

Monitoring and Managing Connections

This chapter describes how to monitor and manage your network connections. The “Monitoring Connections” section describes the **show** commands and procedures that you use to monitor network devices and activities, including showing the status of all sessions or active ports on the networking hardware. The “Managing Connections” section describes session management activities.

Monitoring Connections

This section describes the **show** commands and procedures used to monitor network devices and activities for the supported transmission protocols listed below.

These **show** commands are grouped by protocol topics:

- Monitoring Commands Generic to All Protocols
- LAT Show Commands
- TCP/IP Show Command
- XRemote Show Commands
- Protocol Translation Show Command

Note The various **show** commands described in this section are only a subset of the available monitoring commands for each protocol. For information about additional monitoring commands for a given protocol, refer to the command reference publication for your server.

Enter all monitoring commands at the user EXEC prompt.

Monitoring Commands Generic to All Protocols

This section describes the following commands, which are generic to all connection protocols:

- **show sessions** and **where**
- **show hosts**
- **show users** and **systat**
- **show entry**
- **show terminal**

show sessions and where

You can display information about open LAT, Telnet, or rlogin connections by issuing either of the following commands:

show sessions

where

The information that will be displayed includes the host name, address, number of unread bytes for the user to see, idle time, and connection name.

Sample Display

The following is sample output from the **show sessions** command:

```
sloth# show sessions
Conn Host                Address                Byte    Idle  Conn Name
  1 MATHOM                192.31.7.21           0       0    MATHOM
* 2 CHAFF                 131.108.12.19         0       0    CHAFF
```

The asterisk (*) indicates the current terminal session.

Table 6-1 describes significant fields shown in the display.

Table 6-1 Show Sessions Field Descriptions

Field	Description
Conn	Name or address of the remote host to which the connection is made
Host	Remote host to which the router is connected through a Telnet session
Address	IP address of the remote host
Byte	Number of unread bytes for the user to see on the connection
Idle	Interval (in minutes) since data was last sent on the line
Conn Name	Assigned name of the connection

show hosts

Use the **show hosts** command to display the default domain name, the style of name lookup service, a list of name server hosts, and the cached list of host names and addresses on the network to which you can connect.

show hosts

Sample Display

The following is a sample display from the **show hosts** output:

```
sloth# show hosts
Default domain is CISCO.COM
Name/address lookup uses domain service
Name servers are 255.255.255.255
Host          Flag      Age   Type      Address(es)
SLAG.CISCO.COM (temp, OK) 1     IP        131.108.4.10
CHAR.CISCO.COM (temp, OK) 8     IP        192.31.7.50
CHAOS.CISCO.COM (temp, OK) 8     IP        131.108.1.115
DIRT.CISCO.COM (temp, EX) 8     IP        131.108.1.111
DUSTBIN.CISCO.COM (temp, EX) 0     IP        131.108.1.27
DREGS.CISCO.COM (temp, EX) 24    IP        131.108.1.30
```

Table 6-2 describes significant fields shown in the display.

Table 6-2 Show Hosts Field Descriptions

Field	Description
Flag	A temporary entry is entered by a name server; the server removes the entry after 72 hours of inactivity. A permanent entry is entered by a configuration command and is not timed out. Entries marked OK are believed to be valid. Entries marked ?? are considered suspect and subject to revalidation. Entries marked EX are expired.
Age	Indicates the number of hours since the router last referred to the cache entry.
Type	Identifies the type of address, for example, IP, CLNS, or X.121. If you used the ip hp-host global configuration command, the show hosts command displays these host names as type HP-IP.
Address(es)	Shows the address of the host. One host can have up to eight addresses.

show users and systat

You can display information about the active lines on the server. Issue either of the following commands:

show users [all]

systat [all]

These commands display the same information, including the line number, connection name, idle time, and terminal location.

Syntax Description

all (Optional) Specifies that all lines be displayed, regardless of whether anyone is using them.

Sample Display

The following is sample output from the **show users** command:

```
sleepy# show users
      Line      User      Host(s)      Idle Location
      0 con 0
*    2 vty 0      rose      idle        0 BASHFUL.CISCO.COM
```

The following is sample output from the **show users all** command:

```
sleepy# show users all
      Line      User      Host(s)      Idle Location
*    0 vty 0      rose      idle0        BASHFUL.CISCO.COM
      1 vty 1
      2 con 0
      3 aux 0
      4 vty 2
```

The asterisk (*) indicates the current terminal session.

Table 6-3 describes significant fields shown in the displays.

Table 6-3 Show Users Field Descriptions

Field	Description
Line	Contains three subfields, as the first entry indicates. The first subfield (0 in the sample) is the absolute line number. The second subfield (vty) indicates the type of line. Possible values follow: <ul style="list-style-type: none"> con—Console aux—Auxiliary port tty—Asynchronous terminal port vty—Virtual terminal The third subfield (0 in the current line (*) sample) indicates the relative line number within type.
User	User using the line. If no user is listed in this field, no one is using the line.
Host(s)	Host to which the user is connected (outgoing connection). A value of idle indicates no outgoing connection to a host.
Idle	Interval (in minutes) since the user has typed something.
Location	Either the hard-wired location for the line or, if there is an incoming connection, the host the incoming connection is from.

show entry

Use the **show entry** command to display the list of queued host-initiated connections to a server. You can use this command to determine which LAT hosts have queue entries for printers on servers.

show entry

Sample Display

The following is sample output from the **show entry** command:

```
sloth# show entry
1 waiting 0:02:22 for port 5 from LAT node BLUE
2 waiting 0:00:32 for port 5 from LAT node STELLA
```

The display shows that two LAT connections are waiting for access to port 5. The list is ordered so that the lower-numbered entry, which has waited longer, gets to use the line next. The display shows how long each connection attempt has been waiting, for which port, and the user's name.

Table 6-4 describes the fields in the first line of output shown in the display.

Table 6-4 Show Entry Field Descriptions

Field	Description
1	Number assigned to the queued connection attempt
waiting 0:02:22	Interval (hours:minutes:seconds) the connection attempt has been waiting
for port 5	Port for which the connection attempt is waiting
from LAT node BLUE	Name of the user attempting to make the connection

show terminal

You can display information about the current terminal line such as the line number, line status, modem state, and special characters set. This can be useful for changing lines to match expected settings using the local terminal parameter-setting tasks described in the “Changing Terminal Parameters” chapter later in this publication. To display local terminal settings, issue the following command:

```
show terminal
```

The display includes a comprehensive report on the terminal settings in effect, including the preferred transport protocol.

Note In screen output examples showing two caret (^) symbols together, the first caret represents the Control key and the second caret represents the keystroke sequence Shift-6. The double caret combination (^) means hold down the Control key while you press the Shift and the 6 key.

Sample Display

The following is sample output from the **show terminal** command:

```
sloth# show terminal
Line 2, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600
Status: Ready, Active, No Exit Banner
Capabilities: Enabled
Modem state: Ready
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
                ^^x   none  -     -     none
Timeouts:      Idle EXEC  Idle Session  Modem Answer  Session  Dispatch
                never   never         0:00:15      not imp  not set
Session limit is not set.
Allowed transports are telnet rlogin. Preferred is telnet
No output characters are padded
```

The first three lines of output shown in the display follow:

```
Line 2, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600
```

Table 6-5 describes the fields in the first three lines of **show terminal** output.

Table 6-5 Show Terminal Field Descriptions—First Three Lines of Output

Field	Description
Line	Current terminal line
Location	Location of the current terminal line, as specified by the location configuration command
Type	Type of the current terminal line, as specified by the line global configuration command
Length	Length of the terminal display
Width	Width of the terminal display
Baud rate (TX/RX)	Transmit rate/receive rate of the line

The following line of output indicates the status of the line:

```
Status: Ready, Active, No Exit Banner
```

In this example, Ready, Active, and No Exit Banner are possible values for the Status field.

Table 6-6 shows all possible values for the Status field.

Table 6-6 Show Terminal Field Description—Status Field

Field	Description
Active	A process is actively using the line.
Autobauding	The line is running the autobaud process.
Carrier Dropped	Some sense of “carrier” was dropped, so the line process should be killed.
Connected	The line has at least one active connection.
Dialing Out	A DDR asynchronous interface is dialing a remote site on the line.

Field	Description
Echo Off	The line is not echoing what the user types in (because a password must be entered, for example).
Escape Started	The first character of the escape sequence was typed.
Escape Typed	Both characters of the escape sequence have been typed.
Hanging Up	The line state is “hanging up.”
Hardware XON/XOFF	The line uses a UART that supports XON/XOFF flow control in hardware. This does not mean that the line is currently using software flow control.
Hold Typed	The user typed the “hold character” (and the line is paused).
Idle	The line modem state is “idle.”
Idle Timeout	An idle timeout has occurred.
Input Stopped	The input was turned off due to hardware flow control or overflow.
No Exit Banner	The normal exit banner will not be displayed on this line.
PSI Enabled	The line is paying attention to typed escape characters.
Rcvd BREAK	A BREAK sequence was received on the line.
Rcvd Command	The line has received a special command sequence (^B for SEND BREAK, for example).
Rcvd CR	The last character received was a carriage return.
Ready	The line state is “ready.”
Ring Transition	There was a transition on the RING signal of the line.
Send Break Soon	A BREAK must be sent on the line soon.
Send XOFF Soon	The buffers are full and an XOFF must be sent soon.
Sending Break	A BREAK sequence is in the process of being sent on the line.
Sent XOFF	The buffers were full, so an XOFF was sent.
Async Mode	The line is running SLIP or PPP.

The following line of output indicates the status of the capabilities of the line; these capabilities correspond closely to configurable parameters that can be set using configuration commands.

```
Capabilities: Enabled
```

Table 6-7 describes possible values for the Capabilities field.

Table 6-7 Show Terminal Field Descriptions—Capabilities Field

Field	Descriptions
Autobaud Full Range	Corresponds to the autobaud line configuration command
Character Padding	At least one pad configuration command was used
Enabled	The user has “enabled” successfully
EXEC Suppressed	Corresponds to the no exec configuration command
Hangup on Last Close	Corresponds to the autohangup line configuration command
Hardware Flowcontrol In	Corresponds to the flowcontrol hardware in line configuration command
Hardware Flowcontrol Out	Corresponds to the flowcontrol hardware out line configuration command
Insecure	Corresponds to the insecure line configuration command

Field	Descriptions
Lockable	Corresponds to the lockable line configuration command
Modem Callin	Corresponds to the modem callin line configuration command
Modem Callout	Corresponds to the modem callout line configuration command
Modem CTS-Required	Corresponds to the modem cts-required line configuration command
Modem DTR-Active	Corresponds to the modem dtr-active line configuration command
Modem RI is CD	Corresponds to the modem ri-is-cd line configuration command
No Login Banner	Corresponds to the no exec-banner line configuration command
Notification Set	Corresponds to the notify line configuration command
Output Non-Idle	Corresponds to the session-timeout N output line configuration command
Permanent Async	Corresponds to the dedicated-async line configuration command
Private Line	Corresponds to the private line configuration command
Refuse Suppress-GA	Corresponds to the telnet refuse line configuration command
Receives Logging Output	Corresponds to the monitor configuration line configuration command
Refuse Telnet Echo	Corresponds to the telnet refuse line configuration command
Send BREAK on IP	Corresponds to the telnet break-on-ip line configuration command
SLIP allowed	Corresponds to the slip address xxxx line configuration command
Software Flowcontrol In	Corresponds to the flowcontrol software in line configuration command
Software Flowcontrol Out	Corresponds to the flowcontrol software out line configuration command
Telnet Transparent Mode	Corresponds to the telnet transparent line configuration command

The following line of output indicates the modem state. Possible values include Autobauding, Carrier Dropped, Hanging Up, Idle, and Ready.

```
Modem state: Ready
```

The following lines of output indicate the special characters that can be entered to activate various terminal operations. Where two caret (^) symbols are shown together, the first caret represents the Control key and the second caret represents the keystroke sequence Shift-6. The double caret combination (^) means hold down the Control key while you press the Shift and the 6 key. The none or hyphen (-) values imply that no special characters are set.

```
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
                ^x    none  -    -        none
```

The following lines of output indicate the timeout values that have been configured for the line:

```
Timeouts:      Idle EXEC    Idle Session  Modem Answer  Session  Dispatch
               never      never         0:00:15      not imp  not set
```

Table 6-8 describes the fields in the preceding lines of output.

Table 6-8 Show Terminal Field Descriptions—Timeouts Fields

Field	Descriptions
Idle EXEC	Interval the EXEC command interpreter waits for user input before resuming the current connection, or if no connections exist, returning the terminal to the idle state and disconnecting the incoming session. This interval is set using the exec-timeout line configuration command.
Idle Session	Interval that the server waits for traffic before closing the connection to a remote computer and returning the terminal to an idle state. This interval is set using the session-timeout line configuration command.
Modem Answer	Interval during which the server raises DTR in response to RING and the modem response to CTS. This interval is set using the modem answer-timeout line configuration command.
Session	Not implemented in this release.
Dispatch	Number of milliseconds the server waits after putting the first character into a packet buffer before sending the packet. This interval is set using the dispatch-timeout configuration command.

The following lines of output indicate how various options have been configured:

```

Session limit is not set.
Allowed transports are telnet rlogin. Preferred is telnet
No output characters are padded

```

LAT Show Commands

This section describes the following commands, which monitor LAT connections:

- **show service**
- **show lat services**
- **show lat sessions**

show service

Use the **show service** command to display specific LAT learned services:

```
show service [service-name]
```

Syntax Description

service-name (Optional) Name of a specific LAT service.

The **show service** command without a service name displays a list of known LAT learned services. When entered with the *service-name* argument, it displays a more detailed status of the named service. If no LAT learned service by the specified name is known, a lookup is done for an IP host of that name.

Sample Display

The following is sample output from the **show service** command:

```

cs> show service
Service Name  Status      Identification
BLUE          Available  Welcome to VAX/VMS V5.4
CHAOS         Available
MRL12         Available
MUDDY-RIVER   Available
STELLA-BLUE   Available  Welcome to VAX/VMS V5.4
    
```

The following is sample output from the **show service** command for a specified service:

```

cs> show service blue

Service BLUE - Available
Node Name  Status  Rating  Identification
BLUE      reachable 84      Welcome to VAX/VMS V5.4
    
```

Table 6-9 describes significant fields shown in the two previous displays.

Table 6-9 Show Service Field Descriptions

Field	Description
Service Name	Name of the service.
Status	Status of the service: Available or Unknown when the command is entered without a service name. Available, Unknown, Initializing, or Unreachable when the command is entered with a service name.
Identification	Identification string.
Node Name	Name of the nodes advertising the service.
Rating	Rating of the service: An integer from 0 to 255, with the highest number being the preferred service. Used for load balancing.

show lat services

Use the **show lat services** command on a server to display information on learned LAT services.

show lat services

Sample Display

The following is sample output from the **show lat services** command:

```

sloth# show lat services
Service Name  Rating  Interface  Node (Address)
ABCDEFGHIJ    5       Ethernet0  CONFUSED (0000.0c00.391f)
GLAD          84      Ethernet0  BLUE (aa00.0400.9205)
  Ident: Welcome to Big Blue Gateway
WHEEL        83      Ethernet0  WHEEL (aa00.0400.9005)
ZXYW         5       Ethernet0  CONFUSED (0000.0c00.391f)
    
```

Table 6-10 describes significant fields shown in this display.

Table 6-10 Show LAT Services Field Descriptions

Field	Description
Service Name	LAT service name.
Rating	Rating of the service. If a single service is provided by more than one host, the server connects to the one with the highest rating.
Interface	Interface type.
Node	Connection address.
(Address)	Advertised identification for the service.

show lat sessions

The EXEC command **show lat sessions** displays active LAT sessions. The command has the following syntax:

```
show lat sessions [line-number]
```

Syntax Description

line-number (Optional) Shows an active LAT session on a specific line.

Sample Display

The following is sample output from the **show lat sessions** command. In this example, information about all active LAT sessions is displayed. The output is divided into three sections for each session (in this case two): TTY data, session data, and remote node data.

```
cs> show lat sessions
tty0, connection 1 to service TERM1
TTY data:
  Name "0", Local usage 1/0, Remote usage disabled
  Flags: Local Connects, Enabled
  Type flags: none
  Config flags: -FlowOut, -FlowIn, Parameter Info
  Flow control ^S/^Q in ^S/^Q out, Mode Normal, Parity None, databits 8
  Groups: 0
Session data:
  Name TERM1, Remote Id 1, Local Id 1
  Remote credits 2, Local credits 0, Advertised Credits 2
  Flags: none
  Max Data Slot 255, Max Attn Slot 255, Stop Reason 0
Remote Node data:
Node "TERM1", Address 0000.0C00.291F, usage 1
  Timer 59, sequence 5, changes 159, flags 0x0, protocol 5.1
  Recv 56/22/83, Xmit 41/23/14, 0 Dups, 0 ReXmit
  Groups: 0
tty10, connection 1 to service ENG2
TTY data:
  Name "10", Local usage 1/0, Remote usage disabled
  Flags: Local Connects, Enabled
  Type flags: none
  Config flags: -FlowOut, +FlowIn, Set Parameters, 0x40000000
  Flow control ^S/^Q in ^S/^Q out, Mode Normal, Parity None, databits 8
  Groups: 0
Session data:
  Name ENG2, Remote Id 1, Local Id 1
  Remote credits 1, Local credits 0, Advertised Credits 2
  Flags: none
  Max Data Slot 255, Max Attn Slot 255, Stop Reason 0
Remote Node data:
Node "ENG2", Address AA00.0400.34DC, usage 1
  Timer 179, sequence 60, changes 255, flags 0x0, protocol 5.1
  Recv 58/29/186, Xmit 50/36/21, 0 Dups, 0 ReXmit
  Groups: 0
```

The following sample output displays information about active LAT sessions on one line, line 10. The output is divided into three sections: TTY data, session data, and remote node data.

```
cs# show lat sessions 10
tty10, connection 1 to service ENG2
TTY data:
  Name "10", Local usage 1/0, Remote usage disabled
  Flags: Local Connects, Enabled
  Type flags: none
  Config flags: -FlowOut, +FlowIn, Set Parameters, 0x40000000
  Flow control ^S/^Q in ^S/^Q out, Mode Normal, Parity None, databits 8
  Groups: 0
Session data:
  Name ENG2, Remote Id 1, Local Id 1
  Remote credits 1, Local credits 0, Advertised Credits 2
  Flags: none
  Max Data Slot 255, Max Attn Slot 255, Stop Reason 0
Remote Node data:
Node "ENG2", Address AA00.0400.34DC, usage 1
  Timer 189, sequence 61, changes 247, flags 0x0, protocol 5.1
  Recv 60/29/186, Xmit 52/36/21, 0 Dups, 0 ReXmit
  Groups: 0
```

Table 6-11 describes the screen output for the preceding two examples.

Table 6-11 Show LAT Session Status Display Field Descriptions

Field	Description
TTY data	Summary of the LAT-oriented terminal-line specific data.
Name	Name used for this port as a port identification string. The name is reported to remote systems, which may display it in some operating-system dependent manner. This value is also used for targets of host-initiated connections. Currently, this value is hard-wired to be the line number of the associated terminal line.
Local/Remote usage	Current status of the terminal. The number is reported as current/maximum, where current is the current number of sessions of a given type, and maximum is the maximum number of sessions allowed, or zero if there is no maximum. If a terminal is being used for outgoing sessions, the local usage is equal to the number of current LAT sessions. If the terminal is being used for incoming sessions, local usage will be disabled, and the remote count and maximum will be one.
Flags	Current state of the line, and whether there are any queued host-initiated connections.
Type flags	Report flags not used in the current software release.
Config flags	Current port state as reflected by the most recent configuration message exchange.
Flow control	Lists set flow control characters.
Groups	Group code list currently in use for the line.
Session data	Reports various parameters about the connection.
Name	For the outbound connection, the name of the remote service to which it is connected. For inbound connections, this field is currently unused.
Remote/Local ID	Slot IDs being used to uniquely identify the session multiplexed over the underlying LAT virtual circuit.
Remote/Local/Advertised credits	Number of flow control credits that the server will be sending to the host as soon as possible. The advertised credits are the number of credits that have already been extended.
Flags	Transient conditions in the LAT state machine dealing with the current connection status.
Max Data Slot	Maximum number of characters that can be sent in a single data slot.
Max Attn Slot	Maximum amount of data that can be sent in an attention message because current LAT implementations only send one-byte attention messages (attention messages are used to flush buffered output); a nonzero value means that remote data flushing can be used; a zero means that it cannot.
Stop Reason	Reason the session was stopped, if it was stopped but not deleted. This value is usually zero, indicating that the session has not been stopped yet. If a session persists for a long time with a nonzero stop reason, this generally indicates a problem in the local LAT software.
Remote Node data	Reports information about the remote node. The data includes the same fields as those from the show lat nodes output.
Node	Node name as reported by the host computer.
Address	MAC address of the node's Ethernet interface.
usage	Number of virtual circuits currently active to the node.

Field	Description
Timer	Number of seconds remaining until the node's service advertisement message will time out; this value is set to three times the nodes multicast timer value whenever a new service advertisement message is received.
sequence	Sequence number received in the last service advertisement message received. Nodes increment their sequence number when the contents of the service advertisement change.
changes	Internal representation of what changed in the multicast message the last time the sequence number changed.
flags	Internal representation of various state information about the node.
protocol	LAT protocol version used by the node.
Recv and Xmit	Number of messages, slots, and bytes received or transmitted to the node. The number of messages is the number of LAT virtual circuit messages. Each virtual circuit message contains some number of slots, which contain actual terminal data or control information.
Dups	Number of duplicate virtual circuit messages received.
ReXmit	Number of virtual circuit messages retransmitted.
Groups	Group codes advertised by the node's service advertisement message.

TCP/IP Show Command

This section describes the **show tcp** command.

show tcp

Use the **show tcp** command to display the status of a TCP connection.

show tcp [*line-number*]

Syntax Description

line-number (Optional) Displays (in octal) the status of the TCP connections for a particular line.

Sample Display

The following is sample output from the **show tcp** command:

```
sloth# show tcp
con0 (console terminal), connection 1 to host MATHOM
Connection state is ESTAB, I/O status: 1, unread input bytes: 1
Local host: 192.31.7.18, 33537 Foreign host: 192.31.7.17, 23
Enqueued packets for retransmit: 0, input: 0, saved: 0
Event Timers (current time is 2043535532):
Timer:      Retrans  TimeWait  AckHold   SendWnd   KeepAlive
Starts:      69        0         69        0         0
Wakeups:     5         0         1         0         0
Next:       2043536089  0         0         0         0
iss: 2043207208 snduna: 2043211083 sndnxt: 2043211483  sndwnd: 1344
irs: 3447586816 rcvnxt: 3447586900 rcvwnd: 2144 delrcvwnd: 83
RTTO: 565 ms, RTV: 233 ms, KRTT: 0 ms, minRTT: 68 ms, maxRTT: 1900 ms
ACK hold: 282 ms
Datagrams (max data segment is 536 bytes):
Rcvd: 106 (out of order: 0), with data: 71, total data bytes: 83
Sent: 96 (retransmit: 5), with data: 92, total data bytes: 4678
```

Table 6-12 describes the following lines of output shown in the display:

```
con0 (console terminal), connection 1 to host MATHOM
Connection state is ESTAB, I/O status: 1, unread input bytes: 1
Local host: 192.31.7.18, 33537 Foreign host: 192.31.7.17, 23
Enqueued packets for retransmit: 0, input: 0, saved: 0
```

Table 6-12 Show TCP Field Descriptions—First Section of Output

Field	Description
con0	Line number.
(console terminal)	Location string.
connection 1	Number identifying the TCP connection.
to host MATHOM	Name of the remote host to which the connection is made.
Connection state is ESTAB	<p>A connection progresses through a series of states during its lifetime. The states include the following:</p> <ul style="list-style-type: none"> • LISTEN—Waiting for a connection request from any remote TCP and port. • SYNSENT—Waiting for a matching connection request after having sent a connection request. • SYNRCVD—Waiting for a confirming connection request acknowledgment after having both received and sent a connection request. • ESTAB—Indicates an open connection; data received can be delivered to the user. This is the normal state for the data transfer phase. • FINWAIT1—Waiting for a connection termination request from the remote TCP, or an acknowledgment of the connection termination request previously sent. • FINWAIT2—Waiting for a connection termination request from the remote TCP host.

Field	Description
	<ul style="list-style-type: none"> • CLOSEWAIT—Waiting for a connection termination request from the local user. • CLOSING—Waiting for a connection termination request acknowledgment from the remote TCP host. • LASTACK—Waiting for an acknowledgment of the termination request previously sent to the remote TCP host. • TIMEWAIT—Waiting for enough time to pass to be sure the remote TCP host has received the acknowledgment of its connection termination request. • CLOSED—Indicates no connection state at all. <p>For more information, see RFC 793, <i>Transmission Control Protocol Functional Specification</i>.</p>
I/O status: 1	Number describing the internal status of the connection.
unread input bytes: 1	Number of bytes that the lower-level TCP processes have read, but the higher-level TCP processes have not yet processed.
Local host: 192.31.7.18	IP address of the network server.
33537	Local port number, as derived from the following equation: <i>line-number + (512 * random-number)</i> . The line number uses the lower nine bits; the other bits are random.
Foreign host: 192.31.7.17	IP address of the remote host to which the TCP connection was made.
23	Destination port for the remote host.
Enqueued packets for retransmit: 0	Number of packets waiting on the retransmit queue. These are packets on this TCP connection that have been sent but not yet acknowledged by the remote TCP host.
input: 0	Number of packets waiting on the input queue to be read by the user.
saved: 0	Number of received out-of-order packets waiting for all packets comprising the message to be received before they enter the input queue. For example, if packets 1, 2, 4, 5, and 6 have been received, packets 1 and 2 would enter the input queue, and packets 4, 5, and 6 would enter the saved queue.

The following line of output shows the current time according to the system clock of the local host.

```
Event Timers (current time is 2043535532):
```

The following lines of output display the number of times that various local TCP timeout values were reached during this connection. In this example, the router retransmitted 69 times because it received no response from the remote host, and it transmitted an ACK many more times because there was no data on which to piggyback. Table 6-13 describes the fields in the following lines of output:

```

Timer:      Retrans  TimeWait  AckHold   SendWnd   KeepAlive
Starts:      69      0         69        0         0
Wakeups:     5       0         1         0         0
Next:      2043536089      0         0         0         0
    
```


Table 6-13 Show TCP Field Descriptions—Second Section of Output

Field	Description
Timer	Names of the timers in the display.
Retrans	Determines how long a transmitted frame can remain unacknowledged before the server polls for an acknowledgment.
TimeWait	Determines how long the local TCP connection waits to be sure the remote TCP host has received the acknowledgment of its connection termination request.
AckHold	Number of times the system failed to piggyback data on required a TCP acknowledgment. Such piggybacking can significantly reduce network traffic.
SendWnd	Timers have to do with sending “zero window probes.” Essentially, this field reflects how often users send more data to the remote host than it can handle in the time it takes users to send it. For most normal server applications, this value will likely stay zero.
KeepAlive	Determines the frequency (in seconds) at which the server sends messages to itself (Ethernet and Token Ring) or to the other end (serial) to ensure that a network interface is alive. The keepalive interface configuration command is used to set this timer.
Starts	Number of times the timer was started during this connection.
Wakeups	Number of keepalives that have been transmitted without receiving any response. This field is reset to zero when a response is received.
Next:	System clock setting that triggers the next time this timer will go off.

The following lines of output display the sequence numbers that TCP uses to ensure sequenced, reliable transport of data. The server and remote host each use these sequence numbers for flow control and to acknowledge receipt of datagrams. Table 6-14 describes the fields in this output.

```
iss: 2043207208 snduna: 2043211083 sndnxt: 2043211483 sndwnd: 1344
irs: 3447586816 rcvnxt: 3447586900 rcvwnd: 2144 delrcvwnd: 83
```

Table 6-14 Show TCP Field Descriptions—Sequence Numbers

Field	Description
iss: 2043207208	Initial send sequence number.
snduna: 2043211083	Last send sequence number the server has sent but for which it has not received an acknowledgment.
sndnxt: 2043211483	Sequence number the router will send next.
sndwnd: 1344	TCP window size of the remote host.
irs: 3447586816	Initial receive sequence number.
rcvnxt: 3447586900	Last receive sequence number the server has ACKed.
rcvwnd: 2144	The server’s TCP window size.
delrcvwnd: 83	Delayed receive window—data the server has read from the connection, but has not yet subtracted from the receive window the router has advertised to the remote host. The value in this field gradually increases until it is larger than a full-sized packet, at which point it is applied to the rcvwnd field.

The following lines of output show the values that the router uses to keep track of transmission times so that TCP can adjust to the network it is using. Table 6-15 describes the fields in this output.

```
RTTO: 565 ms, RTV: 233 ms, KRTT: 0 ms, minRTT: 68 ms, maxRTT: 1900 ms
ACK hold: 282 ms
```

Table 6-15 Show TCP Field Descriptions—Line Beginning with RTTO

Field	Descriptions
RTTO: 565 ms	Round-trip timeout.
RTV: 233 ms	Variance of the round-trip time.
KRTT: 0 ms	New round-trip timeout (using the Karn algorithm). This field separately tracks the round trip time of packets that have been retransmitted.
minRTT: 68 ms	Smallest recorded round-trip timeout (hard wire value used for calculation).
maxRTT: 1900 ms	Largest recorded round-trip timeout.
ACK hold: 282 ms	Time the server will delay an ACK in order to piggyback data on it.

For more information on these fields, refer to the article “Round Trip Time Estimation,” P. Karn & C. Partridge, ACM SIGCOMM-87, August 1987.

Table 6-16 describes the fields in the following lines of output:

```
Datagrams (max data segment is 536 bytes): 4761
Rcvd: 106 (out of order: 0), with data: 71, total data bytes: 83
Sent: 96 (retransmit: 5), with data: 92, total data bytes: 4678
```

Table 6-16 Show TCP Field Descriptions—Last Section of Output

Field	Description
Datagrams	Datagrams sent and received on the line
Rcvd	Number of datagrams the local host has received during this connection (and the number of these datagrams that were out of order)
with data	Number of datagrams that contained data
total data bytes	Total number of bytes of data in the transmitted datagrams
Sent (and retransmitted)	Number of datagrams the local host sent during this connection (and the number of these datagrams that had to be retransmitted)
with data	Number of transmitted datagrams that contained data
total data bytes	Total number of bytes of data in the transmitted datagrams

XRemote Show Commands

This section lists the following commands, with which you monitor XRemote connections:

- **Show xremote**
- **Show xremote line**

show xremote

You can use the command **show xremote** to list XRemote connections and monitor XRemote traffic through the networking hardware. This command provides XRemote parameters applied to the entire system as well as statistics that are pulled for all active XRemote connections. The syntax for this command is as follows:

```
show xremote
```

The following is sample output from the **show xremote** command:

```

CS> show xremote
XRemote server-wide parameters:
  Font buffersize:      72000           Font retries: 3
  Font memory errors:  0

TFTP font load statistics for host 131.108.1.111:
  Bytes read:          2697239         Files read: 258
  Network errors:      4               File errors: 0

LAT font load statistics for service WHEEL, incarnation 5:
  Bytes read           182401         Files read: 14
  Protocol errors:     0             Insufficient memory: 0

XRemote statistics for tty2:
  Current clients:      9             Total clients: 17
  Requesting client:    5             Current request size: 0
  Replying client:      6             Current reply size: 0
  XDM state:           10            Next timeout: 172460
  Retransmit counter:  0             Local UDP port: 53616
  Keepalive dormancy:  180           Session id: 94
  Unread input:        0             Unwritten output: 0
  Input buffer size:   1024          Output buffer size: 108
  Protocol version:    2             Line state: Connected
  Transmit packets:    50768         Receive packets: 49444
  Transmit errors:     0             Receive errors: 37
  Retransmissions:     403           Receive out of sequence: 76
  Round trip time:     383           Retransmit interval: 766
  Transmit window:     7             Receive window: 7
  Transmit next:       6             Receive next: 3
  Transmit unacked:    6             Receive unacked: 0

Connection 0 - TCP connection from 131.108.1.55 [Display Manager]
  Client state:        CS_ACTIVE      Byte order: MSBfirst
  Unread input:        0             Unwritten output: 0
  Input buffer size:   1024          Output buffer size: 1024

Connection 1 - TCP connection from 131.108.1.55
  Client state:        CS_ACTIVE      Byte order: MSBfirst
  Unread input:        0             Unwritten output: 0
  Input buffer size:   1024          Output buffer size: 1024

Connection 2 - TCP connection from 131.108.1.55
  Client state:        CS_ACTIVE      Byte order: MSBfirst
  Unread input:        0             Unwritten output: 0
  Input buffer size:   1024          Output buffer size: 1024

Connection 3 - LAT connection from WHEEL
  Client state:        CS_ACTIVE      Byte order: LSBfirst
  Unread input:        0             Unwritten output: 0
  Input buffer size:   1024          Output buffer size: 1024

```

Table 6-17 describes the fields shown in the sample output.

Table 6-17 Show XRemote Field Descriptions

Field	Description
XRemote server-wide parameters	XRemote parameters that apply to the server
Font buffersize	XRemote font buffer size, as specified using the xremote tftp buffersize global configuration command
Font retries	Number of retries the font loader (host) will attempt before declaring an error condition
Font memory errors	Number of font memory error conditions that have been declared for the server
TFTP font load statistics	XRemote statistics for fonts that have been loaded from a TFTP font server at the IP address shown
Bytes read	Number of bytes the host read in order to load the fonts
Files read	Number of files the host read in order to load the fonts
Network errors	Errors that arise from TFTP network connection failures
File errors	Bad-format font file errors
Protocol errors	LAT font loading protocol errors when talking to the font server on VMS
XRemote statistics for tty	XRemote statistics for the specified line
Current clients	Number of clients using this line for active Xremote sessions
Total clients	Number of clients using this line for active Xremote sessions
Requesting client	Number of clients requesting Xremote service
Retransmit counter	Number of times that an Xremote connection request was retransmitted
Local UDP port	Number assigned to the local UDP port
Keepalive dormancy	Amount of time between keepalive messages
Client state	XRemote state.
Byte order	Byte ordering used between the X Server (the X Terminal) and the X Client (the UNIX host)
LSBfirst	Little Endian byte ordering
MSBfirst	Big Endian byte ordering

show xremote line

You can use the command **show xremote line** with a line number to list XRemote connections and monitor XRemote traffic for specific lines on a server. The syntax for this command is as follows:

```
show xremote line number
```

Syntax Description

number Decimal value representing virtual terminal lines on a server.

The following is sample output from a **show xremote line** command when XRemote is enabled on a communication or access server and XRemote sessions are active. Only information about an individual terminal line is provided. Table 6-17 describes the fields in the display:

```

CS# show xremote line 3
Xremote statistics for tty3:
Current clients:      11                Total clients: 19
Requesting client:   10                Current request size: 0
Replying client:     10                Current reply size: 0
XDM state:          10                Next timeout: 173304
Retransmit counter: 0                 Local UDP port: 28384
Keepalive dormancy: 180               Session id: 29
Unread input:       0                 Unwritten output: 0
Input buffer size:  1024              Output buffer size: 108
Protocol version:   2                 Line state: Connected
Transmit packets:   28875              Receive packets: 18644
Transmit errors:    0                 Receive errors: 13
Retransmissions:    53                Receive out of sequence: 41
Round trip time:    384                Retransmit interval: 768
Transmit window:    7                 Receive window: 7
Transmit next:      2                 Receive next: 7
Transmit unacked:   2                 Receive unacked: 0

Connection 0 - TCP connection from 131.108.1.27 [Display Manager]
Client state:      CS_ACTIVE           Byte order: MSBfirst
Unread input:     0                   Unwritten output: 0
Input buffer size: 1024                Output buffer size: 1024

Connection 1 - TCP connection from 131.108.1.27
Client state:      CS_ACTIVE           Byte order: MSBfirst
Unread input:     0                   Unwritten output: 0
Input buffer size: 1024                Output buffer size: 1024

Connection 2 - TCP connection from 131.108.1.27
Client state:      CS_ACTIVE           Byte order: MSBfirst
Unread input:     0                   Unwritten output: 0
Input buffer size: 1024                Output buffer size: 1024

```

Protocol Translation Show Command

This section describes the **show x25 pad** command.

show x25 pad

Use the **show x25 pad** command to display information about current open connections. This information includes packet transmissions, X.3 parameter settings, and information about the current status of virtual circuits. The syntax for this command is as follows:

```
show x25 pad
```

Sample Display

The following is sample output from the **show x25 pad** command:

```
sloth# show x25 pad
tty2, Incoming PAD connection
Total input: 61, control 6, bytes 129. Queued: 0 of 7 (0 bytes).
Total output: 65, control 6, bytes 696.
Flags: 1, State: 3, Last error: 1
ParamsIn: 1:1, 2:0, 3:2, 4:1, 5:1, 6:0, 7:21,
          8:0, 9:0, 10:0, 11:14, 12:0, 13:0, 14:0, 15:1,
          16:127, 17:21, 18:18, 19:0, 20:0, 21:0, 22:0,
ParamsOut: 1:1, 2:1, 3:2, 4:1, 5:0, 6:0, 7:4,
           8:0, 9:0, 10:0, 11:14, 12:0, 13:0, 14:0, 15:0,
           16:127, 17:21, 18:18, 19:0, 20:0, 21:0, 22:0,
LCI: 1, State: D1, Interface: Serial0
Started 0:11:10, last input 0:00:16, output 0:00:16
Connected to 313700540651
Window size input: 7, output: 7
Packet size input: 512, output: 512
PS: 1 PR: 5 ACK: 5 Remote PR: 1 RCNT: 0 RNR: FALSE
Retransmits: 0 Timer (secs): 0 Reassembly (bytes): 0
Held Fragments/Packets: 0/0
Bytes 696/129 Packets 65/61 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Table 6-18 describes significant fields shown in the output in the display.

Table 6-18 Show X.25 Pad Field Descriptions

Field	Description
Total input/output	Number of packets received or sent for the connection.
Control	Number of packets with Qbit set (X.29 control packets).
Bytes	Number of bytes in each direction.
Queued	Number of unread packets waiting for the connection.
Waiting to send	Local data packet bit not sent (part of a line).
Flags, state, last error	Displays data for detecting errors and tracing initialization status. Only useful to your technical support personnel.
Params In	Parameters read from the PAD at the start of the connection.
ParamsOut	Active X.3 parameters.
The line beginning LCI:	Status of the X.25 virtual circuit associated with the PAD connection, and is the same display as for the show x25 vc command.

Managing Connections

This section describes the following connection management activities, which apply to all supported transmission protocols:

- Assign a Logical Name to a Connection
- Escape a Connection
- Set X.3 PAD Parameters
- Change a Login Name
- Lock Access to a Terminal
- Specify a TACACS Host

- Send Messages to Other Terminals
- Exit a Session
- Log Out of a Server
- Disconnect a Line

Assign a Logical Name to a Connection

You can assign a logical name to a connection. This can be useful for keeping track of multiple connections. To name a connection, issue the following command:

name-connection

You are prompted for the connection number and name to assign. The **where** command displays a list of the assigned logical connection names.

Escape a Connection

Escape a connection when you want to switch to another connection. Enter the escape sequence (Ctrl-^ X by default), to return to the system command prompt.

To make a new connection or switch between connections, refer to the “Terminal Service Connections” chapter earlier in this publication.

Set X.3 PAD Parameters

You can use both the **resume** command and the **x3** command to set X.3 PAD parameters. These parameters are numbered from 1 through 18. Table 6-19 describes these parameters and their values.

The **resume** command has the following syntax when setting X.3 parameters:

resume [*connection*] [*/set parameter:value*]

Syntax Description

connection (Optional) Name or number of the connection; the default is the most recent connection.

/set parameter:value (Optional) Sets PAD parameters for the protocol translator.

The **x3** command has the following syntax:

x3 *parameter:value*

Syntax Description

parameter:value Sets the PAD parameters.

Table 6-19 PAD Parameters

Parameter	Action	Value	Description
1	Escape from Data Transfer		Not supported.
2	Local Echo Mode	0	No local echo (incoming PAD connection default).
		1	Local echo on (outgoing connection default).
3	Data Forward Character	0	None—full packet.
		1	Forward packet on receipt of an alphanumeric character.
		2	Forward packet on receipt of a RETURN (outgoing connection default).
		4	Forward packet on receipt of ESCAPE, BEL, ENQ, or ACK.
		8	Forward packet on receipt of DEL, CAN, or DC2.
		16	Forward packet on receipt of ETX or EOT.
		32	Forward packet on receipt of HT, LT, VT, or FF.
4	Idle Timer	0	No timer.
		1-255	Delay value in twentieths of a second (default for both connection types is 1).
5	Device Control		Not supported.
6	PAD Service Signals		Not supported.
7	Receipt of BREAK	0	Ignore the BREAK signal.
		1	Transmit an INTERRUPT packet to notify the remote host or another PAD that the BREAK signal was generated.
		2	Transmit a RESET packet to reset the virtual circuit.
		4	Transmit an X.29 break indication to the remote host, or to a PAD (outgoing connection default).
		8	Escape from data transfer mode.
		16	Discard output to the terminal by setting parameter 8 to a value of 1.
8	Discard Output	0	Normal data delivery to the terminal (outgoing connection default).
		1	Discard all output to the terminal; set by parameter 7.
9	Return Padding		Not supported.
10	Line Folding		Not supported.

Parameter	Action	Value	Description
11	Baud Rate	10	50 baud
		5	75 baud
		9	100 baud
		0	110 baud
		1	134.5 baud
		6	150 baud
		8	200 baud
		2	300 baud
		4	600 ¹ baud
		3	1200 baud
		7	1800 baud
		11	75/1200 ² baud
		12	2400 baud
		13	4800 baud
		14	9600 baud
		15	19200 baud
		16	48000 baud
		17	56000 baud
18	64000 baud		
12	Input Flow Control		Not supported.
13	Line Feed Insertion	0	Do not insert (outgoing connection default).
		1	Insert after transmitting RETURN to the terminal.
		2	Insert after echoing RETURN to the terminal.
		4	Insert after echoing RETURN to the remote host.
14	Line Feed Padding		Not supported.
15	Local Editing	0	Disables editing capabilities.
		1	Enables editing capabilities.
16	Character Delete	0-127	Select one ASCII character. Default is ASCII 127 (Del).
17	Line Delete	0-127	Select one ASCII character. Default is ASCII 21 (Ctrl-U).
18	Line Display	0-127	Select one ASCII character. Default is ASCII 18 (Ctrl-R).

1. 600 is the beginning of values that are PAD-type dependent.

2. 75 is from PAD; 1200 is to PAD.

Default Values

For outgoing connections, the X.3 parameters default to the following:

2:1, 3:2, 4:1, 7:4, 16:127, 17:21, 18:19

All other parameters default to zero, but can be changed using the **/set** switch with either the **resume** command or the **x3** command.

For incoming PAD connections, the software sends an X.29 SET PARAMETER packet to set only the following parameters:

```
2:0, 4:1, 7:21, 15:0
```

For a complete description of the X.3 PAD parameters, refer to the configuration guide or command reference manual for your server product.

Example

The following example illustrates how to reset the outgoing connection default for local echo mode on a router.

```
router> resume 3 /set 2:1
```

The `/set` switch sets the X.3 parameters defined by parameter number and value, separated by a colon.

Change a Login Name

You can change your login username if you must match outgoing access list requirements or other login prompt requirements. To change a login username, enter the **login** user EXEC command at the system prompt.

When you enter this command, the system prompts you for a username and password. Enter the new username and the original password. If the username does not match, but the password does, the session changes to the new username with which the **login** command attempt was made.

If no username and password prompt appears, your administrator did not specify that a username and password be required at login time. If both the username and password are entered correctly, the session becomes associated with the specified username.

When you access a system with TACACS security, you can enter your login name or specify a TACACS server by using the following command when the "Username:" prompt appears:

```
user @tacacs-server
```

The server must be one of the servers defined in a server configuration. For more information, refer to the "Specify a TACACS Host" section later in this chapter, or refer to the **tacacs-server host** command in the publications *Access and Communication Servers Command Reference* or *Protocol Translation Configuration Guide and Command Reference*.

If you do not specify a host, the server will try each of the TACACS servers in the list until it receives a response.

If you do specify a host and that host does not respond, no other TACACS server will be queried. The server will either deny access or behave according to the action specified by the **tacacs-server last-resort** command, if there is one configured.

If you specified a TACACS server host with the *user @tacacs-server* argument, the TACACS server specified will be used for all subsequent authentication or notification queries, with the possible exception of SLIP address queries.

Example

The following example shows how login usernames and passwords can be changed. In this case, a user currently logged on under the username “webster” attempts to change that login name to “sloan.” After entering the **login** command, the user enters the new username, but enters an incorrect password. Because the password does not match the original password, the system rejects the attempt to change the username.

```
CS> login
Username: sloan
Password:
% Access denied
Still logged in as "webster"
```

Next, the user attempts the login change again, with the user name “sloan,” but enters the correct (original) password. This time the password matches the current login information, the login username is changed to “sloan,” and the user is allowed access to the EXEC at the user-level.

```
CS> login
Username: sloan
Password:
cs>
```

Lock Access to a Terminal

You can prevent access to your session while keeping your connection open by setting up a temporary password. To lock access to the terminal, follow this procedure:

Step 1 Issue the **lock** command.

When you issue this command, the system prompts you for a password.

Step 2 Enter a password, which can be any arbitrary string.

The screen clears and displays the message “Locked.”

Step 3 To regain access to your sessions, re-enter the password.

The server honors session timeouts on a locked line. You must clear the line to remove this feature. The system administrator must set the line up to allow use of the temporary locking feature.

Specify a TACACS Host

You can specify a TACACS host when you dial in or use the **login** command. Only the specified host will be searched for user authentication information.

To specify the name of a TACACS host at login, issue the following command:

```
user @hostname
```

Syntax Description

@hostname Address or logical name of the TACACS host.

Example

In the following example, user Imran specifies the TACACS host host1 to authenticate the password.

```
george> login
Username: imran@host1
Translating "HOST1"...domain server (131.108.1.111) [OK]
```

Send Messages to Other Terminals

You can send messages to one or all terminal lines. A common reason for doing this is to inform users of an impending shutdown. To send a message to other terminals, issue the following command:

```
send {line-number | *}
```

Syntax Description

line-number Line number to which the message will be sent.

* Message will be sent to all lines.

The system prompts for the message, which can be up to 500 characters long. Enter **Ctrl-Z** to end the message. Enter **Ctrl-C** to abort the command.

Exit a Session

You can issue any of the following commands to terminate an active terminal session:

exit

quit

logout

Log Out of a Server

To log out of either a server, enter the following command at the server prompt:

Ctrl-]

When the telnet> prompt appears, type **quit**.

Disconnect a Line

To disconnect a line, issue the following command:

```
disconnect [connection]
```

Syntax Description

connection (Optional) Line to be disconnected.

Do not disconnect a line to end a session. Instead, log off the host, thus allowing the server to clear the connection. Then end the session. If you cannot log out of an active session, disconnect the line.