ATM and Layer 3 Switch Router Command Reference
For the Catalyst 8540 MSR, Catalyst 8510 MSR, and Lightstream 1010

Cisco IOS Release 12.1(26)EB

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Preface

This preface defines the audience for the *ATM and Layer 3 Switch Router Command Reference*, and describes how this publication should be used. Specific new or modified commands, as well as the features these commands represent, are found in the “New and Changed Information” section. This preface also explains the document conventions, and provides information on how to obtain related documentation.

Audience

This publication is intended as a standalone document for experienced network administrators who will be configuring and maintaining switches or switch routers, and who would also like to reference the commands. For less-experienced users who need to understand the tasks as well as the commands, it is intended as a companion guide to the *ATM Switch Router Software Configuration Guide*.

New and Changed Information

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<th>Platform Supported</th>
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<td>Access filters</td>
<td>Catalyst 8540 MSR, Catalyst 8510 MSR, LightStream 1010</td>
<td>This feature allows you to configure access control filters on soft PVC and soft PVP passive connections.</td>
<td>atm soft-vc (point-to-point), atm soft-vp, show atm soft-vc, show atm vc, show atm vp</td>
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<tr>
<td>Rules-based timers</td>
<td>Catalyst 8540 MSR, Catalyst 8510 MSR, LightStream 1010</td>
<td>This feature allows you to configure rules-based timers on soft PVC and soft PVP connections.</td>
<td>atm soft-vc (point-to-point), atm soft-vp, atm timer group, atm timer rule, show atm timer group, show atm timer rule, timer-rule</td>
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The *ATM Switch Router Command Reference* is organized alphabetically. Each chapter covers all commands that start with a particular letter, with the exception of Chapter 2, “ATM Commands,” and Chapter 18, “Show Commands.” Appendixes A through D contain information as described in the following table.

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<td>An up-to-date list of the acronyms used in this publication.</td>
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Document Conventions

Unless otherwise noted, all information in this document is relevant to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where certain information relates exclusively to specific switch routers, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Command descriptions use the following conventions (see Figure 1 for an example):

<table>
<thead>
<tr>
<th><strong>boldface</strong> font</th>
<th>Commands and keywords are in <strong>boldface</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>italic font</td>
<td>Arguments for which you supply values are in <em>italics</em>. In contexts that do not allow italics, arguments are enclosed in angle brackets (&lt; &gt;).</td>
</tr>
<tr>
<td>[ ]</td>
<td>Elements in square brackets are optional.</td>
</tr>
<tr>
<td>{ x</td>
<td>y</td>
</tr>
<tr>
<td>[ x</td>
<td>y</td>
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<tr>
<td>string</td>
<td>A nonquoted set of characters. Do not use quotation marks around the string, otherwise the string will include the quotation marks.</td>
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Screen examples use the following conventions:

<table>
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<tr>
<th>screen font</th>
<th>Terminal sessions and information the system displays are in <em>screen font</em>.</th>
</tr>
</thead>
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<tr>
<td><strong>boldface screen</strong> font</td>
<td>Information you must enter is in <strong>boldface screen</strong> font.</td>
</tr>
<tr>
<td>italic screen font</td>
<td>Arguments for which you supply values are in <em>italic screen</em> font.</td>
</tr>
<tr>
<td>^</td>
<td>The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.</td>
</tr>
<tr>
<td>&lt; &gt;</td>
<td>Nonprinting characters, such as passwords, are in angle brackets.</td>
</tr>
<tr>
<td>[ ]</td>
<td>Default responses to system prompts are in square brackets.</td>
</tr>
<tr>
<td>!, #</td>
<td>An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.</td>
</tr>
</tbody>
</table>

Notes use the following conventions:

| Note | Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication. |

Cautions use the following conventions:
Caution

Means reader be careful. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

This publication provides an in-depth description of the commands necessary for configuring and maintaining your ATM switch. It describes tasks only in the context of using a particular command; it does not describe how the tasks interrelate nor does it provide comprehensive configuration examples. You can use this publication as a standalone reference manual or in conjunction with the ATM Switch Router Software Configuration Guide.

Not all of the debug commands are included in this publication. For a complete guide to the debug commands, refer to the Debug Command Reference publication.

Some Cisco IOS commands are not currently supported on the ATM switch router, hence these commands and/or some of their parameters might not function as expected. In this document these commands can be found in Table D-5 of Appendix D, where they are listed in alphabetical order. Wherever possible, a reference document has been listed for further information on these commands.
Figure 1 explains the fields of a typical command reference page.

**Figure 1 Typical Command Reference Page**

- **Command name**: `cdp timer`
- **Brief description of command usage**: To specify how often your switch sends CDP updates, use the `cdp timer` global configuration command. Use the `no` form of this command to revert to the default setting.
- **Command syntax**: `cdp timer seconds`  
  `no cdp timer`
- **List of command arguments and keywords**: `seconds`  
  Specifies how often your switch sends CDP updates
- **Default configuration or value**: Default 60 seconds
- **Mode in which command is entered**: Command Mode  
  Global configuration
- **Guidelines about use and operation of the command or related commands**: Usage Guidelines  
  The trade-off with sending more frequent transmissions is obtaining up-to-date information at the expense of using network bandwidth more often.
- **Example of using the command**: Example  
  In the following example, CDP updates are sent from your switch every 80 seconds, which is less frequent than the default setting of 60 seconds. Make this change if you are concerned about preserving bandwidth.  
  ```
  Switch# cdp timer 80
  ```
- **Other commands to reference for related information**: Related Commands  
  `cdp holdtime`  
  `show cdp`
Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

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San Jose, CA 95134-9883
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Cisco Technical Support Website

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Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

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Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.
Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

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- The Cisco Product Catalog describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:
  http://cisco.com/univercd/cc/td/doc/pcat/

- Cisco Press publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:
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  http://www.cisco.com/packet

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  http://www.cisco.com/go/iqmagsazine

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:
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A Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

 Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

 Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
access-list (extended)

Currently, this command only supports the IP host. To define an extended IP access list, use the extended version of the access-list global configuration command. To remove the access lists, use the no form of this command.

```
access-list access-list-number [dynamic list-name [timeout value]] [deny | permit] protocol
source source-wildcard destination destination-wildcard [precedence precedence] [tos tos]
[log | log-input]
```

```
no access-list access-list-number
```

For ICMP, you can also use the following syntax:

```
access-list access-list-number [dynamic list-name [timeout value]] [deny | permit] icmp
source source-wildcard destination destination-wildcard [icmp-type [icmp-code] | icmp-message]
[precedence precedence] [tos tos] [log | log-input]
```

For TCP, you can also use the following syntax:

```
access-list access-list-number [dynamic list-name [timeout value]] [deny | permit] tcp
source source-wildcard [operator port [port]] destination destination-wildcard [operator port [port]]
[established] [precedence precedence] [tos tos] [log | log-input]
```

For UDP, you can also use the following syntax:

```
access-list access-list-number [dynamic list-name [timeout value]] [deny | permit] udp
source source-wildcard [operator port [port]] destination destination-wildcard [operator port [port]]
[precedence precedence] [tos tos] [log | log-input]
```

**Syntax Description**

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<td>access-list-number</td>
<td>Number of an access list. This is a decimal number from 100 through 199.</td>
</tr>
<tr>
<td>list-name</td>
<td>Name of a dynamic access list.</td>
</tr>
<tr>
<td>deny</td>
<td>Denies access if the conditions are matched.</td>
</tr>
<tr>
<td>permit</td>
<td>Permits access if the conditions are matched.</td>
</tr>
<tr>
<td>protocol</td>
<td>Name or number of an Internet protocol. It can be one of the keywords eigrp, gre, icmp, igmp, igrp ip, ipinip, nos, ospf, tcp, udp, or an integer in the range 0 through 255 representing an IP protocol number. To match any Internet protocol, including ICMP, TCP, and UDP, use the keyword ip. Some protocols allow further qualifiers described below.</td>
</tr>
<tr>
<td>source</td>
<td>Number of the network or host from which the packet is being sent. There are three ways to specify the source: Use a 32-bit quantity in 4-part dotted-decimal format. Use the keyword any as an abbreviation for a source and source-wildcard of 0.0.0.0 255.255.255.255. Use host source as an abbreviation for a source and source-wildcard of source 0.0.0.0.</td>
</tr>
</tbody>
</table>
**source-wildcard**

Wildcard bits to be applied to source. There are three ways to specify the source wildcard:

- Use a 32-bit quantity in 4-part dotted-decimal format. Place ones in the bit positions you want to ignore.
- Use the keyword any as an abbreviation for a source and source-wildcard of 0.0.0.0 255.255.255.255.
- Use host source as an abbreviation for a source and source-wildcard of source 0.0.0.0.

**destination**

Number of the network or host to which the packet is being sent. There are three ways to specify the destination:

- Use a 32-bit quantity in 4-part dotted-decimal format.
- Use the keyword `any` as an abbreviation for the destination and destination-wildcard of 0.0.0.0 255.255.255.255.
- Use `host destination` as an abbreviation for a destination and destination-wildcard of destination 0.0.0.0.

**destination-wildcard**

Wildcard bits to be applied to the destination. There are three ways to specify the destination wildcard:

- Use a 32-bit quantity in 4-part dotted-decimal format. Place ones in the bit positions you want to ignore.
- Use the keyword `any` as an abbreviation for a destination and destination-wildcard of 0.0.0.0 255.255.255.255.
- Use `host destination` as an abbreviation for a destination and destination-wildcard of destination 0.0.0.0.

**precedence**

Packets can be filtered by precedence level, as specified by a number from 0 to 7, or by name, as listed in the section “Usage Guidelines.”

**tos**

Packets can be filtered by type of service level, as specified by a number from 0 to 15, or by name, as listed in the section “Usage Guidelines.”

**icmp-type**

ICMP packets can be filtered by ICMP message type. The type is a number from 0 to 255.

**icmp-code**

ICMP packets which are filtered by ICMP message type can also be filtered by the ICMP message code. The code is a number from 0 to 255.

**icmp-message**

ICMP packets can be filtered by an ICMP message type name or ICMP message type and code name. The possible names are listed in the section “Usage Guidelines.”

**igmp-type**

IGMP packets can be filtered by IGMP message type or message name. A message type is a number from 0 to 15. IGMP message names are listed in the section “Usage Guidelines.”

**operator**

Compares source or destination ports. Possible operands include `lt` (less than), `gt` (greater than), `eq` (equal), `neq` (not equal), and `range` (inclusive range).

If the operator is positioned after the `source` and `source-wildcard`, it must match the source port.

If the operator is positioned after the `destination` and `destination-wildcard`, it must match the destination port.

The `range` operator requires two port numbers. All other operators require one port number.
**access-list (extended)**

The decimal number or name of a TCP or UDP port. A port number is a number from 0 to 65535. TCP and UDP port names are listed in the section “Usage Guidelines.”

TCP port names can only be used when filtering TCP. UDP port names can only be used when filtering UDP.

**established**

For the TCP protocol only; indicates an established connection. A match occurs if the TCP datagram has the ACK or RST bits set. The nonmatching case is that of the initial TCP datagram to form a connection.

**log**

Causes an informational logging message about the packet that matches the entry to be sent to the console. (The level of messages logged to the console is controlled by the `logging console` command.)

The message includes the access list number; whether the packet was permitted or denied; the protocol, whether it was TCP, UDP, ICMP or a number; and, if appropriate, the source and destination addresses and source and destination port numbers. The message is generated for the first packet that matches the entry and then at 5-minute intervals, including the number of packets permitted or denied in the prior 5-minute interval.

**log-input**

Log matches against this entry, including input interface.

**Defaults**

An extended access list defaults to a list that denies everything. An extended access list is terminated by an implicit deny statement.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You can use access lists to control the transmission of packets on an interface, control virtual terminal line access, and restrict contents of routing updates. The switch stops checking the extended access list after a match occurs.

Fragmented IP packets, other than the initial fragment, are immediately accepted by any extended IP access list. Extended access lists used to control virtual terminal line access or restrict contents of routing updates must not match against the TCP source port, the type of service value, or the packet’s precedence.

After an access list is created initially, any subsequent additions (possibly entered from the terminal) are placed at the end of the list. In other words, you cannot selectively add or remove access list command lines from a specific access list.

The following is a list of precedence names:

- **critical**—Match packets with critical precedence (5)
- **flash**—Match packets with flash precedence (3)
- `flash-override`—Match packets with flash override precedence (4)
- `immediate`—Match packets with immediate precedence (2)
- `internet`—Match packets with internetwork control precedence (6)
- `network`—Match packets with network control precedence (7)
- `priority`—Match packets with priority precedence (1)
- `routine`—Match packets with routine precedence (0)

The following is a list of TOS names:
- `max-reliability`—Match packets with max reliable TOS (2)
- `max-throughput`—Match packets with max throughput TOS (4)
- `min-delay`—Match packets with min delay TOS (8)
- `min-monetary-cost`—Match packets with min monetary cost TOS (1)
- `normal`—Match packets with normal TOS (0)

The following is a list of ICMP message-type names and ICMP message-type and code names:
- `administratively-prohibited`—Administratively prohibited
- `alternate-address`—Alternate address
- `conversion-error`—Datagram conversion
- `dod-host-prohibited`—Host prohibited
- `dod-net-prohibited`—Net prohibited
- `dscp`—Match packets with given dscp value
- `echo`—Echo (ping)
- `echo-reply`—Echo reply
- `general-parameter-problem`—Parameter problem
- `host-isolated`—Host isolated
- `host-precedence-unreachable`—Host unreachable for precedence
- `host-redirect`—Host redirect
- `host-tos-redirect`—Host redirect for TOS
- `host-tos-unreachable`—Host unreachable for TOS
- `host-unknown`—Host unknown
- `host-unreachable`—Host unreachable
- `information-reply`—Information replies
- `information-request`—Information requests
- `log`—Log matches against this entry
- `log in-put`—Log matches against this entry, including input interface
- `mask-reply`—Mask replies
- `mask-request`—Mask requests
- `mobile-redirect`—Mobile host redirect
- `net-redirect`—Network redirect
- `net-tos-redirect`—Net redirect for TOS
• **net-tos-unreachable**—Network unreachable for TOS
• **net-unreachable**—Network unreachable for TOS
• **network-unknown**—Network unknown
• **no-room-for-option**—Parameter required but no room
• **option-missing**—Parameter required but not present
• **packet-too-big**—Fragmentation needed and DF set
• **parameter-problem**—All parameter problems
• **port-unreachable**—Port unreachable
• **precedence**—Match packets with given precedence value
• **precedence-unreachable**—Precedence cutoff
• **protocol-unreachable**—Protocol unreachable
• **reassembly-timeout**—Reassembly timeout
• **redirect**—All redirects
• **router-advertisement**—Router discovery advertisements
• **router-solicitation**—Router discovery solicitations
• **source-quench**—Source quenches
• **source-route-failed**—Source route failed
• **time-exceeded**—All time exceededs
• **timestamp-reply**—Timestamp replies
• **timestamp-request**—Timestamp requests
• **tos**—Match packets with given TOS value
• **traceroute**—Traceroute
• **ttl-exceeded**—TTL exceeded
• **unreachable**—All unreachables

The following is a list of TCP port names that can be used instead of port numbers. Refer to the current Assigned Numbers RFC to find a reference to these protocols. Port numbers corresponding to these protocols can also be found by entering a ? in the place of a port number.

• **bgp**—Border Gateway Protocol (179)
• **chargen**—Character generator (19)
• **cmd**—Remote commands (rcmd, 514)
• **daytime**—Daytime (13)
• **discard**—Discard (9)
• **domain**—Domain Name Service (53)
• **echo**—Echo (7)
• **exec**—Exec (rsh, 512)
• **finger**—Finger (79)
• **ftp**—File Transfer Protocol (21)
• **ftp-data**—FTP data connections (used infrequently, 20)
The following is a list of UDP port names that can be used instead of port numbers. Refer to the current Assigned Numbers RFC to find a reference to these protocols. Port numbers corresponding to these protocols can also be found by entering a `?` in the place of a port number.

- **biff**—Biff (mail notification, comsat, 512)
- **bootpc**—Bootstrap Protocol (BOOTP) client (68)
- **bootps**—Bootstrap Protocol (BOOTP) server (67)
- **discard**—Discard (9)
- **dnsix**—DNSIX security protocol auditing (195)
- **domain**—Domain Name Service (DNS, 53)
- **echo**—Echo (7)
- **isakmp**—Internet Security Association and Key Management Protocol (500)
- **mobile-ip**—Mobile IP registration (434)
- **nameserver**—IEN116 name service (obsolete, 42)
- **netbios-dgm**—NetBios datagram service (138)
- **netbios-ns**—NetBios name service (137)
- **netbios-ss**—NetBios session service (139)

The following is a list of UDP port names that can be used instead of port numbers. Refer to the current Assigned Numbers RFC to find a reference to these protocols. Port numbers corresponding to these protocols can also be found by entering a `?` in the place of a port number.
- ntp—Network Time Protocol (123)
- pim-auto-rp—PIM Auto-RP (496)
- rip—Routing Information Protocol (router, in.routed, 520)
- snmp—Simple Network Management Protocol (161)
- snmptrap—SNMP Traps (162)
- sunrpc—Sun Remote Procedure Call (111)
- syslog—System Logger (514)
- tacacs—TAC Access Control System (49)
- talk—Talk (517)
- tftp—Trivial File Transfer Protocol (69)
- time—Time (37)
- who—Who service (rwho, 513)
- xdmcp—X Display Manager Control Protocol (177)

Examples
In the following example, serial interface 0 is part of a Class B network with the address 128.88.0.0, and
the mail host’s address is 128.88.1.2. The keyword established is used only for the TCP protocol to
indicate an established connection. A match occurs if the TCP datagram has the ACK or RST bits set,
which indicate that the packet belongs to an existing connection.

Switch(config)# access-list 102 permit tcp 0.0.0.0 255.255.255.255 128.88.0.0 0.0.255.255
established
access-list 102 permit tcp 0.0.0.0 255.255.255.255 128.88.1.2 0.0.0.0 eq 25
interface serial 0 ip access-group 102 in

The following example also permits DNS packets and ICMP echo and echo reply packets.

Switch(config)# access-list 102 permit tcp any 128.88.0.0 0.0.255.255 established
Switch(config)# access-list 102 permit tcp any host 128.88.1.2 eq smtp
Switch(config)# access-list 102 permit tcp any any eq domain
Switch(config)# access-list 102 permit udp any any eq domain
Switch(config)# access-list 102 permit icmp any any echo

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list (extended)</td>
<td>Used to define an extended IP access list, and only supports an IP host.</td>
</tr>
<tr>
<td>access-list (standard)</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>interface</td>
<td>Used to configure an interface type and enter interface configuration mode.</td>
</tr>
<tr>
<td>logging console</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>show access-lists</td>
<td>Used to display information about the access list.</td>
</tr>
<tr>
<td>show ip access-lists</td>
<td>Used to display the contents of all current IP access lists.</td>
</tr>
</tbody>
</table>
**access-template**

To create a temporary access list entry to the connected switch, use the `access-template` EXEC command.

```
access-template {access-list-number | dynamic-name} temp-list source-addr dest-addr timeout minutes
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list-number</td>
<td>Number of the dynamic access list (100 to 199).</td>
</tr>
<tr>
<td>dynamic-name</td>
<td>Name of the dynamic access list.</td>
</tr>
<tr>
<td>temp-list</td>
<td>Name of the temporary list within the access list.</td>
</tr>
<tr>
<td>source-addr</td>
<td>Source address in the dynamic access list.</td>
</tr>
<tr>
<td></td>
<td>The keywords <code>host</code> and <code>any</code> are allowed. All other attributes are inherited from the original access list entry.</td>
</tr>
<tr>
<td>dest-addr</td>
<td>Destination address in the dynamic access list.</td>
</tr>
<tr>
<td></td>
<td>The keywords <code>host</code> and <code>any</code> are allowed. All other attributes are inherited from the original access list entry.</td>
</tr>
<tr>
<td>minutes</td>
<td>Specifies a maximum time limit for each entry in the dynamic list. It is the absolute time that an entry can reside in the list. The default is an infinite time limit and allows an entry to remain permanently (1 to 9999).</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command provides a way to enable the lock-and-key access feature.

You should always define either an absolute timeout (with the `timeout` keyword in this command) or an idle timeout (with the `timeout` keyword in the `access-class` command). Otherwise, the dynamic access list remains, even after the user has terminated the session.

**Examples**

In the following example, IP access is enabled on incoming packets in which the source address is 171.69.1.129 and the destination address is 172.21.52.12. All other source and destination pairs are discarded.

```
Switch# access-template 101 payroll host 171.69.1.129 host 172.21.52.12 timeout 2
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list (extended)</td>
<td>Used to define an extended IP access list.</td>
</tr>
<tr>
<td>autocommand</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>clear access-template</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
</tbody>
</table>
administrative-weight

To configure the mode of default administrative weight assignment for PNNI interfaces, use the `administrative-weight` ATM router PNNI configuration command. To return to the default value, use the `no` form of this command.

```
administrative-weight { linespeed | uniform }
```

no administrative-weight

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>linespeed</th>
<th>The default value of the administrative weight is based on the linespeed or MaxCR of an interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>uniform</td>
<td>Assigns the weight of 5040 to interfaces that were not configured.</td>
</tr>
</tbody>
</table>

### Defaults

uniform

### Command Modes

ATM router configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Administrative weight is used as the primary routing metric to minimize use of network resources. In the absence of other constraints, this causes PNNI routing to minimize the number of hops. Basing administrative weight on `linespeed` allows path selection to prefer paths along higher bandwidth interfaces. Higher speed links have lower administrative weights and are preferred during routing. The value set in this command becomes the default for the `atm pnni admin-weight` command.

For more information, refer to the `ATM Switch Router Software Configuration Guide`.

### Examples

The following script shows how to access the `administrative-weight` ATM router PNNI configuration command.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# administrative-weight uniform
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni admin-weight</td>
<td>Used to specify the administrative weight of the ATM PNNI interface.</td>
</tr>
<tr>
<td>show atm pnni interface</td>
<td>Used to display specific information about an interface or to list the interfaces running on a PNNI node.</td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Used to display information about a PNNI logical node running on the switch.</td>
</tr>
</tbody>
</table>
### aesa embedded-number left-justified

To enable the automatic conversion of E.164 AESA prefixes into left-justified encoding format, use the `aesa embedded-number left-justified` command.

#### Syntax Description

None

#### Defaults

None.

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

The `aesa embedded-number left-justified` command causes the conversion of all reachable address prefixes with the E.164 Authority and Format Identifier (AFI), including reachable address prefixes advertised by remote PNNI nodes, routes learned by ILMI, and reachable address prefixes installed by the switch router automatically. This affects the `atm route`, `auto-summary`, `summary-address`, `show atm route`, and `show atm pnni summary` commands. The `atm address`, `atm prefix`, and `show atm addresses` commands are not affected because they do not use PNNI address prefixes.

#### Examples

The following example shows how to configure the switch router to convert the E.164 AESA prefixes to PNNI 2.0 format, beginning in global configuration mode:

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# aesa embedded-number left-justified
```

#### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni aesa embedded-number</code></td>
<td>Displays the configuration of the automatic conversion of E.164AESA prefixes into left-justified encoding format.</td>
</tr>
</tbody>
</table>
aggregation-mode

To specify the mode that is used to calculate the combined metrics from multiple lower-level PNNI links into individual aggregated links to be advertised by this node, use the `aggregation-mode` PNNI node configuration command.

```
aggregation-mode {link | node} {abr | cbr | ubr | vbr-rt | vbr-nrt | all} {aggressive | best-link}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>link</code></td>
<td>Specifies the aggregation mode service category for a link.</td>
</tr>
<tr>
<td><code>node</code></td>
<td>Specifies the aggregation mode service category for a node with complex node representation.</td>
</tr>
<tr>
<td><code>abr</code></td>
<td>Specifies the ABR service category.</td>
</tr>
<tr>
<td><code>cbr</code></td>
<td>Specifies the CBR service category.</td>
</tr>
<tr>
<td><code>ubr</code></td>
<td>Specifies the UBR service category.</td>
</tr>
<tr>
<td><code>vbr-rt</code></td>
<td>Specifies the VBR-RT service category.</td>
</tr>
<tr>
<td><code>vbr-nrt</code></td>
<td>Specifies the VBR-NRT service category.</td>
</tr>
<tr>
<td><code>all</code></td>
<td>Specifies all service categories.</td>
</tr>
<tr>
<td><code>aggressive</code></td>
<td>When specified for links, selects the best values for each individual metric from all links or paths that are being aggregated. In this mode, there might be no single lower-level link that is as good as the higher-level link for all of the metrics. When specified for complex nodes, the radius, spoke, and bypass paths are based on a single calculation between each pair of border nodes, which optimizes a single parameter.</td>
</tr>
<tr>
<td><code>best-link</code></td>
<td>When specified for links, one of the lower-level links is chosen as the best link based on one or two metrics. All metrics from the selected lower-level link are copied to the higher-level aggregated link. In this mode, there is at least one lower-level link with metrics matching the higher-level link. When specified for complex nodes, the radius, spoke, and bypass paths are based on the best values from two path calculations for each pair of border nodes, which optimize different parameters.</td>
</tr>
</tbody>
</table>

**Defaults**

`best-link` for all service categories

**Command Modes**
PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

In the PNNI hierarchy, link aggregation is used to represent several parallel links between two peer groups as a single higher-level link. The aggregation modes control how the metrics for the higher level links are derived from the individual parallel links that have the same aggregation token.
Examples

The following example shows how to enter PNNI node configuration mode and specify a node.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)#
```

The following example shows how to specify aggressive mode aggregation for the VBR-RT service category on links.

```
Switch(config-pnni-node)# aggregation-mode link vbr-rt aggressive
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm pnni aggregation node</td>
<td>Used to show the PNNI nodal aggregation tables for a complex node.</td>
</tr>
<tr>
<td>nodal-representation</td>
<td>Used to specify the type of PNNI LGN representation.</td>
</tr>
</tbody>
</table>
aps clear (Catalyst 8540 MSR)

To clear the requests given by the APS control commands, use the **aps clear** EXEC command.

```
aps clear interface atm slot/subslot port
```

**Syntax Description**

```
aps clear interface atm slot/subslot port
```

- **Syntax**
  - `atm slot/subslot/port`: Specifies the slot, subslot, and port of the ATM interface you want cleared of all APS priority requests.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command allows you to remove all of the APS priority requests on the named ATM interface.

**Note**

This command works only if redundancy is configured on the specified interface.

**Examples**

In the following example, all of the current APS priority requests on ATM 1/0/0 are cleared.

```
Switch# aps clear atm 1/0/0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>aps force</strong></td>
<td>Used to force an interface to switch to the alternate port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><strong>aps lockout</strong></td>
<td>Used to lock out the protection port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><strong>aps manual</strong></td>
<td>Used to post an APS request that switches an interface to the alternate port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>
aps force (Catalyst 8540 MSR)

To force an interface to switch to the alternate port within a redundant pair, use the `aps force` EXEC command.

```plaintext
aps force atm slot/subslot/port from [protection | working]
```

Is there a “no” form of this command???

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>slot/subslot/port</code></td>
<td>Specifies the specific slot, subslot, and port of the ATM interface you wish to affect.</td>
</tr>
<tr>
<td><code>from protection</code></td>
<td>Indicates a desire to switch from the protection port to the working port.</td>
</tr>
<tr>
<td><code>from working</code></td>
<td>Indicates a desire to switch from the working port to the protection port.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Force is a defined APS request priority level. The request succeeds if no higher priority request (lockout is the only higher priority request) is posted. The `aps force` command does not persist over a system restart. The port type named in the command indicates which member of the redundant port pair to switch away from.

For more information about APS priority requests, see the Telcordia GR-253-CORE specification.

**Examples**

The following example shows the ATM 1/0/0 interface being forced to switch from the working port to the protection port within the defined redundant pair.

```
Switch# aps force atm 1/0/0 from working
Switch#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>aps clear</code></td>
<td>Used to clear the requests given by the APS control commands.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><code>aps lockout</code></td>
<td>Used to lock out the protection port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><code>aps manual</code></td>
<td>Used to post an APS request that switches an interface to the alternate port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>
**aps lockout (Catalyst 8540 MSR)**

To lock out the protection port within a redundant pair, use the **aps lockout** EXEC command.

```
aps lockout atm slot/subslot/port
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot/subslot/port</td>
<td>Specifies the specific slot, subslot, and port of the ATM interface you want to affect.</td>
</tr>
</tbody>
</table>

| Defaults | None |

| Command Modes | EXEC |

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Lockout is defined as the highest APS request priority level. The **aps lockout** command does not persist over a system restart. When the protection port is locked out, only the working port is used for the specified interface.

For more information about APS priority requests, see the Telcordia GR-253-CORE-specification.

**Note**

This command works only if redundancy is configured on the specified interface.

**Examples**

In the following example, the ATM 1/1/1 interface is forced to use the working port within the defined redundant pair.

```
Switch# aps lockout atm 1/1/1
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aps clear (Catalyst 8540 MSR)</td>
<td>Used to clear the requests given by the APS control commands.</td>
</tr>
<tr>
<td>aps force (Catalyst 8540 MSR)</td>
<td>Used to force an interface to switch to the alternate port within a redundant pair.</td>
</tr>
<tr>
<td>aps manual (Catalyst 8540 MSR)</td>
<td>Used to post an APS request that switches an interface to the alternate port within a redundant pair.</td>
</tr>
</tbody>
</table>
aps manual (Catalyst 8540 MSR)

To post an APS request that switches an interface to the alternate port within a redundant pair, use the `aps manual` EXEC command.

```plaintext
aps manual interface atm slot/subslot/port from [working | protection ]
```

**Syntax Description**

- `slot/subslot/port`: Specifies the specific slot, subslot, and port of the ATM interface to be affected.
- `from working`: Specifies a switch from working port to protection port.
- `from protection`: Specifies a switch from protection port to working port.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Manual is a defined APS request priority level. The request succeeds if no higher priority request is posted. The `aps manual` command switches the specified interface from the working line to the protection line if the option specified keyword is `working`. If the option specified keyword is `protection`, the interface is switched back from the protection line to the working line.

**Note**

The `aps manual` command does not persist over a system restart.

**Note**

This command works only if redundancy is configured on the specified interface.

**Examples**

In the following example, the ATM 1/1/1 interface is switched from the working port to the protection port within the defined redundant pair, provided that no higher priority request is posted.

```plaintext
Switch# aps manual atm 1/1/1 from working
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>aps clear</code></td>
<td>Used to clear the requests given by the APS control commands.</td>
</tr>
<tr>
<td>(<code>Catalyst 8540 MSR</code>)</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>aps force</strong></td>
<td>Used to force an interface to switch to the alternate port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><strong>aps lockout</strong></td>
<td>Used to lock out the protection port within a redundant pair.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>
**aps mode (Catalyst 8540 MSR)**

To set the APS operational mode for a pair of redundant ports, use the **aps mode** interface configuration command. To remove the APS operational mode, use the **no** form of this command.

```
aps mode linear 1+1 nonreverting direction
no aps mode linear 1+1 nonreverting
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>linear 1+1 nonreverting</th>
<th>The linear 1+1 nonreverting APS is currently supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>direction</td>
<td>The direction could be either <strong>unidirectional</strong> or <strong>bidirectional</strong>.</td>
</tr>
</tbody>
</table>

| Defaults                           | None                     |

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **aps mode** command is successful only if both the interfaces are present and support the same transmission standard. This command is required to be executed for one of the two interfaces only. The other interface is internally configured as its identity is fixed by the hardware. The lower slot interface becomes the working interface and the higher slot interface becomes the protect interface.

**Examples**

In the following example, interface 1/0/0 is the working interface, and interface 3/0/0 is the protect interface. If the above interfaces were OC-12c interfaces, then, because of the hardware constraint, interfaces 1/0/1 and 3/0/1 also become APS ports.

```
Switch(config-if)# aps mode linear 1+1 nonreverting unidirectional
Switch(config-if)# end
```

**Related Commands**

None
aps signal-degrade (Catalyst 8540 MSR)

To set the bit-error-rate (BER) threshold for signal degrade APS priority posting, use the `aps signal-degrade` interface configuration command. To remove the BER threshold, use the `no` form of this command.

```
aps signal-degrade BER threshold [value]
no aps signal degrade BER threshold [value]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BER threshold</td>
<td>Specifies the name of the priority request for which you are setting a threshold.</td>
</tr>
<tr>
<td><code>value</code></td>
<td>Specifies the value of the threshold, which is $10^{-x}$, where $x = 5, 6, 7, 8$ or $9$. The default value is $10^{-9}$.</td>
</tr>
</tbody>
</table>

**Defaults**

Default is $10^{-9}$

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

In the following example, the Signal Degrade BER threshold of the APS interface 0/0/0 is $10^{-7}$.

```
Switch(config-if)# aps signal-degrade BER threshold 7
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>aps signal-fail</code> (Catalyst 8540 MSR)</td>
<td>Used to set the BER threshold for signal fail APS priority posting.</td>
</tr>
<tr>
<td><code>aps mode</code> (Catalyst 8540 MSR)</td>
<td>Used to set the APS operational mode for a pair of redundant ports.</td>
</tr>
<tr>
<td><code>show controllers</code></td>
<td>Used to display information about a physical port device.</td>
</tr>
</tbody>
</table>
aps signal-fail (Catalyst 8540 MSR)

To set the bit-error-rate threshold for signal fail APS priority posting, use the `aps signal-fail` interface configuration command. To restore the default BER threshold, use the `no` form of this command.

```
aps signal-fail BER threshold [value]

no aps signal-fail BER threshold
```

**Syntax Description**

<table>
<thead>
<tr>
<th>BER threshold</th>
<th>Specifies the name of the priority request for which you are setting a threshold.</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Specifies the value of the threshold, which is 10(^x), where x = 3, 4 or 5. The default is 10(^{-5}).</td>
</tr>
</tbody>
</table>

**Defaults**

Default is $10^{-5}$

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(17b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

In the following example, the Signal Fail BER threshold of the APS interface 0/0/0 is $10^{-4}$.

```
Switch(config-if)# aps signal-fail BER threshold 4
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>aps signal-degrade (Catalyst 8540 MSR)</code></td>
<td>Used to set the bit-error-rate threshold for signal degrade APS priority posting.</td>
</tr>
<tr>
<td><code>show controllers</code></td>
<td>Used to display information about a physical port device.</td>
</tr>
</tbody>
</table>
arp (global)

To add a permanent entry in the ARP cache, use the `arp` global configuration command. To remove an entry from the ARP cache, use the `no` form of this command.

```
arp ip-address hardware-address type interface-type card/subcard/port [alias]
no arp ip-address hardware-address type interface-type card/subcard/port [alias]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address in four-part dotted-decimal format corresponding to the local data interface address.</td>
</tr>
<tr>
<td><code>hardware-address</code></td>
<td>Local data interface address (a 48-bit address).</td>
</tr>
<tr>
<td><code>type</code></td>
<td>Encapsulation description (<code>arpa</code>, <code>sap</code>, <code>smds</code>, or <code>snap</code>). For Ethernet interfaces, this is typically the <code>arpa</code> keyword.</td>
</tr>
<tr>
<td><code>interface-type</code></td>
<td>Type of interface to which this entry applies.</td>
</tr>
<tr>
<td><code>card/subcard/port</code></td>
<td>Specifies the card, subcard, and port numbers for the interface.</td>
</tr>
<tr>
<td><code>alias</code></td>
<td>Indicates that the switch should respond to ARP requests as if it were the owner of the specified address.</td>
</tr>
</tbody>
</table>

### Defaults

No entries are permanently installed in the ARP cache.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The switch uses ARP cache entries to translate 32-bit IP addresses into 48-bit hardware addresses. Because most hosts support dynamic resolution, you generally do not need to specify static ARP cache entries.

### Examples

The following is an example of a static ARP entry for a typical Ethernet host.

```
Switch(config)# arp 192.31.7.19 0800.0900.1834 arpa
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show arp</code></td>
<td>Used to display the entries in the ARP table.</td>
</tr>
</tbody>
</table>
arp (interface)

To control the interface-specific handling of IP address resolution into 48-bit Ethernet, use the arp interface configuration command. To disable an encapsulation type, use the no form of this command.

```
arp {arpa | frame-relay | probe | snap}
no arp {arpa | frame-relay | probe | snap}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>arp</td>
<td>Standard Ethernet-style ARP (RFC 826).</td>
</tr>
<tr>
<td>frame-relay</td>
<td>ARP for a Frame Relay interface.</td>
</tr>
<tr>
<td>probe</td>
<td>HP Probe protocol for IEEE-802.3 networks.</td>
</tr>
<tr>
<td>snap</td>
<td>ARP packets conforming to RFC 1042.</td>
</tr>
</tbody>
</table>

**Defaults**

Standard Ethernet-style ARP

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Arguments to the arp command are not mutually exclusive. Each command enables or disables a specific type of ARP. For example, if you enter the `arp arpa` command followed by the `arp probe` command, the switch sends three packets (two for `probe` and one for `arpa`) each time it needs to discover a MAC address.

The `arp probe` command allows the switch to use the Probe protocol (in addition to ARP) whenever attempting to resolve an IEEE-802.3 or Ethernet local data interface address. The subset of Probe that performs address resolution is called Virtual Address Request and Reply. Using Probe, the switch communicates transparently with Hewlett-Packard IEEE-802.3 hosts using this type of data encapsulation.

**Note**

All interfaces that use Probe must be explicitly configured for `arp probe`.

The `show ima interface` EXEC command displays the type of ARP being used on a particular interface. To remove all nonstatic entries from the ARP cache, use the `clear atm pnni` privileged EXEC command.
associate (Catalyst 8540 MSR)

To logically associate two slots within one switch router for redundancy, use the `associate` command. To disable slot associations, use the `no` form of this command.

```
associate slot slot_one slot_two
no associate slot slot_one slot_two
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>slot_one</code></td>
<td>Sets first slot to become associated. Valid range is from 0 to 12.</td>
</tr>
<tr>
<td><code>slot_two</code></td>
<td>Sets second slot to be associated with first slot. Valid range is from 0 to 12.</td>
</tr>
</tbody>
</table>

### Defaults

Slots are not associated.

### Command Modes

Redundancy configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Features such as APS (Automatic Protection Switching) utilize logical slot information for the purpose of processor route switchover. Both associated slots must use the same type of interface module. Only slots `{0,2}`, `{1,3}`, `{9,11}`, `{10,12}` can be associated.

### Examples

The following example shows how to associate two separate slots within one switch.

```
Switch(config)# redundancy
Switch(config-r)# associate slot 10 12
Associate slot command accepted for slots 10 and 12
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
auto-summary

To allow default summary addresses to be generated based on the switch’s ATM address, use the auto-summary PNNI node configuration command. To disable generation of default summary addresses, use the no form of this command.

    auto-summary
    no auto-summary

Syntax Description

This command has no arguments or keywords.

Defaults

Enabled

Command Modes

PNNI node configuration

Command History

Release Modification

11.1(4) New command

Usage Guidelines

By default, lowest level PNNI nodes advertise 13-byte summary address prefixes based on the switch address or addresses. The summary address prefix or prefixes cover all end system addresses determined via ILMI address registration from the ILMI address prefix or prefixes, based on each switch’s address. They do not cover end-system addresses determined via ILMI address registration from per-interface ILMI address prefixes (configured using the atm pvc command).

Using the no form of the auto-summary command causes PNNI to advertise all end-system addresses separately (unless other summary addresses matching the end system addresses were configured).

Higher level PNNI nodes (LGNs) have a single default address configured. The length of that summary for any LGN is equal to the level of the child peer group, and its value is equal to the first level bits of the child peer group identifier.

For more information, refer to the ATM Switch Router Software Configuration Guide.

Examples

The following example shows how to access the auto-summary node-level subcommand.

    Switch# configure terminal
    Switch(config)# atm router pnni
    Switch(config-atm-router)# node 1
    Switch(config-pnni-node)# auto-summary

Related Commands

Command Description

atm address Used to assign a 20-byte ATM address to the switch.
atm prefix Used to configure an ILMI address prefix for an ATM interface.
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm route</code></td>
<td>Used to display all local or network-wide reachable address prefixes in a switch router’s ATM routing table.</td>
</tr>
<tr>
<td><code>summary-address</code></td>
<td>Used to configure summary address prefixes on a PNNI node.</td>
</tr>
</tbody>
</table>
ATM Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
**atm abr-mode (Catalyst 8510 MSR and LightStream 1010)**

To select **efci** marking, **relative-rate** marking, or both, use the `atm abr-mode` global configuration command on ABR connections. To assign the default value to ABR mode, use the `no` form of this command.

```
atm abr-mode {efci | relative-rate | all}
```

```
no atm abr-mode
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>efcı</td>
<td>When cells arrive on ABR connections to a congested (as indicated by the efcı threshold) output queue on the interface, the efcı bit in the cell header is set.</td>
</tr>
<tr>
<td>relative-rate</td>
<td>When a backward RM cell is received on an ABR connection on an interface (from outside the switch), its congestion bit is set if the forward-direction interface is congested (as indicated by the abr relative-rate threshold).</td>
</tr>
<tr>
<td>all</td>
<td>Indicates both efcı and relative-rate modes of congestion notification.</td>
</tr>
</tbody>
</table>

**Defaults**

relative-rate

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.0(3c)W5(9)</td>
<td>Modified: (Catalyst 8510 MSR and LightStream 1010) added</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This configuration command changes the global type of notification used on ABR connections to send a congestion alert to the end stations. This change can be made if the switch connects to a network or end station that uses the new technique. The use of `all` causes both efcı and relative-rate marking to be used.

**Examples**

In the following example, the ABR mode of the switch is set to `efci`.

```
Switch(config)# atm abr-mode efcı
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm resource</td>
<td>Displays global resource manager configuration and status.</td>
</tr>
</tbody>
</table>
atm access-group

To subscribe an interface or subinterface to an existing ATM address pattern-matching filter expression, use the `atm access-group` interface configuration command. To delete an address access filter subscription on a specified interface of subinterface, use the `no` form of this command.

```
atm access-group name [in | out]

no atm access-group name [in | out]
```

**Syntax Description**

- `name` The filter expression or filter set.
- `in` Specifies that the filter should be applied to an incoming SETUP message.
- `out` Specifies that the filter should be applied to an outgoing SETUP message.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

- **Release** 11.1(4)
- **Modification** New command

**Usage Guidelines**

This command affects ATM signaling SETUP requests received or transmitted by the switch on an interface.

You should use the `atm filter-set` command prior to using this command. For descriptions of filter sets and expressions, see the `atm filter-expr`, and `atm filter-set` global configuration commands.

Each interface has only one access group. If you create a new access group, it overrides any existing group.

**Examples**

The following is sample output from the `atm access-group` command.

```
Switch(config-if)# atm access-group atm_filter_expr1 in
Switch(config-if)# atm access-group atm_filter_expr2 out
```

**Command** | **Description**
--- | ---
`atm filter-expr` | Configures an ATM address filter that matches patterns.
`atm filter-set` | Creates an ATM address filter set.
`show atm filter-expr` | Displays a specific ATM filter expression or a summary ATM filter expression.
`show atm filter-set` | Displays a specific ATM filter set or a summary ATM filter set.
atm accounting (interface)

To enable ATM accounting on a specific interface, use the **atm accounting** interface configuration command. To disable ATM accounting on a specific interface, use the **no** form of the command.

```plaintext
atm accounting
no atm accounting
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When accounting is disabled for an interface, accounting stops keeping track of the VCs on that interface and treats the interface as if it were shut down. For the VCs that satisfy the selection criteria, accounting writes records to the active file; however, the VCs are not affected.

Use the **show atm accounting** EXEC command to determine which interfaces are using ATM accounting.

**Examples**

The following example shows how to enable ATM accounting on interface ATM 1/0/0.

```plaintext
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm accounting
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface</td>
<td>Configures an interface type and enters interface configuration mode.</td>
</tr>
</tbody>
</table>


## atm accounting collection

To control collection of ATM accounting data into a specific file, use the `atm accounting collection` EXEC command.

\[
\text{atm accounting collection \{collect-now | swap\} filename}
\]

### Syntax Description

- **collect-now**: Immediately captures ATM accounting information for all connections that meet the `min-age` criteria.
- **swap**: Stops the data collection in the active file and activates the passive file so it collects data. The new passive file is now available for downloading.
- **filename**: Specifies the name for the ATM accounting file.

### Command Modes

- Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use the `collect-now` option to return a message with the number of records that were written.

Use the `swap` option to return a message with the number of records that were written.

Use the `show atm accounting` EXEC command to show the active and ready file sizes and the number of records.

### Examples

The following example shows how to perform an on-demand collection to the file `acctng_file1`.

Switch# `atm accounting collection collect-now acctng_file1`
Switch# Collect-now found 12 SVCs with life longer than min-age

The following example shows how to perform a swap operation on the file `acctng_file1`.

Switch# `atm accounting collection swap acctng_file1`
Switch# File Swap Done. New Ready File 4999702 bytes (#records 28796); Active File 65 bytes (#records 0)

### Note

The only filename currently allowed is `acctng_file1`.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm accounting file</code></td>
<td>Used to enable an ATM accounting file and to enter the accounting file configuration mode.</td>
</tr>
</tbody>
</table>
**atm accounting enable**

To enable the ATM VC accounting feature globally, use the **atm accounting enable** global configuration command. To disable this feature, use the **no** form of this command.

```
atm accounting enable
no atm accounting enable
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command (originally atm accounting (global))</td>
</tr>
<tr>
<td>11.2(8.0.1)</td>
<td>Modified: enable added: atm accounting enable (global)</td>
</tr>
<tr>
<td>11.3(3a)</td>
<td>Modified: (global) taken out</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Accounting is enabled globally for the switch on interfaces where accounting is configured. An error message is given if memory is fragmented and ATM accounting cannot get two memory chunks of 5 MB each. The switch needs 32 MB of memory or it returns an error message.

The switch must have this command saved in the NVRAM configuration file. Use the following steps to enable ATM accounting:

1. Enable ATM accounting in global configuration mode.
2. Exit global configuration mode.
3. Use the **copy running-config startup-config** command to save the command in NVRAM.
4. Reboot the switch.

**Examples**

The following example shows how to enable ATM accounting.

```
Switch(config)# atm accounting enable
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm accounting (interface)</td>
<td>Enables ATM accounting on a specific interface.</td>
</tr>
</tbody>
</table>
**atm accounting file**

To enable an ATM accounting file and enter the accounting file configuration mode, use the **atm accounting file** global configuration command. To disable an ATM accounting file, use the **no** form of this command.

```
   atm accounting file filename

   no atm accounting file filename
```

**Note**

The **atm accounting file** global configuration command changes the configuration mode to ATM accounting, and the new prompt appears: `Switch(config-acct-file)#`

To modify the fields in the ATM accounting file, use the following ATM accounting mode configuration subcommands. To set the fields to their default values, use the **no** form of these subcommands.

```
collection-modes | periodic | on-release
   default { collection-modes | description | enable | failed-attempts | interval | min-age }
   description string
   enable
   failed-attempts [none | [regular | soft]]
   interval seconds
   min-age seconds
   remote-log [only] primary-host { hostname | ip-address | tcp-port# } [ alternate-host { alt-host-name | alt-ip-address | alt-tcp-port# } ]
```

```
   no collection-modes | periodic | on-release
   no description string
   no enable
   no failed-attempts [none | [regular | soft]]
   no interval
   no min-age
   no remote-log
```

**Syntax Description**

- **filename**
  - Specifies the filename of the accounting file.
  - The only filename currently allowed is `acctng_file1`.

**Defaults**

See “Syntax Description.”

**Command Modes**

- Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

The ATM accounting configuration mode subcommands are described in Table 2-1.

Table 2-1  ATM Accounting Configuration Mode Subcommands

<table>
<thead>
<tr>
<th>Subcommand</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>collection-modes</td>
<td>Initializes the collection mode and allows you to specify at what time accounting data is recorded in the file: on the release of a connection (on-release), or periodically (periodic).</td>
</tr>
<tr>
<td>default</td>
<td>Sets a parameter to its defaults.</td>
</tr>
<tr>
<td>description</td>
<td>Configures a description of the ATM accounting file with a limit of 64 characters.</td>
</tr>
<tr>
<td>enable</td>
<td>Activates ATM accounting data collection to a specified file.</td>
</tr>
<tr>
<td>failed-attempts</td>
<td>Configures the writing of records for initial connection attempts, as follows:</td>
</tr>
<tr>
<td></td>
<td>• <strong>regular</strong>—Records regular SVC/SVP numbers that originate or terminate at the switch interface.</td>
</tr>
<tr>
<td></td>
<td>• <strong>soft</strong>—Records soft PVC/PVP numbers that originate or terminate at the switch interface.</td>
</tr>
<tr>
<td></td>
<td>• <strong>none</strong>—Does not record failed attempts.</td>
</tr>
<tr>
<td></td>
<td>Default is <strong>regular</strong> and <strong>soft</strong>.</td>
</tr>
<tr>
<td>interval</td>
<td>Sets the period for periodic collection of accounting records. The default is 3600 seconds.</td>
</tr>
<tr>
<td>min-age</td>
<td>Configures the value of the minimum age of the VC for on-release or periodic collection of accounting records. The default is 3600 seconds.</td>
</tr>
<tr>
<td>remote-log</td>
<td>Establishes a TCP connection from the switch to a PC or workstation, as follows:</td>
</tr>
<tr>
<td></td>
<td>• <strong>only</strong>—When you specify <strong>only</strong>, no local storage of accounting occurs.</td>
</tr>
<tr>
<td></td>
<td>• <strong>host-name/ip-address</strong>—Host name or IP address of the accounting records receiving host computer.</td>
</tr>
<tr>
<td></td>
<td>• <strong>tcp port#</strong>—The server communicates with the TCP port to connect to the accounting agent in the switch.</td>
</tr>
<tr>
<td></td>
<td>• <strong>alt-host-name/alt-ip-address</strong>—Host name or IP address of a standby accounting records receiving host computer.</td>
</tr>
<tr>
<td></td>
<td>• <strong>alt-tcp-port#</strong>—Alternate TCP port with which the server communicates to connect to the accounting agent in the switch.</td>
</tr>
</tbody>
</table>

To change the fields, you can either provide new values, or use the **no** form of the command.

Changes made to the list affect the file format. The change takes effect only for the next collection, for example, after using the **atm accounting collection swap** global configuration command. Changes to the connection types take effect immediately.

The ATM selection table is created using the default value of one. You can only modify the following fields in the file:

- **description**
- **failed-attempts**
- **min-age**
Note

The only filename currently allowed is `acctng_file1`.

**Examples**

The following example shows how to enter the ATM accounting file configuration mode.

```
Switch# configure terminal
Switch(config)# atm accounting file acctng_file1
Switch(config-acct-file)#
```

The following example shows how to enter the ATM accounting file configuration mode and configure a description that is displayed in the header of the file when using the `show atm accounting` command.

```
Switch(config)# atm accounting file acctng_file1
Switch(config-acct-file)# description Main accounting file for engineering
```

The following example shows how to enter the ATM accounting file configuration mode and configure failed-attempts to record failed attempts for SVC/SVP connections in the accounting file.

```
Switch(config)# atm accounting file acctng_file1
Switch(config-acct-file)# failed-attempts regular
```

The following example shows how to enter the ATM accounting file configuration mode and configure remote-log.

```
Switch(config)# atm accounting file acctng_file1
Switch(config-acct-file)# remote-log 172.20.52.3 6001 alternate-host cisco-lab 7001
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm accounting collection</td>
<td>Controls collection of ATM accounting data into a specific file.</td>
</tr>
<tr>
<td>atm accounting selection</td>
<td>Enables ATM accounting selection and enters the ATM accounting selection configuration mode.</td>
</tr>
</tbody>
</table>
atm accounting selection

To enable ATM accounting selection and enter the ATM accounting selection configuration mode, use the `atm accounting selection` global configuration command. To disable ATM accounting selection, use the `no` form of this command.

```
atm accounting selection index
no atm accounting selection index
```

**Note**

The `atm accounting selection` global configuration command changes the configuration mode to ATM accounting selection mode, and the following new prompt appears:

```
Switch(config-acct-sel)#
```

To configure the ATM accounting selection, use the following ATM accounting configuration mode subcommands. To set the selection parameters to their defaults, use the no form of these commands.

```
connection-types [type] default {connection-types | list}list
no connection-types [type]
no list
```

**Syntax Description**

- `index` Configures the ATM accounting selection index number.

**Defaults**

No default selection index. See the individual subcommand defaults.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This release supports only one ATM selection table entry which cannot be deleted.

**Examples**

The following example specifies the ATM accounting selection index as 1 and restores the default connection types.

```
Switch# configure terminal
Switch(config)# atm accounting selection 1
Switch(config-acct-sel)# default connection-types
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm accounting collection</code></td>
<td>Controls collection of ATM accounting data into a specific file.</td>
</tr>
<tr>
<td><code>atm accounting file</code></td>
<td>Enables an ATM accounting file and enters the accounting file configuration mode.</td>
</tr>
<tr>
<td><code>connection-types</code></td>
<td>Sets types of connections for atm accounting selection.</td>
</tr>
</tbody>
</table>
atm accounting trap threshold

To configure the threshold value which controls the generation of an ATM accounting SNMP trap, use the `atm accounting trap threshold` global configuration command. To restore the default value of the trap threshold, use the `no` form of the command.

```plaintext
atm accounting trap threshold percent-value

no atm accounting trap threshold
```

**Syntax Description**

`percent-value` Specifies the value as a percent of the maximum file size.

**Defaults**

The default value for the trap threshold is 90.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command (originally <code>atm accounting trap</code>)</td>
</tr>
<tr>
<td>11.2(8.0.1)</td>
<td>Modified: Added <code>threshold</code></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To see the file size, threshold value, and trap statistics, use the `show atm accounting` EXEC command.

**Examples**

The following example changes the ATM accounting trap threshold to 80.

```
Switch(config)# atm accounting trap threshold 80
```

### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>connection-types</code></td>
<td>Sets types of connections for atm accounting selection.</td>
</tr>
</tbody>
</table>
atm address

To assign a 20-byte ATM address to the switch, use the `atm address` global configuration command. To delete a specific ATM address, use the `no` form of this command.

```
  atm address address-template
  no atm address address-template
```

**Syntax Description**

- `address-template`  
  The address template can be a full 20-byte address or a partial 13-byte. When a partial address is assigned, this command automatically sets one of the switch’s 6-byte MAC addresses in the ESI part, and puts a 0 in the selector part.

**Defaults**

When `no atm address` has been configured, an autoconfigured ATM address is assigned. Refer to the `ATM Switch Router Software Configuration Guide` for more information.

**Command Modes**

Global configuration

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Usage Guidelines**

You can have multiple ATM addresses. The first address in the list is the active ATM address for this switch router. When you delete the current active ATM address, the next address in the list becomes the active ATM address.

In autoconfiguration mode, the switch router establishes an address according to the format specified in the `ATM Switch Router Software Configuration Guide`.

The first 13-byte prefixes of all of the addresses are used by ILMI to assign addresses to end stations connected to the UNI ports (unless there is a prefix assigned per port). PNNI also summarizes all of the address prefixes automatically in reachable address advertisements. Refer to the `auto-summary` command for more information.

The active ATM address determines which address is advertised by PNNI as the ATM address of the PNNI local-nodes. Each local-node uses the active ATM address with the selector byte modified to match the local-node index.

In addition, the active ATM address is used as the source prefix for generating the PNNI peer group IDs and node IDs. However, the peer group IDs and node IDs are only updated after the local-node is disabled and reenabled. Therefore, it is recommended that a change to the active ATM address should be followed by a disable and enable of PNNI local-node 1, which will also update the identifiers for all higher local-nodes.

For two switches to belong to the same PNNI peer group, they need to have the same peer group identifier. Peer group identifiers must be prefixes of private ATM addresses, which means the organization that administers the peer group has assignment authority over that prefix. For more information, refer to the `ATM Switch Router Software Configuration Guide`. 
In autoconfiguration mode, all switch routers have the same peer group identifier based on the first seven bytes of the autoconfigured ATM address.

The first 13-byte prefix of the active address is also used to automatically generate ATM addresses for each ATM interface that can be used for soft PVCs and PVPs to identify the destination ATM interface.

**Examples**

The following example shows how to assign a 20-byte ATM address to the switch.

Switch# configure terminal
Switch(config)# atm address 47.00918100000000000000001

The following example shows how to change the active ATM address for the switch and to update the PNNI local-node identifiers based on the new active ATM address prefix.

---

**Step 1** Configure the desired new address or prefix to be added to the list of ATM addresses for the switch.

Switch# configure terminal
Switch(config)# atm address 47.0091810002

**Step 2** Determine the current active ATM address by using the `show atm addresses` command. Then remove the current active ATM address, so that the desired new address will be the first in the list. If desired, the removed ATM address(es) can then be readded to appear later in the list.

Switch(config)# no atm address 47.00918100000000400B003081.00400B003081.00

**Step 3** (Optional) Update all PNNI local-node identifiers by disabling and reenabling local-node 1.

Switch(config)# atm router pnni
Switch(config-atm-router)# node 1 disable
Switch(config-pnni-node)# node 1 enable

**Step 4** (Optional) Save the running configuration to be used as the startup configuration in the event of a reboot.

Switch# copy running-config startup-config

---

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm prefix</td>
<td>Configures an ILMI address prefix for an ATM interface.</td>
</tr>
<tr>
<td>auto-summary</td>
<td>Allows default summary addresses to be generated based on the switch router’s ATM address.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the active ATM addresses on a switch router.</td>
</tr>
</tbody>
</table>
**atm address-registration**

To enable the switch to engage in address registration on an interface using the ILMI protocol, and to enable the optional per-interface access filters on ILMI address registration, use the `atm address-registration` interface configuration command. To disable ILMI address registration functions on an interface, use the `no` form of this command.

```
  atm address-registration [permit {all | matching-prefix [wellknown-groups | all-groups]}]
  no atm address-registration
```

### Syntax Description

- **all**: Permit all AESAs registered by attached end systems.
- **matching-prefix**: Permit AESAs where the first 13 bytes of the address match an ILMI prefix used on the interface. These ILMI prefixes can be configured using the global `atm address` command or the per-interface `atm prefix` command. The ILMI prefixes used on the interface can be shown using the `show atm ilmi-status` command.
- **wellknown-groups**: Permit well-known group addresses assigned by the ATM Forum and AESAs that match an ILMI prefix used on the interface.
  
  The well-known group addresses include the old LECS address (47.0079.0000.0000.0000.0000.0000.00A0.3E00.0001.00) and any address matching the ATM Forum address prefix for well-known addresses. (C5.0079.0000.0000.0000.0000.0000.00A0.3E)
- **all-groups**: Permit all group addresses, including the well-known group addresses, and the AESAs that match an ILMI prefix used on the interface.

### Defaults

ILMI address registration is enabled by default. If no optional keywords are configured, the global default access filter for ILMI address registration is used, as specified through the `atm ilmi default-access permit` global configuration command.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The `atm address-registration` command does not apply to the ATM 0 interface.

The `atm address-registration` command enables a switch to participate in ILMI address registration. When the switch is on the network side of a UNI, the switch sets one or more network prefixes on the peer IME and accepts addresses registered by the peer IME. If the interface does not come up as a UNI, then ILMI address registration is not active, even if it was previously configured to be enabled.
The optional keywords allow configuration of per-interface access filters, in order to allow or deny certain ILMI registered addresses. If specified, the per-interface access filter overrides the global default access filter for ILMI address registration.

**Note**

If the Cisco SSRP for LAN Emulation is used in this network, ILMI registration of well-known group addresses should be permitted. The SSRP allows the active LECS to register the well-known LECS address with the switch router. Either the `permit all`, `permit matching-prefix wellknown-groups`, or `permit matching-prefix all-groups` option should be configured.

In order to allow certain addresses to be registered via ILMI, while also restricting them from being advertised through PNNI, the PNNI suppressed summary address feature should be used instead of the access filters for ILMI address registration (see the `summary-address` command for additional information).

The access filters option of this command allows configuration of per-interface access filters for ILMI registration to override the global defaults of the access filters.

**Examples**

The following example shows how to disable ILMI address registration on ATM interface 1/0/0.

```
Switch(config)# interface atm 1/0/0
Switch(config-if)# no atm address-registration
```

The following example enables ILMI address registration on ATM interface 1/0/0 and configures the per-interface access filter for ILMI address registration to allow well-known group addresses and addresses with matching prefixes.

```
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm address-registration permit matching-prefix wellknown-groups
%ATM-5-ILMIACCFILTER: New access filter setting will be applied to registration of new addresses on ATM1/0/0.
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address</code></td>
<td>Assigns a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><code>atm ilmi default-access permit</code></td>
<td>Sets the global default access filter for ILMI-registered addresses on all interfaces.</td>
</tr>
<tr>
<td><code>atm ilmi-enable</code></td>
<td>Enables the ILMI on a port.</td>
</tr>
<tr>
<td><code>atm prefix</code></td>
<td>Configures an ILMI address prefix for an ATM interface.</td>
</tr>
<tr>
<td><code>show atm ilmi-status</code></td>
<td>Displays the ILMI-related status information.</td>
</tr>
<tr>
<td><code>summary-address</code></td>
<td>Configures summary address prefixes on a PNNI node.</td>
</tr>
</tbody>
</table>
**atm aesa gateway**

To configure an AESA gateway address on an ATM switch interface that connects to a service provider maintaining a separate ATM addressing plan, use the `atm aesa gateway` interface configuration command. To restore the default (disabled), use the `no` form of this command.

```
atm aesa gateway aesa-address

no atm aesa gateway
```

**Syntax Description**

* `aesa-address` Specifies a forwarding 20-octet AESA that is used when a call matching the ATM address prefix is forwarded across the specified interface.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When outgoing calls are configured to use the forwarding AESA address as the called party address (see the `atm route` command), this AESA is used as the forwarding calling party address.

When incoming calls are received on the interface that specifies the forwarding AESA as the called party address, the called and calling party addresses are removed from the signaling message and replaced by the new called and calling party subaddresses.

This new address is not registered with routing because it is used only as this switch’s address for this interface. It is not used as the address of destination from this interface.

The combination of the `atm aesa gateway` command and the `atm-aesa` option of the `atm route` command provides a general mechanism for interconnection of private ATM networks across an ATM service provider. This combination allows one AESA for the interface to the ATM service provider network, with many AESA addresses present in the private network behind the interface.

**Examples**

The following example shows how to configure the AESA gateway address:

```
Switch(config)# interface atm 0/1/2
Switch(config-if)# atm aesa gateway 91.9999999999999999999999.1111111111.00
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm route</code></td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm vc</code></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td><code>show interfaces</code></td>
<td>Displays the interface configuration, status, and statistics.</td>
</tr>
</tbody>
</table>
**atm arp-server**

To identify an ARP server for the IP network, or set TTL values for entries in the ATM ARP table, use the `atm arp-server` interface configuration command. To disable an ARP server process, use the `no` form of this command.

```
    atm arp-server [self [time-out minutes] | nsap nsap-address]
    no atm arp-server [self [time-out minutes] | nsap nsap-address]
```

**Syntax Description**

- `self` Specifies the current switch as the ATM ARP server.
- `minutes` Number of minutes a destination entry listed in the ATM ARP server’s ARP table is kept before the server takes any action to verify or time out the entry.
- `nsap-address` NSAP address of an ATM ARP server.

**Defaults**

The ARP server process is disabled. The default timeout value is 20 minutes.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command applies only to route processor and IP interfaces.

If an NSAP address is specified, the ARP client on this interface uses the specified host as an ARP server.

Multiple ATM ARP servers can be specified by repeating the command. The `no` option is used to remove the definition of an ATM ARP server. If `self` is specified, this interface acts as the ARP server for the logical IP network.

The ATM ARP server takes one of the following actions if a destination listed in the server’s ARP table expires:

- If a virtual circuit still exists to that destination, the server sends an Inverse ARP request.
  - If no response arrives, the entry times out.
- If a virtual circuit does not exist to the destination, the entry times out immediately.

This implementation follows RFC 1577, “Classical IP over ATM.”

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm arp-server</code></td>
<td>Displays the ATM ARP server table.</td>
</tr>
</tbody>
</table>
atm auto-configuration

To enable or disable ILMI autoconfiguration, use the `atm auto-configuration` interface configuration command. To disable this feature, use the `no` form of this command.

```
atm auto-configuration
no atm auto-configuration
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Enabled

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command enables or disables ILMI autoconfiguration procedures, as specified in Section 8.3.3 of the ATM Forum ILMI 4.0 Specification.

Among the variables covered by ILMI autoconfiguration are the interface protocol and version, interface side (user or network), UNI type (public or private), and the maximum number of VPI bits and VCI bits. Configuration of the `atm auto-configuration` command on an interface overwrites any previous configuration of the ATM IISP and ATM NNI.

When autoconfiguration is enabled, ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switched virtual connections across the interface are cleared; permanent virtual connections are not affected.

When the peer switch has a device type of `node` but responds to `GetRequest` messages for `atmfAtmLayerNniSigVersion` with `no SuchName`, the default NNI protocol depends on the ATM routing mode (see the `atm routing-mode` command). When the ATM routing mode is set to `static`, the default NNI protocol is IISP. Otherwise, the default NNI protocol is PNNI 1.0. These defaults are relevant when the peer switch is a LightStream 1010 ATM with software version 11.1.

**Examples**
The following example shows how to enable ILMI autoconfiguration on interface ATM 0/1/2.

```
Switch(config)# interface atm 0/1/2
Switch(config-if)# atm auto-configuration
Switch(config-if)#
%ATM-5-ATMSTART:Restarting ATM signalling and ILMI on ATM0/1/2
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm iisp</td>
<td>Configures ATM IISP on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>atm ilmi-enable</td>
<td>Enables the ILMI on a port.</td>
</tr>
<tr>
<td>atm maxvci-bits</td>
<td>Configures the maximum number of active bits of VCI supported on an ATM interface.</td>
</tr>
<tr>
<td>atm maxvpi-bits</td>
<td>Configures the maximum number of active VPI bits supported on an ATM interface.</td>
</tr>
<tr>
<td>atm nni</td>
<td>Configures an ATM NNI on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>atm routing-mode</td>
<td>Restricts the mode of ATM routing on an ATM switch router.</td>
</tr>
<tr>
<td>show atm ilmi-status</td>
<td>Displays the ILMI-related status information.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
atm backward-max-burst-size-clp0

To change the maximum number of high-priority cells coming from the destination to the source at the burst level on the SVC, use the `atm backward-max-burst-size-clp0` map-class configuration command. To restore the default, use the `no` form of this command.

```
  atm backward-max-burst-size-clp0 cell-count
  no atm backward-max-burst-size-clp0
```

**Syntax Description**

<table>
<thead>
<tr>
<th><code>cell-count</code></th>
<th>Maximum number of high-priority cells coming from the destination switch router at the burst level.</th>
</tr>
</thead>
</table>

**Defaults**

The parameter is not specified in the SVC setup request.

**Command Modes**

Map-class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>cellmax-burst</code></td>
</tr>
<tr>
<td>11.2(8.0.1)</td>
<td>Changed named from <code>cellmax-burst</code></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command defines a traffic parameter for the SVC connection.

The keyword `clp0` indicates this command affects only cells with a CLP of 0 (high-priority cells).

**Examples**

The following example sets the maximum number of high-priority cells coming from the destination switch at the burst level to 800 cells.

```
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-max-burst-size-clp0 800
```

To change the maximum number of the aggregate of low- and high-priority cells coming from the destination to the source at the burst level on the SVC, use the `atm backward-max-burst-size-clp1` map-class configuration command. To restore the default value, use the `no` form of this command.

```
  atm backward-max-burst-size-clp1 cell-count
  no atm backward-max-burst-size-clp1
```

**Syntax Description**

<table>
<thead>
<tr>
<th><code>cell-count</code></th>
<th>Maximum number of the aggregate of low- and high-priority cells coming from the destination at the burst level.</th>
</tr>
</thead>
</table>


atm backward-max-burst-size-clp0

Defaults
The parameter is not specified in the SVC setup request.

Command Modes
Map-class configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>Modified: Command changed to atm backward-max-burst-size-clp1</td>
</tr>
</tbody>
</table>

Usage Guidelines
This command defines a traffic parameter for the SVC connection.
The keyword clp1 applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

Examples
The following example sets the maximum number of the aggregate of low- and high-priority cells coming from the destination switch at the burst level to 100000.

```
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-max-burst-size-clp1 100000
```
To change the peak rate of high-priority cells coming from the destination to the source on the SVC, use the atm backward-peak-cell-rate-clp0 map-class configuration command. To restore the default, use the no form of this command.

```
atm backward-peak-cell-rate-clp0 rate
no atm backward-peak-cell-rate-clp0
```

Syntax Description
rate Maximum rate in kbps that this SVC can receive high-priority cells from the destination switch router. Maximum upper range is 7113539 (limited by 0xffffffff cells per second).

Defaults
The parameter is not specified in the SVC setup request.

Command Modes
Map-class configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
This command defines a traffic parameter for the SVC connection.
The keyword clp0 indicates this command affects only high-priority cells with a CLP of 0.
Examples

The following example sets the peak rate for high-priority cells from the destination switch router to 8000 kbps.

Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-peak-cell-rate-clp0 8000

To change the peak rate of the aggregate of low- and high-priority cells coming from the destination to the source on the SVC, use the `atm backward-peak-cell-rate-clp1` map-class configuration command. To restore the default value, use the `no` form of this command.

```
  atm backward-peak-cell-rate-clp1 rate

  no atm backward-peak-cell-rate-clp1
```

Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rate</td>
<td>Maximum rate in kbps that this SVC can receive of the aggregate of low- and high-priority cells from the destination switch router. Maximum upper range is 7113539 (limited by 0xffffffff cells-per-second).</td>
</tr>
</tbody>
</table>

Defaults

The parameter is not specified in the SVC setup request.

Command Modes

Map-class configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command defines a traffic parameter for the SVC connection.

The keyword `clp1` applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

Examples

The following example sets the peak rate of the aggregate of low- and high-priority cells from the destination switch router to 7000 kbps.

Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-peak-cell-rate-clp1 7000

To change the sustainable rate of high-priority cells coming from the destination to the source on the SVC, use the `atm backward-sustainable-cell-rate-clp0` map-class configuration command. To restore the default value, use the `no` form of this command.

```
  atm backward-sustainable-cell-rate-clp0 rate

  no atm backward-sustainable-cell-rate-clp0
```
### Syntax Description

**rate**  
Sustainable rate in kbps that this SVC can receive high-priority cells from the destination switch. Maximum upper range is 7113539 (limited by 0xffffffff cells per second).

### Defaults

The parameter is not specified in the SVC setup request.

### Command Modes

Map-class configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command defines a traffic parameter for the SVC connection.

The keyword **clp0** indicates this command affects only high-priority cells with a CLP of 0.

### Examples

The following example sets the sustainable rate for high-priority cells from the destination switch to 800 kbps.

```bash
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-sustainable-cell-rate-clp0 800
```

To change the sustainable rate of the aggregate of low- and high-priority cells coming from the destination to the source on the SVC, use the **atm backward-sustainable-cell-rate-clp1** map-class configuration command. To restore the default value, use the **no** form of this command.

```bash
atm backward-sustainable-cell-rate-clp1 rate

no atm backward-sustainable-cell-rate-clp1
```

### Syntax Description

**rate**  
Sustainable rate in kbps that this SVC can receive of the aggregate of low- and high-priority cells from the destination. Maximum upper range is 7113539 (limited by 0xffffffff cells per second).

### Defaults

The parameter is not specified in the SVC setup request.

### Command Modes

Map-class configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
**Usage Guidelines**

This command defines a traffic parameter for the SVC connection. The keyword **clp1** applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

**Examples**

The following example sets the sustainable rate of the aggregate of low- and high-priority cells from the destination switch to 700 kbps.

```
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm backward-sustainable-cell-rate-clp1 700
atm cac best-effort-limit
```

To change or set the interface limit on the number of best-effort connections, use the `atm cac best-effort-limit` interface configuration command. To restore the default, use the no form of this command.

```
atm cac best-effort-limit conn-value
no atm cac best-effort-limit
```

**Syntax Description**

- `conn-value` The number of best-effort connections allowed on the interface, in the range of 0 to 327680.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command places a limit on the total number of ABR and UBR connections on the interface. This command also supports subinterface configuration.

**Examples**

In the following example, the number of best effort connections allowed on the interface is limited to 200.

```
Switch(config-if)# atm cac best-effort-limit 200
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface resource</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm cac framing overhead

To instruct CAC to consider framing overhead, use the `atm cac framing overhead` interface configuration command. To restore the default (disabled), use the `no` form of this command.

```
atm cac framing overhead [force]
no atm cac framing overhead
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>force</td>
<td>Including framing overhead while calculating the maximum cell rate of an interface can reduce the maximum equivalent bandwidth that can actually be allocated for guaranteed services on this interface to a value below the currently allocated bandwidth guarantees. If this occurs, this keyword must be used for the change to take effect. This option forces the CAC to account for framing overhead on this interface.</td>
</tr>
</tbody>
</table>

**Defaults**

Framing overhead is not considered in calculating the MaxCR of an ATM interface.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command directs CAC to consider framing overhead in calculating the MaxCR of an ATM interface. For example, without this configuration, an OC-3 interface has a cell rate of 155,519 kbps. With the `atm cac framing overhead` command in effect, the actual cell rate (subtracting SONET framing overhead) is 149,759 kbps.

**Note**

Once this configuration command is in effect, subsequent SVC establishment and PVC creation can be altered as compared to the default state (less bandwidth is available, and lower traffic parameter values are allowed).

**Note**

Commands that change the framing in effect on an interface (such as those available on a DS-3 interface) can cause corresponding changes in the maximum cell rate of the interface.

**Examples**

The following example forces CAC to account for framing overhead on this interface.

```
Switch(config-if)# atm cac framing overhead force
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>resource</td>
<td></td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**atm cac link-sharing**

To change the resource management interface controlled link-sharing parameters, use the `atm cac link-sharing` interface configuration command. To reset the parameter values to the default, use the `no` form of this command.

```
atm cac link-sharing max-bandwidth {abr | cbr | ubr | vbr} {receive | transmit} percent
atm cac link-sharing max-guaranteed-service-bandwidth {receive | transmit} percent
atm cac link-sharing min-bandwidth {abr | cbr | ubr | vbr} {receive | transmit} percent
```

```
o atm cac link-sharing max-bandwidth {abr | cbr | ubr | vbr} {receive | transmit}
o atm cac link-sharing max-guaranteed-service-bandwidth {receive | transmit}
o atm cac link-sharing min-bandwidth {abr | cbr | ubr | vbr} {receive | transmit}
```

**Syntax Description**

- `abr`: The available bit rate connection.
- `cbr`: The constant bit rate connection.
- `ubr`: The unspecified bit rate connection.
- `vbr`: The variable bit rate connection.
- `receive`: The configured parameter applies to the flow of traffic into the switch on the interface (or from the route processor 0 interface).
- `transmit`: The configured parameter applies to the flow of traffic out of the switch on the interface (or to the route processor 0 interface).
- `percent`: The percent of interface bandwidth, from 0 to 95 percent.

**Defaults**

No limits configured. All minimums are defined as 0 percent, maximums as 95 percent.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

On a 25-Mbps port adapter you can configure the `atm cac link-sharing` parameter only on physical ports 0 or 6. The following rules apply:

- The parameter configured on port 0 applies to ports 0 through 5.
- The parameter configured on port 6 applies to ports 6 through 11.

This command does not support subinterface configuration.

The `atm cac link sharing` command specifies the minimum and maximum bandwidth that can be allocated to guaranteed service (CBR, VBR, ABR, or UBR+) connections. (UBR+ is UBR with MCR specified.)
Maximums can be individually specified for CBR, VBR, ABR, or UBR+, and also the AGG of this bandwidth. Minimums can be individually specified for CBR, VBR, ABR, and UBR+. These parameters, for a direction, are interrelated as follows (assuming these parameters are defined):

- \( \text{min}(\text{CBR}) + \text{min}(\text{VBR}) + \text{min}(\text{ABR}) + \text{min}(\text{UBR}) \leq 95 \text{ percent} \)
- \( \text{min}(\text{CBR}) \leq \text{max}(\text{CBR}) \leq 95 \text{ percent} \)
- \( \text{min}(\text{VBR}) \leq \text{max}(\text{VBR}) \leq 95 \text{ percent} \)
- \( \text{min}(\text{CBR}) \leq \text{max}(\text{AGG}) \leq 95 \text{ percent} \)
- \( \text{min}(\text{VBR}) \leq \text{max}(\text{AGG}) \leq 95 \text{ percent} \)
- \( \text{max}(\text{CBR}) \leq \text{max}(\text{AGG}) \leq 95 \text{ percent} \)
- \( \text{min}(\text{VBR}) \leq \text{max}(\text{AGG}) \leq 95 \text{ percent} \)
- \( \text{max}(\text{VBR}) \leq \text{max}(\text{AGG}) \leq 95 \text{ percent} \)

**Examples**

In the following example, the maximum bandwidth that can be allocated to VBR connections in the transmit direction on the interface is limited to 61 percent of the total bandwidth.

```
Switch(config-if)# atm cac link-sharing max-bandwidth vbr transmit 61
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td><code>resource</code></td>
<td></td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
### atm cac max-cdvt

To configure the maximum CDVT (per service category and direction) allowed for a connection on an interface by CAC, use the `atm cac max-cdvt` interface configuration command. To remove the configuration setting for `atm cac max-cdvt`, use the `no` form of this command.

```
atm cac max-cdvt {abr | cbr | ubr | vbr} {receive | transmit} cdvtval
no atm cac max-cdvt {abr | cbr | ubr | vbr} {receive | transmit}
```

#### Syntax Description

- **abr**: The available bit rate connection.
- **cbr**: The constant bit rate connection.
- **ubr**: The unspecified bit rate connection.
- **vbr**: The variable bit rate connection.
- **receive**: The configured parameter applies to the flow of traffic into the switch router on the interface (or from the route processor 0 interface).
- **transmit**: The configured parameter applies to the flow of traffic out of the switch router on the interface (or to the route processor 0 interface).
- **cdvtval**: The CDVT value, in the range of 0 to 2147483647, expressed in cell times (2.72 microseconds at 155.2 Mbps).

#### Defaults

None

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

This command configures a maximum for the CDVT that is allowed at connection setup. These can be specified independently by service category and traffic direction.

This command also supports subinterface configuration.

#### Examples

The following example configures the maximum CDVT allowed by CAC in traffic parameters for the incoming direction of an ABR connection on the interface to 21354.

```
Switch(config-if)# atm cac max-cdvt abr receive 21354
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface resource</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm cac max-mbs

To change the interface maximum for incoming and outgoing MBS at connection startup, use the atm cac max-mbs interface configuration command. To reset the maximum value to the default, use the no form of this command.

    atm cac max-mbs {receive | transmit} mbsval
    no atm cac max-mbs {receive | transmit}

**Syntax Description**

- **receive**
  The configured parameter applies to the flow of traffic into the switch on the interface (or from the route processor 0 interface).

- **transmit**
  The configured parameter applies to the flow of traffic out of the switch on the interface (or to the route processor 0 interface).

- **mbsval**
  The MBS value, in the range of 0 to 2147483647, expressed as the number of cells.

**Defaults**

None

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command configures a maximum for the MBS that is allowed at connection setup. These can be specified independently by traffic direction.

This command also supports subinterface configuration.

**Examples**

The following example configures the MBS allowed by CAC in traffic parameters for the outgoing direction of a VBR connection on the interface to 2345 cells.

```
Switch(config-if)# atm cac max-mbs transmit 2345
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface resource</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**atm cac max-min-cell-rate**

To configure the maximum MCR for ABR and UBR service category traffic flowing into and out of the switch router, use the `atm cac max-min-cell-rate` interface configuration command. To remove these values, use the `no` form of this command.

```
  atm cac max-min-cell-rate {abr | ubr} {receive | transmit} rate
  no atm cac max-min-cell-rate {abr | ubr} {receive | transmit}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>abr</code></td>
<td>The available bit rate connection.</td>
</tr>
<tr>
<td><code>ubr</code></td>
<td>The unspecified bit rate connection.</td>
</tr>
<tr>
<td><code>receive</code></td>
<td>The configured parameter applies to the flow of traffic into the switch router on the interface (or from the route processor 0 interface).</td>
</tr>
<tr>
<td><code>transmit</code></td>
<td>The configured parameter applies to the flow of traffic out of the switch router on the interface (or to the route processor 0 interface).</td>
</tr>
<tr>
<td><code>rate</code></td>
<td>A positive integer, measured in kbps, in the range of 0 to 910533065.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command configures a maximum for the MCR that is allowed at connection setup. These can be specified independently by service category and traffic direction.

This command also supports subinterface configuration.

**Examples**

The following example configures the maximum MCR allowed by CAC in traffic parameters for the outgoing direction of an ABR connection on the interface to 1340 kbps.

```
Switch(config-if)# atm cac max-min-cell-rate ubr transmit 1340
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface resource</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**atm cac max-peak-cell-rate**

To configure the maximum PCR for specific service categories and traffic directions, use the `atm cac max-peak-cell-rate` interface configuration command. To restore the default value, use the `no` form of this command.

```
use atm cac max-peak-cell-rate {abr | cbr | ubr | vbr} {receive | transmit} rate
no atm cac max-peak-cell-rate {abr | cbr | ubr | vbr} {receive | transmit}
```

**Syntax Description**

- **abr** The available bit rate connection.
- **cbr** The constant bit rate connection.
- **ubr** The unspecified bit rate connection.
- **vbr** The variable bit rate connection.
- **receive** The configured parameter applies to the flow of traffic into the switch router on the interface (or from the route processor 0 interface).
- **transmit** The configured parameter applies to the flow of traffic out of the switch router on the interface (or to the route processor 0 interface).
- **rate** A positive integer, measured in kbps, in the range of 0 to 910533065.

**Defaults**

None

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command configures the maximum PCR that is allowed at connection setup. These can be specified independently by service category and traffic direction.

For UBR connections, cell rate is not checked in CAC. By specifying a peak-cell-rate limit, CAC rejects connections that exceed the limit.

This command also supports subinterface configuration.

**Examples**

The following example configures the maximum PCR allowed by CAC in traffic parameters for the incoming direction of an ABR connection on the interface to 3001 kbps.

```
Switch(config-if)# atm cac max-peak-cell-rate abr receive 3001
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface resource</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm cac max-sustained-cell-rate

To configure the maximum SCR for traffic flow in either direction, use the atm cac max-sustained-cell-rate interface configuration command. To restore the default value, use the no form of this command.

```
atm cac max-sustained-cell-rate { receive | transmit } rate
no atm cac max-sustained-cell-rate { receive | transmit }
```

**Syntax Description**

- **receive**: The configured parameter applies to the flow of traffic into the switch router on the interface (or from the route processor 0 interface).
- **transmit**: The configured parameter applies to the flow of traffic out of the switch router on the interface (or to the route processor 0 interface).
- **rate**: A positive integer, measured in kbps, in the range of 0 to 910533065.

**Defaults**

None

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command specifies a maximum for the SCR that is allowed at connection setup. These can be specified independently by traffic direction.

This command also supports subinterface configuration.

**Examples**

The following example configures the maximum SCR allowed by CAC in traffic parameters for the outgoing direction of a VBR connection on the interface to 2201 kbps.

```
Switch(config-if)# atm cac max-sustained-cell-rate transmit 2201
```

**Command Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface resource</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm cac overbooking

To configure overbooking on an ATM or IMA interface, use the following atm cac overbooking interface configuration command. To restore the default, use the no form of this command.

    atm cac overbooking percent

    no atm cac overbooking

To configure overbooking on an ATM or IMA interface for an individual service class, use the following atm cac overbooking interface configuration command. To restore the default, use the no form of this command.

    atm cac overbooking {abr | vbr-nrt | vbr-rt | ubr} class-percent

    no atm cac overbooking {abr | vbr-nrt | vbr-rt | ubr}

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent</td>
<td>The overbooking percentage of the MaxCR of the interface being configured, from 100 to 10000. 100 percent = disabled.</td>
</tr>
<tr>
<td>abr</td>
<td>Specifies overbooking on an available bit rate connection.</td>
</tr>
<tr>
<td>ubr</td>
<td>Specifies overbooking on an unspecified bit rate connection.</td>
</tr>
<tr>
<td>vbr-rt</td>
<td>Specifies overbooking on a variable bit rate real time connection.</td>
</tr>
<tr>
<td>vbr-nrt</td>
<td>Specifies overbooking on a variable bit rate non-real time connection.</td>
</tr>
<tr>
<td>class-percent</td>
<td>The overbooking percentage of the specified service class, from 100 to 3200. 100 percent = disabled.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added service category support.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command determines whether overbooking is enabled on an ATM or IMA interface or service class, and specifies the extent of overbooking if enabled. Overbooking causes CAC to expand its concept of the amount of bandwidth available on an interface or service class (receive and transmit) by the percentage specified. This applies to the aggregate bandwidth available on the interface; individual traffic parameters are still limited by the maximum cell rate of the interface in a given direction. Also, the normal limit of 95 percent of MaxCR for guaranteed cell rates (or the appropriate controlled link sharing percentages) applies to the overbooked MaxCR of the interface. The overbooking is expressed as a percentage of the MaxCR of the interface being configured.
An interface must be shut down before any change in the overbooking configuration can be made. (See “Example.”) If the overbooking change results in a maximum guaranteed services bandwidth that is below the currently allocated bandwidth guarantees on this interface or service class, then the configuration will be rejected.

Overbooking cannot be configured on regular VP tunnel interfaces and is configurable only on shaped and hierarchical VP tunnel interfaces.

The following restrictions apply to service class overbooking:

- Service class overbooking is not supported on Regular VP tunnels.
- If the overbooking configuration results in a maximum guaranteed services bandwidth that is below the currently allocated bandwidth guarantees on an interface, the configuration is rejected.
- When an interface is overbooked with traffic, cell flow through the well-known VCs might be reduced.
- Service Class overbooking configuration is not supported on switches with FC-PCQ (Feature Card Per-Class Queuing) installed.

Enabling overbooking is recommended only for advanced users. Enabling overbooking forfeits the protection for guaranteed cell rates provided by the CAC algorithm and hardware.

**Note**
Service class overbooking configuration and interface overbooking configuration cannot co-exists on the same ATM and IMA interface. These two modes are mutually exclusive that are configurable on a per interface basis (on an ATM or IMA interface).

**Examples**

In the following example, ATM overbooking is configured for 159 percent of the MaxCR of the interface.

```
Switch(config-if)# shutdown
Switch(config-if)# atm cac overbooking 159
Switch(config-if)# no shutdown
```

In the following example, ATM overbooking is configured for an ABR (available bit rate) connection at 140 percent of the MaxCR of the interface.

```
Switch(config-if)# shutdown
Switch(config-if)# atm cac overbooking abr 140
Switch(config-if)# no shutdown
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>resource</td>
<td></td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>


**atm cac service-category**

To permit or deny a service category on an ATM physical interface, shaped VP tunnel subinterface, or hierarchical VP tunnel subinterface, use the `atm cac service-category` command. To restore the default configuration of the interface with respect to the service category, use the `no` form of this command.

```
atm cac service-category {abr | cbr | ubr | vbr-nrt | vbr-rt} {deny | permit}

no atm cac service-category {abr | cbr | ubr | vbr-nrt | vbr-rt}
```

**Syntax Description**

- **abr** The available bit rate connection.
- **cbr** The constant bit rate connection.
- **ubr** The unspecified bit rate connection.
- **vbr-nrt** The variable bit rate in non-real time.
- **vbr-rt** The variable bit rate in real time.
- **deny** The specified service category on the interface is denied.
- **permit** The specified service category on the interface is permitted.

**Defaults**

For physical interfaces and hierarchical VP tunnel subinterfaces, all service categories are enabled by default. For shaped VP tunnel subinterfaces, only CBR service category is enabled by default.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Broken out into separate command.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command specifies which service categories to permit or deny on the interface. Changes from the defaults must be done on a separate line for each service category. On a shaped VP tunnel interface, only one service category is permitted at one time.

To deny a service category in a shaped VP tunnel subinterface, you must delete all user VCs of the service category on the interface.

VBR-RT is used for connections where there is a fixed timing relationship between samples. VBR-NRT is used for connections where there is no fixed timing relationship between samples, but where there is still a need for guaranteed QoS.

This command also supports subinterface configuration.

**Examples**

In the following example, the CBR service category is prohibited on ATM subinterface 0/0/1.51 before service category UBR is allowed.

```
Switch(config)# interface atm 0/0/1.51
```
Switch(config-subif)# atm cac service-category cbr deny
Switch(config-subif)# atm cac service-category ubr permit

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface resource</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm cdvt-default

To change the default CDVT to request for UPC of cells received on the interface for connections that do not individually request a CDVT value, use the **atm cdvt-default** interface configuration command. To reset the default CDVT for a particular service category to the default value, use the **no** form of this command.

```
atm cdvt-default {cbr | vbr-rt | vbr-nrt | abr | ubr} number
no atm cdvt-default {cbr | vbr-rt | vbr-nrt | abr | ubr}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cbr</code></td>
<td>The constant bit rate connection.</td>
</tr>
<tr>
<td><code>vbr-rt</code></td>
<td>The variable bit rate in real time.</td>
</tr>
<tr>
<td><code>vbr-nrt</code></td>
<td>The variable bit rate in non-real time.</td>
</tr>
<tr>
<td><code>abr</code></td>
<td>The available bit rate connection.</td>
</tr>
<tr>
<td><code>ubr</code></td>
<td>The unspecified bit rate connection.</td>
</tr>
<tr>
<td><code>number</code></td>
<td>A positive integer, in the range 0 to 2147483647. The CDVT is expressed in cell-times (2.72 microseconds at 155.2 Mbps).</td>
</tr>
</tbody>
</table>

**Defaults**

1024

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

CDVT is a limit parameter used in the GCRA policing algorithm to monitor PCR. CDVT can be specified for PVCs through a connection traffic table row. If no CDVT is specified in the row, then a per-interface, per-service category default CDVT is applied for purposes of UPC on the connection.

For signaled connections, CDVT cannot be signaled. Use defaults specified on the interface.

**Examples**

The following example shows changing the default CDVT for received cells on VBR-RT connections.

```
Switch(config-if)# atm cdvt-default vbr-rt 4000
```

**Command** | **Description**
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm</code></td>
<td>Used to create a table entry.</td>
</tr>
<tr>
<td><code>connection-traffic-table-row</code></td>
<td></td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm vc</td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td>show atm vp</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm connection-traffic-table-row

To create a table entry, use the `atm connection-traffic-table-row` global configuration command. To delete an entry, use the `no` form of this command.

```
atm connection-traffic-table-row [index row-index] cbr pcr rate [cdvt cdvtval]
atm connection-traffic-table-row [index row-index] [vbr-rt | vbr-nrt] pcr rate {scr0 | scr10} scrval [mbs mbsval] [cdvt cdvtval] [packet-discard]
atm connection-traffic-table-row [index row-index] abr pcr rate [cdvt cdvtval] [mcr mcrval]
atm connection-traffic-table-row [index row-index] ubr pcr rate [cdvt cdvtval] [mcr mcrval] [packet-discard]
```

Syntax Description

- **cdvt cdvtval**: The value of the cell delay variation tolerance, in the range of 0 to 2147483647, expressed in cell-times (2.72 microseconds at 155.2 Mbps).
- **mbs mbsval**: The value of the maximum burst size, in the range of 0 to 2147483647, expressed in the number of cells.
- **mcr mcrval**: The minimum cell rate is a positive integer, measured in kbps, in the range of 0 to 910533065.
- **pcr rate**: The peak cell rate is a positive integer, measured in kbps, in the range of 0 to 910533065.
- **row-index**: An integer in the range of 1 to 1073741823.
- **scr0**: Sustained cell rate for the CLP 0 flow.
- **scr10**: Sustained cell rate for the CLP 0+1 flow.
- **scrval**: The sustained cell rate is a positive integer, measured in kbps per second, in the range of 0 to 910533065.
- **packet-discard**: Configures early packet discard on all PVCs and Soft VCs associated with this row. If the `packet-discard` keyword is omitted early packet discard is disabled.

Defaults

Rows 1 through 6 in the table are predefined.

Command Modes

Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added <code>packet-discard</code> keyword.</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command sets up the traffic characteristics used in PVC definition. The characteristics are stored as rows of a table. The row index is referenced when a PVC is created using the `atm pvc` interface command.
When the `atm connection-traffic-table-row` command is issued without the index clause, the software uses a free row-index, which is displayed to the user if the command is successful.

When the CDVT or MBS parameter is not specified in the creation of a row, a configurable interface default value is chosen to use in UPC. For systems that are capable of dual leaky bucket UPC (Catalyst 8540 MSR with feature card, and Catalyst 8510 MSR and LightStream 1010 with FC-PFQ), PCR/CDVT is monitored for service categories other than VBR, and for VBR PCR/CDVT and SCR/MBS. For LightStream 1010 with FC-PCQ, a single leaky bucket provides monitoring for PCR/CDVT for service categories other than VBR, and for VBR SCR/MBS.

Six connection traffic table rows are defined by default and are numbered 1 through 6. Row 1 is the default row used by the `atm pvc` command if no rows are explicitly specified. Rows 2 through 6 might be used for well-known `vcs` on a `vp` tunnel subinterface, depending on the service category of the underlying `vp`. Default rows cannot be deleted.

Row 1 PCR represents the maximum cell-rate (the maximum cell-rate that fits in 24 bits) that you can signal.

When an ABR row is configured, if MCR is not specified, MCR is configured as 0 in the CTT row.

When a VBR CTT row is configured using the `scr0` keyword, the switch processor feature card equipped with a dual leaky bucket polices only the CLP-0 flow of cells to the `scrvl`. When the `scr10` keyword is used, the CLP-0+1 flow is policed.

The `packet-discard` keyword enables packet discard on all PVCs and Soft VCs associated with this row that either do not have a `pd` option specified or have `pd use-cttr` in the VC configuration command. Packet discard is ignored for PVCs and Soft VCs that either have `pd on` or `pd off` specified in the VC configuration command and is ignored for all VPs.

**Examples**

In the following example, a CBR CTT row is defined with an index of 200 and a peak cell rate of 7743 kbps.

```
Switch(config)# atm connection-traffic-table-row index 200 cbr pcr 7743
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm pvc</code></td>
<td>Used to create a PVC.</td>
</tr>
<tr>
<td><code>atm pvp</code></td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td><code>show atm connection-traffic-table</code></td>
<td>Displays a table of connection traffic parameters used by network and connection management.</td>
</tr>
</tbody>
</table>
atm e164 address

To configure the native E.164 address of an ATM interface, use the `atm e164 address` interface configuration command. To disable the ATM E.164 address, use the `no` form of this command.

```
atm e164 address e164-address
no atm e164 address
```

**Syntax Description**

- `e164-address`: Specifies a native E.164 address, consisting of 7 to 15 decimal digits. Refer to the ITU-T Recommendation E.164 for more information on the syntax and semantics of native E.164 addresses.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to configure a native E.164 address that is used to connect to public networks.

When outgoing calls are configured to use forwarding E.164 addresses as the called party address (see the `atm route` command), this E.164 address is used as the forwarding calling party address.

When incoming calls are received on the interface that specifies the E.164 address as the called party address, the received called and calling party addresses are removed from the signaling message and replaced by the new received called and calling party subaddresses.

This new address is not registered with routing since it is only used as this switch’s address for this interface. It is not used as the address of destinations from this interface.

Note that this address is not used in conjunction with the E.164 translation table feature. The E.164 translation table should only be used when you want a one-to-one correspondence between the NSAP-format ATM end-system address and the native E.164 address, for example, when the public network does not support transport of subaddresses. The combination of the `atm e164 address` command and the `e164 address` option of the `atm route` command provides a general mechanism for interconnection of private networks across a public network. This combination allows one native E.164 address for the interface to the public network, with many NSAP-format ATM end-system addresses present in the private network behind the interface.

**Examples**

The following example shows setting the native E.164 address of ATM 0/0/1 to 1341457.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 address 1341457
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm e164 address</td>
<td>Configure the native E.164 address of an ATM interface.</td>
</tr>
<tr>
<td>atm route</td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the active ATM addresses on a switch router.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show atm vc</td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
</tbody>
</table>
**atm e164 auto-conversion**

To enable autoconversion of E.164 addresses, use the **atm e164 auto-conversion** interface configuration command. To disable E.164 autoconversion, use the **no** form of this command.

```
  atm e164 auto-conversion
  no atm e164 auto-conversion
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When an interface is configured for E.164 autoconversion, ATM E.164-format addresses are converted to the corresponding native E.164 address for outgoing calls. For incoming calls, native E.164 addresses are converted to the corresponding ATM E.164 format.

**Examples**

The following example shows how to enable E.164 autoconversion on ATM interface 0/0/1.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 auto-conversion
```

**Command Description**

- **show atm vc**
  - Displays the ATM layer connection information about the virtual connection.
**atm e164 translation**

To configure an interface to use the ATM E.164 translation table, use the `atm e164 translation` interface configuration command. To disable the ATM E.164 translation, use the `no` form of this command.

```
  atm e164 translation

  no atm e164 translation
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The ATM E.164 translation table is used when a one-to-one translation between NSAP-format ATM end-system addresses and native E.164 addresses is desired. This method for support of native E.164 addresses might be useful when the ATM interface connects to a public network that does not support transport of subaddresses.

Note that the more general mechanism for interconnection to E.164 public networks involves use of the `atm e164 address` command and the `e164-address` option of the `atm route` command. This other mechanism allows one native E.164 address for the interface to the public network, with many NSAP-format ATM end-system addresses present in the private network behind the interface.

When a signaling message attempts to establish a call from an interface configured for ATM E.164 translation, the called and calling party addresses are initially in NSAP format. Using the ATM E.164 translation table, an attempt is made to find the E.164 addresses corresponding to the NSAP addresses. These E.164 addresses are placed into the called and calling party addresses, and the original NSAP addresses are placed into the called and calling party subaddresses.

When a signaling message is received on an interface configured for ATM E.164 translation, the called and calling party addresses are in E.164 format. If the original NSAP-formatted called and calling addresses have been carried in subaddresses, then those addresses are used to forward the call. If subaddresses are not present, due to the network blocking the subaddresses, or the switch at the entry to the E.164 network does not provide subaddresses, an attempt is made to find a match for the E.164 addresses in the ATM E.164 translation table. If there is a match, the NSAP addresses corresponding to the E.164 addresses are placed into the called and calling party addresses. The call is then forwarded using the NSAP addresses.

**Examples**

The following example shows setting interface ATM 0/0/1 to use the E.164 translation table.

```
Switch(config)# interface atm0/0/1
Switch(config-if)# atm e164 translation
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm e164 auto-conversion</td>
<td>Enables autoconversion of E.164 addresses.</td>
</tr>
<tr>
<td>atm e164 translation-table</td>
<td>Enables ATM E.164 translation configuration mode.</td>
</tr>
<tr>
<td>atm route</td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td>e164 address</td>
<td>Configures an entry in the ATM E.164 translation table.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
atm e164 translation-table

To start ATM E.164 translation configuration mode, use the `atm e164 translation-table` global configuration command. To disable the ATM E.164 translation table, use the `no` form of this command.

```
atm e164 translation-table
no atm e164 translation-table
```

**Note**
The `atm e164 translation-table` global configuration command changes the configuration mode to ATM E.164 translation table configuration, and the following new prompt appears:

```
Switch(config-atm-e164)#
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Use this command to start ATM E.164 translation configuration mode.

The ATM E.164 translation table is used by all interfaces configured with the ATM E.164 translation functionality. Each entry in the table specifies a one-to-one correspondence between a native E.164 address and an NSAP-format ATM end-system address.

Refer to the `atm e164 translation` command for more information and usage guidelines about the ATM E.164 translation feature.

**Examples**
The following example shows how to start the ATM E.164 translation configuration mode.

```
Switch(config)# atm e164 translation-table
Switch(config-atm-e164)# e164 address 1112222 nsap-address 11.11122223333444455556666.1122334455666.11
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm e164 translation</td>
<td>Configures an interface to use the ATM E.164 translation table.</td>
</tr>
<tr>
<td>e164 address</td>
<td>Configures an entry in the ATM E.164 translation table.</td>
</tr>
</tbody>
</table>
atm esi-address

To enter the end station ID (ESI) and selector byte fields of the ATM NSAP address, use the `atm esi-address` interface configuration command. The NSAP address prefix is filled in by way of the ILMI address registration from the ATM switch router. To remove the end station address, use the `no` form of this command.

```
atm esi-address esi,selector
no atm esi-address esi,selector
```

**Syntax Description**

- `esi` End station ID field value in hexadecimal; 6 bytes long.
- `selector` Selector field value in hexadecimal; 1 byte long.

**Defaults**

No end station ID is defined for this interface.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface and subinterfaces.

The NSAP-format ATM end-system address of an interface is used by static maps (refer to the section “Configuring an SVC-Based Map List” in the *ATM Switch Router Software Configuration Guide*) and by Classical IP over ATM, as defined in RFC 1577 (refer to the section “Configure Classical IP over ATM in an SVC Environment” in the *ATM Switch Router Software Configuration Guide*).

The NSAP-format ATM end-system address of an interface can be configured using either the `atm esi-address` or the `atm nsap-address` command. Configuring a new address on the interface overwrites the previous address. The `atm esi-address` and `atm nsap-address` commands are mutually exclusive. Configuring the switch with the `atm esi-address` command negates the `atm nsap-address` setting, and vice versa.

The `atm esi-address` command allows you to configure the ATM address by entering the ESI (12 hexadecimal characters) and the selector byte (2 hexadecimal characters). The ATM address prefix (26 hexadecimal characters) is provided by the ATM switch router (refer to the `atm address` and `atm prefix` commands for more information). The resulting ATM address is registered on the ATM switch router using ILMI address registration.

**Examples**

The following example sets the ESI to 303132333435 and the selector byte to 36 on ATM subinterface 0.1.

```
Switch(config)# interface atm 0.1
Switch(config-subif)# atm esi-address 303132333435.36
```
### ATM Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm address</strong></td>
<td>Assigns a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><strong>atm nsap-address</strong></td>
<td>Configures the NSAP-format ATM end-system address of an ATM interface.</td>
</tr>
<tr>
<td><strong>atm prefix</strong></td>
<td>Configures an ILMI address prefix for an ATM interface.</td>
</tr>
</tbody>
</table>
atm filter-expr

To configure an ATM address filter that matches patterns, use one of the forms of the `atm filter-expr` global configuration command. To delete the specified filter, use the `no` form of this command.

```
   atm filter-expr name term
   atm filter-expr name not term
   atm filter-expr name term and term
   atm filter-expr name term or term
   atm filter-expr name term xor term
```

```
   no atm filter-expr name
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>name</code></td>
<td>The name of the pattern-matching filter expression.</td>
</tr>
<tr>
<td><code>term</code></td>
<td>Can be any of the following:</td>
</tr>
<tr>
<td></td>
<td>- A previously defined address pattern-matching expression</td>
</tr>
<tr>
<td></td>
<td>- A filter set applied to a calling-party address—<code>source</code> <code>filter-set</code> <code>name</code></td>
</tr>
<tr>
<td></td>
<td>- A filter set applied to a called-party address—<code>destination</code> <code>filter-set</code> <code>name</code></td>
</tr>
</tbody>
</table>

**Defaults**

Permit

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The first form (`atm filter-expr name term`) defines a simple filter expression that is pattern-matched only if the pattern given by `term` is matched.

The second form (`atm filter-expr name not term`) defines a filter expression that is pattern-matched only if the pattern given by `term` is not matched.

The third form (`atm filter-expr name term and term`) defines a filter expression that is pattern-matched if `either` of the patterns given by the two `terms` are matched.

The fourth form (`atm filter-expr name term or term`) defines a filter expression that is pattern-matched only if `both` of the patterns, but not both, given by the two `terms` is matched.

The fifth form (`atm filter-expr name term xor term`) defines a filter expression that is pattern-matched only if `one` of the patterns, but not both, given by the two `terms` is matched.

For commands with two `terms`—that is, commands using logical operators `or`, `and`, and `xor`—the evaluation sequence is from left to right of the expression. Further, for commands using logical operators `or` and `and`, the evaluation for the second `term` is conducted only when necessary, that is, the evaluation for the second `term` is omitted if the truth or falsehood can already be concluded from the evaluation for the first `term`. 
Examples

The following is sample output from the `atm filter-expr` command.

```
Switch(config)# atm filter-expr atm_filter_expr1 not source atm_filter_set1
Switch(config)# atm filter-expr atm_filter_expr2 source atm_filter_set1 and destination atm_filter_set2
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm filter-set</code></td>
<td>Creates an ATM address filter set.</td>
</tr>
</tbody>
</table>
atm filter-set

To create an ATM address filter set, use the `atm filter-set` global configuration command. To delete the specified filter, use the `no` form of this command.

```
atm filter-set name [index [number]] [permit | deny] [template | time-of-day {anytime | start-time {end-time}}]

no atm filter-set name [index number]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>name</code></td>
<td>The name of the filter set.</td>
</tr>
<tr>
<td><code>index</code></td>
<td>Set order in which filters are set. The range is from 1 through 65535.</td>
</tr>
<tr>
<td></td>
<td>The default is 1.</td>
</tr>
<tr>
<td><code>permit</code></td>
<td>Permission to accept an incoming call or forward an outgoing call on an</td>
</tr>
<tr>
<td></td>
<td>interface/subinterface if the address pattern-matching succeeds.</td>
</tr>
<tr>
<td><code>deny</code></td>
<td>Denial to accept an incoming call or forward an outgoing call on an</td>
</tr>
<tr>
<td></td>
<td>interface or subinterface if the address pattern-matching succeeds.</td>
</tr>
<tr>
<td><code>template</code></td>
<td>An ATM address, address template, or ATM address template alias.</td>
</tr>
<tr>
<td><code>time-of-day</code></td>
<td>Specify the time range in which the filter set takes place. This parameter</td>
</tr>
<tr>
<td></td>
<td>can be specified as <code>anytime</code> or as a specific time. The default is</td>
</tr>
<tr>
<td></td>
<td><code>anytime</code>.</td>
</tr>
<tr>
<td><code>start-time</code></td>
<td>Specify the time the filter set starts, in 24-hour format, <code>hh:mm:ss</code>.</td>
</tr>
<tr>
<td><code>end-time</code></td>
<td>Specify the time the filter set ends, in 24-hour format, <code>hh:mm:ss</code>.</td>
</tr>
</tbody>
</table>

**Defaults**

Permit

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If neither `permit` nor `deny` is specified, `permit` is assumed. If an address does not match any of the filter set entries, an implicit “deny” is returned as the permit/deny action of the filter set.

Filters are set in the same order they were configured. You can change the order (except in a complete NSAP address that has no wildcards) by specifying the optional parameter `index`.

After you create a filter for a specific interface, associate the filter to that interface by using the `atm access-group` command.
The following is an example of the `atm filter-set` command.

```
Switch(config)# atm filter-set filter_set1 permit 47.0091.8100.0000.0003.bbe4.aa01.4000.0c80.0000.64
Switch(config)# atm filter-set filter_set3 deny 47.840F...
Switch(config)# no atm filter-set filter_set3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm access-group</code></td>
<td>Used to subscribe an interface or subinterface to an existing ATM address pattern-matching filter expression.</td>
</tr>
<tr>
<td><code>atm soft-vc</code></td>
<td>Used to configure access control on the passive side of a soft PVC.</td>
</tr>
<tr>
<td><code>(point-to-point)</code></td>
<td></td>
</tr>
<tr>
<td><code>atm soft-vp</code></td>
<td>Used to configure access control on the passive side of a soft PVP.</td>
</tr>
</tbody>
</table>
**atm forward-max-burst-size-clp0**

To change the maximum number of high-priority cells going from the source to the destination at the burst level on the SVC, use the `atm forward-max-burst-size-clp0` map-class configuration command. To restore the default value, use the `no` form of this command.

```
  atm forward-max-burst-size-clp0 cell-count

  no atm forward-max-burst-size-clp0
```

**Syntax Description**

`cell-count`  
The burst size in cells, from 1 to 16777215. This is the maximum number of high-priority cells going from the source switch at the burst level.

**Defaults**

The parameter is not specified in the SVC setup request.

**Command Modes**

Map-class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command defines a traffic parameter for the SVC connection. The keyword `clp0` indicates this command affects only high-priority cells with a CLP of 0.

**Examples**

The following example sets the maximum number of high-priority cells going from the source switch at the burst level to 100000.

```
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-max-burst-size-clp0 100000
```

To change the maximum number of the aggregate of low- and high-priority cells going from the source to the destination at the burst level on the SVC, use the `atm forward-max-burst-size-clp1` map-class configuration command. To restore the default value, use the `no` form of this command.

```
  atm forward-max-burst-size-clp1 cell-count

  no atm forward-max-burst-size-clp1
```

**Syntax Description**

`cell-count`  
The burst size in cells, from 1 to 16777215. This is the maximum number of the aggregate of low- and high-priority cells going from the source switch at the burst level.
**Defaults**
The parameter is not specified in the SVC setup request.

**Command Modes**
Map-class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command defines a traffic parameter for the SVC connection.

The keyword `clp1` applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

**Examples**
The following example sets the maximum number of the aggregate of low- and high-priority cells going from the source switch at the burst level to 100000.

```plaintext
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-max-burst-size-clp1 100000
```

To change the peak rate of high-priority cells going from the source to the destination on the SVC, use the `atm forward-peak-cell-rate-clp0` map-class configuration command. To restore the default value, use the `no` form of this command.

```
    atm forward-peak-cell-rate-clp0 rate
    no atm forward-peak-cell-rate-clp0
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rate</code></td>
<td>Maximum rate in kbps that this SVC can send high-priority cells from the source switch router. The maximum upper range is 7113539 (limited by 0xffffffff cells per second).</td>
</tr>
</tbody>
</table>

**Defaults**
The parameter is not specified in the SVC setup request.

**Command Modes**
Map-class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command defines a traffic parameter for the SVC connection.

The keyword `clp0` indicates this command affects only high-priority cells with a CLP of 0.
### Examples

The following example sets the peak of the high-priority cell rate from the source switch to 1000 kbps.

```bash
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-peak-cell-rate-clp0 1000
```

To change the peak rate of the aggregate of low- and high-priority cells coming from the source to the destination on the SVC, use the `atm forward-peak-cell-rate-clp1` map-class configuration command. To restore the default value, use the `no` form of this command.

```bash
atm forward-peak-cell-rate-clp1 rate
no atm forward-peak-cell-rate-clp1
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rate</code></td>
<td>Maximum rate in kbps that this SVC can send the aggregate of low- and high-priority cells from the source. The maximum upper range is 7113539 (limited by 0xffffffff cells per second).</td>
</tr>
</tbody>
</table>

### Defaults

The parameter is not specified in the SVC setup request.

### Command Modes

Map-class configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command defines a traffic parameter for the SVC connection.

The keyword `clp1` applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

### Examples

The following example sets the peak of the aggregate of low- and high-priority cell rate from the source switch to 100000 kbps.

```bash
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-peak-cell-rate-clp1 100000
```

To change the sustainable rate of high-priority cells coming from the source to the destination on the SVC, use the `atm forward-sustainable-cell-rate-clp0` map-class configuration command. To restore the default value, use the `no` form of this command.

```bash
atm forward-sustainable-cell-rate-clp0 rate
no atm forward-sustainable-cell-rate-clp0
```
Syntax Description

| Rate | Sustainable rate in kbps that this SVC can send high-priority cells from the source. The maximum upper range is 7113539 (limited by 0xffffffff cells per second). |

Defaults

The parameter is not specified in the SVC setup request.

Command Modes

Map-class configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command defines a traffic parameter for the SVC connection.

The keyword clp0 indicates this command affects only high-priority cells with a CLP of 0.

Examples

The following example sets the sustainable rate of high-priority cells from the source switch to 100000 kbps.

Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-sustainable-cell-rate-clp0 100000

To change the sustainable rate of the aggregate of low- and high-priority cells coming from the source to the destination on the SVC, use the atm forward-sustainable-cell-rate-clp1 map-class configuration command. To restore the default value, use the no form of this command.

atm forward-sustainable-cell-rate-clp1 rate

no atm forward-sustainable-cell-rate-clp1

Syntax Description

| Rate | Sustainable rate in kbps that this SVC can send of the aggregate low- and high-priority cells from the source. The maximum upper range is 7113539 (limited by 0xffffffff cells per second). |

Defaults

The parameter is not specified in the SVC setup request.

Command Modes

Map-class configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
**Usage Guidelines**

This command defines a traffic parameter for the SVC connection.

The keyword `clp1` applies to the cumulative flow of CLP 0 and CLP 1 cells (high-priority and low-priority cells).

**Examples**

The following example sets the sustainable rate of high-priority cells from the source switch to 100000 kbps.

```
Switch(config)# map-class atm high-rate
Switch(config-map-class)# atm forward-sustainable-cell-rate-clp1 100000
```

Hierarchical VP tunnels have dedicated schedulers, which make possible the simultaneous support of all service category circuits inside the tunnel. The overall output of the tunnel rate is limited to the total output of the dedicated scheduler.

To enable hierarchical scheduling, use the `atm hierarchical-tunnel` global configuration command. To disable hierarchical scheduling, use the `no` form of this command.

```
atm hierarchical-tunnel
no atm hierarchical-tunnel
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To define hierarchical tunnels, enable this feature using the `atm idle-timeout` command, reload the switch, and then define the hierarchical tunnels.

When you enable hierarchical scheduling, it impacts the behavior of the CAC software on the switch. For example, enabling hierarchical scheduling can cause CAC software to refuse admission to some connections, even though those same connections were admitted before hierarchical scheduling was enabled.

If hierarchical scheduling is enabled, and if there are any guaranteed service VCs defined (or signalled) with a guarantee less than 76.114 kbps, those guaranteed service VCs are allocated a full rate of 76.114 kbps. Guaranteed service connections include:
• CBR
• VBR
• ABR/UBR with non-zero MCR.

If hierarchical scheduling is disabled, the guaranteed service VC rate is 38.057 kbps.

Note
The guaranteed service VC rate is 38.057 kbps with prerelease 12.0 Cisco IOS software.

Guaranteed service VCs are allocated more bandwidth after hierarchical scheduling is enabled, which affects the CAC of those VCs. You can compute the extra bandwidth that is being allocated and evaluate the effect this has on the interface CAC before enabling hierarchical scheduling.

Note
If hierarchical scheduling is enabled, increased resource consumption occurs across the entire switch.

Note
Best-effort VCs, or VCs with guarantees larger than 76.114 kbps, do not affect the behavior of the switch.

Examples
The following example shows how to enable hierarchical scheduling on an ATM switch router.

Switch# configure terminal
Switch# configure terminal
Switch(config)# atm hierarchical-tunnel
Switch(config)# end
Switch# reload

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pvp</td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the switch.</td>
</tr>
</tbody>
</table>
**atm idle-timeout**

To change the idle timer for SVCs on an interface that causes the SVCs to disconnect when inactive for a specified interval, use the `atm idle-timeout` interface configuration command. To restore the default setting, use the `no` form of this command.

```
  atm idle-timeout seconds

  no atm idle-timeout
```

**Syntax Description**

`seconds` Number of seconds the SVC can be inactive before disconnecting.

**Defaults**

300 seconds

**Command Modes**

Interface configuration.

**Note**

This command applies only to the route processor interface (ATM 0).

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To disable idle timeouts, set the value of `seconds` to 0.

**Examples**

The following example shows setting the timeout to 250.

```
switch(config)# atm idle-timeout 250
```

None
atm iisp

To configure ATM IISP on the specified physical or logical (VP tunnel) port, use the `atm iisp` interface configuration command.

```
  atm iisp [side side [version ver]] | [version ver [side side]]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>side</code></td>
<td>Interface side, specified as <code>user</code> or <code>network</code>. The default is <code>network</code>.</td>
</tr>
<tr>
<td><code>version</code></td>
<td>IISP version, specified as <code>3.0</code>, <code>3.1</code>, or <code>4.0</code>. The default is <code>3.0</code>.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

**Note**

Before using this command, ILMI autoconfiguration must be disabled. (Refer to the `atm auto-configuration` command).

When this command is configured and it causes a change in the interface protocol, version, or side, ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switch virtual connections across the interface are cleared; permanent virtual connections are not affected. Refer to the *ATM Switch Router Software Configuration Guide* for more information about this command.

The `atm auto-configuration`, `atm iisp`, and `atm nni` commands are mutually exclusive. Configuring the `atm iisp` command overwrites any previous configuration of the `atm nni` or `atm uni` commands for this interface. Future configuration of the `atm auto-configuration`, `atm nni`, or `atm uni` command on this interface overwrites the `atm iisp` command.

For calls to be routed from this interface, one or more static routes must be configured. Refer to the `atm route` command.

**Examples**

The following example configures ATM interface 3/1/2 as an IISP interface, running version 3.0 as the user side.

```
Switch(config)# interface atm 3/1/2
Switch(config-if)# no atm auto-configuration
Switch(config-if)#
%ATM-6-ILMINOAUTOCFG: ILMI (ATM3/1/2): Auto-configuration is disabled, current interface parameters will be used at next interface restart.
Switch(config-if)# atm iisp side user version 3.0
```
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM3/1/2.
Switch(config-if)# atm maxvci-bits 12
Switch(config-if)#
%ATM-5-ATMSOFTSTART:# Restarting ATM signalling and ILMI on ATM3/1/2.
Switch(config-if)# end

The following example configures subinterface ATM 3/1/3.100 as an IISP interface, and uses the defaults for this command.

Switch(config)# interface atm 3/1/3.100
Switch(config-subif)# no atm auto-configuration
Switch(config-subif)#
%ATM-6-ILMINOAUTOCFG: ILMI(ATM3/1/3.100): Auto-configuration is disabled, current interface parameters will be used at next interface restart.
Switch(config-subif)# atm iisp
Switch(config-subif)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM3/1/3.100.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm auto-configuration</td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm nni</td>
<td>Configures an ATM NNI on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>atm route</td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show atm route</td>
<td>Displays all local or network-wide reachable address prefixes in the switch router’s ATM routing table.</td>
</tr>
</tbody>
</table>
**atm ilmi default-access permit**

To set the global default access filter for ILMI-registered addresses on all interfaces, use the `atm ilmi default-access permit` global configuration command. To disable the global default access filter, use the `no` form of this command.

```
  atm ilmi default-access permit { all | matching-prefix [wellknown-groups | all-groups] }

  no atm ilmi default-access permit
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Permit all AESAs registered by attached end systems.</td>
</tr>
<tr>
<td>matching-prefix</td>
<td>Permit AESAs where the first 13 bytes of the address match an ILMI prefix used on the interface.</td>
</tr>
<tr>
<td></td>
<td>These ILMI prefixes can be configured using the global <code>atm address</code> command or the per-interface</td>
</tr>
<tr>
<td></td>
<td><code>atm prefix</code> command. The ILMI prefixes used on the interfaces can be shown using the <code>show atm</code></td>
</tr>
<tr>
<td></td>
<td><code>ilmi-status</code> command.</td>
</tr>
<tr>
<td>wellknown-groups</td>
<td>Permit well-known group addresses assigned by the ATM Forum and AESAs that match an ILMI prefix</td>
</tr>
<tr>
<td></td>
<td>used on the interface.</td>
</tr>
<tr>
<td></td>
<td>The well-known group addresses include the old LECS address (47.0079.0000.0000.0000.0000.0000.00A0.3E00.0001.00)</td>
</tr>
<tr>
<td></td>
<td>and any address matching the ATM Forum address prefix for well known addresses. (C5.0079.0000.0000.0000.0000.0000.00A0.3E)</td>
</tr>
<tr>
<td>all-groups</td>
<td>Permit all group addresses, including the well-known group addresses, and AESAs that match an</td>
</tr>
<tr>
<td></td>
<td>ILMI prefix used on the interface.</td>
</tr>
</tbody>
</table>

**Defaults**

`permit all`

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>11.3(3a)</td>
<td>Added: <code>permit</code></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command allows specification of a global default access filter for ILMI address registration. The access filter feature allows you to permit or deny certain ILMI registered addresses. The global default access filter takes effect when address registration is enabled on an interface, but no per-interface access filter is specified. For additional information, refer to the `atm address-registration` command.

- **Note**
  - If the Cisco SSRP for LAN Emulation is used in this network, ILMI registration of well-known group addresses should be permitted. This allows the active LECS to register the well-known LECS address with the switch. Either the `permit all`, `permit matching-prefix wellknown groups`, or `permit matching-prefix all-groups` option should be configured.
The global default-access filter for ILMI registration can be overridden by a per-interface access filter. (See the `atm address-registration` command.)

You should allow certain addresses to be registered through ILMI; however, to restrict them from being advertised through PNNI, the PNNI suppressed summary address feature should be used instead of the access filters for ILMI address registration. (See the `summary-address` command.)

### Examples

The following example shows how to permit all ILMI-registered addresses.

```bash
Switch(config)# atm ilmi default-access permit all
```

%ATM-5-ILMIDEFACCFILTER: New global default access filter setting will be applied to registration of new addresses on interfaces using global default access filter.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address</code></td>
<td>Assigns a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><code>atm address-registration</code></td>
<td>Enables the switch router to engage in address registration on an interface using the ILMI protocol.</td>
</tr>
<tr>
<td><code>atm prefix</code></td>
<td>Configures an ILMI address prefix for an ATM interface.</td>
</tr>
<tr>
<td><code>summary-address</code></td>
<td>Configures summary address prefixes on a PNNI node.</td>
</tr>
</tbody>
</table>
**atm ilmi-enable**

To enable the ILMI on a port, use the `atm ilmi-enable` interface configuration command. To disable the ILMI on a port, use the `no` form of this command.

```
  atm ilmi-enable
  no atm ilmi-enable
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Enabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the ATM 0 interface or the ATM router module interfaces.

ILMI is enabled by default; however, if the peer does not support ILMI, you should turn off ILMI using this command.

Several components of ILMI can be disabled independently without completely disabling ILMI. Refer to the `atm address-registration`, `atm auto-configuration`, and `atm ilmi-keepalive` commands for more information.

**Examples**

The following example shows how to disable ILMI on interface ATM 1/0/0.

```
Switch(config)# interface atm 1/0/0
Switch(config-if)# no atm ilmi-enable
```

**Command Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address-registration</code></td>
<td>Enables the switch to engage in address registration on an interface using the ILMI protocol.</td>
</tr>
<tr>
<td><code>atm auto-configuration</code></td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td><code>atm ilmi-keepalive</code></td>
<td>Used to enable or disable ILMI connectivity procedures and to change the ILMI keepalive poll interval.</td>
</tr>
<tr>
<td><code>show atm ilmi-status</code></td>
<td>Displays the ILMI-related status information.</td>
</tr>
</tbody>
</table>
**atm ilmi-keepalive**

To enable or disable ILMI connectivity procedures and to change the ILMI keepalive poll interval, use the `atm ilmi-keepalive` interface configuration command. To disable ILMI connectivity procedures, use the `no` form of this command.

```
  atm ilmi-keepalive [seconds [retry number]]
  no atm ilmi-keepalive
```

**Syntax Description**

- **seconds**: Period in seconds, from 1 to 65,535, when the IME is polled. The default is 5 seconds.
- **number**: Number of retries from 2 to 5. The default is 5 retries.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the ATM 0 interface or the ATM router module interfaces.

This command enables ILMI connectivity procedures, as described in Section 8.3.1 of the ATM Forum ILMI 4.0 Specification.

**Examples**

The following example enables ILMI keepalives on ATM interface 1/0/0, with a poll interval set to 4 seconds and the number of retries to 3.

```
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm ilmi-keepalive 4 retry 3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm ilmi-enable</td>
<td>Enables the ILMI on a port.</td>
</tr>
<tr>
<td>show atm ilmi-status</td>
<td>Displays the ILMI-related status information.</td>
</tr>
</tbody>
</table>
**atm input-xlate-table minblock**

To specify the minimum ITT-block size that the software attempts to use to allocate an ITT block, use
the `atm input-xlate-table minblock vpi` interface configuration command. To disable the minblock
function, use the `no` form of this command.

```
  atm input-xlate-table minblock vpi vpi-value block-size [force]
  no atm input-xlate-table minblock vpi vpi-value
```

**Syntax Description**

- **vpi-value**
  The VPI to which the command applies. The valid range is 0
to 255 for the LS1010 and the 6400 NSP. The valid range is 0
to 4095 for the Catalyst 8540 MSR.

- **block-size**
  The size of the ITT block in bytes is rounded to the smallest
  power of 2 greater than or equal to the entered value. The valid
  range is 32 to 16384. The minimum block size for the Catalyst
  8540 MSR is 64 bytes.

- **force**
  Forces the user-entered value to be used in configuring ITT
  blocks. If the force keyword is not specified, the user-entered
  value will not be saved in the startup configuration file.

**Defaults**

Disabled.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The purpose of this command is to reduce ITT fragmentation in order to improve utilization of system
resources. Make sure that the specified block size corresponds to the desired VC usage, so system
resources are efficiently used. ITT resources are used only when a connection is installed (when both
interfaces that the VC transits are up).

This command is particularly useful when the demand for SVCs transiting an interface/VPI can be
anticipated. If the user-specified block is larger than what is needed for the VCI, and the requested block
size is larger than what is available, a smaller-than-requested block size will be allocated for the VCI.

Table 1-1 illustrates the different usage scenarios of the autominblock and minblock commands.
Table 2-2  minblock command usage

<table>
<thead>
<tr>
<th>autominblock mode enabled</th>
<th>force minblock command keyword used</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>Command accepted; value rounded up and used as block-size hint, value not overridden by automatic analysis; value are nvgened.</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>Command accepted; value rounded up used as a floor for block-size hint. value may be overridden by automatic analysis; value not necessarily nvgened.</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>Command accepted; value rounded up and used as block-size hint; value are nvgened.</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>Command not accepted.</td>
</tr>
</tbody>
</table>

The following example shows how to set the ITT minblock to 64 bytes. In this example, the **force** keyword is used to override any automatic block sizing.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# atm input-xlate-table minblock vpi 4095 64 force
Switch(config-if)#
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm input-xlate-table autominblock</td>
<td>Use to enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs.</td>
</tr>
<tr>
<td>atm input-xlate-table autoshrink</td>
<td>Use to free up ITT memory blocks after high-number VCIs are removed.</td>
</tr>
<tr>
<td>show atm input-xlate-table</td>
<td>Use to view ITT utilization, including blocks used and available, and ports to which blocks are allocated.</td>
</tr>
</tbody>
</table>
atm input-xlate-table autominblock

To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the `atm input-xlate-table autominblock` global configuration command. To this feature, use the `no` form of this command.

```
        atm input-xlate-table autominblock
    no atm input-xlate-table autominblock
```

**Syntax Description**

None

**Defaults**

Disabled.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If autominblock is active, the system will look at all interfaces and determine the minimum ITT block sizes for all VPIs populated with PVCs and Soft PVC source legs that can use the ITT. When autominblock is active, the system adjusts the ITT block sizes as VCs are added or deleted. When generating a startup configuration file, `atm input-xlate-table autominblock` commands are inserted for each interface and VPI on which a user-defined PVC (that receives cells on the interface) or source leg of a Soft PVC is defined.

On initial configuration of the `atm input-xlate-table autominblock` command, ITT memory may already be somewhat fragmented because of previous commands. This condition can be mitigated by configuring a cross-connect using the maximum VCI on a VPI when first using the VPI. For the automatic determination of minimum block size on a VPI to be effective a PVC should be configured using the planned maximum VCI on a VPI.

To ensure that software allocates optimally sized ITT blocks, even after the system is restarted, enable the autominblock mode before all PVCs are defined. Save the configuration.

**Note**

Note that in analyzing the PVCs to determine minimum ITT block size, PVCs that are not a part of cross connects are included as well as cross-connected PVCs.

**Examples**

The following example shows how enable autominblock mode. Future ITT requests will be assigned automatic (depending on how the `atm input-xlate-table minblock` is set) ITT blocks that are sized based on system analysis of existing ITT blocks.
Switch# configure terminal
Switch(config)# atm input-xlate-table autominblock
Switch(config)#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>atm input-xlate-table minblock vpi</td>
<td>Use to specify the minimum ITT block size that the software attempts to use to allocate an ITT block.</td>
</tr>
<tr>
<td></td>
<td>atm input-xlate-table autoshrink</td>
<td>Use to free up ITT memory blocks after high-number VCIs are removed.</td>
</tr>
<tr>
<td></td>
<td>show atm input-xlate-table</td>
<td>Use to view ITT utilization, including blocks used and available, and ports to which blocks are allocated.</td>
</tr>
</tbody>
</table>
**atm input-xlate-table autoshrink**

To free up ITT memory blocks after high-numbered VCIs are removed, use the `atm input-xlate-table autoshrink` global configuration command. To disable the autoshrink function, use the `no` form of this command.

```
atm input-xlate-table autoshrink

no atm input-xlate-table autoshrink
```

**Syntax Description**

None

**Defaults**

Disabled.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Under normal operation, an ITT block is not resized after a member VC is removed unless it is the only member VC in the ITT block. If the only remaining VC is removed from an ITT block, the block will be freed. When the `atm input-xlate-table autoshrink` command is used, and a VC is removed from an ITT block, a check is made to determine whether the block size can be reduced to a lower power of two (all ITT block sizes are a power of two). If so, the block size is reduced to this amount.

**Examples**

The following example shows how to enable autoshrink mode. Once this mode is enabled, when high numbered VCIs are deleted, the system will shrink existing ITT blocks in-place.

```
Switch# configure terminal
Switch(config)# atm input-xlate-table autoshrink
Switch(config)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm input-xlate-table minblock vpi</code></td>
<td>Use to specify the minimum ITT-block size that the software attempts to use to allocate an ITT block.</td>
</tr>
<tr>
<td><code>atm input-xlate-table autominblock</code></td>
<td>Use to enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs.</td>
</tr>
<tr>
<td><code>show atm input-xlate-table</code></td>
<td>Use to view ITT utilization, including blocks used and available, and ports to which blocks are allocated.</td>
</tr>
</tbody>
</table>


### atm input-xlate-table minblock vpi

To specify the minimum ITT-block size that the software attempts to use to allocate an ITT block, use the **atm input-xlate-table minblock vpi** command. To disable the minblock, use the **no** form of this command.

```
atm input-xlate-table minblock vpi vpi-value block-size [force]

no atm input-xlate-table minblock vpi
```

#### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>vpi-value</strong></td>
<td>VPI to which the command applies. Valid range is 0 to 255 for the LS1010/6400 NSP. Valid range is 0 to 4095 for the 8540MSR.</td>
</tr>
<tr>
<td><strong>block-size</strong></td>
<td>The value is rounded to the smallest power of 2 greater than or equal to the entered value. Valid range is 32 to 16384.</td>
</tr>
<tr>
<td><strong>force</strong></td>
<td>Forces the user-entered value to be used in configuring ITT blocks. If the force keyword is not specified, the user-entered value will not be saved in the startup configuration file.</td>
</tr>
</tbody>
</table>

#### Defaults

Disabled.

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

The purpose of this command is to reduce ITT fragmentation thus better utilizing system resources. Ensure that the specified block size corresponds to the desired VC usage so system resources are efficiently used. ITT resources are used only when a connection is installed (When both interfaces that the VC transits are up).

This command is particularly useful when the needs of SVCs transiting an interface/VPI can be anticipated. If the user-specified block is larger than what is needed for the VCI, and the requested block size is larger than what is available, then a smaller than requested block size will be allocated for VCI.
Table 2-3  minblock command usage

<table>
<thead>
<tr>
<th>autominblock mode enabled</th>
<th>force minblock command keyword used</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>Command accepted; value rounded up and used as block-size hint, value not overridden by automatic analysis; value are nvgened.</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>Command accepted; value rounded up used as a floor for block-size hint. value may be overridden by automatic analysis; value not necessarily nvgened.</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>Command accepted; value rounded up and used as block-size hint; value will be nvgened.</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>Command not accepted.</td>
</tr>
</tbody>
</table>

Examples

The following example shows how to set the ITT minblock to 32K. In this example the force keyword is used to override any automatic block sizing.

Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# atm input-xlate-table minblock vpi 4095 32 force
Switch(config-if)#

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm input-xlate-table autominblock</td>
<td>To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the atm input-xlate-table autominblock command. To disable autominblock, use the no form of this command.</td>
</tr>
<tr>
<td>atm input-xlate-table autoshrink</td>
<td>To free up ITT memory blocks after high-number VCIs are removed, use the atm input-xlate-table autoshrink command. To disable the autoshrink function, use the no form of this command.</td>
</tr>
<tr>
<td>show atm input-xlate-table</td>
<td>To view ITT utilization, including blocks used and available and ports to which blocks are allocated, use the show atm input-xlate-table command.</td>
</tr>
</tbody>
</table>
**atm input-xlate-table autominblock**

To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the `atm input-xlate-table autominblock` command. To disable autominblock, use the `no` form of this command.

```
atm input-xlate-table autominblock
no atm input-xlate-table autominblock
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

**Defaults**

<table>
<thead>
<tr>
<th>Defaults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autominblock mode is disabled.</td>
</tr>
</tbody>
</table>

**Command Modes**

<table>
<thead>
<tr>
<th>Command Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global configuration</td>
</tr>
</tbody>
</table>

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If autominblock is active, the system will look at all interfaces and determine the minimum ITT block sizes for all VPIs populated with PVCs and SoftPVC source legs that can use the ITT. When autominblock is active, the system makes adjusts to the ITT block sizes as VCs are added or deleted. When generating a startup configuration file, `atm input-xlate-table autominblock` commands are inserted for each interface and VPI on which a user-defined PVC (that receives cells on the interface) or source leg of a soft PVC is defined.

On initial configuration of the `atm input-xlate-table autominblock` command, ITT memory may already be somewhat fragmented because of previous commands. This condition can be mitigated by configuring a cross-connect using the maximum VCI on a VPI when first using the VPI. A PVC should be configured using the planned maximum VCI on a VPI for the automatic determination of minimum block size on a VPI to be effective.

To ensure that software allocates optimal-sized ITT blocks—even after the system is restarted-enable the autominblock mode before or after all PVCs are defined. Save the configuration.

**Examples**

The following example shows how enable autominblock mode. Future IIT requests will be assigned automatic (depending on how `atm input-xlate-table minblock` is set) ITT block sized based on system analysis of existing ITT blocks.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# atm input-xlate-table autominblock
Switch(config-if)#
```

---

*ATM and Layer 3 Switch Router Command Reference*
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm input-xlate-table minblock vpi</strong></td>
<td>To specify the minimum ITT-block size that the software attempts to use to allocate an ITT block, use the <code>atm input-xlate-table minblock vpi</code> command. To disable the minblock, use the <code>no</code> form of this command.</td>
</tr>
<tr>
<td><strong>atm input-xlate-table autoshrink</strong></td>
<td>To free up ITT memory blocks after high-number VCIs are removed, use the <code>atm input-xlate-table autoshrink</code> command. To disable the autoshrink function, use the <code>no</code> form of this command.</td>
</tr>
<tr>
<td><strong>show atm input-xlate-table</strong></td>
<td>To view ITT utilization, including blocks used and available and ports to which blocks are allocated, use the <code>show atm input-xlate-table</code> command.</td>
</tr>
</tbody>
</table>
# atm input-xlate-table autoshrink

To free up ITT memory blocks after high-number VCIs are removed, use the `atm input-xlate-table autoshrink` command. To disable the autoshrink function, use the `no` form of this command.

```plaintext
  atm input-xlate-table autoshrink

  no atm input-xlate-table autoshrink
```

## Syntax Description

None

## Defaults

Disabled.

## Command Modes

Global configuration

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)</td>
<td>New command</td>
</tr>
</tbody>
</table>

## Usage Guidelines

Under normal operation, an ITT block is not resized after a member VC is removed unless it is the only member VC of the ITT block. If the only remaining VC is removed from an ITT block, the block will be freed. When `atm input-xlate-table autoshrink` is enabled, and a VC is removed from an ITT block, a check is made to determine if the block size could be reduced by a power of two. If the block can be resized, it is done.

## Examples

The following example shows how to enable autoshrink mode. Once this mode is enabled, the system will shrink existing ITT blocks in-place when high numbered VCIs are deleted.

```plaintext
Switch# configure terminal
Switch(config)# atm interface 0
Switch(config-if)# atm input-xlate-table autoshrink
Switch(config-if)#
```

## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm input-xlate-table minblock vpi</code></td>
<td>To specify the minimum ITT-block size that the software attempts to use to allocate an ITT block, use the <code>atm input-xlate-table minblock vpi</code> command. To disable the minblock, use the <code>no</code> form of this command.</td>
</tr>
</tbody>
</table>
To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the `atm input-xlate-table autominblock` command. To disable autominblock, use the `no` form of this command.

To view ITT utilization, including blocks used and available and ports to which blocks are allocated, use the `show atm input-xlate-table` command.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm input-xlate-table autominblock</code></td>
<td>To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the <code>atm input-xlate-table autominblock</code> command. To disable autominblock, use the <code>no</code> form of this command.</td>
</tr>
<tr>
<td><code>show atm input-xlate-table</code></td>
<td>To view ITT utilization, including blocks used and available and ports to which blocks are allocated, use the <code>show atm input-xlate-table</code> command.</td>
</tr>
</tbody>
</table>
**atm interface-group**

To allow more than one interface to have the same ATM address, use the `atm interface-group` command. To remove the interface from an interface group, use the `no` form of this command.

```
atm interface-group group_number
no atm interface-group group_number
```

**Syntax Description**

- `group_number`: Assigns a group number to this interface. Valid range is 1 to 1000.

**Defaults**

None.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

ATM address groups allow more than one interface to have the same ATM address. These multiple connections provide load balancing for traffic from an end station.

**Examples**

The following example shows how to configure ATM interface 1/1/0 and ATM interface 3/0/1 in ATM address group 5:

```
Switch(config)# interface atm 1/1/0
Switch(config-if)# atm interface-group 5
Switch(config-if)# exit
Switch(config)# interface atm 3/0/1
Switch(config-if)# atm interface-group 5
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show running-config</td>
<td>Shows the ILMI configuration on a per-port basis.</td>
</tr>
</tbody>
</table>
**atm lecs-address**

To configure the LECS address advertised by the switch to the end system, use the `atm lecs-address` interface configuration command.

```
Syntax Description
lecsaddress    Address of the LAN Emulation configuration server.
sequence#      Sequence number of the LECS.
```

**Defaults**

If the LECS address is not configured on an interface, the LECS address that was configured using the `atm lecs-address-default` global configuration command is used by default.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The LECS address is provided by the switch to directly connect LANE clients over the ILMI. LECS addresses can be configured on both interface and global levels. The globally configured address is sent to a port only if there is no LECS address configured on that port. The sequence number provides the position of this address in the ordered LECS address table.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm lecs-address-default</code></td>
<td>Configures the LECS address advertised by the switch to the end system.</td>
</tr>
<tr>
<td><code>show atm ilmi-configuration</code></td>
<td>Displays the switch configuration.</td>
</tr>
</tbody>
</table>
atm lecs-address-default

To configure the LECS address advertised by the switch to the end system, use the atm lecs-address-default global configuration command.

```
atm lecs-address-default lecsaddress [sequence #]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecsaddress</td>
<td>Address of the LECS.</td>
</tr>
<tr>
<td>sequence #</td>
<td>Sequence number of the LECS.</td>
</tr>
</tbody>
</table>

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The LECS address is provided by the switch to directly connected LANE clients over the ILMI. LECS addresses can be configured on both interface and global levels. The globally configured address is sent to a port only if there is no LECS address configured on that port. The sequence number provides the position of this address in the ordered LECS address table.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm lecs-address</td>
<td>Used to configure the LECS address advertised by the switch to the end system.</td>
</tr>
<tr>
<td>show atm ilmi-configuration</td>
<td>Used to display the switch configuration.</td>
</tr>
</tbody>
</table>
**atm link-distance**

To alter the propagation delay component of the cell-transfer delay offered by an interface, use the `atm link-distance` command. To reset the propagation delay to the default value, use the `no` form of this command.

```
atm link-distance p-value
no atm link-distance
```

**Syntax Description**

```
p-value  Specified in units of kilometers, which is then divided by the speed of light in kbps to derive a propagation delay in microseconds (0 to 65535).
```

**Defaults**

0

**Command Modes**

Interface configuration

**Command History**

```
Release  Modification
11.1(4)   New command
```

**Usage Guidelines**

The cell-transfer delay is used for the resource connection admission control of a CBR or VBR-RT connection.

This resource management command is supported for interface and subinterface configurations, and when interface metrics are provided to PNNI routing.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface resource</code></td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
</tbody>
</table>
atm manual-well-known-vc

To create and delete well-known (reserved) PVCs with non-default connection identifiers, or other nondefault parameters, use the `atm manual-well-known-vc` interface configuration command. To reenable the automatic default well-known VC mode, use the `no` form of this command.

```
atm manual-well-known-vc [delete | keep]

no atm manual-well-known-vc
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>delete</code></td>
<td>When specified, the existing automatically created VCs are deleted. If well-known VCs exist, you are prompted to confirm that the VC can be automatically deleted. If you reply with <code>no</code>, the command stops abruptly.</td>
</tr>
<tr>
<td><code>keep</code></td>
<td>When specified, the existing automatically created well-known VCs remain in place and appear in the running configuration.</td>
</tr>
</tbody>
</table>

**Defaults**
The `keep` option becomes the default on existing automatically created VCs when manual mode is entered.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the route processor interface (ATM 0).

All interfaces default to the `no` form of this command during initial startup. When this command is in effect, well-known VCs are not automatically created at startup. When this mode is enabled on an interface, the allowed range for VCI values is 5 through 16383, instead of 32 through 16383.

The three additional reserved channel encapsulation types added for the CPU PVCs are QSAAL, PNNI, and ILMI. These specify that the interface is a signaling, PNNI, or ILMI reserved channel.

You must enter the `copy running-config` command using the `startup-config` option to disable the automatic creation of default well-known VCs at system startup.

Although the OAM channels for tunnels are well-known channels (VCI 3 and VCI 4), they are not affected by the `atm manual-well-known-vc` status.

**Note**

You should not change the well-known channels to use a VC where the remote end is sending AAL5 messages not intended for this well-known VC. This means you should not swap VC values between two types of well-known VCs.
When using the **no** form of this command, if there are existing non-default reserved channel VCs for this interface, you are prompted to confirm that the VC can be automatically deleted. (If you enter **no**, the command stops abruptly.) Well-known VCs with default configurations are then automatically created for the interface. The default well-known PVCs are no longer shown as part of the running configuration.

When you configure well-known VCs on physical interfaces using the CBR service category, the VC scheduling on the external interface is the same as the CBR VC configuration. This means that the VCs are allocated the bandwidth specified and are limited to that same bandwidth (shaped).

---

**Note**

The connection from an external interface to the route processor is never shaped.

## Examples

The following example puts an interface into the manual-well-known-vc mode, deletes the existing default signaling PVC, and then creates a signaling PVC using a VCI value of 7.

```mermaid
Switch(config-if)# atm manual-well-known-vc keep
Switch(config-if)# no atm pvc 0 5
Switch(config-if)# atm pvc 0 7 interface atm 0 0 any-vci encap qsaal
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm pvc</strong></td>
<td>Used to create a PVC.</td>
</tr>
<tr>
<td><strong>copy running-config</strong></td>
<td>Copies the switch’s running configuration file to another destination, and further specifies the configuration used for initialization as the destination of the copy operation.</td>
</tr>
<tr>
<td><strong>startup-config</strong></td>
<td></td>
</tr>
</tbody>
</table>
**atm maxvc-number**

To configure the maximum number of ATM VCs supported on the ATM interface, use the `atm maxvc-number` interface configuration command. To restore the default value, use the `no` form of this command.

```
atm maxvc-number max-vc-num

no atm maxvc-number
```

**Syntax Description**

<table>
<thead>
<tr>
<th>max-vc-num</th>
<th>Maximum number of supported virtual channels. Configures the maximum number of virtual channels supports (0 to 32768).</th>
</tr>
</thead>
</table>

**Defaults**

32768 virtual channels

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Before using this command, the interface must be administratively shut down.

**Examples**

The following example sets the maximum number of ATM virtual channels supported on interface ATM 0/0/0 to 8000.

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# shutdown
Switch(config-if)# atm maxvc-number 8000
```

**Command Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm maxvc-hours</code></td>
<td>Configures the maximum number of active bits of VCI supported on an ATM interface.</td>
</tr>
<tr>
<td><code>atm pvc</code></td>
<td>Used to create a PVC</td>
</tr>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td><code>shutdown (interface)</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
**atm maxvci-bits**

To configure the maximum number of active bits of VCI supported on an ATM interface, use the `atm maxvci-bits` interface configuration command. To restore the default value, use the `no` form of this command.

```
atm maxvci-bits max-vci-bits
no atm maxvci-bits
```

**Syntax Description**

`max-vci-bits` Maximum number of active bits supported on an ATM interface. Configures the maximum number of VCI bits (0 to 14).

**Defaults**

14 bits

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Before using the `atm maxvci-bits` command, disable the `atm auto-configuration` command. Refer to “Examples” below.

When the `atm auto-configuration` command is configured, it causes a change in the maximum number of active VCI bits. The new value of the configured maximum number of active VCI bits is used for ILMI auto-configuration, the minimum of the value configured at this interface and the value configured on the interface UNI or NNI peer takes effect at this interface. ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switched virtual connections across the interface are cleared; permanent virtual connections are not affected.

**Examples**

The following example sets the maximum number of active VCI bits to 10 for interface ATM 0/0/0.

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# atm maxvci-bits 10
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM0/0/0.
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm auto-configuration</code></td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td><code>atm connection-traffic-table-row</code></td>
<td>Creates a table entry.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm maxvc-number</code></td>
<td>Configures the maximum number of ATM VCs supported on the ATM interface.</td>
</tr>
<tr>
<td><code>atm pvc</code></td>
<td>Used to create a PVC.</td>
</tr>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
atm maxvp-number

To configure the maximum number of ATM VPs supported on an ATM interface, use the atm maxvp-number interface configuration command. To restore the default value, use the no form of this command.

```
atm maxvp-number max-vp-number
no atm maxvp-number
```

**Syntax Description**

- **max-vp-number** Configures the maximum number of virtual paths supported:
  - For the Catalyst 8540 MSR: 0 to 4095
  - For the Catalyst 8510 MSR and LightStream 1010: 0 to 255

**Defaults**

- For the Catalyst 8540 MSR: 4095 virtual paths
- For the Catalyst 8510 MSR and LightStream 1010: 255 virtual paths

**Command Modes**

- Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example sets the maximum number of ATM virtual paths supported on interface ATM 0/0/1 to 128.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm maxvp-number 128
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm maxvpi-bits</td>
<td>Configures the maximum number of active VPI bits supported on an ATM interface.</td>
</tr>
<tr>
<td>atm pvp</td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>shutdown (interface)</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
**atm maxvpi-bits**

To configure the maximum number of active VPI bits supported on an ATM interface, use the `atm maxvpi-bits` interface configuration command. To restore the default value, use the `no` form of this command.

```
atm maxvpi-bits max-vpi-bits

no atm maxvpi-bits
```

**Syntax Description**

`max-vpi-bits` Configures the maximum number of active VPI bits supported on an ATM interface:

- For the Catalyst 8540 MSR: 0 to 12.
- For the Catalyst 8510 MSR and LightStream 1010: 0 to 8.

**Defaults**

8 bits

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When this command is configured and it causes a change in the maximum number of active VPI bits. When the `atm auto-configuration` command is configured, the new value of the configured maximum number of active VPI bits is used for negotiation, the minimum of the value configured at this interface and the value configured on the interface UNI or NNI peer takes effect for this interface. ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switched virtual connections across the interface are cleared; permanent virtual connections are not affected.

**Note**

Only 6 interfaces per switch module can have the VPI bits set to more than 8 bits. If an interface with more than 8 bits of VPI is removed (for example, a port adapter is hot-swapped), you can set the VPI bits to more than 8 bits on another interface on the same switch module. If, however, you reinstall the original interface (which had more than 8 bits of VPI), it reconfigures back to 8 bits. If this occurs, the VCs with the VPI set to 255 or higher are sent into a NO HW RESOURCES state. To configure this interface back to a VPI of greater than 8, another interface on the same MSC module must be configured to less than 8 bits. To restore the VC from the NO HW RESOURCES state, toggle the interface using the `shut` or `no shut` command. (Catalyst 8540 MSR)

**Examples**

The following example sets the maximum number of active VPI bits to 6 for interface ATM 0/0/0.

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# no atm auto-configuration
```
Switch(config-if)# atm maxvpi-bits 6
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM0/0/0.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm auto-configuration</td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm connection-traffic-table-row</td>
<td>Creates a table entry.</td>
</tr>
<tr>
<td>atm maxvp-number</td>
<td>Configures the maximum number of ATM VPs supported on an ATM interface.</td>
</tr>
<tr>
<td>atm pvp</td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show switch fabric (Catalyst 8540 MSR)</td>
<td>Shows the details of the switch fabric for an ATM switch router.</td>
</tr>
</tbody>
</table>
**atm mbs-default**

To change the default MBS to request for UPC of cells received on the interface for connections that do not individually request an MBS value, use the `atm mbs-default` interface configuration command. To reset the default MBS for a particular service category to the default value, use the `no` form of this command.

```
atm mbs-default \{vbr-rt | vbr-nrt\} number

no atm mbs-default \{vbr-rt | vbr-nrt\}
```

**Syntax Description**

| number | A positive integer, in the range of 0 to 2147483647. The MBS is expressed in cells. |

**Defaults**

1024

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

MBS is used to determine the burst tolerance limit parameter used in the GCRA policing algorithm to police SCR.

MBS can be specified for PVCs through a connection traffic table row. If no MBS is specified in the row, then a per-interface, per-service category default MBS is applied for purposes of UPC on the connection. This command allows for changes to the MBS default.

**Examples**

The following example shows changing the default MBS for received cells on VBR-RT connections.

```
Switch(config-if)# atm mbs-default vbr-rt 4000
```

**Command Description**

```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Creates a table entry.</td>
</tr>
<tr>
<td>connection-traffic-table-row</td>
<td></td>
</tr>
<tr>
<td>show atm vc</td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td>show atm vp</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
```
To configure an ATM NNI on the specified physical or logical (VP tunnel) port, use the `atm nni` interface configuration command.

```
atm nni
```

### Syntax Description
This command has no keywords or arguments.

### Command Modes
Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

**Note**
Before using this command, ILMI autoconfiguration must be disabled. See the `atm auto-configuration` command.

When this command is configured and it causes a change in the interface protocol, ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switched virtual connections across the interface are cleared; permanent virtual connections are not affected.

The PNNI routing and signaling protocol is run over all NNI interfaces, except those interfaces on which signaling was previously disabled (see the `atm signalling enable` command). To configure an IISP interface, use the `atm iisp` command.

The `atm auto-configuration`, `atm iisp`, and `atm nni` commands are mutually exclusive. Configuring the `atm nni` command overwrites any previous configuration of the `atm iisp` command for this interface. Future configuration of the `atm auto-configuration`, and `atm iisp` command on this interface overwrites the `atm nni` command.

### Examples

The following example shows configuring an ATM NNI on logical port card 3, subcard 1, and port 3, VPI 99.

```
Switch(config)# interface atm 3/1/3.99
Switch(config-subif)# atm nni
```

### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm auto-configuration</td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm iisp</td>
<td>Configures ATM IISP on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>atm signalling enable</td>
<td>Enables the signaling and SSCOP on a port.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
**atm nsap-address**

To configure the NSAP-format ATM end-system address of an ATM interface, use the `atm nsap-address` interface configuration command. To remove any configured NSAP-format address for the interface, use the `no` form of this command.

```
atm nsap-address nsap-address
no atm nsap-address
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>nsap-address</code></td>
<td>A 20-octet NSAP address. Specifies the 40-digit hexadecimal NSAP address of this interface (the source address).</td>
</tr>
</tbody>
</table>

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface and subinterfaces.

The NSAP-format ATM end-system address of an interface is used by static maps (refer to the section “Configuring an SVC-Based Map List” in the *ATM Switch Router Software Configuration Guide*) and by Classical IP over ATM, as defined in RFC 1577 (see the section “Configure Classical IP over ATM in an SVC Environment” in the *ATM Switch Router Software Configuration Guide*).

The NSAP-format ATM end-system address of an interface can be configured using either the `atm esi-address` or the `atm nsap-address` command. Configuring a new address on the interface overwrites the previous address. The `atm esi-address` and `atm nsap-address` commands are mutually exclusive. Configuring the switch with the `atm esi-address` command negates the `atm nsap-address` setting, and vice versa.

NSAP-format ATM end-system addresses have a fixed length of 40 hexadecimal digits. Configure the address using the following dotted format:

```
x.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xxxxx.xx
```

The dots can be omitted.

**Note**

ATM addresses configured using the `atm nsap-address` command are not automatically registered with ATM routing on the switch. In addition to configuring these addresses using the `atm nsap-address` command, the addresses must be configured as static routes on the route processor interface of the ATM switch router.

**Examples**

The following example shows how to configure the NSAP-format ATM end-system address for interface ATM 0.1.

```
Switch(config)# interface atm 0.1
```
Switch(config-subif)# **atm nsap-address** 47.0091.8100.0000.1111.1111.1111.1111.1111.1111.00
Switch(config-subif)# **exit**
Switch(config)# **atm route** 47.0091.8100.0000.1111.1111.1111.1111.1111.1111.00 atm0 internal

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm esi-address</strong></td>
<td>Enters the end station ID (ESI) and selector byte fields of the ATM NSAP address.</td>
</tr>
<tr>
<td><strong>atm nsap-address</strong></td>
<td>Configures the NSAP-format ATM end-system address of an ATM interface.</td>
</tr>
</tbody>
</table>
atm nsap (map-list)

To define an ATM map statement for an SVC, use the `atm-nsap` map-list configuration subcommand in conjunction with the `map-list` global configuration subcommand. To remove the address, use the `no` form of this command.

```
protocol protocol-address atm-nsap atm-nsap-address [class class-name] [broadcast] [aal5mux]
```

```
no protocol protocol-address atm-nsap atm-nsap-address [class class-name] [broadcast] [aal5mux]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>Specified as the keyword <code>ip</code>.</td>
</tr>
<tr>
<td>protocol-address</td>
<td>Destination address that is being mapped to this SVC.</td>
</tr>
<tr>
<td>atm-nsap-address</td>
<td>Destination ATM NSAP address. Must be exactly 40 hexadecimal digits long and in the correct dotted format.</td>
</tr>
<tr>
<td>class-name</td>
<td>Name of a table that contains encapsulation-specific parameters. Such a table can be shared between maps that have the same encapsulation.</td>
</tr>
<tr>
<td>broadcast</td>
<td>Indicates this map entry is to be used when the corresponding protocol sends broadcast packets to the interface.</td>
</tr>
<tr>
<td>aal5mux</td>
<td>Uses <code>aal5mux</code> encapsulation. The default is <code>nsap</code>.</td>
</tr>
</tbody>
</table>

### Defaults

No map statements are defined.

### Command Modes

Map-list configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command is required with the `map-list` command when you are configuring an SVC.

### Examples

In the following example, a map list named `atmsvc` includes one map statement for a destination address being mapped.

```
Switch(config)# map-list atm 1/0/0
Switch(config-map-list)# map-list atmsvc
ip 172.21.97.17 atm-nsap AB.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12 class qos
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>map-list</td>
<td>Defines an ATM map statement for either a PVC or SVC.</td>
</tr>
</tbody>
</table>
**atm oam (global)**

To configure the OAM, AIS, RDI, and loopback operations and to set the maximum number of OAM connections, use the `atm oam` global configuration command. To disable these operations, use the `no` form of this command.

**Catalyst 8540 MSR**

```snippet
d  atm oam [ais] [end-loopback] [rdi] [seg-loopback]

d  no atm oam [ais] [end-loopback] [rdi] [seg-loopback]
```

**Catalyst 8510 MSR and LightStream 1010**

```snippet
d  atm oam [ais] [end-loopback] [max-limit number] [rdi]

d  no atm oam [ais] [end-loopback] [max-limit number] [rdi]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ais</td>
<td>AIS operation.</td>
</tr>
<tr>
<td>end-loopback</td>
<td>End-to-end OAM loopback.</td>
</tr>
<tr>
<td>number</td>
<td>Number of maximum OAM-configured connections allowed per switch. The range is 1 to 3200.</td>
</tr>
<tr>
<td>rdi</td>
<td>RDI operation.</td>
</tr>
<tr>
<td>seg-loopback</td>
<td>Segment loopback.</td>
</tr>
</tbody>
</table>

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>atm oam (global)</code></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None.

**Examples**

The following example globally enables AIS, RDI, and segment loopback operators for all interfaces.

```bash
Switch(config)# atm oam seg-loopback ais rdi
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm oam (interface)</code></td>
<td>Configures the OAM, AIS, RDI, and loopback modules at the interface level.</td>
</tr>
</tbody>
</table>
atm oam (interface)

To configure the OAM, AIS, RDI, and loopback modules at the interface level, use the `atm oam` interface configuration command. To disable these modules, use the `no` form of this command.

```
atm oam [interface atm card/subcard/port]\[vpt\#]\[vpi [vci]] [ais] [end-loopback] [loopback-timer] [max-limit] [rdi] [seg-loopback] [intercept end-to-end]

no atm oam [interface atm card/subcard/port]\[vpt\#]\[vpi [vci]] [ais] [end-loopback] [loopback-timer] [max-limit] [rdi] [seg-loopback] [intercept end-to-end]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>Specifies the card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td><code>.vpt#</code></td>
<td>Specifies the virtual path tunnel number for the ATM interface.</td>
</tr>
<tr>
<td><code>vpi</code></td>
<td>Specifies the virtual path identifier.</td>
</tr>
<tr>
<td><code>vci</code></td>
<td>Specifies the virtual channel identifier.</td>
</tr>
<tr>
<td><code>ais</code></td>
<td>AIS operation.</td>
</tr>
<tr>
<td><code>end-loopback</code></td>
<td>End-to-end OAM loopback.</td>
</tr>
<tr>
<td><code>loopback-timer</code></td>
<td>OAM loopback transmit timer.</td>
</tr>
<tr>
<td><code>max-limit</code></td>
<td>Maximum number of OAMs supported.</td>
</tr>
<tr>
<td><code>rdi</code></td>
<td>RDI operation.</td>
</tr>
<tr>
<td><code>seg-loopback</code></td>
<td>Segment loopback.</td>
</tr>
<tr>
<td><code>intercept end-to-end</code></td>
<td>Intercept OAM cells and forward to the ATM switch processor.</td>
</tr>
</tbody>
</table>

**Defaults**

Default for the `loopback-timer` interval is 5 seconds.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>atm oam (interface)</code></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To enable or disable OAM operations on a VP connection, only specify the `vpi` value. To enable or disable VC connections, you must specify both `vpi` and `vci` values.

In interface and subinterface command modes, `vpt` configuration is supported.

**Note**

For the Catalyst 8510 MSR and the LightStream 1010, use the `atm oam loopback-timer` command only with the `seg-loopback` and `end-loopback` keywords.

**Examples**

The following example enables end-to-end OAM loopback on VPI 50 VCI 100 on ATM 3/0/0.
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm oam 50 100 end-loopback

The following example enables or disables the OAM, AIS, RDI, and loopback operation to a specified connection.

Switch(config-if)# no atm oam 12 100
Switch(config-if)# atm oam 19 rdi
Switch(config-if)# atm oam 100 200 ais rdi
Switch(config-if)# atm oam 34 89 seg-loopback end-to

The following example shows changing the loopback timer interval to 10 seconds.

Switch(config-if)# atm oam 50 100
Switch(config-if)# atm loopback-timer 10

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm oam (global)</td>
<td>Configures the OAM, AIS, RDI, and loopback operations and sets the maximum number of OAM connections.</td>
</tr>
</tbody>
</table>
atm output-queue (Catalyst 8510 MSR and LightStream 1010)

To change the maximum queue size of the output queue, use the `atm output-queue` interface configuration command. To reset the maximum queue size to the default value, use the `no` form of this command.

```
atm output-queue [force] {cbr | vbr-rt | vbr-nrt | abr-ubr} max-size number
no atm output-queue [force] {cbr | vbr-rt | vbr-nrt | abr-ubr} max-size
```

**Syntax Description**

- **force** Forces the change to be made regardless of lost data on the interface queue.
- **cbr** Specifies the constant bit rate service category parameter.
- **vbr-rt** Specifies the variable bit rate real-time parameter.
- **vbr-nrt** Specifies the variable bit rate when the parameter is not real-time.
- **abr-ubr** Specifies the available to unspecified bit rate parameters.
- **max-size** Maximum output queue size per service category.
- **number** Queue size in cells, from 256 to 65280. For installation in hardware, the number provided is rounded up to the next value available in the hardware. The configured and installed values are both displayed using the `show atm interface` command.

**Defaults**

Varies by physical interface type, queue, and either `abr-ubr` or `vbr-nrt` queues, and by the OSF value.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>atm output-queue</code></td>
</tr>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Added: (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `force` argument indicates that the change should be made even if it results in losing data on the interface queue (the queue must be momentarily disabled to change the threshold). This command without the `force` argument only changes the threshold if the interface is down. An error message is displayed and the command does not take effect if the interface is up and the `force` argument has not been specified.

**Note**

This command is not supported on systems equipped with the FC-PCQ.

This command does not support subinterface configuration and does not apply to the route processor interface (ATM 0).
On a 25-Mbps port adapter, you can configure the parameters only on physical ports 0 or 6. The following rules apply:

- The parameters configured on port 0 apply to ports 0 through 5.
- The parameters configured on port 6 apply to ports 6 through 11.

Examples

In the following example, the maximum size of the \texttt{vbr-nrt} output queue is set to a minimum of 512 cells. This can be set even if the interface is up.

\begin{verbatim}
Switch(config-if)# atm output-queue force vbr-nrt max-size 512
\end{verbatim}

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{atm pacing}</td>
<td>Enables or changes the artificial limitation on interface output rate.</td>
</tr>
<tr>
<td>\texttt{show atm interface}</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>\texttt{show atm interface resource}</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
</tbody>
</table>
atm output-threshold (Catalyst 8510 MSR and LightStream 1010)

To change the output queue thresholds, use the `atm output-threshold` interface configuration command. To reset the threshold to the default value, use the `no` form of this command.

```
atm output-threshold {cbr | vbr-rt | vbr-nrt | abr | ubr} discard disc-thresh-num
atm output-threshold {cbr | vbr-rt | vbr-nrt | abr | ubr} efci efci-thresh-num
atm output-threshold abr relative-rate abr-thresh-num

no atm output-threshold discard disc-thresh-num
no atm output-threshold efci efci-thresh-num
no atm output-threshold abr relative-rate abr-thresh-num
```

**Syntax Description**

- **cbr** Specifies the constant bit rate parameter.
- **vbr-rt** Specifies the variable bit rate real-time parameter.
- **vbr-nrt** Specifies the variable bit rate when the parameter is not real-time.
- **abr** Specifies the available bit rate parameter.
- **ubr** Specifies the unspecified bit rate parameter.

- **discard** When a cell arrives at a congested output queue (as indicated by discard-threshold), it is eligible for CLP discard (or EPD if EPD is enabled on the connection).

- **disc-thresh-num** A number (12, 25, 37, 50, 62, 75, 87, or 100) that indicates the percentage of queue-full. Using 100 disables the threshold.

- **efci** When cells arrive on connections to a congested (as indicated by efci-threshold) output queue on the interface, the efci bit in the cell header is set.

- **efci-thresh-num** A number (12, 25, 50, or 100) that indicates the percentage of queue-full. Using 100 disables the threshold.

- **relative-rate** When a backward RM cell is received on an ABR connection on the interface (from outside the switch), its congestion bit is set if the ABR-UBR interface output queue is congested (as indicated by abr-thresh-num).

- **abr-thresh-num** A number (12, 25, 37, 50, 62, 75, 87, or 100) that indicates the percentage of queue-full. Using 100 disables the threshold.

**Defaults**

For all service categories, `discard` is 87 percent and `efci` is 25 percent. The `abr relative-rate` is 25 percent.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>atm output-threshold</code></td>
</tr>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Added: (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>
Usage Guidelines

This command does not support subinterface configuration. This command does not apply to the route processor interface (ATM 0).

Note

This command is not supported on systems equipped with FC-PCQ.

You can configure the abr relative-rate parameter only on physical ports 0 or 6 on a 25-Mbps port adapter. The following rules apply:

- The parameter configured on port 0 applies to ports 0 to 5.
- The parameter configured on port 6 applies to ports 6 to 11.

Examples

In the following example, the discard threshold of the VBR-NRT queue is set to 87 percent of the maximum queue size.

Switch(config-if)# atm output-threshold vbr-nrt discard 87

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
<tr>
<td>resource</td>
<td></td>
</tr>
</tbody>
</table>
atm over-subscription-factor (Catalyst 8510 MSR and LightStream 1010)

To set the over-subscription factor, use the `atm over-subscription-factor` global configuration command. To restore the default value to the over-subscription factor, use the `no` form of this command.

```plaintext
atm over-subscription-factor number
no atm over-subscription-factor
```

**Syntax Description**

- `number`: A positive integer from 1 to 32, representing the over-subscription factor.

**Defaults**

- 8

**Command Modes**

- Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>atm over-subscription-factor</code></td>
</tr>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Added: (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The over-subscription factor number is a positive integer from 1 through 32. Use this command to determine the initial port queue size. The over-subscription factor is used to size the VBR-NRT and ABR/UBR queues.

The resizing of queues can be overridden using the `atm output-queue` (Catalyst 8510 MSR and LightStream 1010) command. Changes to the `atm over-subscription-factor` command only take place during startup.

The sizing of VBR-NRT and ABR UBR queues is determined by the following equations.

- `size (vbr-nrt) = .25 * ((osf * 2048) - DefaultSize (cbr) - DefaultSize (vbr-rt))`
- `size (abr-ubr) = .75 * ((osf * 2048) - DefaultSize (cbr) - DefaultSize (vbr-rt))`

The default size of the CBR and VBR queues varies by interface type, as defined in Table 2-4.

**Table 2-4  Default Maximum Queue Size by Interface Type**

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Default Max Size CBR Queue</th>
<th>Default Max Size VBR-RT Queue</th>
</tr>
</thead>
<tbody>
<tr>
<td>SONET</td>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>DS3/E3</td>
<td>256</td>
<td>512</td>
</tr>
</tbody>
</table>

**Note**

This command is not supported on systems equipped with FC-PFQ.
Examples

In the following example, the over-subscription factor of the switch is set to 15. To effect this change and resize the UBR and VBR-RT queues, the configuration must be written to NVRAM and the switch must be restarted.

Switch(config)# atm over-subscription-factor 15

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm output-queue</td>
<td>Used to change the maximum queue size of the output queue.</td>
</tr>
<tr>
<td>(Catalyst 8510 MSR and LightStream 1010)</td>
<td></td>
</tr>
<tr>
<td>show atm resource</td>
<td>Displays global resource manager configuration and status.</td>
</tr>
</tbody>
</table>
**atm pacing**

To enable or change the artificial limitation on interface output rate, use the `atm pacing` interface configuration command. To disable output pacing, use the `no` form of this command.

```
atm pacing r-value [force]
no atm pacing
```

### Syntax Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>r-value</code></td>
<td>Bit rate expressed in kbps.</td>
</tr>
<tr>
<td><code>force</code></td>
<td>Forces a change to be made regardless of the results. See “Usage Guidelines.”</td>
</tr>
</tbody>
</table>

### Defaults

No pacing

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command is only available on systems equipped with the switch processor feature card or on LightStream 1010 not equipped with FC-PCQ.

**Note**

For the Catalyst 8540, this command applies only to port adapters in the carrier module.

This command is not supported for subinterface configuration and does not apply to the route processor interface (ATM 0). You cannot configure this parameter on OC-12 and 25-Mbps ports.

On systems equipped with the switch processor feature card, the pacing value installed cannot be less than the guaranteed bandwidth allocated on the interface, regardless of the value of the `force` argument. The `force` argument indicates that the change should be made even if it results in an output cell-rate that does not provide sufficient bandwidth for guaranteed service on the transmit flow of the interface. An error message is displayed and the command does not take effect if the change impacts guaranteed bandwidth, and the `force` argument is not present.

**Note**

The granularity of the pacing rate provided by the hardware varies with the size of the bit rate requested. The value entered by the user is rounded up to the closest value available for installation in the hardware. Both the configured and installed values are displayed with the `show ima interface` command.

### Examples

In the following example, the transmit cell rate of the interface is limited to the closest value possible in hardware, greater than 30,000 kbps. If the amount of bandwidth allocated to CBR and VBR connections in the transmit direction on the interface is greater than 30,000 kbps, the command fails.
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm pacing 30000

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ima interface</td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
**atm pnni admin-weight**

To specify the administrative weight of the ATM PNNI interface, use the `atm pnni admin-weight` interface configuration command. To return to the default values, use the `no` form of this command.

```
atm pnni admin-weight number traffic-class
no atm pnni admin-weight traffic-class
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>number</code></td>
<td>The administrative weight value assigned to the interface (1 to 1000000). Refer to the <code>administrative-weight</code> command for default values.</td>
</tr>
<tr>
<td><code>traffic-class</code></td>
<td>The service-category keywords for traffic class are <code>cbr</code>, <code>vbr-rt</code>, <code>vbr-nrt</code>, <code>abr</code>, <code>ubr</code>, or <code>all</code>.</td>
</tr>
</tbody>
</table>

**Defaults**

Determined by the mode set by the `administrative-weight` command.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the ATM 0 interface or the ATM router module interfaces and applies only to the NNI interface.

Use this command to manually set the administrative weight of an interface. Changing the administrative weight of an interface to a larger value might cause calls to be routed away from the interface.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>administrative-weight</code></td>
<td>Configures the mode of default administrative weight assignment for PNNI interfaces.</td>
</tr>
<tr>
<td><code>show atm pnni interface</code></td>
<td>Displays specific information about an interface and lists the interfaces running on a PNNI node.</td>
</tr>
</tbody>
</table>
### atm pnni aggregation-token

To specify the aggregation token for a PNNI interface, use the `atm pnni aggregation-token` command.

```plaintext
atm pnni aggregation-token value
```

#### Syntax Description

- **value**: The aggregation token on this interface, in the range of 0 to 4294967295.

#### Defaults

0

#### Command Modes

PNNI interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

Aggregation tokens are used to determine the grouping of links that are summarized to higher levels of the PNNI hierarchy. All lower-level links with the same aggregation token between a pair of peer groups will be treated as a single aggregated link at the parent node level.

In the default case, all parallel links between two peer groups are aggregated with aggregation token 0.

#### Examples

The following example shows how to set the aggregation token on ATM interface 1/0/0.

```plaintext
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm pnni aggregation-token 100
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aggregation-mode</td>
<td>Specifies the mode that is used to calculate the combined metrics from multiple lower-level PNNI links into individual aggregated links to be advertised by this node.</td>
</tr>
<tr>
<td>show atm pnni aggregation link</td>
<td>Displays the aggregated PNNI links on the switch.</td>
</tr>
<tr>
<td>show atm pnni aggregation node</td>
<td>Displays the PNNI nodal aggregation tables for a complex node.</td>
</tr>
</tbody>
</table>
**atm pnni explicit-path**

To enter PNNI explicit path configuration mode to create or modify PNNI explicit paths, use the `atm pnni explicit-path` command from global configuration mode. Use the `no` form of this command to delete the explicit path and all associated explicit path segments.

```
atm pnni explicit-path {identifier path-id-number [name path-name] | name path-name} [enable | disable]

no atm pnni explicit-path {identifier path-id-number [name path-name] | name path-name}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>identifier</strong></td>
<td>Path ID number of the explicit path.</td>
</tr>
<tr>
<td><strong>path-id-number</strong></td>
<td>Path name of the path for the explicit path. If you specify the identifier first, you can assign or modify its path name.</td>
</tr>
<tr>
<td><strong>name</strong></td>
<td>Path name of the explicit path.</td>
</tr>
<tr>
<td><strong>path-name</strong></td>
<td>Path name of the path for the explicit path. If you specify the identifier first, you can assign or modify its path name.</td>
</tr>
<tr>
<td><strong>enable</strong></td>
<td>Enables the explicit path to be used for routing any soft connections that reference it.</td>
</tr>
<tr>
<td><strong>disable</strong></td>
<td>Prevents the explicit path from being used for routing any soft connections that reference it.</td>
</tr>
</tbody>
</table>

**Defaults**

Enabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to manually configure either a fully-specified or a partially-constrained path for routing a standard soft VC or soft VP connection or a Frame Relay soft VC.

**Creating Explicit Path Entries**

Once you are in PNNI explicit path configuration mode, there are several commands that you can use to create and edit an ordered list of path entries. Refer to the following commands for more information on creating the individual path entries:

- `exclude-node`
- `next-node`
- `segment-target`

**Editing and Deleting Explicit Path Entries**

Each explicit path has entries with indexes that give it a relative position within the list. Use these indexes to edit an explicit path. After each entry is added, the entire current list is displayed.
Chapter 2  ATM Commands

atm pnni explicit-path

Use the following keywords to edit, add an entry to, or delete an entry from an explicit path:

- Use the **index** keyword to specify the index of the entry to be edited. If no index is specified for a new entry, it always defaults to one higher than the last path entry. If the index specified matches the index of an existing entry, the index is overwritten with new information.

- Use the **append-after** keyword to insert a path entry after the specified index. The path entries that follow are renumbered to make room for the new entry.

- Use the **no** form of the command to delete an existing index or entry for a specific explicit path.

- Use the **list** keyword to display the entire current list.

Use the following syntax to edit, add an entry to, or delete an entry from any explicit path:

```
atm pnni explicit-path {identifier path-id-number [name path-name] | name path-name}
[no] [index index-number | append-after index-number] list
```

**Examples**

The following example shows how to enter PNII explicit path configuration mode from global configuration mode, for a path named *boston_2.path1*.

```
Switch(config)# atm pnni explicit-path name boston_2.path1
Switch(cfg-pnni-expl-path)#
```

Once in PNII explicit path configuration mode, the following example shows how to configure the explicit path *boston_2.path1* with four entries and then exit explicit path configuration mode:

- The first entry configures the *dallas_2* node.
- The second entry configures the *dallas_4* node, which is adjacent to *dallas_2*. For the *dallas_4* node, an exit port is specified.
- The third entry configures a partially specified segment to the node *chicago_2* (which is several hops away).
- The fourth entry configures a higher-level LGN node adjacent to *chicago_2*, which is specified by its 15-byte node-ID prefix.

```
Switch(cfg-pnni-expl-path)# next-node dallas_2
Switch(cfg-pnni-expl-path)# next-node dallas_4 port 80003004
Switch(cfg-pnni-expl-path)# segment-target chicago_2
Switch(cfg-pnni-expl-path)# next-node 40:72:47.00918100000010600000000
Switch(cfg-pnni-expl-path)# end
Switch#
```

The following example shows how to reenter PNII explicit path configuration mode for a path named *new_york.path1* and list the current path.

```
Switch(config)# atm pnni explicit-path name new_york.path1
Switch(cfg-pnni-expl-path)# list
Explicit_path name new_york.path1 (id 5) from node dallas_1:
 1 next-node dallas_2
 2 next-node dallas_4 port 80003004
 3 segment chicago_2
 4 next-node new_york
```

**Examples**

The following example shows how to modify the first entry to add an exit port, using the **index** keyword to specify the index of the entry to be modified.

```
Switch(cfg-pnni-expl-path)# index 1 next-node dallas_2 port 80000000
```
Explicit_path name new_york.path1 (id 5) from node dallas_1:
1 next-node dallas_2 port 80000000
2 next-node dallas_4 port 80003004
3 segment   chicago_2
4 next-node 40:72:47.009181000000106000000000.

The following example shows how to use the **append-after** keyword to add a new entry into an explicit path list.

If the explicit path has four **next-node** entries labelled as index 1 through 4, use the **append-after** keyword to add a new entry after index 2, which results in index 3. The remaining two entries are automatically renumbered to index 4 and 5 to accommodate the newly added index 3.

```
Switch(cfg-pnni-expl-path)# append 2 next-node st_louis
Explicit_path name new_york.path1 (id 5) from node dallas_1:
1 next-node dallas_2 port 80000000
2 next-node dallas_4 port 80003004
3 next-node st_louis
4 segment   chicago_2
5 next-node 40:72:47.009181000000106000000000.
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm soft-vc (point-to-point)</td>
<td>Used to create a soft PVC on the switch.</td>
</tr>
<tr>
<td>atm soft-vp</td>
<td>Used to create a soft PVP on the switch.</td>
</tr>
<tr>
<td>exclude-node</td>
<td>Specifies a node to exclude from all segments of a partially specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>frame-relay soft-vc</td>
<td>Creates Frame Relay soft PVCs on the switch.</td>
</tr>
<tr>
<td>next-node</td>
<td>Specifies the next adjacent entry in a fully-specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>segment-target</td>
<td>Specifies a target entry in a partially specified PNNI explicit-path.</td>
</tr>
<tr>
<td>show atm pnni explicit-paths</td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
</tbody>
</table>
**atm pnni link-selection**

To configure a method for selecting a link out of multiple links to the same neighbor, use the `atm pnni link-selection` interface configuration command. To return to the default value, use the `no` form of this command.

```
atm pnni link-selection { cbr | vbr-rt | vbr-nrt | abr | ubr | all } { admin-weight-minimize | blocking-minimize | transmit-speed-maximize | load-balance | alternate }

no atm pnni link-selection { cbr | vbr-rt | vbr-nrt | abr | ubr | all }
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cbr</code></td>
<td>Constant bit rate service category.</td>
</tr>
<tr>
<td><code>vbr-rt</code></td>
<td>Variable bit rate real-time service category.</td>
</tr>
<tr>
<td><code>vbr-nrt</code></td>
<td>Variable bit rate non-real-time service category.</td>
</tr>
<tr>
<td><code>abr</code></td>
<td>Available bit rate service category.</td>
</tr>
<tr>
<td><code>ubr</code></td>
<td>Unspecified bit rate service category.</td>
</tr>
<tr>
<td><code>all</code></td>
<td>All service categories.</td>
</tr>
<tr>
<td><code>admin-weight-minimize</code></td>
<td>Transmits a call on the interface with the lowest administrative weight.</td>
</tr>
<tr>
<td><code>blocking-minimize</code></td>
<td>Minimizes subsequent call blocking.</td>
</tr>
<tr>
<td><code>transmit-speed-maximize</code></td>
<td>Transmits calls on the highest-speed parallel link.</td>
</tr>
<tr>
<td><code>load-balance</code></td>
<td>Balances calls across parallel links.</td>
</tr>
<tr>
<td><code>alternate</code></td>
<td>Selects an alternate link that is used only when all other, nonalternate, links are either down or full.</td>
</tr>
</tbody>
</table>

**Defaults**

- `blocking-minimize` is the default link selection for `cbr`, `vbr-rt`, and `vbr-nrt` service categories.
- `load-balance` is the default link selection for `abr` and `ubr` service categories.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the ATM 0 interface or the ATM router module interfaces.

Link selection applies whenever the port specified in the DTL is zero and there are multiple interfaces to the next node.

When multiple parallel “alternate” links are considered during call setup, the load-balance link selection is applied to these parallel links. The alternate configuration on some links does not modify the link selection for non-alternate parallel links.
When multiple parallel links are configured inconsistently, the order of precedence of configured values is **admin-weight-minimize**, **blocking-minimize**, **transmit-speed-maximize**, and **load-balance**. For example, if any link is configured as **admin-weight-minimize**, that becomes the link selection criteria for the entire group.

**Examples**

The following example shows how to configure link selection on ATM interface 0/0/0 with a VPR-NRT service category and in transmit speed maximize mode:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# atm pnni link-selection vbr-nrt transmit-speed-maximize
```

The following example shows how to configure link selection on ATM interface 0/0/0 with a CBR service category, and then designate the link as an alternate:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# atm pnni link-selection cbr alternate
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show atm pnni neighbor</strong></td>
<td>Displays the PNNI neighboring peers for a switch.</td>
</tr>
</tbody>
</table>
**atm pnni mobile**

Use the `atm pnni mobile` command to specify a PNNI interface node as mobile in a mobile network.

```
atm pnni mobile
no atm pnni mobile
```

**Syntax Description**

None

**Defaults**

Interface is not mobile.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Applies to interfaces on mobile switches (border nodes in a mobile network). A mobile interface (or link) is a wireless (physical or virtual path) connection between two switches, at least one of which is mobile.

Use the `atm pnni mobile` command to enable a mobile border switch to advertise an outside nodal hierarchy list to its peer group. Without advertising, a mobile network cannot join a host peer group.

**Examples**

The following example shows how to specify an interface as mobile.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm pnni mobile
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address</code></td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><code>atm pnni nodal-hierarchy-list highest-level</code></td>
<td>Specifies highest level of PNNI hierarchy to be advertised to bordering networks.</td>
</tr>
<tr>
<td><code>atm router pnni</code></td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td><code>debug atm pnni mobility</code></td>
<td>Sends an error notification if mobile PNNI problems are detected and the <code>debug atm pnni mobility</code> command is enabled.</td>
</tr>
<tr>
<td><code>node</code></td>
<td>Creates, enables or disables switch nodes as well as specifies or changes node level.</td>
</tr>
<tr>
<td><code>show atm pnni local-node</code></td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>show atm pnni mobility-info</td>
<td>Displays lowest node and logical node information associated with PNNI mobility.</td>
</tr>
<tr>
<td>show atm pnni node</td>
<td>Shows whether PNNI nodes are enabled and running, and shows node configuration information.</td>
</tr>
</tbody>
</table>
### atm pnni node

To specify which PNNI node in the switch router runs on an interface when the interface runs PNNI, use the `atm pnni node` interface configuration command. To return to the default value, use the `no` form of this command.

```
atm pnni node node-index

no atm pnni node
```

#### Syntax Description

<table>
<thead>
<tr>
<th>node-index</th>
<th>An integer, from 1 through 255, identifying a PNNI node running on this switch. Currently only a single lowest-level node with node index 1 is supported.</th>
</tr>
</thead>
</table>

#### Defaults

Node index 1

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

This command does not apply to the ATM 0 interface or the ATM router module interfaces.

Currently node index 1 is the only valid value. Refer to the `node` command for more information.

By default, PNNI node 1 automatically runs on all PNNI interfaces.

This command does not turn PNNI on or off for this interface. See the `atm auto-configuration` command and the `atm nni` commands for more information on the interface type.

#### Examples

The following example shows how to configure a PNNI node index on ATM interface 1/0/0.

```
Switch# configure terminal
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm pnni node 1
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm auto-configuration</td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm nni</td>
<td>Configures an ATM NNI on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>node</td>
<td>Used to create, delete, enable, or disable PNNI nodes running on this switch and to specify or change the level of a node.</td>
</tr>
<tr>
<td>show atm pnni interface</td>
<td>Displays specific information about an interface and lists the interfaces running on a PNNI node.</td>
</tr>
</tbody>
</table>
**atm pnni nodal-hierarchy-list highest-level**

Specifies the highest level of PNNI hierarchy to be advertised in the outside nodal hierarchy list.

```
atm pnni nodal-hierarchy-list highest-level level
no atm pnni nodal-hierarchy-list highest-level level
```

**Syntax Description**

<table>
<thead>
<tr>
<th>level</th>
<th>An integer from 0 to 104, identifying where an outside nodal hierarchy list is truncated.</th>
</tr>
</thead>
</table>

**Defaults**

Default is zero, the highest PNNI level possible. Using the default, the outside nodal hierarchy list will not be truncated, allowing attached mobile networks to see all network levels of a fixed network.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

An access point switch is a border switch in a fixed network that has the capacity to establish a wireless connection with a mobile network.

Use the **atm pnni nodal-hierarchy-list highest-level** command in conjunction with an access point switch interface connected to a mobile network. This command sets the highest level advertised in the outside nodal hierarchy list by the access point switch. A mobile network cannot access any hierarchy level higher than the advertised level because it cannot see it. Using this command prevents mobile networks from connecting at higher than wanted levels to a fixed network and/or offers protection against badly configured networks.

**Examples**

The following example shows how to specify the highest outside nodal hierarchy level for an interface.

```
Switch(config)# interface atm 0/0/1
Switch(config - if)# atm pnni nodal-hierarchy-list highest-level 48
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm address</td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td>atm pnni mobile</td>
<td>Used to specify a PNNI interface as mobile.</td>
</tr>
<tr>
<td>atm router pnni</td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td>debug atm pnni mobility</td>
<td>Prints an error notification if mobile PNNI problems are detected and the <strong>debug atm pnni mobility</strong> command is enabled.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>node</strong></td>
<td>Creates, enables, or disables switch nodes as well as specifies or changes node level.</td>
</tr>
<tr>
<td><strong>show atm pnni local-node</strong></td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
<tr>
<td><strong>show atm pnni mobility-info</strong></td>
<td>Displays lowest node and logical node information associated with PNNI mobility.</td>
</tr>
<tr>
<td><strong>show atm pnni node</strong></td>
<td>Shows whether PNNI nodes are enabled and running, and shows node configuration information.</td>
</tr>
</tbody>
</table>
atm pnni trace boundary

To designate an ATM interface as a PNNI connection trace boundary, use the `atm pnni trace boundary` interface configuration command. To revert to the default state, use the `no` form of the command.

```
atm pnni trace boundary
no atm pnni trace boundary
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

ATM PNNI interfaces are not trace boundaries.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command on ATM PNNI interfaces to create boundaries for PNNI connection trace. Any ATM interface can be configured as a trace boundary, but, it is only meaningful for PNNI interfaces.

You can configure an ATM interface to reject any connection traces entering the switch through this interface (such connection traces are “incomplete”) and to terminate any connection traces leaving the switch through this interface (such connection traces are “complete successfully”).

**Note**

All non-PNNI interfaces (for example, UNI and IISP interfaces) are trace destination interfaces by default.

**Examples**

The following example shows how to configure an ATM interface as a PNNI connection trace boundary.

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm pnni trace boundary
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm pnni trace connection</code></td>
<td>Initiates a PNNI connection trace.</td>
</tr>
<tr>
<td><code>show atm pnni trace connection</code></td>
<td>Displays PNNI connection trace information.</td>
</tr>
<tr>
<td><code>show atm pnni trace information</code></td>
<td>Displays PNNI connection trace configuration information.</td>
</tr>
</tbody>
</table>
To initiate a PNNI connection trace, use the `atm pnni trace connection` privileged EXEC command.

```plaintext
atm pnni trace connection interface interface {dlci dlci | direction {incoming | outgoing} {call-reference value [endpt-reference value] | {vpi vpi [vci vci]} [endpt-reference value]} [age-timeout {seconds | none}] [connection-id-trace] [fail-timeout seconds] [no-pass-along]
```

**Syntax Description**

- **interface interface**
  Specifies the source interface for the PNNI connection trace. The interface can be either an ATM interface or a Frame Relay serial interface.

- **dlci dlci**
  Specifies the DLCI for a serial Frame Relay interface. The range is 16 to 1006.

- **direction {incoming | outgoing}**
  Specifies the direction for the PNNI connection trace for an ATM interface. For serial interfaces, the direction is always incoming by default.

- **call-reference value**
  Specifies the call reference used by signaling to identify a connection. The 24-bit call reference is structured in two parts. The most significant bit represents the call reference flag and the 23 least significant bits represent the call reference value. For the same call, the call reference value is identical on both sides of an interface but the call reference flag is different. For the side originating the call reference, the call reference flag is 0. For the side not originating the call reference, the call reference flag is 1. The range is 1 to 16777215.

- **endpt-reference value**
  Specifies the endpoint reference used by signaling to identify a leaf of a point-to-multipoint SVC or a leaf of a switched connection leg of a point-to-multipoint soft PVC. The 16-bit endpoint reference is structured in two parts. The most significant bit represents the endpoint reference flag and the 15 least significant bits represent the endpoint reference value. For the same call and leaf, the endpoint reference value is identical on both sides of an interface while the endpoint reference flag is different. For the side originating the endpoint reference, the endpoint reference flag is set to 0. For the side not originating the endpoint reference, the endpoint reference flag is set to 1. The range is 1 to 65535.

  **Note** The endpoint reference value must be specified to trace a party of a point-to-multipoint call.

- **vpi vpi**
  Specifies the VPI for an ATM interface. The range is 0 to 255.

- **vci vci**
  Specifies the VCI for an ATM interface. The range is 32 to 16383.

- **age-timeout {seconds | none}**
  Specifies the time in seconds for which the trace-record will be retained on the switch. The range is 1 to 2147483647 seconds. The keyword `none` indicates that the trace record does not age out of the switch. The default value is 600 seconds.

- **call-reference-trace**
  Enables a trace of the call references and endpoint references. The default state is disabled.
atm pnni trace connection

connection-id-trace

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni trace connection</td>
<td>Enables a trace of the VPI and VCI values. The default state is disabled.</td>
</tr>
<tr>
<td>fail-timeout seconds</td>
<td>Specifies the time in seconds that the switch waits for the response message for the connection trace. If no response is received within this time, the trace times out and fails. The range is 1 to 100 seconds. The default value is 30 seconds.</td>
</tr>
<tr>
<td>no-pass-along</td>
<td>Disables the “passing along” of connection trace messages through switches that do not recognize these messages. By default “pass along” is enabled.</td>
</tr>
</tbody>
</table>

Defaults

See “Syntax Description.”

Command Modes

Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use this command to initiate a PNNI connection trace. Use the request index created by this command to view the results of the trace with the show atm pnni trace connection command.

Obtain the call reference and endpoint reference values from the show atm vc signalling command.

Connection traces and connection trace results do not persist across switch reloads and route processor switchovers. After a reload or switchover, you must restart the connection trace with the atm pnni trace connection command. Connection trace records are also lost when the connection or party which was traced is cleared using the clear atm pnni trace connection command.

Examples

The following example shows how to configure a connection trace of a point-to-multipoint call using the VPI, VCI, and endpoint reference. It also collects both VPI and VCI information and call reference and endpoint reference information:

Switch# atm pnni trace connection interface atm 1/0/2 direction incoming vpi 0 vci 136 endpt-reference 6 call-reference-trace connection-id-trace

Request accepted - request index:20

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni trace boundary</td>
<td>Configures an ATM interface as a PNNI connection trace boundary.</td>
</tr>
<tr>
<td>atm pnni trace max-concurrent</td>
<td>Modifies the maximum number of concurrent PNNI connection traces.</td>
</tr>
<tr>
<td>atm pnni trace transit-list max-size</td>
<td>Modifies the maximum size of the transit list for a PNNI connection trace.</td>
</tr>
<tr>
<td>show atm pnni trace connection</td>
<td>Displays PNNI connection trace information.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>show atm pnni trace information</code></td>
<td>Displays PNNI connection trace configuration information.</td>
</tr>
<tr>
<td><code>show atm vc signalling</code></td>
<td>Displays the signaling information for switched connections, including the call reference and endpoint reference values.</td>
</tr>
<tr>
<td><code>clear atm pnni trace connection</code></td>
<td>Clears PNNI connection trace information and results.</td>
</tr>
</tbody>
</table>
**atm pnni trace max-concurrent**

To modify the maximum number of concurrent PNNI connection traces, use the `atm pnni trace max-concurrent` global configuration command. To revert to the default value, use the `no` form of the command.

```
atm pnni trace max-concurrent value

no atm pnni trace max-concurrent
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The maximum number of concurrent connection traces that can be active at the same time. The range is 1 to 100.</td>
</tr>
</tbody>
</table>

**Defaults**

5

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to set the maximum number of active connection traces on a switch at any time. A trace is considered active after it is initiated and until it completes or times out. Once a maximum number of traces is reached, no new connection traces can be initiated from this switch.

**Caution**

Connection traces generate ATM signaling messages. If a large number of connection traces are started simultaneously, processing of signaling messages for normal call setups might be delayed. Use this command to avoid accidentally initiating a large number of traces.

**Examples**

The following example shows how to modify the maximum number of concurrent PNNI connection traces.

```
Switch(config)# atm pnni trace max-concurrent 10
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni trace connection</td>
<td>Initiates a PNNI connection trace.</td>
</tr>
<tr>
<td>show atm pnni trace connection</td>
<td>Displays PNNI connection trace information.</td>
</tr>
<tr>
<td>show atm pnni trace information</td>
<td>Displays PNNI connection trace configuration information.</td>
</tr>
</tbody>
</table>
atm pnni trace transit-list max-size

To modify the maximum size of the PNNI trace transit list (TTL) information elements (IEs), use the **atm pnni trace transit-list max-size** global configuration command. To revert to the default value, use the **no** form of the command.

```
atm pnni trace transit-list max-size bytes
no atm pnni trace transit-list max-size
```

**Syntax Description**

<table>
<thead>
<tr>
<th>bytes</th>
<th>The maximum size of the transit list IE in bytes. The range is 1466 to 65535 bytes.</th>
</tr>
</thead>
</table>

**Defaults**

1466 bytes

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The TTL IE carries all the trace information for connection traces. Its default max size (1466 bytes) can hold trace information for 35 to 45 nodes, depending on the trace options used. If a single call traverses more than 45 nodes in a PNNI network, use this command to increase the size of the TTL IE to accommodate all of the trace information.

**Note**

You must increase the maximum size of the TTL IE on every switch that the trace traverses.

**Examples**

The following example shows how to change the maximum size of the PNNI connection TTL IEs.

```
Switch(config)# atm pnni trace transit-list max-size 32000
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni trace connection</td>
<td>Initiates a PNNI connection trace.</td>
</tr>
<tr>
<td>show atm pnni trace connection</td>
<td>Displays PNNI connection trace information.</td>
</tr>
<tr>
<td>show atm pnni trace information</td>
<td>Displays PNNI connection trace configuration information.</td>
</tr>
</tbody>
</table>
**atm prefix**

To configure an ILMI address prefix for an ATM interface, use the `atm prefix` interface configuration command. To delete a configured ILMI address prefix, use the `no` form of this command.

```
atm prefix 13-byte-prefix

no atm prefix
```

**Syntax Description**

- **13-byte-prefix**: A 13-byte ATM address prefix, specified as 26 hexadecimal digits.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is used to assign one or more address prefixes to a specific interface that is different from any prefixes based on the switch addresses (see the `atm address` command). ILMI assigns the prefix to end systems attached to this interface. These prefixes are used as network prefixes during ILMI address registration.

Whenever one or more ILMI address prefix is assigned on an interface, no network prefixes derived from the switch address are used for address registration on that interface.

**Examples**

The following example shows how to configure an ILMI address prefix on interface ATM 3/1/0.

```
Switch(config)# interface atm 3/1/0
Switch(config-if)# atm prefix 47123456789012345678112233
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address</code></td>
<td>Assigns a 20-byte ATM address to the switch.</td>
</tr>
<tr>
<td><code>show atm addresses</code></td>
<td>Displays the active ATM addresses on a switch.</td>
</tr>
<tr>
<td><code>show atm ilmi-status</code></td>
<td>Displays the ILMI-related status information.</td>
</tr>
</tbody>
</table>
**atm pvc**

To create a PVC, use the **atm pvc** interface configuration command. To create a PVCC, use the long form of the **atm pvc** command. To create a PVCL, use the short form of the **atm pvc** command. To remove the specified PVC, use the **no** form of this command.

```
atm pvc vpi-A [vci-A | any-vci] [cast-type type-A] [upc upc-A] [pd {on | off | use-cttr}] [rx-cttr index] [tx-cttr index] [wrr-weight weight] [sched sched-A] [interface atm card-B|subcard-B|port-B[vpt #]]
```

```
no atm pvc vpi vci
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>any-vci</strong></td>
<td>Selects any available VCI. This feature only applies to the route processor interface (ATM 0).</td>
</tr>
<tr>
<td><strong>vpi</strong></td>
<td>VPI of this PVC. From 0 to 4095 for the Catalyst 8540 MSR, or 0 to 255 for the Catalyst 8510 MSR and LightStream 1010. The VPI is a 12-bit field in the Catalyst 8540 MSR, or an 8-bit field in the Catalyst 8510 MSR and LightStream 1010 in the header of the ATM cell. The VPI value is unique only on an interface, not throughout the ATM network (it has local significance only).</td>
</tr>
<tr>
<td><strong>vci</strong></td>
<td>VCI of this PVC. The range is normally 32 to 16383, but can be expanded from 5 to 16383 in manual-well-known-vc mode. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single interface, not throughout the ATM network (it has local significance only).</td>
</tr>
<tr>
<td><strong>type</strong></td>
<td>The type of PVC, specified as p2p, p2mp-root, or p2mp-leaf. The default is p2p.</td>
</tr>
<tr>
<td><strong>pd</strong></td>
<td>Specifies the intelligent packet discard option as on, off, or use-cttr (use the packet-discard option specified in the traffic-descriptor row). The default is use-cttr.</td>
</tr>
<tr>
<td><strong>vpt #</strong></td>
<td>Specifies the virtual path tunnel number.</td>
</tr>
</tbody>
</table>
**encap**  AAL and encapsulation type and applies only to terminating connections. When **aal5mux** is specified, a protocol is required. Possible values are as follows:

- **aal5lane**—A LANE-type virtual connection.
- **aal5mux deenet**—A MUX-type virtual connection.
- **aal5snap**—LLC/SNAP precedes the protocol datagram. This is the only encapsulation supported for Inverse ARP.
- **ilmi**—Specifies the ILMI control VC when in manual-well-known-vc mode only.
- **pnni**—Specifies the PNNI control VC when in manual-well-known-vc mode only.
- **qsaal**—Specifies the signaling control VC when in manual-well-known-vc mode only.

**upc**  Usage parameter control, specified as **pass**, **tag**, or **drop**; the default is **pass**. The **upc** parameter can be set to **tag** or **drop** only under the following conditions:

- The ATM interface is not the route processor port (ATM 0) or a logical port (VP tunnel).
- The connection is not the leaf of a point-to-multipoint connection.

**rx-cttr**  Connection traffic table row index in the received direction. The connection traffic table row should be configured before using the **atm pvc** command. See the **atm connection-traffic-table-row** command for information on configuring the **rx-cttr** parameter. The default is 1.

**tx-cttr**  Connection traffic table row index in the transmitted direction. The connection traffic table row should be configured before using the **atm pvc** command. See the **atm connection-traffic-table-row** command for information on configuring the **tx-cttr** parameter. The default is 1.

**card/subcard/port**  Card, subcard, and port number for the ATM interface.

**inarp minutes**  Specifies how often Inverse ARP datagrams are sent on this virtual connection and applies only to terminating connections. The default value is 15 minutes.

**weight**  Specifies the weight assigned to the output VC for weighted round robin scheduling. This value is an integer in the range of 1 to 15.

---

**Note**  This parameter is valid only on systems equipped with the switch processor feature card. (Catalyst 8540 MSR and Catalyst 8510 MSR and LightStream 1010 with FC-PFQ)

**sched sched**  Specifies the OC-12 scheduler to use for traffic leaving the virtual circuit. The **sched** option is only available on OC-48c interfaces. OC-48c interfaces have four OC-12 schedulers. The **sched** variable is used to select the specific OC-12 scheduler for which the virtual circuit is assigned for output on an interface and is therefore a number between 1 and 4. For instance, the **sched 2** option specifies the use of the second OC-12 scheduler for output. If the **sched** option is not specified, the software will choose the OC-12 scheduler to use for output.
### atm pvc

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The <code>sched</code> option was introduced.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added <code>pd use-cttr</code> keyword.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The commands are used to create or delete the following types of ATM connections on a switch.

- Transit point-to-point PVCC
- Transit point-to-multipoint PVCC
- Point-to-point PVCL
- Point-to-multipoint PVCL
- Point-to-point PVC connection terminated at route processor (terminating VC)
- Point-to-multipoint PVC connection terminated at route processor (terminating VC)

When setting UBR connections the `tx-cttr` and `rx-cttr` fields are not needed, but these fields are required when setting up a CBR, VBR, or ABR connection. Refer to the `atm connection-traffic-table-row` command for information on configuring in the connection traffic table specified by index.

**Examples**

**Catalyst 8540 MSR**

The following example shows how to configure a terminating PVC between interface ATM 3/1/1 and the route processor port.

```
Switch(config)# interface atm 0
Switch(config-if)# atm pvc 0 any-vci interface atm 3/1/1 0 100
```

The following example shows how to set up a UBR PVC connection between interface ATM 3/0/0 and 3/0/1 with a VPI of 0 and a VCI of 40.

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm pvc 0 40 interface atm 3/0/1 0 40
```

The following example shows a display using the `encap` variable.

```
Switch(config-if)# atm pvc 100 200 interface atm 0 0 344 encap ?
aal5lane AAL5+LANE Encapsulation
aal5mux AAL5+MUX Encapsulation
aal5snap AAL5+LLC/SNAP Encapsulation
```

The following example shows how to establish a PVC between a logical interface (VP tunnel) on ATM 3/1/1.99 and ATM 3/0/0.

```
Switch(config)# interface atm 3/1/1.99
Switch(config-if-subif)# atm pvc 99 100 interface atm 3/0/0 0 89
```
The following example shows how to use the `show atm vc` command to display all VCs on an interface. The `Encap` column is displayed only on systems equipped with the switch processor feature card.

```
Switch# show atm vc interface atm 0/0/1.51
Interface    VPI   VCI   Type    X-Interface  X-VPI X-VCI  Encap Status
ATM0/0/1.51  51    3      PVC     ATM2/0/0     0     75    SNAP   DOWN
ATM0/0/1.51  51    4      PVC     ATM2/0/0     0     76    SNAP   DOWN
ATM0/0/1.51  51    5      PVC     ATM2/0/0     0     74    QSAAL  DOWN
ATM0/0/1.51  51    16     PVC     ATM2/0/0     0     73    ILMI   DOWN
```

The following example shows how to use the `show atm vc` command to display detailed information about a specific connection on a system equipped with the switch processor feature card.

```
Switch# show atm vc interface atm 0/0/1.51 51 16
Interface: ATM0/0/1.51, Type: oc3suni
VPI = 51  VCI = 16
Status: DOWN
Time-since-last-status-change: 2w0d
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: enabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM2/0/0, Type: ATM Swi/Proc
Cross-connect-VPI = 0
Cross-connect-VCI = 73
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Encapsulation: AAL5ILMI
Threshold Group: 6, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
Rx Clp0:0, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx pks:0, Rx pkt drops:0
Rx connection-traffic-table-index: 6
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 424
Rx scr-clp01: none
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index: 6
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 424
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: none
No AAL5 connection registered
```

The following example shows how to delete the previously configured ATM transit point-to-point PVC.

```
Switch(config-if)# interface atm 1/1/1
Switch(config-if)# no atm pvc 50 100
```

**Catalyst 8510 MSR and LightStream 1010**

The following example shows how to use the `show atm vc` command to display detailed information about a specific connection on a system equipped with the FC-PCQ.
Switch# show atm vc interface atm 0/1/0 1 10

Interface: ATM0/1/0, Type: oc3suni
VPI = 1  VCI = 100
Status: UP
Time-since-last-status-change: 00:00:08
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: disabled
Usage-Parameter-Control (UPC): pass
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0/1/3, Type: oc3suni
Cross-connect-VPI = 1
Cross-connect-VCI = 100
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Rx cells: 0, Tx cells: 0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 7113539
Rx scr-clp01: none
Rx tolerance: 0 (from default for interface)
Tx connection-traffic-table-index: 1
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 7113539
Tx scr-clp01: none
Tx tolerance: none

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>atm</td>
<td>Used to create a table entry.</td>
</tr>
<tr>
<td></td>
<td>connection-traffic-table-row</td>
<td></td>
</tr>
<tr>
<td></td>
<td>atm pvp</td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td></td>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td></td>
<td>show atm vc</td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
</tbody>
</table>
To create a PVP, use the `atm pvp` interface configuration command. To create a PVPC, use the long form of the `atm pvp` command. To create a PVPL, use the short form of the `atm pvp` command. To remove the specified PVP, use the `no` form of this command.

```
atm pvp vpi-A [cast-type type-A] [upc upc-A] [rx-cttr index] [tx-cttr index] [wrr-weight weight] [sched sched-A] interface atm card-B/subcard-B/port-B vpi-B [cast-type type-B] [upc upc-B] [wrr-weight weight] [sched sched-B]
atm pvp vpi [cast-type type] [hierarchical | shaped] [upc upc] [rx-cttr index] [tx-cttr index] [wrr-weight weight] [sched sched]
```

### Syntax Description

- **vpi**
  - Catalyst 8540 MSR: VPI of this PVP, from 1 to 4095. The VPI is a 12-bit field in the header of the ATM cell.
  - Catalyst 8510 MSR and LightStream 1010: VPI of this PVP from 1 to 255. The VPI is an 8-bit field in the header of the ATM cell.
  
  The VPI value is unique only on a single interface, not throughout the ATM network. It has local significance only.

- **type**
  - Specified as `p2p`, `p2mp-root`, or `p2mp-leaf`. The default is `p2p`.

- **upc**
  - Usage parameter control, specified as `pass`, `tag`, or `drop`. The default is `pass`.
  
  The `upc` variable can be set to `tag` or `drop` only under the following conditions:
  - The ATM interface is not the route processor port (ATM 0) or a logical port (VP tunnel).
  - The connection is not the leaf of a point-to-multipoint connection.

- **hierarchical**
  - Defines a hierarchical VP tunnel. See “Usage Guidelines” for limitations.
  
  The PVP is a VP tunnel that should use hardware shaping of the aggregate transmit flow of cells. Only CBR PVPs can be hierarchical VP tunnels. Hierarchical VP tunnels can support transit VCs of all service categories at the same time.

- **rx-cttr**
  - Connection traffic table row index in the received direction. The connection traffic table row should be configured before using the `atm pvc` command. See the `atm connection-traffic-table-row` command for information on configuring the `rx-cttr` parameter. The default is 1.

- **shaped**
  - The PVP is a VP tunnel that should use hardware shaping of the aggregate transmit flow of cells. Only CBR PVPs can be shaped VP tunnels.

- **tx-cttr**
  - Connection traffic table row index in the transmitted direction. The connection traffic table row should be configured before using `atm pvc` command. See the `atm connection-traffic-table-row` command for information on configuring the `tx-cttr` parameter. The default is 1.
**Chapter 2 ATM Commands**

### atm pvp

<table>
<thead>
<tr>
<th>Card/Subcard/Port</th>
<th>Card, subcard, and port number for the ATM interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Specifies the weight assigned to the output VP for weighted round-robin scheduling. This value is an integer in the range of 1 to 15. This parameter is valid only on systems equipped with the switch processor feature card.</td>
</tr>
<tr>
<td>Sched sched</td>
<td>Specifies the OC-12 scheduler to use for traffic leaving the virtual circuit. The sched option is only available on OC-48c interfaces. OC-48c interfaces have four OC-12 schedulers. The sched variable is used to select the specific OC-12 scheduler for which the virtual circuit is assigned for output on an interface and is therefore a number between 1 and 4. For instance, the sched 2 option specifies the use of the second OC-12 scheduler for output. If the sched option is not specified, the software will choose the OC-12 scheduler to use for output.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The sched option was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

**Catalyst 8540 MSR**

When the PVP is specified as shaped or hierarchical, it must subsequently be used as a VP tunnel (via the interface command). Only CBR VPs can be used for shaped or hierarchical tunnels. A shaped or hierarchical PVP cannot be cross-connected.

**Note**

Shaped and hierarchical tunnels are only supported on systems with FC-PFQ installed. The atm pvp command does not apply to the route processor port or logical port (VP tunnel).

The commands are used to create or delete the following types of ATM connections on a switch:

- Transit point-to-point PVPC
- Transit point-to-multipoint PVPC
- Point-to-point PVPL
- Point-to-multipoint PVPL

Hierarchical VP tunnels can only be defined on slots 0, 2, 8, and 11.

The maximum number of hierarchical VP tunnels that can be supported on the ATM switch router varies from 120 to 240, depending on the port adapter type installed.

If the ATM switch router is entirely populated with LightStream 1010 port adapters installed in carrier modules, hierarchical VP-tunnels can be defined on the following ports, for a total of 120 defined hierarchical VP-tunnels:

- 0/subcard/port (30 maximum)
- `2/subcard/port (30 maximum)`
- `8/subcard/port (30 maximum)`
- `11/subcard/port (30 maximum)`

If the ATM switch router is entirely populated with OC-12 SuperPAMs, hierarchical VP tunnels can be defined on the following ports, for a total of 240 defined hierarchical VP-tunnels.

- `0/0/0 and 1 (30 maximum)`
- `0/0/2 and 3 (30 maximum)`
- `2/0/0 and 1 (30 maximum)`
- `2/0/2 and 3 (30 maximum)`
- `8/0/0 and 1 (30 maximum)`
- `8/0/2 and 3 (30 maximum)`
- `11/0/0 and 1 (30 maximum)`
- `11/0/2 and 3 (30 maximum)`

For a total of 240 defined hierarchical VP-tunnels.

Any physical port with one or more hierarchical VP tunnels defined cannot have any other VCs or VPs (signaled or permanent) defined on that port (except well-known VCs).

Conversely, to define a hierarchical VP tunnel on a port, all existing VCs or VPs on that port must be removed.

Tag switching must not be configured on a port that has hierarchical VP tunnels defined.

**Note**

You must enable the hierarchical VP tunnel feature on the ATM switch router before configuring hierarchical VP tunnels on an interface. See the `atm idle-timeout` command for configuration information.

Before physically removing a port adapter from the chassis with hierarchical VP tunnels defined, all defined hierarchical VP tunnels must be deleted, unless an identical port adapter is plugged back in. If you do not do this, the hardware schedulers allocated for these hierarchical tunnels remain allocated and cannot be used by any other port.

**Catalyst 8510 MSR and LightStream 1010**

When the PVP is specified as shaped or hierarchical, it must subsequently be used as a VP tunnel (via the `interface` command). Only CBR VPs can be used for shaped or hierarchical tunnels. A shaped or hierarchical PVP cannot be cross-connected.

**Note**

Shaped and hierarchical tunnels are only supported on systems with FC-PFQ installed. The `atm pvp` command does not apply to the route processor port or logical port (VP tunnel).

The commands are used to create or delete the following types of ATM connections on a switch:

- Transit point-to-point PVPC
- Transit point-to-multipoint PVPC
- Point-to-point PVPL
- Point-to-multipoint PVPL
ATM switch routers equipped with ASP-B and feature card version FC-PFQ can have hierarchical VP tunnels defined on the following ports:

- 0/0/port and 3/0/port (30 maximum)
- 0/1/port and 3/1/port (32 maximum)

ATM switch routers equipped with ASP-C and feature card version FC-PFQ can have hierarchical VP-tunnels defined on the following ports:

- 0/subcard/port (30 maximum)
- 3/subcard/port (32 maximum)

Any physical port with one or more hierarchical VP tunnels defined cannot have any other VCs or VPs (signaled or permanent) defined on that port (except well-known VCs).

Conversely, to define a hierarchical VP tunnel on a port, all existing VCs or VPs on that port must be removed.

Tag switching must not be configured on a port that has hierarchical VP tunnels defined.

---

**Note**

You must enable the hierarchical VP tunnel feature on the ATM switch router before configuring hierarchical VP tunnels on an interface. See the `atm idle-timeout` command for configuration information.

Before you physically remove a port adapter from the chassis with hierarchical VP tunnels defined, we strongly recommend that all defined hierarchical VP tunnels be deleted, unless an identical port adapter is plugged back in. If you do not do this, the hardware schedulers allocated for these hierarchical tunnels remain allocated and cannot be used by any other port.

---

**Examples**

The following example shows how to configure an ATM PVP from ATM 3/1/1 to ATM 3/1/2.

```
Switch(config)# interface atm 3/1/1
Switch(config-if)# atm pvp 99 upc drop rx-cttr 37 tx-cttr 37 interface atm 3/1/1 88 upc tag
```

The following example shows how to use the `show atm vp` command to display details about the ATM interface 3/1/1 for VPI 99 using the switch processor feature card.

```
Switch# show atm vp interface atm 3/1/1 99
Interface: ATM3/1/1, Type: ds3uni_Quad
VPI = 99
Status: TUNNEL
Time-since-last-status-change: 03:22:05
Connection-type: PVP
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Threshold Group: 5, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
Rx Clp0:0, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx Clp0 q full drops:0, Rx Clp1 qthresh drops:0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
```
To create a VP tunnel on a physical interface, enter the interface configuration mode for the switch, then specify the PVP and create the tunnel. The following example shows the commands used to create a tunnel on ATM 0/0/1.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm pvp 51

Switch(config-if)# interface atm 0/0/1.51
```

The following example shows how to use the `show atm interface` command to display the interface information about ATM 0/0/1.51 using the switch processor feature card.

```
Switch# show atm interface atm 0/0/1.51
Interface:      ATM0/0/1.51     Port-type:      vp tunnel
IF Status:      DOWN            Admin Status:   down
Auto-config:    enabled         AutoCfgState:   waiting for response from peer
IF-Side:        Network         IF-type:        UNI
Uni-type:       Private         Uni-version:    V3.0
Max-VPI-bits:   0               Max-VCI-bits:   14
Max-VP:         0               Max-VC:         16383
ConfMaxSvpcVpi: 0               CurrMaxSvpcVpi: 0
ConfMaxSvccVpi: 0               CurrMaxSvccVpi: 0
ConfMinSvccVci: 33              CurrMinSvccVci: 33
Signalling:     Enabled
ATM Address for Soft VC: 47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0010.33
Configured virtual links:
  PVCls SoftVCLs   SVCLs   TVCLs Total-Cfgd Inst-Conns
  4        0       0       0          4          0
```

To create a hierarchical VP tunnel on a physical interface, enter the interface configuration mode for the switch, then specify the PVP and create the tunnel. The following example shows the commands used to create a hierarchical VP tunnel on ATM 0/0/0.10.

```
Switch(config-if)# atm pvp 10 hierarchical rx-cttr 2 tx-cttr 2
Switch(config-if)# interface atm 0/0/0.10
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Used to create a table entry.</td>
</tr>
<tr>
<td>connection-traffic-table-row</td>
<td>Used to create a PVC.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show atm vp</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm qos default

To configure individual default QoS objectives assigned to SVC setup messages entering the switch through UNI interfaces, use the `atm qos default` global configuration command. To return all default objective values for a service category to the default, use the `no` form of this command.

```
  atm qos default { cbr | vbr-rt } max-cell-transfer-delay { microseconds | any }
  atm qos default { cbr | vbr-rt } peak-to-peak-cell-delay-variation { microseconds | any }
  atm qos default { cbr | vbr-rt | vbr-nrt } max-cell-loss-ratio [ clp0 | clp1plus0 ]
            { loss-ratio exponent | any }
  no atm qos default { cbr | vbr-rt | vbr-nrt }
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>microseconds</code></td>
<td>Integer number, which represents time in microseconds, in the range of 0 through 16777214.</td>
</tr>
<tr>
<td><code>loss-ratio exponent</code></td>
<td>Positive integer in the range of 1 through 15. This represents $10^{-(loss-ratio)}$.</td>
</tr>
<tr>
<td><code>any</code></td>
<td>Indicates that the QoS value is not considered in the setup of the connection.</td>
</tr>
</tbody>
</table>

**Defaults**

`any`

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>uni3 default</code></td>
</tr>
<tr>
<td>11.2(5)</td>
<td>Changed to present name.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command provides default values for individual QoS objectives used in establishing CBR or VBR SVCs. These default values are used when values are not provided in the received setup message. The QoS objectives are as follows:

- Maximum cell-transfer-delay (MaxCTD)
- Peak-to-Peak cell-delay-variation (PPCDV)
- Cell-loss-ratio for CLP = 0 traffic (CLR0)
- Cell-loss-ratio for CLP=0 and CLP=1 traffic (CLR01)

These objectives can be set differently for each of the three service categories: CBR, VBR-RT, and VBR-NRT (VBR-NRT only uses CLR0 and CLR01). All UNI SVC requests received for a particular service category use the configured values. These objectives are signaled across a continuous sequence of PNNI hops, starting at the source switch.

When `max-cell-loss-ratio` is specified, and the `clp0` or `clp1plus0` value is not configured, the default is CLP=0.
Examples

In the following example, the `cbr` MaxCTD objective is set to 1000 microseconds.

```bash
Switch(config)# atm qos default cbr max-cell-transfer-delay 1000
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm resource</code></td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm rmon collect

To add a port to an ATM-RMON MIB port select group, use the atm rmon collect interface configuration command. To disable ATM-RMON collection, use the no form of this command.

```
atm rmon collect number
no atm rmon collect
```

Syntax Description

- **number** Specifies the port select group number, from 1 to 2147483647.

Defaults

Disabled

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command allows references to a nonexistent port select group. You cannot reference an active port select group. However, you can access the group if RMON collection is disabled using the no form of the atm rmon collect command.

**Note**

Collection must be disabled with the no atm rmon enable command before using the no form of this command.

Currently, this command is not allowed on logical ports (VP tunnel).

Examples

The following example shows setting the port select group number to 1000.

```
Switch(config)# atm rmon enable
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm rmon collect 1000
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm rmon enable</td>
<td>Enables ATM-RMON MIB data collection.</td>
</tr>
<tr>
<td>interface</td>
<td>Configures an interface type and enters interface configuration mode.</td>
</tr>
<tr>
<td>show atm rmon</td>
<td>Shows the status of the ATM RMON MIB.</td>
</tr>
</tbody>
</table>
**atm rmon enable**

To enable ATM-RMON MIB data collection, use the `atm rmon enable` global configuration command. To stop data collection for all fully configured port select groups, use the `no` form of this command.

```
atm rmon enable
  no atm rmon enable
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Using this command causes dynamic data pools to be allocated and data collection to begin in the background. This command also propagates signaling information to the RMON agent.

When using the `no` form of this command, all control tables are preserved; however, the drop, insert, and delete counters are cleared, and all data tables are removed.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm rmon</code></td>
<td>Shows the status of the ATM RMON MIB.</td>
</tr>
</tbody>
</table>
**atm rmon portselgrp**

To configure statics, host, and matrix collection parameters for ATM-RMON MIB, use the `atm rmon portselgrp` global configuration command. To remove data to a configured port select group, use the `no` form of this command.

```
  atm rmon portselgrp number [descr string | host-prio number | host-scope number | matrix-prio number | matrix-scope number | maxhost number | maxmatrix | nostats | owner string]

  no atm rmon portselgrp number
```

**Syntax Description**

- `number`
  Specifies the number of the port select group, from 1 to 2147483647.

- `descr`
  Specifies the descriptive label for the ATM-RMON collection.

- `host-prio`
  Specifies the host collection resource priority from 1 to 3. Use 1 for low, 2 for normal, and 3 for high. The default is 2.

- `host-scope`
  Specifies the host collection address collection scope from 1 to 3. Use 1 for prefix, 2 for prefix and esi, and 3 for the entire address. The default is 2.

- `matrix-prio`
  Specifies the matrix collection resource priority from 1 to 3. Use 1 for low, 2 for normal, and 3 for high. The default is 2.

- `matrix-scope`
  Specifies the matrix collection address collection scope from 1 to 3. Use 1 for prefix, 2 for prefix and esi, and 3 for the entire address. The default is 2.

- `maxhost`
  Specifies the maximum desired host entries, from 0 to 4294967295. Use 0 to disable, or omit the number to indicate no configuration limit.

- `maxmatrix`
  Specifies the maximum desired matrix entries from 0 to 4294967295. Use 0 to disable, or omit the number to indicate no configuration limit.

- `nostats`
  Suppresses the collection of the atmStatsTable for this group.

- `owner`
  Specifies the owner for all the control tables used by the ATM-RMON collection (portSelGrpOwner, atmHostControlOwner, or atmMatrixControlOwner). The default is an empty string.

**Defaults**

See “Syntax Description.”

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To use this command, configure the ports into port select groups using the `atm rmon collect` interface configuration command.
Examples

The following example shows configuring the port select group, and sets the `maxhost` to 1000 and the `matrix-scope` to 3.

```
Switch(config-if)# atm rmon collect 3
Switch(config-if)# exit
Switch(config)# atm rmon portselgrp 3 maxhost 1000 matrix-scope 3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm rmon collect</code></td>
<td>Adds a port to an ATM-RMON MIB port select group.</td>
</tr>
<tr>
<td><code>show atm rmon</code></td>
<td>Shows the status of the ATM RMON MIB.</td>
</tr>
</tbody>
</table>
**atm route**

To specify a static route to a reachable address prefix, use the `atm route` global configuration command. To delete a static route, use the `no` form of this command.

```
atm route addr-prefix type card/subcard/port[,vpt#] [internal] [scope org-scope] [e164-address address-string [number type numtype]] [aesagateway aesa-address]
```

```
no atm route addr-prefix type card/subcard/port[,vpt#] [internal] [scope org-scope] [e164-address address-string [number type numtype]] [aesagateway aesa-address]
```

### Syntax Description

<table>
<thead>
<tr>
<th><strong>addr-prefix</strong></th>
<th>Specifies the address prefix. The address prefix has a maximum length of 19 bytes. By default, each character in the prefix is 4 bits long. To specify a part of a prefix in bits, use parentheses () to enclose binary numbers. The asterisk (*) wildcard character means “neutral.” Wildcard character ellipses (...) after a prefix match any destination address that starts with the prefix.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>type</strong></td>
<td>Specifies the interface type as <code>atm</code>, <code>atm-p</code>, <code>cbr</code>, <code>ethernet</code>, <code>loopback</code>, <code>null</code>, <code>serial</code> or <code>tunnel</code>.</td>
</tr>
<tr>
<td><strong>card/subcard/port</strong></td>
<td>Identifies the card, subcard, and port number for the interface.</td>
</tr>
<tr>
<td><strong>vpt#</strong></td>
<td>Specifies an interface that represents a virtual path tunnel.</td>
</tr>
<tr>
<td><strong>internal</strong></td>
<td>Specifies an internal static route to an internal reachable address prefix. By default, an exterior static route to an exterior reachable address prefix is created.</td>
</tr>
<tr>
<td><strong>org-scope</strong></td>
<td>Specifies the organizational <code>scope</code> (for example, UNI scope) value for the route. The valid range of organizational scope values is from local (1) to global (15). The default organizational scope is global (15) for individual addresses and local (1) for group addresses.</td>
</tr>
<tr>
<td><strong>e164-address</strong></td>
<td>Associates a forwarding E.164 address with the static route.</td>
</tr>
<tr>
<td><strong>address-string</strong></td>
<td>Specifies a forwarding native E.164 address, used when a call matching the ATM address prefix is forwarded across the specified interface. The E.164 address consists of 7 to 15 decimal characters.</td>
</tr>
<tr>
<td><strong>numtype</strong></td>
<td>Specifies a number from the following four options: <code>international</code>, <code>national</code>, <code>subscriber</code>, and <code>local</code>.</td>
</tr>
<tr>
<td><strong>aesagateway</strong></td>
<td>Associates a forwarding AESA with the static route.</td>
</tr>
<tr>
<td><strong>aesa-address</strong></td>
<td>Specifies a forwarding AESA; used when a call matching the ATM address prefix is forwarded across the specified interface.</td>
</tr>
</tbody>
</table>

### Defaults

See “Syntax Description.”

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th><strong>Release</strong></th>
<th><strong>Modification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
The internal keyword should be used when a static route is configured to an address prefix representing an attached end system (for example, in place of an ILMI address registration).

The type of static route should be exterior, and the internal keyword should not be present when a static route is configured to an address prefix representing end systems attached to a different switch or network.

The scope keyword value translates to a PNNI level according to the PNNI scope map. Refer to the scope map and scope mode commands for more information.

When the e164-address option is included, the specified address-string is passed on as the called party address. The received called party address is passed on as the called party subaddress, the E.164 address of this interface (configured using the atm e164 address command) is passed on as the calling party address, and the received calling party address (if any) is passed on as the calling party subaddress.

If no e164-address is specified, the received called party address and calling party address are passed on unchanged.

When the aesa-gateway option is included, the specified AESA address is passed on as the called party address. The received called party address is passed on as the called party subaddress. The AESA gateway address of this interface (configured using the atm aesa gateway command) is passed on as the calling party address. The received calling party address (if any) is passed on as the calling party subaddress.

The following example shows how to configure a static route on interface ATM 1/2/1 to the address prefix 47.8 of 12 bits in length.

Switch(config)# atm route 47.8... atm 1/2/1

The following example shows how to configure a static route on interface ATM 1/2/1 to the address prefix 47.88 of 14 bits in length.

Switch(config)# atm route 47.8(10*)... atm 1/2/1

The following example shows how to configure a static route on ATM 0/0/0 with a forwarding E.164 address.

Switch(config)# atm route 1234 atm 0/0/0 e164-address 1234567

The following example shows how to configure a static route with a forwarding AESA gateway address.

Switch(config)# atm route 1234 atm 0/0/0 aesa-gateway 92.999999999999999999999999.222222222222.00

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm aesa gateway</td>
<td>Configures an AESA gateway address on an ATM switch interface that connects to a service provider maintaining a separate ATM addressing plan.</td>
</tr>
<tr>
<td>atm e164 address</td>
<td>Configures the native E.164 address of an ATM interface.</td>
</tr>
<tr>
<td>redistribute</td>
<td>Instructs the PNNI to redistribute static routes throughout the PNNI routing domain.</td>
</tr>
<tr>
<td>scope map</td>
<td>Specifies the mapping from a range of organizational scope values.</td>
</tr>
<tr>
<td>scope mode</td>
<td>Specifies the configuration mode of the mapping from organizational scope values (used at UNI interfaces) to PNNI scope (such as in terms of PNNI routing-level indicators).</td>
</tr>
</tbody>
</table>
## Chapter 2  ATM Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni aesa embedded-number</code></td>
<td>Shows the E.164 AESAs with the E.164 AFI to the left-justified encoding format.</td>
</tr>
<tr>
<td><code>show atm route</code></td>
<td>Displays all local or network-wide reachable address prefixes in this switch router’s ATM routing table.</td>
</tr>
</tbody>
</table>
atm route-optimization (EXEC)

To initiate route optimization immediately for a specific interface or specific soft VC, use the `atm route-optimization` EXEC command.

```
atm route-optimization soft-connection interface { atm card/subcard/port [vpi [vci]] | serial card/subcard/port:cgn [dlci]}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>Specifies the card, subcard, and port number of a specific ATM interface.</td>
</tr>
<tr>
<td><code>vpi</code></td>
<td>Specifies the virtual path identifier.</td>
</tr>
<tr>
<td><code>vci</code></td>
<td>Specifies the virtual channel identifier.</td>
</tr>
<tr>
<td><code>card/subcard/port:cgn</code></td>
<td>Specifies the card, subcard, port and channel-group number for the Frame Relay interface.</td>
</tr>
<tr>
<td><code>dlci</code></td>
<td>For a Frame Relay interface, if a DLCI is not specified, this command sets optimization for the specified Frame Relay interface. If a DLCI is specified, this command sets optimization for a specific Frame Relay interworking soft VC.</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

If you do not specify the VPI and VCI, this command sets optimization for a specific interface.

If you specify the VPI and VCI, this command sets optimization for a specific soft VC.

**Note**

The `atm route-optimization (EXEC)` command must be entered on the same interface where the soft PVCs or PVPs are configured. Route optimization only works for the source end of a soft PVC or PVP, and is ignored if entered on the destination interface.

### Examples

The following example shows how to initiate ATM route optimization on a soft VC at ATM interface 1/0/0 100 250.

```
Switch# atm route-optimization soft-connection interface atm 1/0/0 100 250
```

The following example shows how to initiate ATM route optimization on a soft VC at serial interface 1/0/3:3 DLCI 248.

```
Switch# atm route-optimization soft-connection interface serial 1/0/3:1 248
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm route-optimization (interface)</code></td>
<td>Enables and configures soft PVC route optimization on an ATM interface.</td>
</tr>
<tr>
<td><code>atm route-optimization percentage-threshold</code></td>
<td>Specifies the percentage reduction in the administrative weight of the existing path required to trigger route optimization.</td>
</tr>
</tbody>
</table>
atm route-optimization (interface)

To enable and configure soft PVC route optimization on an ATM interface, use the `atm route-optimization` interface configuration command. To disable this feature, use the `no` form of this command.

```
atm route-optimization soft-connection [interval minutes] [time-of-day {anytime | start-time end-time}]
no atm route-optimization soft-connection
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interval minutes</code></td>
<td>Specifies the frequency of route optimization in minutes. The range is 10 to 10000. The default is 60 minutes.</td>
</tr>
<tr>
<td><code>time-of-day</code></td>
<td>Specifies the 24-hour time range when route optimization can occur. The default is <code>anytime</code>.</td>
</tr>
<tr>
<td><code>anytime</code></td>
<td>Route optimization can occur at any time during the day.</td>
</tr>
<tr>
<td><code>start-time</code></td>
<td>Specifies the start of the time range when route optimization is allowed, in 24-hour format (<code>hh:mm</code>).</td>
</tr>
<tr>
<td><code>end-time</code></td>
<td>Specifies the end of the time range when route optimization is allowed, in 24-hour format (<code>hh:mm</code>).</td>
</tr>
</tbody>
</table>

**Defaults**

For `interval`: 60 minutes  
For `time-of-day`: `anytime`

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to enable and configure soft PVC route optimization to determine when a better route is found. You can also reconfigure the old route after you perform this configuration.

**Note**

The `atm route-optimization (interface)` command must be entered on the same interface where the soft PVCs or PVPs are configured. Route optimization only works for the source end of a soft PVC or PVP and is ignored if entered on the destination interface.

The `time-of-day` parameter is used as a filter to determine if route optimization is acceptable when the interval timer activates.

To ensure that route optimization takes place at least once a day, set the interval to a smaller value than the time range. After route-optimization starts, it runs until it is finished regardless of the time range. All connections on this interface subject to route optimization are checked to see if better paths exist. When better paths are found, the connections are rerouted.
The `atm route-optimization (interface)` command can also be used to configure route optimization for Frame Relay interfaces.

**Examples**

The following example enables soft PVC route optimization on interface ATM 0/1/2, with the time period of 120 minutes.

Switch(config)# interface atm 0/1/2
Switch(config-if)# atm route-optimization soft-connection interval 120

The following example configures a soft PVC with route optimization interval configured as every 30 minutes between the hours of 6:00 p.m. and 5:00 a.m.

Switch(config)# interface serial 11/0/0:1
Switch(config-if)# atm route-optimization soft-connection interval 30 time-of-day 18:00 5:00

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm route-optimization (EXEC)</td>
<td>Initiates route optimization immediately for a specific interface or specific soft VC.</td>
</tr>
<tr>
<td>atm route-optimization percentage-threshold</td>
<td>Specifies the percentage reduction in the administrative weight of the existing path required to trigger route optimization.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm route-optimization percentage-threshold

To specify the percentage reduction in the administrative weight of the existing path required to trigger route optimization, use the `atm route-optimization percentage-threshold` global configuration command. To set the threshold to the default value, use the `no` form of this command.

```
atm route-optimization percentage-threshold percent

no atm route-optimization percentage-threshold
```

**Syntax Description**

- `percent` Specifies the route optimization threshold in percent, from 5 to 100.

**Defaults**

- 30

**Command Modes**

- Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When route optimization is enabled and the threshold is exceeded, the existing path is partially torn down and a new path is established. Currently route optimization is only supported for soft PVCs and soft PVPs.

Smaller values lead to greater network efficiency, at the expense of an increased amount of calls subject to rerouting.

**Examples**

The following example shows setting the route optimization threshold to 20 percent.

```
Switch(config)# atm route-optimization percentage-threshold 20
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm route-optimization (EXEC)</td>
<td>Initiates route optimization immediately for a specific interface or specific soft VC.</td>
</tr>
</tbody>
</table>
atm router pnni

To enter the PNNI configuration mode, use the `atm router pnni` global configuration command. To exit from the PNNI configuration mode, use the `no` form of this command.

```
    atm router pnni
    no atm router pnni
```

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Use this command to start global PNNI configuration mode.

**Examples**
The following example shows using the `atm router pnni` global configuration command to change to ATM router PNNI configuration mode.

```
Switch(config)# atm router pnni
Switch(config-atm-router)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni local-node</code></td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
</tbody>
</table>
**atm routing-mode**

To restrict the mode of ATM routing on an ATM switch router, use the `atm routing-mode` global configuration command. To remove all restrictions on ATM routing, use the **no** form of this command.

```
atm routing-mode static

no atm routing-mode static
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>static</td>
<td>Restricts ATM routing to allow only static configuration of ATM routes. In this routing mode, the switch does not run any dynamic ATM routing protocols, such as PNNI routing.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled (no restrictions on ATM routing)

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command takes effect on the next reboot.

Switch behavior in static routing mode is analogous to that of the LightStream 1010 default IISP software images of Cisco IOS Release 11.1. Without any restrictions on the routing mode, PNNI functionality is available on all interfaces.

This command differs from deletion of all PNNI nodes (using the `node` command) because it affects ILMI autoconfiguration. When the switch is in static routing mode, for each interface, the ILMI variable `atmfAtmLayerNniSigVersion` for the switch is set to `iisp`. This causes ILMI autoconfiguration on interfaces between two switches to determine an interface type of IISP, unless the switch on the other side indicates that the NNI signaling protocol is not supported.

**Examples**

The following example shows configuration of a switch to allow only static routing.

```
Switch(config)# atm routing-mode static
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm auto-configuration</code></td>
<td>Used to enable or disable ILMI autoconfiguration.</td>
</tr>
<tr>
<td><code>node</code></td>
<td>Used to create, delete, enable, or disable PNNI nodes running on this switch and to specify or change the level of a node.</td>
</tr>
</tbody>
</table>
**atm service-category-limit (Catalyst 8510 MSR and LightStream 1010)**

To set the limits on the number of cells simultaneously allowed in the switch memory by type of output queue, use the `atm service-category-limit` global configuration command. To restore the default value of 64544, use the `no` form of this command.

```
atm service-category-limit { cbr | vbr-rt | vbr-nrt | abr-ubr } number
no atm service-category-limit { cbr | vbr-rt | vbr-nrt | abr-ubr }
```

**Syntax Description**

- `number` Integer in the range of 0 to 64544, expressed as number of cells.

**Defaults**

64544

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Added: (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `no` form of this command applies to all service categories.

**Note**

This command is not supported on systems equipped with the FC-PFQ.

**Caution**

Setting a `service-category-limit` to 0 causes the connection requests for the associated service categories to be rejected.

**Examples**

In the following example, the maximum number of `abr` and `ubr` cells allowed into the switch fabric at one time is limited to 45000.

```
Switch(config)# atm service-category-limit abr-ubr 45000
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm resource</code></td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
### atm service-class

To specify the weighting for each service class for physical interfaces or for a hierarchical VP tunnel, use the `atm service-class` interface configuration command. To return the weight of the specified class to its default (see tables below), use the `no` form of this command.

To specify the weighting for each service class for physical interfaces or for a hierarchical VP tunnel, use the `atm service-class` interface configuration command. To return the weight of the specified class to its default, use the `no` form of the `atm service-class` command. This command supports both the ATM Forum service categories and the TBR service classes on physical interfaces, as shown in Table 2-5.

**Table 2-5 ATM Forum Service Classes and Tag Bit Rate Service Classes for Physical Interfaces**

<table>
<thead>
<tr>
<th>ATM Forum Service Classes</th>
<th>ATM Forum Service Categories</th>
<th>Tag Bit Rate</th>
<th>Service Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>VBR-RT</td>
<td>1</td>
<td>TBR class 1</td>
</tr>
<tr>
<td>3</td>
<td>VBR-NRT</td>
<td>6</td>
<td>TBR class 2</td>
</tr>
<tr>
<td>4</td>
<td>ABR</td>
<td>7</td>
<td>TBR class 3</td>
</tr>
<tr>
<td>5</td>
<td>UBR</td>
<td>8</td>
<td>TBR class 4</td>
</tr>
</tbody>
</table>

To specify the weighting of each service class for a physical interface, use the following syntax:

```
atm service-class {1 | 2 | 3 | 4 | 5 | 6 | 7 | 8} wrr-weight weight
```

To cancel WRR scheduling or to set weights to their defaults, use the `no` form of the command.

```
o atm service-class {1 | 2 | 3 | 4 | 5 | 6 | 7 | 8} wrr-weight weight
```

For hierarchical VP tunnels, this command supports either the ATM Forum service categories or the TBR service classes, as shown in Table 2-6.

**Table 2-6 ATM Forum Service Classes and Tag Bit Rate Service Classes for Hierarchical VP Tunnels**

<table>
<thead>
<tr>
<th>ATM Forum Service Classes</th>
<th>ATM Forum Service Categories</th>
<th>Tag Bit Rate</th>
<th>Service Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBR-RT</td>
<td>1</td>
<td>TBR class 1</td>
</tr>
<tr>
<td>2</td>
<td>VBR-NRT</td>
<td>2</td>
<td>TBR class 2</td>
</tr>
<tr>
<td>3</td>
<td>ABR</td>
<td>3</td>
<td>TBR class 3</td>
</tr>
<tr>
<td>4</td>
<td>UBR</td>
<td>4</td>
<td>TBR class 4</td>
</tr>
</tbody>
</table>

To specify the weighting for each service class for a hierarchical VP tunnel, use the following syntax:

```
atm service-class {1 | 2 | 3 | 4} wrr-weight weight
```

To cancel WRR scheduling or to set weights to their defaults, use the `no` form of the command.

```
o atm service-class {1 | 2 | 3 | 4} wrr-weight weight
```
Syntax Description

1-8 ATM Forum service classes or tag bit rate service classes. Refer to Table 2-7 for service classes 1 to 8 for physical interfaces. Refer to Table 2-6 for service classes 1 to 4 for hierarchical VP tunnels.

```
  wrt-weight weight  Integer in the range of 1 to 15.
```

Defaults

Table 2-7 lists the service classes and the default class weights for physical interfaces and hierarchical VP tunnels.

**Table 2-7 Service Classes and Default Class Weights for Physical Interfaces and Hierarchical VP Tunnels**

<table>
<thead>
<tr>
<th>Physical Interfaces</th>
<th>Hierarchical VP Tunnels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Service Class</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

If `wrr-weight` is not specified, the default weight applies. The `no` form of the command returns the weight of the specified class to its default.

**Note**

This command is available only on systems equipped with the FC-PFQ.

Examples

In the following example, ATM interface 2/0/1 is configured for service class 3 with a WRR weight of 8.

```
Switch(config)# interface atm 2/0/1
Switch(config-if)# atm service-class 3 wrr-weight 8
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface resource</td>
<td>Displays resource management interface configuration status and statistics.</td>
</tr>
</tbody>
</table>
atm signalling cug access

To restrict access to and from a closed user group, use the `atm signalling cug access` interface configuration command. To disable this feature, use the `no` form of this command.

```
atm signalling cug access [permit-unknown-cugs {to-user | from-user permanent | both-directions permanent}]
```

No incoming or outgoing access allowed. An interface is not considered to be a CUG access interface unless this command is configured. If the keywords `permit-unknown-cugs` are not specified, calls to or from unknown CUGs are denied. When a CUG call goes out, and the destination is not in the same CUG, the call is rejected at the destination switch.

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>permit-unknown-cugs</code></td>
<td>Permits calls between users attached to this interface and unknown users that are not members of the CUGs on this interface.</td>
</tr>
<tr>
<td><code>to-user</code></td>
<td>Applies to calls going from the network to the user.</td>
</tr>
<tr>
<td><code>from-user</code></td>
<td>Applies to calls going from the user to the network.</td>
</tr>
<tr>
<td><code>both-directions</code></td>
<td>Applies to calls going from the network to the user, and to calls going from the user to the network.</td>
</tr>
<tr>
<td><code>permanent</code></td>
<td>Indicates that <code>permit-unknown-cugs</code> applies to all calls from users to the network, regardless of whether the call setup asked for permission or not.</td>
</tr>
</tbody>
</table>

**Defaults**

No incoming or outgoing access allowed. An interface is not considered to be a CUG access interface unless this command is configured. If the keywords `permit-unknown-cugs` are not specified, calls to or from unknown CUGs are denied. When a CUG call goes out, and the destination is not in the same CUG, the call is rejected at the destination switch.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

CUG procedures are invoked on the interface only if the interface is configured as an access interface. No CUG configuration applies until this command is configured.

Transmission and reception of CUG interlock codes is not allowed over access interfaces.

All interfaces leading outside of the network should be configured as access interfaces, ensuring that all CUG interlock codes are generated and used only within this network.

**Note**

Interfaces to other networks should be configured as CUG access interfaces, even if no CUGs are configured on the interface. In this case, if you want to exchange SVCs with the neighbor network, `permit-unknown-cugs both-directions permanent` should be configured.

Table 2-8 describes the relationship between the Cisco CUG access terminology and ITU-T CUG access terminology.
atm signalling cug access

Examples

The following example shows configuration as a CUG access interface that allows calls from unknown CUGs.

Switch(config)# interface atm 2/0/1
Switch(config-if)# atm signalling cug access permit-unknown-cugs to-user

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm signalling cug assign</td>
<td>Assigns a CUG to an interface.</td>
</tr>
<tr>
<td>show atm signalling cug</td>
<td>Displays all configured CUGs.</td>
</tr>
</tbody>
</table>

Table 2-8 CUG Access Terminology and ITU-T CUG Access Terminology

<table>
<thead>
<tr>
<th>ITU-T CUG</th>
<th>Cisco CUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>incoming access allowed to-user</td>
<td>permit-unknown-cugs</td>
</tr>
<tr>
<td>outgoing access allowed from-user</td>
<td>permit-unknown-cugs</td>
</tr>
</tbody>
</table>
atm signalling cug alias

To create a CUG alias, use the `atm signalling cug alias` global configuration command. To delete the alias, use the `no` form of this command.

```
atm signalling cug alias alias-name interlock-code interlock-code
no atm signalling cug alias alias-name
```

**Syntax Description**

| alias-name          | The name of the alias. |
| interlock-code      | The 24-byte interlock code, specified as a string of 48 hexadecimal digits. |

**Defaults**

No alias name is defined.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to configure an alias for the interlock codes. The alias can be used while configuring CUGs on the interface.

An alias can be defined for each CUG interlock code used on the switch. Using an alias simplifies configuration of a CUG on multiple interfaces. When the alias is used, it removes the need to specify the 48-hexadecimal digit CUG interlock code on each interface attached to a CUG member.

**Examples**

The following example shows how to create the `switch_cug` CUG alias with the 24-byte interlock code.

```
Switch(config)# atm signalling cug alias switch_cug interlock-code 47.0091810000000061705BDA01.0061705BDA01.00.12345678
```

**Command Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm signalling cug assign</td>
<td>Assigns a CUG to an interface.</td>
</tr>
</tbody>
</table>
**atm signalling cug assign**

To assign a CUG to an interface, use the `atm signalling cug assign` interface configuration command. To disable this feature, use the `no` form of this command.

```
atm signalling cug assign { alias name | interlock-code string } [ deny-same-cug { to-user | from-user } ] [ preferential ]

no atm signalling cug assign { alias name | interlock-code string }
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alias</td>
<td>The <em>name</em> of the alias for the 24-byte CUG interlock code.</td>
</tr>
<tr>
<td>interlock-code</td>
<td>The 24-byte interlock code, specified as a <em>string</em> of 48 hexadecimal digits.</td>
</tr>
<tr>
<td>deny-same-cug</td>
<td>Deny calls to or from other members of the same CUG. Use with the <code>to-user</code> or <code>from-user</code> keywords.</td>
</tr>
<tr>
<td>to-user</td>
<td>Deny calls to the user from members of the same CUG.</td>
</tr>
<tr>
<td>from-user</td>
<td>Deny calls from the user to members of the same CUG.</td>
</tr>
<tr>
<td>preferential</td>
<td>The preferential CUG is the default CUG associated with calls from the user to the network. If a preferential CUG already exists, this command is rejected.</td>
</tr>
</tbody>
</table>

### Defaults

If `deny-same-cugs` is not specified, calls to or from other members of the same CUG are permitted. If `preferential` is not specified, the CUG is assigned as a non-preferential CUG.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Each access interface can be configured to have one or more CUGs associated with it. Only one CUG can be selected as the preferential CUG. Calls received from users attached to this interface can only be associated with the preferential CUG. Calls directed to users attached to this interface can be accepted, based on membership in any of the CUGs configured on this interface.

CUG service can be configured without any preferential CUG. If no preferential CUG is configured on the interface, and calls are permitted from users attached to this interface to unknown users, the calls proceed as non-CUG calls, without generating any CUG IE.

### Note

The CUGs assigned to this interface take effect only when the interface is configured as an access interface (see the `atm signalling cug access` command for additional information).
Table 2-9 describes the relationship between the Cisco CUG terminology and the ITU-T CUG terminology.

Table 2-9  ITU-T CUG Terminology and Cisco Terminology

<table>
<thead>
<tr>
<th>ITU-T CUG Terminology</th>
<th>Cisco Terminology</th>
</tr>
</thead>
<tbody>
<tr>
<td>preferential CUG</td>
<td>preferential</td>
</tr>
<tr>
<td>incoming calls barred (ICB)</td>
<td>deny-same-cug to-user</td>
</tr>
<tr>
<td>outgoing calls barred (OCB)</td>
<td>deny-same-cug from-user</td>
</tr>
</tbody>
</table>

Examples

The following example shows assignment of the redefined CUG switch router as the preferential CUG on the interface to ATM 2/0/1.

Switch(config)# interface atm 2/0/1
Switch(config-if)# atm signalling cug assign alias switch_cug preferential

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm signalling cug access</td>
<td>Restricts access to and from a closed user group.</td>
</tr>
<tr>
<td>atm signalling cug alias</td>
<td>Used to create a CUG alias.</td>
</tr>
<tr>
<td>show atm signalling cug</td>
<td>Displays all configured CUGs.</td>
</tr>
</tbody>
</table>
atm signalling diagnostics

To create a filter table for signaling diagnostics, use the `atm signalling diagnostics` global configuration command. To disable signaling diagnostics, use the `no` form of this command.

```
atm signalling diagnostics {index | enable}
no atm signalling diagnostics {index | enable}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>index</td>
<td>Specifies the diagnostics index number for the filter table, from 1 to 50, and enters the diagnostics configuration mode.</td>
</tr>
<tr>
<td>enable</td>
<td>Enables signaling diagnostics globally.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

ATM signaling diagnostics is a tool for troubleshooting call failures in the ATM network, and should not be enabled while the switch is operating.

**Note**

The `atm signalling diagnostics` global configuration command changes the configuration mode to ATM signaling diagnostics, and the new prompt appears: `Switch(cfg-atmsig-diag)#`

**Examples**

The following example shows creating filter table 1.

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>age-timer</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td><code>calling-address-mask</code></td>
<td>Configures the address mask for identifying valid bits of the called NSAP address field.</td>
</tr>
<tr>
<td><code>called-nsap-address</code></td>
<td>Configures the NSAP-format ATM address for the signaling diagnostics filter entry.</td>
</tr>
<tr>
<td><code>cast-type</code></td>
<td>Filters ATM signaling call failures by connection type (point-to-point or point-to-multipoint).</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>clear-cause</td>
<td>Configures the release cause code value in the signaling diagnostics filter table entry.</td>
</tr>
<tr>
<td>connection-category</td>
<td>Used to filter ATM signaling call failures by virtual circuit category.</td>
</tr>
<tr>
<td>ima active-links-minimum</td>
<td>Configures the minimum active links for an IMA group to function.</td>
</tr>
<tr>
<td>max-records</td>
<td>Configures the maximum number of records to be collected for a particular signaling diagnostics filter table entry.</td>
</tr>
<tr>
<td>outgoing-port</td>
<td>Filters ATM signaling call failure based on the outgoing interface rejected call.</td>
</tr>
<tr>
<td>purge</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>scope</td>
<td>Filters ATM signaling call failures that occur within the switch router and on other switch routers.</td>
</tr>
<tr>
<td>segment-target</td>
<td>Specifies a target entry in a partially specified PNNI explicit-path.</td>
</tr>
<tr>
<td>status</td>
<td>Configures the status of this filter table entry.</td>
</tr>
</tbody>
</table>
**atm signalling enable**

To enable the signaling and SSCOP on a port, use the `atm signalling enable` interface configuration command. To disable signaling and SSCOP on a port, use the `no` form of this command.

```
atm signalling enable
no atm signalling enable
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Enabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

ILMI is automatically restarted whenever signaling is enabled or disabled. This command, when used to disable signaling on a PNNI interface, disables both PNNI routing and PNNI signaling.

**Note**

This command does not apply to the route processor interface.

**Examples**

The following example shows how to disable signaling on ATM 0/1/2.

```
Switch(config)# interface atm 0/1/2
Switch(config-if)# no atm signalling enable
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM0/1/2.
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
**atm signalling ie aal5 mode**

To allow the mode field in AAL5 IEs to be added when using UNI 3.0, use the `atm signalling ie aal5 mode` interface configuration command. To disable this feature, use the `no` form of this command.

```plaintext
atm signalling ie aal5 mode {stream | message}
no atm signalling ie aal5 mode
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>stream</td>
<td>Streaming mode.</td>
</tr>
<tr>
<td>message</td>
<td>Message mode.</td>
</tr>
</tbody>
</table>

**Defaults**

Message mode is passed in UNI 3.0 AAL5 information elements.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `atm signalling ie aal5 mode` interface configuration command allows you to fill in the mode field in AAL5 IEs when using UNI 3.0.

The AAL5 IE has a mode field in UNI version 3.0. This mode field was removed in UNI version 3.1. When a setup request arrives from a UNI 3.1 side connection, the AAL5 IE does not have the mode information. Some vendor switches and end systems reject the connection because the mode information is missing. To allow interoperability, this `atm signalling ie aal5 mode` interface configuration command allows, by default, a message mode field to be added statically on UNI 3.0 side connections even if one was not received from the other side, for example, from a UNI 3.1 connection.

**Examples**

The following example configures, in interface configuration mode, ATM interface 1/0/0 signaling IEs in AAL5 to include a mode field configured as message.

```
Switch(config)# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm signalling ie aal5 mode message
Switch(config-if)# ^Z
Switch#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
atm signalling ie forward

To specify which signaling IEs are forwarded from the calling party to the called party, use the `atm signalling ie forward` interface configuration command. To stop the transfer of information, use the `no` form of this command.

```
switch(config)# interface atm 0/1/2
switch(config-if)# atm signalling ie forward calling-number
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Forward all signaling information from the calling party to the called party.</td>
</tr>
<tr>
<td>calling-number</td>
<td>Forward the calling party’s number to the called party.</td>
</tr>
<tr>
<td>calling-subaddress</td>
<td>Forward the calling party’s subaddress to the called party.</td>
</tr>
<tr>
<td>called-subaddress</td>
<td>Forward the called party’s subaddress to the called party.</td>
</tr>
<tr>
<td>higher-layer-info</td>
<td>Forward the broadband higher-layer information element from the calling party to the called party.</td>
</tr>
<tr>
<td>lower-layer-info</td>
<td>Forward the broadband lower-layer information element from the calling party to the called party.</td>
</tr>
<tr>
<td>bli-repeat-ind</td>
<td>Forward the broadband lower-layer repeat indicator information element to the called party.</td>
</tr>
<tr>
<td>aal-info</td>
<td>Forward the AAL information element from the calling party to the called party.</td>
</tr>
<tr>
<td>unknown-ie</td>
<td>Forward the unknown information element in the absence of a known indicator.</td>
</tr>
</tbody>
</table>

### Defaults

Forward all IEs in the signaling message from the calling party to the called party.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

When the action indicator in the IE is not set to indicate what action should be taken when an `unknown-ie` is received, the appropriate action is taken, depending upon whether the `unknown-ie` is enabled or disabled. If the action indicator is set, then the `unknown-ie` configuration is ignored.

### Examples

The following example shows how to forward the calling party’s number to the called party.

```
switch(config)# interface atm 0/1/2
switch(config-if)# atm signalling ie forward calling-number
```
To specify the value of VPCI to be carried in the signaling messages within a VP tunnel, use the `atm signalling vpci` subinterface configuration command. To use the default configuration, use the `no` form of this command.

```
atm signalling vpci vpci_number
no atm signalling vpci
```

**Syntax Description**

| vpci_number | VPCI number 0 to 255. |

**Defaults**

Use the value of VPI on which the subinterface is established. By default, the VPCI is the same as the VPI on the ATM switch router.

**Command Modes**

Subinterface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `atm signalling vpci` subinterface command allows you to configure the VPCI to be different from VPI when configuring PVP tunnels.

The connection identifier IE is used in signaling messages to identify the corresponding user information flow. The connection identifier IE contains the VPCI and VCI.

For example, if you want to configure a PVP tunnel connection from a LightStream 1010 ATM switch on VPI 2, VCI X, to a router with a virtual path switch in between, the signaling message would contain connection ID VPI 2, VCI X. Since the PVP tunnel at the router end is on VPI 3, VCI X, the connection will be refused. By configuring VPCI to 3, you can configure the signaling message explicitly to contain connection ID VPI 3, VCI X, instead of containing VPI 2, VCI X.

This command could also be used to support virtual UNI connections.

**Examples**

The following example configures a PVP tunnel on ATM interface 0/0/0, PVP 99, and then configures the connection ID VCPI as 0 in subinterface configuration mode.

```
Switch(config)# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 1/0/0
Switch(config-if)# atm pvp 99
Switch(config-if)# exit
Switch(config)# interface atm 1/0/0.99
Switch(config-subif)# atm signalling vpci 0
Switch(config-subif)# end
Switch#
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**atm snoop**

To set the current port snooping configuration and actual register values for the highest ATM interface, use the `atm snoop interface atm` interface configuration command.

```plaintext
atm snoop interface atm card/subcard/port [direction dir]
```

**Syntax Description**

<table>
<thead>
<tr>
<th><code>card/subcard/port</code></th>
<th>Card, subcard, and port number for the ATM interface to be monitored. The port can be any port except the ATM 0 port or the test port.</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dir</code></td>
<td>Specified as <code>receive</code> or <code>transmit</code> and determines the direction of the cell traffic to monitor.</td>
</tr>
</tbody>
</table>

**Defaults**

Receive

**Command Modes**

Interface configuration on the snoop test port.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `atm snoop interface atm` subcommand applies only if the previously specified port is the highest system port residing on card 4 and subcard 1 (which has been shut down). If so, this enables it as the snoop test port. Cells transmitted from the snoop test port are copies of cells from a single direction of a monitored port.

While in snoop mode, any prior permanent virtual connections to the snoop test port remain in the down state.

The port number of the test port depends on the card type. Table 2-10 defines the snoop test port number for various interfaces.

**Table 2-10  atm snoop Port Numbers**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Port Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC-3</td>
<td>3/1/3</td>
</tr>
<tr>
<td>OC-12</td>
<td>3/1/0</td>
</tr>
<tr>
<td>DS3/E3</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

**Examples**

The following example configures the highest port in the snoop mode to monitor port card 1, subcard 0, and port 2 in the transmit direction, starting from the configuration mode.

```plaintext
Switch(config)# interface atm 3/1/3
Switch(config-if)# shutdown
Switch(config-if)# atm snoop interface atm 1/0/2 direction transmit
Switch(config-if)# no shutdown
```
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm snoop</td>
<td>Displays the current port snooping configuration and actual register values for the highest ATM interface.</td>
</tr>
</tbody>
</table>
### atm snoop-vc

To set the current port snooping configuration and actual register values per-VC, use the `atm snoop-vc` interface configuration command. To remove a previous configuration, use the `no` form of this command.

```plaintext
atm snoop-vc [vpi-A vci-A] interface atm card/subcard/port vpi-B vci-B [direction {receive | transmit}]

no atm snoop-vc [vpi-A vci-A] interface atm card/subcard/port vpi-B vci-B [direction {receive | transmit}]
```

#### Syntax Description

- **vpi-A**: VPI of the snooping connection.
- **vci-A**: VCI of the snooping connection.
- **card/subcard/port**: Card, subcard, and port number for the ATM interface to be monitored. The port can be any port except the ATM 0 port or the test port.
- **vpi-B**: VPI of the snooped connection.
- **vci-B**: VCI of the snooped connection.
- **direction**: When used with the `receive` or `transmit` keywords, determines which direction of cell traffic to monitor.
  - **receive**: Monitors cell traffic in the receive direction.
  - **transmit**: Monitors cell traffic in the transmit direction.

#### Defaults

Receive

#### Command Modes

Interface configuration. Applies to the snoop test port.

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

There is no restriction on the snoop test port on a switch processor feature card-based system for ATM snoop, snoop-vc, and snoop-vp configurations. The snoop port can be any port and is not limited to the highest port.

The `atm snoop-vc interface atm` option applies only if the previously specified port is the highest system port residing on card 4 and subcard 1 (which has been shut down) on the snoop test port.

Cells transmitted from the snoop test port are copies of cells from a single direction of a monitored port. For Catalyst 8510 MSR and LightStream 1010, this restriction is only for FC-PCQ-based systems.

When in snoop mode, any prior permanent virtual connections to the snoop test port remain in the down state.
The port number of the test port depends on the card type. Table 2-11 defines the ATM snoop test port number for various interfaces.

**Table 2-11  atm snoop-vc Port Numbers**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Port Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC-3</td>
<td>3/1/3</td>
</tr>
<tr>
<td>OC-12</td>
<td>3/1/0</td>
</tr>
<tr>
<td>DS3/E3</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

**Examples**

The following example configures the port in the snoop mode to monitor port card 1, subcard 0, and port 2 in the transmit direction, starting from the configuration mode.

```
Switch(config)# interface atm 3/1/3
Switch(config-if)# shutdown
Switch(config-if)# atm snoop-vc interface atm 1/0/2 1 13 direction transmit
Switch(config-if)# no shutdown
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show atm snoop-vc</strong></td>
<td>Displays the current port snooping configuration and actual register values per-VC.</td>
</tr>
</tbody>
</table>
Chapter 2  ATM Commands

atm snoop-vp

To set the current port snooping configuration and actual register values per-VP, use the atm snoop-vp interface configuration command. To remove a previous configuration, use the no form of this command.

atm snoop-vp [vpi-A vci-A] interface atm card/subcard/port vpi-B vci-B [direction {receive | transmit}]

no atm snoop-vc [vpi-A vci-A] interface atm card/subcard/port vpi-B vci-B [direction {receive | transmit}]

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi-A</td>
<td>VPI of the snooping connection.</td>
</tr>
<tr>
<td>vci-A</td>
<td>VCI of the snooping connection.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number for the ATM interface to be monitored. The port can be any port except the ATM 0 port or the test port.</td>
</tr>
<tr>
<td>vpi-B</td>
<td>VPI of the snooped connection.</td>
</tr>
<tr>
<td>vci-B</td>
<td>VCI of the snooped connection.</td>
</tr>
<tr>
<td>direction</td>
<td>When used with the receive or transmit keywords, determines which direction of cell traffic to monitor.</td>
</tr>
<tr>
<td>receive</td>
<td>Monitors cell traffic in the receive direction.</td>
</tr>
<tr>
<td>transmit</td>
<td>Monitors cell traffic in the transmit direction.</td>
</tr>
</tbody>
</table>

Defaults

receive

Command Modes

Interface configuration. Applies to the snoop test port.

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

There is no restriction on the snoop test port on a switch processor feature card-based system for ATM snoop, snoop-vc, and snoop-vp configurations. The snoop port can be any port and is not limited to the highest port.

The atm snoop-vp interface atm command applies only if the previously specified port is the highest system port residing on card 4 and subcard 1 (which has been shut down) on the snoop test port. Cells transmitted from the snoop test port are copies of cells from a single direction of a monitored port. For Catalyst 8510 MSR and LightStream 1010, this restriction is only for FC-PCQ-based systems.

When in snoop mode, any prior permanent virtual connections to the snoop test port remain in the down state.
The port number of the test port depends on the card type. Table 2-12 defines the ATM snoop test port number for various interfaces.

**Table 2-12 atm snoop-vp Port Numbers**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Port Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC-3</td>
<td>3/1/3</td>
</tr>
<tr>
<td>OC-12</td>
<td>3/1/0</td>
</tr>
<tr>
<td>DS3/E3</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

**Examples**

The following example configures the port in the snoop mode to monitor port card 1, subcard 0, and port 2 in the transmit direction, starting from the configuration mode.

```
Switch(config)# interface atm 3/1/3
Switch(config-if)# shutdown
Switch(config-if)# atm snoop-vp interface atm 1/0/2 1 13 direction transmit
Switch(config-if)# no shutdown
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show atm snoop-vp</strong></td>
<td>Displays the current port snooping configuration and actual register values per-VP.</td>
</tr>
</tbody>
</table>
### atm soft redundancy group

To configure a soft VC redundancy group, use the `atm soft-vc redundancy` configuration command. To return `atm soft-vc redundancy` configuration to the default, use the `no` form of this command.

```
    atm soft redundancy group group-name
    no atm soft redundancy group group-name
```

**Syntax Description**

- `group-name`: Specifies the soft VC group name to associate with the interface.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Redundant soft PVC and soft PVP destinations allow you to configure the same NSAP address on two different ATM interfaces. The ATM interfaces can be on the same switch or different switches and use the same NSAP address in the source-end configuration for the soft PVC or soft PVP. If the active interface fails, the calls terminating on that interface for the redundant destination address are released and subsequently reestablished on the standby interface.

Active and standby modes allow configuring the best route as active and a standby route if the active interface fails.

Load balancing allows equal distribution of the calls between the redundant interfaces when both interfaces are up and working correctly and when active and standby interfaces are configured on the same switch.

**Note**

Load balancing the redundant soft PVCs and soft PVPs uses the number of calls received as the parameter to decide which interface to select.

**Examples**

The following example shows how to configure interface ATM 1/1/1 as part of a redundancy group named `backup_vc`:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# atm soft redundancy group backup_vc
Switch( atmsoft-red)# load-balance
Switch( atmsoft-red)# nsap-address 11.1111.1111.1111.1111.111c.1111.1111.1c11.1111.00
Switch( atmsoft-red)# exit
Switch(config)# interface atm 1/1/1
Switch(config-if)# atm soft redundancy member backup_vc active
```
Switch(config-if)# exit
Switch#

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>load-balance</td>
<td>Configures load balancing between the active redundant ATM interfaces.</td>
</tr>
<tr>
<td>nsap-address (redundant soft VC)</td>
<td>Configures the redundant NSAP address on a soft VC redundancy group.</td>
</tr>
<tr>
<td>atm soft redundancy member</td>
<td>Configures an ATM interface as part of a redundant soft VC or soft VP.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the ATM NSAP addresses of the redundant soft VC destination.</td>
</tr>
<tr>
<td>show atm soft redundancy group</td>
<td>Shows the current soft VC redundancy group configuration.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the switch.</td>
</tr>
</tbody>
</table>
**atm soft redundancy member**

To configure an ATM interface as part of a redundant soft VC or soft VP destination, use the `atm soft redundancy member` configuration command. To return the interface configuration to the default, use the `no` form of this command.

```
atm soft redundancy member group-name {active | standby}
no atm soft redundancy member group-name {active | standby}
```

**Syntax Description**
- `group-name` Associates a redundant soft VC with a previously configured member group name.
- `active | standby` Configures the redundant soft VC as either active or standby.

**Defaults**
Disabled

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Redundant soft PVC and soft PVP destinations allow you to configure the same NSAP address on two different ATM interfaces. The ATM interfaces can be on the same switch or different switches and use the same NSAP address in the source-end configuration for the soft PVC or soft PVP. If the active interface fails, the calls terminating on that interface for the redundant destination address are released and subsequently reestablished on the standby interface.

Active and standby modes allow configuring the best destination as active and a standby destination if the active destination fails.

Load balancing of the calls allows equal distribution of the calls when both interfaces are up and working correctly and when active and standby interfaces are configured on the same switch.

**Note**
Load balancing the redundant soft PVCs and soft PVPs uses the number of calls received as the parameter to decide which interface to select.

**Examples**
The following example shows how to configure an ATM interface as part of a redundancy group named `backup_vc` in active mode:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# atm soft redundancy group backup vc
Switch(atmsoft-red)# load-balance
Switch(atmsoft-red)# nsap-address 11.1111.1111.1111.1111.111c.1111.1111.1c11.1111.00
```
Switch(atmsoft-red)# exit
Switch(config)# interface atm 1/1/1
Switch(config-if)# atm soft redundancy member backup_vc active
Switch(config-if)# exit
Switch#

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm soft redundancy group</strong></td>
<td>Configures a soft VC redundancy group.</td>
</tr>
<tr>
<td><strong>load-balance</strong></td>
<td>Configures load balancing between the active redundant ATM interfaces.</td>
</tr>
<tr>
<td><strong>nsap-address (redundant soft VC)</strong></td>
<td>Configures the redundant NSAP address on a soft VC redundancy group.</td>
</tr>
<tr>
<td><strong>show atm addresses</strong></td>
<td>Displays the ATM NSAP addresses of the redundant soft VC destination.</td>
</tr>
<tr>
<td><strong>show atm soft redundancy group</strong></td>
<td>Used to show the current soft VC redundancy group configuration.</td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Used to show the configuration information currently running on the switch.</td>
</tr>
</tbody>
</table>

**atm soft-vc (point-to-point)**

To create a soft PVC on the switch router, use the `atm soft-vc` interface configuration command.

```plaintext
atm soft-vc source-vpi source-vci [p2p] dest-address atm-address dest-vpi dest-vci
   [enable | disable] [upc upc] [pd {on | off | use-cttr}] [rx-cttr index] [tx-cttr index]
   [retry-interval {first retry-interval} {maximum retry-interval}]
   [explicit-path precedence {name path-name | identifier path-id}]
   [upto partial-entry-index] [only-explicit] [hold-priority priority].
   [timer-group name]
```

To create passive soft PVCs, use the `passive` form of the command.

```plaintext
atm soft-vc dest-vpi dest-vci passive {pd {on | off | use-cttr}] [upc upc] [access-control]
   {src-address atm-address | filter-set name]} [rx-cttr index] [tx-cttr index]
```

To delete the soft PVC, use the `no` form of the command.

```plaintext
no atm soft-vc source-vpi source-vci
```

To respecify the explicit paths, use the `redo-explicit` form.

```plaintext
atm soft-vc source-vpi source-vci [enable | disable] [redo-explicit [explicit-path precedence
   {name path-name | identifier path-id} [upto partial-entry-index] [only-explicit]]]
```

To modify the traffic parameters on an existing connection, use the `rx-cttr` and `tx-cttr` parameters with the valid index numbers to associate a new CTTR.

```plaintext
atm soft-vc source-vpi source-vci [rx-cttr index] [tx-cttr index]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>source-vpi</td>
<td>Source VPI number.</td>
</tr>
<tr>
<td>source-vci</td>
<td>Source VCI number.</td>
</tr>
<tr>
<td>p2p</td>
<td>Optional point-to-point keyword. For point-to-multipoint configuration see the <code>atm soft-vc (point-to-multipoint)</code> command.</td>
</tr>
<tr>
<td>dest-address</td>
<td>ATM address for the destination port.</td>
</tr>
<tr>
<td>atm-address</td>
<td>Destination VPI number.</td>
</tr>
<tr>
<td>dest-vci</td>
<td>Destination VCI number.</td>
</tr>
<tr>
<td>enable</td>
<td>Allows the soft connection to be set up; <code>enable</code> is the default for the initial soft connection configuration.</td>
</tr>
<tr>
<td>disable</td>
<td>Prevents an initial soft connection from being set up, or tears down an existing connection.</td>
</tr>
</tbody>
</table>

**Note** If the soft connection command is reentered for an existing connection, the default is the current enabled or disabled state.
**atm soft-vc (point-to-point)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>upc upc</strong></td>
<td>Usage parameter control, specified as <strong>pass</strong>, <strong>tag</strong>, or <strong>drop</strong>. Default is <strong>pass</strong>. The <strong>upc</strong> option can be set to <strong>tag</strong> or <strong>drop</strong> only when the connection is not the leaf of a point-to-multipoint connection.</td>
</tr>
<tr>
<td><strong>pd</strong></td>
<td>Specifies the intelligent packet discard option as <strong>on</strong>, <strong>off</strong>, or <strong>use-cttr</strong> (use packet-discard option specified in the traffic-descriptor row). The default is <strong>use-cttr</strong>.</td>
</tr>
<tr>
<td><strong>rx-cttr index</strong></td>
<td>Connection traffic table row index in the received direction. The cttr should be configured before using the atm soft-vc command. See the atm connection-traffic-table-row command for information on configuring the <strong>rx-cttr</strong>. The default is 1.</td>
</tr>
<tr>
<td><strong>tx-cttr index</strong></td>
<td>Connection traffic table row index in the transmitted direction. The cttr should be configured before using the atm soft-vc command. See the atm connection-traffic-table-row command for information on configuring the <strong>tx-cttr</strong>. The default is 1.</td>
</tr>
<tr>
<td><strong>retry-interval</strong></td>
<td>Configures the retry interval timers for a soft PVC.</td>
</tr>
</tbody>
</table>
| **first retry-interval** | Retry interval after the first failed attempt, specified in milliseconds. If the first retry after the first failed attempt also fails, the subsequent attempts are made at intervals computed using the **first retry-interval** as follows: 

\[
(2^{(k-1)}) \times \text{first retry-interval}
\]

Where the value of \( k \) is 1 for the first retry after the first failed attempt and is incremented by 1 for every subsequent attempt. Range is from 100 to 3600000 milliseconds; the default is 5000 milliseconds. |
| **maximum retry-interval** | The maximum retry interval between any two attempts, specified in seconds. Once the retry interval is computed in the **first retry-interval** and becomes equal to or greater than the **maximum retry-interval** configured, the subsequent retries are done at regular intervals of **maximum retry-interval** seconds until the call is established. Range is from 1 to 65535 seconds; the default is 60. |
| **redo-explicit** | For existing soft connections only, it allows explicit paths to be respecified without tearing down connections. Existing connections are unaffected unless a reroute takes place, and then they will use the newer **explicit-path** configuration. |
| **explicit-path** | The PNNI explicit path that is manually configured for routing a soft PVC, using the atm pnni explicit-path command. |
| **precedence** | The precedence number by which ATM PNNI explicit paths are assigned, from 1 to 3. Up to three explicit paths can be assigned to a soft PVC. |
| **name path-name** | The name of the ATM PNNI explicit path for routing soft PVCs. |
| **identifier path-id** | The path ID for the explicit path being configured to route soft PVCs. |
Chapter 2  ATM Commands

atm soft-vc (point-to-point)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>upto partial-entry-index</td>
<td>Allows a subset of a longer explicit path to be used, so that all included nodes after the specified entry index are disregarded. If the destination is reachable at any next node or segment target, the remaining included nodes in the explicit path are disregarded automatically.</td>
</tr>
<tr>
<td>only-explicit</td>
<td>If one or more explicit paths have been specified and if the explicit path fails, the soft connection remains down until it is retried at its next retry interval. If this option is not specified, the system uses the standard on-demand routing instead of waiting for the next retry interval.</td>
</tr>
<tr>
<td>hold-priority priority</td>
<td>Allows users to configure a priority for each soft PVC or SVC, which VCs to retain when bandwidth is reduced on an IMA interface. Priority is from 0 (highest) to 15 (lowest). If no hold-priority is specified when the soft PVC or SVC dropping is enabled, the soft PVC or SVC is automatically assigned a priority of 15. The hold-priority option is only available on IMA interfaces and cannot be used to clear transit legs of the soft PVC or SVC (source and destination legs on an IMA interface cannot be cleared).</td>
</tr>
<tr>
<td>passive</td>
<td>Creates a passive half leg.</td>
</tr>
<tr>
<td>access-control</td>
<td>Provides access control to the passive side of a two-ended soft PVC connection.</td>
</tr>
<tr>
<td>src-address atm-address</td>
<td>The source ATM address allowed to connect to this destination.</td>
</tr>
<tr>
<td>filter-set name</td>
<td>The filter-set name used to control access to this destination.</td>
</tr>
<tr>
<td>timer-group name</td>
<td>Configures a timer group with timer rules to the soft PVC.</td>
</tr>
</tbody>
</table>

Defaults
See “Syntax Description.”

Command Modes
Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The hold-priority option was introduced.</td>
</tr>
<tr>
<td>12.1(10)EY</td>
<td>The passive option was introduced.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added interface ATM 0 functionality, pd use-cttr keyword, and p2p keyword.</td>
</tr>
<tr>
<td>12.1(23)EB</td>
<td>Modified: Added access-control feature parameters and timer-group parameters for the rules-based setup and teardown feature.</td>
</tr>
</tbody>
</table>

Usage Guidelines
Obtain the destination port address before configuring a soft PVC by using the show atm addresses or show atm addresses command on the destination switch.

The following list identifies why the creation of a soft PVC might be unsuccessful:
There is a VPI or VCI collision at the source or destination switch.

- The source or destination interface is not up (or autoconfiguration is not complete).
- The specified destination address is not correct.

Up to three explicit paths can be assigned to a soft VC, using precedence numbers 1 through 3. The precedence 1 explicit path is considered the primary path and is tried first. If it fails, then the next precedence path is tried. Explicit paths can be specified either by name or by identifier.

Passive soft PVCs allows you to preconfigure soft PVC attributes that cannot be signaled to the destination end. This allows you to preallocate resources.

Always configure the passive end before configuring the active end. The soft PVC manager uses the passive half leg only if it is in “Not connected” state and if the preconfigured traffic parameters of the passive half leg match those of the incoming connection setup request.

Passive half legs cannot be configured on IMA interfaces.

**Note**

For VBR-nrt and VBR-rt service categories you must configure the MBS (even if the value is default) in the ATM connection traffic table row attached to the passive leg.

The access-control parameter allows you to restrict access to the passive destination side of the soft PVC based on a source interface NSAP address of the connection. To stipulate the source interface ATM NSAP address allowed access you can configure either a source ATM address directly or configure a filter set and then associate the filter set to the soft PVC. You configure a filter set using the `atm filter-set` command. The following section has examples of both configurations.

**Note**

Configuring a filter set gives you the added flexibility to allow multiple NSAP addresses to access the destination side of the soft PVC and limit the time of day when to allow access.

The explicit path options can be changed without tearing down an existing soft PVC. Use the `redo-explicit` form of the command to respecify all of the explicit path options.

After configuring a soft PVC, use the `show atm vc interface` command on the source node (specifying the source VPI and source VCI) to verify that the soft PVC has succeeded and to see the explicit path taken.

**Note**

The configuration displayed for soft connections with explicit paths is always shown as two separate lines, with the `redo-explicit` keyword on the second line, even if it was originally configured using a single command line.

When modifying an existing Soft VC CTTR association by respecifying the `rx-cttr` and `tx-cttr` index values, a data outage will occur until the VC is re-established with the new traffic parameters.

When modifying the CTTR for a Soft VC, if you only specify either the `rx-cttr` or `tx-cttr`, the existing value is used for the unspecified index. For example, if an existing Soft VC has the `rx-cttr` and `tx-cttr` indexes configured as 100 and when you reconfigure the CTTR you only change the `tx-cttr` index to 101 (as in the following example), the `rx-cttr` index will remain at 100:

Switch(config-if)# atm soft-vc 4 400 tx-cttr 101

The timer-group parameter allows you to configure a rules-based setup and release timer, using the `atm timer rule` and `atm timer group` commands, for the soft PVC. This means that the soft PVC or soft PVP can be established or deleted based on the time of the day, day of the week, or a specific date. These
connections can also be programmed to become active for specified duration of time and then become inactive. The service can be extended beyond simple connection set up and deletion, based on the timer, to changing the connection parameters for the specified duration.

**Examples**

The following example shows how a user at the destination switch displays the address of the destination port.

Switch# `show atm address`

Switch Address(es): 47.0091.8100.0000.0003.BE59ED00.00003.BE59ED00.00 active

Soft VC Address(es):
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM2/0/0
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/0/1
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/0/2
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/0/3
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/1/0
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/1/0.5
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/1/1
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/1/2
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM1/1/3
- 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 ATOM2/0/0

ILMI Switch Prefix(es):
- 47.0091.8100.0000.0003.BE59ED00

ILMI Configured Interface Prefix(es):

LECS Address(es):

The following example shows how to configure a soft PVC on interface ATM 0/1/0. At the source switch, create a soft PVC with the following configuration.

```
src vpi = 100,
src vci = 200,
dest port address = 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00

dest vpi = 100

dest vci = 200
```

Switch(config-if)# `atm soft-vc 100 200 dest-address` 47.0091.8100.0000.0003.BE59ED00.0000.0003.BE59ED00.0000.00 100 200

The following example shows how to configure a passive half leg for a soft PVC.

```
Switch(config)# `interface atm 1/1`  
Switch(config-if)# `atm soft-vc 100 500 passive`
```

The following example shows how to restrict access to the passive destination side of the soft VC using the `src-address` parameter to configure only a specific ATM NSAP address from a source interface to access the passive destination leg of the soft VC.

```
Switch(config-if)# `atm soft-vc 1 68 passive access-control src-address` 47.0091.8100.0000.0001.4204.db01.4000.0c80.9000.00
```
The following example shows how to restrict access to the passive destination side of the soft VC by configuring a simple filter set, named fset1, to permit only the configured ATM NSAP address of the source interface to connect to the passive side of the soft VC connection. The `soft-vc` configuration command, on the passive destination leg of the soft VC, then uses the `access-control` and `filter-set` parameters to associate the filter set.

```
Switch(config)# atm filter-set fset1 permit 47.0091.8100.0000.0003.bbe4.aa01.4000.0c80.0000.64
Switch(config)# interface atm 0/1/
```

```
Switch(config-if)# atm soft-vc 1 68 passive access-control filter-set fset1
```

The following example shows how to restrict access to the passive side of the two-ended soft PVC by configuring a more complex filter set, named fset5, to permit only two ATM NSAP addresses to access the passive side of the soft VC. The `soft-vc` configuration command, on the passive destination leg of the soft VC, then uses the `access-control` and `filter-set` parameters to associate the filter set.

```
Switch-C(config)# atm filter-set fset5 index 1 permit 47.0091.8100.0000.0010.073c...
Switch-C(config)# atm filter-set fset5 index 2 permit 47.0091.8100.0000.0001.4204.d801...
Switch-C(config)# interface atm 0/0/1
Switch-C(config-if)# atm soft-vc 1 60 passive access-control filter-set fset5
Switch-C(config-if)# end
```

The following example shows how to restrict access to the two-ended soft PVC by configuring a filter set, named fset6, with a time-of-day filter configured on the passive half leg. The filter set permits an ATM NSAP address to access the passive side of the soft PVC but only for the hour between 10:00 and 11:00. The `soft-vc` configuration command, on the passive destination leg of the soft VC, then uses the `access-control` and `filter-set` parameters to associate the filter set.

```
Switch-C(config)# atm filter-set fset6 permit 47.0091.8100.0000.0010.073c...
Switch-C(config)# atm filter-set fset6 time-of-day 10:00 11:00
Switch-C(config-if)# atm soft-vc 1 60 passive access-control filter-set fset6
Switch-C(config-if)# end
```

The following example shows how to manually configure an explicit path for a soft PVC. For this example, if the explicit path fails, standard routing is used.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vc 0 40 dest-address 47.0091.8100.0000.0003.be59.ed00.4000.0c82.1000.05 100 200
```

The following example shows how to use the `redo-explicit` keyword to modify an existing explicit-path configuration. It also adds a second alternate explicit path to prevent standard routing from being used should both paths fail. Note that the system prompts you to confirm the changes.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vc 0 40 redo-explicit explicit-path 1 name chicago.path1
Switch(config-if)# atm soft-vc 0 40 redo-explicit explicit-path 2 name chicago.path2 only-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]: y
```

The following example shows how to remove all explicit paths from an existing soft PVC, using the `redo-explicit` keyword with no other options specified. The path is not changed until a soft PVC reroute occurs.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vc 0 40 redo-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]: y
```

The following example shows how to configure a soft PVC to the main ATM interface ATM 0 of the Route Processor.

```
Switch(config)# interface atm 0
```
Soft PVC connections to the ATM 0 interface have the following limitations:

- The source VPI and destination VPI must always be 0 for a soft PVC from an ATM 0 interface to an ATM 0 interface.

- You can configuring the `rx-cttr` and `tx-cttr` parameters but it is not recommended on the ATM 0 interface since rate-scheduling is not supported on ATM 0 interface. (The Route Processor supports only WRR scheduling).

- The ATM 0 interface should be used for management purposes only. Terminating and originating numerous soft PVCs on the ATM 0 interface can overloaded it.

- Heavy traffic should not be sent towards the ATM 0 interface using soft PVCs since it is not designed to for traffic.

The following example shows how to modifying the CTTR indexes for an existing ATM Soft VC.

```
Switch(config-if)# atm soft-vc 4 400 rx-cttr 200 tx-cttr 200
```

The following example shows how to configure a rules-based soft PVC timer rule, create an ATM timer group, and add the timer group configuration to the soft PVC to set up or tear down the soft PVC based on the timer values configured.

```
Switch(config)# atm timer rule rule2 periodic friday 10:00 to friday 10:30
Switch(config)# atm timer group timerGrp1
Switch(config-timer-grp)# timer-rule rule2
Switch(config-timer-grp)# exit
Switch(config)# interface atm 0/1/1
Switch(config-if)# atm soft-vc 10 120 dest-address 47.0091.8100.0000.00e0.0401.4000.0c80.0020.00 10 110 timer-group timerGrp1
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm connection-traffic-table-row</code></td>
<td>Creates a CTT.</td>
</tr>
<tr>
<td><code>atm filter-set</code></td>
<td>Creates an ATM address filter set to control access to the passive destination side of the soft PVC.</td>
</tr>
<tr>
<td><code>atm pnni explicit-path</code></td>
<td>Enters PNNI explicit path configuration mode to create or modify PNNI explicit path.</td>
</tr>
<tr>
<td><code>atm soft-vp</code></td>
<td>Configures a soft VC redundancy group.</td>
</tr>
<tr>
<td><code>show atm addresses</code></td>
<td>Displays the active ATM addresses on a switch.</td>
</tr>
<tr>
<td><code>show atm pnni explicit-paths</code></td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
<tr>
<td><code>show atm vc</code></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td><code>show atm timer group</code></td>
<td>Displays the rules-based soft PVC and soft PVP feature timer group configuration.</td>
</tr>
</tbody>
</table>
atm soft-vc (point-to-multipoint)

To create a point-to-multipoint soft PVC on the switch router, use the atm soft-vc interface configuration command with the p2mp keyword.

```
atm soft-vc source-vpi source-vci p2mp
```

The atm soft-vc source-vpi source-vci p2mp command takes the user to the atmsoft-p2mp configuration mode where the following commands are available:

- `cttr rx index tx index`
- `disable (Privileged commands)`
- `enable`
- `packet-discard { on | off | use-cttr }`
- `party leaf-reference (point-to-multipoint ATM soft PVC) value`
- `upc { tag | drop | pass }`

The point-to-multipoint soft PVC connection can be removed using the no form of the atm soft-vc command:

```
no atm soft-vc source-vpi source-vci
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>source-vpi</code></td>
<td>Source VPI number.</td>
</tr>
<tr>
<td><code>source-vci</code></td>
<td>Source VCI number.</td>
</tr>
<tr>
<td><code>p2mp</code></td>
<td>Optional point-to-multipoint keyword. See party leaf-reference (point-to-multipoint ATM soft PVC) command.</td>
</tr>
<tr>
<td><code>party</code></td>
<td>Changes to Soft VC point-to-multipoint party configuration mode. See party leaf-reference (point-to-multipoint ATM soft PVC) command.</td>
</tr>
<tr>
<td><code>packet-discard</code></td>
<td>Specifies the intelligent packet discard option as on, off or use-cttr. The default is use-cttr.</td>
</tr>
<tr>
<td><code>upc upc</code></td>
<td>Usage parameter control, specified as pass, tag, or drop. Default is pass. The upc option can be set to tag or drop only when the connection is not the leaf of a point-to-multipoint connection.</td>
</tr>
<tr>
<td><code>cttr rx index</code></td>
<td>Connection traffic table row index in the received direction. The cttr should be configured before using the atm soft-vc command. See the atm connection-traffic-table-row command for information on configuring the cttr rx. The default is 1.</td>
</tr>
<tr>
<td><code>cttr tx index</code></td>
<td>Connection traffic table row index in the transmitted direction. The cttr should be configured before using the atm soft-vc command. See the atm connection-traffic-table-row command for information on configuring the cttr tx. The default is 1.</td>
</tr>
<tr>
<td><code>party</code></td>
<td>Changes to soft VC point-to-multipoint party configuration mode. See party leaf-reference (point-to-multipoint ATM soft PVC) command.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Description.”
**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **p2mp** keyword of the **atm soft-vc** command allows configuration of the parties of the point-to-multipoint Soft PVC connection. The **party** keyword allows the configuration of the parties of the connection. For detailed information refer to the **party leaf-reference (point-to-multipoint ATM soft PVC)** command.

Point-to-multipoint soft PVC connections have the following restrictions:

- The **explicit path** option is not supported on point-to-multipoint soft PVC connections.
- Point-to-multipoint soft PVC connections can be sourced-from or terminated-on ATM and IMA interfaces only.
- Point-to-multipoint soft PVC connections are not preserved across a Route Processor switchover. The connections are torn down and set up again once the Route Processor switchover is complete, even if the switchover is done on the source, transit, or destination switch.
- Dynamic modification of the CTTR (connection traffic table row) on point-to-multipoint soft PVCs is not allowed.

**Examples**

The following example shows how to configure a point-to-multipoint soft PVC connection:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 0/1/0
Switch(config-if)# atm soft-vc 4 44 p2mp
Switch(atmsoft-p2mp)#
```

The following example shows how to disable the entire point-to-multipoint ATM soft PVC connection:

```
Switch(config)# interface atm 0/1/0
Switch(config-if)# no atm soft-vc 4 44 p2mp
Switch(config-if)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>party leaf-reference</strong></td>
<td>Configures the individual party leaf-reference number of the point-to-multipoint ATM soft PVC connection.</td>
</tr>
<tr>
<td><strong>party leaf-reference (point-to-multipoint ATM soft PVC)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Shows the configuration of the point-to-multipoint ATM soft PVC connection.</td>
</tr>
<tr>
<td><strong>show atm soft-vc</strong></td>
<td>Displays the ATM layer connection information about the soft PVC connection.</td>
</tr>
<tr>
<td><strong>show atm vc</strong></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
</tbody>
</table>
atm soft-vp

To create a soft PVP on the switch, use the `atm soft-vp` interface configuration command.

```plaintext
atm soft-vp source-vpi dest-address atm-address dest-vpi [upc upc] [rx-cttr index] [tx-cttr index] [retry-interval] [first retry-interval] [maximum retry-interval] [hold-priority priority] [timer-group name]
```

To create passive soft PVPs, use the `passive` form of the command.

```plaintext
atm soft-vp dest-vpi passive [pd pd] [upc upc] [rx-cttr index] [tx-cttr index] [access-control] [src-address atm-address | filter-set name]
```

To delete an existing soft PVP, use the `no` form of the command.

```plaintext
no atm soft-vp source-vpi
```

To respecify explicit paths, use the `redo-explicit` form of the command.

```plaintext
atm soft-vp source-vpi [enable | disable]
redo-explicit [explicit-path precedence] [name path-name | identifier path-id] [upto partial-entry-index] [only-explicit]]
```

To modify the traffic parameters on an existing connection, use the `rx-cttr` and `tx-cttr` parameters with the valid index numbers to associate a new CTTR.

```plaintext
atm soft-vp source-vpi [rx-cttr index] [tx-cttr index]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Source VPI number.</th>
<th>Source VPI number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>source-vpi</code></td>
<td><code>source-vpi</code></td>
</tr>
<tr>
<td>Source VPI number.</td>
<td>Source VPI number.</td>
</tr>
<tr>
<td><code>dest-address atm-address</code></td>
<td><code>dest-address atm-address</code></td>
</tr>
<tr>
<td>ATM address for the destination port.</td>
<td>ATM address for the destination port.</td>
</tr>
<tr>
<td><code>dest-vpi</code></td>
<td><code>dest-vpi</code></td>
</tr>
<tr>
<td>Destination VPI number.</td>
<td>Destination VPI number.</td>
</tr>
<tr>
<td><code>upc upc</code></td>
<td><code>upc upc</code></td>
</tr>
<tr>
<td>Usage parameter control, specified as <code>pass</code></td>
<td>Usage parameter control, specified as <code>pass</code></td>
</tr>
<tr>
<td><code>retry-interval</code></td>
<td><code>retry-interval</code></td>
</tr>
<tr>
<td>Line to associate retry interval timers for a soft VP.</td>
<td>Line to associate retry interval timers for a soft VP.</td>
</tr>
<tr>
<td><code>retry-interval</code></td>
<td><code>retry-interval</code></td>
</tr>
<tr>
<td>Retry interval timers for a soft VP.</td>
<td>Retry interval timers for a soft VP.</td>
</tr>
<tr>
<td><code>tx-cttr index</code></td>
<td><code>tx-cttr index</code></td>
</tr>
<tr>
<td>Connection traffic table row index in the transmitted direction.</td>
<td>Connection traffic table row index in the transmitted direction.</td>
</tr>
<tr>
<td><code>rx-cttr index</code></td>
<td><code>rx-cttr index</code></td>
</tr>
<tr>
<td>Connection traffic table row index in the received direction.</td>
<td>Connection traffic table row index in the received direction.</td>
</tr>
<tr>
<td><code>retry-interval</code></td>
<td><code>retry-interval</code></td>
</tr>
<tr>
<td>Configures retry interval timers for a soft VP.</td>
<td>Configures retry interval timers for a soft VP.</td>
</tr>
</tbody>
</table>
**first retry-interval**

Retry interval after the first failed attempt, specified in milliseconds.

If the first retry after the first failed attempt also fails, the subsequent attempts are made at intervals computed using the *first retry-interval* as follows:

\[(2 ^ {\cdot (k-1)}) \times \text{first retry-interval}\]

Where the value of \(k\) is 1 for the first retry after the first failed attempt, and is incremented by 1 for every subsequent attempt.

Range is from 100 to 3600000 milliseconds; the default is 5000 milliseconds.

**maximum retry-interval**

The maximum retry interval between any two attempts, specified in seconds.

Once the retry interval is computed in the *first retry-interval* and becomes equal to or greater than the *maximum retry-interval* configured, the subsequent retries are done at regular intervals of *maximum retry-interval* seconds until the call is established.

Range is from 1 to 65535 seconds; the default is 60.

**hold-priority priority**

Allows users to configure a priority for each soft PVC or SVC, to be used in determining which VCs to retain when bandwidth is reduced on an IMA interface. Priority can be from 0 (highest) to 15 (lowest).

If no *hold-priority* is specified when soft PVC or SVC dropping by priority is enabled, the soft PVC or SVC is automatically assigned a priority of 15.

The *hold-priority* option is only available on IMA interfaces and cannot be used to clear transit legs of the soft PVC of SVC (source and destination legs on an IMA interface cannot be cleared).

**passive**

Creates a passive half leg.

**access-control**

Provides access control to the passive side of a two-ended soft PVP connection.

**src-address atm-address**

The source ATM address allowed to connect to this destination.

**filter-set name**

The filter-set name used to control access to this destination.

**enable**

Allows the soft connection to be set up. Enable is the default for the initial soft connection configuration.

If the soft connection command is reentered for an existing connection, the default is the current enabled or disabled state.

**disable**

Prevents an initial soft connection from being set up, or tears down an existing connection.

**redo-explicit**

For existing soft connections only, it allows explicit paths to be respecified without tearing down connections.

Existing connections are unaffected unless a reroute takes place, and then they use the newer explicit path configuration.

**explicit-path**

The PNNI explicit path that is manually configured for routing a soft PVP, using the *atm pnni explicit-path* command.

**precedence**

The precedence number by which ATM PNNI explicit paths are assigned, from 1 to 3.

Up to three explicit paths can be assigned to a soft PVP.
### atm soft-vp

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name path-name</td>
<td>The name of the ATM PNNI explicit path for routing soft PVPs.</td>
</tr>
<tr>
<td>identifier path-id</td>
<td>The path ID for the explicit path being configured to route soft PVPs.</td>
</tr>
<tr>
<td>upto partial-entry-index</td>
<td>Allows a subset of a longer explicit path to be used, so that all included nodes after the specified entry index are disregarded. If the destination is reachable at any next-node or segment-target, the remaining included nodes in the explicit path are disregarded automatically. For more information, see the atm pnni explicit-path next-node and atm pnni explicit-path segment-target PNNI explicit path configuration commands.</td>
</tr>
<tr>
<td>only-explicit</td>
<td>If one or more explicit paths have been specified and if the explicit path fails, the soft connection remains down until it is retried at its next retry-interval. If this option is not specified, the system uses the standard on-demand routing instead of waiting for the next retry interval.</td>
</tr>
<tr>
<td>timer-group name</td>
<td>Configures a timer group with timer rules to the soft PVP.</td>
</tr>
</tbody>
</table>

#### Defaults

See “Syntax Description.”

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The hold-priority option was introduced.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added the traffic parameter modification function for established circuits.</td>
</tr>
<tr>
<td>12.1(23)EB</td>
<td>Modified: Added access-control feature parameters and timer-group parameters for the rules-based setup and teardown feature.</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

Obtain the destination port address before configuring a soft PVP by using the show atm interface or show atm addresses command on the destination switch.

The following list identifies reasons why the creation of a soft PVP is unsuccessful:

- There is a VPI collision at the source or destination switch.
- The source or destination interface is not up (or autoconfiguration is not complete).
- The specified destination address is not correct.

Up to three explicit paths can be assigned to a soft VP, using precedence numbers 1 through 3. The precedence 1 explicit path is considered the primary path and is tried first. If it fails, then the next precedence path is tried. Explicit paths can be specified either by name or by identifier.

Passive soft PVPs allow you to preconfigure soft PVP attributes that cannot be signaled to the destination end. This provides the ability to preallocate resources.
Always configure the passive end before configuring the active end. The soft PVP manager uses the passive half leg only if it is in “Not connected” state and if the preconfigured traffic parameters of the passive half leg match those of the incoming connection setup request.

Passive half legs cannot be configured on IMA interfaces.

**Note**

For VBR-nrt and VBR-rt service categories you must configure the MBS (even if the value is default) in the ATM connection traffic table row attached to the passive leg.

The **access-control** parameter allows you to restrict access to the passive destination side of the soft PVP based on a source interface NSAP address of the connection. To stipulate the source interface ATM NSAP address allowed access you can configure either a source ATM address directly or configure a filter set and then associate the filter set to the soft PVC. You configure a filter set using the **atm filter-set** command. The following section has examples of both configurations.

**Note**

Configuring a filter set gives you the added flexibility to allow multiple NSAP addresses to access the destination side of the soft PVC and limit the time of day when to allow access.

The explicit path options can be changed without tearing down an existing soft PVC. Use the **redo-explicit** form of the command to respecify all of the explicit path options.

After configuring a soft PVP, use the **show atm vp interface** command on the source node (specifying the source VPI) to verify that the soft PVP has succeeded and to see the explicit path taken.

**Note**

The show configuration displayed for soft connections with explicit paths is always shown as two separate lines, with the **redo-explicit** keyword on the second line, even if it was originally configured using a single command line.

When modifying an existing soft VP CTTR association by respecifying the **rx-cttr** and **tx-cttr** index values, there will be a data outage until the VC is re-established with the new traffic parameters.

When modifying the CTTR for a soft VP, if you only specify either the **rx-cttr** or **tx-cttr**, the existing value is used for the unspecified index. For example, if an existing soft VP has the **rx-cttr** and **tx-cttr** indexes configured as 100 and while reconfiguring the CTTR you only change the **tx-cttr** index to 101 (as in the following example), the **rx-cttr** index will remain 100:

```
Switch(config-if)# atm soft-vp 40 tx-cttr 101
```

The **timer-group** parameter allows you to configure a rules-based setup and teardown timer, using the **atm timer rule** and **atm timer group** commands, for the soft PVC. This means that the SPVC or SPVP can be established or deleted based on the time of the day, day of the week, or a specific date. These connections can also be programmed to become active for specified duration of time and then become inactive. The service can be extended beyond simple connection set up and deletion, based on the timer, to changing the connection parameters for the specified duration.
The following example shows how a user at the destination switch displays the address of the destination port.

```
Switch# show atm interface atm 3/0/1
```

```
Interface:  ATM3/0/1
Interface Status: DOWN
Auto-configuration: enabled
Auto-configuration status: waiting for response from peer
Port-type: External
Interface-type: UNI, Interface-side: User
Uni-type: Public, Uni-version: V3.0
Max-VPI-bits: 12, Max-VCI-bits: 14
Max-VP: 4095, Max-VC: 32768
Number of PVP: 0 Number of SVP: 0 Number of SoftVP: 0
Number of PVC: 3 Number of SVC: 0 Number of SoftVC: 0
Number of logical port (VP-tunnel): 0
Total number of connections: 3
Input cells: 0, Output cells: 0
5 minute input rate: 0 bits/sec, 0 cells/sec
5 minute output rate: 0 bits/sec, 0 cells/sec
ATM Address for Soft VC: 47.0091.8100.0000.0003.be59.ed00.4000.0c82.0010.00
```

At the source switch, create a soft PVP with the VP of 150, the destination port address of 47.0091.8100.0000.0003.be59.ed00.4000.0c82.0010.00, and the destination VPI of 160.

```
Switch(config-if)# atm soft-vp 150 dest-address 47.0091.8100.0000.0003.be59.ed00.4000.0c82.0010.00 160
```

The following example shows how to manually configure an explicit path for a soft PVP. In this example, if the explicit path fails, standard routing is used.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vp 3 dest-address 47.0091.8100.0000.1061.705b.d900.4000.0c81.9000.00 3 explicit-path 1 name chicago.path1
```

The following example shows how to configure a passive half leg for a soft PVP.

```
Switch(config)# interface atm 1/1/1
Switch(config-if)# atm soft-vp 100 passive
```

The following example shows how to restrict access to the passive destination side of the soft PVP using the `src-address` parameter to configure the ATM NSAP address of the source interface to the passive destination leg of the soft PVP.

```
Switch(config-if)# atm soft-vp 68 passive access-control src-address 47.0091.8100.0000.0001.4204.d801.4000.0c80.9000.00
```

The following example shows how to restrict access to the passive destination side of the soft PVP by configuring a simple filter set, named fset1, to permit only the configured ATM NSAP address of the source interface to connect to the passive side of the soft PVP connection. The `soft-vp` configuration command, on the passive destination leg of the soft PVP, then uses the `access-control` and `filter-set` parameters to associate the filter set.

```
Switch(config-if)# atm filter-set fset1 permit 47.0091.8100.0000.0003.bbe4.aa01.4000.0c80.0000.64
Switch(config)# interface atm 0/1/1
Switch(config-if)# atm soft-vp 68 passive access-control filter-set fset1
```
The following example shows how to restrict access to the passive side of the two-ended soft PVP by configuring a more complex filter-set, named fset5, to permit only two ATM NSAP addresses to access the passive side of the soft VP. The soft-vc configuration command, on the passive destination leg of the soft VP, then uses the access-control and filter-set parameters to associate the filter set.

```
Switch-C(config)# atm filter-set fset5 index 1 permit 47.0091.8100.0000.0010.073c...
Switch-C(config)# atm filter-set fset5 index 2 permit 47.0091.8100.0000.0001.4204.d801...
Switch-C(config-if)# atm soft-vc 60 passive access-control filter-set fset5
Switch-C(config-if)# end
```

The following example shows how to restrict access to the two-ended soft PVP by configuring a filter-set, named fset6, with a time-of-day filter configured on the passive half leg. The filter set permits an ATM NSAP address to access the passive side of the soft PVP but only for the hour between 10:00 and 11:00. The soft-vc configuration command, on the passive destination leg of the soft VP, then uses the access-control and filter-set parameters to associate the filter set.

```
Switch-C(config)# atm filter-set fset6 permit 47.0091.8100.0000.0010.073c...
Switch-C(config)# atm filter-set fset6 time-of-day 10:00 11:00
Switch-C(config-if)# atm soft-vc 60 passive access-control filter-set fset6
Switch-C(config-if)# end
```

The following example shows how to use the redo-explicit keyword to modify an existing explicit-path configuration to add a second alternate explicit path and to prevent standard routing from being used should both explicit paths fail. Note that the system prompts you to confirm the changes.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vp 3 redo-explicit explicit-path 1 name chicago.path1 explicit-path 2 name chicago.path2 only-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]: y
```

The following example shows how to remove all explicit paths from an existing soft PVP by using the redo-explicit keyword, with no other options specified. The path is not changed until a soft PVP reroute occurs.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# atm soft-vp 3 redo-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]: y
```

The following example shows how to modifying the CTTR indexes for an existing ATM Soft VP.

```
Switch(config-if)# atm soft-vp 40 rx-cttr 200 tx-cttr 200
```

The following example shows how to configure a rules-based soft PVP timer rule, create an ATM timer group, and add the timer group configuration to the soft PVP to set up or tear down the soft PVP based on the timer values configured.

```
Switch(config)# atm timer rule rule2 periodic friday 10:00 to friday 10:30
Switch(config)# atm timer group timerGrp1
Switch(config-timer-grp)# timer-rule rule2
Switch(config-timer-grp)# exit
Switch(config)# interface atm 0/1/1
Switch(config-if)# atm soft-vp 120 dest-address 47.0091.8100.0000.00e0.f75d.0401.4000.0c80.0020.00 110 timer-group timerGrp1
```

Related Commands
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm connection-traffic-table-row</code></td>
<td>Creates a CTT.</td>
</tr>
<tr>
<td><code>atm filter-set</code></td>
<td>Creates an ATM address filter set to control access to the passive destination side of the soft PVP.</td>
</tr>
<tr>
<td><code>atm pnni explicit-path</code></td>
<td>Enters PNNI explicit path configuration mode to create or modify PNNI explicit paths.</td>
</tr>
<tr>
<td><code>atm soft-vp</code></td>
<td>Configures a soft VC redundancy group.</td>
</tr>
<tr>
<td><code>show atm addresses</code></td>
<td>Displays the ATM NSAP addresses associated with the ATM interfaces.</td>
</tr>
<tr>
<td><code>show atm pnni explicit-paths</code></td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
<tr>
<td><code>show atm vp</code></td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
<tr>
<td><code>show atm timer group</code></td>
<td>Displays the rules-based soft PVC and soft PVP feature timer group configuration.</td>
</tr>
</tbody>
</table>
atm sustained-cell-rate-margin-factor

To change the SCRMF, use the `atm sustained-cell-rate-margin-factor` global configuration command. SCRMF dictates the weight given to PCR in computing the bandwidth used by VBR connections. To assign the default value to SCRMF, use the `no` form of this command.

```
  atm sustained-cell-rate-margin-factor percent

  no atm sustained-cell-rate-margin-factor
```

**Syntax Description**

- `percent` Percent value that dictates the weighting of PCR with respect to SCR in computing the bandwidth used in the CAC of VBR connections.

**Defaults**

1 percent

**Command Modes**

Global configuration

**Command History**

- **Release**
  - 11.1(4)

- **Modification**
  - New command

**Usage Guidelines**

The following equation is used in the CAC of VBR connections to define the bandwidth requested.

```
bandwidth = (SCRMF * (PCR-SCR))/100 + SCR
```

**Examples**

In the following example, the SCRMF of the switch is set to 35 percent.

```
Switch(config)# atm sustained-cell-rate-margin-factor 35
```

**Command**

- `show atm resource` Displays the ATM layer connection information about the virtual path.
# atm svc-frame-discard-on-aal5ie

To install frame discard and to select the criteria used on SVCs, use the `atm svc-frame-discard-on-aal5ie` global configuration command. To install frame discard on UNI 4 or PNNI interfaces, use the `no` form of this command (see “Usage Guidelines”).

```
  atm svc-frame-discard-on-aal5ie

  no atm svc-frame-discard-on-aal5ie
```

## Syntax Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm svc-frame-discard-on-aal5ie</code></td>
<td>Install packet discard based on the presence of the AAL5 IE in the SETUP message.</td>
</tr>
<tr>
<td><code>no atm svc-frame-discard-on-aal5ie</code></td>
<td>None</td>
</tr>
</tbody>
</table>

## Defaults

Install packet discard based on the presence of the AAL5 IE in the SETUP message.

## Command Modes

Global configuration

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

## Usage Guidelines

The common term “frame discard” is referred to as “packet discard” in the LightStream 1010 VC environment.

This command changes information used by the switch when determining whether to install frame discard on SVCs. UNI 4.0 signaling allows explicit signaling of frame discard. Prior to UNI 4.0, the presence of the AAL5 IE was used to determine whether or not to install frame discard. If the AAL5 IE is present, frame discard is installed.

Use the `atm svc-frame-discard-on-aal5ie` command to install frame discard if the AAL5 IE is present. Use the `no atm svc-frame-discard-on-aal5ie` command if frame discard is to be installed on UNI 4 or PNNI interfaces, and only if explicitly requested by the SETUP and CONNECT messages.

The installation of frame discard is controlled by the signaled messages. Even if the configuration specifies using AAL5 IE, if the UNI 4.0 signaling element controlling frame discard is present when the SETUP or CONNECT transits a UNI 4 or PNNI interface, and the AAL5 IE is not present, frame discard is controlled by the TM Options ID.

The signaling element is the Traffic Management Options ID in the ATM Traffic Descriptor Information Element in the SETUP or CONNECT message.

## Examples

In the following example, the switch behavior is set to not use the AAL5 IE to dictate frame discard.

```
Switch(config)# no atm svc-frame-discard-on-aal5ie
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>
**atm svc-clear by-priority**

To specify that the transit legs of guaranteed-bandwidth soft PVCs or SVCs on an IMA interface can be cleared based on signaled priority when bandwidth is lost on the IMA interface, enter the **atm svc-clear by-priority** interface configuration command:

```
 atm svc-clear by-priority
```

```
 no atm svc-clear by-priority
```

**Syntax Description**

None.

**Defaults**

Disabled. If bandwidth is reduced on an IMA interface and **atm svc-clear by-priority** is not enabled, bandwidth guaranteed to connections may not be available.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(10)E</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is only available on IMA interfaces.

The source and destination ends of Soft PVCs cannot be cleared on an interface; only a transit leg can be cleared.

When bandwidth is removed from an IMA interface and the bandwidth reduction results in the amount of guaranteed bandwidth for Soft PVCs and SVCs exceeding the available bandwidth, one of two things will happen to the Soft PVCs and SVCs on the interface: every Soft PVC on the interface will be affected by the bandwidth reduction and will experience a reduction in performance, or the interface will release the low priority Soft PVCs or SVCs so the high priority Soft PVCs or SVCs can continue to forward network traffic without interruption.

By default, all Soft PVCs and SVCs on the interface will experience reduced performance when interface bandwidth is reduced. The **atm svc-clear by-priority** command enables the interface to drop Soft PVCs and SVCs by priority so that high-priority Soft PVCs and SVCs can continue to forward network traffic without interruption.

A priority can be given to each Soft PVC and SVC through the use of the **hold-priority** option when configuring each individual Soft PVC or SVC. This process allows users to rate Soft PVCs and SVCs in order of importance and release the less-important Soft PVCs and SVCs if bandwidth is lost on an interface.

If no **hold-priority** is specified for a Soft PVC or SVC, the Soft PVC or SVC is assigned a priority of 15 (lowest).

The **atm svc-clear by-priority** command allows links to drop Soft PVCs and SVCs based on the **hold-priority** soft PVC and SVC configurations.
If the **atm svc-clear by-priority** command is not enabled, none of the **hold-priority** configurations are considered when bandwidth is dropped on an interface. If bandwidth is lost on an IMA interface and the **atm svc-clear by-priority** is not enabled, the soft PVCs or SVCs on the interface are affected in either of the following ways:

- Traffic is *not* flowing—All of the soft PVCs or SVCs on the interface will suffer from adverse performance but no Soft PVCs or SVCs are dropped.
- Traffic is flowing—Some of the Soft PVCs or SVCs come “up” at random (according to the available bandwidth) and some “go down”.

A signaled VC must have allocated bandwidth in order to be released by priority. Therefore, simple UBR VC cannot be released by priority. UBR+ VC, however, have allocated bandwidth and can therefore be released by priority.

### Examples

In the following example, the ability to clear soft PVCs by their priority configurations when bandwidth is lost on an IMA interface is enabled:

```
Switch(config)# interface atm 0/0/ima0
Switch(config-if)# atm svc-clear by-priority
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show atm vc</strong></td>
<td>Displays the ATM layer connection information about the virtual connection. The <strong>hold-priority</strong> of each interface on the connection is given in the <strong>show atm vc</strong> command output.</td>
</tr>
<tr>
<td><strong>show atm vp</strong></td>
<td>Displays the ATM layer connection information about the virtual path. The <strong>hold-priority</strong> of each interface in the virtual path is given in the <strong>show atm vp</strong> command output.</td>
</tr>
<tr>
<td><strong>atm soft-vc</strong></td>
<td>Creates a Soft PVC. The priority of a Soft PVC is configured using the <strong>hold-priority</strong> option in this command.</td>
</tr>
<tr>
<td><strong>atm soft-vp</strong></td>
<td>Creates a Soft PVP. The priority of a Soft PVP is configured using the <strong>hold-priority</strong> option in this command.</td>
</tr>
<tr>
<td><strong>ces pvc (Soft PVC)</strong></td>
<td>Configures the destination port for a circuit. The priority of a destination port is configured using the <strong>hold-priority</strong> option in this command.</td>
</tr>
<tr>
<td><strong>frame-relay soft-vc</strong></td>
<td>Creates a Frame Relay Soft PVC. The priority of the Frame Relay Soft PVC is configured using the <strong>hold-priority</strong> option in this command.</td>
</tr>
</tbody>
</table>
### atm svc-upc-intent

To change the intended UPC mode used on the cell flow received into the switch fabric for SVCs on an interface, use the `atm svc-upc-intent` interface configuration command. Any change in this parameter is applied to SVCs subsequently established on the interface. To assign the default value to the parameter, use the `no` form of this command.

```
atm svc-upc-intent [abr | cbr | vbr-rt | vbr-nrt | ubr] [pass | tag | drop]
```

```
no atm svc-upc-intent
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>abr</code></td>
<td>(Optional) Specifies the service category:</td>
</tr>
<tr>
<td><code>cbr</code></td>
<td>• ABR—available bit rate</td>
</tr>
<tr>
<td><code>vbr-rt</code></td>
<td>• CBR—constant bit rate</td>
</tr>
<tr>
<td><code>vbr-nrt</code></td>
<td>• VBR-RT—variable bit rate, real time</td>
</tr>
<tr>
<td><code>ubr</code></td>
<td>• VBR-NRT—variable bit rate, non-real time</td>
</tr>
<tr>
<td><code>pass</code></td>
<td>• UBR—unspecified bit rate</td>
</tr>
<tr>
<td><code>tag</code></td>
<td>Cells received on the interface are passed to the switching fabric with no change, regardless of their conformance to the traffic contract.</td>
</tr>
<tr>
<td><code>drop</code></td>
<td>Cells received on the interface violating the traffic contract have their CLP bit set prior to entering the switching fabric.</td>
</tr>
</tbody>
</table>

### Defaults

`pass`

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(12c)E</td>
<td>Added parameters <code>abr</code>, <code>cbr</code>, <code>vbr-rt</code>, <code>vbr-nrt</code>, and <code>ubr</code>.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This configuration parameter determines the usage parameter control (UPC) to use for SVCs and for the destination leg of soft VC and VP. If policing is desired, it should be applied once for traffic entering a network.

### Examples

In the following example, the intended UPC for SVCs on the interface is set to tagging.

```
Switch(config-if)# atm svc-upc-intent tag
```
In the following example, the UBR traffic on an interface is passed while all other traffic is policed:

```
Switch(config-if)# atm svc-upc-intent ubr pass
Switch(config-if)# atm svc-upc-intent cbr tag
Switch(config-if)# atm svc-upc-intent vbr-rt tag
Switch(config-if)# atm svc-upc-intent vbr-nrt tag
Switch(config-if)# atm svc-upc-intent abr drop
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
## atm svcc vci min

To specify the minimum VCI value for the ILMI signaling stack to support for allocation to SVCCs, use the `atm svcc vci min` interface configuration command.

```
atm svcc vci min value
```

### Syntax Description

| value     | Minimum VCI value, in the range of 32 to 16383. |

### Defaults

35

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command specifies the minimum VCI value used in range negotiation by the ILMI signaling stack for SVCCs. This feature is supported in autoconfiguration and nonautoconfiguration mode.

### Examples

The following example illustrates how to set the minimum SVCC VCI value on ATM interface 0/0/1 to 100.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm svcc vci min 100
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm svcc vpi max</td>
<td>Specifies the maximum VPI value for the ILMI signaling stack to support for allocation to SVCCs.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
**atm svcc vpi max**

To specify the maximum VPI value for the ILMI signaling stack to support for allocation to SVCCs, use the `atm svcc vpi max` interface configuration command.

`atm svcc vpi max value`

**Syntax Description**

- **value**: Maximum VPI value. Allowed values have the following ranges, by interface type:
  - For 25-MB port adapters: From 0 to 3
  - For logical and CPU interfaces: 0 only
  - For other interfaces: From 0 through 255

**Defaults**

- For CPU interfaces: 0
- For other interfaces: 255

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command specifies the maximum VPI value used in range negotiation by the ILMI signaling stack for SVCCs. This feature is supported in autoconfiguration and nonautoconfiguration mode.

**Note**

On a bidirectional VCC, the VPI/VCI values used for both directions of the connection are the same at each interface. The same VCI is used for both directions of a connection at an interface.

**Examples**

The following example illustrates how to set the maximum SVCC VPI value on ATM interface 0/0/1 to 3.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm svcc vpi max 3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm svcc vci min</code></td>
<td>Specifies the minimum VCI value for the ILMI signaling stack to support for allocation to SVCCs.</td>
</tr>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
**atm svpc vpi max**

To specify the maximum VPI value for the ILMI signaling stack to support for allocation to SVPCs, use the `atm svpc vpi max` interface configuration command.

```
atm svpc vpi max value
```

**Syntax Description**

- **value**: Maximum VPI value. Allowed values have the following ranges, by interface type:
  - For 25-MB port adapters: From 0 to 3
  - For logical and CPU interfaces: 0 only
  - For other interfaces: From 0 through 255

**Defaults**

- For CPU interfaces: 0
- For other interfaces: 255

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command specifies the maximum VPI value used in range negotiation by the ILMI signaling stack for SVPCs. This feature is supported in autoconfiguration and non-autoconfiguration mode.

**Note**

On a bidirectional VCC, the VPI/VCI values used for both directions of the connection are the same at each interface. The same VCI is used for both directions of a connection at an interface.

**Examples**

The following example shows how to set the maximum SVPC VPI value to 3 on ATM interface 0/0/1.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm svpc vpi max 3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm svcc vci min</td>
<td>Specifies the minimum VCI value for the ILMI signaling stack to support for allocation to SVCCs.</td>
</tr>
<tr>
<td>atm svcc vpi max</td>
<td>Specifies the maximum VPI value for the ILMI signaling stack to support for allocation to SVCCs.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
atm template-alias

To configure an ATM address template alias, use the `atm template-alias` global configuration command. To delete the specified alias, use the `no` form of this command.

```
atm template-alias name template
no atm template-alias
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>name</strong></td>
<td>Name for the template alias.</td>
</tr>
</tbody>
</table>
| **template**       | ATM address template, which can be a single ATM address that matches itself or contains wildcards and/or prefixes or suffixes, allowing a single template to match many addresses. The symbols used for wildcards, prefixes, and suffixes are as follows:

- Asterisk (*) to match any single 4-bit nibble in the address.
- Ellipsis (...) to match any number of leading or trailing 8-bit hexadecimal digits in the address.
- Asterisk (*) to match any single binary digit in a 4-bit nibble in the address, where the 4 binary bits are enclosed within parentheses. |

### Defaults

No alias list is defined.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Address templates are pattern forms that match one or more ATM addresses. They can be simple, single ATM addresses matching themselves or containing wildcards, prefixes, and suffixes, allowing a single template to match many addresses.

### Examples

The simplest address template matches a single address, as shown in this example.

```
Switch(config)# 47.0005.1234.5678.9abc.def0.00
```

Wildcard digits, which can match any value, are indicated with asterisks (*). The following template matches the above address and any other 12-byte address that starts with 47.0005.1234.5678.

```
Switch(config)# 47.0005.1234.5678.****.****.**
```

The following template matches any address of any length and begins with the prefix 47.0005.1234.5678.
In other cases, matching a suffix of the address is also important, such as when matching system IDs. The following template matches any address ending with the suffix 0000.0c01.2345.00.

Switch(config)# ...0000.0c01.2345.00

You might want to match addresses on a single-bit granularity, rather than half-byte (4-bit or nibble) granularity.

This pattern matching is supported by allowing the hex digits that represent four bits to be replaced by groups of four binary bits, represented by the numbers 0 and 1. These four binary digits are enclosed within parentheses. The following template matches any address that starts with 47.0005 followed by the binary bits 10. The final two binary bits in the nibble can be either 0 or 1 and are represented with asterisks.

Switch(config)# 47.0005.(10**)... 

Use this command to define aliases for commonly referenced address templates. The use of these aliases reduces the chances for typographical error in the creation of ATM filter sets.

The following example shows setting ATM template aliases

Switch(config)# atm template-alias atm_addr1 47.1328...
Switch(config)# atm template-alias atm_addr2 47.0012.(10**)...
Switch(config)# atm template-alias atm_addr3 ...1234.(01*1)

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show running-config</strong></td>
<td>Shows configuration information currently running on the console.</td>
<td></td>
</tr>
</tbody>
</table>
**atm threshold-group discard-threshold**

To specify the threshold at which the per-connection queue is considered full for CLP discards and EPD, use the `atm threshold-group discard-threshold` global configuration command. To reset the discard threshold percentage for a particular threshold group to the default value, use the `no` form of this command.

**Catalyst 8540 MSR**

```
  atm threshold-group [module-id id-num] tg-num discard-threshold percent

  no atm threshold-group tg-num discard-threshold
```

**Catalyst 8510 MSR and LightStream 1010**

```
  atm threshold-group tg-num discard-threshold percent

  no atm threshold-group tg-num discard-threshold
```

### Syntax Description

<table>
<thead>
<tr>
<th>id-num</th>
<th>Module identification number. <em>(Catalyst 8540 MSR)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>tg-num</td>
<td>Threshold group number, in the range of 1 to 6.</td>
</tr>
<tr>
<td>percent</td>
<td>The percentage of queue-full in the threshold. To disable the threshold, use 100. The range is 0 to 100.</td>
</tr>
</tbody>
</table>

### Defaults

87 percent

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

As the threshold group becomes congested (the cumulative number of cells on the queues of VCs in the threshold group approaches the configured max-cells value), the maximum number of cells per queue shrinks from the threshold group max-queue-limit to the min-queue-limit. As the queue size changes, the discard threshold changes, and the installed threshold is made as close as possible to the percent of queue-full specified.

**Note**

This command is not available on systems equipped with the FC-PCQ. *(Catalyst 8510 MSR and LightStream 1010)*

### Examples

The following example shows how to configure threshold group 3 to a discard-threshold of 50 percent.
Switch(config)# atm threshold-group 3 discard-threshold 50

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm threshold-group max-cells</td>
<td>Specifies the maximum number of cells queued for all connections that are members of a specified threshold group.</td>
</tr>
<tr>
<td>atm threshold-group max-queue-limit</td>
<td>Sets the largest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td>atm threshold-group min-queue-limit</td>
<td>Sets the smallest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td>show atm resource</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm threshold-group marking-threshold

To specify the threshold at which the per-connection queue is considered full for EFCI marking and ABR relative-rate marking, use the atm threshold-group marking-threshold global configuration command. To reset the marking threshold percentage for a particular threshold group to the default value, use the no form of this command.

Catalyst 8540 MSR

```
atm threshold-group [module-id id-num] tg-num marking-threshold pct
```

```
no atm threshold-group tg-num marking-threshold
```

Catalyst 8510 MSR and LightStream 1010

```
atm threshold-group tg-num marking-threshold pct
```

```
no atm threshold-group tg-num marking-threshold
```

### Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id-num</td>
<td>Module identification number. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>tg-num</td>
<td>Threshold group number, in the range of 1 through 6.</td>
</tr>
<tr>
<td>pct</td>
<td>The percentage of queue-full in the threshold. To disable the threshold, use 100. The range is 0 to 100.</td>
</tr>
</tbody>
</table>

### Defaults

25 percent

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

As the threshold group becomes congested (the cumulative number of cells on the queues of VCs in the threshold group approaches the configured max-cells value), the maximum number of cells per queue shrinks from the threshold group max-queue-limit to the min-queue-limit. As the queue size changes, the marking threshold changes, and the installed threshold is made as close as possible to the percent of queue-full specified.

#### Note

This command is not available on systems equipped with the FC-PCQ. (Catalyst 8510 MSR and LightStream 1010)

### Examples

The following example shows how to configure threshold group 3 to a marking-threshold of 50 percent.

```
atm threshold-group marking-threshold 50
```
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm threshold-group max-cells</code></td>
<td>Specifies the maximum number of cells queued for all connections that are members of a specified threshold group.</td>
</tr>
<tr>
<td><code>atm threshold-group max-queue-limit</code></td>
<td>Sets the largest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td><code>atm threshold-group min-queue-limit</code></td>
<td>Sets the smallest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td><code>show atm resource</code></td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm threshold-group max-cells

To specify the maximum number of cells queued for all connections that are members of a specified threshold group, use the `atm threshold-group max-cells` global configuration command. To reset the maximum cell count for a particular threshold group to the default value, use the `no` form of this command.

**Catalyst 8540 MSR**

```
atm threshold-group [module-id id-num] tg-num max-cells cell-num
```

```
no atm threshold-group tg-num max-cells
```

**Catalyst 8510 MSR and LightStream 1010**

```
atm threshold-group tg-num max-cells cell-num
```

```
no atm threshold-group tg-num max-cells
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>id-num</code></td>
<td>Module identification number. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><code>tg-num</code></td>
<td>Threshold group number, in the range of 1 to 6.</td>
</tr>
<tr>
<td><code>cell-num</code></td>
<td>Cell number, in the range of 0 to 65535.</td>
</tr>
</tbody>
</table>

**Defaults**

65535

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

As the threshold group becomes congested (the cumulative number of cells on the queues of VCs in the threshold group approaches the configured max-cells value), the maximum number of cells per queue shrinks from the threshold group max-queue-limit to the min-queue-limit.

The hardware does not provide all possible max-cell values in the range. Rather, the value used is the closest number of cells greater than that specified. The possible values are \{(64*i)-1, 1<=i<=1024\}. The installed value can be displayed using the `show atm resource` command.

**Note**

This command is not available on systems equipped with the FC-PCQ. (Catalyst 8510 MSR and LightStream 1010)

**Examples**

The following example shows how to set threshold-group 3 to a maximum cell count of 32000.

```
Switch(config)# atm threshold-group 3 max-cells 32000
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm threshold-group</code></td>
<td>Specifies the threshold at which the per-connection queue is considered</td>
</tr>
<tr>
<td><code>discard-threshold</code></td>
<td>full for CLP discards and EPD.</td>
</tr>
<tr>
<td><code>atm threshold-group</code></td>
<td>Specifies the threshold at which the per-connection queue is considered</td>
</tr>
<tr>
<td><code>marking-threshold</code></td>
<td>full for EFCI marking and ABR relative-rate marking.</td>
</tr>
<tr>
<td><code>atm threshold-group</code></td>
<td>Sets the largest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td><code>max-queue-limit</code></td>
<td></td>
</tr>
<tr>
<td><code>atm threshold-group</code></td>
<td>Sets the smallest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td><code>min-queue-limit</code></td>
<td></td>
</tr>
<tr>
<td><code>show atm rmon</code></td>
<td>Shows the status of the ATM RMON MIB.</td>
</tr>
</tbody>
</table>
atm threshold-group max-queue-limit

To set the largest per-VC queue limit for a specified threshold group, use the `atm threshold-group max-queue-limit` global configuration command. To reset the maximum queue limit for a particular threshold group to the default value, use the `no` form of this command.

Catalyst 8540 MSR

```
atm threshold-group \[module-id id-num\] tg-num max-queue-limit cells
```

```
no atm threshold-group tg-num max-queue-limit
```

Catalyst 8510 MSR and LightStream 1010

```
atm threshold-group tg-num max-queue-limit cells
```

```
no atm threshold-group tg-num max-queue-limit
```

**Syntax Description**

- `id-num` Module identification number. (Catalyst 8540 MSR)
- `tg-num` Threshold group number, in the range of 1 to 6.
- `cells` Number of cells. This value is limited to the lesser of 16383 or the value specified with the `atm threshold-group max-cells` command.

**Defaults**

Depends on the threshold group.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

As the threshold group becomes congested (the cumulative number of cells on the queues of the VCs in the threshold group approaches the configured max-cells value), the maximum number of cells per queue shrinks from the threshold group max-queue-limit to the min-queue-limit.

The hardware does not provide all possible max-queue-limit values in the range. Rather, the value used is the closest number of cells greater than that specified. The possible values are `\{(16 * i) -1, 2 <= i <= 1024\}`. The installed value can be displayed using the `show atm resource` command.

**Note**

This command is not available on systems equipped with the FC-PCQ. (Catalyst 8510 MSR and LightStream 1010)

**Examples**

The following example shows how to set threshold-group 3 to a maximum queue limit of 16383.
Switch(config)# atm threshold-group 3 max-queue-limit 16383

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm threshold-group</td>
<td>Specifies the threshold at which the per-connection queue is considered full for CLP discards and EPD.</td>
</tr>
<tr>
<td>discard-threshold</td>
<td></td>
</tr>
<tr>
<td>atm threshold-group</td>
<td>Specifies the threshold at which the per-connection queue is considered full for EFCI marking and ABR relative-rate marking.</td>
</tr>
<tr>
<td>marking-threshold</td>
<td></td>
</tr>
<tr>
<td>atm threshold-group</td>
<td>Specifies the maximum number of cells queued for all connections that are members of a specified threshold group.</td>
</tr>
<tr>
<td>max-cells</td>
<td></td>
</tr>
<tr>
<td>atm threshold-group</td>
<td>Sets the smallest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td>min-queue-limit</td>
<td></td>
</tr>
<tr>
<td>show atm resource</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
**atm threshold-group min-queue-limit**

To set the smallest per-VC queue limit for a specified threshold group, use the `atm threshold-group min-queue-limit` global configuration command. To reset the minimum queue limit for a particular threshold group to the default value, use the `no` form of this command.

**Catalyst 8540 MSR**

```
  atm threshold-group [module-id id-num] tg-num min-queue-limit cells

  no atm threshold-group tg-num min-queue-limit
```

**Catalyst 8510 MSR and LightStream 1010**

```
  atm threshold-group tg-num min-queue-limit cells

  no atm threshold-group tg-num min-queue-limit
```

**Syntax Description**

```
  id-num  Module identification number. (Catalyst 8540 MSR)
  tg-num  Threshold group number, in the range of 1 to 6.
  cells   Number of cells. This value is limited to the lesser of 16383 or the value specified by the `atm threshold-group max-queue-limit` command.
```

**Defaults**

Depends on the threshold group.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

As the threshold group becomes congested (the cumulative number of cells on the queues of VCs in the threshold group approaches the configured max-cells value), the maximum number of cells per-queue shrinks from the threshold group max-queue-limit to the min-queue-limit.

**Note**

This command is not available on systems equipped with the FC-PCQ. (Catalyst 8510 MSR and LightStream 1010)

**Examples**

The following example shows how to set threshold-group 3 to a minimum queue limit of 31.

```
  Switch(config)# atm threshold-group 3 min-queue-limit 31
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm threshold-group discard-threshold</code></td>
<td>Specifies the threshold at which the per-connection queue is considered full for CLP discards and EPD.</td>
</tr>
<tr>
<td><code>atm threshold-group marking-threshold</code></td>
<td>Specifies the threshold at which the per-connection queue is considered full for EFCL marking and ABR relative-rate marking.</td>
</tr>
<tr>
<td><code>atm threshold-group max-queue-limit</code></td>
<td>Sets the largest per-VC queue limit for a specified threshold group.</td>
</tr>
<tr>
<td><code>atm threshold-group max-cells</code></td>
<td>Specifies the maximum number of cells queued for all connections that are members of a specified threshold group.</td>
</tr>
<tr>
<td><code>show atm resource</code></td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm threshold-group name

To specify the name associated with a threshold group number, use the atm threshold-group name global configuration command. To reset the name of a particular threshold group to the default value, use the no form of this command.

**Catalyst 8540 MSR**

```
atm threshold-group [module-id id-num] tg-num name tg-name
no atm threshold-group tg-num name
```

**Catalyst 8510 MSR and LightStream 1010**

```
atm threshold-group tg-num name tg-name
no atm threshold-group tg-num name
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id-num</td>
<td>Module identification number. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>tg-num</td>
<td>Threshold group number, in the range of 1 to 5.</td>
</tr>
<tr>
<td>tg-name</td>
<td>Threshold group name, in the range of 1 to 15 characters.</td>
</tr>
</tbody>
</table>

**Defaults**

1 – cbr-default
2 – vbrrt-default
3 – vbrnrt-default
4 – abr-default
5 – ubr-default

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You cannot rename the well-known VC threshold group.

**Note**

This command is not available on systems equipped with the FC-PCQ.

**Examples**

The following example shows how to change the name of threshold group 3 to bigq.

```
Switch(config)# atm threshold-group 3 name bigq
```
### Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm resource</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm threshold-group service

To assign a service category to a threshold group, use the `atm threshold-group service` global configuration command. To reset the association of a particular service category to a threshold group, use the `no` form of this command.

```
atm threshold-group service {cbr | vbr-rt | vbr-nrt | abr | ubr} tg-num
```

```
no atm threshold-group service {cbr | vbr-rt | vbr-nrt | abr | ubr}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cbr</td>
<td>The constant bit rate parameter.</td>
</tr>
<tr>
<td>vbr-rt</td>
<td>The variable bit rate real-time parameter.</td>
</tr>
<tr>
<td>vbr-nrt</td>
<td>The variable bit rate when the parameter is not real-time.</td>
</tr>
<tr>
<td>abr</td>
<td>The available bit rate parameter.</td>
</tr>
<tr>
<td>ubr</td>
<td>The unspecified bit rate parameter.</td>
</tr>
<tr>
<td>tg-num</td>
<td>Threshold group number, in the range of 1 to 5.</td>
</tr>
</tbody>
</table>

### Defaults

- `atm threshold-group service cbr 1`
- `atm threshold-group service vbr-rt 2`
- `atm threshold-group service vbr-nrt 3`
- `atm threshold-group service abr 4`
- `atm threshold-group service ubr 5`

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command is not available on systems equipped with the FC-PCQ. (Catalyst 8510 MSR and LightStream 1010)

### Examples

The following example shows how to set the threshold group to use subsequently in connection setup for CBR connections to group 3.

```
Switch(config)# atm threshold-group service cbr 3
```

### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm resource</td>
<td>Displays the ATM layer connection information about the virtual path.</td>
</tr>
</tbody>
</table>
atm timer group

To create an ATM timer group as part of a rules-based soft PVC and soft PVP, use the **atm timer group** configuration command to create and specify the name of an ATM timer group and change to ATM timer group configuration mode.

To return **atm timer group** configuration to the default, use the **no** form of this command.

**Syntax Description**

- **Syntax:**
  
  ```
  atm timer group name
  no atm timer group name
  ```

- **name** Specifies the timer group name string.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **atm timer group** command creates an ATM timer group and, used with the **timer-rule** command, is used to associate a timer rule with a soft PVC or soft PVP. The timer rule must have been previously configured using the **atm timer rule** command. The timer rule specifies the setup or release time for a soft PVC or soft PVP based on the timer values configured.

**Examples**

The following example shows how to configure an ATM timer group named timerGrp1 and changes to ATM timer group configuration mode.

```plaintext
Switch# configure terminal
Switch(config)# atm timer group timerGrp1
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm timer rule</td>
<td>Specifies the setup or release time for a soft PVC or soft PVP based on the timer values configured.</td>
</tr>
<tr>
<td>timer-rule</td>
<td>Adds a previously configured timer rule to the ATM timer group.</td>
</tr>
<tr>
<td>show atm timer rule</td>
<td>Displays the timer rule configuration.</td>
</tr>
<tr>
<td>show atm timer group</td>
<td>Displays the timer group configuration.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the configuration of the soft PVC connection.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
**atm timer rule**

To configure the rules-based soft PVC and soft PVP feature, use the `atm timer rule` configuration command to specify the setup or release time for a soft PVC based on the timer values configured. To remove the configured `atm timer rule`, use the `no` form of the command.

```
atm timer rule rule-name {
  absolute start hh:mm | date-month-year [duration hh:mm | end hh:mm | date-month-year] [rx-cttr index] [tx-cttr index]
  periodic [day-of-the-week] daily [weekdays] weekend [hh:mm [duration hh:mm | to hh:mm] [rx-cttr index] [tx-cttr index]
}
```

```
no atm timer rule name
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>name</code></td>
<td>Specifies the name string of the timer rule.</td>
</tr>
<tr>
<td><code>absolute</code></td>
<td>Specifies that the timer rule type is absolute and intended for trigger on specific date.</td>
</tr>
<tr>
<td><code>start</code></td>
<td>Specifies the absolute start time and date that the associated SPVC setup is triggered.</td>
</tr>
<tr>
<td><code>duration</code></td>
<td>Specifies the time interval the connection is expected to be active specified in hours and minutes.</td>
</tr>
<tr>
<td><code>end</code></td>
<td>Specifies the absolute end time and date that the associated SPVC setup is released.</td>
</tr>
<tr>
<td><code>periodic</code></td>
<td>Specifies that the timer rule type is periodic and intended for periodic triggering.</td>
</tr>
<tr>
<td><code>to</code></td>
<td>Indicates the teardown time and date for a periodic timer rule.</td>
</tr>
<tr>
<td><code>hh:mm</code></td>
<td>Specifies the hours and minutes a connection is active or the start or end time for the connection, in 24-hour format.</td>
</tr>
<tr>
<td><code>date-month-year</code></td>
<td>Specifies the date, month, and year of the absolute start or end time the associated connection setup or teardown is triggered. For example, the extra leap year day is specified as 29 February 2004.</td>
</tr>
<tr>
<td><code>day-of-the-week</code></td>
<td>Specify the day of the week (Sunday, Monday, Tuesday, Wednesday, Thursday Friday, or Saturday) the periodic event should occur.</td>
</tr>
<tr>
<td><code>daily</code></td>
<td>Specifies the periodic event should occur every day of the week, Sunday through Saturday.</td>
</tr>
<tr>
<td><code>weekday</code></td>
<td>Specifies the periodic event should occur every day of the week, Monday through Friday.</td>
</tr>
<tr>
<td><code>weekend</code></td>
<td>Specifies the periodic event should occur every week on both Saturday and Sunday.</td>
</tr>
<tr>
<td><code>rx-cttr index</code></td>
<td>(Optional) Specifies the connection traffic table row index in the received direction. The default is 1.</td>
</tr>
<tr>
<td><code>tx-cttr index</code></td>
<td>(Optional) Specifies the connection traffic table row index in the transmitted direction. The default is 1.</td>
</tr>
</tbody>
</table>

| Defaults | Disabled |

| Command Modes | Global configuration |
Chapter 2 ATM Commands

atm timer rule

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

The `atm timer group` command creates an ATM timer group and, used with the `timer-rule` command, is used to associate a timer rule with a soft PVC or soft PVP. The timer rule must have been previously configured using the `atm timer rule` command. The timer rule specifies the setup or release time for a soft PVC or soft PVP based on the timer values configured.

Examples

The following example shows how to configure an absolute ATM timer rule, named rule1, that initiates a connection that exists starting from 10:00 AM, 01 January, 2004 and lasts for one entire day.

Switch# configure terminal
Switch(config)# atm timer rule rule1 absolute start 10:00 01 January 2004 end 10:00 02 January 2004

The following example shows how to configure an absolute ATM timer rule, named rule2, that initiates a connection starting from 10:00 AM, 01 January, 2004 that exists for 30 minutes.

Switch(config)# atm timer rule rule2 absolute start 10:00 01 January 2004 duration 00:30

The following example shows how to delete the ATM timing rule named rule1.

Switch(config)# no atm timer rule rule1

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm timer group</td>
<td>Creates an ATM timer group and changes to ATM timer group configuration mode.</td>
</tr>
<tr>
<td>timer-rule</td>
<td>Adds a previously configured timer rule to the ATM timer group.</td>
</tr>
<tr>
<td>show atm timer rule</td>
<td>Displays the timer rule configuration.</td>
</tr>
<tr>
<td>show atm timer group</td>
<td>Displays the timer group configuration.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the configuration of the soft PVC connection.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
To enable traffic shaping on the Catalyst 8510 MSR platform, use the `atm traffic shaping enable` command. To disable atm traffic shaping, use the `no` form of this command.

```
atm traffic shaping enable {[vbr[pcr-only]][best-effort]}
no atm traffic shaping enable {[vbr[pcr-only]][best-effort]}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>vbr</code></td>
<td>Enables traffic shaping for VBR VCs and VPs.</td>
</tr>
<tr>
<td><code>pcr-only</code></td>
<td>Enables PCR-only shaping for VBR VCs and VPs. When this <code>pcr-only</code> option is specified, VBR VCs and VPs will be shaped to comply to their PCR alone instead of shaping them to their PCR, SCR, and MBS.</td>
</tr>
<tr>
<td><code>best-effort</code></td>
<td>Enables traffic shaping for VCs and VPs belonging to Best Effort Service Categories like UBR and ABR.</td>
</tr>
</tbody>
</table>

### Defaults

Disabled

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The Traffic Shaping functionality can be enabled only on subcard 0 of a slot that is equipped with the Traffic Shaping CAM (TSCAM) hardware. The shaping capabilities that can be enabled on subcard 0 differ based on the type of Port Adapter Module (PAM) present in subcard 0.

For PAMs with maximum port-speeds of OC3 or less: Across all the ports within subcard 0, only a maximum of three traffic classes can be enabled for shaping. For example, if only variable bit rate (VBR) traffic classes have to be shaped, then traffic shaping for VBR can be enabled on a maximum of 3 ports on subcard 0. If both the VBR and best effort traffic classes have to be shaped, only one port of subcard 0 can be configured for traffic shaping.

For DS3, T1, E1, and DSL PAMs: Four traffic classes can be shaped.

For OC12 PAMs: One traffic class can be shaped.

### Note

Traffic shaping configuration on the main physical interface does not apply to Regular VP Tunnels defined on that interface except in the case of UBR VP Tunnels. For example, when best effort traffic shaping is enabled on a physical interface, all the UBR VP Tunnels defined on that interface will be shaped to their PCR. But individual VCs within those VP Tunnels will not be shaped.

Another example is the case where VBR traffic shaping is enabled on a physical interface. In this case, any
Regular VBR VP Tunnel defined on that interface will not be shaped. But VCs within those VBR VP Tunnels will be shaped based on whether their service category had been configured to be shaped on their parent physical interface or not.

**Note**

Changes to the traffic shaping configuration take effect either upon saving the configurations to NVRAM and reloading the switch or upon performing an OIR of the port adapter in subcard 0 of the ATM traffic shaping carrier module.

**Examples**

The following example shows how to enable VBR traffic shaping:

```
Switch# configure terminal
Switch(config)# interface atm 4/0/0
Switch(config-if)# atm traffic shaping enable vbr
Switch(config-if)# end
Switch# copy system:running-config nvram:startup-config
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm traffic shaping thresholds</td>
<td>Sets the class thresholds for ATM traffic shaping.</td>
</tr>
<tr>
<td>show atm traffic shaping</td>
<td>Shows the switch router's traffic shaping configuration.</td>
</tr>
</tbody>
</table>
atm traffic shaping thresholds

To set the class thresholds for ATM traffic shaping, use the `atm traffic shaping thresholds` command. To disable the class thresholds for ATM traffic shaping, use the `no` form of this command.

```
atm traffic shaping thresholds {class { vbr | best-effort} maximum cls-max-pct vc { vbr | best-effort} maximum max-buffers}
```

```
no atm traffic shaping thresholds {class { vbr | best-effort} maximum cls-max-pct vc { vbr | best-effort} maximum max-buffers}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>class</td>
<td>The maximum threshold for the class. The class could be VBR or best effort.</td>
</tr>
<tr>
<td>vbr</td>
<td>VBR traffic class.</td>
</tr>
<tr>
<td>best-effort</td>
<td>Best-effort traffic such as ABR or UBR.</td>
</tr>
<tr>
<td>maximum</td>
<td>The maximum threshold.</td>
</tr>
<tr>
<td>cls-max-pct</td>
<td>The Class Maximum Threshold expressed as a percent of the port MaxThreshold value.</td>
</tr>
<tr>
<td>vc</td>
<td>The threshold for the per-VC queues, configured on a per-class basis.</td>
</tr>
<tr>
<td>max-buffers</td>
<td>Per-VC Queue Maximum thresholds are configured in terms of number of cell buffers. The range of values allowed is from 1 to 8191.</td>
</tr>
</tbody>
</table>

**Defaults**

None.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The cell buffers available for an interface enabled for shaping is denoted by portMaxThreshold for that interface and this value will be available as part of the output of the command `show atm interface resource atm x/y/z`. Approximately 1% to 5% of these cell buffers will be reserved for Traffic Classes that cannot be enabled for shaping by the CATS hardware. The Class Maximum Threshold percentages are configured as a percentage of portMaxThreshold buffers available for an interface. Prior to changing the Maximum Threshold configuration of a class, the corresponding interface should be administratively shutdown. The Per-VC Maximum Thresholds are directly specified in terms of cell buffers. Unlike the Class Maximum Threshold configuration, there are no prerequisites for changing the Per-VC Maximum Threshold configurations. Any changes to the Per-VC Threshold configuration will take effect immediately only for any new VCs installed in the TSCAM hardware but not for already installed VCs in the TSCAM hardware.
atm traffic shaping thresholds

**Note**
Any changes to the Per-VC Maximum Threshold take effect immediately for new VCs only. Already existing VCs will not take the new configuration.

**Note**
Prior to changing the Class Maximum Threshold configuration, enter the `shutdown` command on the corresponding interface. You do not have to shutdown the interface when configuring Per-VC Maximum Thresholds.

**Examples**
The following example shows how to configure traffic shaping thresholds for a specified class:

```
Switch(config-if)# shutdown
Switch(config-if)# end
Switch# show atm vc
Switch# configure terminal
Switch(config-if)# interface atm 4/0/0
Switch(config-if)# atm traffic shaping thresholds class vbr maximum 80 vc vbr maximum 3000
Switch(config-if)# no shutdown
Switch(config-if)#
```

The following example shows how to configure traffic shaping thresholds for a per-VC queue:

```
Switch(config-if)# atm traffic shaping thresholds vc vbr maximum 3000
Switch(config-if)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm traffic shaping enable</td>
<td>Enables ATM traffic shaping.</td>
</tr>
<tr>
<td>show atm traffic shaping</td>
<td>Shows the switch router’s traffic shaping configuration.</td>
</tr>
</tbody>
</table>
To configure an ATM UNI on the specified physical or logical port, use the `atm uni` interface configuration command.

```
atm uni [side side] [version ver] [type type]
```

**Syntax Description**
- `side` Specified as `user` | `network`. The default is `network`.
- `ver` Specified as `3.0`, `3.1`, or `4.0`.
- `type` Specified as `private` | `public`. The default is `private`.

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Before using this command, ILMI autoconfiguration must be disabled (see the `atm auto-configuration` command). When autoconfiguration is disabled, the interface continues to run without disruption. The same interface parameters are used in subsequent interface restarts. When autoconfiguration is enabled, ATM signaling and ILMI are restarted automatically on the interface. When ATM signaling is restarted, all switched virtual connections across the interface are cleared; permanent virtual connections are not affected.

The `atm auto-configuration`, `atm iisp`, and `atm nni` commands are mutually exclusive. Configuring the `atm uni` command overwrites any previous configuration of the `atm iisp` or `atm nni` commands for this interface. Future configuration of the `atm auto-configuration`, `atm iisp`, or `atm uni` command on this interface overwrites the `atm uni` command.

**Examples**

The following example configures ATM interface 3/1/1 as the network side of a private UNI running version 3.1, with the maximum number of active VCI bits set to 10.

```
Switch# interface atm 3/1/1
Switch(config-if)# no atm auto-configuration
Switch(config-if)#
%ATM-6ILMI6AUTOLOG: Auto-configuration is disabled, current interface
parameters will be used at next interface restart.
Switch(config-if)# atm uni version 3.1
Switch(config-if)# atm maxvci-bits 10
```

The following example configures ATM interface 1/1/3 as the user side of a public UNI.

```
Switch# interface atm 1/1/3
Switch(config-if)# no atm auto-configuration
Switch(config-if)#
```
%ATM-6-ILMINOAUTOCFG: ILMI(ATM1/1/3): Auto-configuration is disabled, current interface parameters will be used at next interface restart.
Switch(config-if)# atm uni side user type public
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM1/1/3.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm auto-configuration</td>
<td>Enables or disables ILMI autoconfiguration.</td>
</tr>
<tr>
<td>atm iisp</td>
<td>Configures ATM IISP on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>atm nni</td>
<td>Configures an ATM NNI on the specified physical or logical (VP tunnel) port.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information on an ATM interface.</td>
</tr>
</tbody>
</table>
atm-vc

To define an ATM map statement for a PVC, use the atm-vc map-list configuration command in conjunction with the map-list global configuration command. To remove the address, use the no form of this command.

```
protocol protocol-address atm-vc vci [class class-name] [broadcast] [aal5mux]
```

```
no protocol protocol-address atm-vc vci [class class-name] [broadcast] [aal5mux]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>The keyword ip.</td>
</tr>
<tr>
<td>protocol-address</td>
<td>The destination address being mapped to this PVC.</td>
</tr>
<tr>
<td>vci</td>
<td>Is 31 &lt; vci &lt; 2**14 - 1 (default max-VCI bits is 14).</td>
</tr>
<tr>
<td>class-name</td>
<td>The name of a table that contains encapsulation-specific parameters. Such a table can be shared between maps that have the same encapsulation.</td>
</tr>
<tr>
<td>broadcast</td>
<td>This map entry is to be used when the corresponding protocol sends broadcast packets to the interface.</td>
</tr>
<tr>
<td>aal5mux</td>
<td>Specifies AAL5 multiplexing encapsulation. The default is snap.</td>
</tr>
</tbody>
</table>

### Defaults

No map statements are defined.

### Command Modes

Map-list configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command is required with the map-list command when you are configuring an SVC.

### Examples

The following example shows how to create a map-list named atm, followed by a map statement for the protocol address being mapped.

```
Switch(config)# map-list atm
Switch(config-map-list)# ip 172.21.168.112 atm-vc 99
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>map-list</td>
<td>Defines an ATM map statement for either a PVC or SVC.</td>
</tr>
</tbody>
</table>
B Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

---

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
background-routes-enable

To enable background route computation and to specify how often the switch polls for a significant change that activates a new computation of the background routes, use the `background-routes-enable` ATM router PNNI configuration command. To disable background route computation, use the `no` form of this command.

```
background-routes-enable [insignificant-threshold number] [poll-interval seconds]

no background-routes-enable
```

**Syntax Description**

- `number`: Specifies the number of insignificant changes necessary to trigger a new computation of the background routes, from 1 to 100. The default is 32.
- `seconds`: Specifies the poll interval in seconds, from 1 to 60. The default is 10 seconds.

**Defaults**

Disabled

**Command Modes**

ATM router PNNI configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The ATM switch router supports the following two route selection modes:

- **On-demand (no background routes)**—Separate route computation is performed for each SETUP or ADD PARTY message received over a UNI or IISP interface. In this mode, the most recent topology information received by this node is always used for each setup request.

- **Background routes**—Most calls are routed using precomputed routing trees. In this mode, multiple background trees are precomputed for several service categories and QoS metrics. If no route is found in the background trees that satisfies the QoS requirements of a particular setup request, route selection reverts to on-demand route computation.

The background routes mode should be enabled in large networks, where it could exhibit less stringent processing requirements and better scalability.

The `poll-interval` is used to throttle background route computation. Route computation is performed at most every `poll-interval` seconds, when a significant change in the topology of the network is reported, or when a specified `insignificant-threshold number` of changes has occurred since the last route computation.

**Caution**

Decreasing the `poll-interval` increases the load on the switch processor.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.
The following example shows how to enable background routes with a poll-interval of 15 seconds using the `background-routes-enable` ATM router PNNI configuration command.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# background-routes-enable poll-interval 15
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni background routes</code></td>
<td>Used to show the precalculated background route table to other PNNI nodes.</td>
</tr>
<tr>
<td><code>show atm pnni background status</code></td>
<td>Used to show the status of background route computation activity.</td>
</tr>
</tbody>
</table>
## bert (Catalyst 8510 MSR and LightStream 1010)

To check the bit errors on a line for a particular interval, use the `bert` interface configuration command. To deactivate the test, use the `no` form of this command. The test also terminates automatically when the interval expires.

```
bert pattern \{2^15 | 2^20 | 2^23 | 0s | 1s | 2^11 | 2^20-QRSS | alt-0-1\} interval minutes
```

```
no bert
```

### Syntax Description

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2^15</td>
<td>2^15 test pattern</td>
</tr>
<tr>
<td>2^20</td>
<td>2^20 test pattern</td>
</tr>
<tr>
<td>2^23</td>
<td>2^23 test pattern</td>
</tr>
<tr>
<td>0s</td>
<td>All 0’s test pattern</td>
</tr>
<tr>
<td>1s</td>
<td>All 1’s test pattern</td>
</tr>
<tr>
<td>2^11</td>
<td>2^11-1 test pattern</td>
</tr>
<tr>
<td>2^20-QRSS</td>
<td>2^20-1 QRSS 0.151 test pattern.</td>
</tr>
<tr>
<td>alt-0-1</td>
<td>Alternating 0’s and 1’s test pattern.</td>
</tr>
</tbody>
</table>

### Defaults

Disabled

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The bert test checks the bit errors on a line for a specified (in minutes) interval of time. The test starts at the interface configuration level, and stops automatically when the time interval expires. The `no` form of the `bert` command also deactivates the test.

### Examples

The following example activates the `bert` command for a testing interval of 1 minute with an all 0’s test pattern on ATM 3/1/0.

```
Switch(config)# interface atm 3/1/0
Switch(config-if)# bert pattern 0s interval 1
```

The following example displays the test results of the `bert` command on ATM 3/1/0 by using the `show controllers` command.

```
Switch# show controller atm 3/1/0
<information deleted>
Bert Information:
```
state: OFF, pattern: all zeros
interval: 0, result: OUT_OF_SYNC
sync count: 1536, bit errors: 17600
kbit count: 0
bit errors since last sync: 0
kbit count since last sync: 0
<information deleted>

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
**boot config**

To specify the device and filename of the configuration file from which the switch configures itself during initialization, use the `boot config` global configuration command. To remove this specification, use the `no` form of the command.

```
boot config device:filename
no boot config
```

### Syntax Description

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>device:</code></td>
<td>Device containing the configuration file. The colon (:) is required. Valid devices are as follows:</td>
</tr>
<tr>
<td><code>bootflash:</code></td>
<td>is the internal Flash memory.</td>
</tr>
<tr>
<td><code>sec-bootflash:</code></td>
<td>is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><code>slot0:</code></td>
<td>is the first PC slot on the route processor card and is the initial default device.</td>
</tr>
<tr>
<td><code>sec-slot0:</code></td>
<td>is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><code>slot1:</code></td>
<td>is the second PC slot on the route processor card.</td>
</tr>
<tr>
<td><code>sec-slot1:</code></td>
<td>is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><code>filename</code></td>
<td>Name of the configuration file. The configuration file must be an ASCII file. The maximum filename length is 63 characters.</td>
</tr>
</tbody>
</table>

### Defaults

No device and filename are specified.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The `boot config` command is used to set or modify the `config_file` environment variable in the current running memory. This variable specifies the configuration file used for initialization.

### Note

When you use this global configuration command, you affect only the running configuration. You must save the environment variable setting to your startup configuration to place the information under ROM monitor control and to have the environment variable function as expected. Use the `copy running-config` command to save the environment variable from your running configuration to your startup configuration.
boot system

To specify the system image that the switch loads at startup, use one of the following boot system global configuration commands. To remove the startup system image specification, use the no form of this command.

```
boot system [[device:]filename [hostname] | flash [device:]filename | mop filename [if-type] [card/subcard/port] | rcp filename [ip-address] | rom | tftp [hostname]]

no boot system [[device:]filename [hostname] | flash [device:]filename | mop filename [if-type] [card/subcard/port] | rcp filename [ip-address] | rom | tftp [hostname]]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>device:</strong></td>
<td>Device containing the system image to load at startup. A colon (:) is required as part of the device specification. Valid devices are as follows:</td>
</tr>
<tr>
<td></td>
<td>• <strong>bootflash</strong>: is the internal Flash memory.</td>
</tr>
<tr>
<td></td>
<td>• <strong>sec-bootflash</strong>: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td>• <strong>slot0</strong>: is the first PC slot on the route processor card and is the initial default device.</td>
</tr>
<tr>
<td></td>
<td>• <strong>sec-slot0</strong>: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td>• <strong>slot1</strong>: is the second PC slot on the route processor card.</td>
</tr>
<tr>
<td></td>
<td>• <strong>sec-slot1</strong>: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><strong>filename</strong></td>
<td>Name of the system image to load at startup. The filename is case sensitive. If you do not specify a filename for flash, the switch loads the first valid file in the specified Flash device, the specified partition of Flash memory, or the default Flash device (if you omit the device: argument).</td>
</tr>
<tr>
<td><strong>hostname</strong></td>
<td>Name or IP address of the host that stores the system image.</td>
</tr>
<tr>
<td><strong>flash</strong></td>
<td>Boots the switch from internal Flash memory. If you omit all arguments that follow this keyword, the system searches internal Flash for the first bootable image.</td>
</tr>
<tr>
<td></td>
<td>This keyword boots the switch from a Flash device, as specified by the device argument. When you omit all arguments that follow this keyword, this system searches the PC slot 0 for the first bootable image.</td>
</tr>
<tr>
<td><strong>mop</strong></td>
<td>Boots the switch from a DecNet MOP server.</td>
</tr>
<tr>
<td><strong>if-type</strong></td>
<td>Interface type, specified as atm, atm-p, cbr, ethernet, null, or the MAC layer address of the host to boot from.</td>
</tr>
<tr>
<td><strong>card/subcard/port</strong></td>
<td>Interface identifier for the specified interface type.</td>
</tr>
<tr>
<td><strong>rcp</strong></td>
<td>Boots the switch from a system image stored on a network server using rcp. If you omit this keyword, the transport mechanism defaults to tftp.</td>
</tr>
<tr>
<td><strong>ip-address</strong></td>
<td>IP address of the TFTP server containing the system image file. If omitted, this value defaults to the IP broadcast address of 255.255.255.255.</td>
</tr>
</tbody>
</table>
If you do not specify a system image file with the `boot system` command, the switch uses the configuration register settings to determine the default system image filename for booting from a network server. The switch forms the default boot filename by starting with the word `cisco` and then appending the octal equivalent of the boot field number in the configuration register, followed by a hyphen (-) and the processor type name (Cisco-cpu). See the appropriate hardware installation guide for details on the configuration register and default filename. See also the command `config-register`. See also the “Syntax Description” section.

If you omit a keyword (`flash`, `rcp`, or `tftp`) from the `boot system` command, the system defaults to booting from a system image stored on a TFTP server.

### Command Modes
Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

For this command to work, the `config-register` command must be set properly.

Enter several `boot system` commands to provide a fail-safe method for booting your switch. The switch stores and executes the `boot system` commands in the order in which you enter them in the configuration file. If you enter multiple boot commands of the same type—for example, if you enter two commands that instruct the switch to boot from different network servers—then the switch tries them in the order in which they appear in the configuration file.

Each time you write a new software image to Flash memory, you must delete the existing filename in the configuration file with the `no boot system filename` command. Then add a new line in the configuration file with the `boot system filename` command.

The `no boot system` global configuration command disables all `boot system` configuration commands regardless of argument. Specifying the `flash` device name or the `filename` argument with the `no boot system` command disables only the command specified by these arguments.

You can boot the switch from a compressed image on a network server. When a network server boots software, both the image being booted and the running image must fit into memory. Use compressed images to ensure that enough memory is available to boot the switch. You can compress a software image on any UNIX platform using the `compress` command. Refer to your UNIX platform’s documentation for the exact usage of the `compress` command. (You can also decompress data with the UNIX `uncompress` command.)
The rcp protocol requires that a client send the remote username in an rcp request to a server. When the switch executes the `boot system rcp` command, by default the switch software sends the switch host name as both the remote and local usernames. The rcp software searches for the system image to boot from the remote server relative to the directory of the remote username (if the server has a directory structure as UNIX systems do, for example).

The `boot system` command modifies the BOOT environment variable in the running configuration. The BOOT environment variable specifies a list of bootable images on various devices.
bump

To configure the bumping rules for a specific VC bundle, use the **bump** configuration command. To return **bump** configuration to the default, use the **no** form of this command.

```
bump {implicit | explicit precedence-level | traffic}

no bump {implicit | explicit precedence-level | traffic}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>implicit</td>
<td>Specifies the traffic is bumped to a PVC with the next lower precedence.</td>
</tr>
<tr>
<td>explicit</td>
<td>Specifies the traffic is bumped to a PVC with a specific precedence level.</td>
</tr>
<tr>
<td>precedence-level</td>
<td></td>
</tr>
<tr>
<td>traffic</td>
<td>Specifies this PVC to accept bumped traffic.</td>
</tr>
</tbody>
</table>

**Defaults**

To bump implicitly is defined for a VC bundle (traffic is bumped to the next lower precedence VC).

**Command Modes**

VC bundle member

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **bump** command configures the bumping rules (switching if a VC fails) for a specific PVC. The **traffic** keyword allows traffic to be bumped on to itself when a higher precedence VC goes down. Using the **no bump traffic** command, traffic can be prevented from being bumped on to a particular VC. The **implicit** and **explicit** keywords determine which VC traffic is bumped when this VC goes down. The **implicit** option bumps traffic to the VC with the next lower precedence. The **explicit** option specifies the precedence level where the traffic is bumped.

**Examples**

The following example shows how to configure a PVC bundle to bump traffic on to a PVC with precedence 4 if the VC-bundle member (pvc-bundle 2 108) fails.

```
Switch# configure terminal
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)#
02:30:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to down
Switch(config-if-atm-bundle)# pvc-bundle 2 108 interface atm9/0/0 2 109
Switch(config-if-atm-member)# bump explicit 4
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bundle</strong></td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td><strong>show atm bundle</strong></td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
bundle

To configure a VC bundle, use the `bundle` configuration command. To remove the VC bundle, use the `no` form of this command.

```
bundle name

no bundle name
```

**Syntax Description**

| name                  | Specifies the name of the VC bundle. |

**Defaults**

No VC bundle is specified.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `bundle` command starts the VC bundle configuration process. The bundle name specified is unique throughout the system. This command quits the interface configuration mode and enters the VC bundle configuration mode.

**Examples**

The following example shows how to change from interface configuration mode and start VC bundle configuration mode.

```
Switch# config terminal
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)#?
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm bundle</td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
C Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
cablelength

To configure the cable length for a channelized DS-3 (CDS3) Frame Relay port adapter, use the `cablelength` controller configuration command. To restore the default cable length, use the `no` form of this command.

```
cablelength value
no cablelength value
```

**Syntax Description**

- `value` Cable length of 0 to 450 feet.

**Defaults**

224 feet

**Command Modes**

Controller configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Although you can specify a cable length from 0 to 450 feet, the hardware only recognizes two ranges: 0 to 224, and 225 to 450.

For example, if you enter 150 feet, the 0 to 224 range is used. If you later change the cable length to 200 feet, there is no change because 200 is within the 0 to 224 range. However, if you change the cable length to 250, the 225 to 450 range is used. The actual number you enter is stored in the configuration file.

**Examples**

The following example configures the cable length on controller t3 to 450 feet.

```
Switch(config)# controller t3 4/0/0
Switch(config-controller)# cablelength 450
Switch# show running-config
cablelength 450
```
called-address-mask

To configure the address mask for identifying valid bits of the called NSAP address field, use the `called-address-mask` ATM signalling diagnostics configuration command. To return the address mask to the default, use the `no` form of this command.

```
called-address-mask atm-address-mask

no called-address-mask
```

**Syntax Description**

- `atm-address-mask` Denotes the valid bits in the called NSAP address.

**Defaults**

NULL

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To match this selection criteria, a failed connect setup must have a called party address value equal to the configured called party address for all bits that are 1 in the value of the mask specified with the command. When the default value is retained, the rejected call matches the filter criteria for any called address in the rejected call.

**Examples**

The following example shows configuring a called address mask string.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(config-if)# called-address-mask ff.ff.ff
```
called-nsap-address

To configure the NSAP-format ATM address for the signalling diagnostics filter entry, use the called-nsap-address ATM signalling diagnostics configuration command. To remove any configured address, use the no form of this command.

```
called-nsap-address nsap-address

no called-nsap-address
```

**Syntax Description**

```
nsap-address A 40-digit hexadecimal NSAP address.
```

**Defaults**

NULL

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

NSAP-format ATM end-system addresses have a fixed length of 40 hexadecimal digits. You should configure the address using the following dotted format:

```
xx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx
```

**Note**

The dots can be omitted.

**Examples**

The following example shows setting a called NSAP address.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# called-nsap-address 47.111122223333444455556666.777788881111.00
```
calling-address-mask

To configure the address mask for identifying valid bits of the calling-nsap-address field in the signalling diagnostics filter table entry, use the calling-address-mask ATM signalling diagnostics configuration command. To set to the default value, use the no form of this command.

    calling-address-mask atm-address-mask
    no calling-nsap-address

**Syntax Description**

| atm-address-mask | Use the address mask to denote the valid bits of the calling address field in the signalling diagnostics filter table entry. |

**Defaults**

NULL

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To match this selection criteria, a failed connect setup must have a calling party address value equal to the configured calling party address for all bits that are 1 in the value of the mask specified through the command. When the default value is retained, the rejected call matches the filter criteria for any calling address in the rejected call.

**Examples**

The following example shows a calling address mask.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(config-if)# calling-address-mask ff.ff.ff
```
calling-nsap-address

To configure the NSAP-format ATM address for the signalling diagnostics filter entry, use the calling-nsap-address ATM signalling diagnostics configuration command. To remove any configured address, use the no form of this command.

    calling-nsap-address nsap-address
    no calling-nsap-address

Syntax Description

| nsap-address | The 40-digit, hexadecimal NSAP address. |

Defaults

NULL

Command Modes

ATM signalling diagnostics configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

NSAP-format ATM end-system addresses have a fixed length of 40 hexadecimal digits. You should configure the address using the following dotted format:

xx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xx

Note

The dots can be omitted.

Examples

The following example shows setting a calling NSAP address.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(config-if)# calling-nsap-address 47.11112223333444455556666.777788881111.00
```
cast-type

To filter ATM signalling call failures by connection type (point-to-point or point-to-multipoint), use the **cast-type** ATM signalling diagnostics configuration command. To disable this feature, use the **no** form of this command.

```
cast-type {all | p2p | p2mp}
```

```
no cast-type
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Set the cast type to point-to-point and point-to-multipoint.</td>
</tr>
<tr>
<td>p2p</td>
<td>Point-to-point.</td>
</tr>
<tr>
<td>p2mp</td>
<td>Point-to-multipoint.</td>
</tr>
</tbody>
</table>

### Defaults

all

### Command Modes

ATM signalling diagnostics configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Examples

The following example shows call failures filtered by point-to-point connection.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# cast-type p2p
```
**ces aal1 clock**

To configure the AAL1 timing recovery clock for T1/E1 interfaces, use the `ces aal1 clock` interface configuration command. To revert to the default setting, use the `no` form of this command.

```
    ces aal1 clock {adaptive | srts | synchronous}
```

```
    no ces aal1 clock {adaptive | srts | synchronous}
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>adaptive</th>
<th>Adjusts the output clock on a received AAL1 on a first-in, first-out basis. Use in unstructured mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>srts</td>
<td>Adjusts the output clock on a received AAL1 on a first-in, first-out basis.</td>
</tr>
<tr>
<td></td>
<td>synchronous</td>
<td>Configures the timing recovery to synchronous for structured mode.</td>
</tr>
</tbody>
</table>

**Defaults**

synchronous

**Command Modes**

Interface configuration

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Usage Guidelines**

The clock mode must be `synchronous` for structured mode. In unstructured mode, use `adaptive` when a network-derived clock is not available.

Use `srts` when a network-derived clock is available but devices attached to the CES port use a different clock reference. The `srts` keyword samples the incoming clock, subtracts from the network clock, and sends the remainder in an AAL1 header. The clock is reconstructed during output by adding the residual to the network reference.

Use `synchronous` for all other modes.

**Examples**

The following command shows setting the AAL1 timing recovery clock to adaptive mode.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces aal1 clock adaptive
```
ces aal1 service

To configure the type of ces service, use the ces aal1 service interface configuration command. To revert to the default setting, use the no form of this command.

```
ces aal1 service {structured | unstructured}
```

Syntax Description

- **structured**: Sets the type of service to structured (cross-connect).
- **unstructured**: Sets the type of service to unstructured (clear-channel).

Defaults

unstructured

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

The **structured** keyword means that each time slot is an independent entity grouped into circuits, where each circuit has an independent PVC.

The **unstructured** keyword reduces the incoming serial data on the receiving end of the ATM network. The keyword also sets the service to single circuit, single PVC, where all time slots are carried.

Examples

The following example shows changing the mode for the ces aal1 service command to **structured**.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces aal1 service structured
```
ces circuit

To configure the CES connection attributes, use the ces circuit interface configuration command. To revert to the default setting, use the no form of this command.

```
ces circuit circuit-id [cas] [cdv max-req] [circuit-name name] [partial-fill num] [shutdown |imeslots num] [on-hook-detect pattern]

no ces circuit circuit-id [cas] [cdv] [circuit-name name] [partial-fill num] [shutdown] [timeslots num] [on-hook-detect pattern]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>circuit-id</td>
<td>Selects the circuit identification. For unstructured service, use 0. For T1 structure service, the range is 1 through 24. For E1 structure service, the range is 1 through 31.</td>
</tr>
<tr>
<td>cas</td>
<td>Enables channel-associated signalling for structured service only. The default is no cas.</td>
</tr>
<tr>
<td>cdv max-req</td>
<td>Enables the peak-to-peak cell delay variation requirement. The range for CDV is 1 thorough 65535 milliseconds. The default is 2000 milliseconds.</td>
</tr>
<tr>
<td>circuit-name name</td>
<td>Sets the ASCII name for the CES-IWF circuit. The string for the circuit name is 0 through 255. The default is CBRx/x/x:0.</td>
</tr>
<tr>
<td>partial-fill num</td>
<td>Enables the partial AAL1 cell fill service for structured service only. The range is 0 through 47. The default is 47.</td>
</tr>
<tr>
<td>shutdown</td>
<td>Marks the CES-IWF circuit administratively down. The default is no shutdown.</td>
</tr>
<tr>
<td>timeslots num</td>
<td>Configures the time slots for the CES-IWF circuit for structured service only. The range is 1 through 24 for T1. The range is 1 through 31 for E1.</td>
</tr>
<tr>
<td>on-hook-detect pattern</td>
<td>Configures on-hook detection on the CES circuit.</td>
</tr>
</tbody>
</table>

### Defaults

See “Syntax Description.”

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Channel-associated signalling provides information about the time slot (on or off the hook) and is updated once per multiframe.

### Examples

The following example shows setting the structured service CDV range to 5000 milliseconds.

```
Switch# configure terminal
```
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces circuit 3 cdv 5000
ces dsx1 clock source

To configure a transmit clock source to the T1/E1 CES port adapter, use the `ces dsx1 clock source` interface configuration command. To revert to the default value, use the `no` form of this command.

```
switch# configure terminal
switch(config)# controller cbr 3/0/0
switch(config-if)# ces dsx1 clock source loop-timed
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>`ces dsx1 clock source {loop-timed</td>
<td>network-derived}`</td>
</tr>
<tr>
<td>`no ces dsx1 clock source {loop-timed</td>
<td>network-derived}`</td>
</tr>
</tbody>
</table>

**Defaults**

network-derived

**Command Modes**

Interface configuration mode

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows setting the clock source to `loop-timed`.

```
switch# configure terminal
switch(config)# controller cbr 3/0/0
switch(config-if)# ces dsx1 clock source loop-timed
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ces aal1 clock</code></td>
<td>Configures the AAL1 timing recovery clock for T1/E1 interfaces.</td>
</tr>
</tbody>
</table>
ces dsx1 framing

To select the frame type for the E1 or T1 data line, use the `ces dsx1 framing` interface configuration command. To restore the default setting, use the `no` form of this command.

(For E1) `ces dsx1 framing { e1_crc_mfCASlt | e1_crc_mflt | e1_lt | e1_mfCAS_lt }`

(For T1) `ces dsx1 framing { sf | esf }`

To restore the default setting, use the `no` form of these commands.

(For E1) `no ces dsx1 framing { e1_crc_mfCASlt | e1_crc_mflt | e1_lt | e1_mfCAS_lt }`

(For T1) `no ces dsx1 framing { sf | esf }

Syntax Description

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>e1_crc_mfCAS_lt</code></td>
<td>Configures the frame type to <code>e1_crc_mf</code>: CAS enabled.</td>
</tr>
<tr>
<td><code>e1_crc_mflt</code></td>
<td>Configures the frame type to <code>e1_crc_mf</code>: CAS not enabled.</td>
</tr>
<tr>
<td><code>e1_lt</code></td>
<td>Configures the frame type to <code>e1_mfCAS lt</code>.</td>
</tr>
<tr>
<td><code>e1_mfCAS_lt</code></td>
<td>Configures the frame type to <code>e1_mfCAS lt</code>: CAS enabled.</td>
</tr>
<tr>
<td><code>sf</code></td>
<td>Configures the frame type to super frame.</td>
</tr>
<tr>
<td><code>esf</code></td>
<td>Configures the frame type to extended super frame.</td>
</tr>
</tbody>
</table>

Defaults

For E1: `e1_lt`

For T1: `esf`

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use this command in configurations where the switch router communicates with either the T1 or the E1 data line to configure the frame type for your circuit.

Examples

The following example shows setting the E1 data line frame type to `e1_mfCAS_lt`.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces dsx1 framing e1_mfCAS_lt
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>linecode</code></td>
<td>Selects the linecode type for the T1 or E1 line.</td>
</tr>
</tbody>
</table>
**ces dsx1 lbo**

To configure T1 port parameters, use the `ces dsx1 lbo` interface configuration command. To revert to the default setting, use the `no` form of this command.

```
ces dsx1 lbo length

no ces dsx1 lbo length
```

**Syntax Description**

- `length` Specifies the cable length as one of the following:
  - 0-110
  - 110-200
  - 220-330
  - 330-440
  - 440-550
  - 550-660
  - 660_above
  - square_pulse

**Defaults**

0-110

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Set the cable length to the desired number of feet on your system.

**Examples**

The following example shows setting the cable length to 440 feet using the `ces dsx1 lbo` interface configuration command.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces dsx1 lbo 440_550
```
ces dsx1 linecode

To select the linecode type for the T1 or E1 line, use the `ces dsx1 linecode` interface configuration command. To restore the default setting, use the `no` form of this command.

(For E1) `ces dsx1 linecode {ami | hdb3}`
(For T1) `ces dsx1 linecode {ami | b8zs}`

To restore the default setting, use the `no` form of these commands.

(For E1) `no ces dsx1 linecode {ami | hdb3}`
(For T1) `no ces dsx1 linecode {ami | b8zs}`

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>ami</th>
<th>Specifies the AMI as the linecode type. Valid for the T1 or E1 interfaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b8zs</td>
<td>Specifies B8Zs as the linecode type. Valid for the T1 interface only.</td>
</tr>
<tr>
<td></td>
<td>hdb3</td>
<td>Specifies the HDB3 as the linecode type. Valid for the E1 interface only.</td>
</tr>
</tbody>
</table>

**Defaults**

For T1: `b8zs`  
For E1: `hdb3`

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The T1 service provider determines which linecode type (`ami` or `b8zs`) is required for your circuit. The E1 service provider determines which linecode type (`ami` or `hdb3`) is required for your circuit.

**Examples**

The following example specifies `b8zs` as the linecode type for the T1 interface.

Switch# configure terminal  
Switch(config)# controller cbr 3/0/0  
Switch(config-if)# ces dsx1 linecode b8zs
ces dsx1 loopback

To configure loopback for the T1 or E1 circuit emulation port adapter module, use the ces dsx1 loopback interface configuration command. To revert to the default setting, use the no form of this command.

```
  ces dsx1 loopback {line | noloop | payload}
  no ces dsx1 loopback {line | noloop | payload}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>line</td>
<td>Sets the received signal to be looped at the line (does not penetrate line).</td>
</tr>
<tr>
<td>noloop</td>
<td>Sets the interface to no loop.</td>
</tr>
<tr>
<td>payload</td>
<td>Sets the received signal to be looped through the device and returned.</td>
</tr>
</tbody>
</table>

### Defaults

noloop

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command is useful when testing the circuit emulation port adapter module.

### Examples

The following example shows setting the loopback to payload.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces dsx1 loopback payload
```
ces dsx1 signalmode robbedbit

To configure the signalmode to robbedbit, use the ces dsx1 signalmode robbedbit interface configuration command. To restore the default setting, use the no form of this command.

```
ces dsx1 signalmode robbedbit
no ces dsx1 signalmode robbedbit
```

Syntax Description

This command has no keywords or arguments.

Defaults

Disabled

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

A T1 frame consists of 24 time slots (DS0) that send at a rate of 64 kbps. T1 defines the ability to send signalling in-band on individual time slots by removing the low bit of each byte for signalling in robbedbit mode. This procedure allows 8 kbps for signalling and leaves 56 kbps for data.

In structured mode, you can send the T1 signalling information across the BISDN network. This means that after you set the port in robbedbit signalling mode, and enable CAS on individual circuits that need this type of service, you are robbing bits from the DS0. The system then puts the bits in the specified format to be sent across the BISDN network and reinserts them at the passive side on the CES-IWF connection.

Examples

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces dsx1 signalmode robbedbit
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces aal1 service</td>
<td>Used to configure the type of CES service.</td>
</tr>
<tr>
<td>ces circuit</td>
<td>Used to configure the CES connection attributes.</td>
</tr>
</tbody>
</table>
ces pvc (Hard PVC)

To configure the destination port for the circuit, use the ces pvc (hard PVC) interface configuration command. To disable this feature, use the no form of this command.

```
ces pvc circuit-id interface atm card/subcard/port [vpi vpi-number] vci vci-number
no ces pvc circuit-id interface atm card/subcard/port [vpi vpi-number] vci vci-number
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>circuit-id</td>
<td>Sets the type of service. For unstructured service, use 0. For T1 structured service, the range is 1 through 24. For E1 structured service, the range is 1 through 31.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Card number, subcard number, and port number of the ATM interface.</td>
</tr>
<tr>
<td>vpi-number</td>
<td>Virtual path identifier of the destination PVC.</td>
</tr>
<tr>
<td>vci-number</td>
<td>Virtual channel identifier of the destination PVC.</td>
</tr>
</tbody>
</table>

**Defaults**

None.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You must configure both sides of the CES circuits because the source (the active side in CES-IWF) time slots are not recognized at the destination (the passive side).

Each CES circuit has an ATM address. When configuring the source PVC, you need the destination ATM address. See the show ces address command.

**Examples**

The following example shows how to set a hard PVC on interface ATM 1/0/0.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces pvc 31 interface atm 1/0/0
```

The following example shows how to set an unstructured CES soft PVC.

```
Switch(config-if)# ces pvc 0 dest-atm-addr atm 1/0/0 vpi 1 vci 1
```

The following example shows how to set a structured hard PVC.

```
Switch(config-if)# ces pvc 24 interface atm 1/0/1 vpi 1 vci 1
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ces pvc (Soft PVC)</code></td>
<td>Used to establish a soft pvc circuit</td>
</tr>
<tr>
<td><code>show ces address</code></td>
<td>Used to show all the configured CES-IWF ATM addresses.</td>
</tr>
</tbody>
</table>
ces pvc (Soft PVC)

To configure the destination port for the circuit, use the `ces pvc` (soft PVC) interface configuration command. To disable this feature, use the `no` form of this command.

```
ces pvc circuit-id dest-address atm-address [[vpi vpi-number] vci vci-number] [follow-ifstate] [retry-interval [first retry-interval] [maximum retry-interval]] [hold-priority priority] redo-explicit [explicit-path precedence {name path-name | identifier path-id} [upto partial-entry-index]] [only-explicit]
```

```
no ces pvc circuit-id dest-address atm-address [[vpi vpi-number] vci vci-number] [follow-ifstate] [retry-interval [first retry-interval] [maximum retry-interval]] [hold-priority priority] redo-explicit [explicit-path precedence {name path-name | identifier path-id} [upto partial-entry-index]] [only-explicit]
```

### Syntax Description

- **circuit-id**: Sets the type of service. For unstructured service, use 0. For T1 structured service, the range is 1 through 24. For E1 structured service, the range is 1 through 31.

- **dest-address**: Creates a soft PVC and is specified as the string 0 through 255.

- **vpi vpi**: Virtual path identifier of the destination PVC.

- **vci vci**: Virtual channel identifier of the destination PVC.

- **retry-interval**: Configures retry interval timers for a soft VC.
  - **first retry-interval**: Retry interval for the first retry after the first failed attempt, specified in milliseconds.
    - If the first retry after the first failed attempt also fails, the subsequent attempts will be made at intervals computed using the `first retry-interval` as follows:
      - \((2 ** (k-1)) \times \text{first retry-interval}\)
    - Where the value of \(k\) is 1 for the first retry after the first failed attempt and will be incremented by 1 for every subsequent attempt.
    - Range is from 100 to 3600000 milliseconds; the default is 5000 milliseconds.

- **maximum retry-interval**: The maximum retry interval between any two attempts specified in seconds.
  - Once the retry interval is computed in the `first retry-interval` and becomes equal to or greater than the `maximum retry-interval` configured, the subsequent retries are done at regular intervals of `maximum retry-interval` seconds until the call is established.
  - Range is from 1 to 65535 seconds; the default is 60.

- **follow-ifstate**: When it is determined that the parent interface transitions from the down state to up, the soft PVC setup sequence is started. When it is determined that the parent interface transitions from the up state to down, an established soft PVC is released. Any soft PVC setup sequence in progress is terminated.
ces pvc (Soft PVC)

hold-priority
  priority

  Allows users to configure a priority for each Soft PVC or SVC, to be used in determining which VCs to retain when bandwidth is reduced on an IMA interface. Priority can be from 0 (highest) to 15 (lowest).

  If no hold-priority is specified when Soft PVC or SVC dropping by priority is enabled, the Soft PVC or SVC is automatically assigned a priority of 15.

  The hold-priority option is only available on IMA interfaces and cannot be used to clear transit legs of the Soft PVC of SVC (source and destination legs on an IMA interface cannot be cleared).

redo-explicit

  Enables respecification of an explicit path for an existing CES VC.

explicit-path
  precedence

  Configures a CES VC to use a PNNI explicit path precedence number 1 through 3.

name path-name

  Defines the CES VC explicit path name.

identifier path-id

  Defines the CES VC explicit path numerical path identifier.

upto
  partial-entry-index

  Allows a subset of a longer explicit path to be used, so that all included nodes after the specified entry index are disregarded.

  If the destination is reachable at any next node or segment target, the remaining included nodes in the explicit path are disregarded automatically.

only-explicit

  Configures a CES VC to not revert to standard on-demand PNNI routing if all the configured explicit paths fail.

Defaults

  None.

Command Modes

  Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The hold-priority option was introduced.</td>
</tr>
<tr>
<td>12.1(22)EB</td>
<td>Added PNNI explicit path configuration for CES.</td>
</tr>
</tbody>
</table>

Usage Guidelines

  You must configure both sides of the CES circuits because the source (the active side in CES-IWF) time slots are not recognized at the destination (the passive side).

  Each CES circuit has an ATM address. When configuring the source PVC, you need the destination ATM address. See the show ces address command.

  To configure explicit paths for CES soft PVCs, use the explicit path keyword and a precedence number 1 through 3. When the connection is set up, the precedence 1 path is tried first. If it fails the soft PVC connection is routed using the precedence 2 path and so forth. If all of the explicit paths fail, standard on-demand PNNI routing is tried unless the only-explicit keyword is specified in the configuration. If the soft connection destination address is reachable at one of the included entries in an explicit path, any of the following entries in that path are automatically disregarded. This allows longer paths to be reused for closer destinations. Alternately, the upto keyword can be specified followed by the partial-entry-index number for an explicit path to disregard later path entries.
To change the explicit path options without tearing down an existing soft PVC, use the `redo-explicit` keyword to respecify all of the explicit path options.

**Examples**

The following example shows how to set a soft PVC with the `follow-ifstate` option enabled.

```bash
Switch# configure terminal
Switch(config)# interface cbr 3/1/0
Switch(config-if)# ces pvc 1 dest-address 47.009144556677114410173322.00603E899901.01
     follow-ifstate
```

The following example shows how to set a soft PVC with an explicit path.

```bash
Switch(config)# interface cbr3/1/0
Switch(config-if)# ces circuit 6 timeslots 6
Switch(config-if)# ces svc 6 dest-address 47.0091.8100.0000.0010.073c.0101.4000.0c81.903c.60 explicit-path 1 identifier 1
     only-explicit
Switch(config-if)# end
Switch#
```

The following example `show running-config` command example shows the soft PVC with an explicit path.

```bash
Switch# show running-config interface cbr 3/1/0
no ip address
ces aal1 service Structured
ces circuit 6 timeslots 6
ces circuit 6 shutdown
ces svc 6 dest-address 47.0091.8100.0000.0010.073c.0101.4000.0c81.903c.60
ces svc 6 redo-explicit explicit-path 1 identifier 1 only-explicit
no ces circuit 6 shutdown
Switch#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces pvc (Hard PVC)</td>
<td>Used to establish a hard pvc circuit.</td>
</tr>
<tr>
<td>show ces address</td>
<td>Used to show all the configured CES-IWF ATM addresses.</td>
</tr>
</tbody>
</table>
ces pvc (point-to-multipoint CES soft PVC)

To configure the point-to-multipoint CES soft PVC connections, use the ces pvc configuration command. To restore the default configuration, use the no form of this command.

```
 ces pvc circuit-id p2mp
 no ces pvc circuit-id p2mp
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>circuit-id</td>
<td>Sets the type of service. For unstructured service, use 0. For T1 structured service, the range is 1 to 24. For E1 structured service, the range is 1 to 31.</td>
</tr>
</tbody>
</table>

**Defaults**

None.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(23)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Select the CBR interface to configure, and then use the ces pvc circuit-id p2mp command to change to CES point-to-multipoint (ces-p2mp) configuration mode. See the party leaf-reference (point-to-multipoint CES soft PVC) configuration command.

You must configure both sides of the CES circuits because the source (the active side in CES-IWF) time slots are not recognized at the destination (the passive side).

**Examples**

The following example shows how to select the CBR interface to configure as part of the point-to-multipoint CES soft PVC connection and then use the ces pvc circuit-id p2mp command to change to CES point-to-multipoint (ces-p2mp) configuration mode.

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 1 p2mp
Switch(ces-p2mp)# party leaf-reference 1
Switch(ces-p2mp-party)# dest-address 47.0091.8100.0000.0090.2156.d801.4000.0c88.0070.00 110
Switch(ces-p2mp-party)# exit
Switch#
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dest-address</code> (point-to-multipoint CES soft PVC)</td>
<td>Configures the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party connection.</td>
</tr>
<tr>
<td><code>disable</code> (point-to-multipoint CES soft PVC)</td>
<td>Disables a point-to-multipoint CES soft PVC connection after it has been enabled.</td>
</tr>
<tr>
<td><code>enable</code> (point-to-multipoint CES soft PVC)</td>
<td>Enables a point-to-multipoint CES soft PVC connection that has been disabled.</td>
</tr>
<tr>
<td><code>party leaf-reference</code> (point-to-multipoint CES soft PVC)</td>
<td>Configures the party leaf reference number of a CES soft PVC point-to-multipoint connection.</td>
</tr>
<tr>
<td><code>show ces address</code></td>
<td>Displays all the configured CES-IWF ATM addresses.</td>
</tr>
<tr>
<td><code>show ces circuit</code></td>
<td>Displays detailed CES circuit information.</td>
</tr>
<tr>
<td><code>show ces interface cbr</code></td>
<td>Displays detailed CES port configuration information.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
ces pvc passive follow-ifstate

To enable the passive circuit to mirror the interface state, use the ces pvc passive command. To disable this feature, use the no form of this command.

```
ces pvc circuit_id passive follow-ifstate
no ces pvc circuit_id passive follow-ifstate
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>circuit_id</code></td>
<td>Sets the type of service. For unstructured service, use 0. For T1 structured service, the range is 1 through 24. For E1 structured service, the range is 1 through 31.</td>
</tr>
</tbody>
</table>

**Defaults**

None.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When it is determined that the parent interface transitions from the down state to up, the soft PVC setup sequence is started. When it is determined that the parent interface transitions from the up state to down, an established soft PVC is released. Any soft PVC setup sequence in progress is terminated.

**Examples**

The following example shows how to enable the passive circuit state to mirror the interface state.

```
Switch# configure terminal
Switch(config)# controller cbr 3/0/0
Switch(config-if)# ces pvc 31 passive follow-ifstate
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ces address</td>
<td>Used to show all the configured CES-IWF ATM addresses.</td>
</tr>
</tbody>
</table>
**CES SVC**

To configure a CES SVC (switched VC) use the `ces svc` configuration command. To delete the CES SVC connection configuration use the `no` form of this command.

```
ces svc circuit-id dest-address atm-address [hold-priority priority] [follow-if-state] [retry-interval [first retry-interval] [maximum retry-interval]] redo-explicit [explicit-path precedence {name path-name | identifier path-id}] [upto partial-entry-index]] [only-explicit]
```

```
no ces svc circuit-id dest-address nsap
```

**Syntax Description**

- `circuit-id`: Sets the type of service. For unstructured service, use 0. For T1 structured service, the range is 1 through 24. For E1 structured service, the range is 1 through 31.

- `dest-address atm-address`: ATM address for the destination interface.

- `retry-interval [first retry-interval] [maximum retry-interval]`: Configures retry interval timers for a soft VC.

  - `first retry-interval`: Retry interval for the first retry after the first failed attempt, specified in milliseconds.

  - If the first retry after the first failed attempt also fails, the subsequent attempts will be made at intervals computed using the `first retry-interval` as follows:

    ```
    (2 ** (k-1)) * first retry-interval
    ```

    Where the value of `k` is 1 for the first retry after the first failed attempt and will be incremented by 1 for every subsequent attempt.

    - Range is from 100 to 360000 milliseconds; the default is 5000 milliseconds.

  - `maximum retry-interval`: The maximum retry interval between any two attempts specified in seconds.

    - Once the retry interval is computed in the `first retry-interval` and becomes equal to or greater than the `maximum retry-interval` configured, the subsequent retries are done at regular intervals of `maximum retry-interval` seconds until the call is established.

    - Range is from 1 to 65535 seconds; the default is 60.

- `follow-if-state`: When it is determined that the parent interface transitions from the down state to up, the soft PVC setup sequence is started. When it is determined that the parent interface transitions from the up state to down, an established soft PVC is released. Any soft PVC setup sequence in progress is terminated.

- `hold-priority priority`: Allows users to configure a priority for each Soft PVC or SVC, to be used in determining which VCs to retain when bandwidth is reduced on an IMA interface. Priority can be from 0 (highest) to 15 (lowest).

  - If no `hold-priority` is specified when Soft PVC or SVC dropping by priority is enabled, the Soft PVC or SVC is automatically assigned a priority of 15.

  - The `hold-priority` option is only available on IMA interfaces and cannot be used to clear transit legs of the Soft PVC of SVC (source and destination legs on an IMA interface cannot be cleared).

- `redo-explicit`: Enables respecification of an explicit path for an existing CES VC.
### ces svc

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>explicit-path</strong> precedence</td>
<td>Configures a CES VC to use a PNNI explicit path precedence number 1 through 3.</td>
</tr>
<tr>
<td>name path-name</td>
<td>Defines the CES VC explicit path name.</td>
</tr>
<tr>
<td>identifier path-id</td>
<td>Defines the CES VC explicit path numerical path identifier.</td>
</tr>
<tr>
<td>upto partial-entry-index</td>
<td>Allows a subset of a longer explicit path to be used, so that all included nodes after the specified entry index are disregarded.</td>
</tr>
<tr>
<td>only-explicit</td>
<td>Configures a CES VC to not revert to standard on-demand PNNI routing if all the configured explicit paths fail.</td>
</tr>
</tbody>
</table>

#### Defaults

None.

#### Command Modes

Interface configuration

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>Added PNNI explicit path configuration for CES.</td>
</tr>
<tr>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

You must configure the CES circuit number prior to configuring the switched VC.

When configuring the CES switched VC, you need the destination ATM address. See the `show atm address` command.

To configure explicit paths for CES soft PVCs, use the `explicit path` keyword and a precedence number 1 through 3. When the connection is set up the precedence 1 path is tried first. If it fails the soft PVC connection is routed using the precedence 2 path and so forth. If all of the explicit paths fail, standard on-demand PNNI routing is tried unless the `only-explicit` keyword is specified in the configuration. If the soft connection destination address is reachable at one of the included entries in an explicit path, any of the following entries in that path are automatically disregarded. This allows longer paths to be reused for closer destinations. Alternately, the `upto` keyword can be specified followed by the partial-entry-index number for an explicit path to disregard later path entries.

To change the explicit path options without tearing down an existing soft PVC, use the `redo-explicit` keyword to respecify all of the explicit path options.

#### Examples

The following example shows how to configure a structured CES SVC.
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/0/0
Switch(config-if)# shutdown
Switch(config-if)# ces aal1 service structured
Switch(config-if)# ces circuit 1 timeslots 1-3,7
Switch(config-if)# ces circuit 1 circuit-name CBR-SVC-B
Switch(config-if)# ces svc 1 dest-address 47.0091.8100.0000.00e0.4fac.b401.4000.0c82.1000.00
Switch(config-if)# no shutdown
Switch(config-if)# end
Switch#

The following example shows how to configure a switched VC with an explicit path.

Switch(config)# interface cbr3/1/0
Switch(config-if)# ces circuit 6 timeslots 6
Switch(config-if)# ces circuit 6 dest-address 47.0091.8100.0000.0010.073c.0101.4000.0c81.903c.60 explicit-path 1 identifier 1 only-explicit
Switch(config-if)# end
Switch#

The following example show running-config command example shows the soft PVC with an explicit path.

Switch# show running-config interface cbr 3/1/0
no ip address
ces aal1 service Structured
ces circuit 6 timeslots 6
ces circuit 6 shutdown
ces svc 6 dest-address 47.0091.8100.0000.0010.073c.0101.4000.0c81.903c.60
ces svc 6 redo-explicit explicit-path 1 identifier 1 only-explicit
no ces circuit 6 shutdown
Switch#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>show ces circuit</td>
<td>Used to show all the configured CES circuits.</td>
</tr>
</tbody>
</table>
channel-group

To form a serial interface, or channel-group, by aggregating time slots on a channelized DS3 (CDS3) or channelized E1 (CE1) line, use the channel-group controller configuration command. To delete a serial interface or channel-group, use the no form of this command.

For the CDS3 Frame Relay line, use the following syntax:

```
channel-group cg-number t1 line-number /timeslots list [speed {64 | 56}]
no channel-group cg-number
```

For the CE1 Frame Relay line, use the following syntax:

```
channel-group cg-number /timeslots list | {unframed}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cg-number</code></td>
<td>Channel-group number.</td>
</tr>
<tr>
<td><code>t1 line-number</code></td>
<td>Identifies the T1 line number. The range is 1 to 28.</td>
</tr>
<tr>
<td><code>timeslots list</code></td>
<td>Specifies the time slots assigned to the channel.</td>
</tr>
<tr>
<td>`{speed {64</td>
<td>56}}`</td>
</tr>
<tr>
<td><code>{unframed}</code></td>
<td>Configures a CE1 interface as clear channel (unframed).</td>
</tr>
</tbody>
</table>

### Defaults

For CDS3: **64 kbps**
Not applicable to CE1

### Command Modes

Controller configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

If the serial interface has encapsulation set to Frame Relay, then the no form of this command works only if you shut down the interface or the controller so that it tears down all soft VCs automatically. Otherwise, an error is returned.
Examples

The following example shows how to configure a channel group (#2), assigning time slots 6 to 31, and creating a logical serial port on interface 1/0/0:2.

Switch(config)# controller e1 1/0/0
Switch(config-control)# channel-group 2 timeslots 6-31
# class

To associate a connect-class with a specific interface, use the `class` interface configuration command. To break the association, use the `no` form of this command.

```plaintext
class connect-class-name
no class connect-class-name
```

## Syntax Description

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>connect-class-name</code></td>
<td>Name of the predefined connect-class.</td>
</tr>
</tbody>
</table>

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
clear atm pnni

To clear PNNI-related data, use the `clear atm pnni` privileged EXEC command.

```
clear atm pnni {debug packets | statistics {call | flooding | traffic}}
```

**Syntax Description**
- `debug packets` Clears the PNNI debug memory blocks.
- `call` Clears the PNNI call statistics.
- `flooding` Clears the PNNI flooding statistics.
- `traffic` Clears the PNNI traffic statistics.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**
The following example shows how to clear the PNNI flooding statistics.

```
Switch# clear atm pnni statistics flooding
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni local-node</code></td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
</tbody>
</table>
clear atm pnni trace connection

To clear PNNI connection trace information and results, use the `clear atm pnni trace connection` privileged EXEC command.

```
clear atm pnni trace connection {index | all}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>index</code></td>
<td>Clears trace information and results for a specific PNNI connection trace request. The range is 1 to 2147483647.</td>
</tr>
<tr>
<td><code>all</code></td>
<td>Clears all connection trace request information and results.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to remove a connection trace request and its results. The system can only accommodate 100 connection trace requests. When that limit is reached, you must clear old trace requests and their information before initiating new connection traces.

**Examples**

The following example shows how to clear the PNNI connection trace information for all traces.

```
Switch# clear atm pnni trace connection all
```
clear atm signalling statistics

To clear existing ATM signalling statistics, use the clear atm signalling statistics EXEC command.

```
clear atm signalling statistics [interface atm card/subcard/port]
```

**Syntax Description**
- `card/subcard/port` Specifies the card, subcard, and port number of the ATM interface.

**Command Modes**
- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command clears the statistics for all the interfaces or a specific interface.

**Examples**

The following example shows how to clear the ATM signalling statistics for interface 1/0/0.

```
Switch# clear atm signalling statistics interface atm 1/0/0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm signalling statistics</td>
<td>Displays the ATM signalling statistics.</td>
</tr>
</tbody>
</table>
clear atm-vc

To release a specified SVC, use the clear atm vc privileged EXEC command.

```
clear atm-vc card/subcard/port vpi vci
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>Card number, subcard number, and port number of the ATM interface.</td>
</tr>
<tr>
<td><code>vpi</code></td>
<td>Virtual path identifier of the signalling SVC to clear.</td>
</tr>
<tr>
<td><code>vci</code></td>
<td>Virtual channel identifier of the signalling SVC to clear.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following is an example of the clear atm-vc command, which releases interface 3/1/0 on VPI 0 and VCI 99.

```
Switch# clear atm-vc atm 3/1/0 0 99
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm vc</code></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
</tbody>
</table>
clear-cause

To configure the release cause code value in the signalling diagnostics filter table entry, use the clear-cause ATM signalling diagnostics configuration command. To disable this feature, use the no format of this command.

```
clear-cause clear-cause-code
```  

```
no clear-cause
```  

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>clear-cause-code</th>
<th>Decimal number denoting the release cause codes, as specified in the ATM Forum UNI 3.1 specification.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defaults</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Command Modes</td>
<td>ATM signalling diagnostics configuration</td>
<td></td>
</tr>
<tr>
<td>Command History</td>
<td>Release</td>
<td>Modification</td>
</tr>
<tr>
<td></td>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Only the call failure records that match this configured clear-cause value are collected and stored. The default value zero (0) means the cause code is not considered during filtering.

Examples

The following example shows setting a value of 100.

```
Switch(config-atmsig-diag)# clear-cause 100
```
clear counters

It is recommended that you only use this command for debugging purposes because it clears all counters displayed in the `show interfaces` and `show controllers` commands. To clear the interface counters, use the `clear counters` privileged EXEC command.

```
clear counters [type card/subcard/port]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>Specifies the interface type as <code>atm</code>, <code>atm-p</code>, <code>cbr</code>, <code>ethernet</code>, <code>line</code>, <code>null</code>, <code>serial</code>, or <code>tunnel</code>.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port of the interface to clear.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command clears all the current interface counters from the interface unless the optional arguments `type` and `card/subcard/port` are specified to clear only a specific interface type such as ATM, Ethernet, and so on.

**Note**

This command does not clear counters retrieved using SNMP.

**Examples**

The following example illustrates how to clear all interface counters.

```
switch# clear counters
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ip access-lists</code></td>
<td>Displays the contents of all current IP access lists.</td>
</tr>
</tbody>
</table>
clear facility-alarm (Catalyst 8540 MSR)

Use the clear facility-alarm command to clear alarm conditions and reset the alarm contacts.

```
clear facility-alarm [critical | major | minor]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>critical</code></td>
<td>Clears critical facility alarms.</td>
</tr>
<tr>
<td><code>major</code></td>
<td>Clears major facility alarms.</td>
</tr>
<tr>
<td><code>minor</code></td>
<td>Clears minor facility alarms.</td>
</tr>
</tbody>
</table>

**Defaults**

Clears all facility alarms.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The clear facility-alarm command acts like an ACO. Only a reoccurrence of the original alarm source after the original alarm condition is removed can restart the alarm.

**Examples**

The following example shows how to clear minor facility alarms only.

```
Switch# clear facility-alarm minor
Clearing minor alarms
Switch#
```

The following example shows how to clear all facility alarms.

```
Switch# clear facility-alarm
Clearing all alarms
Switch#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>facility-alarm (Catalyst 8540 MSR)</td>
<td>Configures the temperatures so that the ATM switch router declares a major or minor alarm condition.</td>
</tr>
<tr>
<td>show facility-alarm status (Catalyst 8540 MSR)</td>
<td>Displays the current major and minor alarm status, if any, and displays the configuration of the alarm thresholds.</td>
</tr>
</tbody>
</table>
clear host

To delete entries from the host-name-and-address cache, use the clear host privileged EXEC command.

```
clear host {name | *}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Particular host entry to remove.</td>
</tr>
<tr>
<td>*</td>
<td>Removes all entries.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The host name entries are cleared in running memory.

**Examples**

The following example clears all entries from the host-name-and-address cache.

```
Switch# clear host *
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show hosts</td>
<td>Displays the default domain name, the style of the name lookup service, a list of name server hosts, and the cached list of host names and addresses.</td>
</tr>
</tbody>
</table>
**clear interface**

To reset the hardware logic on an interface, use the `clear interface` privileged EXEC command.

```
clear interface type card/subcard/port
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>Specifies the interface type as <code>atm</code>, <code>atm-p</code>, <code>cbr</code>, <code>ethernet</code>, or <code>null</code>.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port of the interface to clear.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Under normal circumstances, you do not need to clear the hardware logic on interfaces.

**Examples**

The following example resets the interface logic on ATM interface 1/0/1.

```
Switch# clear interface ATM 1/0/1
```
clear ip accounting

Note
This command or some of its parameters might not function as expected.

To delete the cache table entries, use the `clear ip cache` privileged EXEC command.

```
clear ip cache [address-prefix address-mask]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>address-prefix</code></td>
<td>Specifies the IP address.</td>
</tr>
<tr>
<td><code>address-mask</code></td>
<td>Required if <code>address prefix</code> is specified.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command Modes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Privileged EXEC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>show ip interface</code></td>
<td>Displays the usability status of interfaces configured for IP.</td>
</tr>
</tbody>
</table>
clear ip redirect

To redirect an IP cache, use the `clear ip redirect` privileged EXEC command.

```
clear ip redirect
```

Syntax Description

This command has no keywords or arguments.

Command Modes

Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ip redirects</code></td>
<td>Displays the address of a default gateway and the address of hosts for which a redirect has been received.</td>
</tr>
</tbody>
</table>
clear lane client

To clear the LANE client counter configured on the specified LEC interface, use the clear lane client privileged EXEC command.

`clear lane client join-cnt [interface atm card/subcard/port]`

**Syntax Description**

- `card/subcard/port` Specifies the LEC interface to clear.

**Command Modes**

- Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If you do not specify an interface, this command clears all the counters of any LANE client in the switch. When you specify an interface, this command clears all the LANE client counters on that interface.

**Examples**

The following example shows clearing the counters on ATM 1/0/0 interface using the clear lane client privileged EXEC command.

```
Switch# clear lane client join-cnt interface atm 1/0/0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show lane client</code></td>
<td>Displays global and per-VCC LANE information for all the LANE clients configured on an interface, or any of its subinterfaces, on a specified subinterface, or on an emulated LAN.</td>
</tr>
</tbody>
</table>
clear lane le-arp

To clear the dynamic LE_ARP table or a single LE_ARP entry of the LANE client configured on the specified subinterface or emulated LAN, use the clear lane le-arp privileged EXEC command.

```
clear lane le-arp [ interface atm card/subcard/port[/subinterface-num] | name elan-name ] [ mac-address mac-addr | route-desc segment seg-num bridge bridge-num]
```

**Syntax Description**

- `card/subcard/port` ATM interface for the LANE client whose LE_ARP table or entry is to be cleared.
- `subinterface-num` Subinterface for the LANE client whose LE_ARP table or entry is to be cleared.
- `elan-name` Name of the emulated LAN for the LANE client whose LE_ARP table or entry is to be cleared. Maximum length is 32 characters.
- `mac-addr` MAC address of the entry to be cleared from the LE ARP table.
- `seg-num` Segment number of the next-hop route descriptor. The segment number ranges from 1 to 4095.
- `bridge-num` Bridge number of the next-hop route descriptor. The bridge number ranges from 1 to 15.

**Command Modes**

Privileged EXEC

**Command History**

```
Release Modification
11.1(4) New command
```

**Usage Guidelines**

This command only removes dynamic LE_ARP table entries. It does not remove static LE_ARP table entries.

If you do not specify an interface or an emulated LAN, this command clears all the LANE ARP tables of any LANE client in the switch.

If you specify a major interface (not a subinterface), this command clears all the LANE ARP tables of every LANE client on all the subinterfaces of that interface.

This command also removes the fast-cache entries built from the LANE ARP entries.

**Examples**

The following example clears all the LANE ARP tables for all clients on the switch router.

```
Switch# clear lane le-arp
```

The following example clears all the LANE ARP tables for all LANE clients on all the subinterfaces of interface atm 0.

```
Switch# clear lane le-arp interface atm 0
```

The following example clears the entry corresponding to MAC address 0800.AA00.0101 from the LE_ARP table for the LANE client on the emulated LAN named red.
Switch# `clear lane le-arp name red 0800.aa00.0101`

The following example clears all dynamic entries from the LE_ARP table for the LANE client on the emulated LAN named `red`.

Switch# `clear lane le-arp name red`

The following example clears the dynamic entry from the LE_ARP table for the LANE client with next-hop router descriptor segment number 1, bridge number 1, on the emulated LAN named `red`.

Switch# `clear lane le-arp name red route-desc segment 1 bridge 1`

**Note**

MAC addresses are written in the same dotted notation for the `clear lane le-arp` command as they are for the global IP `arp` command.
clear lane server

To force a LANE server on a specified subinterface or emulated LAN to drop the Control Direct and Control Distribute VCCs to a given LANE client and force the client to rejoin, subject to the new bindings, use the clear lane server privileged EXEC command.

```
clear lane server [interface card/subcard/port[.subinterface-num] | name elan-name] [client-atm-address client-atm-addr | lecid lecid | mac-address mac-addr | route-desc segment seg-num bridge bridge-num]
```

**Syntax Description**
- `card/subcard/port`: Card, subcard, and port number of the ATM interface.
- `subinterface-num`: Subinterface on which the LANE server is configured.
- `elan-name`: Name of the emulated LAN on which the LANE server is configured. Maximum length is 32 characters.
- `client-atm-addr`: ATM address of the LANE client.
- `lecid`: LANE client ID, a value between 1 and 4096.
- `mac-addr`: MAC address of the LANE client.
- `seg-num`: Segment number of the next-hop route descriptor. The segment number ranges from 1 to 4095.
- `bridge-num`: Bridge number of the next-hop route descriptor. The bridge number ranges from 1 to 15.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
After changing the bindings on the configuration server, enter this command on the LANE server. The LANE server drops the Control Direct and Control Distribute VCCs to the LANE client. The client then asks the LANE configuration server for the location of the LANE server of the emulated LAN it is requesting to join.

If no LANE client is specified, all LANE clients attached to the LANE server are dropped.

**Examples**
The following example forces all the LANE clients on the emulated LAN named red to be dropped. When they try to join again, they are forced to join a different emulated LAN.

```
Switch# clear lane server red
```

**Related Commands**
- `show lane server`: Used to display global information for the LANE server configured on an interface or any of its subinterfaces.
clear rif-cache

To clear the RIF cache, use the `clear rif-cache` privileged EXEC command.

```
clear rif-cache
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Some entries in the RIF cache are dynamically added, while others are static.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rif</td>
<td>Used to enter static source-route information into the RIF cache.</td>
</tr>
<tr>
<td>rif timeout</td>
<td>Used to specify the number of minutes an inactive entry is kept in the RIF cache.</td>
</tr>
<tr>
<td>show rif</td>
<td>Used to display the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
clear sgcp statistics

To clear all SGCP statistics, use the `clear sgcp statistics` privileged EXEC command.

```
clear sgcp statistics
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
None

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command clears global and per-endpoint statistics.

**Examples**
The following example clears the SGCP statistics.
```
Switch# clear sgcp statistics
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show sgcp</code></td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
<tr>
<td><code>show sgcp endpoint</code></td>
<td>Displays CES circuit endpoints that might or might not have connections created.</td>
</tr>
</tbody>
</table>
client-atm-address name

To add a LANE client address entry to the configuration servers configuration database, use the client-atm-address name lane configuration server database command. To remove a client address entry from the table, use the no form of this command.

```
client-atm-address atm-address-template name elan-name
no client-atm-address atm-address-template
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm-address-template</td>
<td>Template that explicitly specifies an ATM address or a specific part of an ATM address and uses wildcard characters for other parts of the ATM address, enabling you to specify multiple addresses matching the explicitly specified part. Wildcard characters can replace any nibble or group of nibbles in the prefix, the ESI, or the selector fields of the ATM address.</td>
</tr>
<tr>
<td>elan-name</td>
<td>Name of the emulated LAN. Maximum length is 32 characters.</td>
</tr>
</tbody>
</table>

**Defaults**

No address and no emulated LAN name are provided.

**Command Modes**

LANE configuration server database

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command binds any client whose address matches the specified template into the specified emulated LAN. When a client comes up, it consults the LANE configuration server, which responds with the ATM address of the LANE server for the emulated LAN. The client then initiates join procedures with the LANE server.

Before this command is used, the emulated LAN specified by the elan-name argument must be created in the configuration server’s database by using the national reserve (Catalyst 8510 MSR and LightStream 1010) command.

If an existing entry in the configuration server’s database binds the LANE client ATM address to a different emulated LAN, the new command is rejected.

This command affects only the bindings in the named configuration server database. It has no effect on the LANE components themselves.

The client-atm-address name command is a subcommand of the global lane database command. See the lane database command for information about creating the database, and the name server-atm-address command for information about binding the emulated LAN name to the servers ATM address.
**ATM Addresses.** A LANE ATM address has the same syntax as an NSAP but it is not a network-level address. It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI field (1 byte), DCC or ICD field (2 bytes), DFI field (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and the Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

**Address Templates.** LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

In LANE, a *prefix template* explicitly matches the prefix, but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field, but uses wildcards for the prefix and selector.

With the Cisco implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the selector field corresponds to the specific subinterface of the interface.

**Examples**

The following example shows how to enter database configuration mode using the database `lane_db`.

```
Switch(config)# lane database lane_db
Switch(lane-config-database)#
```

The following example uses an ESI template to specify the part of the ATM address corresponding to the interface. This example allows any client on any subinterface of the interface that corresponds to the displayed ESI value, no matter where the switch is connected, to join the engineering emulated LAN.

```
Switch(lane-config-database)# client-atm-address ...0800.200C.1001.** name engineering
```

The following example uses a prefix template to specify the part of the ATM address corresponding to the switch. This example allows any client on a subinterface of any interface connected to the switch that corresponds to the displayed prefix to join the marketing emulated LAN.

```
Switch(lane-config-database)# client-atm-address 47.000014155551212f.00.00... name marketing
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>delay</td>
<td>This command or some of its parameters might not function as expected.</td>
</tr>
<tr>
<td>lane database</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>name</td>
<td>Specifies or replaces the ATM address of the LANE server for the emulated LAN in the configuration server's configuration database.</td>
</tr>
<tr>
<td>server-atm-address</td>
<td></td>
</tr>
</tbody>
</table>
clock source (controller)

To select a transmit clock source for a channelized DS3 (CDS3) or a channelized E1 (CE1) Frame Relay port adapter, or for a 16-port OC-3c MMF port adapter, use the `clock source` controller configuration command. To return the clock source to the default, use the `no` form of this command.

```
clock source {free-running | loop-timed | network-derived | reference}

no clock source {free-running | loop-timed | network-derived | reference}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>free-running</td>
<td>The transmit clock is derived from the local oscillator on the port adapter.</td>
</tr>
<tr>
<td>loop-timed</td>
<td>The transmit clock is derived from the receive (rx) clock.</td>
</tr>
<tr>
<td>network-derived</td>
<td>The transmit clock is derived from the port system clock specified as highest priority when you use the <code>network-clock-select</code> global configuration command.</td>
</tr>
<tr>
<td>reference</td>
<td>The oscillator on the route processor is used as the transmit clock source.</td>
</tr>
</tbody>
</table>

### Defaults

For CDS3 and CE1 Frame Relay port adapters: Default clock source is loop-timed.

For the OC-3c MMF port adapter: Default clock source is network-derived.

### Command Modes

Controller configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>clock source</code></td>
</tr>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>Added: (controller)</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Currently, all types of OC-12 port adapters do not support loop-timed mode.

When a transmit clock port is set to free-running, if there is a local oscillator present on the port adapter, the port uses the port adapter’s oscillator as the clock source. If there is no local oscillator present on the port adapter, the port uses the route processor oscillator.

### Examples

The following example shows how to enable the reference clocking mode on an E1 interface.

```
Switch# configure terminal
Switch(config)# controller e1 1/0/0
Switch(config-controller)# clock source reference
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>network-clock-select</td>
<td>Allows the recovered clock to specify a particular port to provide network clocking.</td>
</tr>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
clock source(interface) (Catalyst 8510 MSR and LightStream 1010)

To select a transmit clock source for a physical device such as a port, use the `clock source` interface configuration command. To return the clock source to the default, use the `no` form of this command.

```
clock source {free-running | loop-timed | network-derived}
no clock source {free-running | loop-timed | network-derived}
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>free-running</th>
<th>The transmit clock is derived from the local oscillator on the port adapter.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>loop-timed</td>
<td>The transmit clock is derived from the receive (rx) clock.</td>
</tr>
<tr>
<td></td>
<td>network-derived</td>
<td>The transmit clock is derived from the port system clock specified at highest priority when you use the <code>network-clock-select</code> global configuration command.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Defaults</th>
<th>network-derived</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Command Modes</th>
<th>Interface configuration</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.0(1a)W5(5b)</td>
<td>New command. Originally <code>clock source (interface)</code></td>
</tr>
<tr>
<td></td>
<td>12.0(3c)W5(9)</td>
<td>Added: (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

| Usage Guidelines | This command applies to all interfaces except older versions of the DS3/E3 and the 25-Mbps interfaces. This subcommand allows selection of the transmit clock source for the physical device of a port. Currently, all types of OC-12 port adapters do not support `loop-timed` mode. When a transmit clock port is set to `free-running`, if there is a local oscillator present on the port adapter, the port uses the port adapter’s oscillator as the clock source. If there is no local oscillator present on the port adapter, the port uses the route processor oscillator. |

<table>
<thead>
<tr>
<th>Examples</th>
<th>The following example shows how to enable the loop-timed clocking mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>Switch(config-if)# clock source loop-timed</code></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>framing (interface)</td>
<td>Selects the frame type for the data line.</td>
</tr>
<tr>
<td></td>
<td>network-clock-select</td>
<td>Allows the recovered clock to specify a particular port to provide network clocking.</td>
</tr>
</tbody>
</table>
clock source (Catalyst 8540 MSR)

To select a transmit clock source for a physical device such as a port, use the `clock source` interface configuration command. To return the clock source to the default, use the `no` form of this command.

```
clock source {free-running | loop-timed | network-derived | reference}

no clock source {free-running | loop-timed | network-derived | reference}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>free-running</td>
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<td>The transmit clock is derived from the receive (rx) clock.</td>
</tr>
<tr>
<td>network-derived</td>
<td>The transmit clock is derived from the port system clock specified at highest priority when you use the <code>network-clock-select</code> global configuration command.</td>
</tr>
<tr>
<td>reference</td>
<td>The oscillator on the route processor is used as the transmit clock source.</td>
</tr>
</tbody>
</table>

### Defaults

network-derived

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command applies to all interfaces except older versions of the DS3/E3 and the 25-Mbps interfaces. This subcommand allows selection of the transmit clock source for the physical device of a port. Currently, all types of OC-12 port adapters do not support `loop-timed` mode.

When a transmit clock port is set to `free-running`, if there is a local oscillator present on the port adapter, the port uses the port adapter’s oscillator as the clock source. If there is no local oscillator present on the port adapter, the port uses the route processor oscillator.

### Examples

The following example shows how to enable the loop-timed clocking mode.

```
Switch(config-if)# clock source loop-timed
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>framing (interface)</td>
<td>Selects the frame type for the data line.</td>
</tr>
<tr>
<td>network-clock-select</td>
<td>Allows the recovered clock to specify a particular port to provide network clocking.</td>
</tr>
</tbody>
</table>
collection-modes

To initialize the collection mode and specify at what time accounting data is recorded in the accounting file, use the `collection-modes` ATM accounting file subcommand. To disable the collection mode, use the `no` form of this command.

```
collection-modes [periodic] [on-release]

no collection-modes
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>periodic</td>
<td>Data is recorded at recurring time intervals.</td>
</tr>
<tr>
<td>on-release</td>
<td>Data is recorded on the release of a connection.</td>
</tr>
</tbody>
</table>

**Command Modes**

ATM accounting file

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example initializes the collection mode and specifies that the accounting data is recorded on the release of a connection.

```
Switch# configure terminal
Switch(config)# atm accounting file acctng_file
Switch(config-acct-file)# collection-modes on-release
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm accounting file</code></td>
<td>Enables an ATM accounting file and enters the accounting file configuration mode.</td>
</tr>
<tr>
<td><code>failed-attempts</code></td>
<td>Configures the writing of records for initial connection attempts.</td>
</tr>
<tr>
<td><code>multiring</code></td>
<td>Enables collection and use of RIF information on a subinterface.</td>
</tr>
</tbody>
</table>
**connection-category**

To filter ATM signalling call failures by virtual circuit category, use the `connection-category` ATM signalling diagnostics configuration command. To return the connection category to the default, use the `no` form of this command.

```
connection-category { all | soft-vc | soft-vp | switched-vc | switched-vp }
no connection-category
```

**Syntax Description**

- `all`: Sets the connection category to `soft-vc`, `soft-vp`, `switched-vc`, and `switched-vp`.
- `soft-vc`: Specifies soft virtual circuit.
- `soft-vp`: Specifies soft virtual path.
- `switched-vc`: Specifies switched virtual circuit.
- `switched-vp`: Specifies switched virtual path.

**Defaults**

- `all`

**Command Modes**

- ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the `atm signalling diagnostics` command to enter diagnostics configuration mode.

**Examples**

In the following example, call failures are filtered by soft virtual circuits.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# connection-category soft-vc
```
connection-types

To set types of connections for atm accounting selection, use the connection-types ATM accounting selection command. To return the connection-type to the default, use the no form of this command.

connection-types \[pvc | pvp | spvc-originator | spvc-target | spvp-originator | spvp-target | svc-in | svc-out | svp-in | svp_out\]

no connection-types \[pvc | pvp | spvc-originator | spvc-target | spvp-originator | spvp-target | svc-in | svc-out | svp-in | svp_out\]

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pvc</td>
<td>Sets the permanent virtual circuit.</td>
</tr>
<tr>
<td>pvp</td>
<td>Sets the permanent virtual path.</td>
</tr>
<tr>
<td>spvc-originator</td>
<td>Sets the originating SPVC.</td>
</tr>
<tr>
<td>spvc-target</td>
<td>Sets the target SPVC.</td>
</tr>
<tr>
<td>spvp-originator</td>
<td>Sets the originating SPVP.</td>
</tr>
<tr>
<td>spvp-target</td>
<td>Sets the target SPVP.</td>
</tr>
<tr>
<td>svc-in</td>
<td>Sets the incoming switched virtual circuit.</td>
</tr>
<tr>
<td>svc-out</td>
<td>Sets the outgoing switched virtual circuit.</td>
</tr>
<tr>
<td>svp-in</td>
<td>Sets the incoming switched virtual path.</td>
</tr>
<tr>
<td>svp_out</td>
<td>Sets the outgoing switched virtual path.</td>
</tr>
</tbody>
</table>

Defaults

The default value for the connection type is svc-in, svc-out, and svp-out.

Command Modes

ATM accounting selection

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Changes to connection-types take effect immediately.

Examples

The following example shows specifying the connection types for ATM accounting selection index 1 as spvc-originator and spvp-originator.

Switch(config)# atm accounting selection 1
Switch(config-acct-sel)# connection-types spvc-originator spvp-originator
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm accounting selection</td>
<td>Enables ATM accounting selection and enters the ATM accounting selection configuration mode.</td>
</tr>
<tr>
<td>atm accounting collection</td>
<td>Controls collection of ATM accounting data into a specific file.</td>
</tr>
<tr>
<td>atm accounting file</td>
<td>Enables an ATM accounting file and enters the accounting file configuration mode.</td>
</tr>
<tr>
<td>list</td>
<td>Cisco IOS command has been removed from this manual.</td>
</tr>
</tbody>
</table>
controller

To select a port on a Frame Relay port adapter, use the `controller` global configuration command.

```
controller {t3 | e1} card/subcard/port
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>t3</th>
<th>Channelized DS3 (CDS3) Frame Relay port adapter.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>e1</td>
<td>Channelized E1 (CE1) Frame Relay port adapter.</td>
</tr>
<tr>
<td></td>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port of the T3 or E1 interface. The card number is displayed using the <code>show interfaces</code> command. The subcard number can be either 0 or 1. The port number is 0 for a single-port CDS3 Frame Relay port adapter.</td>
</tr>
</tbody>
</table>

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Specify the controller to configure by entering the `controller` subcommand, followed by `e1` or `t3`, and `card/subcard/port`.

**Examples**

The following example begins configuration of the CE1 Frame Relay interface on card 11, subcard 0, and port 0 using the `controller` global configuration command.

```
Switch# configure terminal
Switch(config)# controller e1 11/0/0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td>show ima interface</td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
**copy**

To copy any file from a Flash device to another destination, use the `copy` privileged EXEC command.

```
copy {device:filename | source} {device:filename | destination}
```

**Syntax Description**

- **device:filename**
  - Specifies a device and filename as the source or destination of the copy operation. The `device` is optional; but when it is used, the colon (:) is required. Valid devices are as follows:
    - **bootflash**: is the internal Flash memory.
    - **sec-bootflash**: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)
    - **nvram**: is the NVRAM on the route processor card.
    - **sec-nvram**: is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)
    - **slot0**: is the first PC slot on the route processor card and is the initial default device.
    - **sec-slot0**: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)
    - **slot1**: is the second PC slot on the route processor card.
    - **sec-slot1**: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)
  - The `filename` is the name of the source or destination file. You must always provide a source filename. You can omit the destination filename, in which case the system uses the source filename. Wildcards are not permitted. The maximum filename length is 63 characters.

- **source/destination**
  - Specifies a copy source or destination using rcp or TFTP, the running configuration, the startup configuration, or Flash memory. Refer to the `copy flash`, `copy rcp`, `copy running-config`, `copy startup-config`, and `copy tftp` commands.

**Defaults**

If you omit the source or destination device, the switch uses the default device specified by the `cd` command. If you omit the destination filename, the switch uses the source filename.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

The `copy` commands generally copy a file from a source to a destination. Some invalid combinations exist. Specifically, you cannot copy a running configuration to a running configuration, a startup configuration to a startup configuration, or TFTP to rcp.

When the destination is specified by the `config_file` or BOOTLDR environment variable, the switch prompts you for confirmation before proceeding with the copy. When the destination is the only valid image in the BOOT environment variable, the switch also prompts you for confirmation before proceeding with the copy.

The `config_file` environment variable specifies the configuration used during switch initialization. The BOOTLDR environment variable specifies the Flash device and filename containing the rxboot image for booting. The BOOT environment variable specifies a list of bootable images on various devices. To view the contents of environment variables, use the `show bootvar` command. To modify the `config_file` environment variable, use the `boot config` command. To modify the BOOTLDR environment variable, use the `boot bootldr` command. To modify the BOOT environment variable, use the `boot system` command. To save your modifications, use the `copy running-config startup-config` command.

If you do not specify a source or destination device, the switch uses the default device specified by the `cd` command.

Examples

The following example copies the `switch-config1` file from the internal Flash memory of a switch router to the `switch-backupconfig` file on the Flash memory card inserted in the first slot of the route processor card.

```
Switch# copy bootflash:switch-config1 slot0:switch-backupconfig
```

In the following example, the switch copies the `switch-config` file from the Flash memory card inserted in slot 0 of the route processor card to the startup configuration.

```
Switch# copy slot0:switch-config startup-config
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>boot system</code></td>
<td>Specifies the system image that the switch router loads at startup.</td>
</tr>
<tr>
<td><code>copy flash</code></td>
<td>Copies a file from Flash memory to another destination.</td>
</tr>
<tr>
<td><code>copy rcp</code></td>
<td>Copies a file from a network server to the switch router, or to another destination using rcp.</td>
</tr>
<tr>
<td><code>copy running-config</code></td>
<td>Copies the switch router’s running configuration file to another destination.</td>
</tr>
<tr>
<td><code>copy startup-config</code></td>
<td>Copies the switch router’s startup configuration file to another destination.</td>
</tr>
<tr>
<td><code>copy tftp</code></td>
<td>Copies a file from a TFTP server to the switch router or to another destination.</td>
</tr>
<tr>
<td><code>dialer-list list</code></td>
<td>This command or some of its parameters might not function as expected. See Appendix D of this command reference.</td>
</tr>
</tbody>
</table>
**copy flash**

To copy a file from Flash memory to another destination, use the **copy flash** privileged EXEC command.

```
copy flash {rcp | tftp | device:filename}
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>rcp</th>
<th>tftp</th>
<th>device:filename</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specifies a copy operation to a network server using rcp.</td>
<td>Specifies a TFTP server as the destination of the copy operation.</td>
<td>Specifies a <strong>device:filename</strong> as the destination of the copy operation. The <strong>device</strong> argument is optional, but when it is used, the colon (:) is required. Valid devices are as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>bootflash</strong>: is the internal Flash memory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>sec-bootflash</strong>: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>nvrarn</strong>: is the NVRAM on the route processor card.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>sec-nvram</strong>: is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>slot0</strong>: is the first PC slot on the route processor card and is the initial default device.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>sec-slot0</strong>: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>slot1</strong>: is the second PC slot on the route processor card.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>sec-slot1</strong>: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The <strong>filename</strong> argument is the name of the destination file. You must always provide a source filename. You can omit the destination filename, in which case the system uses the source filename. Wildcards are not permitted. The maximum filename length is 63 characters.</td>
</tr>
</tbody>
</table>

**Defaults**

If you omit the destination device, the switch router uses the default device specified by the **cd** command. If you omit the destination filename, the switch router uses the source filename.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **copy flash** command copies from one of the three Flash memory devices. The system prompts you to enter a specific device and filename. You can enter one of the following as the source device:

- **bootflash**: This device is the internal Flash memory in the switch router.
Chapter 4  C Commands

- **slot0**: This device is the first PC slot on the route processor card.
- **slot1**: This device is the second PC slot on the route processor card.

You must follow the source device with a colon (:) and a filename.

Use the `copy flash rcp` command to copy a system image from Flash memory to a network server using `rcp`. You can use the copy of the system image as a backup copy. You can also use it to verify that the copy in Flash memory is the same as the original file.

The rcp software requires that a client send the remote username on each `rcp` request to the server. When you issue the `copy flash rcp` command, by default the switch router software sends the remote username associated with the current TTY if that name is valid. For example, if the user is connected to the switch router through Telnet and was authenticated through the `username` command, the switch router software sends that username as the remote username.

If the TTY username is invalid, the switch router software uses the switch router host name as both the remote and local usernames.

**Note**

TTYs are commonly used in Cisco communications servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called **TTY devices**, which stands for **teletype**, the original UNIX terminal.

To specify a different remote username to be sent to the server, use the `ip rcmd remote-username` command. You can also specify the path of an existing directory along with the remote username.

**Caution**

The remote username must be associated with an account on the destination server. If you do not use the `ip rcmd remote-username` command to specify the name of a remote user associated with an account on the server, the remote username associated with the current TTY process must be associated with an account on the server. If there is no username for the current TTY process, the switch router host name must be associated with an account on the server. If the network administrator of the destination server did not establish accounts for the remote username used, this command does not execute successfully when a default remote username is used.

If you copy the system image to a personal computer used as a file server, the computer must support the `rsh` protocol.

Use the `copy flash tftp` command to copy a system image from Flash memory to a TFTP server. As with the `copy flash rcp` command, you can use the copy of the system image as a backup or verification that the copy in Flash is the same as the original file.

The `copy` commands generally copy a file from a source to a destination. Some invalid combinations exist. Specifically, you cannot copy a running configuration to a running configuration, a startup configuration to a startup configuration, or TFTP to rcp. If you do not specify a source or destination device, the switch router uses the default device specified by the `cd` command.

When the destination is also specified by the `config_file` environment variable, the switch router prompts you for confirmation before proceeding with the copy. The `config_file` environment variable specifies the configuration used during switch initialization. To view the contents of the `config_file` environment variable, use the `show bootvar` command. To modify the `config_file` environment variable, use the `boot config` command. To save your modifications to the `config_file` environment variable, use the `copy running-config startup-config` command.

**Examples**

The following example shows how to use the `copy flash rcp` command.
Example usage of the `copy flash rcp` command:

```
Switch# configure terminal
Switch# ip rcmd remote-username netadmin1
Ctrl-Z
Switch# copy flash rcp
```

System flash directory, partition 2:
```
File  Length   Name/status
1   984     junk
  [1048 bytes used, 8387560 available, 8388608 total]
```

Address or name of remote host [223.255.254.254]?
Source file name? junk
Destination file name [junk]? junk
Verifying checksum for 'junk' (file # 1)... OK
Copy 'junk' from Flash to server
as 'junk'? [yes/no] yes

Upload to server done
Flash copy took 0:00:00

You see a spinning line during the copy process.

The following example illustrates how to use the `copy flash rcp` command when copying from a particular partition of Flash memory.

```
Switch# copy flash rcp
```

System flash partition information:
```
Partition   Size     Used    Free    Bank-Size   State       Copy-Mode
1       4096K 2048K 2048K 2048K Read Only RXBOOT-FLH
2       4096K 2048K 2048K 2048K Read/Write Direct
```

[ Type ?number for partition directory; ? for full directory; q to abort]
Which partition? [default = 1]

The system prompts you if there are two or more partitions. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, a question mark (?) for a directory display of all partitions, or a question mark and a number (?number) for a directory display of a particular partition. The default is the first partition.

System flash directory, partition 2:
```
File  Length   Name/status
1  3459720 master/igs-bfpx.100-4.3
  [3459784 bytes used, 734520 available, 4194304 total]
```

Address or name of remote host [ABC.CISCO.COM]?
Source file name?

The file is copied from the partition given earlier by the user.

Destination file name [default = source name]?
Verifying checksum for 'master/igs-bfpx.100-4.3' (file # 1)... OK
Copy 'master/igs-bfpx.100-4.3' from Flash to server
as 'master/igs-bfpx.100-4.3'? [yes/no] yes

The following is sample output from the `copy flash tftp` command.

```
Switch# copy flash tftp:
Enter source file name: bootflash:test-image
Enter destination file name [test-image]: tftpboot/backup-image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

Address or name of remote host []? 172.20.46.50

The following example illustrates how to use the `copy flash tftp` command when copying from a particular partition of Flash memory.
Switch# `**copy flash tftp**`

System flash partition information:

<table>
<thead>
<tr>
<th>Partition</th>
<th>Size</th>
<th>Used</th>
<th>Free</th>
<th>Bank-Size</th>
<th>State</th>
<th>Copy-Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4096K</td>
<td>2048K</td>
<td>2048K</td>
<td>2048K</td>
<td>Read Only</td>
<td>RXBOOT-FLH</td>
</tr>
<tr>
<td>2</td>
<td>4096K</td>
<td>2048K</td>
<td>2048K</td>
<td>2048K</td>
<td>Read/Write</td>
<td>Direct</td>
</tr>
</tbody>
</table>

[Type ?number for partition directory; ? for full directory; q to abort]

Which partition? [default = 1]

The system prompts you if there are two or more partitions. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, a question mark (?) for a directory display of all partitions, or a question mark and a number (`?number`) for a directory display of a particular partition. The default is the first partition.

System flash directory, partition 2:

<table>
<thead>
<tr>
<th>File</th>
<th>Length</th>
<th>Name/status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3459720</td>
<td>master/igs-bfpx.100-4.3</td>
</tr>
</tbody>
</table>

[3459784 bytes used, 734520 available, 4194304 total]

Address or name of remote host [ABC.CISCO.COM]?

Source file name?

The file is copied from the partition given earlier by the user.

Destination file name [default = source name]?

Verifying checksum for 'master/igs-bfpx.100-4.3' (file # 1)... OK

Copy 'master/igs-bfpx.100-4.3' from Flash to server as 'master/igs-bfpx.100-4.3'? [yes/no] yes

The following example shows how to use the `**copy flash**` command.

Switch# `**copy flash slot0:new-config**`

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>boot config</td>
<td>Used to modify the device and filename of the configuration file from which the switch configures itself during initialization.</td>
</tr>
<tr>
<td>boot system flash</td>
<td>Boots the switch router from internal Flash memory.</td>
</tr>
<tr>
<td>config-register</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>copy running-config</td>
<td>Copies the switch router’s running configuration file to another destination. Specifies the configuration used for initialization as the destination of the copy operation.</td>
</tr>
<tr>
<td>startup-config</td>
<td></td>
</tr>
<tr>
<td>ip rcmd remote-username</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td>show bootvar</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
copy rcp

To copy a file from a network server to the switch router or to another destination using rcp, use the **copy rcp** privileged EXEC command.

```
copy rcp {device:filename | running-config | startup-config | system | tftp}
```

### Syntax Description

- **device:filename** Specifies a `device:filename` as the destination of the copy operation. The `device` is optional, but when used, the colon (:) is required. Valid devices are as follows:
  - **bootflash:** is the internal Flash memory.
  - **sec-bootflash:** is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)
  - **nvram:** is the NVRAM on the route processor card.
  - **sec-nvram:** is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)
  - **slot0:** is the first PC slot on the route processor card and is the initial default device.
  - **sec-slot0:** is the first PC slot on the redundant route processor card.
  - **slot1:** is the second PC slot on the route processor card.
  - **sec-slot1:** is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)

  The `filename` is the name of the destination file. You must always provide a source filename. You can omit the destination filename, in which case the system uses the source filename. Wildcards are not permitted. The maximum filename length is 63 characters.

- **rcp** Specifies a server as the destination of the copy operation.
- **running-config** Specifies the currently running configuration as the destination of the copy operation.
- **startup-config** Specifies the configuration used for initialization as the destination of the copy operation.
- **tftp** Specifies a TFTP server as the destination of the copy operation.

### Defaults

If you omit the destination device, the switch arouter uses the default device specified by the **cd** command. If you omit the destination filename, the switch router uses the source filename.

### Command Modes

Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

The `rcp` protocol requires that a client send the remote username of an rcp request to the server. When you issue one of the `copy rcp` commands, by default the switch router software sends the username associated with the current TTY if that name is valid. For example, if the user is connected to the switch router through Telnet and the user was authenticated through the `username` command, the switch router software sends that username as the remote username.

For Cisco, TTYs are commonly used in communication servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called `TTY devices`, which stands for `teletype`, the original UNIX terminal.

If the TTY username is invalid, the switch router software uses the switch router host name as both the remote and local usernames. To specify a different remote username to be sent to the rcp server, use the `ip rcmd remote-username` command. You can also specify the path of an existing directory along with the remote username.

The remote username must be associated with an account on the destination server. If you do not use the `ip rcmd remote-username` command to specify the name of a remote user associated with an account on the server, the remote username associated with the current TTY process must be associated with an account on the server. If there is no username for the current TTY process, the switch router host name must be associated with an account on the server. If the network administrator of the destination server did not establish accounts for the remote username used, this command does not execute successfully when a default remote username is used.

If you copy a bootstrap image, system image, or configuration file from a personal computer used as a file server, the remote host computer must support the rsh protocol.

Use the `copy rcp bootflash` command to copy a bootstrap image from a network server to Flash memory using rcp. The switch prompts for the name or address of the server and the name of the file to be copied. It provides an option to erase existing Flash memory before writing onto it and allows you to confirm the erasure. The entire copying process takes several minutes and differs from network to network.

Before loading the switch from Flash memory, verify that the checksum of the bootstrap image in Flash memory matches the checksum listed in the README file that was distributed with the system software image.

The checksum of the bootstrap image in Flash memory is displayed at the bottom of the screen when you issue the `copy rcp bootflash` command. The README file was copied to the server automatically when you installed the system software.

If the checksum value does not match the value in the README file, do not reboot the switch. Reissue the `copy rcp bootflash` command and compare the checksums again. If the checksum is repeatedly wrong, copy the original bootstrap image back into Flash memory before you reboot the switch from Flash memory. If you have a corrupted image in Flash memory, and try to boot from Flash, the switch router starts the system image (assuming booting from a network server is not configured).

Use the `copy rcp running-config` command to copy a configuration file from a network server to the switch router’s running configuration environment using rcp. You can copy either a host configuration file or a network configuration file. Accept the default value of `host` to copy and load a host configuration file containing commands that apply to one network server in particular. Enter value of `network` to copy and load a network configuration file containing commands that apply to all network servers on a network.
The **copy rcp running-config** command replaces the **configure network** command when using **rcp**.

Use the **copy rcp startup-configuration** command to copy a host or network configuration file from a network server to the switch router’s startup configuration environment using **rcp**. Accept the default value of **host** to copy and store a host configuration file containing commands that apply to one network server in particular. Enter value of **network** to copy and store a network configuration file containing commands that apply to all network servers on a network.

The command copies a configuration file from the network server to the location specified by the **config_file** environment variable. The **config_file** environment variable specifies the configuration used during switch router initialization.

The **copy rcp startup-config** command replaces the **configure overwrite-network** command when using **rcp**.

The **copy** commands generally copy a file from a source to a destination. Some invalid combinations exist. Specifically, you cannot copy a running configuration to a running configuration, a startup configuration to a startup configuration, or TFTP to **rcp**.

The **copy rcp** command generally copies a file from a network server to another destination using **rcp**. If you do not specify a source or destination device, the switch uses the default device specified by the **cd** command.

When the destination is also specified by the **config_file** environment variable, the switch prompts you for confirmation before proceeding with the copy. To view the contents of the **config_file** environment variable, use the **show bootvar** command. To modify the **config_file** environment variable, use the **boot config** command. To save your modifications, use the **copy running-config startup-config** command.

### Examples

The following example shows sample output resulting from copying a system image into a partition of Flash memory. The system prompts only if there are two or more read/write partitions or one read-only and one read/write partition and dual-Flash bank support in boot ROMs. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, a question mark (?) for a directory display of all partitions, or a question mark and a number (?) for a directory display of a particular partition. The default is the first read/write partition.

Switch# **copy rcp flash**

System flash partition information:

<table>
<thead>
<tr>
<th>Partition</th>
<th>Size</th>
<th>Used</th>
<th>Free</th>
<th>Bank-Size</th>
<th>State</th>
<th>Copy-Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4096K</td>
<td>2048K</td>
<td>2048K</td>
<td>2048K</td>
<td>Read Only</td>
<td>RXBOOT-FLH</td>
</tr>
<tr>
<td>2</td>
<td>4096K</td>
<td>2048K</td>
<td>2048K</td>
<td>2048K</td>
<td>Read/Write</td>
<td>Direct</td>
</tr>
</tbody>
</table>

[Type ? no for partition directory; ? for full directory; q to abort]

Which partition? [default = 2]

If the partition is read-only and has dual-Flash bank support in boot ROM, the session continues as shown in the following display.

```
**** NOTICE ****
Flash load helper v1.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
```
Users with console access can see the results of the copy operation.

Proceed? [confirm]
System flash directory, partition 1:
File Length Name/status
  1 3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx.100.4.3
Destination file name [default = source name]?

The file is copied into the partition given by the user earlier.

Loading master/igs-bfpx.100-4.3 from 131.108.1.111:!
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes

If the partition is read-write, the session continues as follows.

System flash directory, partition 2:
File Length Name/status
  1 3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx.100-4.3
Destination file name [default = source name]?

The file is copied into the partition given by the user earlier.

Accessing file ‘master/igs-bfpx.100-4.3’ on ABC.CISCO.COM...
Loading master/igs-bfpx.100-4.3 from 131.108.1.111:!
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes

The following example uses the `copy rcp device` command to copy the `switch-image` file from a network server using rcp to the Flash memory card inserted in slot 0 of the route processor card.

Switch# copy rcp slot0:switch-image

<table>
<thead>
<tr>
<th>Related Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command</strong></td>
</tr>
<tr>
<td><code>boot config</code></td>
</tr>
<tr>
<td><code>boot system flash</code></td>
</tr>
<tr>
<td><code>config-register</code></td>
</tr>
<tr>
<td><code>copy flash rcp</code></td>
</tr>
<tr>
<td><code>copy running-config rcp</code></td>
</tr>
<tr>
<td><code>copy running-config startup-config</code></td>
</tr>
<tr>
<td><code>copy startup-config rcp</code></td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip rcmd remote-username</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><code>show bootvar</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
**copy running-config**

To copy the switch router’s running configuration file to another destination, use the `copy running-config` privileged EXEC command.

```
copy running-config { rcp | startup-config | tftp | device:filename }
```

**Syntax Description**

- **rcp** Specifies a server as the destination of the copy operation.
- **startup-config** Specifies the configuration used for initialization as the destination of the copy operation.
- **tftp** Specifies a TFTP server as the destination of the copy operation.
- **device:filename** Specifies a `device:filename` as the destination of the copy operation. The `device` is optional, but when used, the colon (:) is required. Valid devices are as follows:
  - `bootflash`: is the internal Flash memory.
  - `sec-bootflash`: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)
  - `nvram`: is the NVRAM on the route processor card.
  - `sec-nvram`: is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)
  - `slot0`: is the first PC slot on the route processor card and is the initial default device.
  - `sec-slot0`: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)
  - `slot1`: is the second PC slot on the route processor card.
  - `sec-slot1`: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)

The `filename` is the name of the destination file. You must always provide a source `filename`. You can omit the destination `filename`, in which case the system uses the source `filename`. Wildcards are not permitted. The maximum `filename` length is 63 characters.

**Defaults**

If you omit the destination device, the switch router uses the default device specified by the `cd` command. If you omit the destination `filename`, the switch router uses the source `filename`.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

Save the configuration file to your startup configuration. This setup saves the configuration to the location specified by the `config_file` environment variable.

The `copy running-config startup-config` command replaces the `write memory` command.
The `copy running-config rcp` or `copy running-config tftp` command replaces the `write network` command.

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>boot config</code></td>
<td>Used to modify the device and filename of the configuration file from which the switch configures itself during initialization.</td>
</tr>
<tr>
<td><code>boot system flash</code></td>
<td>Boots the switch router from internal Flash memory.</td>
</tr>
<tr>
<td><code>cd</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><code>config-register</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><code>copy running-config startup-config</code></td>
<td>Copies the switch router’s running configuration file to another destination, and specifies the configuration used for initialization as the destination of the copy operation.</td>
</tr>
<tr>
<td><code>copy startup-config rcp</code></td>
<td>Copies the switch router’s startup configuration file to another destination, and specifies an <code>rcp</code> server as the destination of the copy operation.</td>
</tr>
</tbody>
</table>
copy startup-config

To copy the switch router’s startup configuration file to another destination, use the `copy startup-config` privileged EXEC command.

```
copy startup-config { rcp | running-config | tftp | device:filename }
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>running-config</code></td>
<td>Specifies the currently running configuration as the destination of the copy operation.</td>
</tr>
<tr>
<td><code>startup-config</code></td>
<td>Specifies the configuration used for initialization as the destination of the copy operation.</td>
</tr>
<tr>
<td><code>rcp</code></td>
<td>Specifies an rcp server as the destination of the copy operation.</td>
</tr>
<tr>
<td><code>tftp</code></td>
<td>Specifies a TFTP server as the destination of the copy operation.</td>
</tr>
<tr>
<td><code>device:filename</code></td>
<td>Specifies a <code>device:filename</code> as the destination of the copy operation. The <code>device</code> argument is optional, but when it is used, the colon (:) is required. Valid devices are as follows:</td>
</tr>
<tr>
<td>- <code>bootflash:</code></td>
<td>is the internal Flash memory.</td>
</tr>
<tr>
<td>- <code>sec-bootflash:</code></td>
<td>is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>- <code>nvram:</code></td>
<td>is the NVRAM on the route processor card.</td>
</tr>
<tr>
<td>- <code>sec-nvram:</code></td>
<td>is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>- <code>slot0:</code></td>
<td>is the first PC slot on the route processor card and is the initial default device.</td>
</tr>
<tr>
<td>- <code>sec-slot0:</code></td>
<td>is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>- <code>slot1:</code></td>
<td>is the second PC slot on the route processor card.</td>
</tr>
<tr>
<td>- <code>sec-slot1:</code></td>
<td>is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
</tbody>
</table>

The filename argument is the name of the destination file. You must always provide a source filename. You can omit the destination filename, in which case the system uses the source filename. Wildcards are not permitted. The maximum filename length is 63 characters.

### Defaults

If you omit the destination device, the switch router uses the default device specified by the `cd` command. If you omit the destination filename, the switch router uses the source filename.

### Command Modes

Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
The `copy` commands generally copy a file from a source to a destination. Some invalid combinations exist. Specifically, you cannot copy a running configuration to a running configuration, a startup configuration to a startup configuration, or TFTP to rcp.

This command copies the configuration file pointed to by the `config_file` environment variable to another destination. To view the contents of the `config_file` environment variable, use the `show bootvar` command. To modify the `config_file` environment variable, use the `boot config` command.

The `rcp` protocol requires that a client send the remote username of an `rcp` request to the server. When you issue the `copy startup-config-rcp` command, by default the switch router software sends the username associated with the current TTY if that name is valid. For example, if the user is connected to the switch router software through Telnet and the user was authenticated through the `username` command, the switch router sends that username as the remote username.

For Cisco, TTYs are commonly used in communication servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called TTY devices, which stands for teletype, the original UNIX terminal.

To specify a different remote username to be sent to the server, use the `ip rcmd remote-username` command. You can also specify the path of an existing directory along with the remote username.

The remote username must be associated with an account on the destination server. If you do not use the `ip rcmd remote-username` command to specify the name of a remote user associated with an account on the server, the remote username associated with the current TTY process must be associated with an account on the server. If there is no username for the current TTY process, the switch router host name must be associated with an account on the server. If the network administrator of the destination server did not establish accounts for the remote username used, this command does not execute successfully when a default remote username is used.

If you copy the configuration file to a personal computer used as a server, the computer must support the rsh protocol.

The following example uses the `copy startup-config` command to copy the startup configuration file (specified by the `config_file` environment variable) to a Flash memory card inserted in slot 0 of the route processor card.

```
Switch# copy startup-config slot0:switch-config
```

The following is sample output from the `copy startup tftp` command.

```
Switch# copy startup tftp
Remote host []? 172.20.46.50
Name of configuration file to write [Switch-config]? tftpboot/test-config
Write file tftpboot/test-config on host 172.20.46.50? [confirm]
Writing tftpboot/test-config !! [OK]
```

The following example is sample output from the `copy startup tftp` command.

```
Switch# copy startup tftp
Remote host []? 172.20.46.50
Name of configuration file to write [Switch-config]? tftpboot/test-config
Write file tftpboot/test-config on host 172.20.46.50? [confirm]
Writing tftpboot/test-config !! [OK]
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>boot config</code></td>
<td>Used to modify the device and filename of the configuration file from which the switch configures itself during initialization.</td>
</tr>
<tr>
<td><code>cd</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>copy rcp</td>
<td>Copies a file from a network server to the switch or to another destination using rcp.</td>
</tr>
<tr>
<td>copy running-config</td>
<td>Copies the switch’s running configuration file to another destination.</td>
</tr>
<tr>
<td>ip rcmd remote-username</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td>show bootvar</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
**copy tftp**

To copy a file from a TFTP server to the switch router or to another destination, use the `copy tftp` privileged EXEC commands.

```
copy tftp {running-config | startup-config | device:filename}
```

**Syntax Description**

- `running-config`: Specifies the currently running configuration as the destination of the copy operation.
- `startup-config`: Specifies the configuration used for initialization as the destination of the copy operation.
- `device:filename`: Specifies a `device:filename` as the destination of the copy operation. The `device` is optional, but when used, the colon (:) is required. Valid devices are as follows:
  - `bootflash`: is the internal Flash memory.
  - `sec-bootflash`: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)
  - `nvram`: is the NVRAM on the route processor card.
  - `sec-nvram`: is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)
  - `slot0`: is the first PC slot on the route processor card and is the initial default device.
  - `sec-slot0`: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)
  - `slot1`: is the second PC slot on the route processor card.
  - `sec-slot1`: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)

The `filename` is the name of the destination file. You must always provide a source filename. You can omit the destination filename, in which case the system uses the source filename. Wildcards are not permitted. The maximum filename length is 63 characters.

**Defaults**

If you omit the destination device, the switch router uses the default device specified by the `cd` command. If you omit the destination filename, the switch router uses the source filename. If you enter a `cd` command to the device, then that device becomes the default. For example, if you enter `cd slot0:` and then enter `copy tftp bootflash`, then “flash” means slot0.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

Refer to the following guidelines:

- The system prompts for the address of the TFTP server and TFTP filename if you do not provide them at the command line.
- The system provides an option to erase existing internal Flash memory before copying to internal Flash memory.
- The entire copying process takes several minutes and differs from network to network.

Table 4-1 The following table describes the characters that you might see during processing of the `copy tftp` command.

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>An exclamation point indicates that the copy process is taking place. Each exclamation point indicates that ten packets (512 bytes each) have been successfully transferred.</td>
</tr>
<tr>
<td>.</td>
<td>A period indicates the copy process timed out. Many periods in a row typically mean that the copy process might fail.</td>
</tr>
<tr>
<td>O</td>
<td>An uppercase O indicates a packet was received out of order and the copy process might fail.</td>
</tr>
<tr>
<td>e</td>
<td>A lowercase e indicates a device is being erased.</td>
</tr>
<tr>
<td>E</td>
<td>An uppercase E indicates an error and the copy process might fail.</td>
</tr>
<tr>
<td>V</td>
<td>A series of uppercase Vs indicates the progress during the verification of the image checksum.</td>
</tr>
</tbody>
</table>

When you enter the `copy tftp flash` command, the Flash memory checksum image displays on the bottom of the screen. Before booting from Flash memory, verify that this checksum identifier matches the checksum listed in the README file that was distributed with the system software image. You can find the README file on the TFTP server.

Caution

If the checksum value is not correct according to the value in the README file, do not reboot the switch. Enter the `copy tftp flash` command and compare the checksums again. If the checksum is wrong, copy the original system software image back into Flash memory before you reboot the switch from Flash memory. If you have a corrupted image in Flash memory and try to boot from Flash, the switch router starts the system image contained in ROM (assuming booting from a network server is not configured). If ROM does not contain a fully functional system image, the switch router cannot function and must be reconfigured through a direct console port connection.

Note

When using TFTP, the `copy tftp running-config` command replaces the `configure network` command and the `copy tftp startup-config` command replaces the `configure overwrite-network` command.

The `copy` commands generally copy a file from a source to a destination. Some invalid combinations exist. Specifically, you cannot copy a running configuration to a running configuration, a startup configuration to a startup configuration, or TFTP to rcp.

The following example shows how to use the `copy tftp bootflash` command.

```
Switch# copy tftp bootflash
```
Copy from TFTP server:

**Boot flash directory:**
**File**  **Length**  **Name/status**
1 2622607  ls1010-xboot

[2622672 bytes used, 1571632 available, 4194304 total]

Address or name of remote host [255.255.255.255]? 223.255.254.254
Source file name? ls1010-xboot.101
Destination file name [ls1010-xboot.101]?
Accessing file 'ls1010-xboot.101' on 223.255.254.254...
Loading ls1010-xboot.101 from 223.255.254.254 (via Ethernet0): ! [OK]

Erase flash device before writing? [confirm]
Flash contains files. Are you sure you want to erase? [confirm]

Copy 'ls1010-xboot.101' from TFTP server into bootflash as 'ls1010-xboot.101' WITH erase? [yes/no] yes
Erasing device... eeeeeeexxxxxxxxxx erased
Loading ls1010-xboot.101 from 223.255.254.254 (via Ethernet0): !!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 2622607/4194304 bytes]

Verifying checksum... OK (0xE408)
Flash copy took 0:00:10 [hh:mm:ss]

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>boot config</strong></td>
<td>Used to modify the device and filename of the configuration file from which the switch configures itself during initialization.</td>
</tr>
<tr>
<td><strong>boot system</strong></td>
<td>Specifies the system image that the switch router loads at startup.</td>
</tr>
<tr>
<td><strong>cd</strong></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><strong>copy flash</strong></td>
<td>Copies a file from Flash memory to another destination.</td>
</tr>
<tr>
<td><strong>show flash</strong></td>
<td>Displays the layout and contents of Flash memory.</td>
</tr>
<tr>
<td><strong>verify</strong></td>
<td>Verifies the checksum of a file on a Flash device.</td>
</tr>
</tbody>
</table>
crypto key

To generate an RSA key-pair and enable the local and remote SSH server, use the `crypto key` privileged EXEC command.

```
crypto key {{ generate rsa [usage-keys] [modulus modulus-value] } |
                { pubkey-chain rsa | zeroize rsa }}
```

**Syntax Description**

- **generate rsa** Generates an RSA key-pair and enables the SSH server.
- **usage-keys** (Optional) Specifies that two RSA special usage key-pairs should be generated (that is, one encryption pair and one signature pair), instead of one general-purpose key-pair.
- **modulus** (Optional) Enables the key modulus.
- **modulus-value** Configures the size of the key modulus, in the range of 360 to 2048.
- **pubkey-chain rsa** Allows peer public key chain management.
- **zeroize rsa** Deletes the RSA key-pair and disables the SSH server.

**Defaults**

Disabled

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(19)EB</td>
<td>Added support for RSA key pair duplication on the new primary route processor after manual switchover.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command generates an RSA (Rivest, Shamir, and Adleman public-key algorithm) key-pair.

If your SSH configuration commands are rejected as illegal commands, you have not successfully generated the RSA key-pair.

When configuring the RSA key-pair, you might see the following error messages:

- **No hostname specified**

  The error indicates you must configure a host name for the switch router using the `hostname` global configuration command.

- **No domain specified**

  The error indicates you must configure a host domain for the switch router using the `ip domain-name` global configuration command.

When you generate RSA keys, you could enter a `modulus` length. A longer modulus could offer stronger security, but takes longer to generate and takes longer to use. Below 512 is normally not recommended. (Cisco recommends using a minimum modulus of 1024.)
The crypto key generate rsa command is not displayed in the show running-config command output.

When you use the redundancy force-failover main-cpu (Catalyst 8540 MSR) command to manually force the secondary route processor to take over as the primary route processor the SSH RSA key-pair is automatically generated on the new primary route processor. This ensures that the SSH server is enabled on the switch router even after route processor switchover and allows you to start configuring the new primary route processor using a new SSH connection without reloading the switch router.

Examples

The following example generates an RSA key-pair and enables the SSH server for local and remote authentication.

```
Switch(config)# crypto key generate rsa modulus 512
The name for the keys will be: test.cisco

% The key modulus size is 512 bits
Generating RSA keys ...
[OK]
```

```
Switch(config)#
02:59:14: %SSH-5-ENABLED: SSH 1.5 has been enabled
```

The following example disables the RSA key-pair and SSH.

```
Switch(config)# crypto key zeroize rsa
% Keys to be removed are named test.cisco.
Do you really want to remove these keys? [yes/no]: y
```

```
Switch(config)#
03:03:02: %SSH-5-DISABLED: SSH 1.5 has been disabled
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ssh</td>
<td>Starts an encrypted session with a remote networking device.</td>
</tr>
<tr>
<td>show ip ssh</td>
<td>Displays the SSH connections.</td>
</tr>
<tr>
<td>show ip ssh</td>
<td>Displays the SSH connections.</td>
</tr>
<tr>
<td>show crypto</td>
<td>Displays the encryption module and configuration.</td>
</tr>
</tbody>
</table>
D Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**
Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**
Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
debug atm accounting

To enable debugging for ATM accounting, use the `debug atm accounting` EXEC command. To disable debugging, use the `no` form of this command.

```
debug atm accounting errors | events
no debug atm accounting errors | events
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>errors</td>
<td>Logs significant errors to the console.</td>
</tr>
<tr>
<td>events</td>
<td>Logs significant events to the console.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

EXEC

**Note**

Not all of the `debug` commands are included in this publication. For a complete guide to the debug commands, refer to the `Debug Command Reference` publication.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm conn

To enable debugging for ATM connection management, use the `debug atm conn` privileged EXEC command. To disable debugging, use the `no` form of this command.

```
debug atm conn {bitmap {errors | events} | errors | events | mib}
no debug atm conn {bitmap {errors | events} | errors | events | mib}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bitmap</td>
<td>Enables ATM connection bitmap management debugging.</td>
</tr>
<tr>
<td>errors</td>
<td>Enables ATM connection management errors debugging.</td>
</tr>
<tr>
<td>events</td>
<td>Enables ATM connection management events debugging.</td>
</tr>
<tr>
<td>mib</td>
<td>Enables ATM connection management MIB debugging.</td>
</tr>
</tbody>
</table>

### Defaults

Disabled

### Command Modes

Privileged EXEC

### Note

Not all of the `debug` commands are included in this publication. For a complete guide to the `debug` commands, refer to the `Debug Command Reference` publication.

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm oam-all

To enable all the debug flags for the OAM, use the `debug atm oam-all` privileged EXEC command. To disable the debug flags, use the `no` form of the command.

```
debug atm oam-all

no debug atm oam-all
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Privileged EXEC

⚠️ **Caution**
This command can generate a significant amount of output when it is implemented.

📝 **Note**
Not all of the `debug` commands are included in this publication. For a complete guide to the debug commands, refer to the *Debug Command Reference* publication.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm oam-pkt

To display the transmit and receive OAM traffic, use the `debug atm oam-pkt` privileged EXEC command. This command also decodes individual OAM cells. To disable OAM traffic debugging, use the `no` form of the command.

```plaintext
ddebug atm oam-pkt

no debug atm oam-pkt
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Privileged EXEC

**Note**
Not all of the `debug` commands are included in this publication. For a complete guide to the debug commands, refer to the *Debug Command Reference* publication.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm pnni

To enable PNNI debugging output, use the following `debug atm pnni` privileged EXEC commands. To disable PNNI debugging output, use the `no` form of these commands.

```
debug atm pnni adj-events
debug atm pnni adj-packet
debug atm pnni aggregation
debug atm pnni all
debug atm pnni api
debug atm pnni election
debug atm pnni flood-packet
debug atm pnni hello-packet
debug atm pnni rm [local-node node-index]
debug atm pnni route-all
debug atm pnni route-errors
debug atm pnni snmp
debug atm pnni svcc-rcc
debug atm pnni topology
```

```
no debug atm pnni adj-events
no debug atm pnni adj-packet
no debug atm pnni aggregation
no debug atm pnni all
no debug atm pnni api
no debug atm pnni election
no debug atm pnni flood-packet
no debug atm pnni hello-packet
no debug atm pnni rm [local-node node-index]
no debug atm pnni route-all
no debug atm pnni route-errors
no debug atm pnni snmp
no debug atm pnni svcc-rcc
no debug atm pnni topology
```

### Syntax Description

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>adj-events</code></td>
<td>Turns on adjacency-related event debugging. The feature can be turned on for a specific PNNI interface.</td>
</tr>
<tr>
<td><code>adj-packet</code></td>
<td>Turns on database summary and request packet debugging. The feature can be turned on for a specific PNNI interface.</td>
</tr>
<tr>
<td><code>aggregation</code></td>
<td>Turns on link aggregation debugging.</td>
</tr>
<tr>
<td><code>all</code></td>
<td>Turns on all PNNI debugging. The feature can be turned on for a specific PNNI interface.</td>
</tr>
<tr>
<td><code>api</code></td>
<td>Turns on application interface debugging.</td>
</tr>
<tr>
<td><code>election</code></td>
<td>Turns on PGL PNNI election debugging.</td>
</tr>
<tr>
<td><code>flood-packet</code></td>
<td>Turns on PTSP and ACK packet debugging.</td>
</tr>
<tr>
<td><code>hello-packet</code></td>
<td>Turns on Hello packet debugging. The feature can be turned on for a specific PNNI interface.</td>
</tr>
<tr>
<td><code>rm</code></td>
<td>Turns on resource management debugging. Debugging output can be limited to a single node using the <code>local-node node-index</code> option.</td>
</tr>
</tbody>
</table>
### debug atm pnni

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>route-all</td>
<td>Turns on all route debugging.</td>
</tr>
<tr>
<td>route-errors</td>
<td>Turns on PNNI route errors debugging.</td>
</tr>
<tr>
<td>snmp</td>
<td>Turns on debugging of SNMP events (get and set) related to the PNNI MIBs.</td>
</tr>
<tr>
<td>svcc-rcc</td>
<td>Turns on debugging for SVCC RCC setup, SVCC Hello processing, and horizontal link extension processing.</td>
</tr>
<tr>
<td>topology</td>
<td>Turns on internal topology maintenance debugging.</td>
</tr>
</tbody>
</table>

#### Defaults

Disabled

#### Command Modes

Privileged EXEC

#### Note

Not all of the `debug` commands are included in this publication. For a complete guide to the `debug` commands, refer to the *Debug Command Reference* publication.

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm pnni mobility

Prints console messages relating to mobile PNNI status if the **debug atm pnni mobility** command is enabled.

```
debug atm pnni mobility

no debug atm pnni mobility
```

### Syntax Description
None

### Defaults
Disabled.

### Command Modes
Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines
Debug messages are logged onto the console if console logging is enabled. Debug messages are logged in the syslog buffer if console logging is disabled.

### Examples
```
Switch# debug atm pnni mobility
PNNI Mobility debugging is on
Switch#
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm address</td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td>atm pnni mobile</td>
<td>Used to specify a PNNI interface as mobile.</td>
</tr>
<tr>
<td>atm pnni nodal-hierarchy-list highest-level</td>
<td>Specifies highest level of PNNI hierarchy, within a fixed network, to be advertised to mobile networks.</td>
</tr>
<tr>
<td>atm router pnni</td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td>node</td>
<td>Creates, enables or gs switch nodes as well as specifies or changes node level.</td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni mobility-info</code></td>
<td>Displays lowest node and logical node information associated with PNNI mobility.</td>
</tr>
<tr>
<td><code>show atm pnni node</code></td>
<td>Shows whether PNNI nodes are enabled and running, and shows node configuration information.</td>
</tr>
</tbody>
</table>
debug atm rm

To enable the debug printout messages for ATM resource manager, use the `debug atm rm` privileged EXEC command. To disable the printout message, use the `no` form of this command.

```
debug atm rm errors
debug atm rm events
debug atm rm pnni-api

no debug atm rm errors
no debug atm rm events
no debug atm rm pnni-api
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Disabled

**Command Modes**

Privileged EXEC

**Caution**

This command can generate a significant amount of output and can interfere with other activity on the switch when it is implemented.

**Note**

Not all of the `debug` commands are included in this publication. For a complete guide to the `debug` commands, refer to the *Debug Command Reference* publication.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug atm sig

To debug the ATM signalling module, use the `debug atm sig` privileged EXEC commands. To disable the debugging, use the `no` form of these commands.

```
debug atm sig-all
  debug atm sig-error [atm card/subcard/port]
  debug atm sig-events [atm card/subcard/port]
  debug atm sig-ie [atm card/subcard/port]
  debug atm sig-nni [atm card/subcard/port]
  debug atm sig-packets [atm card/subcard/port]

no debug atm sig-all
  no debug atm sig-error [atm card/subcard/port]
  no debug atm sig-events [atm card/subcard/port]
  no debug atm sig-ie [atm card/subcard/port]
  no debug atm sig-nni [atm card/subcard/port]
  no debug atm sig-packets [atm card/subcard/port]
```

Syntax Description

- **sig-all**: Turns on the debug output for all of the above conditions.
- **sig-error**: Turns on the debug output for the ATM signalling error conditions.
- **sig-events**: Turns on the debug output for the ATM signalling state machine events.
- **sig-ie**: Turns on the debug output for the ATM signalling messages information element encoding.
- **sig-nni**: Turns on the debug output for the ATM signalling NNI state machine events.
- **sig-packets**: Turns on the debug output for the ATM signalling packets.
- **card/subcard/port**: Specifies the card, subcard, and port number for the ATM interface.

Defaults

Disabled

Command Modes

Privileged EXEC

Note

Not all of the `debug` commands are included in this publication. For a complete guide to the debug commands, refer to the *Debug Command Reference* publication.

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug diag online (Catalyst 8540 MSR)

To enable online diagnostic debugging output, use the `debug diag online` command. To disable debugging, use the `no` form of the command.

```
d debug diag online [access | oir | snake]
  no debug diag online [access | oir | snake]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
</table>
| access   | The access tests ensure connectivity at a configurable interval between the primary route processor and the following:  
  - Active switch processors  
  - Standby switch processor, if it is present  
  - Feature cards  
  - Port adapters  
  - Interface modules  

Whenever the access test detects a hardware failure, the system issues an error message to the console.

If the access test detects a hardware problem with an active switch processor, the standby switch processor, if present, automatically takes over and becomes an active switch processor. The system generates an SNMP trap when the switchover occurs.

<table>
<thead>
<tr>
<th>oir</th>
<th>Online insertion and removal (OIR) tests check the functioning of the switch fabric and interfaces on a per-port basis. The switch router performs these tests when the system boots up and when you insert a port adapter or interface module into a slot. The OIR test sends a packet to the interface loopback and expects to receive it back within a certain time period. If the packet does not reach the port within the expected time period, or the route processor receives a corrupted packet, the system issues an error message to the console, generates an SNMP trap, and brings the port to an administrative down state.</th>
</tr>
</thead>
</table>

| snake     | The snake test establishes a connection across all the active ports in the switch router, originating and terminating at the primary route processor. The route processor establishes a connection by sending a packet to each port in turn, which then terminates at the route processor. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, further testing is performed to isolate and disable the port causing the problem. The size of the packet and frequency of the test are configurable to minimize the impact on system performance.  

The snake test supports all ATM interface modules and enhanced Gigabit Ethernet interface modules. It does not support ATM port adapters, Fast Ethernet interface modules, or Gigabit Ethernet interface modules. |
|----------|-------------|

**Defaults**

Disabled.

**Command Modes**

Privileged EXEC
**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Debug messages are logged onto the console if console logging is enabled. Debug messages are logged in the syslog buffer if console logging is disabled.

**Examples**

Using the `debug diag online` command in the example shown below will cause diagnostic test results to be displayed at the console.

```
Switch# debug diag online oir
Online Dig OIR Test debugging is on
Switch#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>diag online</code> (Catalyst 8540 MSR)</td>
<td>Enables, disables, and configures system diagnostics.</td>
</tr>
<tr>
<td><code>show diag online</code> (Catalyst 8540 MSR)</td>
<td>Displays test results for any diagnostic test that is enabled.</td>
</tr>
</tbody>
</table>
debug ncdp

To display NCDP errors, events, and packet information, use the `debug ncdp` command. To disable ncdp debugging, use the `no` form of this command.

```
debug ncdp {errors | events | packets}

no debug ncdp {errors | events | packets}
```

### Syntax Description

- **errors**: Displays NCDP errors, such as “extract-clock failed.”
- **events**: Displays NCDP events, such as a “switch vector update.”
- **packets**: Displays NCDP messages. This option generates significant output.

### Defaults

Disabled

### Command Modes

Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug sgcp errors

To enable the production of debug information on exceptional conditions encountered in the use of SGCP to control the interconnection of CES circuits, use the debug sgcp errors privileged EXEC command. To disable debugging, use the no form of this command.

```
depg sgcp errors
no debug sgcp errors
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The debug output consists of exceptional events, which should not occur during normal operations. However, these exceptions are not indicative of a software failure.

**Examples**
The following example enables the debugging of SGCP error events.

```
Switch# debug sgcp errors
Simple Gateway Control Protocol errors debugging is on
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug sgcp events</td>
<td>Enables the production of debug information on significant events encountered in the use of SGCP to control the interconnection of CES circuits.</td>
</tr>
<tr>
<td>debug sgcp packets</td>
<td>Enables the production of SGCP packets received to control the interconnection of CES circuits.</td>
</tr>
</tbody>
</table>
debug sgcp events

To enable the production of debug information on significant events encountered in the use of SGCP to control the interconnection of CES circuits, use the **debug sgcp events** privileged EXEC command. To disable debugging, use the **no** form of this command.

```
debug sgcp events

no debug sgcp events
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The principle debug output includes circuit state changes that occur because of SGCP packet and CES circuit events.

**Examples**
The following example enables the debugging of SGCP events.

```
Switch# debug sgcp events
Simple Gateway Control Protocol events debugging is on
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>debug ncdp</strong></td>
<td>Displays NCDP errors and/or events.</td>
</tr>
<tr>
<td><strong>debug sgcp packets</strong></td>
<td>Enables the production of SGCP packets received to control the interconnection of CES circuits.</td>
</tr>
</tbody>
</table>
debug sgcp packets

To enable the production of SGCP packets received to control the interconnection of CES circuits, use the debug sgcp packets privileged EXEC command. To disable debugging, use the no form of this command.

debug sgcp packets

no debug sgcp packets

Syntax Description
This command has no arguments or keywords.

Defaults
Disabled

Command Modes
Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
This command produces the most verbose output of the SGCP debug commands.

Examples
The following example enables the debugging of SGCP packets.

Switch# debug sgcp packets
Simple Gateway Control Protocol packets debugging is on

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug ncdp</td>
<td>Displays NCDP errors and/or events.</td>
</tr>
<tr>
<td>debug sgcp events</td>
<td>Enables the production of SGCP packets received to control the interconnection of CES circuits.</td>
</tr>
</tbody>
</table>
### debug sscop

To debug the ATM signalling SSCOP, use the following **debug sscop** privileged EXEC commands. To return the debug SSCOP to the default, use the **no** form of this command.

```
debug sscop errors [atm card/subcard/port]
debug sscop events [atm card/subcard/port]
debug sscop packets [atm card/subcard/port]

no debug sscop errors [atm card/subcard/port]
no debug sscop events [atm card/subcard/port]
no debug sscop packets [atm card/subcard/port]
```

#### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>errors</td>
<td>Turns on the debug output for the SSCOP error conditions.</td>
</tr>
<tr>
<td>events</td>
<td>Turns on the debug output for the SSCOP state machine events.</td>
</tr>
<tr>
<td>packets</td>
<td>Turns on the debug output for the SSCOP packets.</td>
</tr>
<tr>
<td>atm card/subcard/port</td>
<td>Specifies the card, subcard, and port number of the ATM interface.</td>
</tr>
</tbody>
</table>

#### Defaults

Disabled

#### Command Modes

- **Global configuration**
- **Interface configuration** when `atm card/subcard/port` is specified.

#### Note

Not all of the **debug** commands are included in this publication. For a complete guide to the debug commands, refer to the *Debug Command Reference* publication.

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
debug tag-switching

To debug the tag-switching configuration, use the `debug tag-switching` privileged EXEC commands. To disable tag-switching debugging, use the `no` form of these commands.

```
depth tag-switching
  adjaceny
  debug tag-switching atm-tdp api
  debug tag-switching atm-tdp routes
  debug tag-switching atm-tdp states
  debug tag-switching packets [if-type] [card/subcard/port]
  debug tag-switching tdp advertisements
  debug tag-switching tdp bindings
  debug tag-switching tdp directed-neighbors
  debug tag-switching tdp peer state-machine
  debug tag-switching tdp pies [received [all] | sent [all]]
  debug tag-switching tdp session [io [all] | state-machine]
  debug tag-switching tdp transport {connections | events | timers}
  debug tag-switching tsp-tunnels events
  debug tag-switching tsp-tunnels signalling
  debug tag-switching tsp-tunnels tagging

no debug tag-switching
  no debug tag-switching atm-tdp api
  no debug tag-switching atm-tdp routes
  no debug tag-switching atm-tdp states
  no debug tag-switching packets [if-type] [card/subcard/port]
  no debug tag-switching tdp advertisements
  no debug tag-switching tdp bindings
  no debug tag-switching tdp directed-neighbors
  no debug tag-switching tdp peer state-machine
  no debug tag-switching tdp pies [received [all] | sent [all]]
  no debug tag-switching tdp session [io [all] | state-machine]
  no debug tag-switching tdp transport {connections | events | timers}
  no debug tag-switching tsp-tunnels events
  no debug tag-switching tsp-tunnels signalling
  no debug tag-switching tsp-tunnels tagging
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>adjacency</td>
<td>Displays changes to tag switching entries in the adjacency database. Use this option to monitor instances when entries are updated or added to the adjacency database.</td>
</tr>
<tr>
<td>atm-tdp api</td>
<td>Displays information about the VCI allocation of TVCs, free, and cross-connect requests. Use the <code>debug tag-switching atm-tdp api</code> command with the <code>debug tag-switching atm-tdp states</code> command to display more complete information about a TVC.</td>
</tr>
<tr>
<td>atm-tdp routes</td>
<td>Displays information about the state of the routes for which VCI requests are being made. See also “Usage Guidelines.”</td>
</tr>
<tr>
<td>atm-tdp states</td>
<td>Displays information about TVC state transitions as they occur. See also “Usage Guidelines.”</td>
</tr>
</tbody>
</table>
### debug tag-switching

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>packets</strong></td>
<td>Displays tagged packets switched by this system. The optional <em>if-type</em> (<em>atm</em>, <em>atm-p</em>, <em>cbr</em>, <em>ethernet</em>, or <em>null</em>) and <em>card/subcard/port</em> arguments restrict the display to those packets received or transmitted on the specified interface type or number. This command should be used with care because it generates output for every packet processed. Furthermore, enabling this command causes fast and distributed tag switching to be disabled for the selected interfaces. Use this command only when traffic on the network is low, so other activity on the system is not adversely affected.</td>
</tr>
<tr>
<td><strong>tdp advertisements</strong></td>
<td>Displays information about the advertisement of tags and interface addresses to TDP peers.</td>
</tr>
<tr>
<td><strong>tdp bindings</strong></td>
<td>Displays information about changes to the TIB used to keep track of tag bindings learned from TDP peers through TDP downstream tag distribution.</td>
</tr>
<tr>
<td><strong>tdp directed-neighbors</strong></td>
<td>Displays information about TDP directed-neighbor events.</td>
</tr>
<tr>
<td><strong>tdp peer</strong></td>
<td>Displays information about state transitions at the tag distribution level. See also “Usage Guidelines.”</td>
</tr>
<tr>
<td><strong>tdp pies</strong></td>
<td>Displays information about TDP PIEs received from (received) or sent to (sent) TDP peers. TDP requires periodic transmission of keepalive PIEs. If you do not specify the <em>all</em> option, periodic keepalive PIEs are not displayed.</td>
</tr>
<tr>
<td><strong>tdp session</strong></td>
<td>Displays TDP session information. See also “Usage Guidelines.”</td>
</tr>
<tr>
<td><strong>tdp transport</strong></td>
<td>Used with the <em>connections</em> keyword, this command displays information about the TCP connections used to support TDP sessions. Used with the <em>events</em> keyword, this command displays information about the events related to the TDP peer discovery mechanism, which is used to determine the devices with which to establish TDP sessions. Used with the <em>timers</em> keyword, this command displays TDP discovery and transport timer activity. See also “Usage Guidelines.”</td>
</tr>
<tr>
<td><strong>tsp-tunnels events</strong></td>
<td>Displays TSP tunnels events.</td>
</tr>
<tr>
<td><strong>tsp-tunnels signalling</strong></td>
<td>Displays TSP tunnels signalling.</td>
</tr>
<tr>
<td><strong>tsp-tunnels tagging</strong></td>
<td>Displays TSP tunnels tagging.</td>
</tr>
</tbody>
</table>

**Defaults** Disabled

**Command Modes** Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

When there are a large number of routes and a number of system activities (shutting down interfaces, learning new routes, and so on), the `debug tag-switching atm-tdp routes` and `debug tag-switching atm-tdp states` commands display a lot of information that might interfere with system timing. Most commonly, this affects the normal operation of TDP. You should increase the holdtime value of the TDP by using the `tag-switching tdp holdtime` command.

TDP sessions are supported by data structures and state machines at three levels:

- **Transport**—TCP connections used to support TDP sessions are established and maintained at the transport level.
- **Protocol**—The protocol level implements the TDP session setup protocol, and deals with constructing and parsing TDP PDUs and PIEs.
- **Tag distribution**—The tag distribution level uses TDP sessions to exchange tags with TDP peers.

The `debug tag-switching tdp transport` commands provide visible activity at the transport level, the `debug tag-switching tdp session` commands at the protocol level, and the `debug tag-switching tdp peer state-machine` command at the tag distribution level.
dest-address (point-to-multipoint ATM soft PVC)

To configure the destination address, VPI, and VCI of the ATM soft PVC point-to-multipoint party connection, use the `dest-address` configuration command.

```
dest-address atm-address dest-vpi dest-vci
```

## Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm-address</code></td>
<td>ATM address for the destination port.</td>
</tr>
<tr>
<td><code>dest-vpi</code></td>
<td>Destination VPI number.</td>
</tr>
<tr>
<td><code>dest-vci</code></td>
<td>Destination VCI number.</td>
</tr>
</tbody>
</table>

## Defaults

None.

## Command Modes

ATM soft PVC point-to-multipoint party leaf reference

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

## Usage Guidelines

There are two ways to delete the destination address, VPI, and VCI of the ATM soft PVC point-to-multipoint party leaf connection. You can delete either the entire ATM soft PVC connection or just the party leaf reference number.

## Examples

The following example shows how to configure a destination address, VPI, and VCI for an ATM soft PVC point-to-multipoint party leaf connection.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface atm 0/1/0
Switch(config-if)# atm soft-vc 4 44 p2mp
Switch(atmsoft-p2mp)# party leaf-reference 2
Switch(atmsoft-p2mp-party)# dest-address 47.0091.8100.0000.0010.11bf.3a01.4000.0c80.8030.00 125 238
```

## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm soft-vc (point-to-multipoint)</td>
<td>Configures the point-to-multipoint soft PVC.</td>
</tr>
<tr>
<td>party leaf-reference (point-to-multipoint ATM soft PVC)</td>
<td>Configures individual ATM soft PVC point-to-multipoint leaves.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the ATM layer connection information about the soft PVC connection.</td>
</tr>
</tbody>
</table>
dest-address (point-to-multipoint CES soft PVC)

To configure the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party connection, use the `dest-address` configuration command.

```
dest-address atm-address dest-vpi dest-vci
```

### Syntax Description

- **atm-address**  
  ATM address for the destination port.
- **dest-vpi**  
  Destination VPI number.
- **dest-vci**  
  Destination VCI number.

### Defaults

None.

### Command Modes

CES soft PVC point-to-multipoint

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(23)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

There are two ways to delete the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party leaf connection. You can delete either the entire CES soft PVC connection or just the party leaf reference number.

### Examples

The following example shows how to configure a destination address, VPI, and VCI for a CES soft PVC point-to-multipoint party leaf connection.

```
Switch# config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 0 p2mp
Switch(ces-p2mp)# party leaf-reference 1
Switch(ces-p2mp-party)# dest-address 47.0091.8100.0000.0090.2156.d801.4000.0c88.0070.00 110
Switch(ces-p2mp-party)# exit
Switch#
```

The following example shows how to remove one individual destination address configured on party leaf 1 on the CES soft PVC connection configured on point-to-multipoint CES PVC 0:

```
Switch(config)# interface cbr3/1/0
Switch(config-if)# ces pvc 0 p2mp
Switch(ces-p2mp)# party leaf-reference 1
Switch(ces-p2mp-party)# no dest-address 47.0091.8100.0000.0090.2156.d801.4000.0c88.0070.00
```

ATM and Layer 3 Switch Router Command Reference
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ces pvc (point-to-multipoint CES soft PVC)</strong></td>
<td>Configures point-to-multipoint CES soft PVC connections.</td>
</tr>
<tr>
<td><strong>disable (point-to-multipoint CES soft PVC)</strong></td>
<td>Disables a point-to-multipoint CES soft PVC connection after it has been enabled.</td>
</tr>
<tr>
<td><strong>enable (point-to-multipoint CES soft PVC)</strong></td>
<td>Enables a point-to-multipoint CES soft PVC connection that has been disabled.</td>
</tr>
<tr>
<td><strong>party leaf-reference (point-to-multipoint CES soft PVC)</strong></td>
<td>Configures the party leaf reference number of a CES soft PVC point-to-multipoint connection.</td>
</tr>
<tr>
<td><strong>show ces address</strong></td>
<td>Used to show all the configured CES-IWF ATM addresses</td>
</tr>
<tr>
<td><strong>show ces circuit</strong></td>
<td>Displays detailed CES circuit information</td>
</tr>
<tr>
<td><strong>show ces interface cbr</strong></td>
<td>Displays detailed CES port configuration information.</td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
diag online (Catalyst 8540 MSR)

To enable switch router online diagnostic tests, use the `diag online` command. To disable the online diagnostic tests, use the `no` form of the command.

```
diag online [access | oir | snake]
no diag online
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
</table>
| `access` | The access tests ensure connectivity at a configurable interval between the primary route processor and the following:  
  - Active switch processors  
  - Standby switch processor, if it is present  
  - Feature cards  
  - Port adapters  
  - Interface modules  
  
  Whenever the access test detects a hardware failure, the system issues an error message to the console.  
  
  If the access test detects a hardware problem with an active switch processor, the standby switch processor, if present, automatically takes over and becomes an active switch processor. The system generates an SNMP trap when the switchover occurs. |
| `oir` | Online insertion and removal (OIR) tests check the functioning of the switch fabric and interfaces on a per-port basis. The switch router performs these tests when the system boots up and when you insert a port adapter or interface module into a slot. The OIR test sends a packet to the interface loopback and expects to receive it back within a certain time period. If the packet does not reach the port within the expected time period, or the route processor receives a corrupted packet, the system issues an error message to the console, generates an SNMP trap, and brings the port to an administrative down state. |
| `snake` | The snake test establishes a connection across all the active ports in the switch router, originating and terminating at the primary route processor. The route processor establishes a connection by sending a packet to each port in turn, which then terminates at the route processor. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, further testing is performed to isolate and disable the port causing the problem. The size of the packet and frequency of the test are configurable to minimize the impact on system performance.  
  
  The snake test supports all ATM interface modules and enhanced Gigabit Ethernet interface modules. It does not support ATM port adapters, Fast Ethernet interface modules, or Gigabit Ethernet interface modules. |

### Defaults

Enabled.

### Command Modes

Global configuration
Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use the `diag online` command to enable or disable specified diagnostic tests and set test variables. To enable a diagnostic test, use the `diag online access`, `diag online snake`, or `diag online OIR` command. Use test defaults by running the `diag online access freq`, `diag online OIR pktsize` or `diag online snake timer` commands.

Examples

The following example shows how to enable the access diagnostic test.

```
Switch(config)# diag online access
Enabling Access test
Switch(config)#
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug diag online</code> (Catalyst 8540 MSR)</td>
<td>Enables or disables system debugging.</td>
</tr>
<tr>
<td><code>show diag online</code> (Catalyst 8540 MSR)</td>
<td>Reports diagnostic test results.</td>
</tr>
<tr>
<td><code>diag online access freq</code> (Catalyst 8540 MSR)</td>
<td>Tests proper functionality of all ATM port adapters, ATM and layer 3 interface modules, switch processors and daughter cards.</td>
</tr>
<tr>
<td><code>diag online oir pktsize</code> (Catalyst 8540 MSR)</td>
<td>Tests are performed on all ATM and Layer 3 interface modules. The OIR test occurs at system boot-up and when a new interface module is inserted into a slot.</td>
</tr>
<tr>
<td><code>diag online snake timer</code> (Catalyst 8540 MSR)</td>
<td>The snake test establishes a connection, which includes all the active ports in the switch router, originating and terminating at the primary route processor. The route processor sends a packet through this connection. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, then further testing is performed to isolate and disable the port causing the problem.</td>
</tr>
</tbody>
</table>
diag online access freq (Catalyst 8540 MSR)

To enable the access diagnostic test and set the test variable, use the `diag online access freq` command. To disable the access diagnostic test, use the `no` form of the command.

```
diag online access freq [seconds]
```

```
no diag online access freq
```

**Syntax Description**

| seconds | Sets the frequency of how often the `diag online access freq` test should run. Valid frequency range is 10 to 600 seconds. Results are stored and can be displayed with the `show diag online` command. |

**Defaults**

10 seconds.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Tests proper functionality of all ATM port adapters, ATM and Layer 3 interface modules, switch processors and daughter cards.

**Examples**

The following example shows how to use the `diag online access freq` command to set the access test to run at the default interval of 10 seconds.

```
Switch(config)# diag online access freq
ONLINE-DIAG: Online Access Test Frequency set to default value of 10 sec
Switch(config)#
```

The following example shows how to use the `diag online access freq` command to set the access test to run at 100 second intervals.

```
Switch(config)# diag online access freq 100
ONLINE-DIAG: Online Access Test Frequency set to 100 sec
Switch(config)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug diag online (Catalyst 8540 MSR)</td>
<td>Enables or disables system debugging.</td>
</tr>
<tr>
<td>show diag online (Catalyst 8540 MSR)</td>
<td>Reports online diagnostic test results.</td>
</tr>
<tr>
<td>diag online (Catalyst 8540 MSR)</td>
<td>Enables or disables switch router diagnostic tests.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>diag online oir pktsize (Catalyst 8540 MSR)</td>
<td>Tests are performed on all ATM and Layer 3 interface modules. The OIR test occurs at system boot-up and when a new interface module is inserted into a slot.</td>
</tr>
<tr>
<td>diag online snake timer (Catalyst 8540 MSR)</td>
<td>Tests the integrity of each port and interface, and reports results.</td>
</tr>
</tbody>
</table>
diag online oir pktsize (Catalyst 8540 MSR)

To enable the OIR diagnostic test and to set the test variable, use the diag online oir pktsize command. To disable the OIR diagnostic test, use the no form of this command.

```
diag online oir pktsize [bytes]
```

```
no diag online oir pktsize
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bytes</td>
<td>Sets the network packet size for the OIR test. Valid packet size range is 200 to 1000 bytes.</td>
</tr>
</tbody>
</table>

**Defaults**

1000 bytes.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The OIR test sends a packet to the interface loopback and expects to receive it back within a certain time period. If the packet does not reach the port within the expect time period, or the received packet is corrupted, then an error is registered and the port is brought to an administrative down state.

**Examples**

The following example shows how to use the diag online oir pktsize command to enable the OIR test using the default packet size of 1000 bytes.

```
Switch(config)# diag online oir pktsize
ONLINE-DIAG: OIR Pkt Size set to default value of 1000 bytes
Switch(config)#
```

The following example shows how to use the diag online oir pktsize 200 command to enable the OIR test using a packet size of 200 bytes.

```
Switch(config)# diag online oir pktsize 200
ONLINE-DIAG: OIR Pkt Size set to 200 bytes
Switch(config)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug diag online (Catalyst 8540 MSR)</td>
<td>Enables or disables system debugging.</td>
</tr>
<tr>
<td>show diag online (Catalyst 8540 MSR)</td>
<td>Reports online diagnostic test results.</td>
</tr>
<tr>
<td>diag online (Catalyst 8540 MSR)</td>
<td>Enables or disables switch router diagnostic tests.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>diag online access freq (Catalyst 8540 MSR)</strong></td>
<td>Tests proper functionality of all ATM port adapters, ATM and Layer 3 interface modules, switch processors and daughter cards. The network clock module is not tested because it does not have a diagnostics test register.</td>
</tr>
<tr>
<td><strong>diag online snake timer (Catalyst 8540 MSR)</strong></td>
<td>Tests integrity of each port and interface, and reports results.</td>
</tr>
</tbody>
</table>
diag online snake timer (Catalyst 8540 MSR)

To enable the snake diagnostic test and to set the test variable, use the `diag online snake timer` command. To disable the snake diagnostic test, use the `no` form of this command.

```
diag online snake timer [seconds]
no diag online snake timer
```

**Syntax Description**

- `seconds` Sets the test interval of the snake timer test. Valid timer range is 4 to 1800 seconds

**Defaults**

10 seconds.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The snake test establishes a connection, which includes all the active ports in the switch router, originating and terminating at the primary route processor. The route processor sends a packet through this connection. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, then further testing is performed to isolate and disable the port causing the problem.

**Examples**

The following example shows how to set the snake timer test to run at the default of 10 seconds.

```
Switch(config)# diag online snake timer
ONLINE-DIAG: Snake timer set to default of 10 seconds
Switch(config)#
```

The following example shows how to set the snake timer test to run at 4 second intervals.

```
Switch(config)# diag online snake timer 4
ONLINE-DIAG: Snake timer set to 4 seconds
Switch(config)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug diag online (Catalyst 8540 MSR)</code></td>
<td>Enables or disables system debugging.</td>
</tr>
<tr>
<td><code>show diag online (Catalyst 8540 MSR)</code></td>
<td>Reports online diagnostic test results.</td>
</tr>
<tr>
<td><code>diag online (Catalyst 8540 MSR)</code></td>
<td>Enables or disables switch router diagnostic tests.</td>
</tr>
</tbody>
</table>
## Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>diag online access freq (Catalyst 8540 MSR)</strong></td>
<td>Tests proper functionality of all ATM port adapters, ATM and Layer 3 interface modules, switch processors and daughter cards.</td>
</tr>
<tr>
<td><strong>diag online oir pktsize (Catalyst 8540 MSR)</strong></td>
<td>Tests are performed on all ATM and Layer 3 interface modules. The OIR test occurs at system boot-up and when a new interface module is inserted into a slot.</td>
</tr>
</tbody>
</table>
**disable (Privileged commands)**

To return to the EXEC mode by exiting the privileged EXEC mode, use the `disable` EXEC command.

```
   disable [level]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>level</code></td>
<td>You can specify up to 16 privilege levels, using numbers 0 through 15. Level 1 is normal EXEC-mode user privileges. If this argument is not specified, the privilege level defaults to level 15 (traditional enable privileges).</td>
</tr>
</tbody>
</table>

**Defaults**

15

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

In the following example, the user is logging out from privilege level 5.

```
Switch# disable 5
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>enable (EXEC)</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
disable (point-to-multipoint CES soft PVC)

To temporarily disable a point-to-multipoint CES soft PVC connection that has been enabled, use the `disable` configuration command.

```
disable
```

**Syntax Description**
None

**Defaults**
Enabled

**Command Modes**
CES soft PVC point-to-multipoint

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(23)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the `disable` command, while in CES soft PVC point-to-multipoint configuration mode, to disable a point-to-multipoint CES soft PVC connection. The point-to-multipoint CES soft PVC leaves are torn down when the connection is disabled but the user configuration is not lost. To reestablish all parties in the point-to-multipoint CES soft PVC connection use the `enable (point-to-multipoint CES soft PVC)` command.

Connection parties can also be deleted or added while the connection is in disabled mode.

**Examples**

The following example disables the point-to-multipoint CES soft PVC connection configured on a CES interface:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 1 p2mp
Switch (ces-p2mp)# disable
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces pvc</td>
<td>Configures point-to-multipoint CES soft PVC connections.</td>
</tr>
<tr>
<td>(point-to-multipoint CES PVC)</td>
<td></td>
</tr>
<tr>
<td>dest-address</td>
<td>Configures the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party connection.</td>
</tr>
<tr>
<td>(point-to-multipoint CES PVC)</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>enable (point-to-multipoint CES soft PVC)</strong></td>
<td>Enables a point-to-multipoint CES soft PVC connection that has been disabled.</td>
</tr>
<tr>
<td><strong>party leaf-reference (point-to-multipoint CES soft PVC)</strong></td>
<td>Configures the party leaf reference number of a CES soft PVC point-to-multipoint connection.</td>
</tr>
<tr>
<td><strong>show ces circuit</strong></td>
<td>Displays detailed CES circuit information</td>
</tr>
<tr>
<td><strong>show ces interface cbr</strong></td>
<td>Displays detailed CES port configuration information.</td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
disconnect ssh

To terminate an SSH connection, use the `disconnect ssh` privileged EXEC command.

```
disconnect ssh session-id
```

**Syntax Description**

```
session-id
```

The session-id is the number of connections displayed in the `show ip ssh` command output.

**Defaults**

Incoming SSH connections

**Command Modes**

Global configuration

**Command History**

```
Release   Modification
12.1(12c)EY  New command
```

**Usage Guidelines**

Use the `show ssh` command to determine the session-id for the SSH connection you want cleared. When the EXEC connection ends, whether normally or abnormally, the SSH connection also ends.

**Examples**

The following example displays the SSH commendations on the switch router:

```
Switch# show ssh
Connection Version Encryption State Username
0 1.5 3DES Session started aarun
```

The following example disconnects the SSH connection 0 displayed using the previous `show ssh` command:

```
Switch# disconnect ssh 0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ip ssh</code></td>
<td>Displays the SSH connections.</td>
</tr>
</tbody>
</table>
E Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

---

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
**e164 address**

To configure an entry in the ATM E.164 translation table, use the `e164 address` ATM E.164 translation table configuration command.

```
e164 address e164-address nsap-address nsap-address
```

**Syntax Description**

- `e164-address` Specifies the E.164 address for an entry in the ATM E.164 translation table. The address consists of 7 to 15 decimal digits. See the ITU-T Recommendation E.164 for details on the syntax and semantics of native E.164 addresses.

- `nsap-address` Specifies the NSAP-encoded ATM end-system address for an entry in the ATM E.164 translation table. The address is specified as 40 hexadecimal digits.

**Command Modes**

ATM E.164 translation table configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Each entry in the ATM E.164 translation table specifies a one-to-one correspondence between a native E.164 address and an NSAP-encoded ATM end system-address. Refer to the `atm e164 translation` command for more information and usage guidelines about the ATM E.164 translation feature.

The `e164 address` command is a subcommand of the `atm e164 translation-table` global configuration command.

**Examples**

The following example shows setting an entry in the ATM E.164 translation table.

```
Switch# configure terminal
Switch(config)# atm e164 translation-table
Switch(config-atm-e164)# e164 address 1112222 nsap-address
11.11122223333444455556666.11122223333444455556666.11
```
election

To configure the PNNI peer group leader election, use the `election` PNNI node configuration command. To set the election parameters to their defaults, use the `no` form of this command.

```
election [leadership-priority number] [override-unanimity-timer secs] [pgl-init-timer secs] [reelection-timer secs]
```

```
no election [leadership-priority] [override-unanimity-timer] [pgl-init-timer] [reelection-timer]
```

**Syntax Description**

- `number` Peer group leadership priority that this node should advertise, in the range of 0 to 205. The default is 0.
- `override-unanimity-timer` Specifies the amount of time, in seconds, a node waits to be declared the preferred PGL by unanimous agreement among its peers. This timer is used to prevent nodes from waiting forever for unanimity. The default is 30 seconds.
- `pgl-init-timer` Specifies the amount of time, in seconds, allowed to initialize the PGL before starting the election process. This timer is used to ensure that every node casts a vote only after waiting for topology information to propagate across the group. The default is 15 seconds.
- `reelection-timer` Specifies the amount of time, in seconds, to wait before the reelection process is restarted after connectivity to the PGL is lost. This timer is used to delay each node in the peer group from voting for the PGL upon loss of connectivity until the nodes in the peer group have received updated topology information. The default is 15 seconds.
- `secs` The number of seconds for each timer, in the range of 1 to 120.

**Defaults**
See “Syntax Description.”

**Command Modes**
PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The node with the highest configured leadership priority in the peer group is normally elected to become the peer group leader. The timers are defined in the PNNI PGL election state machine.

**Examples**
The following example shows how to enter PNNI node configuration mode and specify a node.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
```
The following example specifies the peer group leadership priority for this node using the default timers.

```
Switch(config-pnni-node)# election leadership-priority 1
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni election</code></td>
<td>Displays information relevant to the PNNI peer group leader election process.</td>
</tr>
</tbody>
</table>
enable (point-to-multipoint CES soft PVC)

To enable a point-to-multipoint CES soft PVC connection that has been disabled, use the `enable` configuration command.

```
enable
```

**Syntax Description**

None

**Defaults**

Enabled

**Command Modes**

CES soft PVC point-to-multipoint

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(23)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the `enable` command, while in CES soft PVC point-to-multipoint configuration mode, to reestablish all parties in a CES soft PVC point-to-multipoint connection that were disabled using the `disable (point-to-multipoint CES soft PVC)` command.

**Note**

The point-to-multipoint CES soft PVC leaves are torn down when the CES soft PVC point-to-multipoint connection was disabled but the user configuration was not lost.

**Examples**

The following example enables the point-to-multipoint CES soft PVC connection configured on a CES interface:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 1 p2mp
Switch (ces-p2mp)# enable
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ces pvc (point-to-multipoint CES soft PVC)</code></td>
<td>Configures point-to-multipoint CES soft PVC connections.</td>
</tr>
<tr>
<td><code>dest-address (point-to-multipoint CES soft PVC)</code></td>
<td>Configures the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party connection.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>enable (point-to-multipoint CES soft PVC)</strong></td>
<td>Enables a point-to-multipoint CES soft PVC connection after it has been enabled.</td>
</tr>
<tr>
<td><strong>disable (point-to-multipoint CES soft PVC)</strong></td>
<td>Disables a point-to-multipoint CES soft PVC connection after it has been enabled.</td>
</tr>
<tr>
<td><strong>party leaf-reference (point-to-multipoint CES soft PVC)</strong></td>
<td>Configures the party leaf reference number of a CES soft PVC point-to-multipoint connection.</td>
</tr>
<tr>
<td><strong>show ces circuit</strong></td>
<td>Displays detailed CES circuit information.</td>
</tr>
<tr>
<td><strong>show ces interface cbr</strong></td>
<td>Displays detailed CES port configuration information.</td>
</tr>
<tr>
<td><strong>show running-config</strong></td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
**encapsulation (VC bundle)**

To configure the ATM adaptation layer (AAL), use the `encapsulation` VC bundle configuration command. To return the encapsulation configuration to the default, use the `no` form of this command.

```
encapsulation {aal5snap | aal5mux}
no encapsulation {aal5snap | aal5mux}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aal5snap</td>
<td>Specifies that the LLC/SNAP precedes the protocol datagram. This is the only encapsulation supported for Inverse ARP.</td>
</tr>
<tr>
<td>aal5mux</td>
<td>Specifies a MUX-type virtual connection and is only supported on IP VC bundle configurations.</td>
</tr>
</tbody>
</table>

**Defaults**

`aal5snap`

**Command Modes**

VC bundle configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Configures the ATM adaptation layer (AAL) and encapsulation type for the bundle. Encapsulations such as aal5snap and aal5mux can be specified.

**Note**

AAL5MUX encapsulation is supported only for IP and not IPX.

**Examples**

The following example shows how to the encapsulation method is used on the VC bundle.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# ip address 1.1.1.9 255.0.0.0
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)# encapsulation aal5snap
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>show atm bundle</code></td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
encapsulation frame-relay

Before you can use a serial port for Frame Relay, use the `encapsulation frame-relay` interface configuration command to enable encapsulation on the Frame Relay interface. To disable configuration, use the `no` form of this command.

```
encapsulation frame-relay ietf
no encapsulation frame-relay ietf
```

**Syntax Description**

- **ietf**
  
  Sets the encapsulation method to comply with the IETF standard RFC 1490.

**Defaults**

None

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To correctly support Frame Relay-to-ATM service interworking connections that use translation mode, the Frame Relay interface on the adjacent router must also be configured with IETF encapsulation.

**Examples**

The following example configures a serial interface for Frame Relay encapsulation type IETF.

```
Switch# configure terminal
Switch(config)# interface serial 1/0/0:1
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
epc port-reload

To indicate whether a stuck port should be shut down, or reset and reloaded, use the **epc port-reload** interface configuration command. To restore the default, use the **no** form of this command.

```
epc port-reload

no epc port-reload
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Shutdown mode.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(10)W5(18)</td>
<td>New command</td>
</tr>
<tr>
<td>12.0(7)W5(15c)</td>
<td>Command first documented in Release Notes for the Catalyst 8540 MSR.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **epc port-reload** command is used in conjunction with the **epc portstuck-wait** command for the configuration of stuck port detection and recovery. The **epc port-reload** command enables automatic resetting and reloading of the Ethernet interface module microcode after detecting a port stuck failure.

The **epc portstuck-wait** command specifies the delay before signalling a port stuck failure (from the time the failure is detected). The default is 180 seconds. The valid range is 0 to 1200 seconds inclusive. A value of 0 seconds causes a port stuck failure to **not** be detected.

Together, these two commands provide a mechanism to troubleshoot and recover from port stuck failures. The port-stuck detection mechanism detects a stuck port, and prints a message indicating which port is stuck. The mechanism checks for responses sent by the port to the CPU requests. When the port stops responding to the messages sent by the CPU within a certain time (measured in seconds and configured by the user), it is identified as stuck. If it is only a port stuck failure, the port is isolated from the other functional ports, and Cisco IOS is informed that the line is down/down.

Then, depending on the configuration option for reset of the stuck port, the following action will be taken:

- **Default Behavior**
  
  If the switch router is not configured to reset the port upon detecting a port stuck failure, the port will be isolated, thus preserving the integrity of the switch router.

- **Nondefault Behavior**
  
  If the switch router is configured to reset the port upon detection of a port stuck failure, the switch router will isolate the port from the rest of the functioning ports, and reset the port. This might affect up to three other ports in the case of Fast Ethernet 10/100 modules.
If you configure the switch router as described in the nondefault behavior after a port stuck failure is detected, the switch router will not reset the Ethernet ports. The Ethernet interface must be configured to reset before the port stuck failure occurs. Also, the default behavior is to not reset the port if a port stuck failure is detected. If the Ethernet interface is not configured to reset when a port stuck failure is detected, schedule the switch router for downtime to remove and reinsert the module.

The following example puts the port in reload mode:

```
Switch(config)# epc port-reload
```

The following example restores the default (shutdown mode):

```
Switch(config)# no epc port-reload
```

This command is NOVRAM writeable, and can be verified using the `show running-config` command.

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>epc portstuck-wait</code></td>
<td>Determines the length of time a port-stuck detection mechanism waits until declaring a stuck port.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**epc portstuck-wait**

To specify the amount of time before signalling a port stuck failure from the time of detection, use the `epc portstuck-wait` interface configuration command. To restore the default value, use the `no` form of this command.

```
epc portstuck-wait [value]

no epc portstuck-wait
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>value</code></td>
<td>The amount of time, expressed in seconds, that the port-stuck mechanism waits after the port has stopped responding to the CPU requests. The valid range is 0 to 1200 seconds inclusive (20 minutes).</td>
</tr>
</tbody>
</table>

**Defaults**

Default is 180 seconds (3 minutes).

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(8)W5(18)</td>
<td>Command introduced into this manual.</td>
</tr>
<tr>
<td>12.0(7)W5(15c)</td>
<td>Command first documented in Release Notes for the Catalyst 8540 MSR.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is used to configure the amount of time that the port-stuck detection mechanism will wait after the port has stopped responding to the CPU requests, and prior to actually declaring the port to be stuck. The valid range is from 0 to 1200 seconds (20 minutes), with the default value at 180 seconds (3 minutes). A port can be declared stuck only after there is no response to any of the requests made by the CPU within this pre-configured period of time.

**Caution**

Due to the nature of microcode architecture, do not configure low values for the wait time in the `epc portstuck-wait` command. The default value of 180 seconds has been carefully chosen, allowing for the hello intervals of protocols such as HSRP, EIGRP, OSPF. Configuring a low value might lead to incorrectly detecting temporary port stuck failures as real port stuck failures, and could likely cause temporary connectivity loss. It is highly recommended to keep this value at least at 60 seconds. Lower values are provided to allow for some specific network designs where you can absolutely rule out temporary port stuck failure scenarios, and also as a debugging aid. For most networks, 180 seconds should work very well.

**Examples**

The following example configures the portstuck-wait time to 240 seconds:

```
Switch(config)# epc portstuck-wait 240
```

The following example restores the portstuck-wait time to the default of 180 seconds:
Switch(config)# no pec portstuck-wait

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>epc port-reload</td>
<td>Used to specify whether a stuck port should be shut down, or reset and reloaded.</td>
</tr>
<tr>
<td></td>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
**epc xpif-ip-per-pack-all**

To enable ip per packet load sharing for IP packets on interfaces that have configured IP packet load sharing, enter the `epc xpif-ip-per-pack-all` global configuration command. To disable ip per packet load sharing, enter the `no epc xpif-ip-per-pack-all` command.

```
epc xpif-ip-per-pack-all

no epc xpif-ip-per-pack-all
```

**Syntax Description**  
None

**Defaults**  
The `no epc xpif-ip-per-pack-all` setting behavior is enabled by default.  
When the `no epc xpif-ip-per-pack-all` behavior is active, all traffic flows will be forwarded to their destinations without being load balanced unless configured otherwise (for instance, TCP traffic can be configured to per packet load share on an interface by entering the `ip load-sharing per-packet` interface configuration command and not enabling the `epc xpif-ip-per-pack-all` command).

**Command Modes**  
Global Configuration

**Command History**  

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(10)E</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**  
This command enables per-packet load sharing on the router for all IP traffic for all packet traversing interfaces configured using the `ip load-sharing per-packet` command. Load sharing is the concept that allows a device to distribute the outgoing and incoming traffic among multiple best paths to a particular destination. Per packet load sharing is configured per interface using the `ip load-sharing per-packet` command in interface configuration mode. In per packet load sharing, each packet is distributed among multiple best paths to the destination.

The `epc xpif-ip-per-pack-all` command is required to enable IP per packet load sharing on a device and to active the `ip load-sharing per-packet` interface configurations for all IP traffic.

When this command is not enabled, traffic flows will be forwarded to their destinations unless configured otherwise (for instance, TCP traffic can be configured to per packet load share on an interface by entering the `ip load-sharing per-packet` interface configuration command and not enabling the `epc xpif-ip-per-pack-all` command).

This command is only available for Gigabit Ethernet line cards.

This command can only be used with switches equipped with Enhanced ATM Router Modules. This command cannot be used with switches equipped with standard ATM Router Modules.

Per packet load balancing should not be configured on MPLS-enabled interfaces.
Examples

The following example enables per packet load sharing on the interfaces that have `ip load-sharing per-packet` enabled:

```
Switch# epc xpif-ip-per-pack-all
```

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>ip load-sharing per-packet</code></td>
<td>Enables per packet load sharing on an interface on the router.</td>
</tr>
</tbody>
</table>
erase

To erase flash or configuration memory, use one of the **erase** privileged EXEC commands. The **erase startup-config** command replaces the **write erase** command.

```
erase {flash | startup-config}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>flash</td>
<td>Erases internal Flash memory.</td>
</tr>
<tr>
<td>startup-config</td>
<td>Erases the startup configuration in memory.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When you use the **erase startup-config** command, the switch router erases or deletes the configuration pointed to by the `config_file` environment variable. The `config_file` environment variable specifies the configuration file used for initialization. If the `config_file` environment variable specifies a Flash memory device and configuration filename, the switch router deletes the configuration file. That is, the switch router marks the file as “deleted.”

If you attempt to erase the configuration file specified by the `config_file` or BOOTLDR environment variables, the system prompts you to confirm the deletion. Also, if you attempt to erase the last valid system image specified in the BOOT environment variable, the system prompts you to confirm the deletion.

**Examples**

The following example deletes the startup configuration file.

```
Switch# erase startup-config
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bert (Catalyst 8510 MSR and LightStream 1010)</td>
<td>Checks the bit errors on a line for a particular interval.</td>
</tr>
<tr>
<td>cd</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>dialer-list list</td>
<td>This command or some of its parameters might not function as expected in an ATM environment.</td>
</tr>
<tr>
<td>show bootflash:</td>
<td>Displays information about the bootflash: file system.</td>
</tr>
<tr>
<td>show startup-config</td>
<td>Shows the configuration file pointed to by the <code>config_file</code> environment variable.</td>
</tr>
<tr>
<td>undelete</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
exclude-node

To specify a node to exclude from all segments of a partially specified ATM PNNI explicit path, use the **exclude-node** PNNI explicit path configuration command.

**Syntax**

```
exclude-node { name-string | node-id | node-id-prefix } [ port hex-port-id | agg-token hex-agg-token-id ]
```

**Syntax Description**

- **name-string**: Name of the PNNI node to be excluded from all segments of the ATM PNNI explicit path.
- **node-id**: Full 22-byte node ID for a PNNI node.
- **node-id-prefix**: The first 15 or more bytes of a node ID for a PNNI node.
- **port hex-port-id**: Specifies an exit port to exclude for a PNNI node, specified as a hexadecimal port ID.
- **agg-token hex-agg-token-id**: Optionally specifies the exit aggregation token, which is used in place of the port ID for higher-level PNNI LGNs. The default is to allow any valid exit port.

**Defaults**

None

**Command Modes**

PNNI explicit-path configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

**Note**

See the **atm pnni explicit-path** command for a description of how to edit or delete an existing exclude-node path entry.

Unlike other explicit-path entries, **exclude-node** entries do not need to appear in any order. They apply to all segments on the path.

Node IDs can be entered with either the full 22-byte length address, or as a node ID prefix with a length of 15 bytes or more. To specify routes that include higher level nodes (parent LGNs) for other peer groups, we recommend that you enter exactly 15 bytes so that the address remains valid in the event of a PGL update.

Node IDs appear in the following format:

```
dec: dec: 13-20 hex digits
```
To display the node IDs that correspond to named nodes in a network, use either the `show atm pnni identifiers` command or the `show atm pnni topology` command with the `node` keyword.

Node names can be entered instead of node IDs. If names are used to identify higher-level LGNs, the resulting explicit paths are not guaranteed to remain valid if the PGL changes in the neighboring peer group. To prevent invalid paths, configure all parent LGNs (for all potential PGL nodes) with the same node name.

An exit port can be specified for any entry. The port should be specified as a hexadecimal port ID rather than as a port name. For excluded entries, only this port is excluded from the path.

To display the corresponding `hex-port-ids` for a node, use either the `show atm pnni identifiers` command with the `port` keyword, or the `show atm pnni topology` command with the `node` and `hex-port-id` keywords.

Normally, aggregation tokens are used in place of port IDs for nodes that are higher level LGNs. However, aggregation tokens are not allowed for excluded tokens.

### Examples

The following example shows how to perform the following PNNI explicit path configuration tasks.

- Enter PNNI explicit-path configuration mode
- Add two segment-target nodes
- Specify a node to be excluded from all path segments
- Exit PNNI explicit-path configuration mode

```text
Switch# configure terminal
Switch(config)# atm pnni explicit-path name boston_2.path1
Switch(cfg-pnni-expl-path)# segment-target dallas_4
Switch(cfg-pnni-expl-path)# segment-target 40:72:47.00918100000010600000000
Switch(cfg-pnni-expl-path)# exclude-node st_louis_2
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm pnni explicit-path</code></td>
<td>Used to enter PNNI explicit path configuration mode, or to create or modify PNNI explicit paths.</td>
</tr>
<tr>
<td><code>next-node</code></td>
<td>Specifies the next adjacent entry in a fully-specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td><code>segment-target</code></td>
<td>Specifies a target entry in a partially specified PNNI explicit-path.</td>
</tr>
<tr>
<td><code>show atm pnni explicit-paths</code></td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
</tbody>
</table>
F Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
facility-alarm (Catalyst 8540 MSR)

To configure the temperatures so that the ATM switch router declares a major or minor alarm condition, use the `facility-alarm` command. You can configure explicit threshold temperatures (in degrees Celsius [°C]) to override the defaults for major and minor alarms. Use the `no` form of this command to disable alarms for that threshold and reset the threshold to the default value.

```plaintext
facility-alarm core-temperature { major [temperature] | minor [temperature] }

no facility-alarm core-temperature { major [temperature] | minor [temperature] }
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>major [temperature]</td>
<td>Major alarm threshold temperature threshold in degrees C.</td>
</tr>
<tr>
<td>minor [temperature]</td>
<td>Minor alarm threshold temperature threshold in degrees C.</td>
</tr>
</tbody>
</table>

**Defaults**

- `major` is 53°C.
- `minor` is 45°C.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You cannot disable or adjust the system critical alarms threshold. A “critical” alarm is standard Telco terminology for the alarm just before the system powers itself off.

**Examples**

The following example shows how to configure facility alarms to 50°C for major alarms, and 38°C for minor alarms.

```
Switch(config)# facility-alarm core-temperature major 50
Switch(config)# facility-alarm core-temperature minor 38
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear facility-alarm (Catalyst 8540 MSR)</td>
<td>Clears alarm conditions and resets the alarm contacts.</td>
</tr>
<tr>
<td>show facility-alarm status (Catalyst 8540 MSR)</td>
<td>Displays the current major and minor alarm status, if any, and displays the configuration of the alarm thresholds.</td>
</tr>
</tbody>
</table>
failed-attempts

To configure the writing of records for initial connection attempts, use the `failed-attempts` ATM accounting file subcommand. To disable this feature, use the `no` form of this command.

```
failed-attempts [none | [regular | soft]]
no failed-attempts
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>none</code></td>
<td>Does not record failed attempts.</td>
</tr>
<tr>
<td><code>regular</code></td>
<td>Records regular SVC/SVP numbers that originate or terminate at the switch router interface.</td>
</tr>
<tr>
<td><code>soft</code></td>
<td>Records soft PVC/PVP numbers that originate or terminate at the switch router interface.</td>
</tr>
</tbody>
</table>

### Defaults

`regular` and `soft`

### Command Modes

ATM accounting file

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Examples

The following example shows entering the ATM accounting file configuration mode and configuring `failed-attempts` to record failed attempts for SVC/SVP connections in the accounting file.

```
Switch(config)# atm accounting file acctng_file1
Switch(config-acct-file)# failed-attempts regular
```

### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm accounting file</code></td>
<td>Enables an ATM accounting file and employs the accounting file configuration mode.</td>
</tr>
<tr>
<td><code>collection-modes</code></td>
<td>Initializes the collection mode and specifies at what time accounting data is recorded in the accounting file.</td>
</tr>
<tr>
<td><code>min-age</code></td>
<td>Configures the value of the minimum age of the VC for on-release or periodic collection of accounting records.</td>
</tr>
</tbody>
</table>
**fdl (Catalyst 8510 MSR and LightStream 1010)**

To enable the FDL capability provided on the T1 board, use the `fdl` interface configuration command. To restore the default, use the `no` form of this command.

```
fdl {ansi | att}
no fdl
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ansi</td>
<td>Enables ANSI mode for FDL queries from the remote end.</td>
</tr>
<tr>
<td>att</td>
<td>Enables ATT mode for FDL queries from the remote end.</td>
</tr>
</tbody>
</table>

**Defaults**

Both `ansi` and `att` are disabled.

**Command Modes**

Interface configuration

**Command History**

```
Release     Modification
12.0(4a)W5(11a) New command
```

**Usage Guidelines**

The T1 board responds to requests in both ANSI and ATT format, but is only able to gather the remote end data in ANSI format. The T1 board complies to ANSI standard T1.403

FDL packets are used to collect data from the remote end. To enable the FDL capability, it is necessary to know whether the remote end supports FDL functionality.

The mode selected depends upon which mode is supported on the remote end.

**Examples**

The following example shows how to enable FDL capabilities in both ANSI and ATT mode.

```
Switch(Config)# interface atm 0/1/0
Switch(Config-if)# fdl ansi
Switch(Config)# interface atm 0/1/0
Switch(Config-if)# fdl att
```

The following example shows how to disable FDL capabilities in both ANSI and ATT mode.

```
Switch(Config)# interface atm 0/1/0
Switch(Config-if)# no fdl ansi
Switch(Config)# interface atm 0/1/0
Switch(Config-if)# no fdl att
```

None
### format

To format Flash memory, use the `format` privileged EXEC command.

```
format device1: [[device2:] [monlib-filename]]
```

**Caution**

The following formatting procedure erases all information in the Flash memory. To prevent the loss of important data, proceed carefully.

### Syntax Description

- **device1:** Device to format. The colon (:) is required. Valid devices are as follows:
  - `bootflash`: This device is the internal Flash memory.
  - `slot0`: This device is the first PC slot on the route processor card.
  - `slot1`: This device is the second PC slot on the route processor card.

- **device2:** Device containing the monlib file to use for formatting `device1`. The colon (:) is required. Valid devices are as follows:
  - `bootflash`: This device is the internal Flash memory.
  - `slot0`: This device is the first PC slot and is the initial default device.
  - `slot1`: This device is the second PC slot on the route processor card.

- **monlib-filename** Name of the ROM monitor library file (monlib file) to use for formatting `device1`. The default monlib file is the one bundled with the system software.

### Defaults

The default monlib file is the one bundled with the system software.

### Command Modes

Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use the `format` command to format internal Flash memory (`bootflash`) or your Flash memory cards. In some cases, you might need to insert a new PCMCIA Flash memory card and load images or backup configuration files onto it. Before you can use a new Flash memory card, you must format it.

Flash memory cards have sectors that can fail. You can reserve certain Flash memory sectors as “spares” for use when other sectors fail. Use the `format` command to specify between 0 and 16 sectors as spares. If you reserve a small number of spare sectors for emergencies, you do not waste space because you can use most of the Flash memory card. If you specify zero spare sectors and some sectors fail, you must reformat the Flash memory card and thereby erase all existing data.

The monlib file is the ROM monitor library. The ROM monitor uses the monlib file to access files in the Flash file system.
In the command syntax, \textit{device1} is the device to format, and \textit{device2} contains the monlib file to use. When you omit the \texttt{[[device2]:[monlib-filename]]} argument, the system formats \textit{device1} using the monlib file that is bundled with the system software. When you omit \textit{device2} from the \texttt{[[device2]:[monlib-filename]]} argument, the system formats \textit{device1} using the named monlib file from the device specified by the \texttt{cd} command. When you omit \texttt{monlib-filename} from the \texttt{[[device2]:[monlib-filename]]} argument, the system formats \textit{device1} using \textit{device2}’s monlib file. When you specify the whole \texttt{[[device2]:[monlib-filename]]} argument, the system formats \textit{device1} using the specified monlib file from the specified device. Note that you can specify \textit{device1}’s own monlib file in this argument. When the system cannot find a monlib file, the system terminates the formatting process.

### Examples

The following example shows the \texttt{format} command that formats a Flash memory card inserted in slot 0 of the route processor card.

```
Switch# format slot0:
Running config file on this device, proceed? [confirm]y
All sectors will be erased, proceed? [confirm]y
Enter volume id (up to 31 characters): <Return>
Formatting sector 1 (erasing)
Format device slot0 completed
```

When the switch returns you to the EXEC prompt, the new Flash memory card is successfully formatted and ready for use.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{copy flash}</td>
<td>Copies a file from Flash memory to another destination.</td>
</tr>
<tr>
<td>\texttt{dialer-list list}</td>
<td>This command or some of its parameters might not function as expected.</td>
</tr>
</tbody>
</table>
frame-relay accept-overflow

To configure the Frame Relay interface to accept or discard overflow traffic (exceeding CIR) for VBR circuits, use the **frame-relay accept-overflow** interface configuration command. To disable CIR overbooking, use the **no** form of this command.

```
frame-relay accept-overflow
no frame-relay accept-overflow
```

**Defaults** Disabled

**Command Modes** Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The **frame-relay accept-overflow** interface configuration command allows overflow queuing configuration of an existing Frame Relay-to-Frame Relay or Frame Relay-to-ATM PVC or Soft PVC on a particular interface for the source end when it has one of the following:

- overflow configured as “inherit”
- overflow not specified (for example, inherit by default)

**Note** Unavailable on CDS3 Frame Relay interfaces.

**Examples**
The following example configures the serial interface to accept overflow traffic.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface serial 1/0/1:1
Switch(config-if)# frame-relay accept-overflow
```

The following example disables the serial interface from accepting overflow traffic.

```
Switch(config-if)# no frame-relay accept-overflow
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show running-config</strong></td>
<td>Displays the <strong>frame-relay accept-overflow</strong> interface configuration information.</td>
</tr>
</tbody>
</table>
frame-relay bc-default

To configure the committed burst size for ABR or UBR soft VCs terminating on an interface, use the `frame-relay bc-default` interface configuration command. To disable the committed burst size, use the `no` form of this command.

```
frame-relay bc-default bc_default
no frame-relay bc-default
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>bc_default</code></td>
<td>Default committed burst size in bits for ABR or UBR soft VCs terminating on this interface.</td>
</tr>
</tbody>
</table>

| Defaults | 32768 |
|-----------|

<table>
<thead>
<tr>
<th>Command Modes</th>
<th>Interface configuration</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

| Usage Guidelines | Use the `frame-relay bc-default` interface parameter to configure the committed burst size (in bits) on the destination interface of a UBR or ABR soft VC connection. The configured committed burst size is then effective for any subsequent connections. |

<table>
<thead>
<tr>
<th>Examples</th>
<th>The following example shows how to configure the Frame Relay committed burst size to 16384 for serial interface 11/0/0:1.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>Switch# configure terminal</code>&lt;br&gt;<code>Switch(config)# interface serial 11/0/0:1</code>&lt;br&gt;<code>Switch(config-if)# frame-relay bc-default 16384</code></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay connection-traffic-table-row</td>
<td>Displays the Frame Relay traffic table.</td>
</tr>
</tbody>
</table>
**frame-relay called-soft-vc**

To set the default mode of Discard Eligibility (DE) or Cell Loss Priority (CLP) mapping for received soft PVC connections, use the `frame-relay called-soft-vc` command.

To set the default mode for received soft PVC connections in the Frame Relay to ATM direction, enter the following command:

```
frame-relay called-soft-vc default clp-bit [0 | 1 | map-de]
```

To set the default mode for received soft PVCs in the ATM to Frame Relay direction, enter the following command:

```
frame-relay called-soft-vc default de-bit [map-clp-or-de | map-de]
```

To remove the configured soft PVC configurations, enter the following command:

```
no frame-relay called-soft-vc default [clp-bit | de-bit]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>called-soft-vc</td>
<td>Specifies the configuration of a called soft PVC. A called soft PVC is the PVC that receives the call when the soft PVC connection is established between two nodes.</td>
</tr>
<tr>
<td>default</td>
<td>Specifies the default mode for received soft PVC connections. All received soft PVC connections will, by default, be set according to these configurations when a soft PVC connection is established.</td>
</tr>
</tbody>
</table>
frame-relay called-soft-vc

Chapter 7 F Commands

frame-relay called-soft-vc

Defaults

In the ATM to Frame Relay direction, the default setting is map-clp-or-de.

In the Frame Relay to ATM direction, the default setting is map-de.

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(10)E</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command can only be used in network interworking soft PVCs. Network-interworking soft PVCs can be initiated on a frame-relay interface and can terminate on either an
ATM or frame-relay interface. This command is not available in service interworking soft PVCs.

**Examples**

The following example sets the default CLP bit to 1 for all received soft PVC calls on ATM interface 11/0/0.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay called-soft-vc default clp-bit 1
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show vc</td>
<td>Displays active virtual circuits (PVCs, SVCs, and soft VCs).</td>
</tr>
</tbody>
</table>
frame-relay connection-traffic-table-row

To create a table entry in the Frame Relay connection-traffic table, use the frame-relay connection-traffic-table-row global configuration command. To delete an entry, use the no form of this command.

```
frame-relay connection-traffic-table-row [index row-index] cirval bcval pirval [beval]
   {abr | vbr-nrt | ubr} [frame-size bytes] [atm-row-index]

no frame-relay connection-traffic-table-row [index row-index]
```

Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>index row-index</td>
<td>Specifies the index of the entry created in the Frame Relay connection-traffic table. A positive integer from 1 to 1073741823.</td>
</tr>
<tr>
<td>cirval</td>
<td>CIR, in bps. A positive integer from 0 to 2048000.</td>
</tr>
<tr>
<td>bcval</td>
<td>Bc, in bits. A positive integer from 0 to 32768.</td>
</tr>
<tr>
<td>pirval</td>
<td>Peak information rate, in bps. A positive integer from 0 to 2048000.</td>
</tr>
<tr>
<td>beval</td>
<td>Excess burst size, in bits. A positive integer from 0 to 32768. The default is 32768.</td>
</tr>
<tr>
<td>abr vbr-nrt ubr</td>
<td>Selects the ATM service category for an interworking connection.</td>
</tr>
<tr>
<td>frame-size</td>
<td>Specifies the optional Frame Size from 48 to 4096 bytes. Default value is 250 bytes.</td>
</tr>
<tr>
<td>atm-row-index</td>
<td>Specifies the index of the entry created in the ATM connection-traffic table, a positive integer from 1 to 1073741823.</td>
</tr>
</tbody>
</table>

Defaults

See “Syntax Description.”

Command Modes

Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added the frame-size configuration parameter.</td>
</tr>
</tbody>
</table>

Usage Guidelines

When you create a connection traffic table row, the Frame Relay parameters are converted into the ATM equivalent parameters and a row is added to the ATM connection-traffic table. The table index values are shared by the Frame Relay connection table and the ATM connection table. If you specify the index in the command, the index value is available in the ATM connection table.

Note

Since the index value is linked to the ATM connection-traffic table, the index values in the Frame Relay connection-traffic table might not be contiguous.
Modification of the frame size relies on the GAT information element for delivery of Frame Relay parameter information for the Soft PVC. Since the GAT information element is supported from ATM UNI 4.0 versions or later, this requires at least ATM version UNI 4.0.

**Examples**

The following example shows how to create a table entry with a row index of 150, committed information rate of 1024000, committed burst size of 16334, peak information rate of 1024000, excess burst size of 20, the `abr` service category, the Frame size set at 64 bytes, with an ATM row index of 250.

```
Switch# configure terminal
Switch(config)# frame-relay connection-traffic-table-row index 150 1024000 16334 1024000 16334 20 abr frame-size 64 250
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show frame-relay connection-traffic-table-row</code></td>
<td>Displays the Frame Relay traffic table.</td>
</tr>
<tr>
<td><code>show vc</code></td>
<td>Displays the Frame Relay VC configuration.</td>
</tr>
</tbody>
</table>
frame-relay input-queue

To configure discard marking thresholds on a Frame Relay interface in the input direction, use the `frame-relay input-queue` interface configuration command. Use the `no` form of the command to revert to default values for the threshold.

```
frame-relay input-queue {abr | ubr | vbr-nrt} {discard-threshold | marking-threshold} percent

no frame-relay input-queue {abr | ubr | vbr-nrt} {discard-threshold | marking-threshold} percent
```

### Syntax Description

- **abr | ubr | vbr-nrt**: Service categories for which the threshold is configured
- **discard-threshold**: Threshold where the cell is discarded. If the queue fills up above this level, any frame arriving from an external device with the DE bit set is discarded by the interface. The default is 87 percent.
- **marking-threshold**: Threshold where the cell is marked for EFCI. If the queue fills up above this level, all frames arriving from an external device have the EFCI bit set as they are converted into cells. For cells entering the Frame Relay interface from the switch fabric, the BECN bit is set in the outgoing frame header. The default is 75 percent.
- **percent**: Threshold number as percent of queue size.

### Defaults

See “Syntax Description.”

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command affects all existing connections on the interface, as well as subsequent connections.

### Examples

The following example sets the Frame Relay input queue for ABR connects to allow EFCI marking for cells over 75 percent of capacity.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay input-queue abr marking-threshold 75
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay connection-traffic-table-row</td>
<td>Displays the Frame Relay traffic table.</td>
</tr>
<tr>
<td>frame-relay output-queue</td>
<td>Configures discard marking thresholds on a Frame Relay interface in the output direction.</td>
</tr>
</tbody>
</table>
frame-relay intf-type

To configure an interface as DCE or NNI, use the `frame-relay intf-type` interface configuration command. To disable the configuration, use the `no` form of this command.

```
frame-relay intf-type {dce | nni}
no frame-relay intf-type {dce | nni}
```

Syntax Description
- **dce**: Data communications equipment.
- **nni**: Network-to-Network Interface.

Defaults
- **nni**

Command Modes
- Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

When you specify DCE, the ATM switch router supports only network-side PVC status management procedures. When you specify NNI, the ATM switch router supports both user-side and network-side PVC status management procedures.

**Note**

Frame Relay DTE is not supported.

Examples

The following example configures serial interface 11/0/0:1 as Frame Relay interface, type DCE.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay intf-type dce
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show frame-relay</code></td>
<td>Displays the current resource allocation on a Frame Relay interface.</td>
</tr>
<tr>
<td><code>interface resource</code></td>
<td></td>
</tr>
</tbody>
</table>
frame-relay lmi-n391dte

To set a full status polling interval, use the `frame-relay lmi-n391dte` interface configuration command. To restore the default interval value, use the `no` form of this command.

```
frame-relay lmi-n391dte keep-exchanges

no frame-relay lmi-n391dte keep-exchanges
```

**Syntax Description**

| `keep-exchanges` | Number of keep exchanges to be completed before requesting a full status message. The value must be a positive integer from 1 to 255. |

**Defaults**
6 keep exchanges

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To set the full status message polling interval, use this command when the interface is configured as NNI.

**Examples**

The following example shows how to set one out of every four status inquiries to request a full status response from the switch. The remaining three status inquiries request only keepalive exchanges.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay intf-type nni
Switch(config-if)# frame-relay lmi-n391dte 4
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show frame-relay lmi</code></td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
frame-relay lmi-n392dce

To set the error threshold on DCE and NNI interfaces, use the **frame-relay lmi-n392dce** interface configuration command. To remove the setting, use the **no** form of this command.

```
frame-relay lmi-n392dce threshold
no frame-relay lmi-n392dce threshold
```

### Syntax Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>threshold</strong></td>
<td>Error threshold value. The value must be a positive integer from 1 to 10.</td>
</tr>
</tbody>
</table>

### Defaults

Two errors

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

N392 errors must occur within the number defined by the N393 event count for the link to be down. Therefore, the threshold value for this command must be less than the count value defined in the **frame-relay lmi-n393dce** command.

### Examples

The following example configures serial interface 11/0/0:1 with Frame Relay LMI monitoring event count to four.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay lmi-n392dce 4
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>frame-relay lmi-n393dce</strong></td>
<td>Sets the monitored events count on DCE and NNI interfaces.</td>
</tr>
<tr>
<td><strong>show frame-relay lmi</strong></td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
frame-relay lmi-n392dte

To set the error threshold on DTE or NNI interfaces, use the `frame-relay lmi-n392dte` interface configuration command. To remove the setting, use the `no` form of this command.

```
frame-relay lmi-n392dte threshold
no frame-relay lmi-n392dte threshold
```

**Syntax Description**

- `threshold` Error threshold value. This value must be a positive integer from 1 to 10.

**Defaults**

Three errors

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD</td>
<td></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `frame-relay lmi-n392dte` and `frame-relay lmi-n393dte` commands define the condition that causes the link to be declared down. Two “threshold” errors must occur within N393 number of events for the link to be declared down.

**Examples**

The following example shows how to set the LMI error threshold to six.

```
Switch# configure terminal
Switch(config)# interface serial 1/0/0:1
Switch(config-if)# frame-relay intf-type nni
Switch(config-if)# frame-relay lmi-n392dte 6
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show frame-relay lmi</code></td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
frame-relay lmi-n393dce

To set the monitored events count on DCE and NNI interfaces, use the `frame-relay lmi-n393dce` interface configuration command. To remove the setting, use the `no` form of this command.

```
frame-relay lmi-n393dce events
no frame-relay lmi-n393dce events
```

**Syntax Description**

| events | Monitored events count value. The value must be a positive integer from 1 to 10. |

**Defaults**

Two events

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD</td>
<td></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command and the `frame-relay lmi-n392dce` command define the condition that causes the link to be down. In the Cisco implementation, N392 errors must occur within the events count for the link to be down. Therefore, the `events` value that you define for this command must be greater than the threshold value defined in the `frame-relay lmi-n392dce` command.

**Examples**

The following example shows how to set the LMI monitored event count to three.

```
Switch# configure terminal
Switch(config)# interface serial 1/0/0:1
Switch(config-if)# frame-relay intf-type dce
Switch(config-if)# frame-relay lmi-n393dce 3
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show frame-relay lmi</code></td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
# frame-relay lmi-n393dte

To set the monitored event count on DTE and NNI interfaces, use the `frame-relay lmi-n393dte` interface configuration command. To remove the setting, use the `no` form of this command.

```plaintext
frame-relay lmi-n393dte events
no frame-relay lmi-n393dte events
```

## Syntax Description

| events | Monitored events count value. This value must be a positive integer from 1 to 10. |

## Defaults

Four events

## Command Modes

Interface configuration

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

## Usage Guidelines

The `frame-relay lmi-n393dte` and the `frame-relay lmi-n392dte` commands define the condition that causes the link to be declared down. N392 errors must occur within the events count for the link to be declared down.

### Note

The events value defined in this command must be greater than the threshold value defined in the `frame-relay lmi-n392dte` command.

## Examples

The following example shows how to set the LMI monitored events count to three.

```
Switch# configure terminal
Switch(config)# interface serial 1/0/0:1
Switch(config-if)# frame-relay intf-type NNI
Switch(config-if)# frame-relay lmi-n393dte 3
```

## Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay lmi</td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
frame-relay lmi-t392dce

To set the polling verification timer on DCE and NNI interfaces, use the frame-relay lmi-t392dce interface configuration command. To remove the current setting, use the no form of this command.

```
frame-relay lmi-t392dce seconds
no frame-relay lmi-t392dce seconds
```

**Syntax Description**

- **seconds**  Polling verification timer value, in seconds. This value must be a positive integer from 5 to 30.

**Defaults**

15 seconds

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD</td>
<td></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The value for the timer must be greater than the DTE or NNI keepalive timer.

**Examples**

The following example shows how to set a polling verification timer on a DCE or NNI interface set to 20 seconds.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay intf-type dce
Switch(config-if)# frame-relay lmi-t392dce 20
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay lmi</td>
<td>Displays LMI specific status for an interface.</td>
</tr>
</tbody>
</table>
frame-relay lmi-type

To select the LMI type, use the `frame-relay lmi-type` interface configuration command. To return to the default LMI type, use the `no` form of this command.

```
    frame-relay lmi-type [ansi | cisco | q933a]
    no frame-relay lmi-type [ansi | cisco | q933a]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ansi</td>
<td>Annex D defined by the ANSI standard T1.617.</td>
</tr>
<tr>
<td>cisco</td>
<td>The LMI type defined jointly by Cisco Systems and three other companies.</td>
</tr>
<tr>
<td>q933a</td>
<td>ITU-T Q.933 Annex A.</td>
</tr>
</tbody>
</table>

**Defaults**
cisco

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.4(1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The LMI type is set on a per-interface basis. If you want to display the type that is configured, use the `show interfaces` EXEC command.

**Examples**
The following example shows how to configure an interface for the ANSI LMI type.

```
Switch# configure terminal
Switch(config)# interface serial 1/0/0:1
Switch(config-if)# encapsulation frame-relay ietf
Switch(config-if)# frame-relay lmi-type ansi
Switch(config-if)# keepalive 15
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay lmi</td>
<td>Displays LMI specific status for an interface.</td>
</tr>
<tr>
<td>show ima interface</td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
frame-relay output-queue

To configure discard marking thresholds on a Frame Relay interface in the output direction, use the `frame-relay output-queue` interface configuration command. To restore the default values for the threshold, use the `no` form of this command.

```markdown
frame-relay output-queue {abr | ubr | vbr-nrt} {discard-threshold | marking-threshold} percentage

no frame-relay output-queue {abr | ubr | vbr-nrt} {discard-threshold | marking-threshold} percentage
```

**Syntax Description**

<table>
<thead>
<tr>
<th><strong>Syntax</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>`abr</td>
<td>ubr</td>
</tr>
<tr>
<td>- ABR</td>
<td></td>
</tr>
<tr>
<td>- UBR</td>
<td></td>
</tr>
<tr>
<td>- VBR-NRT</td>
<td></td>
</tr>
<tr>
<td><code>discard-threshold</code></td>
<td>Threshold where the cell is discarded. If the queue fills above this level, any frame arriving from the switch router with DE bit set is discarded by the interface. The default is 87 percent.</td>
</tr>
<tr>
<td><code>marking-threshold</code></td>
<td>Threshold where the cell is marked for EFCl. If the queue fills above this level, all frames arriving from the switch router will have the FECN bit set in the frame header as they exit the interface. For cells entering the Frame Relay interface from an external device, the BECN bit is set in the frame header as it enters the switch. The default is 75 percent.</td>
</tr>
<tr>
<td><code>percentage</code></td>
<td>Percentage number.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th><strong>Release</strong></th>
<th><strong>Modification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command affects all existing connections on the interface, as well as subsequent connections.

**Examples**

The following example shows how to set the Frame Relay output queue for ABR connects to allow EFCl marking for cells over 65 percent of capacity.
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay output-queue abr marking-threshold 65

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>frame-relay input-queue</td>
<td>Configures discard marking thresholds on a Frame Relay interface in the input direction.</td>
</tr>
<tr>
<td>show frame-relay interface resource</td>
<td>Displays the current resource allocation on a Frame Relay interface.</td>
</tr>
</tbody>
</table>
frame-relay overbooking

To set the percentage of CIR overbooking, use the `frame-relay overbooking` command. To disable CIR overbooking, use the `no` form of this command.

```
frame-relay overbooking percent
no frame-relay overbooking
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent</td>
<td>The percent of interface bandwidth from 101 to 1000.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The allowable overbooking on an access link or interface is a number times the access link or interface speed (access rate), for example, 200 percent of the access rate. The total of all CIRs for all Frame Relay PVCs and Frame Relay soft VCs cannot exceed the CIR overbooking factor times the access rate.

Once configured and used to admit Frame Relay PVCs and Frame Relay soft VCs on an interface, the CIR overbooking factor can only be adjusted within the upper limit and the level which has been overbooked by the existing connections. Disabling the CIR overbooking factor is allowed only when the total of all CIRs for all Frame Relay PVCs and Frame Relay soft VCs does not exceed the interface access rate.

Configuring the CIR overbooking factor increases the available bit rates for the Frame Relay PVC and soft VC but does not increase the actual bandwidth (access rate) and resources available to the Frame Relay interface.

The CIR of a connection is not allowed to exceed the actual access rate of an interface even if the CIR overbooking factor is configured.

**Note**

You should have a thorough understanding of network traffic patterns when using the `frame relay overbooking` command. Excess traffic arriving at an overbooked Frame Relay interface might lead to discarded or DE tagged frames.

**Examples**

The following example configures the Frame Relay serial interface to allow overbooking the CIR to 200 percent.

```
Switch(config)# interface serial 1/1/0:5
Switch(config-if)# encapsulation frame-relay ietf
Switch(config-if)# frame-relay overbooking 200
```
### Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show frame-relay interface resource</td>
<td>Displays the current resource allocation on a Frame Relay interface.</td>
</tr>
</tbody>
</table>
frame-relay pvc

To create a Frame Relay-to-ATM network interworking or service interworking PVC or Frame-Relay-to-Frame Relay cross-connected PVC, use the frame-relay pvc interface configuration command. To remove a Frame Relay PVC, use the no form of this command.

For Frame Relay-to-ATM network interworking, use the following syntax:

```
frame-relay pvc dlci [accept-overflow {enable | disable | inherit}]
[upc {pass | tag-drop}] [rx-cttr index] [tx-cttr index]
network [clp-bit {0 | 1 | map-de}] [de-bit {map-de | map-clp-or-de}]
[interface atm card/subcard/port vpi vci] [upc {drop | pass | tag-drop}] [pd {off | on}]
[rx-cttr index] [tx-cttr index]
```

```
no frame-relay pvc dlci
```

For Frame Relay-to-ATM service interworking, use the following syntax:

```
frame-relay pvc dlci [accept-overflow {enable | disable | inherit}]
[upc {pass | tag-drop}] [rx-cttr index] [tx-cttr index]
service {transparent | translation} [clp-bit {0 | 1 | map-de}] [de-bit {0 | 1 | map-clp}]
[efci-bit {0 | map-fecn}]
[interface atm card/subcard/port vci any-vci]
[upc {drop | pass | tag-drop}] [pd {off | on}] [rx-cttr index] [tx-cttr index]
[encap {aal5mux ip | aal5snap}] [inarp minutes]
```

```
no frame-relay pvc dlci
```

**Note**
The any-vci feature is only available for interface ATM 0.

For Frame Relay-to-Frame Relay cross-connection, use the following syntax:

```
frame-relay pvc dlci [accept-overflow {enable | disable | inherit}]
[upc {pass | tag-drop}] [rx-cttr index] [tx-cttr index]
interface serial card/subcard/port cgn dlci dlci
[accept-overflow {enable | disable | inherit}]
[upc {drop | pass | tag-drop}] [rx-cttr index] [tx-cttr index]
```

```
no frame-relay pvc dlci
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dlci</strong></td>
<td>Data-link connection identifier, ranging from 16 to 1007, which specifies a PVC in a Frame Relay network.</td>
<td></td>
</tr>
<tr>
<td><strong>accept-overflow</strong></td>
<td>Optional keyword used to configure overflow queuing above CIR rate for VBR-nrt VCs, specified as enable, disable, or inherit. The default is inherit. This parameter can be configured on both source and destination ends of Frame Relay-to-Frame Relay connections.</td>
<td></td>
</tr>
</tbody>
</table>

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### Frame Relay PVC Commands

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>upc</strong></td>
<td>Usage parameter control, specified as <strong>pass</strong> or <strong>tag-drop</strong>. The default is <strong>pass</strong>, which derives from the per-interface default value configured through the <strong>frame-relay upc-intent</strong> command.</td>
</tr>
<tr>
<td><strong>rx-cttr</strong></td>
<td>Frame Relay connection-traffic table row index in the received direction. The default is 100.</td>
</tr>
<tr>
<td><strong>tx-cttr</strong></td>
<td>Frame Relay connection-traffic table row index in the transmitted direction. The default is 100.</td>
</tr>
<tr>
<td><strong>network</strong></td>
<td>Specifies the interworking function that can be either network interworking, service interworking in transparent mode, or service interworking in translation mode.</td>
</tr>
<tr>
<td><strong>service</strong></td>
<td></td>
</tr>
<tr>
<td><strong>clp-bit</strong></td>
<td>Sets the mode of DE/CLP mapping in Frame Relay to the ATM direction. Options <strong>0</strong>, <strong>1</strong>, or <strong>map-de</strong> are allowed for both network interworking and service interworking. The default is <strong>map-de</strong>.</td>
</tr>
<tr>
<td><strong>0</strong> or <strong>1</strong></td>
<td>Specifies mode 2, described in 4.2.1 of FRF.8: “The DE field in the Q.922 core frame shall be mapped to the ATM CLP field of every cell generated by the segmentation process of the AAL5 PDU containing the information of that frame.” Similarly, it applies to mode 2 of 4.4.1 of FRF.5.</td>
</tr>
<tr>
<td><strong>map-de</strong></td>
<td>Specifies mode 1, described in 4.2.1 of FRF.8: “The DE field in the Q.922 core frame shall be mapped to the ATM CLP field of every cell generated by the segmentation process of the AAL5 PDU containing the information of that frame.” Similarly, it applies to mode 1 of 4.4.1 of FRF.5.</td>
</tr>
<tr>
<td><strong>network</strong></td>
<td></td>
</tr>
<tr>
<td><strong>service</strong></td>
<td></td>
</tr>
<tr>
<td><strong>clp-bit</strong></td>
<td></td>
</tr>
</tbody>
</table>

See page for more detailed explanation and examples.
frame-relay pvc

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de-bit [0 | 1 | map-de | map-clp | map-clp-or-de]

Sets the mode of CLP/DE mapping in ATM to the Frame Relay direction.

For network interworking:

Options map-de, or map-clp-or-de are allowed. The default value is map-clp-or-de.

- **map-clp-or-de**—Specifies mode 1 described in 4.4.2 of FRF.5: “If one or more ATM cells belonging to a frame has its CLP field set to 1 or if the DE field of the FR-SSCS PDU is set to 1, the IWF shall set the DE field of the Q.922 core frame.”

- **map-de**—Specifies mode 2 described in 4.4.2 of FRF.5: “No mapping is performed from the ATM layer to Q.922 core layer. The FR-SSCS PDU DE field is copied unchanged to the Q.922 core frame DE field, independent of CLP indication(s) received at the ATM layer.”

For service interworking:

- Options 0, 1, or map-clp are allowed. The default value is map-clp.

- **map-clp**—Specifies mode 1, described in 4.2.2 of FRF.8: “If one or more cells belonging to a frame has its CLP field set, the IWF shall set the DE field of the Q.922 Core frame.”

- **0 or 1**—Specifies mode 2, described in 4.2.2 of FRF.8: “The DE field of the Q.922 Core frame shall be set to a constant value (either 0 or 1) configured at service subscription time.”

card/subcard/port

Card, subcard, and port number for the ATM interface.

vpi

VPI of this PVC, from 0 to 255. The VPI is an 8-bit field in the header of the ATM cell. The VPI value is unique only on an interface, not throughout the ATM network (it has local significance only).

vci

VCI of this PVC. The range is normally 32 to 16383, but can be expanded from 5 to 16383 in manual-well-known-vc mode. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single interface, not throughout the ATM network (it has local significance only).

pd {off | on}

Specifies the intelligent packet discard option as on or off. The default is off.

efc-bit {0 | map-fecn}

Sets the mode of FECN/EFCI mapping in Frame Relay to the ATM direction. The default value is 0.

card/subcard/port/cgn

Card, subcard, port number, and channel group number for the serial interface.
### frame-relay pvc

**encap \{aal5mux ip | aal5snap\}** AAL encapsulation type applies only to terminating connections. (For service interworking connections only.)

- **aal5mux ip**—A MUX-type virtual connection. (For transparent mode only.)
- **aal5snap**—LLC/SNAP precedes the protocol datagram. This is the only encapsulation supported for Inverse ARP. (For translation mode only.)

**inarp minutes** Specifies how often Inverse ARP datagrams are sent on this virtual connection and applies only to terminating connections. (For service interworking translation mode only.) The default value is 15 minutes.

### Defaults

See “Syntax Description.”

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added accept-overflow keyword.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

You can set the upc option to tag or drop only under the following conditions:

- The ATM interface in UNI is on the network side.
- The ATM interface is not the route processor port (ATM 0) or a logical port (VP tunnel).
- The connection is not the leaf of a point-to-multipoint connection.
- Refer to the frame-relay connection-traffic-table-row command for information on configuring the connection-traffic table specified by index.

**Overflow Queuing**—Traffic shaping in the ingress direction (Frame Relay to ATM) is enabled by default for all the VBR-nrt VCs on the Frame Relay ATM interface module. If you want to configure an individual VC to make use of the available bandwidth when the other VCs configured on the same interface are not using all the allocated bandwidth you should configure overflow queuing on that VC.

For example, the policing functionality accepts frames until the PIR rate is reached while the allowable burst and shaping functionality tries to send the cells to the switch fabric at SCR (CIR equivalent on ATM side). If the CIR is very low compared to the PIR this could cause buffers to be held for a long time causing frame discards on that particular VC and other VCs on the same interface.

Enabling overflow queuing allows you to schedule the frames at a rate above SCR. This means when the bandwidth is available and if overflow queuing is enabled the frames will be sent at a higher rate.

### Examples

The following example creates a service translation cross-connection between Frame Relay interface 11/0/0:1 on PVC 66 and ATM interface 10/0/0 100 250.

Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay pvc 66 rx-cttr 5 tx-cttr 5 service translation interface
            atm 10/0/0 100 250

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show vc</td>
<td>Displays active virtual circuits (PVCs, SVCs, and soft VCs).</td>
</tr>
</tbody>
</table>
frame-relay soft-vc

To create Frame Relay soft PVCs on the switch router, use the `frame-relay soft-vc` interface configuration command. You can use this command to create soft PVCs between two Frame Relay connections or between a Frame Relay connection and an ATM connection.

To create a soft PVC between two Frame Relay connections, use the following syntax:

```
frame-relay soft-vc dlci_a [accept-overflow {enable | disable | inherit}] dest-address address
dlci_b [accept-overflow {enable | disable | inherit}] [upc upc]
rx-cttr index [tx-cttr index] [retry-interval [first retry-interval] [maximum max-retry-interval]]
[network [network-service [transparent | translation] [efci-bit {0 | map-fecn}] [efci-bit {0 | map-fecn}]
[clp-bit {0 | 1 | map-de | map-clp-or-de}]]
[de-bit {0 | 1 | map-de | map-clp-or-de}]
[explicit-path precedence {name path-name | identifier path-id}]
[upto partial-entry-index] [only-explicit]
[hold-priority priority]
```

To create a soft PVC between a Frame Relay connection and an ATM connection, use the following syntax:

```
frame-relay soft-vc dlci_a [accept-overflow {enable | disable | inherit}] dest-address address vc
vpi_b vci_b [upc upc] [rx-cttr index] [tx-cttr index] [pd {on | off}] [gat] [retry-interval [first retry-interval] [maximum max-retry-interval]]
[network [network-service [transparent | translation] [efci-bit {0 | map-fecn}] [efci-bit {0 | map-fecn}]
[clp-bit {0 | 1 | map-de | map-clp-or-de}]]
[de-bit {0 | 1 | map-de | map-clp-or-de}]
[explicit-path precedence {name path-name | identifier path-id}]
[upto partial-entry-index] [only-explicit]
[hold-priority priority]
```

For existing Frame Relay soft PVCs, you can enable or disable the connection and use the `redo-explicit` keyword to respecify the explicit-path configuration.

```
frame-relay soft-vc dlci_a [enable | disable]
redo-explicit [explicit-path precedence {name path-name | identifier path-id}]
[upto partial-entry-index] [only-explicit]]
```

To modify the traffic parameters on an existing connection, use the `rx-cttr` and `tx-cttr` parameters with the valid index numbers to associate a new CTTR.

```
frame-relay soft-vc dlci [rx-cttr index] [tx-cttr index]
```

To remove Frame Relay soft PVCs, use the `no` form of this command.

```
no frame-relay soft-vc dlci-a
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dlci_a</code></td>
<td>Specifies the data-link connection identifier, ranging from 16 to 1007, which specifies a PVC in a Frame Relay network.</td>
</tr>
</tbody>
</table>
| `accept-overflow` | Optional keyword used to configure overflow queuing above CIR rate for VBR-nrt VCs, specified as `enable`, `disable`, or `inherit`. The default is `inherit`.  
**Note** This parameter can be configured on both source and destination ends of Frame Relay-to-Frame Relay connections. |
**dest-address address** Specifies the destination address.

**dlci dlci_b** Specifies the data-link connection identifier, ranging from 16 to 1007, which specifies a PVC in a Frame Relay network.

**vbi_b** ATM virtual path identifier.

**vci_b** ATM virtual channel identifier.

**upc upc** Usage parameter control, specified as pass | tag-drop. It gets its default value from the per-interface default value configured with the `frame-relay upc-intent` command.

**rx-cttr index** Connection traffic table row index in the received direction. The default is 100.

The `cttr` should be configured before using the `atm pvc` command. Refer to the `atm connection-traffic-table-row` command for information on configuring the `rx-cttr`.

**tx-cttr index** Connection traffic table row index in the transmitted direction. The default is 100.

The `cttr` should be configured before using the `atm pvc` command. Refer to the `atm connection-traffic-table-row` command for information on configuring the `tx-cttr`.

**pd { on | off }** Specifies the intelligent packet discard option as on or off. The default is off.

`gat` Enables transmission of the GAT (Generic Application Transport) information element.

**retry-interval** Configures retry interval timers for a soft PVC.

**first retry-interval** Retry interval for the first retry after the first failed attempt, specified in milliseconds.

If the first retry after the first failed attempt also fails, the subsequent attempts are made at intervals computed using the `first retry-interval`, as follows:

\[(2^{(k-1)}) \times \text{first retry-interval}\]

Where the value of `k` is 1 for the first retry after the first failed attempt and is incremented by 1 for every subsequent attempt.

Range is from 100 to 3600000 milliseconds; the default is 5000 milliseconds.

**maximum retry-interval** The maximum retry interval between any two attempts, specified in seconds.

Once the retry interval is computed in the `first retry-interval` and becomes equal to or greater than the `maximum retry-interval` configured, the subsequent retries are done at regular intervals of `maximum retry-interval` seconds until the call is established.

Range is from 1 to 65535 seconds; the default is 60.
### network
Specifies the interworking function, which can be either network or service interworking.

- For soft PVCs that originate from a Frame Relay interface and end on a Frame Relay interface, the default is network interworking.
- For soft PVCs that originate from a Frame Relay interface and end on an ATM interface, the default is service interworking.

### standard-signal
Specifies standard signaling. If standard signaling is specified, soft PVCs are signaled using standard Information Element encodings for local and remote DLCIs, rather than proprietary encodings, when the connection is established.

By default, proprietary encoding is used.

### clp-bit
Sets the mode of DE/CLP mapping in the Frame Relay to ATM direction. Values 0, 1, or map-de are allowed for both network interworking and service interworking. The default is map-de.

### de-bit
Sets the mode of DE/CLP mapping in ATM to Frame Relay direction.

- For network interworking, values map-de or map-clp-or-de are allowed. The default value is map-clp-or-de.
- For service interworking, values 0, 1, or map-clp are allowed. The default is map-clp.

### [network | service [transparent | translation]]
Specifies the interworking function, which can be either network interworking or service interworking in transparent mode, or service interworking in translation mode.

### efcf-bit
For service interworking only. Sets the mode of FECN/EFCI mapping in the Frame Relay-to-ATM direction. The default value is 0. Values 0 or map-fecn are allowed.

### enable
Enables the soft connection, and allows it to be set up. This is the default for the initial soft connection configuration.

However, if the `frame-relay soft-vc` command is reentered for an existing connection, the default is to remain in the current enabled or disabled state.

### disable
Disables the soft connection, which prevents it from being set up initially, or tears down an existing connection.

### explicit-path
The PNNI explicit path that is manually configured for routing a soft PVC, using the `atm pnni explicit-path` command.

### precedence
The precedence number by which ATM PNNI explicit paths are assigned, from 1 to 3. Up to three explicit paths can be assigned to a soft PVC.

### name path-name
The name of the ATM PNNI explicit path for routing soft PVCs.

### identifier path-id
The name of the ATM PNNI explicit path for routing soft PVCs.

### upto partial-entry-index
Allows a subset of a longer explicit path to be used, so that all included nodes after the specified entry-index are disregarded.

If the destination is reachable at any next node or segment target, the remaining included nodes in the explicit path are disregarded automatically.
### frame-relay soft-vc

**only-explicit**

If one or more explicit paths have been specified and the explicit path fails, the soft connection remains down until it is retried at its next retry interval.

If this option is not specified, the system uses the standard on-demand routing instead of waiting for the next retry interval.

**redo-explicit**

Applies only to existing soft connections and allows explicit paths to be respecified without tearing down connections.

Existing connections are unaffected unless a reroute takes place, and then they use the newer explicit-path configuration.

**hold-priority priority**

Allows users to configure a priority for each Soft PVC or SVC, to be used in determining which VCs to retain when bandwidth is reduced on an IMA interface. Priority can be from 0 (highest) to 15 (lowest).

If no **hold-priority** is specified when Soft PVC or SVC dropping by priority is enabled, the Soft PVC or SVC is automatically assigned a priority of 15.

The **hold-priority** option is only available on IMA interfaces and cannot be used to clear transit legs of the Soft PVC of SVC (source and destination legs on an IMA interface cannot be cleared).

**Defaults**

See “Syntax Description.”

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)E</td>
<td>The <strong>standard-signal</strong> option was introduced.</td>
</tr>
<tr>
<td></td>
<td>The <strong>hold-priority</strong> option was introduced.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: added <strong>accept-overflow</strong> and <strong>gat</strong> keywords.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Obtain the destination port address before configuring a soft PVC by using the `show atm interface` or `show atm addresses` command on the destination switch.

The following list identifies reasons why the creation of a soft PVC is unsuccessful:

- There is a VPI or VCI collision at the source or destination switch.
- The source or destination interface is not up (or autoconfiguration is not complete).
- The specified destination address is not correct.

Up to three explicit paths can be assigned to a soft VC, using precedence numbers 1 through 3. The precedence 1 explicit path is considered the primary path and is tried first. If it fails, then the next precedence path is tried. Explicit paths can be specified either by **name** or by **identifier**.

The explicit-path options can be changed without tearing down an existing Frame Relay soft PVC. Use the **redo-explicit** form of the command to respecify all of the explicit-path options.
After configuring a Frame Relay soft PVC, use the `show vc` command on the source node (specifying the serial interface and DLCI) to verify that the soft PVC has succeeded and to see the explicit path taken.

The `hold-priority` option does not take affect unless the interface has been configured to drop soft VCs by priority when bandwidth is reduced on an interface. The `atm svc-clear by-priority` interface command is used to enable soft VC dropping by priority when bandwidth is reduced on an interface.

The show configuration displayed for soft connections with explicit paths is always shown as two separate lines, with the `redo-explicit` keyword on the second line, even if it was originally configured using a single command line.

When modifying an existing Soft VC CTTR association by respecifying the `rx-cttr` and `tx-cttr` index values, a data outage will occur until the VC is re-established with the new traffic parameters.

When modifying the CTTR for a Soft VC, if you only specify either the `rx-cttr` or `tx-cttr`, the existing value is used for the unspecified index. For example, if an existing Soft VC has the `rx-cttr` and `tx-cttr` indexes configured as 100 and when you reconfiguring the CTTR you only change the `tx-cttr` index to 101 (as in the following example), the `rx-cttr` index will remain at 100:

```plaintext
Switch(config-if)# frame-relay soft-vc 40 tx-cttr 101
```

**Overflow Queuing**—Traffic shaping in the ingress direction (Frame Relay to ATM) is enabled by default for all the VBR-nrt VCs on the Frame Relay ATM interface module. If you want to configure an individual VC to make use of the available bandwidth (when the other VCs configured on the same interface are not using all the allocated bandwidth) you must configure overflow queuing on that VC.

For example, the policing functionality accepts frames until the PIR rate is reached while the allowable burst and shaping functionality tries to send the cells to the switch fabric at SCR (CIR equivalent on the ATM side). If the CIR is very low compared to the PIR, this could allow buffers to be held for a long time, which causes frame discards on that particular VC and other VCs on the same interface.

Enabling overflow queuing allows you to schedule the frames at a rate above SCR. This means when the bandwidth is available and when overflow queuing is enabled, the frames will be sent at a higher rate.

**Examples**

The following example shows how to create a soft PVC between two Frame Relay connections.

```plaintext
Switch(config-if)# frame-relay soft-vc 50 dest-address 47.0091.8100.0000.00e0.1e79.8803.4000.0c81.8020.00 dlci 50 upc pass
```

The following example shows how to create a soft PVC between a Frame Relay connection and an ATM connection.

```plaintext
Switch(config-if)# frame-relay soft-vc 60 dest-address 47.0091.8100.0000.0060.3e5b.7201.4000.0c80.8000.00 vc 0 100
```

The following example shows these connections via the `show vc` command.

```plaintext
Switch# show vc interface serial3/0/0:1

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial3/0/0:1</td>
<td>50</td>
<td>SoftVC</td>
<td>Serial3/0/0:2</td>
<td>50</td>
<td></td>
<td>UP</td>
</tr>
<tr>
<td>Serial3/0/0:1</td>
<td>55</td>
<td>PVC</td>
<td>Serial3/0/0:2</td>
<td>55</td>
<td></td>
<td>UP</td>
</tr>
<tr>
<td>Serial3/0/0:1</td>
<td>60</td>
<td>SoftVC</td>
<td>ATM1/1/1</td>
<td>0/35</td>
<td></td>
<td>UP</td>
</tr>
<tr>
<td>Serial3/0/0:1</td>
<td>66</td>
<td>PVC</td>
<td>Serial3/0/0:2</td>
<td>66</td>
<td></td>
<td>UP</td>
</tr>
</tbody>
</table>
```
In the `show vc` example above, the Frame Relay-to-Frame Relay connection originates from Serial 3/0/0:1 and terminates at Serial 3/0/0:2. The Frame Relay-to-ATM connection originates from Serial 3/0/0:1 and goes out through ATM 1/1/1 and ends on an ATM interface on an adjacent switch.

The following example shows how to manually configure an explicit path between two Frame Relay connections. In this example, if the explicit path fails, standard routing is used.

```
Switch# configure terminal
Switch(config)# interface atm 0/1/3
Switch(config-if)# frame-relay soft-vc 100 dest-address 47.0091.8100.0000.1061.705b.d900.4000.0c81.9000.00 dlci 100 explicit-path 1 name chicago.path1
```

The following example shows how to use the `redo-explicit` keyword to modify an existing explicit-path configuration to add a second alternate explicit path and to prevent standard routing from being used should both explicit paths fail. Note that the system prompts you to confirm the changes.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# frame-relay soft-vc 100 redo-explicit explicit-path 1 name chicago.path1 explicit-path 2 name chicago.path2 only-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]:y
```

The following example shows how to remove all explicit paths from an existing Frame Relay soft PVC by using the `redo-explicit` keyword, with no other options specified. The path will not be changed until a reroute occurs.

```
Switch(config)# interface atm 0/1/3
Switch(config-if)# frame-relay soft-vc 100 redo-explicit
Modify with new explicit path options [yes], or abort changes [no]? [yes/no]:y
```

The following example shows how to modify the CTTR indexes for an existing Frame Relay Soft VC.

```
Switch(config-if)# frame-relay soft-vc 20 rx-cttr 64000 tx-cttr 64000
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm pnni explicit-path</code></td>
<td>Used to enter PNNI explicit path configuration mode to create or modify PNNI explicit paths.</td>
</tr>
<tr>
<td><code>atm route-optimization</code></td>
<td>Enables and configures soft PVC route optimization on an ATM interface.</td>
</tr>
<tr>
<td>(<code>interface</code>)</td>
<td></td>
</tr>
<tr>
<td><code>atm route-optimization</code></td>
<td>Initiates route optimization immediately for a specific interface or specific soft VC.</td>
</tr>
<tr>
<td>(<code>EXEC</code>)</td>
<td></td>
</tr>
<tr>
<td><code>atm soft-vc</code></td>
<td>Used to create a soft PVC on the switch router.</td>
</tr>
<tr>
<td>(<code>point-to-point</code>)</td>
<td></td>
</tr>
<tr>
<td><code>atm soft-vp</code></td>
<td>Used to create a soft PVP on the switch router.</td>
</tr>
<tr>
<td><code>show atm pnni explicit-paths</code></td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
<tr>
<td><code>show atm vc</code></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td><code>show vc</code></td>
<td>Displays active virtual circuits (PVCs, SVCs, and soft VCs).</td>
</tr>
</tbody>
</table>
frame-relay upc-intent

To configure the UPC to be programmed for the soft VCs terminating on an interface, and to configure the default value for the upc option in the frame-relay pvc command, use the frame-relay upc-intent interface configuration command. To assign the default value, use the no form of this command.

```
frame-relay upc-intent {pass | tag-drop}
no frame-relay upc-intent
```

**Syntax Description**

Pass | tag-drop  Usage parameter control, specified as pass or tag-drop.

**Defaults**

Pass

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command determines the UPC to use for SVCs and for the destination leg of soft VCs. If you want to configure policing, you can apply it once for traffic entering a network.

**Examples**

The following example shows how to set the intended UPC for SVCs on an interface to tag-drop.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# frame-relay upc-intent tag-drop
```

**Command**  **Description**

| show running-config | Displays the configuration information currently running on the terminal. |
framing (controller)

To specify the type of framing used by the port on a Frame Relay port adapter, use the `framing` controller configuration command. To restore the default framing type, use the `no` form of this command.

For the channelized DS3 (CDS3) Frame Relay port adapter, use the following syntax:

```
framing {c-bit | m23}
```

```
no framing {c-bit | m23}
```

For the channelized E1 (CE1) Frame Relay port adapter, use the following syntax:

```
framing {crc | no-crc4}
```

```
no framing {crc | no-crc4}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>c-bit</td>
<td>m23</td>
</tr>
<tr>
<td>crc4</td>
<td>no-crc4</td>
</tr>
</tbody>
</table>

### Defaults

- CDS3 Frame Relay port adapters: **m23**
- CE1 Frame Relay port adapters: **crc4**

### Command Modes

Controller configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The DS3 port adapter has a similar command, but the Frame Relay port adapter does not support the same command options.

### Examples

The following example shows how to set the framing for the CE1 Frame Relay port adapter to `no` CRC4.

```
Switch# configure terminal
Switch(config)# controller e1 11/0/0
Switch(config-controller)# framing no-crc4
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers e1</code></td>
<td>Displays information about a physical port device and specifies a channelized E1 interface.</td>
</tr>
</tbody>
</table>
framing (interface)

To select the frame type for the data line, use the `framing` interface configuration command. To restore the default values, use the `no` form of this command.

```
framing framingmode

no framing framingmode
```

**Syntax Description**

<table>
<thead>
<tr>
<th>framingmode</th>
<th>Specifies framingmode as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For DS3: m23adm</td>
</tr>
<tr>
<td></td>
<td>• For E3: g832adm</td>
</tr>
<tr>
<td></td>
<td>• For E1: crc4adm</td>
</tr>
<tr>
<td></td>
<td>• For E1 IMA: cleare1</td>
</tr>
<tr>
<td></td>
<td>• For T1: esfplcp</td>
</tr>
<tr>
<td></td>
<td>• For T1 IMA: esfadm</td>
</tr>
<tr>
<td></td>
<td>• For OC-12: stm-4c</td>
</tr>
</tbody>
</table>

**Defaults**

For DS3: `cbitplcp`

For E3: `g832adm`

For E1: `pcm30adm`

For E1 IMA: `no-crc4`

For T1: `esfplcp`

For T1 IMA: `esf`

For OC-12: `sts-12c`

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>Modified: Formerly interface configuration</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

In the DS3 environment, the `framing (interface)` subcommand allows selection of DS3 framing mode to M23 ADM, M23 PLCP, C-Bit ADM, or C-Bit PLCP.

In the E3 environment, the `framing (interface)` subcommand allows selection of E3 framing mode to G.751 PLCP, G.751 ADM, or G.832 ADM.

In the E1 environment, the `framing (interface)` subcommand allows selection of E1 framing mode to ADM with CRC, PLCP with CRC, PCM 30 ADM, PCM 30 PCLP.
In the E1 IMA environment, the `framing (interface)` subcommand allows selection of E1 IMA framing mode to clear channel, ADM with CRC, PCM 30 ADM.

In the T1 environment, the `framing (interface)` subcommand allows selection of T1 framing mode to ESF PLCP, SF PLCP, SF ADM, ESF ADM.

In the T1 IMA environment, the `framing (interface)` subcommand allows selection of T1 IMA framing mode to SF ADM, ESF ADM.

In the OC-12 environment, the `framing (interface)` subcommand allows selection of OC-12 framing mode to SONET (STS-12c), SDH (STM-4c).

**Note**

This command is only supported on a system with an OC-12 or OC-48c interface module.

**Examples**

The following example shows how to select `g751plcp` as the frame type.

```
Switch(config-if)# framing g751plcp
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td>sonet overhead</td>
<td>Sets SONET/SDH overhead bytes.</td>
</tr>
</tbody>
</table>
H Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
**hw-module**

To reset a specific port adapter, use the **hw-module** EXEC command.

```
   hw-module {slot number | subslot subslot/subcard} reset
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot number</td>
<td>Physical slot number of the port adapter you want to reset.</td>
</tr>
<tr>
<td>subslot subslot/subcard</td>
<td>Indicates either a half-width card or daughter card attached to full-width cards. If the subcard is not specified, in the case of a half-width card, both the cards in the slot are reset. In case of full-width cards, the motherboard in the slot is reset.</td>
</tr>
<tr>
<td>reset</td>
<td>Reset is performed on the hardware module selected using slot or subslot options.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If the subcard is not provided, both subcards in the slot are reset. In the case of a full-width card, the motherboard in the selected slot is reset. The subcard argument indicates a specific subcard in a selected slot. If the subcard is not given, the full-width card in the selected slot is reset.

This command is available to reset port adapters only. The **hw-module** command cannot be used to reset route processor controllers and switch controllers.

⚠️ **Caution**

If any active connections are configured on this port, they will be lost until the port adapter restarts. The running configuration is restored only when the port adapter returns to normal operation.

**Examples**

The following example resets the port adapter in slot 3.

```
Switch# hw-module slot 3 reset
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reprogram</td>
<td>Upgrades nonvolatile microcode or programmable logic on a selected card from a Flash file.</td>
</tr>
</tbody>
</table>
I Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
ima active-links-minimum

To configure the minimum active links for an IMA group to function, use the `ima active-links-minimum` interface configuration command. To restore the default value, use the `no` form of this command.

`ima active-links-minimum number`

`no ima active-links-minimum`

**Syntax Description**

- **number**: Configures the minimum number (1 to 8) of active links for an IMA group to function.

**Defaults**

1

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

An IMA group might be configured to require a minimum amount of bandwidth or active links to function correctly. However, if you reduce the minimum number of active links to below the minimum active links configured, the far-end connection receives an ICP cell with a failure error, and the interface changes to the down state.

**Note**

This command is only supported on systems equipped with FC-PFQ.

**Examples**

The following example uses the `ima active-links-minimum` command to configure the minimum number of active links that must be active for the IMA group to function correctly.

```
Switch(config)# interface atm 0/0/ima1
Switch(config-if)# ima active-links-minimum 2
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
ima clock-mode

To configure the clocking mode for the IMA group, use the **ima clock-mode** interface configuration command. To restore the default value, use the **no** form of this command.

```
ima clock-mode { common | independent }
no ima clock-mode
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>common</td>
<td>Configures the clocking as CTC, where the same clocking is used for all interfaces.</td>
</tr>
<tr>
<td>independent</td>
<td>Configures the clocking as ITC, where each interface derives its clocking from a different clock source.</td>
</tr>
</tbody>
</table>

**Defaults**

common

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The transmit clock of members of an IMA group can be derived from one single clock source or driven individually from different sources.

The term ITC is used when the transmit clock on each link is independently derived from a clock source. The transmit clock source for each member interface is configured using the **clock source (Catalyst 8540 MSR)** command at interface configuration.

The term CTC applies when the same clock is used for all links. In CTC mode, the network clock as configured by the **network-clock-select** command is the source that drives the transmit clock of all the members of an IMA group.

**Note**

This command is only supported on systems equipped with FC-PFQ.

**Examples**

The following example uses the **ima clock-mode** command to configure the IMA group clocking mode as independent.

```
SwitchA(config)# interface atm 0/0/ima1
SwitchA(config-if)# ima clock-mode independent
```
The following example uses the **ima clock-mode** command to configure the IMA group clocking mode as common with network clock from interface ATM 0/0/6.

Switch(config)# network 1 atm 0/0/6
Switch(config)# interface atm 0/0/ima1
Switch(config-if)# ima clock-mode common

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>clock source(interface)</td>
<td>Used to select a transmit clock source for a physical device, such as a port.</td>
</tr>
<tr>
<td></td>
<td>(Catalyst 8510 MSR and LightStream 1010)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>network-clock-select</td>
<td>Enables the recovered clock to specify a particular port to provide network clocking.</td>
</tr>
<tr>
<td></td>
<td>show ima interface</td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
ima differential-delay-maximum

To configure the maximum differential delay used to align the transmission of IMA frames on all links, use the `ima differential-delay-maximum` interface configuration command. To restore the default value, use the `no` form of this command.

```
ima differential-delay-maximum msecs
no ima differential-delay-maximum
```

**Syntax Description**

- **msecs** Configures the maximum differential delay in milliseconds as follows:
  - For T1 the range is 25 to 250 milliseconds.
  - For E1 the range is 25 to 190 milliseconds.

**Defaults**

25 milliseconds

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The transmitter on the T1/E1 IMA port adapter must align the transmission of IMA frames on all interfaces that are members of the IMA group. This allows the receiver to adjust for differential link delays among the interfaces that are members of the IMA group. Based on this required behavior, the receiver can detect the differential delays by measuring the arrival times of the IMA frames on each link.

At the transmitting end, the cells are transmitted continuously. If no ATM layer cells need to be sent between ICP cells within an IMA frame, then the transmit IMA sends filler cells to maintain a continuous stream of cells at the physical layer.

**Note**

This command is only supported on systems equipped with FC-PFQ.

**Examples**

The following example configures the maximum allowable differential delay to 100 milliseconds for all interfaces assigned to the IMA group.

```
Switch(config)# interface atm 0/0/ima1
Switch(config-if)# ima differential-delay-maximum 100
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
ima frame-length

To configure the IMA interface frame length (number of cells per frame), use the **ima frame-length** interface configuration command. To restore the default value, use the **no** form of this command.

```
ima frame-length { 128 | 256 | 32 | 64 }
no ima frame-length
```

### Syntax Description

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>Configures IMA frame length to 128 cells (default).</td>
</tr>
<tr>
<td>256</td>
<td>Configures IMA frame length to 256 cells.</td>
</tr>
<tr>
<td>32</td>
<td>Configures IMA frame length to 32 cells.</td>
</tr>
<tr>
<td>64</td>
<td>Configures IMA frame length to 64 cells.</td>
</tr>
</tbody>
</table>

### Defaults

128

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

An IMA group uses the frame length parameter to set the insertion of the ICP cells at the beginning of frames in the transmit direction.

**Note**

This command is only supported on systems equipped with FC-PFQ.

### Examples

The following example uses the **ima frame-length** command to configure the frame length transmitted as 256 cells for the IMA group:

```
Switch(config)# interface atm 0/0/ima1
Switch(config-if)# ima frame-length 256
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
ima-group

To assign an interface as a member of an IMA group, use the `ima-group` interface configuration command. To remove an interface from an IMA group, use the `no` form of this command.

```
ima-group number

no ima-group
```

**Syntax Description**

- `number` Specifies the IMA group number (0 to 3).

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the `ima-group` interface command to configure a T1/E1 IMA port adapter interface as part of an IMA group. IMA allows you to aggregate multiple low-speed links into one larger virtual trunk or IMA group which appears to your ATM switch router as one logical pipe. This IMA group provides modular bandwidth for user access to ATM networks for connections between ATM network elements at rates between the traditional order of multiplex levels, such as between T1 or E1, and T3 or E3.

IMA requires inverse multiplexing and demultiplexing of ATM cells in a cyclical fashion among links grouped to form a higher bandwidth logical group with a rate approximately the sum of the link rates. This grouping is called an IMA group.

**Note**

This command is only supported on systems equipped with FC-PFQ.

**Note**

To configure a T1/E1 IMA port adapter interface as a member of an IMA group, you must shut down the interface before using the `ima-group` command when no shutdown has been previously configured.

**Examples**

The following example uses the `ima-group` command to assign ATM interface 0/0/0 as part of IMA group 1.

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# shutdown
Switch(config-if)# ima-group 1
Switch(config-if)# no shutdown
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
<tr>
<td><code>show interfaces</code></td>
<td>Displays the interface configuration, status, and statistics.</td>
</tr>
</tbody>
</table>
ima test

To configure an IMA group test pattern transmitted in the ICP cells, use the **ima test** interface configuration command. To restore the default value, use the **no** form of this command.

**ima test [link link-value] [pattern pattern-value]**

**no ima test**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>link</td>
<td>Configures the link transmitting the test pattern.</td>
</tr>
<tr>
<td>link-value</td>
<td>Specifies which IMA group member link is transmitting the test pattern.</td>
</tr>
<tr>
<td>pattern</td>
<td>Configures the test pattern.</td>
</tr>
<tr>
<td>pattern-value</td>
<td>Specifies the test pattern transmitted in the ICP cells.</td>
</tr>
</tbody>
</table>

**Defaults**

The link-value: First link in the IMA group
The pattern-value: Default is the link-value

For example, suppose an IMA group includes ATM interfaces 0/0/3, 0/0/4 and 0/0/6. If the link or pattern value is not specified in the **ima test** command, then interface 0/0/3 (default) is chosen as test-link, and the pattern value used is 03 (default).

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The test pattern procedure verifies the connectivity of a link within an IMA group. The procedure uses a test pattern sent over one link to verify the connectivity to the other links in the IMA group. The test pattern should be looped over all the other links in the group at the far end of the connection. All of the IMA test pattern procedures are performed over the ICP cells exchanged between both ends of the IMA virtual links. After the test is configured on the IMA group, the test continues until explicitly configured to the default.

**Note**

This command is only supported on systems equipped with FC-PFQ.

**Examples**

The following example uses the **ima test** command to configure the test pattern 0x010 (octal 8) to transmit over ATM interface 0/0/3 of IMA group 1.

```
Switch(config)# interface atm 0/0/ima1
Switch(config-if)# ima test link 3 pattern 010
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
inarp

To configure the Inverse ARP time period for all PVC bundle members, use the `inarp` configuration command. To return the PVC bundle Inverse ARP configuration to the default, use the `no` form of this command.

```
inarp minutes
no inarp
```

**Syntax Description**

- **Syntax**: `inarp minutes`
- **Description**: Specifies the Inverse ARP timer in the range of 1 to 60 minutes. The default is 15 minutes.

**Defaults**

Inverse ARP timer is 15 minutes.

**Command Modes**

- PVC bundle configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `inarp` command configures the Inverse ARP time period for all VC bundle members. This command augments the `inarp` configuration set using the `protocol` command. It specifies the time interval between Inverse ARP operations and sets the Inverse ARP timer.

**Examples**

The following example shows how to configure the Inverse ARP timer to 30 minutes.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# ip address 1.1.1.9 255.0.0.0
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)#
02:30:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to down
Switch(config-if-atm-bundle)# inarp 30
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>bundle</code></td>
<td>Configures a PVC bundle.</td>
</tr>
<tr>
<td><code>show atm bundle</code></td>
<td>Displays the PVC bundle information.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
incoming-port

To filter ATM signalling call failures based on the incoming interface of the call, use the `incoming-port` ATM signalling diagnostics configuration command. To return the incoming port to the default, use the `no` form of this command.

```
incoming-port atm card/subcard/port

no incoming-port atm card/subcard/port
```

**Syntax Description**

- `card/subcard/port` Specifies the card, subcard, and port number of the ATM interface. The card number is displayed using the `show interfaces` command. The subcard number can be either 0 or 1.

**Defaults**

0

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The default 0 means the incoming interface is not considered during filtering.

**Examples**

The following example configures ATM 0/1/1 so all previous records collected on the incoming port are purged.

```
Switch# configure terminal
Switch(config)# controller atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# incoming-port atm 0/1/1
```
interface

To configure an interface type and enter interface configuration mode, use the `interface` global configuration command.

```
interface type card/subcard/port
interface atm card/subcard/ima group
interface type number
```

To configure a subinterface, use the `interface` global configuration command.

```
interface type card/subcard/port.vpt#
interface type card/subcard/port.subinterface# [multipoint | point-to-point]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>type</code></td>
<td>Specifies the type of interface to be configured. Refer to Table 9-1 for a list of keywords.</td>
</tr>
<tr>
<td><code>card</code></td>
<td>Specifies the interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the <code>show interfaces</code> command.</td>
</tr>
<tr>
<td><code>subcard</code></td>
<td>Specifies the backplane slot number. The value is either 0 or 1. The slots are numbered from left to right.</td>
</tr>
<tr>
<td><code>port</code></td>
<td>Specifies the port number of the interface.</td>
</tr>
<tr>
<td><code>ima group</code></td>
<td>Specifies the IMA group number (0 to 3).</td>
</tr>
<tr>
<td><code>number</code></td>
<td>Specifies the integer used to identify the interface.</td>
</tr>
<tr>
<td><code>.vpt#</code></td>
<td>Specifies the virtual path tunnel number for the subinterface on physical ATM ports.</td>
</tr>
<tr>
<td><code>.subinterface#</code></td>
<td>Specifies the subinterface number in the range of 1 to 4294967293. The number that precedes the periods (.) must match the number where this subinterface belongs.</td>
</tr>
<tr>
<td><code>multipoint</code></td>
<td>Specifies a multipoint subinterface. This option only applies to the ATM router module interfaces as well as to route processor interface ATM 0.</td>
</tr>
<tr>
<td><code>point-to-point</code></td>
<td>Specifies a point-to-point subinterface. The default is <code>multipoint</code>. This option only applies to the ATM router module interfaces as well as to route processor interface ATM 0.</td>
</tr>
</tbody>
</table>

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Multiple subinterfaces can be configured on a single route processor interface. The route processor and Ethernet interface address is 0 in the ATM switch router environment.
Multiple subinterfaces for VP tunneling can be configured on a single ATM interface (not on a route processor interface). VP tunnels are useful when you want to run signalling, ILMI, and possibly PNNI routing between two switches that are not directly connected to each other. Before configuring the subinterface, a permanent virtual path must be configured on the ATM interface using the `atm pvp` command. The subinterface for the VP tunnel is created by specifying the VPI used to define the permanent virtual path as the subinterface number.

Table 9-1 lists typical interface keywords.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>ATM interface.</td>
</tr>
<tr>
<td>async</td>
<td>Auxiliary port line used as an asynchronous interface.</td>
</tr>
<tr>
<td>bvi</td>
<td>Bridge-group virtual interface.</td>
</tr>
<tr>
<td>cbr</td>
<td>CBR interface.</td>
</tr>
<tr>
<td>cable</td>
<td>CMTS interface.</td>
</tr>
<tr>
<td>dialer</td>
<td>Dailer interface.</td>
</tr>
<tr>
<td>ethernet</td>
<td>Ethernet IEEE 802.3 interface.</td>
</tr>
<tr>
<td>group-async</td>
<td>Master asynchronous interface.</td>
</tr>
<tr>
<td>lex</td>
<td>Lex interface.</td>
</tr>
<tr>
<td>loopback</td>
<td>Software-only loopback interface that emulates a continually running interface. All platforms support this virtual interface. The <code>interface number</code> (0 to 2147483647) is the number of the loopback interfaces you want to create or configure.</td>
</tr>
<tr>
<td>null</td>
<td>Null interface.</td>
</tr>
<tr>
<td>Port-channel</td>
<td>Ethernet channel of interfaces.</td>
</tr>
<tr>
<td>serial</td>
<td>Serial interface.</td>
</tr>
<tr>
<td>tunnel</td>
<td>Tunnel interface, used to declare a TSP tunnel interface. The tunnel interface <code>number</code> is in the range of 0 to 2147483647.</td>
</tr>
<tr>
<td>virtual-template</td>
<td>Virtual template interface.</td>
</tr>
<tr>
<td>virtual-tokenring</td>
<td>Virtual Token Ring interface.</td>
</tr>
<tr>
<td>vlan</td>
<td>Catalyst 5000 VLAN interface.</td>
</tr>
</tbody>
</table>

Examples

The following example shows how to begin configuration of the ATM interface on card 0, subcard 0, and port 1 using the `interface` global configuration command.

```
Switch(config)# interface atm 0/0/1
Switch(config-if)#
```

The following example shows how to create a VP tunnel with VPI 50 on card 0, subcard 0, and port 1, and enter the subinterface configuration mode for the VP tunnel using the `interface` global configuration command.
The following example shows how to begin configuration of the route processor interface using the `interface` global configuration command.

```
Switch(config)# interface atm 0
Switch(config-if)#
```

The following example shows how to create a point-to-point subinterface on the SAP port and enter the subinterface configuration mode, using the `interface` global configuration command.

```
Switch(config)# interface atm 0.1 point-to-point
Switch(config-subif)#
```

The following example shows how to begin configuration of the Ethernet interface on the ATM switch router using the `interface` global configuration command.

```
Switch(config)# interface ethernet 0
Switch(config-if)#
```

The following example shows how to begin configuration of a CBR interface using the `interface` global configuration command.

```
Switch(config)# interface cbr 1/1/1
Switch(config-if)#
```

The following example shows how to use the `interface tunnel` command to declare a TSP tunnel interface with interface number 2100.

```
Switch(config)# interface tunnel 2100
Switch(config-if)#
```

The following example shows how to begin configuration of an IMA group interface using the `interface` global configuration command.

```
Switch(config)# interface atm 0/0/ima1
Switch(config-if)#
```

---

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show interfaces</code></td>
<td>Displays the interface configuration, status, and statistics.</td>
</tr>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
interface range

To execute a command on multiple ports simultaneously, use the `interface range` command.

```
interface range interface_type card/sub_card first_port - last_port | macro_name , interface_type card/sub_card /first_port - last_port | macro_name
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interface_type</code></td>
<td>Type of interface card in the switch router that is being accessed. Valid card types are FastEthernet, ATM, Ethernet and CBR.</td>
</tr>
<tr>
<td><code>card</code></td>
<td>Slot in the switch router that is being accessed.</td>
</tr>
<tr>
<td><code>sub_card</code></td>
<td>Sub slot in the switch router that is being accessed.</td>
</tr>
<tr>
<td><code>first_port</code></td>
<td>Valid range is from 0 to 12</td>
</tr>
<tr>
<td><code>last_port</code></td>
<td>Valid range is from 0 to 12.</td>
</tr>
<tr>
<td><code>macro_name</code></td>
<td>Variable to specify the macro name.</td>
</tr>
</tbody>
</table>

**Defaults**

Not applicable.

**Command Modes**

Global configuration mode

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You can use the `interface range` command on existing VLAN SVIs only. To display VLAN SVIs, enter the `show running config` command. The commands entered under the `interface range` command are applied to all existing VLAN SVIs.

Before using a macro, you must define a range using the `interface range` command.

All configuration changes made to a port range are saved to NVRAM, but port ranges created with the `interface range` command are not saved to NVRAM.

You can enter a port range in two ways:

- Specify up to five port ranges
- Specify a previously defined macro

When defining a VLAN range, valid values are 1 to 1005.

A macro and an interface range cannot be specified at the same time using one command. After creating a macro, the command line reference does not allow additional ranges to be specified. Likewise, if you already have specified an interface range, the command line reference will not allow a macro.

A single interface can be specified in the port range (making it similar to `interface` command).

**Examples**

The following example shows how to interface to two port ranges at the same time.
Router(config)# **interface range atm 1/0/1-4, cbr 3/1/0-3**
Router(config-if)#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>interface</td>
<td>Configures an interface type.</td>
</tr>
<tr>
<td></td>
<td>show interfaces</td>
<td>Displays the interface configuration, status, and statistics.</td>
</tr>
<tr>
<td></td>
<td>show atm interface</td>
<td>Displays the ATM interface, ATM group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
ip address

To set a primary or secondary IP address for an interface, use the `ip address` interface configuration command. To remove an IP address or disable IP processing, use the `no` form of this command.

```
ip address ip-address mask [secondary]
no ip address ip-address mask [secondary]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address.</td>
</tr>
<tr>
<td><code>mask</code></td>
<td>Mask for the associated IP subnet.</td>
</tr>
<tr>
<td><code>secondary</code></td>
<td>Specifies that the configured address is a secondary IP address. If this keyword is omitted, the configured address is the primary IP address.</td>
</tr>
</tbody>
</table>

**Defaults**

No IP address is defined for the interface.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

An interface can have one primary IP address and multiple secondary IP addresses. Packets generated by the switch always use the primary IP address. Therefore, all switch routers on a segment should share the same primary network number.

Hosts can determine subnet masks using the ICMP Mask Request message. Switch routers respond to this request with an ICMP Mask Reply message.

You can disable IP processing on a particular interface by removing its IP address with the `no ip address` command. If the switch router detects another host using one of its IP addresses, it prints an error message on the console.

The optional keyword `secondary` allows you to specify an unlimited number of secondary addresses. Secondary addresses are treated like primary addresses, except the system never generates datagrams other than routing updates with secondary source addresses. IP broadcasts and ARP requests are processed properly, as are interface routes in the IP routing table.
Secondary IP addresses can be used in a variety of situations. The following are the most common applications:

- There might not be enough host addresses for a particular network segment. For example, your subnetting allows up to 254 hosts per logical subnet, but on one physical subnet you need to have 300 host addresses. Using secondary IP addresses on the switch routers allows you to have two logical subnets using one physical subnet.
- Two subnets of a single network might otherwise be separated by another network. This situation is not permitted when subnets are in use. In these instances, the first network is extended, or layered on top of the second network by using secondary addresses.

Note

If any switch router on a network segment uses a secondary address, all other switch routers on that same segment must also use a secondary address from the same network or subnet. Inconsistent use of secondary addresses on a network segment can cause routing loops to occur very quickly.

Examples

In the following example, 131.108.1.27 is the primary address and 192.31.7.17 and 192.31.8.17 are secondary addresses for main Ethernet 0 interface.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip address 131.108.1.27 255.255.255.0
Switch(config-if)# ip address 192.31.7.17 255.255.255.0 secondary
Switch(config-if)# ip address 192.31.8.17 255.255.255.0 secondary
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
ip broadcast-address

To define a broadcast address for an interface, use the ip broadcast-address interface configuration command. To restore the default IP broadcast address, use the no form of this command.

```
ip broadcast-address [ip-address]
no ip broadcast-address [ip-address]
```

**Syntax Description**

`ip-address` IP broadcast address for a network.

**Defaults**

Default address is 255.255.255.255 (all ones).

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command sets the broadcast address of an interface.

**Examples**

The following example specifies an IP broadcast address of 172.10.50.4.

```
Switch# configure terminal
Switch(config)# ip broadcast-address 172.10.50.4
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None.</td>
<td></td>
</tr>
</tbody>
</table>
ip directed-broadcast

To enable the translation of directed broadcasts to physical broadcasts, use the ip directed-broadcast interface configuration command. To return the directed broadcast to the default, use the no form of this command.

```
ip directed-broadcast [access-list-number]
no ip directed-broadcast [access-list-number]
```

**Syntax Description**
- `access-list-number` Number of the access list. If specified, a broadcast must pass the access list to be forwarded. If not specified, all broadcasts are forwarded.

**Defaults**
Enabled with no list specified

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This feature is enabled only for those protocols configured using the ip forward-protocol global configuration command. An access list might be specified to control which broadcasts are forwarded. When an access list is specified, only those IP packets permitted by the access list are eligible to be translated from directed broadcasts to physical broadcasts.

**Examples**
The following example enables forwarding of IP directed broadcasts on the main Ethernet 0 interface.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip directed-broadcast
```

**Related Commands**
None
ip load-sharing per-packet

To enable per packet load sharing for all IP traffic on an interface, use the **ip load-sharing per-packet** interface configuration command and enter the **epc xpif-ip-per-pack-all** global configuration command.

To enable per-packet load sharing for TCP traffic only on an interface, use the **ip load-sharing per-packet** interface configuration command and do not enter the **epc xpif-ip-per-pack-all** global configuration command.

To disable per packet load sharing on an interface, use the **no ip load-sharing per-packet** command.

```
  ip load-sharing per-packet
  no ip load-sharing per-packet
```

**Syntax Description**

None.

**Defaults**

If the **ip load-sharing per-packet** command is not enabled on an interface, all traffic is forwarded per flow rather than load balanced per packet.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(10)E</td>
<td>This command was introduced on Catalyst 8500 switches.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Load sharing is the concept that allows a device to distribute the outgoing and incoming traffic among multiple best paths. When the **ip load-sharing per-packet** command is enabled on an interface, packets entering the interface are shared between multiple best paths. If **ip load-sharing per-packet** is disabled on an interface, all traffic is forwarded per flow rather than load balanced per packet.

The **ip load-sharing per packet** command can be used to enable per packet load balancing on all IP traffic on an interface or to enable per packet load balancing for all TCP traffic on an interface.

- To enable per packet load balancing for all IP traffic, enter the **ip load-sharing per-packet** command in interface configuration mode and enter the **epc xpif-ip-per-pack-all** global configuration.
- To enable per packet load balancing for TCP traffic only, enter the **ip load-sharing per-packet** command in interface configuration mode and ensure the **epc xpif-ip-per-pack-all** global configuration command is not entered.

This command is only available for Gigabit Ethernet line cards.

This command should only be used with switches equipped with Enhanced ATM Router Modules. This command cannot be used with switches equipped with standard ATM Router Modules.

Per packet load balancing should not be configured on MPLS-enabled interfaces.
### Examples

The following example enables load-sharing for TCP packets on ethernet interface 0. This example assumes that the `epc xpif-ip-per-pack-all` command is not globally enabled:

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip load-sharing per-packet
```

The following example enables load-sharing for all IP packets on ethernet interface 0:

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip load-sharing per-packet
Switch(config-if)# exit
Switch(config)# epc xpif-ip-per-pack-all
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>epc xpif-ip-per-pack-all</code></td>
<td>Enables IP per packet load-sharing for all IP packets on an interface if the <code>ip load-sharing per-packet</code> command is configured on the interface. If the <code>ip load-sharing per-packet</code> command is configured on an interface but <code>epc xpif-ip-per-pack-all</code> command is not globally enabled, only TCP traffic will be load balanced per packet.</td>
</tr>
</tbody>
</table>
ip mtu

To set the MTU size of IP packets sent on an interface, use the **ip mtu** interface configuration command. To restore the default MTU size, use the **no** form of this command.

```
ip mtu bytes

no ip mtu
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bytes</td>
<td>MTU in bytes.</td>
</tr>
</tbody>
</table>

**Defaults**

- Minimum: 128 bytes
- Maximum: Depends on the interface medium

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

- If an IP packet exceeds the MTU set for the interface of the switch router, the switch router fragments the packet.
- All devices on a physical medium must have the same protocol MTU in order to operate.

**Note**

Changing the MTU value (with the **mtu** interface configuration command) can affect the IP MTU value. If the current IP MTU value is the same as the MTU value and you change the MTU value, the IP MTU value is modified automatically to match the new MTU. However, the reverse is not true; changing the IP MTU value has no effect on the value for the **mtu** command.

**Examples**

The following example sets the maximum IP packet size for the first interface to 300 bytes.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip mtu 300
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mtu</strong></td>
<td>Used to adjust the maximum packet size or MTU size.</td>
</tr>
</tbody>
</table>
ip proxy-arp

To enable proxy ARP on an interface, use the `ip proxy-arp` interface configuration command. To disable proxy ARP on the interface, use the `no` form of this command.

```
  ip proxy-arp
  no ip proxy-arp
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Enabled

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Used to enable proxy ARP.

**Examples**
The following example enables proxy ARP on Ethernet interface 0.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip proxy-arp
```
ip rarp-server

Use the `ip rarp-server` interface configuration command to allow the switch router to act as a RARP server. To return the RARP server to the default, use the `no` form of this command.

```
ip rarp-server ip-address

no ip rarp-server ip-address
```

**Syntax Description**
- `ip-address`: IP address that is to be provided in the source protocol address field of the RARP response packet. Normally, this is set to whatever address you configure as the primary address for the interface.

**Defaults**
Disabled

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This feature makes diskless booting of clients possible between network subnets where the client and server are on separate subnets.

RARP server support can be configured on a per-interface basis so the switch router does not interfere with RARP traffic on subnets that do not need RARP assistance from the switch router.

The switch router answers incoming RARP requests only if both of the following two conditions are met:

- The `ip rarp-server` command has been configured for the interface on which the request was received.
- There is a static entry found in the IP ARP table that maps the MAC address contained in the RARP request to an IP address.

Use the `show ip arp` EXEC command to display the contents of the IP ARP cache.

Sun Microsystems makes use of RARP-based and UDP-based network services to facilitate network-based booting of SunOS on their workstations. By bridging RARP packets and using both the `ip mtu` interface configuration command and the `ip forward-protocol` global configuration command, the switch should be able to perform the necessary packet switching to enable booting of Sun workstations across subnets. However, some Sun workstations assume that the sender of the RARP response, in this case the switch router, is the host that the client can contact to TFTP-load the bootstrap image. This causes the workstations to fail to boot.

By using the `ip rarp-server` feature, the switch router can be configured to answer these RARP requests, and the client machine should be able to reach its server by having its TFTP requests forwarded through the switch router that acts as the RARP server.
ip route

To establish static routes, use the `ip route` global configuration command. To remove static routes, use the `no` form of this command.

```
ip route destination-prefix destination-prefix-mask [interface-type card/subcard/port] forward-addr [metric | permanent | tag tag-value]
no ip route destination-prefix destination-prefix-mask [interface-type card/subcard/port] forward-addr [metric | permanent | tag tag-value]
```

**Syntax Description**

- `destination-prefix`: IP address of the target network or subnet.
- `destination-prefix-mask`: Address mask for the destination address.
- `interface-type`: Interface type, specified as `atm`, `atm-p`, `cbr`, `ethernet`, or `null`.
- `card/subcard/port`: Identifier of the interface specified by `interface-type`.
- `forward-addr`: Forwarding router’s IP address.
- `metric`: Distance metric for this route, in the range of 1 to 255.
- `permanent`: Specifies this route as a permanent route.
- `tag-value`: Sets the tag value for this route, in the range of 1 to 4294967295.

**Defaults**

No IP route is specified.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command does not apply to the route processor interface main ATM 0.

**Examples**

In the following example, an administrative distance of 110 was chosen. In this case, packets for network 10.0.0.0 are routed to the switch at 131.108.3.4 if dynamic information with an administrative distance less than 110 is not available.

```
Switch# configure terminal
Switch(config)# ip route 10.0.0.0 255.0.0.0 131.108.3.4 110
```

In the following example, packets for network 131.108.0.0 are routed to the switch at 131.108.6.6.

```
Switch(config)# ip route 131.108.0.0 255.255.0.0 131.108.6.6
```
ip security add

To add a basic security option to all outgoing packets, use the `ip security add` interface configuration command. To disable the adding of a basic security option to all outgoing packets, use the `no` form of this command.

```
ip security add
no ip security add
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled when the security level of the interface is “Unclassified Genser” (or unconfigured). Otherwise, the default is enabled.

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
If an outgoing packet does not have a security option present, this interface configuration command adds one as the first IP option. The security label added to the option field is the label that was computed for this packet when it first entered the switch. Because this action is performed after all the security tests have been passed, this label is either the same as or is in the range of the interface.

**Examples**
The following example adds a basic security option to each packet leaving main Ethernet interface 0.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip security add
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip security dedicated</code></td>
<td>Sets the level of classification and authority on the interface.</td>
</tr>
</tbody>
</table>
ip security aeso

To attach AESOs to an interface, use the `ip security aeso` interface configuration command. To disable AESOs on an interface, use the `no` form of this command.

```
ip security aeso source compartment-bits

no ip security aeso [source compartment-bits]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>source</code></td>
<td>AESO source. This can be an integer from 0 through 255.</td>
</tr>
<tr>
<td><code>compartment-bits</code></td>
<td>Compartment bits, in hexadecimal.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Compartment bits are specified only if this AESO is to be inserted in a packet. On every incoming packet at this level on this interface, these AESOs should be present.

Beyond being recognized, no further processing of AESO information is performed. AESO contents are not checked and are assumed to be valid if the source is listed in the configurable AESO table.

Configuring any per-interface extended IPSO information automatically enables `ip security extended-allowed` (disabled by default).

**Examples**

In the following example, the extended security option source is defined as 5, and the compartment bits are set to 5.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip security aeso 5 5
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip security eso-info</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td><code>ip security eso-max</code></td>
<td>Specifies the maximum sensitivity level for an interface.</td>
</tr>
</tbody>
</table>
ip security dedicated

To set the level of classification and authority on the interface, use the `ip security dedicated` interface configuration command. To reset the interface to default (disabled), use the `no` form of this command.

```
ip security dedicated level authority [authority...]
no ip security dedicated [level authority [authority...]]
```

**Syntax Description**

- `level` Degree of sensitivity of information. The `level` keywords are listed in Table 9-2.
- `authority` Organization that defines the set of security levels that is used in a network. The `authority` keywords are listed in Table 9-3.

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

All traffic entering the system on this interface must have a security option that exactly matches this label. Any traffic leaving through this interface has this label attached.

The following definitions apply to the descriptions of the IPSO in this section:

- `level`—The degree of sensitivity of information. For example, data marked TOPSECRET is more sensitive than data marked SECRET. The level keywords and their corresponding bit patterns are shown in Table 9-2.

**Table 9-2  PSO Level Keywords and Bit Patterns**

<table>
<thead>
<tr>
<th>Level Keyword</th>
<th>Bit Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserved4</td>
<td>0000 0001</td>
</tr>
<tr>
<td>TopSecret</td>
<td>0011 1101</td>
</tr>
<tr>
<td>Secret</td>
<td>0101 1010</td>
</tr>
<tr>
<td>Confidential</td>
<td>1001 0110</td>
</tr>
<tr>
<td>Reserved3</td>
<td>0110 0110</td>
</tr>
<tr>
<td>Reserved2</td>
<td>1100 1100</td>
</tr>
<tr>
<td>Unclassified</td>
<td>1010 1011</td>
</tr>
<tr>
<td>Reserved1</td>
<td>1111 0001</td>
</tr>
</tbody>
</table>
**authority**—An organization that defines the set of security levels used in a network. For example, the Genser authority consists of level names defined by the DCA. The authority keywords and their corresponding bit patterns are shown in Table 9-3.

**Table 9-3  PSO Authority Keywords and Bit Patterns**

<table>
<thead>
<tr>
<th>Authority Keyword</th>
<th>Bit Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genser</td>
<td>1000 0000</td>
</tr>
<tr>
<td>Siop-Esi</td>
<td>0100 0000</td>
</tr>
<tr>
<td>DIA</td>
<td>0010 0000</td>
</tr>
<tr>
<td>NSA</td>
<td>0001 0000</td>
</tr>
<tr>
<td>DOE</td>
<td>0000 1000</td>
</tr>
</tbody>
</table>

**label**—A combination of a security level and an authority or authorities.

**Examples**

The following example sets a confidential level with Genser authority.

```
Switch# configure terminal
Switch(config)# ip security dedicated confidential Genser
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip security add</td>
<td>Adds a basic security option to all outgoing packets.</td>
</tr>
</tbody>
</table>
ip security eso-max

To specify the maximum sensitivity level for an interface, use the `ip security eso-max` interface configuration command. To return to the default, use the `no` form of this command.

```
  ip security eso-max source compartment-bits

  no ip security eso-max source [compartment-bits]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>source</td>
<td>ESO source. This is an integer from 1 through 255.</td>
</tr>
<tr>
<td>compartment-bits</td>
<td>Compartment bits, in hexadecimal.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is used to specify the minimum sensitivity level for a particular interface. Before the per interface compartment information for a particular NLESO source can be configured, the `ip security eso-info` global configuration command must be used to specify the default information.

On every incoming packet on the interface, these extended security options should be resent at the minimum level and should match the configured compartment bits. Every outgoing packet must have these ESOs.

On every packet transmitted or received on this interface, any NLESO sources present in the IP header should be limited by the minimum sensitivity level and by the maximum sensitivity level configured for the interface.

When transmitting locally generated traffic out this interface or adding security information (with the `ip security add` command), the maximum compartment bit information can be used to construct the NLESO sources placed in the IP header.

A maximum of 16 NLESO sources can be configured per interface. Due to IP header length restrictions, a maximum of nine of these NLESO sources appear in the IP header of a packet.

**Examples**

In the following example, the specified ESO source is 240, and the compartment bits are specified as 500.

```
Switch# configure terminal
Switch(config)# interface ethernet 0
Switch(config-if)# ip security eso-max 240 500
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip security eso-info</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td><code>ip security add</code></td>
<td>Adds a basic security option to all outgoing packets.</td>
</tr>
</tbody>
</table>
ip ssh

To configure SSH control parameters, use the **ip ssh** global configuration command. Use the **no** form of this command to restore the default value.

```
ip ssh { [time-out seconds] | [authentication-retries integer] | [version version-number] }
no ip ssh { [time-out seconds] | [authentication-retries integer] | [version version-number] }
```

**Syntax Description**

- **time-out**
  - (Optional) The time interval that the router waits for the SSH client to respond.
  - This setting applies to the SSH negotiation phase. Once the EXEC session starts, the standard timeouts configured for the VTY apply. By default, there are 5 VTYs defined (0-4); therefore 5 terminal sessions are possible. After the SSH executes a shell, the VTY timeout starts. The VTY timeout defaults to 10 minutes.

- **seconds**
  - The number of seconds until timeout disconnects, with a maximum of 120 seconds. The default is 120.

- **authentication-retries**
  - (Optional) The number of attempts after which the interface is reset.

- **integer**
  - The number of retries, with a maximum of 5 authentication-retries. The default is 3.

- **version**
  - (Optional) The version number of the SSH server to enable.

- **version-number**
  - Version number of the SSH server. The default is 1.99.

  1. Explicit configuration of **ip ssh version 1.99** is not allowed.

**Defaults**

- Disabled
- **time-out**—120 seconds
- **authentication-retries**—3
- **version**—1.99

**Note**

If SSH server version default 1.99 is used, the switch can accept SSH sessions of both Version 1 and 2.

**Command Modes**

- Global configuration

**Command History**

```
Release          Modification
12.1(12c)EY      New command
12.1(19)EB       Added **version version-number** key word and parameter.
```


### Usage Guidelines

Before you configure these SSH parameters, you must enable the SSH server using the `crypto key generate rsa` command.

### Examples

The following examples configure SSH control parameters:

```plaintext
Switch(config)# ip ssh time-out 100
Switch(config)# ip ssh authentication-retries 4
Switch(config)# ip ssh version 2
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>crypto key</code></td>
<td>Enables the local and remote SSH server and generates an RSA key-pair.</td>
</tr>
<tr>
<td><code>show ip ssh</code></td>
<td>Displays the SSH connections.</td>
</tr>
<tr>
<td><code>disconnect ssh</code></td>
<td>Terminates an SSH connection.</td>
</tr>
<tr>
<td><code>ssh</code></td>
<td>Starts an encrypted session with a remote networking device.</td>
</tr>
</tbody>
</table>
ip tcp chunk-size

To alter the TCP maximum read size for Telnet or rlogin, use the **ip tcp chunk-size** global configuration command. To restore the default value, use the **no** form of this command.

```
ip tcp chunk-size characters
no ip tcp chunk-size
```

**Syntax Description**

<table>
<thead>
<tr>
<th>characters</th>
<th>Maximum number of characters that Telnet or rlogin can read in one read instruction.</th>
</tr>
</thead>
</table>

**Defaults**

0, which Telnet and rlogin interpret as the largest possible 32-bit positive number.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Do not use this command unless you understand why you need to change the default value.

**Examples**

The following example sets the maximum TCP read size to 64000 bytes.

```
Switch# configure terminal
Switch(config)# ip tcp chunk-size 64000
```
**ip tcp queuemax**

To alter the maximum TCP outgoing queue per connection, use the `ip tcp queuemax` global configuration command. To restore the default value, use the `no` form of this command.

```
ip tcp queuemax packets
no ip tcp queuemax
```

**Syntax Description**

- `packets` Outgoing queue size of TCP packets.

**Defaults**

The default value is 5 segments if the connection has a TTY associated with it. If there is no TTY associated with it, the default value is 20 segments.

**Command Modes**

Global configuration

**Command History**

```
Release  Modification
11.2(5)    New command
```

**Usage Guidelines**

Changing the default value only changes the queue that has a TTY associated with the connection.

**Examples**

The following example sets the maximum TCP outgoing queue to 10 packets.

```
Switch(config)# ip tcp queuemax 10
```
ip tcp synwait-time

To set a period of time the switch router waits while attempting to establish a TCP connection before it times out, use the `ip tcp synwait-time` global configuration command. To restore the default time, use the `no` form of this command.

```
  ip tcp synwait-time seconds
```

```
  no ip tcp synwait-time seconds
```

**Syntax Description**

- `seconds` Time in seconds the switch router waits while attempting to establish a TCP connection. It can be an integer from 5 to 300 seconds. The default is 30 seconds.

**Defaults**

- 30 seconds

**Command Modes**

- Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If your network contains PSTN DDR, it is possible that the call setup time exceeds 30 seconds. This amount of time is not sufficient in networks that have dialup asynchronous connections because it affects your ability to Telnet over the interface (from the switch router) if the interface must be brought up. If you have this type of network, you might want to set this value to the UNIX value of 75.

Because this is a host parameter, it does not pertain to traffic going through the switch, just for traffic originating at the switch. Because UNIX has a fixed 75-second timeout, hosts are unlikely to see this problem.

**Examples**

The following example configures the switch router to continue attempting to establish a TCP connection for 180 seconds.

```
  Switch(config)# ip tcp synwait-time 180
```
ip tcp synwait-time
K Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note
Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note
Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
keepalive

To set the keepalive timer for a specific interface, use the keepalive interface configuration command. To turn off keepalives entirely, use the no form of this command.

keepalive [seconds]

no keepalive [seconds]

Syntax Description

| seconds | Number of seconds, from 0 to 32767, that defines the keepalive interval. The default is 10 seconds. |

Defaults

10 seconds

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command does not apply to ATM interfaces. Refer to the atm ilmi-keepalive command for configuration of keepalives on ATM interfaces.

You can configure the keepalive interval, which is the frequency at which the switch sends messages to itself (Ethernet) or to the other end (auxiliary), to ensure a network interface is alive. The interval is adjustable in one-second increments down to one second. An interface is declared down after three update intervals pass without receiving a keepalive packet.

You must set the interval as a positive integer that is less than the interval set on the neighboring switch. Setting the keepalive timer to a low value is useful for detecting Ethernet interface failures (transceiver cable disconnecting, cable unterminated, and so on). On a Frame Relay interface, the interval that you enter must be a positive integer that is less than the interval set on the ATM switch router. Refer to the frame-relay lmi-n392dte interface configuration command description.

A typical serial line failure involves losing CD. Since this sort of failure is typically noticed within a few milliseconds, adjusting the keepalive timer for faster routing recovery is generally not useful.

When adjusting the keepalive timer for a low bandwidth auxiliary interface, datagrams can delay the smaller keepalive packets long enough to cause the line protocol to go down. You might need to experiment to determine the best value.

Examples

The following example shows how to set the keepalive interval to 3 seconds.

Switch(config)# interface ethernet 0
Switch(config-if)# keepalive 3
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm ilmi-keepalive</td>
<td>Enables or disables ILMI connectivity procedures and to change the ILMI keepalive poll interval.</td>
</tr>
<tr>
<td>frame-relay lmi-n392dte</td>
<td>Sets the error threshold on DTE or NNI interfaces.</td>
</tr>
</tbody>
</table>
L Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
lane auto-config-atm-address

To specify that the configuration server ATM address is computed by the ATM switch router automatic method, use the `lane auto-config-atm-address` interface configuration command.

To remove the previously assigned ATM address, use the `no` form of this command.

```
lane [config] auto-config-atm-address

no lane [config] auto-config-atm-address
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>config</td>
<td>Specifies the configuration server’s ATM address.</td>
</tr>
</tbody>
</table>

**Defaults**

No specific ATM address is set.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface ATM 0.

When the `config` keyword is not present, this command causes the LANE server and LANE client on the subinterface to use the automatically assigned ATM address for the configuration server.

When the `config` keyword is present, this command assigns the automatically generated ATM address to the configuration server (LECS) configured on the interface. Multiple commands that assign ATM addresses to the LANE configuration server can be issued on the same interface to assign different ATM addresses to the configuration server. These commands include `lane auto-config-atm-address`, `lane config-atm-address`, and `lane le-arp`.

**Examples**

The following example associates the LANE configuration server with the database named `network1`, and specifies that the configuration server’s ATM address is assigned by the automatic method.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# lane database network1
Switch(config-if)# name eng server-atm-address 39.0000014155551211.0800.AA00.1001.02
Switch(config-if)# name mkt server-atm-address 39.0000014155551211.0800.AA00.4001.01
Switch(config-if)# lane config database network1
Switch(config-if)# lane config auto-config-atm-address
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lane config-atm-address</td>
<td>Specifies a configuration server’s ATM address explicitly.</td>
</tr>
</tbody>
</table>
### Command Table

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lane database</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>lane le-arp</td>
<td>Specifies that the fixed-configuration server ATM address assigned by the ATM Forum is used.</td>
</tr>
</tbody>
</table>
**lane bus-atm-address**

To specify an ATM address—and override the automatic ATM address assignment—for the broadcast-and-unknown server on the specified subinterface, use the `lane bus-atm-address` interface configuration command. To remove the ATM address previously specified for the broadcast-and-unknown server on the specified subinterface and thus revert to the automatic address assignment, use the `no` form of this command.

```
lane bus-atm-address atm-address-template
no lane bus-atm-address [atm-address-template]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, ESI bytes, or selector byte of the automatically assigned ATM address.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Defaults</th>
<th>Automatic ATM address assignment</th>
</tr>
</thead>
</table>

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface.

This command gives the client the ATM address of the broadcast-and-unknown server. The client will use this address rather than sending LE_ARP requests for the broadcast address.

When applied to a selected interface but with a different ATM address than used previously, this command replaces the broadcast-and-unknown server’s ATM address.

**ATM Addresses.** A LANE ATM address has the same syntax as an NSAP (but it is not a network-level address):

- A 13-byte prefix that includes the following fields defined by the ATM Forum: AFI field (1 byte), DCC or ICD field (2 bytes), DFI field (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and the Area field (2 bytes).
- A 6-byte ESI.
- A 1-byte Selector field.

**Address Templates.** LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character, and an ellipsis (...) to match any number of leading or trailing characters. The values of the digits that are replaced by wildcards come from the automatic ATM assignment method.

In LANE, a `prefix template` explicitly matches the prefix, but uses wildcards for the ESI and selector fields. An `ESI template` explicitly matches the ESI field, but uses wildcards for the prefix and selector.
In the Cisco implementation of LANE, the prefix corresponds to the switch router, the ESI corresponds to the ATM interface, and the Selector field corresponds to the specific subinterface of the interface.

**Examples**

The following example uses an ESI template to specify the part of the ATM address corresponding to the interface; the remaining values in the ATM address come from automatic assignment.

```
Switch(config-if)# lane bus-atm-address 0800.200C.1001.**
```

The following example uses a prefix template to specify the part of the ATM address corresponding to the switch; the remaining values in the ATM address come from automatic assignment.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# lane bus-atm-address 45.000014155551212f.00.00...
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>lane</code></td>
<td>Specifies an ATM address, and overrides the automatic ATM address assignment, for the LANE server on the specified subinterface.</td>
</tr>
<tr>
<td><code>server-atm-address</code></td>
<td></td>
</tr>
</tbody>
</table>
### lane client

To activate a LANE client on the specified subinterface, use the `lane client` interface configuration command. To remove a previously activated LANE client on the subinterface, use the `no` form of this command.

```
lane client {ethernet | tokenring} [elan-name]
```

```
no lane client {ethernet | tokenring} [elan-name]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethernet</td>
<td>Identifies the type of emulated LAN attached to this subinterface as Ethernet.</td>
</tr>
<tr>
<td>tokenring</td>
<td>Identifies the type of emulated LAN attached to this subinterface as Token Ring.</td>
</tr>
<tr>
<td>elan-name</td>
<td>Name of the emulated LAN. This argument is optional because the client obtains its emulated LAN name from the configuration server. Maximum length is 32 characters.</td>
</tr>
</tbody>
</table>

**Defaults**

No LANE clients are enabled on the interface.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface.

If a `lane client` command has already been entered on the subinterface for a different emulated LAN, the client initiates termination procedures for that emulated LAN and joins the new emulated LAN.

If you do not provide an `elan-name` value, the client contacts the server to find which emulated LAN to join. If you do provide an emulated LAN name, the client consults the configuration server to ensure that no conflicting bindings exist.

**Examples**

The following example shows how to enable a Token Ring LANE client on a subinterface.

```
Switch(config)# interface atm 0.1
Switch(config-subif)# lane client tokenring
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lane</td>
<td>Specifies an ATM address, and overrides the automatic ATM address assignment for the LANE server on the specified subinterface.</td>
</tr>
<tr>
<td>server-atm-address</td>
<td></td>
</tr>
</tbody>
</table>
To specify an ATM address—and override the automatic ATM address assignment—for the LANE client on the specified subinterface, use the `lane client-atm-address` interface configuration command. To remove the ATM address previously specified for the LANE client on the specified subinterface and revert to the automatic address assignment, use the `no` form of this command.

```
lane client-atm-address atm-address-template
no client-atm-address [atm-address-template]
```

**Syntax Description**

| atm-address-template | ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, ESI bytes, or selector byte of the automatically assigned ATM address. |

**Defaults**

Automatic ATM address assignment

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface.

Use of this command on a selected subinterface, but with a different ATM address than used previously, replaces the LANE client’s ATM address.

**ATM Addresses.** A LANE ATM address has the same syntax as an NSAP (but it is not a network-level address):

- A 13-byte prefix that includes the following fields defined by the ATM Forum: AFI field (1 byte), DCC or ICD field (2 bytes), DFI field (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and the Area field (2 bytes).
- A 6-byte ESI.
- A 1-byte Selector field.

**Address Templates.** LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character, and an ellipsis (...) to match any number of leading or trailing characters. The wildcard characters come from the automatically assigned ATM address.

In LANE, a `prefix template` explicitly matches the ATM address prefix, but uses wildcards for the ESI and selector fields. An `ESI template` explicitly matches the ESI field, but uses wildcards for the prefix and selector.

In the ATM switch router implementation of LANE, the prefix corresponds to the switch router, the ESI corresponds to the ATM interface, and the Selector field corresponds to the specific subinterface of the interface.
For a discussion of the Cisco method for automatically assigning ATM addresses, refer to the “Configuring LAN Emulation” chapter in the Router Products Configuration Guide.

**Examples**

The following example uses an ESI template to specify the part of the ATM address corresponding to the interface; the remaining parts of the ATM address come from automatic assignment.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# lane client-atm-address ...0800.200C.1001.**
```

The following example uses a prefix template to specify the part of the ATM address corresponding to the switch router; the remaining parts of the ATM address come from automatic assignment.

```
Switch(config)# interface atm 0
Switch(config-if)# lane client-atm-address 47.000014155551212f.00.00...
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>lane client</strong></td>
<td>Activates a LANE client on the specified subinterface.</td>
</tr>
</tbody>
</table>
**lane config-atm-address**

To specify a configuration server’s ATM address explicitly, use the `lane config-atm-address` interface configuration command. To remove an assigned ATM address, use the `no` form of this command.

```
lane [config] config-atm-address atm-address-template

no lane [config] config-atm-address atm-address-template
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm-address-template</td>
<td>ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, ESI bytes, or selector byte of the automatically assigned ATM address.</td>
</tr>
<tr>
<td>config</td>
<td>Used to specify the configuration server ATM address.</td>
</tr>
</tbody>
</table>

**Defaults**

No specific ATM address or method is set.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>Modified: Command name changed to <code>lane config-atm-address</code>.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface.

If the `config` keyword is not present, this command causes the LANE server and LANE client on the subinterface to use the specified ATM address for the configuration server.

When the `config` keyword is present, this command adds an ATM address to the configuration server configured on the interface. A LANE configuration server can listen on multiple ATM addresses. Multiple commands that assign ATM addresses to the LANE configuration server can be issued on the same interface to assign different ATM addresses to the LANE configuration server.

**ATM Addresses.** A LANE ATM address has the same syntax as an NSAP (but it is not a network-level address) and consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI field (1 byte) DCC or ICD field (2 bytes) DFI field (1 byte) Administrative Authority field (3 bytes) Reserved field (2 bytes) Routing Domain field (2 bytes) Area field (2 bytes)
- A 6-byte ESI
- A 1-byte Selector field

**Address Templates.** LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (…) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.
In LANE, a *prefix template* explicitly matches the ATM address prefix, but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field, but uses wildcards for the prefix and selector.

In the Cisco implementation of LANE, the prefix corresponds to the switch prefix, the ESI corresponds to a function of ATM interface’s MAC address, and the Selector field corresponds to the specific subinterface of the interface.

For a discussion of the Cisco method of automatically assigning ATM addresses, refer to the “Configuring LAN Emulation” chapter in the *Cisco IOS Switching Services Configuration Guide*.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lane</td>
<td>Specifies that the configuration server ATM address is computed by the ATM switch router automatic method.</td>
</tr>
<tr>
<td>auto-config-atm-address</td>
<td>Specifies that the fixed-configuration server ATM address assigned by the ATM Forum is used.</td>
</tr>
<tr>
<td>lane config database</td>
<td>Associates a named configuration table (database) with the configuration server on the selected ATM interface.</td>
</tr>
<tr>
<td>lane database</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>lane le-arp</td>
<td>Specifies that the fixed-configuration server ATM address assigned by the ATM Forum is used.</td>
</tr>
</tbody>
</table>
# lane config database

To associate a named configuration table (database) with the configuration server on the selected ATM interface, use the `lane config database` interface configuration command. To remove the association between a named database and the configuration server on the specified interface, use the `no` form of this command.

```
lane config database database-name
no lane config database
```

## Syntax Description

- **database-name**: Name of the LANE database.

## Defaults

No configuration server is defined, and no database name is provided.

## Command Modes

Interface configuration

## Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

## Usage Guidelines

This command only applies to the route processor interface.

This command is not available on a subinterface, because only one LANE configuration server can exist per interface.

The named database must exist before the `lane config database` command is entered. Refer to the `lane database` command for more information.

Multiple `lane config database` commands cannot be entered multiple times on the same interface. You must delete an existing association by using the `no` form of this command before you create a new association on the specified interface.

To activate a LANE configuration server, you need to use the `lane config database` command and one of the following commands:

- `lane auto-config-atm-address`
- `lane config-atm-address`
- `lane le-arp`

## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>lane</code></td>
<td>Specifies that the configuration server ATM address is computed by</td>
</tr>
<tr>
<td><code>auto-config-atm-address</code></td>
<td>the ATM switch router automatic method.</td>
</tr>
<tr>
<td><code>lane config-atm-address</code></td>
<td>Explicitly specifies a configuration server’s ATM address.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>lane database</code></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><code>lane le-arp</code></td>
<td>Specifies that you use the fixed-configuration server ATM address assigned by the ATM Forum.</td>
</tr>
</tbody>
</table>
lane le-arp

To add a static entry to the LE_ARP table of the LANE client configured on the specified subinterface, use the **lane le-arp** interface configuration command. To remove a static entry from the LE_ARP table of the LANE client on the specified subinterface, use the **no** form of this command.

```
lane le-arp {mac-address | route-desc segment seg-num bridge bridge-num} atm-address
no lane le-arp {mac-address | route-desc segment seg-num bridge bridge-num} atm-address
```

**Syntax Description**

- **mac-address**: MAC address to bind to the specified ATM address.
- **atm-address**: ATM address.
- **seg-num**: Segment number of the next-hop route descriptor. The segment number ranges from 1 to 4095.
- **bridge-num**: Bridge number of the next-hop route descriptor. The bridge number ranges from 1 to 15.

**Defaults**

No static address bindings are provided.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to the route processor interface.

This command only adds or removes a static entry binding a MAC address or next-hop route descriptor (for Token Ring) to an ATM address. It does not add or remove dynamic entries. Removing the static entry for a specified ATM address from an LE_ARP table does not release the data-direct VCC established to that ATM address. However, clearing a static entry clears any fast-cache entries that were created from the MAC address-to-ATM address binding.

Static LE_ARP entries are not aged and are not removed automatically.

To remove dynamic entries from the LE_ARP table of the LANE client on the specified subinterface, use the **clear lane le-arp** command.

**Examples**

The following example shows how to add a static entry to the LE_ARP table on the route processor main ATM interface 0.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# lane le-arp 0800.aa00.0101 47.000014155551212f.00.00.0800.200C.1001.01
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear lane le-arp</td>
<td>Used to clear the dynamic LE_ARP table or a single LE_ARP entry of the LANE client configured on the specified subinterface or emulated LAN.</td>
</tr>
</tbody>
</table>
lane server-atm-address

To specify an ATM address—and override the automatic ATM address assignment—for the LANE server on the specified subinterface, use the `lane server-atm-address` interface configuration command. To remove the ATM address previously specified for the LANE server on the specified subinterface and revert to the automatic address assignment, use the `no` form of this command.

```
lane server-atm-address atm-address-template
no server-atm-address [atm-address-template]
```

### Syntax Description

**atm-address-template**  
ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, ESI bytes, or selector byte of the automatically assigned ATM address.

### Defaults

The LANE client finds the LANE server by consulting the configuration server.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command only applies to the route processor interface.

This command also instructs the LANE client configured on this subinterface to reach the LANE server by using the specified ATM address instead of the ATM address provided by the configuration server.

When used on a selected subinterface, but with a different ATM address than was used previously, this command replaces the LANE server's ATM address.

**ATM Addresses.** A LANE ATM address has the same syntax as an NSAP (but it is not a network-level address):

- A 13-byte prefix that includes the following fields defined by the ATM Forum: AFI field (1 byte), DCC or ICD field (2 bytes), DFI field (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and the Area field (2 bytes).
- A 6-byte ESI.
- A 1-byte selector field.

**Address Templates.** LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character, and an ellipsis (...) to match any number of leading or trailing characters. The values of characters replaced by wildcards come from automatic ATM address assignment.

In LANE, a `prefix template` explicitly matches the prefix, but uses wildcards for the ESI and selector fields. An `ESI template` explicitly matches the ESI field, but uses wildcards for the prefix and selector.
In the LightStream 1010 ATM switch implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the Selector field corresponds to the specific subinterface of the interface.

For a discussion of the Cisco method for automatically assigning ATM addresses, refer to the “Configuring LAN Emulation” chapter of the Router Products Configuration Guide.

Examples

The following example uses an ESI template to specify the part of the ATM address corresponding to the interface; the remaining parts of the ATM address come from automatic assignment.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# lane server-atm-address ...0800.200c.1001.**
```

The following example uses a prefix template to specify the part of the ATM address corresponding to the switch; the remaining parts of the ATM address come from automatic assignment.

```
Switch(config)# interface atm 0
Switch(config-if)# lane server-atm-address 45.000014155551212f.00.00...
```

```
lane client-atm-address
```
**lane server-bus**

To enable a LANE server and a broadcast-and-unknown server on the specified subinterface, use the *lane server-bus* interface configuration command. To disable a LANE server and broadcast-and-unknown server on the specified subinterface, use the *no* form of this command.

```
lane server-bus {ethernet | tokenring} elan-name
no lane server-bus {ethernet | tokenring} elan-name
```

**Syntax Description**

- `ethernet` Identifies the type of emulated LAN attached to this subinterface as Ethernet.
- `tokenring` Identifies the type of emulated LAN attached to this subinterface as Token Ring.
- `elan-name` Name of the emulated LAN. Maximum length is 32 characters.

**Defaults**

No LAN type and emulated LAN name are provided.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The LANE server and the broadcast-and-unknown server are located on the same switch.

If a *lane server-bus* command was entered on the subinterface for a different emulated LAN, the server initiates termination procedures with all clients and comes up as the server for the new emulated LAN.

Use of the *no* form of this command removes a previously configured LANE server and broadcast-and-unknown server on the subinterface.

**Examples**

The following example enables a LANE server and broadcast-and unknown server for a Token Ring ELAN.

```
Switch# configure terminal
Switch(config)# interface atm 0.1
Switch(config-subif)# lane server-bus tokenring
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>lane</em></td>
<td>Used to specify an ATM address—and override the automatic ATM address assignment—for the LANE server on the specified subinterface.</td>
</tr>
<tr>
<td><em>server-atm-address</em></td>
<td></td>
</tr>
</tbody>
</table>
lbo

To set the line build-out to various lengths, use the **lbo** interface configuration command. To restore the default in all instances, use the **no** form of this command.

For the channelized DS3 port adapter the syntax is:

```
  lbo [short | long]

  no lbo
```

For the channelized E1 and T1 port adapter the syntax is:

```
  lbo [0_110 | 110_220 | 220_330 | 330_440 | 440_550 | 550_660 | gt_600]
```

For the T1 IMA port adapter the syntax is:

```
  lbo [{(long {gain26 | gain36} {-15db | -22.5db | -7.5db | 0db}) | {short {133ft | 266ft | 399ft | 53ft | 655ft}}
```

For the E1 IMA port adapter the syntax is:

```
  lbo [{(long gain43 {120db | 75db}) | {short gain12 22db}}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Short</th>
<th>Cable length under 225 feet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
<td>Cable length over 225 feet.</td>
</tr>
<tr>
<td>0_110</td>
<td>Cable length is 0 to 100 feet.</td>
</tr>
<tr>
<td>110_220</td>
<td>Cable length is 110 to 220 feet.</td>
</tr>
<tr>
<td>220_330</td>
<td>Cable length is 220 to 330 feet.</td>
</tr>
<tr>
<td>330_440</td>
<td>Cable length is 330 to 440 feet.</td>
</tr>
<tr>
<td>440_550</td>
<td>Cable length is 440 to 550 feet.</td>
</tr>
<tr>
<td>550_660</td>
<td>Cable length is 550 to 660 feet.</td>
</tr>
<tr>
<td>gt_600</td>
<td>Cable length is over 600 feet.</td>
</tr>
<tr>
<td>Gain26</td>
<td>26db gain.</td>
</tr>
<tr>
<td>Gain36</td>
<td>36db gain.</td>
</tr>
<tr>
<td>-15db</td>
<td>-15 db pulse.</td>
</tr>
<tr>
<td>-22.5db</td>
<td>-22.5 db pulse.</td>
</tr>
<tr>
<td>-7.5db</td>
<td>-7.5 db pulse.</td>
</tr>
<tr>
<td>0db</td>
<td>0 db pulse.</td>
</tr>
<tr>
<td>133ft</td>
<td>Cable length is 0 to 133 feet.</td>
</tr>
<tr>
<td>266ft</td>
<td>Cable length is 134 to 266 feet.</td>
</tr>
<tr>
<td>399ft</td>
<td>Cable length is 267 to 399 feet.</td>
</tr>
<tr>
<td>533ft</td>
<td>Cable length is 400 to 533 feet.</td>
</tr>
<tr>
<td>655ft</td>
<td>Cable length is 534 to 655 feet.</td>
</tr>
<tr>
<td>Gain43</td>
<td>43 db gain.</td>
</tr>
<tr>
<td>120db</td>
<td>120 db gain.</td>
</tr>
</tbody>
</table>
lbo

75db 75 db gain.
gain12 12 db gain.
22db 22 db gain.

Defaults
For DS3 interfaces: short
For T1 and E1 interfaces: 110_220
For T1 IMA interfaces: short 133
For E1 IMA interfaces: short gain 12 22db

Command Modes
Interface configuration

Command History
Release Modification
TBD

Usage Guidelines
The lbo command applies on T1, E1, T1 IMA, E1 IMA, and DS3 interfaces.

Examples
The following example illustrates how to set the line build-out for an E1 port adapter to 110.

Switch# configure terminal
Switch(config)# interface atm 3/1/0
Switch(config-if)# lbo 110

Related Commands
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
**linecode**

To select the linecode type for the T1 or E1 line, use the `linecode` interface configuration command. To revert to the default, use the `no` form of this command.

```
linecode {ami | b8zs | hdb3}
no lincode {ami | b8zs | hdb3}
```

### Syntax Description

- **ami**  
  Specifies AMI as the linecode type. Valid for T1 or E1 interfaces.
- **b8zs**  
  Specifies B8ZS as the linecode type. Valid for T1 interfaces only.
- **hdb3**  
  Specifies HDB3 as the linecode type. Valid for E1 interfaces only.

### Defaults

- For T1 lines: **b8zs**
- For E1 lines: **hdb3**

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use this command in configurations where the switch router or access server must communicate with T1 fractional data lines.

The T1 service provider determines which linecode type, either **ami** or **b8zs**, is required for your T1 circuit.

The E1 service provider determines which linecode type, either **ami** or **hdb3**, is required for your E1 circuit.

### Examples

The following example specifies AMI as the linecode type.

```
Switch# configure terminal
Switch(config)# interface atm 3/0/0
Switch(config-if)# linecode ami
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show controllers</strong></td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
load-balance

To configure load balancing on a soft VC redundancy group, use the load-balance redundancy group soft VC configuration command. To return load balancing configuration to the default, use the no form of this command.

load-balance

no load-balance

Syntax Description
This command has no arguments or keywords.

Defaults Disabled

Command Modes Soft VC redundancy group

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Redundant soft PVC and soft PVP destinations allow you to configure the same NSAP address on two different ATM interfaces. The ATM interfaces can be on the same switch or different switches and use the same NSAP address in the source-end configuration for the soft PVC or soft PVP. If the active interface fails, the calls terminating on that interface for the redundant destination address are released and subsequently reestablished on the standby interface.

Active and standby modes allow configuring the best destination as active and a standby destination if the active destination fails.

Load balancing of the calls allows equal distribution of the calls when both interfaces are up and working correctly and when active and standby interfaces are configured on the same switch.

Note
Load balancing the redundant soft PVCs and soft PVPs uses the number of calls received as the parameter to decide which interface to select.

Examples

The following example shows how to configure a soft VC redundancy group with load balancing:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# atm soft redundancy group backup_vc
Switch(atmsoft-red)# nsap-address 11.1111.1111.1111.1111.1111c.1111.1111.1c11.1111.00
Switch(atmsoft-red)# load-balance
Switch(config)# interface atm 1/1/1
Switch(config-if)# atm soft redundancy member backup_vc active
Switch(config-if)# end
Switch#
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm soft redundancy group</td>
<td>Configures a soft VC redundancy group.</td>
</tr>
<tr>
<td>atm soft redundancy member</td>
<td>Configures an ATM interface as part of a redundant soft VC or soft VP.</td>
</tr>
<tr>
<td>nsap-address (redundant soft VC)</td>
<td>Configures the redundant NSAP address on a soft VC redundancy group.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the ATM NSAP addresses of the redundant soft VC destination.</td>
</tr>
</tbody>
</table>
load-interval

To change the length of time for which data is used to compute load statistics, use the load-interval interface configuration command. To revert to the default setting, use the no form of this command.

load-interval seconds

no load-interval

Syntax Description

| Syntax Description | seconds | Length of time for which data is used to compute load statistics; a value that is a multiple of 30, and between 30 and 600 (30, 60, 90, 120, and so on). |

Defaults

300 seconds (or 5 minutes)

Command Modes

Interface configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

This command only applies to the interfaces on the route processor card: Ethernet 0 or ATM 0. To load computations to be more reactive to short bursts of traffic rather than to those averaged over 5-minute periods, shorten the length of time over which load averages are computed.

If the load interval is set to 30 seconds, new data is used for load calculations over a 30-second period. This data is used to compute load statistics, including input rate in bits and packets per second, output rate in bits and packets per second, load, and reliability.

Load data is gathered every 5 seconds on the switch. This data is used for a weighted average calculation in which more recent load data has more weight in the computation than older load data. If the load interval is set to 30 seconds, the average is computed for the last 30 seconds of load data.

The load-interval command enables you to change the default interval of 5 minutes to a shorter or longer period of time. If you change it to a shorter period of time, the input and output statistics that are displayed when you use the show interfaces command are more current and are based on instantaneous data, rather than reflecting an average load over a longer period of time.

This command is often used for dial backup purposes to increase or decrease the likelihood of a backup interface being implemented, but it can be used on any interface.

Examples

In the following example, the default 5-minute average is set to a 30-second average. A burst in traffic that does not trigger a dial backup for an interface configured with the default 5-minute interval might trigger a dial backup for this interface that is set for a shorter, 30-second interval.

Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# load-interval 30
logging event link-status

Configure logging for interface link-status event, use the logging event link-status interface configuration command. To disable logging, use the no form of this command.

```
logging event link-status
no logging event link-status
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Disabled

**Command Modes**

Interface Configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows how to enable logging link-status events on serial interface 11/0/0:1.

```
Switch# configure terminal
Switch(config)# interface serial 11/0/0:1
Switch(config-if)# logging event link-status
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show logging</td>
<td>Displays the state of logging to the syslog.</td>
</tr>
</tbody>
</table>
loopback (controller)

To enable controller loopback for the channelized DS3 (CDS3) and channelized E1 (CE1) Frame Relay port adapters, use the `loopback` controller configuration command. To disable loopback, use the `no` form of this command.

For the CDS3 Frame Relay port adapter, use the following syntax:

```
loopback {diagnostic | line | dual | pif}
```

```
no loopback {diagnostic | line | dual | pif}
```

For the CE1 Frame Relay port adapter, use the following syntax:

```
loopback {diagnostic | line}
```

```
no loopback {diagnostic | line}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>diagnostic</td>
<td>The transmit frames are looped back to the switch at the Frame Relay port adapter as receive frames.</td>
</tr>
<tr>
<td>line</td>
<td>The frames that are received by the ports on the Frame Relay port adapter in the receive direction are passed to the switch router and are looped back in the transmit direction. The transmit direction of the Frame Relay port adapter transmits only the frames that it received on its port.</td>
</tr>
<tr>
<td>dual</td>
<td>This option is similar to a combination of the line and diagnostic loopback options. The frames sent from the switch fabric to the Frame Relay port adapter are looped back and sent back to the switch as the receive frames. The frames received by the port on the Frame Relay port adapter in the receive direction are looped back out of the port as transmit frames. This option is not available for the CE1 Frame Relay port adapter.</td>
</tr>
<tr>
<td>pif</td>
<td>The cells being sent to the Frame Relay port adapter are looped back towards the switch at the PIF. This option is not available for the CE1 Frame Relay port adapter.</td>
</tr>
</tbody>
</table>

### Defaults

No loopback

### Command Modes

Controller configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use this command for testing, diagnostics, and troubleshooting.
The following example configures the E1 interface to line loopback mode.

```
Switch# configure terminal
Switch(config)# controller e1 11/0/0
Switch(config-controller)# loopback line
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
**loopback (interface)**

To enable a loopback on the physical device associated with a port, use the `loopback` interface configuration command. To remove the loop, use the `no` form of this command.

```
loopback looptype

no loopback
```

**Syntax Description**

<table>
<thead>
<tr>
<th>looptype</th>
<th>Specifies the loopback type as one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>diagnostic</td>
<td>Transmit data is looped to receive data at the PHY layer.</td>
</tr>
<tr>
<td>diagnostic-path</td>
<td>Transmit payload is sent to the receive path overhead processor.</td>
</tr>
<tr>
<td>line</td>
<td>Receive signal is looped to transmit at the PHY device.</td>
</tr>
<tr>
<td>cell</td>
<td>Cells received by PHY are sent out through the transmit cell in first-in-first-out order.</td>
</tr>
<tr>
<td>payload</td>
<td>Received payload stream is looped through the transmit stream.</td>
</tr>
<tr>
<td>pif</td>
<td>Transmit is looped to receive before the cells enter the PHY device.</td>
</tr>
</tbody>
</table>

**Defaults**

No loopback

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `cell` and `payload` loopbacks are only available on DS1/E1 and DS3/E3 interfaces. The `diagnostic-path` loopback is only available for the OC-12 interface to loop the payload.

To show interfaces currently in loopback operation, use the `show ima interface` EXEC command. To isolate problems in the field, use the `diagnostic` or `line` options.

**Examples**

The following example shows how to configure diagnostic loopback on the ATM 3/1/0 line.

```
Switch# configure terminal
Switch(config)# interface atm 3/1/0
Switch(config-if)# loopback diagnostic
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td><code>show ima interface</code></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
M Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
mac-address

To configure the MAC address associated with an LEC, use the `mac-address` LANE configuration server database command. To remove the MAC address, use the `no` form of this command.

```
mac-address ieee-address
```

**Syntax Description**

- `ieee-address` 48-bit IEEE MAC address written as a dotted triplet of four-digit hexadecimal numbers.

**Defaults**

No MAC layer address is set.

**Command Modes**

LANE configuration server database

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0.1</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows configuring the MAC address for the LEC where `xx.xxxx` is an appropriate second half of the MAC address to use.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# lane database
Switch(lane-config-database)# mac-address 5000.5axx.xxxx
```
main-cpu (Catalyst 8540 MSR)

To switch to the main-cpu submode of the redundancy mode, use the `main-cpu` redundancy command.

```
main-cpu
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

Redundancy

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

After you enter the main-cpu submode, you can use the `auto-sync` command to synchronize the configuration between the primary and secondary route processors based on the primary configuration. In addition, you can use all of the redundancy commands that are applicable to the main CPU.

**Examples**

The following example shows how to switch to the main-cpu submode of the redundancy mode.

```
Switch(config)# redundancy
Switch(config-r)# main-cpu
Switch(config-r-mc)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sync config</code></td>
<td>Used to synchronize the configuration between the primary and secondary</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td>route processors based on the primary configuration.</td>
</tr>
</tbody>
</table>
map-class

To enter map-class configuration mode to define parameters that you will use in specifying a request for an SVC (the SETUP message), use the `map-class` global configuration command. To delete this class, use the `no` form of this command.

```plaintext
map-class { atm | dialer | frame-relay } class-name

no map-class { atm | dialer | frame-relay } class-name
```

**Syntax Description**

- **atm**: Specifies the ATM map class for an SVC.
- **dialer**: Specifies a class of shared configuration parameters associated with the dialer map for an SVC.
- **frame-relay**: Specifies QoS values for an SVC.
- **class-name**: User-assigned name of the traffic parameters table.

**Defaults**

No traffic parameters are defined.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If the map class identified by `class-name` does not already exist, the switch router creates a new one. In either case, this command specifies the map class to which subsequent encapsulation-specific commands apply. Configuration of a map class is allowed only if the subsystem corresponding to the encapsulation is linked.

It is up to the media-specific routing that uses a static map to ensure that the referenced class exists if parameters are required.

Most parameters specified through a map class are used to dictate the contents of the ATD IE present in a SETUP message used to initiate an SVC. These parameters are as follows:

- **forward-peak-cell-rate-clp0**
- **forward-peak-cell-rate-clp1**
- **backward-peak-cell-rate-clp0**
- **backward-peak-cell-rate-clp1**
- **forward-sustainable-cell-rate-clp0**
- **forward-sustainable-cell-rate-clp1**
- **backward-sustainable-cell-rate-clp0**
- **backward-sustainable-cell-rate-clp1**
- forward-max-burst-size-clp0
- forward-max-burst-size-clp1
- backward-max-burst-size-clp0
- backward-max-burst-size-clp1

**Note**
The 1-parameters specify the traffic characteristics of the aggregate of CLP-0 and CLP-1 cells; the 0-parameters are CLP-0 only.

When possible, Best Effort is signalled. In UNI 3, a Best Effort Indication is included in the ATD IE only if the contents of the IE consist of forward and backward Peak Cell Rate for CLP 0+1 (and the Best Effort Indication). Therefore, if any of the above parameters other than forward-peak-cell-rate-clp0 and backward-peak-cell-rate-clp1 are specified in the map class, Best Effort cannot be signalled.

It is important that Best Effort is signalled, because this causes a switch to interpret the SETUP as a request for a UBR connection. UBR requests do not cause bandwidth to be reserved per-connection.

If Best Effort cannot be signalled (one of the other parameters is specified in the map class), then this causes a switch to interpret the SETUP as a request for VBR-NRT service.

All combinations of parameters are allowed in the definition of map class. The following recommendations can help to specify a correct set of parameters:

- The maximum length of the contents of the ATD IE is 30 bytes. All of the cell-rate and burst parameters require 4 bytes in the IE. This means that no more than 7 of the 4-byte parameters should be specified.

- The allowable combinations of cell-rate and burst-size parameters from the UNI 3 specifications are (per direction):
  - peak-cell-rate0, peak-cell-rate0+1
  - peak-cell-rate0+1, sustained-cell-rate0, max-burst0
  - peak-cell-rate0+1
  - peak-cell-rate0+1, sustained-cell-rate0+1, max-burst0+1

- A clp0+1 parameter should be greater than or equal to the clp0 parameter for the same direction.

If default traffic parameters are used in the initiation of an SVC, a Best Effort ATD IE is used. The forward and backward peak-cell-rate0+1 values are 24-bits set to “1” (0xffffff). This is a unique value used to indicate that default shaping parameters can be applied.

**Examples**
The following example establishes traffic parameters for map-class atmclass1.

```
Switch# configure terminal
Switch(config)# map-class atm atmclass1
ip 172.21.180.121 atm-nsap 12.3456.7890.abcd.0000.00 broadcast class atmclass1
map-class atm atmclass1
atm forward-peak-cell-rate-clp0 8000
atm backward-peak-cell-rate-clp0 8000
main-atm 0
map-group atm atmlist1
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm map</td>
<td>Displays the list of all configured ATM static maps to remote hosts on an ATM network.</td>
</tr>
</tbody>
</table>
map-group

To associate an ATM map list to an interface or subinterface for either a PVC or SVC, use the \texttt{map-group} interface configuration command. To remove the reference to the map list, use the \texttt{no} form of this command.

\begin{center}
\texttt{map-group name} \\
\texttt{no map-group name}
\end{center}

**Syntax Description**

\begin{center}
\texttt{name} Name of the map list identified by the \texttt{map-list} command.
\end{center}

**Defaults**

No ATM map lists are associated.

**Command Modes**

Interface configuration

**Command History**

\begin{center}
\begin{tabular}{lc}
\textbf{Release} & \textbf{Modification} \\
11.1(4) & New command
\end{tabular}
\end{center}

**Usage Guidelines**

More than one map group can be configured for an interface. This command only applies to interfaces on the route processor card and to terminating connections.

**Examples**

In the following example, the map list named \texttt{atm} is associated with the ATM interface.

\begin{verbatim}
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# map-group atm
\end{verbatim}

**Related Commands**

\begin{center}
\begin{tabular}{lc}
\textbf{Command} & \textbf{Description} \\
main-cpu (Catalyst 8540 MSR) & \\
map-list & Defines an ATM map statement for either a PVC or SVC.
\end{tabular}
\end{center}
map-list

To define an ATM map statement for either a PVC or SVC, use the `map-list` global configuration command. To delete this list and all associated map statements, use the `no` form of this command.

```
map-list name

no map-list name
```

**Syntax Description**

<table>
<thead>
<tr>
<th>name</th>
<th>Name of the map list.</th>
</tr>
</thead>
</table>

**Defaults**

No map statements are defined.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command only applies to interfaces on the route processor card and to terminating connections. To allow the switch router to propagate routing updates and ARP requests, a static map that maps the protocol address and the ATM address of the next-hop ATM station must be configured. The switch router supports a mapping scheme that identifies the ATM address of remote hosts or switch routers. This address can be specified either as a VCI descriptor for a PVC or an NSAP address for an SVC.

The `map-list` command specifies the map list to which the subsequent map-list configuration commands apply. These map-list configuration commands identify destination addresses. One map list can contain multiple map entries. A map list can be referenced by more than one interface or subinterface.

**Examples**

In the following example, to configure ATM static maps for a PVC, a map list named `atm` is followed by one map statement for protocol addresses being mapped.

```
Switch# map-list atm
Switch(config-map-list)# ip 172.21.168.112 atm-vc 1 broadcast
```

In the following example for an SVC, a map list named `atm` includes two map statements for protocol addresses being mapped.

```
Switch# map-list atm
Switch(config-map-list)# ip 172.21.97.165 atm-nsap BC.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.13
Switch(config-map-list)# ip 172.21.97.166 atm-nsap BC.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>map-list</strong></td>
<td></td>
</tr>
<tr>
<td><strong>map-group</strong></td>
<td>Associates an ATM map list to an interface or subinterface for either a PVC or SVC.</td>
</tr>
<tr>
<td><strong>show atm map</strong></td>
<td>Displays the list of all configured ATM static maps to remote hosts on an ATM network.</td>
</tr>
</tbody>
</table>
max-admin-weight-percentage

To configure the maximum administrative weight percentage used to determine if an alternate route is acceptable, use the `max-admin-weight-percentage` ATM router PNNI configuration command. To remove the constraint on administrative weight for alternate routes, use the `no` form of this command.

```
max-admin-weight-percentage percentage

no max-admin-weight-percentage
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>percentage</th>
<th>Specifies the maximum acceptable administrative weight for alternate routes as a percentage of the least administrative weight of any route to the destination.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Defaults</th>
<th>Infinity (no constraint on administrative weight for alternate routes).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Command Modes</th>
<th>ATM router PNNI configuration</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usage Guidelines</th>
<th>This command increases network efficiency by preventing alternate routes that use too many network resources from being specified. The command provides a generalized form of a hop-count limit. This command only takes effect when background route computation is enabled. The maximum acceptable administrative weight is equal to the specified percentage of the least administrative weight of any route to the destination (from the background routing tables). For example, if the least administrative weight to the destination is 5040 and the percentage is 300, the maximum acceptable administrative weight for the call is 5040 x 300/100 or 15120. For more information, refer to the <em>ATM Switch Router Software Configuration Guide</em>.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>The following script shows how to configure the maximum administrative weight percentage to 300 percent using the <code>max-admin-weight-percentage</code> ATM router PNNI configuration command.</th>
</tr>
</thead>
</table>

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# max-admin-weight-percentage 300
```
Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>administrative-weight</td>
<td>Configures the mode of default administrative weight assignment for PNNI interfaces.</td>
</tr>
<tr>
<td>atm pnni admin-weight</td>
<td>Specifies the administrative weight of the ATM PNNI interface.</td>
</tr>
<tr>
<td>show atm pnni</td>
<td>Displays the precalculated background route table to other PNNI nodes.</td>
</tr>
<tr>
<td>background routes</td>
<td></td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on the switch router.</td>
</tr>
</tbody>
</table>

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Related Commands

None
max-records

To configure the maximum number of records to be collected for a particular signalling diagnostics filter table entry, use the max-records ATM signalling diagnostics configuration command. To return the maximum records to the default, use the no form of this command.

```
max-records max-num-records
no max-records
```

**Syntax Description**

- `max-num-records` Specifies the number of records to be collected.

**Defaults**

20

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This value denotes the number of call failure records to be collected and stored. When the maximum value is reached, the older records are deleted, making way for the newly created records.

The collected records are overwritten when the max-records value is reached. If this field is set to -1, the records are not overwritten. Setting this field to -1 requires increased memory consumption for call failure records storage, and can lead to shortages of available system memory.

**Examples**

The following example shows setting the maximum number of records to 18.

```
Switch(config)# max-records 20
```
**mdl**

To configure and transmit the MDL messages, use the `mdl` interface configuration command. To disable the transmission of MDL messages, use the `no` form of this command.

```
mdl {transmit [path | idle-signal | test-signal] | string [eic | lic | fic | unit | pfi | port | generator] string}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>transmit path</td>
<td>Enables transmission of the MDL path message.</td>
</tr>
<tr>
<td>transmit idle-signal</td>
<td>Enables transmission of the MDL idle signal message.</td>
</tr>
<tr>
<td>transmit test-signal</td>
<td>Enables transmission of the MDL test signal message.</td>
</tr>
<tr>
<td>string eic string</td>
<td>Specifies the Equipment Identification Code. Can be up to 10 characters.</td>
</tr>
<tr>
<td>string lic string</td>
<td>Specifies the Location Identification Code. Can be up to 11 characters.</td>
</tr>
<tr>
<td>string fic string</td>
<td>Specifies the Frame Identification Code. Can be up to 10 characters.</td>
</tr>
<tr>
<td>string unit string</td>
<td>Specifies the Unit Identification Code. Can be up to six characters.</td>
</tr>
<tr>
<td>string pfi string</td>
<td>Specifies the Facility Identification Code sent in the MDL path message. Can be up to 38 characters.</td>
</tr>
<tr>
<td>string port string</td>
<td>Specifies the port number string sent in the MDL idle signal message. Can be up to 38 characters.</td>
</tr>
<tr>
<td>string generator string</td>
<td>Specifies the generator number string sent in the MDL test signal message. Can be up to 38 characters.</td>
</tr>
</tbody>
</table>

### Defaults

No MDL message is configured.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.3.

Use the `show controllers t3` command to display MDL information (received strings). MDL information is displayed only when framing is set to C-bit.

**Note**

MDL is supported only when the CDS3 framing is C-bit parity.
The following examples show several of the `mdl` commands for the Frame Relay port adapter in slot 9.

```
Switch# configure terminal
Switch(config)# controller t3 4/0/0
Switch(config-controller)# mdl string eic Router A
Switch(config-controller)# mdl string lic Test Network
Switch(config-controller)# mdl string fic Building B
Switch(config-controller)# mdl string unit ABC
```
min-age

To configure the value of the minimum age of the VC for on-release or periodic collection of accounting records, use the **min-age** ATM accounting file subcommand. To return the min-age value to the default, use the **no** form of this command.

```
min-age seconds

no min-age
```

**Syntax Description**

```
seconds Specifies the number of seconds.
```

**Defaults**

3600 seconds

**Command Modes**

ATM accounting file

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0.1</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

None

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm accounting file</td>
<td>Used to employ accounting file configuration mode and to enable an ATM</td>
</tr>
<tr>
<td></td>
<td>accounting file.</td>
</tr>
<tr>
<td>collection-modes</td>
<td>Used to initialize the collection mode and specifies at what time accounting</td>
</tr>
<tr>
<td></td>
<td>data is recorded in the accounting file.</td>
</tr>
<tr>
<td>failed-attempts</td>
<td>Configures the writing of records for initial connection attempts.</td>
</tr>
</tbody>
</table>
**mpls-forwarding interface (Catalyst 8540 MSR)**

To link a Fast Ethernet or ATM interface to an enhanced ATM router module interface for MPLS processing (and VRF for Fast Ethernet interfaces), use the **mpls-forwarding** interface configuration command.

```
  mpls-forwarding interface card/subcard/port

  no mpls-forwarding interface card/subcard/port
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>card/subcard/port</th>
<th>Specifies an enhanced ATM router module interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defaults</strong></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Command Modes</strong></td>
<td>Interface configuration</td>
<td></td>
</tr>
<tr>
<td><strong>Command History</strong></td>
<td>Release</td>
<td>Modification</td>
</tr>
<tr>
<td></td>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Restrictions and limitations of the **mpls-forwarding interface** command for both Fast Ethernet and ATM interfaces:

- The MPLS forwarding command is not allowed on BVI or FEC interfaces.
- Only main Fast Ethernet or ATM interfaces can be linked with the main interface of the Enhanced ATM router module. Sub-interfaces of the Enhanced ATM router module, Fast Ethernet, or ATM interface cannot be used with this command.
- Each ATM or Fast Ethernet interface can be linked with only one Enhanced ATM router module interface. However, more than one Fast Ethernet or ATM interface can be linked with the same Enhanced ATM router module.
- The Enhanced ATM router module internal link has a maximum capacity of 1.2 Gbps which could affect the number of interfaces—either Fast Ethernet or ATM—associated with the Enhanced ATM router module.
- If both Fast Ethernet and ATM interfaces must be tag-enabled, linking them to different Enhanced ATM router module modules is preferred to avoid performance problems.

Linking a Fast Ethernet interface to an enhanced ATM router module interface for MPLS processing has the following restrictions and limitations:

- The Enhanced ATM router module can provide MPLS processing for four Fast Ethernet interfaces without affecting its performance.
Before the MPLS forwarding command is configured on a Fast Ethernet interface, all IPX configuration must be removed from the interface and all other interfaces controlled by the same Ethernet processor interface.

**Note** For example, Fast Ethernet 2/0/0 through Fast Ethernet 2/0/3 interfaces are controlled by one Ethernet processor interface and Fast Ethernet 2/0/4 through Fast Ethernet 2/0/7 interfaces are controlled by another Ethernet processor interface, and so forth.

There is no restriction on the order that MPLS, VRF and MPLS forwarding commands can be configured on a Fast Ethernet interface. However, MPLS or VRF configuration will not be active until the MPLS forwarding command is configured and the controlling ATM router module is active (unshut).

MPLS cannot be configured on a Fast Ethernet sub-interface.

MPLS and VRF cannot be configured together on any Fast Ethernet interface.

VRF on the sub-interface is not active until the main interface is associated with an active controlling ATM router module.

**Examples**

The following example shows how to configure a Fast Ethernet interface to an enhanced ATM router module interface.

```
Switch# configure terminal
Switch(config)# interface fastethernet 3/0/0
Switch(config-if)# mpls-forwarding interface atm 2/0/0
Switch(config-if)# mpls ip
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mpls ip (interface configuration)</td>
<td>Enables label switching of IPv4 packets along normally routed paths for the associated interface.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
mtu

To adjust the maximum packet size or MTU size, use the mtu interface configuration command. To restore the MTU value to its original default value, use the no form of this command.

\begin{verbatim}
mtu bytes

no mtu
\end{verbatim}

**Syntax Description**

*bytes* Specifies the desired size, in bytes.

**Defaults**

Table 12-1 lists default MTU values according to media type.

**Table 12-1  Default Media MTU Values**

<table>
<thead>
<tr>
<th>Media Type</th>
<th>Default MTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>1500</td>
</tr>
<tr>
<td>ATM</td>
<td>4470</td>
</tr>
<tr>
<td>ARM</td>
<td></td>
</tr>
</tbody>
</table>

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Each interface has a default maximum packet size or MTU size. This number generally defaults to the largest size possible for that type interface.

**Note**

Changing the MTU value with the mtu interface configuration command can affect values for the protocol-specific versions of the command (ip mtu for example). If the value specified with the ip mtu interface configuration command is the same as the value specified with the mtu command and you change the value for the mtu command, the ip mtu value automatically matches the new mtu value. However, changing the value for the ip mtu command has no effect on the value for the mtu command.

**Examples**

The following example specifies an MTU of 4470 bytes.

\begin{verbatim}
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# mtu 4470
\end{verbatim}
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip mtu</td>
<td>Sets the MTU size of IP packets sent on an interface.</td>
</tr>
</tbody>
</table>
multiring

To enable collection and use of RIF information on a subinterface, use the `multiring` interface configuration command. To disable the use of RIF information, use the `no` form of this command.

```
multiring ip [all-routes | spanning]
```

```
no multiring ip [all-routes | spanning]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip</code></td>
<td>Protocol type for which to enable multiring.</td>
</tr>
<tr>
<td><code>all-routes</code></td>
<td>Uses all-routes explorers.</td>
</tr>
<tr>
<td><code>spanning</code></td>
<td>Uses spanning-tree explorers.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

In source-route bridged or Token Ring switched networks, only packets with RIF are forwarded by intermediate source-route bridges. To ensure that IP datagrams are transmitted across a Token Ring switch or source-route bridge to and from an ATM switch router, use the `multiring` command.

When multiring is enabled, the Token Ring LEC strips the RIF information and caches it in its RIF table for incoming IP/ARP packets. It adds a RIF for subsequent IP/ARP response packets to be sent back across the network. Use the `show rif` command to display the RIF table entries. To configure static RIF entries, use the `rif` command.

**Examples**

The following example shows how to configure a subinterface with an IP address and Token Ring LANE LEC, and then enable multiring.

```
Switch# configure terminal
Switch(config)# interface atm 0.1
Switch(config-subif)# ip address 1.1.1.2 255.255.255.0
Switch(config-subif)# lane client tokenring cisco
Switch(config-subif)# multiring ip
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rif</code></td>
<td>Used to enter static source-route information into the RIF cache.</td>
</tr>
<tr>
<td><code>show rif</code></td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
N Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
name

To configure a name for a PNNI node, use the `name` node-level subcommand. To return to the default value, use the `no` form of this command.

```
name name
no name
```

**Syntax Description**

- `name` Specify the ASCII name for the PNNI node.

**Defaults**

The value assigned by the `hostname` command.

**Command Modes**

PNNI node command

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The PNNI node name is distributed to all other nodes via PNNI flooding. This allows all PNNI nodes to use this node name in the following PNNI `show` commands:

- `show atm pnni database`
- `show atm pnni identifiers`
- `show atm pnni interface`
- `show atm pnni neighbor`
- `show atm pnni local-node`
- `show atm pnni topology`

This command only applies to PNNI nodes.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

**Examples**

The following example configures the node name to be `eng_1`.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# name eng_1
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>hostname</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td></td>
<td>show atm pnni</td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
<tr>
<td></td>
<td>local-node</td>
<td></td>
</tr>
</tbody>
</table>
name local-seg-id

To specify or replace the ring number of the emulated LAN in the configuration server’s configuration database, use the `name local-seg-id` database configuration command. To remove the ring number from the database, use the `no` form of this command.

```
name elan-name local-seg-id seg-num
no name elan-name local-seg-id seg-num
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>elan-name</code></td>
<td>Name of the emulated LAN. The maximum length of the name is 32 characters.</td>
</tr>
<tr>
<td><code>seg-num</code></td>
<td>Segment number to be assigned to the emulated LAN. The number ranges from 1 to 4095.</td>
</tr>
</tbody>
</table>

**Defaults**

No emulated LAN name or segment number is provided.

**Command Modes**

Database configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is used for Token Ring LANE.

Refer to the `lane database` command for instructions on how to enter database configuration mode.

The same LANE ring number cannot be assigned to more than one emulated LAN.

The `no` form of this command deletes the relationships.

**Examples**

The following example specifies a ring number of 1024 for the emulated LAN red.

```
Switch# configure terminal
Switch(config)# lane database eng_dbase
Switch(lane-config-database)# name red local-seg-id 1024
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>delay</code></td>
<td>This command or some of its parameters might not function as expected.</td>
</tr>
<tr>
<td><code>lane config-atm-address</code></td>
<td>Specifies that the fixed-configuration server ATM address assigned by the ATM Forum is used.</td>
</tr>
</tbody>
</table>
name server-atm-address

To specify or replace the ATM address of the LANE server for the emulated LAN in the configuration server’s configuration database, use the `name server-atm-address` global database configuration command. To remove it from the database, use the `no` form of this command.

```
name elan-name server-atm-address atm-address [restricted | un-restricted] [index n] [preempt]
no name elan-name server-atm-address atm-address [restricted | un-restricted] [index n] [preempt]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>elan-name</td>
<td>Name of the emulated LAN. Maximum length is 32 characters.</td>
</tr>
<tr>
<td>atm-address</td>
<td>LANE server’s ATM address.</td>
</tr>
<tr>
<td>restricted</td>
<td>Membership in the named emulated LAN is restricted to the LANE clients explicitly defined to the emulated LAN in the configuration server’s database.</td>
</tr>
<tr>
<td>un-restricted</td>
<td>Membership in the named emulated LAN is unrestricted.</td>
</tr>
<tr>
<td>index</td>
<td>Priority number. When specifying multiple LANE servers for fault tolerance, you can specify a priority for each server. The highest priority is 0.</td>
</tr>
<tr>
<td>preempt</td>
<td>Turns ON higher priority LES preemption.</td>
</tr>
</tbody>
</table>

### Defaults

No emulated LAN name or server ATM address is provided.

### Command Modes

Database configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use the `lane database` command to enter database configuration mode.

Emulated LAN names must be unique within one named LANE configuration database.

Specifying an existing emulated LAN name with a new LANE server ATM address adds the LANE server ATM address for that emulated LAN for redundant server operation or simple LANE service replication. This command can be entered multiple times.

By default, when a higher-priority LES comes online, it does not preempt the current LES on the same emulated LAN. However, a higher-priority LES configured as preemptable does bump the current LES on the same emulated LAN when the LES comes online.

The `no` form of this command deletes the relationships.

### Examples

The following example configures the `example3` database with two restricted and one unrestricted emulated LANs. The clients that can be assigned to the eng and mkt emulated LANs are specified using the `client-atm-address` command. All other clients are assigned to the man emulated LAN.
Switch# configure terminal
Switch(config)# lane database eng_dbase
Switch(lane-config-database)# lane database example3
  name eng server-atm-address 39.000001415555121101020304.0800.200c.1001.02 restricted
  name man server-atm-address 39.000001415555121101020304.0800.200c.1001.01
  name mkt server-atm-address 39.000001415555121101020304.0800.200c.4001.01 restricted
  client-atm-address 39.0000014155551211101020304.0800.200c.1000.02 name eng
  client-atm-address 39.0000014155551211101020304.0800.200c.2000.02 name eng
  client-atm-address 39.0000014155551211101020304.0800.200c.3000.02 name mkt
  client-atm-address 39.0000014155551211101020304.0800.200c.4000.01 name mkt
  default-name man

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>client-atm-address</td>
<td>To add a LANE client address entry to the configuration servers configuration database.</td>
</tr>
<tr>
<td>name</td>
<td>This command or some of its parameters might not function as expected. See Appendix D.</td>
</tr>
<tr>
<td>delay</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
national reserve (Catalyst 8510 MSR and LightStream 1010)

To select the national bits for E1 IMA interfaces, use the `national reserve` interface configuration command. To restore the default, use the `no` form of this command.

```
national reserve international-bit sa4-bit sa5-bit sa6-bit sa7-bit sa8-bit
no national reserve
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>international-bit</td>
<td>Specifies the national reserve international bit, either 0 or 1.</td>
</tr>
<tr>
<td>sa4-bit</td>
<td>Specifies the national reserve sa4 bit, either 0 or 1.</td>
</tr>
<tr>
<td>sa5-bit</td>
<td>Specifies the national reserve sa5 bit, either 0 or 1.</td>
</tr>
<tr>
<td>sa6-bit</td>
<td>Specifies the national reserve sa6 bit, either 0 or 1.</td>
</tr>
<tr>
<td>sa7-bit</td>
<td>Specifies the national reserve sa7 bit, either 0 or 1.</td>
</tr>
<tr>
<td>sa8-bit</td>
<td>Specifies the national reserve sa8 bit, either 0 or 1.</td>
</tr>
</tbody>
</table>

### Defaults

1 1 1 1 1 1

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

To change the national reserve bit used by the controller, select 0 or 1 for each bit.

**Note**

This command applies only to E1 IMA.

### Examples

The following example sets the national reserve bits for ATM interface 0/0/0:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# national reserve 1 1 1 1 0
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
ncdp (global)

To enable NCDP (Network Clock Distribution Protocol) and configure the network clocking hardware of the switch router, use the `ncdp` command. To exit NCDP mode, use the `no` form of this command.

```
ncdp [max-diameter hops | revertive | source priority {{atm | cbr} card/subcard/port | bits {0 | 1} | stratum | system} | timer {hello | hold} time_in_msec} [percentage]
```

```
nocdp [max-diameter hops | revertive | source priority {{atm | cbr} card/subcard/port | bits {0 | 1} | stratum | system} | timer {hello | hold} time_in_msec} [percentage]
```

**Syntax Description**

**ncdp** Enables NCDP.

**max-diameter** Specifies the maximum network diameter for the protocol.

**hops** Specifies the maximum distance between any two nodes participating in the protocol, measured in hops. Values are 3 to 255. The default is 20.

Each node must be configured with the same `max-diameter` value for the protocol to operate properly.

**revertive** Configures clock sources to be revertive. When clock sources are configured as revertive, a clock source that is selected and then fails is selected again once it becomes operational.

When clock sources are nonrevertive (the default), a failed clock source is prevented from being selected again. This nonrevertive behavior only applies to locally configured clock sources.

**source** Configures a clocking source for the given interface. See Table 13-1 for a list of keywords.

**timer** Specifies, in milliseconds, the hello time or hold time for the NCDP protocol.

**hello** Rate at which NCDP hello messages (configuration protocol data units) are sent. Specified in milliseconds. The default is 500.

**hold** Delay between transmission of hello messages. Specified in milliseconds. The default is 500.

**time_in_msec** Hello rate or hold delay time, in milliseconds. The range is 75-60000.

**percentage** Specifies percentage `hello` or `hold` timer should be jittered. Range is 0-100.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Use the NCDP protocol to configure network clocking hardware to distribute a clock signal through the node (for use by physical interfaces) and to distribute a clock signal between nodes on the network.

When NCDP is enabled, network clock sources are selected by the protocol. When NCDP is disabled, network clock sources are selected according to the definitions entered through the `network-clock-select` command. Table 13-1 describes the key words by source type.

**Table 13-1  Source Type Keywords**

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>priority</td>
<td>Specifies a network-wide priority for the clock source. The range is 1 to 255.</td>
</tr>
<tr>
<td>interface-type</td>
<td>Specifies the interface type as <code>atm</code> or <code>cbr</code>.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td>stratum</td>
<td>The level in the Bellcore stratum hierarchy. (See Bellcore GR-436-CORE and Bellcore GR-1244-CORE for more details.)</td>
</tr>
<tr>
<td>bits</td>
<td>Displayed and accepted when the platform supports the building integrated timing system (BITS). <code>bits</code> is only displayed or accepted if the system is equipped with a telco module.</td>
</tr>
<tr>
<td>system</td>
<td>Specifies the system clock as the clock source.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows how to set the maximum network diameter (number of hops between nodes) to 11.

```
Switch# configure terminal
Switch(config)# ncdp max-diameter 11
```

The following example shows how to configure clock sources, as follows:

- ATM interface 0/0/0 is configured to priority 1 and stratum 2e
- BITS interface 0 (can be BITS 0 or BITS 1) is configured to priority 2 and stratum 2e
- CBR interface 0/0/0 is configured to priority 3 and stratum 3
- System clock is configured to priority 1

```
Switch(config)# ncdp source 1 atm 0/0/0 2e
Switch(config)# ncdp source 2 BITS 0 2e
Switch(config)# ncdp source 3 cbr 0/0/0 3
Switch(config)# ncdp source 1 system
```

The following example shows how to configure the locally defined clock sources to be revertive.

```
Switch(config)# ncdp revertive
```

The following example shows how to configure the NCDP hello timer to 500 milliseconds.

```
Switch(config)# ncdp timer hello 500
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug ncdp</code></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><code>ncdp (interface)</code></td>
<td>Used to enable NCDP and configure the network clocking hardware at the interface level.</td>
</tr>
<tr>
<td><code>show ncdp path root</code></td>
<td>Displays the NCDP path from the current node to its root clock source.</td>
</tr>
<tr>
<td><code>show ncdp ports</code></td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td><code>show ncdp sources</code></td>
<td>Displays all of the NCDP clock sources configured on the node and their attributes.</td>
</tr>
<tr>
<td><code>show ncdp status</code></td>
<td>Displays NCDP status information.</td>
</tr>
<tr>
<td><code>show ncdp timers</code></td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>
ncdp (interface)

To enable NCDP and configure the network clocking hardware at the interface level, use the `ncdp` command. To exit NCDP mode, use the `no` form of this command.

```
ncdp [admin-weight weight | control-vc vpi vci]

no ncdp [admin-weight weight | control-vc vpi vci]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ncdp</td>
<td>Enables NCDP for the interface. For all ATM NNI interfaces, NCDP is enabled</td>
</tr>
<tr>
<td>admin-weight</td>
<td>Specifies the cost metric associated with the given port. The default is 10.</td>
</tr>
<tr>
<td>weight</td>
<td>A strictly positive integer in the range 1 to 16777215.</td>
</tr>
<tr>
<td>control-vc</td>
<td>Changes the control virtual circuit used to transport protocol messages</td>
</tr>
<tr>
<td>vpi vci</td>
<td>Specifies the virtual path identifier and virtual channel identifier.</td>
</tr>
</tbody>
</table>

**Defaults**

- Enabled for all ATM NNI interfaces.
- Disabled for all other interfaces.

**Command Modes**

- Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the NCDP interface-level commands to enable or disable NCDP on the interface or to change interface-level parameters.

NCDP also allows you to enable or disable NCDP on a given port to specify the cost metric associated with a given port and to change the control virtual circuit used to transport protocol messages between adjacent protocol entities on the given interface.

**Examples**

The following example shows how to set a link cost of 75 for ATM interface 0/0/0:

```
Switch# configure terminal
switch(config)# interface atm 0/0/0
switch(config-if)# ncdp admin-weight 75
```

The following example shows how to change the control virtual circuit used by the protocol to VPI=0, VCI=75.

```
switch(config)# interface atm 0/0/0
switch(config-if)# ncdp control-vc 0 75
```
### Related Commands

<table>
<thead>
<tr>
<th>Commanded</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug ncdp</code></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><code>national reserve</code> <strong>(Catalyst 8510 MSR and LightStream 1010)</strong></td>
<td>Used to select the national bits for E1 IMA interfaces.</td>
</tr>
<tr>
<td><code>show ncdp path root</code></td>
<td>Displays the NCDP path from the current node to its root clock source.</td>
</tr>
<tr>
<td><code>show ncdp ports</code></td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td><code>show ncdp sources</code></td>
<td>Displays all of the NCDP clock sources configured on the node and their attributes.</td>
</tr>
<tr>
<td><code>show ncdp status</code></td>
<td>Displays NCDP status information.</td>
</tr>
<tr>
<td><code>show ncdp timers</code></td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>
network-clock-select

To allow the recovered clock to specify a particular port to provide network clocking, use the network-clock-select global configuration command. To disable this feature, use the no form of this command.

**Catalyst 8540 MSR**

```
network-clock-select priority {{atm | cbr} card/subcard/port | bits {0 | 1} | system}} | bits {e1 | t1} | revertive
```

```
no network-clock-select priority {{atm | cbr} card/subcard/port | bits {0 | 1} | system}} | bits {e1 | t1} | revertive
```

**Catalyst 8510 MSR and LightStream 1010**

```
network-clock-select {priority {{atm | cbr} card/subcard/port | system}} | revertive
```

```
no network-clock-select {priority {{atm | cbr} card/subcard/port | system}} | revertive
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>priority</td>
<td>Priority values for the 8540 can be 1 or 2. Priority values for the 8510 and LightStream 1010 can be between 1 and 4.</td>
</tr>
<tr>
<td>atm</td>
<td>ATM interface.</td>
</tr>
<tr>
<td>cbr</td>
<td>Constant bit rate.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port number of the ATM interface or CBR.</td>
</tr>
<tr>
<td>system</td>
<td>The free running clock provided by the route processor, which is the source for all network derived ports.</td>
</tr>
<tr>
<td>BITS</td>
<td>Selects a BITS port as the network clock source. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>E1</td>
<td>Specifies an E1 interface. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>T1</td>
<td>Specifies a T1 interface. (Default for the Catalyst 8540 MSR)</td>
</tr>
<tr>
<td>revertive</td>
<td>Causes the clock to revert to a higher-priority clock if the current clock goes offline.</td>
</tr>
</tbody>
</table>

**Defaults**

System clock

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command applies to all interfaces except older versions of the DS3 interface. The system clock can be selected at any priority.
Examples

The following example shows how to configure ATM 3/0/1 as a network clock source of priority 2, and configure ATM 0/1/0 to use a network-derived clock source.

```
Switch# configure terminal
Switch(config)# network-clock-select 2 atm 3/0/1
Switch(config)# interface atm 0/1/0
Switch(config)# clock source network-derived
```

The following example shows how to configure ATM 0/0/0 as a network clock source of priority 1, and revert to a higher-priority clock.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# network-clock-select 1 atm 0/0/0
Switch(config)# network-clock-select revertive
```

Caution

Configure a network clock-source before a port uses it as the clock source. Otherwise, by default, the system clock (route processor resident local oscillator) is used and the transmit clock is configured as network-derived.

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>network-clock-select</td>
<td>Selects a network clock source.</td>
</tr>
<tr>
<td>show network-clocks</td>
<td>Shows which ports are designated as network clock sources.</td>
</tr>
</tbody>
</table>

Command (interface) (Catalyst 8510 MSR and LightStream 1010)
next-node

To specify the next adjacent entry in a fully-specified ATM PNNI explicit path, use the **next-node** PNNI explicit-path configuration command.

```
next-node {name-string | node-id | node-id-prefix} [port hex-port-id | agg-token hex-agg-token-id]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name-string</td>
<td>Name of the PNNI node.</td>
</tr>
<tr>
<td>node-id</td>
<td>Full 22-byte node-id for a PNNI node.</td>
</tr>
<tr>
<td>node-id-prefix</td>
<td>The first 15 or more bytes of a node ID for a PNNI node.</td>
</tr>
<tr>
<td>port hex-port-id</td>
<td>Specifies an exit port to exclude for a PNNI node. Should be specified as a hexadecimal port ID rather than as a port name. The default is to allow any valid exit port.</td>
</tr>
<tr>
<td>agg-token hex-agg-token-id</td>
<td>Optionally specifies the exit aggregation token, which is used in place of the port ID for higher-level PNNI LGNs. The default allows any valid exit port.</td>
</tr>
</tbody>
</table>

### Defaults

See “Syntax Description.”

### Command Modes

PNNI explicit-path configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

**Note**

See the **atm pnni explicit-path** command for a description of how to edit or delete an existing **next-node** path entry.

Node IDs can be entered with either the full 22-byte length address, or as a node ID prefix with a length of 15 bytes or more. To specify routes that include higher-level nodes (parent LGNs) for other peer groups, we recommend that you enter exactly 15 bytes so that the address remains valid in the event of a PGL update.

Node IDs appear in the following format:

```
dec: dec: 13-20 hex digits
```

**Note**

To display the node IDs that correspond to named nodes in a network, use either the **show atm pnni identifier** command or the **show atm pnni topology** command with the **node** keyword.
Node names can be entered instead of node IDs. If names are used to identify higher-level LGNs, the resulting explicit paths are not guaranteed to remain valid if the PGL changes in the neighboring peer group. To prevent invalid paths, configure all parent LGNs (for all potential PGL nodes) with the same node name.

An exit port can be specified for any entry. The port should be specified as a hexadecimal port ID rather than as a port name. For excluded entries, only this port is excluded from the path.

**Note**
To display the corresponding hexadecimal port IDs for a node, use either the `show atm pnni identifier` command with the `port` keyword, or the `show atm pnni topology` command with the `node` and `hex-port-id` keywords.

Since the port ID could change if the following neighbor peer group changes PGL leaders, the **aggregation token** is used in place of the port ID for nodes with higher-level LGNs. The LGN aggregation token can only identify the port uniquely if the following entry is the next-node entry. Aggregation tokens are not allowed for excluded tokens.

**Note**
Normally, the first `next-node` entry should specify an adjacent neighbor node. However, if an exit port needs to be specified for the local node, it can appear as entry index 1.

**Examples**
The following example shows how to perform the following PNNI explicit path configuration tasks:

- Enter PNNI explicit-path configuration mode
- Add three nodes in a fully specified path
- Specify an exit port for the second node
- Specify the third (LGN) node by its 15-byte node ID prefix
- Exit PNNI explicit-path configuration mode

```bash
Switch# configure terminal
Switch(config)# atm pnni explicit-path name boston_2.path1
Switch(cfg-atm-pnni-exp-pl)# next-node dallas_2
Switch(cfg-atm-pnni-exp-pl)# next-node dallas_4 port 80003004
Switch(cfg-atm-pnni-exp-pl)# next-node 40:72:47.00918100000000000000000000
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni explicit-path</td>
<td>Used to enter PNNI explicit path configuration mode to create or modify PNNI explicit paths.</td>
</tr>
<tr>
<td>exclude-node</td>
<td>Specifies a node to exclude from all segments of a partially specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>segment-target</td>
<td>Specifies a target entry in a partially specified PNNI explicit-path.</td>
</tr>
<tr>
<td>show atm pnni explicit-paths</td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
</tbody>
</table>
node

To create, delete, enable, or disable PNNI nodes running on this switch and to specify or change the level of a node, use the `node` ATM router PNNI configuration command. PNNI node configuration mode is started when this command is entered. To remove a previously set node index, use the `no` form of this command.

```
node node_index level level_indicator [lowest] [peer-group-identifier] [pg_id | default] [enable | disable]
no node node_index
```

**Syntax Description**

- `node_index`: Specifies the local node index, in the range of 1 to 8, used to identify a PNNI node.
- `level_indicator`: Specifies the PNNI level (position in the PNNI hierarchy), in the range of 1 to 104.
- `pg_id`: Specifies a non-default peer group identifier for the node’s peer group. Enter the `default` keyword in place of an identifier to return from a nondefault value to the default peer group identifier.
- `lowest`: Indicates that the node to be created is a lowest-level node (for example, the node runs over physical links and VPCs). If this is not present when a new `node_index` is specified, the new node becomes a logical group node that represents a PNNI peer group. A logical group node only becomes active when its child node is elected peer group leader.

**Defaults**

With the ATM switch router autoconfiguration capabilities, a lowest-level PNNI node with the node index 1 is automatically created and runs on all PNNI interfaces by default (including interfaces determined by ILMI to be PNNI interfaces, and on interfaces configured to run PNNI).

The default level is 56, the proper level for lowest-level nodes using autoconfigured Cisco ATM addresses in a single-level hierarchy.

**Command Modes**

ATM router PNNI configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The level of a node can only be modified when the node is disabled.

The `enable` and `disable` options can be used to reinitialize PNNI. For example, the node ID and peer group ID are recalculated based on the switch router’s first ATM address and the node level whenever a node is enabled.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.
Examples

The following example shows how to enter PNNI node configuration mode.

Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)#

The following example shows how to create a lowest-level PNNI node with node index 1 at level 96 (assuming no node currently exists on this switch router).

Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1 level 96 lowest
Switch(config-pnni-node)#

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm address</td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td>atm router pnni</td>
<td>Used to enter the PNNI configuration mode.</td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on the switch router.</td>
</tr>
</tbody>
</table>
node mobile

To create, delete, enable, or disable nodes running on the mobile switch, and to specify or change the level of a node, use the node ATM router PNNI configuration command. Also use this command to designate the highest node in this switch as a mobile logical group node.

```plaintext
node node_index mobile [highest-join-level join_level] [disable | enable]
no node node_index mobile [highest-join-level join_level]
```

### Syntax Description

- **node_index**: Specifies the local node index, in the range of 1 to 8, used to identify a PNNI node.
- **mobile**: Designates the node as the mobile logical group node.
- **join_level**: The `highest-join-level` specifies the highest level at which the mobile LGN can join. The mobile LGN will not join any host peer group that is at a level higher than that specified by the `highest-join-level`.

### Defaults

None.

### Command Modes

ATM router PNNI configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Using the `mobile` variation of the `node` command designates the highest node running in the switching system as a mobile logical group node. All parent nodes of peer group leaders at the highest level of the group hierarchy must be configured as mobile logical group nodes.

Note that the mobile logical group node level cannot be user configured. Node level is dynamically chosen by the child peer group leader upon joining a host peer group.

### Note

Node level can be modified only when the nodes are disabled. `Enable` and `disable` command options will re-initialize PNNI.

### Examples

The following example shows how to designate node 3 within the switching system as a mobile logical group node, and also assign it a `default-peer-group-identifier`.

```plaintext
Switch(config)# atm router pnni
Switch(config - atm-router)# node 3 mobile default-peer-group-identifier 48:47:0091.3333.3333.3333.0000.0000
```

The following example shows how to enter PNNI node configuration mode.
The following example shows how to create a lowest-level PNNI node with node index 1 at level 96 (assuming no node currently exists on this switch router).

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)#
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm address</td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td>atm pnni mobile</td>
<td>Used to specify a PNNI interface as mobile.</td>
</tr>
<tr>
<td>atm router pnni</td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td>debug atm pnni mobility</td>
<td>Prints an error notification if ATM PNNI mobile problems are detected and the <code>debug atm pnni mobility</code> command is enabled.</td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
<tr>
<td>show atm pnni mobility-info</td>
<td>Displays lowest node and logical node information associated with PNNI mobility.</td>
</tr>
<tr>
<td>show atm pnni node</td>
<td>Shows whether PNNI nodes are enabled and running, and shows node configuration information.</td>
</tr>
</tbody>
</table>
nodal-representation

To specify the type of PNNI LGN representation, use the **nodal-representation** PNNI node configuration command.

```
  nodal-representation {simple | complex [threshold threshold-value | radius-only]}
```

<table>
<thead>
<tr>
<th><strong>Syntax Description</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>simple</strong></td>
<td>Specifies the simple PNNI node representation, where an entire child peer group is represented as a single node.</td>
</tr>
<tr>
<td><strong>complex</strong></td>
<td>Specifies the complex PNNI node representation.</td>
</tr>
<tr>
<td><strong>threshold</strong></td>
<td>Threshold percent for the generation of bypass or spoke exceptions. The threshold value ranges from 0 to 2147483647 percent. The default threshold is 60 percent.</td>
</tr>
<tr>
<td><strong>radius-only</strong></td>
<td>Advertises radius metrics only with no bypass or spoke exceptions.</td>
</tr>
</tbody>
</table>

**Defaults**

- **simple**

**Command Modes**

- PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Larger values for the threshold reduce the number of bypass and spoke exceptions advertised by PNNI. If a metric differs from the default metric and the (larger – smaller)/smaller ratio is greater than the threshold percentage, then an exception spoke, or bypass is advertised.

Lowest-level nodes are not allowed to have complex nodal representation.

The **radius-only** option suppresses all exceptions.

**Examples**

The following example shows how to specify nodal representation for radius only.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 2
Switch(config-atm-router)# nodeal-representation complex radius-only
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni aggregation link</code></td>
<td>Shows the aggregated PNNI links on the switch router.</td>
</tr>
<tr>
<td><code>show atm pnni aggregation node</code></td>
<td>Shows the PNNI nodal aggregation tables for a complex node.</td>
</tr>
<tr>
<td><code>show atm pnni local-node</code></td>
<td>Displays information about a PNNI logical node running on the switch router.</td>
</tr>
</tbody>
</table>
nsap-address (redundant soft VC)

To configure the NSAP-form ATM end-system address of a redundant ATM interface, use the `nsap-address` soft VC redundancy group configuration command.

```
nsap-address nsap-address
```

To remove a configured NSAP-format address from the redundancy group, use the following command:

```
no atm soft redundancy group group_name
```

**Syntax Description**

| `nsap-address` | A 20-octet NSAP address. Specifies the 40-digit hexadecimal NSAP address of this interface (the source address). |

**Defaults**

Disabled

**Command Modes**

Soft VC redundancy group

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Redundant soft PVC and soft PVP destinations allow you to configure the same NSAP address on two different ATM interfaces. The ATM interfaces can be on the same switch or different switches and use the same NSAP address in the source-end configuration for the soft PVC or soft PVP. If the active interface fails, the calls terminating on that interface for the redundant destination address are released and subsequently reestablished on the standby interface.

**Examples**

The following example shows how to configure a soft VC redundancy group and the ATM NSAP address for a redundant soft VC destination:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# atm soft redundancy group backup_vc
Switch(atmsoft-red)# nsap-address 11.1111.1111.1111.1111.1111.1111.1111.1111.1111.00
Switch(config)# interface atm 1/1/1
Switch(config-if)# atm soft redundancy member backup_vc standby
Switch(config-if)# end
Switch#
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm soft redundancy</td>
<td>Configures configure a soft VC redundancy group.</td>
</tr>
<tr>
<td>group</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>atm soft redundancy</td>
<td>Configures an ATM interface as part of a redundant soft VC or soft VP</td>
</tr>
<tr>
<td>member</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>load-balance</td>
<td>Configures load balancing on a soft VC redundancy group.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the ATM NSAP addresses of the redundant soft VC destination.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
O Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
oam-bundle

To enable VC bundle OAM cell transmission, use the oam-bundle configuration command. To return OAM bundle configuration to the default, use the no form of this command.

```
oam-bundle manage frequency-seconds
no oam-bundle manage
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>manage</td>
<td>Enables OAM management on the VC bundle.</td>
</tr>
<tr>
<td>frequency-seconds</td>
<td>Specifies the OAM loopback frequency in the range of 0 to 600 seconds. The default is 5 seconds.</td>
</tr>
</tbody>
</table>

| Defaults | No OAM cell transmission is defined for the VC bundle. |

| Command Modes | VC bundle configuration |

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

| Usage Guidelines | The oam-bundle command enables end-to-end F5 OAM loopback cell generation and OAM management for all VCs in the VC bundle. When used with the manage keyword, this command enables OAM management on the bundle. The frequency indicates the OAM loopback frequency in seconds. |

| Examples | The following example shows how to enable OAM management of the VC bundle with transmission of OAM cells every 300 seconds. |

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# ip address 1.1.1.9 255.0.0.0
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)# oam-bundle manage 300
```

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundle</td>
<td>Configures a VC bundle.</td>
<td></td>
</tr>
<tr>
<td>show atm bundle</td>
<td>Displays the VC bundle information.</td>
<td></td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
<td></td>
</tr>
</tbody>
</table>
### outgoing-port

To filter ATM signalling call failure based on the outgoing interface rejected call, use the `outgoing-port` ATM signalling diagnostics configuration command. To return the outgoing port to the default, use the `no` form of this command.

```
outgoing-port [atm card/subcard/port]

no outgoing-port
```

**Syntax Description**

- `card/subcard/port` Specifies the card, subcard, and port of the ATM interface. The card number is displayed using the `show interfaces` command. The subcard number can be either 0 or 1.

**Defaults**

0

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The default 0 means the incoming interface is not considered during filtering.

**Examples**

The following example shows the `outgoing-port` command.

```
Switch# configure terminal
Switch(config)# outgoing-port ATM 0/1/1
```
outgoing-port
P & Q Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.

Figure 15-1 parent

To specify the PNNI local node index of the parent node, use the parent PNNI node configuration command.

```
parent node-index
```

Syntax Description

- node-index: Index number of the PNNI local node to which the command applies, in the range of 1 to 8.

Command Modes

PNNI node configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

This command specifies the local node index of the parent node to be instantiated in the PNNI hierarchy by this switching system when this node is elected peer group leader.

Examples

The following example shows how to enter PNNI node configuration mode and specify a node.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)#
```

The following example shows how to specify a local node index of 2 for the parent node.

```
Switch(config-pnni-node)# parent 2
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm pnni explicit-paths</td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
</tbody>
</table>
party leaf-reference (point-to-multipoint ATM soft PVC)

To configure individual ATM soft PVC point-to-multipoint leaves, use the `party leaf-reference` configuration command. To delete a point-to-multipoint leaf, use the `no` form of this command.

```
party leaf-reference leaf-number [disable | enable]
no party leaf-reference leaf-number
```

**Syntax Description**

<table>
<thead>
<tr>
<th><strong>leaf-number</strong></th>
<th>Configures a leaf reference number and changes to point-to-multipoint mode. Enter a leaf number ranging from 1 to 65535.</th>
</tr>
</thead>
<tbody>
<tr>
<td>disable</td>
<td>Disables the ATM soft PVC leaf.</td>
</tr>
<tr>
<td>enable</td>
<td>Enables the ATM soft PVC leaf.</td>
</tr>
</tbody>
</table>

**Defaults**

No party leaf-reference is defined.

**Command Modes**

Soft PVC point-to-multipoint

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(23)EB</td>
<td>Added <code>disable</code> and <code>enable</code> keywords</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You must configure a party leaf-reference value (integer) for each point-to-multipoint leaf.

**Examples**

The following example shows how to configure a leaf of an ATM soft PVC point-to-multipoint connection.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface atm 0/1/0
Switch(config-if)# atm soft-vc 4 44 p2mp
Switch(atmsoft-p2mp)# party leaf-reference 2
Switch(atmsoft-p2mp-party)#
```

The following example shows how to delete a specific party from an ATM soft PVC point-to-multipoint connection:

```
Switch(config-if)# atm soft-vc 4 44 p2mp
Switch(atmsoft-p2mp)# no party leaf-reference 2
Last party. Whole connection is removed.
```
The following example shows how to disable an individual leaf of a point-to-multipoint soft PVC connection configured on an ATM interface:

Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Source(config)# interface atm 1/0/2
Source(config-if)# atm soft-vc 10 100 p2mp
Source(atmsoft-p2mp)# party leaf-reference 20 disable
Source(atmsoft-p2mp-party)#

Note
After disabling a party leaf the CLI changes from point-to-multipoint configuration mode to point-to-multipoint party configuration mode. This allows you to modify the party configuration and exit out of the party mode and enable the party leaf again with the modified configurations. For example, you can modify the retry interval, destination address, destination VPI and destination VCI.

The following example shows how to reenable an individual leaf of a point-to-multipoint soft PVC connection:

Switch(atmsoft-p2mp)# party leaf-reference 30 enable
Switch(atmsoft-p2mp)#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest-address (point-to-multipoint ATM soft PVC)</td>
<td>Configures the connection leaf destination ATM address, VPI, and VCI.</td>
</tr>
<tr>
<td>retry-interval</td>
<td>Configures the connection leaf retry intervals.</td>
</tr>
<tr>
<td>atm soft-vc (point-to-multipoint)</td>
<td>Enables the creation of a point-to-multipoint soft PVC connection.</td>
</tr>
<tr>
<td>atm connection-traffic-table-row</td>
<td>Creates a CTT.</td>
</tr>
<tr>
<td>atm pnni explicit-path</td>
<td>Enters PNNI explicit path configuration mode to create or modify a PNNI explicit path.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the active ATM addresses on a switch.</td>
</tr>
<tr>
<td>show atm vc</td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the ATM soft PVC point-to-multipoint connection information.</td>
</tr>
</tbody>
</table>
party leaf-reference (point-to-multipoint CES soft PVC)

To configure the party leaf reference number of a CES soft PVC point-to-multipoint connection, use the `party leaf-reference` configuration command. To return restore the default configuration, use the `no` form of this command.

```plaintext
party leaf-reference leaf-number [disable | enable]
no party leaf-reference leaf-number
```

**Syntax Description**
- `leaf-number` Configures a leaf reference number and changes to point-to-multipoint mode. Enter a leaf number ranging from 1 to 65535.
- `disable` Disables the CES soft PVC leaf.
- `enable` Enables the CES soft PVC leaf.

**Defaults**
No party leaf-reference is defined.

**Command Modes**
CES soft PVC point-to-multipoint

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(23)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
You must configure a party leaf-reference value (integer) for each CES point-to-multipoint leaf.

**Examples**
The following example shows how to configure the party leaf-reference number from CES point-to-multipoint (ces-p2mp) configuration mode.

```plaintext
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 1 p2mp
  Switch(ces-p2mp)# party leaf-reference 1
  Switch(ces-p2mp-party)# dest-address 47.0091.8100.0000.0090.2156.d801.4000.0c88.0070.00 110
  Switch(ces-p2mp-party)# exit
  Switch#
```

The following example shows how to delete a specific party from a CES soft PVC point-to-multipoint connection:

```plaintext
Switch(config-if)# ces pvc 1 p2mp
  Switch(ces-p2mp)# no party leaf-reference 1
Last party. Whole connection is removed.
```
The following example shows how to disable an individual leaf of a point-to-multipoint CES soft PVC connection configured on a CES interface:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface cbr 3/1/3
Switch(config-if)# ces pvc 1 p2mp
Switch (ces-p2mp)# party leaf-reference 30 disable
Switch (ces-p2mp-party)#
```

**Note**

After disabling a party leaf the CLI changes from CES point-to-multipoint configuration mode to CES point-to-multipoint party configuration mode. This allows you to modify the party configuration and exit out of party configuration mode and enable the party leaf again with the modified configurations. For example, you can modify the retry interval, destination address, destination VPI and destination VCI.

The following example shows how to reenable an individual leaf of a point-to-multipoint CES soft PVC connection:

```
Switch (ces-p2mp)# party leaf-reference 30 enable
Switch (ces-p2mp)#
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces pvc (point-to-multipoint CES soft PVC)</td>
<td>Configures point-to-multipoint CES soft PVC connections.</td>
</tr>
<tr>
<td>dest-address (point-to-multipoint CES soft PVC)</td>
<td>Configures the destination address, VPI, and VCI of the CES soft PVC point-to-multipoint party connection.</td>
</tr>
<tr>
<td>disable (point-to-multipoint CES soft PVC)</td>
<td>Disables a point-to-multipoint CES soft PVC connection after it has been enabled.</td>
</tr>
<tr>
<td>enable (point-to-multipoint CES soft PVC)</td>
<td>Enables a point-to-multipoint CES soft PVC connection that has been disabled.</td>
</tr>
<tr>
<td>show ces circuit</td>
<td>Displays detailed CES circuit information</td>
</tr>
<tr>
<td>show ces interface cbr</td>
<td>Displays detailed CES port configuration information.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
### ping atm interface atm

To check connectivity of the switch router, use the `ping atm interface atm` privileged EXEC command.

**Catalyst 8540 MSR**

```
ping atm interface atm card/subcard/port vpi [vci] {end-loopback | seg-loopback}
```

**Catalyst 8510 MSR and LightStream 1010**

```
ping atm interface atm card/subcard/port vpi [vci] {atm-prefix prefix | end-loopback | ip-address ip-address | seg-loopback}
```

#### Syntax Description

- `card/subcard/port` Card number, subcard number, and port number of the specified ATM interface.
- `vpi` Virtual path identifier.
- `vci` Virtual channel identifier.
- `ip-address` IP address of the destination node.
- `seg-loopback` Send OAM segment loopback.
- `prefix` ATM address prefix of the destination node. (Catalyst 8510 MSR and LightStream 1010)
- `end-loopback` Send OAM ping to end loopback.

#### Command Modes

Privileged EXEC

#### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

#### Usage Guidelines

To check reachability and network connectivity, use the `ping` command. You can use either an IP-address or an ATM-address prefix as a ping destination. You can also ping a neighbor switch by selecting the segment loopback option. Note that the `ip-address, atm-prefix` (Catalyst 8510 MSR and LightStream 1010) and `seg-loopback` options are mutually exclusive. In privilege extended command mode, you can select various other parameters, such as repeat count, timeout value, and so on.

#### Examples

(Catalyst 8540 MSR and LightStream 1010)

The following example shows using the `ping` command in normal mode for an ATM switch router.

```
Switch# ping atm interface atm 1/2/3 100 200 atm-prefix 0000a3454545454545464646
```

The following example shows using the `ping` command in extended command mode.

```
Switch# ping
Protocol [ip]: atm
Interface [card/sub-card/port]: 1/1/3
VPI [0]: 200
VCI [0]: 100
```
Send OAM-Segment-Loopback ? [no]:
Target IP address:
Target NSAP Prefix:
Repeat count [5]:
Timeout in seconds [5]:

Examples

The following example shows using the ping command in extended command mode.

Switch# ping atm interface atm 1/1/1 0 5 seg-loopback
Type escape sequence to abort.
Sending Seg-Loopback 5, 53-byte OAM Echoes to a neighbor, timeout is 5 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

Examples

The following example shows using the ping command in user EXEC mode.

Switch# ping james
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.31.7.27, timeout is 2 seconds:
!!!!!
Success rate is 100 percent, round-trip min/avg/max = 1/3/4 ms

The following example shows using the ping command in privileged EXEC mode. While the precise
dialog varies somewhat from protocol to protocol, all are similar to the ping session using default values
shown in the following display.

Switch# ping
Protocol [ip]:
Target IP address: 192.31.7.27
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]:
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.31.7.27, timeout is 2 seconds:
!!!!!
Success rate is 100 percent, round-trip min/avg/max = 1/2/4 ms

Table 15-1 ping Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target IP address:</td>
<td>Prompts for the IP address or host name of the destination node you plan to ping. If you have specified a supported protocol other than IP, enter an appropriate address for that protocol here. Default: none.</td>
</tr>
<tr>
<td>Repeat count [5]:</td>
<td>Number of ping packets that are sent to the destination address. Default: 5.</td>
</tr>
<tr>
<td>Datagram size [100]:</td>
<td>Size of the ping packet (in bytes). Default: 100 bytes.</td>
</tr>
<tr>
<td>Extended commands [n]:</td>
<td>Specifies whether or not a series of additional commands is displayed.</td>
</tr>
</tbody>
</table>
Sweep range of sizes [n]: Allows you to vary the sizes of the echo packets being sent. This capability is useful for determining the minimum sizes of the MTUs configured on the nodes along the path to the destination address. Packet fragmentation contributing to performance problems can then be reduced.

!!!!! Each exclamation point (!) indicates receipt of a reply. A period (.) indicates the network server timed out while waiting for a reply. Other characters might be displayed in the ping output, depending on the protocol type.

Success rate is 100 percent Percentage of packets successfully echoed back to the switch router. Anything less than 80 percent is usually considered problematic.

round-trip min/avg/max = 1/2/4 ms Round-trip travel time intervals for the protocol echo packets, including minimum/average/maximum expressed in milliseconds.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep range of sizes [n]:</td>
<td>Allows you to vary the sizes of the echo packets being sent.</td>
</tr>
<tr>
<td></td>
<td>This capability is useful for determining the minimum sizes of the MTUs configured on the nodes</td>
</tr>
<tr>
<td></td>
<td>along the path to the destination address. Packet fragmentation contributing to performance</td>
</tr>
<tr>
<td></td>
<td>problems can then be reduced.</td>
</tr>
<tr>
<td>!!!!!</td>
<td>Each exclamation point (!) indicates receipt of a reply. A period (.) indicates the network</td>
</tr>
<tr>
<td></td>
<td>server timed out while waiting for a reply. Other characters might be displayed in the ping</td>
</tr>
<tr>
<td></td>
<td>output, depending on the protocol type.</td>
</tr>
<tr>
<td>Success rate is 100 percent</td>
<td>Percentage of packets successfully echoed back to the switch router.</td>
</tr>
<tr>
<td></td>
<td>Anything less than 80 percent is usually considered problematic.</td>
</tr>
<tr>
<td>round-trip min/avg/max = 1/2/4 ms</td>
<td>Round-trip travel time intervals for the protocol echo packets, including minimum/average/maximum expressed in milliseconds.</td>
</tr>
</tbody>
</table>
precedence (PNNI configuration)

To configure the precedence of different types of reachable addresses, use the `precedence` ATM router PNNI configuration command. To return to the default precedence value for a particular reachable address type, use the `no` form of this command.

```
no precedence [pnni-remote-exterior | pnni-remote-exterior-metrics | pnni-remote-internal | pnni-remote-internal-metrics | static-local-exterior | static-local-exterior-metrics | static-local-internal-metrics]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pnni-remote-exterior</code></td>
<td>Sets the priority for the remote exterior prefixes without metrics. The default is 4.</td>
</tr>
<tr>
<td><code>pnni-remote-exterior-metrics</code></td>
<td>Sets the priority for the remote exterior prefixes with metrics. The default is 2.</td>
</tr>
<tr>
<td><code>pnni-remote-internal</code></td>
<td>Sets the priority for the remote internal prefixes without metrics. The default is 2.</td>
</tr>
<tr>
<td><code>pnni-remote-internal-metrics</code></td>
<td>Sets the priority for the remote internal prefixes with metrics. The default is 2.</td>
</tr>
<tr>
<td><code>static-local-exterior</code></td>
<td>Sets the priority for the static exterior prefixes without metrics. The default is 3.</td>
</tr>
<tr>
<td><code>static-local-exterior-metrics</code></td>
<td>Sets the priority for the static exterior prefixes with metrics. The default is 2.</td>
</tr>
<tr>
<td><code>static-local-internal-metrics</code></td>
<td>Sets the priority for the static internal prefixes with metrics. The default is 2.</td>
</tr>
<tr>
<td><code>value</code></td>
<td>Specifies the precedence of a reachable address type. Smaller values take precedence over larger values. The range of values is 2, 3, or 4.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Descriptions.”

**Command Modes**

ATM router PNNI configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

The following naming convention for the precedence option keywords is used:

- The `pnni` prefix (for example `pnni-remote-exterior`) indicates that the routes are learned through PNNI from other nodes.
- The `static` prefix (for example `static-local-exterior`) indicates locally configured routes.

The route selection algorithm chooses routes to particular destinations using the longest match-reachable address prefix known to the switch router. When multiple reachable address types are associated with the longest match-reachable address prefix, the route selection algorithm first attempts to find routes to reachable address types of greatest precedence. Among multiple routes to the same longest match-reachable address prefix with the same reachable address type, routes with the least total administrative weight are preferred.

Use the `precedence (PNNI configuration)` command to change the default values for the different types of reachable addresses.

Local internal reachable addresses, whether learned through ILMI or as static routes, are given the highest priority (level 1).

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni precedence</code></td>
<td>Displays the current PNNI prefix priorities for routing.</td>
</tr>
</tbody>
</table>
precedence (VC bundle)

To configure the precedence associated with a VC bundle member, use the `precedence` configuration command. To return `precedence` configuration to the default, use the `no` form of this command.

```
precedence {other | range}

no precedence {other | range}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>other</code></td>
<td>Specifies all non configured precedence levels.</td>
</tr>
<tr>
<td><code>range</code></td>
<td>Specifies the precedence in the range of 0 to 7 corresponding to the Type of Service (ToS) byte.</td>
</tr>
</tbody>
</table>

**Defaults**

No precedence is defined for the VC bundle.

**Command Modes**

VC bundle member

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `precedence` command, specifies the precedence level associated with a VC bundle. A VC bundle on the enhanced ATM Router Module selects an appropriate VC for a destination based on the precedence bits of the ToS byte set in the IP header. The precedence bits of the ToS byte range from 0-7, and hence each VC in the bundle can be associated either with a unique precedence or with a range of precedence values. The range is specified with a hyphen, for example, 2-7 or 3-5. When you want a VC to be selected for all default precedences, use the `other` keyword. This means for all precedences where a VC is not directly associated, traffic flows on the VC that has precedence configured as `other`.

When a member is assigned precedence `other`, it takes up all IP packets whose precedence have no explicit corresponding PVC member. Once a member has been created with precedence `other`, you cannot create another member with precedence `other`. You see the following error message if you try to configure multiple members with precedence `other`:

```
Switch(config-if-atm-member)# precedence other
Default member already exists in the bundle.
```

When a member with explicit precedence is created, that precedence alone is removed from the designated default member corresponding to the `precedence other` command.

**Examples**

The following example shows how to configure the VC bundle member to carry IP traffic with precedence 7.

```
Switch# configure terminal
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)#
```
02:30:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to down
Switch(config-if-atm-bundle)# pvc-bundle 2 108 interface atm9/0/0 2 109
Switch(config-if-atm-member)# precedence 7

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td></td>
<td>pvc-bundle</td>
<td>Configures a VC bundle member.</td>
</tr>
<tr>
<td></td>
<td>show atm bundle</td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td></td>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
privilege level (global)

To set the privilege level for a command, use the `privilege level` global configuration command. To revert to default privileges for a given command, use the `no` form of this command.

```
privilege mode level level command [type]

no privilege mode level level command
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mode</td>
<td>Configuration mode. Refer to the <code>Router Products Command Reference</code> publication for more information.</td>
</tr>
<tr>
<td>level</td>
<td>Privilege level to be associated with the specified command. You can specify up to 16 privilege levels, using numbers 0 through 15.</td>
</tr>
<tr>
<td>command</td>
<td>Command to which privilege level is associated.</td>
</tr>
<tr>
<td>type</td>
<td>See Table 15-2 for a list of optional keywords.</td>
</tr>
</tbody>
</table>

**Defaults**

Level 15 is the level of access permitted by the `enable` password.

Level 1 is normal EXEC-mode user privileges.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `alias` command shows the acceptable options for the `mode` argument in the `privilege level` global configuration command.

The password for the privilege level defined using the `privilege level` global configuration mode is configured using the `enable password` command.

Level 0 can be used to specify a more limited subset of commands for specific users or lines. For example, you can allow user “guest” to only use the `show users` and `exit` commands.

If you set a command to a privilege level, all commands that have a syntax that is a subset of the syntax of that command are also set to that level. For example, when you set the `show ip route` command to level 15 and do not set `show` and `show ip` commands to a different level, they are also set to privilege level 15.

Table 15-2 shows the optional keywords you specify to set the privileged level.

**Table 15-2 Privilege Level Types**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>acctng-file</td>
<td>Configure ATM accounting file.</td>
</tr>
<tr>
<td>acctng-sel</td>
<td>Configure ATM accounting selection.</td>
</tr>
</tbody>
</table>
Table 15-2 Privilege Level Types (continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm-router</td>
<td>ATM router configuration mode.</td>
</tr>
<tr>
<td>atmsig_e164_table_mode</td>
<td>ATMSIG E164 table.</td>
</tr>
<tr>
<td>configure</td>
<td>Global configuration mode.</td>
</tr>
<tr>
<td>exec</td>
<td>EXEC mode.</td>
</tr>
<tr>
<td>interface</td>
<td>Interface configuration mode.</td>
</tr>
<tr>
<td>lane</td>
<td>ATM LAN Emulation LECS configuration table.</td>
</tr>
<tr>
<td>line</td>
<td>Line configuration mode.</td>
</tr>
<tr>
<td>map-class</td>
<td>Map class configuration mode.</td>
</tr>
<tr>
<td>map-list</td>
<td>Map list configuration mode.</td>
</tr>
<tr>
<td>null-interface</td>
<td>Null interface configuration mode.</td>
</tr>
<tr>
<td>pnni-router-node</td>
<td>PNNI router node configuration mode.</td>
</tr>
<tr>
<td>route-map</td>
<td>Route map configuration mode.</td>
</tr>
</tbody>
</table>

Examples

In the following example, the configure command in global configuration mode is assigned a privilege level of 14. Only users who know the level 14 password are able to use the configure command.

Switch# privilege exec level 14 configure
Switch# enable password level 14 pswd14

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configure</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>enable password</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>privilege level (line)</td>
<td>Sets the default privilege level for a specified line.</td>
</tr>
</tbody>
</table>
privilege level (line)

To set the default privilege level for a line, use the `privilege level` line configuration command. To restore the default user privilege level to the line, use the `no` form of this command.

```
privilege level level
no privilege level
```

Syntax Description

`level` Privilege level to be associated with the specified line.

Defaults

Level 15 is the level of access permitted by the enable password. Level 1 is normal EXEC-mode user privileges.

Command Modes

Line configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>privilege</code></td>
</tr>
<tr>
<td>11.3(3a)</td>
<td>Modified: Changed to <code>privilege level (line)</code></td>
</tr>
</tbody>
</table>

Usage Guidelines

The privilege level that is set using this command can be overridden by a user logging in to the line and enabling a different privilege level. The user can lower the privilege level by using the `disable` command. If the user knows the password to a higher privilege level, the user can use that password to enable the higher privilege level.

Level 0 can be used to specify a more limited subset of commands for specific users or lines. For example, you can allow user “guest” to only use the `show users` and `exit` commands.

You can specify high level privilege for your console line if you are able to restrict who uses that line.

Examples (Catalyst 8540 MSR)

In the following example, the virtual terminal line is configured for privilege level 5. Anyone using virtual terminal line 0 has privilege level 5 by default.

```
Switch# configure terminal
Switch(config)# line console 0
Switch(config-line)# privilege level 5
```

Examples (Catalyst 8510 MSR and LightStream 1010)

In the following example, the auxiliary line is configured for privilege level 5. Anyone using the auxiliary line has privilege level 5 by default.

```
Switch(config)# line aux 0
Switch(config-line)# privilege level 5
```
**protect**

To configure protection for an individual VC or to make it part of a protected group, use the `protect` configuration command. To return the `protect` configuration to the default configuration, use the `no` form of this command.

```
protect {group | vc}

no protect {group | vc}
```

---

**Syntax Description**

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>group</td>
<td>Configures the VC bundle member as part of the protected group of the bundle.</td>
</tr>
<tr>
<td>vc</td>
<td>Configures the VC bundle member as individually protected.</td>
</tr>
</tbody>
</table>

**Defaults**

No protection is defined for the VC bundle.

**Command Modes**

VC bundle member

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `protect` command configures the VC to belong to the protected group of the bundle or as an individually protected VC bundle member. When a VC is designated a protected VC, it means that the bundle is brought down if that particular VC is down. A “protected group” is a group of VCs within the bundle. The bundle remains up if at least one of the VCs in the protected group remains in the Up state.

**Examples**

The following example shows how to configure a VC as a member of a protected group.

```
Switch# configure terminal
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)#
02:30:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to down
Switch(config-if-atm-bundle)# pvc-bundle 2 108 interface atm9/0/0 2 109
Switch(config-if-atm-member)#
02:32:39: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to up
Switch(config-if-atm-member)# protect group
```

The following example shows how to configure a VC as an individually protected VC.

```
Switch(config-if-atm-bundle)# pvc-bundle 2 108 interface atm9/0/0 2 109
Switch(config-if-atm-member)#
02:32:39: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to up
Switch(config-if-atm-member)# protect vc
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td></td>
<td>pvc-bundle</td>
<td>Configures a VC bundle member.</td>
</tr>
<tr>
<td></td>
<td>show atm bundle</td>
<td>Displays a VC bundle information.</td>
</tr>
<tr>
<td></td>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
protocol

To configure the VC bundle protocol, use the protocol interface configuration command.

```
protocol {ip-address | ip ip-address | ipx ipx-address | inarp} [[no] broadcast]
```

**Syntax Description**

- `ip-address`: Specifies the IP address.
- `ip ip-address`: Specifies the IP address.
- `ipx ipx-address`: Specifies the Novell IPX address.
- `inarp`: Enables Inverse ARP on the VC bundle.
- `broadcast`: Enables Broadcast IP packets to be carried over the VCs.

**Defaults**

No static map or Inverse ARP is defined for the VC bundle.

**Command Modes**

VC bundle configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The VC bundle `protocol` command configures a static map, enables Inverse ARP, or Inverse ARP broadcasts for the bundle.

The VC bundle `protocol` command is equivalent to configuring a static map, which attaches the correct VC for an IP address on an interface. In this case, the static map entry attaches a whole bundle (of up to 8 VCs) to an IP address on an interface. The static map is identified by `bundle name`. When you add the `inarp` keyword the static mapping automatically gets the IP address to VC mapping and the protocol-address is not needed.

**Examples**

The following example shows how to configure a VC bundle named cisco using the IP protocol and address and no broadcast.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)# protocol ip 172.20.52.10 no broadcast
Switch(config-if-atm-bundle)#
```

The following example shows how to configure a VC bundle named cisco using the IP protocol and Inverse ARP.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# ip address 1.1.1.9 255.0.0.0
Switch(config-subif)# bundle cisco
```
Switch(config-if-atm-bundle)#
02:30:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to down
Switch(config-if-atm-bundle)# protocol ip inarp
Switch(config-if-atm-bundle)#

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td>show atm bundle</td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
To set PTSE origination and request parameters (including significant change determination parameters), use the `ptse` PNNI node configuration command. To revert to the default values, use the no form of this command.

```plaintext
ptse [lifetime-factor percentage-factor] [min-ptse-interval tenths-of-seconds] [refresh-interval seconds] [request number] [significant-change acr-mt percent] [significant-change acr-pm percent] [significant-change cdv-pm percent] [significant-change ctd-pm percent]
```

```plaintext
no ptse [lifetime-factor] [min-ptse-interval] [refresh-interval] [request] [significant-change acr-mt] [significant-change acr-pm] [significant-change cdv-pm] [significant-change ctd-pm]
```

### Syntax Description

- **lifetime-factor**: Specifies an initial lifetime of self-originated PTSEs as a percentage of the `refresh-interval`. The default is 200 percent.
- **percentage-factor**: Specifies the percentage factor of the refresh interval, from 101 to 1000. The value 100 represents a quantity equal to the refresh interval.
- **min-ptse-interval**: Specifies the minimum interval between updates of any given PTSE. This means new instances of a PTSE are not issued more often than every `min-ptse-interval` second. The default value is 1 second. The minimum value is 0.1 seconds.
- **tenths-of-seconds**: Specifies the time of the interval in tenths of seconds. Ten tenths-of-seconds equals one second.
- **refresh-interval**: Specifies the period the system updates self-originated PTSEs. The default is 1800.
- **request**: Specifies the maximum number of PTSEs requested in one request packet. The default is 32.
- **number**: Specifies the PTSE requests using an integer.
- **acr-mt**: Specifies the available cell rate minimum threshold which is the minimum change of available cell rate considered significant, as a percentage of the maximum cell rate. The default is 3 percent.
- **acr-pm**: Specifies the available cell rate proportional multiplier, which is the percentage of change from the current available cell rate considered significant. The default is 50 percent.
- **cdv-pm**: Specifies the cell delay variation proportional multiplier, which is the percentage of change from the current cell delay variation considered significant. The default is 25 percent.
- **ctd-pm**: Specifies the maximum cell transfer delay proportional multiplier, which is the percentage of change from the current maximum cell transfer delay considered significant. The default is 50 percent.
- **percent**: Specifies the significant change threshold percent, from 1 to 99.

### Defaults

See “Syntax Description.”
Command Modes

PNNI node configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Lowering the refresh-interval time causes PNNI to reoriginate PTSEs more frequently, allowing insignificant changes to be advertised sooner at the cost of more PNNI traffic. Note that significant changes are advertised immediately.

Decreasing the lifetime-factor lowers the initial lifetime of PTSE, which means PTSEs of a PNNI node that has stopped functioning are removed from the database sooner. Lowering min-ptse-interval allows PNNI to update PTSEs quickly when changes happen rapidly in the network. This should be adjusted carefully so that you do not overload switch processors. In a normal situation, these parameters are not changed from their default values.

The significant change parameters define the level of changes in metrics that triggers PNNI to update and send its PTSEs. It applies to all PTSE types that include metrics: for example, horizontal link, up link, external reachable address, and nodal state parameters. Any change in administrative weight or cell loss ratio is considered significant.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

Examples

The following script shows how to access the ptse node-level subcommand.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# ptse refresh-interval 1900
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
<tr>
<td>show atm pnni resource-info</td>
<td>Displays information about routing parameters of all PNNI interfaces received from a resource management module.</td>
</tr>
</tbody>
</table>
To configure the VC bundle member, use the `pvc-bundle` configuration command. To return the VC bundle configuration to the default, use the `no` form of this command.

```
pvc-bundle vpi vci interface atm card/subcard/port vpi vci [upc {tag | drop | pass}] [pd {on | off | use-cttr}] [rx-cttr rx-row] [tx-cttr tx-row] [wrr-weight value]
no pvc-bundle vpi vci
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>vpi</code></td>
<td>Specifies the virtual path identifier.</td>
</tr>
<tr>
<td><code>vci</code></td>
<td>Specifies the virtual channel identifier.</td>
</tr>
<tr>
<td><code>interface atm card/subcard/port</code></td>
<td>Specifies the card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td><code>upc</code></td>
<td>Specifies the usage parameter control, as <code>pass</code>, <code>tag</code>, or <code>drop</code>; the default is <code>pass</code>. The <code>upc</code> parameter can be set to <code>tag</code> or <code>drop</code> only under the following conditions:</td>
</tr>
<tr>
<td></td>
<td>- The ATM interface is not the route processor port (ATM 0) or a logical port (VP tunnel).</td>
</tr>
<tr>
<td></td>
<td>- The connection is not the leaf of a point-to-multipoint connection.</td>
</tr>
<tr>
<td><code>pd</code></td>
<td>Specifies the intelligent packet discard option as <code>on</code>, <code>off</code>, or <code>use-cttr</code>. The default is <code>on</code>.</td>
</tr>
<tr>
<td><code>rx-cttr rx-row</code></td>
<td>Specifies the connection traffic table row index in the received direction. The connection traffic table row should be configured before using the <code>pvc-bundle</code> command. See the <code>atm connection-traffic-table-row</code> command for information on configuring the <code>rx-cttr</code> parameter. The default is 1.</td>
</tr>
<tr>
<td><code>tx-cttr tx-row</code></td>
<td>Specifies the connection traffic table row index in the transmitted direction. The connection traffic table row should be configured before using the <code>pvc-bundle</code> command. See the <code>atm connection-traffic-table-row</code> command for information on configuring the <code>tx-cttr</code> parameter. The default is 1.</td>
</tr>
<tr>
<td><code>wrr-weight value</code></td>
<td>Specifies the weight assigned to the output VC for weighted round robin scheduling. This value is an integer in the range of 1 to 15.</td>
</tr>
</tbody>
</table>

### Defaults

No VC bundle is configured.

### Command Modes

VC bundle configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

The `pvc-bundle` command is similar to the `atm pvc` command, but without some options such as `encapsulation` and `inarp`. These options are removed at the PVC member level, as they are bundle specific and have been configured there. There is no provision to create half legs in the `pvc-bundle` command. The order of specification of any of these values is random, which is consistent with the existing `atm pvc` command. When valid parameters are given to this command, you enter member mode, which is a new mode of operation. As the VC bundle configuration changes, the PVC is installed in the fabric when you enter the `pvc-bundle` command.

Examples

The following example shows how to configure a VC bundle interface.

```
Switch# configure terminal
Switch(config)# interface atm 0/0/1.1 multipoint
Switch(config-subif)# bundle cisco
Switch(config-if-atm-bundle)# pvc-bundle 2 108 interface atm9/0/0 2 109
Switch(config-if-atm-member)#
```

02:32:39: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/1.1, changed state to up
Switch(config-if-atm-member)#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>bundle</code></td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td></td>
<td><code>show atm bundle</code></td>
<td>Displays the VC bundle information.</td>
</tr>
<tr>
<td></td>
<td><code>show running-config</code></td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
qos switching

To enable quality of service (QoS) mapping on the device, use the qos switching command. To disable QoS mapping, use the no form of this command.

qos switching
no qos switching

Syntax Description
This command has no keywords or arguments.

Defaults
QoS mapping is enabled.

Command Modes
Global configuration

Examples
The following example shows how to enable QoS mapping using the qos switching configuration command.

8500CSR(config)# qos switching

Related Commands
qos mapping precedence
qos mapping precedence

To configure QoS mapping at the system or interface level, use the `qos mapping precedence` command. To set the QoS precedence back to the default value, use the `no` form of this command.

```
qos mapping [source source-int] [destination dest-int] precedence value wrr-weight weight
no qos mapping precedence
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>source-int</td>
<td>Source interface from which you want to define a traffic precedence; optional.</td>
</tr>
<tr>
<td>dest-int</td>
<td>Destination interface to which you want to define a traffic precedence; optional.</td>
</tr>
<tr>
<td>value</td>
<td>The precedence value (0 to 3) is derived from the IP precedence field. The higher 2 bits of the IP precedence field is used. When a precedence value (x) is specified, it also implicitly assigns the same WRR weight to precedence (x + 1).</td>
</tr>
<tr>
<td>weight</td>
<td>The WRR-scheduling weight (1 to 15). This parameter specifies the weight assigned to traffic with the given precedence.</td>
</tr>
</tbody>
</table>

**Defaults**

The default WRR-weight for a precedence value \(n\) is \(2^n\).

**Command Modes**

Global configuration

**Usage Guidelines**

When a precedence value \(n\) is specified, it implicitly assigns the same WRR weight to the precedence \(n + 1\).

**Examples**

The following example shows how to set the system-level QoS mapping using the `qos mapping precedence` configuration command.

```
8500CSR(config)# qos mapping precedence 0 wrr-weight 4
```

**Related Commands**

`qos switching`
R Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed, or replaced.
rate-limit

To police the rate of traffic on EPIF-based FE cards of the Catalyst 8540 MSR and Catalyst 8510 MSR on a per-physical-port basis, use the `rate-limit` command. To disable this feature, use the `no` form of this command.

```
rate-limit {input | output} rate burst

no rate-limit
```

**Syntax Description**

- **input**: Applies this CAR traffic policy to packets received on this interface.
- **output**: Applies this CAR traffic policy to packets transmitted on this interface.
- **rate**: This is the committed access rate. The actual CAR rate is rounded off to lower multiple of 32000.
- **burst**: This is the normal burst bytes. The actual burst size is rounded off to the higher multiple of 1556

**Defaults**

Disabled.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>Changed command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Traffic rate is monitored by the EPIF ucode to check for conformity. Non-conforming traffic is dropped; conforming traffic is passed through without any changes.

**Examples**

The following example shows how to set a rate-limit.

```
Switch# configure terminal
Switch(config)# interface atm 0
Switch(config-if)# rate-limit input 32000 64000
Switch(config-if)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show epc port-qos</td>
<td>Displays the current traffic-shaping configuration.</td>
</tr>
<tr>
<td>traffic-shape</td>
<td>Enables traffic shaping for outbound traffic on an interface.</td>
</tr>
</tbody>
</table>
redistribute

To instruct the PNNI to redistribute static routes throughout the PNNI routing domain, use the redistribute PNNI node configuration command. To disable redistribution of static routes, use the no form of this command.

`redistribute protocol`

`no redistribute protocol`

**Syntax Description**

`protocol`  The protocol keyword used for static routes is `atm-static`.

**Defaults**

Enabled for `atm-static`.

**Command Modes**

PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

All redistributed routes are advertised in exterior reachable address PTSE with default scope and without metric. All redistributed routes are summarized by the `summary-address` command.

In autoconfiguration mode, PNNI is set to redistribute the configured static routes.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

**Examples**

The following script shows how to access the redistribute PNNI node configuration command.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# redistribute atm-static
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm route</td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td>show atm route</td>
<td>Displays all local or network-wide reachable address prefixes in this switch’s ATM routing table.</td>
</tr>
</tbody>
</table>
redundancy (Catalyst 8540 MSR)

To switch to the redundancy mode, use the redundancy global configuration command.

```
redundancy
```

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
To enter the main-cpu mode of redundancy mode, use the `main-cpu` command.

**Examples**
The following example shows how to enter the redundancy mode.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-r)#
```

The following example shows how to switch to the main-cpu submode of redundancy mode.

```
Switch(config-r)# main-cpu
Switch(config-r-mc)#
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>main-cpu</code> (Catalyst 8540 MSR)</td>
<td>Switches to the main-cpu submode of the redundancy mode.</td>
</tr>
<tr>
<td><code>secondary console allow enable-mode</code> (Catalyst 8540 MSR)</td>
<td>Allows or disallows the <code>enable</code> command for privileged access on the secondary route processor.</td>
</tr>
<tr>
<td><code>redundancy force-failover main-cpu</code> (Catalyst 8540 MSR)</td>
<td>Forces the primary route processor to allow the secondary route processor to take over and become the primary.</td>
</tr>
<tr>
<td><code>show redundancy</code> (Catalyst 8540 MSR)</td>
<td>Displays all redundancy-related information.</td>
</tr>
<tr>
<td><code>sync config</code> (Catalyst 8540 MSR)</td>
<td>Synchronizes the configuration between the primary and secondary route processors based on the primary configuration.</td>
</tr>
</tbody>
</table>
redundancy force-failover main-cpu (Catalyst 8540 MSR)

To force the primary route processor to allow the secondary route processor to take over and become the primary, use the `redundancy force-failover main-cpu` EXEC command.

```
redundancy force-failover main-cpu
```

### Syntax Description

This command has no arguments or keywords.

### Command Modes

EXEC

### Command History

```
Release          Modification
-----------------------------------
12.0(3c)W5(9)     New command
12.1(19)EB        Added secondary to primary image migration confirmation prompt.
```

### Usage Guidelines

If the secondary route processor is in ROMMON mode, it becomes the primary route processor but continues in the ROMMON mode, meaning that the IOS software does not automatically open.

The `redundancy force-failover main-cpu` command causes the main processor functions of the switch to change to the secondary route processor, if one is installed. If the command is executed when only one route processor is installed, the `redundancy force-failover main-cpu` command is ignored and an error message indicating this condition appears.

An unsaved configuration and all the SVC connections in the former primary route processor are lost after the failover is complete. Only PVC connections are preserved during failover.

If the new primary route processor does not have the same configuration as the previous primary route processor, functionality provided by the additional resources in the former primary route processor is lost after the failover. For example, if the new primary route processor does not have a network clock module installed and the old primary did, network clock functionality is not available after the switchover.

If you use the `redundancy force-failover main-cpu` command to switch over from the primary route processor to the secondary and the Cisco IOS software images are not the same on both route processors, some redundancy synchronization modules are called to translate the database information stored on the route processors. These synchronization modules are used for the signaling, ILMI, interface, driver, and connection databases. If the versions of the database modules are not the same upgrade or downgrade, translation functions are called if either the primary or secondary route processor is running Cisco IOS Release 12.1(19)EB or later. These translation functions automatically migrate the databases from, for example, version 1.0 to 1.2 without any loss of connectivity. If the translation functions needed to migrate the databases are significant, the following warning message appears asking you to confirm the upgrade or downgrade:

```
Warning: Attempting to migrate to a different version of system image than the primary. Do you want to continue?
```
Caution

If you continue with the route processor force failover some connection interruptions might occur.

Examples

The following example shows how to make the secondary route processor the primary.

```
Switch# redundancy force-failover main-cpu
```

The following example shows the warning message that appears if you attempt to force a failover between route processors whose Cisco IOS images differ significantly.

```
Switch# redundancy force-failover main-cpu
Warning: Attempting to migrate to a different version of system image than the primary. Do you want to continue? Y
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show redundancy</code> (Catalyst 8540 MSR)</td>
<td>Displays all redundancy-related information.</td>
</tr>
</tbody>
</table>

Note

The `show redundancy` command is available on the primary route processor only.
**redundancy manual-sync (Catalyst 8540 MSR)**

To manually update the configuration on the secondary processor to be identical with the configuration on the primary processor, use the `redundancy manual-sync` EXEC command. Use this command to update the startup configuration, the running configuration, or both.

```
redundancy manual-sync [startup-config | running-config | both]
```

**Syntax Description**

- **startup-config**: Updates the secondary processor with the startup configuration on the primary processor.
- **running-config**: Updates the secondary processor with the running configuration on the primary processor.
- **both**: Updates the secondary processor with both the startup configuration and the running configuration on the primary processor.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Normally this command is not required because whenever you exit configuration mode (either using `cntrl-Z` or `end`), the running configuration is updated on the secondary processor. Similarly, the startup configuration is updated whenever you issue the `write memory` command. Use the `redundancy manual-sync (Catalyst 8540 MSR)` command if you see an error and want to manually force a configuration update.

**Examples**

The following example shows how to update the secondary processor with the startup configuration on the primary processor.

```
Switch# redundancy manual-sync
Switch# startup-config
```

**Related Commands**

- `show redundancy (Catalyst 8540 MSR)` Displays all redundancy-related information.

**Note**

The `show redundancy` command is available on the primary route processor only.
redundancy manual-sync counters (Catalyst 8540 MSR)

To force the primary route processor to synchronize the VC, interface, and signaling counters with the secondary route processor, use the redundancy manual-sync counters EXEC command.

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(20)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The redundancy manual-sync counters command forces the driver level (interface) counters, VC level (ATM Virtual Channel) counters, and ATM Signaling statistics counter updates between the primary and secondary route processors.

To perform the switchover between primary and secondary route processors, use the redundancy force-failover main-cpu (Catalyst 8540 MSR) command.

**Examples**
The following example shows how to force the primary route processor to synchronize the VC, interface, and signaling counters with the secondary route processor.

```
Switch# redundancy manual-sync counters
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sync counters (Catalyst 8540 MSR)</td>
<td>Configures the time interval for automatic counter updates between the primary and secondary route processors.</td>
</tr>
<tr>
<td>show redundancy (Catalyst 8540 MSR)</td>
<td>Displays all redundancy-related information.</td>
</tr>
</tbody>
</table>
redundancy preferred-switch-card-slot (Catalyst 8540 MSR)

If the switch has three switch cards, then by default the switch cards in slots 5 and 7 are the active switch cards and the one in slot 6 is the standby switch card. To change the active switch slots, use the `redundancy preferred-switch-card-slot` EXEC command.

```
redundancy preferred-switch-card-slot slot#-1 slot#-2
```

**Syntax Description**

<table>
<thead>
<tr>
<th>slot#</th>
<th>Slot number in the range of 5 through 7.</th>
</tr>
</thead>
</table>

**Defaults**

Slots 5 and 7 are the active slots. Slot 6 is the standby slot.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Two unique preferred slots must be specified. If one of the preferred slots selected is not a currently active switch card, you are asked if the system should change the active switch cards to the preferred switch cards. If such a switchover occurs, all the active connections in the system are reinitialized. If you wish to continue, then the preferred switch cards become active and the other switch card becomes the standby. This configuration remains in effect until one of the active switch cards is removed. The preferred switch card configuration is preserved across route processor switchovers but not when the system is power cycled or when both route processors are reloaded to ROM monitor mode.

**Examples**

The following example shows how to change the preferred active slots to slots 5 and 6.

```
Cougar# redundancy preferred-switch-card-slots 5 6
One of the switch cards selected is not currently active. This command will cause the switch cards to reinitialize and all active connections will be reinitialized...
Do you want to continue? [yes/no]: [confirm]
shutting down atm-sec0 port
Waiting for existing connections to be removed...
yDone
The switch card driver will reinitialize now
All the active connections in the switch will now be reinitialized.

Switch Fabric Driver subsystem initializing ...
found
smid=0
smid=2
smid=4
```
```markdown
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show redundancy</td>
<td>Displays all redundancy-related information.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>
```

**Note**
The `show redundancy` command is available on the primary route processor only.
redundancy prepare-for-cpu-removal (Catalyst 8540 MSR)

Prior to removing a route processor from the chassis, precautions must be taken. To be sure that a switch router running IOS is in the proper state, use the redundancy prepare-for-cpu-removal EXEC command.

redundancy prepare-for-cpu-removal

Syntax Description
This command has no arguments or keywords.

Defaults
None

Command Modes
EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
It is safest to have the route processor module in RMON monitor mode before removing it from the chassis. If the switch is running IOS, you can accomplish this using the reload command unless the switch is configured to automatically boot IOS again. To ensure that the route processor is in RMON monitor mode, use the redundancy prepare-for-cpu-removal (Catalyst 8540 MSR). After issuing this command the route processor will go to ROM monitor mode and stay there even if the system is configured to automatically boot IOS. At this point it is safe to remove the route processor module from the chassis.

Note
Be sure to issue the redundancy prepare-for-cpu-removal (Catalyst 8540 MSR) command after connecting to the console port of the route processor module to be removed. If the system has a Y cable, then the Y cable must be removed and a local connection to the route processor being removed must be obtained before issuing the command. Always issue the redundancy prepare-for-cpu-removal (Catalyst 8540 MSR) command on a route processor that is in IOS mode, even if it is the secondary route processor.

Examples
The following example shows how to prepare a route processor for removal by putting it into ROM monitor mode.

Switch# redundancy prepare-for-cpu-removal
This command will cause this CPU to go to the rom monitor through a forced crash.
After this cpu goes to the rom monitor prompt, it is safe to remove it from the chassis
Do you want to continue?[confirm]yPlease DO NOT REBOOT this cpu before removing it rommon 7 >
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show redundancy</td>
<td>Displays all redundancy-related information.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The `show redundancy` command is available on the primary route processor only.
**redundancy primary-cpu preferred**

To establish the preferred primary route processor, which also establishes the preferred secondary route processor, use the `primary-cpu preferred` redundancy command. To change the primary route processor to a secondary, use the `no` form of this command.

```
primary-cpu preferred [slot4 | slot8]
no primary-cpu preferred [slot4 | slot8]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot4</td>
<td>Specifies slot 4</td>
</tr>
<tr>
<td>slot8</td>
<td>Specifies slot 8</td>
</tr>
</tbody>
</table>

**Defaults**

No preferred route processor.

**Command Modes**

Redundancy

**Usage Guidelines**

The primary route processor is determined based on the previous configuration.

**Examples**

The following example shows how to enter redundancy mode and establish the preferred primary route processor for slot 4.

```
Router(config)# redundancy
Router(config-r)# primary-cpu preferred slot4
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>auto-sync</td>
<td>Enables automatic synchronization of the configuration files in NVRAM.</td>
</tr>
<tr>
<td>redundancy force-failover main-cpu (Catalyst 8540 MSR)</td>
<td>Forces the primary route processor to allow the secondary route processor to take over and become the primary.</td>
</tr>
<tr>
<td>redundancy manual-sync counters (Catalyst 8540 MSR)</td>
<td>Forces the primary route processor to synchronize the VC, interface, and signaling counters with the secondary route processor.</td>
</tr>
<tr>
<td>show redundancy (Catalyst 8540 MSR)</td>
<td>Displays all redundancy-related information.</td>
</tr>
</tbody>
</table>

**Note**

The `show redundancy` command is available on the primary route processor only.
reprogram

To upgrade nonvolatile microcode or programmable logic on a selected card from a flash file, use the reprogram EXEC command.

```
reprogram flash-file-name {slot | rommon} subcard
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>flash-file-name</code></td>
<td>Name of the image to download, which can be in the Flash PC card or bootflash.</td>
</tr>
<tr>
<td><code>slot</code></td>
<td>Physical slot number of the controller you want to reprogram. The slot number ranges from 0 to 12 in the Catalyst 8540 MSR and from 0 to 4 in the Catalyst 8510 MSR and LightStream 1010.</td>
</tr>
<tr>
<td><code>rommon</code></td>
<td>If you select <code>rommon</code>, the rommon of the route processor ATM switch router on which the command is invoked is reprogrammed with the image in the given file.</td>
</tr>
<tr>
<td><code>subcard</code></td>
<td>Can indicate a subcard in a slot for half-width cards or daughter cards in full width cards. If you do not specify a subcard number, the motherboard in the given slot is reprogrammed. The subcard number ranges from 0 to 3.</td>
</tr>
</tbody>
</table>

**Defaults**
The motherboard in the given slot is reprogrammed.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command causes nonvolatile change to the controller you select. It also resets the selected controller, which causes active connections and configurations to be lost.

If you reprogram a currently running controller or switch card, power-cycle the switch router after the reprogram completes to make the newly downloaded image active. If you do not perform a power-cycle, the controller continues to run the older image. For secondary controllers or port adapters, you need not perform a power-cycle.

⚠️ **Caution**

Do not power-cycle the switch router during a reprogram operation because damage can occur to the controller you are reprogramming. If you power-cycle the switch router while reprogramming is in progress, you also might be unable to boot the switch router after the reprogram is complete.
Examples

The following example shows how to reprogram the image on the route processor in slot 3.

```
Switch# reprogram cpu_3_10.exo 3
```

## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show</code></td>
<td>Displays information about the in-system programmable device images (FPGA and PLD images) for a given module in the system.</td>
</tr>
<tr>
<td><code>functional-image-info</code></td>
<td></td>
</tr>
</tbody>
</table>
resource-poll-interval

To configure the period of time that PNNI polls resource management to update the values of the interface metrics and attributes, use the `resource-poll-interval` ATM router PNNI configuration command. To return to the default value, use the `no` form of this command.

```
resource-poll-interval seconds

no resource-poll-interval
```

**Syntax Description**

<table>
<thead>
<tr>
<th><code>seconds</code></th>
<th>Specifies the interval, in seconds, at which the values of the interface metrics and attributes are updated.</th>
</tr>
</thead>
</table>

**Defaults**

5 seconds

**Command Modes**

ATM router PNNI configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The maximum allowable poll interval is 300 seconds. Using this value impacts the number of self-generated PTSEs created by the switch. A larger `resource-poll-interval` can generate a smaller number of PTSE updates, as PNNI polls the interface resource information less frequently. A large `resource-poll-interval` is desirable when reducing the number of self-generated PTSEs caused by interface traffic fluctuation.

Lowering the default allows PNNI to poll the resource manager (for resource information) at a higher frequency. This allows PNNI to track resource information faster, but it costs more in processing time and should be adjusted only when needed.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

**Examples**

The following example shows how to change the period of time the interface metrics and attributes are updated using the `resource-poll-interval` ATM router PNNI configuration command.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# resource-poll-interval 30
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni</code></td>
<td>Displays information about routing parameters of all PNNI interfaces received from a resource management module.</td>
</tr>
<tr>
<td><code>resource-info</code></td>
<td></td>
</tr>
</tbody>
</table>
resume

To switch to another open Telnet, LAT, or PAD session, use the resume EXEC command.

```
resume [connection] [keyword]
```

### Syntax Description

- **connection**: The name or number of the connection; the default is the most recent connection.
- **keyword**: One of the options listed in Table 16-1.

### Defaults

`/noline1`

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Several concurrent sessions can be open and you can switch back and forth between them. The number of sessions that can be open is defined by the `sessions` command.

You can switch between sessions by escaping one session and resuming a previously opened session, as follows:

1. **Step 1**
   
   Escape out of the current session by pressing the escape sequence (`Ctrl^x` then `x` [`Ctrl^x`] by default) and return to the EXEC prompt.

2. **Step 2**

   Enter the `where` command to list the open sessions. All open sessions associated with the current terminal line are displayed.

3. **Step 3**

   Enter the `resume` command and the session number to make the connection.

   You also can resume the previous session by pressing the Return key.

   The `Ctrl^x`, `where`, and `resume` commands are available with all supported connection protocols.

Table 16-1 lists the Telnet and rlogin resume options.

### Table 16-1 Telnet and rlogin resume options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/debug</code></td>
<td>Displays parameter changes and messages. In the Cisco IOS software, this option displays informational messages whenever the remote host changes an X.3 parameter, or sends an X.29 control packet.</td>
</tr>
<tr>
<td><code>/echo</code></td>
<td>Performs local echo.</td>
</tr>
<tr>
<td><code>/line</code></td>
<td>Enables line-mode editing.</td>
</tr>
</tbody>
</table>
Table 16-1 Telnet and rlogin resume options (continued)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/nodebug</td>
<td>Cancels printing of parameter changes and messages.</td>
</tr>
<tr>
<td>/noecho</td>
<td>Disables local echo.</td>
</tr>
<tr>
<td>/noline1</td>
<td>Disables line mode and enables character-at-a-time mode. (Default)</td>
</tr>
<tr>
<td>/nostream</td>
<td>Disables stream processing.</td>
</tr>
<tr>
<td>/set parameter:value</td>
<td>Sets X.3 connection options.</td>
</tr>
<tr>
<td>/stream</td>
<td>Enables stream processing.</td>
</tr>
</tbody>
</table>

Examples

The following example shows how to escape out of a connection and to resume connection 2.

```plaintext
Swift% ^X
Switch> resume 2
```

You can omit the command name and simply enter the connection number to resume that connection. The following example illustrates how to resume connection 3.

```plaintext
Switch> 3
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>session-timeout</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td>show sessions</td>
<td>Displays information about open Telnet or rlogin connections.</td>
</tr>
<tr>
<td>where</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
retry-interval

To configure individual ATM soft PVC point-to-multipoint leaf retry intervals, use the `retry-interval` configuration command.

`retry-interval` [first retry-interval] [maximum retry-interval]

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>first retry-interval</td>
<td>The retry interval after the first failed attempt, specified in milliseconds.</td>
</tr>
<tr>
<td>maximum retry-interval</td>
<td>The maximum retry interval between any two attempts, specified in seconds.</td>
</tr>
</tbody>
</table>

**Defaults**

First retry interval = 5000 milliseconds.
Maximum retry interval = 60 seconds.

**Command Modes**

ATM soft PVC point-to-multipoint party leaf-reference

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

There are two ways to delete the destination address, VPI, and VCI of the ATM soft PVC point-to-multipoint party leaf connection. You can delete either the entire ATM soft PVC connection or just the party leaf reference number.

If the first retry after the first failed attempt also fails, the subsequent attempts are made at intervals computed using the `first retry-interval` as follows:

\[(2^{(k-1)}) \times \text{first retry-interval}\]

Where the value of \(k\) is 1 for the first retry after the first failed attempt and is incremented by 1 for every subsequent attempt.

Once the retry interval is computed in the `first retry-interval` and becomes equal to or greater than the `maximum retry-interval` configured, the subsequent retries are done at regular intervals of `maximum retry-interval` seconds until the call is established.

**Examples**

The following example shows how to configure a soft PVC point-to-multipoint party leaf connection first and then the maximum retry intervals.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTRL/Z.
Switch(config)# interface atm 0/1/0
Switch(config-if)# atm soft-vc 4 44 p2mp
Switch(atmsoft-p2mp)# party leaf-reference 2
Switch(atmsoft-p2mp-party)# retry-interval first 100 maximum 100000
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm soft-vc</code> (point-to-multipoint)</td>
<td>Configures the point-to-multipoint soft PVC.</td>
</tr>
<tr>
<td><code>party leaf-reference</code> (point-to-multipoint ATM soft PVC)</td>
<td>Configures individual ATM soft PVC point-to-multipoint leaves.</td>
</tr>
<tr>
<td><code>show atm soft-vc</code></td>
<td>Displays the ATM layer connection information about the soft PVC connection.</td>
</tr>
</tbody>
</table>
To enter static source-route information into the routing information field (RIF) cache, use the rif global configuration command. To remove an entry from the cache, use the no form of this command.

```
rif mac-addr [rif-string]
no rif mac-addr [rif-string]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mac-addr</td>
<td>MAC address of the RIF entry.</td>
</tr>
<tr>
<td>rif-string</td>
<td>Series of 4-digit hexadecimal numbers separated by a period (.). This RIF string is inserted into the packets sent to the specified MAC address.</td>
</tr>
</tbody>
</table>

### Defaults

No static source-route information is entered.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

- If a Token Ring host does not support the use of IEEE 802.2 TEST or XID datagrams as explorer packets, you might need to add static information to the RIF cache.
- Using the command `rif mac-address` without any other arguments puts an entry into the RIF cache indicating that packets for this MAC address do not have RIF information.
- Do not configure a static RIF with any of the all rings type codes. Doing so causes traffic for the configured host to appear on more than one ring and leads to unnecessary congestion.

### Examples

The following example shows inserting the RIF cache entry with MAC address 1000.5A12.3456 and RIF 0630.0081.0090.

```
Switch# configure terminal
Switch(config)# rif 1000.5A12.3456 0630.0081.0090
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>multiring</td>
<td>Enables collection and use of RIF information on a subinterface.</td>
</tr>
<tr>
<td>show rif</td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
rif always-forward

To specify that RIFs must always be stored in the forward direction, use the rif always-forward global configuration command. To disable forward-direction storing of RIFs, use the no form of this command.

    rif always-forward
    no rif always-forward

Syntax Description
This command has no keyword or arguments.

Defaults
RIFs are not stored in the forward direction.

Command Modes
Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rif</td>
<td>Enters static source-route information into the routing information field (RIF) cache.</td>
</tr>
<tr>
<td>show rif</td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
**rif timeout**

To specify the number of minutes an inactive entry is kept in the RIF cache, use the **rif timeout** global configuration command. To restore the default time, use the **no** form of this command.

**Syntax**

```plaintext
rif timeout minutes

no rif timeout
```

**Syntax Description**

- **minutes**
  - Number of minutes an inactive RIF entry is kept in the cache.
  - The valid range is 1 to 120.

**Defaults**

15 minutes

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

A RIF entry is refreshed only if a RIF field of an incoming frame is identical to the RIF information of the RIF entry in the cache.

Until a RIF entry is removed from the cache, no new information is accepted for that RIF entry.

**Examples**

The following example shows changing the timeout to 5 minutes.

```plaintext
Switch# configure terminal
Switch(config)# rif timeout 5
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear rif-cache</td>
<td>Clears the RIF cache.</td>
</tr>
<tr>
<td>rif</td>
<td>Enters static source-route information into the routing information field (RIF) cache.</td>
</tr>
<tr>
<td>show rif</td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
rif validate-age

To permit invalidated and aged-out entries to be removed from the RIF cache, use the rif validate-age global configuration command. To disable this feature, use the no form of this command.

```
rif validate-age

no rif validate-age
```

Syntax Description
This command has no keywords or options.

Defaults
Aged entries are removed.

Command Modes
Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rif</td>
<td>Enters static source-route information into the routing information field (RIF) cache.</td>
</tr>
<tr>
<td>rif timeout</td>
<td>Specifies the number of minutes an inactive entry is kept in the RIF cache.</td>
</tr>
<tr>
<td>show rif</td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
rif validate-enable

To enable RIF validation for entries learned on an interface, use the `rif validate-enable` global configuration command. To disable the specification, use the `no` form of this command.

```
rif validate-enable
no rif validate-enable
```

**Syntax Description**
This command has no keywords or arguments.

**Defaults**
RIF validation is enabled.

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
A RIF validation algorithm is used in the following cases:

- To decrease convergence time to a new source route path when an intermediate bridge goes down.
- To keep a valid RIF entry in a RIF cache even if a RIF entry is not refreshed either because traffic is fast or autonomously switched, or because no traffic exists.

A directed IEEE TEST command is sent to the destination MAC address. If a response is received in the time specified by `rif validate-time`, the entry is refreshed and is considered valid. Otherwise, the entry is removed from the cache. To prevent sending too many TEST commands, any entry that has been refreshed in less than 70 seconds is considered valid.

Validation is triggered when any of the following occurs:

- A RIF entry is found in the cache.
- A RIF field of an incoming frame and the RIF information of the RIF entry is not identical. If, as the result of validation, the entry is removed from the cache, the RIF field of the next incoming frame with the same MAC address is cached.
- The RIF entry is not refreshed for the time specified in the `rif timeout` command.

---

**Note**
If the RIF entry has been in the RIF cache for six hours, and has not been refreshed for the time specified in the `rif timeout` command, the entry is removed from the cache.

**Note**
This command has no effect on remote entries learned over RSRB.
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rif timeout</td>
<td>Specifies the number of minutes an inactive entry is kept in the RIF cache.</td>
</tr>
</tbody>
</table>
**rif xid-explorer**

To send IEEE XID explorer packets instead of TEST commands to learn RIF information, use the `rif xid-explorer` global configuration command. To disable this specification, use the `no` form of this command.

```
rif xid-explorer

no rif xid-explorer
```

### Syntax Description

This command has no keywords or arguments.

### Defaults

TEST commands are sent.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3.(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rif</code></td>
<td>Enters static source-route information into the routing information field (RIF) cache.</td>
</tr>
<tr>
<td><code>show rif</code></td>
<td>Displays the current contents of the RIF cache.</td>
</tr>
</tbody>
</table>
To execute a command remotely on a remote rsh host, use the rsh privileged EXEC command.

```
rsh {ip-address | host} [/user username] line
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the remote host on which to execute the rsh command. Either the IP address or the host name is required.</td>
</tr>
<tr>
<td>host</td>
<td>Name of the remote host on which to execute the command. Either the host name or the IP address is required.</td>
</tr>
<tr>
<td>username</td>
<td>Remote username.</td>
</tr>
<tr>
<td>line</td>
<td>Required parameter to be executed remotely.</td>
</tr>
</tbody>
</table>

**Defaults**

If you do not specify the /user keyword and argument, the switch router sends a default remote username. As the default value of the remote username, the switch software sends the username associated with the current TTY process if that name is valid. For example, if the user is connected to the switch router through Telnet and the user was authenticated through the username command, the switch router software sends that username as the remote username. If the TTY username is invalid, the switch router software uses the switch router host name as both the remote and local usernames.

**Note**

TTYs are commonly used in Cisco communications servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called TTY devices, which stands for teletype, the original UNIX terminal.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the rsh command to execute commands remotely. The host on which you remotely execute the command must support the rsh protocol, and the .rhosts files on the rsh host must include an entry that permits you to remotely execute commands on that host.

For security reasons, the switch software does not default to a remote login if no command is specified. Instead, the switch router provides Telnet and connect services that you can use rather than rsh.

**Examples**

The following command specifies that user rusty attempts to remotely execute the UNIX ls command with the -a argument on the remote host msys.cisco.com. The command output resulting from the remote execution follows the command example.

```
Switch1# rsh msys.cisco.com /user rusty ls -a
```
.. alias
cshrc
.emacs
.exrc
.history
.login
.mailrc
.newsrc
.oldnews
.rhosts
twmrc
.xsession
jazz
To set the terminal baud rate receive (from terminal) speed, use the `rxspeed` line configuration command. To set the baud rate to the default, use the `no` form of this command.

```
rxspeed bps

no rxspeed
```

### Syntax Description

**bps**
Baud rate in bps. Refer to “Usage Guidelines” below for settings.

### Defaults

9600 bps

### Command Modes

Line configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
<tr>
<td>12.0(3c)W5(9)</td>
<td>Modified: <em>(Catalyst 8510 MSR and LightStream 1010)</em> added</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command pertains to the auxiliary port only. Set the speed to match the baud rate of any device you connect to the port. Some baud rates available on devices connected to the port might not be supported on the switch. The switch indicates if the speed you select is not supported.

The following is a list of supported baud rates:

75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, 38400

### Examples

The following example sets the auxiliary line receive rate to 2400 bps.

```
Switch# configure terminal
Switch(config)# line aux 0
Switch(config-line)# rxspeed 2400
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>speed</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td><code>txspeed</code></td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
S Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
scheduler allocate

To guarantee CPU time for processes, use the scheduler allocate global configuration command. To restore the default guaranteed CPU time, use the no form of this command.

```
scheduler allocate interrupt-time process-time
no scheduler-allocate
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interrupt-time</td>
<td>Integer (in microseconds) that limits the maximum number of microseconds to</td>
</tr>
<tr>
<td></td>
<td>spend on fast switching within any one network interrupt context. The range</td>
</tr>
<tr>
<td></td>
<td>is 500 to 6000 microseconds. The default is 4000 microseconds.</td>
</tr>
<tr>
<td>process-time</td>
<td>Integer (in microseconds) that guarantees the minimum number of microseconds</td>
</tr>
<tr>
<td></td>
<td>to spend at the process level when network interrupts are disabled. The range</td>
</tr>
<tr>
<td></td>
<td>is 500 to 6000 microseconds. The default is 200 microseconds.</td>
</tr>
</tbody>
</table>

**Defaults**

Approximately five percent of the CPU is available for process tasks.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The normal operation of the network server allows the switching operations to use as much of the central processor as required. If the network is running unusually heavy loads that do not allow the processor the time to handle the routing protocols, give priority to the system process scheduler. Use the scheduler allocate command to guarantee processor time.

**Examples**

The following example makes 20 percent of the CPU available for process tasks.

```
Switch(config)# scheduler allocate 2000 500
```
**scope**

To filter ATM signalling call failures that occur within the switch and on other switches, use the `scope` ATM signalling diagnostics configuration command. To disable this feature, use the `no` form of this command.

```
scope { all | external | internal }
```

```
no scope
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Filter call failures that occur within the switch or on other external switches.</td>
</tr>
<tr>
<td>external</td>
<td>Filter call failures that occur on other external switches.</td>
</tr>
<tr>
<td>internal</td>
<td>Filter call failures that occur within the switch.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Defaults</th>
<th>all</th>
</tr>
</thead>
</table>

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

In the following example, call failures are filtered by failures that occur within the switch.

```
Switch(cfg-atmsig-diag)# scope internal
```
scope map

To specify the mapping from a range of organizational scope values (used at UNI interfaces) to a PNNI scope value (such as in terms of PNNI routing-level indicators), use the `scope map` PNNI node-level subcommand. To set to default a range of organizational scope values, use the `no` form of this command.

```
scope map low-org-scope [high-org-scope] level level-indicator

no scope map low-org-scope [high-org-scope]
```

### Syntax Description

- **low-org-scope** Specifies the low end of the range of organizational scope values. The valid range of organizational scope values is from local (1) to global (15).
- **high-org-scope** Specifies the high end of the range of organizational scope values. The valid range of organizational scope values is from local (1) to global (15). If no value is specified, then the range includes only one entry (for example, `high-org-scope` equals `low-org-scope`).
- **level-indicator** Specifies the PNNI scope value to which the range of organizational scope values is mapped. The range is from 0 to 104.

### Defaults

Table 17-1 shows the default values specified in the ATM Forum PNNI 1.0 specifications.

### Table 17-1 Organizational Scope-to-Default Level Mappings

<table>
<thead>
<tr>
<th>org-scope Range</th>
<th>ATM Forum Default Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>96</td>
</tr>
<tr>
<td>4-5</td>
<td>80</td>
</tr>
<tr>
<td>6-7</td>
<td>72</td>
</tr>
<tr>
<td>8-10</td>
<td>64</td>
</tr>
<tr>
<td>11-12</td>
<td>48</td>
</tr>
<tr>
<td>13-14</td>
<td>32</td>
</tr>
<tr>
<td>15 global</td>
<td>0</td>
</tr>
</tbody>
</table>

### Command Modes

PNNI node configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The `scope map` command is used to change the values of specific entries. This command is only accepted when the `scope mode` is set to `manual`. 
When the organizational scope of a registered address maps to a PNNI level that is lower in the PNNI hierarchy (larger PNNI routing level) than the level of this node, the registered address is not advertised. Similarly, when the connection scope of a setup attempt maps to a PNNI level that is lower in the PNNI hierarchy than the level of this node, then only destinations directly attached to this switch router are considered acceptable.

**Note**

Modifying the node level without altering the scope map table can result in some advertisements being suppressed.

The ATM switch router provides an option to automatically adjust the level changes. In automatic mode, the default scope map table is tied to the level of the node when it is generated.

Note that the default organizational scope of an individual address is global (15), and the default organizational scope of a group address is local (1).

### Examples

The following example shows setting the scope mode to `manual` and setting the scope map entries for organizational scope values 1 through 5 to PNNI level 96, using the `scope map` PNNI node-level subcommand.

```plaintext
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# scope mode manual
Switch(config-pnni-node)# scope map 1 5 level 96
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>scope mode</code></td>
<td>Specifies the configuration mode of the mapping from organizational scope values (used at UNI interfaces) to PNNI scope (such as PNNI routing-level indicators).</td>
</tr>
<tr>
<td><code>show atm pnni scope</code></td>
<td>Displays the mapping from organizational scope values—used at UNI interfaces—to PNNI scope (such as PNNI routing level indicators).</td>
</tr>
</tbody>
</table>
scope mode

To specify the configuration mode of the mapping from organizational scope values (used at UNI interfaces) to PNNI scope (such as PNNI routing-level indicators), use the **scope mode** node-level subcommand.

```
scope mode { automatic | manual }
```

**Syntax Description**

- **Automatic**
  - Generates a default scope mapping table automatically that is tied to the PNNI level of the node. In this mode, no modifications of the scope mapping table entries are allowed.

- **Manual**
  - Allows for manual configuration of the scope mapping table using the **scope map** command.

**Defaults**

The default scope mappings for **automatic** are shown in Table 17-2.

**Table 17-2** Default Scope Mappings for Automatic Mode

<table>
<thead>
<tr>
<th>Organizational Scope Range</th>
<th>ATM Forum Default Level</th>
<th>Automatic Mode Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>96</td>
<td>min(l,96)</td>
</tr>
<tr>
<td>4-5</td>
<td>80</td>
<td>min(l,80)</td>
</tr>
<tr>
<td>6-7</td>
<td>72</td>
<td>min(l,72)</td>
</tr>
<tr>
<td>8-10</td>
<td>64</td>
<td>min(l,64)</td>
</tr>
<tr>
<td>11-12</td>
<td>48</td>
<td>min(l,48)</td>
</tr>
<tr>
<td>13-14</td>
<td>32</td>
<td>min(l,32)</td>
</tr>
<tr>
<td>15(global)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Command Modes**

- PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to modify the way in which the default scope mapping table is computed.

Using the **automatic** mode ensures that all organizational scope values cover an area at least as wide as this node’s peer group, even when the node is at a level higher than 96. As a result, all addresses including those of local scope are advertised across this node’s peer group.

For each organizational scope value, the corresponding PNNI level is the minimum of the ATM Forum PNNI 1.0 default value and level l of this node.

Note that the scope mapping table is overwritten whenever the **scope mode** is changed from **manual** to **automatic** (for example, all **scope map** commands for this node are removed).
Examples
The following example shows setting the scope mode to manual using the scope mode PNNI node-level subcommand.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# scope mode manual
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>scope map</td>
<td>Specifies the mapping from a range of organizational scope values (used at UNI interfaces) to a PNNI scope value (such as PNNI routing-level indicators).</td>
</tr>
<tr>
<td>show atm pnni scope</td>
<td>Displays the mapping from organizational scope values—used at UNI interfaces—to PNNI scope (such as PNNI routing level indicators).</td>
</tr>
</tbody>
</table>
scrambling

To enabled or disabled scrambling from the current port, use the `scrambling` interface configuration command. To disable scrambling, use the `no` form of this command.

```
scrambling scramblingmode

no scrambling scramblingmode
```

**Syntax Description**

- `scramblingmode` Specifies either `sts-stream` or `cell-payload`.

**Defaults**

- In SONET interfaces, both modes are enabled. In DS3 interfaces, the mode is disabled.

**Command Modes**

- Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `sts-stream` scrambling is applicable only to SONET interfaces.

**Examples**

The following example shows how to disable `sts-stream` and `cell-payload` scrambling on the physical device associated with ATM 3/0/0.

```
Switch# configure terminal
Switch(config)# interface atm 3/0/0
Switch(config-if)# no scrambling cell-payload
Switch(config-if)# no scrambling sts-stream
```
sdm access-list

To partition the TCAM space for the access list region, use the `sdm access-list` command.

```
  sdm access-list num-entries
```

**Syntax Description**
```
num-entries  Size expressed as the number of entries, in the range of 512 to 16384.
```

**Command Modes**
```
Global configuration
```

**Usage Guidelines**
The enhanced Gigabit Ethernet interface module supports TCAM sizes of 32 KB, 64 KB, or 256 KB. The combined size of the protocol regions and access lists should not exceed your TCAM space. The default size of the access lists in a 32 KB, 64 KB, or 256 KB TCAM is 512. You can use the `sdm access-list` command to partition the TCAM space for access lists.

**Related Commands**
```
Command                  Description
------------------------- -------------------------------------
show sdm label           Displays information about the label stack.
```
sdm autolearn

To enable the switching database manager (SDM) autolearn feature, use the `sdm autolearn` command. To disable it, use the `no` form of this command.

```
  sdm autolearn
  no sdm autolearn
```

**Syntax Description**
This command has no keywords or arguments.

**Defaults**
SDM autolearn is enabled.

**Command Modes**
Global configuration

**Usage Guidelines**
When the SDM autolearn feature is enabled, SDM automatically saves mask-length distribution for the routing database. SDM then uses this mask-length distribution as the initial mask-length distribution, which takes effect during the next system reboot.
sdm size

To configure the size of each protocol region in the SDM, use the `sdm size` command.

```
sdm size region-name {num-entries | k-entries num-k-entries}
```

**Syntax Description**

- **region-name**: Name of the protocol region for which you want to configure the size.
  - ipx-bvi-network
  - ip-adjacency
  - ipx-node
  - ip-prefix
  - ipx-network
  - ip-mcast
  - l2-switching (MAC addresses)
  - upd-flooding
  - access-list

- **num-entries**: Size expressed as the number of entries, in the range of 32 to 262144.

- **num-k-entries**: When used with the keyword `k-entries`, specifies the size in multiples of 1024 entries.

**Command Modes**

Global configuration

**Usage Guidelines**

The combined size entered for all the protocol regions should not exceed the total TCAM sizes of 32 KB, 64 KB, or 256 KB. The supported size can be displayed using the `show sdm size` command. The size of SDM is represented as the number of base entries. Each protocol region entry can occupy one or more TCAM entries. The combined size of all the protocol regions should be calculated in terms of the base entries. Table 17-3 lists the number of TCAM entries needed for each protocol region.

**Table 17-3  Protocol Regions and TCAM Entries**

<table>
<thead>
<tr>
<th>Protocol Region</th>
<th>TCAM Entries</th>
</tr>
</thead>
<tbody>
<tr>
<td>ipx-bvi-network</td>
<td>1</td>
</tr>
<tr>
<td>ip-adjacency</td>
<td>1</td>
</tr>
<tr>
<td>ipx-node</td>
<td>2</td>
</tr>
<tr>
<td>ip-prefix</td>
<td>1</td>
</tr>
<tr>
<td>ipx-network</td>
<td>1</td>
</tr>
<tr>
<td>ip-mcast</td>
<td>2</td>
</tr>
<tr>
<td>l2-switching</td>
<td>2</td>
</tr>
<tr>
<td>udp-flooding</td>
<td>2</td>
</tr>
<tr>
<td>access-list</td>
<td>4</td>
</tr>
</tbody>
</table>
Since the ip-prefix region occupies one TCAM entry, the `sdm size ip-prefix k-entries 6` command configures 6 KB TCAM entries in the SDM for the ip-prefix region. Because each ipx-node entry occupies two TCAM entries, the `sdm size ipx-node k-entries 3` command configures 6 KB TCAM entries in the SDM for the ipx-node region.

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>show sdm label</code></td>
<td>Displays information about the label stack.</td>
</tr>
</tbody>
</table>
secondary console allow enable-mode (Catalyst 8540 MSR)

To allow the EXEC level enable command on the secondary route processor, use the `secondary console allow enable-mode` command from the primary processor. To disallow it, use the `no` form of this command.

```
  secondary console allow enable-mode

  no secondary console allow enable-mode
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>allow</code></td>
<td>Specifies whether to allow or disallow the <code>enable</code> command on the secondary route processor.</td>
</tr>
<tr>
<td><code>enable-mode</code></td>
<td>Specifies the <code>enable</code> command used for privileged access.</td>
</tr>
</tbody>
</table>

**Defaults**

Enable mode disallowed on secondary route processor

**Command Modes**

Redundancy configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(19)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `enable` command for privileged level configuration is disallowed on the secondary route processor by default.

The `secondary console allow enable-mode` command allows execution of the `enable` command on the secondary route processor.

The `enable` command on the secondary route processor allows access only to the maximum privilege level through password protection. The password and secret password would be the same as that configured on the primary route processor.

Access to other privilege levels is not available on the secondary route processor.

**Examples**

The following example shows how to allow privilege level configuration on the secondary route processor.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# redundancy
Switch(config-r)# secondary console allow enable-mode
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show running-config</td>
<td>Shows the configuration of enable-mode on the secondary route processor.</td>
</tr>
</tbody>
</table>
segment-target

To specify a target entry in a partially specified PNNI explicit-path, use the segment-target PNNI explicit-path configuration command.

```
segment-target {name-string | node-id | node-id-prefix} [port hex-port-id | agg-token hex-agg-token-id]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name-string</td>
<td>Name of the PNNI node.</td>
</tr>
<tr>
<td>node-id</td>
<td>Full 22-byte node ID for a PNNI node.</td>
</tr>
<tr>
<td>node-id-prefix</td>
<td>The first 15 or more bytes of a node ID for a PNNI node.</td>
</tr>
<tr>
<td>port hex-port-id</td>
<td>Optionally specifies an exit port to exclude for a PNNI node. Should be specified as a hexadecimal port ID rather than as a port name. The default is to allow any valid exit port.</td>
</tr>
<tr>
<td>agg-token hex-agg-token-id</td>
<td>Optionally specifies the exit aggregation token, which is used in place of the port ID for higher-level PNNI LGNs. The default allows any valid exit port.</td>
</tr>
</tbody>
</table>

**Defaults**

See “Syntax Description.”

**Command Modes**

PNNI explicit-path configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

See the atm pnni explicit-path command for a description of how to edit or delete an existing segment-target path entry.

Node IDs can be entered with either the full 22-byte length address, or as a node ID prefix with a length of 15 bytes or more. To specify routes that include higher-level nodes (parent LGNs) for other peer groups, we recommend that you enter exactly 15 bytes so that the address remains valid in the event of a PGL update.

Node IDs appear in the following format:

```
dec: dec: 13-20 hex digits
```

**Note**

To display the node IDs that correspond to named nodes in a network, use either the show atm pnni identifier command or the show atm pnni topology command with the node keyword.
Node names can be entered instead of node IDs. If names are used to identify higher-level LGNs, the resulting explicit paths are not guaranteed to remain valid if the PGL changes in the neighboring peer group. To prevent invalid paths, configure all parent LGNs (for all potential PGL nodes) with the same node name.

An exit port can be specified for any entry. The port should be specified as a hexadecimal port ID rather than as a port name. For excluded entries, only this port is excluded from the path.

Note

To display the corresponding hexadecimal port IDs for a node, use either the show atm pnni identifier command with the port keyword, or the show atm pnni topology command with the node and hex-port-id keywords.

Because the port-id could change if the following neighbor peer group changes PGL leaders, the aggregation token is used in place of the port ID for nodes with higher-level LGNs. The LGN aggregation token can only identify the port uniquely if the following entry is the next-node entry. Aggregation tokens are not allowed for excluded tokens.

Examples

The following example shows how to perform the following PNNI explicit-path configuration tasks:

- Enter PNNI explicit-path configuration mode
- Add one next-node
- Add two segment-target nodes (these must appear in their desired routing order.)
- Specify an LGN node by its 15-byte node ID prefix
- Exit PNNI explicit-path configuration mode

Switch# configure terminal
Switch(config)# atm pnni explicit-path name boston_2.path1
Switch(config)# next-node dallas_2
Switch(config)# segment-target dallas_4
Switch(config)# segment-target 40:72:47.009181000000106000000000

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni explicit-path</td>
<td>Enters PNNI explicit path configuration mode to create or modify PNNI explicit paths.</td>
</tr>
<tr>
<td>exclude-node</td>
<td>Specifies a node to exclude from all segments of a partially specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>next-node</td>
<td>Specifies the next adjacent entry in a fully-specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>show atm pnni explicit-paths</td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
</tbody>
</table>
service-category

To filter ATM signalling call failures by service category, use the `service-category` ATM signalling diagnostics configuration command. To return the service category to the default, use the `no` form of this command.

```
service-category { abr | all | cbr | nrt-vbr | rt-vbr | ubr }
```

```
no service-category
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>abr</td>
<td>Sets the service category to ABR.</td>
</tr>
<tr>
<td>all</td>
<td>Sets the service category to ABR, CBR, NRT-VBR, RT-VBR, and UBR.</td>
</tr>
<tr>
<td>cbr</td>
<td>Sets the service category to CBR.</td>
</tr>
<tr>
<td>nrt-vbr</td>
<td>Sets the service category to NRT-VBR.</td>
</tr>
<tr>
<td>rt-vbr</td>
<td>Sets the service category to RT-VBR.</td>
</tr>
<tr>
<td>ubr</td>
<td>Sets the service category to UBR.</td>
</tr>
</tbody>
</table>

**Defaults**

all

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

In the following example, call failures for the ABR and UBR service categories are filtered.

```
Switch# configure terminal
Switch(config)# interface atm 0/0/0
Switch(config-if)# atm signalling diagnostics 1
Switch(config-atmsig-diag)# service-category abr ubr
```
To enable the operation of the SGCP to interconnect ATM CES interface circuits on a switch router, use the `sgcp` global configuration command. To disable the operation of SGCP on a switch router, use the `no` form of this command.

```
sgcp

no sgcp
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When enabled, SGCP listens on all interfaces for UDP packets that contain SGCP requests or responses. For call setup, SGCP allocates connections to endpoints: CES ATM single time slot circuits. For call teardown, SGCP releases connections between endpoints. The `no` form of the command releases all network connections established for SGCP and all endpoints from connections. It also returns resources allocated to SGCP. The `no` form also stops SGCP from listening for UDP packets. No attempt is made to gracefully release resources.

When SGCP receives a CreateConnection packet for the ATM switch router endpoint, the endpoint name is in the following format:

```
CBR.x.y.z/c
```

where `x`, `y`, and `z` are standard ATM switch router interface specifiers (`card/subcard/interface`), and `c` is a CES circuit ID.

For a CreateConnection packet to succeed:

- There must be a CES card in slot `x`, subcard `y`, `0<=z<=3`:
  - T1: `1<=c<=24`
  - E1: `1<=c<=31`
- There must be a CES circuit defined with circuit ID `c`, with only a single time slot (time slot = `c`) allocated to it.
- There must be no PVC configured for the CES circuit.
The CES circuit must not be the destination end of a CES soft PVC.

The parent CES interface line state (shown by the `show ces interface` command) must be normal.

The SGCP global operational state (shown by the `show sgcp` command) must be active.

For SGCP to operate properly, even with the `sgcp` command in effect, you must not enter the `sgcp graceful-shutdown` command.

### Examples

The following example enables SGCP.

```
Switch# configure terminal
Switch(config)# sgcp
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sgcp call-agent</code></td>
<td>Sends SGCP response packets to a predetermined IP address and UDP port.</td>
</tr>
<tr>
<td><code>sgcp graceful-shutdown</code></td>
<td>Shuts down SGCP operations gracefully.</td>
</tr>
<tr>
<td><code>sgcp request retries</code></td>
<td>Specifies the number of times the ATM switch sends an SGCP request to the call agent without receiving a response, and before ceasing to retry.</td>
</tr>
<tr>
<td><code>sgcp request timeout</code></td>
<td>Specifies the time the ATM switch waits after sending an SGCP request to the call agent before considering the request lost.</td>
</tr>
<tr>
<td><code>show sgcp</code></td>
<td>Displays a global configuration, an operational state, and a summary of connection activity for SGCP.</td>
</tr>
<tr>
<td><code>show sgcp connection</code></td>
<td>Displays a global list of SGCP connections or a single interface based on a related keyword.</td>
</tr>
<tr>
<td><code>show sgcp endpoint</code></td>
<td>Displays CES circuit endpoints that might or might not have connections created.</td>
</tr>
<tr>
<td><code>show sgcp statistics</code></td>
<td>Displays global statistics pertaining to SGCP activity.</td>
</tr>
</tbody>
</table>
sgcp call-agent

To send SGCP response packets to a predetermined IP address and UDP port, use the `sgcp call-agent` global configuration command. To restore the default behavior of responding to SGCP request packets using the source address in the request packet, use the `no` form of this command.

```
sgcp call-agent host [udp_port]
no sgcp call-agent
```

**Syntax Description**

- `host` String representing a DNS name or IP address for the SGCP call agent.
- `udp_port` Decimal UDP port number.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to determine the IP address and UDP port of the call agent for sending requests and responses if the call-agent address is not configured.

- The gateway sends responses to the source IP address and port specified in the UDP packet containing the SGCP request.
- The gateway sends a DeleteConnection request to the source IP address and port specified in the UDP packet of the CreateConnection request that allocated the current connection.

If the address is specified, but no port is specified, SGCP uses the well-known SGCP port 2427.

**Examples**

The following example specifies a call-agent address to use. The default UDP port is used.

```
Switch# configure terminal
Switch(config)# sgcp call-agent 172.69.1.129
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sgcp</code></td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch router.</td>
</tr>
<tr>
<td><code>show sgcp</code></td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
</tbody>
</table>
sgcp graceful-shutdown

To shut down SGCP operation, use the `sgcp graceful-shutdown` global configuration command. To allow SGCP to resume operation, use the `no` form of this command.

```
sgcp graceful-shutdown

no sgcp graceful-shutdown
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The graceful shutdown configuration is used while SGCP is active. This command stops SGCP operation after attempting to notify the call agent about the release of any connections in progress.

The `no sgcp` command operates in a similar manner in that any active network connections established by SGCP are torn down.

The gateway also sends DeleteConnection requests to the call agent for all endpoints allocated to connections. After responses (or retransmission limits, or call agent-initiated DeleteConnection) have been received for all connections, the gateway stops listening to UDP. During this activity, SGCP rejects any requests for new connections.

After you enter the `sgcp graceful-shutdown` command with SGCP enabled, the operational state of SGCP that the `show sgcp` command reflects can be Down or Going Down. The Going Down state is entered only if there are active connections. Once all connections are inactive (not allocated and network connection released), the global operational state is Down. While `sgcp` is outstanding, the `no` form of this command resumes SGCP operation.

The `no` form of this command has no effect when issued while SGCP is not operating.

**Examples**

```
Switch# configure terminal
Switch(config)# sgcp graceful-shutdown
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sgcpe</td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch router.</td>
</tr>
<tr>
<td>show sgcpe</td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
</tbody>
</table>
**sgcp request retries**

To specify the number of times the ATM switch router sends an SGCP request to the call agent without receiving a response and before ceasing to retry, use the `sgcp request retries` global configuration command. To restore the default value, use the `no` form of this command.

```
sgcp request retries retryval

no sgcp request retries
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>retryval</code></td>
<td>Decimal number of retries.</td>
</tr>
</tbody>
</table>

**Defaults**

Three

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Currently, the ATM switch router sends only DeleteConnection requests to the call agent. When UDP is sending packets, there is no assurance that all packets are received. When the number of specified retries has been exceeded, the response to DeleteConnection appears to the ATM switch as positive.

**Examples**

The following example sets the number of request retries to six.

```
Switch# configure terminal
Switch(config)# sgcp request retries 6
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sgcp</code></td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch router.</td>
</tr>
<tr>
<td><code>sgcp request timeout</code></td>
<td>Specifies the time the ATM switch waits after sending an SGCP request to the call agent before considering the request lost.</td>
</tr>
<tr>
<td><code>show sgcp</code></td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
</tbody>
</table>
sgcp request timeout

To specify the time the ATM switch router waits after sending an SGCP request to the call agent before considering the request lost, use the `sgcp request timeout` global configuration command. To restore the default value, use the `no` form of this command.

```
sgcp request timeout timeval
no sgcp request timeout
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>timeval</code></td>
<td>Time value, in milliseconds.</td>
</tr>
</tbody>
</table>

**Defaults**

500 milliseconds

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Currently, the ATM switch router only sends DeleteConnection requests to the call agent.

**Examples**

The following example sets the request timeout to one second.

```
Switch# configure terminal
Switch(config)# sgcp request timeout 1000
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sgcp</code></td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch router.</td>
</tr>
<tr>
<td><code>show sgcp</code></td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
</tbody>
</table>
Use the `slip` EXEC command to attach or detach a SLIP interface.

**slip**

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
**snmp-server enable traps**

To enable the SNMP traps, use the `snmp-server enable traps` global configuration command. To disable SNMP and stop sending traps, use the `no` form of this command.

```
snmp-server enable traps [trap-type] [trap-option]
no snmp-server enable traps [trap-type] [trap-option]
```

**Syntax Description**

<table>
<thead>
<tr>
<th><strong>Keyword</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>trap-type</strong></td>
<td>Enables the trap type. If no type is specified, all traps are sent (including envmon and repeater). <code>trap-type</code> can have one of the following values:</td>
</tr>
<tr>
<td>atm if-event</td>
<td>Enables ATM interface state change traps.</td>
</tr>
<tr>
<td>atm-accounting</td>
<td>Enables ATM accounting state change traps.</td>
</tr>
<tr>
<td>atm-soft</td>
<td>Enables ATM Soft VC state change notifications.</td>
</tr>
<tr>
<td>bgp</td>
<td>Enables Border Gateway Protocol (BGP) state change traps.</td>
</tr>
<tr>
<td>chassis-change</td>
<td>Enables SNMP chassis change traps.</td>
</tr>
<tr>
<td>chassis-fail</td>
<td>Enables SNMP chassis fail traps.</td>
</tr>
<tr>
<td>config</td>
<td>Enables SNMP configuration traps.</td>
</tr>
<tr>
<td>entity</td>
<td>Enables SNMP entity traps.</td>
</tr>
<tr>
<td>frame-relay</td>
<td>Enables Frame Relay traps.</td>
</tr>
<tr>
<td>hsrp</td>
<td>Enables Hot Standby Routing Protocol (HSRP) traps.</td>
</tr>
<tr>
<td>rsvp</td>
<td>Enables Resource Reservation Protocol (RSVP) traps.</td>
</tr>
<tr>
<td>snmp</td>
<td>Enables SNMP traps.</td>
</tr>
<tr>
<td>syslog</td>
<td>Enables SNMP syslog traps.</td>
</tr>
</tbody>
</table>

| **trap-option** | Enables authentication. |

When the `snmp` keyword is used for `trap-type`, you can specify the `authentication` option to enable SNMP Authentication Failure traps.

(The `snmp-server enable traps snmp authentication` command replaces the `snmp-server trap-authentication` command.)

If no option is specified, all SNMP traps are enabled.

**Defaults**

No traps are enabled.

If you enter this command with no keywords, the default is to enable all trap types.

**Command Modes**

Global configuration
**snmp-server enable traps**

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command.</td>
</tr>
<tr>
<td>12.1(12c)E</td>
<td>The keywords <strong>atm if-event</strong> were added.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the **snmp-server enable** command to specify which SNMP traps the switch router sends, and use the **snmp-server host** command to specify which host or hosts receive SNMP traps.

If you enter the **snmp-server enable traps** command without keywords, all notification types are enabled. If you enter this command with special keywords, only the notification types associated with those particular keywords are enabled.

**Examples**

The following example configures the ATM switch router to generate traps for ATM interface state change events (ILMI and SSCOP).

```
Switch# configure terminal
Switch(config)# snmp-server enable traps atm if-event
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>snmp-server host</strong></td>
<td>Specifies the recipient of an SNMP notification operation.</td>
</tr>
<tr>
<td><strong>show snmp</strong></td>
<td>Shows the status of communications between the SNMP agent and SNMP manager.</td>
</tr>
</tbody>
</table>
### snmp-server host

To specify the recipient of an SNMP notification operation, use the `snmp-server host` global configuration command. To remove the specified host, use the `no` form of this command.

```
snmp-server host host-addr [traps | informs] [version {1 | 2c | 3 [auth | noauth | priv]}]
  community-string [udp-port port] [notification-type]
```

```
no snmp-server host host [traps | informs]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>host-addr</code></td>
<td>Name or Internet address of the host (the targeted recipient).</td>
</tr>
<tr>
<td><code>traps</code></td>
<td>(Optional) Send SNMP traps to this host. This is the default.</td>
</tr>
<tr>
<td><code>informs</code></td>
<td>(Optional) Send SNMP informs to this host.</td>
</tr>
<tr>
<td><code>version</code></td>
<td>(Optional) Version of the Simple Network Management Protocol (SNMP) used to send the traps. Version 3 is the most secure model, as it allows packet encryption with the <code>priv</code> keyword. If you use the version keyword, one of the following must be specified:</td>
</tr>
<tr>
<td></td>
<td>• 1 — SNMPv1. This option is not available with informs.</td>
</tr>
<tr>
<td></td>
<td>• 2c — SNMPv2C.</td>
</tr>
<tr>
<td></td>
<td>• 3 — SNMPv3. The following three optional keywords can follow the version 3 keyword:</td>
</tr>
<tr>
<td></td>
<td>– <code>auth</code> (Optional). Enables Message Digest 5 (MD5) and Secure Hash Algorithm (SHA) packet authentication.</td>
</tr>
<tr>
<td></td>
<td>– <code>noauth</code> (Default). Enables noAuthNoPriv security level. This is the default if the `[auth</td>
</tr>
<tr>
<td></td>
<td>– <code>priv</code> (Optional). Enables Data Encryption Standard (DES) packet encryption (also called “privacy”).</td>
</tr>
<tr>
<td><code>community-string</code></td>
<td>Password-like community string sent with the notification operation. Though you can set this string using the <code>snmp-server host</code> command by itself, you should define this string using the <code>snmp-server community</code> command prior to using the <code>snmp-server host</code> command.</td>
</tr>
<tr>
<td><code>udp-port port</code></td>
<td>UDP port of the host to use. The default is 162.</td>
</tr>
</tbody>
</table>
```plaintext
snmp-server host

.notification-type  (Optional) Type of notification to be sent to the host. If no type is specified, all notifications are sent. The notification type can be one or more of the following keywords:

- `atm if-event`—Sends ATM interface state change notifications.
- `atm-accounting`—Sends ATM accounting state change notifications.
- `atm-soft`—Sends ATM Soft VC state change notifications.
- `bgp`—Sends Border Gateway Protocol (BGP) state change notifications.
- `chassis-change`—Sends chassis state change notifications.
- `config`—Sends configuration notifications.
- `entity`—Sends Entity MIB modification notifications.
- `frame-relay`—Sends Frame Relay notifications.
- `hsrp`—Sends Hot Standby Routing Protocol (HSRP) notifications.
- `rsvp`—Sends Resource Reservation Protocol (RSVP) notifications.
- `snmp`—Sends Simple Network Management Protocol (SNMP) notifications (as defined in RFC 1157).
- `syslog`—Sends error message notifications (Cisco Syslog MIB). Specify the level of messages to be sent with the `logging history level` command.
- `tty`—Sends Cisco enterprise-specific notifications when a Transmission Control Protocol (TCP) connection closes.
- `udp-port`—Sends notification of host UDP port number.

**Defaults**

This command is disabled by default. No notifications are sent. If you enter this command with no keywords, the default is to send all trap types to the host. No informs will be sent to this host.

If no `version` keyword is present, the default is version 1. The `no snmp-server host` command with no keywords will disable traps, but not informs, to the host. In order to disable informs, use the `no snmp-server host informs` command.

**Note**

If the `community-string` is not defined using the `snmp-server community` command prior to using this command, the default form of the `snmp-server community` command will automatically be inserted into the configuration. The password (`community-string`) used for this automatic configuration of the `snmp-server community` will be the same as specified in the `snmp-server host` command. This is the default behavior for IOS 12.0(3) and later.

**Command Modes**

Global configuration
```
### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.0(3)T</td>
<td>The following keywords were added:</td>
</tr>
<tr>
<td></td>
<td>• version 3 [auth</td>
</tr>
<tr>
<td></td>
<td>• hsrp</td>
</tr>
<tr>
<td>12.1(12c)E</td>
<td>The keywords atm if-event were added.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

SNMP notifications can be sent as traps or inform requests. Traps are unreliable because the receiver does not send acknowledgments when it receives traps. The sender cannot determine if the traps were received. However, an SNMP entity that receives an inform request acknowledges the message with an SNMP response PDU. If the sender never receives the response, the inform request can be sent again. Thus, informs are more likely to reach their intended destination.

However, informs consume more resources in the agent and in the network. Unlike a trap, which is discarded as soon as it is sent, an inform request must be held in memory until a response is received or the request times out. Also, traps are sent only once, while an inform may be retried several times. The retries increase traffic and contribute to a higher overhead on the network.

If you do not enter an `snmp-server host` command, no notifications are sent. In order to configure the router to send SNMP notifications, you must enter at least one `snmp-server host` command. If you enter the command with no keywords, all trap types are enabled for the host.

In order to enable multiple hosts, you must issue a separate `snmp-server host` command for each host. You can specify multiple notification types in the command for each host.

When multiple `snmp-server host` commands are given for the same host and kind of notification (trap or inform), each succeeding command overwrites the previous command. Only the last `snmp-server host` command will be in effect. For example, if you enter an `snmp-server host inform` command for a host and then enter another `snmp-server host inform` command for the same host, the second command will replace the first.

The `snmp-server host` command is used in conjunction with the `snmp-server enable` command. Use the `snmp-server enable` command to specify which SNMP notifications are sent globally. For a host to receive most notifications, at least one `snmp-server enable` command and the `snmp-server host` command for that host must be enabled.

However, some notification types cannot be controlled with the `snmp-server enable` command. For example, some notification types are always enabled. Other notification types are enabled by a different command. For example, the linkUpDown notifications are controlled by the `snmp trap link-status` command. These notification types do not require an `snmp-server enable` command.

An ATM interface state change event SNMP trap is generated whenever either of the following occur:

- ILMI goes to “upAndNormal” from any other state or to any other state from “upAndNormal” (OR)
- SSCOP goes to “dataTransferReady” from any other state or to any other state from “dataTransferReady” (OR)

The current implementation of this feature combines the ILMI and the SSCOP FSM entities in a single trap. Whenever a state change occurs in either entity, a trap consisting of the current states of both objects is sent to the NMS. Both entities always reflect the correct current state, but in order to determine which entity (ILMI or SSCOP) triggered a particular trap instance, the NMS must look at preceding trap(s). For example, if you are interested in only ILMI state changes, you need to consider only the following cases:

- If the ILMI FSM object in current trap is “upAndNormal” and the ILMI FSM object in the previous trap is anything other than “upAndNormal” (OR)
• If the ILMI FSM object in current trap is anything other than “upAndNormal” and the ILMI FSM object in the previous trap is “upAndNormal”.

Note
Other cases are ignored because they point to SSCOP state change traps.

Examples
If you want to configure a unique SNMP community string for traps, but you want to prevent SNMP polling access with this string, the configuration should include an access-list. In the following example, the community string is named “comaccess” and the access list is numbered 10:

```plaintext
Switch# configure terminal
Switch(config)# snmp-server community comaccess ro 10
Switch(config)# snmp-server host 172.20.2.160 comaccess
Switch(config)# access-list 10 deny any
```

The following example sends the SNMP traps to the host specified by the name myhost.cisco.com. The community string is defined as comaccess.

```plaintext
Switch(config)# snmp-server enable traps
Switch(config)# snmp-server host myhost.cisco.com comaccess snmp
```

The following example sends the ATM interface state change event SNMP traps (using the `atm if-event` keywords) to address 172.30.2.160:

```plaintext
Switch(config)# snmp-server host 172.30.2.160 traps admin atm if-event
```

Note
The atm if-event feature must be enabled using the command `snmp-server enable traps atm if-event` before configuring the host.

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>snmp-server enable traps</td>
<td>Enables the SNMP traps.</td>
</tr>
<tr>
<td>show snmp</td>
<td>Shows the status of communications between the SNMP agent and SNMP manager.</td>
</tr>
</tbody>
</table>
To set up port-based traffic mirroring, or snooping, use the `snoop` command. To disable snooping, use the `no` form of this command.

```
snoop interface source-port direction snoop-direction
no snoop interface source-port
```

### Syntax Description

<table>
<thead>
<tr>
<th>Source/Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>source-port</code></td>
<td>Number of the port or ports being monitored.</td>
</tr>
<tr>
<td><code>snoop-direction</code></td>
<td>Direction of traffic on the source port or ports that is monitored: receive, transmit, or both.</td>
</tr>
</tbody>
</table>

### Defaults

Snooping is disabled on all interfaces.

### Command Modes

Interface configuration

### Usage Guidelines

The snooping destination port can be any port in the system, except for the source port or ports, the Ethernet management port on the route processor, or any ports configured for Fast EtherChannel.

The snooping source port can be any port on an interface module.

There can be multiple snooping destination ports operating simultaneously, but only one destination port can be used per snooping session.

### Examples

The following example shows how to set up bidirectional port snooping using the `snoop interface configuration` command. In this example, the destination port is 12/0/15 and the source port is 0/0/1.

```
8500CSR# configure terminal
8500CSR(config)# interface fastethernet 12/0/15
8500CSR(config-if)# shutdown
8500CSR(config-if)# snoop interface fastethernet 0/0/1 direction both
8500CSR(config-if)# no shutdown
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show snoop</code></td>
<td>Displays the current snooping sessions.</td>
</tr>
</tbody>
</table>
sonet

To set the mode of operation and control the type of ATM cell used for cell-rate decoupling on the SONET, use the `sonet` interface configuration command. To restore the default operation to OC-3, OC-12, and OC-48c interfaces, use the `no` form of this command.

**Catalyst 8540 MSR**

```
sonet {stm-1 | ts-3c} | {stm-4c | ts-12c} | {stm-16 | ts-48c}
```

```
no sonet {stm-1 | ts-3c} | {stm-4c | ts-12c} | {stm-16 | ts-48c}
```

**Catalyst 8510 MSR and LightStream 1010**

```
sonet {stm-1 | ts-3c} | {stm-4c | ts-12c}
```

```
no sonet {stm-1 | ts-3c} | {stm-4c | ts-12c}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>stm-1</code></td>
<td>Synchronous Transport Module level 1. SDH/STM-1 operation (ITU-T specification).¹</td>
</tr>
<tr>
<td><code>sts-3c</code></td>
<td>Synchronous Transport Signal level 3, concatenated (3 x 51.84 Mbps). SONET format that specifies the frame structure for the 155.52 Mbps lines used to carry ATM cells.</td>
</tr>
<tr>
<td><code>stm-4c</code></td>
<td>Synchronous Transport Module level 4. SDH/STM-4 operation (ITU-T specification).</td>
</tr>
<tr>
<td><code>sts-12c</code></td>
<td>Synchronous Transport Signal level 12, concatenated (12 x 51.84 Mbps). SONET format that specifies the frame structure for the 5184 Mbps lines used to carry ATM cells.</td>
</tr>
<tr>
<td><code>sts-48c</code></td>
<td>Synchronous Transport Signal level 48, concatenated. (48 x 51.84 Mbps) SONET format that specifies the frame structure for the 2488.32 Mbps lines used to carry ATM cells. (Catalyst 8540 MSR).</td>
</tr>
</tbody>
</table>

¹ The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

### Defaults

- For OC-3: `sts-3c`.
- For OC-12: `sts-12c`.
- For OC-48c: `sts-48c`.

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
**Usage Guidelines**

This command applies to all ports except the CPU. Use **stm-1**, **stm-4c** and **stm-16** in applications where the ATM switch router requires idle cells for rate adaptation. An idle cell contains 31 zeros followed by a 1.

Use the appropriate default in applications where the ATM switch router requires unassigned cells for rate adaptation. An unassigned cell contains 32 zeros.

**Examples**

The following example specifies ATM SONET STM-1.

```
Switch(config-if)# sonet stm-1
```

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td></td>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
<tr>
<td></td>
<td>sonet overhead</td>
<td>Sets SONET/SDH overhead bytes.</td>
</tr>
<tr>
<td></td>
<td>sonet report</td>
<td>Enables the reporting of selected alarms.</td>
</tr>
<tr>
<td></td>
<td>sonet threshold</td>
<td>Sets the BER threshold values.</td>
</tr>
</tbody>
</table>
sonet overhead

To set SONET/SDH overhead bytes, use the `sonet overhead` interface configuration command. To restore the default value, use the `no` form of this command.

```
sonet overhead {c2 bytes | j0 {bytes | msg line} | j1 {16byte {exp-msg line | msg line} | 64byte {exp-msg line | msg line}} | s1s0 bits}
```

```
no sonet overhead {c2 bytes | j0 {bytes | msg line} | j1 {16byte {exp-msg line | msg line} | 64byte {exp-msg line | msg line}} | s1s0 bits}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>c2</code></td>
<td>Sets path signal label indicator.</td>
</tr>
<tr>
<td><code>bytes</code></td>
<td>Specifies byte value in the range of 0 to 255.</td>
</tr>
<tr>
<td><code>j0</code></td>
<td>Sets string or repeating value (applicable only in STM mode).</td>
</tr>
<tr>
<td><code>msg</code></td>
<td>Specifies string to be transmitted.</td>
</tr>
<tr>
<td><code>line</code></td>
<td>Specifies text consisting of characters.</td>
</tr>
<tr>
<td><code>j1</code></td>
<td>Sets 64/16-byte format, 0x0 by default.</td>
</tr>
<tr>
<td><code>16byte</code></td>
<td>Sets 16-byte format message starting with country code or three alphabetic country code.</td>
</tr>
<tr>
<td><code>exp-msg</code></td>
<td>Specifies expected message.</td>
</tr>
<tr>
<td><code>64byte</code></td>
<td>Sets 64-byte format message.</td>
</tr>
<tr>
<td><code>s1s0</code></td>
<td>Specifies bit S1 and S0 of H1.</td>
</tr>
<tr>
<td><code>bits</code></td>
<td>Specifies bit value in the range of 0 to 3.</td>
</tr>
</tbody>
</table>

### Defaults

64-byte message

### Command Modes

Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

By default, the path trace message is a free format 64-byte string consisting of hostname, interface name, and IP address information. This format is compatible with the default GSR POS j1 message.

**Note**

This command is only supported on a system with an OC-12 or OC-48c interface module.

### Examples

The following example sets the `sonet overhead` path signal indicator to 255 bytes on ATM 10/0/0.

```
Switch(config)# int atm 10/0/0
Switch(config-if)# sonet overhead c2 255
```
# Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td>sonet</td>
<td>Sets the mode of operation and control the type of ATM cell used for cell-rate decoupling on the SONET.</td>
</tr>
<tr>
<td>sonet report</td>
<td>Enables the reporting of selected alarms.</td>
</tr>
<tr>
<td>sonet threshold</td>
<td>Sets the BER threshold values.</td>
</tr>
</tbody>
</table>
To enable the reporting of selected alarms, use the `sonet report` interface configuration command. To revert to the default, or to disable selected alarms, use the `no` form of this command.

```
sonet report {slos | slof | lais | lrди | pais | prdi | plop | sd-ber | sf-ber | b1-tca | b2-tca | b3-tca}
```

```
no sonet report {slos | slof | lais | lrди | pais | prdi | plop | sd-ber | sf-ber | b1-tca | b2-tca | b3-tca}
```

**Syntax Description**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slos</td>
<td>Enables reporting section loss of signal.</td>
</tr>
<tr>
<td>slof</td>
<td>Enables reporting section loss of frame.</td>
</tr>
<tr>
<td>lais</td>
<td>Enables reporting line alarm indication signal.</td>
</tr>
<tr>
<td>lrди</td>
<td>Enables line remote defect indication.</td>
</tr>
<tr>
<td>pais</td>
<td>Enables path alarm indication signal.</td>
</tr>
<tr>
<td>prdi</td>
<td>Enables path remote defect indication.</td>
</tr>
<tr>
<td>plop</td>
<td>Enables reporting path loss of pointer.</td>
</tr>
<tr>
<td>sd-ber</td>
<td>Enables reporting LBIP BER in excess of SD threshold.</td>
</tr>
<tr>
<td>sf-ber</td>
<td>Enables reporting LBIP BER in excess of SF threshold.</td>
</tr>
<tr>
<td>b1-tca</td>
<td>Enables B1 (selection error) BER threshold crossing alarm.</td>
</tr>
<tr>
<td>b2-tca</td>
<td>Enables B2 (line error) BER threshold crossing alarm.</td>
</tr>
<tr>
<td>b3-tca</td>
<td>Enables B3 (BIP-8 error) BER threshold crossing alarm.</td>
</tr>
</tbody>
</table>

**Defaults**

By default, alarm reporting is enabled for `slos`, `slof`, `plop`, `sf`, `b1-tca`, `b2-tca`, `b3-tca`.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command enables the reporting of the selected alarms listed in the “Syntax Description.”

**Note**

This command is only supported on a system with an OC-12 or OC-48c interface module.

**Examples**

The following example enables the section loss of signal reporting:

```
Switch(config-if)# sonet report slos
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td><code>sonet</code></td>
<td>Sets the mode of operation and control the type of ATM cell used for cell-rate decoupling on the SONET.</td>
</tr>
<tr>
<td><code>sonet overhead</code></td>
<td>Sets SONET/SDH overhead bytes.</td>
</tr>
<tr>
<td><code>sonet threshold</code></td>
<td>Sets the BER threshold values.</td>
</tr>
</tbody>
</table>
sonet soakinginterval

To configure the interval before declaring or clearing a SONET connection failure, use the `sonet soakinginterval` configuration command.

```
sonet soakinginterval { declare | clear }
```

```
no soakinginterval { declare | clear }
```

**Syntax Description**

- **declare**: Specifies the interval for declaring a SONET connection failure (2.5 second default).
- **clear**: Specifies the interval for clearing a SONET connection failure (10 second default).

**Defaults**

The default detection interval for each of these defects is to “declare” the connection failed after 2.5 seconds and to “clear” the failure after 10 seconds or resume operation.

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

By default your switch adheres to the standards GR-253-CORE, GR-474-CORE, and GR-1244-CORE that define detection and reporting of certain degraded SONET connections. The defects included in the standards include: LOS, LOF, AIS-L, RFI-L, AIS-P, and RFI-P. The default detection interval for each of these defects is to “declare” the connection failed after 2.5 seconds and to “clear” the failure after 10 seconds or resume operation.

You can shorten the “declare” and “clear” time intervals to approximately 1 second by overriding the default configuration using the `no sonet soakinginterval` command.

**Examples**

The following example shows how to override the SONET default declare (2.5 seconds) and clear (10 seconds) intervals and cause them to occur in approximately 1 second (+/- 0.5 second).

```
Switch# configure terminal
Switch(config)# no sonet soakinginterval declare
Switch(config)# no sonet soakinginterval clear
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show running-config</code></td>
<td>Displays the non-default configuration of the <code>sonet soakinginterval</code> command.</td>
</tr>
</tbody>
</table>
sonet threshold

To set the BER threshold values, use the `sonet threshold` interface configuration command. To disable the threshold values, use the `no` form of this command.

```
sonet threshold {sd-ber | sf-ber | b1-tca | b2-tca | b3-tca} ber

no sonet threshold {sd-ber | sf-ber | b1-tca | b2-tca | b3-tca}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sd-ber</td>
<td>Sets signal degrade BER threshold and displays any signal degradation.</td>
</tr>
<tr>
<td>sf-ber</td>
<td>Sets signal fail BER threshold and displays any signal failure.</td>
</tr>
<tr>
<td>b1-tca</td>
<td>Sets b1 (selection error) BER threshold crossing alarm. This alarm indicates trouble at the section layer of the SONET infrastructure; SONET circuits need to be checked out.</td>
</tr>
<tr>
<td>b2-tca</td>
<td>Sets b2 (line error) BER threshold crossing alarm. This alarm indicates trouble at the Line/Multiplexer layer of the SONET infrastructure; SONET network elements in this circuit need to be checked out.</td>
</tr>
<tr>
<td>b3-tca</td>
<td>Sets b3 (path BIP error) BER threshold crossing alarm. This alarm indicates trouble at the path layer (end to end) of the SONET infrastructure; SONET network elements in this circuit need to be checked out.</td>
</tr>
<tr>
<td>ber</td>
<td>Specifies BER in the range of 3 to 9 (10 to minus n).</td>
</tr>
</tbody>
</table>

**Defaults**

For BER thresholds: `sf = 10e-3, sd = 10e-6`

For TCA thresholds: `b1 = 10e-6, b2 = 10e-6, b3 = 10e-6`

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command sets or changes the BER and threshold crossing alarms. Any errors in B1 automatically results in B2 (line) and B3 (path) errors.

**Note**

This command is only supported on systems with OC-12 or OC-48c interface modules.

**Examples**

The following example sets the b3-tca BER threshold crossing alarm to 10.

```
Switch(config-if)# sonet threshold b3-tca 3
```
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td><code>sonet</code></td>
<td>Sets the mode of operation and control the type of ATM cell used for cell-rate decoupling on the SONET.</td>
</tr>
<tr>
<td><code>sonet overhead</code></td>
<td>Sets SONET/SDH overhead bytes.</td>
</tr>
<tr>
<td><code>sonet report</code></td>
<td>Enables the reporting of selected alarms.</td>
</tr>
</tbody>
</table>
sonet tx-ais on-rx-defect

To enable a SONET interface to send an alarm indication signal (AIS) if it detects the receive port has failed, use the `sonet tx-ais on-rx-defect` command. To disable AIS, use the `no` form of this command.

```
sonet tx-ais on-rx-defect
no sonet tx-ais on-rx-defect
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
Disabled

**Command Modes**
Interface Configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The `sonet tx-ais on-rx-defect` command should not be enabled on both ATM switch router interfaces connected to the same physical line. Even if no alarm exists, both interfaces see the alarm signals and never come up.

**Examples**
The following example enables AIS on an ATM interface.

```
Switch# configure terminal
Switch(config)# interface atm 3/0/0
Switch(config-if)# sonet tx-ais on-rx-defect
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
To start an encrypted session with a remote networking device, use the `ssh` user EXEC command.

```
ssh [-l userid] [-v ssh_client_version_number] [-m hmac_algorithm_type] [-c { des | 3des | aes128-cbc | aes192-cbc | aes256-cbc }] [-o number_of_password_prompts number] [-p port_number] [ip_address | hostname] [command(command(command(command...)))]
```

### Syntax Description

- `-l userid` (Optional) Specifies the user ID to use when logging in on the remote networking device running the SSH server. If no user ID is specified, the default is the current user ID.

- `-v { 1 | 2 }` (Optional) Specifies the SSH client version. If this option is not specified, then version configured through the `ip ssh version version_number` command is used for setting up the SSH session.

- `-m { hmac-md5-128 | hmac-md5-96 | hmac-sha1-160 | hmac-sha1-96 }` (Optional) Specifies the HMAC algorithm used for the SSH v2 session.

- `-c { des | 3des | aes128-cbc | aes192-cbc | aes256-cbc }` (Optional) Specifies the crypto algorithm, DES or 3DES for SSH v1/v2 session and aes128-cbc, aes192-cbc or aes256-cbc for SSH v2 session, to use for encrypting data. To use SSH, you must have an encryption image running on the switch router. Cisco software images that include encryption have the designators 56i (DES) or k2 (3DES).

- `-o number_of_password_prompts number` (Optional) Specifies the number of password prompts that the software generates before ending the session. The SSH server may also apply a limit to the number of attempts. If the limit set by the server is less than the value specified by the `-o number_of_password_prompts` keyword, the limit set by the server takes precedence. The default is 3 attempts, which is also the Cisco IOS SSH server default. The range of values is from 1 to 5.

- `-p port_number` (Optional) Indicates the desired port number for the remote host. The default port number is 22.

- `ip_address | hostname` Specifies the IP address or host name of the remote networking device.

- `command` (Optional) Specifies the Cisco IOS command that you want to run on the remote networking device. If the remote host is not running Cisco IOS software, this may be any command recognized by the remote host. If the command includes spaces, you must enclose the command in quotation marks.

### Defaults

- **Disabled**

### Command Modes

- Any EXEC mode.
The `ssh` command enables a Cisco router to make a secure, encrypted connection to another Cisco router or device running an SSH Version 1 server. This connection provides functionality that is similar to that of an outbound Telnet connection except that the connection is encrypted. With authentication and encryption, the SSH client allows for a secure communication over an insecure network.

SSH is supported on DES (56-bit) and 3DES (168-bit) data encryption software images only. In DES software images, DES is the only encryption algorithm available. In 3DES software images, both DES and 3DES encryption algorithms are available.

For more information, refer to the ATM Switch Router Software Configuration Guide.

**Examples**

The following example illustrates initiating a secure session between the local switch router and the edge router HQedge to run the `show ip route` command. In this example, the edge router prompts for the adminHQ password to authenticate the user. If the authentication step is successful, the edge router returns the result of the `show ip route` command to the local router.

```
Switch# ssh -l adminHQ HQedge "show ip route"
```

The following example shows the SSH client using aes128-cbc cipher and hmac-md5-96 HMAC algorithm to initiate a secure remote command connection with Router2. The SSH server running on Router2 authenticates the session for the admin7 user on Router2 using standard authentication methods and returns the result of the `show ip route` command to the local switch router.

```
Switch# ssh -l admin7 -v 2 -m hmac-md5-128 -c aes128-cbc -o numberofpasswordprompts 4 Router2 "show ip route"
```

The following example shows the SSH client using 3DES to initiate a secure remote command connection with the HQedge router. The SSH server running on HQedge authenticates the session for the admin7 user on HQedge device using standard authentication methods. The HQedge device must have SSH enabled for this to work.

```
Switch# ssh -l admin7 -c 3des -o numberofpasswdprompts 5 HQedge
```

The following example shows the SSH client initiating a secure remote command connection with the remote router IP address 10.10.10.10. The SSH server running on the remote router authenticates the session for the user admin using standard authentication methods. Using the secure connection the admin user can execute the `show ssh` command on the remote router. The remote router device must have SSH enabled for this to work.

```
Switch# ssh -l admin 10.10.10.10
Trying 10.10.10.10...Open
Password:

RemoteRouter> enable
Password:
RemoteRouter# RemoteRouter# RemoteRouter# RemoteRouter# RemoteRouter# show ssh
```

<table>
<thead>
<tr>
<th>Command History</th>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
<tr>
<td></td>
<td>12.1(20)EB</td>
<td>Added SSH Version 2 functionality changes.</td>
</tr>
</tbody>
</table>
ssh

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.5</td>
<td>3DES</td>
<td>Session started</td>
</tr>
<tr>
<td>1</td>
<td>1.5</td>
<td>3DES</td>
<td>Session started</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip ssh</code></td>
<td>Configures SSH server control parameters.</td>
</tr>
<tr>
<td><code>show ssh</code></td>
<td>Displays the SSH connections.</td>
</tr>
</tbody>
</table>
statistics

To turn on the PNNI statistics feature, use the `statistics` ATM router PNNI configuration command. To disable this feature, use the `no` form of this command.

```plaintext
statistics {call}

no statistics {call}
```

**Syntax Description**
- `call` Specifies statistics related to route computation for call and party setups.

**Defaults**
Disabled

**Command Modes**
ATM router PNNI configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
For more information, refer to the *ATM Switch Router Software Configuration Guide*.

**Examples**
The following script shows how to access the `statistics` ATM router PNNI configuration command.

```plaintext
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# statistics call
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm pnni</td>
<td>Displays PNNI statistics.</td>
</tr>
<tr>
<td>statistics call</td>
<td></td>
</tr>
</tbody>
</table>
**status**

To configure the status of this filter table entry, use the `status` ATM signalling diagnostics configuration command. To disable this feature, use the `no` form of this command.

```
status [active | inactive | delete]
```

```
o status [active | inactive | delete]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>active</th>
<th>Sets status to active to begin filtering failed connections.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inactive</td>
<td>Sets status to inactive to stop filtering failed connections.</td>
</tr>
<tr>
<td></td>
<td>delete</td>
<td>Sets status to delete if the signalling diagnostics filter table entry needs to be deleted.</td>
</tr>
</tbody>
</table>

**Defaults**

Inactive

**Command Modes**

ATM signalling diagnostics configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following script shows how to access the `status` command.

```
Switch# configure terminal
Switch(config)# status active
```
summary-address

To configure summary address prefixes on a PNNI node, use the `summary-address` node-level subcommand. To remove configured summary address prefixes, use the `no` form of this command.

```
summary-address address-prefix [internal | exterior] [suppress]
no summary-address address-prefix [internal | exterior]
```

**Syntax Description**

- **address-prefix** Specifies the summary address prefix. The maximum length of the address prefix is 19 bytes. Each character in the prefix is 4 bits. The length of the prefix must fall on a nibble boundary. In other words, the length of the prefix must be a multiple of 4 bits.

- **internal** Specifies local knowledge of reachability, including end-system addresses registered via ILMI address registration.

- **exterior** Specifies knowledge of reachability through remote networks or derived from other protocol exchanges outside the PNNI routing domain.

- **suppress** Indicates that neither the summary address nor any addresses for which the summary address is the longest matching prefix are advertised.

**Defaults**

Default summary addresses are controlled by the `auto-summary` command.

The default summary address type is `internal`.

**Command Modes**

PNNI node configuration

**Command History**

```
Release    Modification
11.1(4)     New command
```

**Usage Guidelines**

Summary addresses can be used to decrease the amount of information advertised by this PNNI node. Summary addresses should only be configured when all end-system addresses matching the summary address are reachable from this switch (for example, not reachable through PNNI interfaces to other switches).

Summary addresses of type internal only summarize internal addresses reachable from this switch (such as ILMI-registered addresses and internal static routes). Summary addresses of type exterior only summarize exterior addresses reachable from this switch (for example, exterior static routes on IISP or public UNI interfaces).

Suppressed summary addresses can be used to prevent other PNNI nodes from learning of switch connectivity to certain addresses (for example, for back doors).

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

**Examples**

The following script shows how to access the `summary-address` node-level subcommand.
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# summary-address 48.91...

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm route</strong></td>
<td>Specifies a static route to a reachable address prefix.</td>
</tr>
<tr>
<td><strong>auto-summary</strong></td>
<td>Allows default summary addresses to be generated based on the switch’s ATM address.</td>
</tr>
<tr>
<td><strong>show atm route</strong></td>
<td>Displays all local or network-wide reachable address prefixes in this switch’s ATM routing table.</td>
</tr>
</tbody>
</table>
sync config (Catalyst 8540 MSR)

To synchronize the configuration between the primary and secondary route processors based on the primary configuration, use the sync config main CPU redundancy command. To disable the synchronization, use the no form of this command.

```
sync config {startup | running | both}
```

```
no sync config {startup | running | both}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>startup</td>
<td>Synchronizes the startup configuration.</td>
</tr>
<tr>
<td>running</td>
<td>Synchronizes the running configuration.</td>
</tr>
<tr>
<td>both</td>
<td>Synchronizes the startup and running configurations.</td>
</tr>
</tbody>
</table>

**Defaults**

both

**Command Modes**

Main CPU redundancy

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example synchronizes the startup configuration of the primary and secondary route processors.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-r)# main-cpu
Switch(config-r-mc)# sync config startup
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show</td>
<td>Displays information about the in-system programmable device images (FPGA and PLD images) for a given module in the system.</td>
</tr>
</tbody>
</table>
sync counters (Catalyst 8540 MSR)

To synchronize the VC, interface, and signaling counters between the primary and secondary route processor, use the `sync counters` configuration command. To return the configuration to the default, use the `no` form of this command.

```
sync counters { vc minutes | interface minutes | signaling }

no sync counters { signaling }
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vc minutes</td>
<td>Specifies how often, 1 to 1440 minutes, the VC counter updates occur between the primary and secondary route processors.</td>
</tr>
<tr>
<td>interface minutes</td>
<td>Specifies how often, 1 to 1440 minutes, the interface counter updates occur between the primary and secondary route processors.</td>
</tr>
<tr>
<td>signaling</td>
<td>Enables the signaling counter updates that occur dynamically between the primary and secondary route processors.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled

**Command Modes**

Redundancy configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(20)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `sync counter` command in redundancy configuration mode allows driver level (interface) counters, VC level (ATM virtual channel) counter and ATM signaling statistics counter updates between the primary and secondary route processors. For the driver and VC based counters, you can configure the counter synchronization periodicity. Choosing how often the synchronization occurs is a trade-off between how frequently the counters need to be synchronized and the update impact on system resources. Signaling level counters occur “dynamically” or whenever the counter value changes in the primary route processor and do not require timer interval configuration.

This command is used for accurate signaling level debugging and to ensure optimal usage of your system resources.

**Note**

The counters of the primary and secondary route processors might not match exactly because the counters are only updated periodically. The difference in values depends on the frequency of the updates.

To force an update of the counters between the primary and secondary route processors, use the `redundancy manual-sync counters (Catalyst 8540 MSR)` command.
The following example shows how to enable and configure the time interval for interface, VC, and signaling counter updates between the primary and secondary route processors.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-r)# main-cpu
Switch(config-r-mc)# sync counters vc 60
Switch(config-r-mc)# sync counters interface 60
Switch(config-r-mc)# sync counters signaling
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>redundancy</strong></td>
<td>Forces the primary route processor to synchronize the VC, interface, and signaling counters with the secondary route processor.</td>
</tr>
<tr>
<td><strong>manual-sync counters</strong> (Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td><strong>sync config</strong></td>
<td>Synchronizes the configuration between the primary and secondary route processor based on the primary configuration, by using the <strong>sync config</strong> (Catalyst 8540 MSR) main processor redundancy command. To disable the synchronization, use the <strong>no</strong> form of this command. This command synchronizes the running configuration.</td>
</tr>
</tbody>
</table>
sync dynamic-info (Catalyst 8540 MSR)

To synchronize dynamic data between the primary processor and secondary processor, use the `sync dynamic-info` command. To disable synchronization, use the `no` form of this command.

```plaintext
sync dynamic-info

no sync dynamic-info
```

### Syntax Description

None

### Defaults

Enabled

### Command Modes

Redundancy configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(19)EB</td>
<td>Added support for point-to-multipoint SPVCs</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Dynamic data refers to any states or data structures such as transit SVCs, transit or endpoint soft PVCs, and point-to-multipoint soft PVCs. The `sync dynamic-info` command works only if the `sync config running` command is enabled. Disabling the `sync config running` command automatically disables `dynamic-info` (if already enabled) because `dynamic-info` is not functional without RCSF enabled. You can turn off dynamic-info anytime regardless of the RCSF status.

### Examples

```plaintext
Switch# configure terminal
Switch(config)# redundancy
Switch(config-r)# main_cpu
Switch(config-r-mc)# sync dynamic-info
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sync config (Catalyst 8540 MSR)</code></td>
<td>Synchronize the configuration between the primary and secondary route processor based on the primary configuration, using the <code>sync config (Catalyst 8540 MSR) main processor redundancy</code> command.</td>
</tr>
</tbody>
</table>
Show Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note
Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note
Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
show access-lists

To display information about the access list, use the show access-lists EXEC command.

    show access-lists [aclnumber \* aclname]

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aclnumber</td>
<td>Number from 1 through 1299 that identifies the access list.</td>
</tr>
<tr>
<td>aclname</td>
<td>Character string that identifies the access list.</td>
</tr>
</tbody>
</table>

Defaults

The system displays all access lists.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3.(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the show access-lists command when access list 101 is specified.

Switch# show access-lists 101
Extended IP access list 101
    permit tcp host 198.92.32.130 any established (4304 matches)
    permit udp host 198.92.32.130 any eq domain (129 matches)
    permit icmp host 198.92.32.130 any
    permit tcp host 198.92.32.130 host 171.69.2.141 gt 1023
    permit tcp host 198.92.32.130 host 171.69.2.135 eq smtp (2 matches)
    permit tcp host 198.92.32.130 host 198.92.30.32 eq smtp
    permit tcp host 198.92.32.130 host 171.69.108.33 eq smtp
    permit udp host 198.92.32.130 host 171.68.225.190 eq syslog
    permit udp host 198.92.32.130 host 171.68.225.126 eq syslog
    deny    ip 150.136.0.0 0.0.255.255 224.0.0.0 15.255.255.255
    deny    ip 171.68.0.0 0.1.255.255 224.0.0.0 15.255.255.255 (2 matches)
    deny    ip 172.24.24.0 0.0.1.255 224.0.0.0 15.255.255.255
    deny    ip 192.82.152.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny    ip 192.122.173.0 0.0.0.255 224.0.0.0 15.255.255.255 (2 matches)
    deny    ip 192.122.174.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny    ip 192.135.239.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny    ip 192.135.240.0 0.0.7.255 224.0.0.0 15.255.255.255
    deny    ip 192.135.248.0 0.0.3.255 224.0.0.0 15.255.255.255
    deny    ip 192.150.42.0 0.0.0.255 224.0.0.0 15.255.255.255

An access list counter counts how many packets are allowed by each line of the access list. This number is displayed as the number of matches.

For information on how to configure access lists, refer to the ATM Switch Router Software Configuration Guide.
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>access-list (extended)</strong></td>
<td>Used to define an extended IP access list. Currently, this command only supports the IP host.</td>
</tr>
<tr>
<td><strong>access-list (standard)</strong></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><strong>clear access-list counters</strong></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td><strong>clear access-template</strong></td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show accounting

To step through all active sessions and to print all the accounting records for actively accounted functions, use the `show accounting` EXEC command. To disable this function, use the `no` form of the command.

```
show accounting

no show accounting
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `show accounting` command allows you to display the active accountable events on the system. It provides systems administrators with a quick look at what is going on, and can also help collect information in the event of a data loss on the accounting server. The `show accounting` command displays additional data on the internal state of AAA if `debug aaa accounting` is turned on.

**Examples**

The following example is sample output from the `show accounting` command.

```
Switch# show accounting
Active Accounted actions on tty0, User chard Priv 1
  Task ID 4425, EXEC Accounting record, 0:04:53 Elapsed
  task_id=4425 service=exec port=0
  task_id=3759, Connection Accounting record, 0:01:06 Elapsed
  task_id=3759 service=exec port=0 protocol=telnet address=171.19.3.78 cmd=grill
Active Accounted actions on tty10, User chard Priv 1
  Task ID 5115, EXEC Accounting record, 0:04:07 Elapsed
  task_id=5115 service=exec port=10
  Task ID 2593, Connection Accounting record, 0:00:56 Elapsed
  task_id=2593 service=exec port=10 protocol=tn3270 address=172.21.14.90 cmd=tn snap
Active Accounted actions on tty11, User mary Priv 1
  Task ID 7390, EXEC Accounting record, 0:00:25 Elapsed
  task_id=7390 service=exec port=11
  Task ID 931, Connection Accounting record, 0:00:20 Elapsed
  task_id=931 service=exec port=11 protocol=telnet address=171.19.6.129 cmd=coal
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show hosts</code></td>
<td>Displays the default domain name, the style of the name lookup service, a list of name server hosts, and the cached list of host names and addresses.</td>
</tr>
<tr>
<td><code>show line</code></td>
<td>Displays terminal line parameters.</td>
</tr>
</tbody>
</table>
show aliases

To display all alias commands or the alias commands in a specified mode, use the `show aliases` EXEC command.

```
show aliases [mode]
```

### Syntax Description

<table>
<thead>
<tr>
<th>mode</th>
<th>Command mode. You can show the alias commands for the following modes by entering the corresponding keywords.</th>
</tr>
</thead>
<tbody>
<tr>
<td>actng-file</td>
<td>ATM accounting file configuration mode</td>
</tr>
<tr>
<td>actng-sel</td>
<td>ATM accounting selection configuration mode</td>
</tr>
<tr>
<td>atm-router</td>
<td>ATM router configuration mode</td>
</tr>
<tr>
<td>atmsig-cug</td>
<td>Closed user group configuration mode</td>
</tr>
<tr>
<td>atmsig-diag</td>
<td>Diagnostics configuration mode</td>
</tr>
<tr>
<td>atmsig_e164_table_mode</td>
<td>ATMSIG E164 table mode</td>
</tr>
<tr>
<td>configure</td>
<td>Global configuration mode</td>
</tr>
<tr>
<td>exec</td>
<td>EXEC mode</td>
</tr>
<tr>
<td>interface</td>
<td>Interface configuration mode</td>
</tr>
<tr>
<td>lane</td>
<td>ATM LAN Emulation LECS configuration table mode</td>
</tr>
<tr>
<td>line</td>
<td>Line configuration mode</td>
</tr>
<tr>
<td>map-class</td>
<td>Map-class configuration mode</td>
</tr>
<tr>
<td>map-list</td>
<td>Map-list configuration mode</td>
</tr>
<tr>
<td>null-interface</td>
<td>Null interface configuration mode</td>
</tr>
<tr>
<td>pnni-router-node</td>
<td>PNNI router node configuration mode</td>
</tr>
<tr>
<td>route-map</td>
<td>Route map configuration mode</td>
</tr>
<tr>
<td>router</td>
<td>Router configuration mode</td>
</tr>
<tr>
<td>subinterface</td>
<td>Subinterface configuration mode</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

All modes except for the null interface mode have their own prompts. For example, the prompt for interface configuration mode is:

```
Switch(config-if)#
```
Examples

The following example is sample output from the `show aliases exec` commands. The default aliases for commands in EXEC mode are displayed.

```
Switch# show aliases exec

Exec mode aliases:
   h     help
   lo    logout
   p     ping
   r     resume
   s     show
   w     where
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alias</td>
<td>This command or some of its parameters might not function as expected. Refer to Appendix D. Refer also to the <code>Router Products Command Reference</code> publication for more information about the <code>alias</code> command.</td>
</tr>
</tbody>
</table>
show arp

To display the entries in the ARP table, use the show arp EXEC command.

show arp

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release    Modification
11.3(3a)    New command

Examples

The following example is sample output from the show arp command.

Switch# show arp
Protocol Address Age (min) Hardware Addr Type Interface
Internet 172.20.42.112 120 0000.a710.4baf ARPA Ethernet3
AppleTalk 4028.5 29 0000.0c01.0e56SNAP Ethernet2
Internet 172.20.42.114 105 0000.a710.859b ARPA Ethernet3
AppleTalk 4028.9 - 0000.0c02.a03cSNAP Ethernet2
Internet 172.20.42.121 42 0000.a710.68cd ARPA Ethernet3
Internet 172.20.36.9 - 0000.3080.6fd4SNAP TokenRing0
AppleTalk 4036.9 - 0000.3080.6fd4SNAP TokenRing0
Internet 172.20.33.9 - c222.2222.2222 SMDS Serial0

Table 18-1 describes the significant fields shown in the first line of output in the display.

Table 18-1  show arp Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Type of network address this entry includes.</td>
</tr>
<tr>
<td>Address</td>
<td>Network address that is mapped to the MAC address in this entry.</td>
</tr>
<tr>
<td>Age (min)</td>
<td>Interval (in minutes) since this entry was entered in the table, rather than the interval since the entry was last used. (The timeout value is 4 hours.)</td>
</tr>
<tr>
<td>Hardware Addr</td>
<td>MAC address mapped to the network address in this entry.</td>
</tr>
<tr>
<td>Type</td>
<td>Encapsulation type used for the network address in this entry. Possible values include:</td>
</tr>
<tr>
<td></td>
<td>• ARPA</td>
</tr>
<tr>
<td></td>
<td>• SNAP</td>
</tr>
<tr>
<td></td>
<td>• ETLK (EtherTalk)</td>
</tr>
<tr>
<td></td>
<td>• SMDS (Interface) Interface associated with this network address.</td>
</tr>
</tbody>
</table>
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>arp (interface)</code></td>
<td>Controls the interface-specific handling of IP address resolution into 48-bit Ethernet.</td>
</tr>
</tbody>
</table>
show async bootp

To display the extended BOOTP request parameters that were configured for asynchronous interfaces, use the show async bootp EXEC command.

show async bootp

Syntax Description
This command has no arguments or keywords.

Command Modes
EXEC

Command History

Release Modification
11.3(3a) New command

Examples
The following is a sample output of the show async bootp command.

Switch# show async bootp

The following extended data will be sent in BOOTP responses:

bootfile (for address 128.128.1.1) "pcboot"
bootfile (for address 131.108.1.111) "dirtboot"
subnet-mask 255.255.0.0
time-offset -3600
time-server 128.128.1.1

If no extended data is defined, you receive the following response.

No extended data will be sent in BOOTP responses:

Table 18-2 describes the significant fields shown in the display.

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Description</td>
</tr>
<tr>
<td>bootfile... &quot;pcboot&quot;</td>
</tr>
<tr>
<td>subnet-mask 255.255.0.0</td>
</tr>
<tr>
<td>time-offset -3600</td>
</tr>
<tr>
<td>time-server 128.128.1.1</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>async-bootp</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
show async status (Catalyst 8510 MSR and LightStream 1010)

To list the status of the asynchronous interface 1 associated with the auxiliary port, use the `show async status` user EXEC command.

```
show async status
```

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Shows all SLIP asynchronous sessions.

**Examples**
The following example is sample output from the `show async status` command.

```
Switch# show async status
Async protocol statistics:
  Rcvd: 5448 packets, 7682760 bytes
    1 format errors, 0 checksum errors, 0 overrun, 0 no buffer
  Sent: 5455 packets, 7682676 bytes, 0 dropped

  Int     Local          Remote Qd InPack OutPac Inerr  Drops  MTU Qsz
  1      192.31.7.84      Dynamic 0 0 0 0 0 1500 10
```

**Table 18-3** describes the significant fields shown in the display.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rcvd:</td>
<td>Statistics on packets received.</td>
</tr>
<tr>
<td>5548 packets</td>
<td>Packets received.</td>
</tr>
<tr>
<td>7682760 bytes</td>
<td>Total number of bytes.</td>
</tr>
<tr>
<td>1 format errors</td>
<td>Packets with a bad IP header, even before the checksum is calculated.</td>
</tr>
<tr>
<td>0 checksum errors</td>
<td>Count of checksum errors.</td>
</tr>
<tr>
<td>0 overrun</td>
<td>Number of giants received.</td>
</tr>
<tr>
<td>0 no buffer</td>
<td>Number of packets received when no buffer was available.</td>
</tr>
<tr>
<td>Sent:</td>
<td>Statistics on packets sent.</td>
</tr>
<tr>
<td>5455 packets</td>
<td>Packets sent.</td>
</tr>
</tbody>
</table>
Table 18-3  show async status Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7682676 bytes</td>
<td>Total number of bytes.</td>
</tr>
<tr>
<td>0 dropped</td>
<td>Number of packets dropped.</td>
</tr>
<tr>
<td>Int</td>
<td>Interface number.</td>
</tr>
<tr>
<td>*</td>
<td>Line currently in use.</td>
</tr>
<tr>
<td>Remote</td>
<td>Remote IP address on the link. “Dynamic” indicates that a remote address is allowed but has not been specified. “None” indicates that no remote address is assigned or being used.</td>
</tr>
<tr>
<td>Qd</td>
<td>Number of packets on hold queue (Qsz is max).</td>
</tr>
<tr>
<td>InPack</td>
<td>Number of packets received.</td>
</tr>
<tr>
<td>OutPac</td>
<td>Number of packets sent.</td>
</tr>
<tr>
<td>Inerr</td>
<td>Number of total input errors; sum of format errors, checksum errors, overruns, and no buffers.</td>
</tr>
<tr>
<td>Drops</td>
<td>Number of packets received that would not fit on the hold queue.</td>
</tr>
<tr>
<td>MTU</td>
<td>Current maximum transmission unit size.</td>
</tr>
<tr>
<td>Qsz</td>
<td>Current output hold queue size.</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slip</td>
<td>Used to attach or detach a SLIP interface.</td>
</tr>
</tbody>
</table>
show atm accounting

To show the ATM accounting configuration information, use the `show atm accounting` EXEC command.

```
show atm accounting
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

**Catalyst 8540 MSR**

The following example is sample output from the `show atm accounting` EXEC command for a switch router that has remote logging configured.

```
Switch# show atm accounting
ATM Accounting Info: AdminStatus - UP; OperStatus : UP
Trap Threshold - 90 percent (4500000 bytes)
Interfaces:
  AT1/0/0
  AT2/0/0
File Entry 1 -
  Name:acctng_file1
  Descr: atm accounting data
  Min-age (seconds): 0
  Failed_attempt : soft regular
  Interval (seconds) : 60
  Collect Mode : on-release periodic
  Sizes: Active 68 bytes (#records 0); Ready 74 bytes (#records 0)
Remote Log and local storage are enabled.
Primary Log Host: eagle, TCP listen port: 2001, OperStatus: DOWN
Alternate Log Host: eagle, TCP listen port: 2002, OperStatus: DOWN
Selection Entry 1 -
  Subtree OID : 1.3.6.1.4.1.9.10.18.1.1
  List Bitmap : FF.FE.BF.FC
  Conn Type : svc-in svc-out pvc pvp spvc-originator spvc-target
  Active List Bitmap - FF.FE.BF.FC
```

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the `show atm accounting` EXEC command.

```
Switch# show atm accounting
ATM Accounting Info: AdminStatus - DOWN; OperStatus : DOWN
Trap Threshold - 90 percent (4500000 bytes)
Interfaces:
File Entry 1: Name acctng_file1
  Descr: atm accounting data
```
show atm accounting

Min-age (seconds): 3600
Failed_attempt : 0xC0
Interval (seconds) : 3600
Collect Mode : 0x80
No file buffers initialized

selection Entry -
  Selection entry 1, subtree OID - 1.3.6.1.4.1.9.10.18.1.1
  Selection entry 1, list bitmap - FF.FE.BF.FC
  Selection entry 1, connType bitmap - F0.00

Active selection -
  Selection entry 1, subtree OID - 1.3.6.1.4.1.9.10.18.1.1
  Selection entry 1, list bitmap - FF.FE.BF.FC
  Selection entry 1, connType bitmap - F0.00

Debug output:
Active Connection/Leg/Party counters
src_legparties (0), dest_legs (0), dest_parties (0)
Sig API: Err - 0
New_Conn: OK - 0; Err - 0
Rel_Conn: OK - 0; Err - 0
New_Leg: OK - 0; Err - 0
Rel_Leg: OK - 0; Err - 0
New_Party: OK - 0; Err - 0
Rel_Party: OK - 0; Err - 0
Switch#

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm accounting</td>
<td>atm accounting</td>
<td>Controls the collection of ATM accounting data into a specific file.</td>
</tr>
<tr>
<td>collection</td>
<td>collection</td>
<td></td>
</tr>
</tbody>
</table>
show atm addresses

To display the active ATM addresses on a switch router, use the show atm addresses EXEC command.

```
show atm addresses
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: added display of interface ATM 0 interface addresses.</td>
</tr>
<tr>
<td>12.1(22)EB</td>
<td>Modified: added display of soft VC redundancy group.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The first switch router address is displayed with the word “active” to indicate the current address of the switch router. The output also includes automatically generated soft VC addresses, switch refix(es) used by ILMI, configured interface-specific ILMI prefixes, and the configured LECS addresses.

**Examples**
The following example is sample output from the show atm addresses command.

```
Switch# show atm addresses
Switch Address(es):
47.0091.8100.0000.00e0.f75d.0401.00e0.f75d.0401.00 active
47.0091.8100.0000.0040.0b0a.2a81.0040.0b0a.2a81.00
47.0091.8100.0000.00e0.4fac.b401.00e0.4fac.b401.00
NOTE: Switch addresses with selector bytes 01 through 7F are reserved for use by PNNI routing

PNNI Local Node Address(es):
47.0091.8100.0000.00e0.f75d.0401.00e0.f75d.0401.03 Node 3

Soft VC Address(es):
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.0000.00 ATM0/0/0
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.0010.00 ATM0/0/1
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.0020.00 ATM0/0/2
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.0030.00 ATM0/0/3
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.1000.00 ATM0/1/0
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.1010.00 ATM0/1/1
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.1020.00 ATM0/1/2
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.1030.00 ATM0/1/3
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.8000.00 ATM-P1/0/0
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.9000.00 ATM1/1/0
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.9000.71 ATM1/1/0.113
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.9010.00 ATM1/1/1
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.9020.00 ATM1/1/2
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.9030.00 ATM1/1/3
47.0091.8100.0000.00e0.f75d.0401.4000.0c87.ff0.00 ATM0
```
show atm addresses

47.0091.8100.0000.00e0.f75d.0401.4000.0c87.fff0.01 ATM0.1
47.0091.8100.0000.00e0.f75d.0401.4000.0c87.fff0.02 ATM0.2
47.0091.8100.0000.00e0.f75d.0401.4000.0c81.8000.00 ATM3/0/0
47.0091.8100.0000.00e0.f75d.0401.4000.0c81.8010.00 ATM3/0/1
47.0091.8100.0000.00e0.f75d.0401.4000.0c81.9030.00 ATM-P3/1/3
47.0091.8100.0000.00e0.f75d.0401.4000.0c82.0000.00 ATM4/0/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0000.00 ATM0/0/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0010.00 ATM0/0/1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0020.00 ATM0/0/2
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0030.00 ATM0/0/3
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.1000.00 ATM0/1/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.1010.00 ATM0/1/1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.1020.00 ATM0/1/2
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.1030.00 ATM0/1/3
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.8000.00 ATM-P1/0/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.9000.00 ATM1/1/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.9000.71 ATM1/1/0.113
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.9010.00 ATM1/1/1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.9020.00 ATM1/1/2
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.9030.00 ATM1/1/3
47.0091.8100.0000.0040.0b0a.2a81.4000.0c87.fff0.00 ATM0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c87.fff0.01 ATM0.1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c87.fff0.02 ATM0.2
47.0091.8100.0000.0040.0b0a.2a81.4000.0c81.8000.00 ATM3/0/0
47.0091.8100.0000.0040.0b0a.2a81.4000.0c81.8010.00 ATM3/0/1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c81.9030.00 ATM-P3/1/3
47.0091.8100.0000.0040.0b0a.2a81.4000.0c82.0000.00 ATM4/0/0
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8210.00 Serial1/0/1:1
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8220.00 Serial1/0/1:2
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8230.00 Serial1/0/1:3
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8200.00 ATM-P1/0/0
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.9000.00 ATM1/1/0
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.9000.71 ATM1/1/0.113
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.9010.00 ATM1/1/1
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.9020.00 ATM1/1/2
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.9030.00 ATM1/1/3
47.0091.8100.0000.00e0.4fac.b401.4000.0c87.fff0.00 ATM0
47.0091.8100.0000.00e0.4fac.b401.4000.0c87.fff0.01 ATM0.1
47.0091.8100.0000.00e0.4fac.b401.4000.0c87.fff0.02 ATM0.2
47.0091.8100.0000.00e0.4fac.b401.4000.0c81.8000.00 ATM3/0/0
47.0091.8100.0000.00e0.4fac.b401.4000.0c81.8010.00 ATM3/0/1
47.0091.8100.0000.00e0.4fac.b401.4000.0c81.9030.00 ATM-P3/1/3
47.0091.8100.0000.00e0.4fac.b401.4000.0c82.0000.00 ATM4/0/0

Soft VC Address(es) for Frame Relay Interfaces:
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.8210.00 Serial1/0/1:1
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.8220.00 Serial1/0/1:2
47.0091.8100.0000.00e0.f75d.0401.4000.0c80.8230.00 Serial1/0/1:3
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.8210.00 Serial1/0/1:1
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.8220.00 Serial1/0/1:2
47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.8230.00 Serial1/0/1:3
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8210.00 Serial1/0/1:1
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8220.00 Serial1/0/1:2
47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8230.00 Serial1/0/1:3
ILMI Switch Prefix(es):
47.0091.8100.0000.00e0.f75d.0401
47.0091.8100.0000.0040.0b0a.2a81
47.0091.8100.0000.00e0.4fac.b401

ILMI Configured Interface Prefix(es):

LECS Address(es):

Switch# show atm addresses

The following example is sample output from the `show atm addresses` command with a soft VC redundancy group configured and displays the active soft VC redundant ATM NSAP address of Switch-A in a dual switch configuration.

Switch-A# show atm addresses

Soft VC Redundant Address(es):
47.0091.8100.0000.00a0.f209.b601.3000.0c88.1080.00 ATM0/0/1(A)
47.0091.8100.0000.00a0.f209.b601.3333.3333.3333.00 ATM0/0/1(A)
11.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/1 ATM0/0/3 - LB
12.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
13.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/0 - LB

A - Active Interface, S - Standby Interface, LB - Load Balance mode

Soft VC Address(es) for Frame Relay Interfaces:

Switch-B# show atm addresses

Soft VC Redundant Address(es):
47.0091.8100.0000.00a0.f209.b601.3000.0c88.1080.00 ATM0/0/1(S)
11.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
15.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/1(S)

A - Active Interface, S - Standby Interface, LB - Load Balance mode

Soft VC Address(es) for Frame Relay Interfaces:

[Information Deleted]
The following `show atm addresses` command displays both the *active* and *standby* soft VC redundant address of a single switch configuration with load balancing configured.

Switch# `show atm addresses`

*Information Deleted*

**Soft VC Redundant Address(es):**
- 47.0091.8100.0000.00a0.f209.b601.3000.0c88.1080.00 ATM0/0/1(A)
- 47.0091.8100.0000.00a0.f209.b601.3333.3333.3333.00 ATM0/0/1(A)
- 11.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/1 ATM0/0/3 – LB
- 12.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/1 ATM0/0/3 – LB
- 13.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00 ATM0/0/1 ima0 ATM0/0/0 – LB

*Information Deleted*

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm address</code></td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><code>nsap-address</code></td>
<td>Used to configure the NSAP-form ATM end-system address of a redundant ATM interface.</td>
</tr>
<tr>
<td>(redundant soft VC)</td>
<td></td>
</tr>
</tbody>
</table>
show atm arp-server

To display the ATM ARP server table, use the **show atm arp-server** command.

```
show atm arp-server atm card/subcard/port[.subinterface]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>Specifies the card, subcard, and port numbers for the ATM interface.</td>
</tr>
<tr>
<td><code>subinterface</code></td>
<td>Specifies the number for the subinterface.</td>
</tr>
</tbody>
</table>

### Command Modes

**EXEC**

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The command only applies to the CPU interface. Use this command to see the ARP server configured on the subinterface CPU.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm aesa gateway</strong></td>
<td>Used to configure an AESA gateway address on an ATM switch router interface that connects to a service provider maintaining a separate ATM addressing plan.</td>
</tr>
</tbody>
</table>
show atm bundle

To display the VC bundle information, use the show atm bundle command.

    show atm bundle name stat

**Syntax Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Specifies the ATM bundle name.</td>
</tr>
<tr>
<td>stat</td>
<td>Displays the VC bundle statistics.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

Release | Modification
---------|-------------------
12.1(14)EB | New command

**Examples**

The following example shows how to display the VC bundle configuration for the bundle named cisco.

Switch# show atm bundle cisco

cisco on ATM9/0/0.1: UP

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>200</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>200</td>
<td>7-5, 3</td>
<td>7-5, 3</td>
<td>2 / Yes</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>201</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>201</td>
<td>4</td>
<td>4</td>
<td>3 / Yes</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>202</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>202</td>
<td>2</td>
<td>2</td>
<td>1 / Yes</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>*2</td>
<td>203</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>203</td>
<td>1-0</td>
<td>1-0</td>
<td>/ Yes</td>
<td>UP</td>
<td></td>
</tr>
</tbody>
</table>

Switch#

The following example shows how to display the VC bundle statistics for the bundle named cisco.

Switch# show atm bundle cisco stat

cisco on ATM9/0/0.1: UP

<table>
<thead>
<tr>
<th>VCI</th>
<th>Rx-cells</th>
<th>Tx-cells</th>
<th>X-Interface</th>
<th>X-VPI</th>
<th>X-VCI</th>
<th>Rx-cells</th>
<th>Tx-cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>3</td>
<td>0</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>200</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>201</td>
<td>0</td>
<td>0</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>201</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>202</td>
<td>0</td>
<td>0</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>202</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>203</td>
<td>0</td>
<td>0</td>
<td>ATM0/0/0.10</td>
<td>10</td>
<td>203</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Switch#

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
show atm connection-traffic-table

To display a table of connection traffic parameters used by network and connection management, use the show atm connection-traffic-table EXEC command.

```
show atm connection-traffic-table [row row-index | from-row row-index]
```

**Syntax Description**
- **row**: Displays a single row by the row-index number.
- **from-row**: Display the entire connection traffic table starting with the row-index.
- **row-index**: Index of the single or starting row, in the range of 1 through 2147483647.

**Defaults**
Display the entire connection traffic table.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added pd (early packet discard) column.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
An asterisk (*) is appended to row indexes created by SNMP but not made active. Because these rows are not active, they cannot be used by connections.

**Examples**
The following example is sample output from the show atm connection-traffic-table command.

```
Switch# show atm connection-traffic-table
Row | Service-category | pcr | scr/mcr | mbs | cdvt | pd
--- | ----------------- | ---- | ------- | ---- |------ |---
1   | ubr              | 7113539 | none    | none | off  |     
2   | cbr              | 424  |        |      |      | off 
3   | vbr-rt           | 424  | 424    | 50   | off  |     
4   | vbr-nrt          | 424  | 424    | 50   | off  |     
5   | abr              | 424  | 0      |      | off  |     
6   | ubr              | 424  | none   |      | off  |     
100 | vbr-nrt          | 81   | 81-0   | 50   | off  |     
200 | vbr-nrt          | 20000| 10000-0| none | on   |     
63999| ubr               | 10000| none   |      | off  |     
64000| ubr              | 15000| none   |      | on   |     
2147483641| vbr-nrt          | 20000| 10000-0| 1024 | off  |     
2147483642| vbr-nrt          | 424  | 424    | 50   | off  |     
2147483643| vbr-nrt          | 424  | 424    | 50   | off  |     
2147483644| vbr-nrt          | 20000| 10000-0| 1024 | on   |     
2147483645| ubr              | 0    | none   |      | off  |     
2147483646| ubr              | 1    | none   |      | off  |     
2147483647| ubr              | 7113539| none   |      | off  |     
```
Table 18-4 describes the fields shown in the display.

### Table 18-4 show atm connection-traffic-table Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row</td>
<td>Index to the connection traffic table.</td>
</tr>
<tr>
<td>Service-category</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>ubr</td>
</tr>
<tr>
<td></td>
<td>cbr</td>
</tr>
<tr>
<td></td>
<td>vbr-rt</td>
</tr>
<tr>
<td></td>
<td>vbr-nrt</td>
</tr>
<tr>
<td></td>
<td>abr</td>
</tr>
<tr>
<td>pcr</td>
<td>The value of the peak cell rate. The peak cell rate is measured in kbps, and is used to transmit whole cells, including the header.</td>
</tr>
<tr>
<td>scr/mcr</td>
<td>The value of the sustained cell rate/maximum cell rate. These values are measured in kbps, and are used to transmit whole cells, including the header.</td>
</tr>
<tr>
<td>mbs</td>
<td>The value of the MBS.</td>
</tr>
<tr>
<td>cdvt</td>
<td>The value of the cell delay variation tolerance.</td>
</tr>
<tr>
<td>pd</td>
<td>The early packet discard configuration on the row.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Used to create a table entry.</td>
</tr>
<tr>
<td>connection-traffic-table</td>
<td></td>
</tr>
<tr>
<td>-row</td>
<td></td>
</tr>
</tbody>
</table>
**show atm filter-expr**

To display a specific ATM filter expression or a summary ATM filter expression, use the `show atm filter-expr` EXEC command.

```
show atm filter-expr name [detail]
```

**Syntax Description**

- `name` Name of the ATM filter expression.
- `detail` Displays more detailed information; must be the last keyword of the command.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following displays assume filter expressions were defined using the commands shown in the example. The names fred, barney, wilma, and betty are all filter sets.

Switch# `atm filter-expr MEN fred or barney`
Switch# `atm filter-expr WOMEN wilma or betty`
Switch# `atm filter-expr ADULTS MEN or WOMEN`

The `show atm filter-expr` command produces the following output.

Switch# `show atm filter-expr`
MEN = fred or barney
WOMEN = wilma or betty
ADULTS = men or women

The `show atm filter-expr detail` command produces the following output.

Switch# `show atm filter-expr detail`
MEN = fred or barney
WOMEN = wilma or betty
ADULTS = (fred or barney) or (wilma or betty)

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm filter-expr</code></td>
<td>Configures an ATM address filter that matches patterns.</td>
</tr>
</tbody>
</table>
show atm filter-set

To display a specific ATM filter set or a summary ATM filter set, use the `show atm filter-set` EXEC command.

```
show atm filter-set name
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the ATM filter set.</td>
</tr>
</tbody>
</table>

### Command Modes

<table>
<thead>
<tr>
<th>Command Modes</th>
<th>EXEC</th>
</tr>
</thead>
</table>

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Examples

The following display assumes the filter sets were defined with the commands shown in the example.

```
Switch# atm filter-set US-OR-NORDUNET 47.0005...
Switch# atm filter-set US-OR-NORDUNET 47.0023...
Switch# atm filter-set LOCAL 49.0003...
```

The following is a sample output from the `show atm filter-set` command.

```
Switch# show atm filter-set
ATM filter set US-OR-NORDUNET
permit 47.0005...
permit 47.0023...
ATM filter set LOCAL
permit 49.0003...
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm filter-set</td>
<td>Creates an ATM address filter set.</td>
</tr>
</tbody>
</table>
show atm ilmi-configuration

To display the switch router configuration, use the `show atm ilmi-configuration` EXEC command.

```
show atm ilmi-configuration
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Displays the information and status about the switch configuration.

**Examples**

The following example is sample output of the `show atm ilmi-configuration` command.

```
Switch# show atm ilmi-configuration
Switch ATM Address (s): 112234456677889901122344556677889900
LECS Address (s): 11223445566778899001122344556677889900
```

Table 18-5 describes the fields shown in the display.

**Table 18-5  show atm ilmi-configuration Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch ATM Address</td>
<td>Displays the current switch router address for the ATM interface.</td>
</tr>
<tr>
<td>LECS Address</td>
<td>Displays the current LECS address for the ATM interface.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm ilmi-enable</code></td>
<td>Enables the ILMI on a port.</td>
</tr>
</tbody>
</table>
show atm ilmi-status

To display the ILMI-related status information, use the **show atm ilmi-status** EXEC command.

    show atm ilmi-status atm card/subcard/port

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>card/subcard/port</strong></td>
<td>Specifies the card, subcard, and port number for the ATM interface.</td>
</tr>
</tbody>
</table>

**Command Modes**

**EXEC**

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output of the **show atm ilmi-status atm** command.

```
Switch# show atm ilmi-status atm 0/1/2

Interface : ATM0/1/2 Interface Type : Private NNI
ILMI VCC : (0, 16) ILMI Keepalive : Disabled
ILMI State: UpAndNormal
Peer IP Addr: 172.20.41.93 Peer IF Name: ATM1/0/3
Peer MaxVPIbits: 8 Peer MaxVCIbits: 14
Peer MaxVPCs: 255 Peer MaxVCCs: 16383
Peer MaxSvccVpi: 255
Peer MinSvccVci: 255
Peer MaxSvpcVpi: 33
Configured Prefix(s) :
47.0091.8100.0000.0040.0b0a.2a81
```

**Table 18-6** describes the fields shown in the display.

**Table 18-6  show atm ilmi-status Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Displays the card, subcard, and port number of the specified ATM interface.</td>
</tr>
<tr>
<td>Interface Type</td>
<td>Displays the type of interface for the specified ATM interface.</td>
</tr>
<tr>
<td>ILMI VCC</td>
<td>Displays the number of the current ILMI VCC for the specified ATM interface.</td>
</tr>
<tr>
<td>ILMI Keepalive</td>
<td>Displays the status of ILMI keepalive packets.</td>
</tr>
<tr>
<td>ILMI State</td>
<td>Displays the status for the ILMI for the specified ATM interface.</td>
</tr>
<tr>
<td>Peer IP Addr</td>
<td>Displays the IP address of the peer.</td>
</tr>
<tr>
<td>Peer IF Name</td>
<td>Displays the card, subcard, and port of the peer interface.</td>
</tr>
<tr>
<td>Peer MaxVPIbits</td>
<td>Displays maximum number of bits allowed for VPIs on the peer interface.</td>
</tr>
<tr>
<td>Peer MaxVCIbits</td>
<td>Displays maximum number of bits allowed for VCIs on the peer interface.</td>
</tr>
<tr>
<td>Peer MaxVPCs</td>
<td>Displays the maximum number of switched and permanent VPCs supported on the peer IME ATM interface.</td>
</tr>
</tbody>
</table>
Chapter 18  Show Commands

Table 18-6  show atm ilmi-status Field Descriptions  (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer MaxVCCs</td>
<td>Displays the maximum number of switched and permanent VCCs supported on the peer IME ATM interface.</td>
</tr>
<tr>
<td>Peer MaxSvpcVpi</td>
<td>Displays the maximum VPI that the signaling stack on the peer IME ATM interface is configured to support for allocation to SVPCs.</td>
</tr>
<tr>
<td>Peer MaxSvccVpi</td>
<td>Displays the maximum VPI that the signaling stack on the peer IME ATM interface is configured to support allocation to SVPCs.</td>
</tr>
<tr>
<td>Peer MinSvccVci</td>
<td>Displays the minimum VCI value that the signaling stack on the peer IME ATM interface is configured to support for allocation to SVCCs. The same value applies to all SVCC VPI values for which the signaling stack is configured.</td>
</tr>
<tr>
<td>Configured Prefix</td>
<td>Displays any prefix for the ATM interface.</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm ilmi-enable</td>
<td>Enables the ILMI on a port.</td>
</tr>
</tbody>
</table>
show atm input-xlate-table

To view ITT utilization, including blocks used and available, and ports to which blocks are allocated, use the `show atm input-xlate-table` EXEC command.

**Catalyst 8540 MSR**

`show atm input-xlate-table [module-id module] [inuse]`

**Catalyst 8510 MSR and Lightstream 1010**

`show atm input-xlate-table [inuse]`

**Syntax Description**

| Command         | Description                                               |
|-----------------|---------------|--------------------------------------------------|
| `inuse`         | Shows a detailed list of in-use blocks by port/VPI.      |
| `module`        | Valid range is from 1 to 8.                              |

**Defaults**

None.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(6)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

The output of the unqualified command shows detail of the free blocks by size and bank, the aggregate free space left, and the location of in-use blocks. The output of the command with the `inuse` keyword shows a detailed list of in-use blocks, by the port/VPI to which they are dedicated.

The output of the `show atm input-xlate-table` command (without the `inuse` keyword) is:

```
8540MSR# show atm input-xlate-table
Input Translation Table Free Blocks:
Block-start Size Bank
  1     1     0
  2     2     0
  4     4     0
  8     8     0
 16    16     0
 32    32     0
 64    64     0
17408 64     0
128   128     0
17536 128     0
256   256     0
17664 256     0
 512   512     0
17920 512     0
```
show atm input-xlate-table

Input Translation Table Total Free = 64350

Input Translation Table In Use (display combines contiguous blocks):
<table>
<thead>
<tr>
<th>Inuse-start</th>
<th>Inuse-end</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>16384</td>
<td>17407</td>
<td>1024</td>
</tr>
<tr>
<td>17472</td>
<td>17535</td>
<td>64</td>
</tr>
<tr>
<td>32768</td>
<td>32768</td>
<td>1</td>
</tr>
<tr>
<td>49216</td>
<td>49247</td>
<td>32</td>
</tr>
<tr>
<td>49280</td>
<td>49343</td>
<td>64</td>
</tr>
</tbody>
</table>

The output of the command with the inuse keyword is:

Switch# show atm input-xlate-table inuse

Interface   VPI  VP/VC Address Size
ATM0/1/0    0    VC  17472   64
ATM0/1/0    2    VP  32768   1
ATM0/1/2    0    VC  49216   32
ATM0/1/2    2    VP  0      1
ATM1/0/0    0    VC  49280   64
ATM1/0/0    9    VC  16384  1024

The following example shows shows the show atm input-xlate-table command (without the inuse keyword).

8540MSR# show atm input-xlate-table
Module 1 Input Translation Table Free Blocks:
<table>
<thead>
<tr>
<th>Block-start</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>1280</td>
<td>128</td>
</tr>
<tr>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>512</td>
<td>512</td>
</tr>
</tbody>
</table>
show atm input-xlate-table

3072          1024
6144          2048
8192          8192
16384         16384

Input Translation Table Total Free = 28736

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start  Inuse-end  Size
0            63          64
1024         1279        256
1408         3071        1664
4096         6143        2048

===============================================

Module 2 Input Translation Table Free Blocks:
0            1024
1024         1024
2048         2048
4096         4096
8192         8192
16384        16384

Input Translation Table Total Free = 32768

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start  Inuse-end  Size
0            63          64
1024         1407        384
3072         6143        3072
16384        32767       16384

===============================================

Module 3 Input Translation Table Free Blocks:
Block-start  Size
64           64
128          128
1408         128
256          256
512          512
1536         512
2048         1024
8192         8192

Input Translation Table Total Free = 12864

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start  Inuse-end  Size
0            63          64
1024         1407        384
3072         6143        3072
16384        32767       16384

===============================================

Module 4 Input Translation Table Free Blocks:
Block-start  Size
0            1024
1024         1024
2048         2048
4096         4096
8192         8192
16384        16384

Input Translation Table Total Free = 32768
Input Translation Table In Use (display combines contiguous blocks):
Inuse-start  Inuse-end  Size
0            63          64
1024         1407        384
3072         6143        3072
16384        32767       16384

===============================================

OL-7395-01, Cisco IOS Release 12.1(26)EB
The output of the command with the `inuse` keyword is:

```
The output of the command with the **inuse** keyword is:

Module 5 Input Translation Table Free Blocks:
Block-start Size
1024   128
1280   256
1536   512
0      1024
2048   2048
4096   4096
8192   8192
16384  16384

Input Translation Table Total Free = 32640

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start Inuse-end Size
1152    1279    128

===============================================

Module 6 Input Translation Table Free Blocks:
Block-start Size
1024   1024
0      1024
2048   2048
4096   4096
8192   8192
16384  16384

Input Translation Table Total Free = 32768

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start Inuse-end Size
1152    1279    128

===============================================

Module 7 Input Translation Table Free Blocks:
Block-start Size
0      1024
1024   1024
2048   2048
4096   4096
8192   8192
16384  16384

Input Translation Table Total Free = 32768

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start Inuse-end Size
1152    1279    128

===============================================

Module 8 Input Translation Table Free Blocks:
Block-start Size
0      1024
1024   1024
2048   2048
4096   4096
8192   8192
16384  16384

Input Translation Table Total Free = 32768

Input Translation Table In Use (display combines contiguous blocks):
Inuse-start Inuse-end Size
1152    1279    128

===============================================
```
### show atm input-xlate-table

```
8540MSR# show atm input-xlate-table inuse

<table>
<thead>
<tr>
<th>Module</th>
<th>Interface</th>
<th>VPI</th>
<th>VP/VC Address</th>
<th>Size</th>
<th>VP-inuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>3</td>
<td>VC 1536</td>
<td>512</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>4</td>
<td>VC 4096</td>
<td>2048</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>5</td>
<td>VC 2048</td>
<td>1024</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>0</td>
<td>VC 1024</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>0</td>
<td>VC 1408</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>2</td>
<td>VC 3072</td>
<td>1024</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>3</td>
<td>VC 1280</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>0</td>
<td>VC 1024</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>2</td>
<td>VC 4096</td>
<td>2048</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>3</td>
<td>VC 16384</td>
<td>16384</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>0</td>
<td>VC 1344</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ATM8/0/0</td>
<td>0</td>
<td>VC 1152</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm input-xlate-table minblock vpi</code></td>
<td>Use to specify the minimum ITT-block size that the software attempts to use to allocate an ITT block.</td>
</tr>
<tr>
<td><code>atm input-xlate-table autominblock</code></td>
<td>Use to enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs.</td>
</tr>
<tr>
<td><code>atm input-xlate-table autoshrink</code></td>
<td>Use to free up ITT memory blocks after high-number VCIs are removed.</td>
</tr>
</tbody>
</table>
show atm input-xlate-table

To view ITT utilization, including blocks used and available and ports to which blocks are allocated, use the `show atm input-xlate-table` command.

```
show atm input-xlate-table [inuse] (LS1010)
show atm input-xlate-table [module-id module] [inuse] (Catalyst 8540MSR)
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>inuse</td>
<td>Shows a detailed list of in-use blocks by port/VPI.</td>
</tr>
<tr>
<td>module</td>
<td>Valid range is from 1 to 8.</td>
</tr>
</tbody>
</table>

### Defaults

None.

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Under normal operation, an ITT block is not resized after a member VC is removed unless it is the only member VC of the ITT block. If the only remaining VC is removed from an ITT block, the block will be freed. When atm input-xlate-table autoshrink is enabled, and a VC is removed from an ITT block, a check is made to determine if the block size could be reduced by a power of two. If the block can be resized, it is done.

### Examples

The output of the unqualified command shows detail of the free blocks by size and bank, the aggregate free space left, and the location of in-use blocks. The output of the command with the `inuse` keyword shows a detailed list of in-use blocks by port/VPI to which they are dedicated.

The output of the unqualified command (without the `inuse` keyword) is:

```
8540MSR# show atm input-xlate-table

Input Translation Table Free Blocks:
Block-start Size  Bank
  1    1    0
  2    2    0
  4    4    0
  8    8    0
 16   16    0
 32   32    0
 64   64    0
17408  64    0
128   128   0
17536  128   0
256   256   0
17664  256   0
```
## show atm input-xlate-table

```
512      512      0
17920    512      0
1024     1024     0
2048     2048     0
18432    2048     0
4096     4096     0
20480    4096     0
8192     8192     0
24576    8192     0
32769    1        1
32770    2        1
32772    4        1
32776    8        1
32784    16       1
32800    32       1
49248    32       1
32832    64       1
49152    64       1
49344    64       1
32896    128      1
33024    256      1
49408    256      1
33280    512      1
49664    512      1
33792    1024     1
50176    1024     1
34816    2048     1
51200    2048     1
36864    4096     1
51248    4096     1
40960    8192     1
57344    8192     1
```

Input Translation Table Total Free = 64350

### Examples

The following example shows shows the `show atm input-xlate-table` command (without the **inuse** keyword).

```
8540MSR# show atm input-xlate-table
```

Module 0 Input Translation Table Free Blocks:
```
  Block-start   Size
```

```
8540MSR# show atm input-xlate-table inuse
```

```
Interface        VPI  VP/VC Address Size
ATM0/1/0         0      VC  17472  64
ATM0/1/0         2      VP  32768  1
ATM0/1/2         0      VC  49216  32
ATM0/1/2         2      VP  0      1
ATM1/0/0         0      VC  49380  64
ATM1/0/0         9      VC  16384  1024
```

The output of the command with the **inuse** keyword is:

```
Switch# show atm input-xlate-table inuse
```

```
Interface        VPI  VP/VC Address Size
ATM0/1/0         0      VC  17472  64
ATM0/1/0         2      VP  32768  1
ATM0/1/2         0      VC  49216  32
ATM0/1/2         2      VP  0      1
ATM1/0/0         0      VC  49380  64
ATM1/0/0         9      VC  16384  1024
```
### Module 1 Input Translation Table Free Blocks:

<table>
<thead>
<tr>
<th>Block-start</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1024</td>
</tr>
<tr>
<td>1024</td>
<td>1024</td>
</tr>
<tr>
<td>2048</td>
<td>2048</td>
</tr>
<tr>
<td>4096</td>
<td>4096</td>
</tr>
<tr>
<td>8192</td>
<td>8192</td>
</tr>
<tr>
<td>16384</td>
<td>16384</td>
</tr>
</tbody>
</table>

Input Translation Table Total Free = 32768

### Module 2 Input Translation Table Free Blocks:

<table>
<thead>
<tr>
<th>Block-start</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>1408</td>
<td>128</td>
</tr>
<tr>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>512</td>
<td>512</td>
</tr>
<tr>
<td>1536</td>
<td>512</td>
</tr>
<tr>
<td>2048</td>
<td>1024</td>
</tr>
<tr>
<td>8192</td>
<td>8192</td>
</tr>
</tbody>
</table>

Input Translation Table Total Free = 12864

### Module 3 Input Translation Table Free Blocks:

<table>
<thead>
<tr>
<th>Block-start</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1024</td>
</tr>
<tr>
<td>1024</td>
<td>1024</td>
</tr>
<tr>
<td>2048</td>
<td>2048</td>
</tr>
<tr>
<td>4096</td>
<td>4096</td>
</tr>
<tr>
<td>8192</td>
<td>8192</td>
</tr>
<tr>
<td>16384</td>
<td>16384</td>
</tr>
</tbody>
</table>
show atm input-xlate-table

Input Translation Table Total Free = 32768
Input Translation Table In Use (display combines contiguous blocks):  
Inuse-start  Inuse-end  Size

======================================================================
Module 4 Input Translation Table Free Blocks:
Block-start  Size
1024        128
1280        256
1536        512
0           1024
2048        2048
4096        4096
8192        8192
16384       16384

Input Translation Table Total Free = 32640
Input Translation Table In Use (display combines contiguous blocks):  
Inuse-start  Inuse-end  Size
1152        1279        128

======================================================================
Block-start  Size
1024        1024
0           1024
2048        2048
4096        4096
8192        8192
16384       16384

Input Translation Table Total Free = 32768
Input Translation Table In Use (display combines contiguous blocks):  
Inuse-start  Inuse-end  Size

======================================================================
Module 6 Input Translation Table Free Blocks:
Block-start  Size
0           1024
1024        1024
2048        2048
4096        4096
8192        8192
16384       16384

Input Translation Table Total Free = 32768
Input Translation Table In Use (display combines contiguous blocks):  
Inuse-start  Inuse-end  Size

======================================================================
Module 7 Input Translation Table Free Blocks:
Block-start  Size
0           1024
1024        1024
2048        2048
4096        4096
8192        8192
16384       16384

Input Translation Table Total Free = 32768
Input Translation Table In Use (display combines contiguous blocks):  
Inuse-start  Inuse-end  Size
The output of the command with the `inuse` keyword is:

```
8540MSR# show atm input-xlate-table inuse
```

<table>
<thead>
<tr>
<th>Module</th>
<th>Interface</th>
<th>VPI</th>
<th>VP/VC Address</th>
<th>Size</th>
<th>VP-inuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>3</td>
<td>VC 1536</td>
<td>512</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>4</td>
<td>VC 4096</td>
<td>2048</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>5</td>
<td>VC 2048</td>
<td>1024</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM0/1/0</td>
<td>0</td>
<td>VC 1024</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ATM4/0/0</td>
<td>0</td>
<td>VC 1408</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>2</td>
<td>VC 3072</td>
<td>1024</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>3</td>
<td>VC 1280</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/0</td>
<td>0</td>
<td>VC 1024</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>2</td>
<td>VC 4096</td>
<td>2048</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>3</td>
<td>VC 16384</td>
<td>16384</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATM2/0/2</td>
<td>0</td>
<td>VC 1344</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ATM8/0/0</td>
<td>0</td>
<td>VC 1152</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm input-xlate-table minblock vpi</code></td>
<td>To specify the minimum ITT-block size that the software attempts to use to allocate an ITT block, use the <code>atm input-xlate-table minblock vpi</code> command. To disable the minblock, use the <code>no</code> form of this command.</td>
</tr>
<tr>
<td><code>atm input-xlate-table autominblock</code></td>
<td>To enable automatic determination of minimum ITT block sizes for all VPIs populated with PVCs/Soft PVC source legs, use the <code>atm input-xlate-table autominblock</code> command. To disable autominblock, use the <code>no</code> form of this command.</td>
</tr>
<tr>
<td><code>atm input-xlate-table autoshrink</code></td>
<td>To free up ITT memory blocks after high-number VCIIs are removed, use the <code>atm input-xlate-table autoshrink</code> command. To disable the autoshrink function, use the <code>no</code> form of this command.</td>
</tr>
</tbody>
</table>
show atm interface

To display ATM-specific information about an ATM interface, use the `show atm interface` EXEC command.

```
show atm interface [atm | atm-p][card/subcard/port,vpt#] [bitmap | status | traffic]
```

**Syntax Description**

- `atm` Specifies an ATM interface.
- `atm-p` Specifies an ATM-P interface.
- `card/subcard/port` Specifies the card, subcard, and port number for the ATM or ATM-P interface.
- `vpt#` Specifies the virtual path tunnel number.
- `imagroup` Specifies the IMA interface group number (0 to 3).
- `bitmap` Displays the ATM interface bitmap.
- `status` Displays the ATM interface status.
- `traffic` Displays the ATM interface cell traffic.

**Command Modes**

EXEC

**Command History**

- **Release** 11.1(4) **Modification** New command

**Usage Guidelines**

If you do not specify a specific interface, all interfaces on the switch are displayed.

**Examples**

The following example is sample output from the `show atm interface` command for ATM interface 3/0/0.

```
Switch# show atm interface atm 2/1/0

Interface: ATM2/1/0     Port-type: oc12suni
IF Status: UP     Admin Status: up
Auto-config: enabled     AutoCfgState: completed
IF-Side: Network     IF-type: NNI
Uni-type: not applicable     Uni-version: not applicable
ConfMaxVpiBits: 12     CurrMaxVpiBits: 8
ConfMaxVc1Bits: 14     CurrMaxVc1Bits: 14
Max-VP: 255     Max-VC: 16383
ConfMaxSvpCvpi: 255     CurrMaxSvpCvpi: 255
ConfMaxSvccVpi: 255     CurrMaxSvccVpi: 255
ConfMinSvccVci: 35     CurrMinSvccVci: 35
Svc Upc Intent: pass     Signalling: Enabled
ATM Address for Soft VC: 47.0091.8100.0000.00d0.58da.de01.4000.0c81.1000.00
```
Configured virtual links:

<table>
<thead>
<tr>
<th>PVCLs</th>
<th>SoftVCLs</th>
<th>SVCLs</th>
<th>TVCLs</th>
<th>PVPLs</th>
<th>SoftVPPLs</th>
<th>SVPLs</th>
<th>Total-Cfgd</th>
<th>Inst-Conns</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>

Logical ports (VP-tunnels): 0

Input cells: 465707  Output cells: 494441

5 minute input rate: 0 bits/sec, 0 cells/sec

5 minute output rate: 0 bits/sec, 0 cells/sec

Table 18-7 describes the fields shown in the display.

Table 18-7  show atm interface Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Displays the card number, subcard number, port number, and VP tunnel number of the interface.</td>
</tr>
<tr>
<td>Port-type</td>
<td>Displays the type of port for the specified ATM interface.</td>
</tr>
<tr>
<td>IF status</td>
<td>Displays the operational status of the specified ATM interface.</td>
</tr>
<tr>
<td>Admin status</td>
<td>Displays the administrative status of the specified ATM interface.</td>
</tr>
<tr>
<td>Auto-config</td>
<td>Displays whether ILMI autoconfiguration is enabled or disabled.</td>
</tr>
<tr>
<td>AutoCfgState</td>
<td>Displays the state of ILMI autoconfiguration for the specified ATM interface.</td>
</tr>
<tr>
<td>IF-side</td>
<td>Displays the interface side for the specified ATM interface.</td>
</tr>
<tr>
<td>IF-type</td>
<td>Displays the type of ATM interface (UNI, NNI, or IISP).</td>
</tr>
<tr>
<td>Uni-type</td>
<td>Displays whether a UNI interface type is public or private.</td>
</tr>
<tr>
<td>Uni-version</td>
<td>Displays the version of a UNI.</td>
</tr>
<tr>
<td>ConfMaxVpiBits</td>
<td>Displays the configured maximum VPI bits.</td>
</tr>
<tr>
<td>CurrMaxVpiBits</td>
<td>Displays the current maximum VPI bits.</td>
</tr>
<tr>
<td>ConfMaxVciBits</td>
<td>Displays the configured maximum VCI bits.</td>
</tr>
<tr>
<td>CurrMaxVciBits</td>
<td>Displays the current maximum VCI bits.</td>
</tr>
<tr>
<td>Max-VP</td>
<td>Displays the maximum number of virtual paths on the specified ATM interface.</td>
</tr>
<tr>
<td>Max-VC</td>
<td>Displays the maximum number of virtual channels on the specified ATM interface.</td>
</tr>
<tr>
<td>ConfMaxSvpcVpi</td>
<td>Displays the maximum VPI that the signaling stack on the ATM interface is configured to support for allocation to SVPCs.</td>
</tr>
<tr>
<td>CurrMaxSvpcVpi</td>
<td>Displays the maximum VPI that the signaling stack on the ATM interface currently supports for allocation to SVPCs.</td>
</tr>
<tr>
<td>ConfMaxSvccVpi</td>
<td>Displays the maximum VPI that the signaling stack on the ATM interface is configured to support for allocation to SVCCs.</td>
</tr>
<tr>
<td>CurrMaxSvccVpi</td>
<td>Displays the maximum VPI that the signaling stack on the ATM interface currently supports for allocation to SVCCs.</td>
</tr>
<tr>
<td>ConfMinSvccVci</td>
<td>Displays the minimum VCI value that the signaling stack is configured to support for allocation to SVCCs.</td>
</tr>
<tr>
<td>CurrMinSvccVci</td>
<td>Displays the minimum VCI value that the signaling stack currently supports for allocation to SVCCs.</td>
</tr>
<tr>
<td>Svc Upc Intent</td>
<td>Displays the intended UPC mode to use for SVCs on the interface.</td>
</tr>
</tbody>
</table>
show atm interface  

Example output:  

Switch# show atm interface atm 0/1/0.2  

Interface: ATM0/1/0.2  Port-type: vp tunnel  
IF Status: UP  Admin Status: up  
Auto-config: enabled  AutoConfigState: waiting for response from peer  
IF-SideNetworkInterface-type: UNI  
Uni-type: PrivateUni-version: V3.1  
Max-VPI-bits: 0  Max-VCI-bits: 10  
Max-VCI-bits: 0  Max-VC: 16383  
ConfMaxSvpcVpi: 255  CurrMaxSvpcVpi: 255  
ConfMaxSvccVpi: 255  CurrMaxSvccVpi: 255  
ConfMinSvccVci: 33  CurrMinSvccVci: 33  
Signalling: Enabled  
ATM Address for Soft VC: 47.0091.8100.0000.0041.0b0a.1581.4000.0c80.1000.02  

Examples:  

The following is sample output from the `show atm interface` command for the subinterface.  

Switch# show atm interface atm 0/0/ima1  

**Table 18-7 show atm interface Field Descriptions (continued)**  

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signalling</td>
<td>Displays whether ILMI signaling is enabled.</td>
</tr>
<tr>
<td>PVCLs</td>
<td>Displays the number of active PVCs for the specified ATM interface.</td>
</tr>
<tr>
<td>PVPLs</td>
<td>Displays the number of active PVPs for the specified ATM interface.</td>
</tr>
<tr>
<td>SoftVCLs</td>
<td>Displays the number of active soft VCLs for the specified ATM interface.</td>
</tr>
<tr>
<td>SVCLs</td>
<td>Displays the number of active switched VCLs for the specified ATM interface.</td>
</tr>
<tr>
<td>SoftVPLs</td>
<td>Displays the number of active soft VPLs for the specified ATM interface.</td>
</tr>
<tr>
<td>SVPLs</td>
<td>Displays the number of active switched VPLs for the specified ATM interface.</td>
</tr>
<tr>
<td>Total-Cfgd</td>
<td>Displays the total number of configured virtual links.</td>
</tr>
<tr>
<td>Inst-Conns</td>
<td>Displays the number of installed connections for the specified ATM interface.</td>
</tr>
<tr>
<td>Input cells</td>
<td>Displays the number of cells received.</td>
</tr>
<tr>
<td>Logical ports (VP-tunnels)</td>
<td>Displays the number of the logical (subinterface) port.</td>
</tr>
<tr>
<td>Output cells</td>
<td>Displays the number of cells sent.</td>
</tr>
<tr>
<td>5 minute input rate</td>
<td>Displays the total number of cells received in 5 minutes, measured in bits per second and cells per second.</td>
</tr>
<tr>
<td>5 minute output rate</td>
<td>Displays the total number of cells sent in 5 minutes, measured in bits per second and cells per second.</td>
</tr>
<tr>
<td>Input, output, and CRC errors</td>
<td>Displays the number of AAL5 packets that were input, output, and had CRC errors for the specified ATM interface.</td>
</tr>
</tbody>
</table>

The following is sample output from the `show atm interface` command for an IMA group.  

Switch# show atm interface atm 0/0/imal
show atm interface

Interface: ATM0/0/ima1      Port-type: imapam_t1_ima
IF Status: UP              Admin Status: up
Auto-config: enabled       AutoCfgState: completed
IF-Side: Network           IF-type: NNI
Uni-type: not applicable   Uni-version: not applicable
ConfMaxVpiBits: 8          CurrMaxVpiBits: 8
ConfMaxVciBits: 14         CurrMaxVciBits: 14
Max-VP: 255                Max-VC: 16383
ConfMaxSvpcVpi: 255        CurrMaxSvpcVpi: 255
ConfMaxSvccVpi: 255        CurrMaxSvccVpi: 255
ConfMinSvccVci: 35         CurrMinSvccVci: 35
Svc Upc Intent: pass       Signalling: Enabled
ATM Address for Soft VC: 47.0091.8100.0000.0040.0b0a.2a81.4000.0c80.0090.00
Configured virtual links:

<table>
<thead>
<tr>
<th>PVCLs</th>
<th>SoftVCLs</th>
<th>SVCLs</th>
<th>TVCLs</th>
<th>PVPLs</th>
<th>SoftVPLs</th>
<th>SVPLs</th>
<th>Total-Cfgd</th>
<th>Inst-Conns</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Logical ports (VP-tunnels): 0
Input cells: 14806          Output cells: 14730
5 minute input rate: 0 bits/sec, 0 cells/sec
5 minute output rate: 0 bits/sec, 0 cells/sec
Input AAL5 pkts: 95217, Output AAL5 pkts: 95193, AAL5 crc errors: 0

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pvp</td>
<td>Used to create a PVP.</td>
</tr>
<tr>
<td>show ip access-lists</td>
<td>Displays the contents of all current IP access lists.</td>
</tr>
<tr>
<td>show atm status</td>
<td>Displays current information about ATM interfaces and the number of installed connections.</td>
</tr>
<tr>
<td>show ima interface</td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
show atm interface resource

To display resource management interface configuration status and statistics, use the show atm interface resource EXEC command.

```
show atm interface resource {atm | atm-p}{card|subcard|port | card/subcard/ima group} [accounting]
```

**Syntax Description**

- **atm** Specifies an ATM interface.
- **atm-p** Specifies an ATM-P interface.
- **card/subcard/port** Specifies the card, subcard, and port number for the ATM or ATM-P interface.
- **ima group** Specifies an IMA group number (0 to 3).
- **accounting** Displays RM interface CAC statistics.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added Per Class OverBooking service category information to the display output.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The show atm interface resource command displays different information depending on the type of interface:

- external physical interface
- subinterface
- CPU interface

**Examples**

**Catalyst 8540 MSR**

The following example shows the resource management information displayed by the show atm interface resource command for a physical interface.

```
Switch# show atm interface resource atm 0/0/1
Resource Management configuration:
   Service Classes:
      Service Category map: none cbr, c2 vbr-rt, c3 vbr-nrt, c4 abr, c5 ubr
      Scheduling: WRR c2, WRR c3, WRR c4, WRR c5
      WRR Weight: 15 c2, 2 c3, 2 c4, 2 c5
      Interface Traffic Shaping Configuration: Disabled
      CAC Configuration to account for Framing Overhead: Disabled
      Pacing: disabled 0 Kbps rate configured, 0 Kbps rate installed
      overbooking: disabled
      Per Class OverBooking:
         vbr-rt: disabled, vbr-nrt: disabled
         abr: 140%, ubr: disabled
```
Service Categories supported: cbr, vbr-rt, vbr-nrt, abr, ubr
Link Distance: 0 kilometers

Controlled Link sharing:
- Max aggregate guaranteed services: none RX, none TX
- Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX
- Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX

Best effort connection limit: disabled 0 max connections

Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
- Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
- Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
- Sustained-cell-rate: none vbr RX, none vbr TX
- Minimum-cell-rate RX: none abr, none ubr
- Minimum-cell-rate TX: none abr, none ubr
- CDVT RX: none cbr, none vbr, none abr, none ubr
- CDVT TX: none cbr, none vbr, none abr, none ubr
- MBS: none vbr RX, none vbr TX

Resource Management state:
- Traffic Shaper Interface MaxThreshold (in cell buffers):
  - Currently Installed: 2816, Value On Next Reset: 2816
- Traffic Shaper Interface queue cell count: 0
- Available bit rates (in Kbps):
  - 147743 cbr RX, 147743 cbr TX, 147743 vbr RX, 147743 vbr TX, 147743 abr RX, 147743 abr TX, 147743 ubr RX, 147743 ubr TX
- Allocated bit rates:
  - 0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX, 0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
- Best effort connections: 0 pvcs, 0 svcs

Catalyst 8540 MSR

The following example shows the resource management information displayed by the `show atm interface resource` command for OC-48c ports only.

Switch# show atm interface resource atm 11/0/0

Resource Management configuration:
- Service Categories supported: cbr, vbr-rt, vbr-nrt, abr, ubr
- Link Distance: 0 kilometers
- Controlled Link sharing:
  - Max aggregate guaranteed services: none RX, none TX
  - Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX
  - Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX

Best effort connection limit: disabled 0 max connections

Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
- Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
- Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
- Sustained-cell-rate: none vbr RX, none vbr TX
- Minimum-cell-rate RX: none abr, none ubr
- Minimum-cell-rate TX: none abr, none ubr
- CDVT RX: none cbr, none vbr, none abr, none ubr
- CDVT TX: none cbr, none vbr, none abr, none ubr
show atm interface resource

MBS: none vbr RX, none vbr TX

Resource Management state:
Scheduler 1:
Available bit rates (in Kbps):
590975 cbr TX, 590975 vbr TX, 590975 abr TX, 590975 ubr TX
Allocated bit rates (in Kbps):
0 cbr TX, 0 vbr TX, 0 abr TX, 0 ubr TX
Scheduler 2:
Available bit rates (in Kbps):
590975 cbr TX, 590975 vbr TX, 590975 abr TX, 590975 ubr TX
Allocated bit rates (in Kbps):
0 cbr TX, 0 vbr TX, 0 abr TX, 0 ubr TX
Scheduler 3:
Available bit rates (in Kbps):
590975 cbr TX, 590975 vbr TX, 590975 abr TX, 590975 ubr TX
Allocated bit rates (in Kbps):
0 cbr TX, 0 vbr TX, 0 abr TX, 0 ubr TX
Scheduler 4:
Available bit rates (in Kbps):
590975 cbr TX, 590975 vbr TX, 590975 abr TX, 590975 ubr TX
Allocated bit rates (in Kbps):
0 cbr TX, 0 vbr TX, 0 abr TX, 0 ubr TX

Available bit rates (in Kbps):
2363903 cbr RX, 2363903 vbr RX, 2363903 vbr TX, 2363903 abr RX, 2363903 abr TX, 2363903 ubr RX, 2363903 ubr TX
Allocated bit rates:
0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX, 0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX

Best effort connections: 0 pvcs, 0 svcs

Examples

Catalyst 8510 MSR and LightStream 1010

The following example shows the resource management information displayed by
the show atm interface resource command for a physical interface with an FC-PCQ installed.

Switch# show atm interface resource atm 1/1/0

Resource Management configuration:
Service Classes:
Service Category map: c2 cbr, c2 vbr-rt, c3 vbr-nrt, c4 abr, c5 ubr
Scheduling: RS c1 WRR c2, WRR c3, WRR c4, WRR c5
WRR Weight: 15 c2, 2 c3, 2 c4, 2 c5
CAC Configuration to account for Framing Overhead : Disabled
Pacing: disabled 0 Kbps rate configured, 0 Kbps rate installed
Service Categories supported: cbr,vbr-rt,vbr-nrt,abr,ubr
Link Distance: 0 kilometers

Controlled Link sharing:
Max aggregate guaranteed services: none RX, none TX
Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX
Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX, none abr RX, none abr TX, none ubr RX, none ubr TX
Best effort connection limit: disabled 0 max connections

Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
Sustained-cell-rate: none vbr RX, none vbr TX
Minimum-cell-rate RX: none abr, none ubr
Minimum-cell-rate TX: none abr, none ubr
CDVT RX: none cbr, none vbr, none abr, none ubr
CDVT TX: none cbr, none vbr, none abr, none ubr
MBS: none vbr RX, none vbr TX
Resource Management state:
Available bit rates (in Kbps):
  147743 cbr RX, 147743 cbr TX, 147743 vbr RX, 147743 vbr TX,
  147743 abr RX, 147743 abr TX, 147743 ubr RX, 147743 ubr TX
Allocated bit rates:
  0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Best effort connections: 1 pvcs, 0 svcs

Examples

The following example shows the resource management information displayed by the 
show atm interface resource command with the accounting parameter.

Switch# show atm interface resource atm 3/1/0 accounting
RCAC result statistics (by request service category):
cbr:
  0 satisfied, 0 no bandwidth, 0 delay
  0 loss, 0 delay variation, 0 traffic parameter
vbr-rt:
  3 satisfied, 0 unsupported combination, 0 no bandwidth
  0 delay, 0 loss, 0 delay variation
  0 traffic parameter
vbr-nrt:
  0 satisfied, 0 unsupported combination, 0 no bandwidth
  0 loss, 0 traffic parameter
abr:
  0 satisfied, 0 traffic parameter, 0 best effort limit
ubr:
  0 satisfied, 0 traffic parameter, 0 best effort limit

The following example shows the resource management information displayed by the 
show atm interface resource command for an IMA interface.

Switch# show atm interface resource atm 0/0/ima1
Resource Management configuration:
Service Classes:
  Service Category map: c2 cbr, c2 vbr-rt, c3 vbr-nrt, c4 abr, c5 ubr
  Scheduling: RS c1 WRR c2, WRR c3, WRR c4, WRR c5
  WRR Weight: 15 c2, 2 c3, 2 c4, 2 c5
CAC Configuration to account for Framing Overhead : Disabled
Pacing: disabled  0 Kbps rate configured, 0 Kbps rate installed
Service Categories supported: cbr,vbr-rt,vbr-nrt,abr,ubr
Link Distance: 0 kilometers
Controlled Link sharing:
  Max aggregate guaranteed services: none RX, none TX
  Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
  none abr RX, none abr TX, none ubr RX, none ubr TX
  Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
  none abr RX, none abr TX, none ubr RX, none ubr TX
Best effort connection limit: disabled  0 max connections
Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
  Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
  Sustained-cell-rate: none vbr RX, none vbr TX
  Minimum-cell-rate RX: none abr, none ubr
  Minimum-cell-rate TX: none abr, none ubr
  CDVT RX: none cbr, none vbr, none abr, none ubr
  CDVT TX: none cbr, none vbr, none abr, none ubr
  MBS: none vbr RX, none vbr TX
Resource Management state:
Available bit rates (in Kbps):
  4340 cbr RX, 4340 cbr TX, 4340 vbr RX, 4340 vbr TX,
  4340 abr RX, 4340 abr TX, 4340 ubr RX, 4340 ubr TX
Available bit rates for SVCs (in Kbps):
4340 cbr RX, 4340 cbr TX, 4340 vbr RX, 4340 vbr TX,
4340 abr RX, 4340 abr TX, 4340 ubr RX, 4340 ubr TX

Allocated bit rates:
0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX

Best effort connections: 0 pvcs, 0 svcs

Table 18-8 describes the field values shown in the previous displays.

**Table 18-8** show atm interface resource Management Field Values

<table>
<thead>
<tr>
<th>Field</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service category map</td>
<td>The service category-to-variable map.</td>
</tr>
<tr>
<td>Scheduling</td>
<td>Type of scheduling used by each service category.</td>
</tr>
<tr>
<td>WRR Weight</td>
<td>The weighted round-robin weight used by each service category configured for weighted round-robin scheduling.</td>
</tr>
<tr>
<td>Pacing</td>
<td>The status of pacing (enabled or disabled) and the rate in kbps.</td>
</tr>
<tr>
<td>Link distance</td>
<td>The link distance in kilometers.</td>
</tr>
<tr>
<td>Max aggregate guaranteed services</td>
<td>The maximum aggregate guaranteed services bandwidth allocatable to connections, expressed in percent of the bandwidth on the interface in a particular direction.</td>
</tr>
<tr>
<td>Max bandwidth</td>
<td>The maximum bandwidth allocatable to connections of a particular service type, expressed in percent of the bandwidth on the interface in a particular direction.</td>
</tr>
<tr>
<td>Min bandwidth</td>
<td>The minimum bandwidth allocatable to connections of a particular service type, expressed in percent of the bandwidth on the interface in a particular direction.</td>
</tr>
<tr>
<td>Best effort connection limit</td>
<td>The maximum number of best effort connections.</td>
</tr>
<tr>
<td>Peak-cell-rate RX</td>
<td>The peak receive cell rate by service category.</td>
</tr>
<tr>
<td>Peak-cell-rate TX</td>
<td>The peak transmit cell rate by service category.</td>
</tr>
<tr>
<td>Sustained-cell-rate</td>
<td>The sustained cell rate by service category.</td>
</tr>
<tr>
<td>Tolerance RX</td>
<td>The receive tolerance (cell delay variation or maximum burst size) by service category.</td>
</tr>
<tr>
<td>Tolerance TX</td>
<td>The transmit tolerance (cell delay variation or maximum burst size) by service category.</td>
</tr>
<tr>
<td>Available bit rates (in kbps)</td>
<td>The transmit and receive bit rates available by service category in kbps.</td>
</tr>
<tr>
<td>Allocated bit rates</td>
<td>The transmit and receive bit rates allocated by service category in kbps.</td>
</tr>
<tr>
<td>Best effort connections</td>
<td>The number of PVC and SVC best-effort connections.</td>
</tr>
</tbody>
</table>
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm cac best-effort-limit</td>
<td>Changes or sets the interface limit on the number of best-effort connections.</td>
</tr>
<tr>
<td>atm cac framing overhead</td>
<td>Instructs CAC to consider framing overhead.</td>
</tr>
<tr>
<td>atm cac link-sharing</td>
<td>Changes the resource management interface controlled link-sharing parameters.</td>
</tr>
<tr>
<td>atm cac max-cdvt</td>
<td>Configures the maximum CDVT (per service category and direction) allowed for a connection on an interface by CAC.</td>
</tr>
<tr>
<td>atm cac max-mbs</td>
<td>Changes the interface maximum for incoming and outgoing MBS at connection startup.</td>
</tr>
<tr>
<td>atm cac max-min-cell-rate</td>
<td>Configures the maximum MCR for ABR and UBR service category traffic flowing into and out of the switch.</td>
</tr>
<tr>
<td>atm cac max-peak-cell-rate</td>
<td>Configures the maximum PCR for specific service categories and traffic directions.</td>
</tr>
<tr>
<td>atm cac max-sustained-cell-rate</td>
<td>Configures the maximum SCR for traffic flow in either direction.</td>
</tr>
<tr>
<td>atm cac overbooking</td>
<td>Configures overbooking on an ATM or IMA interface.</td>
</tr>
<tr>
<td>atm cac service-category</td>
<td>Permits or denies a service category on an ATM physical interface, shaped VP tunnel subinterface, or hierarchical VP tunnel subinterface.</td>
</tr>
<tr>
<td>atm link-distance</td>
<td>Alters the propagation delay component of the cell-transfer delay offered by an interface.</td>
</tr>
<tr>
<td>atm output-queue (Catalyst 8510 MSR and LightStream 1010)</td>
<td>Changes the maximum queue size of the output queue.</td>
</tr>
<tr>
<td>atm output-threshold (Catalyst 8510 MSR and LightStream 1010)</td>
<td>Changes the output queue thresholds.</td>
</tr>
<tr>
<td>atm pacing</td>
<td>Enables or changes the artificial limitation on interface output rate.</td>
</tr>
</tbody>
</table>
show atm map

To display the list of all configured ATM static maps to remote hosts on an ATM network, use the show atm map EXEC command.

show atm map

Syntax Description
This command has no arguments or keywords.

Command Modes
EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the show atm map command.

Switch# show atm map
Map list ab: PERMANENT
ip 1.1.1.1 maps to VC 200

The following example is sample output from the show atm map command for a multipoint connection.

Switch# show atm map
Map list atm_pri: PERMANENT
ip 4.4.4.4 maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, multipoint connection up, VC 6
ip 4.4.4.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, connection up, VC 15, multipoint connection up, VC 6

Map list atm_ipx: PERMANENT
ipx 1004.dddd.dddd.dddd maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, multipoint connection up, VC 8
ipx 1004.cccc.cccc.cccc maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, multipoint connection up, VC 8

Map list atm_apple: PERMANENT
appletalk 62000.5 maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, multipoint connection up, VC 4
appletalk 62000.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast, aal5mux, multipoint connection up, VC 4

Table 18-9 describes the fields shown in the display.
### Table 18-9  show atm map Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map list</td>
<td>Name of map list.</td>
</tr>
<tr>
<td>PERMANENT</td>
<td>This map entry was entered from configuration; it was not entered automatically by a process.</td>
</tr>
<tr>
<td>protocol address maps to VC x or protocol address maps to NSAP...</td>
<td>Name of protocol, the protocol address, and the VCD or NSAP the address is mapped.</td>
</tr>
<tr>
<td>broadcast</td>
<td>Indicates pseudo-broadcasting.</td>
</tr>
<tr>
<td>aal5mux</td>
<td>Indicates the encapsulation used, a multipoint or point-to-point virtual connection, and the number of the virtual connection.</td>
</tr>
<tr>
<td>multipoint connection up</td>
<td>Indicates that this is a multipoint virtual connection.</td>
</tr>
<tr>
<td>VC 6</td>
<td>Number of the virtual connection.</td>
</tr>
<tr>
<td>Connection up</td>
<td>Indicates a point-to-point virtual connection.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pvc</td>
<td>Used to create a PVC.</td>
</tr>
<tr>
<td>map-list</td>
<td>Defines an ATM map statement for either a PVC or SVC.</td>
</tr>
</tbody>
</table>
show atm pnni aesa embedded-number

To show the E.164 AESAs with the E.164 AFI to the left-justified encoding format, use the `show atm pnni aesa embedded-number` privileged EXEC command.

```
show atm pnni aesa embedded-number

show atm pnni aesa embedded-number prefix
```

**Syntax Description**

| prefix       | E.164 AFI portion of the E.164 AESA. |

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays E.164 AESAs with the E.164 AFI to the left-justified encoding format.

**Examples**

The following example is sample output from the `show atm pnni aesa embedded-number` command, without the prefix specified.

```
Switch# show atm pnni aesa embedded-number
AESA embedded-number is left-justified.
```

The following example is sample output from the `show atm pnni aesa embedded-number` command, with the prefix specified.

```
Switch# show atm pnni aesa embedded-number 45001234
AESA embedded-number is left-justified.
Translating 45.0012.34/32 to 45.1234/24
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug atm pnni</code></td>
<td>Enables PNNI debugging output.</td>
</tr>
</tbody>
</table>
show atm pnni aggregation link

To show the aggregated PNNI links on the switch, use the `show atm pnni aggregation link` privileged EXEC command.

```
show atm pnni aggregation link [local-node node-index] [aggregation-detail | border-detail]
```

**Syntax Description**

- **local-node**: Specifies the PNNI local node, where higher-level induced links are generated.
- **node-index**: Index number of the PNNI local node, in the range of 1 to 8.
- **aggregation-detail**: Displays the aggregation table with aggregated metrics for the higher-level induced links.
- **border-detail**: Displays the aggregation table with all border uplink metrics.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the aggregation table(s) for PNNI links.

**Examples**

The following example is sample output from the `show atm pnni aggregation link` command.

```
Switch# show atm pnni aggregation link
PNNI link aggregation for local-node 2 (level=44, name=rhino18.2.44)
Configured aggregation modes (per service class):
  CBR VBR-RT VBR-NRT ABR UBR
  ~~~~~~~~~~~~ ~~~~~~~~~~~  ~~~~~~~~~~~  ~~~~~~~~~~~  ~~~~~~~~~~~
  best-link best-link best-link best-link best-link
Aggregated outside links from child peer group:
Upnode Number: 10 Upnode Name: rhino27.2.44
  AggToken InducPort BorderPort Border Node(No./Name)
  ~~~~~~~~~ ~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~~~~~~
  0 02202000 ATM0/1/2 1 rhino18
Upnode Number: 11 Upnode Name: Switch.3.32
  AggToken InducPort BorderPort Border Node(No./Name)
  ~~~~~~~~~ ~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~~~~~~
  0 02CF2000 ATM0/0/2 1 rhino18
  5 02CF2005 ATM0/0/2.4 9 ls1010-1
  8197 02CF22A1 ATM0/0/1 9 ls1010-1
PNNI link aggregation for local-node 3 (level=32, name=rhino18.3.32)
Configured aggregation modes (per service class):
  CBR VBR-RT VBR-NRT ABR UBR
  ~~~~~~~~~~~~ ~~~~~~~~~~~  ~~~~~~~~~~~  ~~~~~~~~~~~  ~~~~~~~~~~~
  best-link best-link best-link best-link best-link
Aggregated outside links from child peer group:
Upnode Number: 11 Upnode Name: Switch.3.32
  AggToken InducPort BorderPort Border Node(No./Name)
  ~~~~~~~~~ ~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~~~~~~
```
show atm pnni aggregation link

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>03CF2000</td>
<td>2CF2000</td>
<td>2 rhino18.2.44</td>
</tr>
<tr>
<td>5</td>
<td>03CF2005</td>
<td>2CF2005</td>
<td>2 rhino18.2.44</td>
</tr>
<tr>
<td>8197</td>
<td>03CF22A1</td>
<td>2CF22A1</td>
<td>2 rhino18.2.44</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni aggregation-token</td>
<td>Specifies the aggregation token for a PNNI interface.</td>
</tr>
</tbody>
</table>
show atm pnni aggregation node

To show the PNNI nodal aggregation tables for a complex node, use the show atm pnni aggregation node privileged EXEC command.

```
show atm pnni aggregation node [local-node node-index] [border-detail | exception-detail [port hex-port-id [port2 hex-port-id]]]
```

### Syntax Description

- **local-node** Specifies the complex PNNI local node.
- **node-index** Index number of the PNNI local node, in the range of 2 to 8.
- **border-detail** Displays the border path table with path metrics between all pairs of border nodes in the child peer group.
- **exception-detail** Displays the complex node radius, spokes, and exception bypasses.
- **port hex-port-id** Displays the calculated metrics for all spokes and bypasses connected to the specified port. The metrics also display for nonexception spokes or bypasses.
- **port2 hex-port-id** Specifies the second port of a port pair and displays the metrics for a single spoke or bypass.

### Command Modes

Privileged EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command displays the aggregation table(s) for a complex PNNI local node.

### Examples

The following example is sample output from the show atm pnni aggregation node command.

```
Switch# show atm pnni aggregation node
PNNI nodal aggregation for local-node 2 (level=56, child PG level=60)
Complex node representation, exception threshold: 60%

Configured nodal aggregation modes (per service class):
CBR VBR-RT VBR-NRT ABR UBR
~~~~~~~~~~~ ~~~~~~~~~~~ ~~~~~~~~~~~ ~~~~~~~~~~~ ~~~~~~~~~~~
best-link best-link best-link best-link aggressive

Summary Complex Node Port List:
Port ID Rem Inn Agg-Token Border Cnt In-Spoke Out-Spoke Agg-Accur
~~~~~~~~ ~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~~
21FB000 12 0 1 default default ok
2371000 13 0 1 default default ok

Summary Complex Node Bypass Pairs List (exception bypass pairs only)
/-------- LOWER PORT ID -------\ /-------- HIGHER PORT ID -------\
Port ID Rem Inn Agg-Token Inacc Port ID Rem Inn Agg-Token Inacc Exceptns
-------- ~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~ ~~~~~~~~~
```
show atm pnni aggregation node

21FB000 12 0 no 2371000 13 0 no fwd rev

Table 18-10 describes field descriptions for the show atm pnni aggregation node command.

Table 18-10 show atm pnni aggregation node Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port ID = 0</td>
<td>Represents the nucleus.</td>
</tr>
<tr>
<td>Agg-Accur</td>
<td>Displays the aggregation accuracy of the aggregated links.</td>
</tr>
<tr>
<td>Inacc</td>
<td>Indicates the state of the aggregation accuracy, either yes or no. If the aggregated links are on different border nodes that are distant from one another, it might not be possible to accurately represent their spoke and bypass metrics with a single set of metrics. In this case, they are shown as inaccurate.</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the show atm pnni aggregation node exception-detail command.

Switch# show atm pnni aggregation node exception-detail
PNNI nodal aggregation for local-node 2 (level=56, child PG level=60)
Complex node representation, exception threshold: 60%

Metrics for Complex Node Default Radius (input 0x0, output 0x0):

<table>
<thead>
<tr>
<th>vp capable</th>
<th>maxcr</th>
<th>avcr</th>
<th>ctd</th>
<th>cdv</th>
<th>clr0</th>
<th>clr01</th>
<th>aw</th>
<th>crm</th>
<th>vf</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>155519</td>
<td>147743</td>
<td>128</td>
<td>115</td>
<td>10</td>
<td>10</td>
<td>4200</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>VBR-RT</td>
<td>155519</td>
<td>155519</td>
<td>589</td>
<td>576</td>
<td>8</td>
<td>8</td>
<td>4200</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>VBR-NRT</td>
<td>155519</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>8</td>
<td>8</td>
<td>4200</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ABR</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>UBR</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>3360</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Detailed Complex Node Bypass Pairs List (exception bypass pairs only)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Port ID</td>
<td>Rem Inn</td>
<td>Agg-Token</td>
<td>Inacc</td>
<td>Port ID</td>
<td>Rem Inn</td>
<td>Agg-Token</td>
<td>Inacc</td>
<td>Exceptns</td>
</tr>
<tr>
<td>21FB000</td>
<td>12</td>
<td>no</td>
<td>2371000</td>
<td>13</td>
<td>0</td>
<td>no</td>
<td>fwd rev</td>
<td></td>
</tr>
</tbody>
</table>

Remote nodes for this port pair:
21FB000 2371000 Remote Node (No./Name)
------- ------- ------------------
remote   12 pnni-09.2.56
remote   13 pnni-11

Border nodes for this port pair:
21FB000 2371000 Border Node (No./Name)
------- ------- ------------------
border   1 pnni-14
border   9 pnni-12

Metrics for Complex Node Bypass (input 0x21FB000, output 0x2371000):

<table>
<thead>
<tr>
<th>vp capable</th>
<th>maxcr</th>
<th>avcr</th>
<th>ctd</th>
<th>cdv</th>
<th>clr0</th>
<th>clr01</th>
<th>aw</th>
<th>crm</th>
<th>vf</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>155519</td>
<td>147743</td>
<td>154</td>
<td>138</td>
<td>10</td>
<td>10</td>
<td>5040</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>VBR-RT</td>
<td>155519</td>
<td>155519</td>
<td>707</td>
<td>691</td>
<td>8</td>
<td>8</td>
<td>5040</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>VBR-NRT</td>
<td>155519</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>8</td>
<td>8</td>
<td>5040</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ABR</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>5040</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>UBR</td>
<td>155519</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>
Metrics for Complex Node Bypass (input 0x2371000, output 0x21FB000):

```
vp capable
  maxcr  avcr  ctd  cdv   clr0  clr01  aw   crm   vf
CBR     155519  147743  154  138  10   10   5040  n/a   n/a
VBR-RT  155519  155519  707  691   8    8    5040  ---   ---
VBR-NRT 155519  155519  n/a  n/a   8    8    5040  ---   ---
ABR     155519  0     n/a  n/a  n/a  n/a  5040  n/a   n/a
UBR     155519  n/a  n/a  n/a  n/a  n/a  5040  n/a   n/a
```

The following example is sample output from the `show atm pnni aggregation node border-detail` command.

```
Switch# show atm pnni aggregation node border-detail
Nodal aggregation is complex for local-node 2 (level=56, name=pnni-14.2.56),
No of border nodes 2,
Table version 13 active for 07:05:31 [hh:mm:ss]

Configured nodal aggregation modes (per service class):

```
  CBR    VBR-RT    VBR-NRT    ABR    UBR
  ------- ------- ------- ------- -------
  best-link best-link best-link best-link aggressive
```

Inter Border-Node Metric Table

```
From border 1  ---> border 9   [pnni-14-->pnni-12]
vp capable, (vp_cap_flags=0x1F)
  maxcr  avcr  ctd  cdv   clr0  clr01  aw   crm   vf
CBR     155519  147743  154  138  10   10   5040  n/a   n/a
VBR-RT  155519  155519  707  691   8    8    5040  ---   ---
VBR-NRT 155519  155519  n/a  n/a   8    8    5040  ---   ---
ABR     155519  0     n/a  n/a  n/a  n/a  5040  n/a   n/a
UBR     155519  n/a  n/a  n/a  n/a  n/a  5040  n/a   n/a

From border 9  ---> border 1   [pnni-12-->pnni-14]
vp capable, (vp_cap_flags=0x1F)
  maxcr  avcr  ctd  cdv   clr0  clr01  aw   crm   vf
CBR     155519  147743  154  138  10   10   5040  n/a   n/a
VBR-RT  155519  155519  707  691   8    8    5040  ---   ---
VBR-NRT 155519  155519  n/a  n/a   8    8    5040  ---   ---
ABR     155519  0     n/a  n/a  n/a  n/a  5040  n/a   n/a
UBR     155519  n/a  n/a  n/a  n/a  n/a  5040  n/a   n/a
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni aggregation-token</td>
<td>Specifies the aggregation token for a PNNI interface.</td>
</tr>
<tr>
<td>nodal-representation</td>
<td>Specifies the type of PNNI LGN representation.</td>
</tr>
</tbody>
</table>
show atm pnni background routes

To show the precalculated background route table to other PNNI nodes, use the `show atm pnni background routes` EXEC command.

```
show atm pnni background routes [internal-node-num] [abr | cbr | vbr_rt | vbr_nrt | ubr] [admin-weight | cdv | ctd]
```

### Syntax Description

- **internal-node-num**: Shows the background route tables for the node specified by this internal node number.
- **abr**: Shows the background route tables for the available bit rate service category.
- **cbr**: Shows the background route tables for the constant bit rate service category.
- **vbr_rt**: Shows the background route tables for the real-time variable bit rate service category.
- **vbr_nrt**: Shows the background route tables for the non-real-time variable bit rate service category.
- **ubr**: Shows the background route tables for the unspecified bit rate service category.
- **admin-weight**: Shows the background route tables based on administrative weight as the primary metric.
- **cdv**: Shows the background route tables based on cell delay variation as the primary metric.
- **ctd**: Shows the background route tables based on cell transfer delay as the primary metric.

### Command Modes

**EXEC**

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>Modified: changed to <code>show atm pnni background routes</code>.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use this command to display routes from the background route tables to all known nodes in the PNNI network.

This command filters based on service category or metric information.

### Examples

The following example is sample output from the `show atm pnni background routes` command.

```
Switch# show atm pnni background routes cbr admin-weight
Background Routes From CBR/AW Table
----------------------------------------
1 Routes To Node 2
```
1. Hops 2. 1:ATM1/1/0 -> 3:ATM0/1/1 -> 2
   ->: aw 10080  cdv 276  ctd 308  acr 147743  clr0 10  clr01 0
   <-: aw 10080  cdv 276  ctd 308  acr 147743  clr0 10  clr01 0

1 Routes To Node 3
1. Hops 1. 1:ATM1/1/0 -> 3
   ->: aw 5040  cdv 138  ctd 154  acr 147743  clr0 10  clr01 0
   <-: aw 5040  cdv 138  ctd 154  acr 147743  clr0 10  clr01 0

1 Routes To Node 4
1. Hops 1. 1:ATM1/1/0 -> 3:ATM0/0/2 -> 4
   ->: aw 10080  cdv 276  ctd 308  acr 147743  clr0 10  clr01 0
   <-: aw 10080  cdv 276  ctd 308  acr 147743  clr0 10  clr01 0

3 Routes To Node 5
1. Hops 3. 1:ATM1/1/0 -> 3:ATM0/0/2 -> 4:ATM1/0/0 -> 5
   ->: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0
   <-: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0
2. Hops 3. 1:ATM1/1/0 -> 3:ATM0/0/2 -> 4:ATM0/1/0 -> 5
   ->: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0
   <-: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0
3. Hops 3. 1:ATM1/1/0 -> 3:ATM0/0/2 -> 4:ATM1/0/3 -> 5
   ->: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0
   <-: aw 15120  cdv 414  ctd 462  acr 147743  clr0 10  clr01 0

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>background-routes-enable</td>
<td>Enables background route computation and specifies how often the switch polls for a significant change that activates a new computation of the background routes.</td>
</tr>
</tbody>
</table>
show atm pnni background status

To show the status of background route computation activity, use the `show atm pnni background status` privileged EXEC command.

```
show atm pnni background status
```

Syntax Description

This command has no keywords or arguments.

Command Modes

Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <code>bg status</code></td>
</tr>
<tr>
<td>11.2(5)</td>
<td>Modified: changed to <code>show atm pnni background status</code></td>
</tr>
</tbody>
</table>

Usage Guidelines

This command displays the status of the background SPF activity.

Examples

The following example is sample output from the `show atm pnni background status` command.

```
Switch# show atm pnni background status
Background Route Computation is Enabled
Background Interval is set at 10 seconds
Background Insignificant Threshold is set at 32
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>background-routes-enable</code></td>
<td>Enables background route computation and specifies how often the switch polls for a significant change that activates a new computation of the background routes.</td>
</tr>
</tbody>
</table>
show atm pnni database

To display the contents of the PNNI topology database, use the show atm pnni database EXEC command.

```
show atm pnni database [internal-node-number [ptse-id] | local-node node-index] [detail]
```

### Syntax Description

- **internal-node-number**: Displays information about a specified node (1 to 255).
- **ptse-id**: Displays information about a specified PTSE (1 to 4294967295) on a node.
- **node-index**: Index number of the PNNI local node to which the command applies, in the range of 1 to 8.
- **detail**: Displays more detailed information and is used as the last keyword of the command.

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
</table>

### Usage Guidelines

The topology database is the collection of PTSEs that the PNNI node gathered from the network.

To display the mapping of `internal-node-number` to PNNI node identifier and node name, use the show atm pnni identifiers command.

Use this command without the `detail` keyword to display identifying information about each PTSE.

Use the `detail` keyword to display information about the contents of the PTSEs, including nodal information, internal reachable addresses, exterior reachable addresses, and horizontal links.

- Nodal information includes the node’s ATM address, leadership priority, and which node the current node accepts as a peer group leader.
- Internal reachable addresses are attached to the PNNI routing domain.
- Exterior reachable addresses can be accessed outside the scope of the PNNI routing domain, for example, through static routes configured on IISP interfaces.
- Horizontal links are between PNNI nodes that belong to the same peer group.

For information on specific PTSE types and their use, refer to the ATM Forum PNNI 1.0 specification, af-pnni-0055.000.

### Examples

The following example is sample output from the show atm pnni database command.

```
Switch# show atm pnni database
Node 1 ID 56:160:47.00918100000000603E7B3201.00603E7B3201.00 (name: Switch20)

PTSE ID  Length  Type  Seq no.  Checksum  Lifetime  Description
```
show atm pnni database

1 92 97 228 3191 2232 Nodal info
2 52 224 29123 31376 3307 Int. Reachable Address
3 52 256 181 51057 1845 Ext. Reachable Address
4 188 288 61 29561 3068 Horizontal Link

Node 2 ID 56:160:47.009181000000003DDE74601.0003DDE74601.00 (name: Switch22)

PTSE ID Length Type Seq no. Checksum Lifetime Description
1 92 97 889 4149 2563 Nodal info
2 52 224 98986 37349 2504 Int. Reachable Address
3 72 256 918 49460 3043 Ext. Reachable Address
4 156 288 63 45295 2668 Horizontal Link

Type 97 (Nodal info), Length 48
ATM address 47.00918100000000603E7B3201.00603E7B3201.00
priority 0, leader bit NOT SET
preferred PGL: 0:0:0.000000000000000000000000.000000000000.00

The following example is sample output using the detail option with this command.
Switch# show atm pnni database 1 detail
Node 1 ID 56:160:47.00918100000000603E7B3201.00603E7B3201.00 (name: Switch20)

PTSE ID Length Type Seq no. Checksum Lifetime Description
1 92 97 229 3190 1854 Nodal info
Time to refresh 269, time to originate 0
Type 97 (Nodal info), Length 48
ATM address 47.00918100000000603E7B3201.00603E7B3201.00
priority 0, leader bit NOT SET
preferred PGL: 0:0:0.000000000000000000000000.000000000000.00

2 52 224 29124 31375 2387 Int. Reachable Address
Time to refresh 1023, time to originate 0
Type 224 (Int. Reachable Address), Length 32, Port 0, vp capable
Scope (level) 0, Address info length (ail) 16, Address info count 1
Pfx: 47.0091.8100.0000.0060.3E7B.3201..., length 104

3 52 256 183 51055 2744 Ext. Reachable Address
Time to refresh 1135, time to originate 0
Type 256 (Ext. Reachable Address), Length 32, Port 0, vp capable
Scope (level) 0, Address info length (ail) 16, Address info count 1
Pfx: 47.0091.8100.0000.0003.dde7.4601..., length 104

4 188 288 62 29560 2297 Horizontal Link
Time to refresh 835, time to originate 0
Type 288 (Horizontal Link), Length 168, vp capable
Remote Node: 56:160:47.009181000000003DDE74601.0003DDE74601.00
Local port 80002000, Remote port 81802000, Aggregation token 0
Metric:
Type 128, length 32, Traffic class: 0x8800 ( CBR UBR )
  MCR 155519, ACR 147743, CTD 154, CDV 138, CLR0 10, CLR01 10, AW 5040
Type 128, length 32, Traffic class: 0x4000 ( VBR-RT )
  MCR 155519, ACR 155519, CTD 707, CDV 691, CLR0 8, CLR01 8, AW 5040
Type 128, length 32, Traffic class: 0x2000 ( VBR-NRT )
  MCR 155519, ACR 155519, CTD n/a, CDV n/a, CLR0 8, CLR01 8, AW 5040
Type 128, length 32, Traffic class: 0x1000 ( ABR )
  MCR 155519, ACR 0, CTD n/a, CDV n/a, CLR0 n/a, CLR01 n/a, AW 5040
show atm pnni election

To display information relevant to the PNNI peer group leader election process, use the show atm pnni election EXEC command.

    show atm pnni election [local-node node-index] [peers]

Syntax Description

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>node-index</td>
<td>Index number of the PNNI local node to which the command applies, in the range of 1 to 8.</td>
</tr>
<tr>
<td>peers</td>
<td>Displays the leadership priority and preferred PGL as advertised by all peers in the peer group.</td>
</tr>
</tbody>
</table>

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Usage Guidelines

Using the show atm pnni election EXEC command without the peer keyword only displays the local information that pertains to the node’s PGL election.

Examples

The following example is sample output from the show atm pnni election command.

Switch# show atm pnni election
PGL Status................: Not PGL
Preferred PGL.............: Switch20
Preferred PGL Priority.: 64
Active PGL...............: Not PGL
Active PGL Priority....: 64
Current FSM State.......: PGLE Operating: Not PGL
Last FSM State.........: PGLE Calculating
Last FSM Event.........: Preferred PGL Is Not Self
Configured Priority....: 0
Advertised Priority....: 0
Conf. Parent Node Index: NONE
Hello Startup Factor...: 5
PGL Init Interval......: 15 secs
Search Peer Interval...: 75 secs
Re-election Interval...: 15 secs
Override Delay.........: 30 secs

Examples

The following example is sample output from the show atm pnni election peers command.

Switch# show atm pnni election peers
<table>
<thead>
<tr>
<th>Node</th>
<th>Leadership Priority</th>
<th>Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>2</td>
<td>64</td>
<td>Switch20</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>Switch20</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>Switch20</td>
</tr>
</tbody>
</table>
show atm pnni explicit-paths

To display a summary of explicit paths that have been configured, use the **show atm pnni explicit-paths** command.

```
show atm pnni explicit-path [name path-name | identifier path-id] [upto index] [detail]
```

**Syntax Description**

- **name path-name**: Specifies the path name for which explicit path information is to be displayed.
- **identifier path-id**: Specifies the path ID for which explicit path information is to be displayed.
- **upto index**: Specifies the path entry index up to which the routable status is calculated.
- **detail**: Displays full path information with any known errors and warnings for each entry.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

To limit the display to a specific path, use the **name** option. The path information includes the “routable” status, which is based on an actual UBR explicit path calculation to the last included node entry.

Use the **upto** option for troubleshooting explicit paths that are shown as not routable. The routable status is only calculated up to the specified path entry index, which allows you to isolate the first failing path entry.

Use the **detail** option to list the full paths, along with any known errors or warnings associated with each entry.

**Examples**

The following example shows how to display a summary of explicit paths.

```
Switch# show atm pnni explicit-paths
Summary of configured Explicit Paths:
PathId Status    UpTo Routable AdminWt Explicit Path Name
------- -------- ------ -------- ----------------- -----------------
  1       enabled  3        yes    10040    dallas_4.path1
  2       enabled  6        yes    15120    chicago_2.path1
  3       enabled  2        yes    10080    chicago_2.path2
  4       enabled  2        yes    20595    new_york.path1
```

The following example shows how to display the detailed configuration, including any known warnings and error messages, for a non-routable explicit path named **new_york.path2**.
Switch# `show atm pnni explicit-paths name new_york.path2 detail`

<table>
<thead>
<tr>
<th>PathId</th>
<th>Status</th>
<th>UpTo</th>
<th>Routable</th>
<th>AdminWt</th>
<th>Explicit Path Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>enabled</td>
<td>4</td>
<td>no</td>
<td>0</td>
<td>new_york.path2</td>
</tr>
</tbody>
</table>

PNNI routing err_code for UBR call = 6 (PNNI_DEST_UNREACHABLE)

<table>
<thead>
<tr>
<th>Entry Type</th>
<th>Node [Port] specifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>next-node dallas_2</td>
</tr>
<tr>
<td>2</td>
<td>next-node dallas_4 port 80000004</td>
</tr>
<tr>
<td></td>
<td>Warning: Entry index 2 specifies a non-routable port</td>
</tr>
<tr>
<td>3</td>
<td>next-node wash_dc_1</td>
</tr>
<tr>
<td></td>
<td>Warning: Entry index 3 has no connectivity from prior node</td>
</tr>
<tr>
<td>4</td>
<td>segment new_york.2.40</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni</code></td>
<td>Displays a summary of explicit paths that have been configured.</td>
</tr>
<tr>
<td><code>explicit-paths</code></td>
<td></td>
</tr>
</tbody>
</table>
show atm pnni hierarchy

To show the PNNI hierarchy, use the `show atm pnni hierarchy` privileged EXEC command.

```
show atm pnni hierarchy [network [detail] | local-configured]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>network</code></td>
<td>Shows the PGLs and higher-level PNNI ancestor LGNs that are active throughout the PNNI routing domain, as visible from this node.</td>
</tr>
<tr>
<td><code>detail</code></td>
<td>Shows more detailed network hierarchy information.</td>
</tr>
<tr>
<td><code>local-configured</code></td>
<td>Shows only the locally configured nodes and parent nodes on this system.</td>
</tr>
</tbody>
</table>

**Defaults**

`local-configured`

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the configured PNNI hierarchy and its status.

**Examples**

The following example is sample output from the `show atm pnni hierarchy` command.

```
Switch# show atm pnni hierarchy
Locally configured parent nodes:

<table>
<thead>
<tr>
<th>Node</th>
<th>Local-node Status</th>
<th>Node Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Enabled/ Running</td>
<td>xxxxxx-1</td>
</tr>
<tr>
<td>2</td>
<td>Enabled/ Not Running</td>
<td>xxxxxx-1.2.44</td>
</tr>
<tr>
<td>3</td>
<td>Enabled/ Not Running</td>
<td>xxxxxx-1.3.28</td>
</tr>
</tbody>
</table>
```

The following example is sample output from the `show atm pnni hierarchy network` command.

```
Switch# show atm pnni hierarchy network
Summary of active parent LGNs in the routing domain:

<table>
<thead>
<tr>
<th>Node</th>
<th>Parent</th>
<th>Node Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>xxxxxx-1</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>xxxxxx18.2.44</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>xxxxxx27.3.32</td>
</tr>
</tbody>
</table>
```

**Examples**

The following example is sample output from the `show atm pnni hierarchy network detail` command.

```
Switch# show atm pnni hierarchy network detail
```
Detailed hierarchy network display:
Number Of Network LGN Ancestors: 2

Lowest Level (60) information:
Node No......: 1    Node Name: xxxxxx-1
Node's ID....: 60:160:47.0091810000000060705BD9A5.0060705BD900.00
Node's Addr.: 47.0091810000000060705BD9A5.0060705BD900.01
Node's PG ID: 60:47.0091.8100.0000.0000.0000.0000
PGL No.......: 9    PGL Name: xxxxx18
PGL ID.......: 60:160:47.009181000000613E7B2F01.00613E7B2F99.00

Level 44 ancestor information:
Parent LGN..: 10   LGN Name: xxxxx18.2.44
LGN's ID.....: 44:60:47.009181000000000000000000.00613E7B2F99.00
LGN's Addr..: 47.00918100000000613E7B2F01.00613E7B2F99.02
LGN's PG ID.: 44:47.0091.8100.0000.0000.0000.0000
LGN PGL No..: 11   LGN PGL Name: xxxxx27.2.44
LGN's PGL ID: 44:68:47.009181000000400B0A3081.00

Level 32 ancestor information:
Parent LGN..: 12   LGN Name: xxxxx27.3.32
LGN's ID.....: 32:44:47.009181000000000000000000.00400B0A3081.00
LGN's Addr..: 47.00918100000000400B0A3081.00400B0A3081.03
LGN's PG ID.: 32:47.0091.8100.0000.0000.0000.0000
LGN PGL No.: Unelected or unknown
LGN's PGL ID: 0:0:0.000000000000000000000000.0000000000

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>next-node</td>
<td></td>
<td>Specifies the next adjacent entry in a fully-specified ATM PNNI explicit path.</td>
</tr>
<tr>
<td>Figure 15-1par</td>
<td></td>
<td>Specifies the PNNI local node index of the parent node.</td>
</tr>
</tbody>
</table>
**show atm pnni identifiers**

To display the mapping from the local internal node numbers to the global PNNI node identifiers and node names, use the `show atm pnni identifiers` privileged EXEC command.

`show atm pnni identifiers [internal-node-number | local-node node-index]`

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>internal-node-number</td>
<td>Displays the mapping from the specified internal node number to its PNNI node identifier.</td>
</tr>
<tr>
<td>node-index</td>
<td>Index number of the PNNI local node to which the command applies, in the range of 1 to 8.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Because PNNI node identifiers are long, the PNNI implementation has mapped them into internal node numbers. The internal node numbers are used to display the topology in a compact fashion.

**Examples**

The following example is sample output from the `show atm pnni identifiers` command.

```
Switch# show atm pnni identifiers
Node Node Id                                             Name
  1  56:160:47.009181000000000603E7B3201.00603E7B3201.00  Switch20
  2  56:160:47.0091810000000003DDE74601.0003DDE74601.00  Switch22
```
show atm pnni interface

To display specific information about an interface or to list the interfaces running on a PNNI node, use the `show atm pnni interface` EXEC command.

```
show atm pnni interface [local-node node-index | hex-port-id | atm card/subcard/port] [detail]
```

### Syntax Description

- **node-index**: Index number of the PNNI local node to which the command applies, in the range of 1 to 8.
- **hex-port-id**: Identifier in hexadecimal notation of the port to show.
- **card/subcard/port**: Card, subcard, and port number of the PNNI interface.
- **detail**: Displays detailed information and is used as the last keyword of the command.

### Command Modes

- **EXEC**
- **Privileged EXEC**

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use the `show atm pnni interface` command to display information about the status of the PNNI interfaces and the Hello protocol run over the PNNI interfaces.

For a description of the Hello states and timers, refer to the ATM Forum PNNI 1.0 specification, af-pnni-0055.000.

### Examples

The following example is sample output using the `detail` option of the `show atm pnni interface` command.

```
Switch# show atm pnni interface atm 0/0/2 detail

Port ATM0/0/2 RCC is up , Hello state common_out with node SanFran.BldA.T4
Next hello occurs in 1 seconds, Dead timer fires in 63 seconds
  CBR : AW 5040 MCR 155519 ACR 147743 CTD 135 CDV 138 CLR0 10 CLR01 10
  VBR-RT : AW 5040 MCR 155519 ACR 155519 CTD 707 CDV 691 CLR0 8 CLR01 8
  VBR-NRT: AW 5040 MCR 155519 ACR 155519 CLR0 8 CLR01 8
  ABR : AW 5040 MCR 155519 ACR 0
  UBR : AW 5040 MCR 155519

Aggregation Token: configured 0 , derived 2, remote 2
  Tx ULIA seg# 1, Rx ULIA seg# 1, Tx NHL seg# 2, Rx NHL seg# 1
  Remote node ID 72:160:47.009144556677223310111266.00603E7B2001.00
  Remote node address 47.009144556677223310111266.00603E7B2001.01
  Remote port ID ATM0/0/3 (80003000) (0)
  Common peer group ID 56:47.0091.4455.6677.0000.0000.0000
  Upnode ID 56:72:47.00914455667722331000000000000.00603E7B2001.00
  Upnode Address 47.009144556677223310111266.00603E7B2001.02
  Upnode number: 10 Upnode Name: SanFran
```
show atm pnni local-node

To display information about a PNNI logical node running on the switch, use the `show atm pnni local-node` privileged EXEC command.

```
show atm pnni local-node [node-index]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>node-index</code></td>
<td>Displays information about a specific PNNI logical node running on this switch, in the range of 1 to 8.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `show atm pnni local-node` command displays information about the PNNI node and its status.

**Examples**

The following example is sample output from the `show atm pnni local-node` command.

```
Switch# show atm pnni local-node
PNNI node 1 is enabled and running
   System address 47.009144556677114410111255.00603E5BC401.00
   Node ID 72:160:47.009144556677114410111255.00603E5BC401.00
   Peer group ID 72:47.0091.4455.6677.1144.0000.0000
   Level 72, Priority 45 95, No. of interfaces 3, No. of neighbors 1
   Parent Node Index: 2
   Node Allows Transit Calls
   Node Representation: simple
   Hello interval 15 sec, inactivity factor 5,
   Hello hold-down 10 tenths of sec
   Ack-delay 10 tenths of sec, retransmit interval 5 sec,
   Resource poll interval 5 sec
   SVCC integrity times: calling 35 sec, called 50 sec,
   Horizontal Link inactivity time 120 sec,
   PTSE refresh interval 1800 sec, lifetime factor 200 percent,
   Min PTSE interval 10 tenths of sec
   Auto summarization: on, Supported PNNI versions: newest 1, oldest 1
   Default administrative weight mode: uniform
   Max admin weight percentage: -1
   Next resource poll in 3 seconds
   Max PTSEs requested per PTSE request packet: 32
   Redistributing static routes: Yes
```
show atm pnni mobility-info

Displays information regarding lowest node and logical nodes associated with PNNI mobility.

show atm pnni mobility-info

Syntax Description

None

Defaults

No default.

Command Modes

Privileged EXEC, EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

None.

Examples

The example below shows how to display PNNI mobile information using the show atm pnni mobility-info command.

Switch# show atm pnni mobility-info
Local Mobile Interface(s):
Local Port SS Remote Potential source of ONHL
----------------- -- ------ ---------------------------
ATM0/1/0 -- n/a No, Not a mobile interface
ATM0/1/2 3 Mobile Yes, Sources ONHL
Lowest Node 1 Mobility Information:
Mobile LGN joined ind rcvd: Yes
Mobile LGN's child PGL inn: 1
Mobile LGN's joined PG ID : 72:47.0091.3333.3333.3333.0000.0000
Logical Node 1 Mobility Information:
Leader/Mobile LGN Status : PGL
Node is Mobile LGN's child: Yes
Parent Mobile LGN joined?: Yes
Parent Mobile LGN host PG : 72:47.0091.3333.3333.3333.0000.0000
Passing up ONHL from node : 1
Logical Node 2 Mobility Information:
Leader/Mobile LGN Status : Mobile LGN
Cfdg highest join level : 0 (default)
Cfdg default peer group ID: Not configured
Mobile LGN host PG joined?: Yes
Mobile LGN's joined PG ID : 72:47.0091.3333.3333.3333.0000.0000
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm address</td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td>atm pnni mobile</td>
<td>Used to specify a PNNI interface as mobile.</td>
</tr>
<tr>
<td>atm pnni nodal-hierarchy-list highest-level</td>
<td>Specifies highest level of PNNI hierarchy to be advertised to bordering networks.</td>
</tr>
<tr>
<td>atm router pnni</td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td>debug atm pnni mobility</td>
<td>Prints an error notification if ATM PNNI mobile problems are detected and the <code>debug atm pnni mobility</code> command is enabled.</td>
</tr>
<tr>
<td>node</td>
<td>Creates, enables or disables switch nodes as well as specifies or changes node level.</td>
</tr>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
<tr>
<td>show atm pnni node</td>
<td>Shows whether PNNI nodes are enabled and running, and shows node configuration information.</td>
</tr>
</tbody>
</table>
show atm pnni neighbor

To list PNNI neighboring peers for a switch router, use the show atm pnni neighbor EXEC command.

```
show atm pnni neighbor [local-node node-index]
```

**Syntax Description**

| node-index | Index number of the PNNI local node to which the command applies, in the range of 1 to 8. |

**Command Modes**

- EXEC
- Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The show atm pnni neighbor command displays information about adjacencies. Multiple links can be connected to the same neighboring peer. The output from this command displays all PNNI interfaces to each neighboring peer, including the local port, the remote port, and the Hello state for each interface. Based on the port identifiers, PNNI derives the port string if the remote switch is an ATM switch router. The switch may not translate the port identifier into a meaningful string (such as ATM 3/0/0) if the remote switch is not an ATM switch router. For this reason, both the port string and the port identifier are displayed. At any time only one interface to each neighboring peer is used for flooding PTSEs. This interface is identified as (Flooding Port) in the command output.

**Examples**

The following example is sample output from the show atm pnni neighbor command.

```
Switch# show atm pnni neighbor local-node 1

Neighbors For Node (Index 1, Level 72)

Neighbor Name: NewYork.BldB.T1, Node number: 12
Neighbor Node Id: 72:160:47.009144556677114410111233.00603E7B3A01.00
Neighboring Peer State: Full

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
Link Selection Set To: minimize blocking of future calls
Port Remote Port Id Hello state
ATM0/1/3 ATM1/1/3 2way_in (Flooding Port)
```
show atm pnni node

To display PNNI nodes that are enabled and running, and to show node configuration information, use the show atm pnni node command

show atm pnni node

Syntax Description
None

Defaults
No default.

Command Modes
Privileged EXEC, EXEC

Command History
Release        Modification
12.1(7a)EY     New command

Usage Guidelines
None.

Examples
The example below shows how to display PNNI node information.

Switch# show atm pnni node
PNNI node 1 is enabled and running
Node name: T3
System address 47.009144556677114410173322.00603E899901.01
Node ID 96:160:47.009144556677114410173322.00603E899901.00
Peer group ID 96:47.0091.4455.6677.1144.1017.3300
Level 96, Priority 60 110, No. of interfaces 2, No. of neighbors 1
Parent Node Index: 2
Node Allows Transit Calls
Node Representation: simple
Hello interval 15 sec, inactivity factor 5,
Hello hold-down 10 tenths of sec
Ack-delay 10 tenths of sec, retransmit interval 5 sec,
Resource poll interval 5 sec
SVCC integrity times: calling 35 sec, called 50 sec,
Horizontal Link inactivity time 120 sec,
PTSE refresh interval 1800 sec, lifetime factor 200 percent,
Min PTSE interval 10 tenths of sec
Auto summarization: on, Supported PNNI versions: newest 1, oldest 1
Default administrative weight mode: uniform
Max admin weight percentage: -1
Next resource poll in 2 seconds
Max PTSEs requested per PTSE request packet: 32
Redistributing static routes: Yes
Max number of (internal) nodes in topology: 1032
PNNI node 2 is enabled and running
Node name: T3.2.72
System address 47.009144556677114410173322.00603E899901.02
show atm pnni node

Node ID 72:96:47.00914455677114410173300.00603E899901.00
Peer group ID 72:47.0091.3333.3333.3333.0000.0000
Level 72, Priority 0 0, No. of interfaces 0, No. of neighbors 1
Parent Node Index: NONE
Node Allows Transit Calls
Node Representation: simple
Hello interval 15 sec, inactivity factor 5,
Hello hold-down 10 tenths of sec
Ack-delay 10 tenths of sec, retransmit interval 5 sec,
Resource poll interval 5 sec
SVCC integrity times: calling 35 sec, called 50 sec,
Horizontal Link inactivity time 120 sec,
PTSE refresh interval 1800 sec, lifetime factor 200 percent,
Min PTSE interval 10 tenths of sec
Auto summarization: on, Supported PNNI versions: newest 1, oldest 1
Default administrative weight mode: uniform
Max admin weight percentage: -1
Max PTSEs requested per PTSE request packet: 32
Redistributing static routes: No
Node is the mobile LGN. Highest join level: 0
Default PGID: 0:00.0000.0000.0000.0000

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm address</strong></td>
<td>Used to assign a 20-byte ATM address to the switch router.</td>
</tr>
<tr>
<td><strong>atm pnni mobile</strong></td>
<td>Used to specify a PNNI interface as mobile.</td>
</tr>
<tr>
<td><strong>atm pnni nodal-hierarchy-list highest-level</strong></td>
<td>Specifies highest level of PNNI hierarchy within a fixed network to be advertised to mobile networks.</td>
</tr>
<tr>
<td><strong>atm router pnni</strong></td>
<td>Used to enter PNNI configuration mode.</td>
</tr>
<tr>
<td><strong>debug atm pnni mobility</strong></td>
<td>Sends an error notification if ATM PNNI mobile problems are detected and the <code>debug atm pnni mobility</code> command is enabled.</td>
</tr>
<tr>
<td><strong>node</strong></td>
<td>Creates, enables or disables switch nodes as well as specifies or changes node level.</td>
</tr>
<tr>
<td><strong>show atm pnni local-node</strong></td>
<td>Displays information about a PNNI logical node running on a switch router.</td>
</tr>
<tr>
<td><strong>show atm pnni mobility-info</strong></td>
<td>Displays lowest node and logical node information associated with PNNI mobility.</td>
</tr>
</tbody>
</table>
show atm pnni precedence

To show the current PNNI prefix priorities for routing, use the `show atm pnni precedence` privileged EXEC configuration command.

```
show atm pnni precedence
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The following example is sample output from the `show atm pnni precedence` command.

```
Switch# show atm pnni precedence

Working       Default
Prefix Poa Type Priority  Priority
------------------------ -------- --------
local-internal                  1         1
static-local-internal-metrics   2         2
static-local-exterior           3         3
static-local-exterior-metrics   2         2
pnni-remote-internal            2         2
pnni-remote-internal-metrics    2         2
pnni-remote-exterior            4         4
pnni-remote-exterior-metrics    2         2
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>precedence (PNNI configuration)</td>
<td>Configures the precedence of different types of reachable addresses.</td>
</tr>
</tbody>
</table>
show atm pnni resource-info

To display information about routing parameters of all PNNI interfaces received from a resource management module, use the show atm pnni resource-info EXEC command.

    show atm pnni resource-info [hex-port-id] [atm card/subcard/port] [local-node node-index]

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>hex-port-id</td>
<td>Hexadecimal port ID value.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number for the specified ATM interface.</td>
</tr>
<tr>
<td>node-index</td>
<td>Index number of the PNNI local node, in the range of 1 to 8.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>Modified: changed to show atm pnni resource-info.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command is used to display information about the MCR, ACR, CTD, CDV, and CLR for a specific port. Only applicable information is displayed.

- MCR is the maximum cell rate, measured in cells.
- ACR is the available cell rate, measured in cells.
- CTD is the cell transfer delay, measured in microseconds.
- CDV is the cell rate delay variation, in microseconds.
- CLR is the cell loss ratio exponent (for example, 10 means 10exp(-10)).
- [a,b] are the low and high thresholds for the PNNI insignificant change for applicable parameters.

**Examples**

The following example is sample output from the show atm pnni resource-info command.

```
Switch# show atm pnni resource-info
acr pm 50, acr mt 3, cdv pm 25, ctd pm 50, rm poll interval 5 sec
Interface insignificant change bounds:
ATM0/1/0, port ID 80100000
  CBR   : MCR 155519 ACR 147743 [73871,155519] CTD 154 [77,231]
          CDV 138 [104,172] CLR0 10 CLR01 10
  VBR-RT : MCR 155519 ACR 155519 [77759,155519] CTD 707 [354,1060]
          CDV 691 [519,863] CLR0 8 CLR01 8
  VBR-NRT: MCR 155519 ACR 155519 [77759,155519] CLR0 8 CLR01 8
  UBR    : MCR 155519
ATM0/1/3, port ID 80103000
  CBR   : MCR 155519 ACR 147743 [73871,155519] CTD 154 [77,231]
          CDV 138 [104,172] CLR0 10 CLR01 10
  VBR-RT : MCR 155519 ACR 155519 [77759,155519] CTD 707 [354,1060]
          CDV 691 [519,863] CLR0 8 CLR01 8
  VBR-NRT: MCR 155519 ACR 155519 [77759,155519] CLR0 8 CLR01 8
```
show atm pnni resource-info

UBR : MCR 155519
ATM1/0/0, port ID 80800000
CBR : MCR 155519 ACR 147743 [73871,155519] CTD 154 [77,231]
   CDV 138 [104,172] CLR0 10 CLR01 10
VBR-RT : MCR 155519 ACR 155519 [77759,155519] CTD 707 [354,1060]
   CDV 691 [519,863] CLR0 8 CLR01 8
VBR-NRT: MCR 155519 ACR 155519 [77759,155519] CLR0 8 CLR01 8
UBR : MCR 155519

ATM1/0/3, port ID 80803000
CBR : MCR 155519 ACR 147743 [73871,155519] CTD 154 [77,231]
   CDV 138 [104,172] CLR0 10 CLR01 10
VBR-RT : MCR 155519 ACR 155519 [77759,155519] CTD 707 [354,1060]
   CDV 691 [519,863] CLR0 8 CLR01 8
VBR-NRT: MCR 155519 ACR 155519 [77759,155519] CLR0 8 CLR01 8
UBR : MCR 155519
show atm pnni scope

To display the mapping from organizational scope values—used at UNI interfaces—to PNNI scope (in terms of PNNI routing level indicators), use the show atm pnni scope privileged EXEC command.

show atm pnni scope

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

This command groups ranges of organization scope values that map to the same PNNI level. The following example is sample output from the show atm pnni scope privileged EXEC command.

```
Switch# show atm pnni scope
UNI scope   PNNI Level
---------   ----------
(1  - 10)      56
(11 - 12)      48
(13 - 14)      32
(15 - 15)      0
Scope mode: automatic
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>scope map</td>
<td>Specifies the mapping from a range of organizational scope values (used at UNI interfaces) to a PNNI scope value (such as PNNI routing-level indicators).</td>
</tr>
<tr>
<td>scope mode</td>
<td>Specifies the configuration mode of the mapping from organizational scope values (used at UNI interfaces) to PNNI scope (such as PNNI routing-level indicators).</td>
</tr>
</tbody>
</table>
show atm pnni statistics

To display PNNI statistics, use the `show atm pnni statistics` EXEC command.

```
show atm pnni statistics call
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>call</td>
<td>Displays the PNNI call statistics.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays statistics related to path selection, for example, number of crankbacks, number of calls set up, number of calls serviced by the background tree, on-demand calculation, and PTSE exchanges, such as number of incoming PTSEs per minute or number of PTSEs retransmitted.

**Examples**

The following example is sample output from the `show atm pnni statistics call` command.

```
Switch# show atm pnni statistics call
pnni routing call statistics since 00:04:58

<table>
<thead>
<tr>
<th></th>
<th>total</th>
<th>chr</th>
<th>rtvbr</th>
<th>nrtvbr</th>
<th>abr</th>
<th>ubr</th>
</tr>
</thead>
<tbody>
<tr>
<td>source route reqs</td>
<td>137</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>137</td>
</tr>
<tr>
<td>successful</td>
<td>110</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>110</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>crankback reqs</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>successful</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>intraswitch routes</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>on-demand attempts</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>successful</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>background lookups</td>
<td>76</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>76</td>
</tr>
<tr>
<td>successful</td>
<td>76</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>76</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>next port requests</td>
<td>81</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>81</td>
</tr>
<tr>
<td>successful</td>
<td>66</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>66</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>total</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>usecs in queue</td>
<td>74890</td>
<td>546</td>
</tr>
<tr>
<td>usecs in dijkstra</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>usecs in routing</td>
<td>38991</td>
<td>284</td>
</tr>
</tbody>
</table>
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>stopbits</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show atm pnni summary

To display summary information advertised by PNNI nodes, use the `show atm pnni summary` privileged EXEC command.

```
show atm pnni summary [local-node node-index]
```

**Syntax Description**

| node-index | Index number of the PNNI local node to which the command applies, in the range of 1 to 8. Use this option to restrict the display to a single node. |

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show atm pnni summary` command.

```
Switch# show atm pnni summary

Codes: Node - Node index advertising this summary
       Type - Summary type (INT - internal, EXT - exterior)
       Sup - Suppressed flag (Y - Yes, N - No)
       Auto - Auto Summary flag (Y - Yes, N - No)
       Adv - Advertised flag (Y - Yes, N - No)
       C.M - Creation Mode (A - Auto, C - Configured).

<table>
<thead>
<tr>
<th>Node</th>
<th>Type</th>
<th>Sup</th>
<th>Auto</th>
<th>Adv</th>
<th>Summary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Int</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>47.0091.8100.0000.0060.3e7b.3101/104</td>
</tr>
<tr>
<td>1</td>
<td>Int</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>aa.bbcc/24</td>
</tr>
<tr>
<td>1</td>
<td>Int</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>bb.ccdd/24</td>
</tr>
<tr>
<td>1</td>
<td>Ext</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>cc.ddee/24</td>
</tr>
<tr>
<td>1</td>
<td>Ext</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>dd.eeff/24</td>
</tr>
<tr>
<td>2</td>
<td>Int</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>11.2233.4455.6677.88/64</td>
</tr>
<tr>
<td>3</td>
<td>Ext</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>44.4444.444/36</td>
</tr>
</tbody>
</table>
```
show atm pnni svcc-rcc

To display information about the SVCC RCCs on PNNI local nodes, use the `show atm pnni svcc-rcc` privileged EXEC command.

```
show atm pnni svcc-rcc [local-node node-index | remote-node internal-node-num] [detail]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>node-index</td>
<td>Index number of the PNNI local node to which the command applies, in the range of 1 to 8.</td>
</tr>
<tr>
<td>internal-node-num</td>
<td>Internal node number of the PNNI remote node.</td>
</tr>
<tr>
<td>detail</td>
<td>Displays detailed SVCC RCC information; must be the last keyword.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays information about the SVCC RCCs on one or more PNNI local nodes.

**Examples**

The following example is sample output from the `show atm pnni svcc-rcc` command.

```
Switch# show atm pnni svcc-rcc
PNNI VCC-CSS(s) for local-node 2 (level=64):
  Rem-Node RCC Hello St Exit Port  VPI  VCI  HrzLns Rem-Node name
          ~~~~~ ~~~~~~~~ ~~~~~~~~~~~ ~~~~ ~~~~~ ~~~~~~~~~~~~~
   12 UP 2way_in  ATM0/1/1        0    33    1      T2.2.64
PNNI VCC-CSS(s) for local-node 3 (level=56):
  Rem-Node RCC Hello St Exit Port  VPI  VCI  HrzLns Rem-Node name
          ~~~~~ ~~~~~~~~ ~~~~~~~~~~~ ~~~~ ~~~~~ ~~~~~~~~~~~~~
   11 UP 2way_in  ATM0/0/3        0    33    1      T5.3.56
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug atm pnni</td>
<td>Enables PNNI debugging output.</td>
</tr>
<tr>
<td>show atm pnni interface</td>
<td>Displays specific information about an interface or lists the interfaces running on a PNNI node.</td>
</tr>
</tbody>
</table>
show atm pnni topology

To display the topology connectivity information from the internal topology database, use the show atm pnni topology EXEC command.

```
show atm pnni topology [node node-name] [detail]
```

**Syntax Description**

- **node**: Displays the topology information about a specific node identified by the node-name.
- **node-name**: Identifies the node by a specific name.
- **detail**: Displays more detailed information and is used as the last keyword of the command.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The topology as seen from the PNNI database can be displayed using the `show atm pnni topology` command. This command shows all accessible PNNI nodes in the network (through PTSEs) and any links to neighboring nodes.

PNNI nodes are represented internally by an 8-bit number. This command shows the mapping between the internal node number and the full 22-byte node ID.

A link status of “up” indicates the link is advertised by the node on both ends of a link. A link status of “2down” indicates the remote node (neighbor) did not advertise the link. Links that are down are not used for path selection by the current node.

**Examples**

The following example is partial output from the `show atm pnni topology` command.

```
Switch# show atm pnni topology
Node 1 (name: xxxxxx-1, type: xxxxxx, ios-version: xx.x)
Node ID..: 60:160:47.0091810000000060705BD9A5.0060705BD900.00
Node AESA: 47.0091810000000060705BD9A5.0060705BD900.01
Link Service Classes Advertised: CBR VBR-RT VBR-NRT ABR UBR
Leadership Priority: 60, Claims PGL: Yes, Transit Calls: Allowed
Ancestor: No, Nodal Representation: Simple

status  link-type  local port     remote port    neighbor
-------  --------  ---------------  ---------------  ------
up       hrz     ATM0/0/2       ATM0/0/2       Switch
up       hrz     ATM0/0/2.4     ATM0/0/2.4     Switch
up       hrz     ATM0/0/0       ATM0/0/0       xxxxx18
up       hrz     ATM0/1/3       ATM0/0/1       xxxxx18
up       hrz     ATM0/0/1       ATM0/0/1       Switch

Node 2 (name: xxxxxx-1.2.36, type: xxxxxx, ios-version: 11.3)
Node ID..: 36:60:47.0091810000000060705BD9A5.0060705BD900.00
Node AESA: 47.0091810000000060705BD9A5.0060705BD900.01
```

Link Service Classes Advertised: CBR VBR-RT VBR-NRT ABR UBR
Leadership Priority: 0, Claims PGL: No, Transit Calls: Allowed
Ancestor: Yes, Nodal Representation: Simple

<table>
<thead>
<tr>
<th>status</th>
<th>link-type</th>
<th>local port</th>
<th>remote port</th>
<th>neighbor</th>
</tr>
</thead>
<tbody>
<tr>
<td>up</td>
<td>hrz</td>
<td>2D24009</td>
<td>2B70009</td>
<td>xxxxx27.2.36</td>
</tr>
<tr>
<td>up</td>
<td>hrz</td>
<td>2D24000</td>
<td>2B70000</td>
<td>xxxxx27.2.36</td>
</tr>
</tbody>
</table>
show atm pnni trace connection

To display PNNI connection trace requests and results, use the `show atm pnni trace connection` privileged EXEC command.

```
show atm pnni trace connection {index [detail] [hex-only] | all}
```

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>index</td>
<td>Displays a specific trace. The range is 1 to 2147483647.</td>
</tr>
<tr>
<td>detail</td>
<td>Displays detailed information for a specific trace.</td>
</tr>
<tr>
<td>hex-only</td>
<td>Displays hexadecimal PNNI Node-IDs and PNNI Port-IDs instead of node-names and port-names.</td>
</tr>
<tr>
<td>all</td>
<td>Displays summary information for all traces in memory.</td>
</tr>
</tbody>
</table>

Defaults

None

Command Modes

Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

The `all` keyword shows information about all of the accepted connection trace requests on the switch but not the trace results.

To view the results of a specific connection trace, use the index value. Using the index value, the output shows only the nodes and the outgoing interface on each node. The names of the nodes and interfaces are displayed whenever possible.

To view the detailed results for a specific connection trace, use the index value with the `detail` keyword.

To view node IDs and port IDs in hexadecimal notation, instead of name strings, in the trace results, use the `hex-only` keyword along with the index value.

Examples

The following example shows how to display information for all connection traces.

```
Switch# show atm pnni trace connection all
Connection Trace Request-index: 10
Connection Type: ATM-VC
Source Interface: ATM 3/1/0.100     Direction:     Incoming
VPI: 100                          Call-Reference: 0x8ABCDEF
VCI: 1099                         Endpoint-Reference: 0xABCD
Time to age: 476 seconds
Trace Flags: Connection-Id, Call-Reference
Pass Along: Not Requested
Trace Result: Trace Completed Normally

Connection Trace Request-index: 11
Connection Type: ATM-VC
```

The following example shows how to display information for connection trace index 1.

Switch# **show atm pnni trace connection 1**

Connection Trace Request-index: 1

Source Interface: ATM0/0/3

VPI: 0

VCI: 41

Direction: Outgoing

Call-Reference: Not specified

Endpoint-Reference: Not specified

Time to age: none

Trace Flags: Connection-Id, Call-Reference

Pass Along: Requested

Trace Result: Trace Completed Normally

The following example shows how to display information for connection trace index 2 with hexadecimal output.

Switch# **show atm pnni trace connection 2 hex-only**

Connection Trace Request-index: 2

Source Interface: ATM0/0/3

VPI: 0

VCI: 41

Direction: Outgoing

Call-Reference: Not specified

Endpoint-Reference: Not specified

Trace Flags: Connection-Id, Call-Reference

Pass Along: Requested

Trace Result: Trace Completed Normally

The following example shows how to display detailed information for connection trace index 1.

Switch# **show atm pnni trace connection 1 detail**

Connection Trace Request-index: 1

Source Interface: ATM0/0/3

VPI: 0

VCI: 41

Direction: Outgoing

Call-Reference: Not specified

Endpoint-Reference: Not specified

Time to age: 476 seconds

Trace Flags: Connection-Id, Call-Reference

Pass Along: Requested

Trace Result: Trace Completed Normally

Node: in15_c81_08

[Outgoing] Port: ATM0/0/3

Node: in15_c81_09

[Incoming] VPI: 0    VCI: 41    Call-Ref: 0x6

OL-7395-01, Cisco IOS Release 12.1(26)EB
The following example shows how to display detailed information for connection trace index 2 with hexadecimal output.

Switch# show atm pnni trace connection 2 hex-only detail

Connection Trace Request-index: 2
Connection Type: ATM-VC
Source Interface: ATM0/0/3                  Direction:          Outgoing
VPI:              0                       Call-Reference:     Not specified
VCI:              41                      Endpoint-Reference: Not specified
Time to age:      none
Trace Flags:      Connection-Id, Call-Reference
Pass Along:       Requested
Trace Result:     Trace Completed Normally

Node: 56:160:47.009181000000000D0BA34E001.00D0BA34E001.00
[Outgoing] Port: 0x80003000

Node: 56:160:47.0091810000000004DDECD401.0004DDECD401.00
[Incoming] VPI: 0     VCI: 41     Call-Ref: 0x6

Node: 56:160:47.0091810000000050E2097801.0060705BC701.00
[Outgoing] Port: 0x80000000

Node: 56:160:47.0091810000000050E2097801.0060705BC701.00
[Incoming] VPI: 0     VCI: 41     Call-Ref: 0x6
[Outgoing] Port: 0x80802000

VPI: 0     VCI: 105

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pnni trace connection</td>
<td>Initiates a PNNI connection trace.</td>
</tr>
<tr>
<td>clear atm pnni trace connection</td>
<td>_Clears the PNNI connection trace information.</td>
</tr>
</tbody>
</table>
show atm pnni trace information

To display globally configured parameters used by PNNI connection traces, use the `show atm pnni trace information` privileged EXEC command.

```
show atm pnni trace information
```

Syntax Description
This command has no keywords or arguments.

Defaults
None

Command Modes
Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
Use this command to display global information about PNNI connection traces.

Examples
The following example shows how to display PNNI connection trace configuration information.

```
Switch# show atm pnni trace information
Max TTL Size: 1466 Bytes
Accepted Requests: 29  Active Requests: 2
Max Acceptable Requests: 100  Max Concurrent Requests: 5
Boundary Interfaces:
    ATM0/0.100
    ATM1/0/1
    ATM2/0/1.100
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm pnni trace boundary</code></td>
<td>Configures an ATM interface as a PNNI connection trace boundary.</td>
</tr>
<tr>
<td><code>atm pnni trace connection</code></td>
<td>Initiates a PNNI connection trace.</td>
</tr>
<tr>
<td><code>atm pnni trace max-concurrent</code></td>
<td>Modifies the maximum number of concurrent PNNI connection traces.</td>
</tr>
<tr>
<td><code>atm pnni trace transit-list max-size</code></td>
<td>Modifies the maximum size of the transit list for a PNNI connection trace.</td>
</tr>
</tbody>
</table>
show atm pnni traffic

To display information about traffic received on PNNI interfaces, use the show atm pnni traffic privileged EXEC command.

show atm pnni traffic

Syntax Description
This command has no arguments or keywords.

Command Modes
Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples
The following example is sample output from the show atm pnni traffic command.

Traffic statistics for local-node 1 (Level 60)

<table>
<thead>
<tr>
<th>Interface ID</th>
<th>PNNI bytes rcvd</th>
<th>bits/sec</th>
<th>Since</th>
<th>Rem Node(No./Name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/0/0</td>
<td>7368</td>
<td>398</td>
<td>00:02:28</td>
<td>11 xxxxx18</td>
</tr>
<tr>
<td>ATM0/0/1</td>
<td>7228</td>
<td>390</td>
<td>00:02:28</td>
<td>9 Switch</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>1300</td>
<td>70</td>
<td>00:02:28</td>
<td>9 Switch</td>
</tr>
<tr>
<td>ATM0/0/2.4</td>
<td>1300</td>
<td>70</td>
<td>00:02:28</td>
<td>9 Switch</td>
</tr>
<tr>
<td>ATM0/1/0</td>
<td>0</td>
<td>0</td>
<td>00:02:33</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/3</td>
<td>1300</td>
<td>70</td>
<td>00:02:28</td>
<td>11 xxxxx18</td>
</tr>
</tbody>
</table>

Traffic statistics for local-node 2 (Level 36)

<table>
<thead>
<tr>
<th>Interface ID</th>
<th>PNNI bytes rcvd</th>
<th>bits/sec</th>
<th>Since</th>
<th>Rem Node(No./Name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFFFFFFF</td>
<td>4460</td>
<td>275</td>
<td>00:02:09</td>
<td>10 xxxxx27.2.36</td>
</tr>
</tbody>
</table>
show atm qos-defaults

To provide default values for QoS and display the table used, use the **show atm qos-defaults** EXEC command.

```
show atm qos-defaults
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command. Originally <strong>show atm qos</strong>.</td>
</tr>
<tr>
<td>11.2(5)</td>
<td>Modified: changed to <strong>show atm qos-defaults</strong>.</td>
</tr>
</tbody>
</table>

**Examples**

The following sample output from the **show atm qos-defaults** command displays the default QoS table.

```
Switch# show atm qos-defaults
Default QoS objective table:
    Max cell transfer delay (in microseconds): any cbr, any vbr-rt
    Peak-to-peak cell delay variation (in microseconds): any cbr, any vbr-rt
    Max cell loss ratio for CLP0 cells: any cbr, any vbr-rt, any vbr-nrt
    Max cell loss ratio for CLP0+1 cells: any cbr, any vbr-rt, any vbr-nrt
```

Table 18-11 describes the fields shown in the display.

**Table 18-11 show atm qos-defaults Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max cell transfer delay</td>
<td>Is displayed in microseconds and applies to one of the following (any indicates the objective parameter is undefined):</td>
</tr>
<tr>
<td></td>
<td>• cbr</td>
</tr>
<tr>
<td></td>
<td>• vbr-rt</td>
</tr>
<tr>
<td>Peak-to-peak cell delay variation</td>
<td>Is displayed in microseconds and applies to one of the following (any indicates the objective parameter is undefined):</td>
</tr>
<tr>
<td></td>
<td>• cbr</td>
</tr>
<tr>
<td></td>
<td>• vbr-rt</td>
</tr>
<tr>
<td>Max cell loss ratio</td>
<td>Is displayed as a negative power of ten and applies to one of the following (any indicates the objective parameter is undefined):</td>
</tr>
<tr>
<td></td>
<td>• cbr</td>
</tr>
<tr>
<td></td>
<td>• vbr-rt</td>
</tr>
<tr>
<td></td>
<td>• vbr-nrt</td>
</tr>
</tbody>
</table>
## show atm qos-defaults

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm qos default</strong></td>
<td>Changes individual QoS objectives assigned to SVC setup messages entering the switch through UNI interfaces.</td>
</tr>
</tbody>
</table>
show atm resource

To display global resource manager configuration and status, use the `show atm resource` EXEC command.

Catalyst 8540 MSR

`show atm resource [module_id number]`

Catalyst 8510 MSR and LightStream 1010

`show atm resource`

### Syntax Description

```
module_id number  Identification number of the module for which you want to display configuration data and status. (Catalyst 8540 MSR only).
```

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The output from this command normalizes the maximum cell and queue limit values to match what is installed in the hardware. Any values specified explicitly via configuration are preserved and can be displayed by viewing the configuration.

### Examples

#### Catalyst 8540 MSR

The following example shows the results of using the `show atm resource` command with the switch processor feature card installed.

```
Switch# show atm resource
Resource configuration:
  Over-subscription-factor 8  Sustained-cell-rate-margin-factor 1%
  Abr-mode:   EFCI
Service Category to Threshold Group mapping:
  cbr 1 vbr-rt 2 vbr-nrt 3 abr 4 ubr 5
Threshold Groups:
Module Group Max Max Q Min Q Q thresholds Cell Name
     ID cells limit limit Mark Discard count
-----------------------------------------------
 1  131071  63  63  25 %  87 %      0     cbr-default-tg
 2  131071  127 127  25 %  87 %      0     vbrrt-default-tg
 3  131071  511  31  25 %  87 %      0     vbrnrt-default-tg
 4  131071  511  31  25 %  87 %      0     abr-default-tg
 5  131071  511  31  25 %  87 %      0     ubr-default-tg
 6  131071 1023 1023  25 %  87 %      0     well-known-vc-tg
===============================================
 2  1 131071  63  63  25 %  87 %      0     cbr-default-tg
```
### Examples

#### Catalyst 8510 MSR and LightStream 1010

The following example shows the results of using the `show atm resource` command with an FC-PCQ installed.

```
Switch# show atm resource
Resource configuration:
Over-subscription-factor 8  Sustained-cell-rate-margin-factor 1%
Abr-mode: relative-rate
Atm service-category-limit (in cells):
64512 cbr 64512 vbr-rt 64512 vbr-nrt 64512 abr-ubr

Resource state:
Cells per service-category:
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>atm abr-mode</strong>&lt;br&gt;(Catalyst 8510 MSR and LightStream 1010)</td>
<td>Used to select efcı marking, relative-rate marking, or both.</td>
</tr>
<tr>
<td>atm pacing</td>
<td>Enables or changes the artificial limitation on interface output rate.</td>
</tr>
<tr>
<td><strong>atm service-category-limit</strong>&lt;br&gt;(Catalyst 8510 MSR and LightStream 1010)</td>
<td>Sets the limits on the number of cells simultaneously allowed in the switch memory by type of output queue.</td>
</tr>
<tr>
<td>atm sustained-cell-rate-margin-factor</td>
<td>Changes the Sustained SCRMF, which dictates the weight given to PCR in computing the bandwidth used by VBR connections.</td>
</tr>
</tbody>
</table>
show atm rmon

To show the status of the ATM RMON MIB, use the `show atm rmon` EXEC command.

```
show atm rmon {host number | matrix number | stats number | status}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>host</strong></td>
<td>Displays the ATM RMON host table port select group number information.</td>
</tr>
<tr>
<td><strong>matrix</strong></td>
<td>Displays the ATM RMON matrix table information.</td>
</tr>
<tr>
<td><strong>stats</strong></td>
<td>Displays the ATM RMON status table information.</td>
</tr>
<tr>
<td><strong>status</strong></td>
<td>Displays the ATM RMON resource status information.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows ATM host table information for the specified port select group using the `show atm rmon host` EXEC command.

```
atmmon-switch# show atm rmon host 1
PortSelGrp: 1  Collection: Enabled  Drops: 0
47.007900000000000000000000A03E000001.00
  CBR/VBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  ABR/UBR in: calls: 0/123852 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00C39C3F.00
  CBR/VBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  ABR/UBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/123852 cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329221.00
  CBR/VBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  ABR/UBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 1/14 cells: 0 connTime: 3 days 21:18:30
47.00918100000000615C71A501.00603E329221.01
  CBR/VBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  ABR/UBR in: calls: 0/0 cells: 0 connTime: 0 days 00:00:00
  out: calls: 1/14 cells: 0 connTime: 3 days 21:18:30
```
Table 18-12 describes some of the fields in the output from the `show atm rmon` command.

**Table 18-12 show atm rmon Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.0079000000000000000000000.00A03E000001.00</td>
<td>Address of the host.</td>
</tr>
<tr>
<td>CBR/VBR in: calls: 0/0</td>
<td>Total successful CBR/VBR calls, including calls currently connected.</td>
</tr>
<tr>
<td>cells: 0</td>
<td>Total active cells (in: A to everybody; out: everybody to A).</td>
</tr>
<tr>
<td>connTime: 0</td>
<td>Total connection time aggregated for multiple connections.</td>
</tr>
</tbody>
</table>

The following example shows ATM matrix table information for the specified port select group using the `show atm rmon matrix` EXEC command.

```
atmrmon-switch# show atm rmon matrix 1
PortSelGrp: 1  Collection: Enabled  Drops: 0
47.0079000000000000000000000.00A03E000001.00
47.00918100000000615C71A501.00603E329221.00
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329221.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329222.00
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329222.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329222.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329221.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329221.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
47.00918100000000615C71A501.00603E329221.01
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
```

The `show atm rmon stats` command summarizes the statistics for the entire port select group, including non-monitored traffic. The following example shows ATM stats table information for the specified port select group using the `show atm rmon stats` EXEC command.

```
atmrmon-switch# show atm rmon stats 1
PortSelGrp: 1  Collection: Enabled  Drops: 0
  CBR/VBR: calls: 0/0  cells: 0 connTime: 0 days 00:00:00
  ABR/UBR: calls: 1/123862  cells: 0 connTime: 0 days 3 days 21:18:19
```

The following example shows ATM status table information for the specified port select group, and identifies which ATM interfaces were configured using the `atm rmon collect` or the `snmp enable` command.

```
atmrmon-switch# show atm rmon status
PortSelGrp: 1  Status: Enabled  Hosts: 4/no-max  Matrix: 4/no-max
  ATM0/0/0
  ATM0/0/2
PortSelGrp: 2  Status: Enabled  Hosts: 0/no-max  Matrix: 0/no-max
  ATM0/0/3
PortSelGrp: 4  Status: Enabled  Hosts: 0/1  Matrix: 0/5
  ATM0/0/1
PortSelGrp: 5  Status: Enabled  Hosts: 0/no-max  Matrix: 0/no-max
  ATM0/1/2
PortSelGrp: 6  Status: Enabled  Hosts: 0/no-max  Matrix: 0/no-max
  ATM0/1/3
PortSelGrp: 7  Status: Enabled  Hosts: 0/no-max  Matrix: 0/no-max
```
ATM0

As the following example shows, when using the **status** option, the configuration is maintained even when data collection is disabled.

```
atmrmon-switch# show atm rmon status
PortSelGrp: 1 Status: Disabled Hosts: 0/10000 Matrix: 0/20000
  ATM0/0/0  ATM0/0/2
PortSelGrp: 2 Status: Disabled Hosts: 0/10000 Matrix: 0/20000
  ATM0/0/3
```

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>atm rmon collect</td>
<td>Adds a port to an ATM-RMON MIB port select group.</td>
</tr>
<tr>
<td></td>
<td>atm rmon enable</td>
<td>Enables ATM-RMON MIB data collection.</td>
</tr>
<tr>
<td></td>
<td>atm rmon portselgrp</td>
<td>Configures statics, host, and matrix collection parameters for ATM-RMON MIB.</td>
</tr>
</tbody>
</table>
**show atm route**

To display all local or network-wide reachable address prefixes in the switch router’s ATM routing table, use the `show atm route` EXEC command.

```
show atm route [address-prefix [longer_prefix] | local]
```

### Syntax Description

- **address-prefix**: Displays all routing table entries for the specified prefix.
- **longer_prefix**: Displays all routing tables entries for longer prefixes that match the specified address prefix.
- **local**: Displays information about reachable addresses attached to this switch router only. This includes static routes configured on this switch router and routes learned using ILMI address registration.

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command displays the ATM address prefixes in the ATM routing table. Prefixes are tagged with either E or I. The E represents external prefixes that were configured using the `atm route` command. The I represents internal prefixes registered through ILMI or generated internally by the system for other purposes (for example; soft-PVP support). The prefix is displayed in the format `prefix/length`, where `length` indicates the length, in bits:

```
1234.24/16
```

The node represents the switch router that generated the route. Node 1 represents this switch router, while other numbers represent switch routers learned from the network. The port number, the protocol that generated the advertisement, the time stamp, and the port status (or summary information) are also displayed.

The link is down in the following cases:

- For local prefixes, the status is displayed as DN if either the associated interface is down or the associated interface type is NNI. Note that static routes to address prefixes cannot be used on NNI interfaces.
- For remote prefixes, such as those advertised by a remote node, the status is displayed as DN if connectivity from the local switch to the remote switch is lost.

### Examples

The following example is sample output from the `show atm route` command.

```
Switch# show atm route

Codes: P - installing Protocol (S - Static, P - PNNI, R - Routing control),
       T - Type (I - Internal prefix, E - Exterior prefix, SE - Summary Exterior prefix, SI - Summary Internal prefix)
```
### Chapter 18: Show Commands

#### `show atm route`

ZE - Suppress Summary Exterior, ZI - Suppress Summary Internal

<table>
<thead>
<tr>
<th>P</th>
<th>T</th>
<th>Node/Port</th>
<th>St</th>
<th>Lev</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>UP</td>
<td>0</td>
<td>default/0</td>
</tr>
<tr>
<td>R</td>
<td>SI</td>
<td>1   0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201/104</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0/0/0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.0c40.81d2/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0/0/0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.0c40.81d3/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0/0/0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.0c40.81d4/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0/0/0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.0c40.81d5/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.3e7b.3201/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.3e7b.3202/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.3e7b.3203/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.0060.3e7b.3204/152</td>
</tr>
<tr>
<td>R</td>
<td>I</td>
<td>1   ATM0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3E7B.3201.4000.0c/128</td>
</tr>
<tr>
<td>S</td>
<td>E</td>
<td>1   ATM0/0/1</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0003.dde7.4601/104</td>
</tr>
<tr>
<td>P</td>
<td>I</td>
<td>2   0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0003.dde7.4601/104</td>
</tr>
<tr>
<td>P</td>
<td>I</td>
<td>3   0</td>
<td>UP</td>
<td>0</td>
<td>47.0091.8100.0000.0060.3e7b.3801/104</td>
</tr>
</tbody>
</table>
**show atm routing-mode**

To display the routing mode in which the switch is running, use the `show atm routing-mode` privileged EXEC command.

```
show atm routing-mode
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

```
Release   Modification
11.3(3a)   New command
```

**Usage Guidelines**

The routing mode of the switch is dynamic (PNNI) or static (IISP).

**Examples**

This following example is sample output from the `show atm routing-mode` command.

```
Switch# show atm routing-mode
Routing Mode: Dynamic (PNNI)
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm routing-mode</code></td>
<td>Restricts the mode of ATM routing on an ATM switch router.</td>
</tr>
</tbody>
</table>
show atm signalling cug

To display all configured CUGs, use the `show atm signalling cug` EXEC command.

```
show atm signalling cug [interface atm card/subcard/port] [access | alias alias-name | interlock-code ic]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>The card, subcard, and port number of the ATM interface.</td>
</tr>
<tr>
<td><code>alias-name</code></td>
<td>The name of the CUG alias for the 24-byte interlock code.</td>
</tr>
<tr>
<td><code>ic</code></td>
<td>The interlock code number.</td>
</tr>
</tbody>
</table>

**Command Modes**

`EXEC`

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show atm signalling cug` command.

```
Switch# show atm signalling cug
Interface: ATM3/0/0
Cug Alias Name: 
Cug Interlock Code: 00.000000000000000000000000.0000000000.00.01001111
Non preferential Cug
Permit Network to User Calls
Permit User to Network Calls
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm signalling cug</td>
<td>Restricts access to and from a closed user group.</td>
</tr>
<tr>
<td>access</td>
<td></td>
</tr>
<tr>
<td>atm signalling cug</td>
<td>Creates a CUG alias.</td>
</tr>
<tr>
<td>alias</td>
<td></td>
</tr>
<tr>
<td>atm signalling cug</td>
<td>Assigns a CUG to an interface.</td>
</tr>
<tr>
<td>assign</td>
<td></td>
</tr>
</tbody>
</table>
show atm signalling diagnostics

To display the configured filter entries and the collection call records for the ATM signaling diagnostics feature, use the show atm signalling diagnostics EXEC command.

```
show atm signalling diagnostics { filter | record | status filter-index }
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>filter</td>
<td>Displays the information in the filter table.</td>
</tr>
<tr>
<td>record</td>
<td>Displays the call failure records.</td>
</tr>
<tr>
<td>status</td>
<td>Displays global diagnostics status.</td>
</tr>
<tr>
<td>filter-index</td>
<td>Displays all of the records filtered for each entry in the filter index specified. The filter-index can range from 1 to 50.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the show atm signalling diagnostics filter command.

```
Switch# show atm signalling diagnostics filter
FILTER INDEX 1
-----------------------------------------------
Scope: internal, Cast Type: p2mp
Connection Kind: soft-vc
Service Category: CBR (Constant Bit Rate) UBR (Unspecified Bit Rate)
Clear Cause: 0, Initial TimerValue: 600
Max Records: 20, NumMatches: 0, Timer expiry: 600
Incoming Port: ATM0/0/1, Outgoing Port: ATM0/1/1
Calling Nsap Address: 47.11112223344445556666.777788889999.00
Calling Address Mask: FF.FFFFFF000000000000000000.000000000000.00
Called Nsap Address : 47.11112223344445556666.777788889999.01
Called Address Mask : FF.FFFFFF000000000000000000.000000000000.00
Status : active
```

The following example is sample output from the show atm signalling diagnostics record 1 command.

```
Switch# show atm signalling diagnostics record 1
DISPLAY INDEX 1
-----------------------------------------------
Scope: internal, Cast Type: p2p, Conn Indicator: Setup Failure
Connection Kind: switched-vc
Service Category: UBR (Unspecified Bit Rate)
Clear Cause: 0x29, Diagnostics: NULL
Incoming Port: ATM0/0/3, Outgoing Port: ATM0/1/1
Calling Address: 47.009181000000006011000000.470803040506.00
Calling-SubAddr: NULL
Called Address : 47.009181000000006083C42C01.750203040506.00
```
Called-SubAddr : NULL
Crankback Type : No Crankback
DTL’s :
NodeID:56:160:47.009181000000006011000000.006083AB9001.00 Port: 0/1/3:2
NodeID:56:160:47.00918100000000603E7B4101.00603E7B4101.00 Port: 0/0/0:2
NodeID:56:160:47.009181000000006083C42C01.006083C42C01.00 Port: 0
show atm signalling statistics

To show the ATM signaling statistics, use the **show atm signalling statistics** EXEC command.

```
show atm signalling statistics [interface atm card/subcard/port] [ie]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port number of the ATM interface.</td>
</tr>
<tr>
<td>ie</td>
<td>Displays the information element statistics.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If no interface is specified, statistics for all interfaces are displayed.

**Examples**

The following example is sample output from the **show atm signalling statistics** EXEC command with no interface specified.

```
Switch# show atm signalling statistics
Global Statistics:
Calls Throttled: 0
Max Crankback: 3
Max Connections Pending: 255
Max Connections Pending Hi Water Mark: 0

ATM 0:0   UP Time 00:00:32  # of int resets: 0
------------------------------------------------------------------
Terminating connections: 0       Soft VCs: 0
Active Transit PTP SVC: 0       Active Transit MTP SVC: 0
Port requests: 0                Source route requests: 0
Conn-Pending: 0                  Conn-Pending High Water Mark: 0
Calls Throttled: 0               Max-Conn-Pending:  40

Messages:  Incoming  Outgoing
-----------  ---------  --------
PTP Setup Messages:    0         0
MTP Setup Messages:    0         0
Release Messages:     0          0
Restart Messages:     0          0

Message:  Received  Transmitted  Tx-Reject  Rx-Reject
Add Party Messages:    0         0         0         0

Failure Cause:  Routing  CAC  Access-list  Addr-Reg  Misc-Failure
Location Local:  0         0         0          0         0
Location Remote:  0         0         0          0         0
```
show atm signalling statistics

The following example is sample output from the `show atm signalling statistics` EXEC command for interface ATM 0/0/0.

```
Switch# show atm signalling statistics interface atm 0/0/0
ATM 0/0/0:0 UP Time 00:01:32 # of int resets: 0
---------------------------------------------
Terminating connections: 0           Soft VCs: 0
Active Transit PTP SVC: 0           Active Transit MTP SVC: 0
Port requests:  0                   Source route requests: 0
Conn-Pending: 0                    Conn-Pending High Water Mark: 0
Calls Throttled: 0                   Max-Conn-Pending: 40

Messages:  Incoming  Outgoing
----------  -------  --------
PTP Setup Messages: 0          0
MTP Setup Messages: 0          0
Release Messages: 0           0
Restart Messages: 0           0

Message:  Received  Transmitted  Tx-Reject  Rx-Reject
Add Party Messages: 0   0  0  0  0

Failure Cause:  Routing  CAC  Access-list  Addr-Reg  Misc-Failure
Location Local:  0  0  0  0  0
Location Remote:  0  0  0  0  0
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear atm signalling</td>
<td>Clears existing ATM signalling statistics.</td>
</tr>
<tr>
<td>statistics</td>
<td></td>
</tr>
</tbody>
</table>
show atm snoop

To display the current port snooping configuration and actual register values for the highest ATM interface, use the `show atm snoop` EXEC command.

```
show atm snoop
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command displays the snoop test port name, snoop option (enabled or disabled), monitored port name (if enabled), and snoop direction (receive or transmit if enabled).

This command applies only to card 4, subcard 1, and the highest port allowed for the card. See the `atm signalling vpci` command for port information.

**Examples**
The following example displays the snoop configuration and actual register values for the highest interface.

```
Switch# show atm snoop
Snoop Test Port Name: ATM3/1/3 (interface status=SNOOPING)
Snoop option: (configured=enabled) (actual=enabled)
Monitored Port Name: (configured=ATM3/0/0) (actual=ATM3/0/0)
Snoop direction: (configured=receive) (actual=receive)
```

The following example shows that there is no card in the snoop test port card 4, subcard 1 position.

```
Switch# show atm snoop
Snoop Test Port Name: ATM3/1/3 (port is bad or missing)
Snoop option: (configured=disabled)
```

The following example shows that the snoop test port has been inserted and configured but is shut down.

```
Switch# show atm snoop
Snoop Test Port Name: ATM3/1/3 (interface status=DOWN)(shutdown)
Snoop option: (configured=enabled)
Monitored Port Name: (configured=ATM3/1/0)
Snoop direction: (configured=receive)
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm signalling vpci</code></td>
<td>Specifies the value of VPCI to be carried in the signaling messages within a VP tunnel.</td>
</tr>
</tbody>
</table>
show atm snoop-vc

To display the current port snooping configuration and actual register values per-VC, use the show atm snoop-vc EXEC command.

    show atm snoop-vc [interface atm card/subcard/port]

**Syntax Description**

`card/subcard/port` Specifies the card, subcard, and port number of the ATM interface.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(8.0.1)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the snoop test port name, snoop option (enabled or disabled), monitored port name (if enabled), and snoop direction (receive or transmit if enabled).

**Examples**

The following example displays all VC snoop connections on the switch.

```
Switch# show atm snoop-vc
Snooping        Snooped
    Interface  VPI  VCI  Type  X-Interface X-VPI X-VCI Dir    Status
ATM0/0/2       0    5   PVC ATM0/1/1     0    5   Rx  DOWN
ATM0/0/2       0   16   PVC ATM0/1/1     0   16   Rx  DOWN
ATM0/1/2       0    5   PVC ATM0/0/1     0    5   Tx  DOWN
ATM0/1/2       0   16   PVC ATM0/0/1     0   16   Tx  DOWN
ATM0/1/2       0   18   PVC ATM0/0/1     0   18   Tx  UP
ATM0/1/2       0  100  PVC ATM0/0/1     0  100  Tx  DOWN
ATM0/1/2       0  201  PVC ATM0/0/1     0  201  Tx  DOWN
ATM0/1/2       0  202  PVC ATM0/0/1     0  202  Tx  DOWN
ATM0/1/2       0  300  PVC ATM0/0/1     0  300  Tx  DOWN
ATM0/1/2       0  301  PVC ATM0/0/1     0  301  Tx  DOWN
```

The following example displays all VC snoop connections on ATM interface 0/1/2.

```
Switch# show atm snoop-vc interface atm 0/1/2
Snooping        Snooped
    Interface  VPI  VCI  Type  X-Interface X-VPI X-VCI Dir    Status
ATM0/1/2       0    5   PVC ATM0/0/1     0    5   Tx  DOWN
ATM0/1/2       0   16   PVC ATM0/0/1     0   16   Tx  DOWN
ATM0/1/2       0   18   PVC ATM0/0/1     0   18   Tx  UP
ATM0/1/2       0  100  PVC ATM0/0/1     0  100  Tx  DOWN
ATM0/1/2       0  201  PVC ATM0/0/1     0  201  Tx  DOWN
ATM0/1/2       0  202  PVC ATM0/0/1     0  202  Tx  DOWN
ATM0/1/2       0  300  PVC ATM0/0/1     0  300  Tx  DOWN
ATM0/1/2       0  301  PVC ATM0/0/1     0  301  Tx  DOWN
```

**Examples**

The following example displays VC snoop connection VPI 0, VCI 543 on ATM interface 0/0/0.
Switch# `show atm snoop-vc interface atm 0/0/0 0 543`

Interface: ATM0/0/0, Type: oc3uni
VPI = 0 VCI = 543
Status: UP
Time-since-last-status-change: 00:00:19
Connection-type: PVC
Cast-type: snooping-leaf
Packet-discard-option: enabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0, Type: ATM Swi/Proc
Cross-connect-VPI = 0
Cross-connect-VCI = 42
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Threshold Group: 6, Cells queued: 0
Rx cells: 0, Tx cells: 4
Rx connection-traffic-table-index: 3
Rx service-category: VBR-RT (Realtime Variable Bit Rate)
Rx pcr-clp01: 424
Rx scr-clp01: 424
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: 50
Tx connection-traffic-table-index: 3
Tx service-category: VBR-RT (Realtime Variable Bit Rate)
Tx pcr-clp01: 424
Tx scr-clp01: 424
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: 50

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm snoop-vc</code></td>
<td>Sets the current port snooping configuration and actual register values per-VC.</td>
</tr>
</tbody>
</table>
show atm snoop-vp

To display the current port snooping configuration and actual register values per-VP, use the show atm snoop-vp EXEC command.

```
show atm snoop-vp [interface atm card/subcard/port]
```

**Syntax Description**

- `card/subcard/port`: Specifies the card, subcard, and port number of the ATM interface.

**Command Modes**

- EXEC

**Command History**

- **Release**: 11.2(8.0.1)
- **Modification**: New command

**Usage Guidelines**

This command displays the snoop test port name, snoop option (enabled or disabled), monitored port name (if enabled), and snoop direction (receive or transmit if enabled).

**Examples**

The following example displays all VP snoop connections on the switch.

```
Switch# show atm snoop-vp

<table>
<thead>
<tr>
<th>Snooping</th>
<th>Snooped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>VPI</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**Related Commands**

- **Command**: atm snoop-vp
- **Description**: Sets the current port snooping configuration and actual register values per-VP.
show atm soft redundancy group

To display the current soft VC redundancy group configuration, use the `show atm soft redundancy group` EXEC command.

```
show atm soft redundancy group [group-name]
```

**Syntax Description**

- `group-name` Specifies the soft VC redundancy group to display.

**Command Modes**

- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(22)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the configuration details of the soft redundancy group you have configured. The ATM interfaces can be on the same switch or different switches and use the same NSAP address in the source-end configuration for the SPVC. If one of the redundant interfaces fail the calls terminating on that interface for the redundant destination address are released and subsequently reestablished on the standby interface.

The following example shows how to display the configuration of all soft VC redundancy groups.

```
Switch# show atm soft redundancy group
Group Name: group1
  Nsap Address: 47.0091.8100.0000.00a0.f209.b601.3000.0c88.1080.00
  Operating Mode: Active/Standby
  Configured Active Interface: ATM0/0/1 (Currently Active)
  Configured Standby Interface:

Group Name: group2
  Nsap Address: 47.0091.8100.0000.00a0.f209.b601.3333.3333.00
  Operating Mode: Active/Standby
  Configured Active Interface: ATM0/0/1 (Currently Active)
  Configured Standby Interface:

Group Name: group3
  Nsap Address: 11.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
  Operating Mode: Load Balance
  Interface 1:  ATM0/0/1  Number of VCs: 1500  Number of VPs: 0
  Interface 2:  ATM0/0/3  Number of VCs: 1500  Number of VPs: 0

Group Name: group4
  Nsap Address: 12.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
  Operating Mode: Active/Standby
  Configured Active Interface:
  Configured Standby Interface:

Group Name: group5
```

OL-7395-01, Cisco IOS Release 12.1(26)EB
show atm soft redundancy group

Nsap Address: 13.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
Operating Mode: Load Balance
Interface 1: ATM0/1/ima0 Number of VCs: 3 Number of VPs: 0
Interface 2: ATM0/0/0 Number of VCs: 3 Number of VPs: 0

Switch#

The following example shows how to display the configuration of only the soft VC redundancy group named group3.

Switch# show atm soft redundancy group group3
Group Name: group3
Nsap Address: 11.2233.4455.6677.8c11.1111.1111.4000.0c80.0000.00
Operating Mode: Load Balance
Interface 1: ATM0/0/1 Number of VCs: 1500 Number of VPs: 0
Interface 2: ATM0/0/3 Number of VCs: 1500 Number of VPs: 0

Switch#

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm soft redundancy group</td>
<td>Configures a soft VC redundancy group.</td>
</tr>
<tr>
<td>atm soft redundancy member</td>
<td>Configures an ATM interface as part of a redundant soft VC or soft VP.</td>
</tr>
<tr>
<td>show atm addresses</td>
<td>Displays the ATM NSAP addresses of the redundant soft VC destination.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Used to show configuration information currently running on the switch.</td>
</tr>
</tbody>
</table>
show atm soft-vc

To display the configuration of a point-to-multipoint ATM Soft-PVC connection, use the show atm soft-vc command.

```
show atm soft-vc {p2p | p2mp} atm card/subcard/port vpi vci [detail]
```

**Syntax Description**

- **p2p | p2mp** Displays either the point-to-point or point-to-multipoint configurations.
- **atm** Specifies an ATM interface.
- **card/subcard/port** Specifies the card, subcard, and port number for the ATM or ATM-P interface.
- **vpi** Source VPI number.
- **vci** Source VCI number.
- **detail** Displays more detailed information; must be the last keyword of the command.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)EB</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(26)EB</td>
<td>Modified: Added the access control and rules-based soft PVC timer group configuration to the display output.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows how to display the configuration of an individual point-to-multipoint ATM Soft-PVC connection.

```
Switch# show atm soft-vc p2mp interface atm 0/0/1 50 100
Interface: ATM0/0/1, Type: oc3suni
VPI = 50  VCI = 100
Connection-type: SoftVC
Cast-type: point-to-multipoint-root
Soft vc location: Source
Soft vc call state: Inactive
Leaf-ref  VPI  VCI  NSAP Address                               State
         1  50  110.47.0091.8100.0000.0090.2156.d801.4000.0e80.1010.00  UP
         2  50  120.47.0091.8100.0000.00e0.4fac.b401.4000.0e80.9030.00  DOWN
Switch#
```

The following example shows how to display the configuration of an individual point-to-multipoint ATM Soft-PVC connection using the `detail` keyword to expand the display.

```
Switch# show atm soft-vc p2mp atm3/0/1 10 100 detail
Interface: ATM3/0/1, Type: oc3suni
VPI = 10  VCI = 100
Status: UP
Time-since-last-status-change: 02:51:07
Connection-type: SoftVC
Cast-type: point-to-multipoint-root
Hold-priority: none
Soft vc location: Source
```

Packet-discard-option: disabled
Usage-Parameter-Control (UPC): pass
Leaf-ref 10
Remote ATM address: 47.0091.8100.0000.0050.e209.b601.4000.0c88.1050.00
Remote VPI: 10
Remote VCI: 300
Soft vc party state: Active
Number of soft vc re-try attempts: 0
First-retry-interval: 5000 milliseconds
Maximum-retry-interval: 60000 milliseconds
Aggregate admin weight: 5040
timer-group: <group-name>
TIME STAMPS:
Current Slot:2
Outgoing Setup January 01 21:56:28.978
Incoming Connect January 01 21:56:28.990
Leaf-ref 210
Remote ATM address: 47.0091.8100.0000.0050.e209.b601.4000.0c88.1051.00
Remote VPI: 310
Remote VCI: 3300
Soft vc party state: Not Connected
Number of soft vc re-try attempts: 0
First-retry-interval: 5000 milliseconds
Maximum-retry-interval: 60000 milliseconds
Aggregate admin weight: 5040
TIME STAMPS:
Current Slot:2
Outgoing Add party January 01 21:56:28.978
Incoming Add party Ack January 01 21:56:28.990

The following examples show how to display the configuration of an individual point-to-point ATM soft PVC connection with access control configured. The first example show access control configured using a filter set and the second example associates the allowed sources ATM NSAP address directly.

Switch# sh atm soft-vc p2p interface a2/1/2 0 202 detail
Interface: ATM2/1/2, Type: oc3uni
VPI = 0 VCI = 202
Connection-type: SoftVC
Cast-type: point-to-point
Soft vc location: Destination
Remote ATM address: default
Remote VPI: 0
Remote VCI: 0
Access Control: Filter-set - tod2
Soft vc call state: Inactive

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show running-config</td>
<td>Show the configuration of the point-to-multipoint ATM Soft-PVC connection.</td>
<td></td>
</tr>
</tbody>
</table>
show atm status

To display current information about ATM interfaces and the number of installed connections, use the show atm status EXEC command.

show atm status

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC

Command History

Release   Modification
11.1(4)   New command

Examples

The following is sample output from the show atm status command.

Switch# show atm status
NUMBER OF INSTALLED CONNECTIONS: (P2P=Point to Point, P2MP=Point to MultiPoint)

<table>
<thead>
<tr>
<th>Type</th>
<th>PVCs</th>
<th>SoftPVCs</th>
<th>SVCs</th>
<th>PVPs</th>
<th>SoftPVPs</th>
<th>SVPs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2P</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>P2MP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

TOTAL INSTALLED CONNECTIONS = 12

PER-INTERFACE STATUS SUMMARY AT 14:56:19 UTC Mon Mar 25 1997:

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>IF</th>
<th>Status</th>
<th>Admin Status</th>
<th>Auto-Cfg</th>
<th>ILMI Addr</th>
<th>SSPC</th>
<th>Hello</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0</td>
<td>UP</td>
<td>up</td>
<td>n/a</td>
<td>Restarting</td>
<td>Idle</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>ATM3/0/0</td>
<td>UP</td>
<td>up</td>
<td>done</td>
<td>UpAndNormal</td>
<td>Active</td>
<td>2way_in</td>
<td></td>
</tr>
<tr>
<td>ATM3/0/0.25</td>
<td>DOWN</td>
<td>shutdown</td>
<td>waiting</td>
<td>n/a</td>
<td>Idle</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>ATM3/0/0.26</td>
<td>UP</td>
<td>up</td>
<td>waiting</td>
<td>WaitDevType</td>
<td>Idle</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>ATM3/0/1</td>
<td>DOWN</td>
<td>down</td>
<td>n/a</td>
<td>Idle</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATM3/0/2</td>
<td>UP</td>
<td>up</td>
<td>done</td>
<td>UpAndNormal</td>
<td>Active</td>
<td>2way_in</td>
<td></td>
</tr>
<tr>
<td>ATM3/0/3</td>
<td>DOWN</td>
<td>down</td>
<td>waiting</td>
<td>n/a</td>
<td>Idle</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>
show atm timer group

To display the rules-based soft PVC and soft PVP feature timer group configuration, use the `show atm timer group` privileged EXEC command.

```
show atm timer group group-name
```

**Syntax Description**

`group-name` Specifies the specific ATM timer group to display.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

This following `show atm timer group` example displays information about the specific timer group included with the command.

```
Switch#sh atm timer group group1
ATM Timer Group: group1
    Timer Rules in this Group
    ---------------------------
    timer-rule Rule1
    timer-rule Rule3
    timer-rule Rule4
    timer-rule Rule5
    timer-rule Rule6
    No Connections using this Group
```

The following `show atm timer group` example displays information about all timer groups available in the system.

```
Switch#sh atm timer group
ATM Timer Group: abs-group
    Timer Rules in this Group
    ---------------------------
    timer-rule abs-rule
    timer-rule abs-rule1
    Connections using this Group
    ---------------------------
    Interface     VPI  VCI
    ATM0/1/3      10  100
    ATM0/1/3      10  200
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm timer rule</code></td>
<td>Displays the timer rule configuration.</td>
</tr>
<tr>
<td><code>show atm soft-vc</code></td>
<td>Displays the configuration of the soft PVC connection.</td>
</tr>
<tr>
<td><code>show running-config</code></td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
show atm timer rule

To display the rules-based soft PVC and soft PVP feature timer rule configuration, use the show atm timer rule privileged EXEC command.

```
show atm timer rule [rule-name]
```

Syntax Description

| rule-name | Specifies the specific ATM timer rule to display. |

Command Modes

Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

This following show atm timer rule example displays information about the specific timer rule included with the command. This example can be generated by providing one rule-name along with the show atm timer rule command line.

```
Switch#sh atm timer rule Rule6
ATM Timer Rule: Rule6 (periodic)
    Monday 14:00 to 18:00 rx-cttr 1 tx-cttr 1
Timer groups using this rule
    group1
    group2
```

The following show atm timer rule example displays information about all of the timer rules configured in the system.

```
Switch#sh atm timer rule
ATM Timer Rule: abs-rule (absolute)
    start 11:43 18 December 2004 end 11:47 18 December 2004 rx-cttr 1 tx-cttr 1
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm timer rule</td>
<td>Displays the timer rule configuration.</td>
</tr>
<tr>
<td>show atm timer group</td>
<td>Displays the timer group configuration.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the configuration of the soft PVC connection.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>


show atm traffic

To display the ATM layer traffic information for all of the ATM interfaces, use the `show atm traffic` EXEC command.

show atm traffic

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays input and output cell counts and a 5-minute transfer rate for all ATM interfaces.

**Examples**

The following example is sample output from the `show atm traffic` command.

```
Switch# show atm traffic
Interface ATM0
Rx cells: 0
Tx cells: 0
5 minute input rate: 0 bits/sec, 0 cells/sec
5 minute output rate: 0 bits/sec, 0 cells/sec

Interface ATM3/0/0
Rx cells: 0
Tx cells: 0
5 minute input rate: 0 bits/sec, 0 cells/sec
5 minute output rate: 0 bits/sec, 0 cells/sec
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
show atm traffic shaping

To display the traffic shaping configuration, use the `show atm traffic shaping` command.

```
show atm traffic shaping slot slot
```

**Syntax Description**

<table>
<thead>
<tr>
<th><strong>slot</strong></th>
<th>The slot number of the TSCAM hardware.</th>
</tr>
</thead>
</table>

**Defaults**

None

**Command Modes**

Priviliged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

The following example shows the configured ports on a Catalyst 8510 MSR switch router:

```
switch# show atm traffic shaping slot 4
CATS Carrier Module State : ACTIVE
Shaper Configuration Status :
    Shapers In Use by Config : 3  Shapers Available for Config : 1
Shaper Hardware Status :
    Shaper 0 :  In Use - interface : atm 4/0/1 - Class : vbr
    Shaper 1 :  In Use - interface : atm 4/0/2 - Class : Best-Effort
    Shaper 2 :  Not In Use.
    Shaper 3 :  Not In Use.
Statistics :
    Total cell discards = 15, clp0 discards = 3, clp1 discards = 12
    Free cell buffers = 203852
    cells queued for all ports = 58291
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm traffic shaping enable</td>
<td>Enables ATM traffic shaping.</td>
</tr>
<tr>
<td>atm traffic shaping thresholds</td>
<td>Sets ATM traffic threshold.</td>
</tr>
</tbody>
</table>
show atm vc

To display the ATM layer connection information about the virtual connection, use the `show atm vc` EXEC command.

```bash
show atm vc

show atm vc interface {atm | atm-p} card/subcard/port[,vpt#] [vpi vci] [detail]

show atm vc [cast-type cast-type] [conn-type conn-type] [interface {atm | atm-p} card/subcard/port[,vpt#]]

show atm vc traffic [interface {atm | atm-p} card/subcard/port[,vpt#] [vpi vci]]
```

### Syntax Description

- `card/subcard/port`: Card, subcard, and port number for the interface.
- `vpt#`: Displays the virtual path tunnel identifier.
- `vpi vci`: Displays the virtual path identifier and virtual channel identifier.
- `detail`: Displays the Rx cell drops and queued cells for all VCs on a given interface.
- `cast-type`: Specifies the cast type as multipoint-to-point (mp2p), point-to-multipoint (p2mp), or point-to-point (p2p).
- `conn-type`: Specifies the connection type as pvc, soft-vc, svc, or tvc.
- `traffic`: Displays the virtual channel cell traffic.

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)EY</td>
<td>Added output information for passive half legs.</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: added ATM Soft-PVC point-to-multipoint example:</td>
</tr>
<tr>
<td>12.1(23)EB</td>
<td>Modified: added Access-control information to display.</td>
</tr>
</tbody>
</table>

### Examples

The following example shows a display for the VC interfaces.

```bash
Switch# show atm vc

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI</th>
<th>VCI</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-VPI</th>
<th>X-VCI</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/1/0</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>52</td>
<td>QSAAL</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/0</td>
<td>0</td>
<td>16</td>
<td>PVC</td>
<td>ATM0</td>
<td>32</td>
<td>ILMI</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/0</td>
<td>0</td>
<td>18</td>
<td>PVC</td>
<td>ATM0</td>
<td>73</td>
<td>PMNI</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/1</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>53</td>
<td>QSAAL</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/1</td>
<td>0</td>
<td>16</td>
<td>PVC</td>
<td>ATM0</td>
<td>33</td>
<td>ILMI</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>54</td>
<td>QSAAL</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/2</td>
<td>0</td>
<td>16</td>
<td>PVC</td>
<td>ATM0</td>
<td>34</td>
<td>ILMI</td>
<td>DOWN</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/3</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>55</td>
<td>QSAAL</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM0/1/3</td>
<td>0</td>
<td>16</td>
<td>PVC</td>
<td>ATM0</td>
<td>35</td>
<td>ILMI</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM1/0/0</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>56</td>
<td>QSAAL</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM1/0/0</td>
<td>0</td>
<td>16</td>
<td>PVC</td>
<td>ATM0</td>
<td>36</td>
<td>ILMI</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>ATM1/0/1</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>57</td>
<td>QSAAL</td>
<td>DOWN</td>
<td></td>
</tr>
</tbody>
</table>
```
show atm vc

show atm vc

Table 18-13 describes the fields shown in the display.

**Table 18-13 show atm vc Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Displays the card, subcard, and port number of the specified ATM interface.</td>
</tr>
<tr>
<td>VPI</td>
<td>Displays the number of the virtual path identifier.</td>
</tr>
<tr>
<td>VCI</td>
<td>Displays the number of the virtual channel identifier.</td>
</tr>
<tr>
<td>Type</td>
<td>Displays the type of interface for the specified ATM interface.</td>
</tr>
<tr>
<td>X-Interface</td>
<td>Displays the card, subcard, and port number of the cross-connected value for the ATM interface.</td>
</tr>
<tr>
<td>X-VPI</td>
<td>Displays the number of the cross-connected value of the virtual path identifier.</td>
</tr>
<tr>
<td>X-VCI</td>
<td>Displays the number of the cross-connected value of the virtual channel identifier.</td>
</tr>
<tr>
<td>Encap</td>
<td>Displays the type of connection on the interface.</td>
</tr>
<tr>
<td>Status</td>
<td>Displays the current state of the specified ATM interface.</td>
</tr>
</tbody>
</table>

The following example displays the output for interface ATM 1/0/0 with and without the **detail** keyword, which shows the rx-cell-drop and the rx-cell-quad:

**Switch# show atm vc traffic interface atm 1/0/0**

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI</th>
<th>VCI</th>
<th>Type</th>
<th>rx-cell-cnts</th>
<th>tx-cell-cnts</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>32</td>
<td>PVC</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>33</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>34</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>35</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>37</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>39</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>48</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Switch# show atm vc traffic interface atm 1/0/0 detail**

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI</th>
<th>VCI</th>
<th>Type</th>
<th>rx-cell</th>
<th>tx-cell</th>
<th>rx-cell-drop</th>
<th>rx-cell-quad</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>32</td>
<td>PVC</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>33</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>34</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>35</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>37</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>39</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM-P1/0/0</td>
<td>0</td>
<td>48</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The following example displays the output for interface ATM 1/0/0 with point-to-multipoint Soft-PVCs configured:

**Switch# show atm vc interface atm 0/1/0**

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI</th>
<th>VCI</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-VPI</th>
<th>X-VCI</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/1/0</td>
<td>0</td>
<td>5</td>
<td>PVC</td>
<td>ATM0</td>
<td>0</td>
<td>59</td>
<td>QSAAL</td>
<td>UP</td>
</tr>
</tbody>
</table>
The following example displays the output for the soft PVC passive half leg configured on interface ATM 0/1/0.

```
Switch# show atm vc interface atm 0/1/0 50 200
```

```
Interface: ATM0/1/0, Type: oc3suni
VPI = 50  VCI = 200
Status: NOT CONNECTED
Connection-type: SoftVC
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Packet-discard-option: disabled
Time-since-last-status-change: 00:00:39
Passive half leg
Soft vc location: Destination
Remote ATM address: default
Remote VPI: 0
Remote VCI: 0
Soft vc call state: Inactive
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Rx cells: 0, Tx cells: 0
Switch Tx Statistics :
  Clp0 : 0,  Clp1 : 0, TxCells : 0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 7113539
Rx scr-clp01: none
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index: 1
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 7113539
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: none
```

Catalyst 8510 MSR and LightStream 1010

The following example shows the interface information for ATM 1/0/0, with VPI 0, VCI 5, and packet discard enabled, using an FC-PCQ.

```
Switch# show atm vc interface atm 1/0/0 1 100
```

```
Interface: ATM1/0/0, Type: oc3suni
VPI = 0  VCI = 5
Status: UP
Time-since-last-status-change: 1d18h
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: enabled
Usage-Parameter-Control (UPC): pass
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0, Type: ATM Swi/Proc
Cross-connect-VPI = 0
Cross-connect-VCI = 58
```
The following example shows the interface information for ATM 1/0/0, with VPI 1, VCI 100, and packet discard disabled, using the switch processor feature card.

```
Switch# show atm vc interface atm 1/0/0 1 100

Interface: ATM1/0/0, Type: oc12suni
VPI = 1 VCI = 100
Status: UP
Time-since-last-status-change: 02:55:48
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: disabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0/1/0, Type: oc3suni
Cross-connect-VPI = 1
Cross-connect-VCI = 100
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Threshold Group: 5, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
Rx Clp0:0, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx Clp0 q full drops:0, Rx Clp1 qthresh drops:0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 7113539
Rx scr-clp01: none
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index: 1
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 7113539
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
```
The following example shows the interface information for ATM 1/0/0, with VPI 0, VCI 5, and packet discard enabled, using the FC-PFQ.

Switch# show atm vc interface atm 1/0/0 0 5

Interface: ATM1/0/0, Type: oc12suni
VPI = 0  VCI = 5
Status: UP
Time-since-last-status-change: 03:02:32
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: enabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0, Type: ATM Swi/Proc
Cross-connect-VPI = 0
Cross-connect-VCI = 45
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Encapsulation: AAL5SAAL
Threshold Group: 6, Cells queued: 0
Rx cells: 2302, Tx cells: 2301
Tx Clp0:2301, Tx Clp1: 0
Rx Clp0:2302, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx pkts:0, Rx pkt drops:0
Rx connection-traffic-table-index: 3
Rx service-category: VBR-RT (Realtime Variable Bit Rate)
Rx pcr-clp01: 424
Rx scr-clp01: 424
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: 50
Tx connection-traffic-table-index: 3
Tx service-category: VBR-RT (Realtime Variable Bit Rate)
Tx pcr-clp01: 424
Tx scr-clp01: 424
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: 50
Crc Errors:0, Sar Timeouts:0, OverSizedSDUs:0
BufSzOvfl: Small:0, Medium:0, Big:0, VeryBig:0, Large:0

The following example shows the last explicit path status for a soft VC. Note that the first listed explicit path, new_york.path2, shows an unreachable result, but the second explicit path, new_york.path1, has succeeded.

Switch# show atm vc interface atm 0/1/3 0 40
VPI = 0  VCI = 40
Status:UP
Time-since-last-status-change:00:00:03
Connection-type:SoftVC
Cast-type:point-to-point
Soft vc location:Source
Remote ATM address:47.0091.8100.0000.0060.705b.d900.4000.0c81.9000.00
Remote VPI:0
Remote VCI:40
Soft vc call state:Active
Number of soft vc re-try attempts:0
First-retry-interval:5000 milliseconds
Maximum-retry-interval:60000 milliseconds
Aggregate admin weight:15120

TIME STAMPS:
Current Slot:4
Outgoing Release February 26 17:02:45.940
Incoming Rel comp February 26 17:02:45.944
Outgoing Setup February 26 17:02:45.948
Incoming Connect February 26 17:02:46.000
Outgoing Setup February 23 11:54:17.587
Incoming Release February 23 11:54:17.591
Outgoing Setup February 23 11:54:37.591
Incoming Release February 23 11:54:37.611
Outgoing Setup February 23 11:55:17.611
Incoming Connect February 23 11:55:17.655

Explicit-path 1:result=6 PNNI_DEST_UNREACHABLE (new_york.path2)
Explicit-path 2:result=1 PNNI_SUCCESS (new_york.path1)
Only-explicit
Packet-discard-option:disabled
Usage-Parameter-Control (UPC):pass
Number of OAM-configured connections:0
OAM-configuration:disabled
OAM-states: Not-applicable
Cross-connect-interface:ATM0/0/3.4, Type:oc3uni
Cross-connect VPI = 4
Cross-connect VCI = 35
Cross-connect UPC:pass
Cross-connect OAM-configuration:disabled
Cross-connect OAM-state: Not-applicable
Rx cells:0, Tx cells:0
Rx connection-traffic-table-index:1
Rx service-category:UBR (Unspecified Bit Rate)
Rx pcr-clp01:7113539
Rx scr-clp01: none
Rx mcr-clp01: none
Rx cdvt:1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index:1
Tx service-category:UBR (Unspecified Bit Rate)
Tx pcr-clp01:7113539
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: none
The following example shows the passive half-leg configuration information of two-ended soft PVC with the access control source ATM NSAP address configured.

```
Switch# show atm vc interface atm 0/0/1 1 60
Interface:ATM0/0/1, Type:oc3suni
VPI = 1  VCI = 60
Status:UP
Time-since-last-status-change:00:01:15
Connection-type:SoftVC
Cast-type:point-to-point
Passive half leg
  Soft vc location: Destination
  Remote ATM address: default
  Remote VPI:0
  Remote VCI:50
Access-control
  source address: 47.0091.8100.0000.0001.4204.d801.4000.0c80.9000.00
  Soft vc call state: Active
```

The following example shows the passive half-leg configuration information of two-ended soft PVC with the filter set fset1 configured.

```
Switch# show atm vc interface atm 0/0/1 1 60
Interface:ATM0/0/1, Type:oc3suni
VPI = 1  VCI = 60
Status:UP
Time-since-last-status-change:00:01:15
Connection-type:SoftVC
Cast-type:point-to-point
Passive half leg
  Soft vc location: Destination
  Remote ATM address: default
  Remote VPI:0
  Remote VCI:50
Access-control: Filter-set - fset1
  Soft vc call state: Active
```

Table 18-14 describes the fields shown in the displays.

**Table 18-14 show atm vc interface ATM Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Displays the card, subcard, and port number of the ATM interface.</td>
</tr>
<tr>
<td>VPI/VCI</td>
<td>Displays the number of the virtual path identifier and the virtual channel identifier.</td>
</tr>
<tr>
<td>Status</td>
<td>Displays the type of interface for the specified ATM interface.</td>
</tr>
<tr>
<td>Time-since-last-status-change</td>
<td>Displays the time elapsed since the last status change.</td>
</tr>
<tr>
<td>Connection-type</td>
<td>Displays the type of connection for the specified ATM interface.</td>
</tr>
<tr>
<td>Cast-type</td>
<td>Displays the type of cast for the specified ATM interface.</td>
</tr>
</tbody>
</table>
### Table 18-14 show atm vc interface ATM Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet-discard-option</td>
<td>Displays the state of the packet-discard option; enabled or disabled.</td>
</tr>
<tr>
<td>Usage-Parameter-Control (UPC)</td>
<td>Displays the state of the UPC.</td>
</tr>
<tr>
<td>Wrr weight</td>
<td>Weighted round-robin weight.</td>
</tr>
<tr>
<td>Number of OAM-configured connections</td>
<td>Displays the number of connections configured by OAM.</td>
</tr>
<tr>
<td>OAM-configuration</td>
<td>Displays the state of the OAM configuration; enabled or disabled.</td>
</tr>
<tr>
<td>OAM-states</td>
<td>Displays the status of the OAM states; applicable or not applicable.</td>
</tr>
<tr>
<td>Cross-connect-interface</td>
<td>Displays the card, subcard, and port number of the cross-connected ATM.</td>
</tr>
<tr>
<td>Cross-connect-VPI</td>
<td>Displays the number of the cross-connected virtual path identifier.</td>
</tr>
<tr>
<td>Cross-connect-VCI</td>
<td>Displays the number of the cross-connected virtual channel identifier.</td>
</tr>
<tr>
<td>Cross-connect-UPC</td>
<td>Displays the state of the cross-connected UPC; pass or not pass.</td>
</tr>
<tr>
<td>Cross-connect OAM-configuration</td>
<td>Displays the state of the cross-connected OAM configuration; enabled or disabled.</td>
</tr>
<tr>
<td>Cross-connect OAM-state</td>
<td>Displays the status of the cross-connected OAM state; applicable or not applicable.</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Encapsulation type.</td>
</tr>
<tr>
<td>Threshold Group/Cells queued</td>
<td>Displays the threshold group number and number of cells queued.</td>
</tr>
<tr>
<td>Rx cells/Tx cells</td>
<td>Displays the number of cells received and transmitted.</td>
</tr>
<tr>
<td>Tx Clp0/Tx Clp1</td>
<td>Displays the number of CLP=0 and CLP=1 cells transmitted.</td>
</tr>
<tr>
<td>Rx Clp0/Rx Clp1</td>
<td>Displays the number of CLP=0 and CLP=1 cells received.</td>
</tr>
<tr>
<td>Rx Upc Violations</td>
<td>Displays the number of UPC violations detected in the receive cell stream.</td>
</tr>
<tr>
<td>Rx cell drops</td>
<td>Displays the number of cells received and then dropped.</td>
</tr>
<tr>
<td>Rx pkts</td>
<td>Displays the number of packets received.</td>
</tr>
<tr>
<td>Rx pkt drops</td>
<td>Displays the number of packets dropped.</td>
</tr>
<tr>
<td>Rx Clp0 q full drops</td>
<td>Displays the number of CLP=0 cells received and then dropped for exceeding the input queue size.</td>
</tr>
<tr>
<td>Rx Clp1 qthresh drops</td>
<td>Displays the number of CLP=1 cells received and then dropped for exceeding the discard threshold of the input queue.</td>
</tr>
<tr>
<td>Rx connection-traffic-table-index</td>
<td>Displays the receive connection-traffic-table-index.</td>
</tr>
<tr>
<td>Rx service-category</td>
<td>Displays the receive service category.</td>
</tr>
<tr>
<td>Rx pcr-clp01</td>
<td>Displays the receive peak cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Rx scr-clp01</td>
<td>Displays the receive sustained cell rate for clp01 cells (kbps).</td>
</tr>
</tbody>
</table>
Chapter 18  Show Commands

show atm vc

Table 18-14  show atm vc interface ATM Field Descriptions  (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx mcr-clp01</td>
<td>Displays the receive minimum cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Rx cdvt</td>
<td>Displays the receive cell delay variation tolerance.</td>
</tr>
<tr>
<td>Rx mbs</td>
<td>Displays the receive minimum burst size.</td>
</tr>
<tr>
<td>Tx connection-traffic-table-index</td>
<td>Displays the transmit connection-traffic-table-index.</td>
</tr>
<tr>
<td>Tx service-category</td>
<td>Displays the transmit service category.</td>
</tr>
<tr>
<td>Tx pcr-clp01</td>
<td>Displays the transmit peak cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Tx scr-clp01</td>
<td>Displays the transmit sustained cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Tx mcr-clp01</td>
<td>Displays the transmit minimum cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Tx cdvt</td>
<td>Displays the transmit cell delay variation tolerance.</td>
</tr>
<tr>
<td>Tx mbs</td>
<td>Displays the transmit minimum burst size.</td>
</tr>
<tr>
<td>Crc Errors</td>
<td>Displays the number of cyclic redundancy check errors.</td>
</tr>
<tr>
<td>Sar Timeouts</td>
<td>Displays the number of segmentation and reassembly timeouts.</td>
</tr>
<tr>
<td>OverSizedSDUs</td>
<td>Displays the number of oversized service data units.</td>
</tr>
<tr>
<td>BufSzOvfl</td>
<td>Displays the number of buffer size overflows.</td>
</tr>
</tbody>
</table>

The following example shows how to enter the command for a display of the cast type point-to-multipoint and connection type soft VC on ATM interface 0/0/0.

Switch# show atm vc cast-type p2mp conn-type soft-vc interface ATM 0/0/0

The following example shows how to enter the command for a display of the connection type SVC and cast type point-to-point on ATM interface 0/0/0.

Switch# show atm vc conn-type svc cast-type p2p interface ATM 0/0/0

The following example shows the transmit and receive cell count on ATM interface 1/0/0, with VPI 1 and VPI 100.

Switch# show atm vc traffic interface atm 1/0/0 1 100

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI</th>
<th>VCI</th>
<th>Type</th>
<th>rx-cell-cnts</th>
<th>tx-cell-cnts</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM1/0/0</td>
<td>1</td>
<td>100</td>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pvc</td>
<td>Creates a PVC.</td>
</tr>
<tr>
<td>atm soft-vc (point-to-point)</td>
<td>Creates a soft PVC.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show atm status</td>
<td>Displays current information about ATM interfaces and the number of installed connections.</td>
</tr>
<tr>
<td>show atm vc signalling</td>
<td>Displays the ATM VC signaling activity.</td>
</tr>
</tbody>
</table>
show atm vc signalling

To show the ATM VC signaling activity, use the `show atm vc signalling` EXEC command.

```
show atm vc signalling [interface atm card/subcard/port] [cast-type p2p | p2mp] [detail]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>card/subcard/port</strong></td>
<td>Card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td><strong>cast-type</strong></td>
<td>Displays the payload type protocol and the message type protocol information for a point-to-point (p2p) or point-to-multipoint (p2mp) connection.</td>
</tr>
<tr>
<td><strong>detail</strong></td>
<td>Displays detailed information about a connection, including type of connection, calling party, current and previous state, and how the call was initiated.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show atm vc signalling` EXEC command.

```
Switch# show atm vc signalling

+ATM0/0/0 0 32 1 ATM1/0/0 0 32 1 MTP
+ATM0/0/0 0 33 2 ATM1/0/0 0 33 2 MTP
+ATM0/0/0 0 34 3 ATM1/0/0 0 34 3 MTP
+ATM0/0/0 0 35 4 ATM1/0/0 0 35 4 MTP
+ATM0/0/0 0 36 5 ATM1/0/0 0 36 5 MTP
+ATM0/0/0 0 37 6 ATM1/0/0 0 37 6 MTP
+ATM0/0/0 0 38 7 ATM1/0/0 0 38 7 MTP
+ATM0/0/0 0 39 8 ATM1/0/0 0 39 8 MTP
+ATM0/0/0 0 40 9 ATM1/0/0 0 40 9 MTP
+ATM0/0/0 0 41 10 ATM1/0/0 0 41 10 PTP
+ATM0/0/0 0 42 11 ATM1/0/0 0 42 11 PTP
+ATM0/0/0 0 43 12 ATM1/0/0 0 43 12 PTP
+ATM0/0/0 0 44 13 ATM1/0/0 0 44 13 PTP
+ATM0/0/0 0 45 14 ATM1/0/0 0 45 14 PTP
+ATM0/0/0 0 46 15 ATM1/0/0 0 46 15 PTP
+ATM0/0/0 0 47 16 ATM1/0/0 0 47 16 PTP
+ATM0/0/0 0 48 17 ATM1/0/0 0 48 17 PTP
+ATM0/0/0 0 49 18 ATM1/0/0 0 49 18 PTP
+ATM0/0/0 0 50 19 ATM1/0/0 0 50 19 PTP

The following example is sample output from the `show atm vc signalling` EXEC command using the p2p option.

```
Switch# show atm vc signalling cast-type p2p

ATM0 0 67 5 ATM0/1/1 0 32 1 PTP
+ATM0/0/0 0 32 1 ATM1/0/0 0 32 1 PTP
```
The following sample shows the output using the detail and cast-type options with the `show atm vc signalling` command.

```
Switch# show atm vc signalling detail cast-type p2mp
(0/0/0:0 0,36 - 0005) p2p
    From: 47.2222000000000000000000
    remote, Rcvd Connect Ack -> Active(N10),
(1/0/0:0 0,36 - 0005) p2p
    To: 47.1111000000000000000000
    local, Req Connect Ack -> Active(N10),
```

Table 18-15 describes the fields from the `show atm vc signalling detail` command.

**Table 18-15 show atm vc signalling detail Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/0/0</td>
<td>The interface number.</td>
</tr>
<tr>
<td>0,36</td>
<td>The VCI/VCI number.</td>
</tr>
<tr>
<td>0005</td>
<td>The call reference number.</td>
</tr>
<tr>
<td>p2p</td>
<td>The type of connection.</td>
</tr>
<tr>
<td>From</td>
<td>The origin of the calling party.</td>
</tr>
<tr>
<td>remote/local</td>
<td>The call was initiated either remotely or locally.</td>
</tr>
<tr>
<td>Rcvd Connect Ack</td>
<td>The previous state of the call.</td>
</tr>
<tr>
<td>Active</td>
<td>The current state of the call.</td>
</tr>
</tbody>
</table>
show atm vp

To display the ATM layer connection information about the virtual path, use the `show atm vp` EXEC command.

```
  show atm vp
  show atm vp interface {atm | atm-p} card/subcard/port[/vpt#] [vpi vci]
  show atm vp cast-type cast-type [conn-type conn-type] [interface {atm | atm-p} card/subcard/port[/vpt#]]
  show atm vp traffic [interface {atm | atm-p} card/subcard/port[/vpt#] [vpi vci]]
```

**Syntax Description**

```markdown
<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>card/subcard/port</code></td>
<td>Card, subcard, and port number for the interface.</td>
</tr>
<tr>
<td><code>/vpt#</code></td>
<td>Displays virtual path tunnel identifier.</td>
</tr>
<tr>
<td><code>vpi vci</code></td>
<td>Displays virtual path identifier and virtual channel identifier.</td>
</tr>
<tr>
<td><code>cast-type</code></td>
<td>Specifies the cast type as point-to-multipoint (p2mp) or point-to-point (p2p).</td>
</tr>
<tr>
<td><code>conn-type</code></td>
<td>Specifies the connection type as pvc, soft-vc, or svc.</td>
</tr>
<tr>
<td><code>traffic</code></td>
<td>Displays the virtual channel cell traffic.</td>
</tr>
</tbody>
</table>
```

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10)EY</td>
<td>Added output information for passive half legs.</td>
</tr>
<tr>
<td>12.1(23)EB</td>
<td>Modified: added Access-control information to display.</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show atm vp` command.

```
Switch# show atm vp
Interface   VPI  Type   X-Interface   X-VPI  Status
ATM3/1/1    1    SVP    ATM3/1/2    200    UP
ATM3/1/1    2    SVP    ATM3/1/2    201    UP
ATM3/1/1    3    SVP    ATM3/1/2    202    UP
ATM3/1/2    200  SoftVP ATM3/1/1    1     UP
ATM3/1/2    201  SoftVP ATM3/1/1    2     UP
ATM3/1/2    202  SoftVP ATM3/1/1    3     UP
ATM3/1/2    255  SoftVP NOT CONNECTED
```

The following example is sample output from the `show atm vp` command for ATM 3/1/1.

```
Switch# show atm vp interface atm 3/1/1
Interface   VPI  Type   X-Interface   X-VPI  Status
ATM3/1/1    1    SVP    ATM3/1/2    200    UP
ATM3/1/1    2    SVP    ATM3/1/2    201    UP
ATM3/1/1    3    SVP    ATM3/1/2    202    UP
```
The following example displays the output for the soft PVP passive half leg configured on interface ATM 0/1/0 and VPI 50.

Switch# show atm vp interface atm 0/1/0 50

Interface: ATM0/1/0, Type: oc3suni
VPI = 50
Status: NOT CONNECTED
Time-since-last-status-change: 00:00:32
Connection-type: SoftVP
Cast-type: point-to-point
Passive half leg
Soft vp location: Destination
Remote ATM address: default
Remote VPI: 0
Soft vp call state: Inactive
Usage-Parameter-Control (UPC): pass
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Rx cells: 0, Tx cells: 0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 7113539
Rx mcr-clp01: none
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index: 1
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 7113539
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: none

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The following example is sample output from the show atm vp command for ATM 0/1/0 and VP 18 with an FC-PCQ installed.

Switch# show atm vp interface atm 0/1/0 18

Interface: ATM0/1/0, Type: oc3suni
VPI = 18
Status: UP
Time-since-last-status-change: 16:13:58
Connection-type: PVP
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Number of OAM-configured connections: 52
OAM-configuration: Seg-loopback-on Ais-on
OAM-states: OAM-Up
OAM-Loopback-Tx-Interval: 5
Cross-connect-interface: ATM0/1/2, Type: oc3suni
Cross-connect-VPI = 18
Cross-connect-UPC: pass
Cross-connect OAM-configuration: Seg-loopback-on Ais-on
Cross-connect OAM-state: OAM-Up
OAM-Loopback-Tx-Interval: 5
Rx cells: 197554, Tx cells: 151430
Rx connection-traffic-table-index: 1
The following example is sample output from the `show atm vp` command for ATM 0/0/1 and VP 51 with the switch processor feature card installed.

Switch# show atm vp interface atm 0/0/1 51

Interface: ATM0/0/1, Type: oc3suni
VPI = 51
Status: TUNNEL
Time-since-last-status-change: 3d02h
Connection-type: PVP
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Wrr weight: 32
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Threshold Group: 5, Cells queued: 0
Rx cells: 0, Tx cells: 0
Rx Clp0:0, Tx Clp1: 0
Rx Clp0:0, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx Clp0 q full drops:0, Rx Clp1 qthresh drops:0
Rx connection-traffic-table-index: 1
Rx service-category: UBR (Unspecified Bit Rate)
Rx pcr-clp01: 7113539
Rx scr-clp01: none
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: none
Tx connection-traffic-table-index: 1
Tx service-category: UBR (Unspecified Bit Rate)
Tx pcr-clp01: 7113539
Tx scr-clp01: none
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: none
The following example is sample output from the `show atm vp` command for ATM 0/0/1 with the passive half-leg configuration information of two-ended soft PVP with with the access control source ATM NSAP address configured.

```
Switch# show atm vc interface atm 0/0/1 60
Interface:ATM0/0/1, Type:oc3suni
VPI 60
Status:UP
Time-since-last-status-change:00:01:15
Connection-type:SoftVP
Passive half leg
  _Soft vc location: Destination
  Remote ATM address: default
  Remote VPI: 60
  Access-control: Filter-set - fset1
  Soft vp call state: Active
```

The following example is sample output from the `show atm vp` command for ATM 0/0/1 with the passive half-leg configuration information of two-ended soft PVP with the filter set fset1 configured.

```
Switch# show atm vc interface atm 0/0/1 60
Interface:ATM0/0/1, Type:oc3suni
VPI 60
Status:UP
Time-since-last-status-change:00:01:15
Connection-type:SoftVP
Passive half leg
  _Soft vc location: Destination
  Remote ATM address: default
  Remote VPI: 60
  Access-control: Filter-set - fset1
  Soft vp call state: Active
```

Table 18-16 describes the fields shown in the display.

**Table 18-16 show atm vp interface atm Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Displays the card, subcard, and port number of the ATM interface.</td>
</tr>
<tr>
<td>VPI/VCI</td>
<td>Displays the number of the virtual path identifier and the virtual channel identifier.</td>
</tr>
<tr>
<td>Status</td>
<td>Displays the type of interface for the specified ATM interface.</td>
</tr>
<tr>
<td>Time-since-last-status-change</td>
<td>Displays the time elapsed since the last status change.</td>
</tr>
<tr>
<td>Connection-type</td>
<td>Displays the type of connection for the specified ATM interface.</td>
</tr>
<tr>
<td>Cast-type</td>
<td>Displays the type of cast for the specified ATM interface.</td>
</tr>
<tr>
<td>Usage-Parameter-Control (UPC)</td>
<td>Displays the state of the UPC.</td>
</tr>
</tbody>
</table>
Chapter 18  Show Commands

Table 18-16 show atm vp interface atm Field Descriptions  (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of OAM-configured connections</td>
<td>Displays the amount of connections configured by OAM.</td>
</tr>
<tr>
<td>OAM-configuration</td>
<td>Displays the state of the OAM configuration; enabled or disabled.</td>
</tr>
<tr>
<td>OAM-states</td>
<td>Displays the status of the OAM state; applicable or not applicable.</td>
</tr>
<tr>
<td>OAM Loopback-Tx-Interval</td>
<td>Displays the OAM loopback transmit interval.</td>
</tr>
<tr>
<td>Cross-connect-interface</td>
<td>Displays the cross-connect interface number.</td>
</tr>
<tr>
<td>Cross-connect-VPI</td>
<td>Displays the cross-connect VPI number.</td>
</tr>
<tr>
<td>Cross-connect-UPC</td>
<td>Displays the cross-connect UPC status.</td>
</tr>
<tr>
<td>Cross-connect OAM-configuration</td>
<td>Displays the configuration of the OAM in the cross-connect half-leg.</td>
</tr>
<tr>
<td>Cross-connect OAM-state</td>
<td>Displays the state of the OAM cross-connect half-leg.</td>
</tr>
<tr>
<td>OAM-Loopback-Tx-Interval</td>
<td>Displays the OAM loopback transmit interval.</td>
</tr>
<tr>
<td>Rx cells/Tx cells</td>
<td>Displays the number of cells transmitted and received.</td>
</tr>
<tr>
<td>Rx connection-traffic-table-index</td>
<td>Displays the receive connection-traffic-table-index.</td>
</tr>
<tr>
<td>Rx service-category</td>
<td>Displays the receive service category.</td>
</tr>
<tr>
<td>Rx pcr-clp01</td>
<td>Displays the receive peak cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Rx scr-clp01</td>
<td>Displays the receive sustained cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Rx mcr-clp01</td>
<td>Displays the receive minimum cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Rx cdvt</td>
<td>Displays the receive cell delay variation tolerance.</td>
</tr>
<tr>
<td>Rx mbs</td>
<td>Displays the receive maximum burst size.</td>
</tr>
<tr>
<td>Tx connection-traffic-table-index</td>
<td>Displays the transmit connection-traffic-table-index.</td>
</tr>
<tr>
<td>Tx service-category</td>
<td>Displays the transmit service category.</td>
</tr>
<tr>
<td>Tx pcr-clp01</td>
<td>Displays the transmit peak cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Tx scr-clp01</td>
<td>Displays the transmit sustained cell rate for clp01 cells (kbps).</td>
</tr>
<tr>
<td>Tx mcr-clp01</td>
<td>Displays the transmit minimum cell rate for clp01 cells (kbps)</td>
</tr>
<tr>
<td>Tx cdvt</td>
<td>Displays the transmit cell delay variation tolerance.</td>
</tr>
<tr>
<td>Tx mbs</td>
<td>Displays the transmit maximum burst size.</td>
</tr>
</tbody>
</table>

The following example shows how to display the cast type point-to-multipoint and connection type soft VC information on ATM interface 0/0/0.

```
Switch# show atm vp cast-type p2mp conn-type soft-vc interface atm 0/0/0
```

The following example shows how to display the connection type SVC and cast type point-to-point information on ATM interface 0/0/0.

```
Switch# show atm vp conn-type svc cast-type p2p interface atm 0/0/0
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>atm pvp</strong></td>
<td>Creates a PVP.</td>
</tr>
<tr>
<td></td>
<td><strong>atm soft-vp</strong></td>
<td>Creates a soft PVP.</td>
</tr>
<tr>
<td></td>
<td><strong>show atm interface</strong></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td></td>
<td><strong>show atm status</strong></td>
<td>Displays current information about ATM interfaces and the number of installed connections.</td>
</tr>
</tbody>
</table>
show bootflash:

To display information about the bootflash: file system, use the `show bootflash:` EXEC command.

```
show bootflash: [all | chips | filesys]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Displays all flash information.</td>
</tr>
<tr>
<td>chips</td>
<td>Displays flash chip information.</td>
</tr>
<tr>
<td>filesys</td>
<td>Displays file system status information.</td>
</tr>
</tbody>
</table>

**Defaults**

Displays information about files in the file system.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>Modified: Changed to <code>show bootflash:</code></td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show boot` command displaying chip information.

```
Switch# show bootflash: chips
******* RSP Internal Flash Bank -- Intel Chips *******
Flash SIMM Reg: 3424
  Flash SIMM PRESENT
  2 Banks
  Bank Size = 4M
  HW Rev = 4

Flash Status Registers: Bank 0
  Intelligent ID Code : 89898989 A2A2A2A2
  Status Reg: 80808080

Flash Status Registers: Bank 1
  Intelligent ID Code : 89898989 A2A2A2A2
  Status Reg: 80808080
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>boot</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>bert</td>
<td>Checks the bit errors on a line for a particular interval.</td>
</tr>
<tr>
<td>(Catalyst 8510 MSR and LightStream 1010)</td>
<td></td>
</tr>
<tr>
<td>boot system</td>
<td>Specifies the system image that the switch loads at startup.</td>
</tr>
<tr>
<td>show version</td>
<td>Displays the system hardware configuration, software version, and names and sources of configuration files and boot images.</td>
</tr>
</tbody>
</table>
show buffers

Use the **show buffers** EXEC command to display statistics for the buffer pools on the network server.

```
show buffers [address hex-addr | all | assigned | free | input-interface interface-type
card/subcard/port | old | pool pool-name [dump | header | packet]] | [failures]
```

**Syntax Description**

- **hex-addr**
  - Address, in hexadecimal notation, of the buffer to display.

- **all**
  - Displays all buffers.

- **assigned**
  - Displays the buffers in use.

- **free**
  - Displays the buffers available for use.

- **interface-type**
  - Specifies an input interface as **atm**, **atm-p**, **cbr**, **ethernet**, or **null**.

- **card/subcard/port**
  - Specifies the card, subcard, and port number for the interface.

- **old**
  - Displays buffers older than one minute.

- **pool-name**
  - Specifies the name of a buffer pool to use.

- **dump**
  - Shows the buffer header and all data in the display.

- **header**
  - Shows the buffer header only in the display.

- **packet**
  - Shows the buffer header and packet data in the display.

- **failures**
  - Displays buffer allocation failures.

**Command Modes**

**EXEC**

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show buffers** command with no arguments, showing all buffer pool information.

```
Switch# show buffers
Buffer elements:
  500 in free list (500 max allowed)
  19874 hits, 0 misses, 0 created

Public buffer pools:
Small buffers, 104 bytes (total 120, permanent 120):
  120 in free list (20 min, 250 max allowed)
  18937 hits, 0 misses, 0 trims, 0 created
  0 failures (0 no memory)
Middle buffers, 600 bytes (total 100, permanent 100):
  100 in free list (10 min, 200 max allowed)
  58957 hits, 0 misses, 0 trims, 0 created
  0 failures (0 no memory)
Big buffers, 1524 bytes (total 20, permanent 20):
  20 in free list (5 min, 200 max allowed)
  1123 hits, 0 misses, 0 trims, 0 created
  0 failures (0 no memory)
VeryBig buffers, 4520 bytes (total 10, permanent 10):
```

OL-7395-01, Cisco IOS Release 12.1(26)EB

ATM and Layer 3 Switch Router Command Reference
show buffers

10 in free list (0 min, 300 max allowed)
0 hits, 0 misses, 0 trims, 0 created
0 failures (0 no memory)

Large buffers, 5024 bytes (total 0, permanent 0):
0 in free list (0 min, 20 max allowed)
0 hits, 0 misses, 0 trims, 0 created
0 failures (0 no memory)

Huge buffers, 18024 bytes (total 0, permanent 0):
0 in free list (0 min, 13 max allowed)
0 hits, 0 misses, 0 trims, 0 created
0 failures (0 no memory)

Interface buffer pools:
AAL5_Small buffers, 512 bytes (total 512, permanent 512):
0 in free list (0 min, 512 max allowed)
512 hits, 0 misses
512 max cache size, 512 in cache

AAL5_Medium buffers, 4096 bytes (total 128, permanent 128):
0 in free list (0 min, 128 max allowed)
128 hits, 0 misses
128 max cache size, 128 in cache

AAL5_Large buffers, 9216 bytes (total 64, permanent 64):
0 in free list (0 min, 64 max allowed)
64 hits, 0 misses
64 max cache size, 64 in cache

Table 18-17 describes the significant fields shown in the display.

**Table 18-17 show buffers Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer elements</td>
<td>Buffer elements are small structures used as placeholders for buffers in internal operating system queues. Buffer elements are used when a buffer might need to be on more than one queue.</td>
</tr>
<tr>
<td>Free list</td>
<td>Total number of the currently unallocated buffer elements.</td>
</tr>
<tr>
<td>Max allowed</td>
<td>Maximum number of buffers that are available for allocation.</td>
</tr>
<tr>
<td>Hits</td>
<td>Count of successful attempts to allocate a buffer when needed.</td>
</tr>
<tr>
<td>Misses</td>
<td>Count of buffer allocation attempts that resulted in growing the buffer pool to allocate a buffer.</td>
</tr>
<tr>
<td>Created</td>
<td>Count of new buffers created to satisfy buffer allocation attempts when the available buffers in the pool have already been allocated.</td>
</tr>
<tr>
<td>Small buffers</td>
<td>Buffers that are 104 bytes long.</td>
</tr>
<tr>
<td>Middle buffers</td>
<td>Buffers that are 600 bytes long.</td>
</tr>
<tr>
<td>Big buffers</td>
<td>Buffers that are 1524 bytes long.</td>
</tr>
<tr>
<td>VeryBig buffers</td>
<td>Buffers that are 4520 bytes long.</td>
</tr>
<tr>
<td>Large buffers</td>
<td>Buffers that are 5024 bytes long.</td>
</tr>
<tr>
<td>Huge buffers</td>
<td>Buffers that are 18024 bytes long.</td>
</tr>
<tr>
<td>Total</td>
<td>Total number of this type of buffer.</td>
</tr>
<tr>
<td>Permanent</td>
<td>Number of these buffers that are permanent.</td>
</tr>
<tr>
<td>Free list</td>
<td>Number of available or unallocated buffers in that pool.</td>
</tr>
<tr>
<td>Min</td>
<td>Minimum number of free or unallocated buffers in the buffer pool.</td>
</tr>
</tbody>
</table>
### Table 18-17 show buffers Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max allowed</td>
<td>Maximum number of free or unallocated buffers in the buffer pool.</td>
</tr>
<tr>
<td>Hits</td>
<td>Count of successful attempts to allocate a buffer when needed.</td>
</tr>
<tr>
<td>Misses</td>
<td>Count of buffer allocation attempts that resulted in growing the buffer pool in order to allocate a buffer.</td>
</tr>
<tr>
<td>Trims</td>
<td>Count of buffers released to the system because they were not being used. This field is displayed only for dynamic buffer pools, not interface buffer pools, which are static.</td>
</tr>
<tr>
<td>Created</td>
<td>Count of new buffers created in response to misses. This field is displayed only for dynamic buffer pools, not interface buffer pools, which are static.</td>
</tr>
<tr>
<td>Total</td>
<td>Total number of this type of buffer.</td>
</tr>
<tr>
<td>Permanent</td>
<td>Number of these buffers that are permanent.</td>
</tr>
<tr>
<td>Free list</td>
<td>Number of available or unallocated buffers in that pool.</td>
</tr>
<tr>
<td>Min</td>
<td>Minimum number of free or unallocated buffers in the buffer pool.</td>
</tr>
<tr>
<td>Max allowed</td>
<td>Maximum number of free or unallocated buffers in the buffer pool.</td>
</tr>
<tr>
<td>Hits</td>
<td>Count of successful attempts to allocate a buffer when needed.</td>
</tr>
<tr>
<td>Fall backs</td>
<td>Count of buffer allocation attempts that resulted in falling back to the smallest public buffer pool that is at least as big as the interface buffer pool.</td>
</tr>
<tr>
<td>Max Cache Size</td>
<td>Maximum number of buffers from interface pool that can be in the buffer pool’s cache.</td>
</tr>
<tr>
<td></td>
<td>Each interface buffer pool has its own cache. These are not additional permanent buffers; they come from the interface’s buffer pools. Some interfaces place all buffers from the interface pool into the cache. In this case, it is normal for the free list to display 0.</td>
</tr>
<tr>
<td>Failures</td>
<td>Total number of allocation requests that failed because no buffer was available for allocation; the datagram was lost. Such failures normally occur at interrupt level.</td>
</tr>
<tr>
<td>No memory</td>
<td>Number of failures that occurred because no memory was available to create a new buffer.</td>
</tr>
</tbody>
</table>
show calendar

To display the calendar hardware setting, use the show calendar EXEC command.

    show calendar

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You can compare the time and date shown with this command with the time and date listed using the show clock command to verify that the calendar and system clock are synchronized. The time displayed is relative to the configured time zone.

**Examples**

In the following example, the hardware calendar indicates the time stamp of 12:13:44 p.m. on Friday, April 4, 1997.

    Switch# show calendar
    12:13:44 PST Fri April 4 1997

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show clock</td>
<td>Displays the system clock.</td>
</tr>
</tbody>
</table>
**show capability (Catalyst 8540 MSR)**

To display the capabilities of the primary or secondary route processor and the software version that is running, use the `show capability` EXEC command.

```
show capability {primary | secondary}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary</td>
<td>Displays the capabilities of the primary route processor.</td>
</tr>
<tr>
<td>secondary</td>
<td>Displays the capabilities of the secondary route processor.</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The `show capability` display includes hardware and functional versions of the various components.

### Examples

The following example shows capabilities of the primary route processor for the ATM switch router.

```
Switch# show capability primary
Dram Size is :64 MB
Pmem Size is :4 MB
Nvram Size is :512 KB
BootFlash Size is :8 MB
ACPM hw version 3.1
ACPM functional version 3.8
Netclk Module present flag :1
NCLK hw version 1.0
NCLK func version 1.2
Printing the parameters for Switch card: 0
SWC0 HW version 2.2
SWC0 Functional version 0.40
SWC0 Table memory size: 8 MB
SWC0Feat Card Present Flag: 1
SWC0Feat Card HW version 1.0
SWC0Feat Card Functional version 2.0
Printing the parameters for Switch card: 1
SWC1 HW version 0.0
SWC1 Functional version 0.0
SWC1 Table memory size: 0 MB
SWC1Feat Card Present Flag: 0
SWC1Feat Card HW version 0.0
SWC1Feat Card Functional version 0.0
Printing the parameters for Switch card: 2
SWC2 HW version 2.2
SWC2 Functional version 0.40
SWC2 Table memory size: 8 MB
SWC2Feat Card Present Flag: 1
SWC2Feat Card HW version 1.0
SWC2Feat Card Functional version 2.0
```
Number of Drivers in IOS: 3
  Driver 0 type: 2560
  Driver 0 Functional Version 0.27
  Driver 1 type: 2562
  Driver 1 Functional Version 0.1
  Driver 2 type: 2564
  Driver 2 Functional Version 0.1
show cdp

To display global CDP information, including timer and hold-time information, use the `show cdp` EXEC command.

```
show cdp
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show cdp` command. Global CDP timer and hold-time parameters are set to the defaults of 60 and 180 seconds, respectively.

```
Switch# show cdp
Global CDP information:
   Sending CDP packets every 60 seconds
   Sending a holdtime value of 180 seconds
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cdp holdtime</code></td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td><code>cdp timer</code></td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td><code>show cdp entry</code></td>
<td>Displays information about a neighbor device listed in the CDP table.</td>
</tr>
<tr>
<td><code>show cdp neighbors</code></td>
<td>Displays information about neighbors.</td>
</tr>
</tbody>
</table>
show cdp entry

To display information about a neighbor device listed in the CDP table, use the `show cdp entry` EXEC command.

```
show cdp entry entry-name [protocol | version]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>entry-name</td>
<td>Name of the neighbor about which you want information.</td>
</tr>
<tr>
<td>protocol</td>
<td>Limits the display to information about the protocols enabled on a device.</td>
</tr>
<tr>
<td>version</td>
<td>Limits the display to information about the version of software running on the device.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show cdp entry protocol` command. Only information about the protocols enabled on `device.cisco.com` is displayed.

```
Switch# show cdp entry device.cisco.com protocol
Protocol information for device.cisco.com:
  IP address: 198.92.68.18
  CLNS address: 490001.1111.1111.1111.00
  DECnet address: 10.1
```

The following example is sample output from the `show cdp entry version` command. Only information about the version of software running on `device.cisco.com` is displayed.

```
Switch# show cdp entry device.cisco.com version
Version information for device.cisco.com:
  GS Software (GS3), IOS Version xx.x(10302) [jhunt 161]
  Copyright (c) 1986-1998 by cisco Systems, Inc.
  Compiled Mon 07-Nov-97 14:34
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show cdp neighbors</code></td>
<td>Displays information about neighbors.</td>
</tr>
</tbody>
</table>
show cdp interface

To display information about the interfaces on which CDP is enabled, use the show cdp interface EXEC command.

```
show cdp interface [interface-type card/subcard/port]
```

**Syntax Description**

- **interface-type**
  - Type of interface, specified as **atm, atm-p, cbr, ethernet**, or **null**.

- **card/subcard/port**
  - Card, subcard, and port number for the interface.

**Command Modes**

- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

**Catalyst 8540 MSR**

The following example is sample output from the show cdp interface command. Status information and information about CDP timer and hold-time settings is displayed for all interfaces on which CDP is enabled.

```
Switch# show cdp interface
Ethernet 0 is up, line protocol is up, encapsulation is ARPA
   Sending CDP packets every 60 seconds
   Holdtime is 180 seconds

The following example is sample output from the show cdp interface command with an interface specified. Status information and information about CDP timer and hold-time settings is displayed for the Ethernet 0 interface only.

Switch# show cdp interface ethernet 0
Ethernet 0 is up, line protocol is up, encapsulation is ARPA
   Sending CDP packets every 60 seconds
   Holdtime is 180 seconds
```

**Examples**

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the show cdp interface command. Status information and information about CDP timer and hold-time settings is displayed for all interfaces on which CDP is enabled.

```
Switch# show cdp interface
Aux0 is up, line protocol is up, encapsulation is SMDS
   Sending CDP packets every 60 seconds
   Holdtime is 180 seconds
Ethernet 0 is up, line protocol is up, encapsulation is ARPA
   Sending CDP packets every 60 seconds
   Holdtime is 180 seconds
```
show cdp neighbors

To display information about neighbors, use the **show cdp neighbors** EXEC command.

```
show cdp neighbors [interface-type card/subcard/port] [detail]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface-type</td>
<td>Specifies the type of the interface connected to the neighbors in question.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Identifies the card, subcard, and port number of the interface connected to</td>
</tr>
<tr>
<td></td>
<td>the neighbors in question.</td>
</tr>
<tr>
<td>detail</td>
<td>Displays detailed information about a neighbor (or neighbors), including</td>
</tr>
<tr>
<td></td>
<td>network address, enabled protocols, hold time, and software version.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following is sample output from the **show cdp neighbors** command. Device ID, interface type and number, hold-time settings, capabilities, platform, and port ID information about the switch router’s neighbors are displayed.

```
Switch# show cdp neighbors
Capability Codes: R - Switch, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP

Device ID        Local Intrfce     Holdtme    Capability  Platform  Port ID
device.cisco.com      Eth 0          151         R T        AGS       Eth 0
device.cisco.com      Ser 0          165         R T        AGS       Ser 3
```

The following is sample output from the **show cdp neighbors detail** command, with information about the ATM neighbors, including network address, enabled protocols, and software version.

```
Switch# show cdp neighbors detail
Device ID: device.cisco.com
Entry address(es):  
    IP address: 198.92.68.18
    CLNS address: 490001.1111.1111.1111.00
    DECN address: 10.1
Platform: AGS, Capabilities: Switch Trans-Bridge
Interface: Ethernet 0, Port ID (outgoing port): Ethernet 0
    Holdtime: 143 sec
Version: GS Software (GS3), Experimental Version xx.x(10302) [asmith 161]
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Mon 07-Nov-97 14:34
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show cdp entry</td>
<td>Displays information about a neighbor device listed in the CDP table.</td>
</tr>
</tbody>
</table>
**show cdp traffic**

To display traffic information from the CDP table, use the `show cdp traffic` EXEC command.

```
show cdp traffic
```

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**
The following example is sample output from the `show cdp traffic` command.

```
Switch# show cdp traffic
CDP counters:
    Packets output: 94, Input: 75
    Hdr syntax: 0, Chksum error: 0, Encaps failed: 0
    No memory: 0, Invalid packet: 0, Fragmented: 0
```

In this example, traffic information is displayed, including the numbers of packets sent, the number of packets received, header syntax, checksum errors, failed encapsulations, memory problems, and invalid and fragmented packets. Header syntax indicates the number of packets CDP receives that have an invalid header format.
show ces address

To show all the configured CES-IWF ATM addresses, use the `show ces address` EXEC command.

```
show ces address
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**
The following example is sample output from the `show ces address` command.

```
Switch# show ces address
CES-IWF ATM Address(es):
  47.0091.8100.0000.0061.705a.cd01.4000.0c80.0030.10  CBR0/0/0:0  vpi 0 vci 16
  47.0091.8100.0000.0061.705a.cd01.4000.0c80.0034.10  CBR0/0/1:1  vpi 0 vci 1040
  47.0091.8100.0000.0061.705a.cd01.4000.0c80.0034.20  CBR0/0/1:2  vpi 0 vci 1056
  47.0091.8100.0000.0061.705a.cd01.4000.0c80.0038.10  CBR0/0/2:0  vpi 0 vci 2064
```
show ces circuit

To show detailed circuit information, use the show ces circuit EXEC command.

    show ces circuit [interface cbr card/subcard/port [circuits]]

Syntax Description

- **card/subcard/port**: Card, subcard, and port number of the CBR interface.
- **circuits**: Number of circuits to display, from 0 to 31.

Command Modes

EXEC

Command History

Release  Modification
11.2(5)        New command

Examples

The following example is sample output about CBR interface 1/0/0 from the show ces circuit command.

```
Switch# show ces circuit interface cbr 1/0/0
Interface  Circuit  Circuit-Type     X-interface   X-vpi   X-vci Status
CBR0/0/1    1       Active SoftVC     ATM1/0/1      0        33  UP
CBR0/0/1    2       Active SoftVC     ATM1/0/1      0        34  UP
```

The following example is sample output about CBR interface 0/0/1 on circuit 1 using the show ces circuit command.

```
Switch# show ces circuit interface cbr 0/0/1 1
Circuit:Name CBR0/0/1:1, Circuit-state ADMIN_UP / Interface CBR0/0/1,
Circuit_id 1, Port-Type T1, Port-State UP
Port Clocking network-derived, aal1 Clocking Method CESIFI_AAL1_CLOCK_SYNC
Channel in use on this port: 1-24
Channels used by this circuit: 1-12
Cell-Rate: 2043, Bit-Rate 768000
cas OFF, cell_header 0x4100 (vci = 1040)
Configured CDV 2000 usecs,Measured CDV unavailable
De-jitter: UnderFlow unavailable,OverFlow unavailable
ErrTolerance 8, idleCircuitdetect OFF, onHookIdleCode 0x0
state: VcActive, maxQueueDepth 42, startDequeueDepth 25
Partial Fill: 47, Structured Data Transfer 288
Active SoftVC
Src:atm addr 47.0091.8100.0000.0061.705a.cd01.4000.0c80.0034.10 vpi 0, vci 1040
Dst:atm addr 47.0091.8100.0000.0060.5c71.2001.4000.0c80.1034.10
```
show ces interface cbr

To show detailed CES port information, use the `show ces interface cbr` privileged EXEC command.

```
show ces interface cbr card/subcard/port
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number of the CBR interface.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show ces interface cbr` command.

```
Switch# show ces interface cbr0/0/0
Interface: CBR0/0/0  Port-type:T1-DCU
IF Status: UP  Admin Status: UP
Channels in use on this port: 1-24
LineType: ESF  LineCoding: B8ZS  LoopConfig: NoLoop
SignalMode: NoSignalling  XmtClockSrc: network-derived
DataFormat: UnStructured  AAL1 Clocking Mode: Adaptive  LineLength: 0_110

LineState: LossOfSignal
Errors in the Current Interval:
  PCVs  0  LCVs  0  ESs  0  SESs  0  SEFSs  0
  UASs  0  CSSs  0  LESs  0  BESs  0  DMs  0
Errors in the last 24Hrs:
  PCVs  1028  LCVs  190733  ESs  0  SESs  2  SEFSs  0
  UASs  0  CSSs  0  LESs  0  BESs  0  DMs  6
Input Counters: 12160995 cells, 571566765 bytes
Output Counters: 83926483 cells, 3944544701 bytes
```
show ces status

To display the status of the ports on the CES interface, use the **show ces status** EXEC command.

```
show ces status
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show ces status** command.

```
Switch# show ces status

<table>
<thead>
<tr>
<th>Interface</th>
<th>IF Status</th>
<th>Admin Status</th>
<th>Port Type</th>
<th>Channels in use</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR0/0/0</td>
<td>UP</td>
<td>UP</td>
<td>T1</td>
<td>1-24</td>
</tr>
<tr>
<td>CBR0/0/1</td>
<td>UP</td>
<td>UP</td>
<td>T1</td>
<td>1-24</td>
</tr>
<tr>
<td>CBR0/0/2</td>
<td>UP</td>
<td>UP</td>
<td>T1</td>
<td>1-24</td>
</tr>
<tr>
<td>CBR0/0/3</td>
<td>UP</td>
<td>UP</td>
<td>T1</td>
<td></td>
</tr>
</tbody>
</table>
```
show ciscoview package

To show switch router package information, use the show ciscoview package command.

show ciscoview package

Syntax Description
None

Defaults
None.

Command Modes
EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
None.

Examples
The following example shows how to view Cisco package information.

```
Switch# show ciscoview package
CVFILE SIZE (in bytes)
Cat8500-4.0.sgz 1930848
Cat8500-4.0_ace.html 3704
Cat8500-4.0_error.html 401
Cat8500-4.0_jks.jar 15312
Cat8500-4.0_nos.jar 15936
Cisco.X509 529
identifydb.obj 2523
applet.html 8039
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ciscoview version</td>
<td>Shows engine version.</td>
</tr>
</tbody>
</table>
show ciscoview version

To show switch router engine version information, use the `show ciscoview version` command.

```
show ciscoview version
```

**Syntax Description**

None

**Defaults**

None.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None.

**Examples**

The following example shows how display engine version information.

```
Switch# show ciscoview version
Engine Version: 5.3 ADP Device: Cat8500 ADP Version: 4 ADK: 38
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ciscoview package</td>
<td>Shows Cisco package information.</td>
</tr>
</tbody>
</table>
show clock

To display the system clock, use the show clock EXEC command.

    show clock [detail]

Syntax Description

| Syntax Description | detail | Indicates the clock source (NTP, VINES, and so on) and the current summertime setting (if any). |

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

The system clock keeps an authoritative flag that indicates whether or not the time is believed to be accurate. If system clock has been set by a timing source, the flag is set. If the time is not authoritative, it is used only for display purposes. Until the clock is authoritative and the authoritative flag is set, the flag prevents the switch from causing peers to synchronize to itself when the switch time is invalid.

The symbol that precedes the show clock display indicates the following:

- An asterisk (*) indicates not authoritative.
- A blank space indicates authoritative.
- A period (.) indicates authoritative, but NTP is not synchronized.

Examples

The following sample output shows that the current clock is authoritative and that the time source is NTP.

    Switch# show clock detail
    15:29:03.158 PST Fri Ap 4 1997
    Time source is NTP

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clock set</td>
<td>Cisco IOS command removed from this manual. Refer to Appendix D.</td>
</tr>
<tr>
<td>show calendar</td>
<td>Displays the calendar hardware setting.</td>
</tr>
</tbody>
</table>
show compress

To display compression statistics, use the show compress EXEC command.

    show compress

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the show compress command.

    Switch# show compress
    Serial0
       uncompressed bytes xmt/rcv 10710562/11376835
       1 min avg ratio xmt/rcv 2.773/2.474
       5 min avg ratio xmt/rcv 4.084/3.793
       10 min avg ratio xmt/rcv 4.125/3.873
       no bufs xmt 0 no bufs rcv 0
       resets 0

Table 18-18 describes the fields shown in the display.

Table 18-18 show compress Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial0</td>
<td>Name and number of the interface.</td>
</tr>
<tr>
<td>uncompressed bytes</td>
<td>Total number of uncompressed bytes sent and received.</td>
</tr>
<tr>
<td>xmt/rcv</td>
<td></td>
</tr>
<tr>
<td>1 min avg ratio xmt/rcv</td>
<td>Static compression ratio for bytes sent and received, averaged over a</td>
</tr>
<tr>
<td>5 min avg ratio xmt/rcv</td>
<td>period of 1 minute, 5 minutes, and 10 minutes.</td>
</tr>
<tr>
<td>10 min avg ratio xmt/rcv</td>
<td></td>
</tr>
<tr>
<td>no bufs xmt</td>
<td>Number of times buffers were not available to compress data being sent.</td>
</tr>
<tr>
<td>no bufs rcv</td>
<td>Number of times buffers were not available to uncompress data being</td>
</tr>
<tr>
<td></td>
<td>received.</td>
</tr>
<tr>
<td>resets</td>
<td>Number of resets.</td>
</tr>
</tbody>
</table>
show controllers

To display information about a physical port device, use the show controllers EXEC command.

```
show controllers [atm0 | ethernet0 | {atm | ethernet} card/subcard/port |
{atm card/subcard/imagroup} | e1 card/subcard/port [brief | tabular] |
t3 card/subcard/port [t1-line] [brief | tabular]]
```

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm0</td>
<td>Specifies an ATM interface on the route processor.</td>
</tr>
<tr>
<td>ethernet0</td>
<td>Specifies an Ethernet interface on the route processor.</td>
</tr>
<tr>
<td>atm</td>
<td>Specifies an ATM interface.</td>
</tr>
<tr>
<td>ethernet</td>
<td>Specifies an Ethernet interface.</td>
</tr>
<tr>
<td>e1</td>
<td>Specifies a channelized E1 interface.</td>
</tr>
<tr>
<td>t3</td>
<td>Specifies a channelized DS3 (CDS3) interface.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port number for the interface.</td>
</tr>
<tr>
<td>:t1-line</td>
<td>Identifies the T1 line number, which is a number between 1 and 24.</td>
</tr>
<tr>
<td>card/subcard/imagroup</td>
<td>Specifies the card, subcard, and IMA group number (0 to 3) for the IMA interface.</td>
</tr>
<tr>
<td>brief</td>
<td>Displays a subset of information.</td>
</tr>
<tr>
<td>tabular</td>
<td>Displays statistical information in a tabular format.</td>
</tr>
</tbody>
</table>

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

The output from this command shows what transmit clock is configured for an interface.

The show controllers t3 command also displays the port adapter and LSIPC states. If the LSIPC is in a down state, this command shows the number of keepalive attempts that have been made. This command also displays the firmware and hardware version for the Frame Relay port adapter.

Examples

The following example shows output used for debugging for OC-3 counters from the show controllers atm command on ATM 0/1/0.

```
Switch# show controllers atm 0/1/0
IF Name: ATM0/1/0    Chip Base Address: A8908000
Port type: OC3    Port rate: 155 Mbps    Port medium: SM Fiber
Port status:SECTION LOS    Loopback:None    Flags:8300
TX Led: Traffic Pattern    RX Led: Traffic Pattern TX clock source: free-running
Framing mode: std-3c
Cell payload scrambling on
Sts-stream scrambling on
```
OC3 counters:

Key: txcell - # cells transmitted
     rxcell - # cells received
     b1 - # section BIP-8 errors
     b2 - # line BIP-8 errors
     b3 - # path BIP-8 errors
     ocd - # out-of-cell delineation errors - not implemented
     g1 - # path FEBE errors
     z2 - # line FEBE errors
     chcs - # correctable HEC errors
     uhcs - # uncorrectable HEC errors

txcell:3745, rxcell:98171428
b1:0, b2:0, b3:0, ocd:0
g1:0, z2:0, chcs:0, uhcs:0

OC3 errored secs:
b1:0, b2:0, b3:0, ocd:0
g1:0, z2:0, chcs:0, uhcs:0

OC3 error-free secs:
b1:1249, b2:1249, b3:1249, ocd:0
g1:1249, z2:1249, chcs:1249, uhcs:1249

Clock reg:80

mr 0x30, mcfgr 0x70, misr 0x0E0, mcmr 0xEF,
mctlr 0x48, cs csr 0x50, crcsr 0x48, rsop_cier 0x00,
rsop_sier 0x47, rsop_bip80r 0x00, rsop_bip81r 0x00, tsop_ctlr 0x80,
tsop_diagr 0x80, rlop_csr 0x02, rlop_ieisr 0x0E0, rlop_bip8_240r 0x00,
rlop_bip8_241r 0x00, rlop_bip8_242r 0x00, rlop_febe0r 0x00, rlop_febe1r 0x00,
rlop_febeer 0x00, tlop_ctlr 0x80, tlop_diagr 0x80, rpop_scr 0x1C,
rpop_isr 0x9F, rpop_ierr 0xFD, rpop_psr 0x0F, rpop_pbip80r 0x00,
rpop_pbip81r 0x00, rpop_pbip82r 0x00, rpop_pbip83r 0x00, rpop_pbip84r 0x00,
tpop_csr 0x50, tpop_dslr 0x00, tpop_dsrc 0x00, tpop_scr 0x121,
tpop_psr 0x00, racp_csr 0x91, racp_cier 0x15, racp_mhmr 0x00,
racp_mhmr 0x00, racp_cier 0x00, racp_csrcr 0x00, racp_csrcr 0x00,
racp_csrcr 0x00, racp_csrcr 0x00, racp_csrcr 0x00, racp_csrcr 0x00,

Table 18-19 describes some key fields in the output.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Selection errors. Calculated over all bits of previous frame after scrambling. Always even parity.</td>
</tr>
<tr>
<td>B2</td>
<td>Line errors. Calculated over SPE and line overhead bytes of the previous frame before scrambling.</td>
</tr>
<tr>
<td>B3</td>
<td>Path BIP-8 errors. Calculated over SPE of the STE-3c of the previous frame before scrambling.</td>
</tr>
<tr>
<td>G1,Z2</td>
<td>Number of FEBE detected by the receive path. Error numbers are inserted into the appropriate bit positions of the outgoing G1,Z2 bytes.</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the `show controllers atm0` command.
Switch# show controllers atm0
printing the copy stats here...
TxCopiedPkts :0
TxNonCopiedPkts :0
RxCopiedPkts :0
RxNonCopiedPkts :0
Island0: 60ABA4E4 first Ctl address : 607C7890
first blk address A8051000(288) - A80FFE00(7FF) :total 577(1399)

The following example is sample output used for debugging for the T1 interface from the show controllers atm command on ATM 0/1/0.

Switch# show controllers atm 0/1/0
IF Name: ATM0/1/0, framer Base Address: A8909900
Port type: T1 Port rate: 1.5 Mbps Port medium: UTP
Port status:Good Signal Loopback:None Flags:8008
TX clock source: free-running
T1 Framing Mode: ESF PLCP format
FERF on AIS is on
FERF on RED is on
FERF on OOF is on
FERF on LOS is on
LBO: between 0-110

Counters:

Key: txcell - # cells transmitted
rxcell - # cells received
lcv - # line code violations
ferr - # framing bit error event counter
bee - # bit error event, CRC-6 in ESF, Framing bit error in SF
b1 - # PLCP BIP errors
fe - # PLCP framing pattern octet errors
plcp_febe- # PLCP FEBE errors
hcs - # uncorrectable HEC errors
uicell - # unassigned/idle cells dropped
txcell:21460, rxcell:20736
lcv:0, ferr:0, bee:0
febe:0, b1:0, fe:0, plcp_febe:7, hcs:0, uicell:338177354

PDH errored secs:
lcv:0, ferr:0, bee:0
febe:0, b1:0, fe:0, plcp_febe:1, hcs:0

PDH error-free secs:
lcv:101438, ferr:101438, bee:101438
febe:0, b1:101438, fe:101438, plcp_febe:101437, hcs:101438

Misc reg: 10

cfgr 0x08, ier 0x00, isr 0x00, ctrl 0x00,
imr 0x21, dncr 0x78, rboc_cler 0x38, rboc_isr 0x3F,
t3frmr_cfgr 0x80, t3frmr_ier 0x00, t3frmr_isr 0x00, t3frmr_statr 0x02,
rfdl_cfgr 0x84, rfdl_esr 0x80, rfdl_statr 0x87, rfdl_data 0x87,
pmon_pmr 0x38, pmon_i er 0x38, pmon_lcvec0r 0xFF, pmon_lcvec 0r 0xFF,
pmon_fbeec0r 0xFF, pmon_fbeec 0r 0xFF, pmon_sezd0r 0x9A, pmon_sezd 0r 0x9A,
pmon_peec0r 0x00, pmon_peec 0r 0x00, pmon_ppee 0r 0x00, pmon_ppee 0r 0x00,
pmon_fbeec0r 0x00, pmon_fbeec 0r 0x00, t3tran_cfgr 0x00, t3tran_diagr 0x00,
xfdl_cfgr 0x00, xfdl_iser 0x02, xfdl_txdatar 0x00, xnode_coder 0x7F,
splr_cfgr 0x84, splr_i er 0x80, splr_isr 0x80, splr_statr 0x00,
splt_cfgr 0x84, splt_ctlr 0x80, splt_diagr 0x00, splt_fir 0x00,
Examples

The following example is sample output used for debugging for the IMA interface from the show controllers command on ATM interface 0/0/ima1.

Switch# show controllers atm 0/0/ima1
ATM/0/ima1 is up
PAM State is UP
Firmware Version: 1.6
FPGA Version: 1.2
Boot version: 1.2
mmcport = 0
hwgrp number = 0
rxgsr = Receive Group status register
txgsr = Transmit Group status register
lsbdcbcell = # of cells in the delay comp buffer LSB
msbdcbcell = Number of cells in the delay comp buffer MSB
txlnks = Links in the Group in TX direction
rxlnks = Links in the Group in RX direction
scce_reg = SCCI register
imaid_reg = IMA ID register
gsc_reg = GSC register
txtiming_reg = tx timing ref register
txtest_reg = tx test link register
rxtest_reg = tx test pattern register
rxtestp_reg = rx test pattern register
rxgsr = 0x3, txgsr = 0x5, dcbcelllsb = 0x33, dcbcellmsb = 0x53,
rxlnks = 0x7, rxlnks = 0x0, scce_reg = 0x7, imaid_reg = 0x1,
gsc_reg = 0xA2, txtiming_reg = 0x20, txtest_reg = 0x20, txtestp_reg = 0x20,
xtestp_reg = 0x20, xtest_reg = 0x20, xtestp_reg = 0x20,
linkinfo_reg = 0xFC, linkinfo_reg = 0xFC, linkinfo_reg = 0xFC,
linkinfo_reg = 0xFC, linkinfo_reg = 0xFC, linkinfo_reg = 0xFC.
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>show switch fabric</strong> <em>(Catalyst 8540 MSR)</em></td>
<td>Shows the details of the switch fabric for an ATM switch router.</td>
</tr>
<tr>
<td><strong>show ima interface</strong></td>
<td>Displays the IMA interface, IMA group, and ATM layer hardware configuration.</td>
</tr>
</tbody>
</table>
**show controllers**

To display the controller register values, use the `show controllers` EXEC command.

```plaintext
show controllers interface-type slot/subslot/interface
```

**Syntax Description**

<table>
<thead>
<tr>
<th><code>interface-type</code></th>
<th>Specifies an interface type as <code>fastethernet</code>, <code>gigabitethernet</code>, or <code>atm</code>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>slot/subslot/interface</code></td>
<td>Identifies the interface specified in <code>interface-type</code>.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command uses IPC to get the values of MAC registers and MII registers. If the interface processor stops responding to IPC, the counter values shown are no longer current.

**Examples**

The following is sample output from the `show controllers` command for a fast Ethernet interface:

```plaintext
Router# show controllers fastethernet 11/0/4
IF Name:FastEthernet11/0/4
Port Status UP
Loopback Reg [3-0][7-4]:0x8|0x8
Duplex/Speed Reg [3-0][7-4]:0xFFFF|0x0
FPGA Rev :6.8
Slicer registers
SMDR 0x0060 (Tx En, Rx En)
SSTR 0x1000
EVER 0x1704 (Ver C1)
SSMR 0x4000 SIMR 0x0000 MBXW 0x0000 MBXR 0x0000
SPER 0x8000 GMUX VER 0x8000 MARKER 0x0000

MAC registers
CMCR :0x00000443 CMPR :0x140A0E60

MII registers:
Control Register           (0x0):0x2000
Status Register           (0x1):0x780D (Link Up)
PHY Identification Register 1 (0x2):0x7810
PHY Identification Register 2 (0x3):0x43
Auto Neg. Advertisement Reg (0x4):0x81   (Speed 100,Duplex half)
Auto Neg. Partner Ability Reg (0x5):0x0    (Peer not auto-negotiating)
Auto Neg. Expansion Register (0x6):0x0
Mirror Register (0x10):0x630
Interrupt Enable Register (0x11):0x0
Interrupt Status Register (0x12):0x4000
Configuration Register  (0x13):0x0     (UTP, Tx Enable)
Chip Status Register   (0x14):0x28C8 (Link Up, Half, 100)
Link Status Register    [3-0][7-4]:0x1|0x0

MAC Receive Counters:
bytes                   = 130461473
pkt64                   = 5204
pkt65to127              = 10532
pkt128to255             = 54499
```
show controllers

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pkt256to511</td>
<td>1651</td>
</tr>
<tr>
<td>pkt512to1023</td>
<td>766</td>
</tr>
<tr>
<td>pkt1024to1522</td>
<td>4456</td>
</tr>
<tr>
<td>good_giants</td>
<td>0</td>
</tr>
<tr>
<td>error_giants</td>
<td>0</td>
</tr>
<tr>
<td>good_runts</td>
<td>0</td>
</tr>
<tr>
<td>error_runts</td>
<td>0</td>
</tr>
<tr>
<td>ucast_pkts</td>
<td>25743</td>
</tr>
<tr>
<td>mcast_pkts</td>
<td>57570</td>
</tr>
<tr>
<td>bcast_pkts</td>
<td>59331</td>
</tr>
<tr>
<td>align_errs</td>
<td>0</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>overruns</td>
<td>0</td>
</tr>
</tbody>
</table>

MAC Transmit Counters:
<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes</td>
<td>159215359</td>
</tr>
<tr>
<td>pkt64</td>
<td>43038</td>
</tr>
<tr>
<td>pkt65to127</td>
<td>38282</td>
</tr>
<tr>
<td>pkt128to255</td>
<td>54526</td>
</tr>
<tr>
<td>pkt256to511</td>
<td>26485</td>
</tr>
<tr>
<td>pkt512to1023</td>
<td>731</td>
</tr>
<tr>
<td>pkt1024to1518</td>
<td>4507</td>
</tr>
<tr>
<td>ucast_pkts</td>
<td>30936</td>
</tr>
<tr>
<td>mcast_pkts</td>
<td>10927</td>
</tr>
<tr>
<td>bcast_pkts</td>
<td>60170</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>giants</td>
<td>0</td>
</tr>
<tr>
<td>underruns</td>
<td>0</td>
</tr>
<tr>
<td>one_collision</td>
<td>0</td>
</tr>
<tr>
<td>mult_collisions</td>
<td>0</td>
</tr>
<tr>
<td>excess_collisions</td>
<td>0</td>
</tr>
</tbody>
</table>

Slicer Receive Counters:
<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells</td>
<td>1698452</td>
</tr>
<tr>
<td>Frames</td>
<td>99087</td>
</tr>
<tr>
<td>Header Sequence Errors</td>
<td>0</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>Length</td>
<td>0</td>
</tr>
</tbody>
</table>

Slicer Transmit Counters:
<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells</td>
<td>1721097</td>
</tr>
<tr>
<td>Frames</td>
<td>61233</td>
</tr>
</tbody>
</table>
Table 18-20 describes some of the important fields in the previous display.

**Table 18-20 show controllers Registers and Descriptions for Fast Ethernet Interfaces**

<table>
<thead>
<tr>
<th>Register Type</th>
<th>Register Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slicer Registers</td>
<td>SMDR</td>
<td>Should show a value of 0x60</td>
</tr>
<tr>
<td></td>
<td>SSTR</td>
<td>Value of 0x1008 or 0x1009 indicates that the Ethernet processor microcode has not been successfully downloaded</td>
</tr>
<tr>
<td>MAC Registers</td>
<td>CMCR</td>
<td>For Catalyst 8510 Fast Ethernet cards when the interface is not shut down:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Full duplex = 0x00000423</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Half duplex = 0x00000403</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Auto = negotiated duplex value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For Catalyst 8540 Fast Ethernet cards when the interface is not shut down:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Full duplex = 0x00000463</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Half duplex = 0x00000443</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Auto = negotiated duplex value</td>
</tr>
</tbody>
</table>
### Table 18-20 show controllers Registers and Descriptions for Fast Ethernet Interfaces (continued)

<table>
<thead>
<tr>
<th>Register Type</th>
<th>Register Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **MII Registers**              | Status register (0x1)          | Bit 14 = 100 Mbps, full duplex  
|                                |                                | Bit 13 = 100 Mbps, half duplex  
|                                |                                | Bit 12 = 10 Mbps, full duplex  
|                                |                                | Bit 11 = 10 Mbps, half duplex  
|                                |                                | Bit 5 = autonegotiation complete  
|                                |                                | Bit 3 = autonegotiation capable  
|                                |                                | Bit 2 = link up  
|                                |                                | Bits 11 through 14 indicate link capability.  |
| **Auto-negotiation advertisement register (0x4)** | | Bit 13 = remote fault  
|                                |                                | Bit 8 = 100 Mbps, full duplex  
|                                |                                | Bit 7 = 100 Mbps  
|                                |                                | Bit 6 = 10 Mbps, full duplex  
|                                |                                | Bit 5 = 10 Mbps  
|                                |                                | Bit 0 = 1 (fixed value)  
|                                |                                | Bits 5 through 8 indicate link capability.  |
| **Auto-negotiated partner ability register (0x5)** | | Same values as autonegotiation advertisement register. Bits 5 through 8 indicate link partner capability. This register is set to nonzero only if the local and peer are configured to autonegotiate.  |
| **Chip status register (0x14)** | | Bit 13 = link up  
|                                |                                | Bit 12 = full duplex  
|                                |                                | Bit 11 = 100 Mbps  
|                                |                                | Bit 9 = autonegotiation complete  
|                                |                                | Bit 5 = symbol error  
|                                |                                | Bit 4 = MLT3 error  
|                                |                                | Bit 0 = PLL lock  |
The following is sample output from the `show controllers` command for a Gigabit Ethernet interface:

Router# **show controllers gigabitethernet 9/0/0**

IF Name: GigabitEthernet9/0/0
Port Status DOWN
FPGA Rev: 0.2
Gigabit Ether Status: 0x310 (Link Down, Rx Sync-N, Optical detect-N)
Mode Parallel Register: 0x36
Port 0 Serial Mode Register: 0x1
Port 1 Serial Mode Register: 0x1
Link Interrupt Enable: 0x1
Tx Disable: 0x3

Slicer registers
SMDR 0x0060 (Tx En, Rx En)
SSTR 0x1000
EVER 0x1704 (Ver C1)
SSMR 0x4000 SIMR 0x0000 MBXR 0x0000
SPER 0xF000 GMIX VER 0x17B1 MARKER 0x17B1

MAC registers
CMCR: 0x000000423 CMPR: 0x140A0E61

MII registers:
Control Register (0x0): 0x4140
Status Register (0x1): 0x159
Auto Neg. Advt. Register (0x4): 0x20
Auto Neg. Partner Ability Reg (0x5): 0x0
RX Configuration Register (0xA): 0x21
TR_IPG_TIME Register (0x10): 0x6
PAUSE_TIME Register (0x11): 0x0
PAUSE_SA1 Register (0x12): 0x0
PAUSE_SA2 Register (0x13): 0x0
PAUSE_SA3 Register (0x14): 0x0
Pause Watermark Register (0x15): 0x0C040
TX FIFO Watermark Register (0x16): 0xFF02
PAUSE_STAT_SENT Register (0x17): 0x0
PAUSE_STAT_RECV Register (0x18): 0x0
Memory Address Register (0x19): 0x0
Memory Control Register (0x1A): 0x1
Memory Data High Register (0x1B): 0x0
Memory Data Low Register (0x1C): 0x0
Sys Control Register (0x1E): 0x70C
Sys Status Register (0x1F): 0x0
Link Status Register [3-0][7-4]: 0x0

Counters:
Channel 0:
MAC Receive Counters:
bytes = 130461473
pkt64 = 5204
pkt65to127 = 10532
pkt128to255 = 54499
pkt256to511 = 1651
pkt512to1023 = 766
pkt1024to1522 = 4456
good_giants = 0
error_giants = 0
good_runtts = 0
error_runtts = 0
ucast_pkts = 25743
mcast_pkts = 57697
bcast_pkts = 59331
show controllers

align_errs = 0
fcs_errs = 0
overruns = 0

MAC Transmit Counters:
<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes</td>
<td>159215359</td>
</tr>
<tr>
<td>pkt64</td>
<td>43038</td>
</tr>
<tr>
<td>pkt65to127</td>
<td>38282</td>
</tr>
<tr>
<td>pkt128to255</td>
<td>54526</td>
</tr>
<tr>
<td>pkt256to511</td>
<td>26485</td>
</tr>
<tr>
<td>pkt512to1023</td>
<td>731</td>
</tr>
<tr>
<td>pkt1024to1518</td>
<td>4507</td>
</tr>
<tr>
<td>ucast_pkts</td>
<td>30936</td>
</tr>
<tr>
<td>mcast_pkts</td>
<td>10927</td>
</tr>
<tr>
<td>bcast_pkts</td>
<td>60170</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>giants</td>
<td>0</td>
</tr>
<tr>
<td>underruns</td>
<td>0</td>
</tr>
<tr>
<td>one_collision</td>
<td>0</td>
</tr>
<tr>
<td>mult_collisions</td>
<td>0</td>
</tr>
<tr>
<td>excess_collisions</td>
<td>0</td>
</tr>
<tr>
<td>Ingress Markers</td>
<td>16103</td>
</tr>
<tr>
<td>Egress Markers</td>
<td>32207</td>
</tr>
</tbody>
</table>

Slicer Receive Counters:

<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells</td>
<td>1698452</td>
</tr>
<tr>
<td>Frames</td>
<td>99087</td>
</tr>
<tr>
<td>Header Sequence Errors</td>
<td>0</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>Length</td>
<td>0</td>
</tr>
</tbody>
</table>

Slicer Transmit Counters:

<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells</td>
<td>1721097</td>
</tr>
<tr>
<td>Frames</td>
<td>61233</td>
</tr>
</tbody>
</table>

Channel 1:
MAC Receive Counters:

<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>bytes</td>
<td>130461893</td>
</tr>
<tr>
<td>pkt64</td>
<td>5204</td>
</tr>
<tr>
<td>pkt65to127</td>
<td>10532</td>
</tr>
</tbody>
</table>

Channel 7:
MAC Receive Counters:

<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>bytes</td>
<td>13050012</td>
</tr>
<tr>
<td>pkt64</td>
<td>5208</td>
</tr>
<tr>
<td>pkt65to127</td>
<td>10552</td>
</tr>
<tr>
<td>pkt128to255</td>
<td>54501</td>
</tr>
<tr>
<td>pkt256to511</td>
<td>1656</td>
</tr>
<tr>
<td>pkt512to1023</td>
<td>772</td>
</tr>
<tr>
<td>pkt1024to1522</td>
<td>4459</td>
</tr>
<tr>
<td>good_giants</td>
<td>0</td>
</tr>
<tr>
<td>error_giants</td>
<td>0</td>
</tr>
<tr>
<td>good_runts</td>
<td>0</td>
</tr>
<tr>
<td>error_runts</td>
<td>0</td>
</tr>
<tr>
<td>ucast_pkts</td>
<td>25743</td>
</tr>
<tr>
<td>mcast_pkts</td>
<td>57570</td>
</tr>
<tr>
<td>bcast_pkts</td>
<td>59331</td>
</tr>
<tr>
<td>align_errs</td>
<td>0</td>
</tr>
<tr>
<td>fcs_errs</td>
<td>0</td>
</tr>
<tr>
<td>overruns</td>
<td>0</td>
</tr>
</tbody>
</table>

MAC Transmit Counters:

<table>
<thead>
<tr>
<th>Counter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes</td>
<td>15915320</td>
</tr>
</tbody>
</table>

---

18-166
### Table 18-21 show controllers Registers and Descriptions for Gigabit Ethernet Interfaces

<table>
<thead>
<tr>
<th>Register Type</th>
<th>Register Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gigabit Ethernet status</td>
<td>Bit 7 = link up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit 6 = rx sync</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit 5 = optical detect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit 2 = link up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit 1 = rx sync</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit 0 = optical detect</td>
<td></td>
</tr>
</tbody>
</table>

Bits 5 through 7 apply to port 1; bits 0 through 2 apply to port 0.

| MAC Registers  | CMCR          | Should be 0x00000423 |
### Table 18-21 show controllers Registers and Descriptions for Gigabit Ethernet Interfaces (continued)

<table>
<thead>
<tr>
<th>Register Type</th>
<th>Register Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MII Registers</td>
<td>Control register (0x0)</td>
<td>• Bit 13 = loopback enable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bit 12 = autonegotiation enable</td>
</tr>
<tr>
<td></td>
<td>ATM router module port has loopback enable bit set.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Status register (0x1)</td>
<td>• Bit 5 = autonegotiation complete</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bit 3 = autonegotiation capable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bit 2 = link up</td>
</tr>
<tr>
<td></td>
<td>Auto-negotiation advertisement register (0x4)</td>
<td>• Bit 12 through 13 = remote fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bit 6 = half duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bit 5 = full duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bits 4 through 0 = 00000 (fixed)</td>
</tr>
<tr>
<td></td>
<td>Auto-negotiation partner ability register (0x5)</td>
<td>Same values as autonegotiation advertisement register. This register is set to nonzero only if the local and peer are configured to autonegotiate.</td>
</tr>
<tr>
<td></td>
<td>System control register (0x1e)</td>
<td>Bit 4 = link up</td>
</tr>
<tr>
<td>Hardware channel counters</td>
<td></td>
<td>For Gigabit Ethernet or ATM router module ports there are 8 channels that show 8 sets of counters.</td>
</tr>
</tbody>
</table>
show controllers access-list

To display the access control list (ACL) entries on an interface module, use the `show controllers access-list` command.

```
show controllers interface-type slot/subslot/interface access-list [in | out]
```

**Syntax Description**

- `interface-type` Specifies an interface type as `fastethernet` or `gigabitethernet`.
- `slot/subslot/interface` Identifies the interface specified in `interface-type`.
- `in` Displays TCAM entries for input ACL configuration.
- `out` Displays TCAM entries for output ACL configuration.

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command displays TCAM entries for an ACL configured on an interface. It interprets the contents of TCAM and displays them in the same format as the Cisco IOS ACL commands, such as the `show access-lists` command.

**Note**

Because of optimization, there might not be a one-to-one mapping of the output of the `show controllers access-list` command and the original access list.

**Examples**

The following is sample output from the `show controllers access-list` command:

```
Router# show controllers fastethernet 3/0/0 access-list in
Input ACL entries for Interface FastEthernet3/0/0  Index:6 Label:2
  [V:0 M:1][0 IP] deny ip 100.1.3.0 0.0.0.255 any
  [V:0 M:2][1 IP] permit ip any any
  [V:0 M:3][2 IPX] permit 1 2.1000.0000.0003
  [V:0 M:4][3 IPX] deny 1 2
  [V:0 M:5][4 IPX] deny any any
```

This output corresponds to the following access-list configuration:

```
Router# show running-config interface fastethernet 3/0/0
Building configuration...

Current configuration:
!
interface FastEthernet3/0/0
  ip address 1.0.0.1 255.0.0.0
  ip access-group 100 in
  no ip directed-broadcast
  ipx access-group 800 in
  ipx network 4
end
```
Table 18-22 describes the fields in the `show controllers access-list` display.

**Table 18-22 show controllers access-list Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>Index used for this interface for ACL lookups</td>
</tr>
<tr>
<td>Label</td>
<td>Label used to identify TCAM entries for this ACL</td>
</tr>
<tr>
<td>[V:num1 M:num2]</td>
<td>TCAM value location and TCAM mask location</td>
</tr>
<tr>
<td>[protocol]</td>
<td>IP or IPX</td>
</tr>
</tbody>
</table>
show controllers adjacency

To display the IP address table on an interface module, use the **show controllers adjacency** EXEC command.

```
show controllers interface-type slot/subslot/interface adjacency {ip-address | detail} [cam module-num]
```

### Syntax Description

- **interface-type** Specifies an interface type as `fastethernet`, `gigabitethernet`, or `atm`.
- **slot/subslot/interface** Identifies the interface specified in `interface-type`.
- **ip-address** Specifies an IP address to display from the table.
- **detail** Displays additional information.
- **cam module-num** Specifies the module containing the content addressable memory to display.

### Command Modes

Privileged EXEC

### Usage Guidelines

This command displays the IP address table on each interface module. This table contains IP address entries present in the ARP table (displayed by `show arp` command) and adjacency table (displayed by `show adjacency` command). This table has a one-to-one correspondence with the adjacency table.

### Examples

The following is sample output from the `show controllers adjacency` command:

```
Router# show controllers fastethernet 3/0/0 adjacency
IPaddr:1.0.0.2 MACaddr:00e0.4f5d.f000 FastEthernet3/0/0(6)
IPaddr:2.0.0.6 MACaddr:0007.0007.0007 FastEthernet3/0/2(8)
IPaddr:1.0.0.5 MACaddr:0005.0005.0005 FastEthernet3/0/0(6)
IPaddr:2.0.0.5 MACaddr:0006.0006.0006 FastEthernet3/0/2(8)
Total number of IP adjacency entries:4
Missing IP adjacency entries:0
```
**show controllers cef**

To display the IP prefix table on interface modules, use the `show controllers cef` EXEC command.

```
show controllers interface-type slot/subslot/interface cef {prefix mask | detail | missing | summary} [cam module-num]
```

**Syntax Description**

- **interface-type** Specifies an interface type as `fastethernet`, `gigabitethernet`, or `atm`.
- **slot/subslot/interface** Identifies the interface specified in `interface-type`.
- **prefix** Specifies an IP address prefix to display from the table.
- **mask** Specifies an IP address mask.
- **detail** Displays additional information.
- **missing** Displays all entries that are present in the CEF table but missing from the interface module IP prefix table.
- **summary** Displays only a summary of the IP prefix table.
- **cam module-num** Specifies the module containing the content addressable memory to display.

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command displays the IP prefix table on each interface module. The table contains IP prefix entries present in the IP routing table (displayed by the `show ip route` command) and CEF table (displayed by the `show ip cef` command). This table has a one-to-one correspondence with the CEF table.

**Examples**

The following is sample output from the `show controllers cef` command:

```
Router# show controllers fastethernet 3/0/0 cef
Default Network Information:
   Load Balancing:Off
Prefix/Masklen  Next Hop
0.0.0.0/0       not populated
0.0.0.0/32      not populated
1.0.0.0/8       SRP
1.0.0.0/32      SRP
1.0.0.1/32      SRP
1.0.0.2/32      not populated
1.0.0.5/32      not populated
1.255.255.255/32 SRP
2.0.0.0/8       SRP
2.0.0.0/32      SRP
2.0.0.1/32      SRP
2.0.0.5/32      not populated
2.0.0.6/32      not populated
2.255.255.255/32 SRP
11.0.0.0/8      not populated
12.0.0.0/8      not populated
20.0.0.0/8      20.0.0.5
40.0.0.0/8      not populated
128.46.167.95/32 not populated
128.118.25.3/32 not populated
```
140.247.60.28/32      not populated
Prefix/Masklen        Next Hop
171.69.1.129/32       not populated
172.20.42.0/24        SRP
172.20.42.0/32        SRP
172.20.42.213/32      SRP
172.20.42.255/32      SRP
199.199.199.0/24      1.0.0.2
                       2.0.0.5
224.0.0.0/4           not populated
224.0.0.0.0/24        SRP
255.255.255.255/32    not populated

Total IP Prefix Entries in CAM:15
Missing IP Prefix Entries in CAM:0
CEF entries not populated:15

The following is sample output from the show controllers cef summary command:

8500# sh controller f3/0/0 cef summary
Total IP Prefix Entries in CAM:14
Missing IP Prefix Entries in CAM:0
CEF entries not populated:8

The following is sample output from the show controllers cef missing command:

Router# show controllers fastethernet 3/0/0 cef missing
Prefix/Masklen        Next Hop

Total IP Prefix Entries in CAM:15
Missing IP Prefix Entries in CAM:0
CEF entries not populated:15

Table 18-23 describes some of the fields in the display.

Table 18-23 show controllers cef Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix</td>
<td>IP prefix entry</td>
</tr>
<tr>
<td>Masklen</td>
<td>Mask length of IP prefix entry</td>
</tr>
<tr>
<td>SRP</td>
<td>Packets are sent to the route processor</td>
</tr>
<tr>
<td>Missing</td>
<td>IP prefix entry is present in CEF table but missing from interface module prefix table</td>
</tr>
<tr>
<td>Not populated</td>
<td>IP prefix entry present in CEF table but not populated in interface module prefix table for one of the following reasons:</td>
</tr>
<tr>
<td></td>
<td>Prefix entry with all zeros or all ones</td>
</tr>
<tr>
<td></td>
<td>Prefix entries reachable via management port (ethernet0)</td>
</tr>
<tr>
<td></td>
<td>Prefix entries with corresponding adjacency entries (displayed with the show adjacency command)</td>
</tr>
<tr>
<td></td>
<td>Prefix entries that have one of the gateways as a management port</td>
</tr>
<tr>
<td></td>
<td>224.0.0.0.0/4 overlaps with 224.0.0.0.0/24</td>
</tr>
<tr>
<td>Default network</td>
<td>Default network information</td>
</tr>
<tr>
<td>Load balancing</td>
<td>Displays whether load balancing is on or off for default network</td>
</tr>
</tbody>
</table>
**show controllers interface-info**

To display the resident interface entry that corresponds to a second interface, use the `show controllers interface-info` EXEC command.

```
show controllers interface1 interface-info interface2
```

**Syntax Description**

| `interface1` | The interface on which the interface table is resident, specified in the form `interface-type slot/subslot/interface`, where `interface-type` is `gigabitethernet`, `fastethernet`, or `atm`. Only physical interfaces are valid entries. |
| `interface2` | The interface or subinterface corresponding to an entry in the table. Any logical or physical interface, except BVI, is a valid entry. |

**Command Modes**

Privileged EXEC

**Usage Guidelines**

One interface table for each physical port is resident on each interface module. Each table maintains entries corresponding to all interfaces or subinterfaces in the system. Each entry is indexed by a unique-identifier assigned to each interface or subinterface. The interface entry maintains the following information:

- Switching information (VC to switch to this interface)
- MAC address
- Layer 2/3 protocol configuration
- FEC load balancing information, if this interface is FEC

**Examples**

The following is sample output from the `show controllers interface-info` command:

```
Router# show controllers gigabitethernet 12/0/0 interface-info gigabitethernet 12/0/0
IF Entry for GigabitEthernet12/0/0 on GigabitEthernet12/0/0
  Mac(hex) - 00:10:7B:C5:D3:77
  isMyInterface :True isSubInterface :False
  Status Down Broute VC - 0 Bcast VC - 0
  Netmask:32
  FEC disabled
  Trunking Disabled
  State :Not-Applicable/Listening/Blocking
  Bridge-Group disabled
  IP routing off bridging off
  IPX routing off bridging off
  Appletalk routing off
  In Encapsulation:
    ICMP Redirect disabled Unreachable disabled
    IP Multicast disabled:ttl-threshold:0
  ACL Indexs:
    Input ACL:0 Output ACL:0
  ACL Flags:
    Input IP:OFF Output IP:OFF
    Input IPX:OFF Output IPX:OFF
  Slowpath - Input:OFF
```
The display contains the following categories of information:

- **Basic switching information**
  - MAC address of the entry interface, in hexadecimal
  - Status of the entry interface
  - Broute VC (unicast VC to switch to entry interface)
  - Bcast VC (multicast VC to flood broadcast and unknown-unicast during Layer 2 switching)

- **Layer 2/3 configuration information**
  - Netmask (subnet mask of primary IP address)
  - FEC (enabled/disabled)
  - Trunking (enabled/disabled)
  - State (Spanning Tree Protocol)
  - Bridge group (enabled/disabled)
  - IP routing (on/off) and bridging (on/off)
  - IPX routing (on/off) and bridging (on/off)
  - IPX encapsulations
  - ICMP redirect (enabled/disabled) and unreachable (enabled/disabled)
  - IP multicast (enabled/disabled) and TTL threshold

- **ACL configuration flags**
show controllers ipmcast

To display the IP multicast routing table information stored on an interface module, use the show controllers ipmcast EXEC command.

```
show controllers interface-type slot/subslot/interface ipmcast group-address [source-address [detail] | all] [cam module-num]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface-type</td>
<td>Specifies an interface type as fastethernet or gigabitethernet.</td>
</tr>
<tr>
<td>slot/subslot/interface</td>
<td>Identifies the interface specified in interface-type.</td>
</tr>
<tr>
<td>group-address</td>
<td>Specifies the IP address of a multicast group.</td>
</tr>
<tr>
<td>source-address</td>
<td>Specifies the IP address of a multicast source.</td>
</tr>
<tr>
<td>detail</td>
<td>Displays the point-to-multipoint VC connection.</td>
</tr>
<tr>
<td>all</td>
<td>Displays all entries within a group.</td>
</tr>
<tr>
<td>cam module-num</td>
<td>Specifies the module containing the content addressable memory to display.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command displays the IP multicast routing table entries for all sources within a group (*, G) or for a specified source (S, G) within a group.

**Examples**

The following is sample output from the show controllers ipmcast command:

```
Router# show controllers fastethernet 0/0/7 ipmcast 231.1.1.1 171.11.78.77 detail
MEMBER_ENTRY, root vc = 1/33, packet counter = 4
(231.1.1.1, 171.11.78.77), CAM Loc 0x4025, 0 E 50 0 0 4 2 13
Send_to_cpu flag not set, SPT flag set
p2mp vc:root FastEthernet0/0/7, VPI = 1, VCI = 33
leaf FastEthernet0/0/3, VPI = 0, VCI = 226
FastEthernet0/0/0, VPI = 0, VCI = 227
```

Table 18-24 describes some of the fields in the display.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP_ENTRY</td>
<td>A (*, G) entry.</td>
</tr>
<tr>
<td>MEMBER_ENTRY</td>
<td>A (S, G) entry.</td>
</tr>
<tr>
<td>Root VC</td>
<td>VPI/VCI value of the root VC used for forwarding multicast packets for this entry.</td>
</tr>
<tr>
<td>Packet counter</td>
<td>Number of packets forwarded since the last statistics polling interval.</td>
</tr>
<tr>
<td>Send_to_cpu</td>
<td>A flag in the UINFO. Packets are sent to the CPU if this flag is set.</td>
</tr>
</tbody>
</table>
**Table 18-24 show controllers ipmcast Field Descriptions (continued)**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT flag</td>
<td>A flag in the UINFO that corresponds to the SPT bit in the Cisco IOS mroute table.</td>
</tr>
<tr>
<td>p2mp vc</td>
<td>Detailed information about the p2mp ATM VC that is used for multicast forwarding, including root interface, root VPI, root VCI, leaf interfaces, leaf VPI, and leaf VCI.</td>
</tr>
</tbody>
</table>
show controllers ipx-prefix

To display the IPX network entries for a specified interface, use the show controllers ipx-prefix EXEC command.

```
show controllers interface-type slot/subslot/interface ipx-prefix {all-entries | cam-summary | fail-entries | fail-summary | cam module-num}
```

**Syntax Description**

- `interface-type` Specifies an interface type as fastethernet or gigabitethernet.
- `slot/subslot/interface` Identifies the interface specified in `interface-type`.
- `all-entries` Displays all the IPX prefix entries.
- `cam-summary` Displays a summary of IPX prefixes present in the CAM and control tree.
- `fail-entries` Displays inconsistent IPX prefix entries.
- `fail-summary` Displays a summary of failed IPX prefixes in the CAM.
- `cam module-num` Specifies the module containing the content addressable memory to display.

**Command Modes**

Privileged EXEC

**Examples**

The following is sample output from the `show controllers ipx-prefix` command:

```
Router# show controllers fastethernet 10/0/9 ipx-prefix all-entries

IPX Prefix Entries in CAM, Interface FastEthernet10/0/9
-----------------------------------------------------------------
Codes: C  - Connected network,       R  - Remote network
         V  - valid entry,             N  - Network entry
         L  - load balancing enabled, D  - default network
         E  - EIGRP enabled,           I  - Internal network
         B  - BVI network,             M  - My Mac Address
         VC - VCI
C 1009    V N
         Novell ether IF No 14 00d0.5845.2660 My-Node Valid
R 5004    V N
         Novell ether IF No 24 00d0.bbcd.b40e Valid
R 5005    V N
         Novell ether IF No 24 00d0.bbcd.b40e Valid
R 5006    V N
         Novell ether IF No 24 00d0.bbcd.b40e Valid
R 101010  V N B
         Novell ether IF No 24 00d0.5845.2662 My-Node Valid
```
show controllers c8500 interface-map

To display the interface number assigned to each interface or subinterface, use the show controllers c8500 interface-map EXEC command.

show controllers c8500 interface-map

Syntax Description
This command has no arguments or keywords.

Command Modes
Privileged EXEC

Usage Guidelines
The output from this command shows all the interfaces and subinterfaces in the system, along with the assigned interface number for each. This command displays information specific to the Catalyst 8510 and Catalyst 8540 switch routers.

Examples
The following is sample output from the show controllers c800 interface-map command:

Router# show controllers c8500 interface-map
GigabitEthernet2/0/0   (IF number:4)
GigabitEthernet12/0/0  (IF number:5)
GigabitEthernet12/0/1  (IF number:6)
show controllers c8500 ipmcast

To display IP multicast routing table control layer information, VC sharing information, and statistics, use the `show controllers c8500 ipmcast` EXEC command.

```plaintext
show controllers c8500 ipmcast group-address {source-address | all}
show controllers c8500 ipmcast group-address vc-sharing
show controllers c8500 ipmcast group-address {stats | reset}
```

### Syntax Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>group-address</code></td>
<td>Specifies the IP address of a multicast group.</td>
</tr>
<tr>
<td><code>source-address</code></td>
<td>Specifies the IP address of a multicast source.</td>
</tr>
<tr>
<td><code>all</code></td>
<td>Displays all entries within a group.</td>
</tr>
<tr>
<td><code>vc-sharing</code></td>
<td>Displays the VC sharing information for an IP multicast group.</td>
</tr>
<tr>
<td><code>stats</code></td>
<td>Displays the IP multicast statistics.</td>
</tr>
<tr>
<td><code>reset</code></td>
<td>Resets the statistics to zero.</td>
</tr>
</tbody>
</table>

### Command Modes

Privileged EXEC

### Usage Guidelines

When an IP multicast source address or the keyword `all` is specified, this command displays IP multicast routing table control layer information, such as the VC used for an IP multicast packet matching a particular entry.

When the keyword `vc-sharing` is specified, this command displays all the point-to-multipoint VCs used for an IP multicast group and the number of entries that are sharing this VC.

When the keyword `stats` is used, this command displays debugging information.

The `show controllers c8500 ipmcast` command displays information specific to the Catalyst 8510 and Catalyst 8540 switch routers.

### Examples

The following sample output from the `show controllers c8500 ipmcast` command displays routing table control layer information for an IP multicast group:

```plaintext
Router# show controllers c8500 ipmcast 231.1.1.1 all
 (*, 231.1.1.1), RPF NULL, root vc 0/0
 (171.11.78.77, 231.1.1.1), RPF BV1, root vc 1/33
     FastEthernet0/0/7, root vc 1/33
     shr_vc_db vc 1/33, usage_count 1, olist size 2
     FastEthernet0/0/0, root vc 1/33
     shr_vc_db vc 1/33, usage_count 1, olist size 2
     FastEthernet0/0/3, root vc 1/33
     shr_vc_db vc 1/33, usage_count 1, olist size 1
```

Table 18-25 describes some of the fields in the previous display.
The following sample output from the `show controllers c8500 ipmcast` command displays VC sharing information for an IP multicast group:

```
Router# show controllers c8500 ipmcast 231.1.1.1 vc-sharing
FastEthernet0/0/0 vc 1/36, usage count:1
FastEthernet0/0/3 vc 1/36, usage count:1
FastEthernet0/0/7 vc 1/36, usage count:1
```

The following sample output from the `show controllers c8500 ipmcast` command displays general debugging statistics:

```
Router# show controllers c8500 ipmcast stats
LSS Mroute General Statistics:

# of times p2mp vc are created                             6
# of times p2mp vc are released                            3
# of times failed to create p2mp vc's                      0
# of times failed to release p2mp vc's                     0
# of times stats IPC polls sent                           15
# of times stats IPC polls received                        15
# of times mroute entries created                          6
# of times mroute entries deleted                          0
# of times mroute flags modified                          32
# of times mroute rpf changed                              0
# of times midb changed                                    9
# of times sidb updated                                    4
# of times add member IPCs sent                            2
# of times add member IPC failed                           0
# of times add group IPCs sent                             11
# of times add group IPCs failed                           0
# of times spt flag changed                                2
# of times register flag changed                           0
# of times mroute nofs changed                             4
# of times fastdrop sets                                   0
# of times fastdrop clears                                 0
# of times shared vc db created                            6
# of times shared vc db freed                              3
# of times shared vc hash table created                    5
# of times shared vc hash table freed                      4
# of times shared oif db created                           10
# of times shared oif db freed                             5
```

The following table describes the field descriptions for the `show controllers c8500 ipmcast` command:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPF</td>
<td>Incoming interface for this IP multicast entry root VC’s VPI/VCI value that is used for forwarding multicast packets for this entry</td>
</tr>
<tr>
<td>shr_vc_db</td>
<td>Data block that contains the VC information</td>
</tr>
<tr>
<td>usage_count</td>
<td>Number of (*, G) / (S, G) entries that are sharing this VC</td>
</tr>
<tr>
<td>olist size</td>
<td>Number of leaves in the point-to-multipoint VC</td>
</tr>
</tbody>
</table>

Table 18-25 show controllers c8500 ipmcast Field Descriptions
show controllers c8500 ipx-node

To display the specified node entry for all interfaces, use the show controllers c8500 ipx-node EXEC command.

```
show controllers c8500 ipx-node node-num
```

**Syntax Description**

- `node-num` Specifies the node number of the IPX network.

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command displays information specific to the Catalyst 8510 and Catalyst 8540 switch routers.

**Examples**

The following is sample output from the show controllers c8500 ipx-node command:

```
Router# show controllers c8500 ipx-node 101010.00d0.5845.2662
Codes: V - valid entry, M - My-node, I - IF/VC flag
Interface                  Network     Node       IF Number  Flags
GigabitEthernet1/0/0       101010      00d0.5845.2662 18     MV
GigabitEthernet1/1/0       101010      00d0.5845.2662 18     MV
FastEthernet10/0/0         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/1         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/2         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/3         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/4         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/5         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/6         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/7         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/8         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/9         101010      00d0.5845.2662 18     IMV
FastEthernet10/0/10        101010      00d0.5845.2662 18     IMV
FastEthernet10/0/11        101010      00d0.5845.2662 18     IMV
FastEthernet10/0/12        101010      00d0.5845.2662 18     IMV
FastEthernet10/0/13        101010      00d0.5845.2662 18     IMV
FastEthernet10/0/14        101010      00d0.5845.2662 18     IMV
FastEthernet10/0/15        101010      00d0.5845.2662 18     IMV
```
show controller c8500 ipx-prefix

To display IPX network entries for a specified network for all interfaces, use the show controller c8500 ipx-prefix EXEC command.

show controller c8500 ipx-prefix prefix

Syntax Description

prefix IPX network prefix.

Command Modes

Privileged EXEC

Usage Guidelines

This command displays information specific to the Catalyst 8510 and Catalyst 8540 switch routers.

Examples

The following is sample output from the show controller c8500 ipx-prefix command for all entries:

```
Router# show controllers f10/0/9 ipx-prefix all-entries
IPX Prefix Entries in CAM, Interface FastEthernet10/0/9
-----------------------------------------------------------------
Codes: C - Connected network, R - Remote network
V - valid entry, N - Network entry
L - load balancing enabled, D - default network
E - EIGRP enabled, I - Internal network
B - BVI network, M - My Mac Address
VC - VCI
C 1009     V N
Novell ether IF No 14 00d0.5845.2660 My-Node Valid
R 5004     V N
Novell ether IF No 24 00d0.bbcd.b40e Valid
R 5005     V N
Novell ether IF No 24 00d0.bbcd.b40e Valid
R 5006     V N
Novell ether IF No 24 00d0.bbcd.b40e Valid
R 101010    V N B
Novell ether IF No 24 00d0.5845.2662 My-Node Valid
-----------------------------------------------------------------
```

The following is sample output from the show controller c8500 ipx-prefix command for a specified IPX network:

```
Router# show controllers c8500 ipx-prefix 101010
GigabitEthernet1/0/0     R 101010 V B
Novell ether IF No 8 00d0.5845.265a My-Node Valid
GigabitEthernet1/1/0     R 101010 V B
Novell ether IF No 8 00d0.5845.265a My-Node Valid
FastEthernet10/0/0       R 101010 V N B
Novell ether IF No 24 00d0.5845.2662 My-Node Valid
FastEthernet10/0/1       R 101010 V N B
Novell ether IF No 24 00d0.5845.2662 My-Node Valid
FastEthernet10/0/2       R 101010 V N B
Novell ether IF No 24 00d0.5845.2662 My-Node Valid
FastEthernet10/0/3       R 101010 V N B
Novell ether IF No 24 00d0.5845.2662 My-Node Valid
FastEthernet10/0/4       R 101010 V N B
```
<table>
<thead>
<tr>
<th>Interface</th>
<th>IP Address</th>
<th>Prefix Length</th>
<th>Mask</th>
<th>Broadcast</th>
<th>IPv6 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FastEthernet10/0/5</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/6</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/7</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/8</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/9</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/10</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/11</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/12</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/13</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/14</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
<tr>
<td>FastEthernet10/0/15</td>
<td>00d0.5845.2662</td>
<td>0</td>
<td>V N</td>
<td>R</td>
<td>My-Node Valid</td>
</tr>
</tbody>
</table>
show controllers c8500 queuing

To display current queuing information for all well-known static VCs in the system, use the show controllers c8500 queuing EXEC command.

show controllers c8500 queuing

Syntax Description
This command has no arguments or keywords.

Command Modes
Privileged EXEC.

Usage Guidelines
This command displays information specific to the Catalyst 8510 and Catalyst 8540 switch routers.

Examples
The following is sample output from the show controllers c8500 queuing command:

```
Router# show controllers c8500 queuing
INT   X-INT   VCI  QCNT  INT   X-INT   VCI  QCNT
f0/0/0 SRP     34   0     40   400
```

Table 18-26 describes the fields in the display.

Table 18-26 show controllers c8500 queuing Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT</td>
<td>Interface name</td>
</tr>
<tr>
<td>X-INT</td>
<td>Peer interface name</td>
</tr>
<tr>
<td>VCI</td>
<td>VCI value on INT end</td>
</tr>
<tr>
<td>QCNT</td>
<td>Current queue depth in cells, on VC from INT to X-INT direction</td>
</tr>
<tr>
<td>VCI</td>
<td>VCI value on X-INT end</td>
</tr>
<tr>
<td>QCNT</td>
<td>Current queue depth in cells, on VC from X-INT to INT direction</td>
</tr>
</tbody>
</table>
show crypto

To display the encryption module and its configuration, use the `show crypto` command.

```
show crypto { engine configuration | key { mypubkey rsa | pubkey-chain rsa [ address ip-address | name name]}}
```

**Syntax Description**

- `engine configuration`: Displays the encryption engine.
- `mypubkey rsa`: Displays the ATM switch router RSA public key(s).
- `pubkey-chain rsa`: Displays the peers RSA public keys stored on this ATM switch router.
- `address ip-address`: Specifies the key to display by IP address.
- `name name`: Specifies the key to display by name string.

**Command Modes**

Privileged EXEC.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(13)E</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example displays the encryption engine and its configuration.

```
Switch# show crypto engine configuration

crypto engine name: unknown
crypto engine type: software
serial number: 040DC634
crypto engine state: installed
platform: rp crypto engine

Encryption Process Info:
input queue size: 500
input queue top: 0
input queue bot: 0
input queue count: 0

Crypto Adjacency Counts:
Lock Count: 0
Unlock Count: 0
```

The following example shows how to the RSA public key data.

```
Switch# show crypto key mypubkey rsa
% Key pair was generated at: 21:59:24 UTC Apr 3 2002
Key name: test.cisco
Usage: General Purpose Key
Key Data:
305C300D 06092A86 4886F70D 01010101 00034B00 30480241 009F62D1 05DDCF86
B6DB1D0F A8FEFD04 F198864D 9522809A 1E7D2196 71A8B263 E4E507D1 A76C5F9F
75E28CB9 FD41C2A0 6265DDBB 9DD83301 C6367C6D 5133CC6B C5020301 0001
% Key pair was generated at: 21:59:26 UTC Apr 3 2002
Key name: test.cisco.server
```
Usage: Encryption Key
Key Data:
307C300D 06092A86 4886F70D 01010105 00036B00 30680261 009C1F35 8E57D25E
69F80F64 90D9C62 172D42A4 4AB62893 64833E7C F3F8AB85 E314092F C4CE0B22
CE83DBD6 03F56E34 FEBC7EE4 26FB8A62 E0E5AA8D 62416239 ABBAA97B 624407C4
D1D46738 D35226AD A2BCF29B 6B2B9CFD 14D2632C 04F3D22 43020301 0001

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>crypto key</td>
<td>Used to generates an RSA key-pair and enable the local and remote SSH server.</td>
</tr>
</tbody>
</table>
show crypto
**show debugging**

To display information about the types of CDP debugging that are enabled for your switch router, use the `show debugging` EXEC command.

```
show debugging
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show debugging` command, which shows all three types of CDP debugging enabled.

```
Switch# show debugging
CDP:  
  CDP packet info debugging is on  
  CDP events debugging is on  
  CDP neighbor info debugging is on  

CDP-PA: Packet received from neon.cisco.com on interface Ethernet0  
CDP-EV: Encapsulation on interface Serial0 failed  
CDP-AD: Aging entry for neon.cisco.com, on interface Ethernet0
```
show diag

Catalyst 8540 MSR
To display power-on diagnostics status for the Catalyst 8540 MSR, use the `show diag` EXEC command.

```
show diag [power-on]
```

Catalyst 8510 MSR and LightStream 1010
To display environmental statistics and power-on diagnostics status for the Catalyst 8510 MSR and the LightStream 1010, use the `show diag` EXEC command.

```
show diag [environment | power-on | all]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>environment</td>
<td>Displays environmental status.</td>
</tr>
<tr>
<td>power-on</td>
<td>Displays the status of power-on diagnostics.</td>
</tr>
<tr>
<td>all</td>
<td>Displays the status of all command options.</td>
</tr>
</tbody>
</table>

**Defaults**

Catalyst 8540 MSR: None
Catalyst 8510 MSR and LightStream 1010: None

**Command Modes**

EXEC for all models

**Usage Guidelines**

**Catalyst 8540 MSR**
The power-on diagnostic test results for the Catalyst 8540 MSR are displayed using the `show diag` command.

**Catalyst 8510 MSR and LightStream 1010**
The power-on or hardware reset diagnostics provide full sets of test suites for the Catalyst 8510 MSR and the LightStream 1010. The test results are stored in the switch memory and an interface is provided using the `show diag` command. If an error is detected during the test, the status LED turns red.

**Examples**

**Catalyst 8540 MSR**
The following example is sample output from the `show diag power-on` EXEC command on a switch router primary route processor.

```
Switch# show diag power-on

Cat8540 Power-on Diagnostics Status {.=Pass,F=Fail,U=Unknown,N=Not Applicable}
-----------------------------------------------------------------------------------------------
Last Power-on Date: 97/09/15   Time: 18:17:50

  BOOTFLASH:  .  PCMCIA-Slot0: N  PCMCIA-Slot1: N
  CPU-IDPROM: .  NVRAM-Config: .
```
PS0: .  PS2:  N  PS (12V): .  


Power-on Diagnostics Passed.

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the `show diag environment` EXEC command.

Switch# `show diag environment`

Temperature: OK  
Fan: OK  
Voltage: OK  
Power Supply#0 type: Power One, status: Failure  
Power Supply#1 type: Astec, status: OK

The following example is sample output from the `show diag power-on` EXEC command on a switch router with an FC-PCQ installed.

Switch# `show diag power-on`

```plaintext
XXXXXX Power-on Diagnostics Status (.=Pass,F=Fail,U=Unknown,N=Not Applicable)
-------------------------------------------------------------------------------
Last Power-on Date: 97/04/14   Time: 16:03:22
BOOTFLASH: .  PCMCIA-Slot0: .  PCMCIA-Slot1: N
SRAM: .  DRAM: .
Cell-Memory: .

Access/Interrupt/Loopback/CPU-MCast/Port-MCast/FC-MCast/FC-TMCC Test Status:
Ports 0 1 2 3
-------------------------------------------------------------------------------
PAM 0/0 (T1CE) ....... ....... ....... ....... 
PAM 0/1 (155MM) ....... ....... ....... ....... 
PAM 1/0 (155MM) ....... ....... ....... ....... 
PAM 1/1 (155MM) ....... ....... ....... ....... 
PAM 3/0 (155UTP) ....... ....... ....... ....... 
PAM 3/1 (DS3Q) ....... ....... ....... ....... ....... Ethernet-port Access: .  
```

**Examples**

The following example is sample output from the `show diag power-on` EXEC command on a switch router with the switch processor feature card installed.

Switch# `show diag power-on`

```plaintext
XXXXXXX Power-on Diagnostics Status (.=Pass,F=Fail,U=Unknown,N=Not Applicable)
-------------------------------------------------------------------------------
Last Power-on Diags Date: 97/11/05   Time: 11:03:41   By: V 3.2
```
show diag

BOOTFLASH: .  PCMCIA-Slot0: N  PCMCIA-Slot1: N
SRAM: .  DRAM: .
Cell-Memory: .

switch processor feature card
Access: .

TEST:

Access/Interrupt/Loopback/CPU-MCast/Port-MCast/FC-MCast/FC-TMCC Test Status:
Ports 0 1 2 3
-------------------------------------------------------------------------------
PAM 0/0 (155UTP) .....NN .....NN .....NN .....NN
PAM 1/0 (155MM) .....NN .....NN .....NN .....NN
PAM 1/1 (622) .....NN N N N
PAM 3/0 (622MM) .....NN N N N
PAM 3/1 (DS3Q) .....NN .....NN .....NN .....NN

Power-on Diagnostics Passed.

The following example is sample output from the show diag all EXEC command on an ATM switch router.

Switch# show diag all
XXXXXX Power-on Diagnostics Status (.=Pass,F=Fail,U=Unknown,N=Not Applicable)
-------------------------------------------------------------------------------

environment
----------
Temperature: OK
Fan: OK
Voltage: OK
Power Supply#0 type: Power One, status: Failure
Power Supply#1 type: Astec, status: OK

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show hardware</td>
<td>Displays the revision number of the hardware.</td>
</tr>
</tbody>
</table>
**show diag online (Catalyst 8540 MSR)**

To display test results for system diagnostic online tests, use the `show diag online` command.

```
show diag online [detail | status] [access | oir | snake]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>detail</code></td>
<td>Displays test detail for the specified test.</td>
</tr>
<tr>
<td><code>status</code></td>
<td>Displays test status for the specified test.</td>
</tr>
<tr>
<td><code>access</code></td>
<td>Ensures connectivity at a configurable interval between the primary route processor and the following:</td>
</tr>
<tr>
<td></td>
<td>• Active switch processors</td>
</tr>
<tr>
<td></td>
<td>• Standby switch processor, if it is present</td>
</tr>
<tr>
<td></td>
<td>• Feature cards</td>
</tr>
<tr>
<td></td>
<td>• Port adapters</td>
</tr>
<tr>
<td></td>
<td>• Interface modules</td>
</tr>
</tbody>
</table>

Whenever the access test detects a hardware failure, the system issues an error message to the console.

If the access test detects a hardware problem with an active switch processor, the standby switch processor, if present, automatically takes over and becomes an active switch processor. The system generates an SNMP trap when the switchover occurs.

<table>
<thead>
<tr>
<th><code>oir</code></th>
<th>Checks functioning of the switch fabric and interfaces on a per-port basis. The switch router performs these tests when the system boots up and when you insert a port adapter or interface module into a slot. The OIR test sends a packet to the interface loopback and expects to receive it back within a certain time period. If the packet does not reach the port within the expected time period, or the route processor receives a corrupted packet, the system issues an error message to the console, generates an SNMP trap, and brings the port to an administrative down state.</th>
</tr>
</thead>
</table>

| `snake` | Establishes a connection across all the active ports in the switch router, originating and terminating at the primary route processor. The route processor establishes a connection by sending a packet to each port in turn, which then terminates at the route processor. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, further testing is performed to isolate and disable the port causing the problem. The size of the packet and frequency of the test are configurable to minimize the impact on system performance. The snake test supports all ATM interface modules and enhanced Gigabit Ethernet interface modules. It does not support ATM port adapters, Fast Ethernet interface modules, or Gigabit Ethernet interface modules. |

**Defaults**

No default.

**Command Modes**

Privileged EXEC, EXEC
The access and snake online diagnostic tests run at user specified intervals and results are stored. The OIR diagnostic test has a variable packet size that can be configured. The `show diag online` command displays test results.

Diagnostic tests must be enabled by using the `diag online` command before the `show diag online` command display current diagnostic test results.

### Examples

The following example is sample output from the `show diag online access` command.

```
Switch# show diag online access
======== Access Test Status and Details ========
======== Online Access Test Status ========
Current Test Status : Test is Enabled
Current Frequency of Access Test : 100 seconds
Slot Card-Type       Test Status
---- ----------      ------------
0/* Super Cam       Pass
0/0 8T1 IMA PAM     Pass
0/1 8E1 IMA PAM     Pass
2/* ARM PAM         Pass
3/* ETHERNET PAM    Pass
5/* Switch Card     Pass
5/0 Feature Card    Pass
7/* Switch Card     Pass
7/0 Feature Card    Pass
9/* OC48c PAM       Pass
10/* OCM Board      Pass
10/0 QUAD 622 Gen   Pass
11/* OC48c PAM       Pass
12/* OCM Board      Pass
12/0 QUAD 622 Gen   Pass
======== Online Access Test Status End ========
======== Online Access Test Details ========
Current Test Status : Test is Enabled
Current Frequency of Access Test : 100 seconds
Slot Card-Type       Iteration    Success    Failure    Last Failure
---- ----------      ----------   -------    -------    ------------
0/* Super Cam       3247         3247       0          ----
0/0 8T1 IMA PAM     3247         3247       0          ----
0/1 8E1 IMA PAM     3247         3247       0          ----
2/* ARM PAM         3247         3247       0          ----
3/* ETHERNET PAM    3247         3247       0          ----
5/* Switch Card     3247         3247       0          ----
5/0 Feature Card    3247         3247       0          ----
7/* Switch Card     3247         3247       0          ----
7/0 Feature Card    3247         3247       0          ----
9/* OC48c PAM       3247         3247       0          ----
10/* OCM Board      3247         3247       0          ----
10/0 QUAD 622 Gen   3247         3247       0          ----
11/* OC48c PAM       3247         3247       0          ----
```

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(5a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

- The access and snake online diagnostic tests run at user specified intervals and results are stored.
- The OIR diagnostic test has a variable packet size that can be configured.
- The `show diag online` command displays test results.
- Diagnostic tests must be enabled by using the `diag online` command before the `show diag online` command displays current diagnostic test results.
The following example is sample output from the `show diag online detail oir` command.

```
Switch# show diag online detail oir
======== Online OIR Test Details ========
Current Test Status : Test is Enabled
------- Previous failure details ---------
Port  Card Type  Pkt Size  Err Type  Test Time  LOOP
-----  ----------  --------  -------  ----------  -----
02/0/00  8E1 IMA 300 OIR_TIMER_ERR 00:00:43  PIF
02/0/01  8E1 IMA 300 OIR_TIMER_ERR 00:00:43  PIF

-------- Complete details --------
Port  Tx Pkt  Rx Pkt  Success  Failure  Total Tests
-----  ------  ------  --------  -------  ------------
02/0/00  0     0      0         1        1
02/0/01  0     0      0         1        1
```
For additional information about the `show diag online` command, or about how to display results, refer to the *ATM Switch Router Software Configuration Guide*.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug diag online (Catalyst 8540 MSR)</code></td>
<td>Enables or disables system debugging.</td>
</tr>
<tr>
<td><code>diag online (Catalyst 8540 MSR)</code></td>
<td>Enables, disables, and configures system diagnostic tests.</td>
</tr>
</tbody>
</table>
**show environment**

To display temperature and voltage information on the console, use the `show environment` EXEC command.

```
show environment
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show environment` command.

```
Switch# show environment
Temperature:OK
Fan:OK
Voltage: OK
Power Supply #0 type: 0 Status:OK
```
show epc vc-bundle

To display the bundle-ID to bundle-name mapping and precedence to VC mapping for a VC bundle, use the `show epc vc-bundle` command.

```
show epc vc-bundle {bundle-name | interface atm card/subcard/port}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>bundle-name</code></td>
<td>Specifies the bundle name.</td>
</tr>
<tr>
<td><code>interface atm</code></td>
<td>Specifies the card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td><code>card/subcard/port</code></td>
<td></td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(14)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows the bundle-ID to bundle-name mapping for a VC bundle.

```
Switch# show epc vc-bundle
Bundle-id to Bundle-name map
Id   Name
--   ----
8    pvc11
20   pvc13
22   pvc
```

The following example shows the precedence to VC mapping for VC bundle named `pvc`.

```
Switch# show epc vc-bundle pvc
bundle located at address:79808
Precedence to VCD map
Precedence   VCD
0        203
1        203
2        202
3        200
4        201
5        200
6        200
7        200
```

Switch#
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundle</td>
<td>Configures a VC bundle.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
show epc port-qos

To display EPIF token bucket parameters, use the show epc port-qos command.

```
show epc port-qos [int interface] [in | out]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>int</td>
<td>Indicates a specified interface will be used for displaying information.</td>
</tr>
<tr>
<td>interface</td>
<td>Specifies interface to be accessed.</td>
</tr>
<tr>
<td>in</td>
<td>Displays input policing token bucket parameters.</td>
</tr>
<tr>
<td>out</td>
<td>Displays output policing token bucket parameters.</td>
</tr>
</tbody>
</table>

**Defaults**

None.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None.

**Examples**

The following example shows the current traffic shaping configuration.

```
Switch# show epc port-qos
Interface   Type   Input/ Target-Rate   Burst-Size
           Output   (bits/sec)   (bytes)
---------------------------------------------------------------
FastEthernet9/0/3 Rate-Limit   Input     10000000   64000
Rate-Limit   Output    10000000   64000

termserve-is-c1# show epc port-qos int f9/0/3 in
Input Port QoS Parameters:
Current number of tokens (tokens): 65268
Configured burst size (burstsize): 65352
Token update interval (ticks) (timel): 7789
Tokens added per interval (tokens_in_timel): 1556
Time to fill bucket (ticks) (time_to_fill_burst): 327138

termserve-is-c1# show epc port-qos int f9/0/3 out
Output Port QoS Parameters:
Current number of tokens (tokens): 99
Configured burst size (burstsize): 65352
Token update interval (ticks) (timel): 7789
Tokens added per interval (tokens_in_timel): 1556
Time to fill bucket (ticks) (time_to_fill_burst): 327138

termserve-is-c1# show run in f9/0/3
Building configuration...
```
Current configuration : 137 bytes

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rate-limit</td>
<td>Polices the rate of traffic on EPIF-based FE cards of the Catalyst 8540 MSR and Catalyst 8510 MSR on a per-physical-port basis</td>
</tr>
<tr>
<td></td>
<td>traffic-shape</td>
<td>Enables traffic shaping for outbound traffic on an interface.</td>
</tr>
</tbody>
</table>
show facility-alarm status (Catalyst 8540 MSR)

To display the current major and minor alarm status, if any, and to display the configuration of the alarm thresholds, use the `show facility-alarm status` EXEC command.

```
show facility-alarm status
```

**Defaults**
Displays all alarms and configuration settings.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example displays the facility alarm status and configuration while no alarm condition exists.

```
Switch# show facility-alarm status
Thresholds:
  Core minor 38 major 50
Switch#
```

The following example displays the facility alarm status and configuration while an alarm condition exists.

```
Switch# show facility-alarm status
Thresholds:
  Core minor 45 major 53
SOURCE:Chassis TYPE:Power entry module 0 failure SEVERITY:Minor ACO:Normal
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>clear facility-alarm</code> (Catalyst 8540 MSR)</td>
<td>Clears alarm conditions and resets the alarm contacts.</td>
</tr>
<tr>
<td><code>facility-alarm</code> (Catalyst 8540 MSR)</td>
<td>Configures the temperatures so that the ATM switch router declares a major or minor alarm condition.</td>
</tr>
</tbody>
</table>
show file

To display the configuration stored in a specified file, use the show file EXEC command.

```
show file descriptors | information [(device[:filename]] | systems
```

### Syntax Description

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>descriptors</strong></td>
<td>Displays open file descriptors information.</td>
</tr>
<tr>
<td><strong>information</strong></td>
<td>Displays file information.</td>
</tr>
<tr>
<td><strong>device</strong></td>
<td>Specifies the device containing the configuration file. The colon (:) is required. Valid devices are as follows:</td>
</tr>
<tr>
<td></td>
<td>• bootflash: is the internal Flash memory.</td>
</tr>
<tr>
<td></td>
<td>• sec-bootflash: is the secondary internal Flash memory on the redundant route processor. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td>• nvram: is the NVRAM on the route processor card.</td>
</tr>
<tr>
<td></td>
<td>• sec-nvram: is the NVRAM on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td>• slot0: is the first PC slot on the route processor card and is the initial default device.</td>
</tr>
<tr>
<td></td>
<td>• sec-slot0: is the first PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td></td>
<td>• slot1: is the second PC slot on the route processor card.</td>
</tr>
<tr>
<td></td>
<td>• sec-slot1: is the second PC slot on the redundant route processor card. (Catalyst 8540 MSR)</td>
</tr>
<tr>
<td><strong>filename</strong></td>
<td>Specifies the name of the file. The file can be of any type. The maximum filename length is 63 characters.</td>
</tr>
<tr>
<td><strong>systems</strong></td>
<td>Displays file systems information.</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

When showing the configuration, the switch informs you whether the displayed configuration is a complete configuration or a distilled version. A distilled configuration is one that does not contain access lists.

### Examples

The following example is sample output from the show file command.
Switch# show file slot0:switch-config
Using 534 out of 129016 bytes
!
version xx.x
!
hostname Cyclops
!
enable-password xxxx
service pad
!
boot system dross-system 131.108.13.111
boot system dross-system 131.108.1.111
!
exception dump 131.108.13.111
!
no ip ipname-lookup
!
decnet routing 13.1
decnet node-type area
decnet max-address 1023
!
interface Ethernet 0
ip address 131.108.1.1 255.255.255.0
ip helper-address 131.120.1.0
ip accounting
ip gdp
decnet cost 3
!
ip domain-name CISCO.COM
ip name-server 255.255.255.255
!
end

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>boot</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td>cd</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show flash

To display the layout and contents of Flash memory, use one of the following `show flash` EXEC commands.

```
show flash [all | chips | filesys]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Displays the same information as the <code>dir</code> command when used with the <code>/all</code> and <code>/long</code> keywords. This information includes that displayed by the <code>filesys</code> and <code>chips</code> keywords.</td>
</tr>
<tr>
<td>chips</td>
<td>Displays information per partition and per chip, including which bank the chip is in, plus its code, size, and name.</td>
</tr>
<tr>
<td>filesys</td>
<td>Displays the Device Info Block, the Status Info, and the Usage Info.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `show flash` command displays the type of Flash memory present, any files that might currently exist in PC slot0: Flash memory, and the amounts of Flash memory used and remaining.

When you specify a PC slot as the device, the switch router displays the layout and contents of the Flash memory card inserted in the specified slot of the route processor card. When you omit the `device:` argument, the switch router displays the default device specified by the `cd` command. Use the `pwd` command to show the current default device.

**Examples**

The following example is sample output from the `show flash` command.

```
Switch# show flash
#-#- ED --type-- --crc--- -seek-- nlen --length-- -----date/time------ name
1 .D FFFFFFFF 9099E94C 233F8C  22   2047753  Feb 29 1997 06:30:03 xxxxxx-i-m_Z
2 .. 1        E9D05582 458C54  29   2247751  Apr 04 1997 16:07:33 pnni/ls101Z

3306412 bytes available (4295764 bytes used)
```

As the display shows, the Flash memory can store and display multiple, independent software images for booting itself or for TFTP server software for other products. This feature is useful for storing default system software. These images can be stored in compressed format (but cannot be compressed by the switch).

To eliminate any files from Flash memory (invalidated or otherwise) and free up all available memory space, the entire Flash memory must be erased; individual files cannot be erased from Flash memory.
Table 18-27 describes the `show flash` display fields.

### Table 18-27 `show flash` Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Filename and status of a system image file. The invalidated status appears when a file has been rewritten (recopied) into Flash memory. The first (now invalidated) copy of the file is still present within Flash memory, but it is unusable because of the newest version.</td>
</tr>
<tr>
<td>crc</td>
<td>Address of the file in Flash memory.</td>
</tr>
<tr>
<td>Length</td>
<td>Size of the system image file (in bytes).</td>
</tr>
<tr>
<td>Bytes available/used</td>
<td>Amount of Flash memory used/available amount of Flash memory.</td>
</tr>
</tbody>
</table>

### Examples

The following example is sample output for the `show flash all` command that has Flash memory partitioned.

Switch# `show flash all`

```
-#- ED --type-- --crc---- --seek-- nlen -length- -----date/time------ name
1   .D FFFFFFFF 9099E94C 233F8C  22   2047753  Feb 29 1997 06:30:03 xxxxxxx-i-m_Z
2   . . 1        E9D05582 458C54  29   2247751  Apr 04 1997 16:07:33 Switch/ls101Z
```

3306412 bytes available (4295764 bytes used)

```
-------- FILE SYSTEM STATUS --------
Device Number = 2
DEVEICE INFO BLOCK:
  Magic Number          = 6887635   File System Vers = 10000    (1.0)
  Length                = 800000    Sector Size      = 40000
  Programming Algorithm = 5         Erased State     = FFFFFFFF
  File System Offset    = 40000     Length = 740000
  MONLIB Offset         = 100       Length = A570
  Bad Sector Map Offset = 3FFF      Length = 4
  Squeeze Log Offset    = 780000    Length = 40000
  Squeeze Buffer Offset = 7C0000    Length = 40000
  Num Spare Sectors     = 0
  Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  Squeeze in progress
USAGE INFO:
  Bytes Used     = 418C54  Bytes Available = 3273AC
  Bad Sectors    = 0       Spared Sectors  = 0
  OK Files       = 1       Bytes = 224C48
  Deleted Files  = 1       Bytes = 1F3F0C
  Files w/Errors = 0       Bytes = 0

****** RSP Internal Flash Bank -- Intel Chips ******
Flash SIMM Reg: 401
Flash SIMM PRESENT
2 Banks
Bank Size = 4M
HW Rev = 1

Flash Status Registers: Bank 0
```
Intelligent ID Code : 89898989 A2A2A2A2
Status Reg: 80808080

Flash Status Registers: Bank 1
Intelligent ID Code : 89898989 A2A2A2A2
Status Reg: 80808080

slot0, slot1, bootflash, nvram, tftp, rcp

Table 18-28 describes the show flash all display fields.

**Table 18-28 show flash all Fields for Partitioned Flash Memory**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank-Size</td>
<td>Size of bank in bytes</td>
</tr>
<tr>
<td>Chip</td>
<td>Chip number</td>
</tr>
<tr>
<td>Bank</td>
<td>Bank number</td>
</tr>
<tr>
<td>Code</td>
<td>Code number</td>
</tr>
<tr>
<td>Size</td>
<td>Size of chip</td>
</tr>
<tr>
<td>Name</td>
<td>Name of chip</td>
</tr>
</tbody>
</table>

**Related Commands**

None
show frame-relay connection-traffic-table-row

To display the Frame Relay traffic table, use the `show frame-relay connection-traffic-table-row` EXEC command.

```
show frame-relay connection-traffic table row [from-row | row row]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>from-row</td>
<td>Shows the table from a specific row.</td>
</tr>
<tr>
<td>row row</td>
<td>Shows the row that you specify.</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(13)EB</td>
<td>Modified: Added frame size display.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

The row index must be an integer between 1 and 2147483647. An asterisk is appended to row indexes created by SNMP but not made active. Because these rows are not active, they can not be used by connections. If neither the `row` nor `from-row` keywords are used, the entire table is displayed.

### Examples

The following example shows information for a Frame Relay connection traffic table row.

```
Switch# show frame-relay connection-traffic-table-row
Row   cir    bc    be    pir  FrameSize  fr-atm    Service-category ATM Row
102   16000  32768  32768  6400  64 vbr   100
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>frame-relay connection-traffic-table-row</td>
<td>Creates a table entry in the Frame Relay connection-traffic table.</td>
</tr>
</tbody>
</table>
show frame-relay interface resource

To display the current resource allocation on a Frame Relay interface, use the show frame-relay interface resource EXEC command.

```
show frame-relay interface resource serial card/subcard/port:dlci
```

**Syntax Description**

<table>
<thead>
<tr>
<th>card/subcard/port</th>
<th>Interface card number, backplane slot number, port number, and logical serial port of the interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td>dlci</td>
<td>Data-link connection identifier.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The show frame-relay interface resource command display differs depending on whether the interface type is Frame Relay or Frame FUNI.

**Examples**

The following example displays detailed information about a Frame Relay port adapter.

```
Switch# show frame-relay interface resource serial 1/1/1:12
Encapsulation: FRAME-RELAY
Resource Management configuration:
  Input queues (PAM to switch fabric):
    Discard threshold: 87% vbr-nrt, 87% abr, 87% ubr
    Marking threshold: 75% vbr-nrt, 75% abr, 75% ubr
  Output queues (PAM to line):
    Discard threshold: 87% vbr-nrt, 87% abr, 87% ubr
    Marking threshold: 75% vbr-nrt, 75% abr, 75% ubr
  Overflow servicing for VBR: enabled
  Overbooking: 200%
Resource Management state:
  Available bit rates (in bps):
    3968000 vbr-nrt RX, 3968000 vbr-nrt TX
    3968000 abr RX, 3968000 abr TX
    3968000 ubr RX, 3968000 ubr TX
  Allocated bit rates (in bps):
    0 vbr-nrt RX, 0 vbr-nrt TX
    0 abr RX, 0 abr TX
    0 ubr RX, 0 ubr TX
Switch#
```
### show frame-relay interface resource

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>frame-relay</td>
<td>Configures discard marking thresholds on a Frame Relay interface in the input</td>
</tr>
<tr>
<td></td>
<td>input-queue</td>
<td>direction.</td>
</tr>
<tr>
<td></td>
<td>frame-relay</td>
<td>Configures discard marking thresholds on a Frame Relay interface in the output</td>
</tr>
<tr>
<td></td>
<td>output-queue</td>
<td>direction.</td>
</tr>
</tbody>
</table>
**show frame-relay lmi**

To display LMI specific status for an interface, use the `show frame-relay lmi` EXEC command.

```plaintext
show frame-relay lmi [interface serial card/subcard/port]
```

**Syntax Description**
- `card/subcard/port` Card, subcard, and port number for the serial interface.

**Command Modes**
- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1a)W5(5b)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Enter the `show frame-relay lmi` command without arguments to obtain statistics about all Frame Relay interfaces.

**Examples**

The following is sample output from the `show frame-relay lmi` command when the interface is an NNI:

```
Switch# show frame-relay lmi
LMI Statistics for interface Serial3/0/0:1 (Frame Relay NNI) LMI TYPE = CISCO
  Invalid Unnumbered info 0  Invalid Prot Disc 0
  Invalid dummy Call Ref 0   Invalid Msg Type 0
  Invalid Status Message 0   Invalid Lock Shift 0
  Invalid Information ID 0   Invalid Report IE Len 0
  Invalid Report Request 0   Invalid Keep IE Len 0
  Num Status Enq. Rcvd 11   Num Status msgs Sent 11
  Num Update Status Rcvd 0   Num Status msgs Rcvd 10
  Num Status Enq. Sent 10   Num Status Timeouts 0
  Num Update Status Sent 0

Table 18-29 describes the field descriptions for the `show frame-relay lmi` command.

**Table 18-29 show frame-relay lmi Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMI Statistics</td>
<td>Signaling or LMI specification: CISCO, ANSI, or ITU-T.</td>
</tr>
<tr>
<td>Invalid Unnumbered info</td>
<td>Number of received LMI messages with an invalid unnumbered information field.</td>
</tr>
<tr>
<td>Invalid Prot Disc</td>
<td>Number of received LMI messages with an invalid protocol discriminator.</td>
</tr>
<tr>
<td>Invalid dummy Call Ref</td>
<td>Number of received LMI messages with invalid dummy call references.</td>
</tr>
<tr>
<td>Invalid Msg Type</td>
<td>Number of received LMI messages with an invalid message type.</td>
</tr>
<tr>
<td>Invalid Status Message</td>
<td>Number of received LMI messages with an invalid status message.</td>
</tr>
</tbody>
</table>
### Table 18-29 show frame-relay lmi Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid Lock Shift</td>
<td>Number of received LMI messages with an invalid lock shift type.</td>
</tr>
<tr>
<td>Invalid Information ID</td>
<td>Number of received LMI messages with an invalid information identifier.</td>
</tr>
<tr>
<td>Invalid Report IE Len</td>
<td>Number of received LMI messages with an invalid report IE length.</td>
</tr>
<tr>
<td>Invalid Report Request</td>
<td>Number of received LMI messages with an invalid report request.</td>
</tr>
<tr>
<td>Invalid Keep IE Len</td>
<td>Number of received LMI messages with an invalid keep IE length.</td>
</tr>
<tr>
<td>Num Status Enq. Sent</td>
<td>Number of LMI status inquiry messages sent.</td>
</tr>
<tr>
<td>Num Status Msgs Rcvd</td>
<td>Number of LMI status messages received.</td>
</tr>
<tr>
<td>Num Update Status Rcvd</td>
<td>Number of LMI asynchronous update status messages received.</td>
</tr>
<tr>
<td>Num Status Timeouts</td>
<td>Number of times the status message was not received within the keepalive time value.</td>
</tr>
<tr>
<td>Num Status Enq. Rcvd</td>
<td>Number of LMI status enquiry messages received.</td>
</tr>
<tr>
<td>Num Status Msgs Sent</td>
<td>Number of LMI status messages sent.</td>
</tr>
<tr>
<td>Num Status Enq. Timeouts</td>
<td>Number of times the status enquiry message was not received within the T392 DCE timer value.</td>
</tr>
<tr>
<td>Num Update Status Sent</td>
<td>Number of LMI asynchronous update status messages sent.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>frame-relay pvc</td>
<td>Creates a Frame Relay-to-ATM network interworking or service interworking PVC or Frame-Relay- to-Frame Relay cross-connected PVC.</td>
</tr>
</tbody>
</table>
show functional-image-info

To display information about the in-system programmable device images (FPGA and PLD images) for a given module in the system, use the `show functional-image-info` EXEC command.

```
show functional-image-info {slot | subslot}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot</td>
<td>Physical slot number of the designated module. The range is 0 to 12.</td>
</tr>
<tr>
<td>subslot</td>
<td>Physical subslot number of the designated module. The range is 0 or 1.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example displays information about the motherboard in slot 8 of an ATM switch router.

```
Switch# show functional-image-info 8
Functional Version of the FPGA Image: 3.8
#Jtag-Distribution-Format-B
#HardwareRequired: 100(3.1,4.0,5.0)
#FunctionalVersion: 3.8
#Sections: 1
#Section1Format: MOTOROLA_EXORMAX
Copyright (c) 1996-98 by cisco Systems, Inc.
All rights reserved.
generated by: holliday
on: Fri Jul  3 14:43:15 PDT 1998
using: /cougar/bin/jtag_script Version 1.08
cfg file: /cougar/bin/jtag_script
Chain description:
Part type Bits Config file
10k50 10 /cougar/custom/cubfpga2/max/cidr_fpga.ttf
xc4062 3 /cougar/custom/cubfpga2/xil/cubi.bit
xc4062 3 /cougar/custom/cubfpga2/xil/cubi.bit
generic 2
XC4005 3 /cougar/custom/common/jtcfg/xil/jtcfg_r.bit
Number devices = 5
Number of instruction bits = 21
FPGA config file information:
Bitgen date/time Sum File
98/07/03 14:39:17 26503 /cougar/custom/cubfpga2/max/cidr_fpga.ttf
98/06/25 09:44:49 63850 /cougar/custom/cubfpga2/xil/cubi.bit
98/06/25 09:44:49 63850 /cougar/custom/cubfpga2/xil/cubi.bit
98/06/11 16:56:44 49904 /cougar/custom/common/jtcfg/xil/jtcfg_r.bit
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reprogram</td>
<td>Upgrades nonvolatile microcode or programmable logic on a selected card from a Flash file.</td>
</tr>
</tbody>
</table>
show hardware

To display the revision number of the hardware, use the `show hardware` EXEC command.

**Catalyst 8540 MSR**

`show hardware [detail]`

**Catalyst 8510 MSR and LightStream 1010**

`show hardware`

---

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>detail</code></td>
<td>Shows detailed hardware information. (Catalyst 8540 MSR)</td>
</tr>
</tbody>
</table>

---

### Command Modes

- EXEC

---

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

---

### Examples

#### Catalyst 8540 MSR

The following example is sample output from the `show hardware` command for an ATM switch router.

```
Switch# show hardware

C8540 named Switch, Date: 10:54:26 UTC Thu Nov 19 1998

<table>
<thead>
<tr>
<th>Slot</th>
<th>Ctrlr-Type</th>
<th>Part No.</th>
<th>Rev</th>
<th>Ser No</th>
<th>Mfg Date</th>
<th>RMA No.</th>
<th>Hw Vrs</th>
<th>Tst EEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/*</td>
<td>OCM Board</td>
<td>73-2852-05</td>
<td>03</td>
<td>mic02360</td>
<td>Jan 00 00</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/0</td>
<td>quad622 Gene</td>
<td>73-2852-05</td>
<td>03</td>
<td>mic02360</td>
<td>Jan 00 00</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/*</td>
<td>Super Cam</td>
<td></td>
<td>02</td>
<td>07285959</td>
<td>Jan 00 00</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/0</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>06</td>
<td>02202232</td>
<td>Jan 15 96</td>
<td>3.0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2/1</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>00</td>
<td>03115169</td>
<td>Feb 23 96</td>
<td>3.0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4/*</td>
<td>Route Proc</td>
<td>73-2644-05</td>
<td>02</td>
<td>mic02360</td>
<td>Jan 00 00</td>
<td>5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/*</td>
<td>Switch Card</td>
<td>73-3315-07</td>
<td>02</td>
<td>MICRO2390</td>
<td>Jan 00 00</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/*</td>
<td>Switch Card</td>
<td>73-3315-07</td>
<td>02</td>
<td>MICRO2390</td>
<td>Jan 00 00</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/*</td>
<td>Route Proc</td>
<td>73-2644-05</td>
<td>00</td>
<td>mic02360</td>
<td>Jan 00 00</td>
<td>5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/*</td>
<td>Super Cam</td>
<td>73-2739-03</td>
<td>11</td>
<td>MICRO2380</td>
<td>Jan 00 00</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/0</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>00</td>
<td>03114868</td>
<td>Feb 24 96</td>
<td>3.0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

DS1201 Backplane EEPROM:

<table>
<thead>
<tr>
<th>Model</th>
<th>Ver.</th>
<th>Serial</th>
<th>MAC-Address</th>
<th>MAC-Size</th>
<th>RMA</th>
<th>RMA-Number</th>
<th>MFG-Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8540</td>
<td>2</td>
<td>6312897</td>
<td>00107BC6F300</td>
<td>1024</td>
<td>0</td>
<td>0</td>
<td>Aug 21 1998</td>
</tr>
</tbody>
</table>

cubi version : D
```

#### Examples

The following is sample output from the `show hardware detail` command for an ATM switch router.

```
Switch# show hardware detail

cubi version : D
```
C8540 named Switch, Date: 10:54:45 UTC Thu Nov 19 1998

<table>
<thead>
<tr>
<th>Slot</th>
<th>Ctrlr-Type</th>
<th>Part No. 0/12</th>
<th>Rev 0/12</th>
<th>Ser No 0/12</th>
<th>Mfg Date 0/12</th>
<th>RMA No. 0/12</th>
<th>Hw Vrs 0/12</th>
<th>Tst EEP 0/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/*</td>
<td>OCM Board</td>
<td>73-2852-05</td>
<td>03</td>
<td>mic0236002b</td>
<td>Jan 00 00</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>0/0</td>
<td>quad622 Generic</td>
<td>73-2852-05</td>
<td>03</td>
<td>mic0236002b</td>
<td>Jan 00 00</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>2/*</td>
<td>Super Cam</td>
<td>02 07285959</td>
<td></td>
<td></td>
<td>Jan 00 00</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>2/0</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>06</td>
<td>mic0236002b</td>
<td>Jan 00 00</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>2/1</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>00</td>
<td>03115169</td>
<td>Feb 23 96 00-00-00</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>11/*</td>
<td>Super Cam</td>
<td>73-2739-03</td>
<td>11</td>
<td>MIC0238003C</td>
<td>Jan 00 00</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>11/0</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>00</td>
<td>03114868</td>
<td>Feb 24 96 00-00-00</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
</tbody>
</table>

.slot: 0/* Controller-Type : OCM Board
Part Number: 73-2852-05
Serial Number: mic0236002b
RMA Number: H/W Version: 1.0

.slot: 0/0 Controller-Type : quad622 Generic
Part Number: 73-2852-05
Serial Number: mic0236002b
RMA Number: H/W Version: 1.0

.slot: 2/* Controller-Type : Super Cam
Part Number: 07285959
Serial Number: mic0236002b
RMA Number: H/W Version: 1.0

.slot: 2/0 Controller-Type : Super Cam
Part Number: 07285959
Serial Number: 07285959
RMA Number: H/W Version: 3.0

.slot: 4/* Controller-Type : Route Proc
Part Number: 73-2644-05
Serial Number: mic0236005c
RMA Number: H/W Version: 5.1

.slot: 5/* Controller-Type : Switch Card
Part Number: 73-3315-07
Serial Number: MIC0239000D
RMA Number: H/W Version: 7.1

.slot: 7/* Controller-Type : Switch Card
Part Number: 73-3315-07
Serial Number: MIC0236003C
RMA Number: H/W Version: 7.1

.slot: 8/* Controller-Type : Route Proc
Part Number: 73-2644-05
Serial Number: mic0236005g
RMA Number: H/W Version: 5.1

.slot: 11/* Controller-Type : Super Cam
Part Number: 73-2739-03
Serial Number: MIC0238007E
RMA Number: H/W Version: 3.0

DS1201 Backplane EEPROM:
- Model: C8540
- Version: 2
- Serial: 6312897
- MAC-Address: 00107FC6F300
- MAC-Size: 1024
- RMA: 0
- RMA-Number: 0
- MFG-Date: Aug 21 1998

Examples

Catalyst 8510 MSR and LightStream 1010

The following example is sample output from the `show hardware` command for an ATM switch router.
Switch# `show hardware`

**LS1010 named Switch, Date: 12:27:09 UTC Tue Sep 30 1997**  
Feature Card's FPGA Download Version: 0

<table>
<thead>
<tr>
<th>Slot</th>
<th>Ctrlr-Type</th>
<th>Part No.</th>
<th>Rev</th>
<th>Ser No</th>
<th>Mfg Date</th>
<th>RMA No.</th>
<th>Hw Vrs</th>
<th>Tst EEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/0</td>
<td>155UTP PAM</td>
<td>73-1572-02</td>
<td>01</td>
<td>02749041</td>
<td>Jan 17 96</td>
<td>00-00-00</td>
<td>3.0</td>
<td>0 2</td>
</tr>
<tr>
<td>0/1</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>06</td>
<td>02180424</td>
<td>Jan 16 96</td>
<td>00-00-00</td>
<td>3.0</td>
<td>0 2</td>
</tr>
<tr>
<td>1/0</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>06</td>
<td>02180444</td>
<td>Jan 17 96</td>
<td>00-00-00</td>
<td>3.0</td>
<td>0 2</td>
</tr>
<tr>
<td>1/1</td>
<td>155MM PAM</td>
<td>73-1496-03</td>
<td>06</td>
<td>02202228</td>
<td>Jan 11 96</td>
<td>00-00-00</td>
<td>3.0</td>
<td>0 2</td>
</tr>
<tr>
<td>3/0</td>
<td>CE-T1 PAM</td>
<td>73-2176-02</td>
<td>A0</td>
<td>03669320</td>
<td>Feb 15 97</td>
<td>00-00-00</td>
<td>1.0</td>
<td>0 2</td>
</tr>
<tr>
<td>3/1</td>
<td>QUAD DS3 PAM</td>
<td>73-2197-02</td>
<td>A0</td>
<td>03816513</td>
<td>Jan 30 97</td>
<td>00-00-00</td>
<td>2.0</td>
<td>0 2</td>
</tr>
<tr>
<td>2/0</td>
<td>ATM Swi/Proc</td>
<td>73-1402-06</td>
<td>C2</td>
<td>05426230</td>
<td>Sep 23 97</td>
<td>00-00-00</td>
<td>4.0</td>
<td>0 2</td>
</tr>
<tr>
<td>2/1</td>
<td>FC-PFQ</td>
<td>73-2281-04</td>
<td>01</td>
<td>04845638</td>
<td>Sep 17 97</td>
<td>00-00-00</td>
<td>4.0</td>
<td>0 2</td>
</tr>
</tbody>
</table>

**DS1201 Backplane EEPROM:**  
Model Ver. Serial MAC-Address MAC-Size RMA RMA-Number MFG-Date

<table>
<thead>
<tr>
<th>Model</th>
<th>Ver.</th>
<th>Serial</th>
<th>MAC-Address</th>
<th>MAC-Size</th>
<th>RMA</th>
<th>RMA-Number</th>
<th>MFG-Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNKNOWN</td>
<td>255</td>
<td>-1</td>
<td>FFFFFFFF</td>
<td>65535</td>
<td>255</td>
<td>16777215</td>
<td><code>Vv8</code>x<code>\</code>V<code>u </code>V` 255 65535</td>
</tr>
</tbody>
</table>
show history

To list the commands you have entered in the current EXEC session, use the `show history` EXEC command.

```
show history
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The command history feature provides a record of EXEC commands you have entered. Table 18-30 lists the keys and functions you can use to recall commands from the command history buffer.

**Table 18-30 History Keys**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrl-P or Up arrow</td>
<td>Recalls commands in the history buffer in a backward sequence, beginning with the most recent command. Repeat the key sequence to recall successively older commands.</td>
</tr>
<tr>
<td>Ctrl-N or Down arrow</td>
<td>Returns to more recent commands in the history buffer after recalling commands with Ctrl-P or the Up arrow. Repeat the key sequence to recall successively more recent commands.</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show history` command, which lists the commands the user has entered in EXEC mode for this session.

```
Switch# show history
   help
   where
   show hosts
   show history
```

**Related Commands**

None
show hosts

To display the default domain name, the style of the name lookup service, a list of name server hosts, and the cached list of host names and addresses, use the show hosts EXEC command.

```
show hosts hostname
```

**Syntax Description**

- `hostname` Specifies the host name of the server to display.

**Command Modes**

- EXEC

**Command History**

- Release: 11.1(4)
- Modification: New command

**Examples**

The following example is sample output from the `show hosts` command.

```
Switch# show hosts
Default domain is CISCO.COM
Name/address lookup uses domain service
Name servers are 255.255.255.255

<table>
<thead>
<tr>
<th>Host</th>
<th>Flag</th>
<th>Age</th>
<th>Type</th>
<th>Address(es)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLAG.CISCO.COM</td>
<td>(temp, OK)</td>
<td>1</td>
<td>IP</td>
<td>131.108.4.10</td>
</tr>
<tr>
<td>CHAR.CISCO.COM</td>
<td>(temp, OK)</td>
<td>8</td>
<td>IP</td>
<td>192.31.7.50</td>
</tr>
<tr>
<td>CHAOS.CISCO.COM</td>
<td>(temp, OK)</td>
<td>8</td>
<td>IP</td>
<td>131.108.1.115</td>
</tr>
<tr>
<td>DIRT.CISCO.COM</td>
<td>(temp, EX)</td>
<td>8</td>
<td>IP</td>
<td>131.108.1.111</td>
</tr>
<tr>
<td>DUSTBIN.CISCO.COM</td>
<td>(temp, EX)</td>
<td>0</td>
<td>IP</td>
<td>131.108.1.27</td>
</tr>
<tr>
<td>DREGS.CISCO.COM</td>
<td>(temp, EX)</td>
<td>24</td>
<td>IP</td>
<td>131.108.1.30</td>
</tr>
</tbody>
</table>
```

Table 18-31 describes the significant fields shown in the display.

**Table 18-31 show hosts Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flag</td>
<td>Indicates a temporary entry is entered by a name server; the switch removes the entry after 72 hours of inactivity. An entry marked perm is entered by a configuration command and is not timed out. Entries marked OK are considered valid. Entries with question marks (??) are suspect and subject to revalidation. Entries marked EX are expired.</td>
</tr>
<tr>
<td>Age</td>
<td>Indicates the number of hours since the switch last referred to the cache entry.</td>
</tr>
<tr>
<td>Type</td>
<td>Identifies the type of address, for example, IP, CLNS, or X.121. If you have used the <code>ip hp-host</code> global configuration command, the show hosts command displays these host names as type HP-IP.</td>
</tr>
<tr>
<td>Address(es)</td>
<td>Shows the address of the host. One host may have up to eight addresses.</td>
</tr>
</tbody>
</table>

**Related Commands**
### Command Reference: show hosts

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear host</td>
<td>Deletes entries from the host-name-and-address cache.</td>
</tr>
</tbody>
</table>
**show ima interface**

To display the IMA interface, IMA group, and ATM layer hardware configuration, use the `show ima interface` EXEC command.

```
show ima interface [{atm | atm-p} {card/subcard/port | card/subcard/imagroup} [detailed]]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>atm</code></td>
<td>Specifies an ATM interface.</td>
</tr>
<tr>
<td><code>atm-p</code></td>
<td>Specifies an ATM-P interface.</td>
</tr>
<tr>
<td><code>card/subcard/port</code></td>
<td>Specifies the card, subcard, and port number for the ATM or ATM-P interface.</td>
</tr>
<tr>
<td><code>card/subcard/imagroup</code></td>
<td>Specifies the card, subcard, and IMA group number (0 to 3) for the ATM interface.</td>
</tr>
<tr>
<td><code>detailed</code></td>
<td>Displays more detailed information; must be the last keyword of the command.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command. Originally <code>show ima interface</code> (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `show ima interface` command has two specific display types, the IMA group information display and the IMA port adapter hardware information display.

The IMA group ATM layer information display is shown using the `ima` keyword and IMA group number instead of the port number in the hardware interface description.

*Note*

If no ATM keyword is entered, the `show ima interface` command displays all IMA interfaces that are present in the system.

*Note*

This command is only supported on systems equipped with FC-PFQ.

**Examples**

The following example shows how to use the `show ima interface` command with no interface variables to display the ATM layer information for all IMA groups in tabular mode.

```
Switch# show ima interface
ATM0/0/ima1 is up
  Group Index = 1
  State: NearEnd = operational, FarEnd = operational
  FailureStatus = noFailure
  IMA Group Current Configuration:
    MinNumTxLinks = 2    MinNumRxLinks = 2
```
The following example shows how to use the `show ima interface` command to display the ATM layer information for a specific IMA group in tabular mode.

```
Switch# show ima interface atm 0/0/ima1
ATM0/0/ima1 is up
Group Index  = 1
  State: NearEnd = operational, FarEnd = operational
  FailureStatus = noFailure
IMA Group Current Configuration:
  MinNumTxLinks = 2  MinNumRxLinks = 2
  DiffDelayMax  = 25  FrameLength   = 128
  NeTxClkMode   = common(ctc)  CTC_Reference_Link = ATM0/0/0
  TestLink      = 0    TestPattern   = 0
  TestProcStatus     = operating  GTSM change timestamp = 990618150733
IMA Link Information:

<table>
<thead>
<tr>
<th>Link</th>
<th>Physical Status</th>
<th>NearEnd Rx Status</th>
<th>Test Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/0/0</td>
<td>up</td>
<td>active</td>
<td>operating</td>
</tr>
<tr>
<td>ATM0/0/1</td>
<td>up</td>
<td>active</td>
<td>operating</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>up</td>
<td>active</td>
<td>operating</td>
</tr>
</tbody>
</table>
```

The following example shows how to use the `show ima interface` command to display the ATM layer information for the IMA group in detailed mode.

```
Switch# show ima interface atm 0/0/ima1 detailed
ATM0/0/ima1 is up
Group Index  = 1
  State: NearEnd = operational, FarEnd = operational
  FailureStatus = noFailure
IMA Group Current Configuration:
  MinNumTxLinks = 2  MinNumRxLinks = 2
  DiffDelayMax  = 25  FrameLength   = 128
  NeTxClkMode   = common(ctc)  CTC_Reference_Link = ATM0/0/0
  TestLink      = 0    TestPattern   = 0
  TestProcStatus     = operating  GTSM change timestamp = 990618150733
Detailed group Information:
  Symmetry        = symmetricOperation
  FeTxClkMode     = common(ctc)
  RxFrameLength   = 128
  TxTimingRefLink = 0    RxTimingRefLink = 2
  TxImaId         = 1    RxImaId      = 1
  NumTxCfgLinks   = 3    NumRxCfgLinks = 3
  NumTxActLinks   = 3    NumRxActLinks = 3
  LeastDelayLink  = 2    DiffDelayMaxObs = 0
Group counters:
  NeNumFailures   = 1  FeNumFailures   = 1
  UnAvailSecs     = 2  RunningSecs     = 345032
IMA Detailed Link Information:
ATM0/0/0 is up
```
RowStatus = active
IfIndex = 5  GroupIndex = 1
State:
    NeTx = active  NeRx = active
    FeTx = active  FeRx = active
FailureStatus:
    NeRx = noFailure  FeRx = noFailure
    TxLid = 0  RxLid = 2
    RxTestPattern = 64  TestProcStatus = operating
    RelativeDelay = 0
IMA Link counters:
    ImaViolations = 1
    NeSevErroredSecs = 1  FeSevErroredSecs = 1
    NeUnavailSecs = 0  FeUnavailSecs = 0
    NeTxUnusableSecs = 2  NeRxUnusableSecs = 1
    FeTxUnusableSecs = 2  FeRxUnusableSecs = 2
    NeTxNumFailures = 0  NeRxNumFailures = 0
    FeTxNumFailures = 0  FeRxNumFailures = 0
ATM0/0/1 is up
RowStatus = active
IfIndex = 6  GroupIndex = 1
State:
    NeTx = active  NeRx = active
    FeTx = active  FeRx = active
FailureStatus:
    NeRx = noFailure  FeRx = noFailure
    TxLid = 1  RxLid = 3
    RxTestPattern = 64  TestProcStatus = operating
    RelativeDelay = 2
IMA Link counters:
    ImaViolations = 1
    NeSevErroredSecs = 1  FeSevErroredSecs = 1
    NeUnavailSecs = 0  FeUnavailSecs = 0
    NeTxUnusableSecs = 1  NeRxUnusableSecs = 1
    FeTxUnusableSecs = 1  FeRxUnusableSecs = 1
    NeTxNumFailures = 0  NeRxNumFailures = 0
    FeTxNumFailures = 0  FeRxNumFailures = 0
ATM0/0/2 is up
RowStatus = active
IfIndex = 7  GroupIndex = 1
State:
    NeTx = active  NeRx = active
    FeTx = active  FeRx = active
FailureStatus:
    NeRx = noFailure  FeRx = noFailure
    TxLid = 2  RxLid = 4
    RxTestPattern = 64  TestProcStatus = operating
    RelativeDelay = 0
IMA Link counters:
    ImaViolations = 1
    NeSevErroredSecs = 1  FeSevErroredSecs = 1
    NeUnavailSecs = 0  FeUnavailSecs = 0
    NeTxUnusableSecs = 2  NeRxUnusableSecs = 2
    FeTxUnusableSecs = 1  FeRxUnusableSecs = 1
    NeTxNumFailures = 0  NeRxNumFailures = 0
    FeTxNumFailures = 0  FeRxNumFailures = 0

**Examples**

The following example shows how to use the `show ima interface` command to display the specific ATM interface hardware configuration in **detailed** mode.

```
Switch# show ima interface atm 0/0/0 detailed
ATM0/0/0 is up
```
The following example shows how to use the `show ima interface` command to display the specific ATM interface hardware configuration.

```
Switch# show ima interface atm 0/0/0
ATM0/0/0 is up
RowStatus = active
    IfIndex   = 5           GroupIndex = 1
State:                           
    NeTx = active   NeRx = active
    FeTx = active   FeRx = active
FailureStatus:                  
    NeRx = noFailure        FeRx = noFailure
    TxLid            = 0    RxLid           = 2
    RxTestPattern    = 64   TestProcStatus   = operating
    RelativeDelay    = 0
IMA Link counters :             
    ImaViolations    = 1
    NeSevErroredSecs = 1    FeSevErroredSecs = 1
    NeUnavailSecs    = 0    FeUnAvailSecs     = 0
    NeTxUnusableSecs = 2    NeRxUnusableSecs = 1
    FeTxUnusableSecs = 0    FeRxUnusableSecs = 2
    NeTxNumFailures  = 0    NeRxNumFailures  = 0
    FeTxNumFailures  = 0    FeRxNumFailures  = 0
```

Table 18-32 describes some key fields in the `show ima interface` command displays.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MinNumTxLinks</td>
<td>Minimum number of transmit links configured for the IMA group to function.</td>
</tr>
<tr>
<td>MinNumRxLinks</td>
<td>Minimum number of receive links configured for the IMA group to function.</td>
</tr>
<tr>
<td>DiffDelayMax</td>
<td>Maximum differential delay configured for the IMA group.</td>
</tr>
<tr>
<td>FrameLength</td>
<td>Frame length configured for the IMA group.</td>
</tr>
<tr>
<td>NeTxClkMode</td>
<td>Near-end transmit clock mode configured for the IMA group.</td>
</tr>
<tr>
<td>TestProcStatus</td>
<td>Test procedure status configured for the IMA group.</td>
</tr>
</tbody>
</table>
## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm interface</code></td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td><code>show interfaces</code></td>
<td>Displays the interface configuration, status, and statistics.</td>
</tr>
</tbody>
</table>
show interfaces

To display the interface configuration, status, and statistics, use the `show interfaces` command.

```
show interfaces {type [card/subcard/port[:cgn] | card/subcard/ima group]}
```

**Syntax Description**

- **type** Specifies one of the interface types listed in Table 18-32.
- **card/subcard/port** Specifies the card, subcard, and port number of the ATM, ATM-P, CBR, or Ethernet interface.
- **:cgn** Specifies the channel-group number (identifier).
- **card/subcard/ima group** Specifies the card, subcard, and IMA group number of the ATM interface.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
</table>

**Usage Guidelines**

Table 18-33 shows the interface types for the `show interfaces EXEC` command.

**Table 18-33 Interface Types for the show interfaces Command**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>accounting</td>
<td>Shows the ATM accounting interface information.</td>
</tr>
<tr>
<td>atm</td>
<td>Specifies the ATM interface.</td>
</tr>
<tr>
<td>atm-p</td>
<td>Specifies the ATM pseudo interface.</td>
</tr>
<tr>
<td>cbr</td>
<td>Specifies the CBR interface.</td>
</tr>
<tr>
<td>ethernet</td>
<td>Specifies the main Ethernet interface (0).</td>
</tr>
<tr>
<td>serial</td>
<td>Specifies a serial interface, such as a channelized Frame Relay interface.</td>
</tr>
</tbody>
</table>

At Cisco, implementation of Frame Relay supports the following three LMI types: Cisco, ANSI Annex D, and ITU-T Q.933 Annex A. The LMI type is set per interface and is shown in the output of the `show interfaces` command. The default LMI type is Cisco.

**Examples**

The following is sample output from the `show interfaces` command. In this example, CRC is the number of correctable and uncorrectable input HCS errors.

```
Input and output packets are the number of terminated cells received or transmitted over the interface for physical ports. For the route processor port, the number represents AAL5 packets plus the terminating OAM cells received or transmitted.
```

```
Switch# show interfaces
```
Main-ATM0 is up, line protocol is up
  Hardware is ATMS2000 switch fabric
  Internet address is 1.2.2.2 255.0.0.0
  MTU 4470 bytes, BW 1000000 Kbit, DLY 0 usec, rely 255/255, load 1/255
  NSAP address: 47.00918100000000000CA7CE01.0003B8422A06.00
  Encapsulation ATM, loopback not set, keepalive not set
  Encapsulation(s):
  2048 maximum active VCs, 0 VCs per VP, 0 current VCCs
  VC idle disconnect time: 300 seconds
  Signalling vc = 32, vpi = 0, vci = 5
  UNI Version = 3.0, Link Side = user
  Last input 0:00:02, output 0:00:02, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Output queue: 0/64/0 (size/threshold/drops)
  Conversations 0/0 (active/max active)
  Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
  8977 packets input, 566317 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  8981 packets output, 475993 bytes, 0 underruns
  5 output errors, 0 collisions, 0 interface resets, 0 restarts
  0 output buffer failures, 0 output buffers swapped out
Ethernet0 is up, line protocol is up
  Hardware is SonicT, address is 0002.bbe4.2a00 (bia 0002.bbe4.2a00)
  Internet address is 172.20.40.43 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:03, output 0:00:04, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 2000 bits/sec, 2 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
  70468 packets input, 29650832 bytes, 0 no buffer
  Received 70458 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  0 input packets with dribble condition detected
  1140 packets output, 359630 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets, 0 restarts
  0 output buffer failures, 0 output buffers swapped out
Table 18-34 lists the keyword field descriptions for the `show interfaces` command.

### Table 18-34 show interfaces serial Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTU</td>
<td>Number of maximum transmission units.</td>
</tr>
<tr>
<td>BW</td>
<td>Number of bandwidth (kbps).</td>
</tr>
<tr>
<td>Dly</td>
<td>Number of station delay parameter (used by IGRP).</td>
</tr>
<tr>
<td>relay</td>
<td>Number of reliability coefficient.</td>
</tr>
<tr>
<td>load</td>
<td>Number of load (IGRP).</td>
</tr>
<tr>
<td>last input</td>
<td>Amount of time since last input in the following format: hh:mm:ss.</td>
</tr>
<tr>
<td>last output</td>
<td>Amount of time since last output in the following format: hh:mm:ss.</td>
</tr>
<tr>
<td>output hang</td>
<td>Time of last reset for output failure.</td>
</tr>
<tr>
<td>output queue</td>
<td>Size of output queue or default size of queue.</td>
</tr>
<tr>
<td>drops</td>
<td>Number of all output drops.</td>
</tr>
<tr>
<td>packets input</td>
<td>Number of all packets received since last reset.</td>
</tr>
<tr>
<td>bytes</td>
<td>Number of all bytes received since last reset.</td>
</tr>
<tr>
<td>no buffers</td>
<td>Number of all drops because of no buffers.</td>
</tr>
<tr>
<td>broadcasts, runts, giants</td>
<td>Not applicable if this is an ATM interface.</td>
</tr>
<tr>
<td>input errors</td>
<td>Number of damaged packets received.</td>
</tr>
<tr>
<td>crc</td>
<td>Number of packets received with correctable and uncorrectable input HCS errors.</td>
</tr>
<tr>
<td>frame</td>
<td>Number of packets with framing and alignment errors.</td>
</tr>
<tr>
<td>overrun, ignored, abort</td>
<td>Not applicable if this is an ATM interface.</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show interfaces serial` command for a serial interface with Cisco LMI enabled.

```
Switch# show interfaces serial 0/1/0:5
Serial0/1/0:5 is up, line protocol is up
Hardware is FRPAM-SERIAL
  MTU 4096 bytes, BW 1536 Kbit, DLY 0 usec, rely 229/255, load 14/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive set (10 sec)
  LMI enq sent 0, LMI stat recv 0, LMI upd recv 0
  LMI enq recv 8010, LMI stat sent 8010, LMI upd sent 0, DCE LMI up
  LMI DLCI 1023 LMI type is CISCO frame relay DCE
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
    Conversations 0/1 (active/max active)
    Reserved Conversations 0/0 (allocated/max allocated)
    5 minute input rate 67000 bits/sec, 786 packets/sec
    5 minute output rate 85000 bits/sec, 786 packets/sec
    32556459 packets input, 421648869 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    690040 input errors, 425237 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    32130599 packets output, 466708295 bytes, 36921560 underruns
```
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ATM and Layer 3 Switch Router Command Reference

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show interfaces

3094283652 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
28 carrier transitions
Timeslots(s) Used: 1-24 on T1 5
Frames Received with:
  DE set: 0, FECN set :4294879164, BECN set: 0
Frames Tagged :
  DE: 0, FECN: 615698146 BECN: 0
Frames Discarded Due to Alignment Error: 0
Frames Discarded Due to Illegal Length: 0
Frames Received with unknown DLCI: 0
Frames with illegal Header : 0
Transmit Frames with FECN set :0, BECN Set :0
Transmit Frames Tagged FECN : 3463814532 BECN : 3469839556
Transmit Frames Discarded due to No buffers : 0

Examples

The following is sample output from the show interfaces atm command for an IMA group interface.

Switch# show interfaces atm 0/0/ima1
ATM0/0/ima1 is up, line protocol is up
  Hardware is imapam_t1_ima
  MTU 4470 bytes, sub MTU 4470, BW 1500 Kbit, DLY 0 usec, rely 255/255, load 1/2
  Encapsulation ATM, loopback not set, keepalive not supported
  Last input 00:00:01, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: weighted fair
  Output queue: 0/100/0 (size/max total/threshold/drops)
    Conversations 0/0/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    16253 packets input, 861409 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    16168 packets output, 856904 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
</tbody>
</table>
show ip access-lists

To display the contents of all current IP access lists, use the `show ip access-list` EXEC command.

```
show ip access-list [access-list-number \ access-list-name]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list-number</td>
<td>Number of the IP access list to display. This is a decimal number from 1 to 199.</td>
</tr>
<tr>
<td>access-list-name</td>
<td>Name of the IP access list to display.</td>
</tr>
</tbody>
</table>

**Defaults**

Displays all standard and extended IP access lists.

**Command Modes**

EXEC

**Usage Guidelines**

The `show ip access-list` command provides output identical to the `show access-lists` command, except that it is IP-specific and allows you to specify a particular access list.

**Examples**

The following example is sample output from the `show ip access-list` command.

```
Switch# show ip access-list
Extended IP access list 101
  deny udp any any eq ntp
  permit tcp any any
  permit udp any any eq tftp
  permit icmp any any
  permit udp any any eq domain
```
show ip accounting

To display the active accounting or checkpointed database or to display access-list violations, use the show ip accounting EXEC command.

```
show ip accounting [access-violations | checkpoint | output-packets]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-violations</td>
<td>Shows the access violation in the accounting database.</td>
</tr>
<tr>
<td>checkpoint</td>
<td>Displays the checkpointed database.</td>
</tr>
<tr>
<td>output-packets</td>
<td>Displays information pertaining to packets that passed access control and were successfully routed.</td>
</tr>
</tbody>
</table>

### Defaults

If neither the output-packets nor access-violations keywords are specified, show ip accounting displays information pertaining to packets that passed access control and were successfully routed.

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

If you do not specify any keywords, the show ip accounting command displays information about the active accounting database.

To display IP access violations, use the access-violations keyword with the command. If you do not specify the keyword, the command defaults to displaying the number of packets that have passed access lists and were routed.

To use the show ip accounting command, you must first enable ip accounting mode on a per-interface basis.

### Examples

The following example is sample output from the show ip accounting command.

```
Switch# show ip accounting

Source           Destination              Packets               Bytes
131.108.19.40    192.67.67.20                     7                 306
131.108.13.55    192.67.67.20                    67                2749
131.108.2.50     192.12.33.51                    17                1111
131.108.2.50     130.93.2.1                     5                 319
131.108.2.50     130.93.1.2                     463               30991
131.108.19.40    130.93.2.1                     4                 262
131.108.19.40    130.93.1.2                     28                2552
131.108.13.55    130.93.1.2                     35                3020
131.108.19.40    192.12.33.51                  1986               95091
131.108.2.50     192.67.67.20                   233               14908
131.108.13.28    192.67.67.53                   390               24817
```
The following example is sample output from the `show ip accounting access-violations` command. The output pertains to packets that failed access lists and were not switched.

```
Switch# show ip accounting access-violations
```

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
<th>Packets</th>
<th>Bytes</th>
<th>ACL</th>
</tr>
</thead>
<tbody>
<tr>
<td>131.108.19.40</td>
<td>192.67.67.20</td>
<td>7</td>
<td>306</td>
<td>77</td>
</tr>
<tr>
<td>131.108.13.55</td>
<td>192.67.67.20</td>
<td>67</td>
<td>2749</td>
<td>185</td>
</tr>
<tr>
<td>131.108.2.50</td>
<td>192.12.33.51</td>
<td>17</td>
<td>1111</td>
<td>140</td>
</tr>
<tr>
<td>131.108.2.50</td>
<td>130.93.2.1</td>
<td>5</td>
<td>319</td>
<td>140</td>
</tr>
<tr>
<td>131.108.19.40</td>
<td>130.93.2.1</td>
<td>4</td>
<td>262</td>
<td>77</td>
</tr>
</tbody>
</table>

Accounting data age is 41

Table 18-35 describes the fields shown in the displays.

**Table 18-35 show ip accounting (and access-violations) Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Source address of the packet.</td>
</tr>
<tr>
<td>Destination</td>
<td>Destination address of the packet.</td>
</tr>
<tr>
<td>Packets</td>
<td>Number of packets transmitted from the source address to the destination address.</td>
</tr>
<tr>
<td></td>
<td>With the <code>access-violations</code> keyword, the number of packets transmitted from the source address to the destination address that violated an access control list.</td>
</tr>
<tr>
<td>Bytes</td>
<td>Sum of the total number of bytes (IP header and data) of all IP packets transmitted from the source address to the destination address.</td>
</tr>
<tr>
<td></td>
<td>With the <code>access-violations</code> keyword, the total number of bytes transmitted from the source address to the destination address that violated an access-control list.</td>
</tr>
<tr>
<td>ACL</td>
<td>Number of the access list of the last packet transmitted from the source to the destination that failed an access list filter.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear ip accounting</td>
<td>Deletes the cache table entries; however, this command or some of its parameters might not function as expected.</td>
</tr>
<tr>
<td>alias</td>
<td>This command or some of its parameters might not function as expected.</td>
</tr>
</tbody>
</table>
show ip aliases

To display the switch’s IP addresses mapped to TCP ports (aliases) and SLIP addresses, which are treated similarly to aliases, use the show ip aliases EXEC command.

```
show ip aliases
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

**Catalyst 8510 MSR and LightStream 1010**

To distinguish a SLIP address from a normal alias address, the command output uses the form SLIP TTY1 for the port number, where 1 is the auxiliary port.

**Examples**

**Catalyst 8540 MSR**

The following example is sample output from the show ip aliases command. The display lists the IP address and corresponding port number.

```
Switch# show ip aliases
IP Address  Port
131.108.29.245
```

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the show ip aliases command. The output lists the IP address and corresponding port number.

```
Switch# show ip aliases
IP Address  Port
131.108.29.245  SLIP TTY1
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show line</td>
<td>Displays terminal line parameters.</td>
</tr>
</tbody>
</table>
show ip arp

To display the ARP cache, where SLIP addresses appear as permanent ARP table entries, use the show ip arp EXEC command.

```
show ip arp [interface-type card/subcard/port | hostname | mac-addr]
```

**Syntax Description**

- `interface-type`: Specifies an interface type as `atm`, `atm-p`, `cbr`, `ethernet`, or `null`.
- `card/subcard/port`: Identifies the interface specified in `interface-type`.
- `hostname`: Specifies the IP address or host name of the ARP entry.
- `mac-addr`: Specifies the 48-bit hardware address of the ARP entry.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

ARP establishes correspondences between network addresses (an IP address, for example) and LAN hardware addresses (Ethernet addresses). A record of each correspondence is kept in a cache for a predetermined amount of time and then discarded.

**Examples**

The following example is sample output from the show ip arp command.

```
Switch# show ip arp
Protocol Address  Age (min)  Hardware Addr  Type  Interface
Internet 171.69.193.21  112  VCD#0000  ARPA  Ethernet0
Internet 172.20.40.43  -  0002.bbe4.2a00  ARPA  Ethernet0
```

Table 18-36 describes the significant fields shown in the display.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Protocol for the network address in the Address field.</td>
</tr>
<tr>
<td>Address</td>
<td>The network address that corresponds to the Hardware Addr.</td>
</tr>
<tr>
<td>Age (min)</td>
<td>Age, in minutes, of the cache entry.</td>
</tr>
<tr>
<td>Hardware Addr</td>
<td>LAN hardware address of a MAC address that corresponds to the network address</td>
</tr>
</tbody>
</table>

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### Table 18-36  `show ip arp` Field Displays (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type of encapsulation:</td>
</tr>
<tr>
<td></td>
<td>ARPA—Ethernet</td>
</tr>
<tr>
<td></td>
<td>SNAP—RFC 1042</td>
</tr>
<tr>
<td></td>
<td>SAP—IEEE 802.3</td>
</tr>
<tr>
<td>Interface</td>
<td>Interface to which this address mapping is assigned.</td>
</tr>
</tbody>
</table>
show ip interface

To display the usability status of interfaces configured for IP, use the `show ip interface` EXEC command.

```
show ip interface [interface-type | card/subcard/port] [brief]
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>interface-type</strong></td>
<td>Specifies an interface type as atm, atm-p, cbr, ethernet, null, serial, or tunnel.</td>
</tr>
<tr>
<td><strong>card/subcard/port</strong></td>
<td>Card, subcard, and port number for the specified interface type.</td>
</tr>
<tr>
<td><strong>brief</strong></td>
<td>Displays a brief summary of IP status and configuration for all interfaces.</td>
</tr>
</tbody>
</table>

**Command Modes**

- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

A switch automatically enters a directly connected route in the routing table if the interface is usable. A usable interface is one through which the switch can send and receive packets. If the switch determines that an interface is not usable, it removes the directly connected routing entry from the routing table. Removing the entry allows the switch to use dynamic routing protocols to determine backup routes to the network (if any).

If the interface can provide two-way communication, the line protocol is marked “up.” If the interface hardware is usable, the interface is marked “up.”

If you specify an optional interface type, you will see only information on that specific interface.

If you specify no optional arguments, you will see information on all the interfaces.

**Examples**

The following example is sample output from the `show ip interface` command.

```
Switch# show ip interface

Ethernet0 is up, line protocol is up
  Internet address is 192.195.78.24, subnet mask is 255.255.255.240
  Broadcast address is 255.255.255.255
  Address determined by non-volatile memory
  MTU is 1500 bytes
  Helper address is not set
  Secondary address 131.192.115.2, subnet mask 255.255.255.0
  Directed broadcast forwarding is enabled
  Multicast groups joined: 224.0.0.1 224.0.0.2
  Outgoing access list is not set
  Inbound access list is not set
  Proxy ARP is enabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
```
ICMP mask replies are never sent
IP fast switching is enabled
IP fast switching on the same interface is disabled
IP SSE switching is disabled
Router Discovery is disabled
IP output packet accounting is disabled
IP access violation accounting is disabled
TCP/IP header compression is disabled
Probe proxy name replies are disabled

Table 18-37 describes the fields shown in the display.

Table 18-37 show ip interface Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet 0 is up</td>
<td>Shows the interface is “up” if the interface hardware is usable, the interface is marked “up.” For an interface to be usable, both the interface hardware and line protocol must be up.</td>
</tr>
<tr>
<td>line protocol is up</td>
<td>Shows the line protocol is “up” if the interface can provide two-way communication, the line protocol is marked “up.” For an interface to be usable, both the interface hardware and line protocol must be up.</td>
</tr>
<tr>
<td>Broadcast address</td>
<td>Shows the broadcast address.</td>
</tr>
<tr>
<td>Address determined by ...</td>
<td>Indicates how the IP address of the interface was determined.</td>
</tr>
<tr>
<td>MTU</td>
<td>Shows the MTU value set on the interface.</td>
</tr>
<tr>
<td>Helper address</td>
<td>Shows a helper address if one has been set.</td>
</tr>
<tr>
<td>Secondary address</td>
<td>Shows a secondary address if one has been set.</td>
</tr>
<tr>
<td>Directed broadcast forwarding</td>
<td>Indicates whether directed broadcast forwarding is enabled.</td>
</tr>
<tr>
<td>Multicast groups joined</td>
<td>Lists the multicast groups in which this interface is a member.</td>
</tr>
<tr>
<td>Outgoing access list</td>
<td>Indicates whether the interface has an outgoing access list set.</td>
</tr>
<tr>
<td>Inbound access list</td>
<td>Indicates whether the interface has an incoming access list set.</td>
</tr>
<tr>
<td>Proxy ARP</td>
<td>Indicates whether Proxy ARP is enabled for the interface.</td>
</tr>
<tr>
<td>Security level</td>
<td>Specifies the IPSO security level set for this interface.</td>
</tr>
<tr>
<td>ICMP redirects</td>
<td>Specifies whether redirects are sent on this interface.</td>
</tr>
<tr>
<td>ICMP unreachables</td>
<td>Specifies whether unreachable messages are sent on this interface.</td>
</tr>
<tr>
<td>ICMP mask replies</td>
<td>Specifies whether mask replies are sent on this interface.</td>
</tr>
<tr>
<td>IP fast switching</td>
<td>Specifies whether fast switching is enabled for this interface.</td>
</tr>
<tr>
<td>IP SSE switching</td>
<td>Specifies whether IP SSE switching is enabled.</td>
</tr>
<tr>
<td>Router Discovery</td>
<td>Specifies whether the discovery process has been enabled for this interface.</td>
</tr>
<tr>
<td>IP output packet accounting</td>
<td>Specifies whether IP accounting is enabled for this interface and the threshold (maximum number of entries).</td>
</tr>
</tbody>
</table>
### Table 18-37 show ip interface Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP/IP header compression</td>
<td>Indicates whether compression is enabled or disabled.</td>
</tr>
<tr>
<td>Probe proxy name</td>
<td>Indicates whether HP Probe proxy name replies are generated.</td>
</tr>
</tbody>
</table>


show ip masks

To display the masks used for network addresses and the number of subnets using each mask, use the `show ip masks` EXEC command.

```
show ip masks ip-address
```

**Syntax Description**

+ `ip-address` : Network address for which a mask is required.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `show ip masks` command is useful for debugging when variable-length subnet masks are used. It shows the number of masks associated with the network and the number of routes for each mask.

**Examples**

The following example is sample output from the `show ip masks` command.

```
Switch# show ip masks 131.108.0.0

<table>
<thead>
<tr>
<th>Mask</th>
<th>Reference count</th>
</tr>
</thead>
<tbody>
<tr>
<td>255.255.255.255</td>
<td>2</td>
</tr>
<tr>
<td>255.255.255.0</td>
<td>3</td>
</tr>
<tr>
<td>255.255.0.0</td>
<td>1</td>
</tr>
</tbody>
</table>
```
show ip redirects

To display the address of a default gateway and the address of hosts for which a redirect has been received, use the **show ip redirects** EXEC command.

```
show ip redirects [ip-address]
```

**Syntax Description**

- **ip-address**  IP address of network to display.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show ip redirects** command.

```
Switch# show ip redirects

Default gateway is 160.89.80.29

<table>
<thead>
<tr>
<th>Host</th>
<th>Gateway</th>
<th>Last Use</th>
<th>Total Uses</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>131.108.1.111</td>
<td>160.89.80.240</td>
<td>0:00</td>
<td>9</td>
<td>Ethernet0</td>
</tr>
<tr>
<td>128.95.1.4</td>
<td>160.89.80.240</td>
<td>0:00</td>
<td>4</td>
<td>Ethernet0</td>
</tr>
</tbody>
</table>
```

**Related Commands**

- **ip route** Establishes static routes.
show ip route summary

To display summary information about entries in the routing table, use the `show ip route summary` EXEC command.

```
show ip route summary
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

```
Release          Modification
11.1(4)           New command
```

**Examples**

The following example is sample output from the `show ip route summary` command.

```
Switch# show ip route summary

<table>
<thead>
<tr>
<th>Route Source</th>
<th>Networks</th>
<th>Subnets</th>
<th>Overhead</th>
<th>Memory (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>connected</td>
<td>0</td>
<td>3</td>
<td>126</td>
<td>360</td>
</tr>
<tr>
<td>static</td>
<td>1</td>
<td>2</td>
<td>126</td>
<td>360</td>
</tr>
<tr>
<td>igrp 109</td>
<td>747</td>
<td>12</td>
<td>31878</td>
<td>91080</td>
</tr>
<tr>
<td>internal</td>
<td>3</td>
<td></td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>751</td>
<td>17</td>
<td>32130</td>
<td>92160</td>
</tr>
</tbody>
</table>
```

Table 18-38 describes the fields shown in the display.

**Table 18-38 show ip route summary Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Source</td>
<td>Routing protocol name, or connected, static, or internal. If internal, those routes that are in the primary routing table merely as markers to hold subnet routes. These routes are not owned by any routing protocol. There should be one of these internal routes for each subnetted network in the routing table.</td>
</tr>
<tr>
<td>Networks</td>
<td>The number of Class A, B, or C networks that are present in the routing table for each route source.</td>
</tr>
<tr>
<td>Subnets</td>
<td>The number of subnets that are present in the routing table for each route source, including host routes.</td>
</tr>
<tr>
<td>Overhead</td>
<td>Any additional memory involved in allocating the routes for the particular route source other than the memory specified under “Memory.”</td>
</tr>
<tr>
<td>Memory</td>
<td>The number of bytes allocated to maintain all the routes for the particular route source.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ip interface</td>
<td>Displays the usability status of interfaces configured for IP.</td>
</tr>
</tbody>
</table>
**show ip sockets**

To display current information about open IP sockets, use the `show ip sockets` EXEC command.

```
show ip sockets
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show ip sockets` EXEC command.

```
Switch# show ip sockets
Proto  Remote    Port   Local     Port   In Out Stat TTY OutputIF
17 0.0.0.0     0   --any--    67   0   0    1   0
17 0.0.0.0   123 172.20.40.93 123   0   0    1   0
17 0.0.0.0     0 172.20.40.93 161   0   0    1   0
```
**show ip ssh**

To display the SSH configuration, whether the SSH server is enabled, and the values of the SSH server parameters, use the `show ip ssh` privileged EXEC command.

`show ip ssh`

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You must enable the SSH server before using this command. If the SSH server is not enabled, this command will generate an error message.

**Examples**

The following example is sample output from the `show ip ssh` privileged EXEC command when the SSH server is enabled.

```
Switch# show ip ssh
SSH Enabled - version 1.5
Authentication timeout: 120 secs; Authentication retries: 3
```

The following example is sample output from the `show ip ssh` privileged EXEC command when the SSH server is disabled.

```
Switch# show ip ssh
SSH Disabled - version 1.5
%Please create RSA keys to enable SSH.
```
show ip tcp header-compression

To display statistics about TCP header compression, use the `show ip tcp header-compression` EXEC command.

```
show ip tcp header-compression [type]
```

**Syntax Description**

- `type` Displays the buffers assigned to an input interface. You must specify an `atm`, `atm-p`, `cbr`, `ethernet`, `null`, `serial`, or `tunnel` interface.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show ip tcp header-compression` command.

```
Switch# show ip tcp header-compression
TCP/IP header compression statistics:
Interface Aux 1: (passive, compressing)
  Rcvd:  4060 total, 2891 compressed, 0 errors
         0 dropped, 1 buffer copies, 0 buffer failures
  Sent:  4284 total, 3224 compressed, 105295 bytes saved, 661973 bytes sent
         1.15 efficiency improvement factor
  Connect: 16 slots, 1543 long searches, 2 misses, 99% hit ratio
         Five minute miss rate 0 misses/sec, 0 max misses/sec
```

Table 18-39 describes the significant fields shown in the display.

<table>
<thead>
<tr>
<th>Table 18-39 show ip tcp header-compression Field Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
</tr>
<tr>
<td>Rcvd: total</td>
</tr>
<tr>
<td>Rcvd: compressed</td>
</tr>
<tr>
<td>Rcvd: errors</td>
</tr>
<tr>
<td>Rcvd: dropped</td>
</tr>
<tr>
<td>Rcvd: buffer copies</td>
</tr>
<tr>
<td>Rcvd: buffer failures</td>
</tr>
<tr>
<td>Sent: total</td>
</tr>
<tr>
<td>Sent: compressed</td>
</tr>
</tbody>
</table>
### Table 18-39 `show ip tcp header-compression` Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bytes saved</td>
<td>Number of bytes reduced.</td>
</tr>
<tr>
<td>bytes sent</td>
<td>Number of bytes sent.</td>
</tr>
<tr>
<td>efficiency improvement factor</td>
<td>Improvement in line efficiency because of TCP header compression.</td>
</tr>
<tr>
<td>Connect:</td>
<td></td>
</tr>
<tr>
<td>number of slots</td>
<td>Size of the cache.</td>
</tr>
<tr>
<td>long searches</td>
<td>Number of times the software had to look to find a match.</td>
</tr>
<tr>
<td>misses</td>
<td>Number of times a match could not be made. If your output shows a large miss rate, the number of allowable simultaneous compression connections may be too small.</td>
</tr>
<tr>
<td>hit ratio</td>
<td>Percentage of times the software found a match and was able to compress the header.</td>
</tr>
<tr>
<td>Five minute miss rate</td>
<td>Calculates the miss-rate over the previous 5 minutes for a longer-term (and more accurate) look at miss rate trends.</td>
</tr>
<tr>
<td>max misses/sec</td>
<td>Maximum value of the previous field.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip tcp synwait-time</code></td>
<td>Sets a period of time that the switch waits while attempting to establish a TCP connection before it times out.</td>
</tr>
</tbody>
</table>
show ip traffic

To display statistics about IP traffic, use the **show ip traffic** EXEC command.

```
show ip traffic
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Examples**

The following example is sample output from the **show ip traffic** command.

```
Switch# show ip traffic

IP statistics:
   Rcvd: 98 total, 98 local destination
   0 format errors, 0 checksum errors, 0 bad hop count
   0 unknown protocol, 0 not a gateway
   0 security failures, 0 bad options
   Frags:0 reassembled, 0 timeouts, 0 too big
   0 fragmented, 0 couldn't fragment
   Bcast:38 received, 52 sent
   Sent: 44 generated, 0 forwarded
   0 encapsulation failed, 0 no route

ICMP statistics:
   Rcvd: 0 checksum errors, 0 redirects, 0 unreachable, 0 echo
   0 echo reply, 0 mask requests, 0 mask replies, 0 quench
   0 parameter, 0 timestamp, 0 info request, 0 other
   Sent: 0 redirects, 3 unreachable, 0 echo, 0 echo reply
   0 mask requests, 0 mask replies, 0 quench, 0 timestamp
   0 info reply, 0 time exceeded, 0 parameter problem

UDP statistics:
   Rcvd: 56 total, 0 checksum errors, 55 no port
   Sent: 18 total, 0 forwarded broadcasts

TCP statistics:
   Rcvd: 0 total, 0 checksum errors, 0 no port
   Sent: 0 total

EGP statistics:
   Rcvd: 0 total, 0 format errors, 0 checksum errors, 0 no listener
   Sent: 0 total

IGRP statistics:
   Rcvd: 73 total, 0 checksum errors
   Sent: 26 total

HELLO statistics:
   Rcvd: 0 total, 0 checksum errors
   Sent: 0 total

ARP statistics:
   Rcvd: 20 requests, 17 replies, 0 reverse, 0 other
   Sent: 0 requests, 9 replies (0 proxy), 0 reverse

Probe statistics:
```
Table 18-40 describes the significant fields shown in the display.

**Table 18-40 show ip traffic Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>format errors</td>
<td>A gross error in the packet format, such as an impossible Internet header length.</td>
</tr>
<tr>
<td>bad hop count</td>
<td>A packet is discarded because its TTL field was decremented to zero.</td>
</tr>
<tr>
<td>encapsulation failed</td>
<td>Indicates that the switch had no ARP request entry and therefore did not send a datagram.</td>
</tr>
<tr>
<td>no route</td>
<td>The switch discards a datagram that it did not know how to route.</td>
</tr>
<tr>
<td>proxy name reply</td>
<td>Counted when the switch sends an ARP or Probe Reply on behalf of another host. The display shows the number of probe proxy requests received and the number of responses sent.</td>
</tr>
</tbody>
</table>
show ipc

To display IPC information, use the show ipc command.

```
show ipc {nodes | ports [open] | queue | status} [ | {begin | exclude | include} expression]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>nodes</td>
<td>Shows participating nodes</td>
</tr>
<tr>
<td>ports</td>
<td>Shows local IPC ports.</td>
</tr>
<tr>
<td>open</td>
<td>Optional keyword used to display open ports only.</td>
</tr>
<tr>
<td>queue</td>
<td>Optional, shows the IPC retransmission queue.</td>
</tr>
<tr>
<td>status</td>
<td>Optional, shows status of local IPC server.</td>
</tr>
<tr>
<td>begin</td>
<td>Optional, orders the output display to begin with the line matching the expression variable.</td>
</tr>
<tr>
<td>exclude</td>
<td>Optional, orders the output display to exclude lines matching the expression variable.</td>
</tr>
<tr>
<td>include</td>
<td>Optional, orders the output display to include lines matching the expression variable.</td>
</tr>
<tr>
<td>expression</td>
<td>Specifies the expression in the output to use as a reference point.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(10)W5(18)</td>
<td>Introduced into this manual. Originally part of the Catalyst 6000 IOS command set.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows how to display participating nodes:

```
Switch# show ipc nodes
There are 3 nodes in this IPC realm.
  ID  Type       Name          Last Sent Last Heard
  10000 Local   IPC Master    0    0     0     0
  0 ATM-VC     Primary       0    0     0     0
  20000 ATM-VC Secondary    39   5483   5483   5483
```

The following example shows how to display local IPC ports:

```
Switch# show ipc ports
There are 15 ports defined.
```
### show ipc

The following example shows how to display open IPC ports:

```
Switch# show ipc ports open
There are 3 ports defined.
```

<table>
<thead>
<tr>
<th>Port ID</th>
<th>Type</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000.4</td>
<td>unicast</td>
<td>Secondary Services Port</td>
</tr>
<tr>
<td>10000.6</td>
<td>unicast</td>
<td>Primary:Netclkd Port</td>
</tr>
<tr>
<td>10000.9</td>
<td>unicast</td>
<td>Secondary RFS Server Port</td>
</tr>
</tbody>
</table>

```
port_index = 0  last sent = 5440  last heard = 0
port_index = 0  last sent = 0     last heard = 0
port_index = 0  last sent = 19    last heard = 0
```

The following example shows how to display the contents of the IPC retransmission queue:

```
Switch# show ipc queue
There are 0 IPC messages waiting for acknowledgement in the transmit queue.
There are 0 IPC messages waiting for a response.
There are 0 IPC messages waiting for additional fragments.
There are 0 IPC messages currently on the IPC inboundQ.
There are 0 messages currently in use by the system.
```

### Examples

The following example shows how to display the status of the local IPC server:

```
Switch# show ipc status
IPC System Status:
This processor is the IPC master server.
1000 IPC message headers in cache
227997 messages in, 222402 out, 217056 delivered to local port,
5486 acknowledgements received, 5484 sent,
0 NACKs received, 0 sent,
0 messages dropped on input, 0 messages dropped on output
0 no local port, 0 destination unknown, 0 no transport
0 missing callback or queue, 0 duplicate ACKs, 2 retries,
```
0 message timeouts.
0 ipc_output failures, 0 mtu failures,
0 msg alloc failed, 0 emer msg alloc failed, 0 no origs for RPC replies
0 pak alloc failed, 0 memd alloc failed
0 no hwq, 0 failed opens, 0 hardware errors
No regular dropping of IPC output packets for test purposes
show lane

To display global and per-VCC LANE information for all the LANE components configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN, use the show lane EXEC command.

```
show lane [interface atm card/subcard/port[,subinterface-number] | name elan-name] [brief]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interface atm</code></td>
<td>Card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td><code>card/subcard/port</code></td>
<td>Subinterface number.</td>
</tr>
<tr>
<td><code>subinterface-number</code></td>
<td>Name of emulated LAN. Maximum length is 32 characters.</td>
</tr>
<tr>
<td><code>brief</code></td>
<td>Keyword used to display the global information, but not the per-VCC information.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Entering the show lane command is equivalent to entering the show lane config, show lane server, show lane bus, and show lane client commands. The show lane command shows all LANE-related information except the show lane database information.

**Examples**

The following example is sample output of the show lane command.

```
Switch# show lane
LE Client ATM0  ELAN name: alpha  Admin: up  State: operational
Client ID: 2
HW Address: 0041.0b0a.2c82  Type: ethernet      Max Frame Size: 1516
ATM Address: 47.00918100000000410B0A2C81.0001122334455.00

VCD  rxFrames  txFrames  Type       ATM Address
 0    0          0  configure  47.33330000000000000000000000000000.00112223333.00
255   1          2  direct     47.33330000000000000000000000000000.0011222334455.00
256   1          0  distribute  47.33330000000000000000000000000000.0011222334455.00
260   1          0  send       47.33330000000000000000000000000000.0011222334455.00
261   1         13  forward    47.33330000000000000000000000000000.0011222334455.00

LE Client ATM0.5 ELAN name: alpha5  Admin: up  State: operational
Client ID: 2
HW Address: 0041.0b0a.2c82  Type: ethernet      Max Frame Size: 1516
ATM Address: 47.00918100000000410B0A2C81.0001122334455.05

VCD  rxFrames  txFrames  Type       ATM Address
 0    0          0  configure  47.33330000000000000000000000000000.00112223333.00
259   1          5  direct     47.33330000000000000000000000000000.0011222334455.00
260   7          0  distribute  47.33330000000000000000000000000000.0011222334455.00
261   0         13  send       47.33330000000000000000000000000000.0011222334455.00
```

OL-7395-01, Cisco IOS Release 12.1(26)EB
Table 18-41 describes the significant fields in the sample display.

### Table 18-41 show lane Command Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE Client</td>
<td>Interface on which the LANE configuration server is configured.</td>
</tr>
<tr>
<td></td>
<td>Identifies the following lines as applying to the LANE configuration server.</td>
</tr>
<tr>
<td>config table</td>
<td>Name of the database associated with the LANE configuration server.</td>
</tr>
<tr>
<td>State</td>
<td>State of the configuration server: down or operational. If down, a “down</td>
</tr>
<tr>
<td></td>
<td>reasons” field indicates why it is down. The reasons include the following:</td>
</tr>
<tr>
<td></td>
<td>NO-config-table, NO-nsap-address, NO-config-pvc, and NO-interface-up.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address or addresses of this configuration server.</td>
</tr>
<tr>
<td>LE Server</td>
<td>Identifies the following lines as applying to the LANE server. These lines</td>
</tr>
<tr>
<td></td>
<td>are also displayed in output from the <code>show lane lecs</code> command.</td>
</tr>
<tr>
<td>ATM x/x/x.x</td>
<td>Interface or subinterface this LANE server is on.</td>
</tr>
<tr>
<td>ELAN name</td>
<td>Name of the emulated LAN served by this LE server.</td>
</tr>
<tr>
<td>State</td>
<td>Status of this LANE server. Possible states for a LANE server include down,</td>
</tr>
<tr>
<td></td>
<td>waiting_ILMI, waiting_listen, up_not_registered, operational, and</td>
</tr>
<tr>
<td></td>
<td>terminating.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of emulated LAN.</td>
</tr>
<tr>
<td>Max Frame Size</td>
<td>Maximum frame size on this type of LAN.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of this server.</td>
</tr>
<tr>
<td>Config Server ATM</td>
<td>The ATM address used to reach the LANE configuration server.</td>
</tr>
<tr>
<td>addr</td>
<td></td>
</tr>
<tr>
<td>control distribute:</td>
<td>Virtual circuit descriptor of the Control Distribute VCC.</td>
</tr>
<tr>
<td>VCD</td>
<td>proxy/ (ST: Init, Conn, Waiting, Adding, Joined, Operational, Reject,</td>
</tr>
<tr>
<td></td>
<td>Term)</td>
</tr>
<tr>
<td>lecid</td>
<td>Identifier for the LANE client at the other end of the Control Distribute VCC.</td>
</tr>
<tr>
<td>ST</td>
<td>Status of the LANE client at the other end of the Control Distribute VCC.</td>
</tr>
<tr>
<td></td>
<td>Possible states are Init, Conn, Waiting, Adding, Joined, Operational, Reject,</td>
</tr>
<tr>
<td></td>
<td>and Term.</td>
</tr>
<tr>
<td>VCD</td>
<td>Virtual channel descriptor used to reach the LANE client.</td>
</tr>
<tr>
<td>pkts</td>
<td>Number of packets sent by the LANE server on the Control Distribute VCC to</td>
</tr>
<tr>
<td></td>
<td>the LANE client.</td>
</tr>
<tr>
<td>Hardware Addr</td>
<td>MAC-layer address of the LANE client.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of the LANE client.</td>
</tr>
</tbody>
</table>
### Table 18-41 show lane Command Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE BUS</td>
<td>Identifies the following lines as applying to the LANE broadcast-and-unknown server. These lines are also displayed in output from the <code>show lane bus</code> command.</td>
</tr>
<tr>
<td>ATM x/x/x.x</td>
<td>Interface or subinterface this LANE broadcast-and-unknown server is on.</td>
</tr>
<tr>
<td>ELAN name</td>
<td>Name of the emulated LAN served by this broadcast-and-unknown server.</td>
</tr>
<tr>
<td>State</td>
<td>Status of this LANE client. Possible states include down and operational.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of emulated LAN.</td>
</tr>
<tr>
<td>Max Frame Size</td>
<td>Maximum frame size on this type of LAN.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of the LANE broadcast-and-unknown server.</td>
</tr>
<tr>
<td>data forward: vcd 22, 2 members, 10 packets</td>
<td>Virtual channel descriptor of the Data Forward VCC, number of LANE clients attached to the VCC, and the number of packets transmitted on the VCC.</td>
</tr>
<tr>
<td>lecid</td>
<td>Identifier assigned to each LANE client on the Data Forward VCC.</td>
</tr>
<tr>
<td>VCD</td>
<td>Virtual channel descriptor used to reach the LANE client.</td>
</tr>
<tr>
<td>Pkts</td>
<td>Number of packets sent by the broadcast-and-unknown server to the LANE client.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of the LANE client.</td>
</tr>
<tr>
<td>LE Client</td>
<td>Identifies the following lines as applying to a LANE client. These lines are also displayed in output from the <code>show lane client</code> command.</td>
</tr>
<tr>
<td>ATM x/x/x.x</td>
<td>Interface or subinterface this LANE client is on.</td>
</tr>
<tr>
<td>ELAN name</td>
<td>Name of the emulated LAN to which this client belongs.</td>
</tr>
<tr>
<td>State</td>
<td>Status of this LANE client. Possible states include initialState, lecsConnect, configure, join, busConnect, and operational.</td>
</tr>
<tr>
<td>HW Address</td>
<td>MAC address, in dotted hexadecimal notation, assigned to this LANE client.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of emulated LAN.</td>
</tr>
<tr>
<td>Max Frame Size</td>
<td>Maximum frame size on this type of LAN.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of this LANE client.</td>
</tr>
<tr>
<td>VCD</td>
<td>Virtual channel descriptor for each of the VCCs established for this LANE client.</td>
</tr>
<tr>
<td>rxFrames</td>
<td>Number of frames received on the VCC.</td>
</tr>
<tr>
<td>txFrames</td>
<td>Number of frames transmitted on the VCC.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of VCC; same as the SVC and PVC types. Possible VCC types are configure, direct, distribute, send, forward, and data.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of the LANE component at the other end of the VCC.</td>
</tr>
</tbody>
</table>
show lane bus

To display detailed LANE information for the broadcast-and-unknown server configured on an interface or any of its interfaces, on a specified subinterface, or on an emulated LAN, use the show lane bus EXEC command.

```
show lane bus [interface atm card/subcard/port[.subinterface-number] | name elan-name] [brief]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td>subinterface-number</td>
<td>Subinterface number.</td>
</tr>
<tr>
<td>elan-name</td>
<td>Name of the emulated LAN. Maximum length is 32 characters.</td>
</tr>
<tr>
<td>brief</td>
<td>Keyword used to display the global information but not the per-VCC information.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the show lane bus command.

```
Switch# show lane bus interface atm 3/0/0.1

interface atm 3/0/0.1
type Ethernet name: pubsAAL5-SDU length:1516
max frame age: 2 secondsrelayed frames/sec: 116
NSAP: 45.000001415555121f.yyyy.zzzz.0800.200c.1002.01
lecidvcdentNSAP
*  80 659 45.000001415555121f.yyyy.zzzz.0800.200c.1002.01
  81 99 45.000001415555121f.yyyy.zzzz.0800.200c.1000.01
  91 69 45.000001415555121f.yyyy.zzzz.0800.200c.1100.01
  99 101 45.000001415555121f.yyyy.zzzz.0800.200c.1300.01

Table 18-42 describes the significant fields in the sample display.

**Table 18-42 show lane bus Command Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface</td>
<td>Interface or subinterface for which information is displayed.</td>
</tr>
<tr>
<td>type</td>
<td>Type of emulated LAN interface.</td>
</tr>
<tr>
<td>name</td>
<td>Name of the emulated LAN.</td>
</tr>
<tr>
<td>MTU</td>
<td>Maximum transmission unit (packet) size on the emulated LAN.</td>
</tr>
</tbody>
</table>
### Table 18-42 show lane bus Command Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAL5-SDU</td>
<td>Maximum number of bytes in a LANE SDU encapsulated in an ATM AAL5 frame. This length includes a 2-byte marker and a full Ethernet-like frame from the destination MAC address field through the last byte of data. It does not include the Ethernet CRC or FRC, which is not present on emulated LAN frames. The number does not include the 8-byte AAL5 trailer in the last ATM cell of the frame, or the padding between the last data byte and the 8-byte trailer.</td>
</tr>
<tr>
<td>max frame age</td>
<td>After receiving a frame over Multicast Send VCC, the broadcast-and-unknown server must transmit the frame to all relevant Multicast Forward VCCs within this number of seconds. When the time expires, the server discards the frame.</td>
</tr>
<tr>
<td>NSAP</td>
<td>ATM address of this broadcast-and-unknown server.</td>
</tr>
<tr>
<td>lecid</td>
<td>Unique identifier of the LANE client at the other end of this VCC.</td>
</tr>
<tr>
<td>vcd</td>
<td>Virtual circuit descriptor that uniquely identifies this VCC.</td>
</tr>
</tbody>
</table>
| cnt          | For Multicast Send VCC, the number of packets sent from the client to the broadcast-and-unknown server.                                       
|              | For Multicast Forward VCC, the number of packets sent from the broadcast-and-unknown server clients.                                         |
| NSAP         | For Multicast Send VCC, the ATM address of the LANE client at the other end of this VCC.                                                   |
|              | For Multicast Forward VCC, the ATM address of the broadcast-and-unknown server.                                                            |
show lane client

To display global and per-VCC LANE information for all the LANE clients configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN, use the `show lane client` EXEC command.

```
show lane client [interface atm card/subcard/port [subinterface-number] | name elan-name] [brief | detail]
```

**Syntax Description**

- `card/subcard/port`: Card, subcard, and port number for the ATM interface.
- `subinterface-number`: Subinterface number.
- `elan-name`: Name of the emulated LAN. Maximum length is 32 characters.
- `brief`: Keyword used to display the global information but not the per-VCC information.
- `detail`: Keyword used to display backup server connection information.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show lane client` command.

```
Switch# show lane client
LE Client ATM0  ELAN name: alpha  Admin: up  State: operational
HW Address: 0041.0b0a.2c82  Type: ethernet  Max Frame Size: 1516
ATM Address: 47.00918100000000410B0A2C81.001122334455.00

VCD  rxFrames  txFrames  Type    ATM Address
0    0         0         configure  47.33330000000000000000000000000000.000111222333.00
255  1         2         direct   47.33330000000000000000000000000000.001122334455.00
256  1         0         distribute 47.33330000000000000000000000000000.001122334455.00
257  0         0         send      47.33330000000000000000000000000000.000000111111.00
258  1         0         forward   47.33330000000000000000000000000000.000000111111.00

VCD  rxFrames  txFrames  Type    ATM Address
264  22        12        data      47.33330000000000000000000000000000.000111122222.00
```

Table 18-43 describes the significant fields in the sample display.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Interface or subinterface for which information is displayed.</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the emulated LAN.</td>
</tr>
<tr>
<td>MAC</td>
<td>MAC address of this LANE client.</td>
</tr>
<tr>
<td>type</td>
<td>Type of emulated LAN, Ethernet, or Token Ring.</td>
</tr>
<tr>
<td>MTU</td>
<td>Maximum transmission unit (packet) size on the emulated LAN.</td>
</tr>
<tr>
<td>AAL5-SDU length</td>
<td>Maximum number of bytes in a LANE SDU encapsulated in an AAL5 frame. This</td>
</tr>
<tr>
<td></td>
<td>length includes a 2-byte marker and a full Ethernet-like frame from the</td>
</tr>
<tr>
<td></td>
<td>destination MAC address field through the last byte of data. It does not</td>
</tr>
<tr>
<td></td>
<td>include an Ethernet CRC (or FRC), which is not present on emulated LAN</td>
</tr>
<tr>
<td></td>
<td>frames. The number does not include the 8-byte AAL5 trailer in the last</td>
</tr>
<tr>
<td></td>
<td>ATM cell of the frame, or the padding between the last data byte and the</td>
</tr>
<tr>
<td></td>
<td>8-byte trailer.</td>
</tr>
<tr>
<td>NSAP</td>
<td>ATM address of this LANE client.</td>
</tr>
<tr>
<td>VCD</td>
<td>Virtual channel descriptor that uniquely identifies this VCC.</td>
</tr>
<tr>
<td>rxFrames</td>
<td>Number of packets received.</td>
</tr>
<tr>
<td>txFrames</td>
<td>Number of packets transmitted.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of VCC; same as the SVC and PVC types. Possible VCC types are</td>
</tr>
<tr>
<td></td>
<td>configure, direct, distribute, send, forward, and data.</td>
</tr>
<tr>
<td>NSAP</td>
<td>ATM address of the LANE component at the other end of this VCC.</td>
</tr>
</tbody>
</table>

1. The Configure Direct VCC is shown in this display as *configure*. The Control Direct VCC is shown as *direct*; the Control Distribute VCC is shown as *distribute*. The Multicast Send VCC and Multicast Forward VCC are shown as *send* and *forward*, respectively. The data Direct VCC is shown as *data*. 
show lane config

To display global LANE information for the configuration server configured on an interface, use the show lane config EXEC command.

```
show lane config [interface atm card/subcard/port] [brief]
```

**Syntax Description**

- **card/subcard/port**: Card, subcard, and port number for the ATM interface.
- **brief**: Keyword used to display the global information, but not the per-VCC information.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the show lane config command on a configuration server with two ATM addresses.

```
Switch# show lane config
LE Config Server ATM 1/0/0 config table: table State: operational
ATM Address: 39.000000000000000000000000.000000000500.00
ATM Address: 39.000000000000000000000000.000000000500.01
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 10
cumulative total number of config failures so far: 0
```

The following example shows an operational server even though the addresses are not completely registered. The first address is not registered with the ILMI, as indicated by the ilmi-state. The second address is not registered with either the ILMI or the ATM signaling subsystem, as indicated by the atmsig-state.

```
Switch# show lane config
LE Config Server ATM 1/0/0 config table: table State: operational
ATM Address: 39.000000000000000000000000.000000000500.00 ilmi-
ATM Address: 39.000000000000000000000000.000000000500.01 ilmi- atmsig-
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 10
cumulative total number of config failures so far: 0
```

The following example displays some physical connectivity problems with the result that the configuration server ATM address is undetermined. Either the prefix was not obtained, or it is not there. As a result, the address cannot be computed and you see the message “EXACT ADDRESS NOT YET SET (NO PREFIX?)” in the display.

```
Switch# show lane config
LE Config Server ATM 1/0/0 config table: table State: operational
ATM Address: EXACT ADDRESS NOT YET SET (NO PREFIX ?) ilmi- atmsig-
actual user specified form:...
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 0
```
cumulative total number of config failures so far: 0

Table 18-44 describes the significant fields in the sample displays.

**Table 18-44 show lane config Command Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE Config Server</td>
<td>Major interface on which the LANE configuration server is configured.</td>
</tr>
<tr>
<td>config-table</td>
<td>Name of the database associated with the LANE configuration server.</td>
</tr>
<tr>
<td>State</td>
<td>State of the configuration server: down or operational. If down, the reasons field indicates why it is down. The reasons include the following: NO-config, NO-nsap-address, and No-interface-up.</td>
</tr>
<tr>
<td>ATM address</td>
<td>ATM address of this configuration server.</td>
</tr>
</tbody>
</table>
show lane database

To display the database of the configuration server, use the **show lane database** EXEC command.

```
show lane database [name]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Specific database name.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Defaults**

Shows all databases.

**Examples**

The following example is sample output from the **show lane database** command.

```
Switch# show lane database
config-table: engandmkt - bound to interface/s: atm 1/0/0
default ELAN: none
ELAN eng: les NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1001.01
    LEC MAC 0800.200c.1100
    LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1000.01
    LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1300.01
ELAN mkt: les NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1001.02
    LEC MAC 0800.200c.1100
    LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1000.02
    LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1300.02
```

**Table 18-45** describes the significant fields in the sample display.

**Table 18-45 show lane database Command Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>config-table</td>
<td>Name of current database.</td>
</tr>
<tr>
<td>default ELAN</td>
<td>Default name, if one is established.</td>
</tr>
<tr>
<td>ELAN</td>
<td>Name of the emulated LAN whose data is reported in the line and the next three lines.</td>
</tr>
<tr>
<td>LEC MAC</td>
<td>MAC addresses of an individual LANE client in the emulated LAN. This display includes a separate line for every LANE client in this emulated LAN.</td>
</tr>
<tr>
<td>LEC NSAP</td>
<td>ATM addresses of all LANE clients in the emulated LAN.</td>
</tr>
</tbody>
</table>
show lane default-atm-addresses

To display the automatically assigned ATM address of each LANE component in a switch router or on a specified interface or subinterface, use the `show lane default-atm-addresses` EXEC command.

```plaintext
show lane default-atm-addresses [interface atm card/subcard/port.subinterface-number]
```

**Syntax Description**

- `card/subcard/port`: Card, subcard, and port number for the ATM interface.
- `.subinterface-number`: Specifies the number of the subinterface.

**Command Modes**

- EXEC

**Command History**

Release | Modification
--- | ---
11.2(5) | New command

**Usage Guidelines**

You do not need any of the LANE components running on this switch before using this command.

**Examples**

The following example is sample output from the `show lane default-atm-addresses` command for the ATM 1/0/0 when all LANE components are located on that interface.

```
Switch# show lane default-atm-addresses interface atm 1/0/0
interface ATM1/0/0:
LANE Client:47.000000000000000000000000.00000C304A98.**
LANE Server:47.000000000000000000000000.00000C304A99.**
LANE Bus:47.000000000000000000000000.00000C304A9A.**
LANE Config Server:47.000000000000000000000000.00000C304A9B.00
note: ** is the subinterface number byte in hex
```

Table 18-46 describes the significant fields shown in the display.

**Table 18-46 show lane default-atm-addresses Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface</td>
<td>Displays the specified interface.</td>
</tr>
<tr>
<td>LANE Client</td>
<td>Displays the ATM address of the LANE client on the interface.</td>
</tr>
<tr>
<td>LANE Server</td>
<td>Displays the ATM address of the LANE server on the interface.</td>
</tr>
<tr>
<td>LANE Bus</td>
<td>Displays the ATM address of the LANE broadcast-and-unknown server on the interface.</td>
</tr>
<tr>
<td>LANE Config Server</td>
<td>Displays the ATM address of the LANE configuration server on the interface.</td>
</tr>
</tbody>
</table>
show lane le-arp

To display the LANE ARP table of the LANE client configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN, use the show lane le-arp EXEC command.

```
show lane le-arp [interface atm card/subcard/port|subinterface-number] | name elan-name]
```

**Syntax Description**
- `card/subcard/port`  Card, subcard, and port number of the ATM interface.
- `subinterface-number`  The number of the subinterface.
- `elan-name`  The name of the emulated LAN. Maximum length is 32 characters.

**Command Modes**
- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output of the show lane le-arp command.

```
Switch# show lane le-arp
Hardware Addr   ATM Address                                 VCD  Interface
0000.0c52.3bc8  47.333300000000000000000000.000011112222.05 264  ATM0.5
```

Table 18-47 describes the significant fields shown in the display.

**Table 18-47 show lane le-arp Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Addr</td>
<td>MAC address, in dotted hexadecimal notation, assigned to the LANE component at the other end of this VCD.</td>
</tr>
<tr>
<td>ATM Address</td>
<td>ATM address of the LANE component at the other end of this VCD.</td>
</tr>
<tr>
<td>VCD</td>
<td>Virtual channel descriptor.</td>
</tr>
<tr>
<td>Interface</td>
<td>Interface or subinterface used to reach the specified component.</td>
</tr>
</tbody>
</table>
show lane name

To show the LAN emulation ARP server, use the `show lane name` EXEC command.

```
show lane name elan-name [brief]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>elan-name</td>
<td>The name for the emulated LAN.</td>
</tr>
<tr>
<td>brief</td>
<td>Displays all the information about the LANE except the connection client information.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>
show lane server

To display global information for the LANE server configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN, use the **show lane server** EXEC command.

```
show lane server [interface atm card/subcard/port [.subinterface-number] | name elan-name] [brief]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>card/subcard/port</td>
<td>Card, subcard, and port number for the ATM interface.</td>
</tr>
<tr>
<td>.subinterface-number</td>
<td>Specifies the number for the subinterface.</td>
</tr>
<tr>
<td>elan-name</td>
<td>Name of the emulated LAN. Maximum length is 32 characters.</td>
</tr>
<tr>
<td>brief</td>
<td>Keyword used to display the global information but not the per-VCC information.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show lane server** command.

```
Switch# show lane server interface atm 3/0/0.1

interface atm 3/0/0.1 name: pubs
type: Ethernet MTU:1500 AAL5-SDU length:1516
NSAP: 45.00001415555121f.yyyy.zzzz.0800.200c.1001.01
lecid/
proxyvcedent NSAP
  * 75 330 45.00001415555121f.yyyy.zzzz.0800.200c.1001.01
  1 76 33 45.00001415555121f.yyyy.zzzz.0800.200c.1000.01
  5/P 87 15 45.00001415555121f.yyyy.zzzz.0800.200c.1100.01
  6/P 95 53 45.00001415555121f.yyyy.zzzz.0800.200c.1300.01
```

Table 18-48 describes the significant fields in the sample display.

**Table 18-48 show lane server Command Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface</td>
<td>Interface or subinterface on which this LANE server is configured.</td>
</tr>
<tr>
<td>name</td>
<td>Name of emulated LAN.</td>
</tr>
<tr>
<td>type</td>
<td>Type of emulated LAN interface.</td>
</tr>
<tr>
<td>MTU</td>
<td>Maximum transmission unit (packet) size on the emulated LAN.</td>
</tr>
</tbody>
</table>
### Table 18-48 show lane server Command Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAL5-SDU</td>
<td>Maximum number of bytes in a LANE SDU encapsulated in an AAL5 frame. This length includes a 2-byte marker and a full Ethernet-like frame from the destination MAC address field through the last byte of data. It does not include the Ethernet CRC or FRC, which is not present on emulated LAN frames. The number does not include the 8-byte AAL5 trailer in the last ATM cell of the frame, nor the padding between the last data byte and the 8-byte trailer.</td>
</tr>
<tr>
<td>NSAP</td>
<td>ATM address of this broadcast-and-unknown server.</td>
</tr>
<tr>
<td>lecid</td>
<td>Unique identifier of the LANE client at the other end of this VCC.</td>
</tr>
<tr>
<td>proxy</td>
<td>When a LANE client joins an emulated LAN, it includes a proxy bit that tells the LANE server that the LANE client does not guarantee to register all its MAC address-ATM address pairs with the LANE server. The Cisco Systems LANE clients must set the proxy bit. Workstation LANE clients, directly attached to ATM, do not set the proxy.</td>
</tr>
<tr>
<td>vcd</td>
<td>Virtual circuit descriptor that uniquely identifies this VCC.</td>
</tr>
<tr>
<td>cnt</td>
<td>For Multicast Send VCC, the number of packets sent from the client to the broadcast-and-unknown server.</td>
</tr>
<tr>
<td></td>
<td>For Multicast Forward VCC, the number of packets sent from the broadcast-and-unknown server clients.</td>
</tr>
<tr>
<td>NSAP</td>
<td>For Multicast Send VCC, the ATM address of the LANE client at the other end of this VCC.</td>
</tr>
<tr>
<td></td>
<td>For Multicast Forward VCC, the ATM address of the broadcast-and-unknown server.</td>
</tr>
</tbody>
</table>
**show line**

To display terminal line parameters, use the `show line` EXEC command.

**Catalyst 8540 MSR**

```
show line [line-num | console 0 | vty vty-line-num]
```

**Catalyst 8510 MSR and LightStream 1010**

```
show line [line-num | aux 0 | console 0 | vty vty-line-num]
```

**Syntax Description**

- **line-num**: Specifies absolute line number of the terminal line.
- **aux 0**: Displays parameters for the auxiliary line. (Catalyst 8510 MSR and LightStream 1010).
- **console 0**: Displays parameters for the primary terminal line.
- **vty-line-num**: Specifies VTY line number.

**Command Modes**

- EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following sample output from the `show line` command shows line 2 as a virtual terminal with a transmit and receive rate of 9600 bps. The modem state and the terminal screen width and length are also displayed.

Overruns occur when the UART serving the line receives a byte but has nowhere to put it because previous bytes were not taken from the UART by the host route processor. The byte is lost, and the overrun count increases when the route processor next looks at the UART status.

```
Switch# show line 2

Tty Typ  Tx/Rx  A Modem  Roty AccO AccI  Uses  Noise  Overruns
 2 VTY  9600/9600 - - - - - 0 0 0/0

Line 2, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600
Status: No Exit Banner
Capabilities: none
Modem state: Idle
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
          ^~x  none  -  -  none
Timeouts:  Idle EXEC  Idle Session  Modem Answer  Session  Dispatch
         0:10:00  never  none  none  not set
Session limit is not set.
Time since activation: never
Editing is enabled.
History is enabled, history size is 10.
```
Full user help is disabled
Allowed transports are telnet. Preferred is telnet.
No output characters are padded
No special data dispatching characters

Table 18-49 describes the fields shown in the display.

**Table 18-49 show line Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tty</td>
<td>Line number. In this case, 17.</td>
</tr>
</tbody>
</table>
| Typ   | Type of line. In this case, a virtual terminal line (vty), which is active, in asynchronous mode denoted by the preceding “A.” Possible values include:
- CTY—Console
- AUX—Auxiliary port (Catalyst 8510 MSR and LightStream 1010)
- TTY—Asynchronous terminal port
- lpt—Parallel printer |
| Tx/Rx | Transmit rate/receive rate of the line. |
| A     | Indicates whether or not autobaud has been configured for the line. A value of “F” indicates that autobaud has been configured; a hyphen (-) indicates that it has not been configured. |
| Modem | Types of modem signals configured for the line. Possible values include:
- callin
- callout
- cts-req
- DTR-Act
- inout
- RIisCD |
| Roty  | Rotary group configured for the line. |
| AccO, Accl | Output or Input access list number configured for the line. |
| Uses  | Number of connections established to or from the line since the system was restarted. |
| Noise | Number of times noise has been detected on the line since the system was restarted. |
| Overruns | Hardware (UART) overruns or software buffer overflows, both defined as the number of overruns or overflows that occurred on the specified line since the system was restarted. Hardware overruns are buffer overruns; the UART chip has received bits from the software faster than it can process them. A software overflow occurs when the software has received bits from the hardware faster than it can process them. |
| Line  | Current line. |
| Location | Location of the current line. |
| Type  | Type of line, as specified by the line global configuration command. |
| Length | Length of the terminal or screen display. |
Table 18-49 show line Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Width of the terminal or screen display.</td>
</tr>
<tr>
<td>Baud rate (TX/RX)</td>
<td>Transmit rate/receive rate of the line.</td>
</tr>
<tr>
<td>Status</td>
<td>State of the line: ready or not, connected or disconnected, active or inactive, exit banner or no exit banner, async interface active or inactive.</td>
</tr>
<tr>
<td>Capabilities</td>
<td>Current terminal capabilities. In this case, the line is usable as an asynchronous interface.</td>
</tr>
<tr>
<td>Modem state</td>
<td>Modem control state. This field should always read READY.</td>
</tr>
<tr>
<td>Special characters</td>
<td>Current settings that were input by the user (or taken by default) from the following global configuration commands:</td>
</tr>
<tr>
<td></td>
<td>• escape-character</td>
</tr>
<tr>
<td></td>
<td>• hold-character</td>
</tr>
<tr>
<td></td>
<td>• stop-character</td>
</tr>
<tr>
<td></td>
<td>• start-character</td>
</tr>
<tr>
<td></td>
<td>• disconnect-character</td>
</tr>
<tr>
<td></td>
<td>• activation-character</td>
</tr>
<tr>
<td>Timeouts</td>
<td>Current settings that were input by the user (or taken by default) from the following global configuration commands:</td>
</tr>
<tr>
<td></td>
<td>• exec-timeout</td>
</tr>
<tr>
<td></td>
<td>• session-timeout</td>
</tr>
<tr>
<td></td>
<td>• dispatch-timeout</td>
</tr>
<tr>
<td></td>
<td>• modem answer-timeout</td>
</tr>
<tr>
<td>Session limit</td>
<td>Maximum number of sessions.</td>
</tr>
<tr>
<td>Time since activation</td>
<td>Last time <code>start_process</code> was run.</td>
</tr>
<tr>
<td>Editing</td>
<td>Whether or not command line editing is enabled.</td>
</tr>
<tr>
<td>History</td>
<td>Current history length, set by the user (or taken by default) from the <code>history</code> configuration command.</td>
</tr>
<tr>
<td>Full user help</td>
<td>Whether or not full user help is enabled, set by the user (or taken by default) from the <code>help</code> line configuration command.</td>
</tr>
<tr>
<td>Transport methods</td>
<td>Current set transport method, set by the user (or taken by default) from the <code>transport preferred</code> line configuration command.</td>
</tr>
<tr>
<td>Character padding</td>
<td>Current set padding, set by the user (or taken by default) from the <code>padding</code> line configuration command.</td>
</tr>
<tr>
<td>Data dispatching</td>
<td>Current dispatch character set by the user (or taken by default) from the <code>dispatch-character</code> line configuration command.</td>
</tr>
<tr>
<td>Group codes</td>
<td>AT group codes.</td>
</tr>
<tr>
<td>Line protocol</td>
<td>Definition of the specified line’s protocol and address.</td>
</tr>
<tr>
<td>Output, Input Packets</td>
<td>Number of output and input packets queued on this line.</td>
</tr>
</tbody>
</table>
show location

To display the system location, use the `show location` EXEC command.

```
show location
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Use this command to display information for analyzing and evaluating the system.
show logging

To display the state of logging to the syslog, use the `show logging` EXEC command.

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the state of syslog error and event logging, including host addresses, and whether console logging is enabled. This command also displays SNMP configuration parameters and protocol activity.

**Examples**

The following example is sample output from the `show logging` command.

```
Switch# show logging
Syslog logging: enabled
Console logging: disabled
    Monitor logging: level debugging, 266 messages logged.
    Trap logging: level informational, 266 messages logged.
    Logging to 131.108.2.238
```

Table 18-50 describes the significant fields shown in the display.

**Table 18-50 show logging Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syslog logging</td>
<td>When enabled, system logging messages are sent to a UNIX host that acts as a syslog server; that is, it captures and saves the messages.</td>
</tr>
<tr>
<td>Console logging</td>
<td>If enabled, states the level; otherwise, this field displays disabled.</td>
</tr>
<tr>
<td>Monitor logging</td>
<td>Minimum level of severity required for a log message to be sent to a monitor terminal (not the console).</td>
</tr>
<tr>
<td>Trap logging</td>
<td>Minimum level of severity required for a log message to be sent to a syslog server.</td>
</tr>
</tbody>
</table>
show memory

To show statistics about switch memory, including memory free pool statistics, use the **show memory** EXEC command.

```
show memory [type] [allocating process] [dead] [free] [pci]
```

**Syntax Description**

- **type**: Memory type to display (see Table 18-51). If *type* is not specified, statistics for all memory types present in the switch are displayed.
- **allocating-process**: Displays allocating process name.
- **dead**: Displays memory owned by dead processes.
- **free**: Displays free memory statistics.
- **pci**: Displays PCI memory statistics.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You should use the **summary** option to limit the amount of information presented.

Table 18-51 lists the types of memory statistics that you specify in the **show memory type** EXEC command.

**Table 18-51 show memory Type Options**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>address</td>
<td>Displays memory starting at 0 through 4294967294.</td>
</tr>
<tr>
<td>allocating-process</td>
<td>Shows allocating process name.</td>
</tr>
<tr>
<td>dead</td>
<td>Displays memory owned by dead processes.</td>
</tr>
<tr>
<td>failures alloc</td>
<td>Displays memory allocation failures.</td>
</tr>
<tr>
<td>fast</td>
<td>Displays fast memory statistics.</td>
</tr>
<tr>
<td>free</td>
<td>Displays free memory statistics.</td>
</tr>
<tr>
<td>io</td>
<td>Displays IO memory statistics.</td>
</tr>
<tr>
<td>multibus</td>
<td>Displays multibus memory statistics.</td>
</tr>
<tr>
<td>pci</td>
<td>Displays PCI memory statistics.</td>
</tr>
<tr>
<td>processor</td>
<td>Displays processor memory statistics.</td>
</tr>
<tr>
<td>summary</td>
<td>Displays summary of memory usage per allocated PC.</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show memory** command.
### The following example is sample output from the `show memory free` command.

#### Switch# show memory free

<table>
<thead>
<tr>
<th>Address</th>
<th>Bytes</th>
<th>Prev.</th>
<th>Next</th>
<th>Ref</th>
<th>PrevF</th>
<th>NextF</th>
<th>Alloc PC</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>608B4724</td>
<td>36</td>
<td>608B46F8</td>
<td>608B4770</td>
<td>0</td>
<td>0</td>
<td>608198D</td>
<td>60069ED4</td>
<td>Exec</td>
</tr>
<tr>
<td>608198DC</td>
<td>24</td>
<td>608198B0</td>
<td>6081991C</td>
<td>0</td>
<td>608B472</td>
<td>608B3E4</td>
<td>60069ED4</td>
<td>Exec</td>
</tr>
<tr>
<td>608B3E48</td>
<td>52</td>
<td>608B3E10</td>
<td>608B3EA4</td>
<td>0</td>
<td>608198D</td>
<td>0</td>
<td>6006A0FC</td>
<td>Exec</td>
</tr>
<tr>
<td>104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 2</td>
</tr>
<tr>
<td>608B60B4</td>
<td>112</td>
<td>608B6084</td>
<td>608B614C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>60034890</td>
<td>(coalesced)</td>
</tr>
<tr>
<td>116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 4</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 5</td>
</tr>
<tr>
<td>124</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 6</td>
</tr>
<tr>
<td>152</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 7</td>
</tr>
</tbody>
</table>

#### Processor memory

**Head** | **Freelist** | **Total(b)** | **Used(b)** | **Free(b)** | **Largest(b)**
---|---|---|---|---|---
Processor | 6059E050 | 605F96C8 | 10887088 | 3249536 | 7637552 | 7601484
Fast | 6057E050 | 603FA454 | 131072 | 43444 | 87628 | 87280

#### Processor memory

<table>
<thead>
<tr>
<th>Address</th>
<th>Bytes</th>
<th>Prev.</th>
<th>Next</th>
<th>Ref</th>
<th>PrevF</th>
<th>NextF</th>
<th>Alloc PC</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td></td>
<td></td>
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<td>Free list 1</td>
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<tr>
<td>608B4724</td>
<td>36</td>
<td>608B46F8</td>
<td>608B4770</td>
<td>0</td>
<td>0</td>
<td>608198D</td>
<td>60069ED4</td>
<td>Exec</td>
</tr>
<tr>
<td>608198DC</td>
<td>24</td>
<td>608198B0</td>
<td>6081991C</td>
<td>0</td>
<td>608B472</td>
<td>608B3E4</td>
<td>60069ED4</td>
<td>Exec</td>
</tr>
<tr>
<td>608B3E48</td>
<td>52</td>
<td>608B3E10</td>
<td>608B3EA4</td>
<td>0</td>
<td>608198D</td>
<td>0</td>
<td>6006A0FC</td>
<td>Exec</td>
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<td>104</td>
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<td>608B6084</td>
<td>608B614C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>60034890</td>
<td>(coalesced)</td>
</tr>
<tr>
<td>116</td>
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<td></td>
<td></td>
<td></td>
<td>Free list 7</td>
</tr>
</tbody>
</table>

#### Address | Bytes | Prev. | Next | Ref | PrevF | NextF | Alloc PC | What                  |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
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<tr>
<td>608B3D08</td>
<td>204</td>
<td>608B3CD0</td>
<td>608B3DFC</td>
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<td>0</td>
<td>60034890</td>
<td>(coalesced)</td>
</tr>
<tr>
<td>216</td>
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<td>Free list 8</td>
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<td>608B5BD0</td>
<td>248</td>
<td>608B5B98</td>
<td>608B5CF0</td>
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<td>0</td>
<td>0</td>
<td>60034890</td>
<td>(coalesced)</td>
</tr>
<tr>
<td>264</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Free list 9</td>
</tr>
</tbody>
</table>
show memory

<table>
<thead>
<tr>
<th>Address</th>
<th>Bytes</th>
<th>Prev.</th>
<th>Next</th>
<th>Ref</th>
<th>PrevF</th>
<th>NextF</th>
<th>Alloc PC</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>280</td>
<td>Free list 10</td>
<td>608BA45C</td>
<td>296 608BA430 608BA5AC</td>
<td>0 0 0</td>
<td>60034890</td>
<td>(coalesced)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>Free list 11</td>
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<td>384</td>
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<tr>
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<td>608BA848</td>
<td>712 608BA690 608BAB38</td>
<td>0 0 0</td>
<td>0</td>
<td>(fragment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>760</td>
<td>Free list 16</td>
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<td>1144</td>
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<tr>
<td>1500</td>
<td>Free list 18</td>
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<tr>
<td>1684</td>
<td>Free list 19</td>
<td>608BAD50</td>
<td>1740 608BACFC 608BB444</td>
<td>0 0 0</td>
<td>0</td>
<td>(coalesced)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Free list 20</td>
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<tr>
<td>3000</td>
<td>Free list 21</td>
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<td></td>
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<tr>
<td>4256</td>
<td>Free list 22</td>
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<tr>
<td>4680</td>
<td>Free list 23</td>
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<tr>
<td>5000</td>
<td>Free list 24</td>
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<td></td>
</tr>
<tr>
<td>5184</td>
<td>Free list 25</td>
<td>608BB514</td>
<td>7588 608BB4C0 608BD2E0</td>
<td>0 0 6006D054</td>
<td>0</td>
<td>(coalesced)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9376</td>
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<tr>
<td>10000</td>
<td>Free list 27</td>
<td>608B6664</td>
<td>12528 608B661C 608B977C</td>
<td>0 0 605A53C</td>
<td>0</td>
<td>(coalesced)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>605A53C8</td>
<td>12528 605A5380 605A84E0</td>
<td>0 608B666 0</td>
<td>600441E0</td>
<td>(coalesced)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18184</td>
<td>Free list 28</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20000</td>
<td>Free list 29</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>32768</td>
<td>Free list 30</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>65536</td>
<td>Free list 31</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>131072</td>
<td>Free list 32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>262144</td>
<td>Free list 33</td>
<td>608C028C7601484</td>
<td>608BD39B 0</td>
<td>0 0 0</td>
<td>60067AC8</td>
<td>(coalesced)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 7637552

Fast memory

<table>
<thead>
<tr>
<th>Address</th>
<th>Bytes</th>
<th>Prev.</th>
<th>Next</th>
<th>Ref</th>
<th>PrevF</th>
<th>NextF</th>
<th>Alloc PC</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Free list 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The display of `show memory free` contains the same types of information as the `show memory` display, except that only free memory is displayed, and the information is displayed, in order, for each free list.

The first section of the display includes summary statistics about the activities of the system memory allocator.
Table 18-52 describes significant fields shown in the first section of the display.

**Table 18-52 show memory Field Descriptions—First Section**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Hexadecimal address of the head of the memory allocation chain.</td>
</tr>
<tr>
<td>Free List</td>
<td>Hexadecimal address of the base of the free list.</td>
</tr>
<tr>
<td>Total (b)</td>
<td>Sum of used bytes plus free bytes.</td>
</tr>
<tr>
<td>Used (b)</td>
<td>Amount of memory in use.</td>
</tr>
<tr>
<td>Free (b)</td>
<td>Amount of memory not in use.</td>
</tr>
<tr>
<td>Largest (b)</td>
<td>Size of largest available free block.</td>
</tr>
</tbody>
</table>

The second section of the display is a block-by-block listing of memory use. Table 18-53 describes the significant fields in the second section of the display.

**Table 18-53 Characteristics of Each Block of Memory—Second Section**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>Hexadecimal address of the block.</td>
</tr>
<tr>
<td>Bytes</td>
<td>Size of the block, in bytes.</td>
</tr>
<tr>
<td>Prev.</td>
<td>Address of the previous block (should match the Address field on previous line).</td>
</tr>
<tr>
<td>Next</td>
<td>Address of the next block (should match the address on the next line).</td>
</tr>
<tr>
<td>Ref</td>
<td>Reference count for that memory block, indicating how many different processes are using that block of memory.</td>
</tr>
<tr>
<td>PrevF</td>
<td>Address of the previous free block (if free).</td>
</tr>
<tr>
<td>NextF</td>
<td>Address of the next free block (if free).</td>
</tr>
<tr>
<td>Alloc PC</td>
<td>Address of the system call that allocated the block.</td>
</tr>
<tr>
<td>What</td>
<td>Name of process that owns the block, or “(fragment)” if the block is a fragment, or “(coalesced)” if the block was coalesced from adjacent free blocks.</td>
</tr>
</tbody>
</table>

The `show memory io` command displays the free IO memory blocks. This command quickly shows how much unused IO memory is available.

The following example is sample output from the `show memory io` command.

```
Switch# show memory io
Address  Bytes  Prev.  Next  Ref  PrevF  NextF  Alloc PC  What
6132DA0  59264  6132664 6141520  0    0     600DDEC  3FCF0  *Packet Buffer*
600DDEC  500  600DAAC 600DFE0  0   6132DA0 600FE68  0
600FE68  376  600FAC8 600FFE0  0   600DDEC 6011D54  0
6011D54  652  60119B4 6011FEO  0   600FE68 6013D54  0
614FC4A0  832  614F564 614FFE0  0   601FD54 6177640  0
6177640  2657056 6172E90 0  0   614FC4A0 0  0
Total: 2723244
```
show ncdp path root

To display the NCDP path from the current node to its root clock source, use the `show ncdp path root` command.

```
show ncdp path root
```

When this command is executed, a PDU is built and sent towards its root clock source. As the PDU traverses nodes in the network, the NCDP entity on each node adds path information to the PDU. When the PDU reaches the node with the root clock source, it is routed back to the originating node. When the PDU is received by the originating node, the accumulated path information is displayed.

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The operation of this command is asynchronous, and thus the PDU or response PDU could be dropped within the network, causing this command to fail.

**Examples**

```
Switch# show ncdp path root
Ncdp:name            :low-sodium
Ncdp:address         :4700918100000000603E7B6E0100603E7B6E0100
Ncdp:hop count       :0
Ncdp:clock source    :BITS 0

Ncdp:name            :ls1010-b
Ncdp:address         :4700918100000000E0F751CC0100E0F751CC0100
Ncdp:hop count       :1
Ncdp:clock source    :ATM0/1/3

Ncdp:name            :ls1010-c
Ncdp:address         :4700918100000000E0F751CD0100E0F751CD0100
Ncdp:hop count       :2
Ncdp:clock source    :ATM0/1/0
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug ncdp</code></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><code>ncdp (interface)</code></td>
<td>Enables NCDP and configures the network clocking hardware at the interface</td>
</tr>
<tr>
<td></td>
<td>level.</td>
</tr>
<tr>
<td><code>show ncdp ports</code></td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td><code>show ncdp sources</code></td>
<td>Displays all of the NCDP clock sources configured on the node and their</td>
</tr>
<tr>
<td></td>
<td>attributes.</td>
</tr>
<tr>
<td><code>show ncdp status</code></td>
<td>Displays NCDP status information.</td>
</tr>
<tr>
<td><code>show ncdp timers</code></td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>
show ncdp ports

To display NCDP information at the port level, use the `show ncdp ports` command.

```
show ncdp ports {port_number | {atm | cbr} card/subcard/port | all}
```

### Syntax Description

- `port_number`: Displays NCDP information for the given port.
- `card/subcard/port`: Displays NCDP information for the given ATM interface.
- `all`: Displays NCDP information for all ports.

### Defaults

None

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use this command to show NCDP information at the port and interface level.

### Examples

The following example is sample output from the `show ncdp ports` command.

```
Switch# show ncdp ports 14
port data --(14)------ATM3/1/1-------------
port_id                             : 14
state                               : forwarding
admin weight                        : 10
root vector priority                : 1
root vector stratum level           : 4
root vector prs id                  : 255
root vector switch stratum level    : 4
root vector address                 : 4700918100000000E0F75D040100E0F75D040100
designated_cost                     : 0
hop_count                           : 0
switch vector priority              : 1
switch vector stratum level         : 4
switch vector prs id                : 255
switch vector switch stratum level  : 4
switch vector address               : 4700918100000000E0F75D040100E0F75D040100
designated_port                     : 7
topology_change_acknowledge         : 0
tx_sequence_number                  : 628
rx_sequence_number                  : 1212285
config_pending                      : 0
health                               : unknown
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug ncdp</code></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><code>national reserve (Catalyst 8510 MSR and LightStream 1010)</code></td>
<td>Selects the national bits for E1 IMA interfaces.</td>
</tr>
<tr>
<td><code>ncdp (interface)</code></td>
<td>Enables NCDP and configure the network clocking hardware at the interface level.</td>
</tr>
<tr>
<td><code>show ncdp path root</code></td>
<td>Displays the NCDP path from the current node to its root clock source</td>
</tr>
<tr>
<td><code>show ncdp sources</code></td>
<td>Displays all of the NCDP clock sources configured on the node and their attributes.</td>
</tr>
<tr>
<td><code>show ncdp status</code></td>
<td>Displays NCDP status information.</td>
</tr>
<tr>
<td><code>show ncdp timers</code></td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>
show ncdp sources

To display all of the NCDP clock sources configured on the node and their attributes, use the `show ncdp sources` command.

```
show ncdp sources
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Usage Guidelines**

Use this command to display NCDP clock sources configured on the node and their attributes.

**Examples**

The following example is sample output from the `show ncdp sources` command.

```
Switch# show ncdp sources
= ncdp clock source information ==============
Source type: Normal port (ATM0/1/3, 26, DOWN) (health: unknown)
  Priority   : 1
  Stratum level : 3e
  Prs id     : 0
  Switch stratum level : 4
  Address    : 4700918100000000400B0A2A8100400B0A2A8100

Source type: ASP free running
  Priority   : 128
  Stratum level : 4
  Prs id     : 255
  Switch stratum level : 4
  Address    : 4700918100000000400B0A2A8100400B0A2A8100
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug ncdp</code></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><code>national reserve</code></td>
<td>Selects the national bits for E1 IMA interfaces.</td>
</tr>
<tr>
<td>(Catalyst 8510 MSR</td>
<td></td>
</tr>
<tr>
<td>and LightStream 1010)</td>
<td></td>
</tr>
<tr>
<td><code>ncdp (interface)</code></td>
<td>Enables NCDP and configures the network clocking hardware at the</td>
</tr>
<tr>
<td></td>
<td>interface level.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>show ncdp path root</code></td>
<td>Displays the NCDP path from the current node to its root clock source.</td>
</tr>
<tr>
<td><code>show ncdp ports</code></td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td><code>show ncdp status</code></td>
<td>Displays NCDP status information.</td>
</tr>
<tr>
<td><code>show ncdp timers</code></td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>
show ncdp status

To display NCDP status information, use the show ncdp status command.

show ncdp status

Syntax Description

This command has no arguments or keywords.

Defaults

None

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use this command to display NCDP status information on the local node.

Examples

The following example is sample output from the show ncdp status command.

```
LS1010# show ncdp status
    = ncdp switch information ==== enabled ==============
revertive
    root clock source priority:  1
    root clock source stratum level:  4
    root clock source prs id:  255
    stratum level of root switch:  4
    clocking root address:  4700918100000000E0F75D040100E0F75D040100
    hop count:  1
    root path cost:  10
    root port:  14 <ATM3/1/1>
    max age:  20
    hello time:  500
    priority of best source:  128
    stratum level of best source:  4
    prs id of best source:  255
    switch stratum level:  4
    address:  4700918100000000400B0A2A8100400B0A2A8100
    switch max age:  11
    switch hello time:  500
    switch hold time:  500
    max diameter:  11
    converged root count:  1181224
    converged:  1
    total timer events:  1524768
    total queue events:  1195449
    rx config messages:  1195449
    tx config messages:  332043
    rx tcn messages:  1
    tx tcn messages:  6
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug ncdp</td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td>national reserve (Catalyst 8510 MSR and LightStream 1010)</td>
<td>Selects the national bits for E1 IMA interfaces.</td>
</tr>
<tr>
<td>ncdp (interface)</td>
<td>Enables NCDP and configures the network clocking hardware at the interface level.</td>
</tr>
<tr>
<td>show ncdp path root</td>
<td>Displays the NCDP path from the current node to its root clock source.</td>
</tr>
<tr>
<td>show ncdp ports</td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td>show ncdp sources</td>
<td>Displays all of the NCDP clock sources configured on the node and their attributes.</td>
</tr>
<tr>
<td>show ncdp timers</td>
<td>Displays NCDP information for the node-level timers.</td>
</tr>
</tbody>
</table>

```plaintext
rx non-participant messages: 14
rx unknown messages: 0
```
show ncdp timers

To display NCDP information for the node-level timers, use the **show ncdp timers** command.

**show ncdp timers**

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command to display NCDP information for the node-level timers.

**Examples**

The following example is sample output from the **show ncdp timers** command.

```
LS1010# show ncdp timers
= ncdp switch timer information ==========================
hello   events           : 714
tcn     events           : 0
topo    events           : 1
port    events           : 4
msg_age events           : 0
hold    events           : 332061
ncdp    events           : 1195205
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>debug ncdp</strong></td>
<td>Displays NCDP errors, events, and packet information.</td>
</tr>
<tr>
<td><strong>national reserve</strong></td>
<td>Selects the national bits for E1 IMA interfaces.</td>
</tr>
<tr>
<td>(Catalyst 8510 MSR</td>
<td></td>
</tr>
<tr>
<td>and LightStream 1010)</td>
<td></td>
</tr>
<tr>
<td><strong>ncdp (interface)</strong></td>
<td>Enables NCDP and configures the network clocking hardware at the interface level.</td>
</tr>
<tr>
<td><strong>show ncdp path root</strong></td>
<td>Displays the NCDP path from the current node to its root clock source.</td>
</tr>
<tr>
<td><strong>show ncdp ports</strong></td>
<td>Displays NCDP information at the port level.</td>
</tr>
<tr>
<td><strong>show ncdp sources</strong></td>
<td>Displays all of the NCDP clock sources configured on the node and their attributes.</td>
</tr>
<tr>
<td><strong>show ncdp status</strong></td>
<td>Displays NCDP status information.</td>
</tr>
</tbody>
</table>
show network-clocks

To show which ports are designated as network clock sources, use the show network-clocks EXEC command.

    show network-clocks

Syntax Description
This command has no keywords or arguments.

Command Modes
EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
This command also displays what is configured at each priority, and the current priority of the functioning clock.

Examples

Catalyst 8540 MSR
The following example is sample output from the show network-clocks EXEC command for an ATM switch router.

    Switch# show network-clocks
    Network clocking information:
    ---------------------------------------
    Source switchover mode: non-revertive
    Netclkd state: Active
    Source selection method: provisioned
    NCLKM hardware status: installed & usable
    NCLKM status: software enabled
    Primary clock source: BITS 0 in T1 mode
    Secondary clock source: not configured
    Present clock source: BITS 0 in T1 mode Locking

Catalyst 8510 MSR and LightStream 1010
The following example is sample output from the show network-clocks EXEC command for an ATM switch router.

    Switch# show network-clocks
    clock configuration is NON-Revertive
    Priority 1 clock source: No clock
    Priority 2 clock source: No clock
    Priority 3 clock source: No clock
    Priority 4 clock source: No clock
    Priority 5 clock source: System clock
    Current clock source:System clock, priority:5
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>network-clock-select</code></td>
<td>Allows the recovered clock to specify a particular port to provide network clocking.</td>
</tr>
</tbody>
</table>
show ntp associations

To show the status of NTP associations, use the show ntp associations EXEC command.

    show ntp associations [detail]

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>detail</td>
<td>Shows detailed information about each NTP association.</td>
</tr>
</tbody>
</table>

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

Detailed descriptions of the information displayed by this command can be found in the NTP specification (RFC 1305).

The following example is sample output from the show ntp associations command.

```
Switch# show ntp associations
address         ref clock     st  when  poll reach  delay  offset    disp
~160.89.32.2      160.89.32.1       5    29  1024  377     4.2   -8.59     1.6
+~131.108.13.33    131.108.1.111     3    69   128  377     4.1    3.48     2.3
*~131.108.13.57    131.108.1.111     3    32   128  377     7.9   11.18     3.6
```

* master (synced), # master (unsynced), + selected, - candidate, ~ configured

Table 18-54 describes the significant fields shown in the display.

Table 18-54 show ntp associations Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>address</td>
<td>Address of the peer.</td>
</tr>
<tr>
<td>ref clock</td>
<td>Address of the peer reference clock.</td>
</tr>
<tr>
<td>st</td>
<td>Peer stratum.</td>
</tr>
<tr>
<td>when</td>
<td>Time since the last NTP packet was received from the peer.</td>
</tr>
<tr>
<td>poll</td>
<td>Polling interval (seconds).</td>
</tr>
<tr>
<td>reach</td>
<td>Peer reachability (bit string, in octal).</td>
</tr>
<tr>
<td>delay</td>
<td>Round-trip delay to the peer (milliseconds).</td>
</tr>
<tr>
<td>offset</td>
<td>Relative time of the peer’s clock to the local clock (milliseconds).</td>
</tr>
<tr>
<td>disp</td>
<td>Dispersion.</td>
</tr>
</tbody>
</table>

The first character of the line can be one or more of the following:

* Synchronized to this peer.
# Almost synchronized to this peer.
+ Peer selected for possible synchronization.
The following example is sample output of the `show ntp associations detail` command.

```
Switch# show ntp associations detail
160.89.32.2 configured, insane, invalid, stratum 5
ref ID 160.89.32.1, time AFE252C1.6D0EF2 (00:12:01.428 PDT Fri Apr 4 1997)
our mode active, peer mode active, our poll intvl 1024, peer poll intvl 64
root delay 137.77 msec, root disp 142.75, reach 376, sync dist 215.363
delay 4.23 msec, offset -8.587 msec, dispersion 1.62
precision 2**19, version 3
org time AFE25301.6F83E753 (00:13:05.435 PDT Fri Apr 4 1997)
filtdelay = 4.23 4.14 2.41 5.95 2.37 2.33 4.26 4.33
filtoffset = -8.59 -8.82 -9.91 -8.42 -10.51 -10.77 -10.13 -10.11
filterror = 0.50 1.48 2.46 3.43 4.41 5.39 6.36 7.34

131.108.13.33 configured, selected, sane, valid, stratum 3
our mode client, peer mode server, our poll intvl 128, peer poll intvl 128
root delay 83.72 msec, root disp 217.77, reach 377, sync dist 264.633
delay 4.07 msec, offset 3.483 msec, dispersion 2.33
precision 2**6, version 3
org time AFE252B9.7124E14A (00:11:53.441 PDT Fri Apr 4 1997)
xmt time AFE252B9.6F625195 (00:11:53.441 PDT Fri Apr 4 1997)
filtdelay = 6.47 4.07 3.94 3.86 7.31 7.20 9.52 8.71
filtoffset = 3.63 3.48 3.06 2.82 4.51 4.57 4.28 4.59
filterror = 0.00 1.95 3.91 4.88 5.84 6.82 7.80 8.77

131.108.13.57 configured, our_master, sane, valid, stratum 3
ref ID 131.108.1.111, time AFE252DE.77C29000 (00:12:28.121 PDT Mon Jul 5 1993)
our mode client, peer mode server, our poll intvl 128, peer poll intvl 128
root delay 125.50 msec, root disp 115.80, reach 377, sync dist 186.157
delay 7.86 msec, offset 11.176 msec, dispersion 3.62
precision 2**6, version 2
org time AFE252DE.77C29000 (00:12:30.467 PDT Fri Apr 4 1997)
xmt time AFE252DE.72AE40B (00:12:30.481 PDT Fri Apr 4 1997)
filtdelay = 49.21 7.86 8.18 8.80 4.30 4.24 7.58 6.42
filtoffset = 11.30 11.18 11.13 11.28 8.91 9.09 9.27 9.57
filterror = 0.00 1.95 3.91 4.88 5.78 6.76 7.74 8.71
```

Table 18-55 describes the significant fields shown in the display.

**Table 18-54 show ntp associations Field Descriptions (continued)**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configured</td>
<td>Peer was statically configured.</td>
</tr>
<tr>
<td>dynamic</td>
<td>Peer was dynamically discovered.</td>
</tr>
<tr>
<td>our_master</td>
<td>Local machine is synchronized to this peer.</td>
</tr>
<tr>
<td>selected</td>
<td>Peer is selected for possible synchronization.</td>
</tr>
</tbody>
</table>

**Table 18-55 show ntp associations detail Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configured</td>
<td>Peer was statically configured.</td>
</tr>
<tr>
<td>dynamic</td>
<td>Peer was dynamically discovered.</td>
</tr>
<tr>
<td>our_master</td>
<td>Local machine is synchronized to this peer.</td>
</tr>
<tr>
<td>selected</td>
<td>Peer is selected for possible synchronization.</td>
</tr>
</tbody>
</table>
Table 18-55 show ntp associations detail Field Descriptions  (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>candidate</td>
<td>Peer is a candidate for selection.</td>
</tr>
<tr>
<td>sane</td>
<td>Peer passes basic sanity checks.</td>
</tr>
<tr>
<td>insane</td>
<td>Peer fails basic sanity checks.</td>
</tr>
<tr>
<td>valid</td>
<td>Peer time is believed to be valid.</td>
</tr>
<tr>
<td>invalid</td>
<td>Peer time is believed to be invalid.</td>
</tr>
<tr>
<td>leap_add</td>
<td>Peer is signaling that a leap second is added.</td>
</tr>
<tr>
<td>leap-sub</td>
<td>Peer is signaling that a leap second is subtracted.</td>
</tr>
<tr>
<td>unsynced</td>
<td>Peer is not synchronized to any other machine.</td>
</tr>
<tr>
<td>ref ID</td>
<td>Address of the machine to which peer is synchronized.</td>
</tr>
<tr>
<td>time</td>
<td>Last time stamp peer received from its master.</td>
</tr>
<tr>
<td>our mode</td>
<td>Our mode relative to peer (active/passive/client/server/bdcast/bdcast client).</td>
</tr>
<tr>
<td>peer mode</td>
<td>Peer’s mode relative to us.</td>
</tr>
<tr>
<td>our poll ivl</td>
<td>Our poll interval to the peer.</td>
</tr>
<tr>
<td>peer poll ivl</td>
<td>Peer’s poll interval to us.</td>
</tr>
<tr>
<td>root delay</td>
<td>Delay along the path to the root (ultimate stratum 1 time source).</td>
</tr>
<tr>
<td>root disp</td>
<td>Dispersion of the path to the root.</td>
</tr>
<tr>
<td>reach</td>
<td>Peer reachability (bit string in octal).</td>
</tr>
<tr>
<td>sync dist</td>
<td>Peer synchronization distance.</td>
</tr>
<tr>
<td>delay</td>
<td>Round-trip delay to the peer.</td>
</tr>
<tr>
<td>offset</td>
<td>Offset of the peer clock relative to our clock.</td>
</tr>
<tr>
<td>dispersion</td>
<td>Dispersion of the peer clock.</td>
</tr>
<tr>
<td>precision</td>
<td>Precision of the peer clock (in Hz).</td>
</tr>
<tr>
<td>version</td>
<td>NTP version number that peer is using.</td>
</tr>
<tr>
<td>org time</td>
<td>Originate time stamp.</td>
</tr>
<tr>
<td>rcv time</td>
<td>Receive time stamp.</td>
</tr>
<tr>
<td>xmt time</td>
<td>Transmit time stamp.</td>
</tr>
<tr>
<td>filtdelay</td>
<td>Round-trip delay, in milliseconds, of each sample.</td>
</tr>
<tr>
<td>filtoffset</td>
<td>Clock offset, in milliseconds, of each sample.</td>
</tr>
<tr>
<td>filterror</td>
<td>Approximate error of each sample.</td>
</tr>
</tbody>
</table>
To show the status of NTP, use the `show ntp status` EXEC command.

```
show ntp status
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show ntp status` command.

```
Switch# show ntp status
Clock is synchronized, stratum 4, reference is 131.108.13.57
nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**19
reference time is AFE2525E.70597B34 (00:10:22.438 PDT Fri Apr 4 1997)
clock offset is 7.33 msec, root delay is 133.36 msec
root dispersion is 126.28 msec, peer dispersion is 5.98 msec
```

**Table 18-56** shows the significant fields in the display.

**Table 18-56 show ntp status Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>synchronized</td>
<td>System is synchronized to an NTP peer.</td>
</tr>
<tr>
<td>unsynchronized</td>
<td>System is not synchronized to any NTP peer.</td>
</tr>
<tr>
<td>stratum</td>
<td>NTP stratum of this system.</td>
</tr>
<tr>
<td>reference</td>
<td>Address of the peer to which the unit is synchronized.</td>
</tr>
<tr>
<td>nominal freq</td>
<td>Nominal frequency of the system hardware clock.</td>
</tr>
<tr>
<td>actual freq</td>
<td>Measured frequency of the system hardware clock.</td>
</tr>
<tr>
<td>precision</td>
<td>Precision of this system’s clock (in Hz).</td>
</tr>
<tr>
<td>reference time</td>
<td>Reference time stamp.</td>
</tr>
<tr>
<td>clock offset</td>
<td>Offset of our clock to synchronized peer.</td>
</tr>
<tr>
<td>root delay</td>
<td>Total delay along the path to the root clock.</td>
</tr>
<tr>
<td>root dispersion</td>
<td>Dispersion of the root path.</td>
</tr>
<tr>
<td>peer dispersion</td>
<td>Dispersion of the synchronized peer.</td>
</tr>
</tbody>
</table>
show ppp multilink

To display bundle information for the multilink PPP bundles, use the `show ppp multilink` EXEC command.

```
show ppp multilink
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output when no bundles are on a system.

```
impulse# show ppp multilink
No active bundles
```

The following example is sample output when a single multilink PPP bundle (named `rudder`) is on a system.

```
systema# show ppp multilink
Bundle rudder, 3 members, first link is BRI0: B-channel 1
  0 lost fragments, 8 reordered, 0 unassigned, sequence 0x1E/0x1E rcvd/sent
```

The following example is sample output when two active bundles are on a system. Subsequent bundles would be displayed below the previous bundle.

```
impulse# show ppp multilink
Bundle rudder, 3 members, first link is BRI0: B-Channel 1
  0 lost fragments, 8 reordered, 0 unassigned, sequence 0x1E/0x1E rcvd/sent
Bundle dallas, 4 members, first link is BRI2: B-Channel 1
  0 lost fragments, 28 reordered, 0 unassigned, sequence 0x12E/0x12E rcvd/sent
```

The following example shows output when a stack group was created. On stack group member `systema` on stack group `stackq`, multilink PPP bundle `hansolo` has bundle interface `Virtual-Access4`. Two child interfaces are joined to this bundle interface. The first is a local PRI channel (serial 0:4), and the second is an interface from stack group member `systemb`.

```
systema# show ppp multilink
Bundle hansolo 2 members, Master link is Virtual-Access4
  0 lost fragments, 0 reordered, 0 unassigned, 100/255 load
  0 discarded, 0 lost received, sequence 40/66 rcvd/sent
members 2
  Serial0:4
    systemb:Virtual-Access6 (1.1.1.1)
```
show privilege

To display your current level of privilege, use the show privilege EXEC command.

    show privilege

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

The following example is sample output from the show privilege command. The current privilege level is 15.

    Switch# show privilege
    Current privilege level is 15

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable password</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
show processes

To display information about the active processes, use the `show processes` EXEC command.

show processes [cpu]

**Syntax Description**

<table>
<thead>
<tr>
<th>CPU</th>
<th>Displays utilization statistics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpu</td>
<td>Displays detailed route processor utilization statistics. (Catalyst 840 MSR)</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show processes` command.

```
Switch# show processes
CPU utilization for five seconds: 0%/0%; one minute: 0%; five minutes: 0%
PID QTy PC Runtime (ms) Invoked uSecs Stacks TTY Process
  1 M*  0  2156  3194 67510408/12000 0 Exec
  2 Lst 6001EFF0  4532  2266  2000  5808/6000 0 Check heaps
  3 Mst 6004867C  0    2  0    5680/6000 0 Timers
  4 Lwe 600804C0  908  7752 117  5404/6000 0 ARP Input
  5 Mwe 601A05A4  0    1  0    2712/3000 0 OIR Handler
  6 HE  6022A61C  0    1  0    5840/6000 0 ATM OAM input
  7 LE  6022BDA0  0    1  0    5852/6000 0 ATM ARP Input
  8 Lmp 6019F048  0  13593  0    5792/6000 0 Aal5 Reassembly
  9 Mwe 600E0344  0  6798  0    5524/6000 0 CDP Protocol
 10 Lwe 6011C744  0    1  0    5680/6000 0 Probe Input
 11 Mwe 6011C038  0    1  0    5716/6000 0 RARP Input
 12 Hwe 6010B7A0  660  3449 19110648/12000 0 IP Input
 13 Mwe 60138A70  0  13593  0    5764/6000 0 TCP Timer
 14 Lwe 601A674  0    3  0    5640/6000 0 TCP Protocols
 15 Mwe 6026CE40  0    4  0    5696/6000 0 ATM-RT Background
 16 Mwe 60117C78  0    1  0    5544/6000 0 BOOTP Server
 17 Lai 6016B72C  0  1133  0    5788/6000 0 IP Cache Ager
 18 Hwe 602691B8 28    9 3111  5032/6000 0 ILMI Input
 19 Mwe 60263284  8  5    1600  5268/6000 0 ILMI Request
 20 Mwe 60263338  4  5    800  5176/6000 0 ILMI Response
 21 Lwe 602522B4  0    1  0    5828/6000 0 Resource Mgmt ba
 22 Mwe 602496F8  0    2  0    5680/6000 0 ATM OAM Proc
 23 Mwe 6024CA90  0    2  0    5684/6000 0 ATM OAM Ping
 24 Mwe 60203D50  0    7  0    5680/6000 0 ATMISIG Timer
 25 Mwe 6022528C  0  4534  0    5132/6000 0 SSCOP Input
 26 Mwe 6022555C  0  2266  0    5176/6000 0 SSCOP Output
 27 Mst 60225924  0    3  0    5252/6000 0 SSCOP Timer
 28 Mwe 602024D4  0    2  0    5680/6000 0 ATMISIG Input
 29 Mwe 602028E8  0    3  0    5364/6000 0 ATMISIG Output
 30 Mwe 60238488  0    2  0    5688/6000 0 ATM Soft VC Time
 31 Mwe 6029328B  0    2  0    5286/6000 0 IISP router
 32 Mwe 60012040  0    1  0    5720/6000 0 Critical Bkgnd
 33 Mwe 60011E68 36    2  18000 4720/6000 0 Net Background
 34 Lwe 600424F8  0    9  0    5544/6000 0 Logger
```
Examples

The following example is sample output from the `show processes cpu` command.

```
Switch# show processes cpu
CPU utilization for five seconds: 0%/0%; one minute: 0%; five minutes: 0%
```

<table>
<thead>
<tr>
<th>PID</th>
<th>Runtime(ms)</th>
<th>Invoked</th>
<th>uSecs</th>
<th>5Sec</th>
<th>1Min</th>
<th>5Min</th>
<th>TTY</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2180</td>
<td>3212</td>
<td>678</td>
<td>0.00%</td>
<td>0.03%</td>
<td>0.07%</td>
<td>0</td>
<td>Exec</td>
</tr>
<tr>
<td>2</td>
<td>4536</td>
<td>2268</td>
<td>2000</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Check heaps</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Timers</td>
</tr>
<tr>
<td>4</td>
<td>912</td>
<td>7787</td>
<td>117</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ARP Input</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>OIR Handler</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM OAM input</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM ARP Input</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>13605</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Aal5 Reassembly Tim</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>6804</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>CDP Protocol</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Probe Input</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>RARP Input</td>
</tr>
<tr>
<td>12</td>
<td>660</td>
<td>3452</td>
<td>191</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>IP Input</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>13605</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>TCP Timer</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>TCP Protocols</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM-RT Background</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>BOOTP Server</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>1134</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>IP Cache Ager</td>
</tr>
<tr>
<td>18</td>
<td>28</td>
<td>9</td>
<td>3111</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ILM1 Input</td>
</tr>
<tr>
<td>19</td>
<td>8</td>
<td>5</td>
<td>1600</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ILM1 Request</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>5</td>
<td>800</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ILM1 Response</td>
</tr>
<tr>
<td>21</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Resource Mgmt backg</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATMCORE OAM Process</td>
</tr>
<tr>
<td>23</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATMCORE OAM Ping Rc</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM SIG Timer</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
<td>4538</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>SSCOP Input</td>
</tr>
<tr>
<td>26</td>
<td>0</td>
<td>2268</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>SSCOP Output</td>
</tr>
<tr>
<td>27</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>SSCOP Timer</td>
</tr>
<tr>
<td>28</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM SIG Input</td>
</tr>
<tr>
<td>29</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM SIG Output</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>ATM Soft VC Timer</td>
</tr>
<tr>
<td>31</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>IISP router</td>
</tr>
<tr>
<td>32</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Critical Bkgnd</td>
</tr>
<tr>
<td>33</td>
<td>36</td>
<td>2</td>
<td>18000</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Net Background</td>
</tr>
<tr>
<td>34</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Logger</td>
</tr>
<tr>
<td>35</td>
<td>4</td>
<td>68023</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>TTY Background</td>
</tr>
<tr>
<td>36</td>
<td>2100</td>
<td>62522</td>
<td>33</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>Net Input</td>
</tr>
<tr>
<td>37</td>
<td>13596</td>
<td>1134</td>
<td>11989</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0</td>
<td>Per-minute Jobs</td>
</tr>
</tbody>
</table>

Table 18-57 describes the significant fields shown in the two displays.

**Table 18-57 show processes Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>utilization for five seconds</td>
<td>CPU utilization for the last 5 seconds, 1 minute, and 5 minutes.</td>
</tr>
<tr>
<td>route processor utilization for five seconds (Catalyst 8540 MSR)</td>
<td>CPU utilization for the last 5 seconds, 1 minute, and 5 minutes.</td>
</tr>
<tr>
<td>PID</td>
<td>Process ID.</td>
</tr>
</tbody>
</table>
Table 18-57 show processes Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>Process queue priority. Possible values are: H (high), M (medium), L (low).</td>
</tr>
<tr>
<td>Ty</td>
<td>Scheduler test. Possible values: * (currently running), E (waiting for an event), S (ready to run, voluntarily relinquished processor), rd (ready to run, wakeup conditions occurred), we (waiting for an event), sa (sleeping until a timer expires), xx (dead; the process has terminated, but has not yet been deleted).</td>
</tr>
<tr>
<td>PC</td>
<td>Current program counter.</td>
</tr>
<tr>
<td>Runtime (ms)</td>
<td>CPU time the process has used, in milliseconds.</td>
</tr>
<tr>
<td>Invoked</td>
<td>Number of times the process has been invoked.</td>
</tr>
<tr>
<td>uSecs</td>
<td>Microseconds of CPU time for each process invocation.</td>
</tr>
<tr>
<td>Stacks</td>
<td>Low water mark/total stack space available (in bytes).</td>
</tr>
<tr>
<td>TTY</td>
<td>Terminal that controls the process.</td>
</tr>
<tr>
<td>Process</td>
<td>Name of process.</td>
</tr>
<tr>
<td>five seconds</td>
<td>CPU utilization by task in last 5 seconds (in hundredths of seconds).</td>
</tr>
<tr>
<td>one minute</td>
<td>CPU utilization by task in last minute (in hundredths of seconds).</td>
</tr>
<tr>
<td>five minutes</td>
<td>CPU utilization by task in last 5 minutes (in hundredths of seconds).</td>
</tr>
</tbody>
</table>

Note: Because the network server has a 4-ms clock resolution, run times are considered reliable only after a large number of invocations or a reasonable, measured run time.
show processes memory

To show memory utilization, use the `show processes memory` EXEC command.

```
show processes memory
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show processes memory` command.

```
Switch# show processes memory
Total: 10887088, Used: 3249408, Free: 7637680

        PID    TTY  Allocated    Freed    Holding     Getbufs    Retbufs    Process
       0       0    45016     300      32056        0        0    *Init*
       0       0     300     38640     30512        0        0    *Sched*
       0       0   1649012  107596  2956340  1715216        0    *Dead*
       1       0   254992  253508  14144        0        0      Exec
       2       0       0     6660        0        0      Check heaps
       3       0       0  92        92        0        0       Timers
       4       0       0  92        0  6752        0        0     ARP Input
       5       0       0  92        0  3752        0        0     OIR Handler
       6       0       0       0  6660        0        0  ATM OAM input
       7       0       0       0  6660        0        0  ATM ARP Input
       8       0       0       0  6660        0        0     Aal5 Reassembly
       9       0       0  332        92  6900        0        0   CDP Protocol
      10       0      228       0  6888        0        0      Probe Input
      11       0      228       0  6752        0        0      RARP Input
      12       0      204       0  12864        0        0       IP Input
      13       0       0       0  6660        0        0      TCP Timer
      14       0      728       0  7388        0        0   TCP Protocols
      15       0     184     92    6752        0        0  ATM-RT Backgrod
      16       0     528       0  7188        0        0      BOOFP Server
      17       0       0       0  6660        0        0     IP Cache Aggr
      18       0    37576  37056  6788        0        0      ILM Input
      19       0    10164  8360    6752        0        0      ILM Request
      20       0     1688    6956    6844        0        0      ILM Response
      21       0       0       0  6660        0        0  Resource Mgmt d
      22       0     184     92    6752        0        0  ATMCOORE OAM Prs
      23       0     184     92    6752        0        0  ATMCOORE OAM Pis
      24       0      92     92    6660        0        0    ATMSIG Timer
      25       0     184     92    6752        0        0  SCCOP Input
      26       0     184     92    6752        0        0  SCCOP Output
      27       0      92     92    6660        0        0  SCCOP Timer
      28       0     184     92    6752        0        0    ATMSIG Input
      29       0     796    1512    7364        0        0    ATMSIG Output
      30       0      92     92    6660        0        0  ATM Soft VC Tir
      31       0     628     92    7196        0        0      IISIP router
      32       0     128       0  6844        0        0      Critical Bkgnd
```
Table 18-58 describes the significant fields shown in the display.

**Table 18-58 show processes memory Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Total amount of memory held.</td>
</tr>
<tr>
<td>PID</td>
<td>Process ID.</td>
</tr>
<tr>
<td>TTY</td>
<td>Terminal that controls the process.</td>
</tr>
<tr>
<td>Allocated</td>
<td>Sum of all memory that the process has requested from the system.</td>
</tr>
<tr>
<td>Freed</td>
<td>How much memory a process has returned to the system.</td>
</tr>
<tr>
<td>Holding</td>
<td>Allocated memory minus freed memory. A value can be negative when it has freed more than it was allocated.</td>
</tr>
<tr>
<td>Process</td>
<td>Process name.</td>
</tr>
<tr>
<td><em>Init</em></td>
<td>System initialization.</td>
</tr>
<tr>
<td><em>Sched</em></td>
<td>The scheduler.</td>
</tr>
<tr>
<td><em>Dead</em></td>
<td>Processes (as a group) that are now dead.</td>
</tr>
</tbody>
</table>
show protocols

To display the configured protocols, use the show protocols EXEC command.

    show protocols [type card/subcard/port]

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>Specifies an interface type as <strong>atm</strong>, <strong>atm-p</strong>, <strong>cbr</strong>, <strong>ethernet</strong>, or <strong>null</strong>.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard and port numbers for the interface-type.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New document</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command shows the global and interface-specific status of any configured IP protocol.

**Examples**

The following example is sample output from the show protocols command.

```
Switch# show protocols
Global values:
    ATM0 is up, line protocol is up
        Internet address is 1.2.2.2 255.0.0.0
    Ethernet0 is up, line protocol is up
        Internet address is 172.20.40.43 255.255.255.0
    ATM3/0/0 is up, line protocol is up
    ATM3/0/1 is down, line protocol is down
    ATM3/0/2 is down, line protocol is down
    ATM3/0/3 is up, line protocol is up
```
show qos switching

To show whether QoS mapping is enabled on the device, use the `show qos switching` command.

```
show qos switching
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Examples**

The following example shows how to display whether QoS mapping is enabled using the `show qos switching` command.

```
8500CSR# show qos switching
QoS Based IP Switching enabled
```

**Related Commands**

`show qos mapping`
show qos mapping

To show the QoS mapping in effect at the system or interface level, use the `show qos mapping` command.

```
show qos mapping [source source-int] [destination dest-int]
```

**Syntax Description**

- `source-int` Source interface from which you want to display QoS mapping; optional.
- `dest-int` Destination interface to which you want to display QoS mapping; optional.

**Command Modes**

Privileged EXEC

**Examples**

The following example shows how to display the system-level QoS mapping using the `show qos mapping` command.

```
8500CSR# show qos mapping
Precedence WRR-Weight
  0  1
  1  2
  2  4
  3  8
```

**Related Commands**

- `show qos switching`
show redundancy (Catalyst 8540 MSR)

To list all redundancy-related information, use the show redundancy EXEC command.

    show redundancy

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release                Modification
12.0(3c)W5(9)          New command
12.1(19)EB             Added “Last switchover duration” and counter status to display

Usage Guidelines

This command is available on the primary route processor only.

Examples

The following example shows how to list redundancy information for an ATM switch router.

Switch# show redundancy
This CPU is the PRIMARY
Primary
--------
Slot:                          4
CPU Uptime:                    25 minutes
ILMI sysUpTime:                25 minutes
Image:                         PNNI Software (cat8540m-WP-M), Experimental
Version 12.1(20030605:120716) [mumahesh-counters-5june 163]

Time Since :
    Last Running Config. Sync:   21 minutes
    Last Startup Config. Sync:   21 minutes
Module Syncs are ENABLED
Init Sync is Complete
Interface counters syncs are DISABLED
VC counters syncs are DISABLED
Signaling counters syncs are DISABLED
Last Restart Reason: Switch Over
Time since switchover:         1 minute
Last Switchover duration:      52 seconds

Secondary
--------
State:                          UP
Slot:                          8
Uptime:                        23 minutes
Image:                         PNNI Software (cat8540m-WP-M), Experimental
Version 12.1(20030605:120716) [mumahesh-counters-5june 163]
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>redundancy</td>
<td>Switches to the redundancy mode.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
</tbody>
</table>
show registry

To show the function registry information, use the `show registry` EXEC command.

```
show registry [registry-name [registry-num] [brief]] [brief | statistics]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>registry-name</td>
<td>Name of the registry to examine.</td>
</tr>
<tr>
<td>registry-num</td>
<td>Number of the registry to examine.</td>
</tr>
<tr>
<td>brief</td>
<td>Displays limited functions and services information.</td>
</tr>
<tr>
<td>statistics</td>
<td>Displays function registry statistics.</td>
</tr>
</tbody>
</table>

### Defaults

Brief

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Examples

The following example is sample output from the `show registry` command.

```
Switch# show registry atm 0
Registry objects: 1799 bytes: 213412

--
Registry 23: ATM Registry
  Service 23/0: Stub service with 5 arguments 0x6025E890
  Service 23/1: Stub service with 4 arguments 0x602649A0
  Service 23/2: Stub service with 3 arguments 0x60264B20
  Service 23/3: Stub service with 1 argument 0x60263790
  Service 23/4: Stub service with 1 argument 0x60261C30
  Service 23/5: Stub service with 1 argument 0x60261CC0
  Service 23/6: Stub service with 1 argument 0x60261E78
  Service 23/7: Stub service with 2 arguments 0x60262038
```
Service 23/8:
Stub service with 1 argument
0x602620C0
Service 23/9:
Stub service with 2 arguments
0x6023F610
Service 23/10:
List service with 1 argument
0x602677A4
0x60212F0C
0x60233CA4
Service 23/11:
Stub service with 1 argument
Service 23/12:
Case service with 1 argument, 7 maximum cases
3 0x6027CFCC
6 0x602120B8
default 0x60211BA8
Service 23/13:
Stub service with 1 argument
0x602650C0
Service 23/14:
Stub service with 1 argument

Examples

The following example is sample output of a brief show display command.

Switch# show registry atm 3/0/0 brief
Registry objects: 1799 bytes: 213412

Registry 23: ATM Registry
Service 23/0:
Service 23/1:
Service 23/2:
Service 23/3:
Service 23/4:
Service 23/5:
Service 23/6:
Service 23/7:
Service 23/8:
Service 23/9:
Service 23/10:
Service 23/11:
Service 23/12:
Service 23/13:
Service 23/14:

Registry 25: ATM routing Registry
Service 25/0:
show reload

To display the reload status on the switch, use the show reload EXEC command.

show reload

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use show reload command to display a pending software reload.

Examples

The following show reload command represents a reload scheduled for 12:00 a.m. (midnight) on Saturday, April 20, 1998.

Switch# show reload
Reload scheduled for 00:00:00 PDT Sat April 20 1998 (in 12 hours and 12 minutes)

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reload</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show rhosts

To display information about current remote hosts, use the **show rhosts** EXEC command.

```
show rhosts
```

### Syntax Description

This command has no keywords or arguments

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use this command to display information about current users on the remote host. The information shows the local user, the host address, and the remote user.

### Examples

The following example is sample output from the **show rhosts** EXEC command.

```
Switch# show rhosts
Local user Host Remote user
jhunt 171.69.194.9 jhunt
```
show rif

To display the current contents of the RIF cache, use the `show rif` privileged EXEC command.

```
show rif
```

**Syntax Description**
This command has no arguments or keywords.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**
The following example is sample output from the `show rif` command:

```
Switch# show rif
Codes: * interface, - static, + remote
Hardware Addr  How   Idle (min)  Routing Information Field
5A00.0000.2333 atm0               3   08B0.0101.2201.0FF0
5B01.0000.4444 -                  -   -
0000.1403.4800 atm0               0   -
0000.2805.4C00 atm0               *   -
0000.2807.4C00 atm0               *   -
0000.28A8.4800 atm0               0   -
0077.2201.0001 atm0               10  0830.0052.2201.0FF0
```

In the display, entries marked with an asterisk (*) are the interface addresses of the router. Entries marked with a dash (-) are static entries. Entries with a number indicate cached entries. If the RIF timeout is set to a value other than the default of 15 minutes, the timeout is displayed at the top of the display. Table 18-59 describes the significant fields shown in the display.

### Table 18-59 show rif Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Addr</td>
<td>MAC address for this entry.</td>
</tr>
<tr>
<td>How</td>
<td>Describes how the RIF has been learned. Possible values are atm0 or “-”.</td>
</tr>
<tr>
<td>Idle (min)</td>
<td>Indicates how long (in minutes) since the last response was received directly from this node.</td>
</tr>
<tr>
<td>Routing Information Field</td>
<td>RIF number.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>multiring</code></td>
<td>Enables collection and use of RIF information on a subinterface.</td>
</tr>
<tr>
<td><code>rif</code></td>
<td>Enters static source-route information into the routing information field (RIF) cache.</td>
</tr>
</tbody>
</table>
show rmon alarms

To display the contents of the switch’s RMON alarm table, use the show rmon alarms EXEC command.

**show rmon alarms**

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
For additional information, refer to the RMON MIB described in RFC 1757.

You must have first enabled RMON on the interface, and configured RMON alarms to display alarm information with the show rmon alarms command.

**Examples**
The following example is sample output from the show rmon alarms command.

```
Switch# show rmon alarms
Alarm 2 is active, owned by manager1
Monitors ifEntry.1.1 every 30 seconds
Taking delta samples, last value was 0
Rising threshold is 15, assigned to event 12
Falling threshold is 0, assigned to event 0
On startup enable rising or falling alarm
```

Table 18-60 describes the fields shown in the display.

**Table 18-60 show rmon alarms Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm 2 is active, owned by manager1</td>
<td>Unique index into the alarmTable, showing the alarm status is active, and the owner of this row, as defined in the RMON alarmTable.</td>
</tr>
<tr>
<td>Monitors ifEntry.1.1 every 30 seconds</td>
<td>Object identifier of the particular variable to be sampled. Equivalent to alarmVariable in RMON.</td>
</tr>
<tr>
<td>Taking delta samples</td>
<td>Interval in seconds over which the data is sampled and compared with the rising and falling thresholds. Equivalent to alarmInterval in RMON.</td>
</tr>
<tr>
<td>Taking delta samples</td>
<td>Method of sampling the selected variable and calculating the value to be compared against the thresholds. Equivalent to alarmSampleType in RMON.</td>
</tr>
</tbody>
</table>
### Table 18-60 show rmon alarms Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>last value was</td>
<td>Value of the statistic during the last sampling period. Equivalent to alarmValue in RMON.</td>
</tr>
<tr>
<td>Rising threshold is</td>
<td>Threshold for the sampled statistic. Equivalent to alarmRisingThreshold in RMON.</td>
</tr>
<tr>
<td>assigned to event</td>
<td>Index of the eventEntry that is used when a rising threshold is crossed. Equivalent to alarmRisingEventIndex in RMON.</td>
</tr>
<tr>
<td>Falling threshold is</td>
<td>Threshold for the sampled statistic. Equivalent to alarmFallingThreshold in RMON.</td>
</tr>
<tr>
<td>assigned to event</td>
<td>Index of the eventEntry that is used when a falling threshold is crossed. Equivalent to alarmFallingEventIndex in RMON.</td>
</tr>
<tr>
<td>On startup enable rising or falling alarm</td>
<td>Alarm that may be sent when this entry is first set to valid. Equivalent to alarmStartupAlarm in RMON.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rmon alarm</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show rmon events

To display the contents of the switches RMON event table, use the `show rmon events` EXEC command.

```
show rmon events
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

`EXEC`

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

For additional information, refer to the RMON MIB described in RFC 1757.

You must have first enabled RMON on the interface, and configured RMON events to display alarm information with the `show rmon events` command.

**Examples**

The following example is sample output from the `show rmon events` command.

```
 Switch# show rmon events
 Event 12 is active, owned by manager1
   Description is interface-errors
   Event firing causes log and trap to community rmonTrap, last fired 00:00:00
```

Table 18-61 describes the fields shown in the display.

**Table 18-61 show rmon events Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event 12 is active, owned by manager 1</td>
<td>Unique index into the eventTable, showing the event status is active, and the owner of this row, as defined in the eventTable of RMON.</td>
</tr>
<tr>
<td>Description is interface-errors</td>
<td>Type of event, in this case an interface error.</td>
</tr>
<tr>
<td>Event firing causes log and trap</td>
<td>Type of notification that the switch makes about this event. Equivalent to eventType in RMON.</td>
</tr>
<tr>
<td>community rmonTrap</td>
<td>If an SNMP trap is sent, it is sent to the SNMP community specified by this octet string. Equivalent to eventCommunity in RMON.</td>
</tr>
<tr>
<td>last fired</td>
<td>Last time the event was generated.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rmon event</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
**show running-config**

To display the configuration information currently running on the switch, use the `show running-config` EXEC command. This command replaces the `write terminal` command.

```
show running-config
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>Modified: Replaced <code>write terminal</code>.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use this command in conjunction with the `show startup-config` command to compare the information in running memory to the information stored in a location specified by the `config_file` environment variable. This variable specifies the configuration file used for initialization (startup). Use the `bert (Catalyst 8510 MSR and LightStream 1010)` command in conjunction with the `copy running-config startup-config` command to set the `config_file` environment variable.

**Examples**

The following example shows how to display the running configuration.

```
Switch# show running-config
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch
!
boot host tftp dplatzi dummy.cfg 172.20.52.3
boot network tftp dplatzi dummy.cfg 172.20.52.3
boot system tftp dplatzi dummy.cfg 172.20.52.3
boot system flash cat8540m-wp-mz.120-2.5.0w.7.20
logging buffered 4096 debugging
enable password lab
!
no facility-alarm core-temperature major
no facility-alarm core-temperature minor
redundancy
main-cpu
    sync config startup
    sync config running
no ip subnet-zero
ip host-routing
```
show running-config

! atm address 47.0091.8100.0000.0090.2156.d801.0090.2156.d801.00
atm address 47.0091.8100.0000.0040.0b0a.c501.0040.0b0a.c501.00
atm router pnni
  no aesa embedded-number left-justified
  node 1 level 56 lowest
  redistribute atm-static
!
! lane database x
  sgcp
!
! interface Tunnel0
  no ip address
  no ip directed-broadcast
!
interface ATM0
  no ip address
  no ip directed-broadcast
  atm service-class 8 wrr-weight 15
  atm maxvp-number 0
!
interface Ethernet0
  ip address 172.20.52.11 255.255.255.224
  no ip directed-broadcast
!
interface Async1
  no ip address
  no ip directed-broadcast
  hold-queue 10 in
!
  ip default-gateway 172.20.52.1
  ip classless
!
! atm pnni explicit-path identifier 1 name LS1010.path enable
  next-node LS1010 port 81901001
  next-node dallas
  next-node NewLs1010
!
! atm pnni explicit-path identifier 2 name newpath enable
!
! atm pnni explicit-path identifier 5 name test enable
!
line con 0
  no exec
  exec-timeout 0 0
  transport input none
line aux 0
  exec-timeout 0 0
line vty 0 4
  exec-timeout 0 0
  password lab
  no login
!
end

Related Commands
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bert (Catalyst 8510 MSR and LightStream 1010)</td>
<td>Checks the bit errors on a line for a specified interval.</td>
</tr>
<tr>
<td>copy running-config</td>
<td>Copies the switch’s running configuration file to another destination.</td>
</tr>
<tr>
<td>copy startup-config</td>
<td>Copies the switch’s startup configuration file to another destination.</td>
</tr>
<tr>
<td>show startup-config</td>
<td>Shows the configuration file pointed to by the <code>config_file</code> environment variable.</td>
</tr>
</tbody>
</table>
show sdm address

To display information regarding the Label Forwarding Information Base (LFIB) or Tag Forwarding Information Base (TFIB) entry address as well as additional label information, use the `show sdm address` command.

```
show sdm address sdm_physical_address interface interface_type interface_name
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sdm_physical_address</code></td>
<td>Specifies the SDM physical address.</td>
</tr>
<tr>
<td><code>interface</code></td>
<td>Specifies the interface type for the SDM address.</td>
</tr>
<tr>
<td><code>interface_type</code></td>
<td></td>
</tr>
<tr>
<td><code>interface_name</code></td>
<td>Specifies the interface name for the SDM address.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

In the following example, the LFIB for Gigabit Ethernet 10/0/0 is revealed in the `show sdm address` output:

```
Router# show sdm address 1001D int gigabit ethernet 10/0/0
Value @ 0x0001001D - 0x83DF0000:0x00000028
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show sdm entry</code></td>
<td>Displays a specific TCAM entry.</td>
</tr>
<tr>
<td><code>show sdm label</code></td>
<td>Displays information about the label stack.</td>
</tr>
<tr>
<td><code>show sdm lfib</code></td>
<td>Displays the LFIB or TFIB entry address and label values for all labels in a stack.</td>
</tr>
<tr>
<td><code>show sdm vrf</code></td>
<td>Displays detailed or summary information for each vrf ip-prefix entry in all or particular buckets for a specific interface.</td>
</tr>
</tbody>
</table>
show sdm entry

To display information about a specific ternary content addressable memory (TCAM) entry, use the `show sdm entry` command.

```
show sdm entry sdm_entry interface interface_type interface_number
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sdm_entry</code></td>
<td>Specifies the SDM address to monitor.</td>
</tr>
<tr>
<td><code>interface</code></td>
<td>Specifies the interface type and the interface name for the SDM entry that is being monitored.</td>
</tr>
<tr>
<td><code>interface_type</code></td>
<td>Specifies the interface number for the SDM entry that is being monitored.</td>
</tr>
<tr>
<td><code>interface_number</code></td>
<td>Specifies the interface number for the SDM entry that is being monitored.</td>
</tr>
</tbody>
</table>

**Defaults**
None.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
None

**Examples**

The following example shows output for the `show sdm entry` command when a unique entry and interface are specified:

```
Router# show sdm entry 2105 interface gigabit ethernet 10/0/0
SDM Entry at address 0x2105 -
Region :IP Adjacency
Status :Used
Key    :0x0C010102 Class :0x1
Mask   :0xFFFFFFFF:0xFFFFFFFF Class :0x7
U-info :0x00603E20:0x90400081
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show sdm address</code></td>
<td>Displays the LFIB or TFIB entry address.</td>
</tr>
<tr>
<td><code>show sdm label</code></td>
<td>Displays information about the label stack.</td>
</tr>
<tr>
<td><code>show sdm lfib</code></td>
<td>Displays the LFIB or TFIB entry address and label values for all labels in a stack.</td>
</tr>
<tr>
<td><code>show sdm vrf</code></td>
<td>Displays detailed or summary information for each vrf ip-prefix entry in all or particular buckets for a specific interface.</td>
</tr>
</tbody>
</table>
show sdm internal

To display SDM management information for each protocol region in TCAM, use the `show sdm internal` EXEC command. The information includes SDM status, minimum TCAM size available, and the TCAM size required for the configuration. For each application region, this command also yields information about the logical start and end of the application region in TCAM, lookup type, key size, and statistics about other key operations.

```
show sdm internal { all-region | ip-adjacency | ip-multicast | ip-prefix | ipx-network | ipx-node }
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all-region</td>
<td>Displays SDM management information for all the protocol regions in TCAM.</td>
</tr>
<tr>
<td>ip-adjacency</td>
<td>Displays SDM management information for the ip-adjacency protocol region in TCAM.</td>
</tr>
<tr>
<td>ip-multicast</td>
<td>Displays SDM management information for the ip-multicast protocol region in TCAM.</td>
</tr>
<tr>
<td>ip-prefix</td>
<td>Displays SDM management information for the ip-prefix protocol region in TCAM.</td>
</tr>
<tr>
<td>ipx-network</td>
<td>Displays SDM management information for the ipx-network protocol region in TCAM.</td>
</tr>
<tr>
<td>ipx-node</td>
<td>Displays SDM management information for the ipx-node protocol region in TCAM.</td>
</tr>
</tbody>
</table>

### Command Modes

Privileged EXEC

### Examples

The following example is sample output from the `show sdm internal` command:

```
Router# show sdm internal all-region
Address Map    : Ready
Status         : Ready
TCAM Minimum Size  : 262144 entries
TCAM Required Size : 29248 entries
SRAM Sz        : 481280 entries
TCAM Start     : 32
Xinfo Start    : 262144
Xinfo Size     : 225536
Name           : IPX BVI Network
Size           : 32
MinSize        : 32
MaxSize        : 32
FreeKey        : 0x0
Start          : 0x20
End            : 0x3F
Entry          : 32-bit
Lookup         : Exact-Match
Events         :
Insert         : Success 0 Failure 0
Delete         : Success 0 Failure 0
Modify         : Success 0 Failure 0
IPCs           :
```

OL-7395-01, Cisco IOS Release 12.1(26)EB
show sdm internal

Name: IP Adjacency
Size: 2048
MinSize: 32
MaxSize: 65536
FreeKey: 0xEEEEEEEE
Start: 0x40
End: 0x83F
Entry: 32-bit
Lookup: Exact-Match
Events:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
Move: Success 0 Failure 0
Mask RW: Success 0 Failure 0

Name: IPX Node
Size: 2048
MinSize: 32
MaxSize: 65536
FreeKey: 0xF0000000
Start: 0x840
End: 0x183E
Entry: 64-bit
Lookup: Exact-Match
Events:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
Move: Success 0 Failure 0
Mask RW: Success 0 Failure 0

Name: IP Prefix
Size: 8192
MinSize: 32
MaxSize: 262144
FreeKey: 0xEEEEEEEEEEEEEEEE
Start: 0x1840
End: 0x383F
Entry: 32-bit
Lookup: Longest-Match
Buckets: 33
Events:
Insert: Success 9 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 9 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0

Name: IP Adjacency
Size: 2048
MinSize: 32
MaxSize: 65536
FreeKey: 0xEEEEEEEE
Start: 0x40
End: 0x83F
Entry: 32-bit
Lookup: Exact-Match
Events:
Insert: Success 5 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 5 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
Move: Success 0 Failure 0
Mask RW: Success 0 Failure 0

Name: IPX Node
Size: 2048
MinSize: 32
MaxSize: 65536
FreeKey: 0xF0000000
Start: 0x840
End: 0x183E
Entry: 64-bit
Lookup: Exact-Match
Events:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 0 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
Move: Success 0 Failure 0
Mask RW: Success 0 Failure 0

Name: IP Prefix
Size: 8192
MinSize: 32
MaxSize: 262144
FreeKey: 0xEEEEEEEEEEEEEEEE
Start: 0x1840
End: 0x383F
Entry: 32-bit
Lookup: Longest-Match
Buckets: 33
Events:
Insert: Success 9 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
IPCs:
Insert: Success 9 Failure 0
Delete: Success 0 Failure 0
Modify: Success 0 Failure 0
Move : Success 0 Failure 0
Mask RW : Success 0 Failure 0

Name : IPX Network
Size : 6144
MinSize : 32
MaxSize : 65536
FreeKey : 0x0
Start : 0x3840
End : 0x503F
Entry : 32-bit
Lookup : Exact-Match
Events :
Insert : Success 2 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
IPCs :
Insert : Success 2 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
Move : Success 0 Failure 0
Mask RW : Success 0 Failure 0

Name : IP Multicast
Size : 3072
MinSize : 16
MaxSize : 65536
FreeKey : 0x0F0000000F0000000
Start : 0x5040
End : 0x683E
Entry : 64-bit
Lookup : Longest-Match
Buckets : 34
Events :
Insert : Success 3 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
IPCs :
Insert : Success 3 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
Move : Success 0 Failure 0
Mask RW : Success 0 Failure 0

Name : UDP Flooding
Size : 256
MinSize : 256
MaxSize : 256
FreeKey : 0x0F00000000
Start : 0x6840
End : 0x6A3E
Entry : 64-bit
Lookup : Exact-Match
Events :
Insert : Success 0 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
IPCs :
Insert : Success 0 Failure 0
Delete : Success 0 Failure 0
Modify : Success 0 Failure 0
Move : Success 0 Failure 0
Mask RW : Success 0 Failure 0
Name : MAC Addr
Size  : 1024
MinSize : 64
MaxSize : 65536
FreeKey : 0x0
Start   : 0x6A40
End     : 0x723E
Entry   : 64-bit
Lookup  : Reserved
show sdm label

To display information regarding the label stack in the labeling forwarding information base (LFIB) on the router, use the `show sdm lfib` command.

```
show sdm label [top_label]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>top_label</code></td>
<td>Specifies the top label of a specific label stack to display.</td>
</tr>
</tbody>
</table>

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

None

**Examples**

In the following example, the SDM label information is displayed for the router:

```
Router# show sdm label
TCAM-ADDR   ADJ-ADDR    LABEL-STACK
143DF       2106        0001A000
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show sdm address</code></td>
<td>Displays the LFIB or TFIB entry address.</td>
</tr>
<tr>
<td><code>show sdm entry</code></td>
<td>Displays a specific TCAM entry.</td>
</tr>
<tr>
<td><code>show sdm lfib</code></td>
<td>Displays the LFIB or TFIB entry address and label values for all labels in a stack.</td>
</tr>
<tr>
<td><code>show sdm vrf</code></td>
<td>Displays detailed or summary information for each vrf ip-prefix entry in all or particular buckets for a specific interface.</td>
</tr>
</tbody>
</table>
show sdm lfib

To display the LFIB or TFIB entry address and label values for the labels in a stack, use the show sdm lfib command.

show sdm lfib [all | summary] [inlabel label-value] [all | summary] [inlabel label_value]

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Displays detailed information for the labels in the stack.</td>
</tr>
<tr>
<td>summary</td>
<td>Displays summary information for a particular incoming label.</td>
</tr>
<tr>
<td>inlabel</td>
<td>Specifies the specific label to display.</td>
</tr>
</tbody>
</table>

Defaults

None

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>This command was introduced.</td>
</tr>
</tbody>
</table>

Usage Guidelines

The show sdm lfib command can be used to gather information for all entries in an LFIB or TFIB table for a particular incoming label or for all incoming labels.

This command output provides the following information: Entry Address, Incoming Label, and Outgoing Label Stack.

Examples

In the following example, the show sdm lfib command is used to display all of the LFIB or TFIB entries available on the router.

Router# show sdm lfib
TCAM-ADDR LOCAL LABEL-STACK
10030 48
1002F 47
1002E 46
1002D 45
1002C 44
1002B 43
1002A 42
10029 41
10028 40
10027 39
10026 38
10025 37
10024 36
10023 35
10022 34
10021 33
10020 32
### show sdm lfib

<table>
<thead>
<tr>
<th>LFIB Entry</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001F</td>
<td>31</td>
</tr>
<tr>
<td>1001E</td>
<td>30</td>
</tr>
<tr>
<td>1001D</td>
<td>29</td>
</tr>
<tr>
<td>1001C</td>
<td>28</td>
</tr>
<tr>
<td>1001B</td>
<td>27</td>
</tr>
<tr>
<td>1001A</td>
<td>26</td>
</tr>
</tbody>
</table>

1001D is 29 with a 0001A000 prefix.

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show sdm address</td>
<td>Displays the LFIB or TFIB entry address.</td>
</tr>
<tr>
<td>show sdm entry</td>
<td>Displays a specific TCAM entry.</td>
</tr>
<tr>
<td>show sdm label</td>
<td>Displays information about the label stack.</td>
</tr>
<tr>
<td>show sdm vrf</td>
<td>Displays detailed or summary information for each vrf ip-prefix entry in all or particular buckets for a specific interface.</td>
</tr>
</tbody>
</table>
show sdm size

To display the size of TCAM and the size of each protocol region, use the `show sdm size` EXEC command. The size is shown as number of entries.

```
show sdm size
```

**Syntax Description**

This command does not have any keywords or arguments.

**Command Modes**

Privileged EXEC

**Examples**

The following example is sample output from the `show sdm size` command:

```
Router# show sdm size
Switching Database Region Sizes :
  IPX BVI Network       :32  32-bit entries
  IP Adjacency          :2048 32-bit entries
  IPX Node              :2048 64-bit entries
  IP Prefix             :8192 32-bit entries
  IPX Network           :6144 32-bit entries
  IP Multicast          :1072 64-bit entries
  UDP Flooding          :256 64-bit entries
  MAC Addr              :1024 64-bit entries
  Access List           :512 128-bit entries
```
**show sdm vrf**

To display detailed or summary information for each VRF IP-prefix entry in all buckets or for a particular bucket on a specific interface, use the `show sdm vrf` command.

```
show sdm vrf vrf_instance_name [all | interface | summary] [bucket bucket_id_number] [vrf vrf_instance_name] [all | summary] [bucket bucket_id_number] [interface interface-number [all | summary] [bucket bucket_id_number]
```

**Syntax Description**

- **all** Specifies detailed output information.
- **summary** Specifies summary output information.
- **bucket bucket_id_number** Specifies information about a specific bucket.
- **vrf vrf_instance_name** Specifies information for all or a particular bucket on a specific Virtual Private Network (VPN).
- **interface interface-number** Specifies information for all or a particular bucket on a specific interface.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

- **Release** 12.1(7a)EY: This command was introduced.

**Usage Guidelines**

The `show sdm vrf` command displays detailed or summary information for a bucket, a bucket for a specified VPN, or a bucket for a specified interface. The user can choose to view output for all buckets or to specify a single bucket to monitor.

**Examples**

In the following example, the `show sdm vrf` command is used to show all information on a particular VRF.

```
Switch# show sdm vrf vpn1 all
SDM VRF table entries for vrf: vpn1(tableid 1)
-------------------------------------------------        
IP-PREFIX               TCAM-ADDRESS    STATE     
-------------------------------------------------        
[Bucket 0] 255.255.255.255               48DC          Used
0.0.0.0          48DE          Used
[Bucket 8] 224.0.0.0                     48E0          Used
[Bucket 16] [Bucket 32]
Switch#
```
# show sdm vrf

## Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show sdm address</td>
<td>Displays the LFIB or TFIB entry address.</td>
</tr>
<tr>
<td>show sdm entry</td>
<td>Displays a specific TCAM entry.</td>
</tr>
<tr>
<td>show sdm label</td>
<td>Displays information about the label stack.</td>
</tr>
<tr>
<td>show sdm lfib</td>
<td>Displays the LFIB or TFIB entry address and label values for all labels in a stack.</td>
</tr>
</tbody>
</table>
show sessions

To display information about open Telnet or rlogin connections, use the show sessions EXEC command.

```
show sessions
```

### Syntax Description
This command has no arguments or keywords.

### Command Modes
EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines
This command displays the host name, address, number of unread bytes for the user to receive, idle time, and connection name.

### Examples
The following example is sample output from the show sessions command.

```
Switch# 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
```

Table 18-62 describes the significant fields shown in the display.

### Table 18-62 show sessions Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conn</td>
<td>Name or address of the remote host to which the connection is made.</td>
</tr>
<tr>
<td>Host</td>
<td>Remote host to which the switch is connected through a Telnet session.</td>
</tr>
<tr>
<td>Address</td>
<td>IP address of the remote host.</td>
</tr>
<tr>
<td>Byte</td>
<td>Number of unread bytes displayed for the user to receive.</td>
</tr>
<tr>
<td>Idle</td>
<td>Interval (in minutes) since data was last sent on the line.</td>
</tr>
<tr>
<td>Conn Name</td>
<td>Assigned name of the connection.</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resume</td>
<td>Switches to another open Telnet, LAT, or PAD session</td>
</tr>
<tr>
<td>where</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
**show sgcp**

To display global configuration, operational state, and a summary of connection activity for SGCP, use the `show sgcp` EXEC command.

```
show sgcp
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

None

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command shows the global configuration, operational state, and a summary of connection activity.

**Examples**

The following example shows how to display the global configuration, operational state, and a summary of connection activity.

```
Switch# show sgcp
SGCP Admin State ACTIVE, Oper State ACTIVE
SGCP call-agent: none , SGCP graceful-shutdown enabled? FALSE
SGCP request timeout 2000, SGCP request retries 6
74 CES endpoint connections created
74 CES endpoints in active connections
```

The following table lists the field descriptions for the `show sgcp` command:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin State</td>
<td>Administrative state of SGCP.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Corresponds to <code>sgcp</code> configuration.</td>
</tr>
<tr>
<td>DOWN</td>
<td>Corresponds to <code>no sgcp</code> configuration.</td>
</tr>
<tr>
<td>Operational State</td>
<td>Operational state of SGCP.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Configuration is <code>sgcp</code> and <code>no sgcp graceful-shutdown</code>.</td>
</tr>
</tbody>
</table>
## Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOING_DOWN</td>
<td>Configuration is <strong>no sgcp</strong> while network connections are being torn down.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>Configuration is <strong>sgcp</strong> and <strong>sgcp graceful-shutdown</strong> while network and SGCP connections are being torn down.</td>
</tr>
<tr>
<td>Operational State</td>
<td>Operational state of SGCP.</td>
</tr>
<tr>
<td>DOWN</td>
<td>Configuration is <strong>no sgcp</strong></td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>Configuration is <strong>sgcp</strong> and <strong>sgcp graceful-shutdown</strong> and network connections are down.</td>
</tr>
<tr>
<td>SGCP call-agent</td>
<td>Value of <strong>sgcp call-agent</strong> configuration.</td>
</tr>
<tr>
<td>SGCP graceful-shutdown</td>
<td>Value of <strong>sgcp graceful-shutdown</strong> configuration.</td>
</tr>
<tr>
<td>SGCP request timeout</td>
<td>Value of <strong>sgcp request timeout</strong> configuration.</td>
</tr>
<tr>
<td>SGCP request retries</td>
<td>Value of <strong>sgcp request retries</strong> configuration.</td>
</tr>
<tr>
<td>SGCP endpoint connections created</td>
<td>Number of CES circuits for which SGCP has created a connection.</td>
</tr>
<tr>
<td>SGCP endpoints in active connections</td>
<td>Number of CES circuits for which SGCP has created a connection; network connection is active.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>sgcp</code></td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface</td>
</tr>
<tr>
<td></td>
<td>circuits on a switch.</td>
</tr>
<tr>
<td><code>sgcp call-agent</code></td>
<td>Sends SGCP response packets to a predetermined IP address and UDP port.</td>
</tr>
<tr>
<td><code>sgcp graceful-shutdown</code></td>
<td>Shuts down SGCP operation.</td>
</tr>
<tr>
<td><code>sgcp request retries</code></td>
<td>Specifies the number of times the ATM switch sends an SGCP request to the</td>
</tr>
<tr>
<td></td>
<td>call agent without receiving a response and before ceasing to retry.</td>
</tr>
<tr>
<td><code>sgcp request timeout</code></td>
<td>Specifies the time the ATM switch waits after sending an SGCP request to the</td>
</tr>
<tr>
<td></td>
<td>call agent before considering the request lost.</td>
</tr>
<tr>
<td><code>show sgcp connection</code></td>
<td>Displays a global list of SGCP connections or a single interface based on</td>
</tr>
<tr>
<td></td>
<td>a related keyword.</td>
</tr>
<tr>
<td><code>show sgcp endpoint</code></td>
<td>Displays CES circuit endpoints that might or might not have connections</td>
</tr>
<tr>
<td></td>
<td>created.</td>
</tr>
<tr>
<td><code>show sgcp statistics</code></td>
<td>Displays global statistics pertaining to SGCP activity.</td>
</tr>
</tbody>
</table>
show sgcp connection

To display a global list of SGCP connections or a single interface based on a related keyword, use the `show sgcp connection` EXEC command.

```
show sgcp connection [interface cbr card/subcard/port]
```

### Syntax Description

*card/subcard/port* Specifies the card, subcard, and port numbers for the CBR interface.

### Defaults

None

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

If you show the allocated SGCP connections, it is easier to determine which single endpoints to display.

### Examples

The following example shows how to display the global list of SGCP connections.

```
Switch> show sgcp connection
Conn Endpt     Soft VC State       Call ID
CBR1.1.0/1     Dest- active VC     1564abc
CBR1.1.0/2     Src - active VC     123372c
CBR1.1.0/3     Dest- active VC     12343bc
CBR1.1.0/4     Src - active VC     1238926
CBR1.1.0/5     Dest- active VC     1003abc
CBR1.1.0/6     Src - active VC     12596dc
CBR1.1.0/7     Dest- active VC     124567c
CBR1.1.0/8     Src - active VC     14322bc
CBR1.1.0/9     Dest- active VC     120095c
CBR1.1.0/10    Src - active VC     129999c
CBR1.1.0/11    Dest- active VC     167776c
CBR1.1.0/12    Src - active VC     123456c
CBR1.1.0/14    Dest- active VC     1278764
CBR1.1.0/15    Src - active VC     123424c
CBR1.1.0/16    Dest- active VC     122345c
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sgcp</td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch.</td>
</tr>
<tr>
<td>show sgcp endpoint</td>
<td>Displays CES circuit endpoints that might or might not have connections created.</td>
</tr>
</tbody>
</table>
show sgcp endpoint

To display CES circuit endpoints that might or might not have connections created, use the show sgcp endpoint EXEC command.

```
show sgcp endpoint [interface cbr card/subcard/port [endpoint_val]]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port numbers for the CBR interface.</td>
</tr>
<tr>
<td>endpoint_val</td>
<td>CES circuit ID:</td>
</tr>
<tr>
<td></td>
<td>• T1 = 1 to 24</td>
</tr>
<tr>
<td></td>
<td>• E1 = 1 to 31</td>
</tr>
</tbody>
</table>

### Defaults

None

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command displays the endpoints that might be eligible for SGCP connections. The ATM switch router displays endpoints that follow:

- Are assigned a single time slot
- Do not have a PVC or soft PVC defined

### Examples

The following example shows all CES circuits eligible to be SGCP endpoints.

```
Switch> show sgcp endpoint
      Endpt     Timeslots Conn State            Call ID
      CBR1.1.0/1   1    no connection          
      CBR1.1.0/2   1    no connection          
      CBR1.1.0/3   1    no connection          
      CBR1.1.0/4   1    no connection          
      CBR1.1.0/5   1    no connection          
      CBR1.1.0/6   1    no connection          
      CBR1.1.0/7   1    no connection          
      CBR1.1.0/8   1    no connection          
      CBR1.1.0/9   1    no connection          
      CBR1.1.0/10  1    no connection          
      CBR1.1.0/11  1    active               
      CBR1.1.0/12  1    no connection          
      CBR1.1.0/13  1    active               1234abc
      CBR1.1.0/14  1    active               1234abc
      CBR1.1.0/15  1    active               1234abc
      CBR1.1.0/16  1    active               1234abc
      CBR1.1.0/17  1    active               1234abc
      CBR1.1.0/18  1    active               1234abc
```
CBR1.1.0/19  1  active  1234abc
CBR1.1.0/20  1  active  1234abc
CBR1.1.0/21  1  active  1234abc
CBR1.1.0/22  1  active  1234abc
CBR1.1.0/23  1  active  1234abc
CBR1.1.0/24  1  active  1234abc

The following example shows a particular CES circuit SGCP endpoint.

```
Switch> show sgcp endpoint interface c1/1/0 1
Call ID:    Conn ID:    CES VC state: no VC
Conn Mode none    , Conn State no connection
CreateConn rx 554, successful 552, failed 2
DeleteConn rx 554, successful 554, failed 0
ModifyConn rx 0, successful 0, failed 0
DeleteConn tx 2, successful 2, failed 0
Peer RELEASE rx 0, Net RELEASE rx 0
```

Table 18-63 lists possible strings that appear with the `show sgcp endpoint` command.

**Table 18-63 Possible Strings with show sgcp endpoint**

<table>
<thead>
<tr>
<th>Field</th>
<th>Possible Strings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES VC states:</td>
<td>no VC</td>
</tr>
<tr>
<td></td>
<td>waiting VC</td>
</tr>
<tr>
<td></td>
<td>initiating VC</td>
</tr>
<tr>
<td></td>
<td>active VC</td>
</tr>
<tr>
<td></td>
<td>tearing down VC</td>
</tr>
<tr>
<td>Connection states:</td>
<td>no connection</td>
</tr>
<tr>
<td></td>
<td>created-passive</td>
</tr>
<tr>
<td></td>
<td>created-initiator</td>
</tr>
<tr>
<td></td>
<td>active</td>
</tr>
<tr>
<td></td>
<td>ca delete pending</td>
</tr>
<tr>
<td></td>
<td>waiting delete rsp</td>
</tr>
<tr>
<td></td>
<td>waiting ca delete</td>
</tr>
<tr>
<td>Connection modes:</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>SendOnly</td>
</tr>
<tr>
<td></td>
<td>RecvOnly</td>
</tr>
<tr>
<td></td>
<td>SendRecv</td>
</tr>
<tr>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td></td>
<td>Loopback</td>
</tr>
<tr>
<td></td>
<td>ContTest</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sgcp</td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch.</td>
</tr>
<tr>
<td>show sgcp</td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
<tr>
<td>show sgcp connection</td>
<td>Displays a global list of SGCP connections or a single interface based on a related keyword.</td>
</tr>
</tbody>
</table>
show sgcp statistics

To display global statistics pertaining to SGCP activity, use the `show sgcp statistics` EXEC command.

```
show sgcp statistics
```

**Syntax Description**  
This command has no arguments or keywords.

**Defaults**  
None

**Command Modes**  
EXEC

**Command History**  
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**  
Because circuit endpoint structures can be lost when you change interface circuit configuration, global statistics are useful once endpoint statistics are unavailable.

**Examples**  
The following example displays global statistics for SGCP.

```
Switch# show sgcp stat
  UDP pkts rx 104517, tx 104874
  Unrecognized rx pkts 0, SGCP message parsing errors 0
  Duplicate SGC rsp tx 18
  CreateConn rx 53677, successful 48954, failed 4723
  DeleteConn rx 50808, successful 48872, failed 1936
  ModifyConn rx 20, successful 20, failed 0
  DeleteConn tx 357, successful 6, failed 351
  Peer RELEASE rx 24442, Net RELEASE rx 0
```

Table 18-64 lists field descriptions for the `show sgcp statistics` command.

**Table 18-64 sgcp statistics Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP pkts rx</td>
<td>Number of UDP packets SGCP received.</td>
</tr>
<tr>
<td>UDP pkts tx</td>
<td>Number of UDP packets SGCP transmitted.</td>
</tr>
<tr>
<td>Unrecognized rx pkts</td>
<td>Number of packets that did not have a recognizable SGCP header.</td>
</tr>
<tr>
<td>SGCP message parsing errors</td>
<td>Number of packets that had an SGCP header, but had other parsing errors.</td>
</tr>
</tbody>
</table>
Table 18-64 sgcp statistics Field Descriptions  (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplicate SGCP rsp tx</td>
<td>This counter increments if an SGCP request is received that duplicates one for which a response exists in the response cache and a duplicate response is sent.</td>
</tr>
<tr>
<td>CreateConn rx</td>
<td>Total number of CreateConnection SGCP packets received.</td>
</tr>
<tr>
<td>CreateConn successful</td>
<td>Total number of CreateConnection requests to which SGCP positively responded.</td>
</tr>
<tr>
<td>CreateConn failed</td>
<td>Total number of CreateConnection requests to which SGCP responded negatively.</td>
</tr>
<tr>
<td>DeleteConn rx</td>
<td>Total number of DeleteConnection SGCP packets received, or retries were exceeded.</td>
</tr>
<tr>
<td>DeleteConn successful</td>
<td>Total number of DeleteConnection requests to which SGCP responded positively.</td>
</tr>
<tr>
<td>DeleteConn failed</td>
<td>Total number of DeleteConnection requests to which SGCP responded negatively.</td>
</tr>
<tr>
<td>ModifyConn rx</td>
<td>Total number of ModifyConnection SGCP packets received.</td>
</tr>
<tr>
<td>ModifyConn successful</td>
<td>Total number of ModifyConnection requests to which SGCP responded positively.</td>
</tr>
<tr>
<td>ModifyConn failed</td>
<td>Total number of ModifyConnection requests to which SGCP responded negatively.</td>
</tr>
<tr>
<td>DeleteConn tx</td>
<td>Total number of DeleteConnection SGCP packets transmitted.</td>
</tr>
<tr>
<td>Peer RELEASE rx</td>
<td>Total number of RELEASE messages received from the circuit peer.</td>
</tr>
<tr>
<td>Net RELEASE rx</td>
<td>Total number of network-generated RELEASE messages received.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sgcp</td>
<td>Enables the operation of the SGCP to interconnect ATM CES interface circuits on a switch.</td>
</tr>
<tr>
<td>show sgcp</td>
<td>Displays global configuration, operational state, and a summary of connection activity for SGCP.</td>
</tr>
<tr>
<td>show sgcp connection</td>
<td>Displays a global list of SGCP connections or a single interface based on a related keyword.</td>
</tr>
<tr>
<td>show sgcp endpoint</td>
<td>Displays CES circuit endpoints that might or might not have connections created.</td>
</tr>
</tbody>
</table>
show snmp

To check the status of communications between the SNMP agent and SNMP manager, use the show snmp EXEC command.

Syntax Description

This command has no arguments or keywords.

Command Modes
EXEC

Command History

Release            Modification
11.1(4)            New command

Usage Guidelines

This command provides counter information for RFC 1213 SNMP operations. It also displays the chassis ID string defined with the snmp-server chassis-id command.

Examples

The following example is sample output from the show snmp command.

Switch# show snmp
Chassis: SN#TS02K229
167 SNMP packets input
  0 Bad SNMP version errors
  0 Unknown community name
  0 Illegal operation for community name supplied
  0 Encoding errors
167 Number of requested variables
  0 Number of altered variables
  0 Get-request PDUs
  167 Get-next PDUs
  0 Set-request PDUs
167 SNMP packets output
  0 Too big errors (Maximum packet size 484)
  0 No such name errors
  0 Bad values errors
  0 General errors
  167 Get-response PDUs
  0 SNMP trap PDUs

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>snmp-server community</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
</tbody>
</table>
show snoop

To display the current snooping sessions, use the show snoop command.

```
show snoop [interface destination-port]
```

### Syntax Description

| destination-port | Number of the snooping interface. |

### Command Modes

Privileged EXEC

### Examples

The following example shows output from the show snoop command.

```
8500CSR# show snoop
Snoop Test Port Name: FastEthernet1/0/4 (interface status=SNOOPING)
Snoop option: (configured=enabled)(actual=enabled)
Snoop direction: (configured=receive)(actual=receive)
Monitored Port Name: (configured=FastEthernet1/0/3)(actual=FastEthernet1/0/3)
```

### Related Commands

show snoop-vc
show snoop-vc

To display the virtual circuits being used by the snooping feature, use the show snoop-vc command.

    show snoop-vc [interface destination-port]

Syntax Description

destination-port  Snoop monitoring port.

Command Modes

Privileged EXEC

Examples

The following example shows output from the show snoop-vc command.

8500CSR# show snoop-vc

<table>
<thead>
<tr>
<th>Snooping</th>
<th>Snooped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>VPI</td>
</tr>
<tr>
<td>FastEthernet1/0/4</td>
<td>4</td>
</tr>
<tr>
<td>35</td>
<td>RX</td>
</tr>
<tr>
<td>FastEthernet1/0/4</td>
<td>4</td>
</tr>
<tr>
<td>36</td>
<td>RX</td>
</tr>
<tr>
<td>FastEthernet1/0/4</td>
<td>8</td>
</tr>
<tr>
<td>57</td>
<td>RX</td>
</tr>
<tr>
<td>FastEthernet1/0/4</td>
<td>8</td>
</tr>
<tr>
<td>58</td>
<td>RX</td>
</tr>
<tr>
<td>FastEthernet1/0/4</td>
<td>8</td>
</tr>
<tr>
<td>59</td>
<td>RX</td>
</tr>
<tr>
<td>..........</td>
<td></td>
</tr>
</tbody>
</table>

Related Commands

show snoop
show sscop

To show SSCOP details for all ATM interfaces, use the **show sscop** EXEC command.

```
show sscop
```

**Syntax Description**

This command has no keywords or arguments

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show sscop** command.

```
Switch# show sscop atm 3/0/0
SSCOP details for interface ATM3/0/0
    Current State = Data Transfer Ready
    Send Sequence Number: Current = 2, Maximum = 9
    Send Sequence Number Acked = 3
    Rcv Sequence Number: Lower Edge = 2, Upper Edge = 2, Max = 9
    Poll Sequence Number = 1876, Poll Ack Sequence Number = 2
    Vt(Pd) = 0
    Connection Control: timer = 1000
    Timer currently Inactive
    Keep Alive Timer = 30000
    Current Retry Count = 0, Maximum Retry Count = 10
    Statistics -
        Pdu's Sent = 0, Pdu's Received = 0, Pdu's Ignored = 0
        Begin = 0/1, Begin Ack = 1/0, Begin Reject = 0/0
        End = 0/0, End Ack = 0/0
        Resync = 0/0, Resync Ack = 0/0
        Sequenced Data = 2/0, Sequenced Poll Data = 0/0
        Poll = 1591/1876, Stat = 0/1591, Unsolicited Stat = 0/0
        Unassured Data = 0/0, Mgmt Data = 0/0, Unknown Pdu's = 0
```

Table 18-65 describes the fields shown in the display. Interpreting this output requires an understanding of the SSCOP; it is usually displayed by Cisco technicians to help diagnose network problems.

**Table 18-65 show sscop Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSCOP details for interface</td>
<td>Interface card, subcard, and port.</td>
</tr>
<tr>
<td>Current State</td>
<td>SSCOP state for the interface.</td>
</tr>
<tr>
<td>Send Sequence Number</td>
<td>Current and maximum send sequence number.</td>
</tr>
<tr>
<td>Send Sequence Number Acked</td>
<td>Sequence number of packets already acknowledged.</td>
</tr>
</tbody>
</table>
**Table 18-65 show sscop Field Descriptions (continued)**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rcv Sequence Number</td>
<td>Sequence number of packets received.</td>
</tr>
<tr>
<td>Poll Sequence Number</td>
<td>Current poll sequence number.</td>
</tr>
<tr>
<td>Poll Ack Sequence</td>
<td>Poll sequence number already acknowledged.</td>
</tr>
<tr>
<td>Vt (Pd)</td>
<td>Number of SD frames sent that trigger sending a Poll frame.</td>
</tr>
<tr>
<td>Connection Control</td>
<td>Timer used for establishing and terminating SSCOP.</td>
</tr>
<tr>
<td>Keep Alive Timer</td>
<td>Timer used to send keepalives on an idle interface.</td>
</tr>
<tr>
<td>Current Retry Count</td>
<td>Current count of the retry counter.</td>
</tr>
<tr>
<td>Maximum Retry Count</td>
<td>Maximum value the retry counter can take.</td>
</tr>
<tr>
<td>PDUs Sent</td>
<td>Total number of SSCOP frames sent.</td>
</tr>
<tr>
<td>PDUs Received</td>
<td>Total number of SSCOP frames received.</td>
</tr>
<tr>
<td>PDUs Ignored</td>
<td>Number of invalid SSCOP frames ignored.</td>
</tr>
<tr>
<td>Begin</td>
<td>Number of Begin frames sent/received.</td>
</tr>
<tr>
<td>Begin Ack</td>
<td>Number of Begin ACK frames sent/received.</td>
</tr>
<tr>
<td>Begin Reject</td>
<td>Number of Begin Reject frames sent/received.</td>
</tr>
<tr>
<td>End</td>
<td>Number of End frames sent/received.</td>
</tr>
<tr>
<td>End Ack</td>
<td>Number of End ACK frames sent/received.</td>
</tr>
<tr>
<td>Resync</td>
<td>Number of Resync frames sent/received.</td>
</tr>
<tr>
<td>Resync Ack</td>
<td>Number of Resync ACK frames sent/received.</td>
</tr>
<tr>
<td>Sequenced Data</td>
<td>Number of Sequenced Data frames sent/received.</td>
</tr>
<tr>
<td>Sequenced Poll Data</td>
<td>Number of Sequenced Poll Data frames sent/received.</td>
</tr>
<tr>
<td>Poll</td>
<td>Number of Poll frames sent/received.</td>
</tr>
<tr>
<td>Stat</td>
<td>Number of Stat frames sent/received.</td>
</tr>
<tr>
<td>Unsolicited Stat</td>
<td>Number of Unsolicited Stat frames sent/received.</td>
</tr>
<tr>
<td>Unassured Data</td>
<td>Number of Unassured Data frames sent/received.</td>
</tr>
<tr>
<td>Mgmt Data</td>
<td>Number of Mgmt Data frames sent/received.</td>
</tr>
<tr>
<td>Unknown PDUs</td>
<td>Number of Unknown PDU frames sent/received.</td>
</tr>
</tbody>
</table>
show ssh

To display the SSH connections, use the show ssh privileged EXEC command.

show ssh

Syntax Description
This command has no keywords or arguments.

Command Modes
EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(12c)EY</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
You must enable the SSH server before using this command. If the SSH server is not enabled, this command will generate an error message.

Examples
The following example is sample output from the show ssh privileged EXEC command.

Switch# show ssh
Connection Version Encryption State Username
1 1.5 DES Session started aarun
Switch#
show stacks

To monitor the stack utilization of processes and interrupt routines, use the `show stacks` EXEC command. The display includes the reason for the last system reboot.

```
show stacks number
```

**Syntax Description**

- `number`: Shows the detail for a specific process (enable mode only).

**Command Modes**

- EXEC

**Command History**

- **Release**: 11.1(4)
- **Modification**: New command

**Usage Guidelines**

If the system was reloaded because of a system failure, a saved system stack trace is displayed. This information is useful to Cisco engineers for troubleshooting purposes.

**Examples**

The following example is sample output from the `show stacks` command following a system failure.

```
Switch# show stacks
Minimum process stacks:
Free/Size Name
5724/6000 Autoinstall
5192/6000 Setup
11528/12000 BootP Resolver
10504/12000 Init

Interrupt level stacks:
Level Called Unused/Size Name
1 9137 4460/6000 Switch Interrupt
2 71781 5292/6000 Ethernet Interrupt
3 0 5676/6000 OIR interrupt
4 0 6000/6000 PCMCIA Interrupt
5 326900 5624/6000 Console Uart
6 0 6000/6000 Error Interrupt
7 34179793 5668/6000 NMI Interrupt Handle
```
show startup-config

To show the configuration file pointed to by the config_file environment variable, use the show startup-config EXEC command. This command replaces the show configuration command.

    show startup-config

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command. Originally show configuration.</td>
</tr>
<tr>
<td>12.0(3c)W5(9)</td>
<td>Modified: Changed to show startup-config.</td>
</tr>
</tbody>
</table>

Usage Guidelines The show startup-config command shows the configuration file specified by the config_file environment variable. The switch informs you whether the displayed configuration is a complete configuration or a distilled version. A distilled configuration is one that does not contain access lists.

Examples Catalyst 8540 MSR

The following example is sample output from the show startup-config command.

    Switch# show startup-config
    Using 1288 out of 129016 bytes
    !
    version xx.x
    no service pad
    service udp-small-servers
    service tcp-small-servers
    !
    hostname Switch3
    !
    boot bootldr bootflash:/home/cyadaval/xxxxxx-i-m.bin.Z
    !
    atm address 47.0091.8100.0000.0000.0ca7.ce01.0000.0ca7.ce01.00
    !
    interface ATM0
    ip address 1.2.2.2 255.0.0.0
    no ip route-cache
    map-group ab
    atm maxvp-number 0
    !
    interface Ethernet0
    ip address 172.20.40.43 255.255.255.0
    no ip route-cache
    !
    interface ATM3/0/0
    no atm auto-link-determination
    no atm address-registration
Examples

Catalyst 8510 MSR and LightStream 1010

The following example is sample output from the `show startup-config` command.

```bash
Switch# show startup-config
Using 1288 out of 129016 bytes
!
version xx.x
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch3
!
boot bootldr bootflash:/home/cyadaval/xxxxxx-i-m.bin.Z
!
atm address 47.0091.8100.0000.0ca7.ce01.0000.0ca7.ce01.00
```
interface ATM0
    ip address 1.2.2.2 255.0.0.0
    no ip route-cache
    map-group ab
    atm maxvp-number 0

interface Ethernet0
    ip address 172.20.40.43 255.255.255.0
    no ip route-cache

interface ATM3/0/0
    no atm auto-link-determination
    no atm address-registration
    atm uni type public side user

interface ATM3/1/0
    no keepalive

interface ATM3/1/1
    no keepalive

interface ATM3/1/2
    no keepalive
    atm pvc 0 100 rx-cttr 1 tx-cttr 1 interface ATM3/1/1 0 100
    atm pvp 1 rx-cttr 1 tx-cttr 1
    atm pvp 2 rx-cttr 1 tx-cttr 1
    atm pvp 3 rx-cttr 1 tx-cttr 1

interface ATM3/1/2.1 point-to-point
    atm maxvp-number 0

interface ATM3/1/2.2 point-to-point
    atm maxvp-number 0

interface ATM3/1/2.3 point-to-point
    atm maxvp-number 0

interface ATM3/1/3
    no keepalive
    atm pvc 0 200 rx-cttr 1 tx-cttr 1 interface ATM0 0 200 encap aal5snap

ip domain-name cisco.com
ip name-server 198.92.30.32

map-list ab
    ip 1.1.1.1 atm-vc 200

line con 0
    exec-timeout 0 0
line aux 0
    transport input all
line vty 0
    password Switch
    login
line vty 1 4
    login
end

The following example is partial sample output from the `show startup-config` command when the configuration file is compressed.

Switch# show startup-config
show startup-config

Using 21542 out of 65536 bytes, uncompressed size = 142085 bytes
!
version 11.2
service compress-config
!
hostname rose
!
boot system flash gs7-k.stormod_clean
boot system rom

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>copy running-config</td>
<td>Copies the switch’s running configuration file to another destination.</td>
</tr>
<tr>
<td>description</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td>service</td>
<td>Cisco IOS command removed from this manual. See Appendix D.</td>
</tr>
<tr>
<td>compress-config</td>
<td></td>
</tr>
<tr>
<td>show bootflash:</td>
<td>Displays information about the bootflash: file system.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Displays the configuration information currently running on the terminal.</td>
</tr>
</tbody>
</table>
show subsys

To display the subsystem information, use the `show subsys` EXEC command.

```
show subsys [class class | name name]
```

**Syntax Description**

- **class**: Specifies the subsystem class to display. Valid entries are driver, kernel, library, management, protocol, and registry.
- **name**: Specifies the name of a subsystem to display.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

**Catalyst 8540 MSR**

The following example is sample output from the `show subsys` command.

```
Switch# show subsys

Class         Version   Required Subsystems
---           --------   -------------------------------
static_map    Kernel    1.000.001
arp           Kernel    1.000.001
ether         Kernel    1.000.001
compress      Kernel    1.000.001
alignment     Kernel    1.000.002
monvar        Kernel    1.000.001
slot          Kernel    1.000.001
oir           Kernel    1.000.001
atm           Kernel    1.000.001
ip_addrpool_sys Library 1.000.001
chat          Library   1.000.001
dialer        Library   1.000.001
flash_services Library 1.000.001
ip_localpool_sys Library 1.000.001
nvram_common  Driver    1.000.001
route processor Driver    1.000.001
sonict        Driver    1.000.001
oc3suni       Driver    1.000.001
oci2suni      Driver    1.000.001
ds3suni       Driver    1.000.001
```

**Examples**

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the `show subsys` command.

```
Switch# show subsys

Class         Version   Required Subsystems
---           --------   -------------------------------
static_map    Kernel    1.000.001
```

---
<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Type</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>arp</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ether</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>compress</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>alignment</td>
<td>Kernel</td>
<td>1.000.002</td>
</tr>
<tr>
<td>monvar</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>slot</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>oir</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>atm</td>
<td>Kernel</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ip_addrpool_sys</td>
<td>Library</td>
<td>1.000.001</td>
</tr>
<tr>
<td>chat</td>
<td>Library</td>
<td>1.000.001</td>
</tr>
<tr>
<td>dialer</td>
<td>Library</td>
<td>1.000.001</td>
</tr>
<tr>
<td>flash_services</td>
<td>Library</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ip_localpool_sys</td>
<td>Library</td>
<td>1.000.001</td>
</tr>
<tr>
<td>nvram_common</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ASP</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ssonict</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
<tr>
<td>oc3suni</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
<tr>
<td>oc12suni</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
<tr>
<td>ds3suni</td>
<td>Driver</td>
<td>1.000.001</td>
</tr>
</tbody>
</table>
show switch counters

To display the counters on the switch router’s interfaces, use the `show switch counters` EXEC command.

```
show switch counters
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

Privileged EXEC

**Usage Guidelines**

This command does not use IPC to get the information and can be used to find the port state prior to using any IPC-based commands, such as the `show controllers` command. The counts reflect the actual number that the interface has received; these counter values are not reset when the `clear counters` command is issued.

**Examples**

The following example is sample output from the `show switch counters` command:

```
Router# show switch counters

<table>
<thead>
<tr>
<th>Interface</th>
<th>State</th>
<th>Input Packets</th>
<th>Runts</th>
<th>Giants</th>
<th>Input Errors</th>
<th>CRC</th>
<th>Frame Output Packets</th>
<th>Output Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>G9/0/0</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G9/0/1</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ATM10/0</td>
<td>U</td>
<td>112459</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>112459</td>
<td>0</td>
</tr>
<tr>
<td>ATM10/0</td>
<td>U</td>
<td>116132</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>116132</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/0</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/1</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/2</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/3</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/4</td>
<td>U</td>
<td>1011</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30379</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/5</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>29547</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/6</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/7</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/8</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/9</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/10</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/11</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/12</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/13</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/14</td>
<td>AD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>F11/0/15</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

AD - Admin Down, D - Down, F - Fail, U - Up
```
show switch fabric (Catalyst 8540 MSR)

To show the details of the switch fabric for an ATM switch router, use the `show switch fabric` EXEC command.

```
show switch fabric
```

**Syntax Description**
This command has no keywords or arguments.

**Command Modes**
EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
This command shows the details of all MSCs in one display. It also displays the condition of the entire ATM switch router.

**Examples**
The following example shows how to display information about the fabric of an ATM switch router.

```
Switch# show switch fabric
MMC Switch Fabric (idb=0x60848BE0)

Key: Rej. Cells - # cells rejected due to lack of resources
     or policing (16-bit)
     Inv. Cells - # good cells that came in on a non-existent conn.
     Mem Buffs  - # cell buffers currently in use
     RX Cells   - # rx cells (16-bit)
     TX Cells   - # tx cells (16-bit)
     Rx HEC     - # cells Received with HEC errors
     Tx PERR    - # cells with memory parity errors

<table>
<thead>
<tr>
<th>MSC#</th>
<th>Rej. Cells</th>
<th>Inv. Cells</th>
<th>Mem. Buffs</th>
<th>Rx Cells</th>
<th>Tx Cells</th>
<th>Rx HEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-----------</td>
<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

### Switch Fabric Statistics

- Rejected Cells: 0
- Invalid Cells: 0
- Memory Buffers: 0
- Rx Cells: 0
- Tx Cells: 0
- RHEC: 0
- TPE: 0
- # marker intrs = 0
- # marker list entries = 0
- # ivcs used = 0
- # ovcs used = 0

<table>
<thead>
<tr>
<th>MSC</th>
<th>Used for MSC 0</th>
<th>Used for MSC 1</th>
<th>Used for MSC 2</th>
<th>Used for MSC 3</th>
<th>Used for MSC 4</th>
<th>Used for MSC 5</th>
<th>Used for MSC 6</th>
<th>Used for MSC 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Port Statistics

<table>
<thead>
<tr>
<th>Port</th>
<th>Type</th>
<th>Status</th>
<th>RXcells</th>
<th>TXcells</th>
<th>RHEC</th>
<th>TPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/0/0</td>
<td>155MBPS</td>
<td>xytrpm</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
</tr>
<tr>
<td>0/0/1</td>
<td>155MBPS</td>
<td>xytrpm</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
</tr>
<tr>
<td>0/0/2</td>
<td>155MBPS</td>
<td>xytrpm</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
</tr>
<tr>
<td>0/0/3</td>
<td>155MBPS</td>
<td>xytrpm</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
<td>0x0000</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
<tr>
<td>show switch module</td>
<td>Displays interface, Max vpi-bits, and status information per switch module.</td>
</tr>
</tbody>
</table>

(Catalyst 8540 MSR)
show switch module (Catalyst 8540 MSR)

To display interface, Max vpi-bits, and status information per switch module, use the show switch module EXEC command.

```
show switch module [interface | atm] card/subcard/port
```

### Syntax Description

- **module**
  - Specifies a module.

- **interface**
  - Specifies an interface type.

- **atm**
  - Specifies an ATM interface.

- **card/subcard/port**
  - Identifies the card, subcard, and port number of the interface.

### Defaults

None

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(4a)W5(11a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

None

### Examples

The following example shows the interface, Max vpi-bits, and status information per switch module:

```
Switch# show switch module
Module ID  Interface  Maxvpi-bits  State
----------------------------------------
 2          ATM2/0/0   8           DOWN
 3          ATM2/0/1   8           DOWN
 4          ATM9/0/0   8           DOWN
 5          ATM10/0/0  8             UP
          ATM10/0/2  8             DOWN
          ATM10/0/1  8             DOWN
          ATM10/0/3  8             DOWN
 6          ATM11/0/0  8             DOWN
 7          ATM12/0/0  8             UP
          ATM12/0/2  8             DOWN
          ATM12/0/1  8             DOWN
          ATM12/0/3  8             DOWN
```
The following example shows how to display interface, Max vpi-bits, and status information for interface atm 10/0/0:

```
Switch# show switch module interface atm 10/0/0
Module ID  Interface  Maxvpi-bits  State
----------------------------------------
5           ATM10/0/0   8           UP-LPBK
ATM10/0/2   8           DOWN
ATM10/0/1   8           DOWN
ATM10/0/3   8           DOWN
========================================
```

The following example shows how to display interface, Max vpi-bits, and status information for module 0:

```
Switch# show switch module module-id 0
Module ID  Interface  Maxvpi-bits  State
----------------------------------------
0            ATM0/0/0   8           UP
ATM0/0/4   8           DOWN
ATM0/0/1   8           DOWN
ATM0/0/5   8           DOWN
ATM0/0/2   8           UP
ATM0/0/6   8           DOWN
ATM0/0/3   8           UP
ATM0/0/7   8           DOWN
========================================
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show switch fabric</td>
<td>Displays the details of the switch fabric for an ATM switch router.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td>show controllers</td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
show tacacs

To show current TACACS+ server statistics, use the show tacacs EXEC command.

show tacacs

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines

Use this command to display information for analyzing and evaluating the TACACS+ server.
show tag-switching atm-tdp bindings

To display the requested entries from the ATM TDP tag binding database, use the 
show tag-switching atm-tdp bindings privileged EXEC command.

```
show tag-switching atm-tdp bindings [ip-address {mask|length}] [local-tag | remote-tag vpi vci] [neighbor atm card/subcard/port] [remote-tag vpi vci]
```

**Syntax Description**

- **ip-address**
  - Specifies destination prefix.
- **mask**
  - Specifies destination netmask prefix.
- **length**
  - Specifies netmask length, in the range of 1 to 32.
- **local-tag vpi vci**
  - Selects tag values assigned by this switch.
- **neighbor atm card/subcard/port**
  - Selects tags assigned by a neighbor on the specified ATM interface.
- **remote-tag vpi vci**
  - Selects tag values assigned by another switch.

**Defaults**

Displays all database entries.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The display output can show the entire database or a subset of entries based on the prefix, the VC tag value, or an assigning interface.

**Examples**

The following example shows the display from the `show tag-switching atm-tdp bindings` command.

```
Switch# show tag-switching atm-tdp bindings
Destination: 13.0.0.0/8
  Tailend Switch ATM0/1/0 1/33 Active -> Terminating Active
  Tailend Switch ATM0/1/0 1/34 Active -> Terminating Active
  Tailend Switch ATM0/0/0.10 10/33 Active -> Terminating Active
Destination: 11.0.0.0/8
  Transit ATM0/1/0 1/45 Active -> ATM0/0/0.10 10/33 Active
Destination: 128.1.0.0/16
  Transit ATM0/1/0 1/46 Active -> ATM0/0/0.10 10/34 Active
  Transit ATM0/0/0.10 10/34 Active -> ATM0/1/0 1/36 Active
```
### Table 18-66 show tag-switching atm-tdp bindings Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination:</td>
<td>Destination IP address/length of netmask</td>
</tr>
<tr>
<td>10.16.0.16/32</td>
<td></td>
</tr>
<tr>
<td>Tailend Switch</td>
<td>VC type:</td>
</tr>
<tr>
<td></td>
<td>• Tailend—VC that terminates at this switch</td>
</tr>
<tr>
<td></td>
<td>• Headend—VC that originates at this switch</td>
</tr>
<tr>
<td></td>
<td>• Transit—VC that passes through this switch</td>
</tr>
<tr>
<td>ATM1/0/1</td>
<td>ATM interface</td>
</tr>
<tr>
<td>1/35</td>
<td>VPI/VCI</td>
</tr>
<tr>
<td>Active</td>
<td>TVC state:</td>
</tr>
<tr>
<td></td>
<td>• Active—Set up and working</td>
</tr>
<tr>
<td></td>
<td>• Bindwait—Waiting for response</td>
</tr>
</tbody>
</table>

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show tag-switching</td>
<td>Displays summary information on ATM tag bindings.</td>
</tr>
<tr>
<td>atm-tdp summary</td>
<td></td>
</tr>
</tbody>
</table>
show tag-switching atm-tdp capability

To display the ATM TDP tag capabilities for all interfaces, use the `show tag-switching atm-tdp capability` privileged EXEC command.

```
show tag-switching atm-tdp capability
```

Syntax Description
This command has no keywords or arguments.

Command Modes
Privileged EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples
The following example shows the display from the `show tag-switching atm-tdp capability` command.

```
Switch# show tag-switching atm-tdp capability

<table>
<thead>
<tr>
<th>VPI</th>
<th>VCI</th>
<th>Alloc</th>
<th>Odd/Even VC Merge</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/1/0</td>
<td>Range</td>
<td>Range</td>
<td>Scheme</td>
</tr>
<tr>
<td>Negotiated</td>
<td>[1 - 1]</td>
<td>[33 - 1023]</td>
<td>UNIDIR</td>
</tr>
<tr>
<td>Local</td>
<td>[1 - 1]</td>
<td>[33 - 16383]</td>
<td>UNIDIR</td>
</tr>
<tr>
<td>Peer</td>
<td>[1 - 1]</td>
<td>[33 - 1023]</td>
<td>UNIDIR</td>
</tr>
<tr>
<td>ATM0/0/0.10</td>
<td>VPI</td>
<td>VCI</td>
<td>Alloc</td>
</tr>
<tr>
<td>Negotiated</td>
<td>[10 - 10]</td>
<td>[33 - 16383]</td>
<td>UNIDIR</td>
</tr>
<tr>
<td>Local</td>
<td>[10 - 10]</td>
<td>[33 - 16383]</td>
<td>UNIDIR</td>
</tr>
<tr>
<td>Peer</td>
<td>[10 - 10]</td>
<td>[33 - 16383]</td>
<td>UNIDIR</td>
</tr>
</tbody>
</table>
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tag-switching atm control-vc</td>
<td>Configures the VPI/VCI to be used for the initial link to the tag switching peer.</td>
</tr>
</tbody>
</table>
show tag-switching atm-tdp summary

To display summary information on ATM tag bindings, use the `show tag-switching atm-tdp summary` privileged EXEC command.

```
show tag-switching atm-tdp summary
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Examples**

The following example displays output from the `show tag-switching atm-tdp summary` command.

```
Switch# show tag-switching atm-tdp summary
Total number of destinations: 40

TC-ATM bindings summary
interface      total   active  local   remote  Bwait   Rwait   IFwait
ATM0/0/0       21      21      10      11      0       0       0
ATM0/0/1       21      21      11      10      0       0       0
ATM0/0/2       49      49      31      18      0       0       0
ATM0/0/3       45      45      31      14      0       0       0
ATM0/1/0       6       6       0       6       0       0       0
ATM0/1/2       64      64      34      30      0       0       0
ATM0/1/0.18    20      20      10      10      0       0       0
ATM0/1/0.19    25      25      13      12      0       0       0
ATM0/1/1.51    15      15      9       6       0       0       0
ATM0/1/1.52    3       3       1       2       0       0       0
```

Table 18-61 describes the `show tag-switching atm-tdp summary` summaries.

**Table 18-67 Describes show tag-switching atm-tdp summary Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of destinations</td>
<td>Number of known destination address prefixes.</td>
</tr>
<tr>
<td>interface</td>
<td>Name of an interface with associated ATM tag bindings.</td>
</tr>
<tr>
<td>total</td>
<td>Total number of ATM tags on this interface.</td>
</tr>
<tr>
<td>active</td>
<td>Number of ATM tags in an “active” state, ready to use for data transfer.</td>
</tr>
<tr>
<td>local</td>
<td>Number of ATM tags on this interface assigned by this tag switch.</td>
</tr>
<tr>
<td>remote</td>
<td>Number of ATM tags on this interface assigned by the neighbor tag switch.</td>
</tr>
<tr>
<td>Bwait</td>
<td>Number of bindings waiting for a tag assignment from the neighbor tag switch.</td>
</tr>
</tbody>
</table>
Table 18-67 Describes show tag-switching atm-tdp summary Field Descriptions (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwait</td>
<td>Number of TVCs waiting for remote resources because the neighbor has run out of VC space.</td>
</tr>
<tr>
<td>IFwait</td>
<td>Number of TVCs waiting for response from the tag ATM API. For the ATM switch router, this value is always 0.</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show tag-switching atm-tdp bindings</code></td>
<td>Displays the requested entries from the ATM TDP tag binding database.</td>
</tr>
</tbody>
</table>
show tag-switching interfaces

To display information about interfaces where tag switching is enabled, use the **show tag-switching interface** privileged EXEC command.

```
show tag-switching interfaces [type card|subcard|port | all] [detail]
```

**Syntax Description**
- `type` Specifies one of the interface types listed in Table 18-68.
- `card|subcard|port` Specifies the card, subcard, and port number of the interface.
- `detail` Displays detailed tag switching information by interface.

**Defaults**
Displays tag switching information for all interfaces.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
Displays information about the requested interface or all interfaces where tag switching is enabled.

**Table 18-68 Interface Types for the show tag-switching interfaces Command**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Specifies the ATM interface.</td>
</tr>
<tr>
<td>atm-p</td>
<td>Specifies the ATM pseudo interface.</td>
</tr>
<tr>
<td>cbr</td>
<td>Specifies the CBR interface.</td>
</tr>
<tr>
<td>ethernet</td>
<td>Specifies the Ethernet interface (0).</td>
</tr>
<tr>
<td>null</td>
<td>Specifies the null interface.</td>
</tr>
<tr>
<td>serial</td>
<td>Specifies the serial interface.</td>
</tr>
<tr>
<td>tunnel</td>
<td>Specifies the tunnel interface.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows the display from the **show tag-switching interfaces** command.

```
Switch# show tag-switching interface

Interface     TP  Tunnel  Operational
ATM0/0/0      Yes No Yes  (ATM tagging)
ATM0/0/1      Yes No Yes  (ATM tagging)
ATM0/0/2      Yes No Yes  (ATM tagging)
ATM0/0/3      Yes No Yes  (ATM tagging)
ATM0/1/0      Yes No Yes  (ATM tagging)
ATM0/1/0.18   Yes No Yes  (ATM tagging)
ATM0/1/0.19   Yes No Yes  (ATM tagging)
```
Tag-switching interface descriptions are provided in Table 18-69.

Table 18-69 Describes show tag-switching interface Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Interface name.</td>
</tr>
<tr>
<td>IP</td>
<td>Whether the interface is configured to tag IP packets.</td>
</tr>
<tr>
<td>Tunnel</td>
<td>Whether a tunnel is configured through this interface.</td>
</tr>
<tr>
<td>Operational</td>
<td>Whether packets are being tagged.</td>
</tr>
</tbody>
</table>

The following example shows the display from the `show tag-switching interfaces` command for a single interface using the `detail` option.

```
Switch# show tag interfaces atm 0/0/1 detail
Interface ATM0/0/1:
    IP tagging enabled
    TSP Tunnel tagging not enabled
    Tagging operational
    MTU = 8940
    ATM tagging: Tag VPI range = 2 - 5, Control VC = 6/32
```

### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>tag-switching ip (interface)</code></td>
<td>Enables tag switching of IPv4 packets on an interface.</td>
</tr>
</tbody>
</table>
show tag-switching tdp discovery

To display the status of the TDP discovery process, use the `show tag-switching tdp discovery` privileged EXEC command.

```
show tag-switching tdp discovery
```

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows the display from the `show tag-switching tdp discovery` command. The interfaces over which TDP discovery is running follow.

```
Switch# show tag-switching tdp discovery
Local TDP Identifier:
    172.20.40.161:0
TDP Discovery Sources:
    Interfaces:
        ATM0/1/0: xmit/recv
        TDP Id: 172.20.40.164:1
        ATM0/0/0.10: xmit/recv
        TDP Id: 172.20.40.163:1
```

**Table 18-70 Describes show tag-switching tdp discovery Field Descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local TDP Identifier</td>
<td>TDP identifier for the local switch. A TDP identifier is a 6-byte quantity displayed as IP address:number. The Cisco convention is to use a switch identification for the first 4 bytes of the TDP identifier, and integers starting with 0 for the last 2 bytes.</td>
</tr>
<tr>
<td>Interfaces</td>
<td>Interfaces engaging in TDP discovery activity: xmit indicates that the interface is transmitting TDP discovery Hello packets; recv indicates that the interface is receiving TDP discovery Hello packets.</td>
</tr>
</tbody>
</table>

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show tag-switching tdp neighbor</code></td>
<td>Displays the status of TDP sessions.</td>
</tr>
</tbody>
</table>
show tag-switching tdp neighbor

To display the status of TDP sessions, use the `show tag-switching tdp neighbor` privileged EXEC command.

```
show tag-switching tdp neighbor [ip-address type card/subcard/port] [detail]
```

**Syntax Description**
- `ip-address`: Specifies the IP address of the neighbor.
- `type`: Specifies one of the interface types listed in Table 18-71.
- `card/subcard/port`: Specifies the card, subcard, and port number of the interface.
- `detail`: Displays detailed TDP neighbor information by interface.

**Defaults**
Displays information about all TDP neighbors.

**Command Modes**
Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The neighbor information branch can give information about all TDP neighbors or can be limited to the following:
- The neighbor with a specific IP address
- TDP neighbors accessible over a specific interface
Displays information about the requested interface or all interfaces where tag switching is enabled.

**Table 18-71 Interface Types for the show tag-switching tdp neighbor Command**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm</td>
<td>Specifies the ATM interface.</td>
</tr>
<tr>
<td>atm-p</td>
<td>Specifies the ATM pseudo interface.</td>
</tr>
<tr>
<td>cbr</td>
<td>Specifies the CBR interface.</td>
</tr>
<tr>
<td>ethernet</td>
<td>Specifies the Ethernet interface (0).</td>
</tr>
<tr>
<td>null</td>
<td>Specifies the null interface.</td>
</tr>
<tr>
<td>serial</td>
<td>Specifies the serial interface.</td>
</tr>
<tr>
<td>tunnel</td>
<td>Specifies the tunnel interface.</td>
</tr>
</tbody>
</table>

**Examples**
The following example shows the display from the `show tag-switching tdp neighbor` command.

```
switch# show tag-switching tdp neighbor
```
show tag-switching tdp neighbor

Peer TDP Ident: 1.0.12.12:2; Local TDP Ident 1.0.11.11:2
TCP connection: 1.0.12.12.11008 - 1.0.11.11.711
State: Oper; PIEs sent/rcvd: 2199/2198; Downstream on demand
Up time: 02:31:58
TDP discovery sources:
ATM0/0/1

Peer TDP Ident: 1.0.12.12:8; Local TDP Ident 1.0.11.11:7
TCP connection: 1.0.12.12.11015 - 1.0.11.11.711
State: Oper; PIEs sent/rcvd: 2119/2130; Downstream on demand
Up time: 02:31:39
TDP discovery sources:
ATM0/1/0.19

Peer TDP Ident: 1.0.12.12:7; Local TDP Ident 1.0.11.11:6
TCP connection: 1.0.12.12.11016 - 1.0.11.11.711
State: Oper; PIEs sent/rcvd: 2120/2119; Downstream on demand
Up time: 02:31:38
TDP discovery sources:
ATM0/1/0.18

Table 18-72 show tag-switching tdp neighbor Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer TDP Ident</td>
<td>TDP identifier of the neighbor (peer) for this session.</td>
</tr>
<tr>
<td>Local TDP Ident</td>
<td>TDP identifier for the local tag switch for this session.</td>
</tr>
<tr>
<td>TCP connection</td>
<td>Specifies the TCP connection used to support the TDP session. The format for displaying the TCP connection is: peer I address.peer port local IP address.local port</td>
</tr>
<tr>
<td>State</td>
<td>State of the TDP session. Generally this is Oper (operational); or transient.</td>
</tr>
<tr>
<td>PIEs sent/rcvd</td>
<td>Number of TDP PIEs sent to and from the session peer, including transmission and receipt of periodic keepalive PIEs required to maintain the TDP session.</td>
</tr>
<tr>
<td>Downstream</td>
<td>Indicates that the downstream method of tag distribution is being used for this TDP session. When this method is being used, a tag switch advertises all of its locally assigned (incoming) tags to its TDP peer (subject to any configured access list restrictions).</td>
</tr>
<tr>
<td>Downstream on demand</td>
<td>Indicates that the downstream on-demand method of tag distribution is being used for this TDP session. When this method is being used, a tag switch advertises its locally assigned (incoming) tags to its TDP peer only when the peer asks for them.</td>
</tr>
<tr>
<td>Up time</td>
<td>Length of time the TDP session has existed.</td>
</tr>
<tr>
<td>TDP Discovery Sources</td>
<td>Source(s) of TDP discovery activity that led to the establishment of this TDP session.</td>
</tr>
<tr>
<td>Addresses bound to peer TDP Ident</td>
<td>The known interface addresses of the TDP session peer. These are addresses that might appear as “next hop” addresses in the local routing table, and are used to maintain the TFIB.</td>
</tr>
</tbody>
</table>

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show tag-switching tdp discovery</td>
<td>Displays the status of the TDP discovery process.</td>
</tr>
</tbody>
</table>
show tag-switching tdp parameters

To display available TDP parameters, use the `show tag-switching tdp parameters` privileged EXEC command.

    show tag-switching tdp parameters

**Syntax Description**

This command has no keywords or arguments.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows the display from the `show tag-switching tdp parameters` command.

```
Switch# show tag-switching tdp parameters
Protocol version: 1
  No tag pool for downstream tag distribution
  Session hold time: 15 sec; keep alive interval: 5 sec
  Discovery hello: holdtime: 15 sec; interval: 5 sec
  Discovery directed hello: holdtime: 15 sec; interval: 5 sec
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tag-switching tdp holdtime</td>
<td>Configures the hold time for a TDP session.</td>
</tr>
</tbody>
</table>
show tag-switching tsp-tunnels

To display TSP tunnel status and configuration, use the show tag-switching tsp tunnels privileged EXEC command.

```
show tag-switching tsp-tunnels [ip-address | all | head | middle | tail | remote] [tunnel-interface-num] [brief]
```

**Syntax Description**

- `ip-address` Specifies an IP address that restricts the display to TSP tunnels originating at this IP address.
- `all` Restricts the display to TSP tunnels that originate, transit, or terminate locally.
- `head` Restricts the display to TSP tunnels that originate at the node.
- `middle` Restricts the display to TSP tunnels that transit through the node.
- `tail` Restricts the display to TSP tunnels that terminate at the node.
- `remote` Restricts the display to TSP tunnels originating elsewhere. This is, in effect, a combination of `middle` and `tail`.
- `tunnel-interface-num` Specifies the interface number part of the TSP tunnel identifier. See “Usage Guidelines.”
- `brief` Displays TSP tunnels using a format of one line per tunnel.

**Defaults**

Displays all TSP tunnels through the node.

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Each TSP tunnel has a globally unique identifier that is used when signaling the TSP tunnel. This identifier, available at each hop, is the combination of the originating IP address (`ip-address`) and the interface number of the tunnel interface (`tunnel-interface-num`) used to configure the TSP tunnel at the head end.

**Examples**

The following example is sample output from the `show tag-switching tsp-tunnels` command.

```
Switch# show tag-switching tsp-tunnels
Signalling Summary:
  TSP Tunnels Process:          running
  RSVP Process:                running
  Forwarding:                  enabled

<table>
<thead>
<tr>
<th>TUNNEL ID</th>
<th>DESTINATION</th>
<th>STATUS</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.106.0.6</td>
<td>10.2.0.12</td>
<td>up</td>
<td>up</td>
</tr>
</tbody>
</table>
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tag-switching</td>
<td>Enables support for TSP tunnel negotiation.</td>
</tr>
<tr>
<td></td>
<td>tsp-tunnels</td>
<td></td>
</tr>
</tbody>
</table>
**show tcp**

To display the status of TCP connections, use the `show tcp` EXEC command.

**Catalyst 8540 MSR**

```
show tcp [line-number] {brief | console | vty}
```

**Catalyst 8510 MSR and LightStream 1010**

```
show tcp [line-number] {aux | brief | console | vty}
```

**Syntax Description**

- **line-number**: Absolute line number of the line for which you want to display the Telnet connection status.
- **brief**: Keyword used to limit the display of information.
- **console**: Keyword used to display the primary terminal line.
- **vty**: Keyword used to display the virtual terminal.
- **aux** *(Catalyst 8510 MSR and LightStream 1010)*
  - Line number on which to execute the chat script. If a line number is not specified, the current line number is chosen. If the specified line is busy, the script is not executed and an error message appears.
  - This command is not optional if you specify a `dialer-string`. If the `dialer-string` argument is specified, aux 0 must be entered.
  - This command functions only on physical terminal (tty) lines.
  - It does not function on virtual terminal (vty) lines.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the `show tcp` command.

```
Switch# show tcp
con0 (console terminal), connection 1 to host MATHOM
Connection state is ESTAB, I/O status: 1, unread input bytes: 1
Local host: 172.30.7.18 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 rcvtxt: 3447586900 rccwnd: 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 18-73 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: 172.30.7.18, 33537 Foreign host: 192.31.7.17, 23
Enqueued packets for retransmit: 0, input: 0, saved: 0

Table 18-73 show tcp Field Descriptions—First Section of Output

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>con0</td>
<td>Number identifying the line (console terminal) and location string.</td>
</tr>
<tr>
<td>connection 1</td>
<td>Number identifying the TCP connection.</td>
</tr>
<tr>
<td>to host MATHOM</td>
<td>Name of the remote host to which the connection has been made.</td>
</tr>
</tbody>
</table>

Connection state is ESTAB. A connection progresses through a series of states during its lifetime. A connection progresses through these states in the following order:

- **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 of the connection.
- **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.
Table 18-73 show tcp Field Descriptions—First Section of Output (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>to host MATHOM (Continued)</td>
<td></td>
</tr>
<tr>
<td>I/O status: 1</td>
<td>Number describing the current internal status of the connection.</td>
</tr>
<tr>
<td>unread input bytes: 1</td>
<td>Number of bytes that the lower-level TCP processes read, but the higher-level TCP processes have not yet processed.</td>
</tr>
<tr>
<td>Local host: 192.31.7.18</td>
<td>IP address of the network server. 33537 local port number, as derived from the following equation: line-number + (512 * random-number). (The line number uses the lower nine bits; the other bits are random.)</td>
</tr>
<tr>
<td>Foreign host: 192.31.7.17</td>
<td>IP address of the remote host to which the TCP connection has been made.</td>
</tr>
<tr>
<td>23</td>
<td>Destination port for the remote host.</td>
</tr>
<tr>
<td>Enqueued packets for retransmit: 0</td>
<td>Number of packets waiting on the retransmit queue. These are packets on this TCP connection that were sent but not acknowledged by the remote TCP host.</td>
</tr>
<tr>
<td>input: 0</td>
<td>Number of packets that are waiting on the input queue to be read by the user.</td>
</tr>
<tr>
<td>saved: 0</td>
<td>Number of received out-of-order packets that are 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 were received, packets 1 and 2 enter the input queue, and packets 4, 5, and 6 enter the saved queue.</td>
</tr>
</tbody>
</table>

Examples

The following lines of output show the current time according to the system clock of the local host.

Event Timers (current time is 2043535532):
The time shown is the number of milliseconds since the system started.

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 local host retransmitted 69 times because it received no response from the remote host, and it transmitted an acknowledgment many more times because there was no data on which to piggyback.

<table>
<thead>
<tr>
<th>Timer</th>
<th>Retrans</th>
<th>TimeWait</th>
<th>AckHold</th>
<th>SendWnd</th>
<th>KeepAlive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts:</td>
<td>69</td>
<td>0</td>
<td>69</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wakeups:</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Next: 2043536089</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 18-74 describes the fields in the preceding lines of output.
The following lines of output display the sequence numbers that TCP uses to ensure sequenced, reliable transport of data. The local host and remote host each use these sequence numbers for flow control and to acknowledge receipt of datagrams. Table 18-75 describes the specific fields in the following lines of output.

Table 18-74 show tcp Field Descriptions—Second Section of Output

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer:</td>
<td>Names of the timers in the display.</td>
</tr>
<tr>
<td>Starts:</td>
<td>Number of times the timer has been started during this connection.</td>
</tr>
<tr>
<td>Wakeups:</td>
<td>Number of keepalives transmitted without receiving any response. (This field is reset to zero when a response is received.)</td>
</tr>
<tr>
<td>Next:</td>
<td>System clock setting that triggers the next time this timer goes off.</td>
</tr>
<tr>
<td>Retrans</td>
<td>Retransmission interval time TCP packets that were not acknowledged and are waiting for retransmission.</td>
</tr>
<tr>
<td>TimeWait</td>
<td>TimeWait timer ensures that the remote system receives a request to disconnect a session.</td>
</tr>
<tr>
<td>AckHold</td>
<td>Acknowledgment timer delays the sending of acknowledgments to the remote TCP in an attempt to reduce network use.</td>
</tr>
<tr>
<td>SendWnd</td>
<td>Send Window timer ensures that there is no closed window due to a lost TCP acknowledgment.</td>
</tr>
<tr>
<td>KeepAlive</td>
<td>KeepAlive timer controls the transmission of test messages to the remote TCP to ensure that the interface has not been broken without the local TCP’s knowledge.</td>
</tr>
</tbody>
</table>

Table 18-75 show tcp Field Descriptions—Sequence Number

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>iss: 2043207208</td>
<td>Initial send sequence number.</td>
</tr>
<tr>
<td>snduna: 2043211083</td>
<td>Last send sequence number the local host sent for which it has not received an acknowledgment.</td>
</tr>
<tr>
<td>sndnxt: 2043211483</td>
<td>Sequence number the local host is sending next.</td>
</tr>
<tr>
<td>sndwnd: 1344</td>
<td>TCP window size of the remote host.</td>
</tr>
<tr>
<td>irs: 3447586816</td>
<td>Initial receive sequence number.</td>
</tr>
<tr>
<td>rcvnx: 3447586900</td>
<td>Last receive sequence number the local host has acknowledged.</td>
</tr>
<tr>
<td>rcvwnd: 2144</td>
<td>Local host’s TCP window size.</td>
</tr>
<tr>
<td>delrcvwnd: 83</td>
<td>Delayed receive window—The data the local host has read from the connection but has not yet subtracted from the receive window that the host 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.</td>
</tr>
</tbody>
</table>
The following lines of output display values that the local host uses to track transmission times so that TCP can adjust to the network it is using.

Table 18-76 describes the fields in the following line of output.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTTO: 565 ms</td>
<td>Round-trip timeout.</td>
</tr>
<tr>
<td>RTV: 233 ms</td>
<td>Variance of the round-trip time.</td>
</tr>
<tr>
<td>KRTT: 0 ms</td>
<td>New round-trip timeout (using the Karn algorithm). This field separately</td>
</tr>
<tr>
<td></td>
<td>tracks the round-trip time of packets that were retransmitted.</td>
</tr>
<tr>
<td>minRTT: 68 ms</td>
<td>Smallest recorded round-trip timeout (hard-wired value used for calculation).</td>
</tr>
<tr>
<td>maxRTT: 1900 ms</td>
<td>Largest recorded round-trip timeout.</td>
</tr>
<tr>
<td>ACK hold: 282 ms</td>
<td>Time the local host delays an acknowledgment in order to piggyback data on it.</td>
</tr>
</tbody>
</table>

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

Table 18-77 describes the fields in the following lines of output.

**Datagrams (max data segment is 536 bytes):**

<table>
<thead>
<tr>
<th>Rcvd: 106 (out of order: 0)</th>
<th>with data: 71, total data bytes: 83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent: 96 (retransmit: 5)</td>
<td>with data: 92, total data bytes: 4678</td>
</tr>
</tbody>
</table>

Table 18-77 show tcp Field Descriptions—Last Section of Output

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rcvd: 106 (out of order: 0)</td>
<td>Number of datagrams the local host has received during this connection (and the number of these datagrams that were out of order).</td>
</tr>
<tr>
<td>with data: 71</td>
<td>Number of these datagrams that contained data.</td>
</tr>
<tr>
<td>total data bytes: 83</td>
<td>Total number of bytes of data in these datagrams.</td>
</tr>
<tr>
<td>Sent: 96 (retransmit: 5)</td>
<td>Number of datagrams the local host sent during this connection (and the number of these datagrams that had to be retransmitted).</td>
</tr>
<tr>
<td>with data: 92</td>
<td>Number of these datagrams that contained data.</td>
</tr>
<tr>
<td>total data bytes: 4678</td>
<td>Total number of bytes of data in these datagrams.</td>
</tr>
</tbody>
</table>
show tech-support

To show information about the switch router for use when contacting technical support, use the `show tech-support` EXEC configuration command.

```markdown
show tech-support [page] [password] [ipmulticast | rsvp]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>page</td>
<td>Pages through output.</td>
</tr>
<tr>
<td>password</td>
<td>Includes passwords in output.</td>
</tr>
<tr>
<td>ipmulticast</td>
<td>Displays IP multicast-related information.</td>
</tr>
<tr>
<td>rsvp</td>
<td>Displays RSVP-related information.</td>
</tr>
</tbody>
</table>

### Command Modes

EXEC

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

### Usage Guidelines

Use the `show tech-support` to gather information about the current software image, configuration, controllers, counters, stacks, interfaces, memory, and buffers.

The output from this command contains a lot of information. Use the `page` option to control the amount of information presented on the screen. When you use the `page` option, pressing the Space bar displays the next page of information.

### Examples

The following example is sample output from the `show tech-support` EXEC command. Not all the information from this command is in the example.

```bash
Switch# show tech-support page
--------------------------------- show version --------------------------------
Cisco Internetwork Operating System Software
IOS (tm) XXXXXX WA4-x Software (XXXXXX-WP-M), Version x.x(x.x)WA4(x.x)
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 19-Jan-98 02:41 by
Image text-base: 0x60010910, data-base: 0x605B8000
ROM: System Bootstrap, Version 11.2(1.4.WA3.0) [integ 1.4.WA3.0], RELEASE SOFTWARE

Switch uptime is 4 days, 20 hours, 38 minutes
System restarted by reload
System image file is "slot0:xxxxxx-wp-mz.113-0.8.TWA4.1.30", booted via slot0:
cisco xxx (R4600) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface(s)
22 ATM network interface(s)
123K bytes of non-volatile configuration memory.
```
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x100

---------------- show running-config ----------------

Building configuration...

Current configuration:

! version xx.x
no service pad
no service udp-small-servers
no service tcp-small-servers
!
hostname Switch
!
enable password <removed>
!
ip host-routing
!
atm el64 translation-table
!
atm threshold-group 5 max-cells 50000
atm abr-mode efci
atm address 47.0091.8100.0000.0040.0b0a.2a81.0040.0b0a.2a81.00
atm router pnni
  node 1 level 80 lowest peer-group-identifier 80:47.01B1.0000.0000.0000.0000.0000.0000.0000.00
  parent 2
  redistribute atm-static
  election leadership-priority 205
  node 2 level 72 peer-group-identifier 72:B7.809A.0000.0000.0000.0000.0000.0000.0000.00
    aggregation-mode link CBR    aggressive
!
interface ATM0/0/0
  no ip address
  loopback pif
  tag-switching ip
!
interface ATM0/0/1
  no ip address
  atm pvp 51
  ntp broadcast client
!
interface ATM0/0/1.51 point-to-point
!
interface ATM0/0/2
  no ip address
!
interface ATM0/0/3
  no ip address
!
interface ATM0/1/0
--More--
**show terminal**

To obtain information about the terminal configuration parameter settings for the current terminal line, use the **show terminal** EXEC command.

```
show terminal
```

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example is sample output from the **show terminal** command.

```
Switch# show terminal
Line 0, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Status: Ready, Active
Capabilities: none
Modem state: Ready
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
       ^x    none   -     -       none
Timeouts:      Idle EXEC    Idle Session   Modem Answer  Session   Dispatch
       00:10:00        never                        none     not set
Idle Session Disconnect Warning
       never
Modem type is unknown.
Session limit is not set.
Time since activation: 00:23:38
Editing is enabled.
History is enabled, history size is 10.
DNS resolution in show commands is enabled
Full user help is disabled
Allowed transports are telnet. Preferred is telnet.
No output characters are padded
No special data dispatching characters
```

Table 18-78 describes the fields in the first two lines of **show terminal** output.

**Table 18-78 show terminal Field Descriptions—First Two Lines of Output**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 0</td>
<td>Current terminal line.</td>
</tr>
<tr>
<td>Location: &quot;&quot;</td>
<td>Location of the current terminal line, as specified using the <strong>location</strong> line configuration command.</td>
</tr>
<tr>
<td>Type: &quot;&quot;</td>
<td>Type of the current terminal line, as specified using the <strong>line</strong> global configuration command.</td>
</tr>
</tbody>
</table>
show terminal

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

Status: Ready, Active

Table 18-79 describes the possible values for the Status field.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>A process is actively using the line.</td>
</tr>
<tr>
<td>Autobauding</td>
<td>The line is running the autobaud process.</td>
</tr>
<tr>
<td>Carrier Dropped</td>
<td>Some sense of “carrier” was dropped, and the line process should be stopped.</td>
</tr>
<tr>
<td>Connected</td>
<td>The line has at least one active connection.</td>
</tr>
<tr>
<td>Input Stopped</td>
<td>The input was turned off because of hardware flow control or overflow.</td>
</tr>
<tr>
<td>No Exit Banner</td>
<td>The normal exit banner is not displayed on this line.</td>
</tr>
<tr>
<td>Ready</td>
<td>The line state is “ready.”</td>
</tr>
<tr>
<td>SLIP Mode</td>
<td>The line is running SLIP or PPP.</td>
</tr>
</tbody>
</table>

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 18-80 describes the possible values for the Capabilities field.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autobaud Full Range</td>
<td>Corresponds to the <code>autobaud</code> command.</td>
</tr>
<tr>
<td>Enabled</td>
<td>The user is successfully “enabled.”</td>
</tr>
<tr>
<td>EXEC Suppressed</td>
<td>Corresponds to the <code>no exec</code> command.</td>
</tr>
<tr>
<td>Hangup on Last Close</td>
<td>Corresponds to the <code>autohangup</code> command.</td>
</tr>
<tr>
<td>Notification Set</td>
<td>Corresponds to the <code>notify</code> command.</td>
</tr>
<tr>
<td>Output Non-Idle</td>
<td>Corresponds to the <code>session-timeout</code> command.</td>
</tr>
</tbody>
</table>

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. The none or hyphen (-) values imply that no special characters are set.
The following lines of output indicate the timeout values that were configured for the line.

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

Table 18-81 describes the fields in the preceding lines of output.

Table 18-81 show terminal Field Descriptions—Timeouts Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle EXEC</td>
<td>Interval that 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 command.</td>
</tr>
<tr>
<td>Idle Session</td>
<td>Interval that the software 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 command.</td>
</tr>
<tr>
<td>Modem Answer Session</td>
<td>Not implemented.</td>
</tr>
<tr>
<td>Dispatch</td>
<td>Number of milliseconds the software waits after putting the first character into a packet buffer before sending the packet. This interval is set using the dispatch-timeout command.</td>
</tr>
</tbody>
</table>

The following lines of output indicate how various options were configured.

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

To display information about the active lines on the switch router, use the show users EXEC command.

`show users [all]`

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Specifies that all lines be displayed, regardless of whether anyone is using them.</td>
</tr>
</tbody>
</table>

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2(5)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This command displays the line number, connection name, idle time, and terminal location.

**Examples**

In the following two examples, the asterisk (*) indicates the current terminal session.

The following example is sample output from the `show users` command.

```
Switch# show users
Line  User     Host(s)  Idle  Location
  0 con 0                          idle
  *  2 vty 0  jim  idle             0   GRUMPY.CISCO.COM
```

**Catalyst 8540 MSR**

The following example is sample output from the `show users all` command.

```
Switch# show users all
Line     User  Host(s)      Idle  Location
  *  0 vty 0  jim     idle      0   GRUMPY.CISCO.COM
      1 vty 1
      2 con 0
      3 vty 2
```

**Catalyst 8510 MSR and LightStream 1010**

The following example is sample output from the `show users all` command.

```
Switch# show users all
Line     User     Host(s)  Idle  Location
  *  0 vty 0  jim     idle      0   GRUMPY.CISCO.COM
      1 vty 1
      2 con 0
      3 aux 0
      4 vty 2
```
Table 18-82  describes the significant fields shown in the displays.

Table 18-82 show users Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line</td>
<td>The first subfield (0 in the example output) is the absolute line number and contains three subfields. The second subfield (vty) indicates the type of line. Possible values are:</td>
</tr>
<tr>
<td></td>
<td>• con—Console</td>
</tr>
<tr>
<td></td>
<td>• aux—Auxiliary port (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
<tr>
<td></td>
<td>• tty—Asynchronous terminal port</td>
</tr>
<tr>
<td></td>
<td>• vty—Virtual terminal</td>
</tr>
<tr>
<td></td>
<td>• The third subfield (0 in the example output) indicates the relative line number within the type.</td>
</tr>
<tr>
<td>User</td>
<td>User using the line. If no user is listed in this field, the line is idle.</td>
</tr>
<tr>
<td>Host(s)</td>
<td>Host to which the user is connected (outgoing connection). A value of “idle” means that there is no outgoing connection to a host.</td>
</tr>
<tr>
<td>Idle</td>
<td>Interval (in minutes) since the user had an entry.</td>
</tr>
<tr>
<td>Location</td>
<td>Either the hard-wired location for the line or, if there is an incoming connection, the host from which the incoming connection came.</td>
</tr>
</tbody>
</table>
show vc

To display active virtual circuits (PVCs, SVCs, and soft VCs), use the show vc EXEC command.

**Catalyst 8540 MSR**

```
show vc [interface {atm card/subcard/port [vpi vci] | serial card/subcard/port [channel#] [dlci]}]
```

**Catalyst 8510 MSR and LightStream 1010**

```
show vc [interface {atm card/subcard/port [vpi vci] | serial card/subcard/port [:n] [dlci]}]
```

### Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface</td>
<td>Specifies an interface type, either <strong>atm</strong> or <strong>serial</strong>.</td>
</tr>
<tr>
<td>atm</td>
<td>Specifies an ATM interface.</td>
</tr>
<tr>
<td>card/subcard/port</td>
<td>Specifies the card, subcard, and port number for the serial interface.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td>vpi vci</td>
<td>Virtual path identifier and virtual channel identifier to display.</td>
</tr>
<tr>
<td>serial</td>
<td>Specifies a serial interface.</td>
</tr>
<tr>
<td>channel#</td>
<td>Channel group identifier for the serial interface.</td>
</tr>
<tr>
<td>(Catalyst 8540 MSR)</td>
<td></td>
</tr>
<tr>
<td>dlci</td>
<td>Specifies the data-link connection identifier.</td>
</tr>
<tr>
<td>:n</td>
<td>Serial interface number. (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
</tbody>
</table>

### Command Modes

**EXEC**

### Command History

**Release** | **Modification**
--- | ---
11.1(4) | New command

### Usage Guidelines

This command can be used to display a summary of all VCs in the system or on an interface, or to display the details of a particular VC. The interface specified can either be an ATM or Frame Relay interface, and the VC specified can be an ATM or a Frame Relay VC.

### Examples

The following example displays the details of a specific ATM VC.

```
Switch# show vc interface atm 1/1/0 0 99
Interface: ATM1/1/0, Type: ds3suni
VPI = 0  VCI = 99
Status: UP
Connection-type: PVC
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Packet-discard-option: disabled
Time-since-last-status-change: 00:02:54
Wrr weight: 32
```
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: Serial3/0:1, Type: FRPAM-SERIAL
Cross-connect-DLCI = 99
Threshold Group: 3, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
Rx Clp0:0, Rx Clp1: 0
Rx Upc Victions:0, Rx cell drops:0
Rx Clp0 q full drops:0, Rx Clp1 qthresh drops:0
Rx connection-traffic-table-index: 100
Rx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Rx pcr-clp01: 81
Rx scr-clp0 : 81
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: 50
Tx connection-traffic-table-index: 100
Tx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Tx pcr-clp01: 81
Tx scr-clp0 : 81
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: 50

Examples

The following example shows the last explicit-path status for a soft VC along with the accumulated aggregate administrative weight for the full path.

Switch# show vc interface atm 0/1/3 0 42
Interface:ATM0/1/3, Type:oc3suni
VPI = 0  VCI = 42
Status:UP
Connection-type:SoftVC
Cast-type:point-to-point
Usage-Parameter-Control (UPC):pass
Packet-discard-option:disabled
Time-since-last-status-change:2d22h
Soft vc location:Source
Remote ATM address:47.0091.8100.0000.1060.705b.d900.4000.0c81.9000.00
Remote VPI:0
Remote VCI:42
Soft vc call state:Active
Number of soft vc re-try attempts:0
First-retry-interval:5000 milliseconds
Maximum-retry-interval:60000 milliseconds
Aggregate admin weight:40080
TIME STAMPS:
Current Slot:4
Outgoing Setup March 30 13:44:28.543
Incoming Release March 30 13:44:28.999
Outgoing Setup March 30 13:44:33.999
Incoming Connect March 30 13:44:34.031

Explicit-path 1:result=1 PNNI_SUCCESS (chicago.path1)
Only-explicit
Number of OAM-configured connections:0
OAM-configuration:disabled
OAM-states: Not-applicable
Cross-connect-interface:ATM0/0/3, Type:oc3suni
Cross-connect-VPI = 0
Cross-connect-VCI = 35
Cross-connect-UPC:pass
Cross-connect OAM-configuration:disabled
Cross-connect OAM-state: Not-applicable
Rx cells:0, Tx cells:0
Rx connection-traffic-table-index:1
Rx service-category:UBR (Unspecified Bit Rate)
Rx pcr-clp01:7113539
Rx scr-clp01:none
Rx mcr-clp01:none
Rx cdvt:1024 (from default for interface)
Rx mbs:none
Tx connection-traffic-table-index:1
Tx service-category:UBR (Unspecified Bit Rate)
Tx pcr-clp01:7113539
Tx scr-clp01:none
Tx mcr-clp01:none
Tx cdvt:none
Tx mbs:none

Examples

Catalyst 8540 MSR

The following example displays all the VCs in a system.

Switch# show vc

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/0/0</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/45</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/35</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/1</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/46</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/1</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/36</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/47</td>
<td>QSAAL</td>
<td>UP</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/37</td>
<td>ILMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0/18</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/54</td>
<td>PNNI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/48</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM0</td>
<td>0/38</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/35</td>
<td>PVC</td>
<td>ATM0/0/0</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/36</td>
<td>PVC</td>
<td>ATM0/0/1</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/37</td>
<td>PVC</td>
<td>ATM0/0/2</td>
<td>0/16</td>
<td>ILMI</td>
<td>UP</td>
</tr>
</tbody>
</table>

ATM0/1/0  | 0/5     | PVC  | ATM0/1/0    | 0/40      | ILMI    | DOWN   |
| ATM0/1/0  | 0/16    | PVC  | ATM0/1/1    | 0/49      | QSAAL   | DOWN   |
| ATM0/1/0  | 0/35    | PVC  | ATM0/1/0    | 0/39      | ILMI    | DOWN   |
| ATM0/1/1  | 0/5     | PVC  | ATM0/1/1    | 0/50      | QSAAL   | DOWN   |
| ATM0/1/1  | 0/16    | PVC  | ATM0/1/1    | 0/40      | ILMI    | DOWN   |
| ATM0/1/1  | 0/5     | PVC  | ATM0/1/2    | 0/51      | QSAAL   | DOWN   |
| ATM0/1/2  | 0/16    | PVC  | ATM0/1/2    | 0/37      | ILMI    | DOWN   |
| ATM0/1/3  | 0/5     | PVC  | ATM0/1/3    | 0/52      | QSAAL   | DOWN   |
| ATM0/1/3  | 0/16    | PVC  | ATM0/1/3    | 0/42      | ILMI    | DOWN   |
| ATM0      | 0/35    | PVC  | ATM0/0/0    | 0/16      | ILMI    | DOWN   |
| ATM0      | 0/36    | PVC  | ATM0/0/1    | 0/16      | ILMI    | DOWN   |
| ATM0      | 0/37    | PVC  | ATM0/0/2    | 0/16      | ILMI    | UP     |
| ATM0      | 0/38    | PVC  | ATM0/0/3    | 0/16      | ILMI    | DOWN   |
| ATM0      | 0/39    | PVC  | ATM0/1/0    | 0/16      | ILMI    | DOWN   |

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/0/0</td>
<td>0/40</td>
<td>PVC</td>
<td>ATM0/1/1</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/41</td>
<td>PVC</td>
<td>ATM0/1/2</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/42</td>
<td>PVC</td>
<td>ATM0/1/3</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/43</td>
<td>PVC</td>
<td>ATM-SEC0</td>
<td>0/29</td>
<td>IPC</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/44</td>
<td>PVC</td>
<td>ATM-SEC0</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/45</td>
<td>PVC</td>
<td>ATM0/0/0</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/46</td>
<td>PVC</td>
<td>ATM0/0/1</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/47</td>
<td>PVC</td>
<td>ATM0/0/2</td>
<td>0/5</td>
<td>QSAAL</td>
<td>UP</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/48</td>
<td>PVC</td>
<td>ATM0/0/3</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/49</td>
<td>PVC</td>
<td>ATM0/1/0</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/50</td>
<td>PVC</td>
<td>ATM0/1/1</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/51</td>
<td>PVC</td>
<td>ATM0/1/2</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/52</td>
<td>PVC</td>
<td>ATM0/1/3</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/53</td>
<td>PVC</td>
<td>ATM-SEC0</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
</tbody>
</table>
### Examples

**Catalyst 8510 MSR and LightStream 1010**

The following example displays all the VCs in a system.

**Switch1# show vc**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM0/0/0</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/49</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/35</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/0</td>
<td>0/18</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/73</td>
<td>PNNI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/1</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/50</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/36</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/2</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/51</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/5</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/37</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM0/0/3</td>
<td>0/16</td>
<td>PVC</td>
<td>ATM2/0/0</td>
<td>0/38</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/47</td>
<td>PVC</td>
<td>ATM1/1/0</td>
<td>0/16</td>
<td>ILMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/48</td>
<td>PVC</td>
<td>ATM1/1/1</td>
<td>0/16</td>
<td>ILMI</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/49</td>
<td>PVC</td>
<td>ATM0/0/0</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/61</td>
<td>PVC</td>
<td>ATM1/1/0</td>
<td>0/5</td>
<td>QSAAL</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/62</td>
<td>PVC</td>
<td>ATM1/1/1</td>
<td>0/5</td>
<td>QSAAL</td>
<td>DOWN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM2/0/0</td>
<td>0/63</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/32</td>
<td>LSIPC</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/64</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/39</td>
<td>LSIPC</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/65</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/33</td>
<td>INFLMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/66</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/34</td>
<td>INFLMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/67</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/37</td>
<td>INFLMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/68</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/48</td>
<td>INFLMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/69</td>
<td>PVC</td>
<td>ATM-P3/0/0</td>
<td>0/35</td>
<td>INFLMI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/70</td>
<td>PVC</td>
<td>ATM0/1/2</td>
<td>0/18</td>
<td>PNNI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/71</td>
<td>PVC</td>
<td>ATM1/0/1</td>
<td>0/18</td>
<td>PNNI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/72</td>
<td>PVC</td>
<td>ATM0/1/3</td>
<td>0/18</td>
<td>PNNI</td>
<td>UP</td>
</tr>
<tr>
<td>ATM2/0/0</td>
<td>0/73</td>
<td>PVC</td>
<td>ATM0/0/0</td>
<td>0/18</td>
<td>PNNI</td>
<td>DOWN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial3/0/0:1</td>
<td>44</td>
<td>SoftVC</td>
<td>Serial3/0/0:2</td>
<td>55</td>
<td>UP</td>
<td></td>
</tr>
</tbody>
</table>

The following example displays the summary of VCs on a serial interface.

**Switch# show vc interface serial 3/0/0:1**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Conn-Id</th>
<th>Type</th>
<th>X-Interface</th>
<th>X-Conn-Id</th>
<th>Encap</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial3/0/0:1</td>
<td>44</td>
<td>SoftVC</td>
<td>Serial3/0/0:2</td>
<td>55</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>Serial3/0/0:1</td>
<td>66</td>
<td>SoftVC</td>
<td>ATM1/1/0</td>
<td>0/66</td>
<td>UP</td>
<td></td>
</tr>
<tr>
<td>Serial3/0/0:1</td>
<td>99</td>
<td>PVC</td>
<td>ATM1/1/0</td>
<td>0/99</td>
<td>UP</td>
<td></td>
</tr>
</tbody>
</table>

The following example displays the summary of VCs on an ATM interface.

**Switch# show vc interface serial 1/0/1:1 43**

<table>
<thead>
<tr>
<th>Interface: Serial1/0:1:1, Type: FRPAM-SERIAL</th>
<th>DLCI = 43</th>
<th>Status : ACTIVE</th>
<th>Peer Status : INACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection-type: PVC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cast-type: point-to-point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per VC Overflow: Disabled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configured Option is: Inherit from Interface.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usage-Parameter-Control (UPC): tag-drop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pvc-create-time : 4d21h Time-since-last-status-change : 4d21h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interworking Function Type : service translation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>de-bit Mapping : map-clp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>efc-cl-b Mapping : map-de</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>clp-bit Mapping : 0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
show vc

ATM-P Interface: ATM-P1/0/0, Type: ATM-PSEUDO
ATM-P VPI = 33  ATM-P VCI = 75
ATM-P Connection Status: UP
Cross-connect-interface: ATM4/0/0, Type: arm_port
Cross-connect-VPI = 2
Cross-connect-VCI = 128
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Cross-connect-UPC: pass

Transmit Direction:
  Total tx Frames: 0
  Total tx Bytes: 0
  Discarded tx Frames: 0
  Discarded tx Bytes: 0
  Total Tx Frames with DE: 0
  Total Tx Frames with FECN: 0
  Tx Frames with FECN Tagged Locally: 0
  Total Tx Frames with BECN: 0
  Tx Frames with BECN Tagged Locally: 0

Receive Direction:
  Rx Frames: 7071
  Rx Bytes: 2432424
  Rx Frames Discarded: 3
  Rx Bytes Discarded: 1032
  Total Rx Frames with DE: 0
  Rx Frames with DE Tagged Locally: 0
  Total Rx Frames with FECN: 0
  Rx Frames with FECN Tagged Locally: 0
  Total Rx Frames with BECN: 0
  Rx Frames with BECN Tagged Locally: 0

Rx connection-traffic-table-index: 100
Rx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Rx pir: 64000
Rx cir: 64000
Rx Bc: 32768
Rx Be: 32768
Rx Frame Size: 64

Tx connection-traffic-table-index: 100
Tx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Tx pir: 64000
Tx cir: 64000
Tx Bc: 32768
Tx Be: 32768
Tx Frame Size: 64

Switch#

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm pvc</td>
<td>Creates a PVC.</td>
</tr>
<tr>
<td>frame-relay pvc</td>
<td>Creates a Frame Relay-to-ATM network interworking or to service interworking PVC or Frame-Relay-to-Frame Relay cross-connected PVC.</td>
</tr>
<tr>
<td>frame-relay soft-vc</td>
<td>Creates a Frame Relay soft PVCs on the switch.</td>
</tr>
<tr>
<td>show atm interface</td>
<td>Displays ATM-specific information about an ATM interface.</td>
</tr>
<tr>
<td>show atm status</td>
<td>Displays current information about ATM interfaces and the number of installed connections.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm vc</code></td>
<td>Displays the ATM layer connection information about the virtual connection.</td>
</tr>
<tr>
<td><code>show atm vc signalling</code></td>
<td>Shows the ATM VC signaling activity.</td>
</tr>
</tbody>
</table>
show version

To display the system hardware configuration, software version, and names and sources of configuration files and boot images, use the show version EXEC command.

    show version

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
</table>

Examples

The following example is sample output from the show version command.

Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) XXXXXX WA4-x Software (XXXXXX-WP-M), Version x.x(x.x)WA4(x.x)
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 19-Jan-98 02:41 by
Image text-base: 0x60010910, data-base: 0x605B8000

ROM: System Bootstrap, Version 11.2(1.4.WA3.0) [integ 1.4.WA3.0], RELEASE SOFTWARE

Switch uptime is 4 days, 20 hours, 38 minutes
System restarted by reload
System image file is "slot0:xxxxxx-wp-mz.113-0.8.TWA4.1.30", booted via slot0:
cisco xxx (R4600) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface(s)
22 ATM network interface(s)
123K bytes of non-volatile configuration memory.
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x100

Table 18-83 describes the significant fields shown in the display.

Table 18-83 Describes show version Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software version 11.2</td>
<td>You should always specify the complete version number when reporting a possible software problem. In the example output, the version number is 11.2.</td>
</tr>
<tr>
<td>System Bootstrap, Version</td>
<td>Bootstrap version version string.</td>
</tr>
</tbody>
</table>
The output of the `show version` EXEC command also provides certain messages, such as bus error messages. If such error messages appear, report the complete text of this message to your technical support specialist.

---

**Table 18-83 Describes show version Field Descriptions (continued)**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current date and time</td>
<td>Current date and time, the date and time the system was last booted, and</td>
</tr>
<tr>
<td>Boot date and time</td>
<td><code>uptime</code>, or the length of time the system has been up and running.</td>
</tr>
<tr>
<td>Switch uptime is</td>
<td></td>
</tr>
<tr>
<td>System restarted by reload</td>
<td>Also displayed is a log of how the system was last booted, as a result of</td>
</tr>
<tr>
<td></td>
<td>normal system startup or system error. For example, information can be</td>
</tr>
<tr>
<td></td>
<td>displayed to indicate a bus error that is generally the result of an attempt</td>
</tr>
<tr>
<td></td>
<td>to access a nonexistent address, as follows: “System restarted by bus</td>
</tr>
<tr>
<td></td>
<td>error at PC 0xC4CA, address 0x210C0C0”.</td>
</tr>
<tr>
<td>Running default software</td>
<td>If the software is booted over the network, the Internet address of the</td>
</tr>
<tr>
<td></td>
<td>boot host is shown. If the software is loaded from onboard ROM, this line</td>
</tr>
<tr>
<td></td>
<td>reads “running default software.” The names and sources of the host and</td>
</tr>
<tr>
<td></td>
<td>network configuration files are also shown.</td>
</tr>
</tbody>
</table>

The output of the `show version` EXEC command also provides certain messages, such as bus error messages. If such error messages appear, report the complete text of this message to your technical support specialist.
T Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

**Note**

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

**Note**

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
tag-switching atm allocation-mode

To control the mode used for handling tag binding requests on TC ATM interfaces, use the `tag-switching atm allocation-mode` global configuration command. To set the allocation mode to its default, use the `no` form of this command.

```
tag-switching atm allocation-mode {optimistic | conservative}
no tag-switching atm allocation-mode {optimistic | conservative}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>optimistic</td>
<td>Tag binding is returned immediately and packets are discarded until the downstream setup is complete.</td>
</tr>
<tr>
<td>conservative</td>
<td>Waits until the tag VC is set up downstream before returning a tag binding.</td>
</tr>
</tbody>
</table>

**Defaults**

conservative

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Examples**

The following example sets the mode for handling binding requests to **optimistic** on TC ATM interfaces.

```
Switch# configure terminal
Switch(config)# tag-switching atm allocation-mode optimistic
```
tag-switching atm control-vc

To configure the VPI/VCI to be used for the initial link to the tag switching peer, use the `tag-switching atm control-vc` interface configuration command. This control VC is used to establish the TDP session and carry non-IP traffic. To set the control VPI/VCI to the default, use the `no` form of this command.

```
tag-switching atm control-vc vpi vci
no tag-switching atm control-vc vpi vci
```

**Syntax Description**

- **vpi**  
  Virtual path identifier, in the range of 0 to 255.
- **vci**  
  Virtual channel identifier, in the range of 1 to 65535.

**Defaults**

0/32

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

On a VP tunnel, the default VPI is the tunnel number and the default VCI is 32.

**Examples**

The following example shows how to select VPI 1 and VCI 34 as the control VC.

```
Switch# configure terminal
Switch(config)# interface atm 3/0/1
Switch(config-if)# tag-switching ip
Switch(config-if)# tag-switching atm control-vc 1 34
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>tag-switching ip</code></td>
<td>Enables tag switching of IPv4 packets on an interface.</td>
</tr>
<tr>
<td><em>(interface)</em></td>
<td></td>
</tr>
</tbody>
</table>
**tag-switching atm vc-merge**

To control whether VC-merge (multipoint-to-point VCs) is supported for unicast tag VCs, use the `tag-switching atm vc-merge` global configuration command. To disable this feature, use the `no` form of this command.

```
tag-switching atm vc-merge
no tag-switching atm vc-merge
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Enabled

**Command Modes**

Global configuration

**Command History**

```
<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>T11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>
```

**Usage Guidelines**

This feature is enabled by default.

**Examples**

Because this feature is enabled by default, it is not necessary to issue the `tag-switching atm vc-merge` command. However, to disable VC merge, you must enter the `no` form of the command.

```
Switch# configure terminal
Switch(config)# no tag-switching atm vc-merge
```

**Related Commands**

```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show tag-switching atm-tdp bindings</td>
<td>Displays the requested entries from the ATM TDP tag binding database.</td>
</tr>
<tr>
<td>show tag-switching atm-tdp capability</td>
<td>Displays the ATM TDP tag capabilities for all interfaces.</td>
</tr>
</tbody>
</table>
tag-switching atm vpi

To configure the range of values to use in the VPI field for tag VCs, use the `tag-switching atm vpi` interface configuration command. To clear the interface configuration, use the `no` form of this command.

```
tag-switching atm vpi [vpi] [-vpi] [vci-range vci - vci]
no tag-switching atm vpi
```

**Syntax Description**
- `vpi` Low end of the VPI range (0 to 255).
- `vpi` High end of the VPI range (2 to 255).
- `vci` Low end of the VCI range (33 to 65535).
- `vci` High end of the VCI range (33 to 65535).

**Defaults**
1 - 1

**Command Modes**
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
<tr>
<td>12.1(10.5)EY</td>
<td>Added <code>vci-range</code> parameter</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
The value will be negotiated with its peer.
You cannot enter a VPI range on a VP tunnel; the VPI is the PVP number of the tunnel.
If the TDP neighbor is a router, the VPI range cannot be larger than 2; for example, from 5 to 6 (a range of 2), not 5 to 7 (a range of 3).

**Examples**
The following example shows you how to select a VPI range from 10 to 15 and a VCI range 35 to 100.
```
Switch# configure terminal
Switch(config)# interface atm 3/0/1
Switch(config-if)# tag-switching atm vpi 10 - 15 vci-range 35 - 100
```
tag-switching ip (global)

To allow tag switching of IPv4 packets, use the tag-switching ip global configuration command. To disable IP tag switching across all interfaces, use the no form of this command.

    tag-switching ip
    no tag-switching ip

Syntax Description
This command has no keywords or arguments.

Defaults
Enabled

Command Modes
Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Usage Guidelines
Dynamic tag switching (that is, the distribution of tags based on routing protocols) is allowed by this optional command, but is not actually enabled until the interface-level tag-switching ip command is issued on at least one interface.

The no form of this command stops the distribution of dynamic tags and the sending of outgoing tagged packets on all interfaces. The sending of tagged packets on TSP tunnels is not affected by this command.

For TC ATM, the no form of this command prevents tag VCs beginning at, terminating at, or passing through the platform.

Examples
The following example shows how to enable the distribution of dynamic tags on all interfaces.

```
Switch# configure terminal
Switch(config)# tag-switching ip
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tag-switching ip</td>
<td>Enables tag switching of IPv4 packets on an interface. (interface)</td>
</tr>
</tbody>
</table>
tag-switching ip (interface)

To enable tag switching of IPv4 packets on an interface, use the tag-switching ip interface configuration command. To disable IP tag switching on an interface, use the no form of this command.

```
tag-switching ip
no tag-switching ip
```

Syntax Description

This command has no keywords or arguments.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release Modification
11.3(3a) New command

Usage Guidelines

The first time this command is issued on any interface, dynamic tag switching is enabled on the entire switch router. TDP Hellos are issued on this interface. When an outgoing tag for a destination routed out through this interface is received, packets sent to that destination are tagged as outgoing.

The no form of this command causes packets routed out through this interface to be sent as untagged, and outgoing TDP Hellos are no longer sent.

When the no form is issued on the only interface for which tag switching is enabled, dynamic tag switching is disabled on the entire switch router.

For TC ATM, the no form of this command prevents tag VCs beginning at, terminating at, or passing through the interface.

Examples

In the following example, tag switching is enabled on ATM interface 1/1/0.

```
Switch# configure terminal
Switch(config)# interface atm 1/1/0
Switch(config-if)# tag-switching ip
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tag-switching atm allocation-mode</td>
<td>Controls the mode used for handling tag binding requests on TC ATM interfaces.</td>
</tr>
<tr>
<td>tag-switching ip (global)</td>
<td>Enables tag switching of IPv4 packets.</td>
</tr>
</tbody>
</table>
tag-switching tdp discovery

To configure the interval between transmission of TDP discovery Hello messages and the hold time for a TDP transport connection, use the `tag-switching tdp discovery` global configuration command. To set the interval and hold time to their defaults, use the `no` form of this command.

```
tag-switching tdp discovery { hello | directed-hello } { holdtime | interval } seconds
```

Syntax Description

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>hello</td>
<td>Intervals and hold times for directly connected neighbors.</td>
</tr>
<tr>
<td>directed-hello</td>
<td>Intervals and hold times for neighbors that are not directly connected; for example, TDP sessions that run over a TSP tunnel.</td>
</tr>
<tr>
<td>holdtime</td>
<td>Interval for which a connection stays up if no Hello messages are received. The default is 15 seconds.</td>
</tr>
<tr>
<td>interval</td>
<td>Period between sending Hello messages. The default is 5 seconds.</td>
</tr>
<tr>
<td>seconds</td>
<td>Hold time or interval, in the range of 1 to 2147483647.</td>
</tr>
</tbody>
</table>

Defaults

See “Syntax Description.”

Command Modes

Global configuration

Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

Examples

In the following example, the interval for which a connection stays up if no Hello packets are received is set to 5 seconds.

```
Switch# configure terminal
Switch(config)# tag-switching tdp discovery hello holdtime 5
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show tag-switching interfaces</td>
<td>Displays information about interfaces that have tag switching enabled.</td>
</tr>
<tr>
<td>show tag-switching atm-tdp summary</td>
<td>Displays summary information on ATM tag bindings.</td>
</tr>
<tr>
<td>show tag-switching tdp parameters</td>
<td>Displays available TDP parameters.</td>
</tr>
</tbody>
</table>
**tag-switching tdp holdtime**

To configure the hold time for a TDP session, use the `tag-switching tdp holdtime` global configuration command. To set the hold time to the default, use the `no` form of this command.

```
tag-switching tdp holdtime seconds
```

**Syntax Description**

| seconds | The time, in seconds, that a TDP session is maintained in the absence of TDP messages from the session peer (1 to 2147483647). |

**Defaults**

15 seconds

**Command Modes**

- Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

When a TDP session is initiated, the hold time is negotiated to the lower of the values configured at the two ends.

This command configures the hold time determined by this tag switch.

**Examples**

The following example configures the hold time of TDP sessions to 30 seconds.

```
Switch# configure terminal
Switch(config)# tag-switching tdp holdtime 30
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show tag-switching tdp parameters</code></td>
<td>Displays available TDP parameters.</td>
</tr>
</tbody>
</table>
**tag-switching tsp-tunnels**

To enable support for TSP tunnel negotiation, use the `tag-switching tsp-tunnels` global configuration command or interface configuration command. To disable support for TSP tunnel negotiation, use the `no` form of this command.

```
tag-switching tsp-tunnels
no tag-switching tsp-tunnels
```

**Syntax Description**

This command has no keywords or arguments.

**Defaults**

Disabled

**Command Modes**

Global configuration
Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3(3a)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Enabling TSP tunnel negotiation using the `tag-switching tsp-tunnels` command in the interface configuration mode has no effect unless the command is also issued in the global configuration mode.

**Examples**

The following example shows how to enable TSP tunnel negotiation globally, then enable it at the interface.

```
Switch# configure terminal
Switch(config)# tag-switching tsp-tunnels
Switch(config)# interface atm 1/1/1
Switch(config-if)# tag-switching tsp-tunnels
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show tag-switching</code></td>
<td>Displays TSP tunnel status and configuration.</td>
</tr>
<tr>
<td><code>tsp-tunnels</code></td>
<td></td>
</tr>
</tbody>
</table>
tftp-server

To specify that the switch or Flash device operates as a TFTP server, use the `tftp-server` global configuration commands. To remove a previously defined filename, use the `no` form of this command with the appropriate filename.

```
tftp-server device:filename [alias name] [ip-access-list]
no tftp-server device:filename [alias name] [ip-access-list]
```

**Syntax Description**

- **device:** Specifies TFTP service of a file on a memory device. The colon (:) is required. Valid devices include the following:
  - **bootflash:** This device is the internal Flash memory.
  - **slot0:** This device is the first PC slot on the route processor card.
  - **slot1:** This device is the second PC slot on the route processor card.
  - **nvram:** This device is nonvolatile random-access memory.

- **filename** Name of a file that the TFTP server uses in answering TFTP Read Requests.

- **alias** Specifies an alternate name for the file that the TFTP server uses in answering TFTP Read Requests.

- **ip-access-list** IP access list of requesting hosts.

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

You can specify multiple filenames by repeating the `tftp-server` command. The system sends a copy of the system image contained in memory to any client that issues a TFTP Read Request with this filename. If the specified filename exists in memory, a copy of the image is sent.

Images that run from ROM cannot be loaded over the network. Therefore, you should not use TFTP to offer the ROMs on these images.

The system sends a copy of the file to any client that issues a TFTP Read Request with its filename.

**Examples**

In the following example, the system uses TFTP to send a copy of the `version-11.1` file located in Flash memory in response to a TFTP Read Request for that file. The requesting host is checked against access list 22.

```
Switch# configure terminal
```
Switch(config)# tftp-server flash version-11.1 22

In the following example, the system uses TFTP to send a copy of the version-11.1.4 file in response to a TFTP Read Request for that file. The file is located on the Flash memory card inserted in slot 0 of the route processor card.

Switch# configure terminal
Switch(config)# tftp-server flash slot0:version-11.1.4

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-list (extended)</td>
<td>Defines an extended IP access list. Currently, this command only supports the IP host.</td>
<td></td>
</tr>
</tbody>
</table>
**timer**

To configure the PNNI timers, use the **timer** PNNI node configuration command. To return to the default values, use the **no** form of this command.

```
timer [ack delay tenths-of-seconds] [called-integrity seconds] [calling-integrity seconds] [hello-holddown tenths-of-seconds] [hello-interval seconds] [hrz-link-inactivity seconds] [inactivity-factor number] [retransmit-interval seconds]
no timer [ack delay] [called-integrity] [calling-integrity] [hello-holddown] [hello-interval] [hrz-link-inactivity] [inactivity-factor] [retransmit-interval]
```

**Syntax Description**

- **ack-delay** Specifies the waiting period before sending an accumulated PTSE acknowledgment packet. The default is 1 second.
- **called-integrity** Specifies the value used to initialize the SVC integrity timer at the node that accepts an LGN-to-LGN SVC RCC originated by a neighbor node. The default is 50 seconds.
- **calling-integrity** Specifies the value used to initialize the SVC integrity timer at the node that initiates an LGN-to-LGN SVC RCC. The SVC integrity timer determines how long this node waits for an SVC-based RCC to reach the two-way inside state before releasing it. The default is 35 seconds.
- **hello-holddown** Specifies the hold-down period for event-triggered Hellos. This is mainly used for Hello packets between outside neighbors. The default is 1 second.
- **hello-interval** Specifies the frequency, in seconds, at which Hello packets are transmitted. The default is 15 seconds.
- **hrz-link-inactivity** Specifies the length of time that this node continues to advertise a horizontal link for which it has not received and processed an LGN horizontal link extension information group piggybacked onto an SVC-RCC Hello packet. The default is 120 seconds.
- **inactivity-factor** Specifies the dead-interval time (the period after which a neighbor is declared down if no Hello is received) as a factor of the Hello interval. The default is 5 seconds.
- **retransmit-interval** Specifies the waiting period before retransmitting a PTSE, PTSE request, or database summary packet. The default is 5 seconds.

**Defaults**

See “Syntax Description.”

**Command Modes**

PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>
Usage Guidelines

Decreasing the **hello-interval** allows PNNI to detect neighbor nodes that have stopped functioning more quickly. The **inactivity-factor** is used as a multiplier of the **hello interval** in received Hello packets to determine the dead interval, the time after which the neighbor node is declared down if no Hello packets are received. The **inactivity-factor** can be increased on unreliable interfaces to avoid false alarms.

Decreasing the **retransmit-interval** causes retransmission to increase when a PNNI packet gets lost. However, this increases the risk of unnecessarily retransmitting PNNI packets that are delayed but actually reach the neighbor. Increasing **ack-delay** causes more PTSEs to be acknowledged in one **ack** packet. Lowering **hello-holddown** allows another Hello packet to be sent shortly after one was sent. To avoid an overload in switch processing, you should adjust these parameters carefully.

For more information, refer to the *ATM Switch Router Software Configuration Guide*.

Examples

The following script shows how to change the **hello-interval** to **5 seconds**.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# timer hello-interval 5
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show atm pnni local-node</code></td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
</tbody>
</table>
**timer-rule**

To configure a timer rule as part of a timer group, use the `timer-rule` configuration command. To remove a timer rule from the timer group, use the `no` form of this command.

```
  timer-rule name
  no timer-rule name
```

**Syntax Description**

```
  name          Specifies the name of the previously configured ATM timer rule to add to the ATM timer group.
```

**Defaults**

Disabled

**Command Modes**

Timer group configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(26)EB</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The `atm timer group` command creates an ATM timer group and, used with the `timer-rule` command, is used to associate a timer rule with a soft PVC or soft PVP. The timer rule must have been previously configured using the `atm timer rule` command. The timer rule specifies the setup or teardown time for a soft PVC or soft PVP based on the timer values configured.

**Examples**

The following example shows how to associate previously configured timer rules with a timer group in timer group configuration mode.

```
Switch# configure terminal
Switch(config)# atm timer group timerGrp1
Switch(config)# timer-rule rule1
Switch(config)# timer-rule rule2
Switch(config)# end
Switch#
```
### Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atm timer rule</td>
<td>Specifies the setup or release time for a soft PVC or soft PVP based on the timer values configured.</td>
</tr>
<tr>
<td>atm timer group</td>
<td>Creates an ATM timer group and changes to ATM timer group configuration mode.</td>
</tr>
<tr>
<td>show atm timer rule</td>
<td>Displays the timer rule configuration.</td>
</tr>
<tr>
<td>show atm timer group</td>
<td>Displays the timer group configuration.</td>
</tr>
<tr>
<td>show atm soft-vc</td>
<td>Displays the configuration of the soft PVC connection.</td>
</tr>
<tr>
<td>show running-config</td>
<td>Shows configuration information currently running on the console.</td>
</tr>
</tbody>
</table>
**traceroute (user)**

To trace the IP routes the packets actually take when traveling from the switch to their destination, use the **traceroute** EXEC command.

```
traceroute [protocol] [destination]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>Protocol that can be used is <strong>ip</strong>.</td>
</tr>
<tr>
<td>destination</td>
<td>Destination address or host name on the command line. The default parameters for the appropriate protocol are assumed, and the tracing action begins.</td>
</tr>
</tbody>
</table>

**Defaults**

The **protocol** argument is based on the switch router’s examination of the format of the **destination** argument. For example, if the switch router finds a destination in IP format, the protocol defaults to **ip**.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(10)W5(18)</td>
<td>Re-introduced into this manual. (Was previously in the LightStream 1010 Command Reference only.)</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The **traceroute** command works by taking advantage of the error messages generated by switch routers when a datagram exceeds its TTL value.

The **traceroute** command starts by sending probe datagrams with a TTL value of 1. This causes the first switch router to discard the probe datagram and send back an error message. The **traceroute** command sends several probes at each TTL level and displays the round-trip time for each.

The **traceroute** command sends out one probe at a time. Each outgoing packet may result in one or two error messages. A “time exceeded” error message indicates that an intermediate switch router detected and discarded the probe. A “destination unreachable” error message indicates that the destination node received and discarded the probe because it could not deliver the packet. If the timer goes off before a response comes in, **traceroute** prints an asterisk(*).

The **traceroute** command terminates when the destination responds, when the maximum TTL is exceeded, or when the user interrupts the trace with the escape sequence. By default, to invoke the escape sequence, enter **^X**.

**Common Trace Problems**

Due to bugs in the IP implementation of various hosts and switches, the **IP trace** command may behave in unexpected ways.

Not all destinations respond correctly to a probe message by sending back an “ICMP port unreachable” message. A long sequence of TTL levels with only asterisks, terminating only when the maximum TTL is reached, may indicate this problem.
There is a known problem with the way some hosts handle an “ICMP TTL exceeded” message. Some hosts generate in ICMP message, but they reuse the TTL of the incoming packet. Since this is zero, the ICMP packets do not make it back. When you trace the path to such a host, you may see a set of TTL values with asterisks (*). Eventually, the TTL gets high enough that the “ICMP” message can get back. For example, if the host is 6 hops away, `traceroute` times out in responses 6 through 11.

### Examples

The following example displays sample IP `traceroute` output when a destination host name is specified:

```
Switch# traceroute ip ABA.NYC.mil
```

Type escape sequence to abort.
Tracing the route to ABA.NYC.mil (26.0.0.73)
  1 DEBRIS.CISCO.COM (131.108.1.6) 1000 msec 8 msec 4 msec
  2 BARRNET-GW.CISCO.COM (131.108.16.2) 8 msec 8 msec 8 msec
  3 EXTERNAL-A-GATEWAY.STANFORD.EDU (192.42.110.225) 8 msec 4 msec 4 msec
  4 BB2.SU.BARRNET.NET (131.119.254.6) 8 msec 8 msec 8 msec
  5 SU.ARC.BARRNET.NET (131.119.3.8) 12 msec 12 msec 8 msec
  6 MOFFETT-FLD-MB.in.MIL (192.52.195.1) 216 msec 120 msec 132 msec
  7 ABA.NYC.mil (26.0.0.73) 412 msec 628 msec 664 msec

Table 19-1 describes the fields shown in the display.

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indicates the sequence number of the switch router in the path to the host.</td>
</tr>
<tr>
<td>DEBRIS.CISCO.COM</td>
<td>Host name of this switch router.</td>
</tr>
<tr>
<td>131.108.1.61</td>
<td>IP address of this switch router.</td>
</tr>
<tr>
<td>1000 msec 8 msec 4 msec</td>
<td>Round-trip time for each of the three probes that are sent.</td>
</tr>
</tbody>
</table>

Table 19-2 describes the characters that can appear in `traceroute` output.

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>nn msec</td>
<td>For each node, the round-trip time in milliseconds for the specified number of probes.</td>
</tr>
<tr>
<td>*</td>
<td>The probe timed out.</td>
</tr>
<tr>
<td>?</td>
<td>Unknown packet type.</td>
</tr>
<tr>
<td>Q</td>
<td>Source quench.</td>
</tr>
<tr>
<td>P</td>
<td>Protocol unreachable.</td>
</tr>
<tr>
<td>N</td>
<td>Network unreachable.</td>
</tr>
<tr>
<td>U</td>
<td>Port unreachable.</td>
</tr>
<tr>
<td>H</td>
<td>Host unreachable.</td>
</tr>
<tr>
<td>Related Commands</td>
<td>Command</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>traceroute (privileged)</td>
</tr>
</tbody>
</table>
traffic-shape

To enable traffic shaping for outbound traffic on an interface, use the traffic-shape rate interface configuration command. To disable traffic shaping on the interface, use the no form of this command.

```
traffic-shape target-bit-rate bit-per-interval
no traffic-shape
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>target-bit-rate</td>
<td>This is the target bit rate, rounded off to lower multiple of 32Kbps.</td>
</tr>
<tr>
<td>bit-per-interval</td>
<td>This is the sustained number of bits that can be sent per interval, rounded off to the higher multiple of 1556.</td>
</tr>
</tbody>
</table>

**Defaults**

Disabled.

**Command Modes**

Interface configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1(7a)EY</td>
<td>Changed command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

This feature allows the user to shape down the output of a port (for egress traffic) on a per-physical-port basis. The egress traffic rate will be monitored by the ucode to ensure that traffic goes out on the interface only at the shaping rate configured by the user. When excess traffic enters the switch, the egress side PIF applies back-pressure to the NP5400 switch fabric and the traffic gets queued in the switch fabric. If the switch fabric queues overflow, the traffic will be dropped from the switch fabric. There is no drop by the PIF in this feature. This feature is similar to the IOS GTS feature.

The token bucket algorithm developed for the policer will be adapted to do shaping. Policers and shapers, in general, can identify the traffic violation in the same way, but differ in the manner they respond to those violations. That is, the shaper is supposed to delay the excess traffic by applying back-pressure and buffer it; to the extent possible.

**Examples**

The following example enables traffic shaping on serial interface 0 using the bandwidth required by the service provider.

```
Switch# interface f2/0/0
Switch(config)# traffic-shape rate 64000 1500
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rate-limit</td>
<td>Polices the rate of traffic on EPIF-based FE cards of the Catalyst 8540 MSR and Catalyst 8510 MSR on a per-physical-port basis</td>
</tr>
<tr>
<td>show epc port-qos</td>
<td>Displays the current traffic-shaping configuration.</td>
</tr>
</tbody>
</table>
transit-restricted

To indicate to the network that this node does not allow calls to transit through, use the transit-restricted PNNI node configuration command. To allow calls to transit through the node, use the no form of this command.

```
  transit-restricted

  no transit-restricted
```

**Syntax Description**  
This command has no keywords or arguments.

**Defaults**  
Enabled

**Command Modes**  
PNNI node configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**  
This command enables the network administrator to prevent connections from transiting nodes that only originate or terminate connections, for example, low-end edge switches that do not have the capacity to support transit calls.

For more information, refer to the ATM Switch Router Software Configuration Guide.

**Examples**  
The following script shows how to access the transit-restricted PNNI node configuration command.

```
Switch# configure terminal
Switch(config)# atm router pnni
Switch(config-atm-router)# node 1
Switch(config-pnni-node)# transit-restricted
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show atm pnni local-node</td>
<td>Displays information about a PNNI logical node running on the switch.</td>
</tr>
</tbody>
</table>
t1 framing

To configure T1 framing mode, use the **t1 framing** controller configuration command.

```
t1 line-number framing {esf | sf}
```

**Syntax Description**

- **line-number**: Specifies a T1 line, from 1 to 28.
- **esf**: Specifies that extended super frame is used as the T1 framing type.
- **sf**: Specifies that super frame is used as the T1 framing type.

**Defaults**

esf

**Command Modes**

Controller configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the **t1 framing** controller configuration command to specify the framing mode used by the t1 line.

**Examples**

The following example sets the framing mode on the t1 interface on line 1 to **esf** and on line 2 to **sf**.

```
Switch# configure terminal
Switch(config)# controller t3 3/1/0
Switch(config-controller)# t1 1 framing esf
Switch(config-controller)# t1 2 framing sf
```
### t1 yellow

To configure T1 autoalarm detection and generation, use the `t1 yellow` controller configuration command. To disable autoalarm detection and generation, use the `no` form of this command.

```
t1 line-number yellow {generation | detection}
```

<table>
<thead>
<tr>
<th>Syntax Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>line-number</code></td>
<td>Specifies a T1 line, from 1 to 28.</td>
</tr>
<tr>
<td><code>generation</code></td>
<td>Generates yellow alarms.</td>
</tr>
<tr>
<td><code>detection</code></td>
<td>Detects yellow alarms.</td>
</tr>
</tbody>
</table>

**Defaults**

Yellow alarms are detected and generated on the T1 channel.

**Command Modes**

Controller configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(3c)W5(9)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

A yellow alarm indicates a loss of frame alignment at the remote end. Use the `t1 yellow` command to turn the generation or detection of yellow alarms on or off.

**Note**

If you use the `t1 framing` command to select the `sf` framing mode, you should consider turning off alarm detection because the yellow alarms might be detected incorrectly with `sf` framing enabled.

**Examples**

The following example enables autoalarm detection.

```
Switch# configure terminal
Switch# (config)# controller t3 1/1/0
Switch# (config-controller)# t1 1 yellow detection
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show controllers</code></td>
<td>Displays information about a physical port device.</td>
</tr>
</tbody>
</table>
U Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
username

To establish a username-based authentication system at login, even though your network cannot support a TACACS service, use the `username` global configuration command.

```
username name [access-class access-class-num]
username name [autocommand command]
username name [callback-dialstring dialstring] [callback-line line] [callback-rotary group] [nocallback-verify]
username name [noescape] [nohangup]
username name [dnis] [nopassword | password [encryption-type] password]
username name privilege level
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>name</code></td>
<td>Specifies the username to which this command applies. The <code>name</code> argument can only be one word. White spaces and quotation marks are not allowed.</td>
</tr>
<tr>
<td><code>access-class-num</code></td>
<td>Specifies an outgoing access list that overrides the access list specified in the <code>access-class</code> line configuration command; used for the duration of that session.</td>
</tr>
<tr>
<td><code>command</code></td>
<td>Specifies a command to be issued automatically after the user logs in. When the command is complete, the session is terminated. Because the command can be any length and contain embedded spaces, commands using the <code>autocommand</code> keyword must be the last option on the line.</td>
</tr>
<tr>
<td><code>dialstring</code></td>
<td>Specifies a dialback string for connections initiated by the user.</td>
</tr>
<tr>
<td><code>line</code></td>
<td>Specifies a line to associate with this callback.</td>
</tr>
<tr>
<td><code>group</code></td>
<td>Specifies a rotary group to associate with this callback.</td>
</tr>
<tr>
<td><code>nocallback-verify</code></td>
<td>Does not require authentication after callback.</td>
</tr>
<tr>
<td><code>noescape</code></td>
<td>Prevents a user from using an escape character on the host where the user is connected.</td>
</tr>
<tr>
<td><code>nohangup</code></td>
<td>Prevents the communication server from disconnecting the user after an automatic command (set up with the <code>autocommand</code> keyword) is complete. Instead, the user gets another login prompt.</td>
</tr>
<tr>
<td><code>dnis</code></td>
<td>No password is required for this user when obtained via DNIS.</td>
</tr>
<tr>
<td><code>nopassword</code></td>
<td>No password is required for this user to log in. This is usually most useful in combination with the <code>autocommand</code> keyword.</td>
</tr>
<tr>
<td><code>encryption-type</code></td>
<td>A one-digit number that defines whether the text immediately following is encrypted, and what type of encryption is used. Currently defined encryption types are 0 (the text immediately following is not encrypted), and 7 (the text is encrypted using an encryption algorithm defined by Cisco).</td>
</tr>
<tr>
<td><code>password</code></td>
<td>A password can contain embedded spaces and must be the last option specified in the <code>username</code> command.</td>
</tr>
<tr>
<td><code>level</code></td>
<td>Sets the user privilege level.</td>
</tr>
</tbody>
</table>

**Command Modes**

Global configuration
The `username` command provides username/password authentication for login purposes only.

Multiple `username` commands can be used to specify options for a single user. Add a `username` entry for each remote system that the local switch communicates with and requires authentication from. The remote device must have a `username` entry for the local switch router. This entry must have the same password as the local switch’s entry for that remote device.

This command can be useful for defining usernames that get special treatment, for example, an “info” username that does not require a password but connects the user to a general-purpose information service.

The `username` command is also required as part of the configuration for the CHAP. For each remote system that requires authentication from the local switch communicates, add a `username` entry.

To enable the local switch to respond to remote CHAP challenges, one `username name` entry must be the same as the `hostname name` entry that was already assigned to your switch.

If there is no `secret` specified and `debug serial-interface` is enabled, an error is displayed when an interface is established and the CHAP challenge is not implemented. Debugging information on CHAP is available using the `debug serial-interface` and `debug serial-packet` commands. For more information about `debug` commands, refer to the `Debug Command Reference` publication.

To implement a service similar to the UNIX `who` command, which can be entered at the login prompt and lists the current users of the switch, the `username` command takes the following form.

```
Switch# username who nopassword nohangup autocommand show users
```

To implement an information service that does not require a password, the command takes the following form.

```
Switch# username info nopassword noescape autocommand telnet nic.ddn.mil
```

To implement an ID that works even if all TACACS servers go down, the command takes the following form.

```
Switch# username superuser password superpassword
```

The following example configuration enables CHAP on interface serial 0. It also defines a password for local server `Adam` and remote server `Eve`.

```
Switch# configure terminal
Switch(config)# hostname Adam
Switch(config)# interface serial 0
Switch(config-if)# encapsulation ppp
Switch(config-if)# ppp authentication chap
Switch(config-if)# end
```
Switch(config)# username Adam password oursystem
Switch(config)# username Eve password theirsystem

When you look at your configuration file, the passwords are encrypted and the display looks similar to the following output.

Switch# configure terminal
Switch(config)# hostname Adam
Switch(config)# interface serial 0 encapsulation ppp
Switch(config-if)# ppp authentication chap
Switch(config-if)# end
Switch(config)# username Adam password 7 1514040356
Switch(config)# username Eve password 7 121F0A18

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>hostname</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
</tbody>
</table>
V Commands

The commands shown in this chapter apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Where an entire command or certain attributes of a command have values specific to a particular switch or switch router, an exception is indicated by the following callouts:

- Catalyst 8540 MSR
- Catalyst 8510 MSR and LightStream 1010

Note

Commands that are identical to those documented in the Cisco IOS software documentation have been removed from this chapter.

Note

Commands that no longer function as expected in ATM environments have also been removed from this chapter.

Refer to Appendix D of this command reference for a detailed list of commands that have been removed, changed or replaced.
verify

To verify the checksum of a file on a Flash device, use the `verify` EXEC command. This command replaces the `copy verify` and `copy verify flash` commands.

```
verify [device:]filename
```

**Syntax Description**

- `device:` Device containing the file whose checksum is being verified. The colon (:) is required. Valid devices are as follows:
  - `bootflash:` This device is the internal Flash memory.
  - `sec-bootflash:` The secondary internal Flash memory on the redundant route processor.
  - `slot0:` The first PC slot on the route processor card and is the initial default device.
  - `sec-slot0:` The first PC slot on the redundant route processor card. (Catalyst 8540 MSR)
  - `slot1:` The second PC slot on the route processor card.
  - `sec-slot1:` The second PC slot on the redundant route processor card. (Catalyst 8540 MSR)

When you omit this argument, the system verifies the checksum of the specified file on the current working device.

- `filename` Name of a file on the specified Flash device. The file can be of any type. The maximum filename length is 63 characters.

**Defaults**

The current working device is the default device.

**Command Modes**

EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1(4)</td>
<td>New command</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

Use the `verify` command to verify the checksum of a file before using it. When you omit the `device:` argument, the system verifies the checksum of the specified file on the current working device.

**Examples**

The following example shows how to get information and verify the `test-image` file using the `dir` and `verify` commands.

```
Switch# dir bootflash:
-#- -length- -date/time------ name
1  169295 Dec 25 1927 17:53:24 b.Z
2   1382 Dec 25 1927 17:54:33 test-file
3   1382 Dec 25 1927 17:55:28 test-file3

Switch# verify bootflash:test-image
```
Chapter 21  V Commands

verify

4   1385   Dec 25 1927 17:56:11 test-file4
5   2200823 Dec 25 1927 17:58:56 test-image
6   1382   Dec 26 1927 10:28:42 test-file2

3695748 bytes available (3906428 bytes used)

Switch# verify bootflash:test-image

File bootflash:test-image verified OK

<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cd</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td></td>
<td>copy flash</td>
<td>Copies a file from Flash memory to another destination.</td>
</tr>
<tr>
<td></td>
<td>ip rcmd</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td></td>
<td>remote-username</td>
<td></td>
</tr>
<tr>
<td></td>
<td>purge</td>
<td>Cisco IOS command removed from this manual.</td>
</tr>
<tr>
<td></td>
<td>show flash</td>
<td>Displays the layout and contents of Flash memory.</td>
</tr>
</tbody>
</table>
verify
Acronyms

The acronyms in this appendix apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. Table A-1 lists the acronyms used in this publication, along with their definitions.

Table A-1 List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>authentication, authorization, and accounting</td>
</tr>
<tr>
<td>AAL</td>
<td>ATM adaptation layer</td>
</tr>
<tr>
<td>ABR</td>
<td>available bit rate</td>
</tr>
<tr>
<td>ACK</td>
<td>acknowledgment</td>
</tr>
<tr>
<td>ACO</td>
<td>audible cutoff</td>
</tr>
<tr>
<td>ACR</td>
<td>allowed cell rate</td>
</tr>
<tr>
<td>ADM</td>
<td>Add Drop Multiplexer</td>
</tr>
<tr>
<td>AESA</td>
<td>ATM End System Address</td>
</tr>
<tr>
<td>AESO</td>
<td>Auxiliary Extended Security Option</td>
</tr>
<tr>
<td>AFI</td>
<td>authority and format identifier</td>
</tr>
<tr>
<td>AGG</td>
<td>aggregate</td>
</tr>
<tr>
<td>AIS</td>
<td>alarm indication signal</td>
</tr>
<tr>
<td>AMI</td>
<td>alternate mark inversion</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>APS</td>
<td>Automatic Protection Switching</td>
</tr>
<tr>
<td>ARAP</td>
<td>AppleTalk Remote Access Protocol</td>
</tr>
<tr>
<td>ARP</td>
<td>Address Resolution Protocol</td>
</tr>
<tr>
<td>ARPA</td>
<td>Advanced Research Projects Agency</td>
</tr>
<tr>
<td>ATD IE</td>
<td>ATM Traffic Descriptor Information Element</td>
</tr>
<tr>
<td>ATM</td>
<td>Asynchronous Transfer Mode</td>
</tr>
<tr>
<td>ATM-P</td>
<td>ATM Pseudo interface</td>
</tr>
<tr>
<td>B8ZS</td>
<td>binary 8-zero substitution</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Bc</td>
<td>Committed Burst</td>
</tr>
<tr>
<td>BECN</td>
<td>backward explicit congestion notification</td>
</tr>
<tr>
<td>BER</td>
<td>bit error rate</td>
</tr>
<tr>
<td>BIP</td>
<td>bit interleaved parity</td>
</tr>
<tr>
<td>BISDN</td>
<td>Broadband Integrated Services Digital Network</td>
</tr>
<tr>
<td>BITS</td>
<td>building integrated timing supply</td>
</tr>
<tr>
<td>BOOTP</td>
<td>Bootstrap Protocol</td>
</tr>
<tr>
<td>CAC</td>
<td>connection admission control</td>
</tr>
<tr>
<td>CAS</td>
<td>channel associated signalling</td>
</tr>
<tr>
<td>CBR</td>
<td>constant bit rate</td>
</tr>
<tr>
<td>CD</td>
<td>Carrier Detect</td>
</tr>
<tr>
<td>CDP</td>
<td>Cisco Discovery Protocol</td>
</tr>
<tr>
<td>CDS3</td>
<td>channelized digital signal level 3</td>
</tr>
<tr>
<td>CDV</td>
<td>cell delay variation</td>
</tr>
<tr>
<td>CDVT</td>
<td>cell delay variation tolerance</td>
</tr>
<tr>
<td>CE1</td>
<td>channelized E1</td>
</tr>
<tr>
<td>CES</td>
<td>circuit emulation service</td>
</tr>
<tr>
<td>CES-IWF</td>
<td>CES interworking function</td>
</tr>
<tr>
<td>CHAP</td>
<td>Challenge Handshake Authentication Protocol</td>
</tr>
<tr>
<td>CIR</td>
<td>committed information rate</td>
</tr>
<tr>
<td>CLNS</td>
<td>Connectionless Network Service</td>
</tr>
<tr>
<td>CLP</td>
<td>cell loss priority</td>
</tr>
<tr>
<td>CLR</td>
<td>cell loss ratio</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>CRC</td>
<td>cyclic redundancy check</td>
</tr>
<tr>
<td>CTC</td>
<td>common transmit clocking</td>
</tr>
<tr>
<td>CTD</td>
<td>cell transfer delay</td>
</tr>
<tr>
<td>CTT</td>
<td>Connection Traffic Table</td>
</tr>
<tr>
<td>CUG</td>
<td>closed user group</td>
</tr>
<tr>
<td>DCA</td>
<td>Defense Communications Agency</td>
</tr>
<tr>
<td>DCC</td>
<td>Data Country Code</td>
</tr>
<tr>
<td>DCE</td>
<td>data communications equipment</td>
</tr>
<tr>
<td>DE</td>
<td>discard eligible</td>
</tr>
<tr>
<td>DFI</td>
<td>Domain Specific Part Format Identifier</td>
</tr>
<tr>
<td>DLCI</td>
<td>data-link connection identifier</td>
</tr>
<tr>
<td>DNIS</td>
<td>Distributed Network Information Services</td>
</tr>
</tbody>
</table>
### Table A-1  List of Acronyms (continued)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNS</td>
<td>Domain Name System</td>
</tr>
<tr>
<td>DTL</td>
<td>designated transit list</td>
</tr>
<tr>
<td>EFCI</td>
<td>Explicit Forward Congestion Indication</td>
</tr>
<tr>
<td>EPD</td>
<td>early packet discard</td>
</tr>
<tr>
<td>ESI</td>
<td>end system identifier or end-station identifier</td>
</tr>
<tr>
<td>ESO</td>
<td>Extended Security Option</td>
</tr>
<tr>
<td>FC-PCQ</td>
<td>feature card per-connection queueing (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
<tr>
<td>FC-PFQ</td>
<td>feature card per-flow queueing (Catalyst 8510 MSR and LightStream 1010)</td>
</tr>
<tr>
<td>FDL</td>
<td>facility data link</td>
</tr>
<tr>
<td>FEBE</td>
<td>far-end block errors</td>
</tr>
<tr>
<td>FECN</td>
<td>forward explicit congestion notification</td>
</tr>
<tr>
<td>FPGA</td>
<td>field-programmable gate array</td>
</tr>
<tr>
<td>FRC</td>
<td>frame redundancy check</td>
</tr>
<tr>
<td>GCRA</td>
<td>generic cell rate algorithm</td>
</tr>
<tr>
<td>HDB3</td>
<td>line code type used on E1 circuits</td>
</tr>
<tr>
<td>ICD</td>
<td>International Code Designator</td>
</tr>
<tr>
<td>ICMP</td>
<td>Internet Control Message Protocol</td>
</tr>
<tr>
<td>ICP</td>
<td>IMA Control Protocol</td>
</tr>
<tr>
<td>IE</td>
<td>information element</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
</tr>
<tr>
<td>IETF</td>
<td>Internet Engineering Task Force</td>
</tr>
<tr>
<td>IGRP</td>
<td>Interior Gateway Routing Protocol</td>
</tr>
<tr>
<td>IISP</td>
<td>Interim-Interswitch Signalling Protocol</td>
</tr>
<tr>
<td>ILMI</td>
<td>Interim Local Management Interface (UNI 3.1) or Integrated Local Management Interface (UNI 4.0)</td>
</tr>
<tr>
<td>IMA</td>
<td>inverse multiplexing over ATM</td>
</tr>
<tr>
<td>IME</td>
<td>interface management entity</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IPSO</td>
<td>IP Security Option</td>
</tr>
<tr>
<td>ITC</td>
<td>independent transmit clocking</td>
</tr>
<tr>
<td>ITU-T</td>
<td>International Telecommunications Union Telecommunication Standardization Sector</td>
</tr>
<tr>
<td>LANE</td>
<td>LAN Emulation</td>
</tr>
<tr>
<td>LEC</td>
<td>LAN Emulation Client</td>
</tr>
<tr>
<td>LECS</td>
<td>LAN Emulation Configuration Server</td>
</tr>
<tr>
<td>LGN</td>
<td>logical group node</td>
</tr>
<tr>
<td>LLC2</td>
<td>Logical Link Control, type 2</td>
</tr>
</tbody>
</table>
### Table A-1  List of Acronyms (continued)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMI</td>
<td>Local Management Interface</td>
</tr>
<tr>
<td>LS1010</td>
<td>LightStream 1010</td>
</tr>
<tr>
<td>MAC</td>
<td>Media Access Control</td>
</tr>
<tr>
<td>MBS</td>
<td>maximum burst size</td>
</tr>
<tr>
<td>MCR</td>
<td>minimum cell rate</td>
</tr>
<tr>
<td>MDL</td>
<td>maintenance data link</td>
</tr>
<tr>
<td>MIB</td>
<td>Management Information Base</td>
</tr>
<tr>
<td>MMF</td>
<td>multimode fiber</td>
</tr>
<tr>
<td>MOP</td>
<td>Maintenance Operation Protocol</td>
</tr>
<tr>
<td>MSC</td>
<td>modular switch controller</td>
</tr>
<tr>
<td>MSR</td>
<td>multiservice ATM switch router</td>
</tr>
<tr>
<td>MTU</td>
<td>maximum transmission unit</td>
</tr>
<tr>
<td>mux</td>
<td>multiplexing device</td>
</tr>
<tr>
<td>NCDP</td>
<td>Network Clock Distribution Protocol</td>
</tr>
<tr>
<td>NCP</td>
<td>Network Control Protocol or Network Control Program</td>
</tr>
<tr>
<td>NLESO</td>
<td>Network Level Extended Security Option</td>
</tr>
<tr>
<td>NNI</td>
<td>Network-to-Network Interface</td>
</tr>
<tr>
<td>NSAP</td>
<td>network service access point</td>
</tr>
<tr>
<td>NTP</td>
<td>Network Time Protocol</td>
</tr>
<tr>
<td>NVRAM</td>
<td>nonvolatile random-access memory</td>
</tr>
<tr>
<td>OAM</td>
<td>Operation, Administration, and Maintenance</td>
</tr>
<tr>
<td>OIR</td>
<td>online insertion and removal</td>
</tr>
<tr>
<td>OSF</td>
<td>oversubscription factor</td>
</tr>
<tr>
<td>PCI</td>
<td>protocol control information</td>
</tr>
<tr>
<td>PCR</td>
<td>peak cell rate</td>
</tr>
<tr>
<td>PDU</td>
<td>protocol data unit</td>
</tr>
<tr>
<td>PGL</td>
<td>peer group leader</td>
</tr>
<tr>
<td>PIE</td>
<td>protocol information element</td>
</tr>
<tr>
<td>PIF</td>
<td>port interface</td>
</tr>
<tr>
<td>ping</td>
<td>packet internet groper</td>
</tr>
<tr>
<td>PLCP</td>
<td>physical layer convergence procedure</td>
</tr>
<tr>
<td>PLD</td>
<td>programmable logic device</td>
</tr>
<tr>
<td>PNNI</td>
<td>Private Network-Network Interface or Private Network Node Interface</td>
</tr>
<tr>
<td>POS</td>
<td>packet over SONET</td>
</tr>
<tr>
<td>PPP</td>
<td>Point-to-Point Protocol</td>
</tr>
<tr>
<td>PRI</td>
<td>Primary Rate Interface</td>
</tr>
</tbody>
</table>
**Table A-1** List of Acronyms (continued)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network dial-on-demand routing</td>
</tr>
<tr>
<td>DDR</td>
<td></td>
</tr>
<tr>
<td>PTSE</td>
<td>PNNI topology state element</td>
</tr>
<tr>
<td>PTSP</td>
<td>PNNI topology state packet</td>
</tr>
<tr>
<td>PVC</td>
<td>permanent virtual circuit</td>
</tr>
<tr>
<td>PVCC</td>
<td>permanent virtual channel connection</td>
</tr>
<tr>
<td>PVCL</td>
<td>permanent virtual channel link</td>
</tr>
<tr>
<td>PVP</td>
<td>permanent virtual path</td>
</tr>
<tr>
<td>PVPC</td>
<td>permanent virtual path connection</td>
</tr>
<tr>
<td>PVPL</td>
<td>permanent virtual path link</td>
</tr>
<tr>
<td>QOS</td>
<td>quality of service</td>
</tr>
<tr>
<td>QSAAL</td>
<td>Q.2931 protocol over signalling ATM adaptation layer</td>
</tr>
<tr>
<td>RARP</td>
<td>Reverse Address Resolution Protocol</td>
</tr>
<tr>
<td>RCC</td>
<td>routing control channels</td>
</tr>
<tr>
<td>rcp</td>
<td>remote copy protocol</td>
</tr>
<tr>
<td>RDI</td>
<td>remote defect indication</td>
</tr>
<tr>
<td>RIF</td>
<td>Routing Information Field</td>
</tr>
<tr>
<td>RM</td>
<td>resource management</td>
</tr>
<tr>
<td>RMON</td>
<td>Remote Monitoring</td>
</tr>
<tr>
<td>ROM</td>
<td>read-only memory</td>
</tr>
<tr>
<td>rsh</td>
<td>remote shell protocol</td>
</tr>
<tr>
<td>RST</td>
<td>reset</td>
</tr>
<tr>
<td>RSVP</td>
<td>Resource Reservation Protocol</td>
</tr>
<tr>
<td>SAP</td>
<td>service access point</td>
</tr>
<tr>
<td>SCR</td>
<td>sustainable cell rate</td>
</tr>
<tr>
<td>SCRMF</td>
<td>Sustained Cell Rate Margin Factor</td>
</tr>
<tr>
<td>SD</td>
<td>sequential data</td>
</tr>
<tr>
<td>SDU</td>
<td>service data unit</td>
</tr>
<tr>
<td>SGCP</td>
<td>Simple Gateway Control Protocol</td>
</tr>
<tr>
<td>SLIP</td>
<td>Serial Line Internet Protocol</td>
</tr>
<tr>
<td>SNAP</td>
<td>Subnetwork Access Protocol</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>SONET</td>
<td>Synchronous Optical Network</td>
</tr>
<tr>
<td>SPE</td>
<td>synchronous payload envelope</td>
</tr>
<tr>
<td>SPVC</td>
<td>soft permanent virtual circuit</td>
</tr>
<tr>
<td>SPVP</td>
<td>soft permanent virtual path</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>SSCOP</td>
<td>Service Specific Connection Oriented Protocol</td>
</tr>
<tr>
<td>SSE</td>
<td>silicon switching engine</td>
</tr>
<tr>
<td>SSRP</td>
<td>Simple Server Redundancy Protocol</td>
</tr>
<tr>
<td>SVC</td>
<td>switched virtual circuit</td>
</tr>
<tr>
<td>SVCC</td>
<td>switched virtual circuit connection</td>
</tr>
<tr>
<td>SVP</td>
<td>switched virtual path</td>
</tr>
<tr>
<td>SVPC</td>
<td>switched virtual path connection</td>
</tr>
<tr>
<td>TACACS</td>
<td>Terminal Access Controller Access Control System</td>
</tr>
<tr>
<td>TBR</td>
<td>tag bit rate</td>
</tr>
<tr>
<td>TC</td>
<td>tag-controlled</td>
</tr>
<tr>
<td>TCA</td>
<td>threshold crossing alarm</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>TDP</td>
<td>Tag Distribution Protocol</td>
</tr>
<tr>
<td>TFIB</td>
<td>Tag Forwarding Information Base</td>
</tr>
<tr>
<td>TFTP</td>
<td>Trivial File Transfer Protocol</td>
</tr>
<tr>
<td>ToS</td>
<td>type of service</td>
</tr>
<tr>
<td>TSP</td>
<td>tag-switched path or topology state packet</td>
</tr>
<tr>
<td>TTL</td>
<td>Time To Live</td>
</tr>
<tr>
<td>TVC</td>
<td>tag VC</td>
</tr>
<tr>
<td>UART</td>
<td>Universal Asynchronous Receiver/Transmitter</td>
</tr>
<tr>
<td>UBR</td>
<td>unspecified bit rate</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
</tr>
<tr>
<td>UNI</td>
<td>User-Network Interface</td>
</tr>
<tr>
<td>UPC</td>
<td>usage parameter control</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
</tr>
<tr>
<td>VBR</td>
<td>variable bit rate</td>
</tr>
<tr>
<td>VBR-NRT</td>
<td>variable bit rate non-real time</td>
</tr>
<tr>
<td>VBR-RT</td>
<td>variable bit rate-real time</td>
</tr>
<tr>
<td>VC</td>
<td>virtual channel</td>
</tr>
<tr>
<td>VCC</td>
<td>virtual channel connection</td>
</tr>
<tr>
<td>VCD</td>
<td>virtual circuit descriptor</td>
</tr>
<tr>
<td>VCI</td>
<td>virtual channel identifier</td>
</tr>
<tr>
<td>VCL</td>
<td>virtual channel link</td>
</tr>
<tr>
<td>VLAN</td>
<td>virtual LAN</td>
</tr>
<tr>
<td>VP</td>
<td>virtual path</td>
</tr>
<tr>
<td>VPC</td>
<td>virtual path connection</td>
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</tbody>
</table>
### Table A-1  List of Acronyms (continued)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPI</td>
<td>virtual path identifier</td>
</tr>
<tr>
<td>VPL</td>
<td>virtual path link</td>
</tr>
<tr>
<td>WDM</td>
<td>wave division multiplexing</td>
</tr>
<tr>
<td>WRR</td>
<td>weighted round-robin</td>
</tr>
</tbody>
</table>
References and Recommended Reading

This appendix contains the following lists of publications related to networks and networking:

- Books and periodicals
- Technical publications and standards
- RFCs supported by Cisco

Books and Periodicals


McNamara, J.E. Local Area Networks. Digital Press, Educational Services, Digital Equipment Corporation, 12 Crosby Drive, Bedford, MA 01730.


Technical Publications and Standards


American National Standards Institute X3T9.5 Committee. FDDI Station Management (SMT). Rev. 6.1; March 15, 1990.


Banyan Systems, Inc. VINES Protocol Definition. DA254-00, Rev. 1.0. Westboro, Massachusetts; February 1990.


———. **DIGITAL Network Architecture (Phase V).** EK-DNAPV-GD-001; September 1987.


IEEE Project 802—Local & Metropolitan Area Networks. Proposed Standard: Distributed Queue Dual Bus (DQDB) Subnetwork of a Metropolitan Area Network (MAN); February 7, 1990.

IEEE 802.2—**Local Area Networks Standard, 802.2 Logical Link Control.** ANSI/IEEE Standard; October 1985.

IEEE 802.3—**Local Area Networks Standard, 802.3 Carrier Sense Multiple Access.** ANSI/IEEE Standard; October 1985.


———. **Advanced Communications Function for VTAM (ACF/VTAM), General Information: Introduction.** GS27-0462.

———. **Advanced Communications Function for VTAM, general information: concepts.** GS27-0463.


———. **Local Area Network Technical Reference.** SC30-3883.

———. **Network Problem Determination Application: general information.** GC34-2010.

———. **Synchronous Data Link Control: general information.** GA27-3093.

———. **Systems Network Architecture: concepts and products.** GC30-3072.


———. **Token-Ring Network Architecture Reference.** SC30-3374.


Cisco-Supported RFCs

Table B-1 lists the RFCs supported by the Cisco Internetwork Operating System (Cisco IOS) software as of Cisco IOS Release 11.0, in descending numerical order. RFCs that have been superseded or replaced are identified, as are RFCs that are partially supported or supported only from Software Release 9.21 forward.

<table>
<thead>
<tr>
<th>Standard Number</th>
<th>Standard Title</th>
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<tbody>
<tr>
<td>RFC 1695</td>
<td>AToM MIB</td>
</tr>
<tr>
<td>RFC 1661</td>
<td>PPP (Point-to-Point Protocol)</td>
</tr>
<tr>
<td>RFC 1654</td>
<td>A Border Gateway Protocol (BGP-4)</td>
</tr>
<tr>
<td>RFC 1634</td>
<td>Supersedes 1362 and 1551 Novell Routing over Various WAN Media (IPXWAN)</td>
</tr>
<tr>
<td>RFC 1583</td>
<td>OSPF Version 2</td>
</tr>
<tr>
<td>RFC 1552</td>
<td>The PPP Internetwork Packet Exchange Control Protocol (IPXCP)</td>
</tr>
<tr>
<td>RFC 1549</td>
<td>PPP in HDLC Framing</td>
</tr>
<tr>
<td>RFC 1548</td>
<td>The Point-to-Point Protocol (PPP)</td>
</tr>
<tr>
<td>RFC 1541</td>
<td>Dynamic Host Configuration Protocol</td>
</tr>
<tr>
<td>RFC 1519</td>
<td>Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy</td>
</tr>
<tr>
<td>RFC 1492</td>
<td>Access Control Protocol or TACACS</td>
</tr>
<tr>
<td>RFC 1490</td>
<td>Multiprotocol Interconnect over Frame Relay</td>
</tr>
<tr>
<td>RFC 1483 (1)</td>
<td>Multiprotocol Encapsulation over ATM Adaptation Layer 5</td>
</tr>
<tr>
<td>RFC 1450</td>
<td>MIB for SNMP Version 2</td>
</tr>
<tr>
<td>RFC 1403</td>
<td>BGP OSPF Interaction</td>
</tr>
<tr>
<td>RFC 1397</td>
<td>Default Route Advertisement in BGP2 and BGP3</td>
</tr>
<tr>
<td>RFC 1395</td>
<td>BootP Extensions</td>
</tr>
<tr>
<td>RFC 1390</td>
<td>Transmission of IP and ARP over FDDI Networks</td>
</tr>
<tr>
<td>RFC 1382 (1,2)</td>
<td>SNMP MIB Extension for X.25 Packet Layer</td>
</tr>
<tr>
<td>RFC 1381 (1,2)</td>
<td>SNMP MIB Extension for X.25 LAPB</td>
</tr>
<tr>
<td>RFC 1378 (1)</td>
<td>PPP AppleTalk Control Protocol (ATCP)</td>
</tr>
<tr>
<td>RFC 1377</td>
<td>PPP OSI Network Layer Control Protocol (OSINLCP)</td>
</tr>
<tr>
<td>RFC 1376</td>
<td>PPP DECnet Phase IV Control Protocol (DNCP)</td>
</tr>
</tbody>
</table>
**Table B-1  Cisco-Supported Requests for Comments (continued)**

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<th>Standard Title</th>
</tr>
</thead>
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<td>Multiprotocol Interconnect on X.25 and ISDN in the Packet Mode</td>
</tr>
<tr>
<td>RFC 1350</td>
<td>TFTP Version 2</td>
</tr>
<tr>
<td>RFC 1348</td>
<td>DNS NSAP RRs</td>
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<tr>
<td>RFC 1334</td>
<td>PPP Authentication Protocols</td>
</tr>
<tr>
<td>RFC 1333</td>
<td>PPP Link Quality Monitoring</td>
</tr>
<tr>
<td>RFC 1332</td>
<td>PPP Internet Protocol Control Protocol (IPCP)</td>
</tr>
</tbody>
</table>
| RFC 1331        | Replaced by RFC 1548  
|                 | PPP for the Transmission of Multi-protocol Datagrams over Point-to-Point Links |
| RFC 1315  
| RFC 1305        | MIB for Frame Relay DTEs |
| RFC 1294  
| RFC 1293        | Replaced by RFC1490  
|                 | Multiprotocol Interconnect over Frame Relay |
| RFC 1286        | Inverse ARP |
| RFC 1285  
| RFC 1269  
| RFC 1268        | Definitions of Managed Objects for Bridges |
| RFC 1267        | FDDI MIB |
| RFC 1256        | Definitions of Managed Objects for the Border Gateway Protocol (Version 3) |
| RFC 1253        | Application of BGP in the Internet |
| RFC 1247        | BGP-3 |
| RFC 1236        | ICMP Router Discovery Messages |
| RFC 1231  
| RFC 1220        | MIB for OSPF Version 2 |
| RFC 1215        | Proposed Standard for the Transmission of IP Datagrams over FDDI Networks |
| RFC 1213        | OSPF Version 2 |
| RFC 1212        | Concise MIB Definitions |
| RFC 1209        | Transmission of IP Datagrams over SMDS Service |
| RFC 1196        | Finger User Information Protocol |
| RFC 1195  
| RFC 1191        | Use of OSI IS-IS for Routing in TCP/IP in Dual Environments |
| RFC 1188        | Path MTU Discovery |
| RFC 1172        | Proposed Standard for the Transmission of IP Datagrams over FDDI Networks |

\[1\] RFC 1285, 1269, 1247, 1213, 1212, 1209, 1196, 1195, 1191, 1188, 1172 have been replaced by corresponding RFCs.
### Cisco-Supported RFCs

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<thead>
<tr>
<th>Standard Number</th>
<th>Standard Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFC 1171</td>
<td>Replaced by RFC 1331: Point-to-Point Protocol for the Transmission of Multi-Protocol Datagrams over Point-to-Point links</td>
</tr>
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</tr>
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<td>RFC 1144</td>
<td>Compressing TCP/IP Headers for Low-Speed Serial Links</td>
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</tr>
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</tr>
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<td>RFC 1058</td>
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</tr>
<tr>
<td>RFC 1042</td>
<td>Standard for the Transmission of IP Datagrams Over IEEE 802 Networks</td>
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<td>RFC 1035</td>
<td>Domain Names—Implementation and Specification</td>
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<td>Domain Names—Concepts and Facilities</td>
</tr>
<tr>
<td>RFC 1027</td>
<td>Using ARP to Implement Transparent Subnet Gateways (Proxy ARP)</td>
</tr>
<tr>
<td>RFC 1009</td>
<td>Requirements for Internet Gateways</td>
</tr>
<tr>
<td>RFC 994</td>
<td>Replaced by ISO 8473: Protocol for Providing the Connectionless-Mode Network Service</td>
</tr>
</tbody>
</table>

### Table B-1: Cisco-Supported Requests for Comments (continued)
### Table B-1 Cisco-Supported Requests for Comments (continued)

<table>
<thead>
<tr>
<th>Standard Number</th>
<th>Standard Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFC 951</td>
<td>Bootstrap Protocol (BootP)</td>
</tr>
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<td>RFC 919</td>
<td>Broadcasting Internet Datagrams</td>
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<td>RFC 906</td>
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<td>RFC 904</td>
<td>Exterior Gateway Protocol (EGP) Formal Specification</td>
</tr>
<tr>
<td>RFC 903</td>
<td>Reverse Address Resolution Protocol (RARP)</td>
</tr>
<tr>
<td>RFC 896</td>
<td>Congestion Control in TCP/IP Internetworks</td>
</tr>
<tr>
<td>RFC 894</td>
<td>Standard for the Transmission of IP Datagrams over Ethernet</td>
</tr>
<tr>
<td>RFC 891</td>
<td>Hello Protocol</td>
</tr>
<tr>
<td>RFC 879</td>
<td>The TCP Maximum Segment Size and Related Topics</td>
</tr>
<tr>
<td>RFC 877</td>
<td>Standard for the Transmission of IP Datagrams Over Public Data Networks</td>
</tr>
<tr>
<td>RFC 874</td>
<td>Telnet Protocol Specification</td>
</tr>
<tr>
<td>RFC 863</td>
<td>Discard Service (TCP discard)</td>
</tr>
<tr>
<td>RFC 862</td>
<td>Echo Service (TCP echo)</td>
</tr>
<tr>
<td>RFC 860</td>
<td>Telnet Timing Mark Option</td>
</tr>
<tr>
<td>RFC 858</td>
<td>Telnet Suppress Go Ahead Option</td>
</tr>
<tr>
<td>RFC 857</td>
<td>Telnet Echo Option</td>
</tr>
<tr>
<td>RFC 856</td>
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</tr>
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<td>RFC 855</td>
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</tr>
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<td>RFC 854</td>
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<td>RFC 813</td>
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<td>RFC 793</td>
<td>MIL STD 1778 Transmission Control Protocol (TCP)</td>
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<td>RFC 792</td>
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<td>RFC 791</td>
<td>MIL STD 1777 Internetwork Protocol (IP)</td>
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<td>RFC 783</td>
<td>Trivial File Transfer Protocol (TFTP) (version 2)</td>
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<td>RFC 779</td>
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</tr>
<tr>
<td>RFC 768</td>
<td>User Datagram Protocol (UDP)</td>
</tr>
</tbody>
</table>
1. This RFC is only partially supported by the Cisco IOS.
2. This RFC is supported from Software Release 9.21 forward.

Where to Obtain RFCs

RFCs are maintained by Government Systems, Inc. (GSI). Both electronic and printed copies can be obtained. GSI can be contacted in the following ways:

- By mail:
  Government Systems, Inc.  
  Attn: Network Information Center  
  14200 Park Meadow Drive, Suite 200  
  Chantilly, Virginia 22021

- By telephone:
  1–800–365–3642  
  1–703–802–8376  
  1–703–802–8376 (FAX)

- By electronic mail:
  NIC@NIC.DDN.MIL  
  Network address: 192.112.36.5
This appendix explains regular expressions and how to use them in ATM switch router configurations. (Refer to the *ATM Switch Router Software Configuration Guide* for more information.) It also provides details for composing regular expressions. This appendix has the following sections:

- **Understanding General Concepts**
- **Using Regular Expressions**
- **Creating Regular Expressions**
- **Working with Practical Examples**

**Understanding General Concepts**

A regular expression is a pattern to match against an input string. You specify the pattern that a string must match when you compose a regular expression. Matching a string to the specified pattern is called “pattern matching.” Pattern matching either succeeds or fails.

For example, you can specify in an X.25 routing table that incoming packets with destination addresses beginning with 3107 are routed to serial interface 0. In this example, the pattern to match is the 3107 specified in the X.25 routing table. The string is the initial portion of the destination address of any incoming X.25 packet. When the destination address string matches the 3107 pattern, pattern matching succeeds and the Cisco IOS software routes the packet to serial interface 0. When the initial portion of the destination address does not match 3107, then pattern matching fails and the software does not route the packet to serial interface 0.

If a regular expression can match two different parts of an input string, it will match the earliest part first.

**Using Regular Expressions**

Cisco ATM switch router configurations use several implementations of regular expressions. Generally, you use regular expressions in the following ways:

- To specify chat scripts for asynchronous lines in the dial-on-demand routing (DDR) feature
- To specify routes in a routing table for the X.25 switching feature
- To filter packets and routing information in DECnet and Border Gateway Protocol (BGP)
Creating Regular Expressions

Specifying Chat Scripts

On asynchronous lines, chat scripts send commands for modem dialing and logging in to remote systems. You use a regular expression in the **modem chat-script** command to specify the name of the chat script that the Cisco IOS software is to execute on a particular asynchronous line. You can also use regular expressions in the **dialer map** command to specify a “modem” script or “system” script to be used for a connection to one or multiple sites on an asynchronous interface.

For configuration information on chat scripts, refer to the “Configuring DDR” chapter in the *Router Products Configuration Guide*. For details on the **modem chat-script** and **dialer map** commands, refer to the “Asynchronous DDR Preparation Commands” chapter of the *Dial Solutions Command Reference*.

Specifying Routes in a Routing Table

As described in the “Understanding General Concepts” section, you can use regular expressions to help specify routes in an X.25 routing table. When you create entries in an X.25 routing table, you can use regular expressions in the **x25 route** command to help specify routes for incoming calls. When an ATM switch router receives an incoming call that should be forwarded to its destination, the Cisco IOS software consults the X.25 routing table to determine the route. The software compares the X.121 network interface address (or destination address) field and the Call User Data (CUD) field of the incoming packet with the routing table to determine the route. When the destination address and the CUD of the incoming packet match the X.121 and CUD regular expressions you specified in the routing table, the ATM switch router forwards the call.

For details on creating an X.25 routing table, refer to the “Configuring X.25 and LAPB” chapter in the *Router Products Configuration Guide*. Also, see the **x25 route** command in the “X.25 and LAPB Commands” chapter of the *Wide-Area Networking Command Reference*.

Filtering Packets and Routing Information

You can use regular expressions in access lists for both DECnet and BGP. In DECnet, you can use regular expressions in the **access-list** command to filter connect initiate packets. With these packets, you can filter packets by DECnet object type, such as MAIL. In BGP, you use regular expressions in the **ip as-path access-list** command for path filtering by neighbor. Using regular expressions, you specify an access list filter on both incoming and outbound updates based on the BGP autonomous system paths.

For configuration information on filtering connect initiate packets and path filtering by neighbor, refer to the “Configuring DECnet” and “Configuring IP Routing Protocols” chapters in the *Router Products Configuration Guide*. For detailed information on the **access-list** and **ip as-path access-list** commands, refer to the “DECnet Commands” and “IP Routing Protocols” chapters of the *Network Protocol Command Reference*.

Creating Regular Expressions

A regular expression can be a single-character pattern or a multiple-character pattern. That is, a regular expression can be a single character that matches the same single character in the input string, or multiple characters that match the same multiple characters in the input string. This section describes creating both single-character patterns and multiple-character patterns. It also discusses creating more complex regular expressions using multipliers, alternation, anchoring, and parentheses.
Single-Character Patterns

The simplest regular expression is a single character that matches itself in the input string. For example, the single-character regular expression 3 matches a corresponding 3 in the input string. You can use any letter (A–Z, a–z) or number (0–9) as a single-character pattern. The following examples are single-character regular expression patterns:

A
k
5

You can use a keyboard character other than a letter or a number—such as an exclamation point (!) or a tilde (~)—as a single-character pattern, but certain keyboard characters have special meaning when used in regular expressions. Table C-1 lists the keyboard characters with special meaning.

Table C-1 Characters with Special Meaning

<table>
<thead>
<tr>
<th>Character</th>
<th>Special Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>period .</td>
<td>Matches any single character, including white space.</td>
</tr>
<tr>
<td>asterisk *</td>
<td>Matches 0 or more sequences of the pattern.</td>
</tr>
<tr>
<td>plus sign +</td>
<td>Matches 1 or more sequences of the pattern.</td>
</tr>
<tr>
<td>question mark ?</td>
<td>Matches 0 or 1 occurrences of the pattern.</td>
</tr>
<tr>
<td>caret ^</td>
<td>Matches the beginning of the input string.</td>
</tr>
<tr>
<td>dollar sign $</td>
<td>Matches the end of the input string.</td>
</tr>
<tr>
<td>underscore _</td>
<td>Matches a comma (,), left brace ({), right brace (}), left parenthesis, right parenthesis, the beginning of the input string, the end of the input string, or a space.</td>
</tr>
<tr>
<td>brackets []</td>
<td>Designates a range of single-character patterns.</td>
</tr>
<tr>
<td>hyphen -</td>
<td>Separates the end points of a range.</td>
</tr>
</tbody>
</table>

To use these special characters as single-character patterns, remove the special meaning by preceding each character with a backslash (\). The following examples are single-character patterns matching a dollar sign, an underscore, and a plus sign, respectively:

\$
\
\_
\+

You can specify a range of single-character patterns to match against a string. For example, you can create a regular expression that matches a string containing one of the following letters: a, e, i, o, and u. One and only one of these characters must exist in the string for pattern matching to succeed. To specify a range of single-character patterns, enclose the single-character patterns in square brackets ([ ]). The
order of characters within the brackets is not important. For example, \[aeiou\] matches any one of the five vowels of the lowercase alphabet, while \[abcdABCD\] matches any one of the first four letters of the lowercase or uppercase alphabet.

You can simplify ranges by entering only the end points of the range, separated by a dash (-). Simplify the previous range as follows:

\[[a-dA-D]\]

To add a hyphen as a single-character pattern in your range, include another hyphen and precede it with a backslash:

\[[a-dA-D\-]\]

You can also include a right square bracket (]) as a single-character pattern in your range. To do so, enter the following:

\[[a-dA-D\[]\]]

The previous example matches any one of the first four letters of the lowercase or uppercase alphabet, a hyphen, or a right square bracket.

You can reverse the matching of the range by including a caret (^) at the start of the range. The following example matches any letter except the ones listed:

\^[^a-dqsv]\]

The following example matches anything except a right square bracket (]) or the letter d:

\^[^\]d]\]

Multiple-Character Patterns

When creating regular expressions, you can also specify a pattern containing multiple characters. You create multiple-character regular expressions by joining letters, numbers, or keyboard characters that do not have special meaning. For example, \a4%\ is a multiple-character regular expression. Precede keyboard characters that have special meaning with a backslash (\) when you want to remove their special meaning.

With multiple-character patterns, order is important. The regular expression \a4%\ matches the character a followed by the number 4 followed by a percent (%\) sign. If the input string does not have a4\% in that order, pattern matching fails. The multiple-character regular expression \a\ uses the special meaning of the period character (.) to match the letter a followed by any single character. With this example, the strings ab, a\!, or a2 are all valid matches for the regular expression.

You can remove the special meaning of the period character by preceding it with a backslash. In the expression \a\, only the string a\ matches the regular expression.

You can create a multiple-character regular expressions containing all letters, all digits, all special keyboard characters, or a combination of letters, digits, and other keyboard characters. The following examples are all valid regular expressions:

\telebit\n
\3107\n
\v32bis\n
Multipliers

You can create more complex regular expressions that instruct the Cisco IOS software to match multiple occurrences of a specified regular expression. To do so, you use some special characters with your single- and multiple-character patterns. Table C-2 lists the special characters that specify “multiples” of a regular expression.

**Table C-2  Special Characters Used as Multipliers**

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Matches 0 or more single- or multiple-character patterns.</td>
</tr>
<tr>
<td>+</td>
<td>Matches 1 or more single- or multiple-character patterns.</td>
</tr>
<tr>
<td>?</td>
<td>Matches 0 or 1 occurrences of the single- or multiple-character pattern.</td>
</tr>
</tbody>
</table>

The following example matches any number of occurrences of the letter \( a \), including none:

\( a^* \)

The following pattern requires that at least one letter \( a \) be present in the string to be matched:

\( a+ \)

The following pattern matches the string \( bb \) or \( bab \):

\( ba?b \)

The following string matches any number of asterisks (*):

\( \backslash** \)

To use multipliers with multiple-character patterns, enclose the pattern in parentheses. In the following example, the pattern matches any number of the multiple-character string \( ab \):

\( (ab)^* \)

As a more complex example, the following pattern matches one or more instances of alphanumeric pairs (but not none; that is, an empty string is not a match):

\( ([A-Za-z][0-9])^+ \)

The order for matches using multipliers (*, +, or ?) is longest construct first. Nested constructs are matched from outside to inside. Concatenated constructs are matched beginning at the left side of the construct. Thus, the regular expression matches \( A9b3 \), but not \( 9Ab3 \) because the letter appears first in the construct.
Alternation

Alternation allows you to specify alternative patterns to match against a string. You separate the alternative patterns with a vertical bar (|). Exactly one of the alternatives can match the input string. For example, the regular expression `codex|telebit` matches the string `codex` or the string `telebit`, but not both `codex` and `telebit`.

Anchoring

You can instruct the Cisco IOS software to match a regular expression pattern against the beginning or the end of the input string. That is, you can specify that the beginning or end of an input string contain a specific pattern. You “anchor” these regular expressions to a portion of the input string using the special characters shown in Table C-3.

Note another use for the `^` symbol. As an example, the following regular expression matches an input string only if the string starts with `abcd`:

```
^abcd
```

Whereas the following expression is a range that matches any single letter, as long as it is not the letters `a`, `b`, `c`, or `d`:

```
[^abcd]
```

With the following example, the regular expression matches an input string that ends with `.12`:

```
$.12
```

Contrast these anchoring characters with the special character underscore (_). Underscore matches the beginning of a string (`^`), the end of a string (`$`), parentheses ( `()` ), space ( ` ` ), braces ( `{ }` ), comma ( `,` ), or underscore ( `_` ). With the underscore character, you can specify that a pattern exist anywhere in the input string. For example, `_1300_` matches any string that has `1300` somewhere in the string. The string’s `1300` can be preceded by or end with a space, brace, comma, or underscore. So `1300` matches the regular expression, but `21300` and `13000` do not.

Using the underscore character, you can replace long regular expression lists. For example, you can replace the following list of regular expressions with simply `_1300_`:

```
^1300$
^1300(space)
(space)1300
{1300,
```

Table C-3 Special Characters Used for Anchoring

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>^</code></td>
<td>Matches the beginning of the input string.</td>
</tr>
<tr>
<td><code>$</code></td>
<td>Matches the end of the input string.</td>
</tr>
</tbody>
</table>
Parentheses for Recall

As shown in the “Multipliers” section, you use parentheses with multiple-character regular expressions to multiply the occurrence of a pattern. You can also use parentheses around a single- or multiple-character pattern to instruct the IOS software to remember a pattern for use elsewhere in the regular expression.

To create a regular expression that recalls a previous pattern, you use parentheses to instruct memory of a specific pattern and a backslash (\) followed by an integer to reuse the remembered pattern. The integer specifies the occurrence of a parentheses in the regular expression pattern. If you have more than one remembered pattern in your regular expression, then \1 uses the first remembered pattern and \2 uses the second remembered pattern, and so on.

The following regular expression uses parentheses for recall:

```
a(.)bc(.)\1\2
```

This regular expression matches the letter a followed by any character (call it character #1) followed by bc, followed by any character (character #2), followed by character #1 again, followed by character #2 again. In this way, the regular expression can match aZbcTZT. The software identifies character #1 as Z and character #2 as T and then uses Z and T again later in the regular expression.

The parentheses do not change the pattern; they only instruct the software to recall that part of the matched string. The regular expression `(a)b` still matches the input string `ab`, and `(^3107)` still matches a string beginning with `3107`, but now the Cisco IOS software can recall the `a` of the `ab` string and the starting `3107` of another string for use later.

Working with Practical Examples

This section shows you practical examples of regular expressions. The examples correspond with the various ways you can use regular expressions in your configurations.

Specifying Chat Scripts Example

The following example uses regular expressions in the `modem chat-script` command to specify chat scripts for lines connected to Telebit and U.S. Robotics modems. The regular expressions are `telebit.*` and `usr.*`. When the chat script name (the string) matches the regular expression (the pattern specified in the command), then the Cisco IOS software uses that chat script for the specified lines. For lines 1 and 6, the Cisco IOS software uses the chat script named `telebit` followed by any number of occurrences (*) of any character (.). For lines 7 and 12, the software uses the chat script named `usr` followed by any number of occurrences (*) of any character (.).

```
! Some lines have Telebit modems
line 1 6
```
modem chat-script telebit.*
  ! Some lines have US Robotics modems
  line 7 12
  modem chat-script usr.*

X.25 Switching Feature Example

In the following X.25 switching feature example, the `x25 route` command causes all X.25 calls to addresses whose first four Data Network Identification Code (DNIC) digits are 1111 to be routed to serial interface 3. Note that the first four digits (^1111) are followed by a regular expression pattern that the Cisco IOS software is to remember for use later. The \1 in the rewrite pattern recalls the portion of the original address matched by the digits following the 1111 but changes the first four digits (1111) to 2222.

\[\text{x25 route } ^1111(.*) \text{ substitute-dest 2222}\1 \text{ interface serial 3}\]

DECnet Access List Example

In the following DECnet example, the regular expression is ^SYSTEM$. The access list permits access to all connect initiate packets that match the access identification of SYSTEM.

\[\text{access-list 300 permit 0.0 63.1023 eq id } ^\text{SYSTEM}$\]

BGP IP Access Example

The following BGP example contains the regular expression ^123.*. The example specifies that BGP neighbor with IP address 128.125.1.1 is not sent advertisements about any path through or from the adjacent autonomous system 123.

\[\text{ip as-path access-list 1 deny } ^123 .*\]

\[\text{router bgp 109}\]
\[\text{network 131.108.0.0}\]
\[\text{neighbor 129.140.6.6 remote-as 123}\]
\[\text{neighbor 128.125.1.1 remote-as 47}\]
\[\text{neighbor 18.125.1.1 filter-list 1 out}\]
Removed and Changed Commands

This appendix contains tables that list commands that have been removed from this manual and those that have changed name, as follows:

- Table D-1, “Cisco IOS Commands Removed from This Manual”
- Table D-2, “Cisco Configuration Commands with Name Changes”
- Table D-3, “System Image and Microcode Commands with Name Changes”
- Table D-4, “Router Memory Commands with Name Changes”
- Table D-5, “Commands That No Longer Function as Expected in ATM Environments”

Refer to the following publications for descriptions of the Cisco IOS commands that are no longer contained in this manual:

- Configuration Fundamentals Command Reference
- Wide-Area Networking Command Reference
- Network Protocols Command Reference, parts 1 and 2

### Table D-1  Cisco IOS Commands Removed from This Manual

<table>
<thead>
<tr>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa accounting</td>
</tr>
<tr>
<td>aaa authentication enable default</td>
</tr>
<tr>
<td>aaa authentication local-override</td>
</tr>
<tr>
<td>aaa authentication login</td>
</tr>
<tr>
<td>aaa authentication ppp</td>
</tr>
<tr>
<td>aaa new-model</td>
</tr>
<tr>
<td>access-class</td>
</tr>
<tr>
<td>access-enable</td>
</tr>
<tr>
<td>access-list (standard)</td>
</tr>
<tr>
<td>age-timer</td>
</tr>
<tr>
<td>arp timeout</td>
</tr>
<tr>
<td>async-bootp</td>
</tr>
<tr>
<td>autocommand</td>
</tr>
<tr>
<td>banner exec</td>
</tr>
</tbody>
</table>
Table D-1  Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>banner incoming</td>
</tr>
<tr>
<td>banner motd</td>
</tr>
<tr>
<td>boot</td>
</tr>
<tr>
<td>boot bootldr</td>
</tr>
<tr>
<td>boot buffersize</td>
</tr>
<tr>
<td>boot host</td>
</tr>
<tr>
<td>boot network</td>
</tr>
<tr>
<td>buffers</td>
</tr>
<tr>
<td>buffers huge size</td>
</tr>
<tr>
<td>calendar set</td>
</tr>
<tr>
<td>callback</td>
</tr>
<tr>
<td>cd</td>
</tr>
<tr>
<td>cdp enable</td>
</tr>
<tr>
<td>cdp holdtime</td>
</tr>
<tr>
<td>cdp run</td>
</tr>
<tr>
<td>cdp timer</td>
</tr>
<tr>
<td>chat-script</td>
</tr>
<tr>
<td>clear access-list counters</td>
</tr>
<tr>
<td>clear access-template</td>
</tr>
<tr>
<td>clear arp-cache</td>
</tr>
<tr>
<td>clear cdp counters</td>
</tr>
<tr>
<td>clear cdp table</td>
</tr>
<tr>
<td>clear ip route</td>
</tr>
<tr>
<td>clock read-calendar</td>
</tr>
<tr>
<td>clock set</td>
</tr>
<tr>
<td>clock summer-time</td>
</tr>
<tr>
<td>clock timezone</td>
</tr>
<tr>
<td>clock update-calendar</td>
</tr>
<tr>
<td>configure</td>
</tr>
<tr>
<td>config-register</td>
</tr>
<tr>
<td>connect</td>
</tr>
<tr>
<td>cont</td>
</tr>
<tr>
<td>databits</td>
</tr>
<tr>
<td>data-character-bits</td>
</tr>
<tr>
<td>debug ports</td>
</tr>
<tr>
<td>default-name</td>
</tr>
</tbody>
</table>
### Table D-1 Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
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<tr>
<td>default-value exec-character-bits</td>
</tr>
<tr>
<td>default-value special-character-bits</td>
</tr>
<tr>
<td>delete</td>
</tr>
<tr>
<td>description</td>
</tr>
<tr>
<td>dir</td>
</tr>
<tr>
<td>dis</td>
</tr>
<tr>
<td>disconnect</td>
</tr>
<tr>
<td>editing</td>
</tr>
<tr>
<td>enable (EXEC)</td>
</tr>
<tr>
<td>enable last-resort</td>
</tr>
<tr>
<td>enable password</td>
</tr>
<tr>
<td>enable use-tacacs</td>
</tr>
<tr>
<td>end</td>
</tr>
<tr>
<td>escape-character</td>
</tr>
<tr>
<td>exec</td>
</tr>
<tr>
<td>exec-banner</td>
</tr>
<tr>
<td>exec-character-bits</td>
</tr>
<tr>
<td>exec-timeout</td>
</tr>
<tr>
<td>exit</td>
</tr>
<tr>
<td>flowcontrol</td>
</tr>
<tr>
<td>full-help</td>
</tr>
<tr>
<td>help</td>
</tr>
<tr>
<td>history</td>
</tr>
<tr>
<td>hostname</td>
</tr>
<tr>
<td>ip default-gateway</td>
</tr>
<tr>
<td>ip domain-list</td>
</tr>
<tr>
<td>ip domain-lookup</td>
</tr>
<tr>
<td>ip domain-name</td>
</tr>
<tr>
<td>ip host</td>
</tr>
<tr>
<td>ip host-routing</td>
</tr>
<tr>
<td>ip mask-reply</td>
</tr>
<tr>
<td>ip name-server</td>
</tr>
<tr>
<td>ip netmask-format</td>
</tr>
<tr>
<td>ip rcmd domain-lookup</td>
</tr>
<tr>
<td>ip rcmd rcp-enable</td>
</tr>
<tr>
<td>ip rcmd remote-host</td>
</tr>
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</table>
Table D-1  Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
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</thead>
<tbody>
<tr>
<td>ip rcmd remote-username</td>
</tr>
<tr>
<td>ip rcmd rsh-enable</td>
</tr>
<tr>
<td>ip security eso-info</td>
</tr>
<tr>
<td>ip source-route</td>
</tr>
<tr>
<td>ip subnet-zero</td>
</tr>
<tr>
<td>ip tcp async-mobility</td>
</tr>
<tr>
<td>ip tcp selective-ack</td>
</tr>
<tr>
<td>ip tcp timestamp</td>
</tr>
<tr>
<td>ip tcp window-size</td>
</tr>
<tr>
<td>lane database</td>
</tr>
<tr>
<td>length</td>
</tr>
<tr>
<td>line</td>
</tr>
<tr>
<td>list</td>
</tr>
<tr>
<td>location</td>
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<tr>
<td>lock</td>
</tr>
<tr>
<td>logging</td>
</tr>
<tr>
<td>logging buffered</td>
</tr>
<tr>
<td>logging console</td>
</tr>
<tr>
<td>logging facility</td>
</tr>
<tr>
<td>logging monitor</td>
</tr>
<tr>
<td>logging on</td>
</tr>
<tr>
<td>logging synchronous</td>
</tr>
<tr>
<td>logging trap</td>
</tr>
<tr>
<td>login</td>
</tr>
<tr>
<td>login authentication</td>
</tr>
<tr>
<td>logout</td>
</tr>
<tr>
<td>modem answer-timeout</td>
</tr>
<tr>
<td>modem callin</td>
</tr>
<tr>
<td>modem cts-required</td>
</tr>
<tr>
<td>modem dialin</td>
</tr>
<tr>
<td>modem dtr-active</td>
</tr>
<tr>
<td>modem inout</td>
</tr>
<tr>
<td>monitor</td>
</tr>
<tr>
<td>multilink</td>
</tr>
<tr>
<td>notify</td>
</tr>
<tr>
<td>ntp access-group</td>
</tr>
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</table>
### Table D-1 Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
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</thead>
<tbody>
<tr>
<td>ntp authenticate</td>
</tr>
<tr>
<td>ntp authentication-key</td>
</tr>
<tr>
<td>ntp broadcast</td>
</tr>
<tr>
<td>ntp broadcast client</td>
</tr>
<tr>
<td>ntp broadcastdelay</td>
</tr>
<tr>
<td>ntp clock-period</td>
</tr>
<tr>
<td>ntp disable</td>
</tr>
<tr>
<td>ntp master</td>
</tr>
<tr>
<td>ntp max-associations</td>
</tr>
<tr>
<td>ntp peer</td>
</tr>
<tr>
<td>ntp server</td>
</tr>
<tr>
<td>ntp source</td>
</tr>
<tr>
<td>ntp trusted-key</td>
</tr>
<tr>
<td>ntp update-calendar</td>
</tr>
<tr>
<td>padding</td>
</tr>
<tr>
<td>parity</td>
</tr>
<tr>
<td>password</td>
</tr>
<tr>
<td>ping</td>
</tr>
<tr>
<td>ppp authentication</td>
</tr>
<tr>
<td>ppp use-tacacs</td>
</tr>
<tr>
<td>purge</td>
</tr>
<tr>
<td>pwd</td>
</tr>
<tr>
<td>random-detect</td>
</tr>
<tr>
<td>refuse-message</td>
</tr>
<tr>
<td>reload</td>
</tr>
<tr>
<td>rmon alarm</td>
</tr>
<tr>
<td>rmon event</td>
</tr>
<tr>
<td>script activation</td>
</tr>
<tr>
<td>script connection</td>
</tr>
<tr>
<td>script reset</td>
</tr>
<tr>
<td>script startup</td>
</tr>
<tr>
<td>send</td>
</tr>
<tr>
<td>service compress-config</td>
</tr>
<tr>
<td>service config</td>
</tr>
<tr>
<td>service exec-wait</td>
</tr>
<tr>
<td>service finger</td>
</tr>
</tbody>
</table>
Table D-1Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>service linenumber</td>
</tr>
<tr>
<td>service nagle</td>
</tr>
<tr>
<td>service password-encryption</td>
</tr>
<tr>
<td>service tcp-keepalives</td>
</tr>
<tr>
<td>service telnet-zeroidle</td>
</tr>
<tr>
<td>service timestamps</td>
</tr>
<tr>
<td>session-timeout</td>
</tr>
<tr>
<td>show bootvar</td>
</tr>
<tr>
<td>shutdown (controller)</td>
</tr>
<tr>
<td>shutdown (interface)</td>
</tr>
<tr>
<td>snmp-server community</td>
</tr>
<tr>
<td>snmp-server contact</td>
</tr>
<tr>
<td>snmp-server host</td>
</tr>
<tr>
<td>snmp-server location</td>
</tr>
<tr>
<td>snmp-server packetsize</td>
</tr>
<tr>
<td>snmp-server queue-length</td>
</tr>
<tr>
<td>snmp-server system-shutdown</td>
</tr>
<tr>
<td>snmp-server tftp-server-list</td>
</tr>
<tr>
<td>snmp-server trap-source</td>
</tr>
<tr>
<td>snmp-server trap-timeout</td>
</tr>
<tr>
<td>snmp-server trap-timeout</td>
</tr>
<tr>
<td>special-character-bits</td>
</tr>
<tr>
<td>speed</td>
</tr>
<tr>
<td>squeeze</td>
</tr>
<tr>
<td>sscop cc-timer</td>
</tr>
<tr>
<td>sscop idle-timer</td>
</tr>
<tr>
<td>sscop keepalive-timer</td>
</tr>
<tr>
<td>sscop max-cc</td>
</tr>
<tr>
<td>sscop noresponse-timer</td>
</tr>
<tr>
<td>sscop poll-timer</td>
</tr>
<tr>
<td>sscop receive-window</td>
</tr>
<tr>
<td>sscop send-window</td>
</tr>
<tr>
<td>start-character</td>
</tr>
<tr>
<td>start-chat</td>
</tr>
<tr>
<td>stopbits</td>
</tr>
<tr>
<td>stop-character</td>
</tr>
</tbody>
</table>
### Table D-1  Cisco IOS Commands Removed from This Manual (continued)

<table>
<thead>
<tr>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>systat</td>
</tr>
<tr>
<td>tacacs-server attempts</td>
</tr>
<tr>
<td>tacacs-server directed-request</td>
</tr>
<tr>
<td>tacacs dns-alias-lookup</td>
</tr>
<tr>
<td>tacacs-server extended</td>
</tr>
<tr>
<td>tacacs-server host</td>
</tr>
<tr>
<td>tacacs-server key</td>
</tr>
<tr>
<td>tacacs-server last-resort</td>
</tr>
<tr>
<td>tacacs-server optional-passwords</td>
</tr>
<tr>
<td>tacacs-server retransmit</td>
</tr>
<tr>
<td>tacacs-server timeout</td>
</tr>
<tr>
<td>telnet</td>
</tr>
<tr>
<td>terminal</td>
</tr>
<tr>
<td>terminal-type</td>
</tr>
<tr>
<td>test</td>
</tr>
<tr>
<td>traceroute</td>
</tr>
<tr>
<td>transport</td>
</tr>
<tr>
<td>txspeed</td>
</tr>
<tr>
<td>undebug</td>
</tr>
<tr>
<td>undelete</td>
</tr>
<tr>
<td>vacant-message</td>
</tr>
<tr>
<td>where</td>
</tr>
<tr>
<td>width</td>
</tr>
</tbody>
</table>

### Table D-2  Cisco Configuration Commands with Name Changes

<table>
<thead>
<tr>
<th>Previous Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>configure network</td>
<td>copy ftp: system:running-config</td>
</tr>
<tr>
<td>configure overwrite-network</td>
<td>copy ftp: nvram:startup-config</td>
</tr>
<tr>
<td>copy rcp running-config</td>
<td>copy rcp: system:running-config</td>
</tr>
<tr>
<td>copy rcp startup-config</td>
<td>copy rcp: nvram:startup-config</td>
</tr>
<tr>
<td>copy running-config rcp</td>
<td>copy system:running-config rcp:</td>
</tr>
<tr>
<td>copy running-config startup-config</td>
<td>copy system:running-config nvram:startup-config</td>
</tr>
<tr>
<td>copy running-config tftp</td>
<td>copy system:running-config tftp:</td>
</tr>
<tr>
<td>copy tftp running-config</td>
<td>copy tftp: system:running-config</td>
</tr>
<tr>
<td>copy tftp startup-config</td>
<td>copy tftp: nvram:startup-config</td>
</tr>
</tbody>
</table>
Table D-2  Cisco Configuration Commands with Name Changes (continued)

<table>
<thead>
<tr>
<th>Previous Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>erase startup-config</td>
<td>erase nvram:</td>
</tr>
<tr>
<td>show configuration</td>
<td>show startup-config</td>
</tr>
<tr>
<td>show file</td>
<td>more</td>
</tr>
<tr>
<td>show running-config</td>
<td>more system:running-config</td>
</tr>
<tr>
<td>show startup-config</td>
<td>more nvram:startup-config</td>
</tr>
<tr>
<td>write erase</td>
<td>erase</td>
</tr>
<tr>
<td>write memory</td>
<td>copy system:running-config nvram:startup-config</td>
</tr>
<tr>
<td>write network</td>
<td>copy system:running-config ftp:</td>
</tr>
<tr>
<td>write terminal</td>
<td>more system:running-config</td>
</tr>
</tbody>
</table>

Table D-3  System Image and Microcode Commands with Name Changes

<table>
<thead>
<tr>
<th>Previous Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>copy erase flash</td>
<td>erase flash: (Class B Flash file systems only)</td>
</tr>
<tr>
<td></td>
<td>format (Class A and C Flash file systems only)</td>
</tr>
<tr>
<td>copy verify</td>
<td>verify</td>
</tr>
<tr>
<td>copy verify bootflash</td>
<td>verify bootflash:</td>
</tr>
<tr>
<td>copy verify flash</td>
<td>verify flash:</td>
</tr>
<tr>
<td>verify bootflash</td>
<td>verify bootflash:</td>
</tr>
<tr>
<td>verify flash</td>
<td>verify flash:</td>
</tr>
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</table>

Table D-4  Router Memory Commands with Name Changes

<table>
<thead>
<tr>
<th>Previous Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>copy erase flash</td>
<td>erase flash: (Class B Flash file systems only)</td>
</tr>
<tr>
<td></td>
<td>format (Class A and C Flash file systems only)</td>
</tr>
<tr>
<td>copy verify</td>
<td>verify flash:</td>
</tr>
<tr>
<td>copy verify bootflash</td>
<td>verify bootflash:</td>
</tr>
<tr>
<td>copy verify flash</td>
<td>verify flash:</td>
</tr>
<tr>
<td>verify bootflash</td>
<td>verify bootflash:</td>
</tr>
<tr>
<td>verify flash</td>
<td>verify</td>
</tr>
</tbody>
</table>

Table D-5  Commands That No Longer Function as Expected in ATM Environments

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa authentication arap</td>
</tr>
<tr>
<td>aaa authorization</td>
</tr>
<tr>
<td>alias</td>
</tr>
<tr>
<td>Command</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>autoselect</td>
</tr>
<tr>
<td>bandwidth</td>
</tr>
<tr>
<td>clear dialer</td>
</tr>
<tr>
<td>custom-queue-list</td>
</tr>
<tr>
<td>delay</td>
</tr>
<tr>
<td>dialer-list list</td>
</tr>
<tr>
<td>dnsix-dmdp retries</td>
</tr>
<tr>
<td>dnsix-nat authorized-redirection</td>
</tr>
<tr>
<td>dnsix-nat primary</td>
</tr>
<tr>
<td>dnsix-nat secondary</td>
</tr>
<tr>
<td>dnsix-nat source</td>
</tr>
<tr>
<td>ip access-group</td>
</tr>
<tr>
<td>ip accounting</td>
</tr>
<tr>
<td>ip accounting-list</td>
</tr>
<tr>
<td>ip accounting-threshold</td>
</tr>
<tr>
<td>ip accounting-transits</td>
</tr>
<tr>
<td>ip classless</td>
</tr>
<tr>
<td>ip domain-lookup nsap</td>
</tr>
<tr>
<td>ip forward-protocol</td>
</tr>
<tr>
<td>ip gdp</td>
</tr>
<tr>
<td>ip helper-address</td>
</tr>
<tr>
<td>ip redirects</td>
</tr>
<tr>
<td>ip route-cache</td>
</tr>
<tr>
<td>ip tcp path-mtu-discovery</td>
</tr>
<tr>
<td>name-conn</td>
</tr>
<tr>
<td>priority-group</td>
</tr>
<tr>
<td>route-map</td>
</tr>
<tr>
<td>router</td>
</tr>
<tr>
<td>rotary</td>
</tr>
<tr>
<td>snmp-server chassis-id</td>
</tr>
<tr>
<td>show dialer</td>
</tr>
<tr>
<td>show dnsix</td>
</tr>
<tr>
<td>show ip cache</td>
</tr>
<tr>
<td>show ip irdp</td>
</tr>
<tr>
<td>show ip local pool</td>
</tr>
<tr>
<td>show ip protocols</td>
</tr>
</tbody>
</table>
### Table D-5  Commands That No Longer Function as Expected in ATM Environments (continued)

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>show ip route</td>
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<tr>
<td>show ipc</td>
</tr>
<tr>
<td>show queue</td>
</tr>
<tr>
<td>show queueing</td>
</tr>
<tr>
<td>show route map</td>
</tr>
<tr>
<td>show standby</td>
</tr>
<tr>
<td>traceroute (privileged)</td>
</tr>
<tr>
<td>transmit-interface</td>
</tr>
<tr>
<td>tunnel</td>
</tr>
<tr>
<td>tx-queue-limit</td>
</tr>
</tbody>
</table>