

LAT Configuration Commands

The Digital Equipment Corporation (Digital) Local Area Transport (LAT) protocol is the one used most often to connect to Digital hosts. LAT is a Digital-proprietary protocol. Cisco provides LAT technology licensed from Digital. This chapter describes the commands used to configure the LAT transmission protocol on the routers. For configuration information and examples, refer to the chapter “Configuring LAT” earlier in this publication.

access-class

To define restrictions on incoming and outgoing connections, use the **access-class** line configuration command. To remove the access-list number, use the **no** form of this command.

```
access-class number {in | out}  
no access-class number
```

Syntax Description

access-list-number Specifies an integer between 1 and 199 that defines the access list.

in Controls which nodes can make LAT connections into the server.

out Defines the access checks made on outgoing connections. (A user who enters a node name at the system prompt to initiate a LAT connection is making an outgoing connection.)

Default

Disabled

Command Mode

Line configuration

Usage Guidelines

This command defines access-list numbers that will then be used with the **lat access-list** command to specify the access conditions.

The value supplied for the *number* argument in both variations of the **access-class** command is used for all protocols supported by the router. If you are already using an IP access list, you must define LAT (and possibly X.25) access lists permitting connections to everything, to emulate the behavior of previous software versions.

When both IP and LAT connections are allowed from a terminal line and an IP access list is applied to that line with the **access-class** command, you must also create a LAT access list with the same number if you want to allow any LAT connections from that terminal. You can specify only one incoming and one outgoing access list number for each terminal line. When checking LAT access lists, if the specified list does not exist, the system denies all LAT connections.

Example

The following example configures an incoming access class on virtual terminal line 4:

```
line vty 4  
access-class 4 in
```

Related Command

lat access-list

clear entry

To delete an entry from the list of queued host-initiated connections, enter the **clear entry** EXEC command at the system prompt.

clear entry *number*

Syntax Description

number An entry number obtained from the **show entry** EXEC command.

Command Mode

EXEC

Example

The following example illustrates how to delete pending entry number 3 from the queue:

```
pt# clear entry 3
```

Related Command

show entry

lat access-list

To specify access conditions to nodes on the LAT network, use the **lat access-list** global configuration command. To remove a specified access-list number, use the **no** form of this command.

```
lat access-list number { permit | deny } nodename
no lat access-list number
```

Syntax Description

<i>number</i>	Specifies a number between 1 and 199 assigned to the line using the access-class line configuration command.
permit	Allows any matching node name to access the line.
deny	Denies access to any matching node name.
<i>nodename</i>	Specifies the name of the LAT node, with or without regular expression pattern matching characters, with which to compare for access. The UNIX-style regular expression characters allow for pattern matching of characters and character strings in the node name.

Default

No access conditions defined.

Command Mode

Global configuration

Usage Guidelines

Regular expressions are case sensitive. Because LAT node names are always in all capital letters, make sure you use only all capital-letter regular expressions.

Table 7-1 and Table 7-2 summarize pattern-matching and character-matching symbols and their use. A more complete description of the pattern matching characters is found in the appendix “Regular Expressions” later in this publication.

Table 7-1 **Pattern Matching**

Character	Description
\0	Replaces the entire original address.
\1..9	Replaces the strings that match the first through ninth parenthesized part of X.121 address.
*	Matches 0 or more sequences of the regular expressions.
+	Matches 1 or more sequences of the regular expressions.
?	Matches the regular expression of the null string.

Table 7-2 Character Matching

Character	Description
^	Matches the null string at the beginning of the input string.
\$	Matches the null string at the end of the input string.
\char	Matches <i>char</i> .
.	Matches any single character.

Examples

The following example illustrates how to enter a request to permit all packets destined for any LAT node named *WHEEL*:

```
lat access-list 1 permit WHEEL
```

The following example illustrates how to enter a request to deny all packets destined for any LAT node name beginning with the *BLDG1-* prefix:

```
lat access-list 2 deny ^BLDG1-
```

Related Command

access-class

lat enabled

To enable LAT, use the **lat enabled** interface configuration command. To disable LAT, use the **no** form of this command.

lat enabled
no lat enabled

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Interface configuration

Examples

The following example enables LAT on the Ethernet 0 interface:

```
interface ethernet 0
lat enabled
```

The following example disables LAT on the same Ethernet interface:

```
interface ethernet 0
no lat enabled
```

lat group-list

Use the **lat group-list** global configuration command to allow a name to be assigned to the group list. A group list is any combination of group names, numbers, or ranges. To remove the specified group list, use the **no** form of this command.

```
lat group-list groupname {number | range | all} [enabled | disabled]  
no lat group-list groupname {number | range | all} [enabled | disabled]
```

Syntax Description

<i>groupname</i>	Specifies a group code name.
<i>number</i>	Specifies a group code number. You can also enter both a group code name and group code numbers.
<i>range</i>	Specifies a hyphenated range of numbers.
all	Specifies the range from 0 to 255.
enabled	(Optional) Allows incremental changes to the list; that is, you can add a group code without retyping the entire command.
disabled	(Optional) Allows selective removal of a group code from the list.

Default

No group names are assigned to the list.

Command Mode

Global configuration

Usage Guidelines

Specifying a name for a group list simplifies the task of entering individual group codes. In other words, a name makes it easier to refer to a long list of group code numbers. The group list must already exist. Use the EXEC command **show lat groups** to see a list of existing groups.

Examples

The following example creates the new group named *stockroom* and defines it to include the group numbers 71 and 99:

```
lat group-list stockroom 71 99
```

The following example adds group code 101 to the group named *stockroom*:

```
lat group-list stockroom 101 enabled
```

The following example deletes the group named *Bldg-2*:

```
no lat group-list Bldg-2
```

Related Commands

lat out-group

lat service-group

lat host-buffers

To set the number of receive buffers that will be negotiated when the router is acting as a LAT host, use the **lat host-buffers** global configuration command. To return to the default of one receive buffer, use the **no** form of this command.

```
lat host-buffers receive-buffers  
no lat host-buffers receive-buffers
```

Syntax Description

receive-buffers An integer that specifies the number of receive buffers that will be negotiated. The argument can be any number between 1 and 128.

Default

1 receive buffer

Command Mode

Global configuration

Usage Guidelines

Before LAT Version 5.2, LAT allowed only one outstanding message at a time on a virtual circuit. This could limit the performance of large routers. For example, only one Ethernet packet of data could be in transit at a time. With LAT Version 5.2, nodes can indicate that they are willing to receive more than one message at a time. During virtual-circuit startup, each side communicates to the other how many outstanding messages it is willing to accept.

Example

The following example enables LAT and configures the LAT host to negotiate 100 receive buffers:

```
lat enabled  
lat host-buffers 100
```

Related Command

lat server-buffers

lat ka-timer

To set the rate of the keepalive timer, use the **lat ka-timer** global configuration command. To restore the default, use the **no** form of this command.

lat ka-timer *seconds*
no lat ka-timer

Syntax Description

seconds Timer rate in seconds.

Default

20 seconds

Command Mode

Global configuration

Usage Guidelines

The keepalive timer sets the rate that messages are sent in the absence of actual traffic between the router and the remote node. The server uses keepalive messages to detect when communication with a remote node is disrupted or when the remote node has crashed.

Example

The following example sets the keepalive timer to rate of five seconds:

```
lat ka-timer 5
```

lat node

To change the LAT node name without changing the system host name, use the **lat node** global configuration command.

lat node *node-name*

Syntax Description

node-name Name of the LAT node.

Default

No default LAT node name

Command Mode

Global configuration

Usage Guidelines

This command allows you to give the server a node name that is different than the host name. Use the EXEC command **show entry** to determine which LAT hosts have queue entries for printers on the servers. Use the EXEC command **clear entry** to delete entries from the queue.

Example

The following example specifies the LAT node name as *DEC2*:

```
lat node DEC2
```

Related Commands

clear entry

show entry

lat out-group

To define a group list for a line's outgoing user-initiated connections, use the **lat out-group** line configuration command.

```
lat out-group {groupname | number | range | all}
```

Syntax Description

<i>groupname</i>	Specifies a group code name.
<i>number</i>	Specifies a group code number. You can also enter both a group code name and group code numbers.
<i>range</i>	Specifies a hyphenated range of numbers.
all	Specifies the range from 0 to 255.

Default

The default group code number is 0.

Command Mode

Line configuration

Usage Guidelines

Use the EXEC command **show lat** to display group numbers. If the host node and router do not share a common group number, the host's services will not be displayed.

Use the command **lat out-group 0** to return to the default value of 0.

Example

The following example defines the services for lines 1 through 7, 10 through 17, and 20 through 24. Access to systems on the first set of lines is limited to groups 12 and 18 through 23; the second set is limited to group 12; the third set is limited to group codes 12, 18 through 23, and 44. All other lines use the default of group zero.

```
line 1 7
lat out-group 12 18-23
line 10 17
lat out-group 12
line 20 24
lat out-group 12 18-23 44
```

Related Commands

Two daggers (††) indicate that the command is documented in the *Cisco Access Connection Guide*.

```
terminal lat out-group††  
lat group-list
```

lat retransmit-limit

To set the number of times that LAT retransmits a message before declaring the remote system unreachable, use the **lat retransmit-limit** global configuration command. To restore the default retry value, use the **no** form of this command.

```
lat retransmit-limit number  
no lat retransmit-limit
```

Syntax Description

number Number of retries—any number between 4 and 255.

Default

8 retries

Command Mode

Global configuration

Usage Guidelines

Assigning larger values to the number of tries increases the robustness of the LAT service at the cost of longer delays when communications are disrupted. Because LAT generally retransmits messages once a second, the value is approximately the number of seconds that LAT connections will survive connection disruption.

If you bridge LAT, the message-retransmit limit should be set to at least 20 tries for LAT sessions to survive a worst-case spanning-tree reconfiguration, because bridging spanning-tree reconfiguration can take up to 15 seconds.

Example

The following example sets the retransmission limit to 30 tries, enough time to sustain the down time incurred when the system must reconfigure a spanning-tree topology:

```
lat retransmit-limit 30
```

lat server-buffers

To set the number of receive buffers that will be negotiated when the router is acting as a LAT server, use the **lat server-buffers** global configuration command. To return to the default of one receive buffer, use the **no** form of this command.

```
lat server-buffers receive-buffers  
no lat server-buffers receive-buffers
```

Syntax Description

receive-buffers Integer that specifies the number of receive buffers that will be negotiated. The argument can be any number between 1 and 128.

Default

1 receive buffer

Command Mode

Global configuration

Usage Guidelines

Before LAT Version 5.2, LAT allowed only one outstanding message on a virtual circuit at a time. This could limit the performance of large routers because only one Ethernet packet of data could be in transit at a time. With LAT Version 5.2, nodes can indicate that they are willing to receive more than one message at a time. During virtual-circuit startup, each side communicates to the other how many outstanding messages it is willing to accept.

Example

The following example enables LAT and configures the server to negotiate 25 receive buffers:

```
lat enabled  
lat server-buffers 25
```

Related Command

lat host-buffers

lat service autocommand

To associate a command with a service, use the **lat service autocommand** global configuration command. To remove the specified autocommand, use the **no** form of this command.

lat service *service-name* **autocommand** *command*
no lat service *service-name* **autocommand** *command*

Syntax Description

service-name Name of the service.
command Command to be associated with the service.

Default

No commands automatically associated with a service.

Command Mode

Global configuration

Usage Guidelines

When an inbound connection is received for the specified service, the command associated with the service is automatically executed instead of the user receiving a virtual terminal session.

TACACS or port passwords are bypassed for these services; only the LAT password is checked.

Note Do not use this option with the **rotary** keyword.

Example

The following example associates the command **telnet sartre** to the service *SARTRE*:

```
lat service SARTRE autocommand telnet sartre
```

lat service enabled

To enable inbound connections to the specified service and enable the advertisement of this service to routers on the network, use the **lat service enabled** global configuration command. To delete the named service, use the **no** form of this command.

lat service *service-name* **enabled**
no lat service *service-name* **enabled**

Syntax Description

service-name Name of the service.

Default

No services enabled

Command Mode

Global configuration

Usage Guidelines

In the simplest form, this command creates a service that gives connecting users access to a VTY port on the server.

Use the **enabled** keyword after commands that define a service so that users do not connect to a service before all the parameters are set.

Deleting a service does not disconnect existing connections.

Example

The following example illustrates how to enable inbound connections to the service *WHEEL*:

```
lat service WHEEL enabled
```


lat service ident

To set the LAT service identification for a specified service, use the **lat service ident** global configuration command. To remove the identification, use the **no** form of this command.

```
lat service service-name ident identification  
no lat service service-name ident
```

Syntax Description

service-name Name of the service.

identification Descriptive name (text only) that identifies the service.

Default

No LAT service identification set for specific services.

Command Mode

Global configuration

Usage Guidelines

The identification is advertised to other servers on the network and is displayed along with the list of name services on the LAN.

Example

The following example specifies the identification *Welcome to Gateway-A* on service *STELLA*:

```
lat service STELLA ident Welcome to Gateway-A
```

lat service password

To set up a LAT password for a service, use the **lat service password** global configuration command. To remove the password, use the **no** form of this command.

```
lat service service-name password password  
no lat service service-name password
```

Syntax Description

service-name Name of the service.

password Password.

Default

No default LAT service passwords

Command Mode

Global configuration

Usage Guidelines

The connecting user will be required to enter the password to complete the connection.

The password is obtained through the LAT password mechanism; routers running Software Release 8.1 or earlier do not support this capability. Any services protected in this manner cannot be connected by a device running 8.1 or earlier software.

Example

The following example specifies a service named *BLUE* and the password *secret*:

```
lat service BLUE password secret
```

lat service rating

To set a static service rating for the specified service, use the **lat service rating** global configuration command. To remove the service rating, use the **no** form of this command.

```
lat service service-name rating static-rating  
no lat service service-name rating
```

Syntax Description

<i>service-name</i>	Name of the service.
<i>static-rating</i>	Static service rating. The rating must be in the range of 1 to 255.

Default

Dynamic rating

Command Mode

Global configuration

Usage Guidelines

If this command is not entered, the router calculates a dynamic rating based on the number of free ports that can handle connections to the service. Setting a static rating overrides this calculation and causes the specified value to be used.

Example

The following example specifies a service rating of 84 on the service *WHEEL*:

```
lat service WHEEL rating 84
```

lat service rotary

To associate a rotary group with a service, use the **lat service rotary** global configuration command. To remove the association, use the **no** form of this command.

```
lat service service-name rotary group  
no lat service service-name rotary
```

Syntax Description

<i>service-name</i>	Name of the service.
<i>group</i>	Rotary group number.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

Establish rotary groups using line configuration commands and the **rotary** line configuration command.

When an inbound connection is received for this service, the router establishes a reverse-LAT connection to a terminal in that rotary group.

If the rotary option is not set, the connection will be to a virtual terminal session on the router.

Example

The following example creates a service called *MODEM* to establish a rotary group:

```
lat services MODEM rotary 1
```

Related Command

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

rotary†

lat service-announcements

To reenabLe LAT broadcast service announcements, use the **lat service-announcements** global configuration command. To disable the sending of LAT service announcements, use the **no** form of this command.

lat service-announcements
no lat service-announcements

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Global configuration

Usage Guidelines

If this command is enabled, the LAT code will periodically broadcast service advertisements. If the command is disabled, the LAT code will not send service announcements, so solicit information messages will have to be used to look up node information.

Note You should only disable service announcements if all of the nodes on the local-area network (LAN) support the service responder feature.

Example

The following example reenables the sending of broadcast service announcements:

```
lat service-announcements
```

Related Command

lat service-responder

lat service-group

To specify a group code mask to use when advertising all services for this node and to control incoming services, use the **lat service-group** global configuration command. To remove the group code mask specified, use the **no** form of this command.

```
lat service-group {groupname | number | range | all} [enabled | disabled]  
no lat service-group {groupname | number | range | all} [enabled | disabled]
```

Syntax Description

<i>groupname</i>	Specifies a group code name.
<i>number</i>	Specifies a group code number.
<i>range</i>	Specifies a hyphenated range of numbers between 0 and 255.
all	Specifies the range from 0 to 255.
enabled	(Optional) Allows incremental changes to the list; that is, you can add a group code without retyping the entire command.
disabled	(Optional) Allows selective removal of a group code from the list.

Default

If no service group is specified, the router defaults to advertising to group 0.

Command Mode

Global configuration

Usage Guidelines

When this command is written to nonvolatile memory (using the EXEC **write memory** command), the system looks for an exact match on a group code name. If it finds one, it uses that name in the command. Otherwise, it writes out a list of numbers, using the range syntax whenever possible.

Examples

The following example specifies groups 100 through 103, then defines engineering as the group code list to advertise:

```
lat group-list engineering 100-103  
lat service-group engineering enabled
```

The following example specifies the groups 1, 5, 20 through 36, and 52:

```
lat service-group 1 5 20-36 52
```

You can then enter the following command to add group 99:

```
lat service-group 99 enabled
```

Related Command
lat group-list

lat service-responder

To configure a node to act as proxy for other nodes when a solicit-information multicast message is received, use the **lat service-responder** global configuration command. To remove any proxy definition set up using the **lat service-responder** command, use the **no** form of this command.

lat service-responder
no lat service responder

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

Your router can be configured to support the service responder feature that is part of the latest LAT Version 5.2 specification.

Specifically, the DECserver90L+, which has less memory than other DECservers, does not maintain a cache of learned services. Instead, the DECserver90L+ solicits information about services as they are needed.

LAT Version 5.2 nodes can respond for themselves; LAT Version 5.1 nodes, for example VMS Version 5.4 or earlier nodes, cannot. Instead, a LAT Version 5.2 node configured as a service responder can respond in proxy for those LAT Version 5.1 nodes.

Your router can be configured as a LAT service responder. If all your nodes are LAT Version 5.2 nodes, you do not need to enable the service responder features.

Example

The following example configures a node to act as a proxy for a node when a solicit-information multicast message is received. The node configured with this command will respond to solicit messages.

```
lat service-responder
```

Related Command

lat service-announcements

lat service-timer

To adjust the time between LAT service advertisements, use the **lat service-timer** global configuration command.

lat service-timer *interval*

Syntax Description

interval Number of seconds between service announcements. Note that the granularity offered by this command is ten-second intervals, and the *interval* value is rounded up.

Default

20 seconds

Command Mode

Global configuration

Usage Guidelines

This command adjusts the time, in seconds, between LAT service announcements for services offered by the router. This is useful in large networks with many LAT services and limited bandwidth.

Example

The following example sets the interval between LAT service announcements to 11, and illustrates the rough granularity of the **lat service-timer** command:

```
! The time between LAT service announcements is set to 11. Because the
! granularity is in ten-second intervals, the actual time between announcements
! is 20 seconds.
lat service-timer 11
! 20 seconds between updates
lat service-timer 19
! 120 seconds between updates
lat service-timer 120
```

lat vc-sessions

To set the maximum number of sessions to be multiplexed onto a single LAT virtual circuit, use the **lat vc-sessions** global configuration command. To remove a prior session's definition set, use the **no** form of this command.

lat vc-sessions *number*
no lat vc-sessions *number*

Syntax Description

number Specifies the number of sessions that will be multiplexed onto a single LAT virtual circuit. This number cannot be greater than 255.

Default

255 sessions per virtual circuit

Command Mode

Global configuration

Usage Guidelines

Setting the number of sessions to a smaller number can increase throughput if there are a large number of sessions to one host, especially with terminal servers with many physical ports. It can also increase overhead if there is little traffic but a large number of sessions to the same host

Example

The following example sets the maximum number of sessions to be multiplexed onto a single LAT virtual circuit at 100:

```
lat vc-sessions 100
```

lat vc-timer

To set the interval of time LAT waits before sending traffic, use the **lat vc-timer** global configuration command. To remove a timer definition, use the **no** form of this command.

```
lat vc-timer milliseconds  
no lat vc-timer milliseconds
```

Syntax Description

milliseconds Timer value. Specifies the amount of time LAT will wait before sending traffic. Acceptable values are between 10 and 1000 milliseconds.

Default

80 milliseconds

Command Mode

Global configuration

Usage Guidelines

Smaller timer values increase the overhead on both the router and the host. However, you can use smaller values to correct buffer overflows, which happen when the router receives more data than it can buffer during a virtual-circuit timer interval.

Larger values increase the need for router buffering and can cause noticeable echoing delay. However, increased values can reduce traffic. In environments with slow bridging, retransmissions can be reduced if you increase the value to at least three times the worst-case, round-trip interval.

Example

The following example sets the time between transmitting messages to 500 milliseconds:

```
lat vc-timer 500
```

show entry

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

show entry

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show entry** command. The display shows that two LAT connections are waiting for access to port 5. The list is ordered so that the lower-numbered entry has been waiting longer, and will get to use the line next.

```
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
```

Table 7-3 describes the fields in the first line of output shown in the display.

Table 7-3 Show Entry Field Descriptions

Field	Description
1	Number assigned to the queued connection attempt
waiting 0:02:22	Interval (hours:minutes:seconds) during which 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 (BLUE) attempting to make the connection

show lat advertised

Use the **show lat advertised** EXEC command to display the LAT services a router offers to other systems running LAT on the network.

show lat advertised

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

Advertised services are created with the **lat service** configuration commands. The display includes the service rating, rotary group, if present, and whether or not the service is enabled for incoming connections.

Sample Display

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

```
sloth# show lat advertised

Service Name      Rating      Rotary  Flags
SARTRE            4(Dynamic)  None    Enabled
  Autocommand: telnet sartre
MODEMS            0(Dynamic)  12     Enabled
  Ident: SpaceBlazer modem services
RECLUSE           4(Dynamic)  None    Enabled
  Ident: white recluse...
```

The display shows output from a router, *RECLUSE*, which has three services defined: *SARTRE*, *MODEMS*, and *RECLUSE*.

Table 7-4 describes significant fields shown in the display.

Table 7-4 Show LAT Advertised Field Descriptions

Field	Description
Service Name	Lists the LAT service name.
Rating	Lists the static service rating set, if any.
Rotary	Lists the associated rotary service.
Flags	Lists whether or not a service is enabled.
Autocommand	Defines the autocommand associated with the service.
Ident	Lists the advertised identification for the service.

show lat groups

Use the **show lat groups** EXEC command to display the groups that were defined for a router using the **lat group-list** global configuration command.

show lat groups

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

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

```
sloth# show lat groups

Group Name      Len   Groups
cafeteria       3     13  15  23
engineering      7     55
manufacturing   10    70  71  72
```

Table 7-5 describes significant fields shown in the display.

Table 7-5 Show LAT Groups Field Descriptions

Field	Description
Group Name	Assigned group name
Len	Size of internal data structure used to contain the group code map
Groups	Group codes associated with the learned group

Related Command

lat group-list

show lat nodes

Use the **show lat nodes** EXEC command on a router to display information about all known LAT nodes.

show lat nodes

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

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

```
pt# show lat nodes

Node "CHAOS", usage -1, Interface Ethernet0, Address 0000.0c01.0509
  Timer 89, sequence 188, changes 131, flags 0x0, protocol 5.1
  Facility 0, Product code 0, Product version 0
  Recv 0/0/0, Xmit 0/0/0, 0 Dups, 0 ReXmit
  Bad messages: 0, Bad slots: 0, Solicits accepted: 0
  Solicits rejected: 0, Multiple nodes: 0
  Groups: 0
  Service classes: 1
Node "CONFUSED", usage -1, Local
  Timer 99, sequence 4, changes 151, flags 0x0, protocol 5.2
  Facility 0, Product code 0, Product version 0
  Recv 0/0/0, Xmit 0/0/0, 0 Dups, 0 ReXmit
  Bad messages: 0, Bad slots: 0, Solicits accepted: 0
  Solicits rejected: 0, Multiple nodes: 0
  Groups: 0
  Service classes: 1
Node "WOMBAT", usage -1, Interface Ethernet0, Address 0000.0cff.c9ed
  Timer 99, sequence 9, changes 159, flags 0x0, protocol 5.1
  Facility 0, Product code 0, Product version 0
  Recv 0/0/0, Xmit 0/0/0, 0 Dups, 0 ReXmit
  Bad messages: 0, Bad slots: 0, Solicits accepted: 0
  Solicits rejected: 0, Multiple nodes: 0
  Groups: 0
  Service classes: 1
Node "TARMAC", usage -1, Interface Ethernet0, Address 0000.0c02.c7c1
  Timer -10351, sequence 1, changes 131, flags 0x40, protocol 5.2
  Facility 0, Product code 0, Product version 0
  Recv 0/0/0, Xmit 0/0/0, 0 Dups, 0 ReXmit
  Bad messages: 0, Bad slots: 0, Solicits accepted: 0
  Solicits rejected: 0, Multiple nodes: 0
  Groups: 0
  Service classes: 1
```

Table 7-6 describes significant fields shown in the display.

Table 7-6 Show LAT Nodes Field Descriptions

Field	Description
Node	The node name as reported by the host computer.
usage	The number of virtual circuits currently active to this node.
Interface	Node interface type and number.
Address	The MAC address of the node's Ethernet interface.
Timer	The number of seconds remaining until this node's service announcements message will time out; this value is set to three times the nodes multicast timer value whenever a new service announcements is received.
sequence	The sequence number received in the last service announcements message received. Nodes increment their sequence number when the contents of the service advertisement change.
changes	The internal representation of what changed in the multicast message the last time the sequence number changed.
flags	The internal representation of various state information about the node.
protocol	The LAT protocol version used by the node.
Facility	The remote facility number.
Product code	The remote product code.
Product version	The remote product version.
Recv and Xmit	The 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. Bytes is the number of data bytes (input or output characters) exchanged.
Dups	The number of duplicate virtual-circuit messages received.
ReXmit	The number of virtual-circuit messages retransmitted.
Bad messages	The number of bad messages received.
Bad slots	The number of bad slots received.
Solicits accepted	The number of solicit-information requests accepted.
Solicits rejected	The number of solicit-information requests rejected.
Multiple nodes	The total of multiple nodes seen.
Groups	The list of group codes advertised by the node's service announcements.
Service classes	The number of service classes.

show lat sessions

Use the **show lat sessions** EXEC command on a router to display information on active LAT sessions.

show lat sessions [*line-number*]

Syntax Description

line-number (Optional) Use to display information about a single line.

Command Mode

EXEC

Sample Displays

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

```
orange# show lat sessions

tty0, connection 1 to service TERM1
TTY data:
  Name "0", Local usage 1/0, Remote usage disabled
  Flags: Local Connects, Enabled
  Command Mode 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
  Command Mode 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 display shows information about active LAT sessions on one line, line 10:

```

pt# 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
  Command Mode 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 7-7 describes the screen output for the preceding two examples. The output is divided into three sections: TTY data, session data, and remote node data. Where information on more than one session appears, there is a group of three sections for each session, preceded by a line identifying the session.

Table 7-7 Show LAT Sessions Field Descriptions

Field	Description
TTY data	Reports a summary of the LAT-oriented terminal-line specific data.
Name	Identifies the name used for a port as a port-identification string. This is reported to remote systems, which might display it in some operating-system dependent manner. This is also the value used for targets of host-initiated connections. Currently, this value is hard-wired to be the line number of the associated terminal line.
Local usage Remote usage	Indicate the current status of the terminal. The number is reported as <i>current/maximum</i> , where <i>current</i> is the current number of sessions of a given type, and <i>maximum</i> 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 will be 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	Indicate the current state of the line, and whether there are currently any queued host-initiated connections.
Command Mode flags	Report flags that are not currently used in this software release.
Config flags	Indicate the current port state as reflected by the most recent configuration message exchange.
Flow control	Lists set flow control characters.
Groups	Report the group code list currently in use for the line.
Session data	Reports various parameters about the connection.
Name	For outbound connections, indicates the name of the remote service to which the router is connected. For inbound connections, this field is currently unused.

Field	Description
Remote/Local Id	Report the slot IDs being used to uniquely identify the session multiplexed over the underlying LAT virtual circuit.
Remote/Local/advertised credits	List the number of flow control credits that the router will be sending to the host as soon as possible. The advertised credits are the number of credits that have already been extended.
Flags	Indicate transient conditions in the LAT state machine dealing with the current connection status.
Max Data Slot	Lists the maximum number of characters that can be sent in a single data slot.
Max Attn Slot	Lists the 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	Identifies the reason that the session was stopped, if it has been 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 period of 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.

show lat traffic

Use the **show lat traffic** EXEC command to display information on traffic and resource utilization statistics on all active lines of a router.

show lat traffic

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

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

```
sloth# show lat traffic

Local host statistics:
  0/100 circuits, 0/500 sessions, 1/500 services
  100 sessions/circuit, circuit timer 80, keep-alive timer 5
Recv:  335535 messages (2478 duplicates), 161722 slots, 1950146 bytes
       0 bad circuit messages, 3458 service messages (52 used)
Xmit:  182376 messages (2761 retransmit), 146490 slots, 36085 bytes
       1 circuit timeouts
Total:  23 circuits created, 38 sessions
```

Table 7-8 describes significant fields shown in the display.

Table 7-8 Show LAT Traffic Field Descriptions

Field	Description
Local host statistics	Information about the router
circuits	The current number and maximum support number of virtual circuits
sessions	The current and maximum number of sessions
services	The current number of known remote services, and the maximum supported
sessions/circuit	The number of sessions per virtual circuit supported by the software
circuit timer	The value of the virtual-circuit timer parameter defined by the lat vc-timer global configuration command
keep-alive timer	The value defined by the lat ka-timer global configuration command
Recv	Statistics about local node receive totals
messages	The total count of virtual circuit messages received
duplicates	The number of duplicate virtual circuit messages received
slots	The number of slots received
bytes	The actual number of data bytes received
bad circuit messages	The count of invalid messages received
service messages	The number of service announcements multicast messages received

Field	Description
used	The number of multicast messages that caused the local node information to be updated
Xmit	Various transmission totals
messages	The total number of virtual-circuit messages transmitted
etransmit	The number of virtual-circuit messages retransmitted due to the lack of an acknowledgment
slots	The number of data and control slots transmitted
bytes	The actual count of user data bytes transmitted
circuit timeouts	The count of times that a virtual circuit timed out because the remote node stopped responding (due to a node failure or communications failure)
Total	The count of virtual circuits and sessions that have existed since the router booted or rebooted

show node

Use the **show node** EXEC command to display information about LAT nodes.

```
show node [all | node-name] [counters | status | summary]
```

Syntax Description

all	(Optional) Specifies all nodes.
<i>node-name</i>	(Optional) Identifies the name of the node for which status is required.
counters	(Optional) Specifies the various node counters.
status	(Optional) Specifies detailed node status. This is the default if a node name is specified.
summary	(Optional) Specifies a status summary for the node. This is the default if no node name is specified.

Command Mode

EXEC

Usage Guidelines

show node command with no arguments is the same as entering **show node all summary**.

You can enter the **show node** command with either a specific node name or the keyword **all**, but not both.

You can enter the **show node** command with only one of the keywords **counters**, **status**, or **summary**. If you enter **show node** and two of these keywords without specifying a node name, the first keyword is treated as a node name, causing an error. If you enter **show node node-name** and two of these keywords, the second keyword will be treated as ambiguous.

The **show node** command with no further parameters shows a one-line summary of all known nodes. The **show node** command displays three different sets of information about a node: the node counters, the node status, or a one-line summary of the node status.

Note The **show node** command with a *node-name* argument but no **counters**, **status**, or **summary** keyword defaults to **show node node-name status**.

Sample Display with No Keywords

The following is sample output from the **show node** command with no further parameters (the same as **show node all summary**):

```
pt> show node

Node Name      Status      Identification
CHAOS          Reachable
MUDDY-RIVER    Reachable
```

```
TARMAC      Reachable
WHEEL       Reachable  Welcome to VAX/VMS V5.4-2
```

Table 7-9 describes significant fields shown in the display.

Table 7-9 Show Node with no Keywords Field Descriptions

Field	Description
Node Name	Lists the names of the nodes.
Status	Indicates whether the node is reachable or not.
Identification	Lists the identification string for the node.

Sample Display with a Node Name

The following is sample output from the **show node** output that defaults to **show node chaos status**. It results in a display of the detailed status of node *CHAOS*.

```
pt> show node chaos

Node: CHAOS      Address: 00-00-0C-01-05-09
LAT Protocol: V5.1  Data Link Frame Size: 1500
Identification:
Node Groups: 0
Service Name  Status      Rating  Identification
CHAOS        Available  80
```

Table 7-10 describes significant fields shown in the display.

Table 7-10 Show Node with the Node Name Specified Field Descriptions

Field	Description
Node	Lists the node name as reported by the host computer.
Address	Identifies the MAC address of the node's Ethernet interface.
LAT protocol	Lists the version of the LAT protocol used by the node.
Data Link Frame Size	Lists the size of the largest packet that can be sent to the LAT host.
Identification	Lists the identification string for the node.
Node Groups	Lists the group-code list that is advertised by the remote node in its service announcements.
Service Name	Lists the LAT service name.
Status	Indicates whether or not the node is currently available on the network.
Rating	Indicates the rating of the service: An integer from 0 to 255, with the highest number being the preferred service. Used for load balancing.

Sample Display with the Counters Keyword

The following is sample output for the counter information for a specific node.

```
pt> show node tarmac counters

Node: tarmac
Seconds Since Zeroed: 100 Multiple Node Addresses: 0
Messages Received: 0 Duplicates Received: 0
```

```
Messages Transmitted: 0 Messages Re-transmitted: 0
Slots Received: 0 Illegal Messages Received: 0
Slots Transmitted: 0 Illegal Slots Received: 0
Bytes Received: 0 Solicitations Accepted: 0
Bytes Transmitted: 0 Solicitations Rejected: 0
```

Additional Command Examples

In the following example, the keyword **status** is treated as the node name:

```
pt> show node status counters

Local -710- Node STATUS not known
```

In the following example, the keyword **counters** is treated as ambiguous:

```
pt> show node lager status counters

Local -702- Keyword "COUNTERS" not known or ambiguous
```


show service

Use the **show service** EXEC command on a router to display specific LAT learned services.

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

Syntax Description

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

Command Mode

EXEC

Usage Guidelines

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, then a lookup is done for an IP host of that name.

Sample Display

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

```
pt> 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 display shows sample **show service** output for a specific service.

```
pt> show service blue

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

Table 7-11 describes significant fields shown in the two previous displays.

Table 7-11 Show Service Field Descriptions

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