serial ports. Instead, the ports should be configured as slave or adaptive and applications should use TCP to connect to them directly (see *The Port Server and Rotaries* on page A-71).

Remote Annex Server Tools For Windows NT<sup>®</sup> does not support the **aprint** utility.

Table C-77. Supported Arguments for `aprint`

Argument	Description
<code>-Aannex</code>	The name or Internet address of the Annex to which the printer is attached.
<code>-Lline</code>	The Annex port number on which to print. If <i>line</i> is <b>0</b> or missing, the parallel port is used; see <code>-p</code> .
<code>-f</code>	Prevents <b>aprint</b> from supplying form-feeds between files. By default, <b>aprint</b> supplies a form-feed at the start and end of every file.
<code>-Fstring</code>	The <i>string</i> used to produce a form-feed instead of the default (^L). If the printer does not recognize the <i>string</i> as a form-feed, it prints the <i>string</i> , does not supply a form-feed, and <b>aprint</b> does not look at the file. <code>-F</code> is ignored if <code>-f</code> is specified.
<code>-pprinterport</code>	The Annex parallel port on which to print. If this field is missing, parallel printer port 1 is used.
<i>filename</i>	The file(s) to print. If no file is specified, the standard input is used.

The **aprint** utility provides the following error messages:

- **Command syntax errors**

```
Usage: aprint [-Aannex][-L#][-Fstring][-f][file]...
```

Old style `-Pprinter` flag cannot be combined with new flags:

```
Can't mix -A and -P flags
```

```
Can't mix -L and -P flags
```

Out of range number used for `-L#` option:

```
invalid serial/parallel unit number N
```

- **Host system configuration error**  
can't get service to printer  
`/etc/services` should have an entry like: `printer 515/tcp`
- **Initialization errors**
  - Annex* not found on network:  
can't find host address for Annex "annexname"
  - L#* port is in use or disabled:  
Annex can't access requested printer
  - Old style –*Pprinter* not found in `/etc/printcap`:  
unknown printer NAME
  - System network software problems occurred before connection established:  
aprint: could not get socket  
aprint: bind  
aprint: connect  
aprint: transport option (N) not available  
aprint: setsockopt (N)
- **Network errors**
  - Network error while sending form-feed before print job:  
file "filename" aborted while sending formfeed to Annex
  - Network error occurred while sending contents of file:  
file "filename" aborted while sending data to Annex

Network error occurred while sending form-feed after last file:

```
error sending final formfeed to Annex
```

Network errors occurred while establishing contact with Annex:

```
error during Annex port select
error during wait for ACK after port select
```

Network error occurred while waiting for acknowledgment of print job completion from Annex:

```
error during wait for final ACK
```

Unexpected *SIGPIPE* error from system software:

```
Annex connection was lost unexpectedly
Annex connection was lost during attempt to spool
"filename"
```

**-Pprinter** found in **/etc/printcap**, but it is not an Annex printer:

```
NAME is not an Annex printer
```

Negative acknowledgment or time-out while waiting for Annex to acknowledge completion of print job:

```
Annex didn't acknowledge final data
```

System network software problems occurred during communication with Annex:

```
aprint: rcv/read failed
aprint: recvmsg
aprint: sendmsg failed
aprint: write failed
aprint: read failed. errno N
aprint: rcvfrom
aprint: sendto failed
Unknown error
```



## erpcd

The **erpcd**, or expedited remote procedure call daemon, responds to all Annex boot, dump, and ACP security requests. This daemon contains two programs:

- **bfs** – the block file server used to access host files and dump Annex images.
- **acp** – the Access Control Protocol program for host-based security requests.

Table C-78 lists the arguments for **erpcd**. The syntax is:

```
/etc/erpcd [ -D[level]] [ -c [maxnumber] [ -d [udpport]] [ -f [directory]] \
    [ -p]] [ -s [directory] [ -u [filename] [ -b [max_con] [ -x
[max_total]] \
    [ -g [period]]
```

When operational code is being downloaded to Annexes, a minimum of one host, accessible to an Annex, must be running **erpcd** with the **bfs** program enabled. A UDP port (121) for **erpcd** must be defined in the services database and the **eservices** file must be configured properly.



For expert *C* coders only: the host **erpcd** daemon can implement macros, extended commands, command logging, and arbitrary security restrictions through a set of interface routines to the Annex CLI. These are documented in the **acp\_policy.doc** file; the **acp\_policy.c** file contains examples (for more details on implementing code changes, see *Modifying the Supplied Security Application* on page A-546 and *Modifying the Code* on page A-556).

For more details on installing **erpcd**, see 1) *Setting Up the File Server* on page A-344, and 2) the *Annex Installation Notes*.

For more details on using the **acp\_userinfo** file, see *Creating the acp\_userinfo File* on page A-454. For more information on blacklisting, as enabled through the **-b**, **-x**, and **-g** arguments, see *Overview of Blacklisting* on page A-491 and *Configuring Blacklisting* on page A-493.

Table C-78. Supported Arguments for erpcd

Argument	Description
<b>-Dlevel</b>	Restarts <b>erpcd</b> in test mode on the load server host – it does not detach from the <i>tty</i> and it prints out extensive debugging information. Entering a debugging <i>level</i> increases the amount of debugging information. For each <i>level</i> , specify a <b>D</b> . For example <b>-DD</b> specifies 2 levels. Note that there is no space between the <b>D</b> s.
<b>-c maxnumber</b>	Specifies the maximum number of child processes that <b>erpcd</b> can create (so that it can handle simultaneous requests).
<b>-d udpport</b>	Specifies a UDP port number; the default is 121.
<b>-f directory</b>	Specifies the location of the <b>bfs</b> files (load/dump); defaults to the defined <b>bfs</b> directory (usually <b>/usr/spool/erpcd/bfs</b> ).
<b>-p</b>	Prints the daemon's process ID to standard output so that automatic mechanisms can start/stop this process.
<b>-s directory</b>	Specifies the location of the security files ( <b>acp_*</b> ) and <b>eservices</b> ); defaults to the defined install-annex directory (usually <b>/etc</b> ).

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Table C-78. Supported Arguments for `erpcd` (continued)

Argument	Description
<code>-u filename</code>	<p>Invokes the <b>acp_userinfo</b> file syntax checker on the file designated by <i>filename</i>. If <i>filename</i> is omitted, <b>stdin</b> is used. Running this option does not interfere with any other <b>erpcd</b> running on the system.</p> <p>Parsing errors are printed on <b>stderr</b>. Error messages are in the form:</p> <pre>&lt;filename&gt;: line &lt;number&gt;: &lt;severity&gt;: &lt;description&gt;</pre> <p>where <i>&lt;filename&gt;</i> is the name of the file, <i>&lt;number&gt;</i> designates the line on which the error occurs, <i>&lt;severity&gt;</i> is either an <i>error</i> or a <i>warning</i> (<i>error</i> indicates there is a serious parsing error; <i>warning</i> indicates the parser remedied the situation by conversion), and <i>&lt;description&gt;</i> describes the error.</p>
<code>-b max_con</code>	<p>The number of consecutive login failures a user is permitted before being blacklisted. Valid values are 0-8. A value of 0 enables blacklisting upon any login failure (not recommended). This value can also be set via the <code>MAX_BL_CON</code> variable in <code>acp_policy.h</code>. The default, as pre-set via <code>MAX_BL_CON</code>, is 5. If <code>MAX_BL_CON</code> is undefined and you do not specify <code>-b max_con</code>, ACP never blacklists based on consecutive login failures. For more information, see <i>Configuring Blacklisting</i> on page A-493.</p>

(continued on next page)

Table C-78. Supported Arguments for erpcd (continued)

Argument	Description
<code>-x max_total</code>	The number of non-consecutive login failures a user is permitted before being blacklisted. Valid values are 0-20. A value of 0 enables blacklisting upon any login failure (not recommended). This value can also be set via the <code>MAX_BL_NONCON</code> variable in <code>acp_policy.h</code> . The default, as pre-set by <code>MAX_BL_NONCON</code> , is 10. If <code>MAX_BL_NONCON</code> is undefined and you do not specify <code>-x max_total</code> , ACP never blacklists based on consecutive login failures. For more information, see <i>Configuring Blacklisting</i> on page A-493.
<code>-g period</code>	The time period, in weeks, over which <code>max_total</code> is applied. Login failures that occurred more than this number of weeks ago do not count toward blacklisting. Valid values are 0-52. This value can also be set via the <code>MAX_BL_NONCON</code> variable in <code>acp_policy.h</code> . The default, as pre-set via <code>MAX_BL_PERIOD</code> , is 26. If <code>MAX_BL_PERIOD</code> is undefined or is set to 0, <code>MAX_BL_NONCON</code> is effectively disabled. For more information, see <i>Configuring Blacklisting</i> on page A-493.

## Default User Name and Password Verification

The Annex supports both native and proprietary support routines and integrated **passwd** and **passwd/shadow** files (for more details, see *Encrypting Security Messages* on page A-436 and *Modifying the Supplied Security Application* on page A-546).

When the proprietary routines are used for reading and writing files, these files are called **acp\_passwd** and, if enabled, **acp\_shadow**; they are located in the installation directory. When the native routines are used (selected with `-DNATIVEPASSWD` and/or `-DNATIVESHADOW`), **erpcd** queries the standard library routines for validating user passwords. (The use of **shadow** files is selected with `-DUSESHADOW` for both native and proprietary routines.)

Using the native routines allows **erpcd** to query NIS for user logins, enabling nicely distributed databases; using the proprietary routines separates this query from the host code, enabling tighter security control.

The integrated **passwd** form keeps both the user names/UIDs (used by **ls** and other programs to translate UIDs and user names) and one-way-encrypted passwords (using *salted DES* encryption) in a single file. The **passwd/shadow** form places an *x* in place of a password in the **passwd** file and saves the encrypted passwords in a separate file called **shadow**.

The integrated **passwd** form is a Berkeley standard; the **passwd/shadow** form is System V-based. The **passwd/shadow** form is more secure because the permissions on the user names (which are world-readable) and the encrypted passwords (root-readable only) can be set separately. Additionally, the **passwd/shadow** form allows password aging, forcing users to change their passwords periodically. (The *convert* program, located in the **erpcd** directory, can change the integrated **passwd** form to **passwd/shadow** form and vice-versa.)

## rtelnet

The **rtelnet** daemon establishes a Telnet connection between a serial line on the Annex and a character special file on the host (**/dev** file).

Table C-79 describes the arguments for **rtelnet**. The syntax is:

```
rtelnet [-abcdfhkmnoprstCDFOPRTV] [-lfile] [-uuser] [-Mmode]
annex_id annex_port /dev/new_dev_name
```

The **rtelnet** utility runs on top of the pseudo-terminal facility provided by UNIX hosts. A pseudo-terminal is a pair of character devices: a master side and a slave side. The slave side presents an interface resembling a tty device; it is driven by the **rtelnet** process operating on the master side.



Generally, applications written for use with the Annex should not use **rtelnet** to connect to serial ports. Instead, the ports should be configured as **slave** or **adaptive** and applications should use TCP to connect to them directly (see *The Port Server and Rotaries* on page A-71).

Remote Annex Server Tools For Windows NT<sup>®</sup> does not support the **rtelnet** utility.

Table C-79. Supported Arguments for rtelnet

Argument	Description
-a	Use alternate pty banks -- switch between BSD and SysV ptys.
-b	Requests negotiation for Telnet binary mode when communicating with the Annex.
-c	Default to CBREAK mode on the pty -- avoid cooked line
-d	Turns on socket-level debugging.

(continued on next page)

Table C-80. Supported Arguments for rtelnet

Argument	Description
-f	Opens network connection when the slave pseudo-device is opened. Use in conjunction with <b>-m</b> to ensure that <b>rtelnet</b> drops the connection when the slave device is not in use.
-h	Resets the Annex port when the connection closes; valid only if the Annex's <b>password</b> parameter is not set. Use in conjunction with <b>-m</b> .
-k	Periodically retries network connection ('keepalive').
-lfile	Appends log output to given file name.
-m	Drops the network connection when the slave pseudo-device is closed. This argument frequently is used for dial-out modems, causing them to hang up when a program like <b>tip</b> exits.
-n	Never open the slave side of the pseudo-device.
-o	Holds the slave side of the pseudo-device open at all times.
-p	Provides the process ID of the child on standard output.
-r	Overwrites the <i>device-name</i> if it already exists. Without <b>-r</b> , <b>rtelnet</b> exits with an error message if <i>device-name</i> already exists. The <b>-r</b> argument will not remove regular links, files, or directories.
-s	Uses a symbolic link instead of a hard link for the slave.
-t	Creates a transparent TCP connection to the indicated Annex. The connection is made through Annex ports in the 7000 range, rather than the 5000 range, and no Telnet option negotiation or carriage return/line-feed mapping is used.

(continued on next page)

Table C-80. Supported Arguments for rtelnet (continued)

Argument	Description
-user	Change UID to <user> before creating pseudo-device.
-C	Don't try to fix cooked-mode pseudo-device problems with LF insertion.
-D	Turns on verbose-output debugging. When this argument is supplied, <b>rtelnet</b> does not fork off a daemon. Rather, <b>rtelnet</b> displays the Telnet option negotiation and all received data on the terminal on which it was started.
-F	Forces <b>rtelnet</b> to fork into background, even in debug mode.
-Mmode	Sets default pseudo-device file mode to <mode> (given in octal).
-O	Disables out-of-band <b>telnet</b> data (for pre-R7.0 Annexes).
-P	Interprets the port number as a TCP port (1-65535 or name).
-R	Renames the slave pseudo-device to given name rather than linking.
-T	Truncates (rather than breaks) lines that would choke the pseudo-device.
-V	Displays the version information on standard output and exits.
<i>annex_id</i>	The Annex's host name or IP address.
<i>annex_port</i>	The Annex's serial port number.
<i>device_name</i>	The name of the pseudo-device to create (usually in the <b>/dev</b> directory).



The **rtelnet -t** command provides the best throughput performance.



This section consists of a series of tables that provide the following information about the Annex.

### Configuration Parameters

- Table C-81 on page A-249 is a list of all configuration parameters.
- Table C-82 on page A-279 is a list of Annex parameters.
- Table C-83 on page A-291 is a list of AppleTalk-specific Annex parameters.
- Table C-84 on page A-292 is a list of LAT-specific Annex parameters.
- Table C-85 on page A-294 is a list of RIP-specific Annex parameters.
- Table C-86 on page A-295 is a list of T1-specific Annex parameters.
- Table C-87 on page A-296 is a list of TMux-specific Annex parameters.
- Table C-88 on page A-297 is a list of VMS-specific Annex parameters.
- Table C-89 on page A-298 is a list of RIP-specific Interface parameters.
- Table C-90 on page A-299 is a list of asynchronous port parameters.
- Table C-91 on page A-309 is a list of AppleTalk-specific asynchronous port parameters.
- Table C-92 on page A-310 is a list of LAT-specific asynchronous port parameters.

- Table C-93 on page A-311 is a list of PPP-specific asynchronous port parameters.
- Table C-94 on page A-313 is a list of SLIP-specific asynchronous port parameters.
- Table C-95 on page A-315 is a list of VMS-specific asynchronous port parameters.
- Table C-96 on page A-317 is a list of parallel port parameters.

### Commands

- Table C-97 on page A-318 is a list of **na** commands.
- Table C-98 on page A-321 is a list of CLI commands.
- Table C-99 on page A-323 is a list of CLI superuser commands.
- Table C-100 on page A-325 is a list of ROM Monitor commands.

### Miscellaneous

- Table C-101 on page A-326 is a list of formatting codes for Annex prompts.
- Table C-102 on page A-327 is a list of variable arguments.
- Table C-103 on page A-328 is a list of Annex processes.



All table entries are listed in alphabetical order.

Parameters that require a string input allow a maximum of 16 characters, unless otherwise specified.

Table C-81. All Parameters

Parameter	Values	Default	Description
a_router	hexadecimal ethernet address	00-00-00-00-00-00	The ethernet address of the network A_Router.
acp_key	<unset> or a string	<unset>	Specifies a string for the Annex's encryption key; used for passing messages between the Annex and the ACP security server.
address_origin	local, acp, dhcp	local	Determines where a Remote Annex will look to find the local and remote IP addresses to use as the endpoints of a PPP/IPCP link. This parameter works only when the mode parameter is set to "slip" or "ppp".
alarmsyslog	Y or N	Y	Enables or disables the T1 alarm event syslogs.
allow_broadcast	Y or N	Y	Permits the port to receive Annex administrative broadcasts.
allow_compression	Y or N	N	The Annex uses TCP/IP header compression if the SLIP/PPP link's end point also uses compression.

Parameter	Values	Default	Description
allow_snmp_sets	Y or N	N	Enables/disables SNMP sets to the Annex.
arap_v42bis	Y or N	Y	Enables V.42bis compression during an ARAP session.
at_guest	Y or N	N	Allows guests to log into an ARAP service.
at_nodeid	0.0 to 65534.254	0.0	Defines the node ID given to an ARA client during connection establishment.
at_security	Y or N	N	Enables ACP service for the port.
attn_string	control char. sequence	"" virtual CLI=^A	Defines a control character sequence as an attention character or string.
authoritative_agent	Y or N	Y	Enables the Annex to reply to an ICMP Address Mask Request.
authorized_groups	optional code range within 0 to 255 followed by "enabled" or "disabled"	disabled	Specifies which LAT remote group codes are accessible to users on a particular Annex port.

Parameter	Values	Default	Description
autobaud	Y or N	N	Determines whether or not the Annex automatically detects line speed when a connection is opened, and whether or not it sets matching terminal port characteristics on the next login.
backward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	“ “	Reopens the next lower numbered session from within the current session without returning to local mode.
banner	Y or N	Y	Enables/disables the Annex banner and message-of-the-day.
broadcast_addr	0.0.0.0 or 255.255.255.255 or all ones for the host portion and all zeroes for the network or subnet portion	0.0.0.0	Defines the Internet address for use when broadcasting. A value of 255.255.255.255 broadcasts to all nodes on a subnet. RIP routing does not recognize 0.0.0.0.
broadcast_direction	network or port	port	Defines the direction of administrative broadcasts for slave ports.
bypass	Y or N	Y	Removes the T1 engine from the network.

Parameter	Values	Default	Description
chap_auth_name	A string of 1–16 characters	chap	Defines the entry used for the <i>Name</i> field of a CHAP challenge.
char_erase	Y or N	Y	Enables/disables echoing character erase for a CRT.
circuit_timer	1–25	8 (80 ms)	The time interval in tens of milliseconds between the transmission of LAT packets.
cli_imask7	Y or N	Y	Enables/disables masking eight-bit CLI input to seven bits.
cli_inactivity	0–254, immediate, or off	0 (off)	Sets the amount of time that the Annex waits before hanging up the port after it becomes idle.
cli_interface	vci or uci	uci	Allows you to control the prompt that appears for VMS or UNIX environments.
cli_prompt	coded string of up to 16 codes	%a%c	Customizes the CLI prompt.
cli_security	Y or N	N	Enables/disables CLI security for an Annex.
config_file	user-defined	config. annex	Specifies the name of the configuration file.

Parameter	Values	Default	Description
connect_security	Y or N	N	Enables/disables the host-based security policy for access from the CLI to the network.
control_lines	modem_ control, flow_control, both, none	none	Specifies the type of hardware control lines used on the port.
data_bits	5, 6, 7, or 8	8	Defines the number of data bits in a character; does not include start, stop, or parity bits.
daylight_savings	us, australian, british, canadian, east_european, mid_european,w est_european, none	us	Defines the daylight savings type.
dedicated_address	Internet address	0.0.0.0	Defines the host to which a dedicated port connects.
dedicated_arguments	100-character string	""	Defines the command line arguments used for dedicated ports. Use with the mode and dedicated_port parameters.
dedicated_port	telnet, rlogin, call, TCP port number	telnet	Specifies application or TCP port number to which a dedicated port connects.

Parameter	Values	Default	Description
default_zone_list	100-character string	""	Defines the zone list that is sent to ARA clients as the local back-up to an ACP failure.
default_session_mode	interactive, passthru, passall, transparent	inter-active	Defines the default session mode when the VMS interface is configured (i.e., when cli_interface is set to vci).
dhcp_broadcast	Y or N	N	Enables/disables the broadcast of DHCP messages, the means by which DHCP clients discover DHCP servers for dynamic IP addressing.
disabled_modules	admin, atalk, dialout, edit, fingerd, ftpd, ipx, lat, nameserver, ppp, slip, snmp, tn3270, tstty, vci, all, none	none	Selectively disables modules and frees space to the memory pool.
do_compression	Y or N	N	Starts TCP/IP header compression on the SLIP or link.
echo	Y or N	Y	Enables/disables local character echoing.
enable_security	Y or N	N	Enables/disables security subsystem.
erase_char	control char. sequence	^? (DEL key)	Defines the character erase character.



Parameter	Values	Default	Description
erase_line	control char. sequence	^U	Defines the line erase character.
erase_word	control char. sequence	^W	Defines the word erase character.
facility_num	0–32767	0	Identifies a LAT host by number.
force_CTS	Y or N	N	Controls the CTS (Clear to Send) signal on a given port.
forward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	" "	Reopens the next available higher numbered session already established at your port.
forwarding_count	0–255	0	When set, the port will not forward received characters until it receives the specified number of characters.
forwarding_timer	0–255, off	0	Sets the amount of time, in tens of milliseconds, that will elapse before forwarding received data.
group_value	optional code range within 0 - 255, followed by “enabled” or “disabled”	disabled	Security mechanism that restricts access to LAT services for all users on the Annex.

Parameter	Values	Default	Description
hardware_tabs (asynchronous)	Y or N	Y	Allows the terminal to expand ASCII tab characters if the terminal does not support hardware tabs.
hardware_tabs (parallel port)	Y or N	N	Enables/disables use of hardware tab stops for parallel printers.
host_table_size	1–255, (255=unlimited, 254=none)	64	Sets the maximum number of entries in the host table.
image_name	host file name (up to 100 characters)	""	Specifies the name of the file containing the Annex's operational code.
imask_7bits	Y or N	N	When enabled, the Annex port ignores the eighth bit of received characters.
inactivity_timer	0–255	0 (off)	Specifies the amount of time, in minutes, a port can remain inactive before all sessions are terminated and the port reset.
inet_addr	Internet address	no default	Sets the Annex's Internet address.
input_flow_control	eia, start/stop, bell, none	bell	Specifies the method of flow control for input received from device connected to serial port.

Parameter	Values	Default	Description
input_is_activity	Y or N	Y	Defines activity as input.
input_start_char	control char. sequence	^Q	Defines the control character sequence that restarts input.
input_stop_char	control char. sequence	^S	Defines the control character sequence that stops input.
ipencap_type	ethernet or ieee802	ethernet	Sets the IP encapsulation type.
ip_forward_broadcast	Y or N	N	Enables the Annex to scan the interface list and copy broadcast packets.
ipso_class	topsecret, secret, confidential, unclassified, none	none	Specifies the U.S. Department of Defense basic IP Security Option (IPSO) classification level included in TCP packets generated locally on Annex CLI, dedicated, or adaptive asynchronous ports.
ipx_do_checksum	Y or N	N	Controls whether or not the Annex enables an IPX checksum.
ipx_dump_password	0–16 chars.	<unset>	Controls whether or not the Annex enables an IPX checksum.

Parameter	Values	Default	Description
ipx_dump_path	0–100 chars.	No default	Specifies the full pathname that stores the uploaded Annex dump image on the Novell file server.
ipx_dump_username	0–48 chars.	No default	Provides a user name for logging on to the Novell file server before the Annex sends a dump file to the server.
ipx_file_server	0–48 chars.	No default	Contains the name of the Novell file server from which the Annex boots.
ipx_frame_type	ethernetII, raw802_3, 802_2, 802_2snap	raw 802_3	Defines the framing used for IPX packets on the Ethernet interface.
ipx_security	Y or N	N	Controls whether or not IPX security is enabled on the port.
ixany_flow_control	Y or N	N	Treats any input character as a start (XON) character if output has been suspended by a stop (XOFF) character.
keep_alive_timer	10–255	20 seconds	The time interval, in seconds, between the transmission of identification packets during times of network inactivity.

Parameter	Values	Default	Description
lat_key	unique value	no default	Enables/disables the LAT protocol as well as LAT-specific Annex parameters.
lat_queue_max	1–255 or none	4	Limits the number of HIC requests that the Annex can queue.
latb_enable	Y or N	N	Enables the Annex to decode a LAT host's data-b packet.
line_erase	Y or N	Y	Enables/disables echoing line erase for a CRT.
load_broadcast	Y or N	Y	Enables/disables broadcasting for files other than the image if one or all are not available.
load_dump_gateway	Internet address	0.0.0.0	Specifies the gateway's Internet address. A gateway is required if the preferred load or dump host is located on a different network or subnet than the Annex.
load_dump_sequence	net, slmn, self	net	Defines the network interface(s) for use when loading and dumping.
local_address	Internet address	0.0.0.0	Defines the Internet address for the port (Annex side of link).

Parameter	Values	Default	Description
location	string of 1 to 16 characters	""	Defines a string that represents the port's location.
lock_enable	Y or N	N	Enables any port to use the Annex Interface for VMS Environment's lock command.
login_password	<unset> or a string of 1 to 16 characters	<unset>	Specifies the password for all ports using a VMS interface.
login_port_password	Y or N	N	Enables the port password when the VMS command interface is configured (i.e., when cli_interface is set to vci).
login_prompt	string of 1 to 16 characters	#	Defines the prompt that appears for all ports using a VMS interface.
login_timer	0–60	30	Specifies the number of minutes a port using a VMS interface can remain inactive.
login_timeout	Y or N	N	Enables a login timer when the VMS command interface is configured (i.e., when cli_interface is set to vci).

Parameter	Values	Default	Description
long_break	Y or N	Y	When enabled, the Annex returns the user to the CLI prompt after receiving a break greater than two seconds.
loose_source_route	Y or N	Y	Allows the Internet protocol to use loose source routing.
map	map_val modem_number	Unset	Controls the mapping of the modem, T1 Drop/Insert interface, and T1 Network Interface.
map_to_lower	Y or N	N	Enables/disables case conversion (from upper to lower) for characters sent from the terminal to the Annex.
map_to_upper (serial port)	Y or N	N	Enables/disables case conversion (from lower to upper) for characters sent from the terminal to the Annex.
map_to_upper (parallel port)	Y or N	N	Enables/disables case conversion for parallel printers that do not support lower case characters.

Parameter	Values	Default	Description
max_session_count	1–16	3	Specifies the number of active sessions (jobs) allowed per port.
max_vcli	unlimited, 0–254	unlimit-ed	Sets the maximum number of virtual CLIs the Annex can create at one time.
metric	1–15	1	Defines the hop count to the remote end of the serial line.
min_unique_hostnames	Y or N	Y	Enables/disables using minimum uniqueness for host names.
mode	adaptive, arap, auto-adapt, auto-detect, cli, connect, dedicated, ipx, ndp, ppp, rlogin, slave, slip, telnet, tn3270, unused	cli	Sets the mode for access to an asynchronous port.
mop_password	string	<unset>	Contains the MOP maintenance password. In this 8-byte password, each byte consists of two hexadecimal digits.
motd_file	file name of up to 16 characters	motd	Defines the name for the message-of-the-day file.



Parameter	Values	Default	Description
multicast_timer	10–180 seconds	30	Defines the number of seconds that can elapse between service announcement transmissions for the LAT protocol.
multisessions_enable (Annex)	Y or N	N	Allows multisessions to be managed on a terminal server basis. When enabled, terminals that support TD/SMP can display two active windows simultaneously over one communications line.
multisessions_enable (asynchronous port)	Y or N	N	Allows multisessions to be managed on a per port basis.
name_server_1	dns, ien_116, none	none	Defines the first preference name server.
name_server_2	dns, ien_116, none	none	Defines the second preference name server.
nameserver_broadcast	Y or N	N	Enables/disables broadcasting for a name server host in case preferred hosts are not available.

Parameter	Values	Default	Description
need_dsr	Y or N	N	For use with a modem connected to a slave port. When enabled, the connection fails if no DSR signal is present; when disabled, the Annex accepts the connection, but waits for DSR and DCD before communicating with the modem.
net_inactivity	0–255	0	Defines the amount of time an asynchronous port can remain inactive before the port is reset.
net_inactivity_units	minutes or seconds	minutes	Defines the units of time used for the port's inactivity timer.
network_turnaround	1–255	2	Sets the number of seconds to wait for an answer from a security host.
newline_terminal	Y or N	N	Interprets carriage returns and line feeds at the CLI level.

Parameter	Values	Default	Description
node_id	0 to 65534.254	0.0	Contains the address an Annex tries to acquire at the start of an AppleTalk session. If this address is in use, the Annex must acquire a new node ID. This new ID is stored in non-volatile RAM.
option_key	unique value	no default	Enables ARA, tn3270, filtering, and dial-out routing.
output_flow_control	eia, start/stop, bell, both, none	start/stop	Defines method of flow control that the terminal uses to stop output from the Annex.
output_is_activity	Y or N	N	Defines activity as output.
output_start_char	control char. sequence	^Q	Defines the character that restarts output.
output_stop_char	control char. sequence	^S	Defines the control character sequence that stops output.
output_ttl	1–255	64	Defines a locally-generated packet's time-to-live on the network.
parity	even, odd, none	none	Defines the type of parity that the device uses.
password	<unset> or a string	<unset>	Sets the Annex's administrative password.

Parameter	Values	Default	Description
passwd_limit	0–10	3	Defines the maximum number of times a user can try to enter a password before an Annex resets the port.
phone_number	32-char string	null string	Defines the phone number for use with dynamic dialing.
port_password	<unset> or a string	<unset>	Defines a password for the port for use with local password protection or as a back-up for host-based security.
port_server_security	Y or N	N	Enables/disables a host-based security policy for access to a port via the port server.
ppp_acm	0x00000000 to 0xffffffff	0x00000000	Specifies which of the first 32 characters in a TCP/IP packet will be escaped before being sent to the network.
ppp_ipx_network	00000001 to ffffffff, or 0	randomly generated number	Specifies a 4-byte, Novell network number the Annex suggests for the remote PC client on an IPXCP link.

Parameter	Values	Default	Description
ppp_ipx_node	000000000000 to ffffffffffe	Ethernet address plus one	Specifies a string of 12 hexadecimal digits representing the 6-byte, non-zero node number the Annex suggests for the node number of the remote PC client on an IPXCP link.
ppp_mru	64–1500	1500	Defines the maximum receive unit for PPP.
ppp_ncp	ipcp, atcp, ipxcp, mp, ccp, all	all	Specifies which protocol(s) run on the interface.
ppp_password_remote	<unset> or a string	<unset>	Defines a PPP port user's password as a string.
ppp_security_protocol	pap, chap, chap-pap, none	none	Enables password authentication protocol for PPP ports.
ppp_username_remote	<unset> or a string of 1 to 15 characters	“ ”	Defines a PPP port user's name as a string.
pref_dhcp1_addr	Internet address	0.0.0.0	Specifies the IP address of a DHCP server that a DHCP client will attempt to discover as a primary source of dynamic IP addresses.

Parameter	Values	Default	Description
pref_dhcp2_addr	Internet address	0.0.0.0	Specifies the IP address of a DHCP server that a DHCP client will attempt to discover as a backup source of dynamic IP addresses. This address is used only if if “pref_dhcp1_addr” has a non-zero value and does not respond.
pref_dump_addr	Internet address	0.0.0.0	Defines the address for the preferred dump host.
pref_load_addr	Internet address	0.0.0.0	Defines the address for the preferred load host.
pref_mop_host	Ethernet address	00-00-00-00-00-00	Specifies the Ethernet address of the preferred MOP load or dump host.
pref_name1_addr	Internet address	0.0.0.0	Defines the address for the first preference name server host.
pref_name2_addr	Internet address	0.0.0.0	Defines the address for the second preference name server host.
pref_secure1_host	Internet address	0.0.0.0	Defines the address for the first preference security server host.

Parameter	Values	Default	Description
pref_secure2_host	Internet address	0.0.0.0	Defines the address for the second preference security server host.
printer_crlf	Y or N	N	Converts a carriage return to a carriage return followed by a line feed before it is sent to the printer.
printer_host	Internet address	0.0.0.0	Specifies the IP address or fully qualified domain name of a machine running a Berkeley-style <i>lpd</i> server.
printer_name	valid name	no default	Specifies the name of the printer to which dumps are sent.
printer_width	integer	0	Sets the maximum number of characters per line.
prompt	string of up to 16 codes	%a%c	Defines a port-specific CLI prompt.
ps_history_buffer	0–32767 (0 = disabled)	0	Specifies how much data to buffer on a slave port.
redisplay_line	control char. sequence	^R	Defines the reprint line character.
remote_address	Internet address	0.0.0.0	Defines the Internet address for the host at the other end of the serial line.
reset_idle_time_on	input or output	input	Resets the idle timer on input or output.

Parameter	Values	Default	Description
retrans_limit	4–120	8	The number of times to retransmit a packet before notifying the user of a network failure.
ring	Y or N	Y	Specifies if the T1 engine should provide the audible ring to the central office for incoming calls.
rip_accept	access_spec, none, all	all	Controls which routes are accepted from RIP updates.
rip_advertise	access_spec, none, all	all	Controls which routes are advertised.
rip_auth	<set> or <unset>	""	Enables/disables RIP authentication.
rip_default_route	0 - 15, off (0 = off)	off	Advertises that the Annex is the default router and indicates the hop count.
rip_horizon	off, split, poison	poison	Controls the split horizon algorithm.
rip_next_hop	never, needed, always	needed	Specifies whether or not the next hop value is included in RIP version 2 advertisements.
rip_recv_version	1, 2, both	both	Controls which RIP version the Annex accepts.
rip_routers	router_list, all	all	Forces RIP to direct periodic RIP updates to a list of routers.



Parameter	Values	Default	Description
rip_send_version	1, 2, compatibility	compatibility	Controls which RIP versions the Annex sends.
rip_sub_accept	Y or N	Y	Accepts or rejects subnet routes.
rip_sub_advertise	Y or N	Y	Advertises the subnet routes.
routed	Y or N	Y	Enables/disables the RIP routing daemon.
rwhod	Y or N	Y	Enables/disables listening for RWHO broadcasts.
security_broadcast	Y or N	Y	Enables/disables broadcasting for a security server host in case preferred hosts are not available.
server_capability	all, config, image, motd, none	none	Allows the Annex to act as a load host.
server_name	string of 1 to 16 characters	physical Ethernet address appended to string LAT_	A string of characters used to name the Annex in the LAT protocol.
service_limit	16–2048	256	The upper bound on the number of services that the Annex can maintain in its local service table.

Parameter	Values	Default	Description
session_limit	1–1152, none (1152 = none)	1152	Specifies the maximum number of active sessions the Annex allows at one time.
short_break	Y or N	Y	When enabled, the Annex returns the user to the CLI prompt after receiving a break shorter than two seconds.
sigproto	proto_in proto_out	unset	Specifies the inbound and outbound signaling protocols for each DS0.
slip_allow_dump	Y or N	Y	Enables/disables dumping across a SLIP link.
slip_load_dump_host	Internet address	0.0.0.0	Defines the host from which the Annex receives a load or to which the Annex dumps over the SLIP link.
slip_mtu_size	small or large	small	Forces SLIP interface to use large (1006) or small (256) maximum transmission units.
slip_no_icmp	Y or N	N	Discards any ICMP packets directed to the SLIP link.
slip_ppp_security	Y or N	N	Enables/disables access to the <b>slip</b> and <b>ppp</b> commands from the CLI.

Parameter	Values	Default	Description
slip_tos	Y or N	N	When enabled, the Annex sends interactive traffic before any other traffic.
speed	autobaud, 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 57600, 115200	9600	Defines the speed of the serial line between the device and the Annex.
stop_bits	1, 1.5, 2	1	Specifies the number of bit time intervals between successive characters.
subnet_mask (Annex)	IP subnet mask	0.0.0.0	Defines the Annex's IP subnet mask.
subnet_mask (port)	subnet mask	0.0.0.0	Defines the subnet mask for a SLIP/PPP interface.
sys_location	a string of up to 32 chars.	""	Supplies host location or identification information.
syslog_facility	log_local <i>n</i> ( <i>n</i> = 0–7)	log_local7	Defines the facility for logging Annex <i>syslog</i> messages.
syslog_host	Internet address	0.0.0.0	Defines the host for logging Annex messages.

Parameter	Values	Default	Description
syslog_mask	emergency, alert, critical, error, warning, notice, info, debug, all, none	none	Determines the priority levels that are to be logged.
syslog_port	0–Annex port count	0	Routes <i>syslog</i> messages to a serial port. Zero indicates syslogging over the network.
t1_info	a 120-byte string of printable ASCII characters	Unset	Stores T1 installation information from the service provider.
tcp_keepalive (Annex)	1–255 (in minutes) ((0 = 120)	0	Specifies whether or not the Annex sends keep-alive messages for idle TCP connections.
tcp_keepalive (serial port)	1-254 (in minutes) (255 = disabled, 0 = tcp_keepalive Annex)	0 (matchestcp_keepalive Annex parameter setting)	Overrides the Annex tcp_keepalive parameter for one or more specific serial ports.
tcp_keepalive (parallel port)	1-254 (in minutes) (255 = disabled, 0 = tcp_keepalive Annex)	0 (matchestcp_keepalive Annex parameter setting)	Overrides the Annex tcp_keepalive parameter for one or more specific parallel ports.

Parameter	Values	Default	Description
tdi_distance	an integer from 0 to 655	0	Specifies the length, in feet, of the cable from the T1 Drop/Insert interface to the PBX or other equipment.
tdi_framing	d4 or esf	esf	Controls which super frame format is used on the T1 Drop/Insert Interface.
tdi_line_code	ami or b8zs	b8zs	Selects the line code to be used on the T1 Drop/Insert Interface.
telnet_crlf	Y or N	N	When enabled, a carriage return translates to a carriage return followed by a line feed; when disabled, a carriage return translates to a carriage return followed by a null string.
telnet_escape	control char. sequence	^]	Defines the character that returns the user to the <i>telnet</i> prompt.
term_var	string of 1 to 16 characters	""	Identifies the type of terminal using the CLI connection.

Parameter	Values	Default	Description
tftp_dump_name	string	host-dependent	Provides the name of the file to use when dumping the core image using tftp if the Annex operational image and erpcd fail.
tftp_load_dir	string	host-dependent	The string prepended to the image, motd, and configuration file names for tftp transfers.
time_broadcast	Y or N	N	Enables/disables broadcasting for a time server host in case the preferred load host is not available.
time_server	loopback address, 0.0.0.0, 127.0.0.1, host address, broadcast address	0.0.0.0	Determines whether or not the Annex queries for time service.
timezone_minuteswest	+ or - number	300	Sets the time zone by number of minutes east or west (+/-) of GMT.
tmux_delay	0–255 ms	20	Defines the maximum number of milliseconds during which small packets can accumulate to form larger packets. When the time expires, the Annex sends the multiplexed packet.

Parameter	Values	Default	Description
tmux_enable	Y or N	N	Controls whether or not an Annex uses TMux to multiplex small TCP packets into a single IP packet.
tmux_max_host	10–255	64	Specifies the maximum number of host addresses allowed in the TMux address table.
tmux_max_mpx	5–65535	700	Specifies the largest user packet that can be placed in a TMux packet.
tmi_circuit_id	string of up to 120 characters	null string	Stores the T1 circuit identifier string from the service provider.
tmi_clock	loop, local, or external	loop	Controls from where the T1 clock is set.
tmi_esf_fdl	ANSI or ATT format	ATT	Defines the T1 Facilities Data Link.
tmi_framing	d4 or esf	esf	Controls which super frame format is used on the T1 Network Interface.
tmi_line_buildout	0, 7.5, 15, or 22.5	0	Specifies the measured cable loss between the last T1 line generator and the customer location.
tmi_line_code	ami or b8zs	b8zs	Selects the line code to be used on the T1 Network Interface.

Parameter	Values	Default	Description
tnt_ones_density	on or off	off	Defeats the T1 built-in ones density monitor.
toggle_output	control char. sequence	^O	Defines the flush character.
type (asynchronous)	hardwired or dial_in	hard-wired	Defines the type of device connected to the serial port.
type (parallel port)	centronics or dataproducts	centronics	Defines the printer interface for a parallel printer port.
type_of_modem	16-byte string	no default	Specifies the modem type connected to the port.
user_name	string of 0 to 16 characters	" "(null string)	Defines a string that represents the user of the port.
vcli_groups	either all, none, or port range of 0 - 255 followed by none or disable	none enable	Specifies which remote group codes are accessible to virtual CLI users.
vcli_password	<unset> or a string	<unset>	Defines the virtual CLI password for local password protection.
vcli_security	Y or N	N	Enables/disables security on virtual CLI connections.
zone	string of 0 to 32 characters	""	Provides the AppleTalk zone for use at start-up.



Table C-82. Annex Parameters

Parameter	Values	Default	Description
a_router	hexadecimal ethernet address	00-00-00-00-00-00	The ethernet address of the network A_Router.
acp_key	<unset> or a string	<unset>	Specifies a string for the Annex's encryption key; used for passing messages between the Annex and the ACP security server.
allow_snmp_sets	Y or N	N	Enables/disables SNMP <b>sets</b> to the Annex.
authoritative_agent	Y or N	Y	Enables the Annex to reply to an ICMP Address Mask Request.
autodetect_timeout	1-60 (seconds)	30	Specifies the maximum amount of time an Annex should wait for auto_detect mode to identify an incoming call as PPP.
broadcast_addr	0.0.0.0 or 255.255.255.255 or all ones for the host portion and all zeroes for the network or subnet portion	0.0.0.0	Defines the Internet address for use when broadcasting. A value of 255.255.255.255 broadcasts to all nodes on a subnet. RIP routing does not recognize 0.0.0.0.
chap_auth_name	A string of 1–16 characters	chap	Defines the entry used for the <i>Name</i> field of a CHAP <i>challenge</i> .

Parameter	Values	Default	Description
circuit_timer	1–25 ms	8	Defines the time interval in tens of milliseconds between the transmission of LAT packets
cli_prompt	coded string of up to 16 codes	%a%c	Customizes the CLI prompt.
config_file	user-defined	config.annex	Specifies the name of the configuration file.
daylight_savings	us, australian, british, canadian, east_european, mid_european, west_european, none	us	Defines daylight savings type.
default_zone_list	100-character string	""	Defines the zone list that is sent to ARA clients as the local back-up to an ACP failure.
dhcp_broadcast	Y or N	N	Enables/disables the broadcast of DHCP messages, the means by which DHCP clients discover DHCP servers for dynamic IP addressing.
disabled_modules	admin, atalk, dialout, edit, fingerd, ftpd, ipx, lat, nameserver, ppp, slip, snmp, tn3270, tstty, vci, all, none	none	Selectively disables modules and frees space to the memory pool.

Parameter	Values	Default	Description
enable_security	Y or N	N	Enables/disables security subsystem.
facility_num	0–32767	0	Identifies a LAT host by number.
group_value	optional code range within 0 - 255, followed by “enabled” or “disabled”	disabled	Security mechanism that restricts access to LAT services for all users on the Annex.
host_table_size	1–255, (255=unlimited, 254=none)	64	Sets the maximum number of entries in the host table.
image_name	host file name; up to 100 characters.	""	Specifies the name of the file containing the Annex’s operational code.
inet_addr	Internet address	no default	Sets the Annex’s Internet address.
ipencap_type	ethernet or ieee802	ethernet	Sets the IP encapsulation type.
ip_forward_broadcast	Y or N	N	Enables the Annex to scan the interface list and copy broadcast packets.
ipx_do_checksum	Y or N	N	Controls whether or not the Annex enables an IPX checksum.
ipx_dump_password	0–16 chars.	<unset>	Controls whether or not the Annex enables an IPX checksum.
ipx_dump_path	0–100 chars.	No default	Specifies the full pathname that stores the uploaded Annex dump image on the Novell file server.

Parameter	Values	Default	Description
ipx_dump_username	0–48 chars.	No default	Provides a user name for logging on to the Novell file server before the Annex sends a dump file to the server.
ipx_file_server	0–48 chars.	No default	Contains the name of the Novell file server from which the Annex boots.
ipx_frame_type	ethernetII, raw802_3, 802_2, 802_2snap	raw802_3	Defines the framing used for IPX packets on the Ethernet interface.
keep_alive_timer	10–255	20 seconds	The time interval, in seconds, between the transmission of identification packets during times of network inactivity.
lat_key	unique value	no default	Enables/disables the LAT protocol as well as LAT-specific Annex parameters.
lat_queue_max	0–255 or none	4	Limits the number of HIC requests that the Annex can queue.
load_broadcast	Y or N	Y	Enables/disables broadcasting for files other than the image if one or all are not available.

Parameter	Values	Default	Description
load_dump_gateway	Internet address	0.0.0.0	Specifies the gateway's Internet address. A gateway is required if the preferred load or dump host is located on a different network or subnet than the Annex.
load_dump_sequence	net, slnn, self	net	Defines the network interface(s) for use when loading and dumping.
lock_enable	Y or N	N	Enables any port to use the Annex Interface for VMS Environment's lock command.
login_password	<unset> or a string of 1 to 16 characters	<unset>	Specifies the password for all ports using a VMS interface.
login_prompt	string of 1 to 16 characters	#	Defines the prompt that appears for all ports using a VMS interface.
login_timer	0-60	30	Specifies the number of minutes a port using a VMS interface can remain inactive.
loose_source_route	Y or N	Y	Allows the Internet protocol to use loose source routing.
max_vcli	unlimited 0-254	unlimited	Sets the maximum number of virtual CLIs the Annex can create at one time.
min_unique_hostnames	Y or N	Y	Enables/disables using minimum uniqueness for host names.

Parameter	Values	Default	Description
mop_password	string	<unset>	Contains the MOP maintenance password. In this 8-byte password, each byte consists of two hexadecimal digits.
motd_file	file name of up to 16 characters	motd	Defines the name for the message-of-the-day file.
multicast_timer	10–180 seconds	30	Defines the number of seconds that can elapse between service announcement transmissions for the LAT protocol.
multisessions_enable	Y or N	N	Allows multisessions to be managed on a terminal server basis. When enabled, terminals that support TD/SMP can display two active windows simultaneously over one communications line.
name_server_1	dns, ien_116, none	none	Defines the first preference name server.
name_server_2	dns, ien_116, none	none	Defines the second preference name server.
nameserver_broadcast	Y or N	N	Enables/disables broadcasting for a name server host in case preferred hosts are not available.

Parameter	Values	Default	Description
network_turnaround	1–255	2	Sets the number of seconds to wait for an answer from a security host.
node_id	0 to 65534.254	0.0	Contains the address an Annex tries to acquire at the start of an AppleTalk session. If this address is in use, the Annex must acquire a new node ID. This new ID is stored in non-volatile RAM.
option_key	unique value	no default	Enables ARA, tn3270, filtering, and dial-out routing.
output_ttl	1–255	64	Defines a locally-generated packet's time-to-live on the network.
password	<unset> or a string	<unset>	Sets the Annex's administrative password.
passwd_limit	0–10	3	Defines the maximum number of times a user can try to enter a password before an Annex resets the port.
ppp_sec_auto	Y or N	N	Allows the use of auto_detect mode regardless of whether the clients support PAP/CHAP.

Parameter	Values	Default	Description
pref_dhcp1_addr	Internet address	0.0.0.0	Specifies the IP address of a DHCP server that a DHCP client will attempt to discover as a primary source of dynamic IP addresses.
pref_dhcp2_addr	Internet address	0.0.0.0	Specifies the IP address of a DHCP server that a DHCP client will attempt to discover as a backup source of dynamic IP addresses. This address is used only if if “pref_dhcp1_addr” has a non-zero value and does not respond.
pref_dump_addr	Internet address	0.0.0.0	Defines the Internet address for the preferred dump host.
pref_load_addr	Internet address	0.0.0.0	Defines the Internet address for the preferred load host.
pref_mop_host	Ethernet address	00-00-00-00-00-00	Specifies the Ethernet address of the preferred MOP load or dump host.
pref_name1_addr	Internet address	0.0.0.0	Defines the Internet address for the first preference name server host.
pref_name2_addr	Internet address	0.0.0.0	Defines the Internet address for the second preference name server host.



Parameter	Values	Default	Description
pref_secure1_host	Internet address	0.0.0.0	Defines the Internet address for the first preference security server host.
pref_secure2_host	Internet address	0.0.0.0	Defines the Internet address for the second preference security server host.
retrans_limit	4–120	8	The number of times to retransmit a packet before notifying the user of a network failure.
rip_auth	<set> or <unset>	""	Enables/disables RIP authentication.
rip_routers	Internet address	all	Forces RIP to direct periodic RIP updates to a router list rather than broadcasting updates.
routed	Y or N	Y	Enables/disables RIP.
rwhod	Y or N	Y	Enables/disables listening for RWHO broadcasts.
security_broadcast	Y or N	Y	Enables/disables broadcasting for a security server host in case preferred hosts are not available.
server_capability	all, config, image, motd, none	none	Allows the Annex to act as a load host.
server_name	string of 1 to 16 characters	physical Ethernet address appended to string LAT_	A string of characters used to name the Annex in the LAT protocol.

Parameter	Values	Default	Description
service_limit	16–2048	256	The upper bound on the number of services that the Annex can maintain in its local service table.
session_limit	1–1152, none (1152 = none)	1152	Specifies the maximum number of active sessions the Annex allows at one time.
subnet_mask	IP subnet mask	0.0.0.0	Defines the Annex's Internet subnet mask.
syslog_facility	log_localn (n=0-7)	log_local7	Defines the facility for logging Annex <i>syslog</i> messages.
syslog_host	Internet address	0.0.0.0	Defines the address of the host logging Annex messages.
syslog_mask	emergency, alert, critical, error, warning, notice, info, debug, all, none	none	Determines the priority levels for logging <i>syslog</i> messages.
syslog_port	0–Annex port count	0	Routes <i>syslog</i> messages to a serial port. Zero indicates syslogging over the network.
tcp_keepalive (Annex)	1–255 (in minutes) (0 = 120)	0	Specifies whether or not the Annex sends keep-alive messages for idle TCP connections.

Parameter	Values	Default	Description
tftp_dump_name	string	host-dependent	Provides the name of the file to use when dumping the core image using tftp if the Annex operational image and erpcd fail.
tftp_load_dir	string	host-dependent	The string prepended to the image, motd, and configuration file names for tftp transfers.
time_broadcast	Y or N	N	Enables/disables broadcasting for a time server host in case the preferred load host is not available.
time_server	loopback address, 0.0.0.0, 127.0.0.1, host address, broadcast address	0.0.0.0	Determines whether or not the Annex queries for time service.
timezone_minuteswest	+ or - number	300	Sets the time zone by number of minutes east or west (+/-) of GMT.
tmux_delay	0–255 ms	20	Defines the maximum number of milliseconds during which small packets can accumulate to form larger packets. When the time expires, the Annex sends the multiplexed packet.
tmux_enable	Y or N	N	Controls whether or not an Annex uses TMux to multiplex small TCP packets into a single IP packet.

Parameter	Values	Default	Description
tmux_max_host	10–255	64	Specifies the maximum number of host addresses allowed in the TMux address table.
tmux_max_mpx	5–65535	700	Specifies the largest user packet that can be placed in a TMux packet.
vcli_groups	either all, none, or port range of 0 - 255 followed by none or disable	none enable	Specifies which remote group codes are accessible to virtual CLI users.
vcli_inactivity	0 - 255 (minutes)	0	Specifies the amount of time that a VCLI session can remain inactive.
vcli_password	<unset> or a string	<unset>	Defines the virtual CLI password for local password protection.
vcli_security	Y or N	N	Enables/disables security on virtual CLI connections.
zone	string of 0 to 32 characters	""	Provides the AppleTalk zone for use at start-up.

Table C-83. AppleTalk-specific Annex Parameters

Parameter	Values	Default	Description
a_router	hexadecimal ethernet address	00-00-00-00-00-00	The ethernet address of the network A_Router.
default_zone_list	100-char string	""	This zone list is sent to ARA clients as the local back-up to ACP.
node_id	0 to 65534.254	0.0	Contains the address an Annex tries to acquire at the start of an AppleTalk session. If this address is in use, the Annex must acquire a new node ID. This new ID is stored in non-volatile RAM.
option_key	unique	""	Enables/disables AppleTalk.
zone	string of 0 to 32 characters	""	Provides the AppleTalk zone for use at start-up.

Table C-84. LAT-specific Annex Parameters

Parameter	Values	Default	Description
circuit_timer	1–25	8 (80 ms)	The time interval in tens of milliseconds between the transmission of LAT packets.
facility_num	0–32767	42	Also known as the host number.
group_value	optional code range within 0 - 255, followed by “enabled” or “disabled”	disabled	Security mechanism that restricts access to LAT services for all users on the Annex.
keep_alive_timer	10–255	20 seconds	The time interval, in seconds, between the transmission of identification packets during times of network inactivity.
lat_key	unique value	no default	Enables/disables the LAT protocol as well as LAT-specific Annex parameters.
lat_queue_max	1–255	4	Limits the number of HIC requests that the Annex can queue.
multicast_timer	10–180 seconds	30	Defines the number of seconds that can elapse between service announcement transmissions for the LAT protocol.

Parameter	Values	Default	Description
retrans_limit	4–120	8	The number of times to retransmit a packet before notifying the user of a network failure.
server_name	string of 1 to 16 characters	physical Ethernet address appended to string LAT_	A string of characters used to name the Annex in the LAT protocol.
service_limit	16–2048	256	The upper bound on the number of services that the Annex can maintain in its local service table.
sys_location	a string; up to 32 chars.	""	Supplies host location or identification information.
vcli_groups	either all, none, or port range of 0 - 255 followed by none or disable	none enable	Specifies which remote group codes are accessible to virtual CLI users.

Table C-85. RIP-specific Annex Parameters

Parameter	Values	Default	Description
option_key	unique	""	Enables/disables active routing.
output_ttl	1-255	64	Defines a locally-generated packet's time-to-live on the network.
rip_auth	<set> or <unset>	""	Enables/disables RIP authentication.
rip_routers	router_list, all	all	Forces RIP to direct periodic RIP updates to a list of routers.
routed	Y or N	Y	Enables/disables the RIP routing daemon.



Table C-86. T1-specific Annex Parameters

Parameter	Values	Default	Description
t1_info	a 120-byte string of printable ASCII characters	Unset	Stores T1 installation information from the service provider.
tdi_distance	an integer from 0 to 655	0	Specifies the length, in feet, of the cable from the T1 Drop/Insert interface to the PBX or other equipment.
tdi_framing	d4 or esf	esf	Controls which super frame format is used on the T1 Drop/Insert Interface.
tdi_line_code	ami or b8zs	b8zs	Selects the line code to be used on the T1 Drop/Insert Interface.

Table C-87. TMux-specific Annex Parameters

Parameter	Values	Default	Description
tmux_delay	0–255 ms	20	Defines the maximum number of milliseconds during which small packets can accumulate to form larger packets. When the time expires, the Annex sends the multiplexed packet.
tmux_enable	Y or N	N	Controls whether or not an Annex uses TMux to multiplex small TCP packets into a single IP packet.
tmux_max_host	10–255	64	Specifies the maximum number of host addresses allowed in the TMux address table.
tmux_max_mpx	5–65535	700	Specifies the largest user packet that can be placed in a TMux packet.

Table C-88. VMS-specific Annex Parameters

Parameter	Values	Default	Description
lock_enable	Y or N	N	Enables any port to use the Annex Interface for VMS Environment's lock command.
login_password	<unset> or a string of 1 to 16 characters	<unset>	Specifies the password for all ports using a VMS interface.
login_prompt	string of 1 to 16 characters	#	Defines the prompt that appears for all ports using a VMS interface.
login_timer	0–60	30	Specifies the number of minutes a port using a VMS interface can remain inactive.
multisessions_enable	Y or N	N	Allows multisessions to be managed on a terminal server basis. When enabled, terminals that support TD/SMP can display two active windows simultaneously over one communications line.

Table C-89. RIP-specific Interface Parameters

Parameter	Values	Default	Description
rip_accept	access_spec, none, all	all	Controls which routes are accepted from RIP updates.
rip_advertise	access_spec, none, all	all	Controls which interfaces routes are advertised over.
rip_default_route	0 - 15, off (0 = off)	off	Advertises that the Annex is the default router and indicates the hop count.
rip_horizon	off, split, poison	poison	Controls the split horizon algorithm.
rip_next_hop	never, needed, always	needed	Specifies whether or not the next hop value is included in RIP version 2 advertisements.
rip_rcv_version	1, 2, both	both	Controls which RIP versions the Annex accepts.
rip_send_version	1, 2, compat-ibility	compat-ibility	Controls which RIP versions the Annex sends.
rip_sub_accept	Y or N	Y	Accepts or rejects subnet routes.
rip_sub_advertise	Y or N	Y	Advertises the subnet routes.

Table C-90. Asynchronous Port Parameters

Parameter	Values	Default	Description
address_origin	local, acp, dhcp	local	Determines where a Remote Annex will look to find the local and remote IP addresses to use as the endpoints of a PPP/IPCP link. This parameter works only when the mode parameter is set to “slip” or “ppp”.
allow_broadcast	Y or N	Y	Permits the port to receive Annex administrative broadcasts.
allow_compression	Y or N	N	The Annex uses TCP/IP header compression if the SLIP/PPP link’s end point also uses compression.
arap_v42bis	Y or N	Y	Enables V.42bis compression during an ARAP session.
at_guest	Y or N	N	Allows guests to log into an ARAP service.
at_nodeid	0.0 to 65534.254	0.0	Defines the node ID given to an ARA client during connection establishment.
at_security	Y or N	N	Enables ACP service for the port.
attn_string	control char. sequence	"" virtual CLI=^A	Defines a control character sequence as an attention character or string.
authorized_groups	optional code range within 0 to 255 followed by “enabled” or “disabled”	disabled	Specifies which LAT remote group codes are accessible to users on a particular Annex port.

Parameter	Values	Default	Description
autobaud	Y or N	N	Determines whether or not the Annex automatically detects line speed when a connection is opened, and whether or not it sets matching terminal port characteristics on the next login.
backward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	“ “	Reopens the next lower numbered session from within the current session without returning to local mode.
banner	Y or N	Y	Enables/disables the Annex banner and message-of-the-day.
broadcast_direction	network or port	port	Defines the direction of administrative broadcasts for slave ports.
char_erase	Y or N	Y	Enables/disables echoing character erase for a CRT.
cli_imask7	Y or N	Y	Enables/disables masking eight-bit CLI input to seven bits.
cli_inactivity	0–254, immediate, or off	0 (off)	Sets the amount of time that the Annex waits before hanging up the port after it becomes idle.
cli_interface	vci or uci	uci	Allows you to control the prompt that appears for VMS or UNIX environments.
cli_security	Y or N	N	Enables/disables CLI security for an Annex.
connect_security	Y or N	N	Enables/disables the host-based security policy for access from the CLI to the network.

Parameter	Values	Default	Description
control_lines	modem_control, flow_control, both, none	none	Specifies the type of hardware control lines used on the port.
data_bits	5, 6, 7, or 8	8	Defines the number of data bits in a character; does not include start, stop, or parity bits.
dedicated_address	Internet address	0.0.0.0	Defines the host to which a dedicated port connects.
dedicated_arguments	100-char. string	""	Defines the command line arguments used for dedicated ports. Use with the mode and dedicated_port parameters.
dedicated_port	telnet, rlogin, TCP port number	telnet	Specifies application or TCP port number to which a dedicated port connects.
default_session_mode	interactive, passthru, passall, transparent	interactive	Defines the default session mode when the VMS interface is configured (i.e., when cli_interface is set to vci).
do_compression	Y or N	N	Starts TCP/IP header compression on the SLIP link.
echo	Y or N	Y	Enables/disables local character echoing.
erase_char	control char. sequence	^? (DEL key)	Defines the character erase character.
erase_line	control char. sequence	^U	Defines the line erase character.
erase_word	control char. sequence	^W	Defines the word erase character.

Parameter	Values	Default	Description
forward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	" "	Reopens the next available higher numbered session already established at your port.
forwarding_count	0–255	0	When set, the port will not forward received characters until it receives the specified number of characters.
forwarding_timer	0–255, off	0	Sets the amount of time, in tens of milliseconds, that will elapse before forwarding received data.
hardware_tabs (asynchronous)	Y or N	Y	Allows the terminal to expand ASCII tab characters if the terminal does not support hardware tabs.
imask_7bits	Y or N	N	When enabled, the Annex port ignores the eighth bit of received characters.
inactivity_timer	0–255 (0 = off)	off	Specifies the amount of time, in minutes, a port can remain inactive before all sessions are terminated and the port is reset.
input_buffer_size	1–255	1	Allocates, in 512-byte blocks, amount of per-port memory.
input_flow_control	eia, start/ stop, bell, none	bell	Specifies the method of flow control for input received from device connected to serial port.
input_is_activity	Y or N	Y	Defines activity as input.
input_start_char	control char. sequence	^Q	Defines the control character sequence that restarts input.
input_stop_char	control char. sequence	^S	Defines the control character sequence that stops input.



Parameter	Values	Default	Description
ipso_class	top-secret, secret, confidential, unclassified,none	none	Specifies the U.S. Department of Defense basic IP Security Option (IPSO) classification level included in TCP packets generated locally on Annex CLI, dedicated, or adaptive asynchronous ports.
ipx_security	Y or N	N	Controls whether or not IPX security is enabled on the port.
ixany_flow_control	Y or N	N	Treats any input character as a start (XON) character if output has been suspended by a stop (XOFF) character.
latb_enable	Y or N	N	Enables the Annex to decode a LAT host's data-b packet.
line_erase	Y or N	Y	Enables/disables echoing line erase for a CRT.
local_address	Internet address	0.0.0.0	Defines the Internet address for the port on the Annex side of the link.
location	string of 1 to 16 characters	""	Defines a string that represents the port's location.
login_port_password	Y or N	N	Enables the port password when the VMS command interface is configured (i.e., when cli_interface is set to vci).
login_timeout	Y or N	N	Enables a login timer when the VMS command interface is configured (i.e., when cli_interface is set to vci).
long_break	Y or N	Y	When enabled, the Annex returns the user to the CLI prompt after receiving a break longer than two seconds.

Parameter	Values	Default	Description
map_to_lower	Y or N	N	Enables/disables case conversion (from upper to lower) for characters sent from the terminal to the Annex.
map_to_upper	Y or N	N	Enables/disables case conversion (from lower to upper) for characters sent from the terminal to the Annex.
metric	1–15	1	Defines the hop count to the remote end of the serial line.
max_session_count	1–16	3	Specifies the number of active sessions (jobs) allowed per port.
mode	adaptive, arap, auto-adapt, auto-detect, cli, connect, dedicated, ipx, ndp, ppp, rlogin, slave, slip, telnet, tn3270, unused	cli	Sets the mode for access to an asynchronous port.
multisessions_enable	Y or N	N	Allows multisessions to be managed on a per port basis.
need_dsr	Y or N	N	For use with a modem connected to a slave port. When enabled, the connection fails if no DSR signal is present; when disabled, the Annex accepts the connection, but waits for DSR and DCD before communicating with the modem.
net_inactivity	Integer or 0	0 (off)	Defines the amount of time for toll saving network inactivity.
net_inactivity_units	minutes or seconds	minutes	Defines the units of time used for the port's inactivity timer.

Parameter	Values	Default	Description
<code>newline_terminal</code>	Y or N	N	When enabled, a line feed terminates both the input and the output line(s). When disabled, on input, either a CR or a LF terminates the input line; a CR followed by a LF terminates output line(s).
<code>output_flow_control</code>	eia, start/stop, bell, both, none	start/stop	Defines method of flow control that the terminal uses to stop output from the Annex.
<code>output_is_activity</code>	Y or N	N	Defines activity as output.
<code>output_start_char</code>	control char. sequence	^Q	Defines the character that restarts output.
<code>output_stop_char</code>	control char. sequence	^S	Defines the control character sequence that stops output.
<code>parity</code>	even, odd, none	none	Defines the type of parity that the device uses.
<code>phone_number</code>	32-char string	""	The phone number for use with dynamic dialing.
<code>port_password</code>	<unset> or a string	<unset>	Defines a password for the port for use with local password protection.
<code>port_server_security</code>	Y or N	N	Enables/disables a host-based security policy for access to a port via the port server.
<code>ppp_acm</code>	0x00000000 to 0xffffffff	0x00000000	Specifies which of the first 32 characters in a TCP/IP packet will be escaped before being sent to the network.
<code>ppp_ipx_network</code>	00000001 to ffffffff, or 0	randomly generated number	Specifies a 4-byte, Novell network number the Annex suggests for the remote PC client on an IPXCP (IPX over PPP) link.

Parameter	Values	Default	Description
ppp_ipx_node	000000000000 0 to ffffffffffffe	Ethernet address plus one	Specifies a string of 12 hexadecimal digits representing the 6-byte, non-zero node number the Annex suggests for the node number of the remote PC client on an IPXCP (IPX over PPP) link.
ppp_mru	64–1500	1500	Defines the maximum receive unit used with PPP.
ppp_ncp	ipcp, atcp, ipxcp, mp, ccp, all	all	Specifies which protocol(s) run on the interface.
ppp_password_remote	<unset> or a string	<unset>	Defines a PPP port user's password as a string.
ppp_security_protocol	pap, chap, chap-pap, none	none	Enables password authentication protocol for PPP ports.
ppp_username_remote	<unset> or a 1 - 15 character string	<unset>	Defines the PPP port user's name as a string.
printer_host	Internet address	0.0.0.0	Specifies the IP address or fully qualified domain name of a machine running a Berkeley-style <i>lpd</i> server.
printer_name	valid name	no default	Specifies the name of the printer to which dumps are sent.
prompt	string of up to 16 codes	%a%c	Defines a port-specific CLI prompt.
ps_history_buffer	0–32767 (0 = disabled)	0	Specifies how much data to buffer on a slave port.
redisplay_line	control char. sequence	^R	Defines the reprint line character.
remote_address	Internet address	0.0.0.0	Defines the Internet address for the host at the other end of the serial line.

Parameter	Values	Default	Description
reset_idle_time_on	input or output	input	Resets the idle timer on input or output.
short_break	Y or N	Y	When enabled, the Annex returns the user to the CLI prompt after receiving a break shorter than two seconds.
slip_allow_dump	Y or N	Y	Enables/disables dumping across a SLIP link.
slip_load_dump_host	Internet address	0.0.0.0	Defines the host from which the Annex receives a load or to which the Annex dumps over the SLIP link.
slip_mtu_size	small or large	small	Forces SLIP interface to use large (1006) or small (256) maximum transmission units.
slip_no_icmp	Y or N	N	Discards any ICMP packets directed to the SLIP link.
slip_ppp_security	Y or N	N	Enables/disables access to the <b>slip</b> and <b>ppp</b> commands from the CLI.
slip_tos	Y or N	N	When enabled, the Annex sends interactive traffic before any other traffic.
speed	autobaud, 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 57600, 115200	9600	Defines the speed of the asynchronous line between the device and the Annex.
subnet_mask	subnet mask	0.0.0.0	Defines the subnet mask for an async SLIP/PPP interface.

Parameter	Values	Default	Description
stop_bits	1, 1.5, or 2	1	Specifies the number of bit time intervals between successive characters.
tcp_keepalive (serial port)	1-254 (in minutes) (255 = disabled, 0 = tcp_keepalive Annex)	0 (matches tcp_keepalive Annex parameter setting)	Overrides the Annex tcp_keepalive parameter for one or more specific serial ports.
telnet_crlf	Y or N	N	When enabled, a carriage return translates to a carriage return followed by a line feed; when disabled, a carriage return translates to a carriage return followed by a null string ("").
telnet_escape	control char. sequence	^]	Defines the character that returns the user to the <i>telnet</i> prompt.
term_var	string of 1 to 16 characters	""	Identifies the type of terminal using the CLI connection.
toggle_output	control char. sequence	^O	Defines the flush character.
type (asynchronous)	hardwired or dial_in	hard-wired	Defines the type of device connected to the serial port.
type_of_modem	16-byte string	no default	Specifies the modem type connected to the port.
user_name	string	""	Defines a string that represents the user of the port.

Table C-91. AppleTalk-specific Asynchronous Port Parameters

Parameter	Values	Default	Description
arap_v42bis	Y or N	Y	Enables/disables V.42bis compression during an ARA session.
at_guest	Y or N	N	Allows ARA guest login service.
at_nodeid	0.0 to 65534.254	0.0	Defines the node ID given to an ARA client during connection establishment.
at_security	Y or N	N	Enables/disables ACP service for this port.
ppp_ncp	ipcp, atcp, ipxcp, mp, ccp, all	all	Specifies which protocol(s) run on the interface.

Table C-92. LAT-specific Asynchronous Port Parameters

Parameter	Values	Default	Description
authorized_groups	optional code range within 0 to 255 followed by “enabled” or “disabled”	disabled	Specifies which LAT remote group codes are accessible to users on a particular Annex port.
latb_enable	Y or N	N	Enables the Annex to decode a LAT host’s data-b packet.



Table C-93. PPP-specific Asynchronous Port Parameters

Parameter	Values	Default	Description
address_origin	local, acp, dhcp	local	Determines where a Remote Annex will look to find the local and remote IP addresses to use as the endpoints of a PPP/IPCP link. This parameter works only when the mode parameter is set to “slip” or “ppp”.
allow_compression	Y or N	N	The Annex uses TCP/IP header compression if the PPP link’s end point initiates compression.
local_address	IP	0.0.0.0	Defines the IP address for the port (Annex side).
metric	Integer	1	Defines the hop count to the remote end of the serial line.
ppp_acm	0x00000000 to 0xffffffff	0x00000000	Specifies which of the first 32 chara. in a TCP/IP packet will be escaped before being sent to the network.
ppp_mru	64–1500	1500	Defines the maximum receive unit used with PPP.
ppp_ncp	ipcp, atcp, ipxcp, mp, ccp, all	all	Specifies which protocol(s) run on the interface.
ppp_password_remote	<unset> or a string	<unset>	Defines a PPP port user’s password as a string.
ppp_security_protocol	pap, chap, chap-pap, none	none	Enables password authentication protocol for PPP ports.
ppp_username_remote	<unset> or a 1 - 15 character string	<unset>	Defines the PPP port user’s name as a string.

Parameter	Values	Default	Description
remote_address	IP address	0.0.0.0	Defines the IP address for the host at the remote end of the link.
slip_ppp_security	Y or N	N	Enables access to the <b>ppp</b> command from the CLI.
subnet_mask	Internet subnet mask	0.0.0.0	Defines an Internet subnet mask for the interface.

Table C-94. SLIP-specific Asynchronous Port Parameters

Parameter	Values	Default	Description
address_origin	local, acp, dhcp	local	Determines where a Remote Annex will look to find the local and remote IP addresses to use as the endpoints of a PPP/PCP link. This parameter works only when the mode parameter is set to “slip” or “ppp”.
allow_compression	Y or N	N	The Annex uses TCP/IP header compression if the SLIP link’s end point also uses compression.
do_compression	Y or N	N	Starts TCP/IP header compression on this SLIP link.
local_address	Internet address	0.0.0.0	Defines the Internet address for the port (Annex side of link).
metric	integer	1	Defines the hop count to the remote end of the serial line.
remote_address	Internet address	0.0.0.0	Defines the Internet address for the host at the other end of the serial line.
slip_allow_dump	Y or N	Y	Enables/disables dumping across a SLIP link.
slip_load_dump_host	Internet address	0.0.0.0	Defines the host from which the Annex receives a load or to which the Annex dumps over the SLIP link.
slip_mtu_size	small or large	small	Forces SLIP interface to use large (1006) or small (256) maximum transmission units.
slip_no_icmp	Y or N	N	Discards any ICMP packets directed to the SLIP link.
slip_ppp_security	Y or N	N	Enables/disables access to the <b>slip</b> command from the CLI.
slip_tos	Y or N	N	When enabled, the Annex sends interactive traffic before any other traffic.



Table C-95. VMS-specific Asynchronous Port Parameters

Parameter	Values	Default	Description
autobaud	Y or N	N	Determines whether or not the Annex automatically detects line speed when a connection is opened, and whether or not it sets matching terminal port characteristics on the next login.
backward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	“ “	Reopens the next lower numbered session from within the current session without returning to local mode.
cli_interface	vci or uci	uci	Allows you to control the prompt that appears for VMS or UNIX environments.
forward_key	vcli: one printable or control character. non-vcli: string (1 to 16 characters)	" "	Reopens the next available higher numbered session already established at your port.
default_session_mode	interactive, passthru, passall, transparent	inter- active	Defines the default session mode when the VMS interface is configured (i.e., when cli_interface is set to vci).
login_port_password	Y or N	N	Enables the port password when the VMS command interface is configured (i.e., when cli_interface is set to vci).

Parameter	Values	Default	Description
login_timeout	Y or N	N	Enables a login timer when the VMS command interface is configured (i.e., when cli_interface is set to vci).
multisessions_enable	Y or N	N	Allows multisessions to be managed on a per port basis.

Table C-96. Parallel Printer Port Parameters

Parameter	Values	Default	Description
hardware_tabs	Y or N	N	Enables/disables use of hardware tab stops.
map_to_upper	Y or N	N	Enables/disables printing in upper case only.
printer_crlf	Y or N	N	Converts a carriage return to a carriage return followed by a line feed before it is sent to the printer.
printer_width	integer	0	Sets the maximum number of characters per line.
tcp_keepalive (parallel port)	1-254 (in minutes) (255 = disabled, 0 = tcp_keepalive Annex)	0 (matchestcp_keepalive Annex parameter setting)	Overrides the Annex tcp_keepalive parameter for one or more specific parallel ports.
type	centronics or dataproducts	centronics	Defines the printer interface.

Table C-97. na Commands

Command	Arguments	Description
annex	<i>annex_list</i>	Sets the default <i>annex_list</i> .
boot	<b>[-adhq]</b> [ <i>time</i> ] [ <i>filename</i> ] [ <i>warning</i> ]	Reboots the Annex. Only ROM revisions 0600 and greater with the self-boot option installed support the <b>-I</b> argument.
broadcast	<b>=</b> [ <i>port_set</i>   <b>=broadcast_keyword</b> [ <b>@annex_identifier</b> ]] <i>message</i>	Sends a broadcast message to a port(s).
copy annex	<i>annex_identifier annex_list</i>	Copies Annex parameters to other Annexes.
copy interface	<i>interface_name@annex_identifier</i> <i>port_set</i>	Copies all interface parameters from the specified interface to the <i>interface_set</i> .
copy [port  asynchronous]	<i>port_number@annex_identifier port_set</i>	Copies port parameters except the port password from the specified asynchronous port to the <i>port_set</i> .
copy printer	<b>@annex_identifier annex_list</b>	Copies printer parameters to multiple printer ports.
dumpboot	<b>[-aq]</b> <b>[[+]</b> <b>[HH:]</b> <b>[MM]</b> <i>annex_list filename warning</i>	Boots an Annex and produces an up-line dump.
echo	<i>message</i>	Echoes the remainder of the line to standard output.
help or ?	<i>command</i>	Displays command syntax.
interface	<i>interface_set</i>   <b>all</b>	Groups interfaces in an <i>interface_set</i> , allowing you to issue one <b>na</b> command to change parameter values for all interfaces in the group.
password		Enters the default password.



Command	Arguments	Description
port   asynchronous	[ <i>port_set</i>   <i>keyword</i> ]	Groups asynchronous ports in a <i>port_set</i> , allowing you to issue a single <b>na</b> command to change values for all ports in the group. This command is synonymous with the <b>asynchronous</b> command.
printer	<i>printer_set</i>	Selects a subset of the parallel printer ports. The default includes all printers.
quit		Terminates the <b>na</b> session.
read	<i>filename</i>	Reads and executes a script file.
reset annex	[= <i>annex_list</i> ] <i>annex_subsystem</i>	Resets a subsystem without rebooting an Annex.
reset interface	[= <i>interface_list</i>   <i>keyword</i> ]	Resets an interface parameter(s) without rebooting an Annex.
reset port   asynchronous	[= <i>async_port_list</i>   <i>keyword</i> ]	Resets an asynchronous port parameter(s) without rebooting an Annex.
reset printer	[= <i>printer_port_list</i>   <i>keyword</i> ]	Resets parallel printer port parameter(s) without rebooting an Annex.
reset t1	[ <i>soft</i>   <i>hard</i>   <i>esf</i> ]	Resets the T1 engine and ESF statistics.
set annex	[= <i>annex_list</i> ] <i>annex_parameters</i>	Modifies the value of an Annex parameter(s).
set interface	[= <i>interface_list</i> ] <i>interface_parameters</i>	Modifies the value of an interface parameter(s)
set port   asynchronous	[= <i>port_list</i> ] <i>port_parameters</i>	Modifies the value of an asynchronous port parameter(s).
set printer	[= <i>annex_list</i> ] <i>printer_parameters</i>	Modifies the value of a parallel printer parameter(s).

Command	Arguments	Description
show annex	[= <i>annex_list</i> ] [ <i>keyword</i>   <i>annex_parameter</i> ]	Displays the current value of an Annex parameter(s).
show interface	[= <i>interface_list</i> ] [ <i>keyword</i>   <i>interface_parameters</i> ]	Displays the current value of an interface parameter(s).
show port   asynchronous	[= <i>port_set</i> ] [ <i>keyword</i>   <i>port_parameter</i> ]	Displays the current value of an asynchronous port parameter(s).
show printer	[= <i>port_set</i> ] [ <i>keyword</i>   <i>printer_parameter</i> ]	Displays the current value of a parallel printer parameter(s).
write	<i>annex_identifier filename</i>	Writes the current configuration to a script file.
#		Indicates a comment line (useful in command files).

Table C-98. CLI Commands

Command	Arguments	Description
arap		Converts a CLI line into an ARA connection. When the port is reset, it reverts to its original mode.
backward	[switch] string, none	Reopens the next lower numbered session already established at your port, from within the current session without returning to local mode.
bg	[ <b>-d</b> ] [%] [%, +, -, number, hostname]	Puts a job into the background.
connect	service [hostname [port]]	Uses the LAT protocol to connect to an advertised LAT service.
fg	[ <b>-q</b> ] [%] [%, +, -, number, hostname]	Brings a job to the foreground.
forward	[switch] string, none	Reopens the next available higher numbered session already established at your port.
hangup		Disconnects all jobs and resets all CLI connections.
help or ?	[command]	Displays help information on CLI commands.
hosts	[ <b>-qn</b> ] [host]	Displays the names and addresses of hosts and other Annexes listed in the Annex's host table.
ipx		Converts a CLI port to an ipx mode port.
ipxroute	add {default / network} gateway hops ticks replace {default / network} gateway hops ticks delete {default / network} gateway	Sets up routing information for IPX links.
jobs		Displays a list of current jobs.
kill	[%] [%, +, -, number, hostname]	Terminates a job.
lock	[time-out]	Locks a port.
netstat	[ <b>-AaCfгимnpQRrSstxz</b> ]	Displays network statistics.
ppp		Converts a CLI port to a PPP port.

Command	Arguments	Description
queue	[[[- <b>h</b> <i>hostname</i> ] [- <b>s</b> <i>service</i> ] [- <b>p</b> <i>port</i> ]], [- <b>r</b> <i>entry_id</i> ]	Displays information about queued HIC requests or removes a HIC request from the queue.
rlogin	<i>hostname</i> [- <b>l</b> <i>user</i> ]	Connects to a host using <b>rlogin</b> .
services	[- <b>vh</b> ] <i>service hostname</i>	Displays LAT services that have been advertised by LAT hosts.
slip		Converts a CLI port to a SLIP port.
stats	[- <b>smp</b> [ <i>ports</i> ][ <i>time</i> ]   [- <b>op</b> ]	Displays Annex statistics.
stats -T	[ <i>current</i>   <i>total</i>   <i>all</i>   <i>interval_set</i>   <i>clear_alarm</i> ]	Displays the status and statistics of the T1 Network Interface.
stty	[ <i>parameter</i> [ <i>value</i> ]]	Displays and modifies CLI port parameters.
su		Enters and exits superuser administrative mode.
telnet	[[[- <b>rst</b> ] <i>host</i> [ <i>port</i> ]]	Connects to a host using <b>telnet</b> .
tn3270	[ <i>host</i> [ <i>port</i> ]]	Connects to an IBM VM/CMS or MVS host using the <b>tn3270</b> variation of the Telnet protocol.
who	[[ <b>h=</b> ] <i>host</i>   [ <b>u=</b> ] <i>user</i> / [ <b>p=</b> ] <i>port</i>   <b>@</b> <i>host</i>   <i>user</i> <b>@</b> <i>host</i>   - <b>l</b> <b>@</b> <i>host</i> ]	Displays information about current users of Annex ports.

Table C-99. CLI Superuser Commands

Command	Arguments	Description
admin		Enters administrative mode.
arp	<b>[–ads]</b> [ <i>host</i> ] [ <i>addr</i> ][ <b>temp</b>   <b>pub</b> ]	Displays/modifies the Internet-to-hardware address translation table.
boot	<b>[–adlq]</b> [[+] [ <i>HH:</i> ][ <i>MM</i> ]] [ <i>filename</i> ] <i>[warning]</i>	Reboots the Annex. Only ROM revisions 0600 and greater with the self-boot option installed support the <b>–I</b> argument.
broadcast		Sends a broadcast message to a port or ports.
compact	<b>[–s]</b>	Consolidates all valid records to the beginning of the EEPROM.
control	<i>port</i> [ <b>dtr–</b>   <b>dtr+</b>   <b>rts–</b>   <b>rts+</b> ]   <i>port</i> <b>testmsg</b> [ <i>times</i>   <b>forever</b> ]	Resets DTR and RTS or outputs a test message.
cp	<i>src_filename</i> <i>dst_filename</i>	Copies a file in the local file system.
dialout	<b>[–I]</b> <i>route_name</i>	Displays the current dial-out database.
edit	<i>filename</i>	Edits local files.
filter		Enters the filtering subsystem of the CLI user interface.
help –m	[ <i>macro</i> ]	Displays help information on macros.
hosts	<b>[–qaffn]</b> [ <i>host...</i> ]	Displays information about hosts and name servers.
ls		Displays the self-boot ROM's directory.
modem	<b>[–al]</b>	Lists the modem types supported by the Annex.
more	<i>filename</i>	Provides a read-only mechanism for reviewing files in the local file system.

Command	Arguments	Description
mv	<i>src_filename dst_filename</i>	Renames a file in the local file system.
passwd		Changes the administrative password.
ping	<b>[-artv]</b> <i>host [databytes [count]]</i>	Sends ICMP Echo Request packets to host.
port		Enters the default <i>port_set</i> .
printer		Enters the default <i>printer_set</i> .
printer		Enters the default <i>printer_set</i> .
procs	<b>[-r]</b> <b>[-ppid]</b> <b>[-ddev]</b>	Displaces processes at the Annex.
quit		Terminates the <b>admin</b> session.
reset		Resets a port or subsystem.
rm	<i>filename</i>	Deletes a file in the local file system.
route	<b>[-fF]</b> <i>add [-s] dest mask gateway [metric]</i> <b>[-fF]</b> <i>add default gateway [metric]</i> <b>[-fF]</b> <i>delete [default   dest]</i>	Adds or deletes a route from the routing table.
set		Modifies the value of a configuration parameter.
show		Displays the current value of a configuration parameter.
stats -c		Clears all serial line statistics to zero.
su		Returns you to the CLI.
t1_loopback	[ none   line   payload   local ]	Places the T1 engine into loopback mode.
tap	<b>[-aksvx]</b> <i>port</i>	Displays input and output for a serial port.

Table C-100. ROM Monitor Commands

Command	Arguments	Description
addr	<b>[-d]</b>	Displays the unit's ROM-resident Ethernet address in hexadecimal notation or prompts for values.
boot	<b>[-lv   filename]</b>	Boots and loads Annex operational code. Only ROM revisions 0600 and greater with the self-boot option installed support the <b>-l</b> argument.
config		Displays the current hardware configuration and revision levels.
console_ baud		Changes the console port's baud rate so that it can interface with any modem to which it is connected.
erase		Erases non-volatile memory.
help or ?		Displays ROM Monitor commands.
image	<b>[-d   filename]</b>	Sets the default image file name.
ipx	<b>[-d ]</b>	Sets several parameters associated with IPX booting and dumping.
lat	<b>[-d ]</b>	Allows you to set the LAT key from the ROM monitor.
mop	<b>[-d ]</b>	Sets the MOP load/dump address.
net		Executes a loopback test on the LAN.
ping	<i>host_ip_address [data_size]</i> <i>[npackets]</i>	Sends an Internet Control Message Protocol (ICMP) mandatory ECHO_REQUEST datagram to elicit an ICMP ECHO_RESPONSE from a host or gateway.
ports		Tests the serial line ports.
sequence	<b>[-d   [interface [, interface]...]</b>	Edits the load-dump sequence interface list.
slip	<b>[-d] [port]</b>	Defines a serial port as a SLIP interface.

Command	Arguments	Description
stats	<b>-slip</b>	Displays the current network statistics gathered by the ROM.

Table C-101. Formatting Codes for Annex Prompts

Code	Expansion
%a	The string <i>annex</i> .
%c	A colon followed by a space.
%d	The current date and time in this format: Mon Jan 6 13:59:42 1992.
%i	The Annex's Internet address.
%j	A new line character, skip to the beginning of the next line.
%l	The location defined for the port; if none, the string <i>port nm</i> , where <i>nm</i> is the number of the serial line.
%n	The Annex's name, if known, or the Internet address.
%p	The port number, or the virtual CLI connection number in <i>vn</i> form, where <i>n</i> is the virtual CLI connection number.
%r	The string <i>port</i> .
%s	A space.
%t	The current time in 24-hour format.
%u	The user name defined for the port; if none, a null string ("").



Table C-102. Variable Arguments

Variable	Argument
annex_list	annex_identifier [, annex_identifier]
annex_identifier	symbolic name   Internet address
annex_parameter	annex_parameter value [annex_parameter value] ...
port_parameter	port_parameter value [port_parameter value] ...
port_set	port_identifiers [; port_identifiers]
port_identifier	port_number [, port_number]   port_number-port_number
port_number	1...64
printer_parameter	parallel_port_parameter [value] [parallel_port_parameter [value]]
broadcast_keyword	all   serial   virtual
port_keyword	all   serial
reset_keyword	all   annex   lat   macros   security]   nameserver   serial   virtual
show_keyword	all   lat   interface   device   editing
time	[[+] [HH:] [MM]]

Table C-103. Annex Processes

Process	Purpose
adm_timer	Watches serial ports for activity (idle timer, inactivity timer).
cli	One per active CLI.
connect_rdr connect_wtr	One pair per active <b>connect</b> command.
dp_mon	Listens for dedicated port requests.
erpcd	Listens for incoming <b>erpcd</b> requests.
fingerd_lis	User information for listener.
line_admin	Port and virtual line administrator.
lpd	Listens for <b>aprint</b> commands.
netdattimer	Ages the host table.
ping	The <b>ping</b> command.
p_srvr_conv	Prompts for CLI and rotary access.
reset_mach	Listens for the <b>reset all</b> command.
rlogin_rdr rlogin_wtr	One pair for each active <b>rlogin</b> command.
root	The initial process.
routed	Listens for RIP messages.
rwhod	Listens for <b>rwho</b> requests.
snmpd	Listens for <b>snmp</b> commands and requests.
syslog_port	Logs messages to the port specified in the <b>syslog_port</b> parameter.
telnet_cmd telnet_rdr	One pair per active <b>telnet</b> command.
telnetd_lis	Listens for incoming <b>telnet</b> requests.
telnetd_rdr telnetd_wri	One pair per active incoming <b>telnet</b> session.
timed	Maintains the Annex time-of-day clock.

Process	Purpose
watcher	Maintains the watchdog timer.



**A**

- a\_router parameter C-43
- acp\_key parameter C-43
- acp\_passwd file C-86, C-243
- acp\_policy.c file C-239
- acp\_policy.doc file C-239
- acp\_shadow file C-243
- address\_origin parameter C-43
- admin command
  - reference C-132
  - set descriptions C-132
- admin prompt C-132
  - using with quit command C-132
- administrative password
  - using with su command C-122
- alarmsyslog parameter C-44
- allow\_broadcast parameter C-44
- allow\_snmp\_sets parameter C-45
- annex command C-6 to C-8
- aprint utility C-235 to C-238
  - error messages C-236
  - supported arguments C-236
- arap command
  - reference C-135
- arap\_v42bis parameter C-45
- arp command
  - arguments C-136
  - reference C-135
- at\_nodeid parameter C-46
- at\_security parameter C-46
- authoritative\_agent parameter C-47
- authorized\_groups parameter C-47
- autobaud parameter C-47

**B**

- backward\_key parameter C-48
- banner parameter C-48
- bfs C-239
- bg command
  - arguments C-137

- reference C-137
- boot command C-8 to C-10
  - arguments, for CLI C-138
  - reference, for CLI C-138
  - supported arguments for C-9
- broadcast command
  - supported keywords for C-10
- broadcast\_addr parameter C-49
- broadcast\_direction parameter C-50
- bypass parameter C-50

**C**

- CHAP C-91
- chap\_auth\_name parameter C-50
- char\_erase parameter C-51
- circuit\_timer parameter C-51
- CLI
  - See also CLI commands, CLI port parameters
  - command syntax definition C-121
  - errors (squelch) C-121
- CLI commands C-121 to C-233
  - admin superuser command C-132 to C-134
  - arap user command C-135
  - arp superuser command C-135
  - bg user command C-137
  - boot superuser command C-138
  - compact superuser command C-140
  - connect user command C-141
  - control superuser command C-141
  - cp superuser command C-142
  - dialout superuser command C-143
  - edit superuser command C-144
  - fg user command C-145
  - hangup user command C-147
  - help user command C-147
  - hosts superuser command C-151
  - hosts user command C-149
  - ipx user command C-152
  - jobs user command C-152
  - kill user command C-153
  - list of user and superuser commands C-122

- to C-125, C-321 to C-325
- lock user command C-153
- ls superuser command C-154
- modem superuser command C-155
- more superuser command C-157
- mv superuser command C-157
- netstat user command C-158 to C-160
- passwd superuser command C-161
- ping superuser command C-161 to C-170
- ppp user command C-170
- procs superuser command C-171
- queue user command C-174 to C-176
- rlogin user command C-176
- rm superuser command C-177
- route superuser command C-177 to C-179
- services user command C-180 to C-183
- slip user command C-183
- stats -c superuser command C-187
- stats user command C-184 to C-193
- stty user command C-194 to C-203
- su superuser command C-204
- tap superuser command C-205 to C-207
- telnet user command C-208 to C-214
- tn3270 user command C-214 to C-230
- who user command C-231 to C-233
- cli\_imask7 parameter C-51
- cli\_inactivity parameter C-52
- cli\_interface parameter C-52
- cli\_prompt parameter C-52
- cli\_security parameter C-53
- compact command
  - reference C-140
- config\_file parameter C-54
- configuration parameters
  - Annex
    - a\_router C-43
    - acp\_key C-43
    - allow\_snmp\_sets C-45
    - authoritative agent C-47
    - broadcast\_addr C-49
    - chap\_auth\_name C-50
    - circuit\_timer C-51
    - cli\_prompt C-52
    - config\_file C-54
    - daylight\_savings C-55
    - default\_zone\_list C-56
    - dhcp\_broadcast C-57
    - disabled\_modules C-57
    - enable\_security C-58
    - facility\_num C-59
    - group\_value C-61
    - host\_table\_size C-61
    - image\_name C-62
    - inet\_addr C-63
    - ip\_forward\_broadcast C-65
    - ipencap\_type C-64
    - ipx\_do\_checksum C-65
    - ipx\_dump\_password C-66
    - ipx\_dump\_path C-66
    - ipx\_dump\_username C-66
    - ipx\_file\_server C-66
    - ipx\_frame\_type C-66
    - keep\_alive\_timer C-67
    - lat\_key C-67
    - lat\_queue\_max C-68
    - list of C-279 to C-290
    - list of AppleTalk-specific C-291
    - list of LAT-specific C-292
    - list of RIP-specific C-294
    - list of T1-specific C-295
    - load\_broadcast C-69
    - load\_dump\_gateway C-69
    - load\_dump\_sequence C-69
    - lock\_enable C-70
    - login\_password C-70
    - login\_prompt C-71
    - login\_timer C-71
    - loose\_source\_route C-72
    - max\_chap\_chall\_int C-74
    - max\_vcli C-75
    - min\_unique\_hostnames C-75
    - mop\_password C-77

motd\_file C-78  
 multicast\_timer C-78  
 multisessions\_enable C-78  
 name\_server\_1 C-79  
 name\_server\_2 C-79  
 nameserver\_broadcast C-79  
 network\_turnaround C-81  
 node\_id C-82  
 output\_ttl C-84  
 passwd\_limit C-85  
 password C-85  
 pref\_dhcp1\_addr C-92  
 pref\_dhcp2\_addr C-92  
 pref\_dump\_addr C-92  
 pref\_load\_addr C-93  
 pref\_mop\_host C-93  
 pref\_name1\_addr C-93  
 pref\_name2\_addr C-93  
 pref\_secure1\_host C-94  
 pref\_secure2\_host C-94  
 retrans\_limit C-97  
 rip\_auth C-98  
 rip\_routers C-100  
 routed C-101  
 rwhod C-101  
 security\_broadcast C-101  
 server\_capability C-102  
 server\_name C-102  
 service\_limit C-102  
 session\_limit C-103  
 subnet\_mask C-106  
 sys\_location C-106  
 syslog\_facility C-107  
 syslog\_host C-107  
 syslog\_mask C-107  
 syslog\_port C-108  
 tcp\_keepalive C-109  
 tftp\_dump\_name C-111  
 tftp\_load\_dir C-112  
 time\_broadcast C-112  
 time\_server C-112  
 timezone\_minuteswest C-113  
 tmux\_delay C-113  
 tmux\_enable C-113  
 tmux\_max\_host C-114  
 tmux\_max\_mpx C-114  
 vcli\_groups C-118  
 vcli\_password C-119  
 vcli\_security C-119  
 zone C-120  
 asynchronous port  
   address\_origin C-43  
   allow\_broadcast C-44  
   arap\_v42bis C-45  
   at\_nodeid C-46  
   at\_security C-46  
   authorized\_groups C-47  
   autobaud C-47  
   backward\_key C-48  
   banner C-48  
   broadcast\_direction C-50  
   char\_erase C-51  
   cli\_imask7 C-51  
   cli\_inactivity C-52  
   cli\_interface C-52  
   cli\_security C-53  
   connect\_security C-54  
   control\_lines C-54  
   data\_bits C-55  
   dedicated\_address C-55  
   dedicated\_arguments C-55  
   dedicated\_port C-56  
   default\_session\_mode C-56  
   do\_compression C-58  
   echo C-58  
   erase\_char C-58  
   erase\_line C-59  
   erase\_word C-59  
   forward\_key C-59  
   forwarding\_count C-60  
   forwarding\_timer C-60  
   hardware\_tabs C-61

- imask\_7bits C-62
- inactivity\_timer C-62
- input\_flow\_control C-63
- input\_is\_activity C-64
- input\_start\_char C-64
- input\_stop\_char C-64
- ipso\_class C-65
- ipx\_security C-67
- latb\_enable C-68
- line\_erase C-68
- list of C-299 to C-308
- list of AppleTalk-specific C-309
- list of LAT-specific C-310
- list of PPP-specific C-311
- list of SLIP-specific C-313
- list of VMS-specific C-315
- local\_address C-70
- location C-70
- login\_port\_password C-71
- login\_timeout C-71
- long\_break C-72
- map\_to\_lower C-73
- map\_to\_upper C-74
- max\_session\_count C-74
- metric C-75
- mode C-75
- multisessions\_enable C-78
- need\_dsr C-79
- net\_inactivity C-80
- net\_inactivity\_units C-80
- newline\_terminal C-81
- output\_flow\_control C-82
- output\_is\_activity C-83
- output\_start\_char C-84
- output\_stop\_char C-84
- parity C-84
- phone\_number C-86
- port\_password C-86
- port\_server\_security C-86
- ppp\_acm C-87
- ppp\_ipx\_network C-89
- ppp\_ipx\_node C-89
- ppp\_mru C-90
- ppp\_password\_remote C-90
- ppp\_security\_protocol C-91
- printer\_host C-94
- printer\_name C-95
- prompt C-95
- ps\_history\_buffer C-96
- redisplay\_line C-96
- reset\_idle\_time\_on C-96
- short\_break C-103
- slip\_allow\_dump C-104
- slip\_load\_dump\_host C-104
- slip\_mtu\_size C-104
- slip\_no\_icmp C-104
- slip\_ppp\_security C-105
- slip\_tos C-105
- speed C-105
- stop\_bits C-106
- subnet\_mask C-106
- tcp\_keepalive C-109
- telnet\_crlf C-111
- telnet\_escape C-111
- term\_var C-111
- toggle\_output C-116
- type C-116
- type\_of\_modem C-118
- user\_name C-118
- list of all C-249 to C-278
- parallel printer port
  - hardware\_tabs C-61
  - list of C-317
  - map\_to\_upper C-74
  - printer\_crlf C-94
  - printer\_width C-95
  - tcp\_keepalive C-110
  - type C-117
- parameter conventions C-33 to C-37
  - entering parameter values C-34
  - setting parameters to supplied defaults C-35 to C-37



parameter descriptions C-37 to C-120  
RIP-specific interface  
  list of C-298  
  rip\_accept C-97  
  rip\_advertise C-98  
  rip\_default\_route C-98  
  rip\_horizon C-99  
  rip\_next\_hop C-99  
  rip\_recv\_version C-99  
  rip\_send\_version C-100  
  rip\_sub\_accept C-100  
  rip\_sub\_advertise C-101  
synchronous port  
  allow\_compression C-45  
  ppp\_username\_remote C-91  
  remote\_address C-96  
T1  
  alarmsyslog C-44  
  bypass C-50  
  map C-73  
  ring C-97  
  sigproto C-103  
  t1\_info C-109  
  tdi\_distance C-110  
  tdi\_framing C-110  
  tdi\_line\_code C-110  
  tni\_circuit\_id C-114  
  tni\_clock C-114  
  tni\_esf\_fall C-115  
  tni\_framing C-115  
  tni\_line\_buildout C-115  
  tni\_line\_code C-115  
  tni\_ones\_density C-116  
TMux-specific Annex  
  list of C-296  
VMS-specific Annex  
  list of C-297  
connect command  
  reference C-141  
connect\_security parameter C-54  
control command

  arguments C-142  
  reference C-141  
control\_lines parameter C-54  
copy command C-11  
cp command C-142

## D

data\_bits parameter C-55  
daylight\_savings parameter C-55  
dedicated\_address parameter C-55  
dedicated\_arguments parameter C-55  
dedicated\_port parameter C-56  
default\_session\_mode parameter C-56  
default\_zone\_list parameter C-56  
dhcp\_broadcast parameter C-57  
dialout command  
  reference C-143  
dialout -l command C-144  
disabled\_modules parameter C-57  
disabling  
  modules C-57  
do\_compression parameter C-58  
dumpboot command C-12  
  arguments for C-13

## E

echo command C-14  
echo parameter C-58  
edit command  
  reference C-144  
enable\_security parameter C-58  
erase\_char parameter C-58  
erase\_line parameter C-59  
erase\_word parameter C-59  
erpcd C-239 to C-243  
  command syntax C-239  
  description of C-239  
  supported arguments C-240, C-241, C-242  
eservices file C-239



## F

facility\_num parameter C-59  
fg command  
    arguments C-145  
    reference C-145  
filter list command C-146  
forward\_key parameter C-59  
forwarding\_count parameter C-60  
forwarding\_timer parameter C-60

## G

group\_value parameter C-61

## H

hangup command  
    reference C-147  
hardware\_tabs parameter  
    asynchronous port C-61  
    configuring for parallel printer C-61  
help command C-14 to C-15  
    arguments for C-14  
    reference, for CLI C-147  
host\_table\_size parameter C-61  
hosts superuser command  
    arguments C-151  
    reference C-151  
hosts user command  
    arguments C-150  
    command display C-149  
    reference C-149  
    status field definitions C-150

## I

image\_name parameter C-62  
imask\_7bits parameter C-62  
inactivity\_timer parameter C-62  
inet\_addr parameter C-63  
input\_flow\_control parameter C-63  
input\_is\_activity parameter C-64  
input\_start\_char parameter C-64

input\_stop\_char parameter C-64  
interface command C-16  
ip\_forward\_broadcast parameter C-65  
ipencap\_type parameter C-64  
ipso\_class parameter C-65  
ipx  
    command C-152  
ipx\_do\_checksum parameter C-65  
ipx\_dump\_password parameter C-66  
ipx\_dump\_path parameter C-66  
ipx\_dump\_username parameter C-66  
ipx\_file\_server parameter C-66  
ipx\_frame\_type parameter C-66  
ipx\_security parameter C-67  
ixany\_flow\_control parameter C-67

## J

jobs command  
    reference C-152

## K

keep\_alive\_timer parameter C-67  
key values  
    option\_key C-82  
kill command  
    arguments C-153, C-155  
    reference C-153

## L

lat\_key parameter C-67, C-141  
lat\_queue\_max parameter C-68  
latb\_enable parameter C-68  
line\_erase parameter C-68  
load\_broadcast parameter C-69, C-139  
load\_dump\_gateway parameter C-69  
load\_dump\_sequence parameter C-69, C-226  
    valid options for C-69  
local\_address parameter  
    asynchronous port C-70  
location parameter C-70  
lock command

- reference C-153
- lock\_enable parameter C-70
- login\_password parameter C-70
- login\_port\_password parameter C-71
- login\_prompt parameter C-71
- login\_timeout parameter C-71
- long\_break parameter C-72
- loose\_source\_route parameter C-72
- ls command
  - reference C-154

**M**

- map parameter C-73
- map\_to\_lower parameter C-73
- map\_to\_upper parameter
  - asynchronous port C-74
  - parallel port C-74
- map3270 file C-215, C-221
- max\_chap\_chall\_int parameter C-74
- max\_session\_count parameter C-74
- max\_vcli parameter C-75
- metric parameter
  - asynchronous port C-75
- min\_unique\_hostnames parameter C-75
- mode parameter
  - configuring for asynchronous port C-75
- modem command
  - reference C-155
- modem\_set parameter C-22
- mop\_password parameter C-77
- more command
  - reference C-157
- motd\_file parameter C-78
- multicast\_timer parameter C-78
- multisessions\_enable (Annex) parameter C-78
- multisessions\_enable (asynchronous port)
  - parameter C-78
- mv command
  - reference C-157

## N

na

- annex command C-6 to C-8
- boot command C-8 to C-10
- broadcast command C-10
- command notation C-2 to C-5
- commands C-1 to C-32
  - introduction to C-1
  - list of C-5
  - list of arguments for C-3
- copy command C-11
- dumpboot command C-12
- echo command C-14
- help command C-14 to C-15
- interface command C-16
- list of commands C-318 to C-320
- password command C-17
- port command C-17
- printer command C-19
- quit command C-19
- read command C-19
- reset command C-21 to C-23, C-230
- set command C-24
- show command C-25 to C-29
- write command C-31

- name\_server\_1 parameter C-79
- name\_server\_2 parameter C-79
- nameserver\_broadcast parameter C-79
- need\_dsr parameter C-79
- net\_inactivity parameters C-80
- net\_inactivity\_units parameter C-80
- netstat command
  - arguments C-159
  - reference C-158 to C-160
- network\_turnaround parameter C-81
- newline\_terminal parameter C-81
- node\_id parameter C-82

## O

- option\_key parameter C-126, C-216, C-229

- output\_flow\_control parameter C-82
- output\_is\_activity parameter C-83
- output\_start\_char parameter C-84
- output\_stop\_char parameter C-84
- output\_ttl parameter C-84

## P

parameter

- conventions C-33 to C-37
- descriptions C-37 to C-120
- entering values C-34
- setting to supplied defaults C-35 to C-37
  - all parameters C-37
  - Annex parameters C-35
  - asynchronous port parameters C-36
  - interface parameters C-35
  - parallel printer port parameters C-36

parity parameter C-84

passwd command

- reference C-161

passwd file C-242

passwd\_limit parameter C-85

password command C-17

password parameter C-85

phone\_number parameter C-86

ping command

- fields displayed by ping -t option C-167
- reference C-161 to C-170
- sample displays using -a and -v options C-164
- using ping -t (traceroute) option C-165
- with count argument C-163

ping -t command C-165 to C-170

- command displays C-168

- topology for ping -t examples C-168

port command C-17

- supported keywords for C-18

port\_password parameter

- asynchronous port C-86

- setting when using SecurID C-86

port\_server\_security parameter C-86

ppp command

- display C-170

- reference C-170

ppp\_acm parameter C-87

ppp\_ipx\_network parameter C-89

ppp\_ipx\_node parameter C-89

ppp\_mru parameter C-90

ppp\_password\_remote parameter C-90

ppp\_security\_protocol parameter

- asynchronous port C-91

ppp\_username\_remote parameter

- synchronous port C-91

pref\_dhcp1\_addr parameter C-92

pref\_dhcp2\_addr parameter C-92

pref\_dump\_addr parameter C-92

pref\_load\_addr parameter C-93

pref\_mop\_host parameter C-93

pref\_name1\_addr parameter C-93

pref\_name2\_addr parameter C-93

pref\_secure1\_host parameter C-94

pref\_secure2\_host parameter C-94

printer command C-19

printer\_crlf parameter C-94

printer\_host parameter C-94, C-230

printer\_name parameter C-95, C-230

printer\_width parameter C-95

procs command

- Annex-specific processes C-173

- arguments C-171

- command display C-172

- reference C-171

prompt parameter C-95

ps\_history\_buffer parameter C-96

## Q

queue command C-174 to C-176

- arguments C-175

- command display C-175

- examples C-176

- reference C-174 to C-176

quit command C-19

## R

- read command C-19
- redisplay\_line parameter C-96
- remote\_address parameter
  - synchronous port C-96
- reset command C-21 to C-23
  - keywords for C-23
- reset t1 command C-21
- reset\_idle\_time\_on parameter C-96
- reset\_internal\_modem command C-21
- resume session command C-126
- retrans\_limit parameter C-97
- ring parameter C-97
- rip\_accept parameter C-97
  - valid options for C-97
- rip\_advertise parameter C-98
  - valid options for C-98
- rip\_auth parameter C-98
- rip\_default\_route parameter C-98
- rip\_horizon parameter C-99
- rip\_next\_hop parameter C-99
- rip\_recv\_version parameter C-99
- rip\_routers parameter C-100
- rip\_send\_version parameter C-100
  - valid options for C-100
- rip\_sub\_accept parameter C-100
- rip\_sub\_advertise parameter C-101
- rlogin command
  - reference C-176
- rm command
  - reference C-177
- ROM monitor commands
  - list of C-325
- route command
  - arguments C-178
  - reference C-177 to C-179
- routed parameter C-101
- rtelnet -t command C-246
- rtelnet utility C-244 to C-246
  - command syntax C-244
  - description of C-244

- supported arguments C-244, C-245
- rwhod parameter C-101

## S

- security\_broadcast parameter C-101
- serial line
  - displaying statistics C-185
- server\_capability parameter C-102
- server\_name parameter C-102
- service\_limit parameter C-102
- services command
  - arguments C-180
  - command display C-182
  - examples C-181
  - reference C-180 to C-183
- session\_limit parameter C-103
- set command C-24, C-37
- shadow file C-243
- short\_break parameter C-103
- show annex command
  - keywords for C-26, C-27
- show command C-25 to C-29, C-37
- show interface command
  - keywords C-27, C-39
- show port command
  - keywords for C-28
- show printer command
  - keyword C-39
- sigproto parameter C-103
- slip command
  - display C-183
  - reference C-183
- slip\_allow\_dump parameter C-104
- slip\_load\_dump\_host parameter C-104
- slip\_mtu\_size parameter C-104
- slip\_no\_icmp parameter C-104
- slip\_ppp\_security parameter C-105
- slip\_tos parameter C-105
- SNMP
  - for configuring Annex parameters C-33
- speed parameter C-105





- parallel printer port C-117
- type\_of\_modem parameter C-118, C-155

## U

- user\_name parameter C-118, C-230
- utilities C-235 to C-246
  - erpcd daemon C-239
  - rtnet daemon C-244

## V

- vcli\_groups parameter C-118
- vcli\_password parameter C-119
- vcli\_security parameter C-119
- VMS
  - environments C-126
    - non-privileged Annex VMS
      - commands C-126, C-127
    - privileged Annex VMS commands C-127 to C-132

## W

- who command
  - arguments C-232
  - command display C-233
  - reference C-231 to C-233
- write command C-31, C-34

## Z

- zone parameter C-120

